1.0 GENERAL INFORMATION ON LONG-TERM ANTIFREEZE AND CORROSION INHIBITORS

The cooling system of BMW cars must only be filled with reputable brand name ethylene glycol long-term antifreeze having corrosion inhibitors that are compatible with aluminum radiators.

Coolants must fulfill four basic requirements.

- Guarantee sufficient cooling.
- Protect various metals (gray cast iron, steel, aluminum alloys, brass, copper and solder) against corrosion.
- Prevent excessive silicate gel precipitation, which may cause clogging of the cooling system.
- Guarantee operation of cooling system in winter (prevent freezing of coolant) and in summer by boosting the boiling point.

The quality or grade of a long-term antifreeze and corrosion inhibitor is very important to be able to protect metal (gray cast iron, steel, aluminum alloys, brass, copper and solder) in the cooling system against corrosion. It guarantees full operation of the cooling system in winter and also increases the boiling point at high outside temperatures and under heavy loads.

INITIAL FILLING IN FACTORY

The factory fills the cooling system for protection against freezing, for the U.S. and Canada, down to-34°F (-37° C). This means an antifreeze ratio of 50% antifreeze and 50% water. In severely cold areas, the antifreeze can be increased to 60% which provides freezing protection down to-62°F (-52°C). Do not exceed a 60% ratio of antifreeze. The specified antifreeze ratio is important, since an insufficient amount would impair antifreezing and corrosion inhibiting protection. An excessive amount would not improve freezing protection, but instead reduce freezing protection.

CHANGE INTERVALS

Regular checking of coolant concentration is part of Inspection I or II. for change intervals.

LIFETIME COOLANT

The BMW engine coolant has a lifetime rating, except when the cooling system requires repairs. Drained coolant is not to be re-used. Top up with new coolant.

REMARKS AND LIMITATIONS

Only tap water of drinking quality with the following properties may be used as coolant.

DRINKING QUALITY SPECIFICATION

Appearance	-	colorless, clear
Residue	-	without suspended matter
pH value	-	6.5 - 8.0
Total hardness	-	max. 357 PPM Calcium Carbonate
Chloride content	-	max. 100 mg/l
Sulfate content	-	max. 100 mg/l

The antifreeze concentration in a cooling system should be checked before the beginning of winter. When determining the mixture concentration it is important to make sure that there is sufficient protection against freezing.

A hydrometer (radiator antifreeze tester) is required for correct determination of antifreeze concentration. The composition of long-term antifreezes and corrosion inhibitors differs between manufacturers.

BMW Anti-Freeze/Coolant contains no nitrites or phosphates and has been formulated to prevent excessive silicate drop out. Order the 1gallon container under BMW Part No. 82 14 1 467 704.

NOTE: Do not mix BMW Anti-Freeze/Coolant with different antifreezes which contain nitrites and/or phosphates and a high silicate formulation.

2.0 COOLANT ADDITIVES

No aftermarket coolant additives, including but not limited to those which provide additional corrosion inhibition or seal off minor leaks are approved by BMW.

Use of non-approved coolant additives may cause reduced heat transfer from the cylinder head to the coolant and the formation of hot spots. This can cause the burning through of cylinder head gaskets and/or cracking of the cylinder head.

BMW NA cannot accept the liability for the resulting effects and consequential damage caused by the use of coolant additives.

1700 COOLANT, CHECKING COOLING SYSTEM

17 00 009 CHECKING COOLING SYSTEM FOR LEAKS (N54, N52K)

WARNING: Danger of scalding!
Only perform this work after engine has cooled down.

Protective measures/rules of conduct

- Wear protective goggles
- Wear protective gloves
- Observe national/country-specific regulations

IMPORTANT: Risk of slipping due to coolant on the floor.
Danger of injury!

Catch and dispose of drained coolant in drip tray (1) and if necessary special tool 00 2 030 (universal hydraulic lifter).

Recycling:

Observe country-specific waste-disposal regulations.

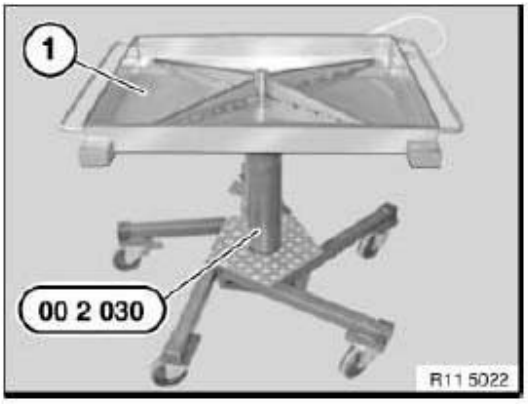


Fig. 1: Identifying Drip Tray And Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure drop in cooling system

Open cap on coolant expansion tank. Fit special tools (1) 17 0 101 and (2) 17 0 113.

Build up **GAUGE PRESSURE** and wait approx. 2 minutes.

Cooling system is impervious to leaks if pressure drop is max. 0.1 bar.

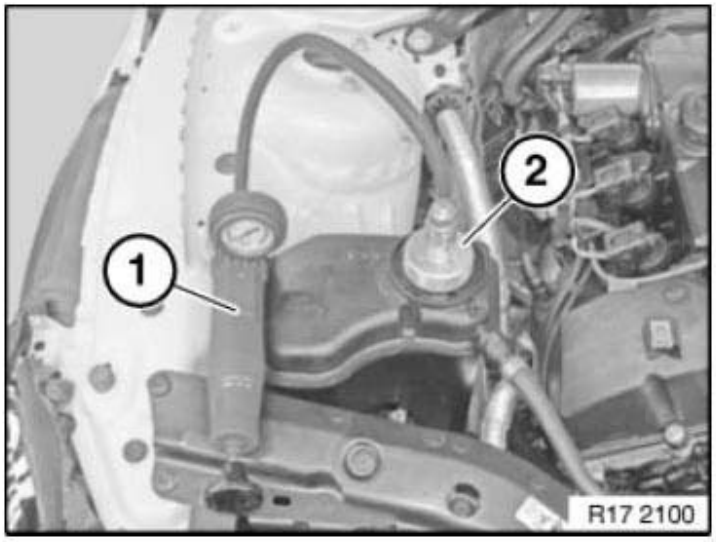


Fig. 2: Checking Pressure Drop In Cooling System Using Special Tools (17 0 101) And (17 0 113)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure relief valve in cap

NOTE: While the vehicle is driven at high outside temperatures, the design may cause the pressure relief valve in the cap to open slightly and air together with dissolved coolant to escape. This coolant vapor condenses on the surface of the expansion tank and leaves traces when the vehicle has cooled down. These traces do not indicate whether the cap is defective or not. When the vehicle has been parked up for an extended period of time, the residual escaping coolant can cause the pressure relief valve in the cap to stick; therefore check the cap again 2 to 3 times.

Replace the cap only after you have checked three times and there is an incorrect opening pressure.

Checking pressure relief valve in cap

Screw cap (1) onto special tool 17 0 114.

Build up pressure with special tool (hand pump) 17 0 101; observe pressure gauge to ascertain when opening pressure is achieved.

Compare **OPENING PRESSURE** of pressure relief valve.

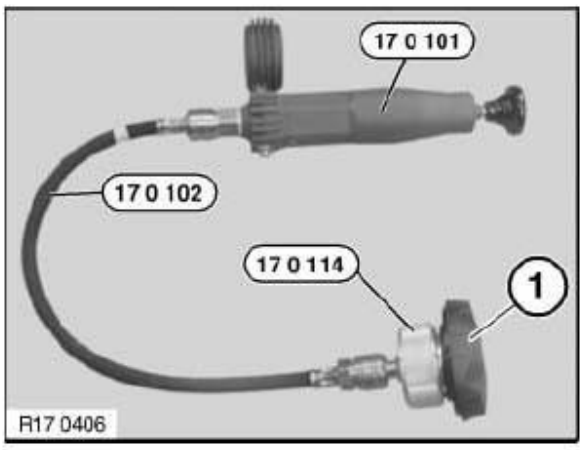


Fig. 3: Checking Pressure Relief Valve In Cap Using Special Tool (Hand Pump 17 0 101)
Courtesy of BMW OF NORTH AMERICA, INC.

17 00 515 CHECKING FUNCTION OF RADIATOR AND HEATING SYSTEM

WARNING: Danger of scalding!
Only carry out work on cooling system after engine has cooled down.

Necessary preliminary tasks:

- Switch off ignition.
- Remove air duct.
- Remove fan cowl with electronic fan.

Check production date.

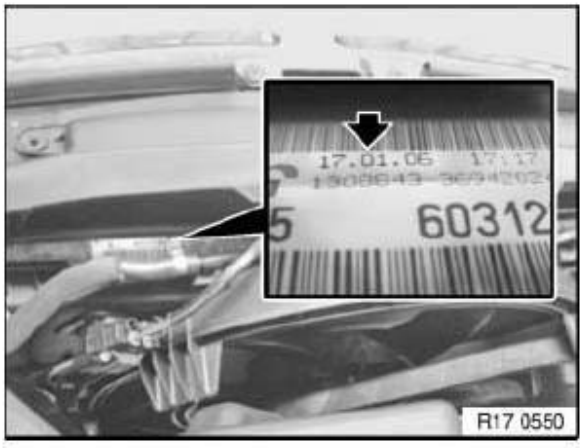


Fig. 4: Locating Production Date
Courtesy of BMW OF NORTH AMERICA, INC.

Clamp off low-temperature feed lines with special tool 13 3 010.

Function test:

Observe diagnosis instructions.

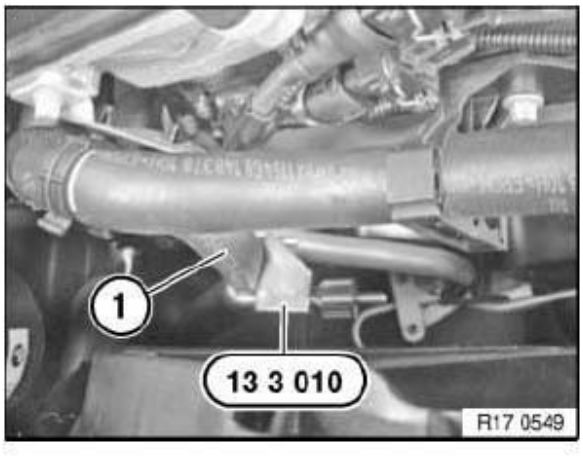


Fig. 5: Identifying Special Tool (13 3 010)
Courtesy of BMW OF NORTH AMERICA, INC.

Check function of radiator.

Clamp off low-temperature feed line (1) at coolant pump outlet or radiator inlet with special tool 13 3 010 (see arrows).

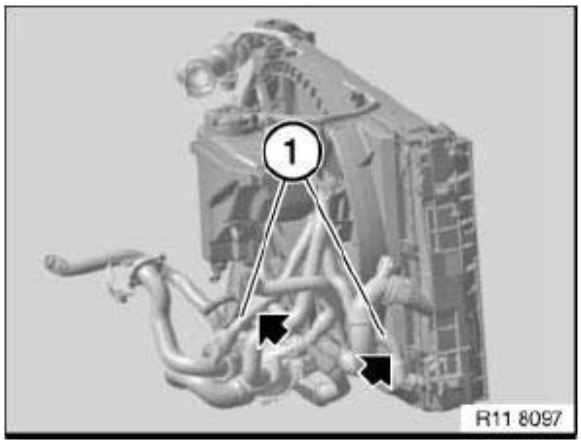


Fig. 6: Locating Low-Temperature Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Automatic transmission only

Check function of heat exchanger.

Clamp off low-temperature feed line (1) at coolant pump outlet with special tool 13 3 010.

Clamp off low-temperature feed line (2) at oil-coolant heat exchanger with special tool 13 3 010.

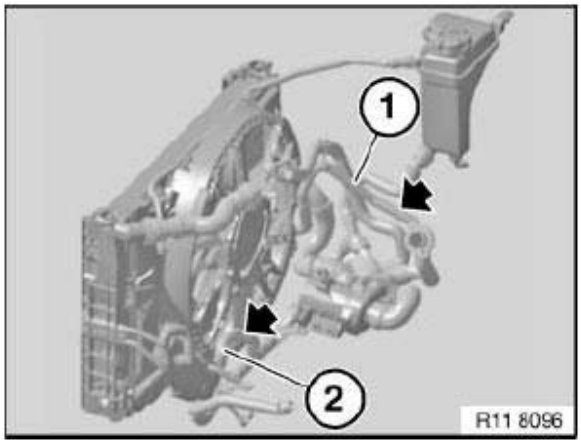


Fig. 7: Locating Low-Temperature Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Check heating and cooling circuits in accordance with diagnosis instruction.

17 00 008 DRAINING AND ADDING COOLANT (N52K)

WARNING: Danger of scalding!
These tasks on the cooling system should only be carried out on an engine that has cooled down!

IMPORTANT: Lifetime coolant filling:
Never reuse used coolant!
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.

In the case of other removal work involving the draining of partial quantities of coolant, replace these quantities which have been drained with new coolant.

Installation:

Use only recommended coolant .See **COOLING SYSTEM - OPERATING FLUIDS** .

Observe mixture ratio.

Protective measures/rules of conduct

- Wear safety goggles

- Wear protective gloves
- Observe national/country-specific regulations

IMPORTANT: For dirt contamination of the cooling system (e.g. by engine oil), the cooling system must be rinsed with water until all dirt contamination is removed!

**IMPORTANT: Risk of slipping due to coolant on the floor.
Risk of injury!**

Catch and dispose of drained coolant in drip tray (1) and if necessary special tool 00 2 030 (universal hydraulic lifting equipment).

Recycling:

Observe country-specific waste-disposal regulations.

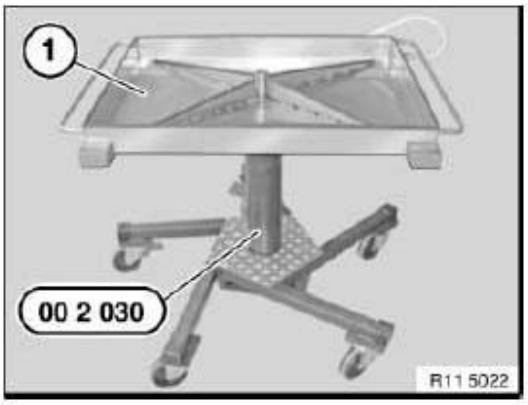


Fig. 8: Identifying Drip Tray And Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Remove front **UNDERBODY PROTECTION**

Draining coolant

Open cap (1) on coolant expansion tank.

Installation:

Close cap (1) until the arrow marks line up.

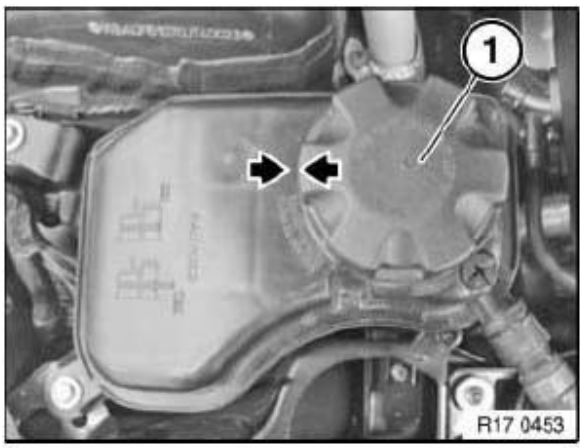


Fig. 9: Locating Cap Of Coolant Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten and detach right coolant hose (1) from radiator.

Drain, catch and dispose of coolant.

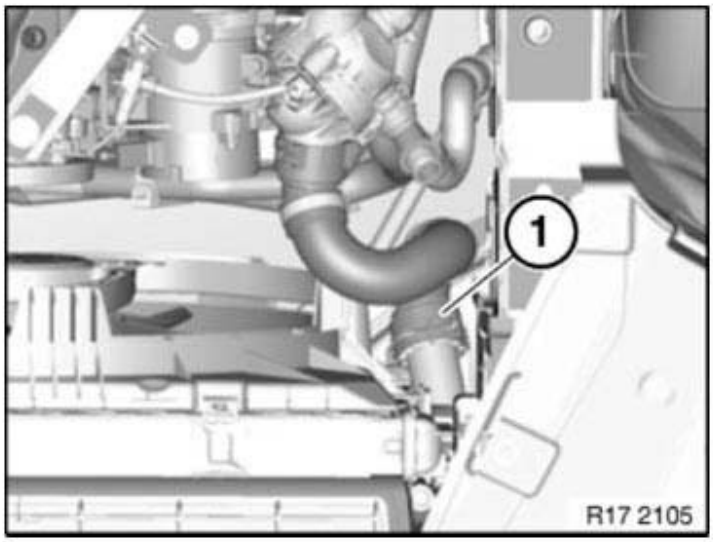


Fig. 10: Identifying Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Adding coolant

Use recommended coolant **COOLING SYSTEM - OPERATING FLUIDS** .

Observe mixture ratio.

Observe **FILLING CAPACITIES** .

Fill and vent **COOLING SYSTEM** .

Observe venting instructions without fail.

Assemble engine.

Check **COOLANT SYSTEM** for leaks.

17 00 ... INSTRUCTIONS FOR WORKING ON COOLING SYSTEM

WARNING: Danger of scalding! Work on the cooling system should only be carried out when the engine has cooled down.

IMPORTANT: Wear protective gloves and safety goggles.

IMPORTANT: Lifetime coolant filling:
Never reuse used coolant.
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.

In the case of other removal work involving the draining of partial quantities of coolant, replace these quantities which have been drained with new coolant.

IMPORTANT: Open cooling system only when it has cooled down.
Opening the cooling system while hot can result in air entering the system.
This can cause overheating with permanent damage to the engine.

IMPORTANT: You must protect the alternator against contamination before carrying out any work on the cooling circuit.
Cover alternator with suitable materials.
Failure to comply with this procedure may result in an alternator malfunction.

IMPORTANT: Do not fill coolant expansion tank over MAX level as overfilling will cause the coolant to overflow. This may give rise to traces of residual coolant on the expansion tank or in the engine compartment and wrongly suggest possible leakages.

Recycling

Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

NOTE: To disconnect coolant hoses, use commercially available disconnect tools such

as HAZET brand tools (see table).

COMMERCIALLY AVAILABLE DISCONNECT TOOL

HAZET no.:	Description
4590-1	Disconnect tool, length (mm): 150
4590-2	Disconnect tool, length (mm): 180
4590-3	Disconnect tool, length (mm): 253
4590/2	Disconnect/plier set
4590/3	Disconnect/plier set

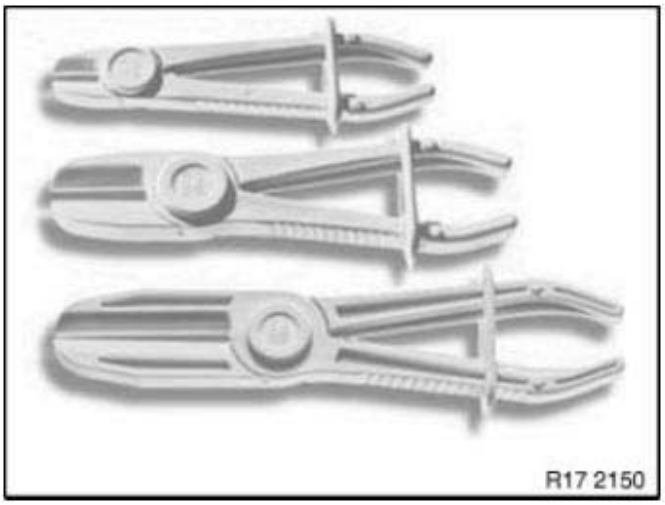


Fig. 11: Identifying Disconnect Tools
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Tightening torque, hose clamps 17 00 1AZ .

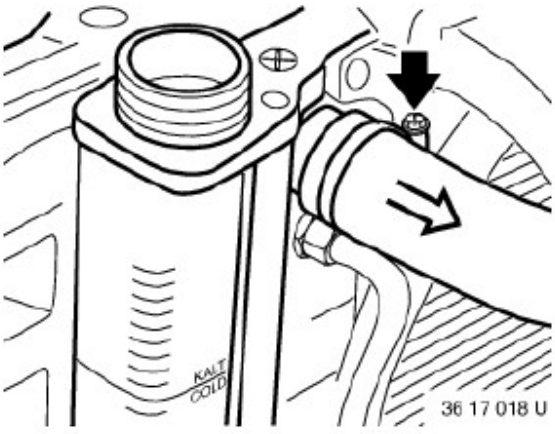


Fig. 12: Disconnecting Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Instructions for disassembly/assembly of coolant hose quick-connect couplings

Disassembly of quick-connect coupling

Pull out lock (1) and (2). Pull off hose.

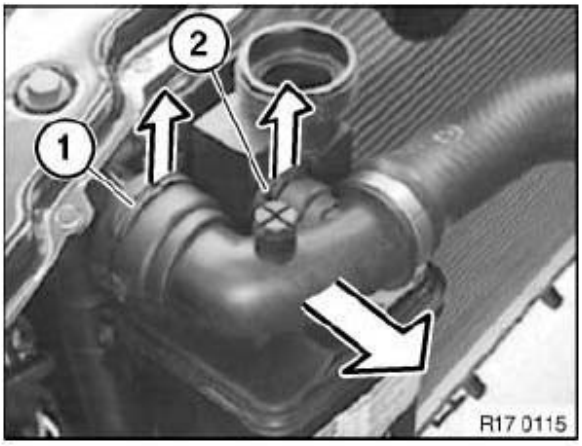


Fig. 13: Disassembling Quick-Connect Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check O-rings (1).

Do not coat O-rings (1) with antiseize agent.

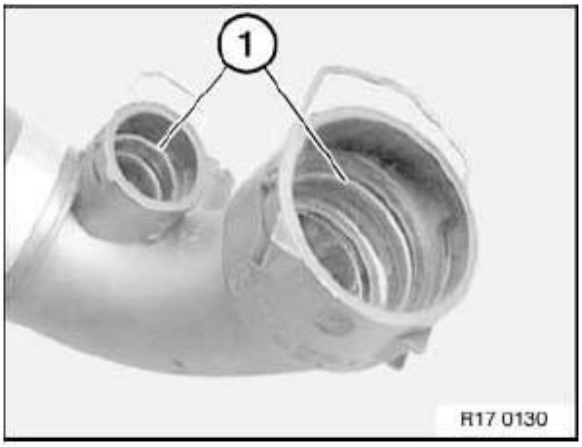


Fig. 14: Identifying O-Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Assembly of quick-connect coupling

Press in lock (1) before installing fast-release coupling.

Push on hose.

Quick-connect coupling must clearly snap audibly into place.

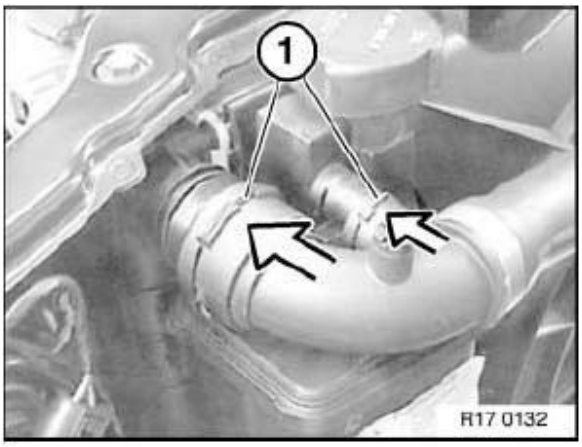


Fig. 15: Assembling Quick-Connect Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

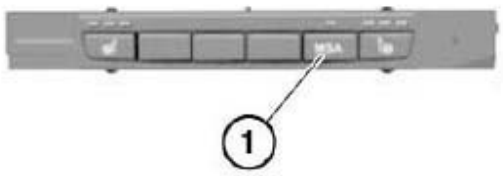


Fig. 16: Identifying Automatic Engine Start/Stop Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
- Workshop mode

  A = 10 mm

- Basic setting (engine hood/bonnet open)

  B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

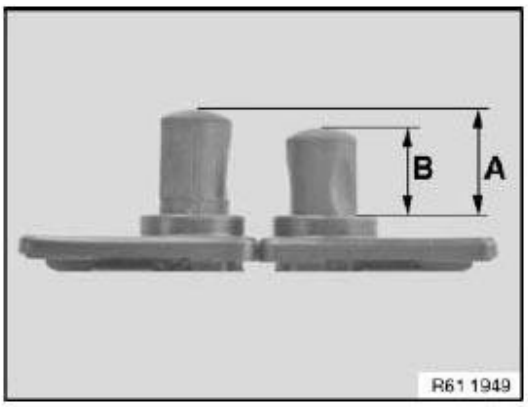


Fig. 17: Identifying Basic Setting For Engine Hood/Bonnet Basic
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

17 00 039 VENTING AND FILLING COOLING SYSTEM WITH VACUUM FILLING UNIT

SPECIAL TOOLS REFERENCE CHART

Type	Engine	Adapter Y from 17 0 100

E60/E61/E63/E64	All	17 0 113
E65/E66	M54/N52/N62/N62T/N73	17 0 105
E65/E66	M57S/M57T/M67/M67T	17 0 113
E70/E71/E72	All	17 0 113
E81/E82/E84/E87/E88/E89	All	17 0 113
E83	M54/N46/N52K	17 0 105
E83	M47S/M57S/M57T/M57Y/N47	17 0 113
E85/E86	All	17 0 105
E90/E91/E92/E93	All	17 0 113
F01/F02/F03/F04/F07/F10	All	17 0 113
R50/R52	W10	17 0 107 and 17 0 102
R50	W17	17 0 109
R52/R53	W11	17 0 109
R55/R56/R57/R60	All	17 0 109
F25	All	17 0 113

IMPORTANT: Lifetime coolant filling:
Never reuse used coolant!
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.
In the case of other removal work involving the draining of part quantities of coolant, replace these quantities which have been drained with new coolant.

IMPORTANT: You must protect the alternator against contamination by coolant when carrying out repair work on the cooling circuit.
Cover alternator with suitable materials.
Failure to comply with this procedure may result in an alternator malfunction.

Note on ordering:

- Workshop equipment
- Workshop equipment catalogue
- Filler unit no. 81 39 2 152 473
- Collecting vessel no. 81 49 2 152 347
- Adapter: 17 0 100

IMPORTANT: Risk of slipping due to coolant on the floor.
Danger of injury!

Catch and dispose of emerging coolant in drip tray (1) and if necessary special tool 00 2 030 (universal hydraulic lifting equipment).

Recycling:

Observe country-specific waste disposal regulations.

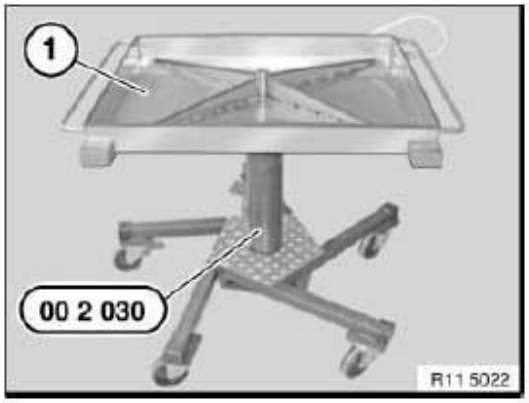


Fig. 18: Identifying Drip Tray And Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check all the coolant hoses before filling the cooling system with the vacuum filling unit.
If necessary, replace damaged and porous coolant hoses.

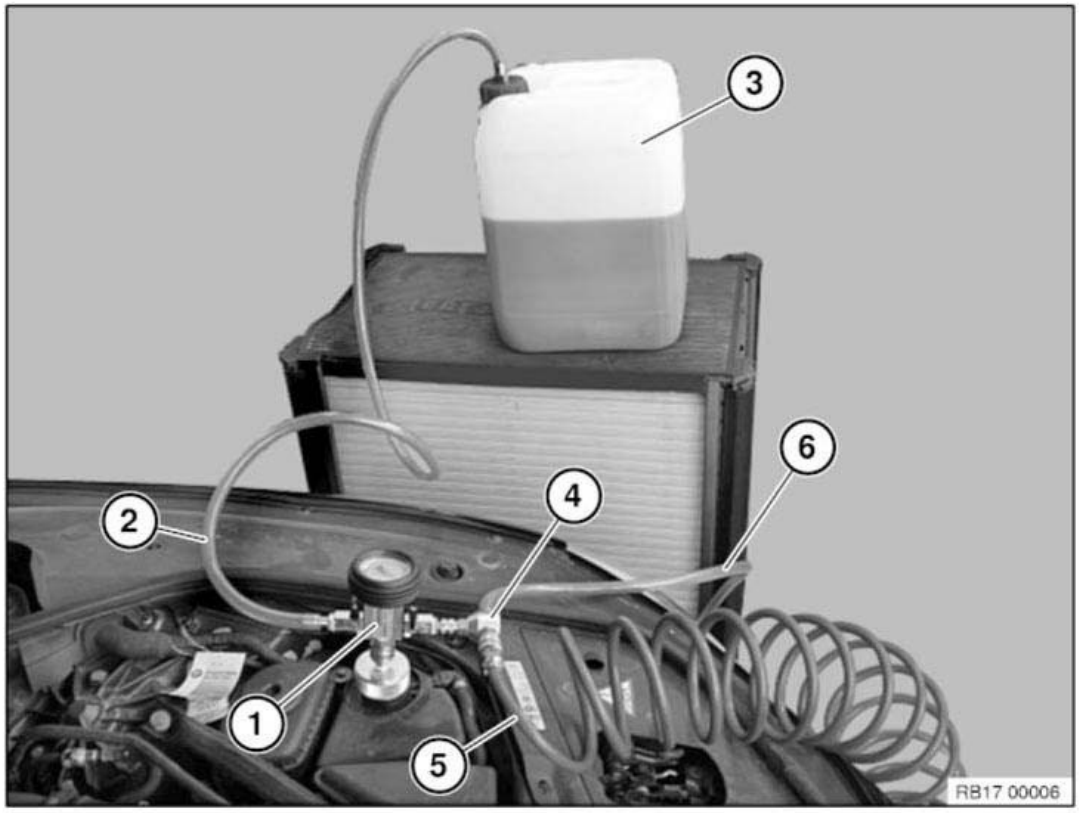


Fig. 19: Identifying Vacuum Filling Unit Components
Courtesy of BMW OF NORTH AMERICA, INC.

- 1) Filling unit with vacuum meter and shut-off valves
- 2) Filler hose
- 3) Coolant container
- 4) Venturi nozzle
- 5) Compressed air connection (max. 6 bar)
- 6) Outgoing-air hose (lead outgoing-air hose into a collecting container)

Requirements

- Cooling system expansion tank must be empty.
- There must be sufficiently premixed coolant in the filling unit container, 1 - 2 liters more than the vehicle filling capacity.
  - Use only recommended coolant **COOLING SYSTEM - OPERATING FLUIDS** .
  - Observe mixture ratio .
  - Observe capacities.
- Position the filling unit container at the same height as the coolant expansion tank.
- Compressed-air connection with 6 bar pressure present.
- Set vehicle heater to maximum temperature.

Select adapter (Y) according to table and connect to coolant expansion tank.

Connect filler unit to adapter connection (X).

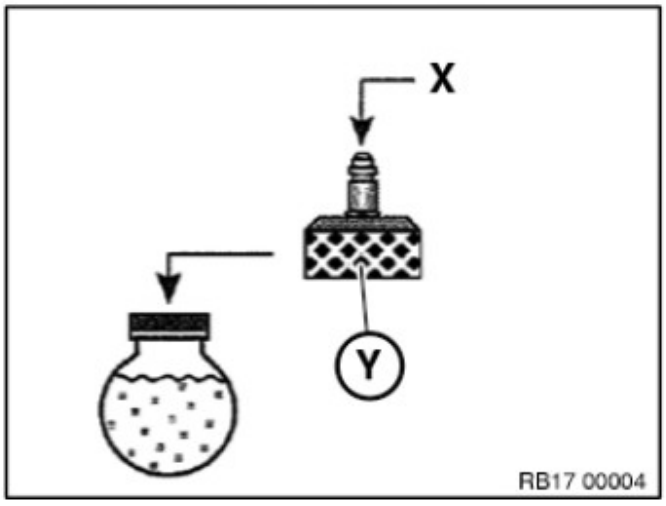


Fig. 20: Identifying Adapter And Adapter Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Shut-off valves (A) and (B) of the filling unit (1) must be closed.

X) Expansion tank connection

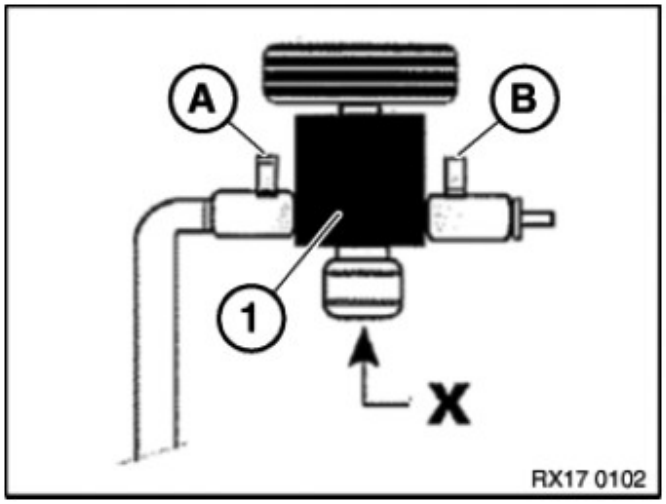


Fig. 21: Identifying Filling Unit Shut-Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Connect venturi nozzle (1) to filling unit (2).

X) Expansion tank connection

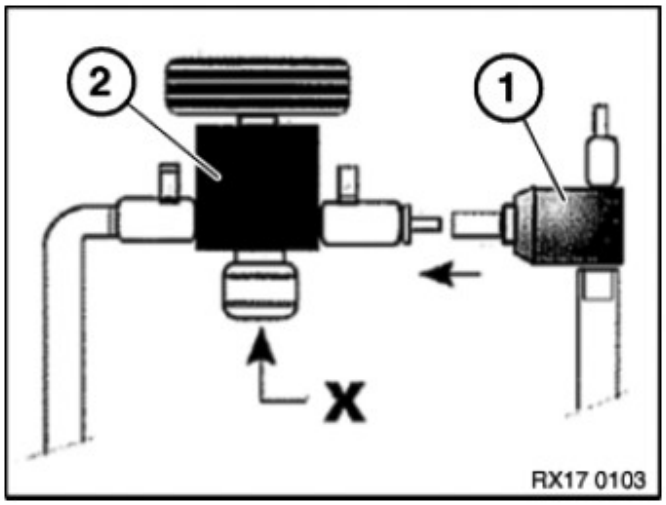


Fig. 22: Connecting Venturi Nozzle To Filling Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Connect compressed air (1).

X) Expansion tank connection

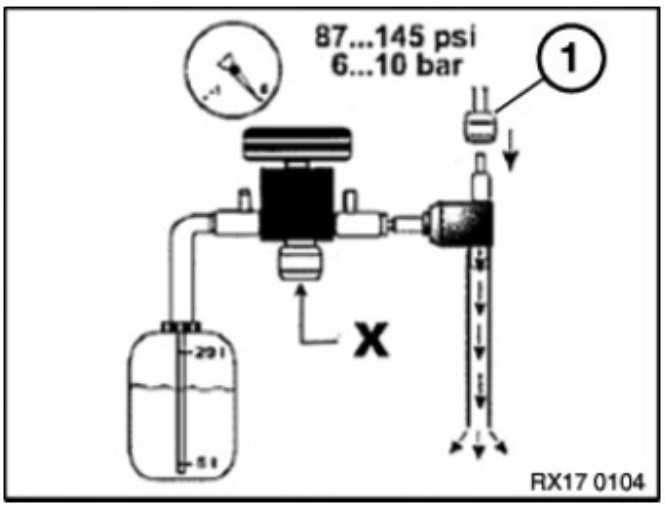


Fig. 23: Connecting Compressed Air Line
Courtesy of BMW OF NORTH AMERICA, INC.

Open shut-off valve (B).

The venturi nozzle produces a flow noise.

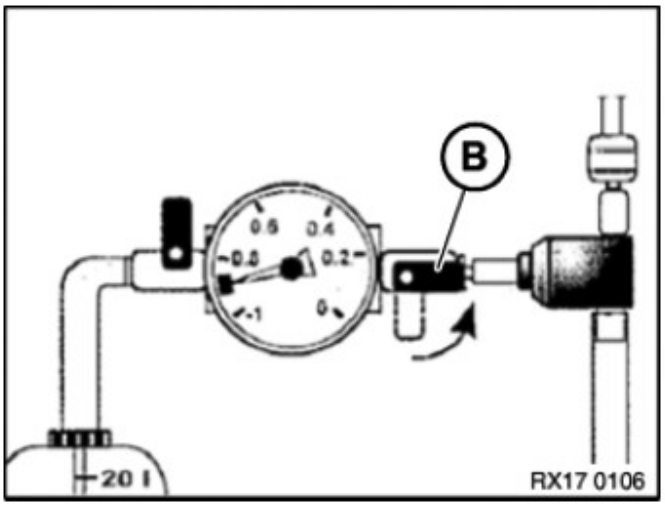


Fig. 24: Opening Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Then open shut-off valve (A) until the filling hose (1) is free of bubbles.

Close shut-off valve (A) again. The filling hose (1) is vented in this way.

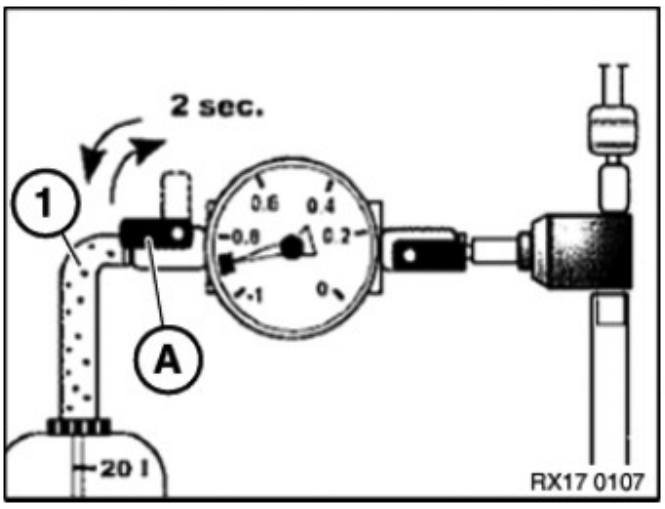


Fig. 25: Opening/Closing Of Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Shut-off valve (B) remains open. Generate vacuum in coolant system for approx. 2 minutes. The final vacuum is reached at a vacuum of -0.7 to -0.95 bar. Green scale on the vacuum meter.

NOTE: The coolant hoses contract during vacuum build-up.

Then close shut-off valve (B) again.

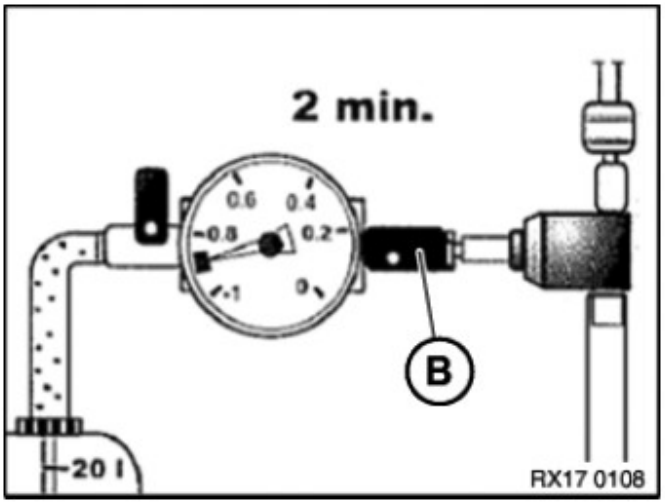


Fig. 26: Checking Shut-Off Valve Opening Time
Courtesy of BMW OF NORTH AMERICA, INC.

Both shut-off valves (A) and (B) must be closed. Then seal Venturi nozzle (1).

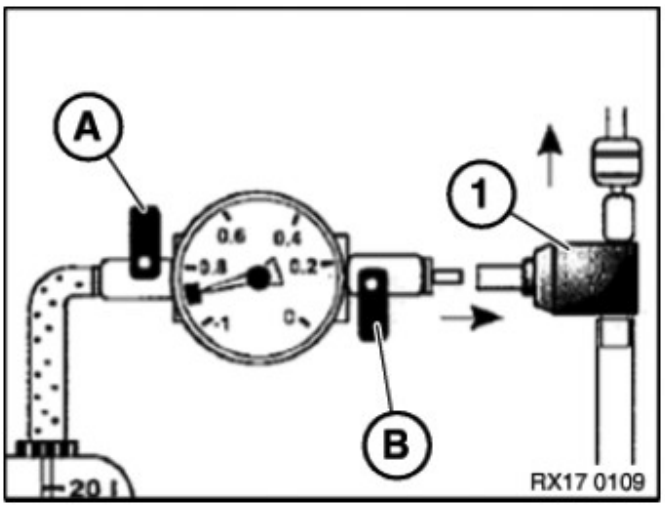


Fig. 27: Closing Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

The cooling system must hold the vacuum for 30 seconds. If the needle in the vacuum meter falls, this indicates a leak in the cooling system.

If the vacuum remains constant, proceed with filling.

In event of leaks, check cooling system for leaks.

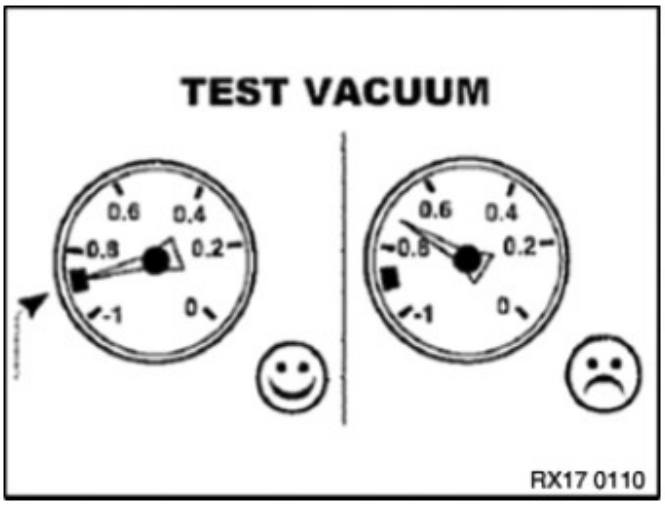


Fig. 28: Identifying Vacuum Meters
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: There must be sufficiently premixed coolant in the filling unit container, 1 - -2 liters more than the vehicle filling capacity.

Position the filling unit container at the same height as the coolant expansion tank.

Shut-off valve (B) remains closed during the filling process.

To fill the cooling system, open shut-off valve (A) to filling unit container.

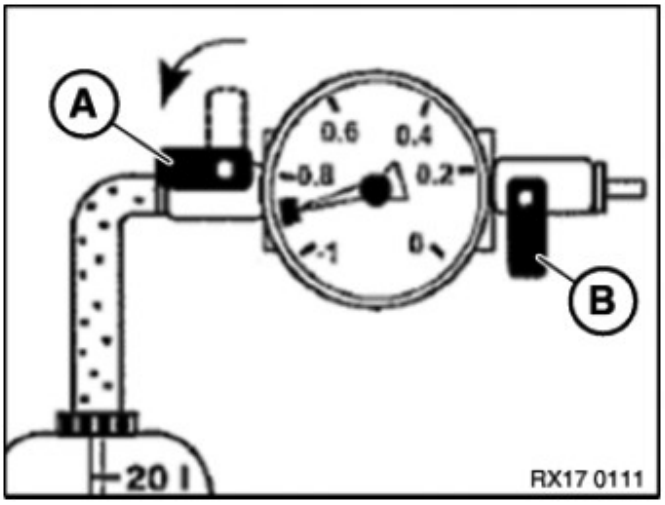


Fig. 29: Opening Shut-Off Valve To Filling Unit Container
Courtesy of BMW OF NORTH AMERICA, INC.

Coolant is now added.

The filling process is finished when the needle in the vacuum meter is at 0 bar or no longer falls.

If necessary, reduce remaining vacuum. Open shut-off valve (B) to do so.

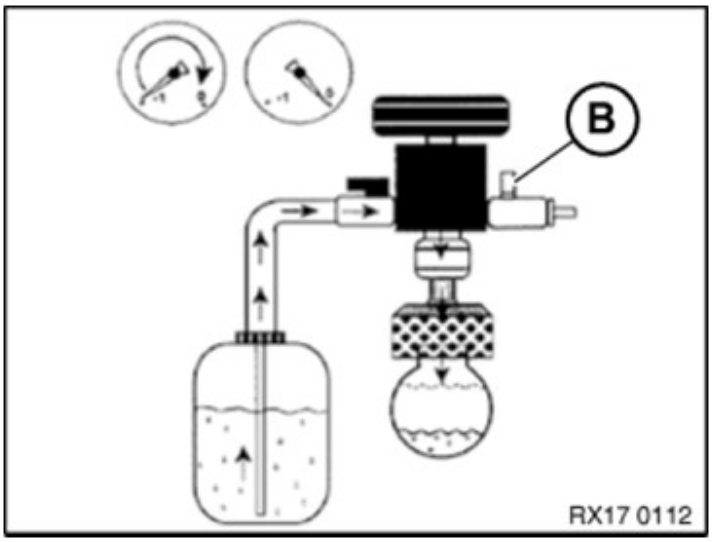


Fig. 30: Filling Coolant

Courtesy of BMW OF NORTH AMERICA, INC.

Remove filling unit with adapter from expansion tank.

Adjust coolant level to max.

Close coolant expansion tank.

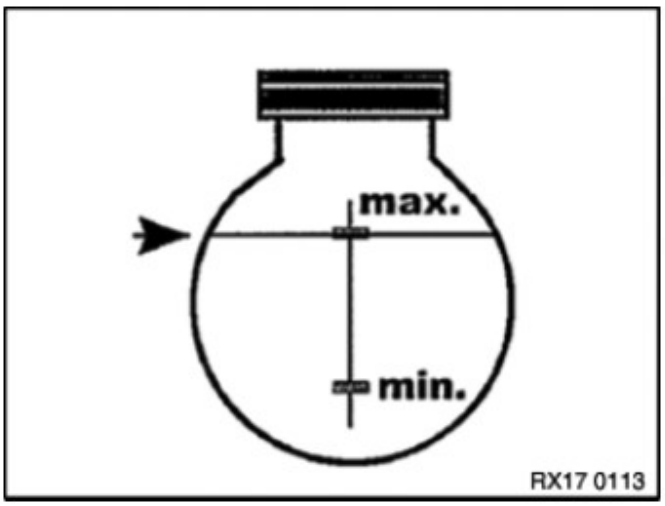


Fig. 31: Adjusting Coolant Level To Max
Courtesy of BMW OF NORTH AMERICA, INC.

Check function of cooling system.

Check cooling system for leaks.

17 00 039 VENTING AND FILLING COOLING SYSTEM WITH VACUUM FILLING UNIT

IMPORTANT: Lifetime coolant filling:
Never reuse used coolant!
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.
In the case of other removal work involving the draining of partial quantities of coolant, replace these quantities which have been drained with new coolant.

IMPORTANT: You must protect the alternator against contamination by coolant before carrying out any work on the coolant circuit.
Cover alternator with suitable materials.
Failure to comply with this procedure may result in an alternator malfunction.

Note on ordering:

- Workshop equipment
- Workshop equipment catalogue
- No.- 81 93 2 152 473

IMPORTANT: Risk of slipping due to coolant on the floor.
Risk of injury!

Catch and dispose of emerging coolant in drip tray (1) and if necessary special tool 00 2 030 (universal hydraulic lifter).

Recycling:

Observe country-specific waste-disposal regulations.

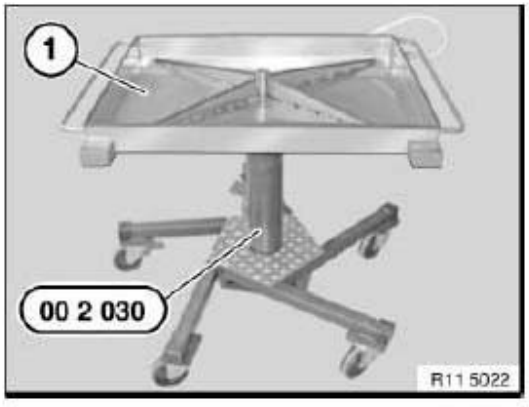


Fig. 32: Identifying Drip Tray And Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check all the coolant hoses before filling the cooling system with the vacuum filling unit.
If necessary, replace damaged and porous coolant hoses.

NOTE: Following graphics shows F01, procedure for other model series is identical.

Vacuum filling unit consists of

- 1) Filling unit with vacuum meter and shut-off valves
- 2) Filler hose
- 3) Coolant container
- 4) Venturi nozzle
- 5) Compressed-air connection (max. 6 bar)
- 6) Outgoing-air hose (lead outgoing-air hose into a collecting container)

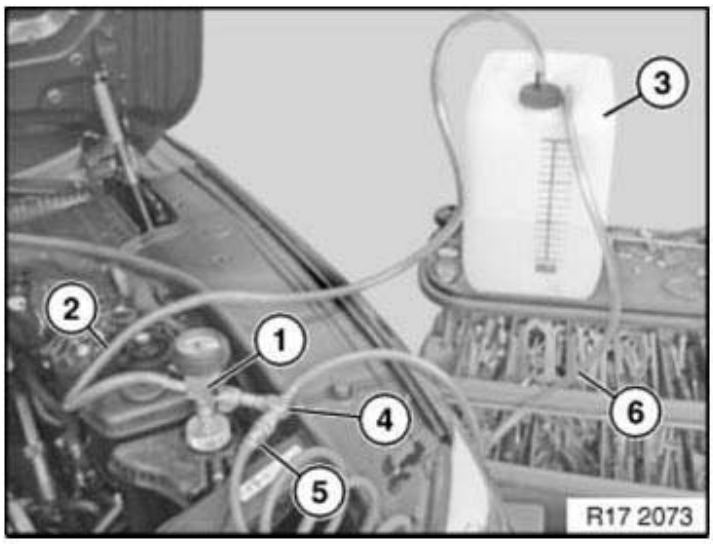


Fig. 33: Identifying Vacuum Filling Unit Components
Courtesy of BMW OF NORTH AMERICA, INC.

Preconditions

- Cooling system expansion tank must be empty.
- There must be sufficiently premixed coolant in the filling unit container, 1 - 2 liters more than the vehicle filling capacity.
  - Use only recommended coolant **COOLING SYSTEM - OPERATING FLUIDS** .
  - Observe mixture ratio .
  - Observe **FILLING CAPACITIES** .
- Position the filling unit container at the same height as the coolant expansion tank.
- Compressed-air connection with 6 bar pressure present.
- Set heating to maximum temperature.

Application

Connect filling unit (1) with adapter (2) 17 0 113 to coolant expansion tank.

Shut-off valves (A) and (B) must be closed.

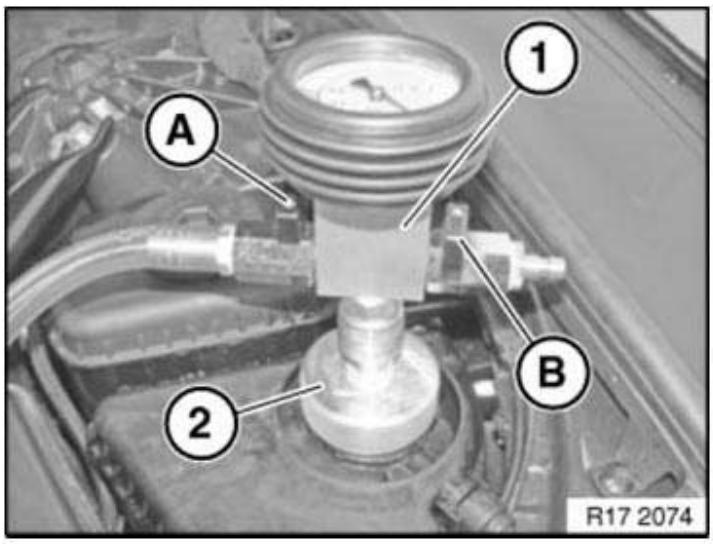


Fig. 34: Identifying Coolant Filling Unit With Adapter And Shut-Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Connect venturi nozzle (1) to filling unit (2).

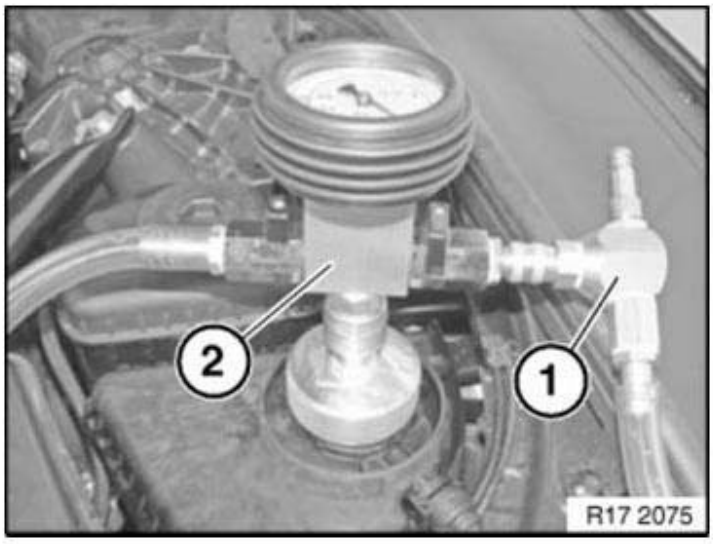


Fig. 35: Identifying Coolant Filling Unit With Venturi Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Connect compressed air (1) and open shut-off valve (B).

The venturi nozzle produces a flow noise.

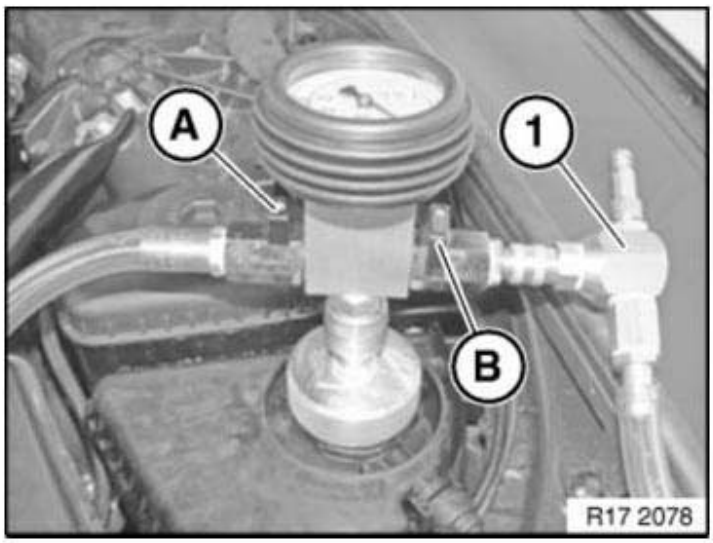


Fig. 36: Identifying Venturi Nozzle With Shut Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Then open shut-off valve (A) until filler hose (1) is filled without bubbles. Close shut-off valve (A) again. This vents the filler hose (1).

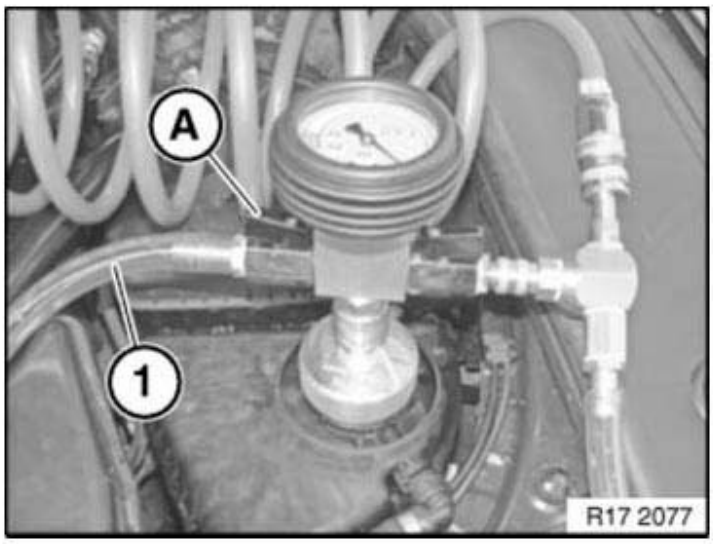


Fig. 37: Identifying Coolant Filling Hose With Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Shut-off valve (B) remains open. Approx. 1 minute. Generate vacuum in cooling circuit. The end vacuum is reached at a vacuum of -0.7 to -0.95 bar. Green scale in vacuum meter.

NOTE: The coolant hoses contract during vacuum build-up.

Then close shut-off valve (B) again.

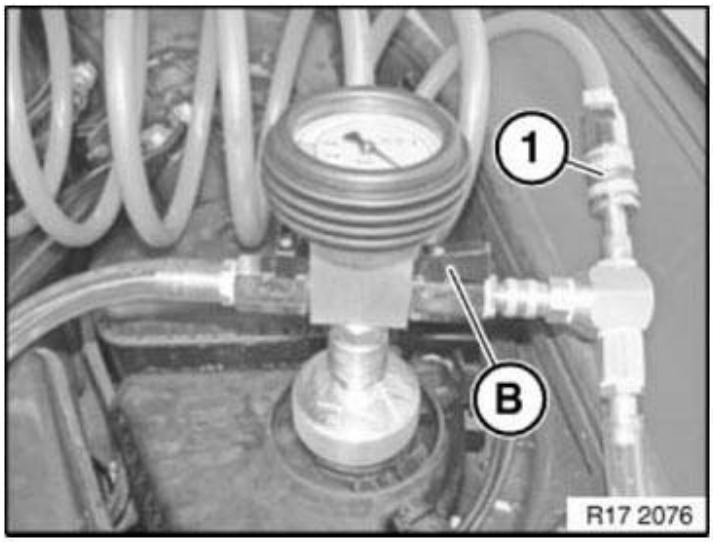


Fig. 38: Identifying Coolant Shut-Off Valves With Vacuum Meter
Courtesy of BMW OF NORTH AMERICA, INC.

Both shut-off valves (A) and (B) must be closed. Then seal venturi nozzle (1).

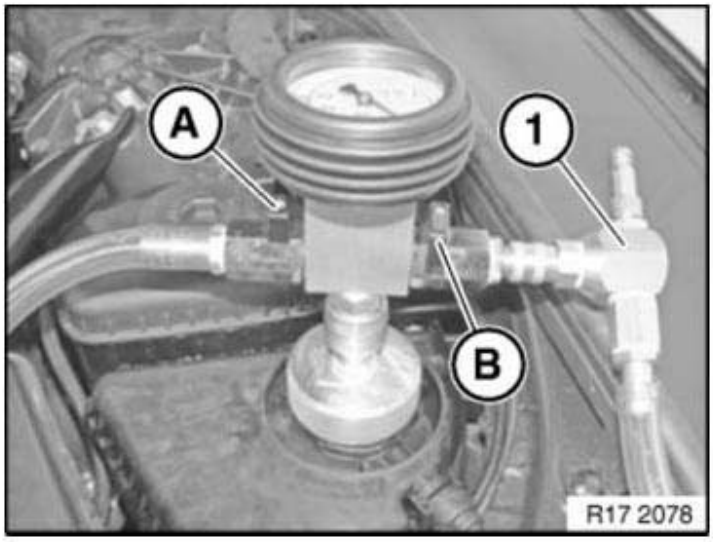


Fig. 39: Identifying Venturi Nozzle With Shut Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

The cooling system must maintain the vacuum for 30 seconds. If the needle in the vacuum meter falls, this indicates a leak in the cooling system.

If the vacuum remains constant, proceed with filling.

In event of leaks, check **COOLING SYSTEM FOR LEAKS** .

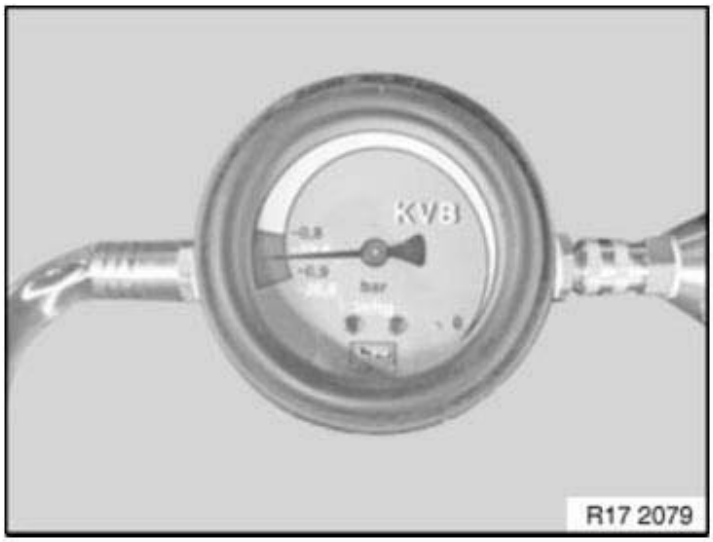


Fig. 40: Checking Cooling System For Leaks
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: There must be sufficiently PREMIXED COOLANT in the filling unit container, 1 - 2 liters more than the vehicle filling capacity.
Position the filling unit container at the same height as the coolant expansion tank.

Shut-off valve (B) remains closed during the filling process.

To fill the cooling system, open shut-off valve (A) to filling unit container.

Coolant is now added.

The filling process is finished when the needle in the vacuum meter is at 0 bar or no longer falls.

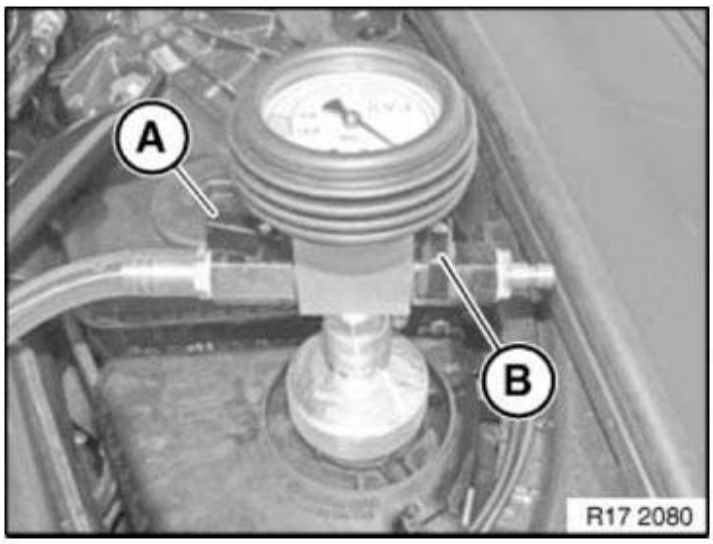


Fig. 41: Identifying Cooling System Shut-Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, release remaining vacuum. To do so, open shut-off valve (B).

Remove filling unit with adapter from expansion tank.

Adjust coolant level to max.

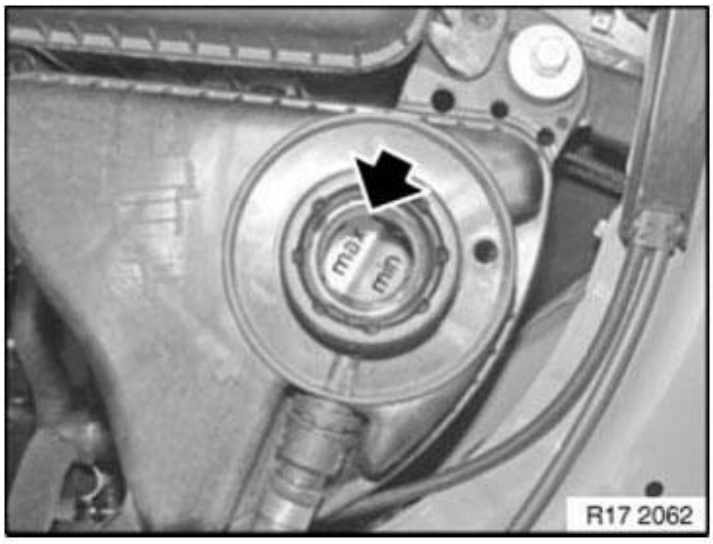


Fig. 42: Adjusting Coolant Level To Maximum
Courtesy of BMW OF NORTH AMERICA, INC.

Close coolant expansion tank.

Installation:

Close cap (1) until the arrow marks line up.

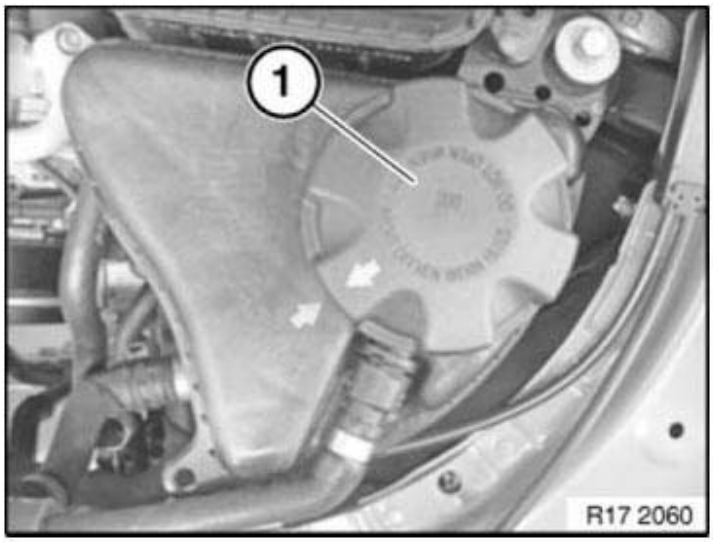


Fig. 43: Identifying Coolant Expansion Tank Sealing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Check function of cooling system.

Check **COOLING SYSTEM FOR LEAKS** .

1710 RADIATOR, EXPANSION TANK, PIPES

17 00 009 CHECKING COOLING SYSTEM FOR LEAKS (N54, N52K)

WARNING: Danger of scalding!
Only perform this work after engine has cooled down.

Protective measures/rules of conduct

- Wear protective goggles
- Wear protective gloves
- Observe national/country-specific regulations

IMPORTANT: Risk of slipping due to coolant on the floor.
Danger of injury!

Catch and dispose of drained coolant in drip tray (1) and if necessary special tool 00 2 030 (universal hydraulic lifter).

Recycling:

Observe country-specific waste-disposal regulations.

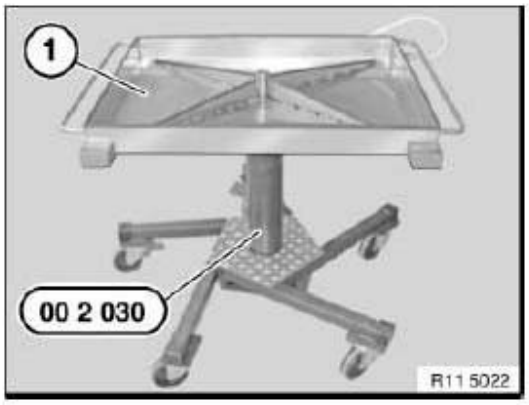


Fig. 44: Identifying Drip Tray And Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure drop in cooling system

Open cap on coolant expansion tank. Fit special tools (1) 17 0 101 and (2) 17 0 113.

Build up **GAUGE PRESSURE** and wait approx. 2 minutes.

Cooling system is impervious to leaks if pressure drop is max. 0.1 bar.

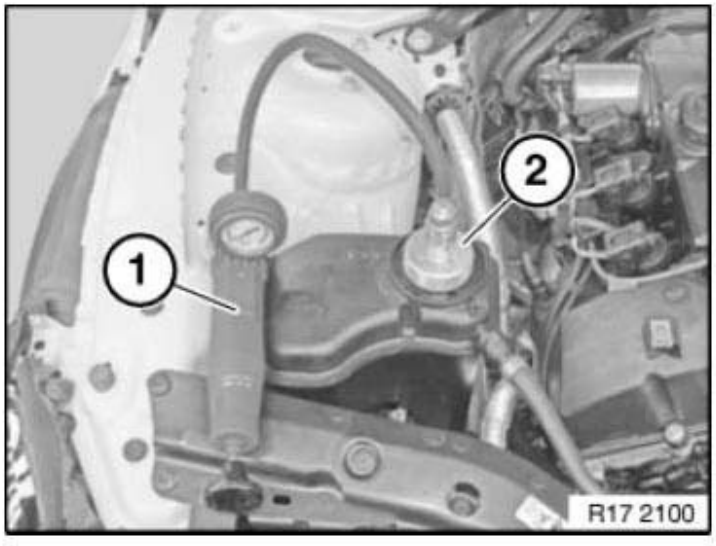


Fig. 45: Checking Pressure Drop In Cooling System Using Special Tools (17 0 101) And (17 0 113)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure relief valve in cap

NOTE: **While the vehicle is driven at high outside temperatures, the design may cause the pressure relief valve in the cap to open slightly and air together with dissolved coolant to escape. This coolant vapor condenses on the surface of the expansion tank and leaves traces when the vehicle has cooled down. These traces do not indicate whether the cap is defective or not. When the vehicle has been parked up for an extended period of time, the residual escaping coolant can cause the pressure relief valve in the cap to stick; therefore check the cap again 2 to 3 times.**

Replace the cap only after you have checked three times and there is an incorrect opening pressure.

Checking pressure relief valve in cap

Screw cap (1) onto special tool 17 0 114.

Build up pressure with special tool (hand pump) 17 0 101; observe pressure gauge to ascertain when opening pressure is achieved.

Compare **OPENING PRESSURE** of pressure relief valve.

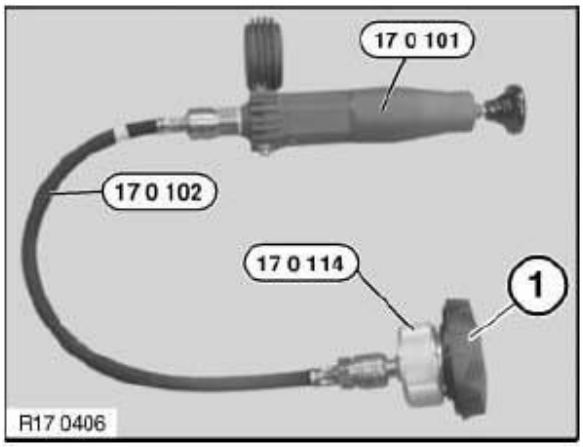


Fig. 46: Checking Pressure Relief Valve In Cap With Special Tool (Hand Pump 17 0 101)
Courtesy of BMW OF NORTH AMERICA, INC.

1711 ENGINE RADIATOR WITH ATTACHMENT

17 11 052 REMOVING AND INSTALLING LEFT MODULE CARRIER (N52K, N54)

WARNING: Danger of scalding!
Only perform this work after engine has cooled down.

Necessary preliminary tasks:

- Remove **FAN COWL**
- **54 only:**

Remove intercooler

Release bolts (1) on radiator on left and right.

Tightening torque **17 10 2AZ** .

Do **not** unfasten or detach coolant hose (2).

Do **not** drain coolant.

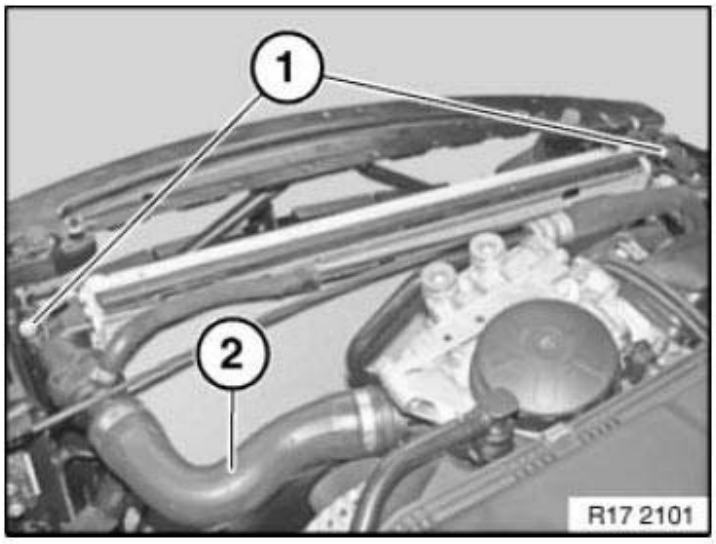


Fig. 47: Identifying Radiator Bolts And Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Slide radiator and condenser slightly towards rear.

Feed out left module carrier (1) and remove towards top.

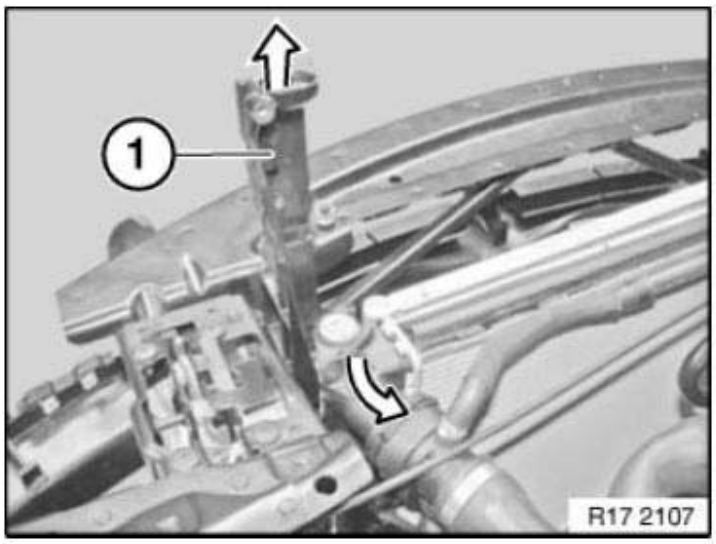


Fig. 48: Removing Left Module Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When reinstalling module carrier (1), ensure without fail that the radiator is correctly seated in mounting (2).

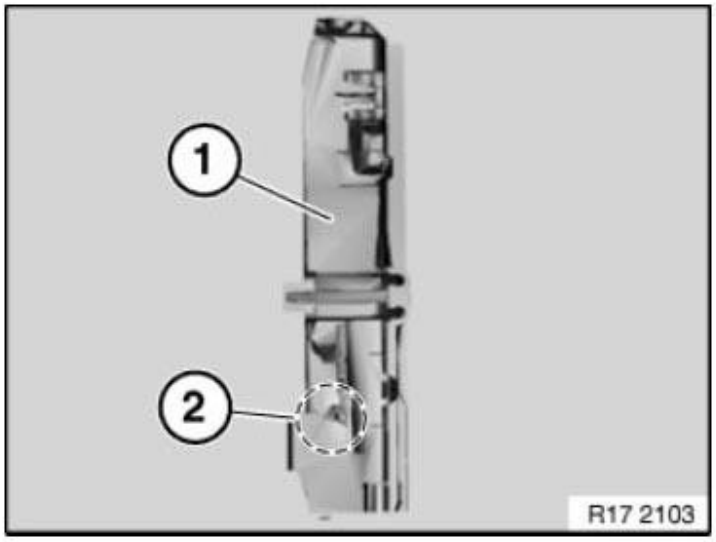


Fig. 49: Identifying Module Carrier And Radiator Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Add final details to vehicle.

17 11 000 REMOVING AND INSTALLING RADIATOR (N52K, N54)

WARNING: Danger of scalding!
Only perform this work after engine has cooled down.

IMPORTANT: Wear protective goggles and gloves.

Necessary preliminary tasks:

- Remove **FAN COWL**
- Draining **COOLANT**
- Unlock coolant hoses and detach
- **N54 only:**

Remove intercooler

Release bolts (1) on radiator on left and right.

Tightening torque **17 10 2AZ** .

Unlock and detach coolant hose (2).

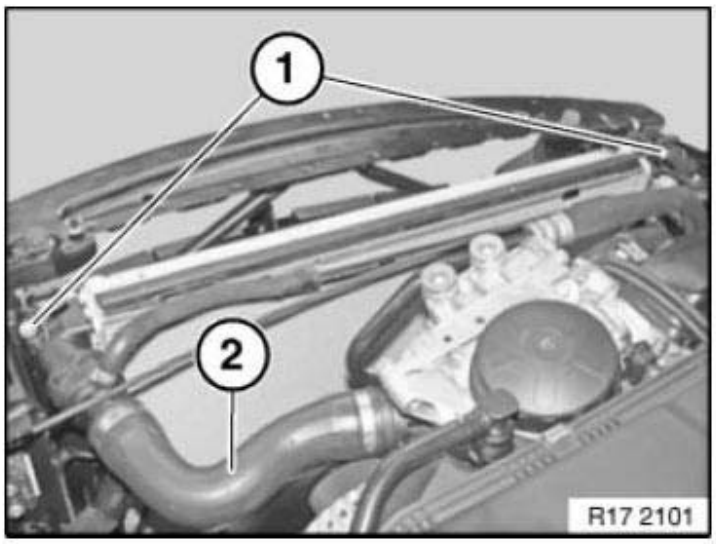


Fig. 50: Identifying Radiator Bolts And Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out module carrier (1) on left.

Feed out radiator (2) and remove towards top.

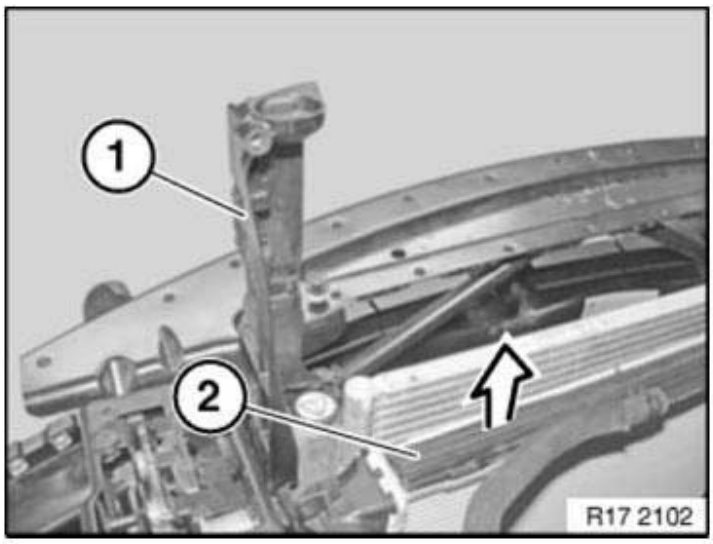


Fig. 51: Lifting Out Module Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When reinstalling the radiator and module carrier (1), ensure without fail that the radiator is correctly seated in mounting (2).

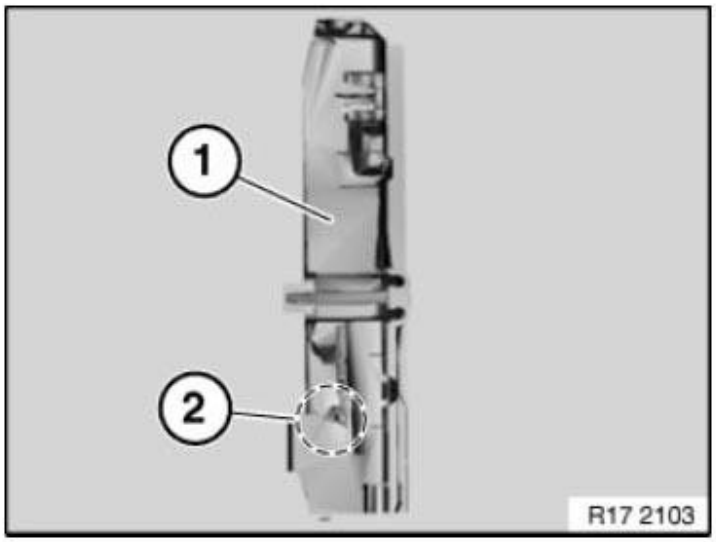


Fig. 52: Identifying Module Carrier And Radiator Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Add final details to vehicle.

Check **COOLING SYSTEM** for leaks.

17 11 054 REMOVING AND INSTALLING RIGHT MODULE CARRIER (N52K, N54)

WARNING: Danger of scalding!
Only perform this work after engine has cooled down.

WARNING: Risk of injury!
Refrigerant circuit is under high pressure!
Follow safety instructions for handling refrigerant See 6450... INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A or 6450... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT R134A .
Avoid contact with refrigerant and refrigerant oil Follow safety instructions for HANDLING REFRIGERANT OIL .

IMPORTANT: Risk of damage!
Restart engine only when A/C system has been correctly filled.
Follow INSTRUCTIONS for opening and replacing parts in refrigerant circuit.

If A/C system is opened for more than 24 hours: Replace **DESICCANT INSERT** for A/C system.

Necessary preliminary tasks:

- Remove left **MODULE CARRIER**
- Drain off **AIR CONDITIONING SYSTEM**

Release screws (1).

Tightening torque **64 53 6AZ** .

Detach A/C lines (2) from A/C condenser.

Installation:

Replace all sealing rings and moisten with refrigerant oil.

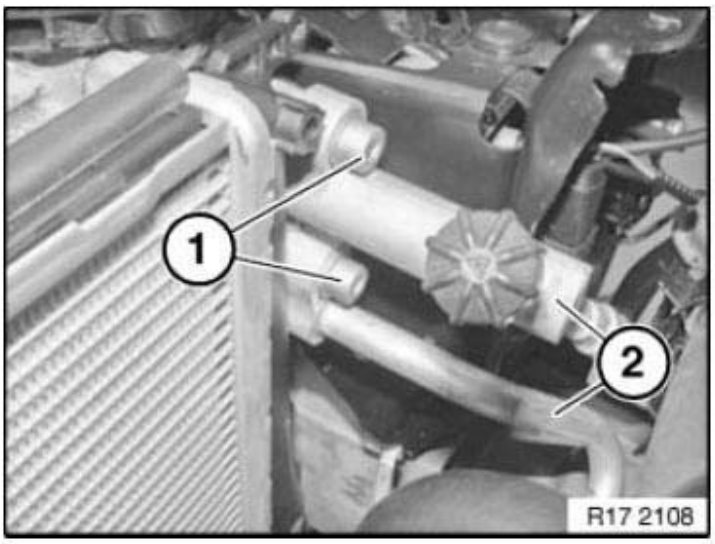


Fig. 53: Identifying Screws And A/C Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out right module carrier (1) together with A/C condenser (2).

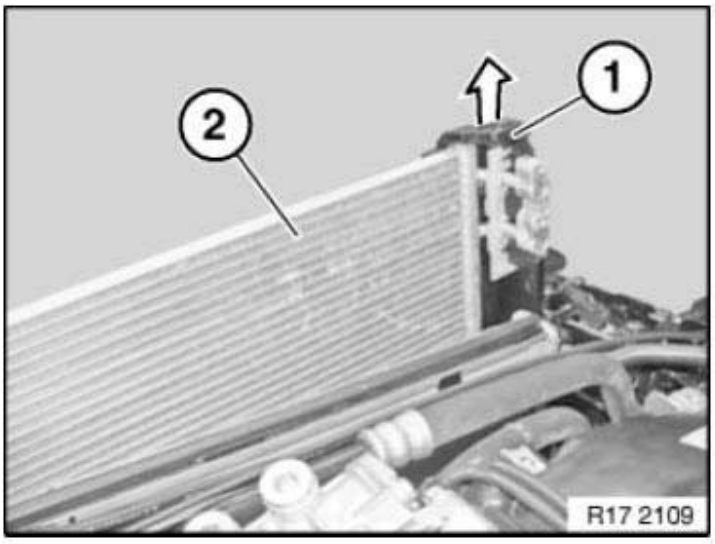


Fig. 54: Lifting Out Right Module Carrier With A/C Condenser
Courtesy of BMW OF NORTH AMERICA, INC.

Release A/C condenser from module carrier. In so doing, release lock (1) on side of module carrier in direction of arrow.

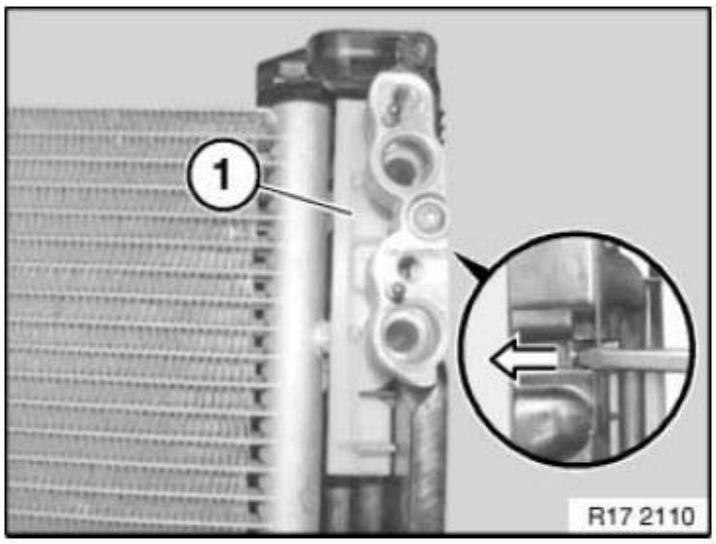


Fig. 55: Removing A/C Condenser From Module Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When reinstalling the radiator and module carrier (1), ensure without fail that the radiator is correctly seated in mounting (2).

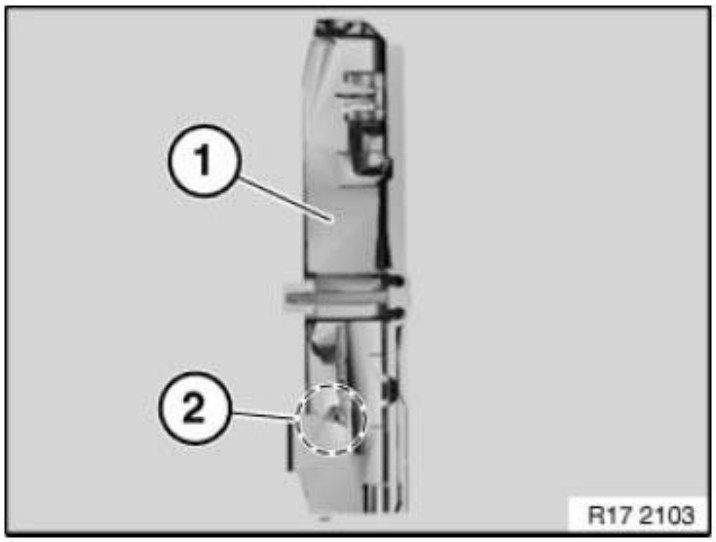


Fig. 56: Identifying Module Carrier And Radiator Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Add final details to vehicle.

Evacuate and fill **A/C SYSTEM** .

17 11 100 REMOVING AND INSTALLING/REPLACING COOLANT EXPANSION TANK (N54, N52K)

Necessary preliminary tasks

- Drain **COOLANT** .

N54 only: Release vacuum line at retainers (1) from expansion tank.

Unfasten screws (2).

Tightening torque **17 10 4AZ** .

Release and disconnect coolant hoses (3).

Raise expansion tank (4)

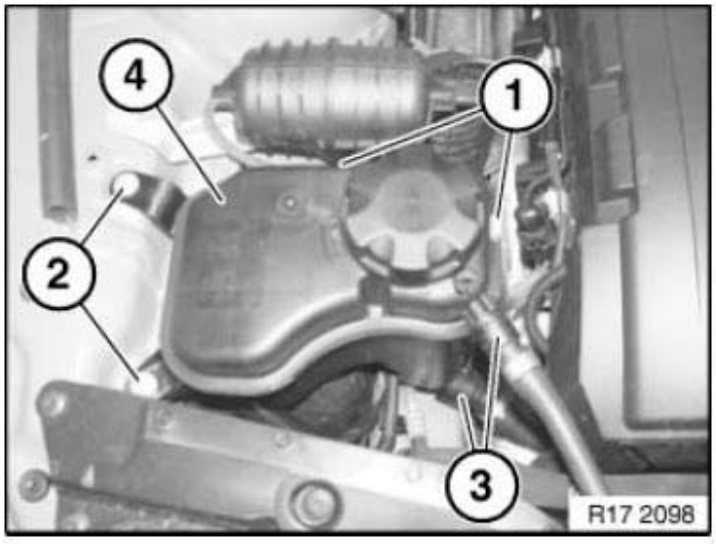


Fig. 57: Identifying Retainers, Coolant Hoses, Screws And Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) on coolant level switch and disconnect.

Remove expansion tank (2).

Installation:

Make sure locating pin (3) is correctly seated in rubber mount (4).

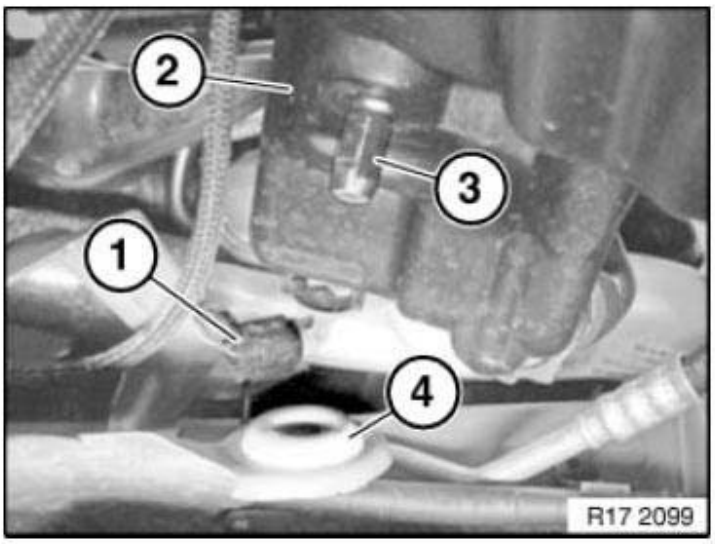


Fig. 58: Identifying Plug, Expansion Tank, Locating Pin And Rubber Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Top up **COOLANT** .

Check cooling system for **LEAKS** .

17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N52K, N54)

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Turn off ignition
- Remove **CROSS-MEMBER**
- **Only automatic transmission and twin-clutch gearbox:**

RELEASE TRANSMISSION FLUID COOLER from the fan cowl do not remove

Unclip coolant line (1) from fan cowl.

Unlock and disconnect plug (2) on fan cowl on right.

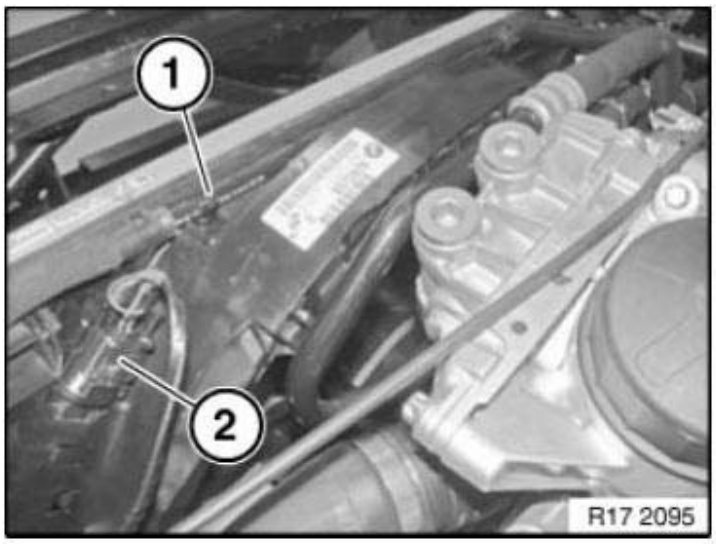


Fig. 59: Identifying Coolant Line And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on fan cowl.

Tightening torque **17 10 1AZ** .

Release lock (2) and remove fan cowl (3) towards top.

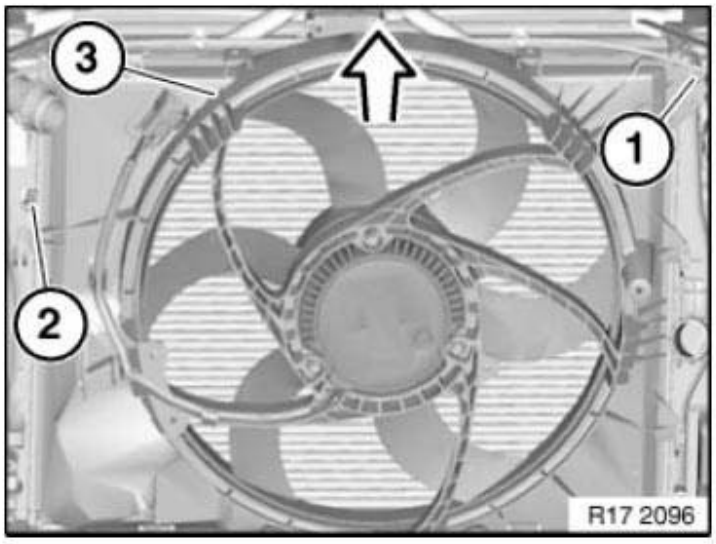


Fig. 60: Removing Fan Cowl Towards Top
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert retaining tabs (1) at bottom on radiator/intercooler.

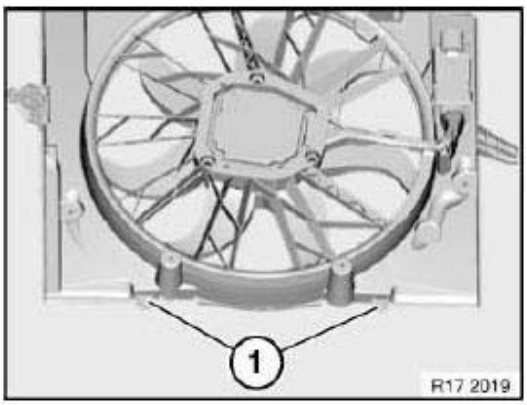


Fig. 61: Identifying Fan Cowl Plug
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Reassemble the vehicle.
clear fault memory.

17 12 010 REMOVING AND INSTALLING/REPLACING COOLANT PIPE ON FRONT AXLE (N52K)

Necessary preliminary tasks: Remove intake filter housing. See **13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING (N52K)** . Drain **coolant**.

Release screws (1). Tightening torque 17 10 5AZ. Unfasten and detach coolant pipe from expansion tank (2). Unfasten and detach coolant pipe from coolant thermostat (3). Unfasten and detach coolant pipe from coolant hose (4). Feed out coolant pipe and remove.

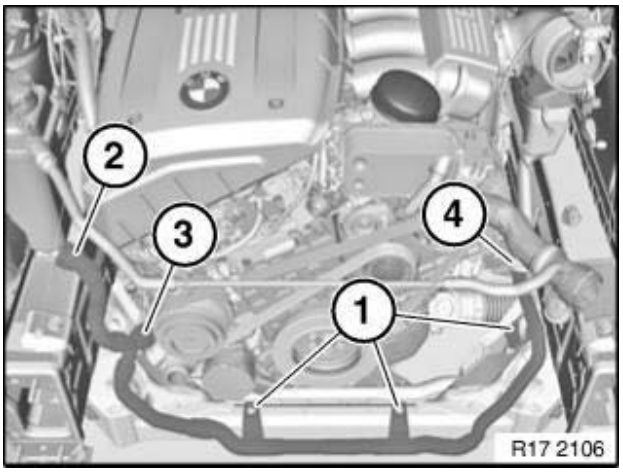


Fig. 62: Replacing Coolant Pipe On Front Axle
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine. Top up **coolant**. Check **cooling system for leaks**.

1721 OIL COOLER

17 21 500 FLUSHING TRANSMISSION OIL COOLER WITH LINES (AUTOMATIC TRANSMISSION)

NOTE: Carry out the work steps listed when:
Installing a new or replacement transmission.
Flushing can only be carried out with the automatic transmission removed.

Procedure

Automatic transmission removed.

Connect appropriate adapters (see description below) to oil lines exiting from automatic transmission.

Connect connecting line 17 2 019 from the oil collection unit with the quick-release coupling.

Connect drain line 17 2 018 using quick-release coupling.

Hold and direct open end of drain line into a suitable drip tray.

Using oil collection unit, flush approx. 1 liter of transmission fluid through oil lines and transmission oil cooler.

Reposition quick-release couplings.

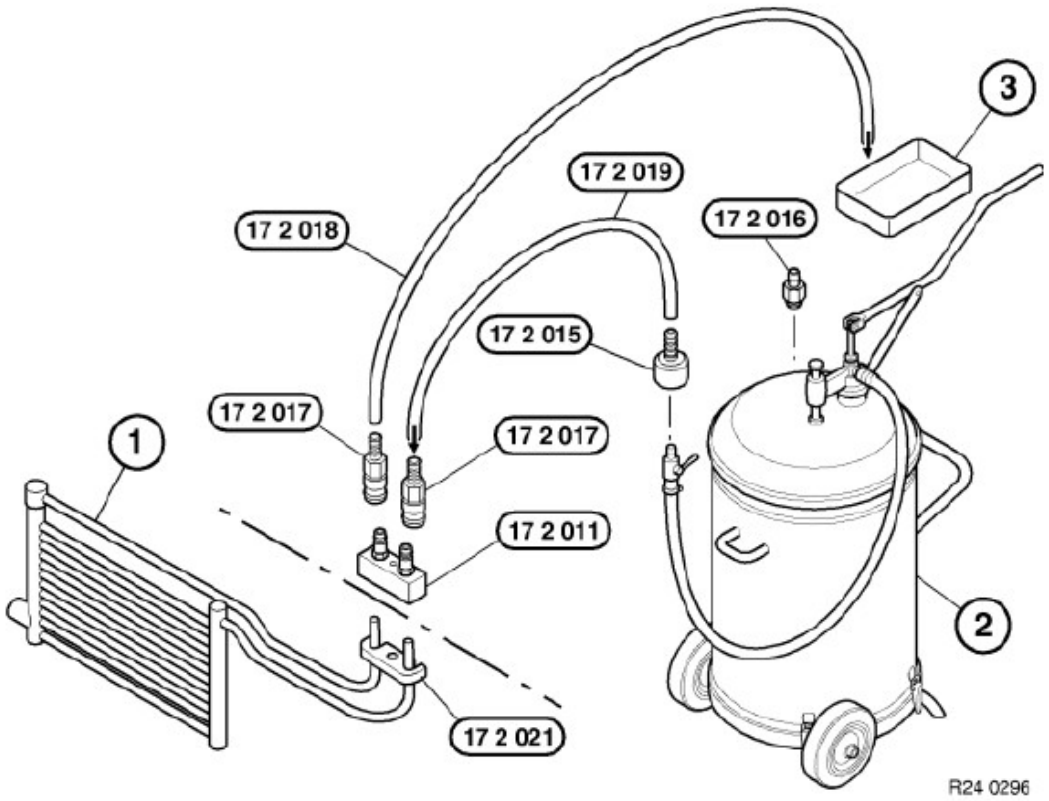
Flush oil lines/transmission oil cooler in opposite direction with approx. 1 liter of transmission fluid.

Disconnect quick-release couplings.

Remove adapter.

NOTE: Dispose of flushing oil correctly.
Do not reuse under any circumstances.

Arrangement, flushing apparatus for transmissions A5S 310Z, A5S 560Z, A5S 360R/390R, A4S 200R, A5S 325Z



1) Transmission-oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 63: Arrangement - Flushing Apparatus For Transmissions (A5S 310Z, A5S 560Z, A5S 360R/390R, A4S 200R, A5S 325Z)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 011 Adapter for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

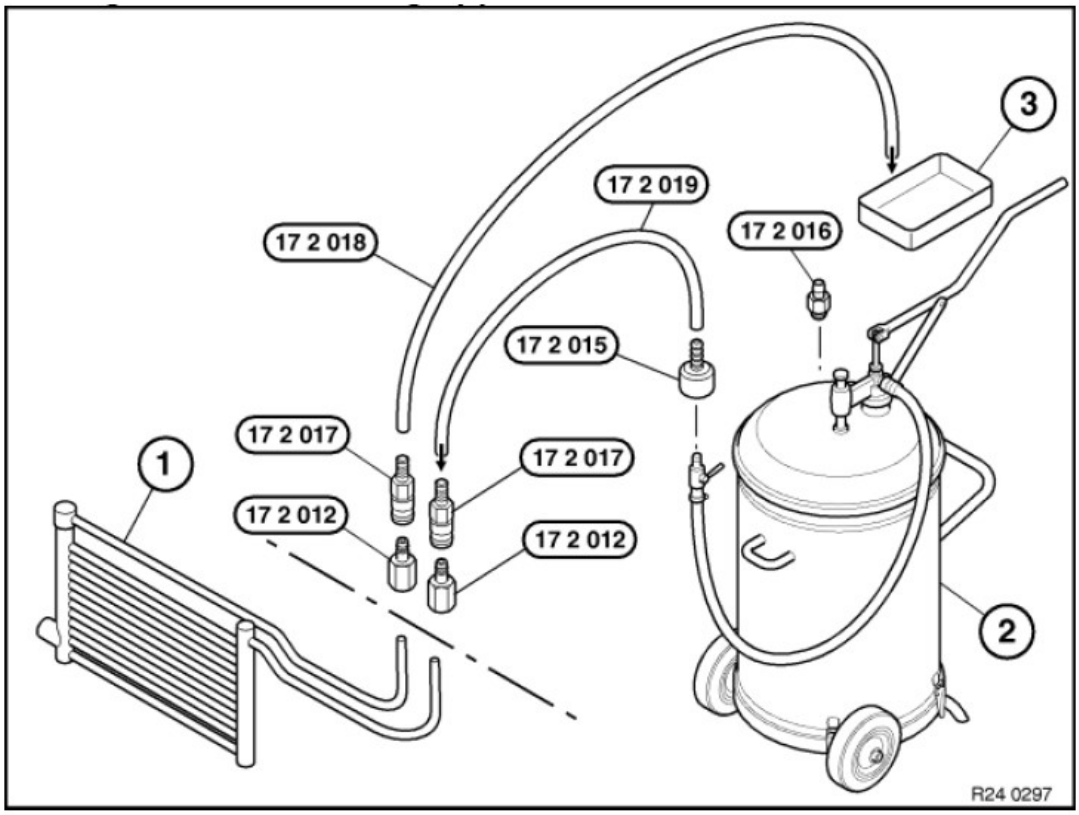
17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

17 2 021 Mounting plate for adapter 17 2 011 for transmissions A5S 325Z, GA6HP26Z

Arrangement of flushing apparatus for transmission A4S 310R



1)	Transmission oil cooler with lines
2)	Oil collection unit
3)	Oil drip tray
17 2 012	Adapters (2 x) for connecting transmission-side oil cooler lines (1)
17 2 015	Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or
17 2 016	Connection for oil collection unit (2), manufacturer: Hom
17 2 017	Quick-release coupling (2 pieces)
17 2 018	Hose to oil drip tray (3)
17 2 019	Hose to oil collection unit (2)

Fig. 64: Arrangement - Flushing Apparatus For Transmissions (A5S 310R)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

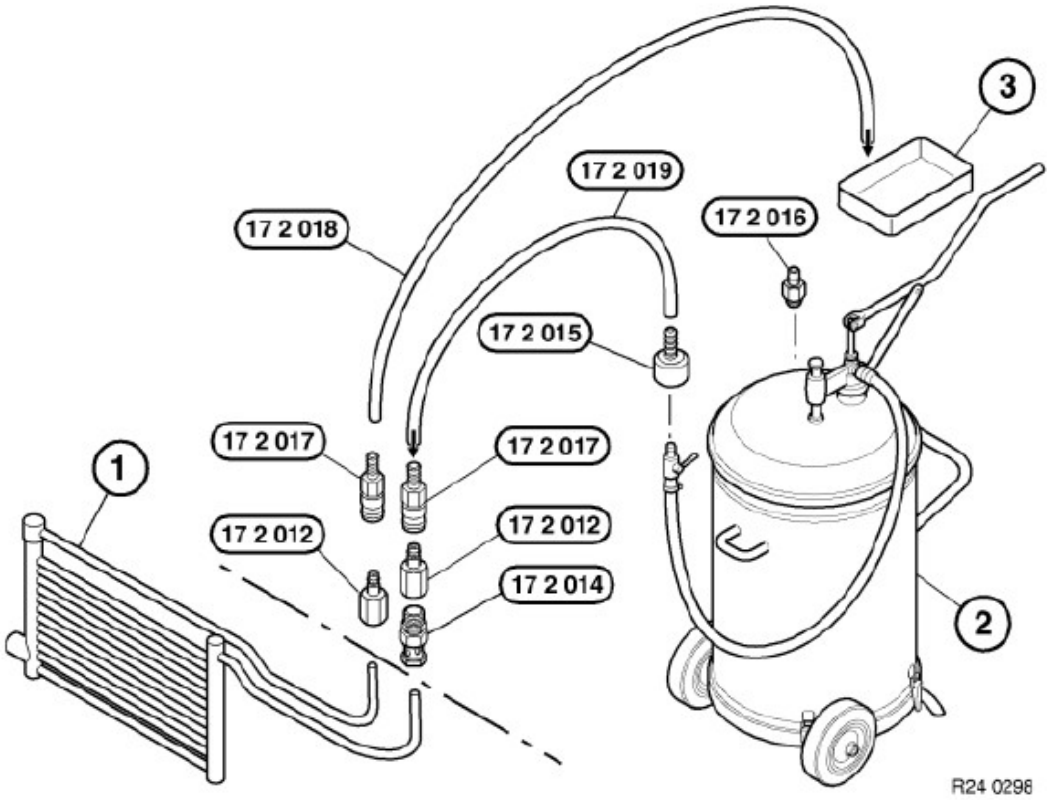
17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

Arrangement of flushing apparatus for transmission A4S 300J



1) Transmission-oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 65: Arrangement - Flushing Apparatus For Transmission (A4S 300J)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 014 Banjo bolt for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

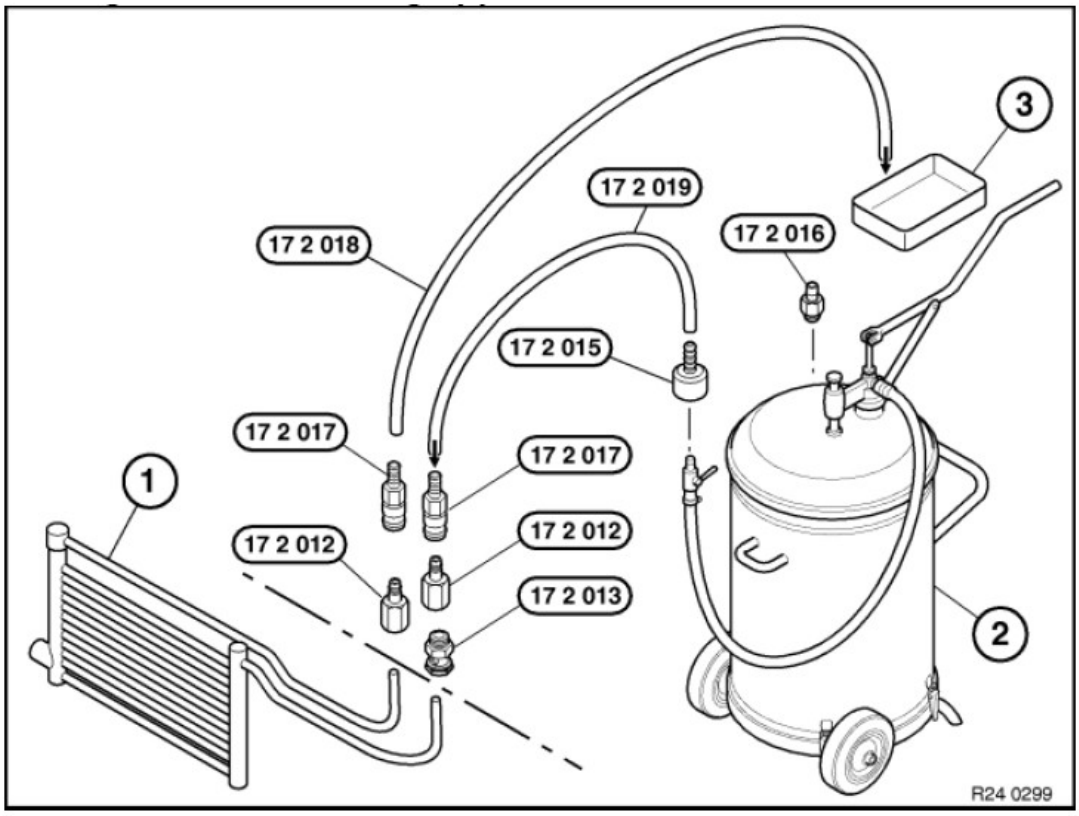
17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

Arrangement of flushing apparatus for transmission A5S 440Z



1) Transmission oil cooler with lines
2) Oil collection unit
3) Oil drip tray
17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)
17 2 013 Banjo bolt for connecting transmission-side oil cooler lines (1)
17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or
17 2 016 Connection for oil collection unit (2), manufacturer: Horn
17 2 017 Quick-release coupling (2 pieces)
17 2 018 Hose to oil drip tray (3)
17 2 019 Hose to oil collection unit (2)

Fig. 66: Arrangement - Flushing Apparatus For Transmission (A5S 440Z)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 013 Banjo bolt for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

17 21 500 FLUSHING TRANSMISSION OIL COOLER WITH LINES (AUTOMATIC TRANSMISSION) (GA6HP19Z, GAHP26Z, GA6HP32Z)

NOTE: Carry out the work steps listed when:
Installing a new or replacement transmission.

Procedure

Automatic transmission removed.

Connect appropriate adapters (see description below) to oil lines exiting from automatic transmission.

Connect connecting line 17 2 019 from the oil collection unit with the quick-release coupling.

Connect drain line 17 2 018 using quick-release coupling.

Hold and direct open end of drain line into a suitable drip tray.

Using oil collection unit, flush approx. 1 liter of transmission fluid) through oil lines and transmission oil cooler.

Reposition quick-release couplings.

Flush oil lines/transmission oil cooler in opposite direction with approx. 1 liter of transmission fluid.

Disconnect quick-release couplings.

Remove adapter.

NOTE: Dispose of flushing oil correctly.
Do not reuse under any circumstances.

Press hydraulic lines (1) into adapters (2).

Slide clamping bar (3) into guides and secure with screw (4).

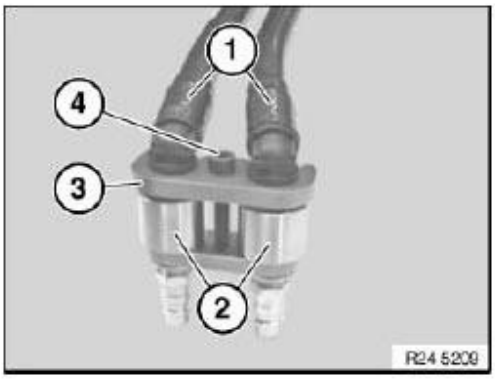


Fig. 67: Identifying Hydraulic Lines, Adapters, Clamping Bar With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement of flushing apparatus for transmissions GA6HP19Z, GA6HP26Z, GA6HP32Z

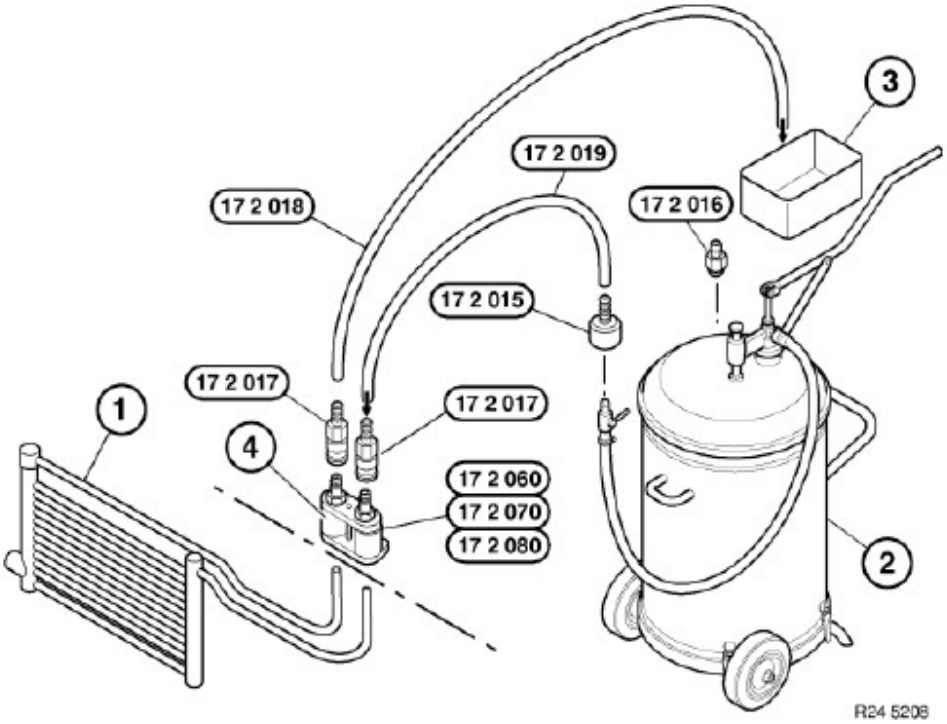


Fig. 68: Arrangement - Flushing Apparatus For Transmissions (GA6HP19Z, GA6HP26Z, GA6HP32Z)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission-oil cooler with lines
2. Oil collection unit

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 019 Hose to oil collection unit (2)

3. Oil drip tray

   17 2 018 Hose to oil drip tray (3)

4. Adapter with clamping bar

   17 2 060 Adapter with clamping bar for aluminum lines and steel lines with aluminum connection (line diameter 12 mm) GA6HP19Z

   17 2 070 Adapter with clamping bar (line diameter 15 mm) GA6HP26Z, GA6HP32Z, TCT for N54 engine

   17 2 080 Adapter with clamping bar for fuel lines GA6HP26Z

1722 OIL COOLER LINES

17 21 500 FLUSHING TRANSMISSION OIL COOLER WITH LINES (AUTOMATIC TRANSMISSION)

NOTE: Carry out the work steps listed when:
Installing a new or replacement transmission.
Flushing can only be carried out with the automatic transmission removed.

Procedure

Automatic transmission removed.

Connect appropriate adapters (see description below) to oil lines exiting from automatic transmission.

Connect connecting line 17 2 019 from the oil collection unit with the quick-release coupling.

Connect drain line 17 2 018 using quick-release coupling.

Hold and direct open end of drain line into a suitable drip tray.

Using oil collection unit, flush approx. 1 liter of transmission fluid (refer to BMW Service Operating Fluids) through oil lines and transmission oil cooler.

Reposition quick-release couplings.

Flush oil lines/transmission oil cooler in opposite direction with approx. 1 liter of transmission fluid (refer to

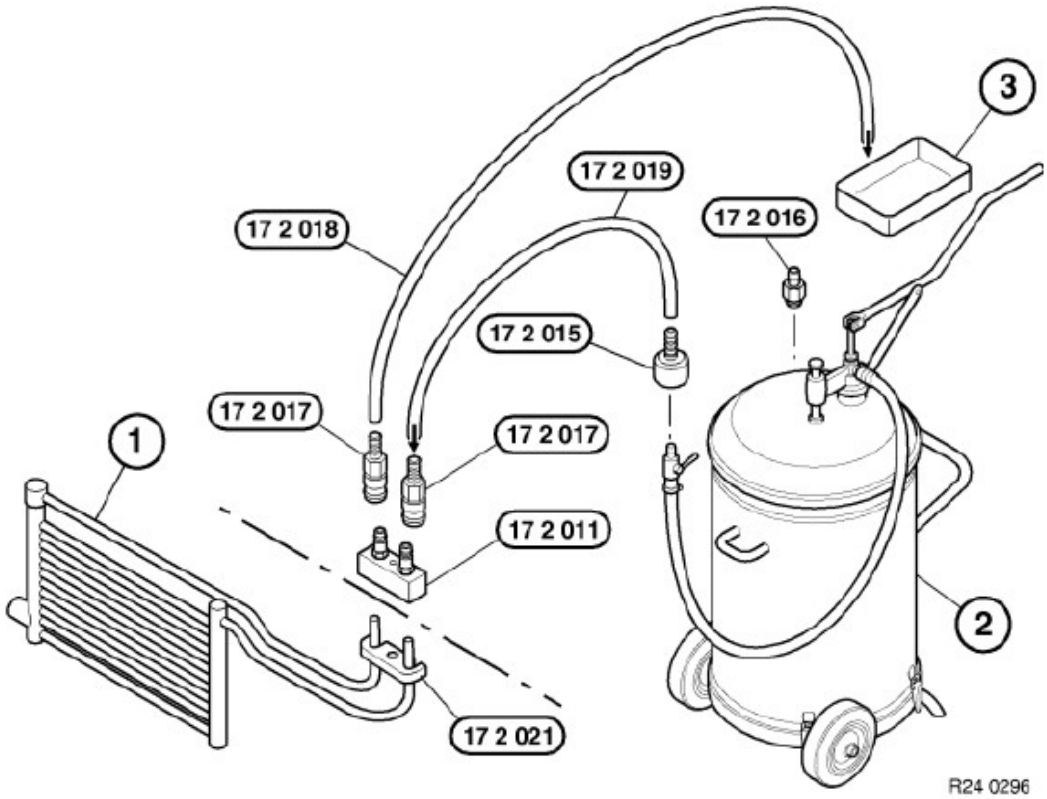
BMW Service Operating Fluids).

Disconnect quick-release couplings.

Remove adapter.

NOTE: Dispose of flushing oil correctly.
Do not reuse under any circumstances.

Arrangement, flushing apparatus for transmissions A5S 310Z, A5S 560Z, A5S 360R/390R, A4S 200R, A5S 325Z



1) Transmission-oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 69: Arrangement - Flushing Apparatus For Transmissions (A5S 310Z, A5S 560Z, A5S 360R/390R, A4S 200R, A5S 325Z)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit

3. Oil drip tray

17 2 011 Adapter for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

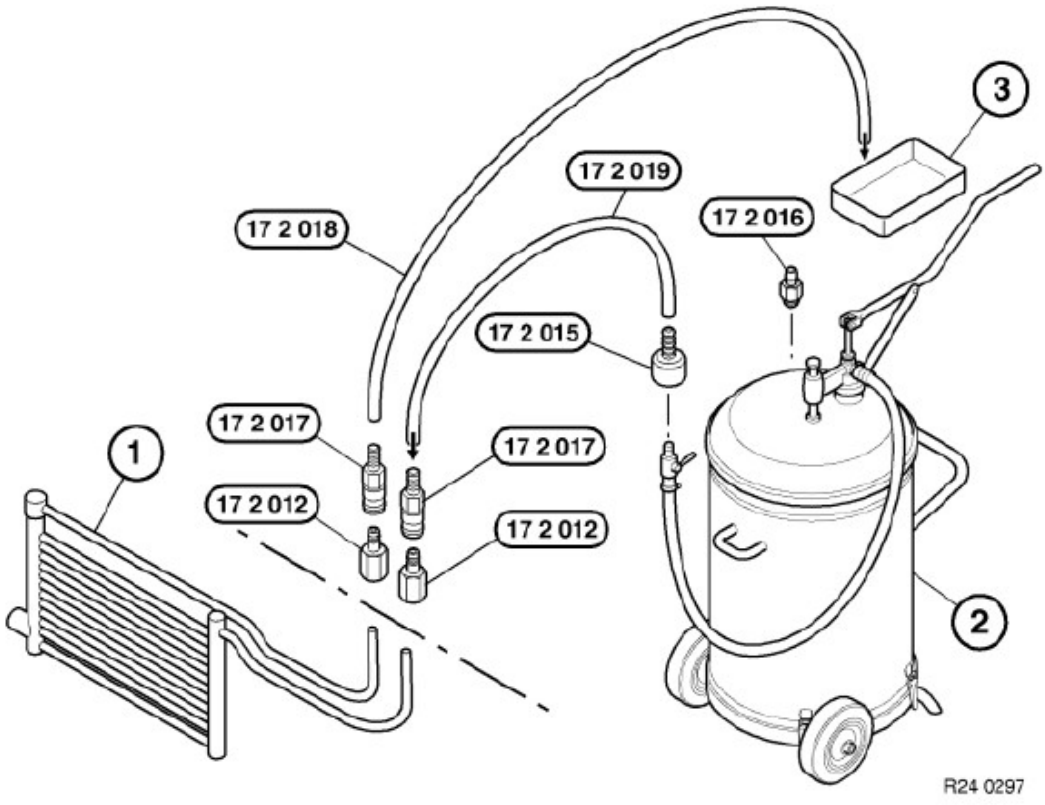
17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

17 2 021 Mounting plate for adapter 17 2 011 for transmissions A5S 325Z, GA6HP26Z

Arrangement of flushing apparatus for transmission A4S 310R



1) Transmission-oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 70: Arrangement - Flushing Apparatus For Transmission (A4S 310R)

Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

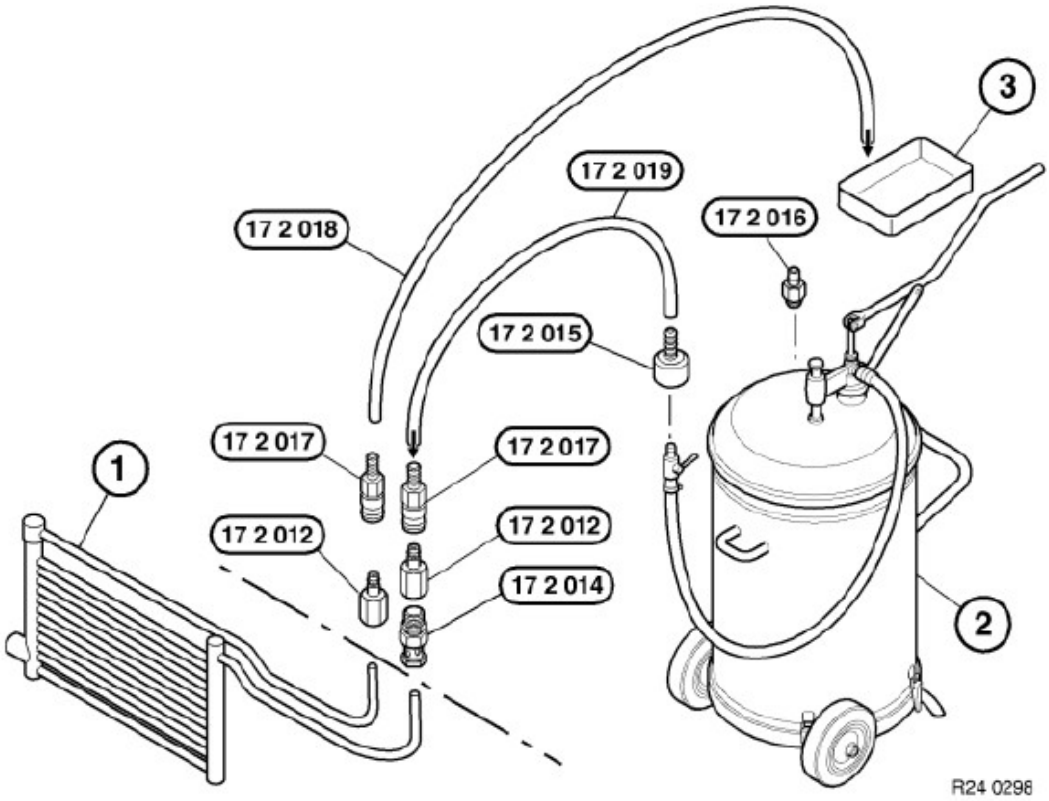
17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

Arrangement of flushing apparatus for transmission A4S 300J



1) Transmission-oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 71: Arrangement - Flushing Apparatus For Transmission (A4S 300J)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 014 Banjo bolt for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

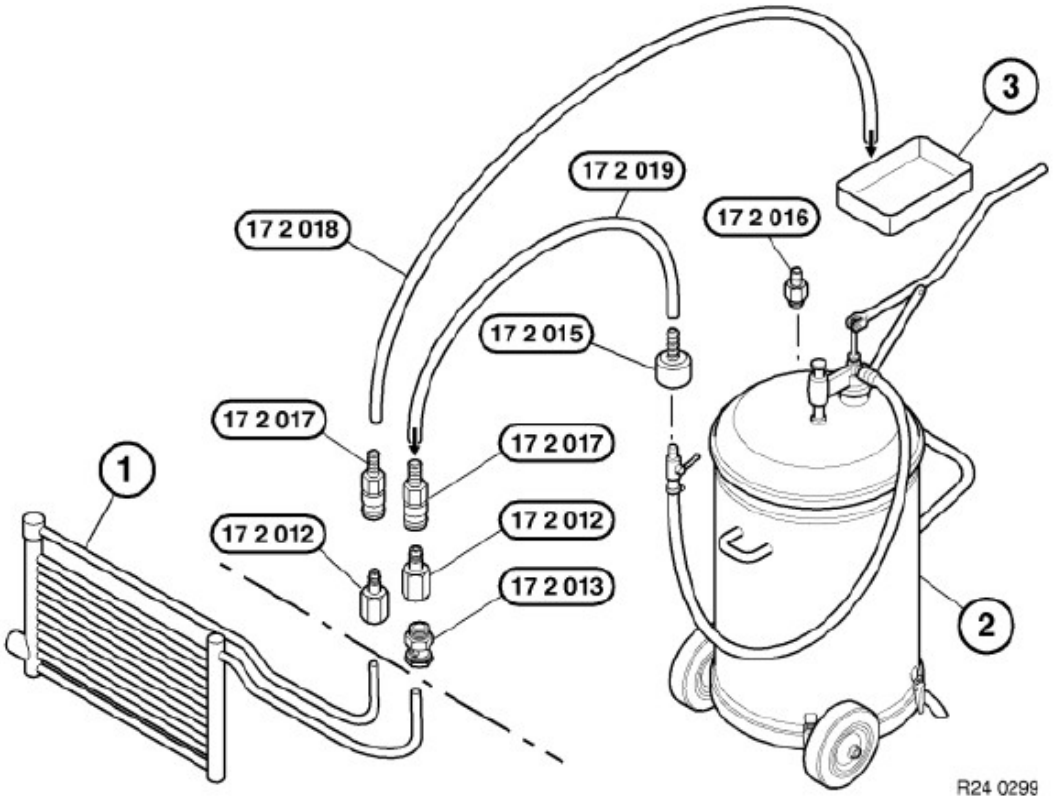
17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

Arrangement of flushing apparatus for transmission A5S 440Z



1) Transmission-oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 72: Arrangement - Flushing Apparatus For Transmission (A5S 440Z)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 013 Banjo bolt for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

17 21 500 FLUSHING TRANSMISSION OIL COOLER WITH LINES (AUTOMATIC TRANSMISSION) (GA6HP19Z, GAHP26Z, GA6HP32Z)

NOTE: Carry out the work steps listed when:
Installing a new or replacement transmission.

Procedure

Automatic transmission removed.

Connect appropriate adapters (see description below) to oil lines exiting from automatic transmission.

Connect connecting line 17 2 019 from the oil collection unit with the quick-release coupling.

Connect drain line 17 2 018 using quick-release coupling.

Hold and direct open end of drain line into a suitable drip tray.

Using oil collection unit, flush approx. 1 liter of transmission fluid (refer **AUTOMATIC TRANSMISSION - OPERATING FLUIDS**) through oil lines and transmission oil cooler.

Reposition quick-release couplings.

Flush oil lines/transmission oil cooler in opposite direction with approx. 1 liter of transmission fluid.

Disconnect quick-release couplings.

Remove adapter.

NOTE: Dispose of flushing oil correctly.
Do not reuse under any circumstances.

Press hydraulic lines (1) into adapters (2).

Slide clamping bar (3) into guides and secure with screw (4).

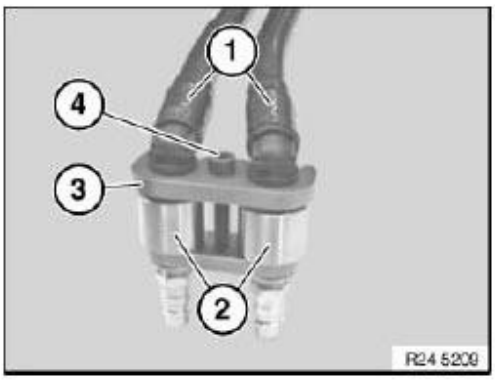


Fig. 73: Identifying Hydraulic Lines, Adapters, Clamping Bar With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement of flushing apparatus for transmissions GA6HP19Z, GA6HP26Z, GA6HP32Z

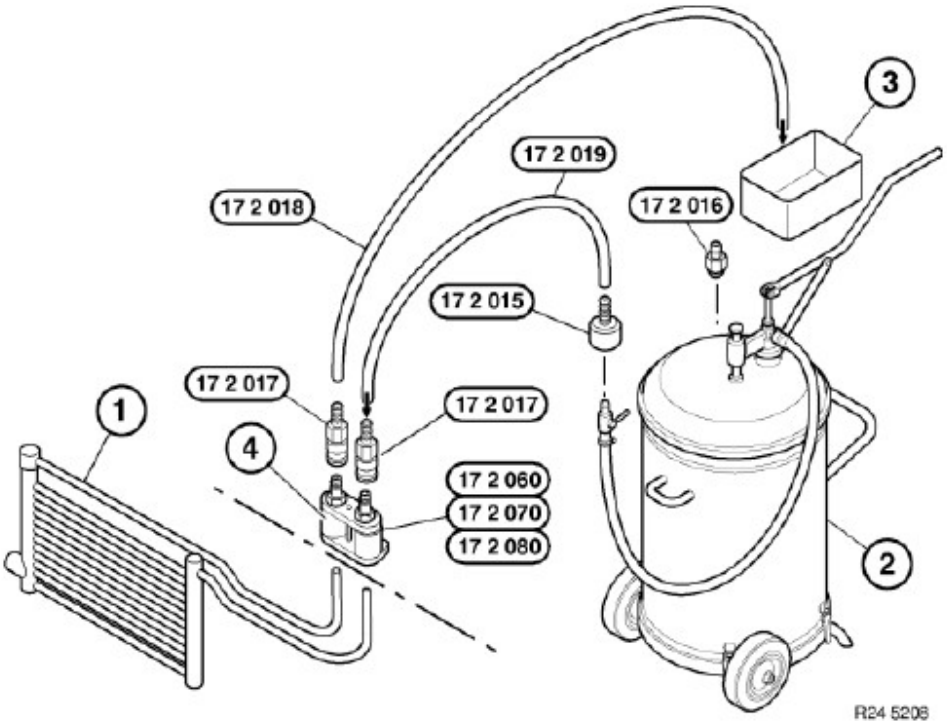


Fig. 74: Arrangement - Flushing Apparatus For Transmissions (GA6HP19Z, GA6HP26Z, GA6HP32Z)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission-oil cooler with lines
2. Oil collection unit

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 019 Hose to oil collection unit (2)

3. Oil drip tray

   17 2 018 Hose to oil drip tray (3)

4. Adapter with clamping bar

   17 2 060 Adapter with clamping bar for aluminum lines and steel lines with aluminum connection (line diameter 12 mm) GA6HP19Z

   17 2 070 Adapter with clamping bar (line diameter 15 mm) GA6HP26Z, GA6HP32Z, TCT for N54 engine

   17 2 080 Adapter with clamping bar for fuel lines GA6HP26Z

17 22 010 REMOVING AND INSTALLING/REPLACING HEAT EXCHANGER FOR AUTOMATIC TRANSMISSION (N52K)

IMPORTANT: Danger of scalding!
Only perform this work after engine has cooled down.

Necessary preliminary tasks

- Drain **COOLANT**
- Remove **UNDERBODY PROTECTION**

Recycling

Catch and dispose of drained coolant in a suitable container.

Transmission fluid emerges when oil lines are detached from heat exchanger.

Catch and dispose of escaping transmission fluid in a suitable container.

Observe country-specific waste-disposal regulations.

Release and disconnect coolant hoses (1).

Unlock transmission fluid lines (2) and detach.

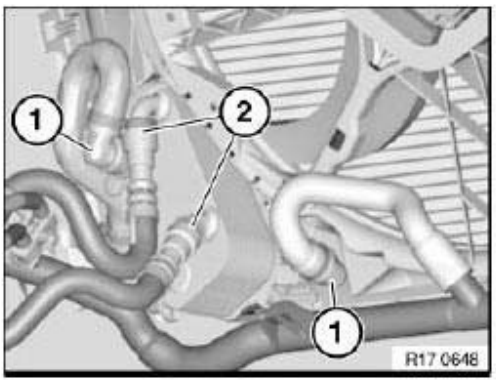


Fig. 75: Identifying Transmission Fluid Lines With Coolant Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

Lay the coolant hose (1) to the side if necessary.

Release screw.

Tightening torque **17 10 6AZ** .

Remove transmission oil cooler.



Fig. 76: Identifying Coolant Hoses With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Assemble engine.**
Check FLUID LEVEL in automatic transmission. If necessary, top up transmission fluid.

ENGINE

Cooling System - Repair - Z4

1700 COOLANT, CHECKING COOLING SYSTEM

17 00 009 CHECKING COOLING SYSTEM FOR LEAKS (N54, N52K)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

Protective measures/rules of conduct

- Wear protective goggles
- Wear protective gloves
- Observe national/country-specific regulations

IMPORTANT: Risk of slipping due to coolant on the floor.

Danger of injury!

Catch and dispose of drained coolant in drip tray (1) and if necessary special tool **00 2 030** (universal hydraulic lifter).

Recycling:

Observe country-specific waste-disposal regulations.

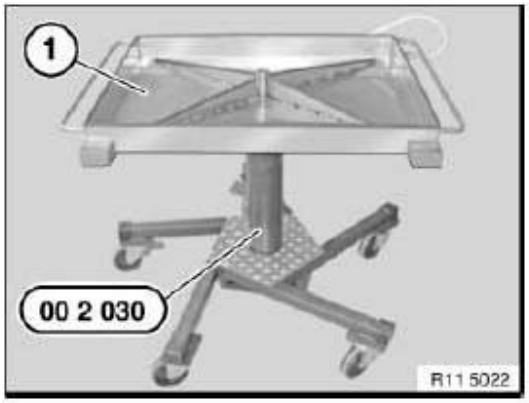


Fig. 1: Lifting Drip Tray Using Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure drop in cooling system

Open cap on coolant expansion tank. Fit special tools (1) 17 0 101 and (2) 17 0 113.

Build up **GAUGE PRESSURE** and wait approx. 2 minutes.

Cooling system is impervious to leaks if pressure drop is max. 0.1 bar.

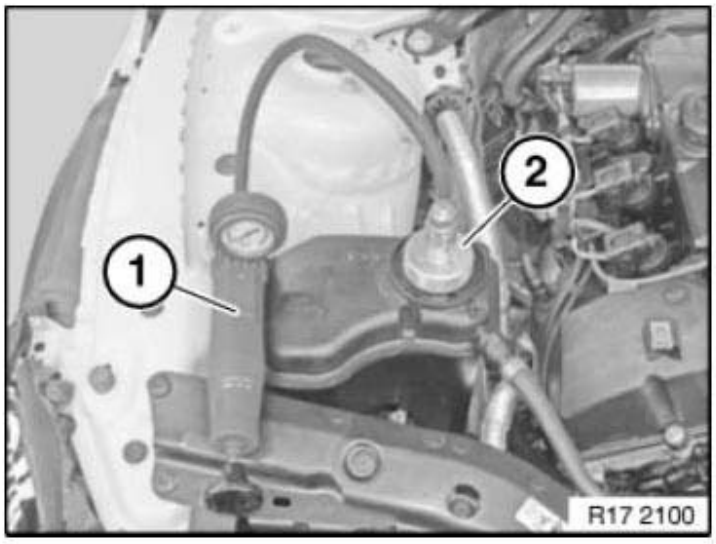


Fig. 2: Checking Pressure Drop In Cooling System Using Special Tools (17 0 101) And (17 0 113)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure relief valve in cap

NOTE: **While the vehicle is driven at high outside temperatures, the design may cause the pressure relief valve in the cap to open slightly and air together with dissolved coolant to escape. This coolant vapor condenses on the surface of the expansion tank and leaves traces when the vehicle has cooled down. These traces do not indicate whether the cap is defective or not. When the vehicle has been parked up for an extended period of time, the residual escaping coolant can cause the pressure relief valve in the cap to stick; therefore check the cap again 2 to 3 times.**

Replace the cap only after you have checked three times and there is an incorrect opening pressure.

Checking pressure relief valve in cap

Screw cap (1) onto special tool 17 0 114.

Build up pressure with special tool (hand pump) 17 0 101; observe pressure gauge to ascertain when opening pressure is achieved.

Compare **OPENING PRESSURE** of pressure relief valve.

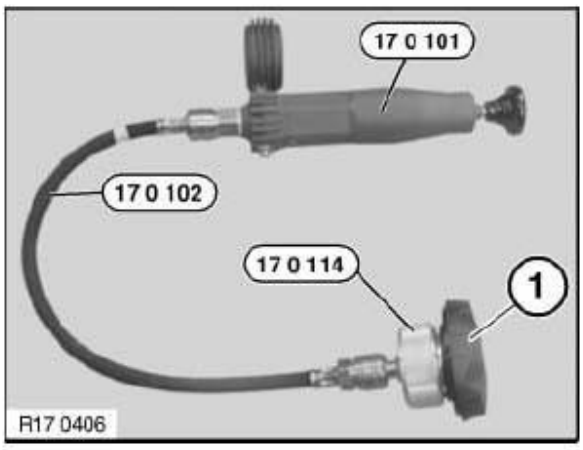


Fig. 3: Checking Pressure Relief Valve In Screw Cap Using Special Tool (17 0 114)
Courtesy of BMW OF NORTH AMERICA, INC.

17 00 515 CHECKING FUNCTION OF RADIATOR AND HEATING SYSTEM

WARNING: Danger of scalding!

Only carry out work on cooling system after engine has cooled down.

Necessary preliminary tasks:

- Switch off ignition.
- Remove air duct.
- Remove fan cowl with electronic fan.

Check production date.

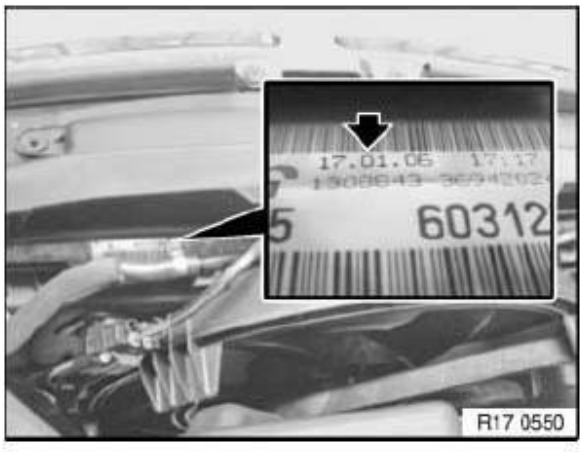


Fig. 4: Locating Production Date
Courtesy of BMW OF NORTH AMERICA, INC.

Clamp off low-temperature feed lines with special tool **13 3 010** .

Function test:

Observe diagnosis instructions.

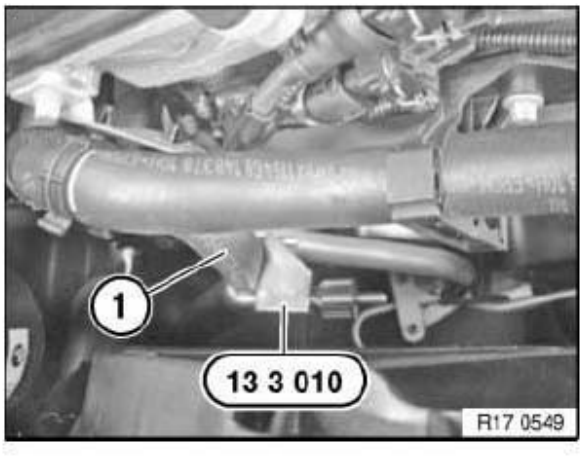


Fig. 5: Identifying Special Tool (13 3 010)
Courtesy of BMW OF NORTH AMERICA, INC.

Check function of radiator.

Clamp off low-temperature feed line (1) at coolant pump outlet **or** radiator inlet with special tool **13 3 010** (see arrows).

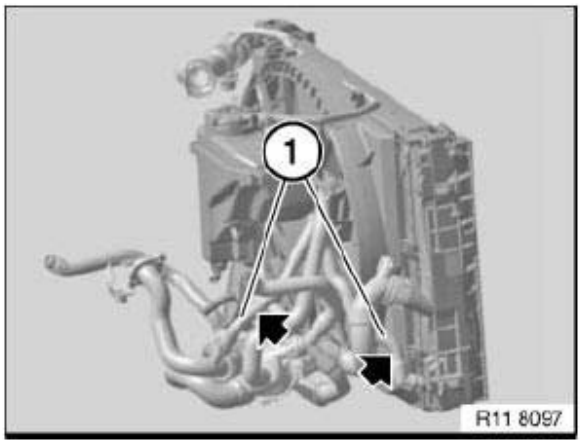


Fig. 6: Locating Low-Temperature Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Automatic transmission only

Check function of heat exchanger.

Clamp off low-temperature feed line (1) at coolant pump outlet with special tool **13 3 010** (see arrow).

Clamp off low-temperature feed line (2) at oil-coolant heat exchanger with special tool **13 3 010** (see arrow).

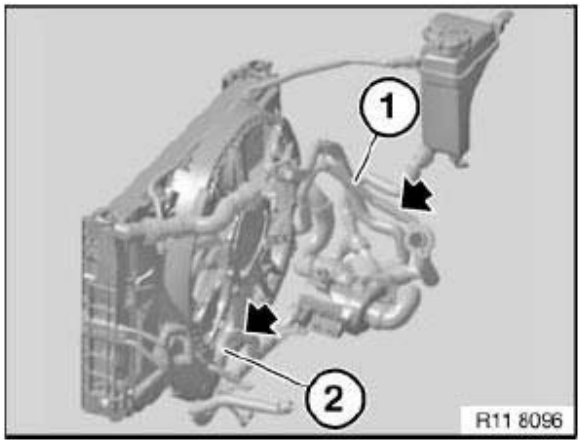


Fig. 7: Locating Low-Temperature Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Check heating and cooling circuits in accordance with diagnosis instruction.

17 00 008 DRAINING AND ADDING COOLANT (N54)

WARNING: Risk of scalding!

This repair work on the cooling system should only be carried out on an engine that has cooled down!

IMPORTANT: Lifetime coolant filling:

Never reuse used coolant!

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.

In the case of other removal work involving the draining of partial quantities of coolant, replace these quantities which have been drained with new coolant.

Installation note:

Use only recommended coolant. See **COOLING SYSTEM - OPERATING FLUIDS** .

Observe **mixture ratio** .

Protective measures/rules of conduct

- Wear safety goggles
- Wear protective gloves
- Observe national/country-specific regulations

IMPORTANT: For dirt contamination of the cooling system (e.g. by engine oil), the cooling system must be rinsed with water until all dirt contamination is removed!

IMPORTANT: Risk of skidding due to coolant on the floor.

Danger of injury!

Catch and dispose of drained coolant in drip tray (1) and if necessary special tool **00 2 030** (universal hydraulic lifting equipment).

Recycling

Observe country-specific waste disposal regulations.

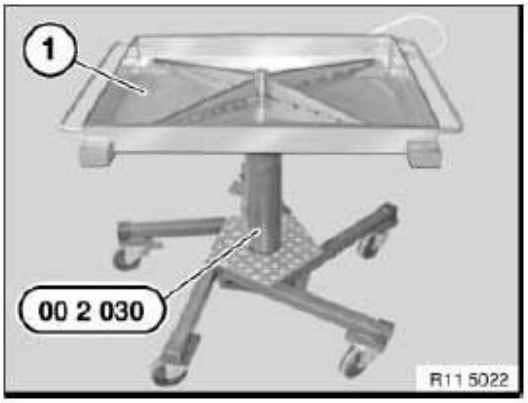


Fig. 8: Lifting Drip Tray Using Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary work:

- Remove front **UNDERBODY PROTECTION**
- Remove **FAN COWL**

Draining coolant

Open sealing cap (1) on coolant expansion tank.

Installation note:

Close sealing cap (1) until the arrow marks line up.

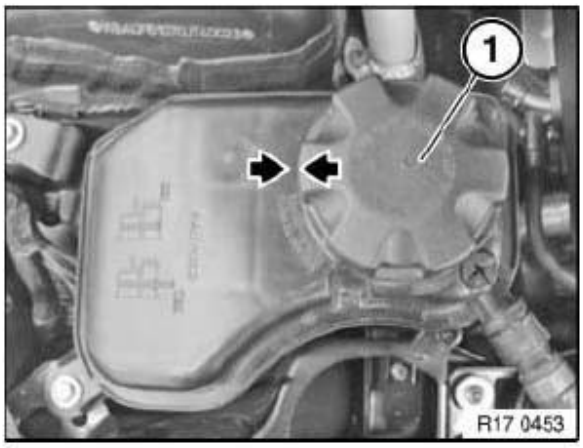


Fig. 9: Locating Sealing Cap And Coolant Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten and detach coolant hose (1) from radiator.

Drain, catch and dispose of coolant.

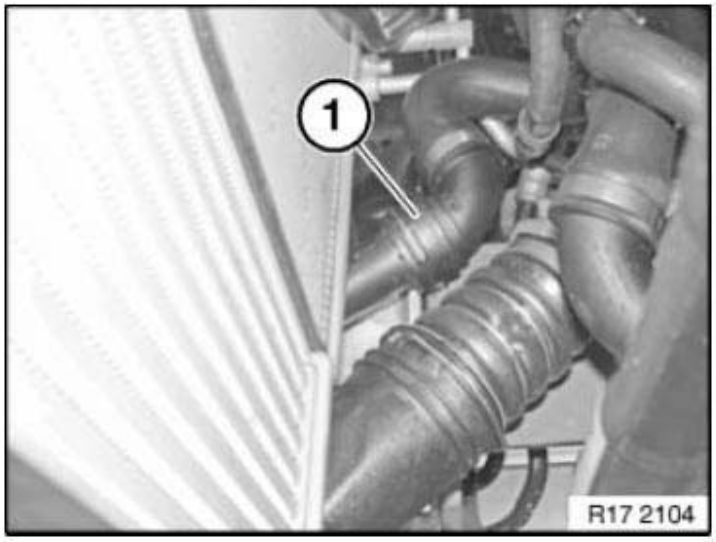


Fig. 10: Identifying Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Adding coolant

Use recommended coolant. See **COOLING SYSTEM - OPERATING FLUIDS** .

Observe **mixture ratio** .

Observe **CAPACITIES** .

Fill and vent **COOLING SYSTEM** .

Observe bleeding instructions without fail.

Assemble engine.

Check **COOLANT SYSTEM** for tightness.

17 00 ... INSTRUCTIONS FOR WORKING ON COOLING SYSTEM

WARNING: Danger of scalding! Work on the cooling system should only be carried out when the engine has cooled down.

IMPORTANT: Wear protective gloves and safety goggles.

IMPORTANT: Lifetime coolant filling:

Never reuse used coolant.

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.

In the case of other removal work involving the draining of partial quantities of coolant, replace these quantities which have been drained with new coolant.

IMPORTANT: Open cooling system only when it has cooled down.

Opening the cooling system while hot can result in air entering the system.

This can cause overheating with permanent damage to the engine.

IMPORTANT: You must protect the alternator against contamination before carrying out any work on the cooling circuit.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

IMPORTANT: Do not fill coolant expansion tank over MAX level as overfilling will cause the coolant to overflow. This may give rise to traces of residual coolant on the expansion tank or in the engine compartment and wrongly suggest possible leakages.

Recycling

Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

NOTE: To disconnect coolant hoses, use commercially available disconnect tools such as HAZET brand tools (see table).

HAZET TOOLS DESCRIPTION CHART

HAZET no.:	Description
4590-1	Disconnect tool, length (mm): 150
4590-2	Disconnect tool, length (mm): 180
4590-3	Disconnect tool, length (mm): 253
4590/2	Disconnect/plier set
4590/3	Disconnect/plier set

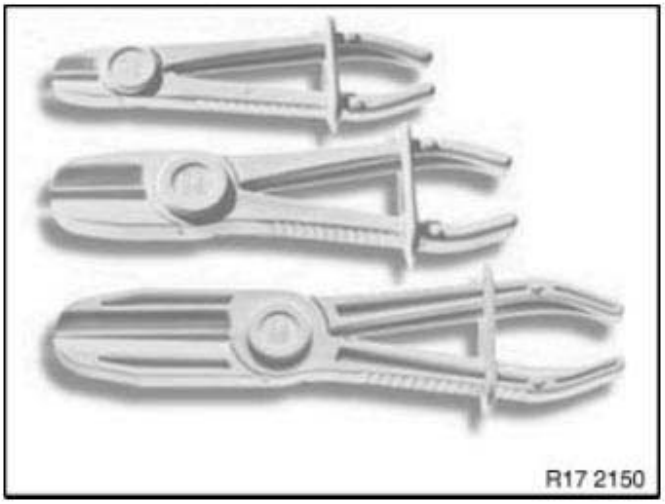


Fig. 11: Identifying Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Tightening torque, hose clamps 17 00 1AZ .

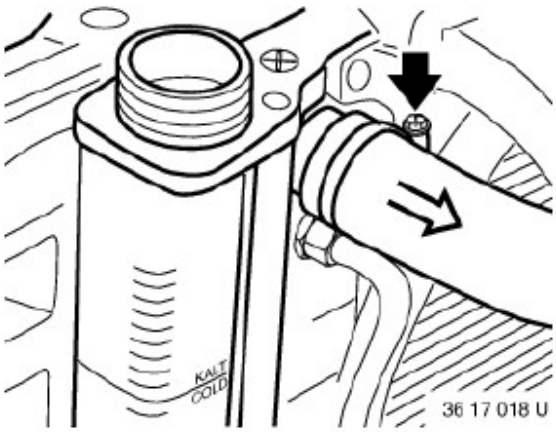


Fig. 12: Locating Hose Clamp Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Instructions for disassembly/assembly of coolant hose quick-connect couplings

Disassembly of quick-connect coupling

Pull out lock (1) and (2). Pull off hose.

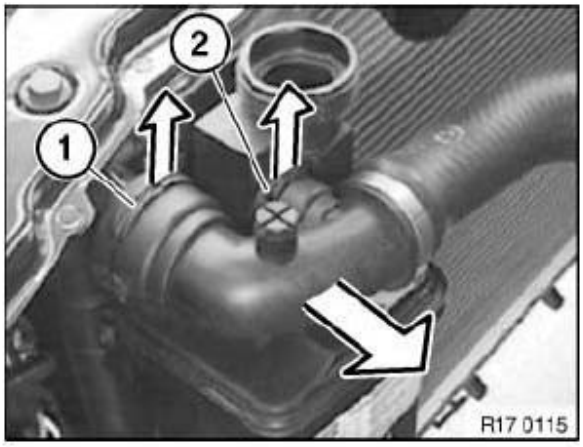


Fig. 13: Disassembling Quick-Connect Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check O-rings (1).

Do not coat O-rings (1) with antiseize agent.

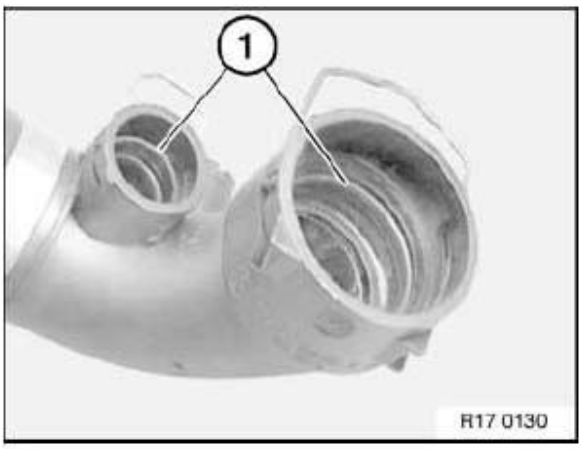


Fig. 14: Identifying O-rings
Courtesy of BMW OF NORTH AMERICA, INC.

Assembly of quick-connect coupling

Press in lock (1) before installing fast-release coupling.

Push on hose.

Quick-connect coupling must clearly snap audibly into place.

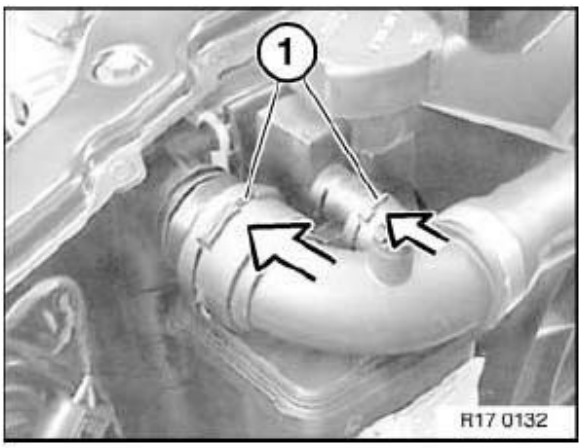


Fig. 15: Assembling Quick-Connect Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start stop function is active.

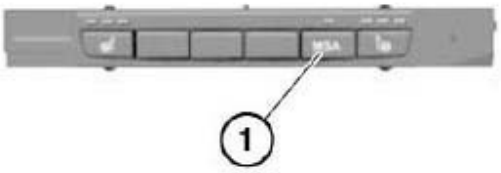
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



R61 1948

Fig. 16: Identifying MSA Switch In Passenger Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
- Workshop mode

  A = 10 mm
- Basic setting (engine hood/bonnet open)

  B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

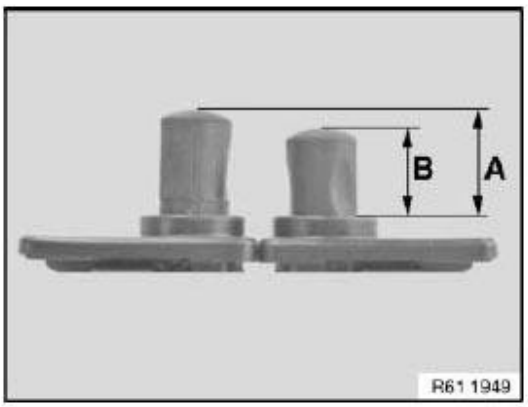


Fig. 17: Identifying Engine Hood/Bonnet Basic Setting And Workshop Mode
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

17 00 039 VENTING AND FILLING COOLING SYSTEM WITH VACUUM FILLING UNIT

SPECIAL TOOLS DESCRIPTION

Type	Engine	Adapter Y from 17 0 100
E60/E61/E63/E64	All	17 0 113
E65/E66	M54/N52/N62/N62T/N73	17 0 105
E65/E66	M57S/M57T/M67/M67T	17 0 113
E70/E71/E72	All	17 0 113
E81/E82/E84/E87/E88/E89	All	17 0 113
E83	M54/N46/N52K	17 0 105
E83	M47S/M57S/M57T/M57Y/N47	17 0 113
E85/E86	All	17 0 105
E90/E91/E92/E93	All	17 0 113
F01/F02/F03/F04/F07/F10	All	17 0 113
R50/R52	W10	17 0 107 and 17 0 102
R50	W17	17 0 109
R52/R53	W11	17 0 109
R55/R56/R57/R60	All	17 0 109
F25	All	17 0 113

IMPORTANT: Lifetime coolant filling:

Never reuse used coolant!

When replacing and removing components which rely on the corrosion

protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.

In the case of other removal work involving the draining of part quantities of coolant, replace these quantities which have been drained with new coolant.

IMPORTANT: You must protect the alternator against contamination by coolant when carrying out repair work on the cooling circuit.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

Note on ordering:

- Workshop equipment
- Workshop equipment catalogue
- Filler unit no. 81 39 2 152 473
- Collecting vessel no. 81 49 2 152 347
- Adapter: **17 0 100**

IMPORTANT: Risk of slipping due to coolant on the floor.

Danger of injury!

Catch and dispose of emerging coolant in drip tray (1) and if necessary special tool **00 2 030** (universal hydraulic lifting equipment).

Recycling

Observe country-specific waste disposal regulations.

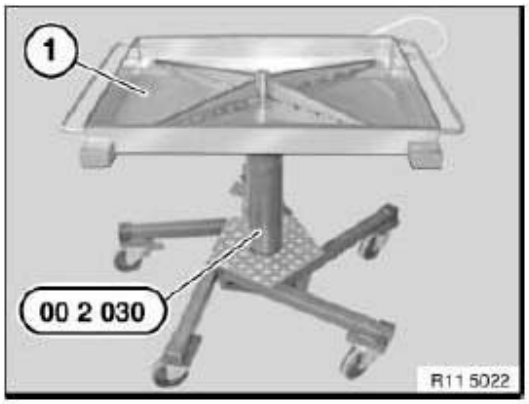


Fig. 18: Lifting Drip Tray Using Special Tool (00 2 030)

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check all the coolant hoses before filling the cooling system with the vacuum filling unit.

If necessary, replace damaged and porous coolant hoses.

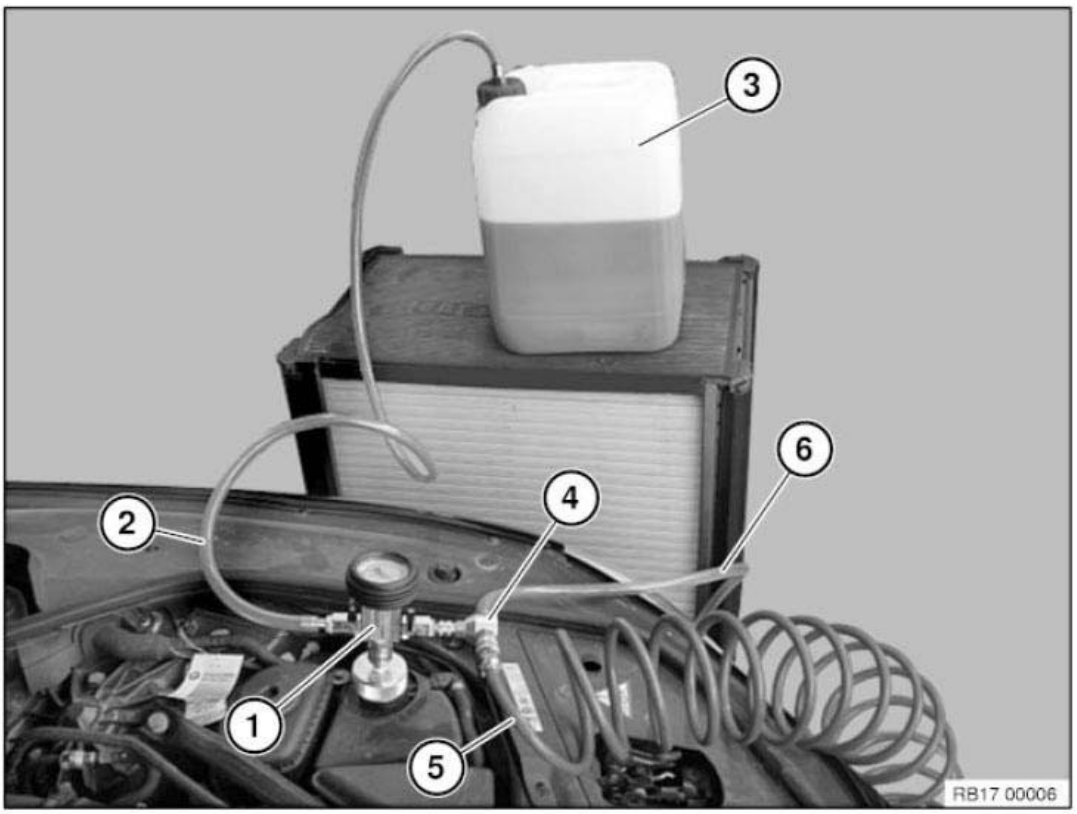


Fig. 19: Identifying Cooling System Components
Courtesy of BMW OF NORTH AMERICA, INC.

- 1) Filling unit with vacuum meter and shut-off values
- 2) Filler hose
- 3) Coolant container
- 4) Venturi nozzle
- 5) Compressed air connection (max. 6 bar)
- 6) Outgoing-air hose (lead outgoing-air hose into a collecting container)

Requirements

- Cooling system expansion tank must be empty.
- There must be sufficiently premixed coolant in the filling unit container, 1 - 2 liters more than the vehicle filling capacity.

- Use recommended coolant. See **COOLING SYSTEM - OPERATING FLUIDS** .
- Observe **mixture ratio** .
- Observe capacities.

- Position the filling unit container at the same height as the coolant expansion tank.
- Compressed-air connection with 6 bar pressure present.
- Set vehicle heater to maximum temperature.

Select adapter (Y) according to table and connect to coolant expansion tank.

Connect filler unit to adapter connection (X).

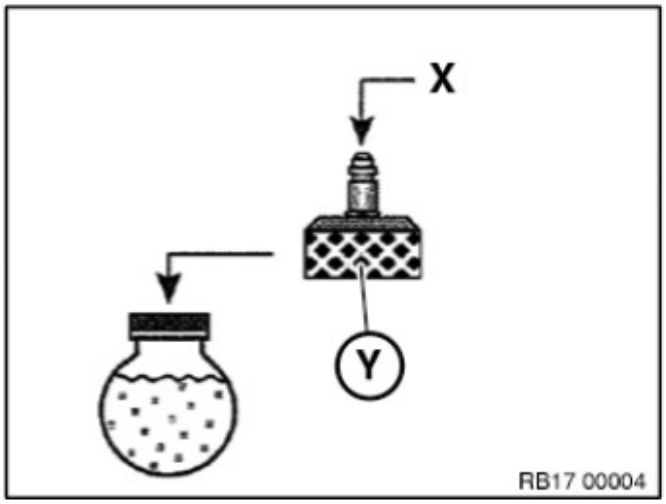


Fig. 20: Identifying Adapter And Adapter Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Shut-off valves (A) and (B) of the filling unit (1) must be closed.

X) Expansion tank connection

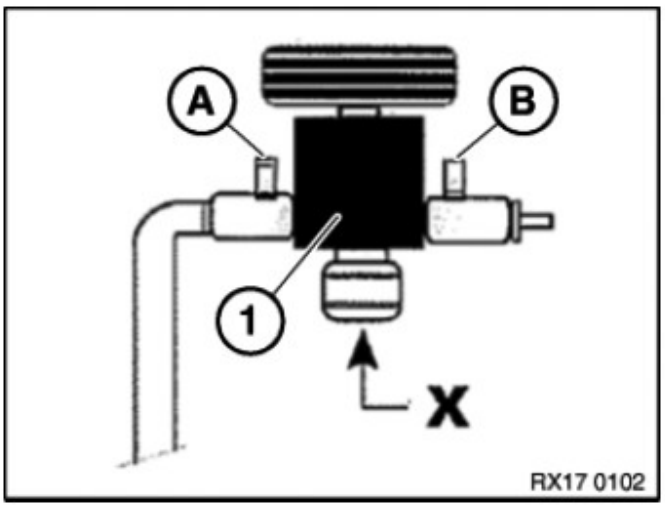


Fig. 21: Identifying Filling Unit Shut-Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Connect venturi nozzle (1) to filling unit (2).

X) Expansion tank connection

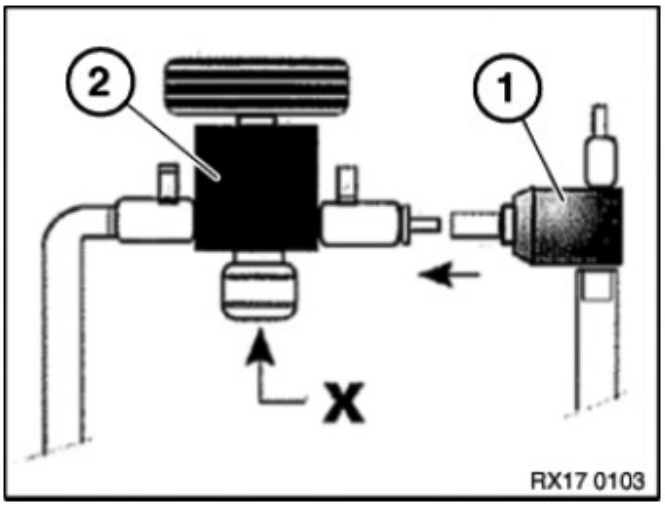


Fig. 22: Connecting Venturi Nozzle To Filling Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Connect compressed air (1).

X) Expansion tank connection

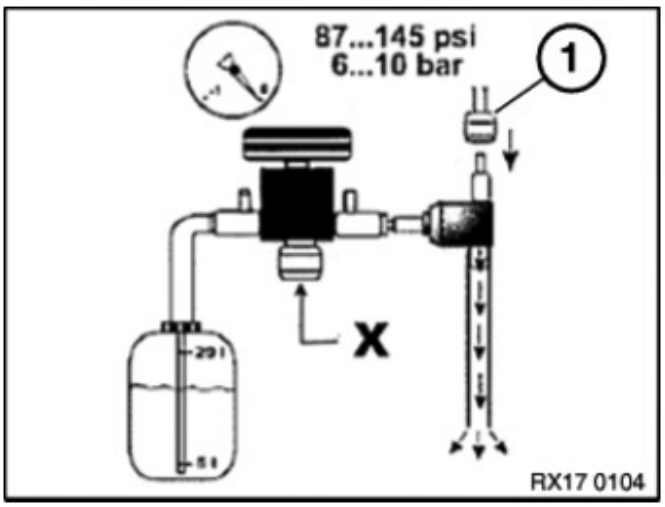


Fig. 23: Connecting Compressed Air Line
Courtesy of BMW OF NORTH AMERICA, INC.

Open shut-off valve (B).

The venturi nozzle produces a flow noise.

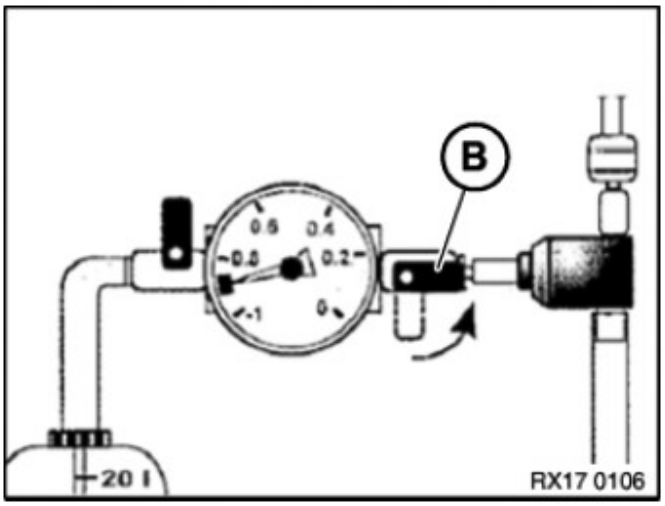


Fig. 24: Opening Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Then open shut-off valve (A) until the filling hose (1) is free of bubbles.

Close shut-off valve (A) again. The filling hose (1) is vented in this way.

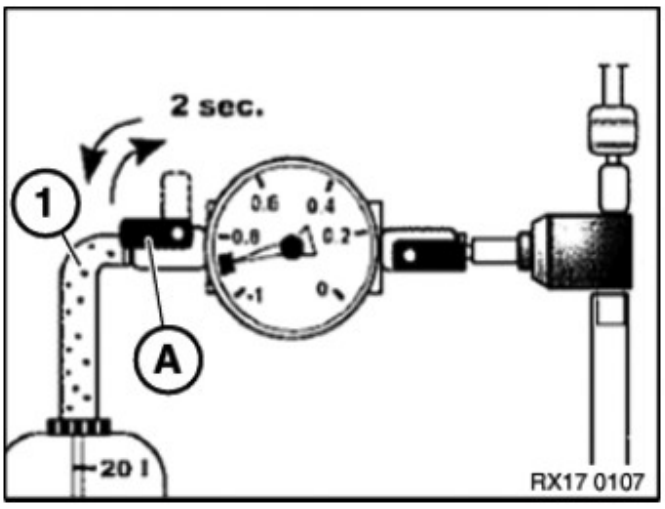


Fig. 25: Opening/Closing Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Shut-off valve (B) remains open. Generate vacuum in coolant system for approx. 2 minutes. The final vacuum is reached at a vacuum of -0.7 to -0.95 bar. Green scale on the vacuum meter.

NOTE: The coolant hoses contract during vacuum build-up.

Then close shut-off valve (B) again.

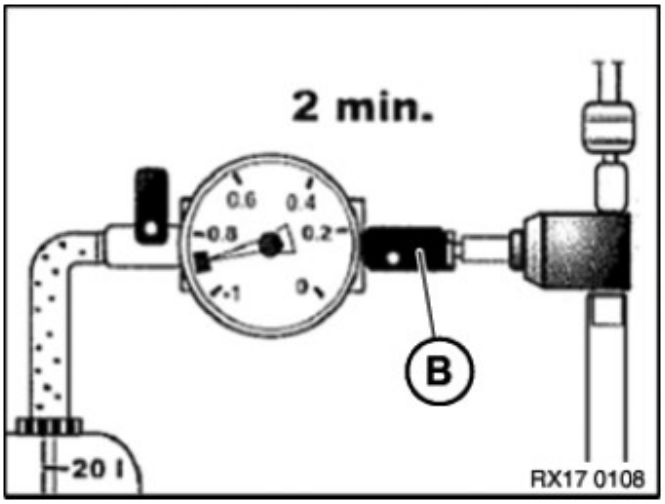


Fig. 26: Identifying Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Both shut-off valves (A) and (B) must be closed. Then seal Venturi nozzle (1).

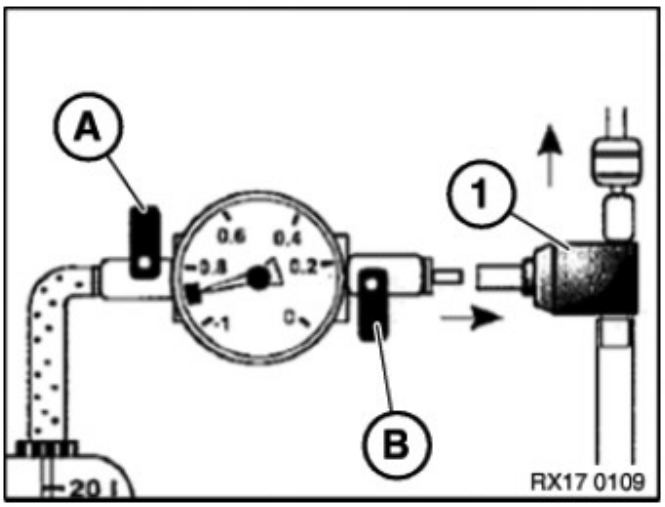


Fig. 27: Sealing Venturi Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

The cooling system must hold the vacuum for 30 seconds. If the needle in the vacuum meter falls, this indicates a leak in the cooling system.

If the vacuum remains constant, proceed with filling.

In event of leaks, check cooling system for leaks.

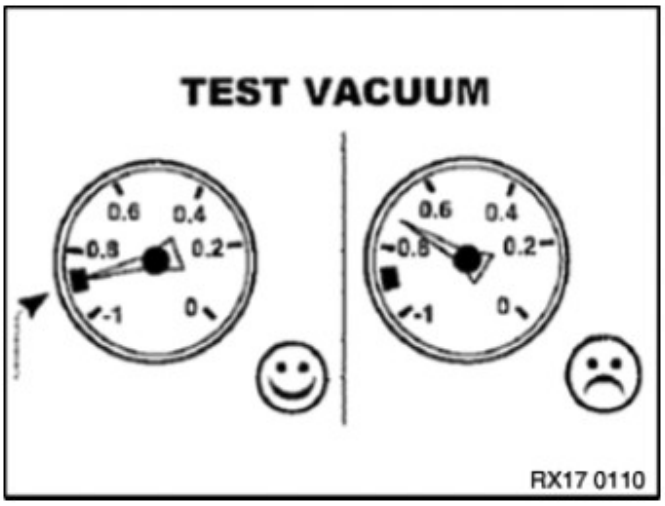


Fig. 28: Testing Cooling System Vacuum
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: There must be sufficiently premixed coolant in the filling unit container, 1 - -2 liters more than the vehicle filling capacity.

Position the filling unit container at the same height as the coolant expansion tank.

Shut-off valve (B) remains closed during the filling process.

To fill the cooling system, open shut-off valve (A) to filling unit container.

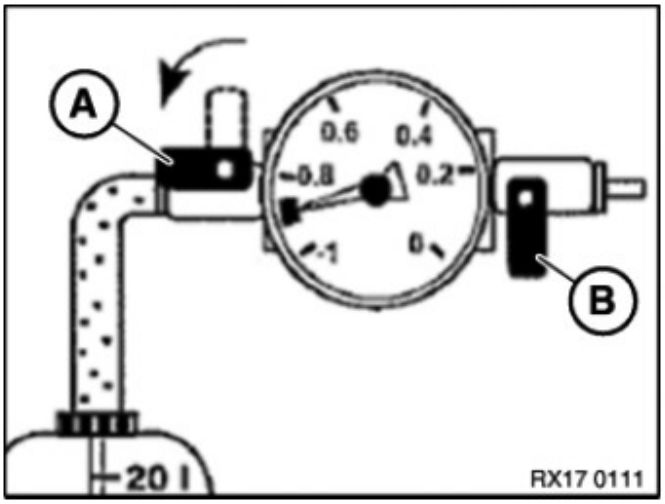


Fig. 29: Opening Shut-Off Valve To Filling Unit Container
Courtesy of BMW OF NORTH AMERICA, INC.

Coolant is now added.

The filling process is finished when the needle in the vacuum meter is at 0 bar or no longer falls.

If necessary, reduce remaining vacuum. Open shut-off valve (B) to do so.

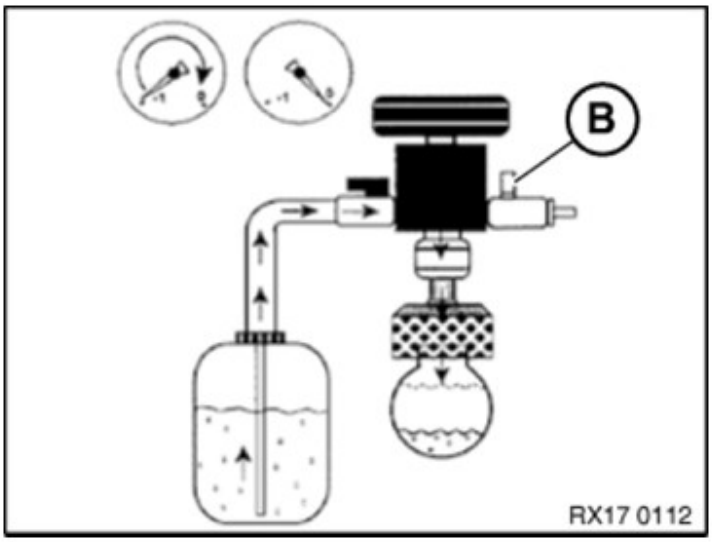


Fig. 30: Identifying Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Remove filling unit with adapter from expansion tank.

Close coolant expansion tank.

Check function of cooling system.

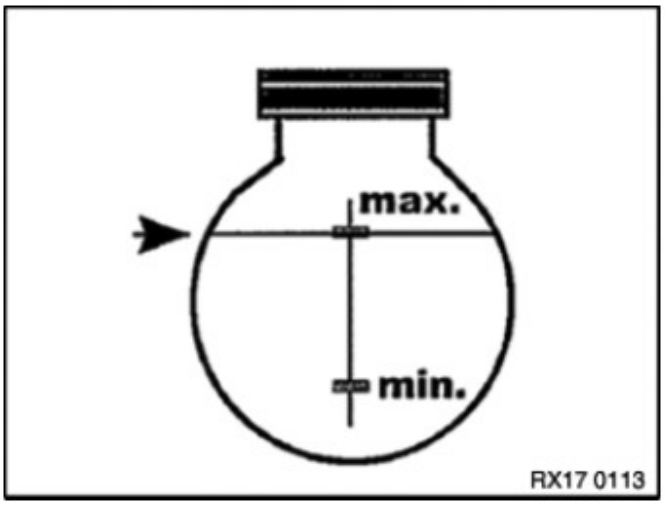


Fig. 31: Adjusting Coolant Level To Max
Courtesy of BMW OF NORTH AMERICA, INC.

Check cooling system for leaks.

Venting and filling cooling system with vacuum filling unit

17 00 039 VENTING AND FILLING COOLING SYSTEM WITH VACUUM FILLING UNIT

IMPORTANT: Lifetime coolant filling:

Never reuse used coolant!

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.

In the case of other removal work involving the draining of partial quantities of coolant, replace these quantities which have been drained with new coolant.

IMPORTANT: You must protect the alternator against contamination by coolant before carrying out any work on the coolant circuit.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

Note on ordering:

- Workshop equipment
- Workshop equipment catalogue
- No.- 81 93 2 152 473

IMPORTANT: Risk of slipping due to coolant on the floor.

Risk of injury!

Catch and dispose of emerging coolant in drip tray (1) and if necessary special tool **00 2 030** (universal hydraulic lifter).

Recycling

Observe country-specific waste-disposal regulations.

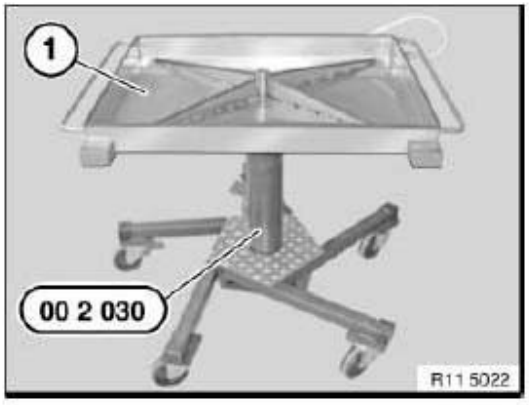


Fig. 32: Lifting Drip Tray Using Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check all the coolant hoses before filling the cooling system with the vacuum filling unit.

If necessary, replace damaged and porous coolant hoses.

NOTE: Following graphics shows F01, procedure for other model series is identical.

Vacuum filling unit consists of

- 1) Filling unit with vacuum meter and shut-off valves
- 2) Filler hose
- 3) Coolant container
- 4) Venturi nozzle
- 5) Compressed-air connection (max. 6 bar)
- 6) Outgoing-air hose (lead outgoing-air hose into a collecting container)

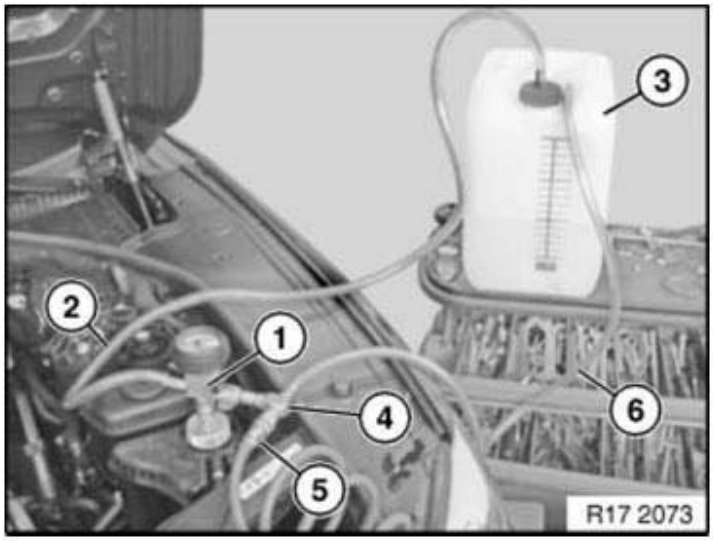


Fig. 33: Identifying Vacuum Filling Unit Components
Courtesy of BMW OF NORTH AMERICA, INC.

Preconditions

- Cooling system expansion tank must be empty.
- There must be sufficiently premixed coolant in the filling unit container, 1 _ 2 liters more than the vehicle filling capacity.
  - Use recommended coolant. See **COOLING SYSTEM - OPERATING FLUIDS** .
  - Observe **mixture ratio** .
  - Observe **FILLING CAPACITIES** .
- Position the filling unit container at the same height as the coolant expansion tank.
- Compressed-air connection with 6 bar pressure present.
- Set heating to maximum temperature.

Application

Connect filling unit (1) with adapter (2) 17 0 113 to coolant expansion tank.

Shut-off valves (A) and (B) must be closed.

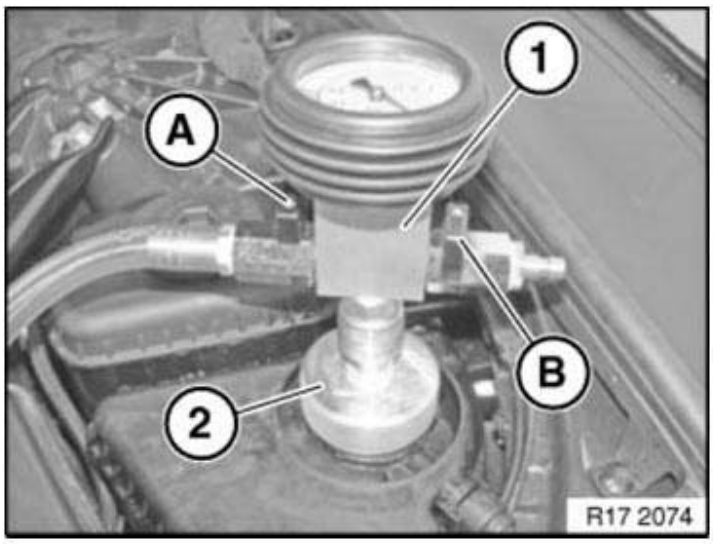


Fig. 34: Identifying Coolant Filling Unit With Adapter And Shut-Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Connect venturi nozzle (1) to filling unit (2).

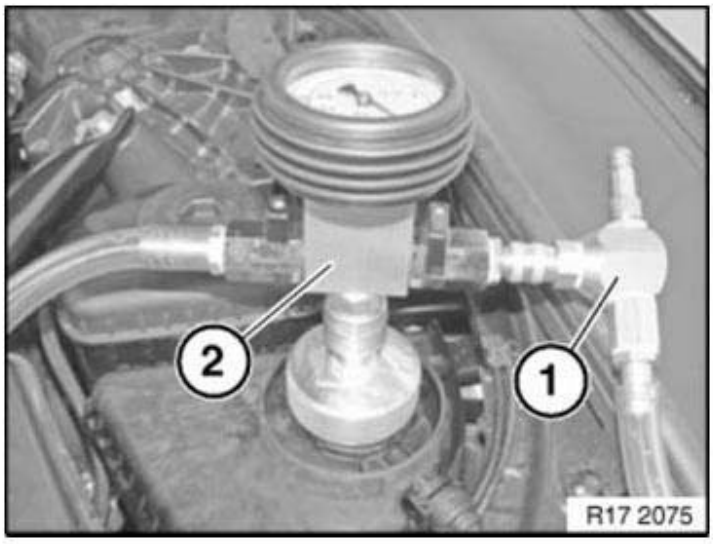


Fig. 35: Identifying Coolant Filling Unit With Venturi Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Connect compressed air (1) and open shutoff valve (B).

The venturi nozzle produces a flow noise.

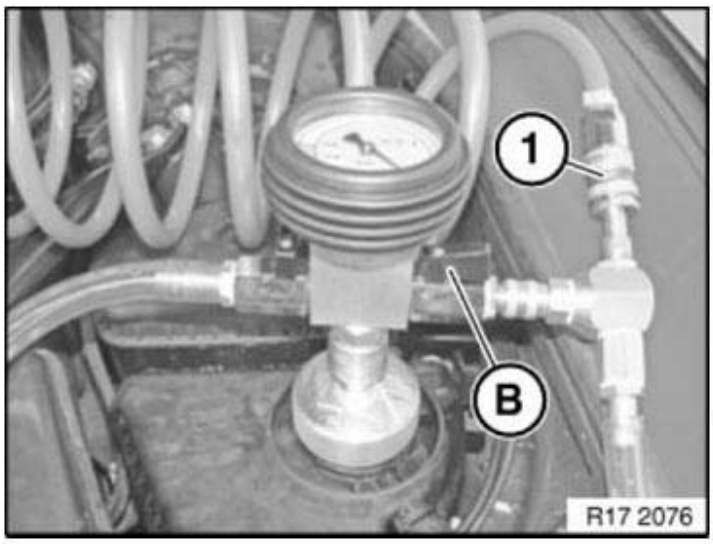


Fig. 36: Identifying Shut-Off Valve With Compressed Air Line
Courtesy of BMW OF NORTH AMERICA, INC.

Then open shut-off valve (A) until filler hose (1) is filled without bubbles. Close shut-off valve (A) again. This vents the filler hose (1).

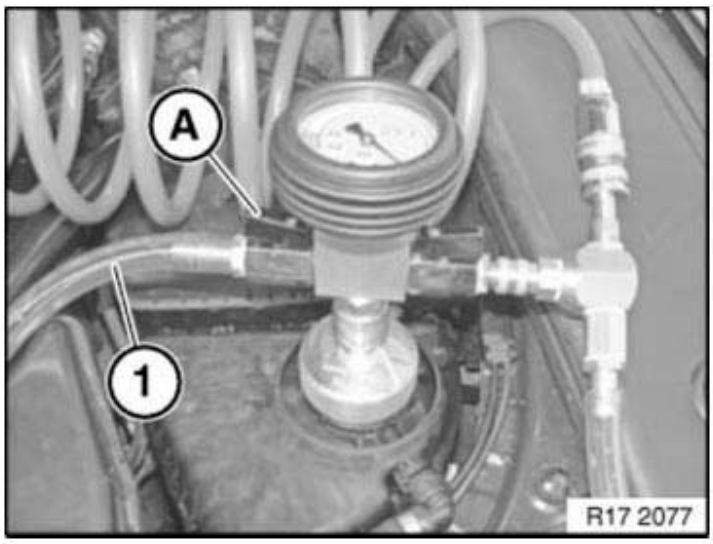


Fig. 37: Identifying Coolant Filling Hose With Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Shut-off valve (B) remains open. Approx. 1 minute. Generate vacuum in cooling circuit. The end vacuum is reached at a vacuum of -0.7 to -0.95 bar. Green scale in vacuum meter.

NOTE: The coolant hoses contract during vacuum build-up.

Then close shut-off valve (B) again.

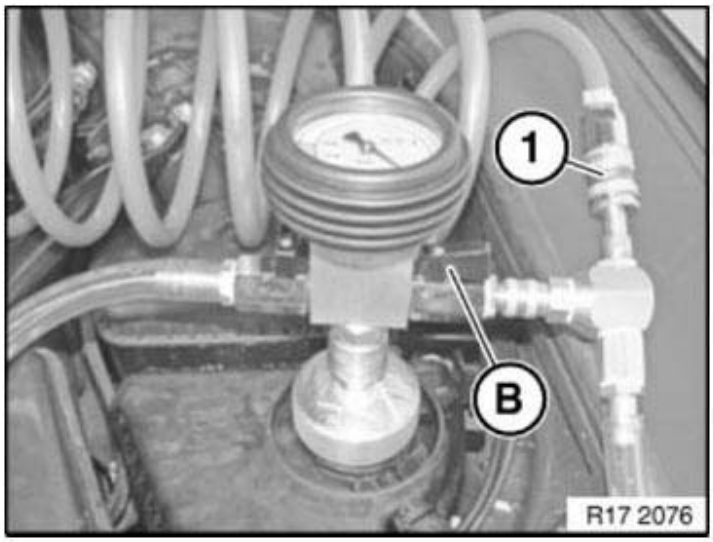


Fig. 38: Identifying Shut-Off Valve With Compressed Air Line
Courtesy of BMW OF NORTH AMERICA, INC.

Both shut-off valves (A) and (B) must be closed. Then seal venturi nozzle (1).

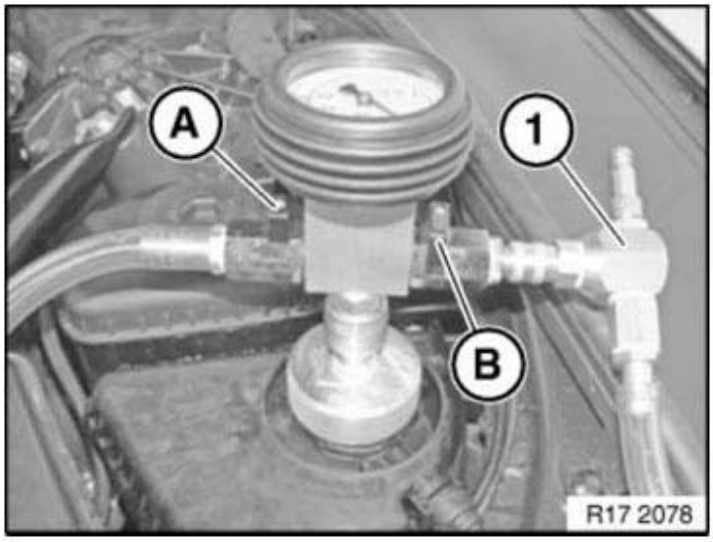


Fig. 39: Identifying Venturi Nozzle With Shut Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

The cooling system must maintain the vacuum for 30 seconds. If the needle in the vacuum meter falls, this indicates a leak in the cooling system.

If the vacuum remains constant, proceed with filling.

In event of leaks, check **COOLING SYSTEM FOR LEAKS** .

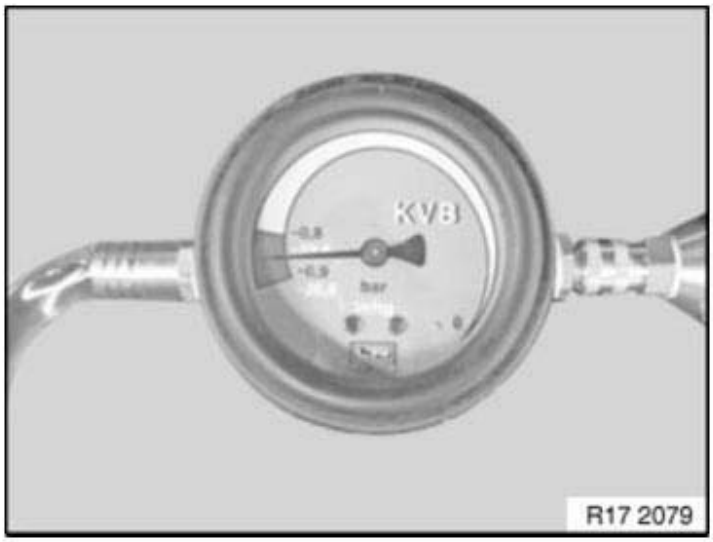


Fig. 40: Checking Cooling System For Leaks
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: There must be sufficiently PREMIXED COOLANT in the filling unit container, 1 2 liters more than the vehicle filling capacity.

Position the filling unit container at the same height as the coolant expansion tank.

Shut-off valve (B) remains closed during the filling process.

To fill the cooling system, open shut-off valve (A) to filling unit container.

Coolant is now added.

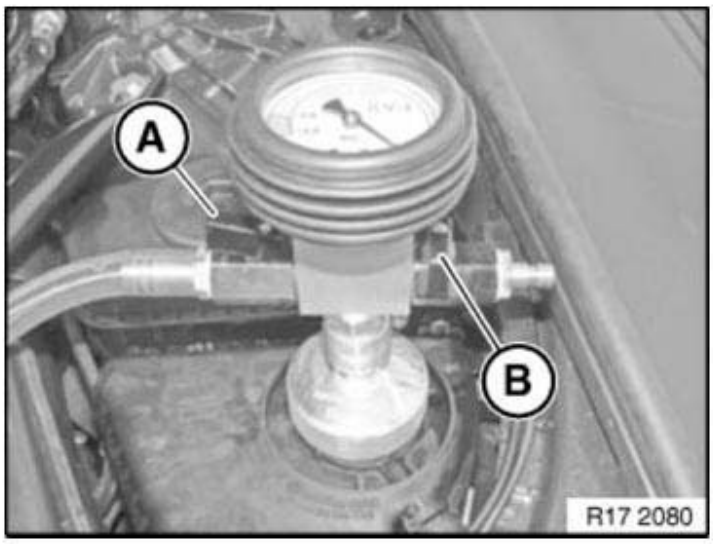


Fig. 41: Identifying Cooling System Shut-Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

The filling process is finished when the needle in the vacuum meter is at 0 bar or no longer falls.

If necessary, release remaining vacuum. To do so, open shut-off valve (B).

Remove filling unit with adapter from expansion tank.

Adjust coolant level to max.

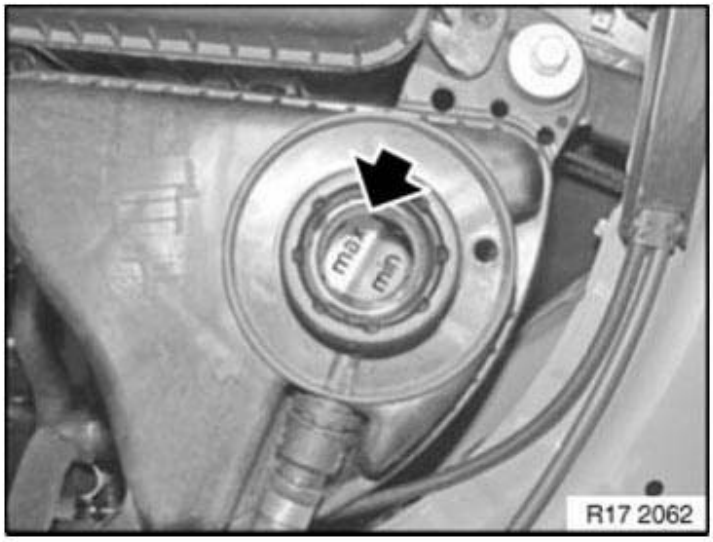


Fig. 42: Identifying Coolant Level
Courtesy of BMW OF NORTH AMERICA, INC.

Close coolant expansion tank.

Installation:

Close cap (1) until the arrow marks line up.

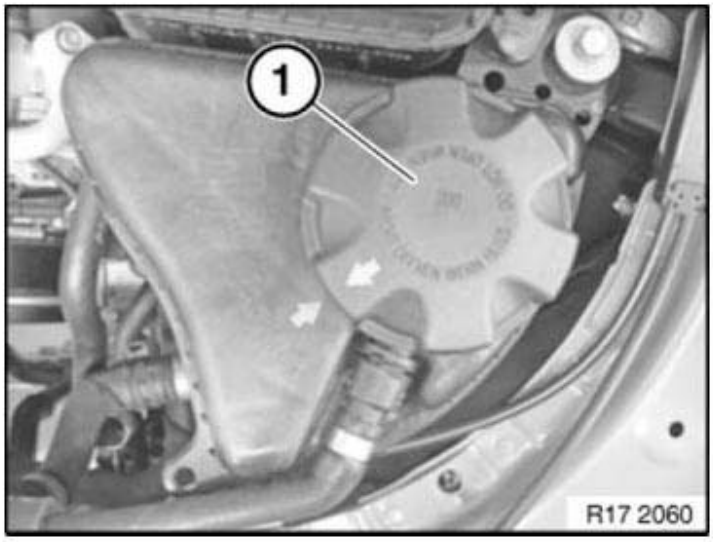


Fig. 43: Identifying Coolant Sealing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Check function of cooling system.

Check **COOLING SYSTEM FOR LEAKS** .

17 00 039 VENTING COOLING SYSTEM AND CHECKING FOR WATER LEAKS (N54)

WARNING: Danger of scalding!

Open sealing cap only after engine has cooled down.

IMPORTANT: Electric coolant pump!

FOLLOW INSTRUCTIONS FOR WORKING ON COOLING SYSTEM .

IMPORTANT: Lifetime coolant filling:

Never reuse used coolant!

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.

In the case of other removal work involving the draining of partial quantities of

coolant, replace these quantities which have been drained with new coolant.

Only when refilling!

Use recommended coolant. See **COOLING SYSTEM - OPERATING FLUIDS** .

Observe **mixture ratio** .

Perform filling operation slowly.

Adjust coolant level to MAX.

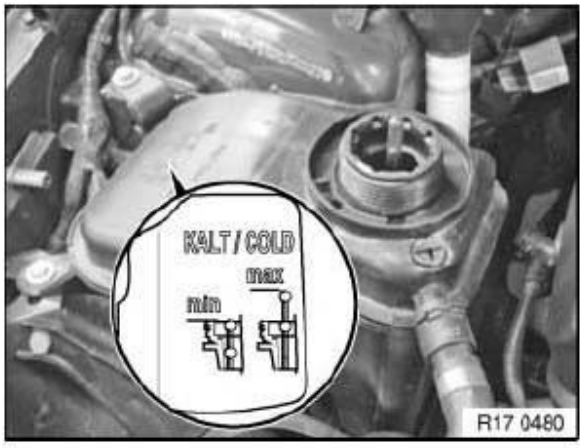


Fig. 44: Identifying Coolant Level To MAX
Courtesy of BMW OF NORTH AMERICA, INC.

Close coolant expansion tank.

Installation:

Close cap (1) until the arrow marks line up.

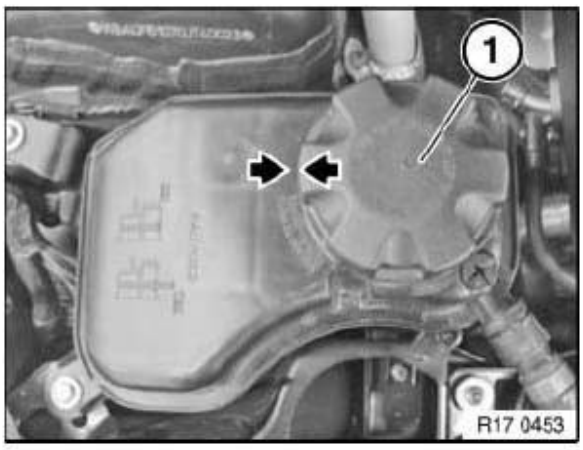


Fig. 45: Locating Sealing Cap And Coolant Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The following venting procedure is necessary e.g. when a part is replaced in the cooling system or when the cooling system is refilled.

Vehicles with independent heating only

Open vent screw (1).

Tightening torque **17 00 4AZ** .

Slowly fill coolant expansion tank with recommended coolant. See **COOLING SYSTEM - OPERATING FLUIDS** . .

Close vent screw (1) after coolant emerges.

Installation:

Have a cleaning cloth ready and mop up emerging coolant.

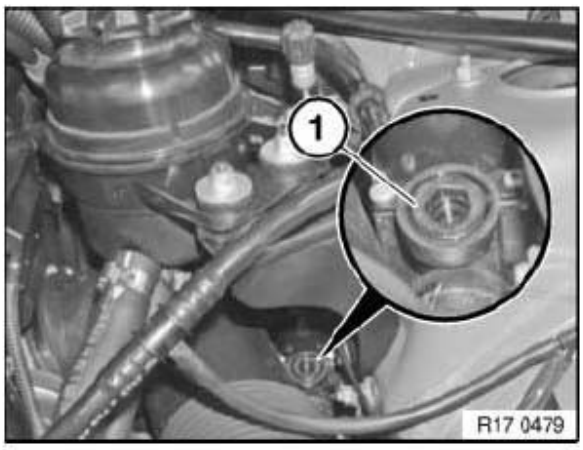


Fig. 46: Identifying Vent Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Adding coolant

NOTE: **Open vent screw (1).**

Fill coolant expansion tank up to lower edge of filler neck with recommended coolant. See COOLING SYSTEM - OPERATING FLUIDS . .

Observe mixture ratio .

Close bleed screw (1).

Close cap on expansion tank.

Installation:

Have a cleaning cloth ready and mop up emerging coolant.

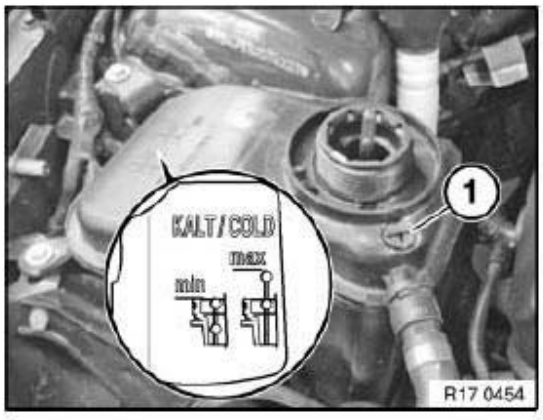


Fig. 47: Identifying Vent Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Only when venting!

NOTE: Do not open the coolant expansion tank cap during the venting procedure.

1. **Connect battery charger.**
2. **Switch on ignition.**
3. **Set heater to maximum temperature and turn fan down to lowest speed.**
4. **Press accelerator pedal for 10 seconds to floor. Engine must not be started.**
5. **The venting procedure is started when the accelerator pedal is pressed and takes approx. 12 minutes. (Electric coolant pump was activated and shuts down automatically after approx. 12 minutes).**
6. **Then top up fill level in coolant expansion tank with 100 ml above max (see illustration).**
7. **Check cooling system for leaks.**
8. **If venting has to be carried out again (e.g. if cooling system is leaking), allow DME to fall completely (leave ignition key removed for approx. 3 minutes), then repeat from Point 3.**

Only when venting!

Perform filling operation slowly.

Fill coolant expansion tank with 100 ml above max.

100 ml corresponds to A=6 mm.

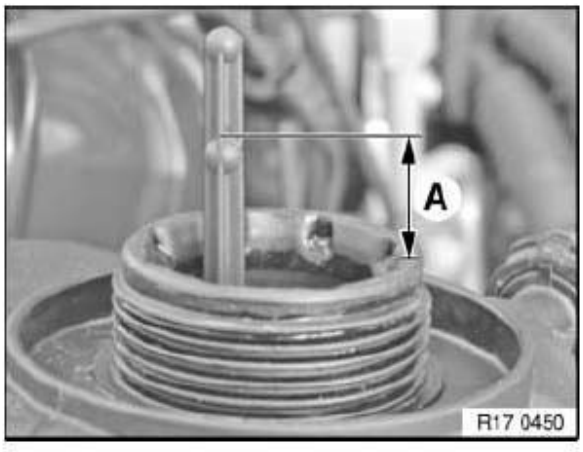


Fig. 48: Identifying Coolant Expansion Tank Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Close coolant expansion tank.

Installation:

Close cap (1) until the arrow marks line up.

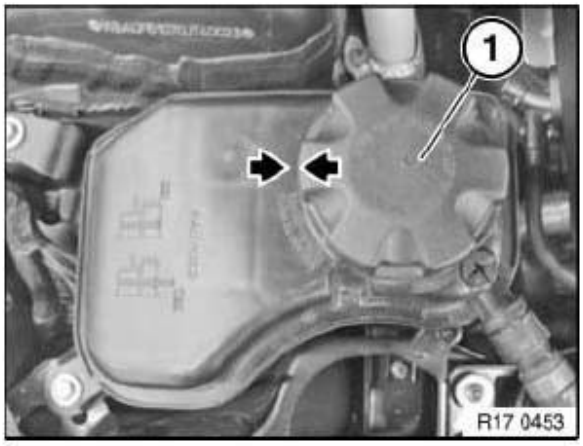


Fig. 49: Locating Sealing Cap And Coolant Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

1710 RADIATOR, EXPANSION TANK, PIPES

17 00 009 CHECKING COOLING SYSTEM FOR LEAKS (N54, N52K)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

Protective measures/rules of conduct

- Wear protective goggles
- Wear protective gloves
- Observe national/country-specific regulations

IMPORTANT: Risk of slipping due to coolant on the floor.

Danger of injury!

Catch and dispose of drained coolant in drip tray (1) and if necessary special tool **00 2 030** (universal hydraulic lifter).

Recycling

Observe country-specific waste-disposal regulations.

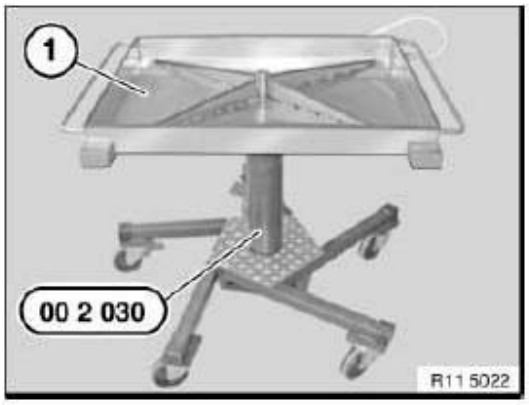


Fig. 50: Lifting Drip Tray Using Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure drop in cooling system

Open cap on coolant expansion tank. Fit special tools (1) 17 0 101 and (2) 17 0 113.

Build up **GAUGE PRESSURE** and wait approx. 2 minutes.

Cooling system is impervious to leaks if pressure drop is max. 0.1 bar.

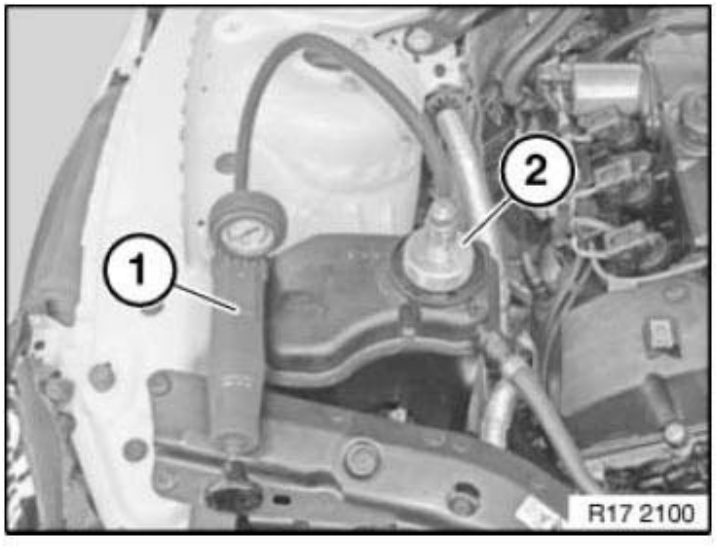


Fig. 51: Checking Pressure Drop In Cooling System Using Special Tools (17 0 101) And (17 0 113)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure relief valve in cap

NOTE: **While the vehicle is driven at high outside temperatures, the design may cause the pressure relief valve in the cap to open slightly and air together with dissolved coolant to escape. This coolant vapor condenses on the surface of the expansion tank and leaves traces when the vehicle has cooled down. These traces do not indicate whether the cap is defective or not. When the vehicle has been parked up for an extended period of time, the residual escaping coolant can cause the pressure relief valve in the cap to stick; therefore check the cap again 2 to 3 times.**

Replace the cap only after you have checked three times and there is an incorrect opening pressure.

Checking pressure relief valve in cap

Screw cap (1) onto special tool 17 0 114.

Build up pressure with special tool (hand pump) 17 0 101; observe pressure gauge to ascertain when opening pressure is achieved.

Compare **OPENING PRESSURE** of pressure relief valve.

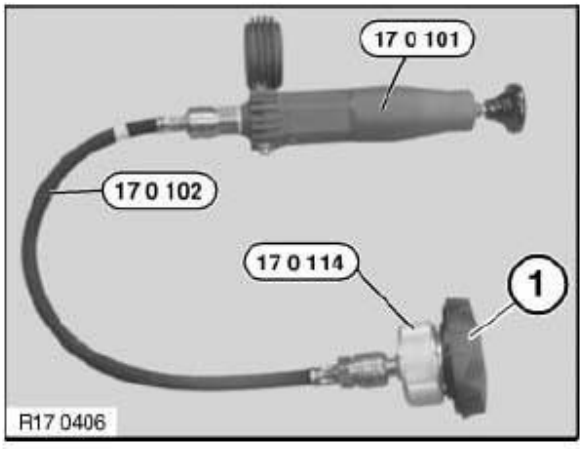


Fig. 52: Checking Pressure Relief Valve In Screw Cap Using Special Tool (17 0 114)
Courtesy of BMW OF NORTH AMERICA, INC.

1711 ENGINE RADIATOR WITH ATTACHMENT

17 11 052 REMOVING AND INSTALLING LEFT MODULE CARRIER (N52K, N54)

WARNING: **Danger of scalding!**

Only perform this work after engine has cooled down.

Necessary preliminary tasks

- Remove **FAN COWL**
- **54 only:**

Remove **INTERCOOLER**

Release bolts (1) on radiator on left and right.

Tightening torque **17 10 2AZ** .

Do **not** unfasten or detach coolant hose (2).

Do **not** drain coolant.

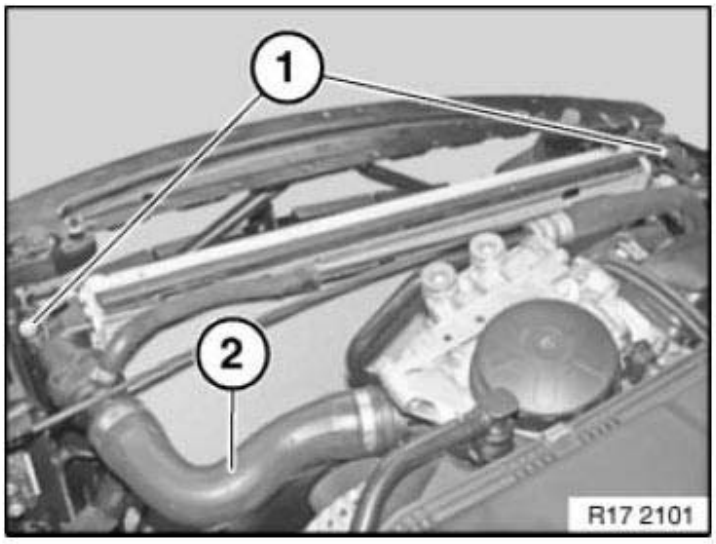


Fig. 53: Identifying Radiator Bolts And Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Slide radiator and condenser slightly towards rear.

Feed out left module carrier (1) and remove towards top.

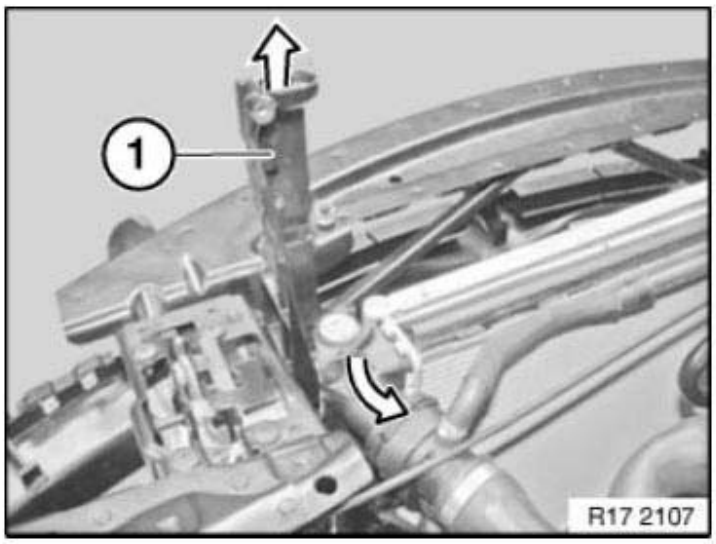


Fig. 54: Removing Left Module Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When reinstalling module carrier (1), ensure without fail that the radiator is correctly seated in mounting (2).

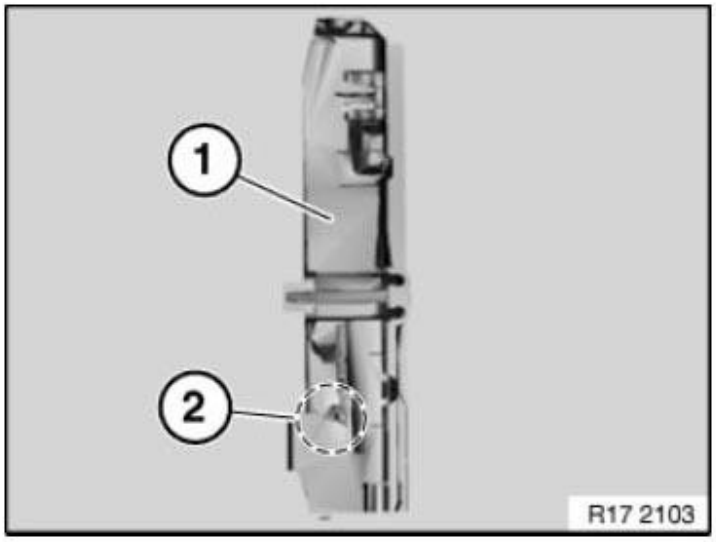


Fig. 55: Identifying Module Carrier And Radiator Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Add final details to vehicle.

17 11 000 REMOVING AND INSTALLING RADIATOR (N52K, N54)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

IMPORTANT: Wear protective goggles and gloves.

Necessary preliminary tasks

- Remove **FAN COWL**
- Draining **COOLANT**
- Unlock coolant hoses and detach
- **54 only:**

Remove **INTERCOOLER**

Release bolts (1) on radiator on left and right.

Tightening torque **17 10 2AZ** .

Unlock and detach coolant hose (2).

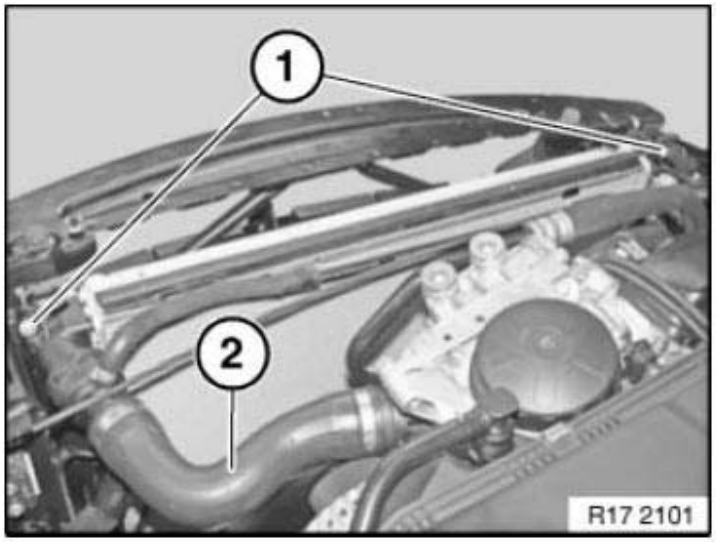


Fig. 56: Identifying Radiator Bolts And Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out module carrier (1) on left.

Feed out radiator (2) and remove towards top.

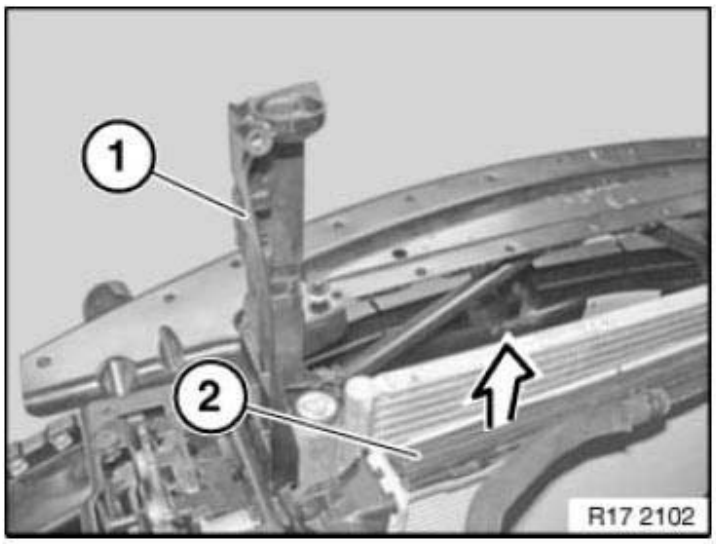


Fig. 57: Removing Radiator
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When reinstalling the radiator and module carrier (1), ensure without fail that the radiator is correctly seated in mounting (2).

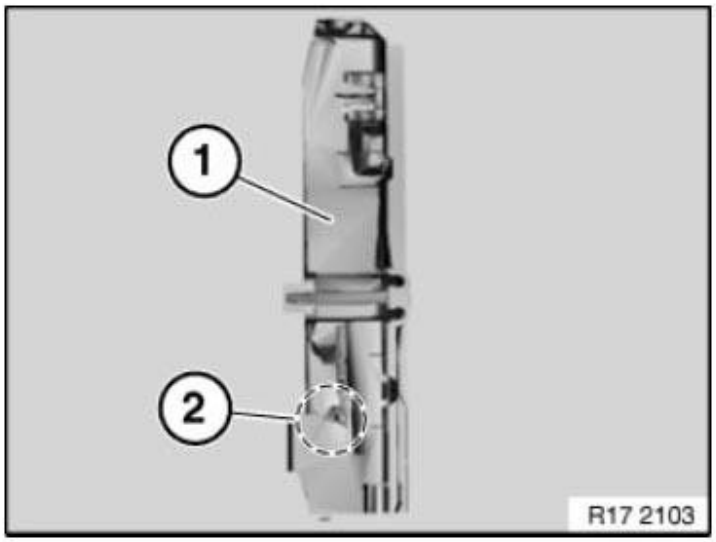


Fig. 58: Identifying Module Carrier And Radiator Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Add final details to vehicle.

Check **COOLING SYSTEM** for leaks.

17 11 054 REMOVING AND INSTALLING RIGHT MODULE CARRIER (N52K, N54)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

WARNING: Risk of injury!

Refrigerant circuit is under high pressure!

Follow safety INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A .

Avoid contact with refrigerant and refrigerant oil

Follow safety instructions for 64 50 ... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT OIL .

IMPORTANT: Risk of damage!

Restart engine only when A/C system has been correctly filled.

Follow INSTRUCTIONS FOR OPENING AND REPLACING PARTS IN REFRIGERANT CIRCUIT for opening and replacing parts in refrigerant circuit.

If A/C system is opened for more than 24 hours:

Replace DESICCANT INSERT for A/C system.

Necessary preliminary tasks

- Remove left **MODULE CARRIER**
- Drain off **AIR CONDITIONING SYSTEM (R 134A)**

Release screws (1).

Tightening torque, see 64 53 6AZ in **64 53 REFRIGERANT LINES AND EXPANSION VALVE** .

Detach A/C lines (2) from A/C condenser.

Installation:

Replace all sealing rings and moisten with refrigerant oil.

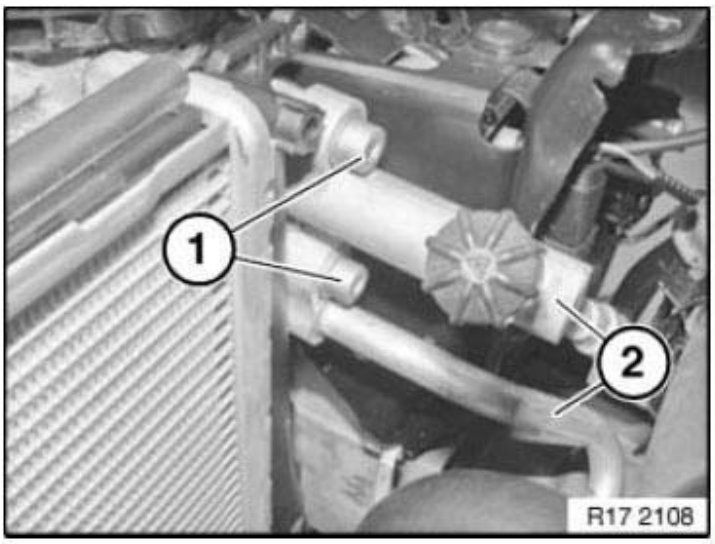


Fig. 59: Identifying Screws And A/C Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out right module carrier (1) together with A/C condenser (2).

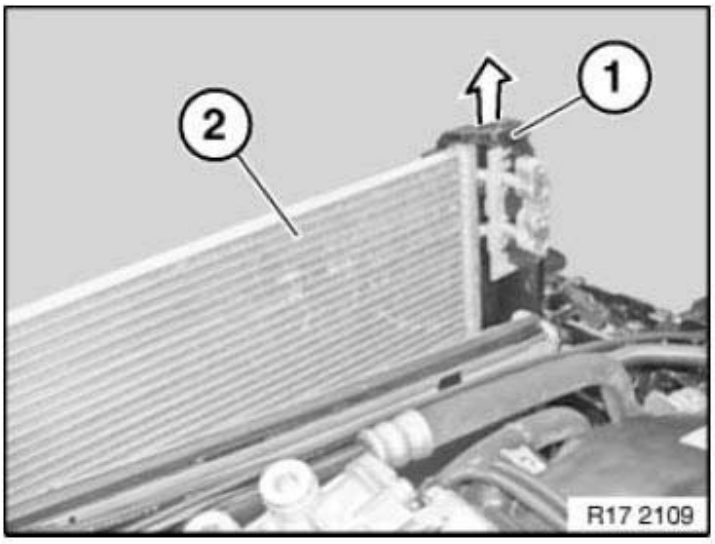


Fig. 60: Lifting Out Right Module Carrier With A/C Condenser
Courtesy of BMW OF NORTH AMERICA, INC.

Release A/C condenser from module carrier. In so doing, release lock (1) on side of module carrier in direction of arrow.

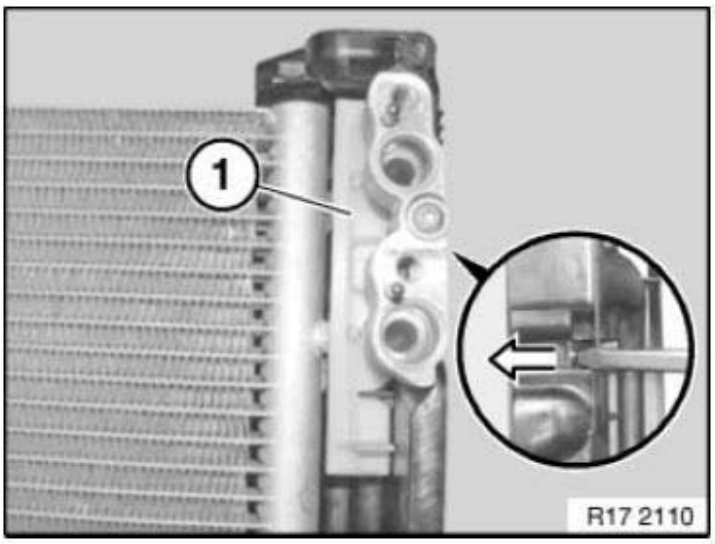


Fig. 61: Removing A/C Condenser From Module Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When reinstalling the radiator and module carrier (1), ensure without fail that the radiator is correctly seated in mounting (2).

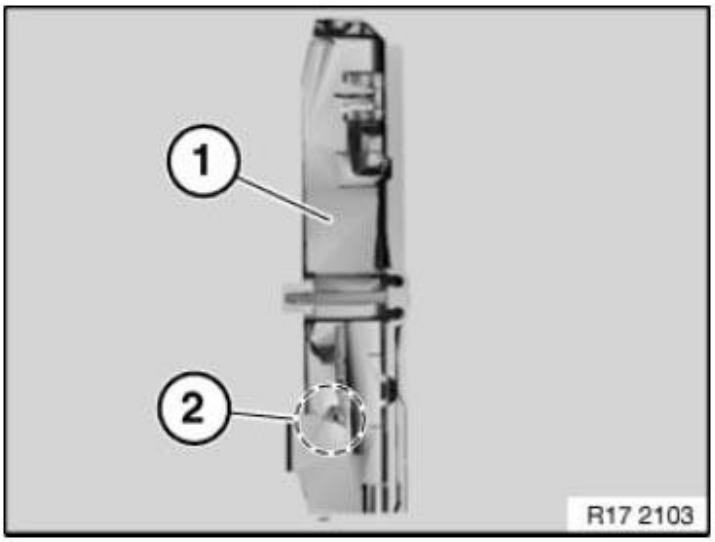


Fig. 62: Identifying Module Carrier And Radiator Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Add final details to vehicle.

Evacuate and fill **AIR CONDITIONING SYSTEM (R 134A)** .

17 11 100 REMOVING AND INSTALLING/REPLACING COOLANT EXPANSION TANK (N54, N52K)

Necessary preliminary tasks

- Drain **COOLANT** .

N54 only: Release vacuum line at retainers (1) from expansion tank.

Unfasten screws (2).

Tightening torque **17 10 4AZ** .

Release and disconnect coolant hoses (3).

Raise expansion tank (4)

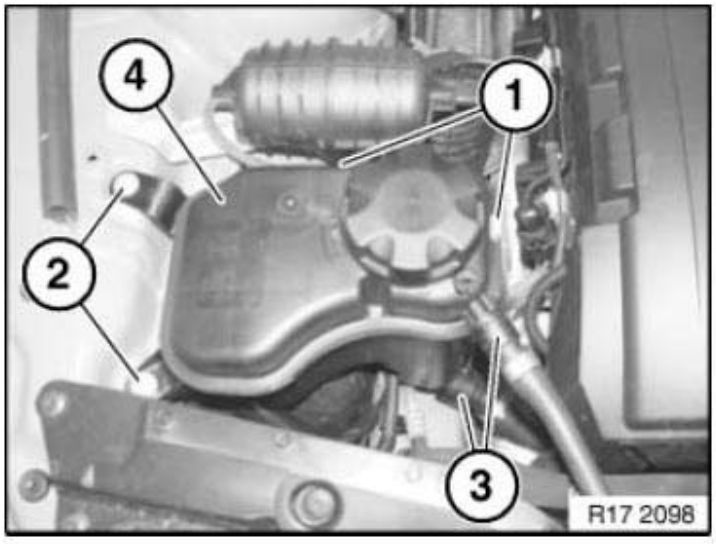


Fig. 63: Identifying Retainers, Coolant Hoses, Screws And Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) on coolant level switch and disconnect.

Remove expansion tank (2).

Installation:

Make sure locating pin (3) is correctly seated in rubber mount (4).

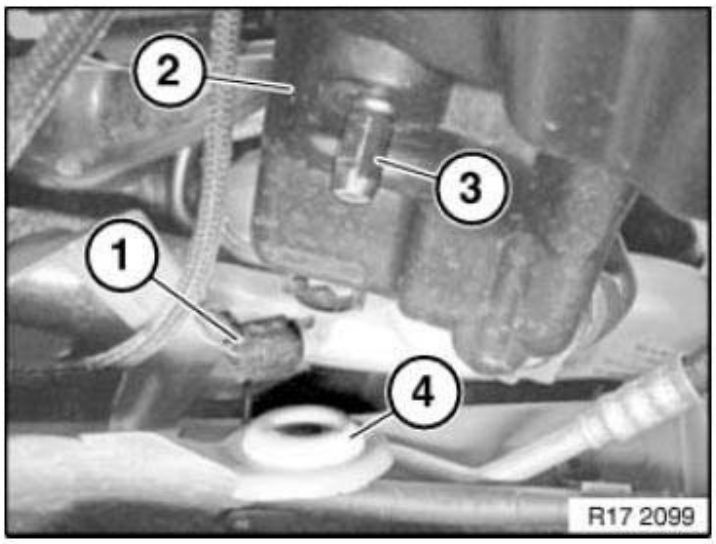


Fig. 64: Identifying Plug, Expansion Tank, Locating Pin And Rubber Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Top up **COOLANT** .

Check cooling system for **LEAKS** .

17 12 010 REMOVING AND INSTALLING/REPLACING COOLANT PIPE ON FRONT AXLE (N54)

Necessary preliminary tasks

- Remove left **CHARGE-AIR DUCT**
- Draining **COOLANT**

Release screws (1).

Tightening torque **17 10 5AZ** .

Unfasten and detach coolant pipe from expansion tank (2).

Unfasten and detach coolant pipe from coolant thermostat (3).

Unfasten and detach coolant pipe from coolant hose (4).

Feed out coolant pipe and remove.

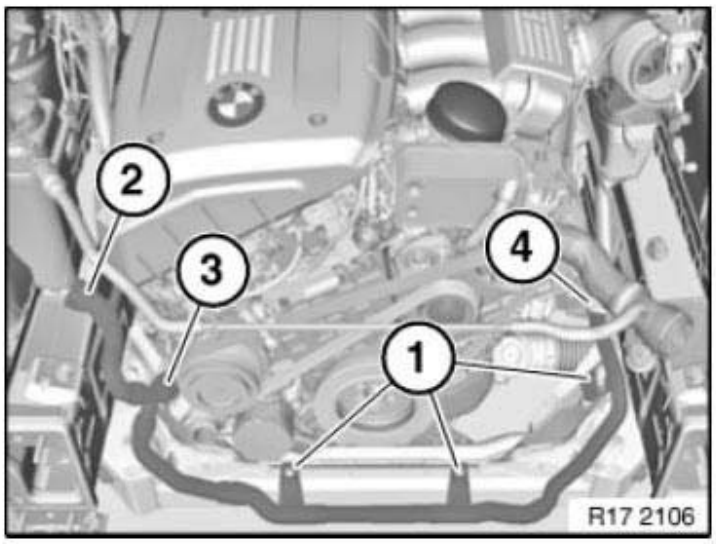


Fig. 65: Identifying Screws, Expansion Tank, Coolant Thermostat And Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Top up **COOLANT** .

Check cooling system for **LEAKS** .

17 11 150 REMOVING AND INSTALLING/REPLACING ENGINE OIL COOLER (N54)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

IMPORTANT: Wear protective goggles and gloves.

Necessary preliminary tasks

- Remove right **WHEEL ARCH COVER (FRONT SECTION)** front section

Recycling

Engine oil escapes when oil lines are released. Catch and dispose of emerging engine oil.

Observe country-specific waste-disposal regulations.

Release screw (1).

Tightening torque **17 21 2AZ** .

Detach engine oil line.

Engine oil escapes when oil lines are released. Catch and dispose of emerging engine oil.

Observe country-specific waste-disposal regulations.

Unfasten screws (2).

Tightening torque **17 21 3AZ** .

Feed out engine oil cooler (3) and remove.

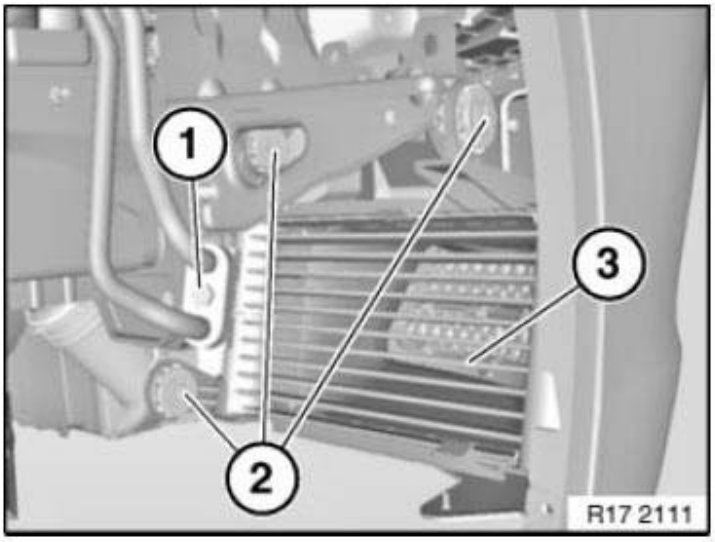


Fig. 66: Identifying Screws And Engine Oil Cooler
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing rings on engine oil lines.

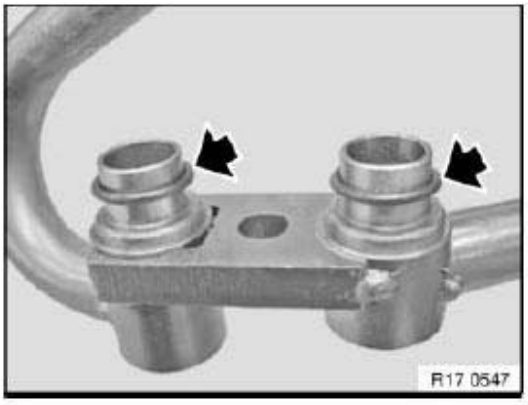


Fig. 67: Identifying Sealing Rings
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work, check engine oil level and top up engine oil if necessary.

17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N52K, N54)

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Turn off ignition
- Remove **CROSS-MEMBER**
- **Only automatic transmission and twin-clutch gearbox:**

RELEASE TRANSMISSION FLUID COOLER from the fan cowl do **not** remove

Unclip coolant line (1) from fan cowl.

Unlock and disconnect plug (2) on fan cowl on right.

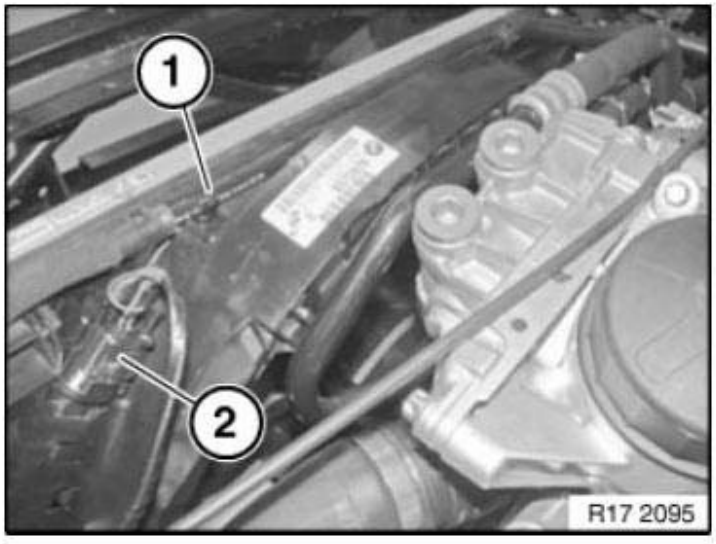


Fig. 68: Identifying Coolant Line And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on fan cowl.

Tightening torque **17 10 1AZ** .

Release lock (2) and remove fan cowl (3) towards top.

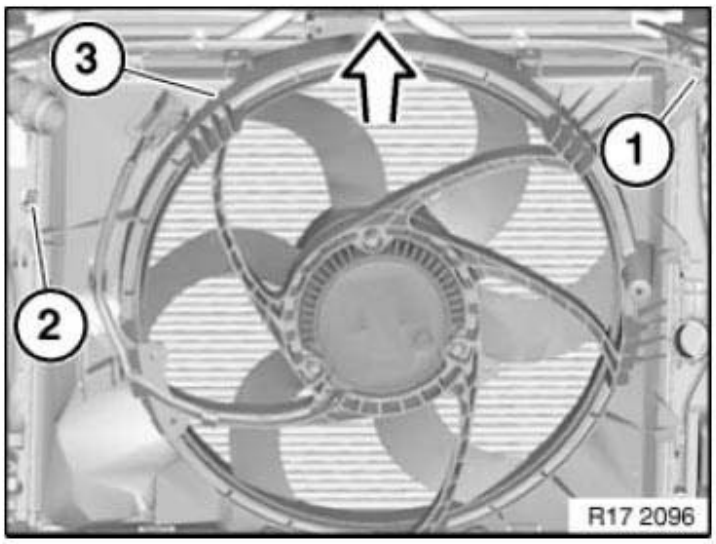


Fig. 69: Removing Fan Cowl Towards Top
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert retaining tabs (1) at bottom on radiator/intercooler.

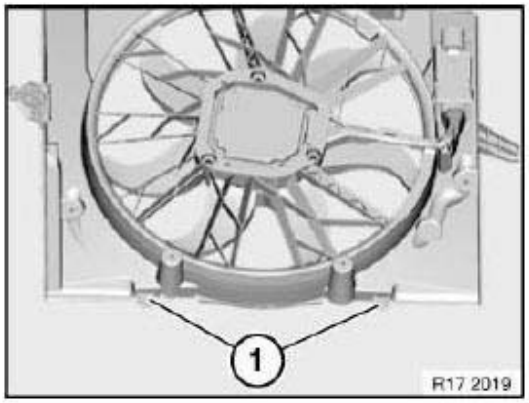


Fig. 70: Identifying Radiator Retaining Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.

Reassemble the vehicle.

clear fault memory.

17 22 030 REMOVING AND INSTALLING/REPLACING OIL LINE FOR ENGINE OIL COOLER (N54)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

IMPORTANT: Wear protective gloves and goggles.

Recycling

Engine oil escapes when oil line is released.

Catch and dispose of emerging engine oil.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks

- Remove **FAN COWL**

Release screw.

Tightening torque **17 21 1AZ** .

Detach oil line (1) from oil filter control housing.

Catch and dispose of emerging engine oil.

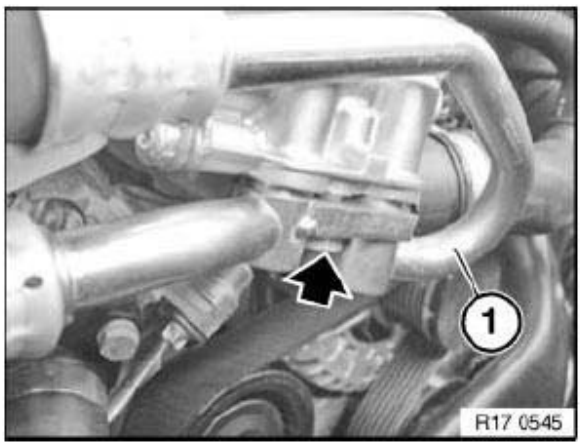


Fig. 71: Locating Oil Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **17 21 2AZ** .

Disconnect oil line (1) from engine oil cooler flange, feed out and remove.

Catch and dispose of emerging engine oil.

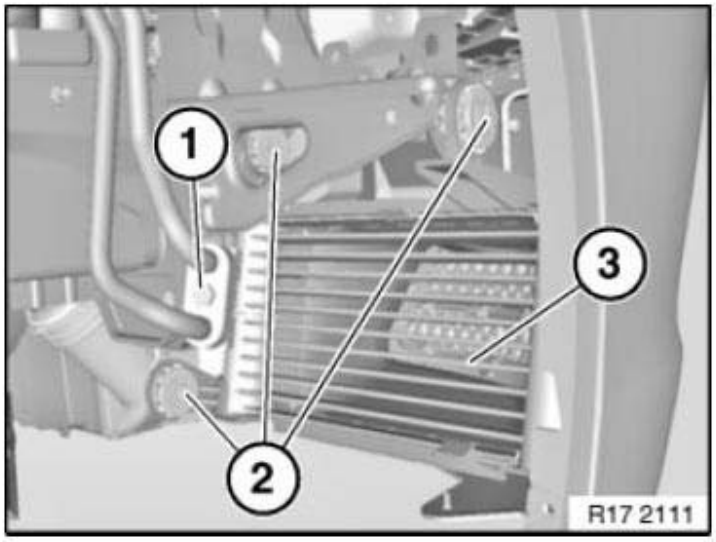


Fig. 72: Identifying Oil Line, Engine Oil Cooler And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing rings on engine oil line.

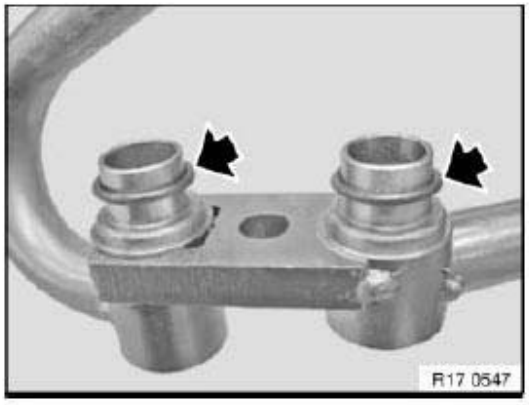


Fig. 73: Identifying Sealing Rings
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work, check engine oil level and top up engine oil if necessary.

1721 OIL COOLER

17 11 150 REMOVING AND INSTALLING/REPLACING ENGINE OIL COOLER (N54)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

IMPORTANT: Wear protective goggles and gloves.

Necessary preliminary tasks

- Remove right **WHEEL ARCH COVER** front section

Recycling

Engine oil escapes when oil lines are released. Catch and dispose of emerging engine oil.

Observe country-specific waste-disposal regulations.

Release screw (1).

Tightening torque **17 21 2AZ** .

Detach engine oil line.

Engine oil escapes when oil lines are released. Catch and dispose of emerging engine oil.

Observe country-specific waste-disposal regulations.

Unfasten screws (2).

Tightening torque **17 21 3AZ** .

Feed out engine oil cooler (3) and remove.

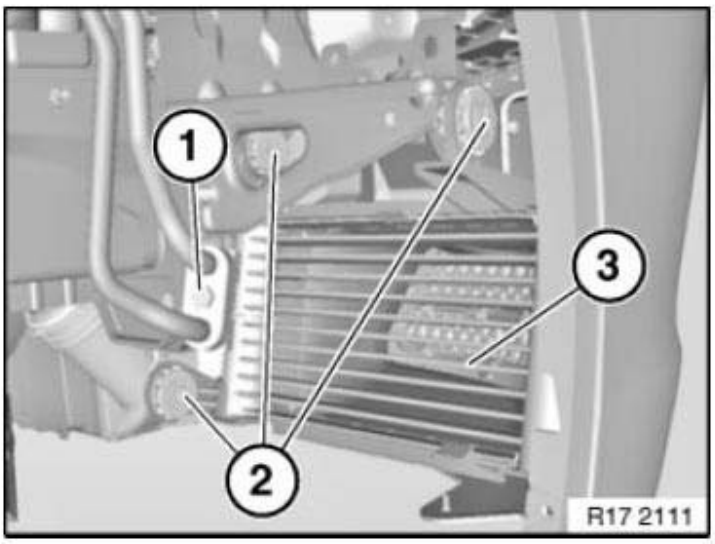


Fig. 74: Identifying Engine Oil Cooler And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing rings on engine oil lines.

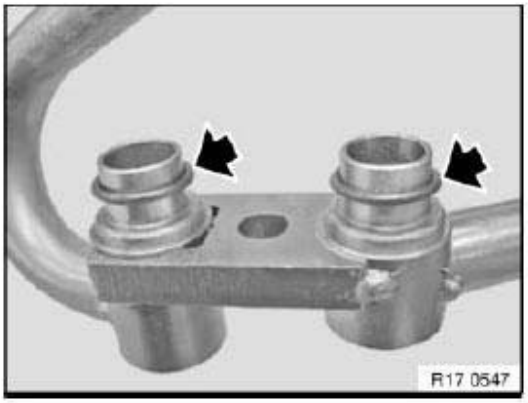


Fig. 75: Identifying Sealing Rings
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work, check engine oil level and top up engine oil if necessary.

17 22 030 REMOVING AND INSTALLING/REPLACING OIL LINE FOR ENGINE OIL COOLER (N54)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

IMPORTANT: Wear protective gloves and goggles.

Recycling

Engine oil escapes when oil line is released.

Catch and dispose of emerging engine oil.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks

- Remove **FAN COWL**

Release screw.

Tightening torque **17 21 1AZ** .

Detach oil line (1) from oil filter control housing.

Catch and dispose of emerging engine oil.

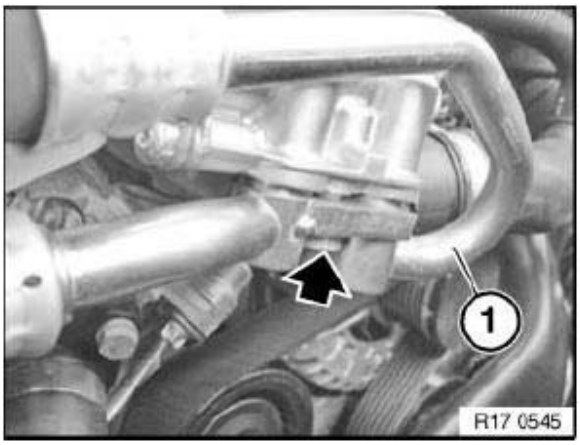


Fig. 76: Locating Oil Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **17 21 2AZ** .

Disconnect oil line (1) from engine oil cooler flange, feed out and remove.

Catch and dispose of emerging engine oil.

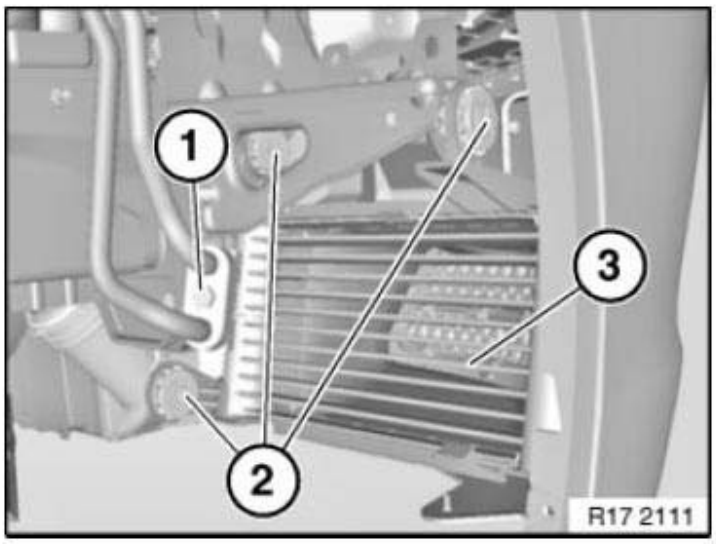


Fig. 77: Identifying Oil Line, Engine Oil Cooler And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing rings on engine oil line.

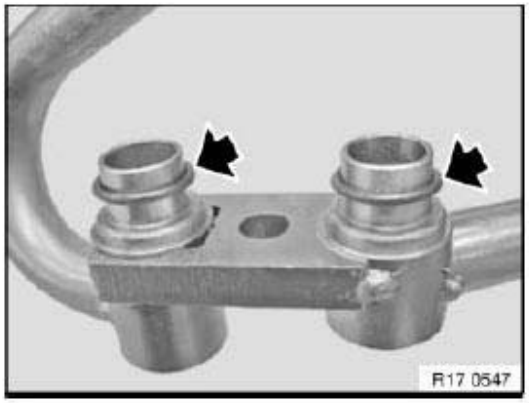


Fig. 78: Identifying Sealing Rings
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work, check engine oil level and top up engine oil if necessary.

17 21 020 REVOVING AND INSTALLING/REPLACING TRANSMISSION OIL COOLER (DKG) (N54)

IMPORTANT: Danger of scalding!

Only perform this work after engine has cooled down.

Necessary preliminary tasks

- Drain **COOLANT**
- Remove **UNDERBODY PROTECTION**

Recycling

Catch and dispose of drained coolant in a suitable container.

Transmission fluid emerges when fluid lines are detached from transmission fluid cooler.

Catch and dispose of escaping transmission fluid in a suitable container.

Observe country-specific waste-disposal regulations.

Release and disconnect coolant hoses (1).

Unlock transmission fluid lines (2) and detach.

Release screw (3).

Tightening torque **17 10 6AZ** .

Remove transmission fluid cooler (4).

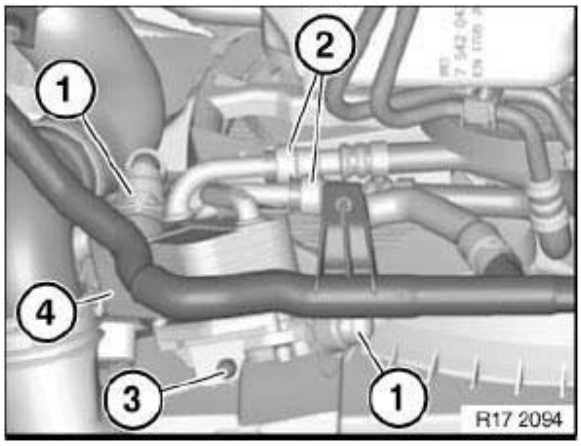


Fig. 79: Identifying Coolant Hoses And Transmission Fluid Lines With Heat Exchanger
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Assemble engine.

CHECKING OIL LEVEL in twin clutch gearbox. If necessary, fill with transmission oil.

17 21 500 RINSE GEARBOX OIL COOLER AND LINES OF TWIN CLUTCH GEARBOX

NOTE: Follow work steps for:

Installing a new or replacement transmission.

Procedure

Double twin clutch gearbox removed.

Connect the respective adapters to all oil pipes leaving the double TCT (see description below).

Use quick-release coupling to connect line 17 2 019 from oil collecting unit.

Use quick-release coupling to connect drain line 17 2 018.

Hold and direct open end of drain line into a suitable drip tray.

Using oil collection unit, flush approx. 1 liter of transmission fluid (refer to Gear oil for dual clutch transmission GS7D36SG) through oil lines and transmission oil cooler.

Reposition quick-release couplings.

Flush oil lines/transmission oil cooler in opposite direction with approx. 1 liter of transmission fluid.

Disconnect quick-release couplings.

Remove adapter.

NOTE: Dispose of flushing oil correctly.

Do not reuse under any circumstances.

Press hydraulic lines (1) into adapters (2).

Slide clamping bar (3) into guides and secure with screw (4).

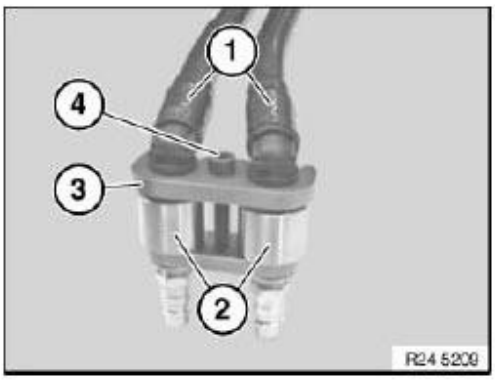
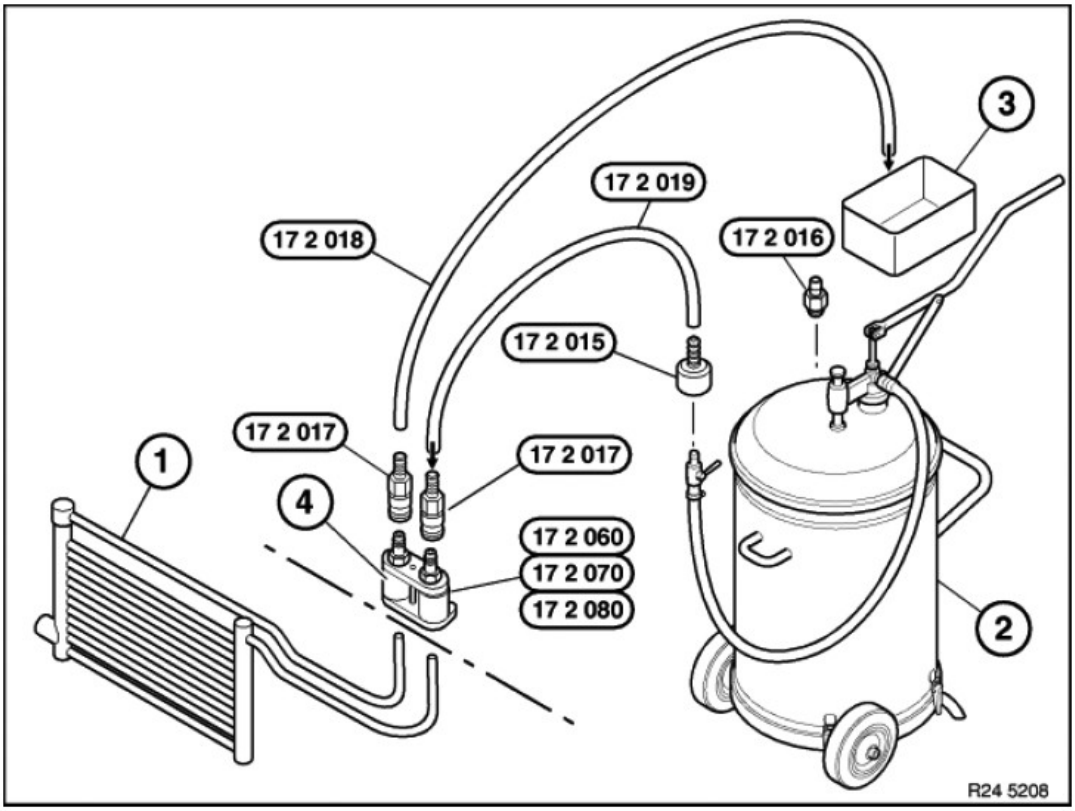


Fig. 80: Identifying Hydraulic Lines, Adapters, Clamping Bars With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement of flushing apparatus for TCT



1) Transmission-oil cooler with lines

2) Oil collection unit

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or
17 2 016 Connection for oil collection unit (2), manufacturer: Horn
17 2 017 Quick-release coupling (2 pieces)
17 2 019 Hose to oil collection unit (2)

3) Oil drip tray

17 2 018 Hose to oil drip tray (3)

4) Adapter with clamping bar

17 2 060 Adapter with clamping bar for aluminium lines and steel lines with aluminium connection (line diameter 12 mm) TCT for engine
17 2 070 Adapter with clamping bar (line diameter15 mm) TS65TCT for TCT engine

Fig. 81: Arrangement Of Flushing Apparatus For TCT
Courtesy of BMW OF NORTH AMERICA, INC.

1722 OIL COOLER LINES

17 22 030 REMOVING AND INSTALLING/REPLACING OIL LINE FOR ENGINE OIL COOLER (N54)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

IMPORTANT: Wear protective gloves and goggles.

Recycling

Engine oil escapes when oil line is released.

Catch and dispose of emerging engine oil.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks

- Remove **FAN COWL**

Release screw.

Tightening torque **17 21 1AZ** .

Detach oil line (1) from oil filter control housing.

Catch and dispose of emerging engine oil.

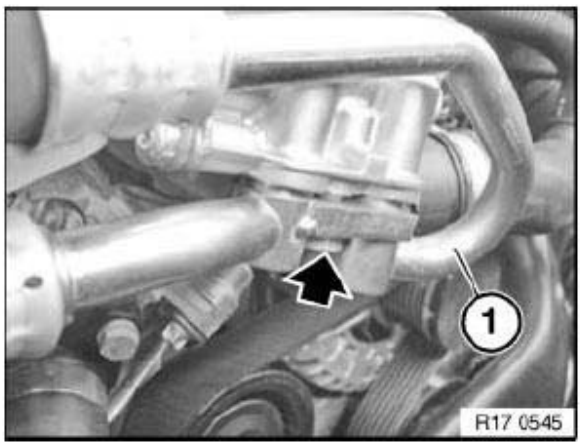


Fig. 82: Locating Oil Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **17 21 2AZ** .

Disconnect oil line (1) from engine oil cooler flange, feed out and remove.

Catch and dispose of emerging engine oil.

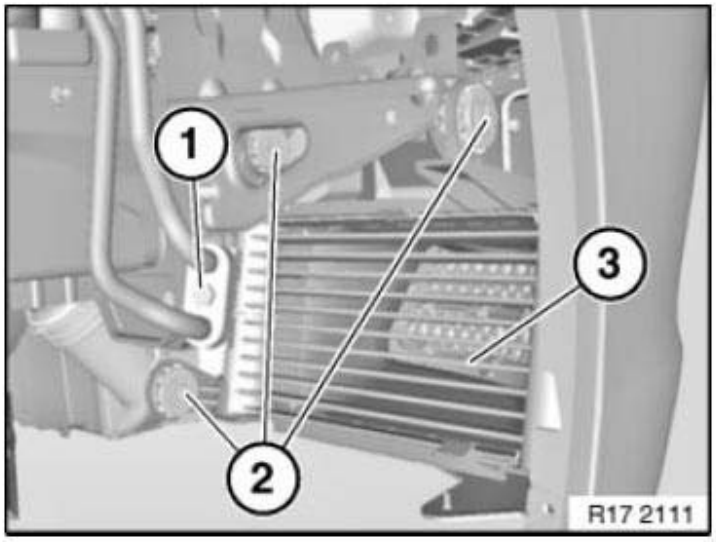


Fig. 83: Identifying Oil Line, Engine Oil Cooler And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing rings on engine oil line.

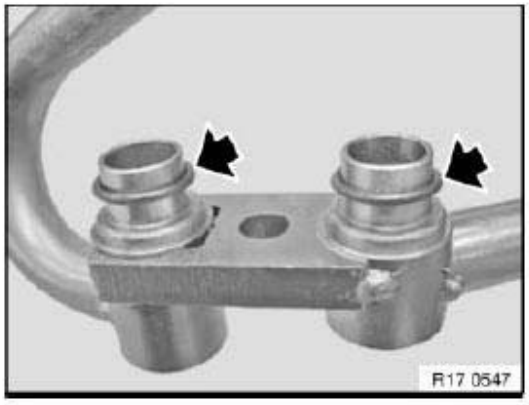


Fig. 84: Identifying Sealing Rings
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work, check engine oil level and top up engine oil if necessary.

17 21 020 REVOVING AND INSTALLING/REPLACING TRANSMISSION OIL COOLER (DKG) (N54)

IMPORTANT: Danger of scalding!

Only perform this work after engine has cooled down.

Necessary preliminary tasks

- Drain **COOLANT**
- Remove **UNDERBODY PROTECTION**

Recycling

Catch and dispose of drained coolant in a suitable container.

Transmission fluid emerges when fluid lines are detached from transmission fluid cooler.

Catch and dispose of escaping transmission fluid in a suitable container.

Observe country-specific waste-disposal regulations.

Release and disconnect coolant hoses (1).

Unlock transmission fluid lines (2) and detach.

Release screw (3).

Tightening torque **17 10 6AZ** .

Remove transmission fluid cooler (4).

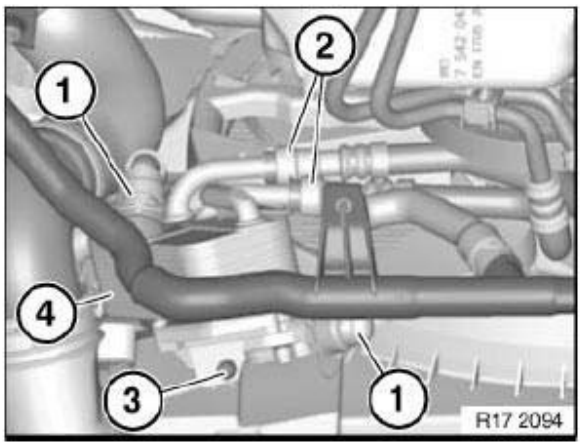


Fig. 85: Identifying Coolant Hoses And Transmission Fluid Lines With Heat Exchanger
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Assemble engine.

<u>CHECKING OIL LEVEL</u> in twin clutch gearbox. If necessary, fill with transmission oil.

17 21 500 RINSE GEARBOX OIL COOLER AND LINES OF TWIN CLUTCH GEARBOX

NOTE: Follow work steps for:

Installing a new or replacement transmission.

Procedure

Double twin clutch gearbox removed.

Connect the respective adapters to all oil pipes leaving the double TCT (see description below).

Use quick-release coupling to connect line 17 2 019 from oil collecting unit.

Use quick-release coupling to connect drain line 17 2 018.

Hold and direct open end of drain line into a suitable drip tray.

Using oil collection unit, flush approx. 1 liter of transmission fluid (refer to Gear oil for dual clutch transmission GS7D36SG) through oil lines and transmission oil cooler.

Reposition quick-release couplings.

Flush oil lines/transmission oil cooler in opposite direction with approx. 1 liter of transmission fluid.

Disconnect quick-release couplings.

Remove adapter.

NOTE: Dispose of flushing oil correctly.

Do not reuse under any circumstances.

Press hydraulic lines (1) into adapters (2).

Slide clamping bar (3) into guides and secure with screw (4).

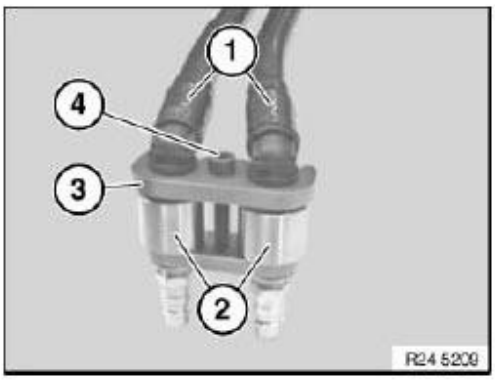
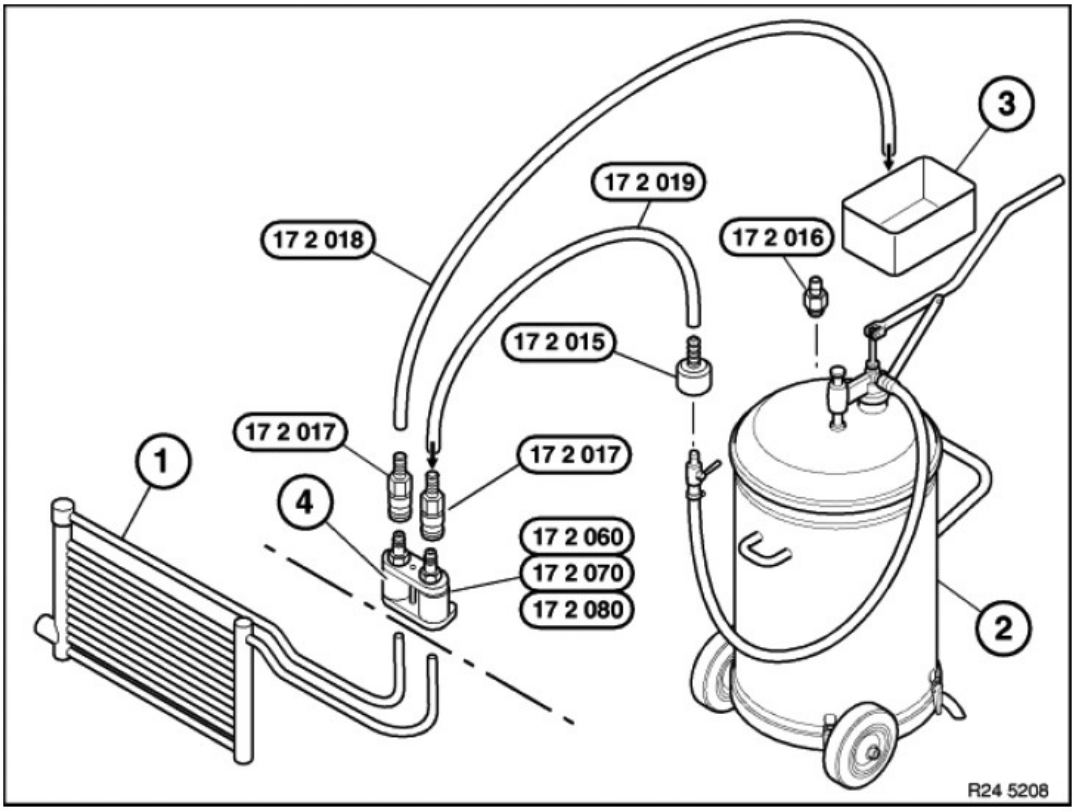


Fig. 86: Identifying Hydraulic Lines, Adapters, Clamping Bars With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement of flushing apparatus for TCT



1) Transmission-oil cooler with lines

2) Oil collection unit

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or
17 2 016 Connection for oil collection unit (2), manufacturer: Horn
17 2 017 Quick-release coupling (2 pieces)
17 2 019 Hose to oil collection unit (2)

3) Oil drip tray

17 2 018 Hose to oil drip tray (3)

4) Adapter with clamping bar

17 2 060 Adapter with clamping bar for aluminium lines and steel lines with aluminium connection (line diameter 12 mm) TCT for engine
17 2 070 Adapter with clamping bar (line diameter15 mm) TS65TCT for TCT engine

Fig. 87: Arrangement Of Flushing Apparatus For TCT
Courtesy of BMW OF NORTH AMERICA, INC.

1751 CHARGE AIR COOLER WITH MOUNT

17 51 000 REMOVING AND INSTALLING/REPLACING INTERCOOLER (N54)

Necessary preliminary tasks

- Remove front **UNDERBODY PROTECTION** .

IMPORTANT: Coat sealing rings of quick-connect couplings with antiseize agent.

Pressure pipes cannot be fitted without antiseize agent.

Unfasten and detach charge-air hoses (1).

Unfasten screws (2).

Tightening torque **17 10 3AZ** .

Remove intercooler (3) towards bottom.

Installation:

Charge-air hoses must audibly snap into place.

Coat sealing rings of charge-air hoses with antiseize agent.

Pressure pipes cannot be fitted without antiseize agent.

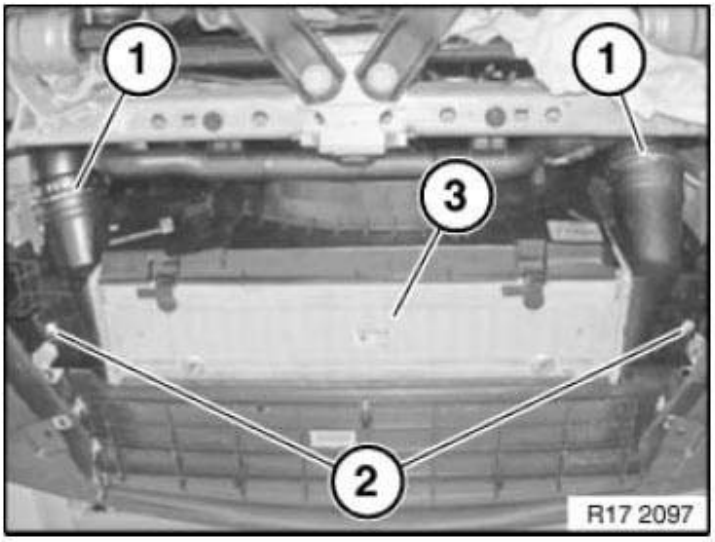


Fig. 88: Identifying Charge Air Hoses, Screws And Intercooler
Courtesy of BMW OF NORTH AMERICA, INC.

Check charge-air duct for leaks.

Assemble engine.

COOLING SYSTEM

17-0130 ADAPTER

Adapter MW

NOTE: (Adapter kit) For connecting the adapters from 17 0 000 with pump 17 0 101 and hose 17 0 102.

SI number

01 07 02 (884)

Consisting of:

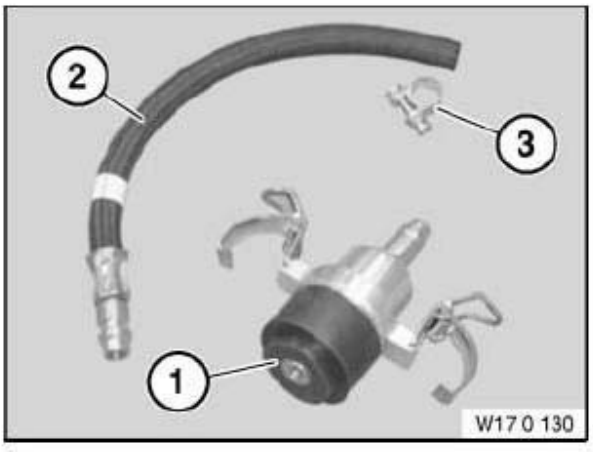


Fig. 1: Identifying Adapter (17-0130)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0494430 Adapter

NOTE: For connecting the pump 17 0 101 and hose 17 0 102 to the adapter from 17 0 000

2 = 0494431 Hose

NOTE: (Hose with coupling connection) For connecting pump 17 0 101 to adapter 17 0 007

3 = 0494761 Clamp

NOTE: **(Hose clamp) For hose 17 0 132**

17-2080 ADAPTER

Adapter Minimum set: Mechanical tools MW

NOTE: **For flushing fluid cooler and lines of automatic transmission. Check lines: Plastic tubes**

Storage Location

A25

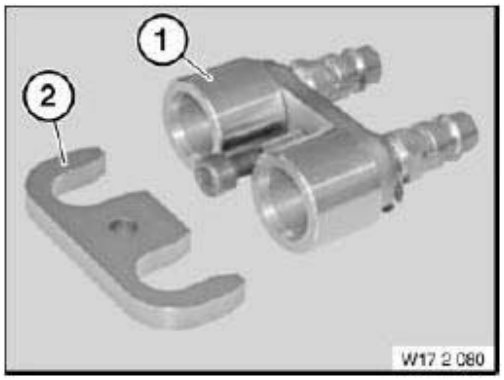


Fig. 2: Identifying Adapter (17-2080)
Courtesy of BMW OF NORTH AMERICA, INC.

SI number

01 14 08 (464)

Consisting of:

1 = 0496492 Adapter

2 = 0496493 Clip

NOTE: **(Clamping bracket)**

17-2010 ADAPTER

Adapter Minimum set: Mechanical tools MW

NOTE: **(Adapter kit) For rinsing the oil cooler in automatic transmissions.**

SI number

01 12 96 (103)

Consisting of:

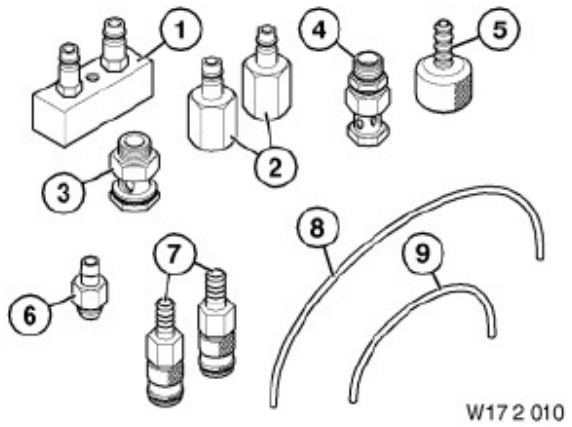


Fig. 3: Identifying Adapter (17-2010)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0493621 Plate

NOTE: (Mounting plate) For adapter 17 2 011 - Transmission: A5S 325Z

1 = 0491404 Adapter

NOTE: For connecting the oil cooler lines to the oil dispenser unit - Transmission: A5S 310Z, A5S 560Z, A5S 325Z

2 = 0491405 Adapter

NOTE: (Adapter (2 pieces)) For connecting the oil cooler lines to the oil dispenser unit - Transmission: A4S 310R

3 = 0491406 Screw

NOTE: (Banjo bolt (2 pieces)) Thread M18x1.5 with nut and gasket for connecting the oil cooler lines to the oil dispenser unit - \Transmission: A5S 440Z

4 = 0491407 Screw

NOTE: (Banjo bolt (2 pieces)) Thread M16x1.5 with nut, gasket and thread piece for connecting the oil cooler lines to the oil dispenser unit - transmission: A5S 300J

5 = 0491408 Connector

NOTE: For the oil dispenser unit from Tecalemit

6 = 0491409 Connector

NOTE: For the oil dispenser unit from Horn

7 = 0491410 Adapter

NOTE: (Clutch) Scope: 2 pcs.

8 = 0491411 Hose

NOTE: (Hose, long)

9 = 0491412 Hose

NOTE: (Hose, short)

17-2070 ADAPTER

Adapter Minimum set: Mechanical tools MW

NOTE: For flushing fluid cooler and lines of automatic transmission. Check lines: Diameter 15 mm

Storage Location

A25

SI number

01 14 08 (464)

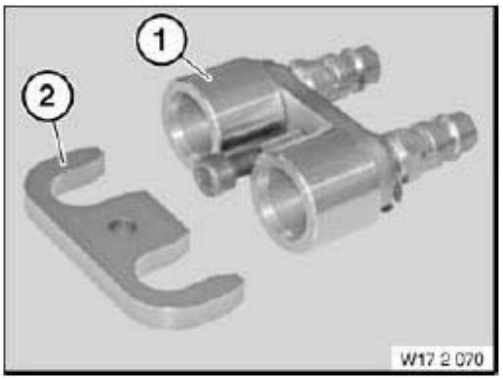


Fig. 4: Identifying Adapter (17-2070)

Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = 0496490 Adapter

2 = 0496491 Clip

NOTE: (clamping bracket)

17-2060 ADAPTER

Adapter Minimum set: Mechanical tools MW

NOTE: For flushing fluid cooler and lines of automatic transmission. Check lines: Diameter 12 mm

Storage Location

A25

SI number

01 14 08 (464)

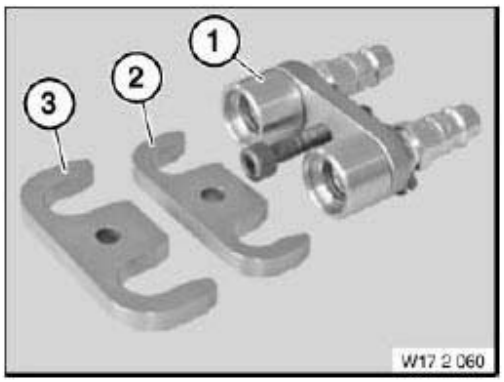


Fig. 5: Identifying Adapter (17-2060)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = 0496487 Adapter

2 = 0496488 Clip

NOTE: (Clamping bracket) Clamping bracket for aluminium line.

3 = 0496489 Clip

NOTE: (Clamping bracket) Clamping bracket for steel line with pressed-on aluminium bush (connection).

17-2050 PLIERS

Pliers MW

NOTE: (Set of pliers) For assembling and disassembling the spring band clamps (Coolant hoses)

SI number

01 26 06 (321)

Consisting of:

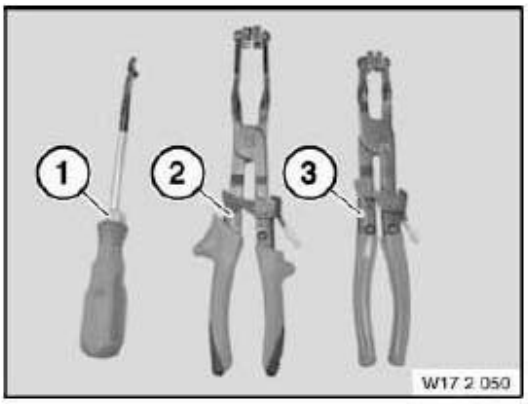


Fig. 6: Identifying Pliers (17-2050)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0495795 Release tool

2 = 0495796 Pliers

NOTE: (Pliers (bent version))

3 = 0495797 Pliers

NOTE: (Pliers (straight version))

17-0100 TESTER

Tester Minimum set: Mechanical tools MW

NOTE: **For checking engine cooling system for watertightness. For checking radiator cap.**

SI number

01 07 02 (884)

Consisting of:

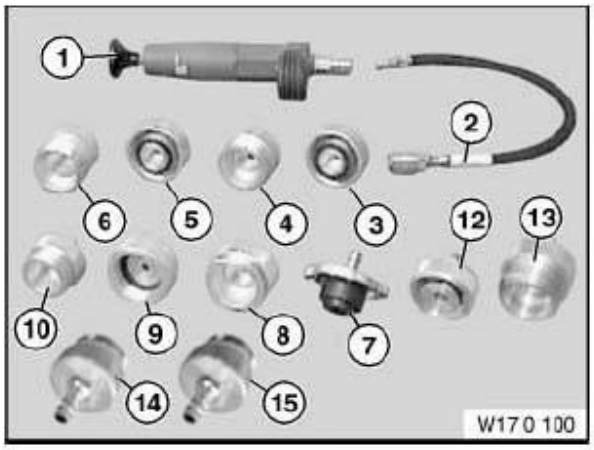


Fig. 7: Identifying Tester (17-0100)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0494418 Pump

2 = 0494419 Hose

NOTE: **(hose with quick-release coupling)**

3 = 0494420 Adapter

NOTE: **For radiator cap (normal thread)**

4 = 0494421 Adapter

NOTE: **For radiator cap (normal thread)**

5 = 0494422 Adapter

NOTE: **For radiator cap (sawtooth thread)**

6 = 0494423 Adapter

NOTE: For radiator cap (sawtooth thread)

7 = 0494424 Adapter

NOTE: For radiator cap R50/W10

8 = 0494425 Adapter

NOTE: For radiator cap R50/W10

9 = 0494426 Adapter

NOTE: For radiator connection R53/W11, R50/W17 adapter corresponds to 17 0 051

10 = 0494427 Adapter

NOTE: For radiator cap R53/W11, R50/W17 adapter corresponds to 17 0 052

11 = 0494428 Case

12 = 0494642 Adapter

NOTE: For radiator cap Model series: E60, E61, E63, E64 SI no.: 1 08 03 (988)

13 = 0494643 Adapter

NOTE: For radiator cap Model series: E60, E61, E63, E64 SI no.: 1 08 03 (988)

14 = 0495889 Adapter

NOTE: For radiator cap Model series: N12, N14

17-0000 TESTER

Tester MW

Replaced by: 0494417

NOTE: For checking cooling system for leak tightness and function of pressure relief valve in radiator cap. Replaced by 17 0 100 (0 494 417)

Storage Location

A43

C17

Consisting of:

5 = 0491389 Adapter

NOTE: (Adapter) For screw-on radiator caps (sawtooth thread)/Series: E31, E32, E34, E36, E38, E39 Replaced by 17 0 100 (0 494 417)



Fig. 8: Identifying Tester (17-0000)
Courtesy of BMW OF NORTH AMERICA, INC.

7 = 0493108 Adapter

NOTE: (Adapter) For testing the expansion tank cover/Series: E31, E32, E34, E36, E38, E39 Replaced by 17 0 100 (0 494 417)

8 = 0494017 Hose

NOTE: (Pressure hose)

1 = 0491385 Adapter

NOTE: (Adapter) For checking the pressure relief valve in the radiator cap/Series: all, except E28

= 0491386

2 = 0491386 Tester

NOTE: (Tester without adapter) Pressure range 0...2.5 bar/Series: all, except E28 Free only for motorcycle!!!

3 = 0491387 Adapter

NOTE: **(Adapter) For screw-on radiator caps (normal thread)/Series: E28, E30, E31, E32 Engine: all, except M51 Free only for motorcycle!!!**

4 = 0491388 Adapter

NOTE: **(Adapter) For screw-on radiator caps (standard thread)/Series: E28, E30, E32/Engine: M51 Free only for motorcycle!!!**

6 = 0491390 Adapter

NOTE: **(Adapter) For screw-on radiator caps (sawtooth thread)/Replaces 06/97 with 17 0 007/Reason: Expansion tank cover design change**

9 = 0491391 Adapter

NOTE: **(Adapter for radiator expansion tank) Series: E36/Model: M3 US engine: W10**

COOLANT, COOLING SYSTEM TEST E89/N52K

17 00 COOLANT, COOLING SYSTEM TEST E89/N52K

COOLANT, COOLING SYSTEM TEST SPECIFICATION

Coolant volume (incl. heater) MT	Litres	
Coolant volume (incl. heater) AT	Litres	
with integrated air conditioner MT	Litres	8.2
with integrated air conditioner AT	Litres	8.5
Test pressure for cooling system (gauge pressure)	bar	1.5

RADIATOR AND MOUNTING PARTS

17 11 RADIATOR AND MOUNTING PARTS E89/N52K

RADIATOR AND MOUNTING PARTS SPECIFICATION

Cap for cooling system		
Pressure relief valve opens at overpressure to ambient pressure	bar	$1{,}4\ ^{+0{,}1}_{-0{,}2}$
Vacuum valve must open at latest at partial vacuum to ambient pressure	bar	0.1
Test pressure, coolant radiator (gauge pressure)	bar	1.5

COOLANT, COOLING SYSTEM TEST E89/N54

17 00 COOLANT, COOLING SYSTEM TEST E89/N54

COOLANT, COOLING SYSTEM TEST SPECIFICATIONS

Coolant volume (incl. heater) MT	Litres	
Coolant volume (incl. heater) AT	Litres	
with integrated air conditioner MT	Litres	8.2
with integrated air conditioner AT	Litres	8.5
Test pressure for cooling system (gauge pressure)	bar	1.5

RADIATOR AND MOUNTING PARTS

17 11 RADIATOR AND MOUNTING PARTS E89/N54

RADIATOR AND MOUNTING PARTS SPECIFICATIONS

Cap for cooling system		
Pressure relief valve opens at overpressure to ambient pressure	bar	$1{,}4\ ^{+0{,}1}_{-0{,}2}$
Vacuum valve must open at latest at partial vacuum to ambient pressure	bar	0.1
Test pressure, coolant radiator (gauge pressure)	bar	1.5

ADDITIONAL FAN (ELECTRIC)

17 40 ADDITIONAL FAN (ELECTRIC)

TIGHTENING TORQUE SPECIFICATION - ADDITIONAL FAN (ELECTRIC)

	Type	Thread	Tightening specification	Measure
1AZ Electric auxiliary fan on fan cowl	E46			6 Nm
2AZ Electronics for auxiliary fan on fan cowl	E46			6 Nm

COOLANT

17 00 COOLANT

TIGHTENING TORQUE SPECIFICATION - COOLANT

	Type	Thread	Tightening specification	Measure
1AZ Hose clamps to coolant hoses 32 ... 48 mm dia.	All			2.5 Nm
2AZ Bleed screw (WAF 8) to thermostat housing	All, without E46			8 Nm
Plastic bleed screws to coolant lines	E46			2 -0.5/+1 Nm
3AZ Level switch (WAF 30) to coolant expansion tank	All			3 Nm
4AZ Bleed screw to water valve or auxiliary water pump	E90/E91			3.5 Nm

ENGINE OIL COOLER

17 21 ENGINE OIL COOLER

TIGHTENING TORQUE SPECIFICATION - ENGINE OIL COOLER

	Type	Thread	Tightening specification	Measure
1AZ Engine oil cooler to body	All			14 Nm
Oil cooler vapor extraction guide to trim panel	E36/M3	B4.8		4 Nm

ENGINE OIL COOLER AND LINES

17 21 ENGINE OIL COOLER AND LINES

TIGHTENING TORQUE SPECIFICATION - ENGINE OIL COOLER AND LINES

	Type	Thread	Tightening specification	Measure
1AZ Engine oil cooler line to oil filter control housing	N54	M8 x 25		19 Nm
2AZ Engine oil cooler line to engine oil cooler flange	N54	M8 x 25		19 Nm
3AZ Engine oil cooler to bracket, engine carrier	N54	M6 x 20		8 Nm

OIL COOLER PIPES

17 22 OIL COOLER PIPES

TIGHTENING TORQUE SPECIFICATION - OIL COOLER PIPES

	Type	Thread	Tightening specification	Measure
5AZ Cap nut on transmission oil cooler (on radiator) and on transmission	All	M18 x 1.5		20 Nm
	5HP30	M22 x 1.5		28 Nm
6AZ Oil lines on transmission				
Hollow bolt	All	M16 x 1.5		37 Nm
7AZ Oil lines on transmission oil cooler	A 5 S 300 J			28 Nm
Hollow bolt	All	M14 x 1.5		27 Nm
8AZ Screw-in fitting on transmission	All	M14x1.5 und M16x1.5		37 Nm
9AZ Oil hose on oil pipe	E23			28 Nm
10AZ Oil pipe bracket on radiator	E23			2 Nm
11AZ Oil pipe bracket on body	E23			6.5 Nm
12AZ Oil cooler on transmission	5HP30			10 Nm
13AZ Transmission oil cooler line to transmission	N42	M8		21 Nm

RADIATOR AND MOUNTING PARTS

17 11 RADIATOR AND MOUNTING PARTS

TIGHTENING TORQUE SPECIFICATION - RADIATOR AND MOUNTING PARTS

	Type	Thread	Tightening specification	Measure
1AZ Radiator to body				
self-tapping screw	All	B6.3		9 Nm
	All	M6		10 Nm
2AZ Drain plug to radiator	All			2.5 Nm
3AZ Temperature switch to radiator (91°C/99° C) max.	All			15 Nm
	All			9 Nm

4AZ Expansion tank to body	M57TU/E65			4 Nm
5AZ Radiator on module carrier	E46			4 + 1 Nm
6AZ Retaining plate, expansion tank, to radiator	E46			4 + 1 Nm
7AZ Fan cowl on radiator	E46			4 + 1 Nm
8AZ Plug in radiator (temperature switch omitted)	E36/7/M54	M14 x 1.5		15 Nm
9AZ Mounting plate to radiator	M57TU/E65			4.5 Nm
10AZ Radiator bracket	All			2.5 Nm

RADIATOR, EXPANSION TANK (N52K, N54)

17 10 RADIATOR, EXPANSION TANK (N52K, N54)

TIGHTENING TORQUE SPECIFICATION - RADIATOR, EXPANSION TANK

	Type	Thread	Tightening specification	Measure
1AZ Fan cowl to coolant radiator	N52K/N54			4.5 Nm
2AZ Coolant radiator to module carrier	N52K/N54			4.5 Nm
3AZ Intercooler to module carrier	N54			4.5 Nm
4AZ Coolant expansion tank to body	N52K/N54	M6		8 Nm
5AZ Coolant pipe to front axle carrier	N54	M6		7.3 Nm
6AZ Transmission oil cooler to fan cowl	N52K/N54			4.5 Nm

ENGINE

Engine - Operating Fluids

1.0 GENERAL INFORMATION

The specified engine oil is extremely important for the operation and service life of an engine.

Engine oil requirements will depend on the engine design, operating conditions, oil change intervals and, in the case of diesel engines, the fuel grade.

A modern engine oil provides more than just a lubrication function. The following qualities are required:

GOOD WEAR PROTECTION AND FRICTION REDUCTION

Frictional losses will lead to a reduction of engine power and efficiency. An approved engine oil will minimize frictional losses. Excessive wear will lead to a reduction in service life (e.g. wear of bearings, piston rings, cam lobes) or to mechanical failure.

LIMITED TENDENCY TO PRODUCE COMBUSTION RESIDUE

During engine operation, a limited amount of oil enters the combustion chamber, where it is burned. Combustion residues or deposits, which build up in the combustion chamber, lead to unwanted increases in compression and promote surface ignition ("pinging"). Any approved engine oil will help prevent such a condition.

FAVORABLE VISCOSITY TEMPERATURE BEHAVIOR

Viscosity is the tendency of oil to resist flowing. Engine oil, when cold, should be thin enough so that the engine can be cranked over. Hot oil should be thick enough to maintain proper lubrication.

ANTI-FOAMING

The oil is forcefully mixed with air during engine operation. Heavy foaming will lead to impaired lubrication and reduction in oil flow rate. To prevent foaming, antifoaming additives are mixed with the oil.

GOOD CORROSION INHIBITION

The engine oil must prevent corrosion on engine components under all circumstances. Corrosion and rust inhibitors are added to displace water and acids from metal surfaces so that oil coats them.

MIXING ABILITY/COMPATIBILITY

It must be possible to mix all engine oils with each other, even synthetic with mineral oils, without causing any incompatibility problems. A further requirement is the compatibility with all materials contacted by oil, in particular oil seals, hoses and paint.

GOOD THERMAL CONDUCTIVITY/GOOD COOLING PROPERTY

Engine oil makes an important contribution to the cooling of an engine. It must transfer heat from friction surfaces, and combustion heat away from affected areas. The oil absorbed heat is carried back to the oil pan where it is transferred to the surrounding air.

GOOD DISPERSANT/DETERGENT QUALITIES

To limit or slow down the formation of combustion deposits and acidic components, together with abrasive particles and dirt from the intake air, good engine oils contain a detergent additive. Deposits of carbon and dirt are loosened and suspended in the oil, being drained away at the next oil change.

OXIDATION INHIBITORS AND AGING STABILITY

Oxidation can be described as the oxygen absorption of hydrocarbons formed in the oil. The results of oxidation have a negative impact on viscosity causing corrosion on certain metals and the formation of sludge. Inhibitors are added to prevent oxidation from occurring. A good engine oil must maintain its stability during the required oil change intervals.

Good Lubricating Oil Must:

1. Lubricate moving parts to minimize wear.
2. Lubricate moving parts to minimize loss from friction.
3. Remove heat from engine parts by acting as a cooling agent.
4. Absorb shocks between bearings and other engine parts, reducing engine noise and extending engine life.
5. Form a good seal between piston rings and cylinder walls.
6. Act as a cleaning agent.

2.0 GRADING OF OILS

VISCOSITY NUMBER

A method of classifying an oil by number, based on its resistance to flow at a high temperature.

These numbers are usually prefixed by SAE which is the abbreviation for the Society of Automotive Engineers. A lower SAE Number (i.e. SAE 5W) indicates a thinner oil with a higher flow rate, for use at lower temperatures. A higher SAE Number (i.e. SAE 30) indicates a thicker oil with a slower flow rate, for use at higher temperatures.

MULTIGRADE OILS

A multigrade, or multiviscosity oil has the qualities of a lower number oil at low temperatures and those of a higher number oil at high temperatures. Multigrade oils have numbers such as SAE 5W-30 and SAE 10W-40. For reliable engine performance in all temperature ranges mineral based engine oil viscosity must be matched to the temperature range at which the vehicle will be operated.

SINGLE GRADE OILS

A single grade viscosity oil has a limited temperature/viscosity range compared with multigrade oils. Due to the limited temperature/viscosity range of these oils they are no longer used in BMW engines and thus no longer listed in the BMW Engine Oil Temperature/Viscosity Table.

OIL CLASSIFICATIONS

A method of classifying oil was jointly developed by the SAE, API (American Petroleum Institute), and ASTM (American Society for Testing and Materials). Engine oils are rated according to two engine use categories:

C = Compression Ignition (i.e. CC)

Compression Ignition (C) oils are those that are used for diesel engines. The current service ratings for diesel-engine lubricating oils are: CA, CB, CC, CD, CE, CF and CG. The oils differ in their properties and in the additives they contain.

S = Spark Ignition (i.e. SE)

Spark Ignition (S) oils are those that are used for gasoline engines. The current service ratings for gasoline-engine lubricating oils are: SA, SB, SC, SD, SE, SF, SG, SH and SJ. These oils differ in their properties and in the additives they contain.

Another method of classifying minimum performance standards for gasoline-fueled engine oils has been developed through ILSAC (International Lubrication Standardization Approval Committee). Oils that meet ILSAC GF-1 performance standards must have a "starburst" certification mark displayed on the print of the oil product packaging.

3.0 ENGINE OIL REQUIREMENTS AND SPECIFICATIONS

APPROVED ENGINE OILS

- For BMW gasoline engines with two valves per cylinder, all reputable multiple grade engine oils* which meet or exceed the API classification of SH. (Combination with diesel oil specifications CD or CE quality classifications are also permitted, e.g. SH/CE etc.)

  For BMW gasoline engines with four valves per cylinder, only reputable multiple grade engine oils* which meet or exceed the API classification of SH. (Combination with diesel oil specifications CD or CE quality classifications are also permitted, e.g. SH/CE etc.)

- For BMW turbocharged diesel engines, all reputable multiple grade engine oils* which meet or exceed the API classification CD/CE.

*Engine oil may be mineral or synthetic based.

Special Oils category has been replaced by BMW **High Performance Synthetic** Engine Oil (5W-30). It eliminates the need for seasonal oil changes since it covers all ambient temperature ranges.

BMW of North America has introduced a line of exclusively formulated High Performance Engine Oils which exceed existing international quality specifications (SAE/CCMC) for motor oils. BMW part numbers are:

ENGINE OIL REQUIREMENTS AND SPECIFICATIONS

SAE 5W-30 (SJ/CF) BMW High Performance Synthetic Oil	1 quart	Part No. 07 51 0 017 866
SAE 15W-40 (SJ/CF) BMW High Performance Mineral Oil	1 quart	Part No. 07 51 0 017 868

Motorsport Engines

E46 M3 / S54E36 M roadster, M coupe / S54 from start of production

E39 M5 / S62 Up to 3/2000

E52 Z8 / S62 Up to 3/2000

E60 M5 / S85 From start of production

E63 M6 From start of production

E64 M6 From start of production

E85 Z4 M Coupe / Z4 M Roadster From start of production

BMW High Performance Synthetic Oil Castrol RS SAE 10W-60 also called Castrol TWS Motorsport SAE 10W-60 Synthetic Oil Part No. 07 51 0 009 420 (1quart)

E39 M5 / S62 From 3/2000

E52 Z8 / S62 From 3/2000

BMW High Performance Synthetic Oil SAE 5W-30 Part No. 07 51 0 017 866 Or BMW High Performance Synthetic Oil Castrol RS SAE 10W-60 also called Castrol TWS Motorsport SAE 10W-60 Synthetic Oil Part No. 07 51 0 009 420 (1quart)

BMW High Performance Synthetic Oil 5W-30 and 10W-60 offer several benefits over conventional mineral based oils.

SUPERIOR THERMAL STABILITY

The synthetic based oil resists thickening at very low ambient temperatures providing improved flow, lubrication and less internal engine resistance during cold starts.

Under high heat conditions, the oil resists thermal breakdown/shearing which causes a loss of lubrication quality compared with conventional oils.

SUPERIOR LUBRICATION THROUGHOUT THE LIFE OF THE OIL

Compared to conventional engine oils, BMW High Performance Synthetic Oil is better able to keep engine combustion contaminants in suspension and is less susceptible to the harmful effects of oxidation.

The oil resists sludge buildup thus allowing extended oil change intervals. Synthetic based oils also have a lower volatility which makes them less susceptible to evaporation thereby reducing oil consumption.

This oil has been durability tested on BMW engines and supplies superior lubrication under all operating conditions and over the extended BMW oil change intervals.

4.0 ENGINE OIL CHANGE INTERVALS

With the introduction of the 1999 Model Year vehicles BMW has introduced an extended oil change interval of approximately 15,000 miles (depending on engine operating conditions) on most models.

To coincide with the increased oil change interval, BMW has also introduced "BMW High Performance Synthetic Oil" which must be used on all 1999 Model Year vehicles (except E36 318ti, 323is/iC, 328is/iC, M3, M Roadster and M Coupe models) whenever a service is necessary to avoid engine damage.

NOTE: Only if it is necessary to top up the engine oil between oil changes is it permissible to use synthetic low viscosity engine oils which conform to the API classification SJ or higher.

A label in the engine compartment states the oil specifications and refers to the BMW website (www.bmwusa.com) and toll free number (1-800-831-1117) for additional information.



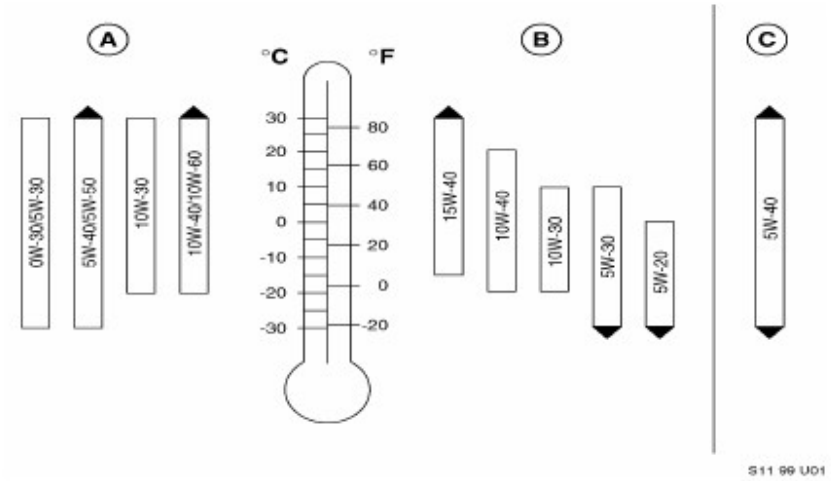
Fig. 1: Identifying Label In Engine Compartment States
Courtesy of BMW OF NORTH AMERICA, INC.

BMW High Performance Synthetic Engine Oil may also be used on Model Year 1999 E36 (3-Series and M models) as well has Model Year 1998 and earlier BMW models.

The oil change intervals should not be extended due to the greater durability of a fully synthetic engine oil. The engine oil and filter should always be changed as per the vehicle's Service Interval Indicator when the "Oil Service" or the "Inspection" display appears regardless of the type of oil being used.

BMW mineral-based High Performance engine oil is also offered for model year 1998 and earlier BMW

models. However, for reliable engine performance in all temperature ranges mineral-based engine oil viscosity must be matched to the temperature range at which the vehicle will be operated. See Engine Oil Temperature/Viscosity Table below.



A/B: Brand name oils approved per API or ACEA (CCMC)

A = Diesel engines

B = Spark-ignition engines

C: BMW High Performance Synthetic Oil

C = Valid for spark-ignition and diesel engines

Fig. 2: Identifying BMW Engine Oil Temperature/Viscosity Table
Courtesy of BMW OF NORTH AMERICA, INC.

Other Oil Changes For Cars Without Service Indicator:

MODEL YEAR/MILLAGE REFERENCE

Model Year(s)	Mileage
1980 and later	7,500
1975 thru 1979	6,500
1974 or earlier	4,000

Including oil filter. However, at least twice annually, preferably before and after the winter season.

Under severe driving conditions it is recommended to increase the number of oil services.

5.0 CONDITION BASED SERVICE

Models: E90, 91, 92, E60, E61, E63, E64 E65, E66

Condition Based Service measures, monitors, and determines the required maintenance of several service items independent from each other. This technology prompts the customer to bring the vehicle for service whenever one of the CBS items requires maintenance or replacement. CBS strikes a compromise between too frequent

maintenance and too rigid service intervals that call for the replacement of service items which may still have substantial remaining useful life. CBS also details the recommended, due, and overdue required maintenance during and after the BMW Vehicle Maintenance Program Agreement. Thus, CBS allows BMW customers to experience a technology that makes service more convenient, transparent and structured.

6.0 ENGINE OIL ADDITIVES

The use of engine oil additives is not recommended and not necessary on BMW engines. Instead, it is mandatory to use BMW High Performance Synthetic Oil in 1999 model year and later BMW models and recommended to use either BMW High Performance Synthetic Oil, BMW High Performance Mineral Oil or one of today's highly advanced brand name lubricating oils conforming to API classification SH or higher in 1998 and earlier BMW models.

7.0 BREAK-IN INSTRUCTIONS

During the break-in period of a new engine or parts of a reconditioned engine (new bearings, crankshaft, pistons, etc.) BMW engines do not require special break-in oils.

All of the multiple grade engine oils can be used, as long as they conform with BMW specifications.

8.0 N52, N52KP AND N54 FRONT AND REAR RADIAL SEAL SEALANT

When replacing the front or rear radial crankshaft seals on new generation 6 cylinder engines, a special Loctite® sealant must be applied to fill the seal grooves at the bedplate seam. Follow the appropriate repair instruction in TIS:

RA 11 14 005 - Front radial crankshaft seal replacement

RA 11 14 151 - Replacing crankshaft radial seal (rear)

All special tools required to perform these repairs have been sent out through the automatic tool shipment program and are listed in S.I. Bulletin 04 01 06.

Required Materials:

P/N 83 19 7 536 051 - Loctite® 128357 sealant compound\

P/N 83 19 7 515 683 - Loctite® 171000 primer

P/N 83 19 7 515 684 - Stamp

10.0 LUBRICANT FOR OXYGEN SENSOR

Apply Bostik NEVER-SEEZ® (Part No. NSBT-16) to threads of oxygen sensor.

11.0 OIL CONSUMPTION

All engines normally consume a certain amount of oil. This is necessary in order to properly lubricate the cylinder walls, pistons, piston rings etc. In addition, engines with less than 6,000 miles will generally consume additional oil because the components are not fully seated. Therefore, oil consumption complaints received prior to 6,000 miles cannot be considered.

Once a new or rebuilt engine has accumulated 6,000 miles this procedure should be used if there is a drastic change in the oil consumption rate (i.e. the oil consumption rate triples) under similar driving conditions or if the oil consumption rate exceeds 1 qt. per 750 miles at any time..

All Motorsport Engines:

Due to their increased output and maximum engine speeds, these engines are allowed a maximum consumption of 2.5 quarts per 1,000 miles.

13.0 OPERATING FLUIDS TABLE AND ALTERNATE SUPPLIERS

OPERATING FLUIDS TABLE AND ALTERNATE SUPPLIERS

BMW Part Number	Description / Application	3M	Wurth	Loctite	CRC
11 12 1 262 571(1)	**Silicone Sealant**	8661		80050/PX66BR	
81 12 9 400 086(1)	**Hylogrip/Loctite 270 Thread Sealant** Secures and seals bolts, studs, nuts, threaded inserts, screw plugs against impact and vibration. Fastens ball, roller and sliding bearings onto shafts or in housings, with play up to 0.25mm. Quick setting.		8932700	21438	
	Oil filter flange bolt				
	-				
81 22 9 400 243(1)	**Sealer** Low viscosity, non-hardening, removeable. For sealing off against mineral oils, grease, gases, air and many chemicals. Application: from-40°C to approx. 200°			Permatex 3D Aviation Form a Gasket 80017	

	C. Tacking cylinder gasket -					
81 22 9 400 339	**Hylomar SQ32M Sealant** Universal sealing compound, applicable by brush. For sealing interfaces between surfaces that require excellent temperature resistance and sealing elasticity. Material: Polyester-urethane mixture.					
81 22 9 407 394[1]	**Loctite 380 Epoxy Cement** Black cyanacrylate adhesive for joining metals, rubber, PVC.	8155	8934103	38050		
81 22 9 400 794[1]	**Copper Paste** Multi-purpose grease for all detachable joints at high temperatures and corrosive conditions, also after long operating periods. Able to withstand high pressures, protection against undesired weld contact, seizure and corrosion, active adhesion properties, effective as lubricant and separator up to 1100°C. Applications: parts subject to high temperatures, such as bolts and flanges on exhaust system, engine, disk brakes, etc.	8945				3046010

81 22 9 407 439[1]	07 58 9 062 376[1]	**Silicone Sealer** A black colored silicone-based sealant for large areas. Resists temperatures up to 250°C. For engine or gearbox; particularly suitable for sealing the timing case on M70 engine, and eliminating oil seepage from E36 M42 cylinder head.	8670 8661	81157/PX16B 80050/PX66BR	
81 22 9 407 760[1]	Engine Cleaner Spray Fast acting cleaner for dirty engines and engine parts. Does not attack painted, rubber, or plastic parts.	8899	890923	80043	14045
N/A	**Lubro Moly Lecksucher** Intake and vacuum system leak detector.				
N/A	**J-B Weld** Repairs pitting in cylinder head sealing surfaces.				
N/A	**Bostik Never-Seez** Thread lubricant for oxygen sensors.				

(1) *These items are no longer available through BMW NA Parts Department.

1100 ENGINE, GENERAL

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

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

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

Protective measures/rules of conduct

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

First aid measures

- Do not induce vomiting.

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

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

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

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

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

Protective measures/rules of conduct

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

First aid measures

- Do not induce vomiting.

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

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

ENGINE IDENTIFICATION

Punch engine numbers at marked surface with number punch.

Magnesium crankcase with sticker

M47/M47TU/M47T2

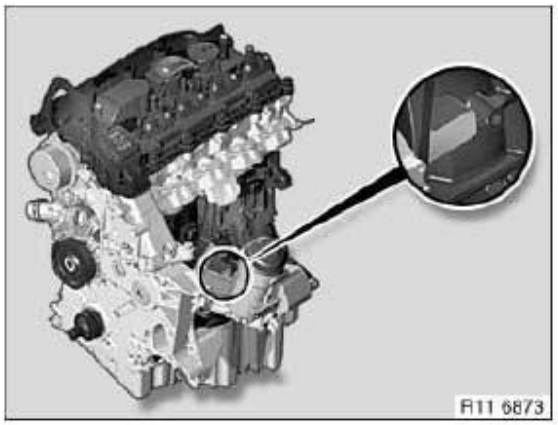


Fig. 1: Identifying Engine Identification Mark - M47/M47TU/M47T2
Courtesy of BMW OF NORTH AMERICA, INC.

M57/M57TU/M57T2

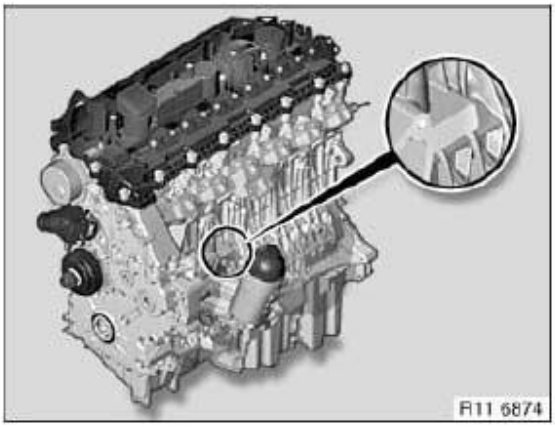


Fig. 2: Identifying Engine Identification Mark - M57/M57TU/M57T2
Courtesy of BMW OF NORTH AMERICA, INC.

M67/M67TU

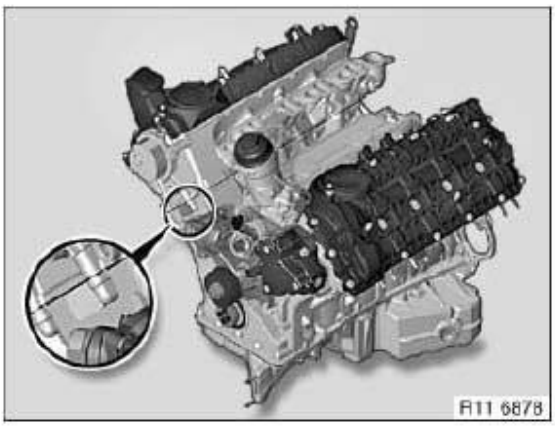


Fig. 3: Identifying Engine Identification Mark - M52/M52TU
Courtesy of BMW OF NORTH AMERICA, INC.

N47/N47S/N47C/N57 N57S

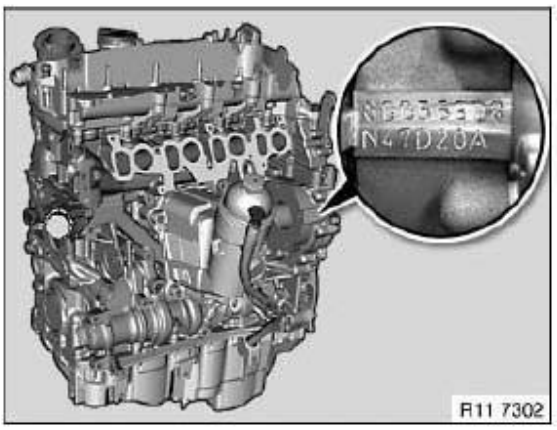


Fig. 4: Identifying Engine Identification Mark - N47/N47S/N47C/N57 N57S
Courtesy of BMW OF NORTH AMERICA, INC.

M52/M52TU

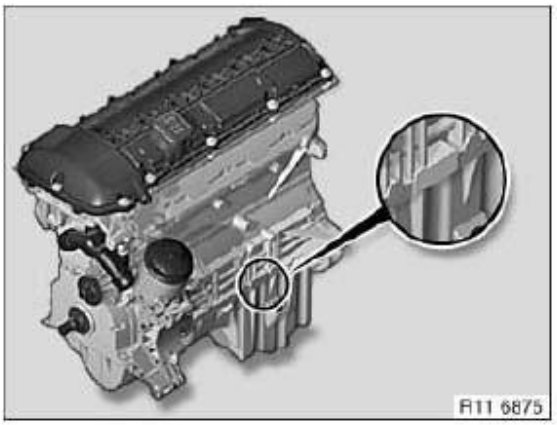


Fig. 5: Identifying Engine Identification Mark - M52/M52TU
Courtesy of BMW OF NORTH AMERICA, INC.

M54

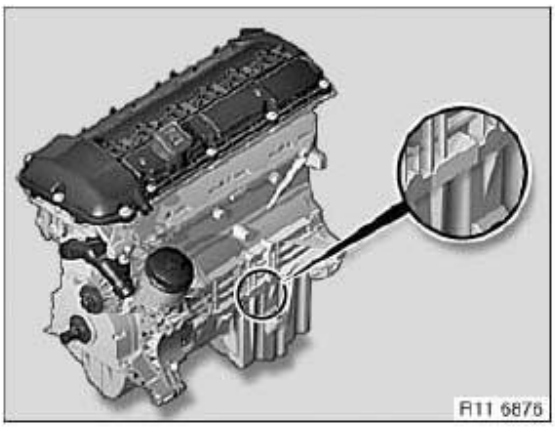


Fig. 6: Identifying Engine Identification Mark - M54
Courtesy of BMW OF NORTH AMERICA, INC.

M56

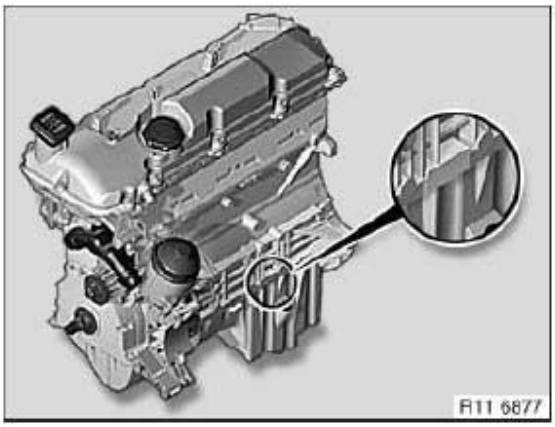


Fig. 7: Identifying Engine Identification Mark - M56
Courtesy of BMW OF NORTH AMERICA, INC.

N40/N45/N45T/N43

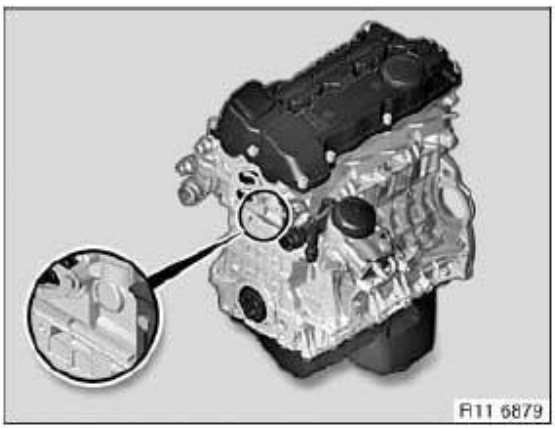


Fig. 8: Identifying Engine Identification Mark - N40/N45/N45T/N43
Courtesy of BMW OF NORTH AMERICA, INC.

N42/N46/N46T

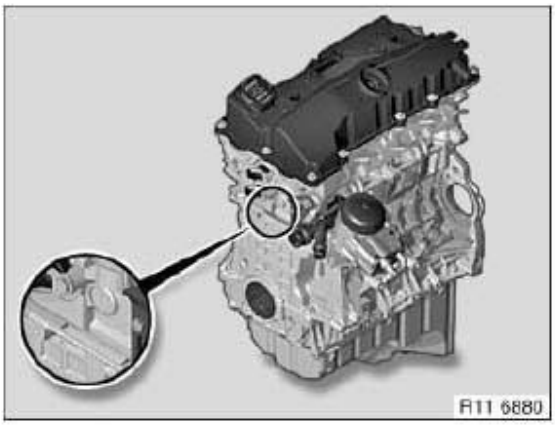


Fig. 9: Identifying Engine Identification Mark - N42/N46/N46T
Courtesy of BMW OF NORTH AMERICA, INC.

N51/N52/N52K/N52T/N53/N54/N55

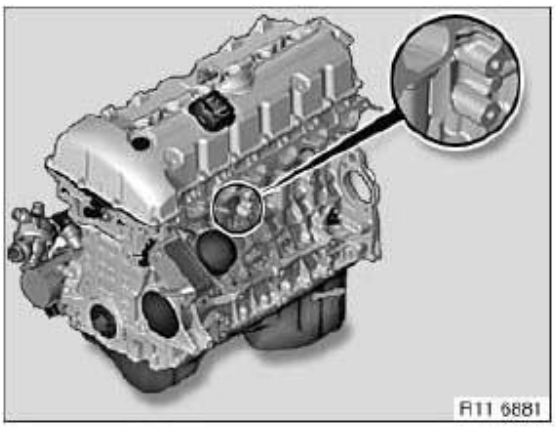


Fig. 10: Identifying Engine Identification Mark - N51/N52/N52K/N52T/N53/N54/N55
Courtesy of BMW OF NORTH AMERICA, INC.

N62/N62TU

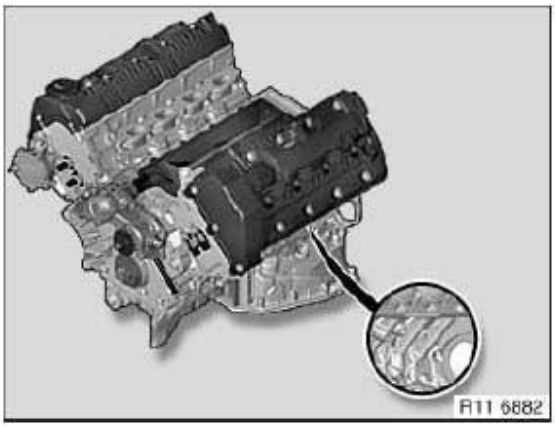


Fig. 11: Identifying Engine Identification Mark - N62/N62TU
Courtesy of BMW OF NORTH AMERICA, INC.

N73

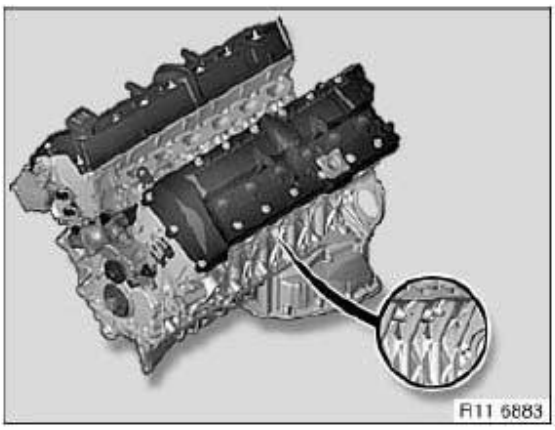


Fig. 12: Identifying Engine Identification Mark - N73
Courtesy of BMW OF NORTH AMERICA, INC.

S54

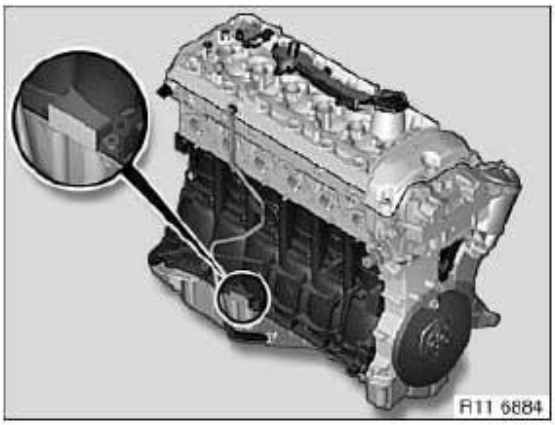


Fig. 13: Identifying Engine Identification Mark - S54
Courtesy of BMW OF NORTH AMERICA, INC.

S85/S65

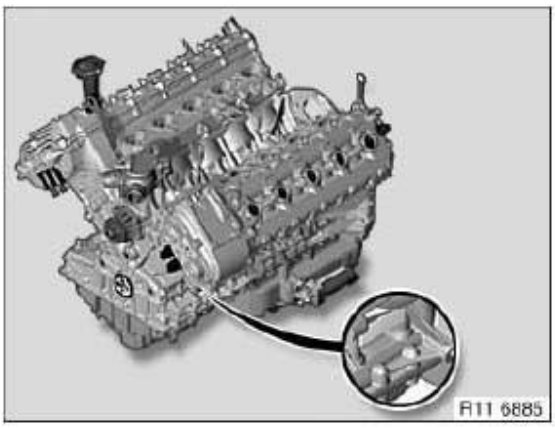


Fig. 14: Identifying Engine Identification Mark - S85/S65
Courtesy of BMW OF NORTH AMERICA, INC.

W10/W11

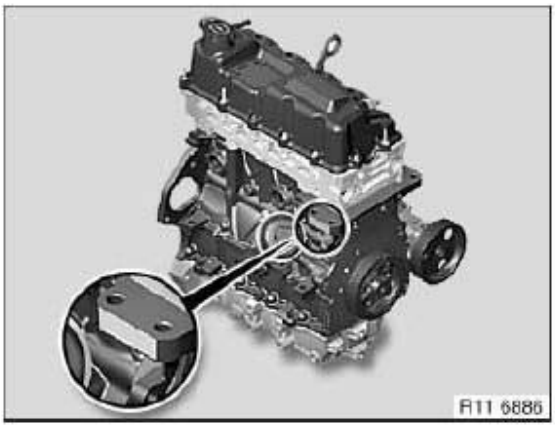


Fig. 15: Identifying Engine Identification Mark - W10/W11
Courtesy of BMW OF NORTH AMERICA, INC.

N12/N14/N16/N18



Fig. 16: Identifying Engine Identification Mark - N12/N14/N16/N18
Courtesy of BMW OF NORTH AMERICA, INC.

W17

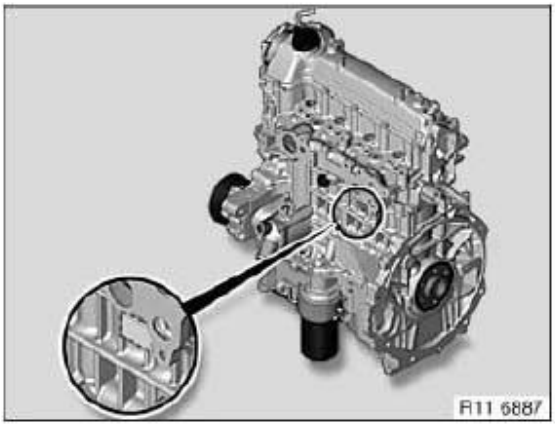


Fig. 17: Identifying Engine Identification Mark - W17
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 00 ... ENGINE OIL SERVICE (N52K)

WARNING: Danger of scalding!
Carry out work on the vehicle only when wearing oil- and heat-resistant protective gloves incl. forearm protection, face guard and protective apron.

IMPORTANT: Carry out the engine oil service only when the engine is at normal operating

temperature.
Observe the exact engine oil filling capacity.
Overfilling the engine with engine oil will result in engine damage .
Checking and drop-off times (at least 10 minutes) must be observed.

IMPORTANT: Risk of damage!
Protect belt drive against dirt.
Cover with suitable materials.

Recycling

Catch and dispose of drained engine oil in a suitable container.

Observe country-specific waste-disposal regulations.

Release oil filter cap with special tool 11 9 240 .

Tightening torque **11 42 1AZ** .

NOTE: Engine oil flows out of the oil filter housing and back into the oil sump.

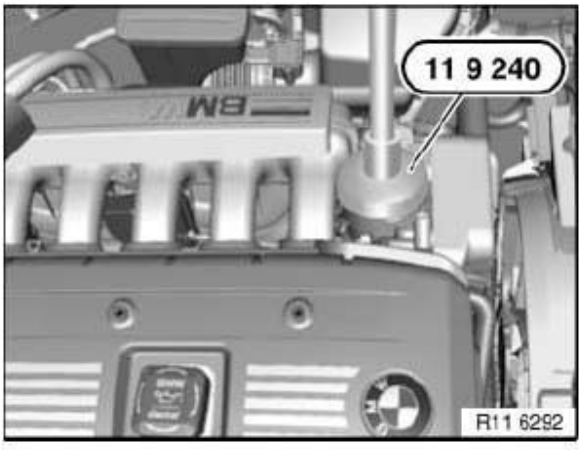


Fig. 18: Identifying Special Tool (11 9 240)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Presentation: E63 without underbody protection.

Unclip service opening on underbody protection.

Remove screw plug (1) from oil sump and drain engine oil.

Tightening torque **11 13 1AZ** .

Installation:

Replace sealing ring.

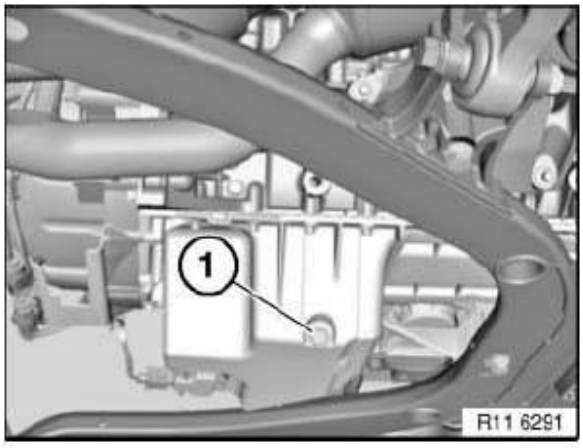


Fig. 19: Identifying Screw Plug On Oil Sump
Courtesy of BMW OF NORTH AMERICA, INC.

Remove and insert oil filter element (1) in direction of arrow.

Installation:

Replace oil filter element (1) and sealing rings (2).

NOTE: Moisten sealing rings (2) with engine oil.

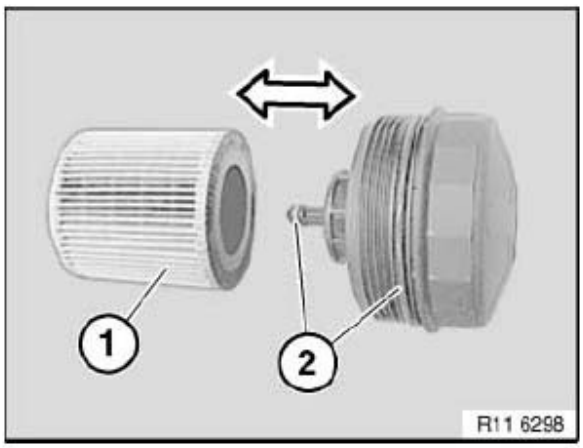


Fig. 20: Identifying Oil Filter Element And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Secure oil filter cap with special tool 11 9 240 .

Tightening torque **11 42 1AZ** .

NOTE: Pour in ENGINE OIL .

Start engine and run at idle until oil pressure warning lamp goes out.

Turn off engine.

Check oil filter cap and screw plug on oil sump for leaks.

Assemble engine.

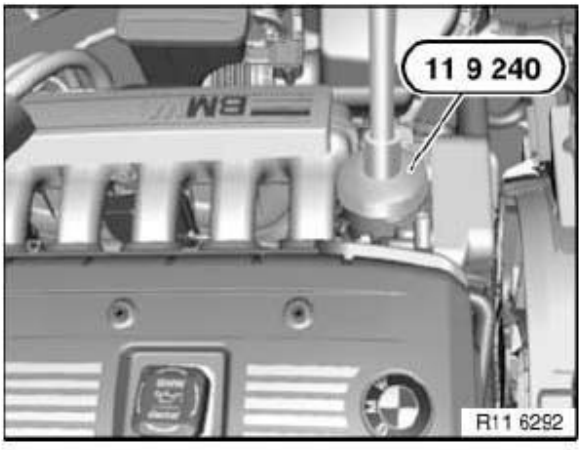


Fig. 21: Identifying Special Tool (11 9 240)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking engine oil level:

- Park vehicle on a horizontal surface
- Allow engine at normal operating temperature to run for three minutes with increased revs (approx. 1100 RPM)
- Read off engine oil level in instrument cluster or on Control Display
- Top up engine oil if necessary

MOUNTING ENGINE ON ASSEMBLY STAND (N52K)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released .
The end faces of aluminum screws/bolts are painted blue for the purposes of reliable identification.
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove engine

Bolt engine or engine block with steel bolts (1) and aluminum bolts (2) to special tool 11 4 440 .

To release central bolt, bolt on special tools 11 9 261 and 11 9 265 as well.

Mount engine with special tool 11 3 370 to special tool 00 1 450.

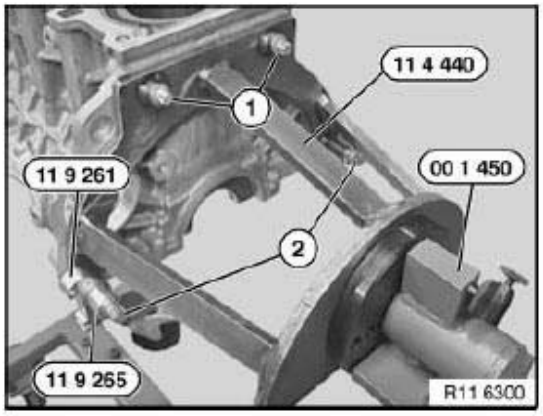


Fig. 22: Identifying Engine Block With Steel Bolts And Aluminum Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

11 00 ... OVERVIEW OF CONSUMABLES (ELECTRONIC PARTS CATALOGUE)

1.0 Sealing compound for injection

SEALING COMPOUND INJECTION REFERENCE CHART

	Repair instructions (engine)	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
1.1	N40, N42, N45, N46, N43, N45N, N46N	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 128367 sealing compound
1.2	N40, N42, N45, N46, N43, N45N, N46N	Loctite 128357 liquid gasket	83 19 7 536 051	Sealing between crankcase upper and lower halves
1.3	N51, N52, N53, N54, N52N, N55	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 193140 sealing compound
1.4	N51, N52, N53, N54, N52N, N55	Loctite 193140 liquid gasket	83 19 0 439 030	Sealing between crankcase upper and lower halves
1.5	S65, S85	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 193140 sealing compound

1.6	S65, S85	Loctite 193140 liquid gasket	83 19 0 439 030	Sealing between crankcase upper and lower halves

2.0 Sealing compound for application

SEALING COMPOUND APPLICATION REFERENCE CHART

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
2.1	M41, M47, M47TU, M47T2, M50, M51, M52, M52TU, M54, M57, M57TU, M57T2, M60, M62 N40, N42, N45, N45N, N46, N46N, N43, N47, N47top, N47C N47D1 N51, N52, N52N, N53, N54, N55, N57, N57S N62, N62TU, N63, N73, N73H, N74 S14, S38, S50, S52, S54, S62, S65, S85 N12, N14, N16, N18	Drei Bond 1209 liquid gasket	07 58 9 062 376	For sealing separation points on crankcase
2.2	N12, N14, N16, N18 W16, N47top, N47D1, N47C1 N57D1,	Loctite 5970 liquid gasket	83 19 0 404 517 83 19 0 404 517	Sealing between crankcase upper and lower sections. Sealing of gear case cover, oil sump, coolant pump, component carrier.
2.3	N12, N14, N16, N18 W16	Loctite 648 liquid gasket	07 58 9 067 732	Sealing between cover sleeve and crankcase

3.0 Cleaning agent

CLEANING AGENT REFERENCE CHART

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
3.1	N45, N46, N45T, N46T, N43, N51, N52, N52Kp, N52TU, N53, N55, N63, N63S, N63Hyprid, N74	Cold cleaner (chlorine free)	83 19 0 026 956	Cleaning assemblies, washing engine

4.0 Lubricant for application

LUBRICANT REFERENCE CHART

	Designation in repair	Designation,	Part number,	

	instructions	Electronic Parts Catalogue	Electronic Parts Catalogue	Application examples
4.1	N20, N42, N46, N46TU, N51, N52, N52KP, N52TU, N55, N62, N62TU, N73	Lubricating grease Longtime PD1	83 19 2 160 340	For greasing the splined shaft on actuator drive/gearing of intermediate shaft.
4.2	M47, M47TU, M47T2, M57, M57TU, M57T2,	High temperature paste	83 19 2 152 323	For greasing the threads on the exhaust turbocharger.
4.3	N12, N14, N16, N18 N40, N42, N45, N45TU N46, N46TU, N43. N51, N52, N52Kp, N52TU, N53, N54, N55. N62, N62TU, N63, N73, N73H, N74. S65, S85.	High temperature paste (NEVER-SEEZ compound)	83 23 0 140 233	For greasing the threads on the oxygen sensors.
4.4	N47, N47O1 N47C1, N47T N47D1 N57 N57D1	Copper paste	81 22 9 400 794	For greasing the double hex head bolt on the exhaust turbocharger.

5.0 Lubricants to loosen locked screw connections

LUBRICANTS REFERENCE CHART

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
5.1	M47, M47TU, M47TU2, M57, M57TU, M57TU2. N47, N47C, N47D1, N57, N57D1, W16, W17,	Brunox lubricating grease	83 23 0 445 529	For releasing the glow elements

11 00 050 REMOVING AND INSTALLING ENGINE (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Disconnect **BATTERY NEGATIVE LEAD**
- Move **ENGINE HOOD/BONNET** into service position
- Remove **INTAKE FILTER HOUSING**
- Remove **FAN COWL** with electric fan
- Remove **RADIATOR**
- Remove **CONDENSER**
- Detach all coolant hoses from engine
- Detach vacuum line from brake booster
- Release engine wiring harness from electronics box and lay to one side
- Remove **EXHAUST SYSTEM**
- Remove transmission See **2300017 REMOVING AND INSTALLING TRANSMISSION (GS6-17BG) N52K** or **2400030 REMOVING AND INSTALLING AUTOMATIC TRANSMISSION (6HP19Z) N52K**
- Release **STEERING SPINDLE** from steering gear (do not remove)
- Release grounding strap on left engine support arm

Release nut (1) and disconnect battery positive lead (2) from terminal.

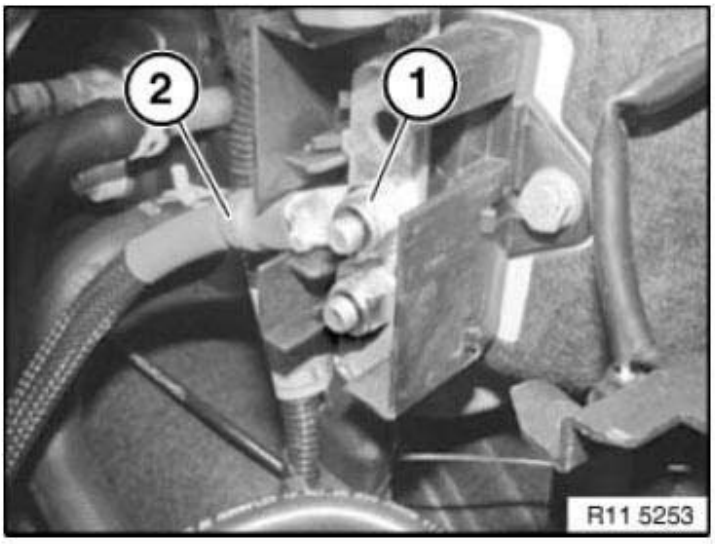


Fig. 23: Identifying Battery Positive Lead And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove A/C line (2) from A/C compressor.

Installation:

Replace seals.

Tightening torque **64 52 1AZ** .

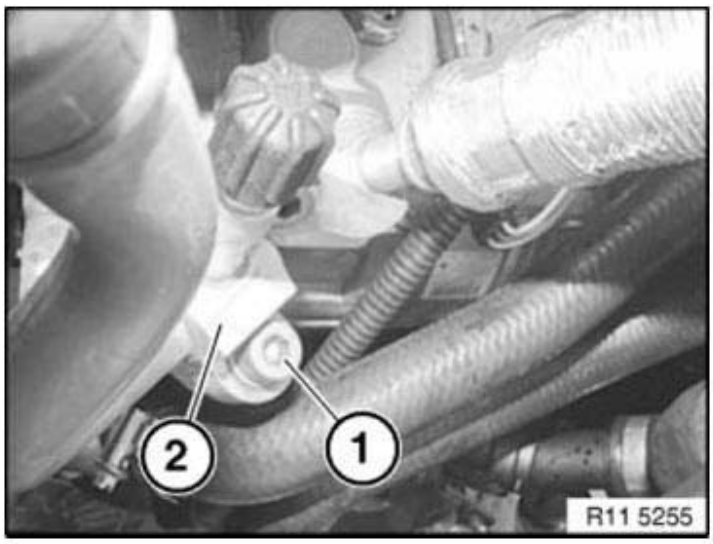


Fig. 24: Identifying A/C Line And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect fuel lines (1).

Seal off fuel lines with special tools 13 5 161 and 13 5 162.

Disconnect tank vent line (2).

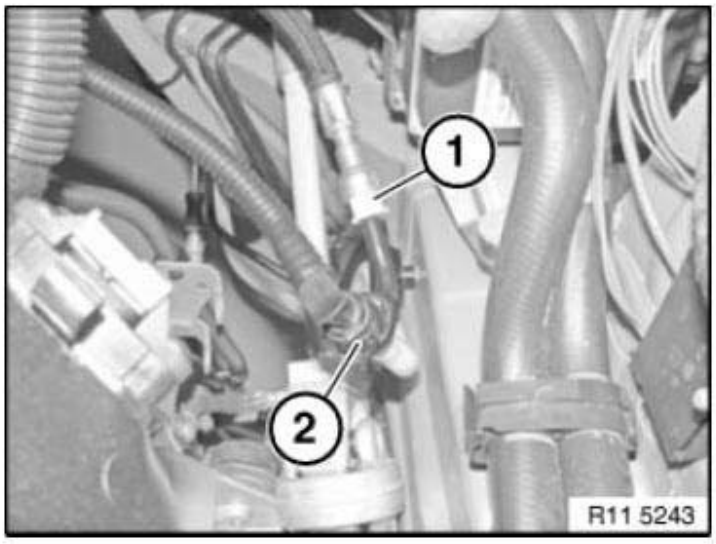


Fig. 25: Identifying Tank Vent Line And Fuel Line
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock crankcase breather hose (2) and detach from cylinder head cover (1).

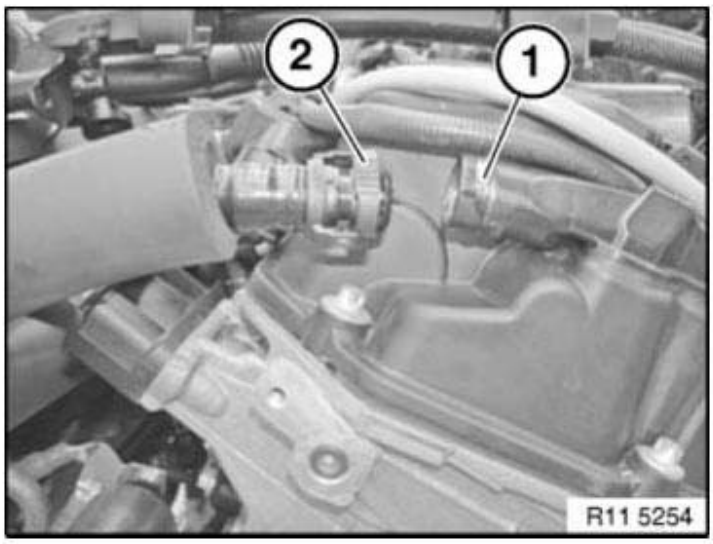


Fig. 26: Identifying Crankcase Breather Hose And Cylinder Head Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) on engine mount on left and right.

Installation:

Replace self-locking nut.

Tightening torque **22 11 2AZ** .

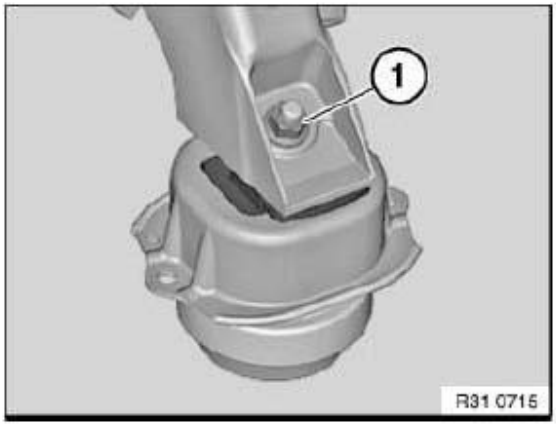


Fig. 27: Identifying Engine Mount Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Screw towing eye (1) into cylinder head.

Tightening torque **11 12 9AZ** .

Suspend special tool 11 0 020 from engine crane.

Suspend special tool 11 0 020 from the designated mounting eyelets (2) only.

Lift engine out with engine crane.

NOTE: For purposes of clarity, engine removed and not showing intake manifold.

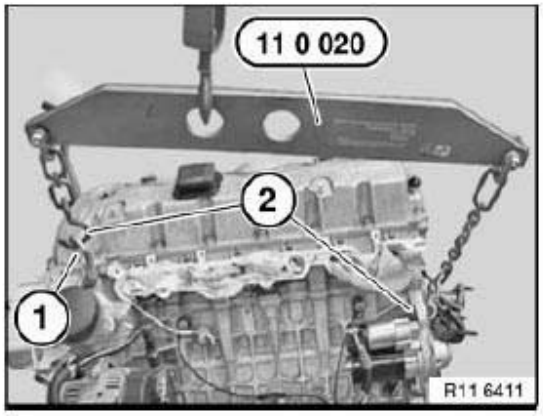


Fig. 28: Lifting Engine Using Special Tool (11 0 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Secure special tool (1) 11 7 310 on steering gear.

Remove again before securing transmission carrier.

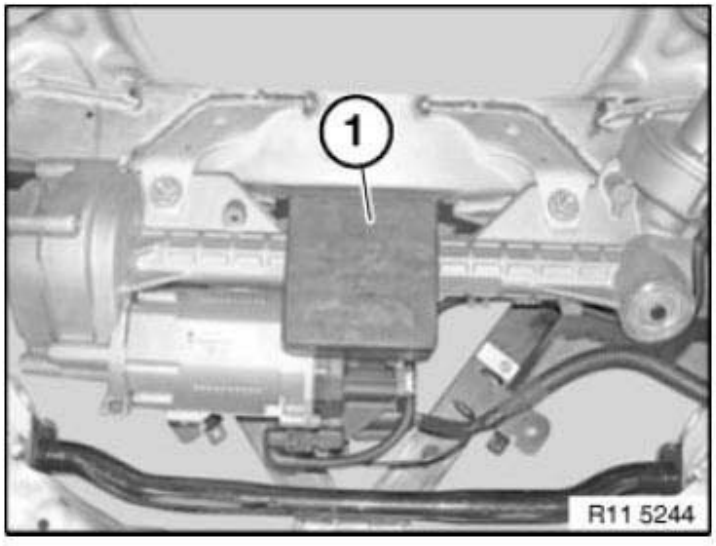


Fig. 29: Identifying Special Tool (11 7 310) On Steering Box

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

11 00 REMOVING AND INSTALLING/REPLACING ACOUSTIC COVER (N52K)

Release screws (1).

Raise acoustic cover slightly and remove towards front.

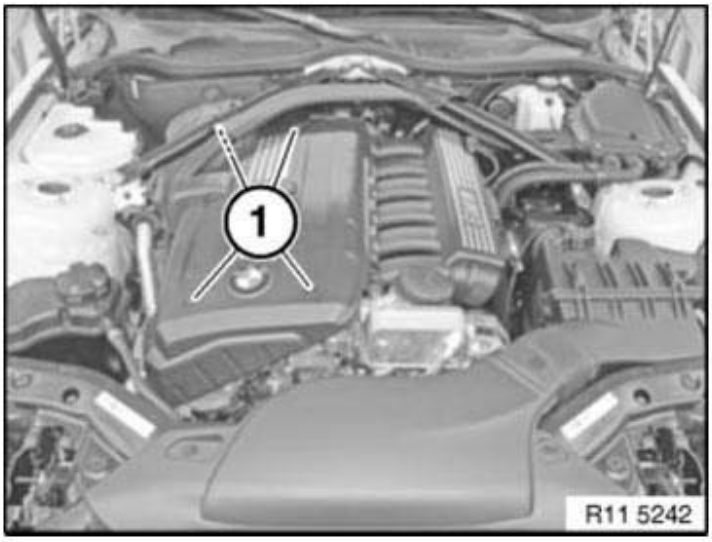


Fig. 30: Identifying Acoustic Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

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

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

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

Protective measures/rules of conduct

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

Risk 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 INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop

function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

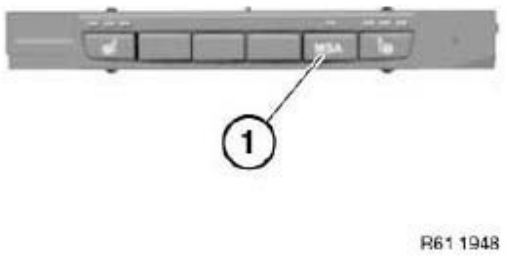


Fig. 31: Identifying MSA Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
- Workshop mode

  A = 10 mm

- Basic setting (engine hood/bonnet open)

B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

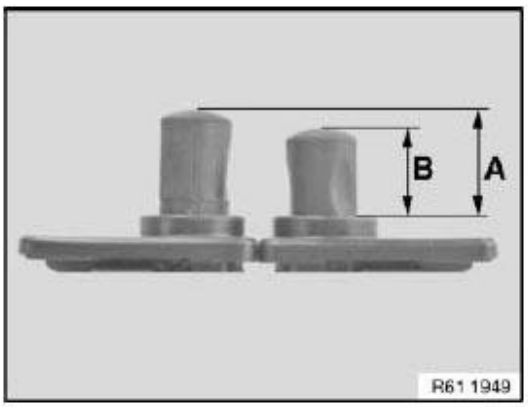


Fig. 32: Identifying Engine Hood/Bonnet Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

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

Recycling

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released

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

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

11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N52)

WARNING: Risk of injury!
Observe following instructions relating to special tool:

1. **Prior to each use, check the special tools for defects, modifications**

and operational reliability.

2. **Damaged/modified special tools must not be used!**
3. **No changes or modifications may be made to the special tools!**
4. **Keep special tools dry, clean and free of grease.**

Necessary preliminary tasks:

- Secure **ENGINE COMPARTMENT LID IN SERVICE POSITION**
- Remove **AIR INTAKE FILTER HOUSING**

Lever out expanding rivets (2) and remove cable clip (1).

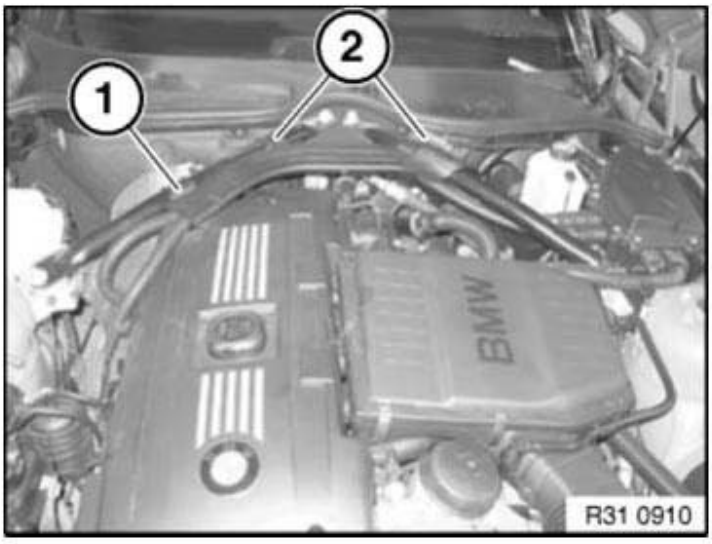


Fig. 33: Identifying Lever Out Expanding Rivets And Cable Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect quick-release coupling (2). Detach vent line from cylinder head cover (1).

Installation:

Make sure quick-release coupling is fitted correctly.

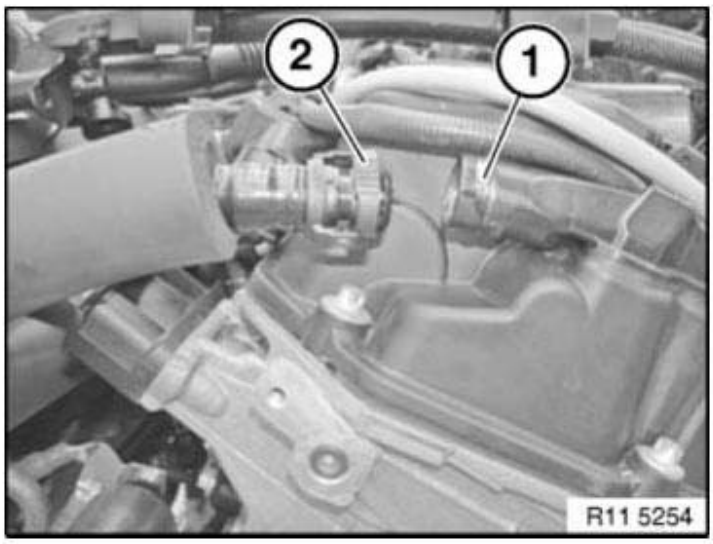


Fig. 34: Identifying Quick-Release Coupling And Cylinder Head Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble transverse member 00 6 000 with special tools 00 6 030.

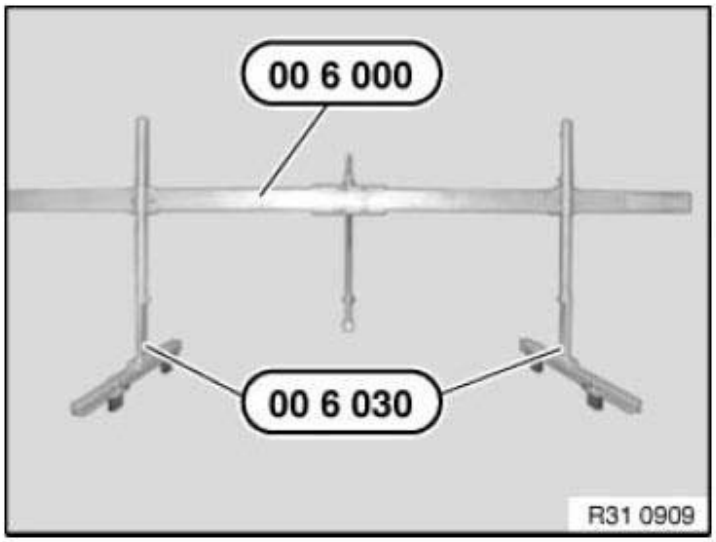


Fig. 35: Assembling Transverse Member 00 6 000 Using Special Tools 00 6 030
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in towing hook (1).

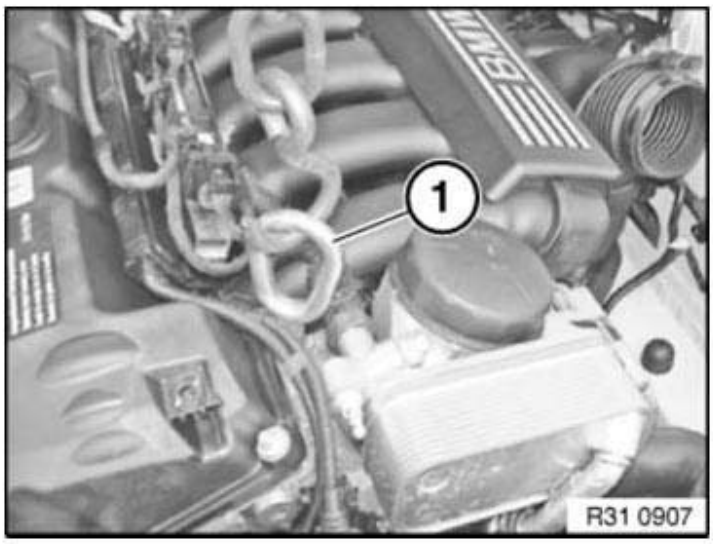


Fig. 36: Identifying Towing Hook
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Avoid a change of engine position in the transverse or longitudinal direction. Always make sure there is sufficient clearance between the engine (or its attachment parts) and the body.

The support points on the left side are shown.

IMPORTANT: Risk of damage!
Position transverse member 00 6 030 with a 2nd person help on designated areas (1,2) of side panel.

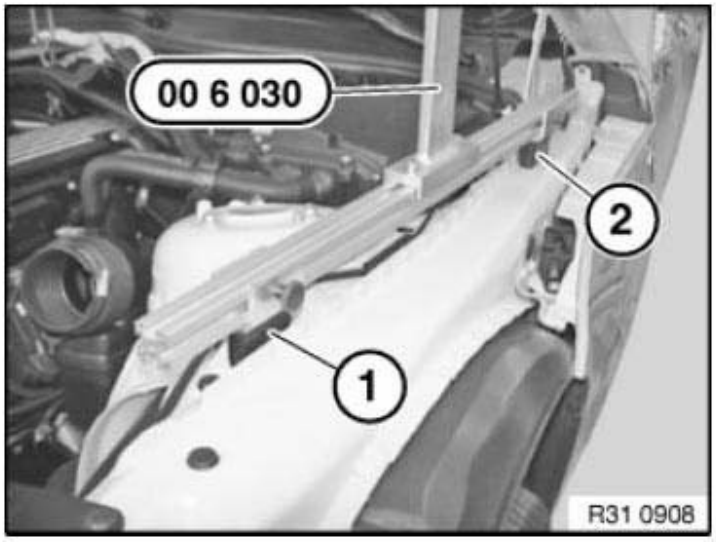


Fig. 37: Positioning Transverse Member 00 6 030 On Side Panel

Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 0 020 to spindle 00 6 002.

Fit suitable chains to special tool 11 0 020 and attach to engine towing hook or lifting eye.

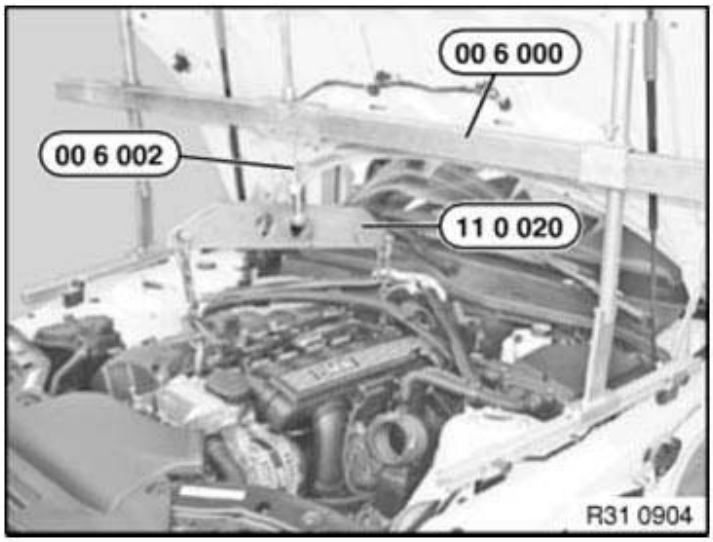


Fig. 38: Fitting Suitable Chains Using Special Tool (11 0 020)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury!
Tighten down all adjusting screws and nuts on transverse member 00 6 000, 00 6 030.

Unscrew nuts (1).

Raise engine approx. 10 mm with transverse member.

Installation:

Replace self-locking nuts.

Tightening torque **22 11 2AZ** .

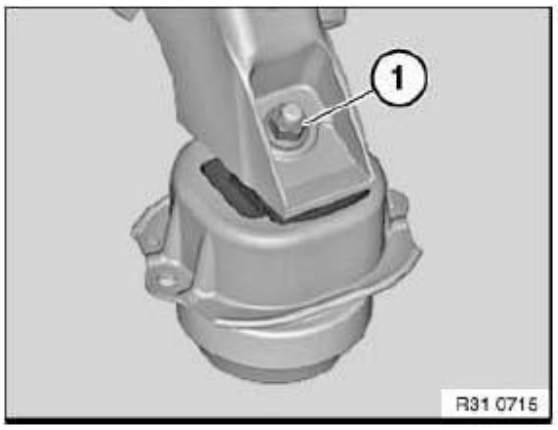


Fig. 39: Identifying Engine Mount Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

1112 CYLINDER HEAD WITH COVER

11 12 729 CHECKING CYLINDER HEAD FOR WATER LEAKS (N52K)

IMPORTANT: Pressure-test cylinder head to max. 3 bar .
Heat cylinder head to 60 °.
Check for bubble formation in a water bath.

Necessary preliminary tasks:

- Remove **CYLINDER HEAD**
- Disassemble **CYLINDER HEAD**

NOTE: Observe mounting of special tool 11 4 341 on cylinder.

Secure special tool 11 4 341 with bolts 11 4 345 to 25 Nm.

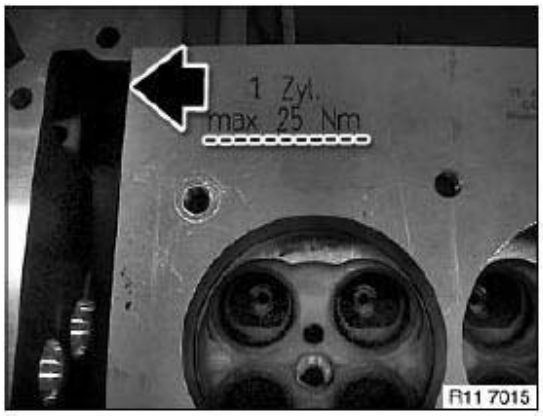


Fig. 40: Identifying Special Tool (11 4 341) On Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool 11 4 341 with special tool 11 4 345.

Installation:

Cylinder no. 1 is marked.

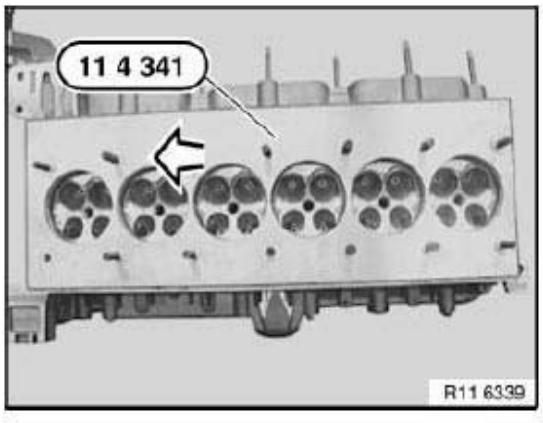


Fig. 41: Identifying Special Tool (11 4 341) On Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 4 342 with bolts (1). Screw in knurled screw in direction of arrow.

Sealing flange must rest flat.

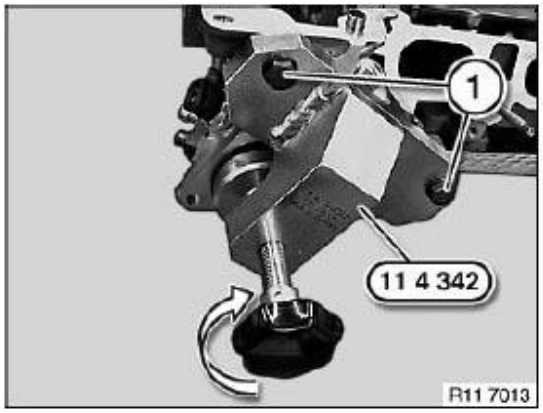


Fig. 42: Identifying Special Tool (11 4 342) With Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 344 with bolts (1).

NOTE: Compressed air at valve max. 3 bar .

Heat cylinder head to 60 °.

Check for bubble formation in a water bath.

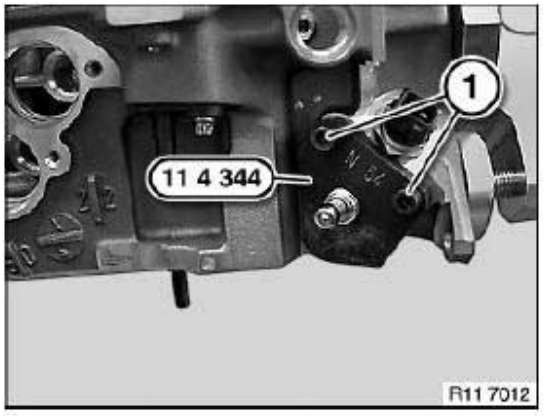


Fig. 43: Identifying Special Tool (11 4 344) With Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 100 REMOVING AND INSTALLING CYLINDER HEAD (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **EXHAUST SYSTEM**
- Drain **COOLANT**
- Drain off **ENGINE OIL**
- Remove both exhaust manifolds See **1840060 REMOVING AND INSTALLING/REPLACING REAR EXHAUST MANIFOLD (N52K)** or **1840050 REMOVING AND INSTALLING/REPLACING FRONT EXHAUST MANIFOLD (N52K)**
- Remove **INTAKE PLENUM**
- Detach coolant hoses from cylinder head
- Remove **INTAKE AND EXHAUST CAMSHAFT ADJUSTERS**

IMPORTANT: Fit new cylinder head screws.
Do not wash off bolt coating.
There must be no fluids or contaminants in any of the threaded holes for the cylinder head bolt connections.
Risk of corrosion and cracking!
Apply a light coat of oil to washer contact areas and threads of new cylinder head bolts.

Release screws (1).

Unclip timing chain module (2) at junction (3) and remove towards top.

Set down timing chain.

IMPORTANT: If the timing chain is stowed in the gearcase, the crankshaft must no longer be rotated.
This would cause the timing chain on the crankshaft sprocket wheel to jam or jump.

Installation:

The timing chain is lifted out with a hook only during assembly.

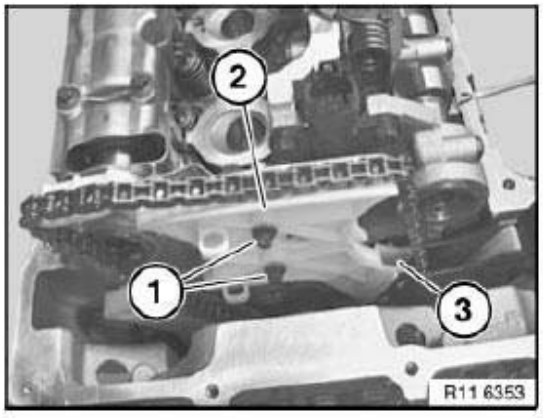


Fig. 44: Identifying Timing Chain Module With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (2) for eccentric shaft sensor (1).

Remove eccentric shaft sensor (1) towards front.

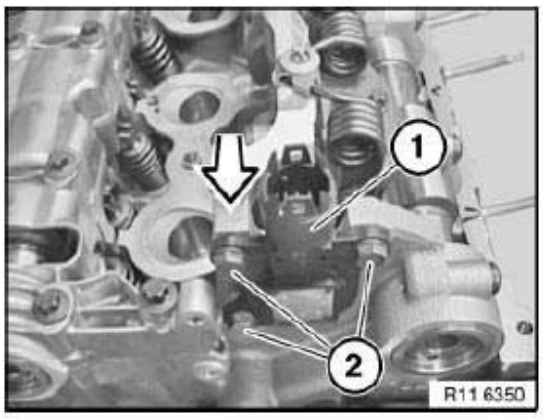


Fig. 45: Removing Eccentric Shaft Sensor Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Screw (1) is not magnetic and must be secured against falling down.

Release screw (1).

Remove magnet wheel (2) towards front.

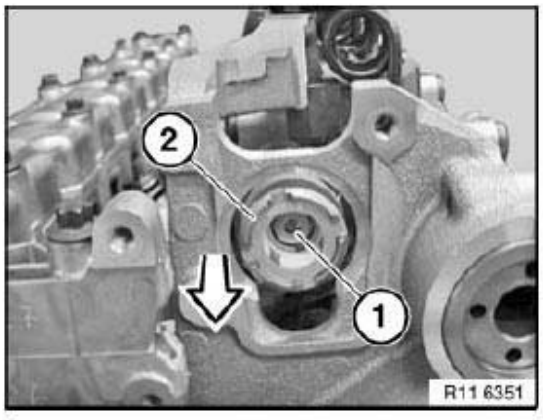


Fig. 46: Removing Magnet Wheel And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Magnet wheel (1) is highly magnetic and must be protected against metal filings/borings.

After removing, place magnet wheel (1) in a plastic bag (2) with a seal.

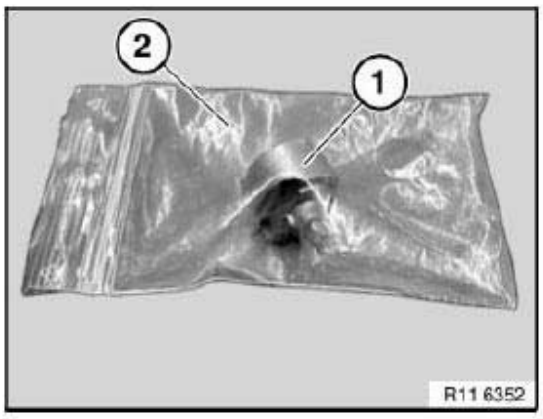


Fig. 47: Identifying Magnet Wheel In Plastic Bag
Courtesy of BMW OF NORTH AMERICA, INC.

Pre-tension eccentric shaft (1) upwards in direction of arrow.

Remove stop screw between 1st and 2nd cylinders.

Tightening torque **11 37 5AZ** .

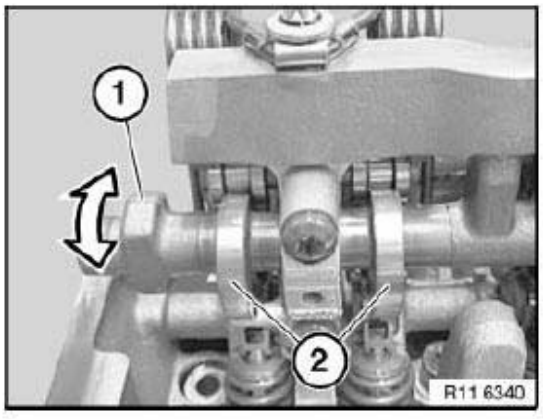


Fig. 48: Identifying Pre-Tension Eccentric Shaft With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Bolt (2) can only be released when the timing chain module is pressed forward slightly.

IMPORTANT: Secure bolt (2) with a gripper against falling down.

Release screw (2).

Tightening torque **11 12 3AZ** .

Release screws (1).

Tightening torque **11 12 4AZ** .

Installation:

Replace aluminum screws.

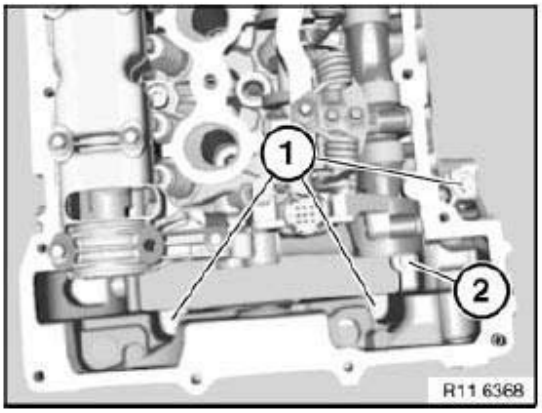


Fig. 49: Identifying Timing Chain Module Bolt And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe different bolt heads.

Release cylinder head bolts (1) M10 with special tool 11 8 580 .

Release cylinder head bolts (2) M9 with special tool **11 4 420** .

NOTE: Picture shows intake and exhaust camshafts removed.

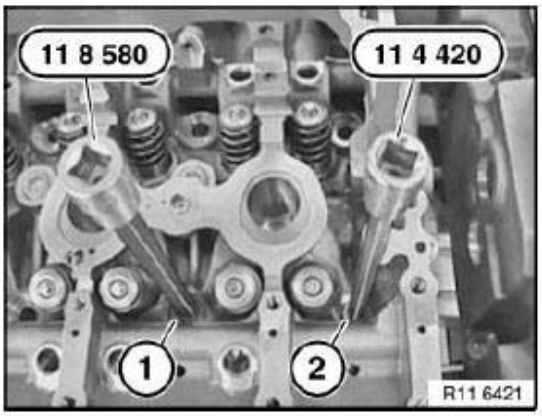


Fig. 50: Identifying Cylinder Head Bolts And Special Tool (11 8 580)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe different M9 bolt lengths (1 and 3).

Undo cylinder head bolts (1 and 3) M9 using special tool **11 4 420** .

Tightening torque **11 12 2AZ** .

Release cylinder head bolts (2) M10 with special tool 11 8 580 from outside inwards.

Tightening torque **11 12 1AZ** .

IMPORTANT: All cylinder head bolts (1, 2 and 3) must be replaced.
Joining torque and angle of rotation must be observed without fail.
Risk of damage!

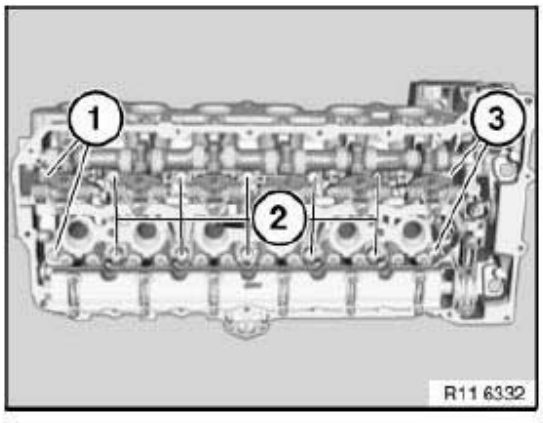


Fig. 51: Identifying Cylinder Head Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 0 320 with existing cylinder head cover bolts (1).

Tightening torque **11 12 5AZ** .

IMPORTANT: Removing and install cylinder head with a second person helping.
Weight of cylinder head with add-on parts is approx. 40 kg.
Do not rest cylinder head on sealing surface. Risk of damage to valves!

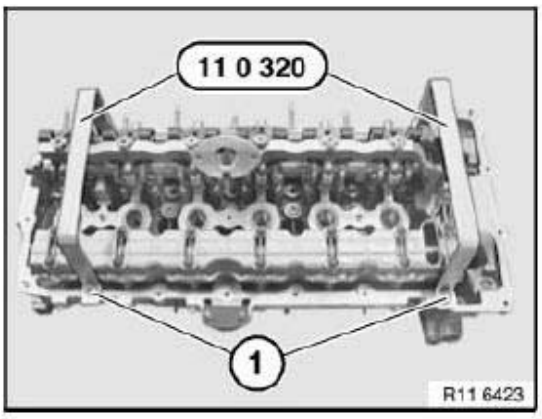


Fig. 52: Identifying Cylinder Head Cover Bolts And Special Tool (11 0 320)
Courtesy of BMW OF NORTH AMERICA, INC.

Insert 11 4 430 special tool into bores.

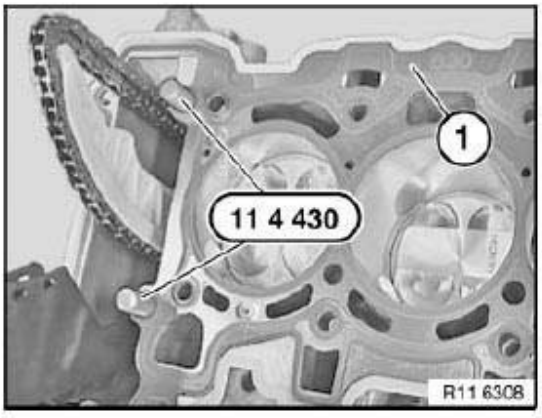


Fig. 53: Identifying Special Tool (11 4 430)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove coarse residues on sealing surfaces with special tool 11 4 471 from cylinder head and crankcase.

IMPORTANT: Do not use any metal-cutting tools.

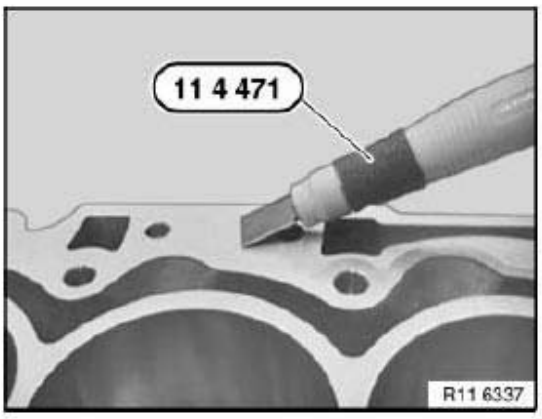


Fig. 54: Removing Coarse Residues On Sealing Surfaces Using Special Tool 11 4 471
Courtesy of BMW OF NORTH AMERICA, INC.

Remove fine residues on sealing surfaces with special tool 11 4 472 from cylinder head and crankcase.

IMPORTANT: Do not use any metal-cutting tools.

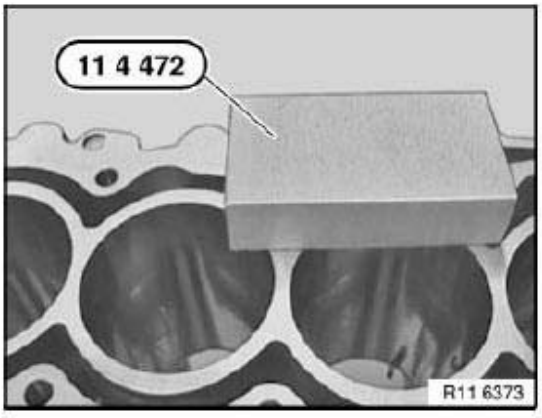


Fig. 55: Removing Fine Residues On Sealing Surfaces Using Special Tool 11 4 472
Courtesy of BMW OF NORTH AMERICA, INC.

There must be no fluids or contaminants in any of the threaded holes (1) for the cylinder head bolt connections.

Risk of corrosion and cracking!

Clean all threaded holes.

Replace **CYLINDER HEAD GASKET** .

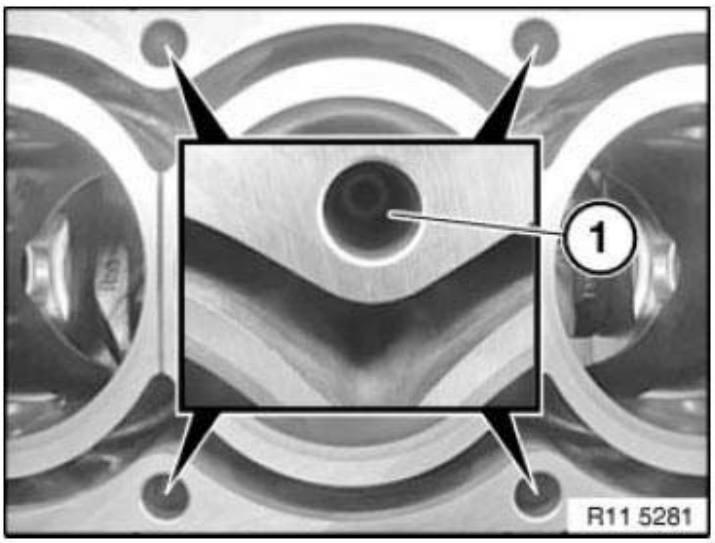


Fig. 56: Identifying Cylinder Head Bolt And Threaded Holes
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe sequence for tightening cylinder head bolts without fail.
Fit new cylinder head screws.
Insert cylinder head bolts (1 to 10) with special tool 11 8 580 .
Tightening torque 11 12 1AZ .
Insert cylinder head bolts (11 to 14) with special tool 11 4 420 .
Tightening torque 11 12 2AZ .

NOTE: Picture shows intake and exhaust camshafts removed.

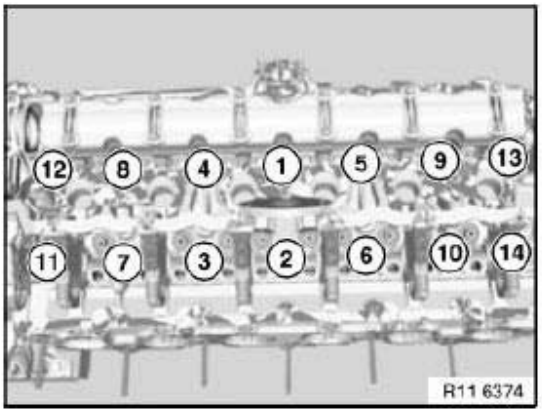


Fig. 57: Identifying Cylinder Head Bolts In Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Observe sequence for tightening cylinder head bolts without fail

IMPORTANT: The 2nd torsion angle relates only to cylinder head bolts 1 to 10.

Installation:

- **Jointing torque:**

  All cylinder head bolts 1 to 14 to 30 Nm

- **1st angle of rotation:**

  All cylinder head bolts 1 to 14 to 90°

- **2nd angle of rotation:**

  Only cylinder head bolts 1 to 10 to 90°

- **3rd angle of rotation:**

  All cylinder head bolts 1 to 14 to 45°

Insert bolts (1).

Tightening torque **11 12 4AZ** .

IMPORTANT: Secure bolt (2) with a gripper against falling down.

Insert bolt (2).

Tightening torque **11 12 3AZ** .

Installation:

Replace aluminum screws.

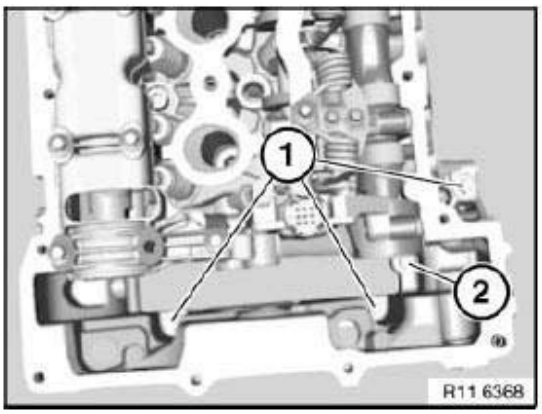


Fig. 58: Identifying Timing Chain Module And Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 000 REMOVING AND INSTALLING/SEALING CYLINDER HEAD COVER (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **IGNITION COILS**
- Release **IGNITION WIRING HARNESS** in cylinder head cover area
- Remove **TENSION STRUT**

Unlock and detach vent hose (1).

If necessary, pull off metal bracket (2) in direction of arrow.

Release screws (3) on electric servomotor.

Tightening torque **11 37 3AZ** .

NOTE: A further screw, which cannot be seen in the picture, must be released under the electric servomotor (4).

Release screw on electric servomotor.

Tightening torque **11 37 3AZ** .

Remove servomotor (4) in direction of arrow.

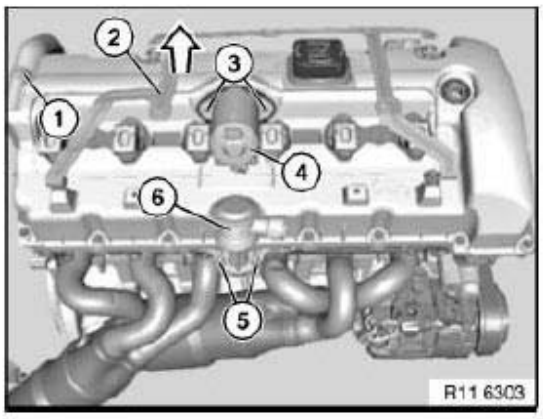


Fig. 59: Pulling Off Metal Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, release nuts (5).

Tightening torque **11 72 1AZ** .

If necessary, remove secondary air valve (6).

IMPORTANT: Observe different screw lengths.
Installation location of screws (1 and 2) is specified by the different bushing shapes.

Release screws in area (1).

Tightening torque **11 12 5AZ** .

Installation:

Replace aluminum screws.

Release threaded pin (2).

Tightening torque **11 12 5AZ** .

Installation:

Replace aluminum screws.

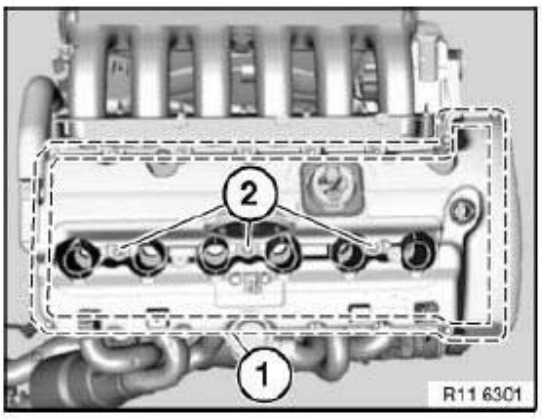


Fig. 60: Identifying Cylinder Head Gasket Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Slotted sleeves (2) for guiding ignition coils in cylinder head cover (1) must be replaced.

Remove slotted sleeves (2).

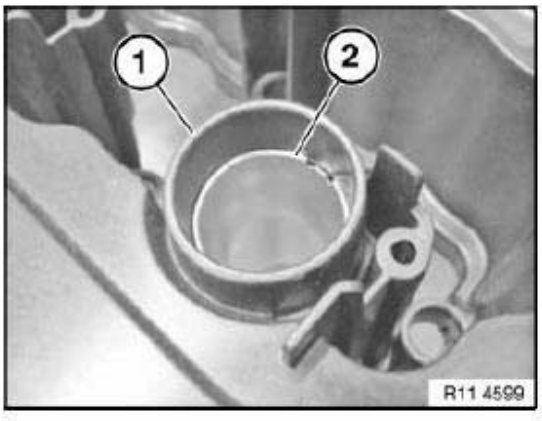


Fig. 61: Identifying Cylinder Head Cover And Slotted Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean all sealing faces (1 and 2).

IMPORTANT: Do not use any metal-cutting tools.

Installation:

Replace gaskets (1 and 2).

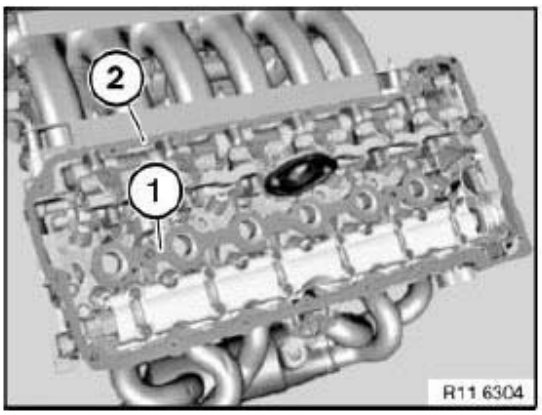


Fig. 62: Identifying Seal On Sealing Faces
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 101 REPLACING CYLINDER HEAD GASKET (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **CYLINDER HEAD** .

Insert 11 4 430 special tool into bores.

Remove cylinder head seal.

IMPORTANT: Check marking (1) on cylinder head gasket (B25 or B30).

- **B = petrol/gasoline engine**
- **30 = displacement (3 litres)**

Do not mix them up as this will cause engine damage .

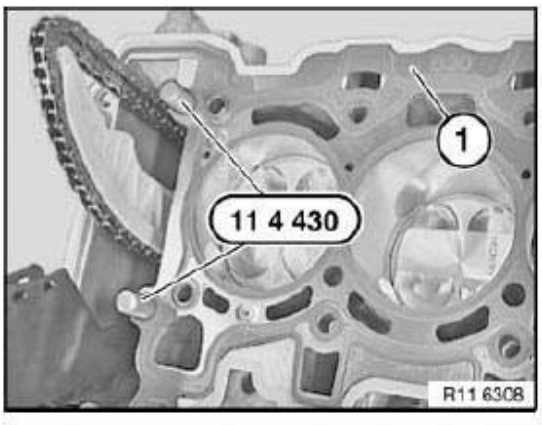


Fig. 63: Identifying Marking On Cylinder Head Gasket And Special Tool (11 4 430)
Courtesy of BMW OF NORTH AMERICA, INC.

There must be no fluids or contaminants in any of the threaded holes (1) for the cylinder head bolt connections.

IMPORTANT: Work on sealing surface on engine block and on cylinder head with special tool 11 4 470 only.
Do not use any metal-cutting tools.

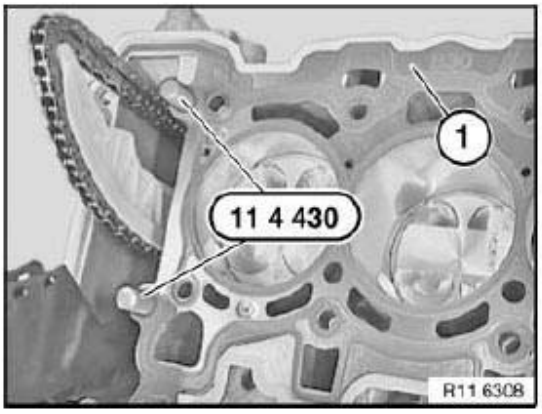


Fig. 64: Identifying Cylinder Head Pocket Threaded Holes
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rubber coating (2) on cylinder head gasket (3) must not under any circumstances be damaged (electrochemical corrosion).

Cylinder head gasket (3) is a sheet-metal gasket.

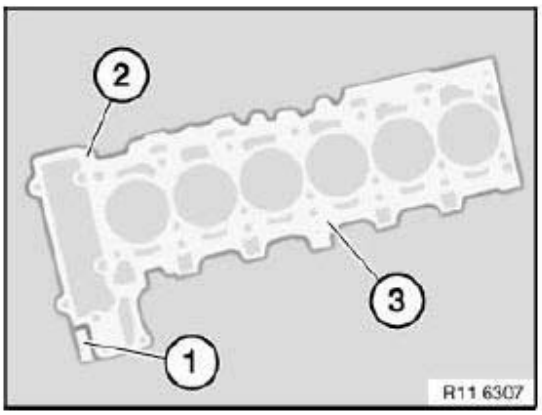


Fig. 65: Identifying Cylinder Head Gasket Identification Mark With Rubber Coating
Courtesy of BMW OF NORTH AMERICA, INC.

Check adapter sleeves (1) for damage and firm seating.

Place cylinder head gasket (2) in direction of arrow on engine block.

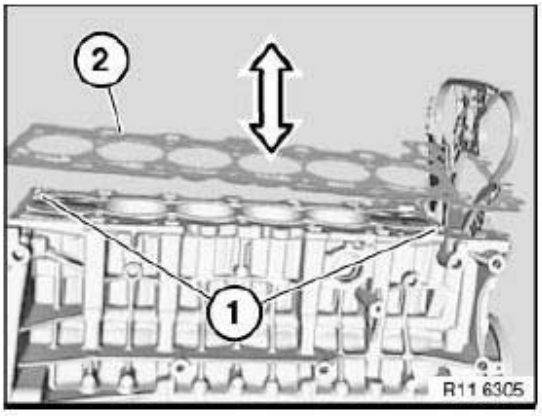


Fig. 66: Mounting Cylinder Head Gasket On Engine Block
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check cylinder head for DEVIATION FROM FLATNESS .
Check cylinder head for WATER LEAKS .

Assemble engine.

11 12 719 RESURFACING CYLINDER HEAD SEALING FACE (N52K)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD**
- Remove **EXHAUST CAMSHAFT** .

- Remove **INTERMEDIATE LEVER** on inlet side

Check evenness of cylinder head sealing faces with a standard straight-edge (1).

NOTE: Max. deviation from level (longitudinal) 0.10 mm

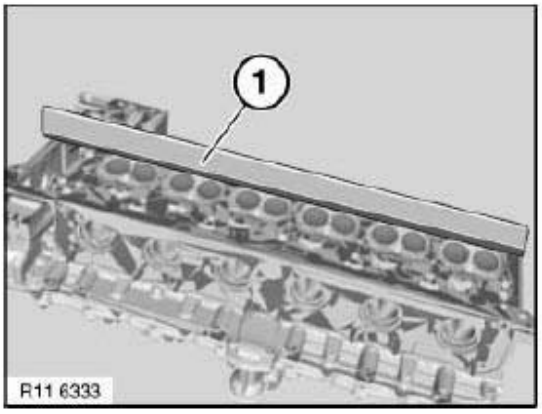


Fig. 67: Checking Cylinder Head Sealing Faces Evenness Using Standard Straight-Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Check evenness of cylinder head sealing faces with a standard straight-edge (1).

NOTE: Max. deviation from level (transversal) 0.05 mm

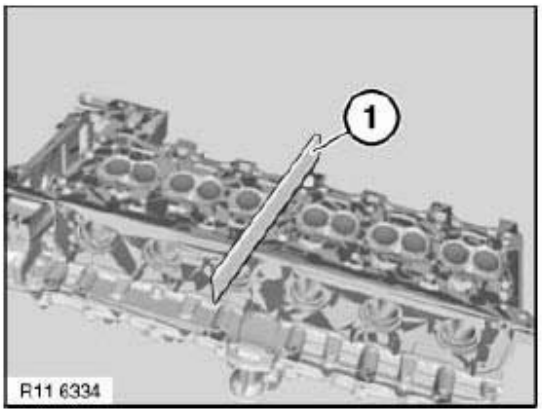


Fig. 68: Checking Cylinder Head Sealing Faces Evenness Using Standard Straight-Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Check cylinder head for **WATER LEAKS** .

Assemble engine.

1113 OIL SUMP

11 13 000 REMOVING AND INSTALLING, SEALING OR REPLACING OIL SUMP (N52K)

IMPORTANT: When working on the engine oil, coolant or fuel circuit, you must protect the alternator against contamination.
Risk of damage!
Cover alternator with suitable materials.
Failure to comply with this procedure may result in an alternator malfunction.

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- **LOWER FRONT AXLE**
- Drain and add **ENGINE OIL**

Release bolts along line (1).

Tightening torque **11 13 5AZ** .

Installation:

Replace aluminum screws.

If necessary, release nuts (4). Remove oil level sensor.

Tightening torque **11 13 11AZ** .

Installation:

Replace sealing ring.

IMPORTANT: There must be no adhesive residues in the lower crankcase retaining threads.
Clean retaining threads and sealing faces.

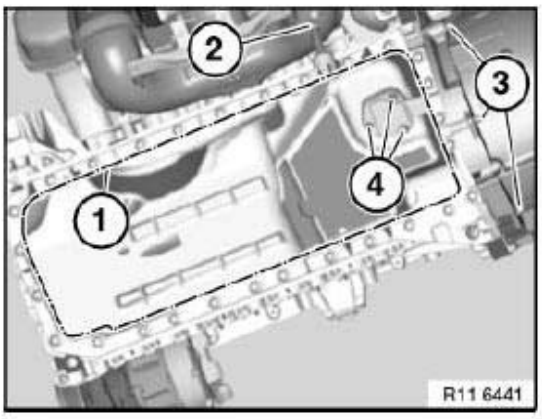


Fig. 69: Identifying Oil Level Sensor And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace all seals.

Assemble engine.

1114 HOUSING COVER

11 14 151 REPLACING CRANKSHAFT RADIAL SEAL (TRANSMISSION SIDE) (N52K)

Necessary preliminary tasks:

- Remove **TRANSMISSION**
- Remove **FLYWHEEL**

NOTE: Crankshaft radial seal has six removal openings for removal with special tool 11 9 200 .

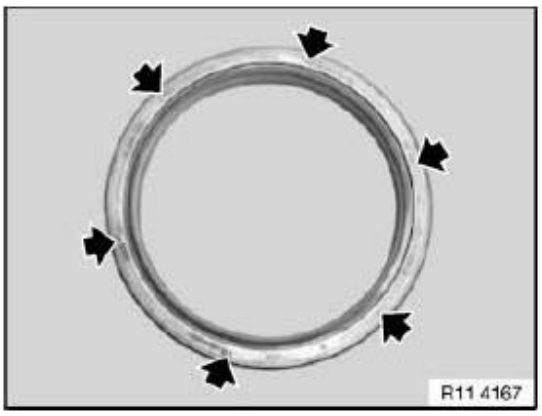


Fig. 70: Locating Crankshaft Radial Seal
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If necessary, remove rubber coating (1) on top side of crankshaft radial seal and expose a removal opening (2) (see illustration).

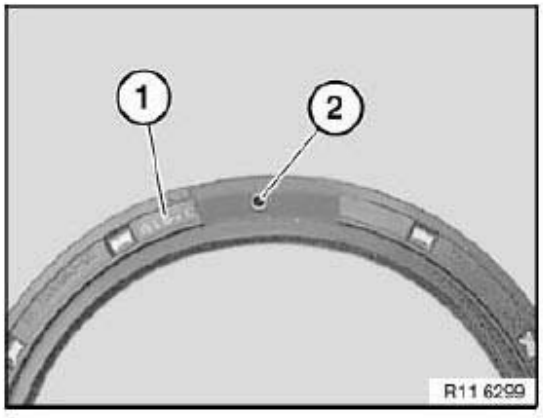


Fig. 71: Identifying Rubber Coatiing And Removal Opening
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 200 . Insert sheet metal screws into removal opening of crankshaft radial seal and fasten without play (do **not** overtighten sheet metal screws).

Screw in spindle (1) slowly and carefully and detach crankshaft radial seal.

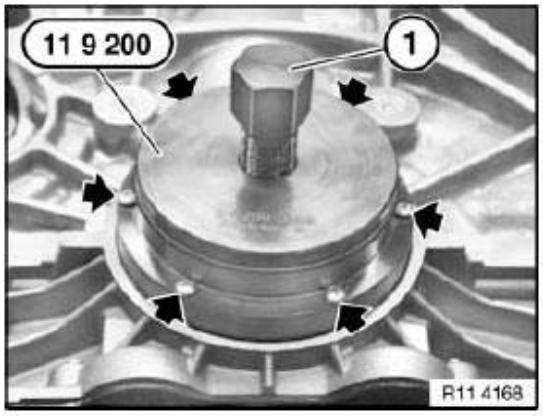


Fig. 72: Locating Crankshaft Radial Seal Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing surface (1) and degrease thoroughly in area of housing partition.

Apply a light coat of oil to running surface (2) of crankshaft radial seal.

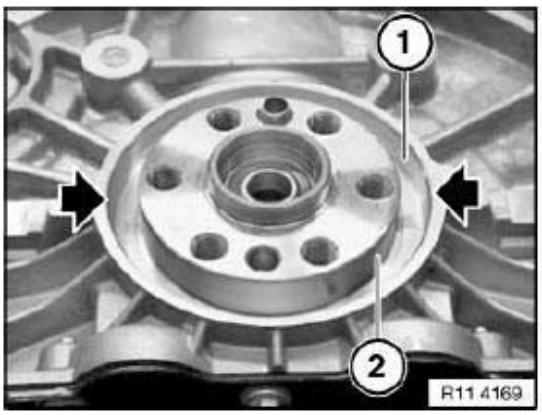


Fig. 73: Locating Crankshaft Radial Seal Running Surface
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Support bushing (4) is contained in scope of delivery of crankshaft radial seal (1).**
When crankshaft radial seal (1) is installed, only support bushing (4) may be used as a slip bushing.
Crankshaft radial seal (1) has a groove (2) on both left and right sides.

IMPORTANT: **After installation, grooves (2) must be filled with sealing compound.**

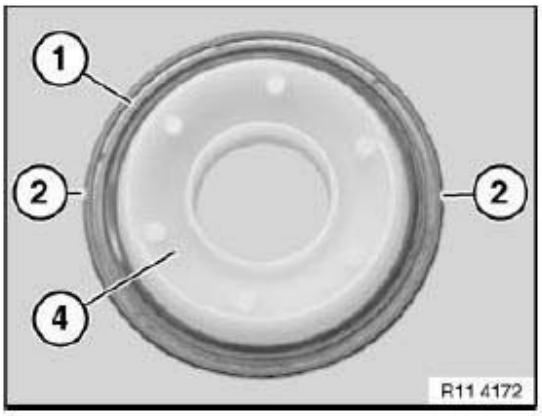


Fig. 74: Identifying Crankshaft Radial Seal With Grooves And Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: **The following text describes installation and sealing between the engine block and crankshaft radial seal.**
The engine block will not be leakproof at the outside of the crankshaft radial seal if you fail to comply with the individual work steps and the work sequence.

NOTE: **The required parts are available from the BMW Parts Department (Electronic Parts Catalogue).**

Remove screw caps (1) from injector (2).

Screw on metering needle.

Insert piston for pressing out.

Injector (2) contains the sealing compound Loctite, manufacturer's number 128357.

Bottle (3) contains the primer Loctite, manufacturer's number 171000.

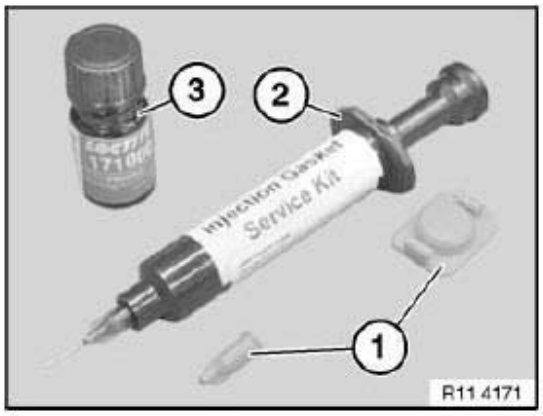


Fig. 75: Identifying Injector And Screw Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit support bushing (4) with crankshaft radial seal (1) on crankshaft.

Align groove (2) centrally to housing partition (3).

Coat both grooves (2) on crankshaft radial seal (1) with Loctite primer, manufacturer's number 171000, and expose to air for approx. one minute.

Push crankshaft radial seal (1) by hand as far as possible onto running surface.

Carefully remove support bush (4).

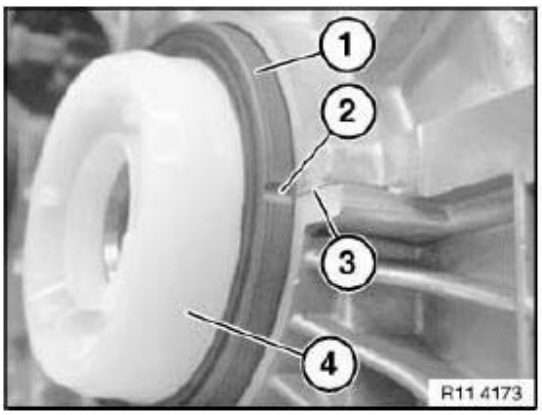


Fig. 76: Identifying Grooves On Crankshaft Radial Seal
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Spacer ring (1) is supplied with radial shaft seal.

Screw special tool 11 9 182 with screws (special tool 11 9 184) to the crankshaft.

Fit spacer ring (1) on preassembled radial shaft seal.

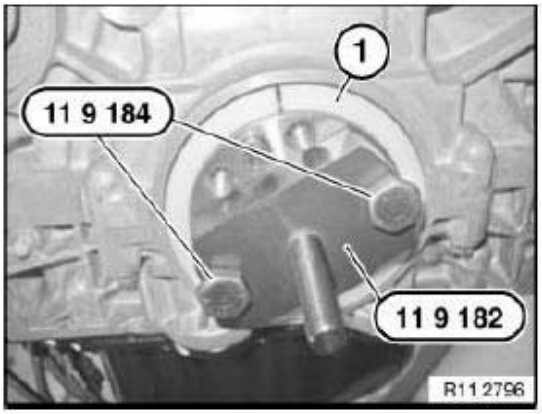


Fig. 77: Fitting Spacer Ring Using Special Tool (11 9 182 And 11 9 184)
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in radial shaft seal and spacer ring with special tool 11 9 181 in conjunction with special tool 11 9 183.

Then remove spacer ring again.

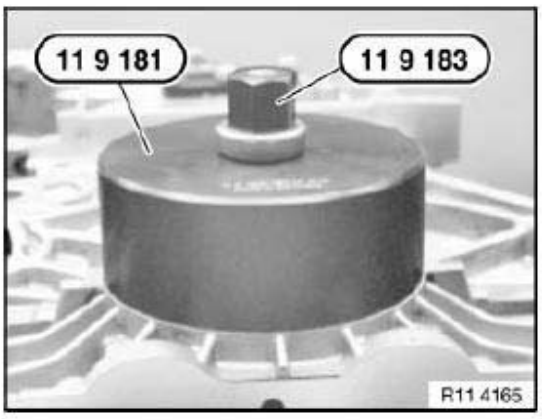


Fig. 78: Identifying Special Tool (11 9 181 And 11 9 183)
Courtesy of BMW OF NORTH AMERICA, INC.

Before filling with sealing compound:

Moisten brush with Loctite primer, manufacturer's number 171000. Insert brush as far as possible into grooves (1) on crankshaft radial seal in order to coat housing partition on engine block.

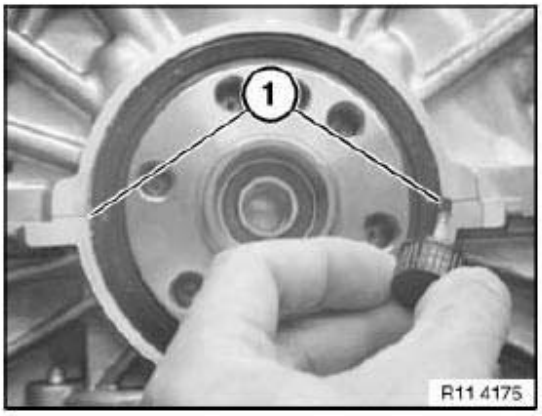


Fig. 79: Coating Sealing Compound Surface Using Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Using injector, fill both grooves (1) flush with Loctite sealing compound, manufacturer's number 128357.

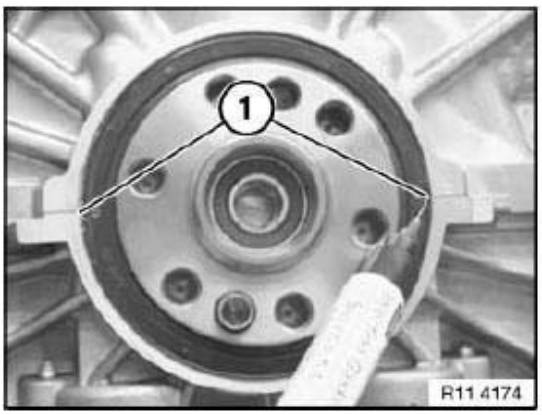


Fig. 80: Filling Grooves With Loctite Sealing Compound Using Injector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Loctite primer, manufacturer's number 171000, binds the Loctite sealing compound, manufacturer's number 128357, and prevents leakage. Coat surface of sealing compound in both grooves (1) with Loctite primer, manufacturer's number 171000.

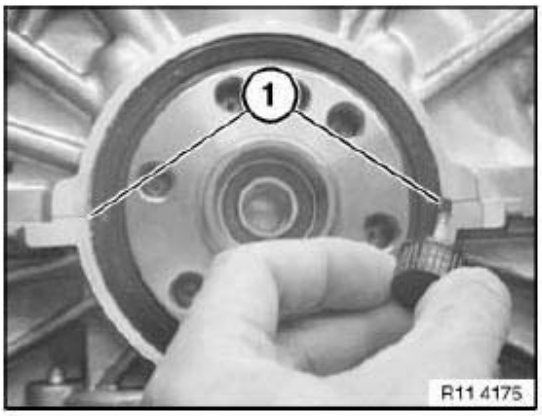


Fig. 81: Coating Sealing Compound Surface Using Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 14 005 REPLACING FRONT CRANKSHAFT SEAL (N52K)

Necessary preliminary tasks:

- Remove **VIBRATION DAMPER**

IMPORTANT: Do not release central bolt.
If the central bolt is released, the sprocket wheels of the timing chain and the

oil pump will no longer be non-positively connected to the crankshaft. Inlet and exhaust camshafts can turn in relation to crankshaft.

Risk of damage!

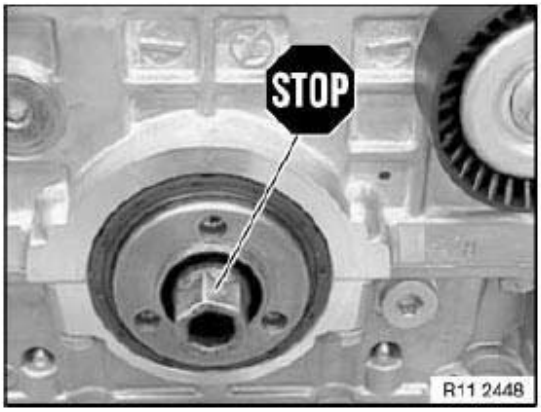


Fig. 82: Caution For Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Turn back special tool 11 9 222.

Push special tool 11 9 221 onto crankshaft.

IMPORTANT: When screws are tightened down (special tool 11 9 224), crankshaft seal is pressed inwards approx. 1 mm and thus slackened for subsequent removal.

Insert screws (special tool 11 9 224) and tighten down to approx. 20 Nm.

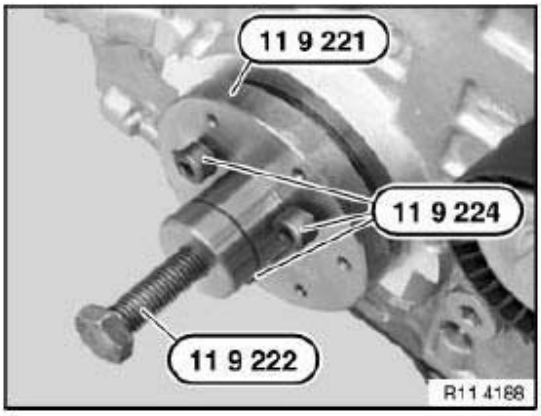


Fig. 83: Identifying Special Tools (11 9 221, 11 9 224 And 11 9 222)
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 0 371 to 80 Nm into crankshaft seal.

Screw in spindle 11 0 372.

Release crankshaft seal from housing.

Repeat the operation several times if necessary.

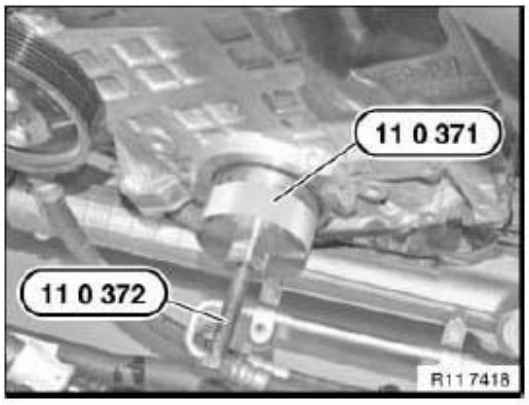


Fig. 84: Identifying Special Tools (11 0 372 And 11 0 371)
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully saw open crankshaft seal (1) at cutting line (2).

Remove crankshaft seal (1) from special tool 11 0 371.

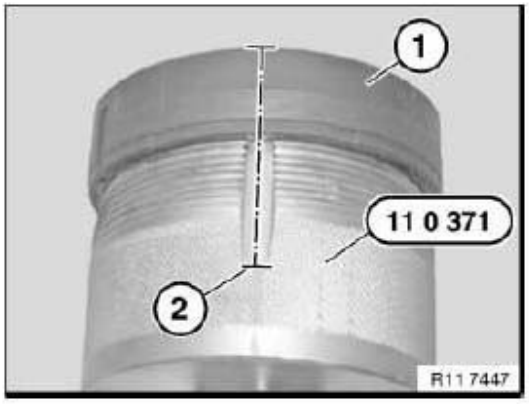


Fig. 85: Identifying Crankshaft Radial Seal And Cutting Line
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The following text describes installation and sealing between the engine block and crankshaft seal.
The engine block will not be leakproof at the outside of the crankshaft seal if you fail to comply with the individual work steps and the work sequence.

Installation:

Clean sealing surface (1) and degrease thoroughly in area of housing partition.

Apply a light coat of oil to running surface (2) of crankshaft seal.

Illustration N42.

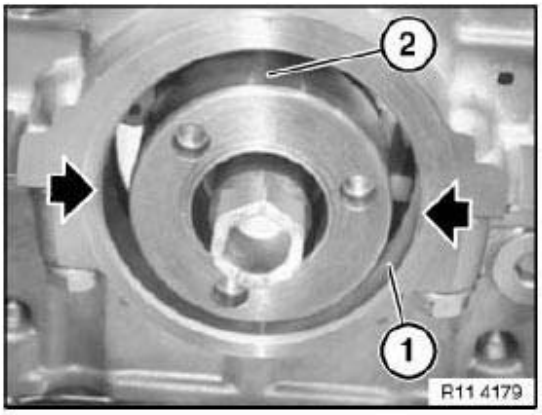


Fig. 86: Identifying Sealing Surface And Running Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 9 232 with screws (special tool 11 9 234) to crankshaft.

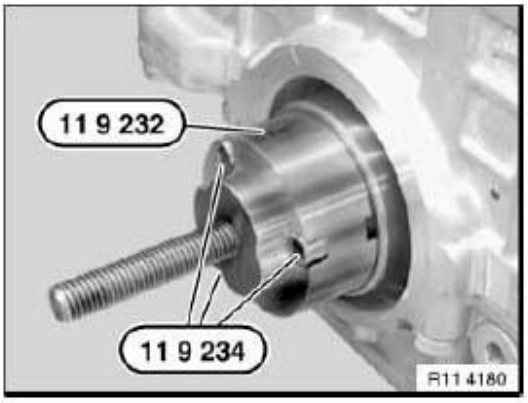


Fig. 87: Identifying Special Tool (11 9 232 And 11 9 234)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Support sleeve (1) is supplied with crankshaft seal (2).
When crankshaft seal (2) is installed, only support sleeve (1) may be used as a slip sleeve.
Crankshaft seal (2) has a groove on both left and right sides.

IMPORTANT: After installation, the grooves must be filled with sealing compound.

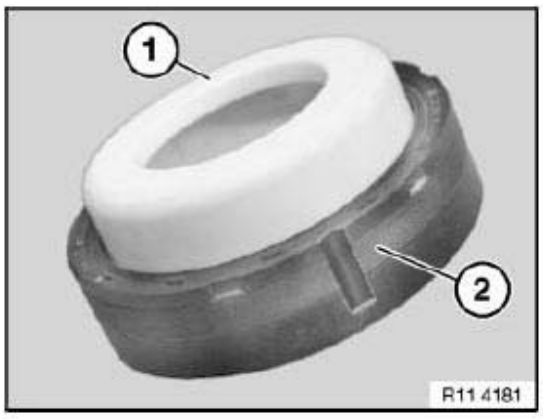


Fig. 88: Identifying Crankshaft Seal And Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The required parts are available from the BMW Parts Service.

Remove screw caps (1) from injector (2).

Screw on metering needle.

Insert piston for pressing out.

Injector (2) contains the sealing compound Loctite, manufacturer's number 128357.

Bottle (3) contains the primer Loctite, manufacturer's number 171000.

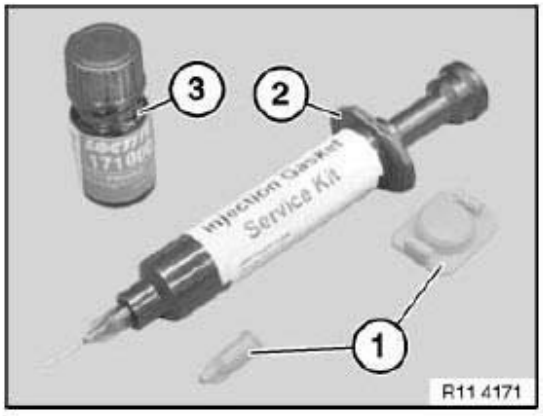


Fig. 89: Identifying Injector, Sealing Compound And Bottle
Courtesy of BMW OF NORTH AMERICA, INC.

Push support sleeve (1) with crankshaft seal (2) onto special tool 11 9 232.

IMPORTANT: Support sleeve (1) remains on special tool 11 9 232, until crankshaft seal is

drawn in.

Align groove (3) centrally to housing partition (4).

Coat both grooves (3) on crankshaft seal (2) with Loctite primer, manufacturer's number 171000, and expose to air for approx. one minute.

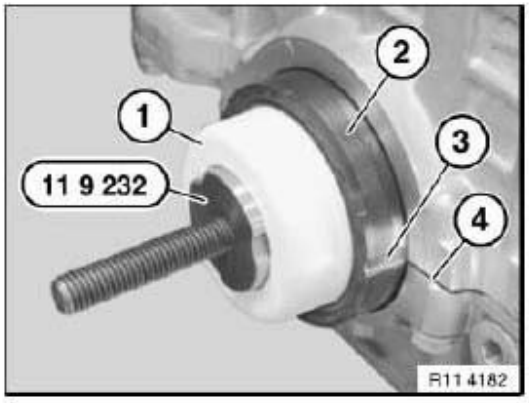


Fig. 90: Identifying Sleeve, Crankshaft Seal, Groove And Housing partition And Special Tool (11 9 232)
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in crankshaft seal with special tool 11 9 231 in conjunction with special tool 11 9 233 until flush.

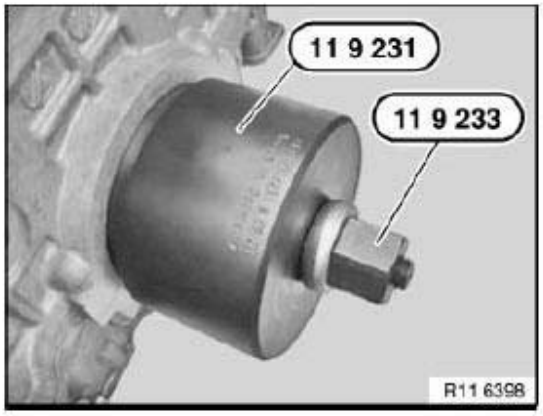


Fig. 91: Identifying Special Tool (11 9 231 And 11 9 233)
Courtesy of BMW OF NORTH AMERICA, INC.

Before filling with sealing compound:

Moisten brush with Loctite primer, manufacturer's number 171000. Insert brush as far as possible into grooves (1) on crankshaft seal in order to coat housing partition on engine block.

Illustration N42.

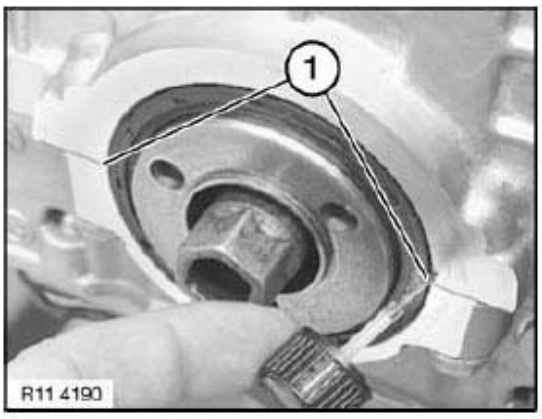


Fig. 92: Coating Housing Partition On Engine Block Using Brush Moistened With Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Using injector (2), fill both grooves (3) flush with Loctite sealing compound, manufacturer's number 128357.

Illustration N42.

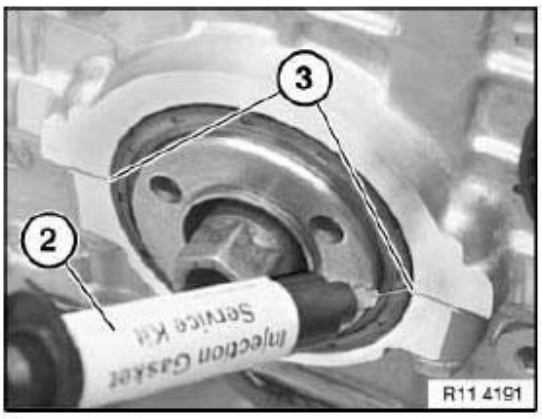


Fig. 93: Filling Both Grooves With Loctite Sealing Compound Using Injector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Loctite primer, manufacturer's number 171000, binds the Loctite sealing compound, manufacturer's number 128357, and prevents leakage.

Coat surface of sealing compound in both grooves (1) with Loctite primer, manufacturer's number 171000.

Illustration N42.

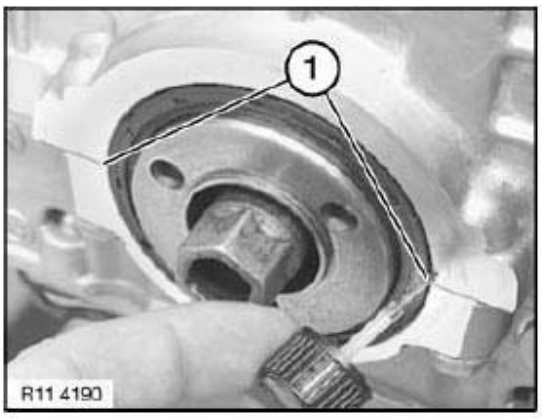


Fig. 94: Coating Housing Partition On Engine Block Using Brush Moistened With Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 14 010 REPLACING SEALING COVER FOR VACUUM PUMP (N52K)

Necessary preliminary tasks:

- Remove **FAN COWL** with electric fan
- Remove alternator **DRIVE BELT**
- Remove **DRIVE BELT TENSIONER**

NOTE: The procedure is the same as for the crankshaft radial seal. Expose removal openings on sealing cover.

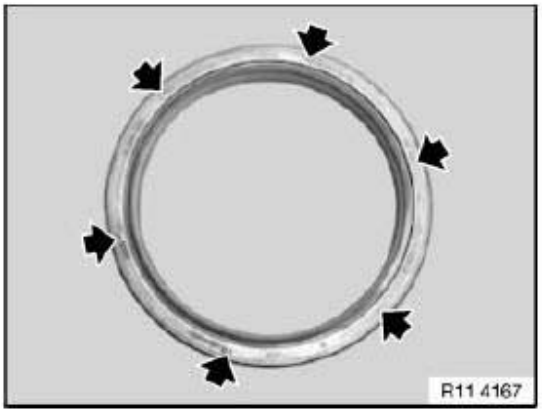


Fig. 95: Locating Crankshaft Radial Seal Openings
Courtesy of BMW OF NORTH AMERICA, INC.

Convert special tool 11 9 200 (see illustration).

Screw special tool 11 9 200 onto sealing cover.

NOTE: Insert screws until flush only with special tool 11 9 200 .

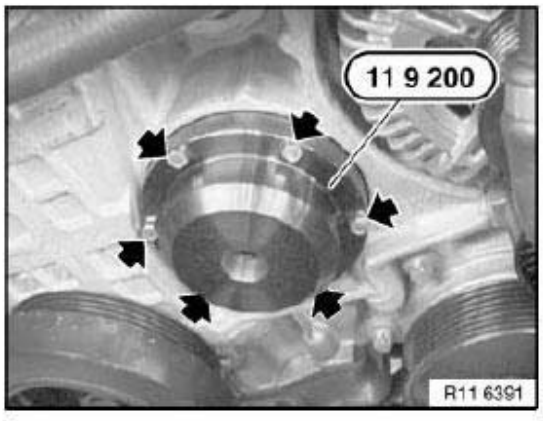


Fig. 96: Locating Sealing Cover Screws And Special Tool (11 9 200)
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 11 4 362.

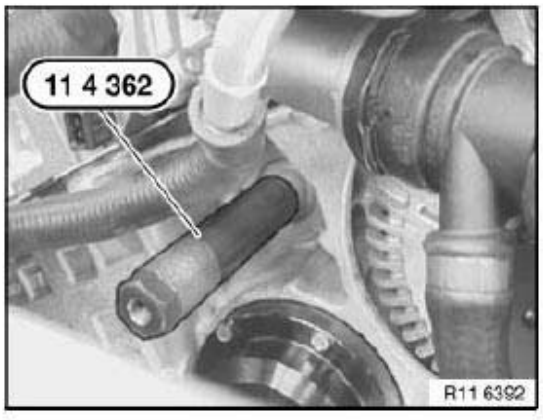


Fig. 97: Identifying Special Tool (11 4 362)
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 11 4 361 to bedplate construction screw connection (see arrow).

Secure with knurled screw (1).

Screw special tool 11 4 364 into special tool 11 9 200 and screw out in direction of arrow.

NOTE: For purposes of clarity, the picture shows the alternator and power steering pump removed.

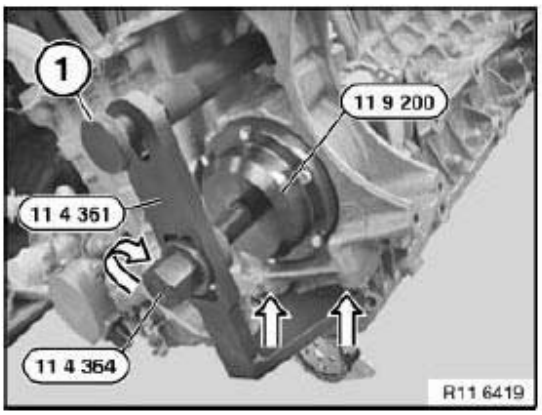


Fig. 98: Connecting Special Tool 11 4 361 To Bedplate Construction Screw Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare new sealing cover (1) with special tool 11 9 200 **without** screws.

Screw in sealing cover with special tool 11 4 363 until it is flush.

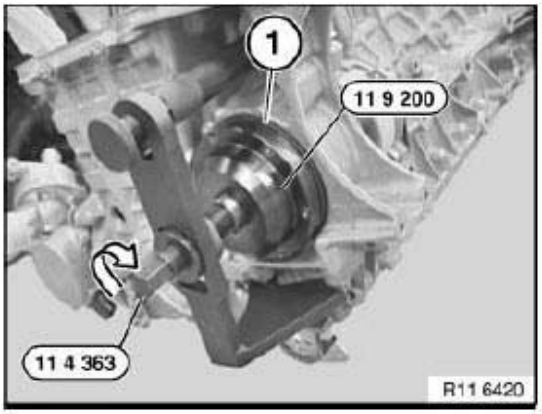


Fig. 99: Installing Sealing Cover Using Special Tool 11 4 363
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1121 CRANKSHAFT WITH BEARING

11 22 500 REMOVING AND INSTALLING/REPLACING FLYWHEEL (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .

Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove transmission See **2300017 REMOVING AND INSTALLING TRANSMISSION (GS6-17BG) N52K** or **2400030 REMOVING AND INSTALLING AUTOMATIC TRANSMISSION (6HP19Z) N52K**
- Remove **CLUTCH**

For vehicles with optional extra SA205 (automatic transmission)

Secure flywheel (1) with existing transmission bolt (2) and special tool 11 9 260 .

Installation:

Replace aluminum screws.

Unfasten flywheel screws.

Tightening torque **11 22 1AZ** .

Installation:

Flywheel (1) is secured with an alignment pin.

Fit new flywheel screws.

Clean all threads for flywheel screws in crankshaft.

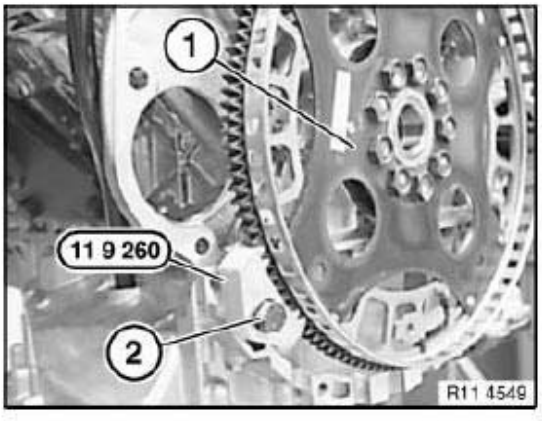


Fig. 100: Identifying Flywheel, Existing Transmission Bolt And Special Tool 11 9 260

Courtesy of BMW OF NORTH AMERICA, INC.

For vehicles without optional extra SA205 (automatic transmission)

Secure flywheel with transmission bolt (1) and special tool 11 9 260 and 11 9 265.

Installation:

Replace aluminum screws.

Release flywheel bolts with special tool 11 4 180 /

Tightening torque **11 22 2AZ** .

Installation:

Flywheel is secured with a dowel pin.

Fit new flywheel screws.

Clean all threads for flywheel screws in crankshaft.

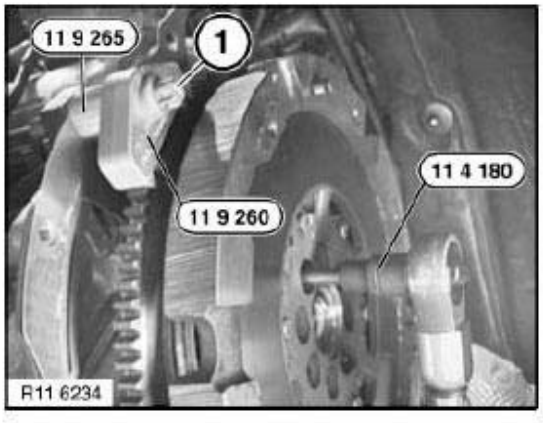


Fig. 101: Tightening Flywheel Bolts Using Special Tool (11 4 180)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 21 531 REPLACING ALL MAIN CRANKSHAFT BEARING SHELLS (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .

Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **CRANKSHAFT**

Checking position of oil spray nozzles

Insert special tool 11 4 251 in screw connection of main bearing.

NOTE: Special tool 11 4 252 must be pre-installed at the seventh main bearing.

Check position of oil spray nozzle (2) according to position (1) on special tool 11 4 251.

If necessary, adjust and secure oil spray nozzle (2).

Tightening torque **11 11 5AZ** .

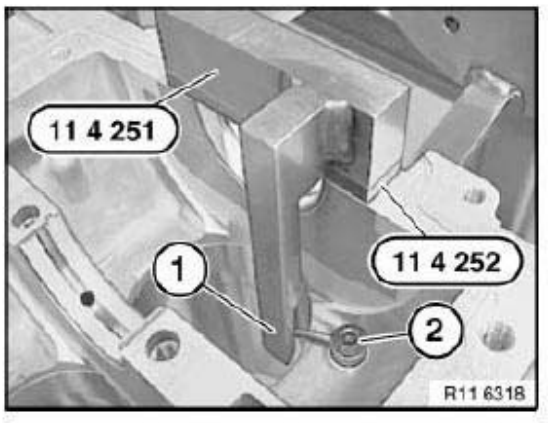


Fig. 102: Identifying Oil Spray Nozzle On Special Tool 11 4 251
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bearing shells (2) and guide bearing shell (3).

NOTE: Guide bearing shell (3) is a thrust bearing.

Observe bearing classification See **ENGINE BLOCK, CYLINDER CRANKCASE N52K/B30** ; **ENGINE BLOCK, CYLINDER CRANKCASE N52K/B25** ; **CRANKSHAFT AND BEARINGS** ; **CRANKSHAFT AND BEARINGS** ; **CRANKSHAFT AND BEARINGS N52K/B30** ; **CRANKSHAFT AND BEARINGS N52K/B25** ; **CRANKSHAFT AND BEARINGS N52K/B30** or **CRANKSHAFT AND BEARINGS N52K/B25** .

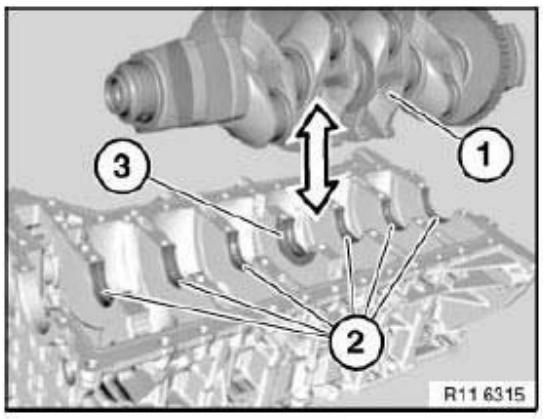


Fig. 103: Checking Bearing Play
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Bearing shell (1) with lubricant groove must be fitted in crankcase.

Bearing shell (2) without lubricant groove must be fitted in bedplate.

IMPORTANT: Allocation of bearing points:
Bearing point 1 is at the front on the timing chain drive in the direction of travel.

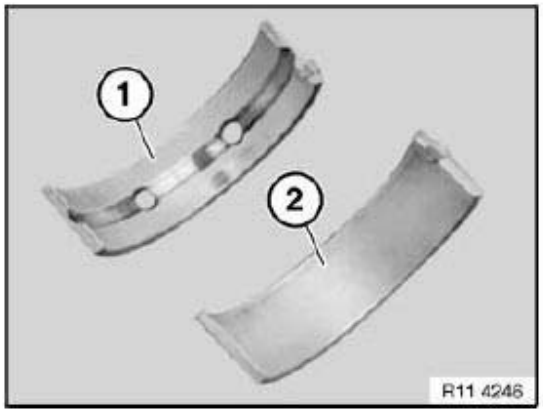


Fig. 104: Identifying Bearing Shell With/Without Lubricant Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Surface (1) for identification on crankshaft web 1.

Seven-digit part number (2).

Main bearing classification (3) for crankcase lower half (bedplate), code numbers 1 2 3, see table.

NOTE: Code letters (4 and 5) are exclusively required for a machined crankshaft.

Code letter (4) as per table, main bearing.

B= build date 1 (B 1 2 3 -0.25 mm).

B= build date 2 (C 1 2 3 -0.50 mm).

Code letter (5) as per table, lift bearing.

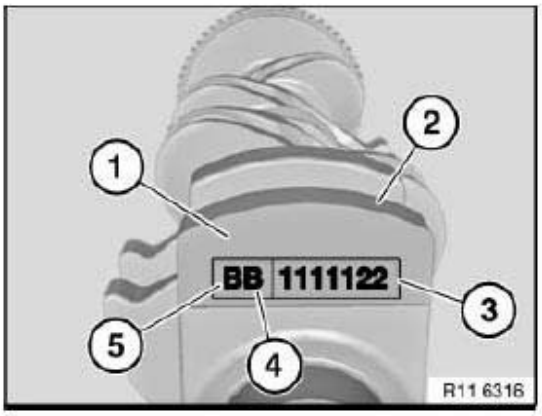


Fig. 105: Identifying Seven Digit Code On Crankshaft Web Surface
Courtesy of BMW OF NORTH AMERICA, INC.

B= construction stage 1 (-0.25 mm).

C = construction stage 2 (-0.50 mm)

Observe bearing classification See **CRANKSHAFT AND BEARINGS** ; **CRANKSHAFT AND BEARINGS** ; **CRANKSHAFT AND BEARINGS N52K/B30** ; **CRANKSHAFT AND BEARINGS N52K/B25** ; **CRANKSHAFT AND BEARINGS N52K/B30** or **CRANKSHAFT AND BEARINGS N52K/B25** .

Main bearing classification (1) in crankcase, code letters A/B or C, see table.

Installation:

When all the letters and number code have been determined, the bearing shell color must be allocated, see table.

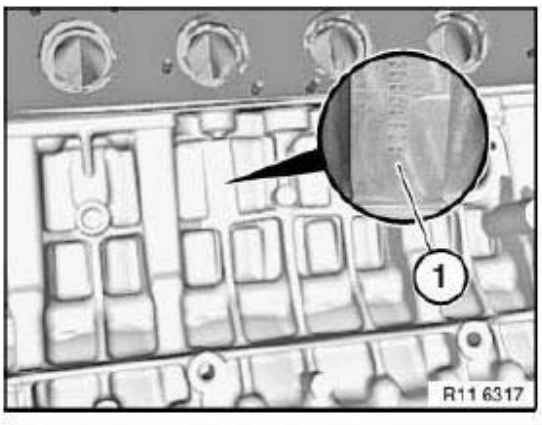


Fig. 106: Identifying Bearing Classification Of Crankcase Upper Section
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The letter/number combination produces a bearing shell pairing.

Identification by different colors.

IMPORTANT: First bearing point is on the timing drive.
The color combination Yellow and Red must not be fitted.
Engine damage will result if excessively small bearing play is determined.

Code letters on crankcase

Code letter A = bearing shell (1) color Yellow.

Code letter B = bearing shell (1) color Green.

Code letter C = bearing shell (1) color Red.

Code numbers on crankshaft:

Code number 1 = bearing shell (2) Yellow.

Code number 2 = bearing shell (2) Green.

Code number 3 = bearing shell (2) Red.

IMPORTANT: The color combination Yellow and Red must not be fitted; the bearing colors Green/Green must be selected for this color combination, see table.

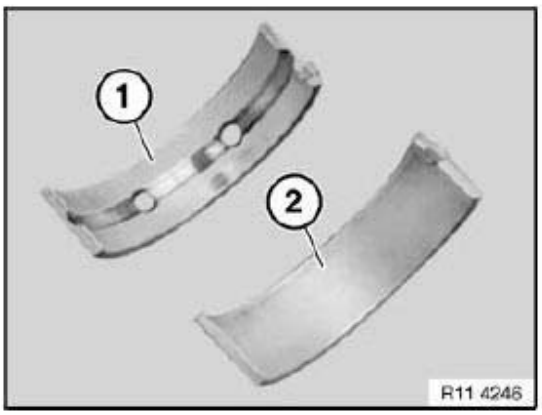


Fig. 107: Identifying Bearing Shell With/Without Lubricant Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Installation example

For bearing 1 with code letter **A** on the **crankcase** and code number **1** on the **crankshaft** bearing shell (1) with the color **Yellow** is required for the **crankcase** and bearing shell (2) with the color **Yellow** for the **crankcase lower half** (bedplate).

Bearing 2: **A** and **2** colors Yellow and Green.

Bearing 3: **B** and **2** colors Green and Green.

Bearing 4: **C** and **2** colors Red and Green.

Bearing 5: **B** and **1** colors Green and Yellow.

Bearing 6: **C** and **3** colors Red and Red.

Bearing 7: **C** and **1** colors Green and Green.

The color combination **Yellow and Red** must not be fitted.

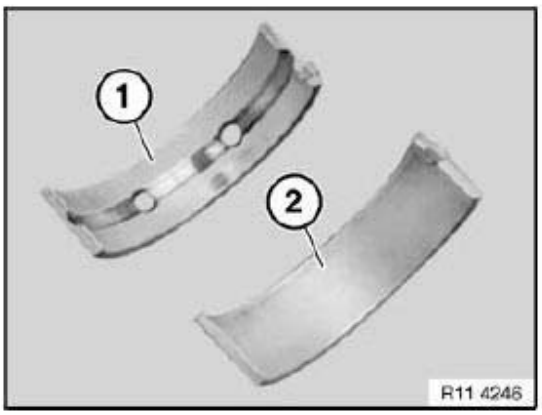


Fig. 108: Identifying Bearing Shell With/Without Lubricant Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Possible color combinations for mounting the crankshaft in the crankcase.

CRANKSHAFT COLOR REFERENCE CHART

(A 1) Crankcase/**Yellow**	**(B 1)** Crankcase/**Green**	**(C 1)** Crankcase/**Green**
(A 1) Crankcase lower half/**Yellow**	**(B 1)** Crankcase lower half/**Yellow**	**(C 1)** Crankcase lower half/**Green**
(A 2) Crankcase/**Yellow**	**(B 2)** Crankcase/**Green**	**(C 2)** Crankcase/**Red**
(A 2) Crankcase lower half/**Green**	**(B 2)** Crankcase lower half/**Green**	**(C 2)** Crankcase lower half/**Green**
(A 3) Crankcase/**Green**	**(B 3)** Crankcase/**Green**	**(C 3)** Crankcase/**Red**
(A 3) Crankcase lower half/**Green**	**(B 3)** Crankcase lower half/**Red**	**(C 3)** Crankcase lower half/**Red**

Install bearing shells (2) and guide bearing shell (3).

Installation:

Clean all sealing surfaces.

IMPORTANT: Do not use any metal-cutting tools.

Clean sealing faces with special tool 11 4 470 only.

Determine bearing play with special tool 00 2 590 .

Installation:

All measuring points must be clean and free from oil and grease. If necessary, clean all measuring points.

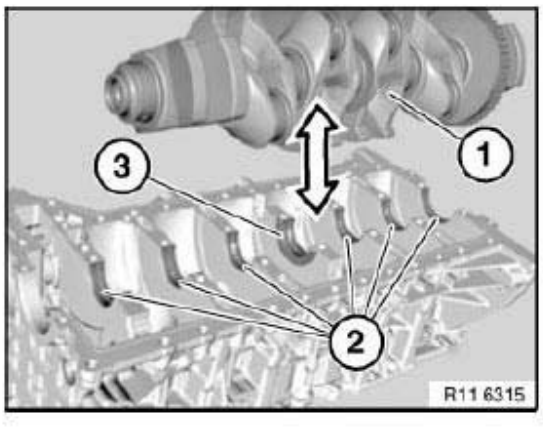


Fig. 109: Checking Bearing Play
Courtesy of BMW OF NORTH AMERICA, INC.

Use the existing screws to determine the bearing play.

Set up **BEDPLATE** with bearing shells.

Remove bedplate.

Read off bearing play at width of flattened plastic thread and measurement scale.

Installation:

Remove plastic thread.

Apply a light coat of oil to bearing shells and crankshaft.

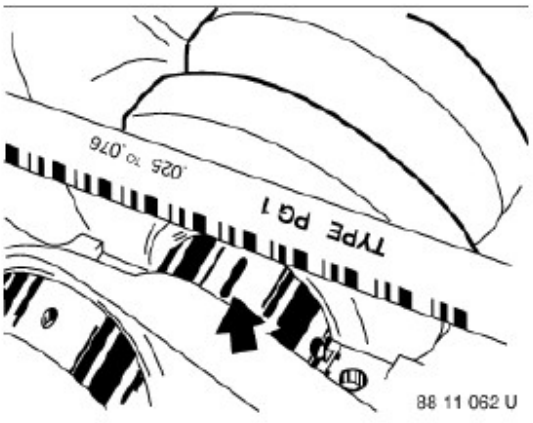


Fig. 110: Checking Radial Clearance At Width Of Flattened Plastic Thread (Plastigage)
Courtesy of BMW OF NORTH AMERICA, INC.

Install **BEDPLATE** .

Assemble engine.

11 21 500 REPLACING CRANKSHAFT (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **ENGINE**
- Mount engine on assembly stand
- Remove **VIBRATION DAMPER**
- Remove **OIL SUMP**
- Remove **OIL PUMP**
- Remove oil pump/vacuum pump **CHAIN MODULE**
- Remove timing **CHAIN MODULE**
- Remove **CYLINDER HEAD**
- Remove **FLYWHEEL**
- Removing all **PISTONS**

Release screws (1).

Tightening torque **11 13 6AZ** .

Installation:

Replace aluminum screws.

Remove oil deflector (2).

NOTE: Graphic shows the screw connection of the oil deflector (2) for vehicles with optional extra SA203 (all-wheel drive).

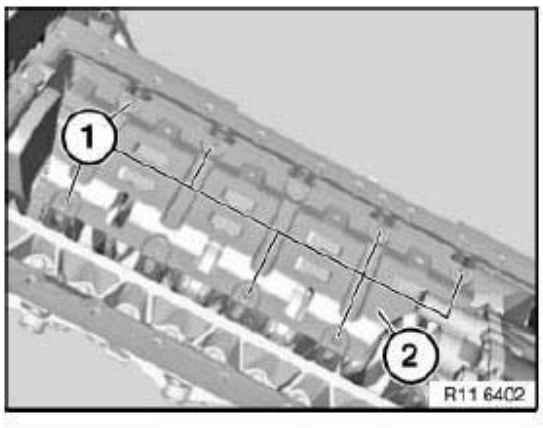


Fig. 111: Identifying Oil Deflector And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 11 2AZ** .

Unfasten screws (2).

Tightening torque **11 11 3AZ** .

Installation:

Replace aluminum screws.

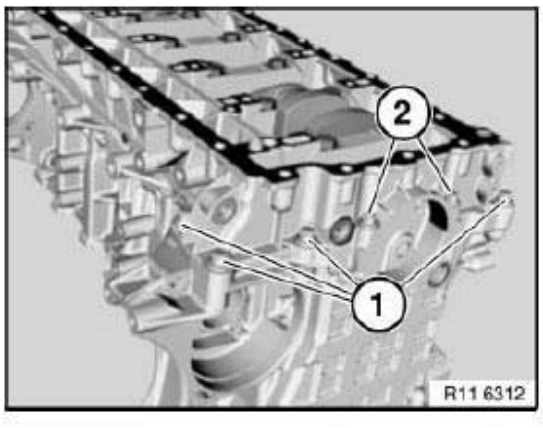


Fig. 112: Identifying Aluminum Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 11 4AZ** .

Unfasten screws (2).

Tightening torque **11 11 2AZ** .

Installation:

Replace aluminum screws.

Release steel screws (1 to 14) from outside inwards.

Tightening torque **11 11 1AZ** .

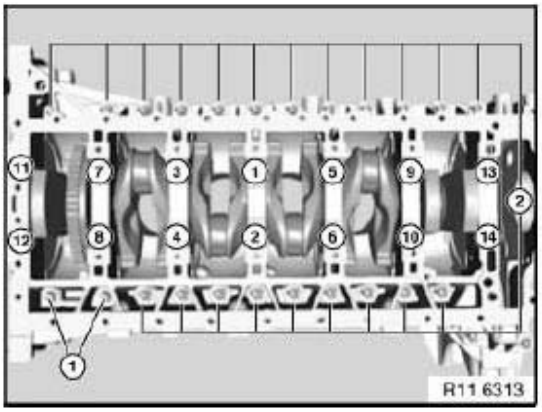


Fig. 113: Identifying Crankshaft Steel Screws In Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 11 3AZ** .

Installation:

Replace aluminum screws.

Lift out bedplate.

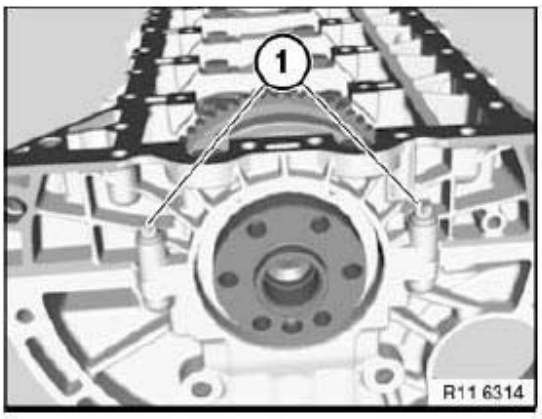


Fig. 114: Identifying Crankshaft Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove crankshaft (1) in direction of arrow.

IMPORTANT: Remove crankshaft with aid of a second person.
Weight of crankshaft approx. 25 kg.

Remove **BEARING SHELLS** (2) and guide bearing shell (3), replace if necessary.

Clean all sealing faces with special tool 11 4 470 .

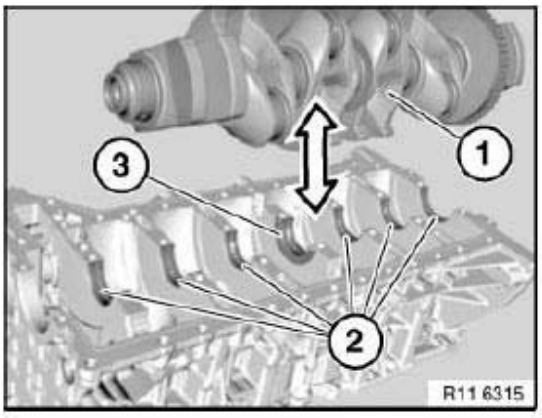


Fig. 115: Checking Bearing Play
Courtesy of BMW OF NORTH AMERICA, INC.

Check adapter sleeves (1) for damage and secure seating; replace if necessary.

Install all **BEARING SHELLS** .

Installation:

Lubricate all bearing points with engine oil.

NOTE: Graphic shows N46.

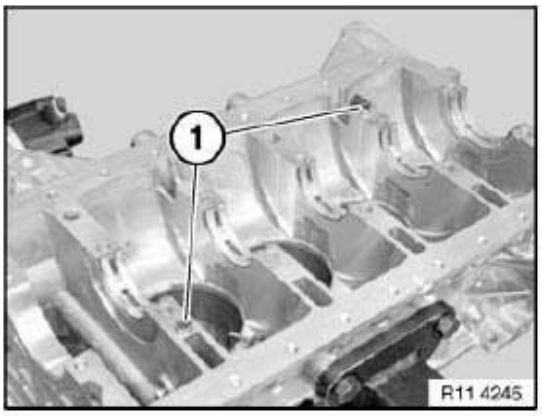


Fig. 116: Identifying Adapter Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Insert crankshaft (1).

IMPORTANT: Install crankshaft with aid of a second person.
Weight of crankshaft approx. 25 kg.

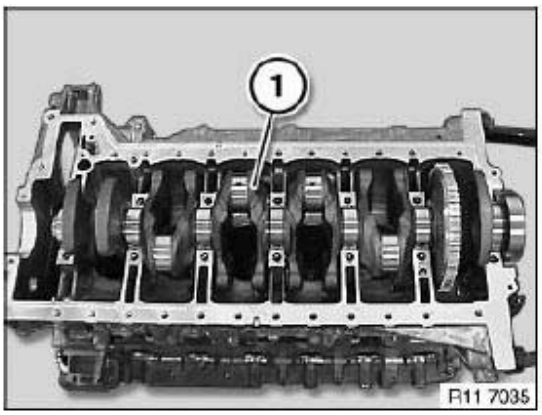


Fig. 117: Identifying Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten steel screws (1 to 14) from inside outwards.

Tightening torque **11 11 1AZ** .

Tighten screws (2) from inside outwards.

Tightening torque **11 11 2AZ** .

Tighten screws (1).

Tightening torque **11 11 4AZ** .

Installation:

Replace aluminum screws.

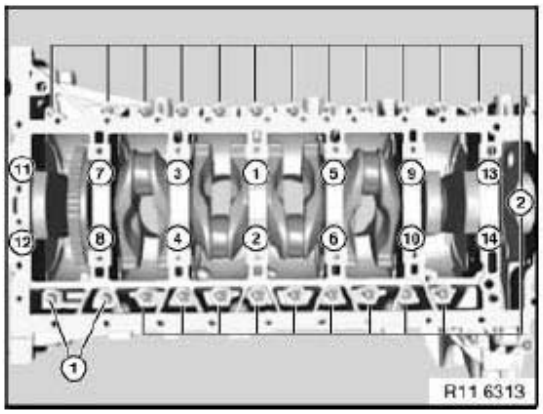


Fig. 118: Identifying Crankshaft Steel Screws In Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten aluminum screws exclusively with special tool 00 9 120 .

IMPORTANT: In the case of aluminum screws, jointing torque and angle of rotation must be observed without fail.

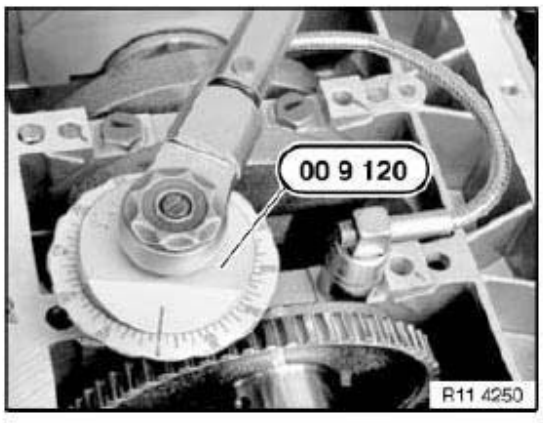


Fig. 119: Tightening Aluminum Screws Using Special Tool (00 9 120)
Courtesy of BMW OF NORTH AMERICA, INC.

Set up stand with magnetic foot (1) on special tool 11 4 440 .

Set up special tool 00 2 510 on stand.

Position special tool 00 2 510 on crankshaft.

Move crankshaft in direction of arrow.

Determine bearing play See **CRANKSHAFT AND BEARINGS** ; **CRANKSHAFT AND BEARINGS** ; **CRANKSHAFT AND BEARINGS N52K/B30** ; **CRANKSHAFT AND BEARINGS N52K/B25** ; **CRANKSHAFT AND BEARINGS N52K/B30** or **CRANKSHAFT AND BEARINGS N52K/B25** .

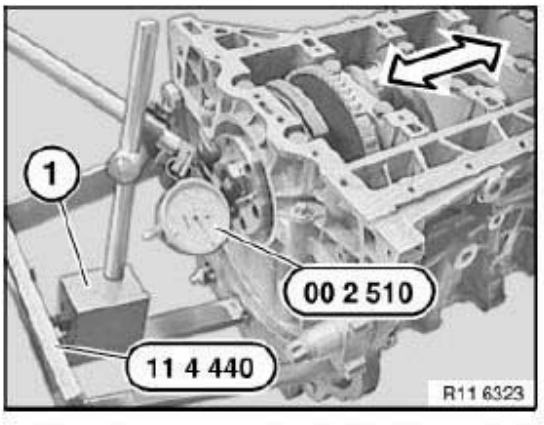


Fig. 120: Moving Crankshaft Using Special Tool (11 4 440)
Courtesy of BMW OF NORTH AMERICA, INC.

Drive in both nozzles (1) with special tool 11 9 360 on left and right into crankcase.

Installation:

Always replace nozzles (1).

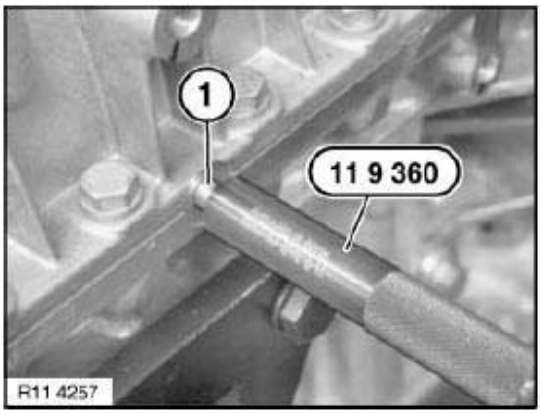


Fig. 121: Driving Nozzles In Crankcase Using Special Tool (11 9 360)
Courtesy of BMW OF NORTH AMERICA, INC.

Replace **CRANKSHAFT RADIAL SEAL** at front.

Replace **CRANKSHAFT RADIAL SEAL** (transmission side).

Installation:

Use **PRIMER 1.3 AND LIQUID GASKET 1.4** .

Prepare liquid gasket (1) in special tool 11 4 370 .

Screw on nozzle for injecting liquid gasket.

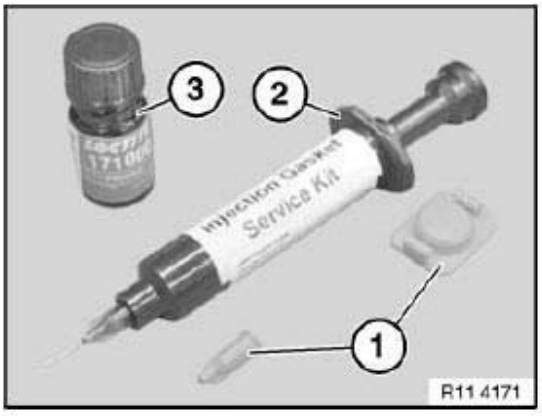


Fig. 122: Identifying Injector, Sealing Compound And Bottle
Courtesy of BMW OF NORTH AMERICA, INC.

Slowly insert liquid gasket (1) with special tool 11 4 370 in direction of arrow.

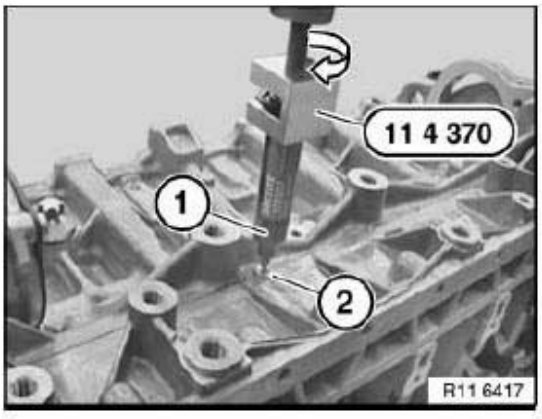


Fig. 123: Inserting Liquid Gasket Using Special Tool (11 4 370)
Courtesy of BMW OF NORTH AMERICA, INC.

Stop (seal off) escaping liquid gasket with primer 1.3.

(Picture shows N40).

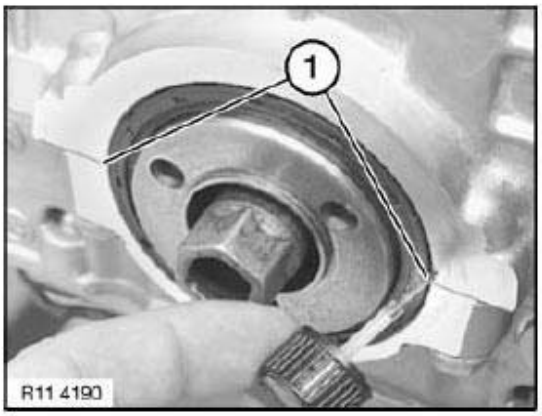


Fig. 124: Coating Housing Partition On Engine Block Using Brush Moistened With Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 21 571 REPLACING ROLLER BALL BEARING IN CRANKSHAFT (N52K)

Necessary preliminary tasks:

- Remove **CLUTCH** .

Remove guide bearing with special tool 11 2 340.

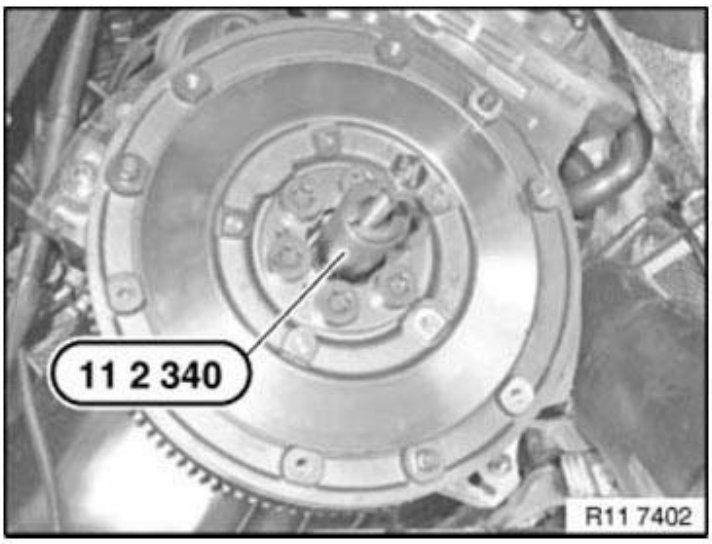


Fig. 125: Removing Guide Bearing Using Special Tool 11 2 340
Courtesy of BMW OF NORTH AMERICA, INC.

Install new thrust bearing and drive firmly home with special tool 11 2 350 in conjunction with special tool 00 5 500 .

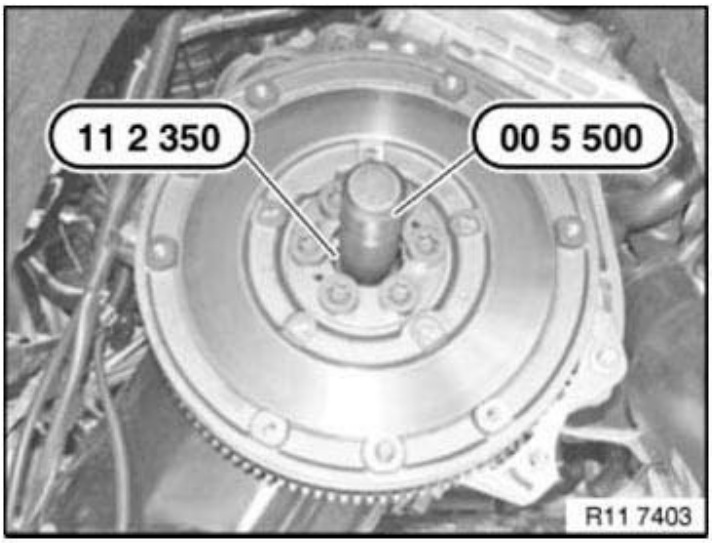


Fig. 126: Installing Thrust Bearing Using Special Tool (11 2 350 And 00 5 500)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 21 505 SEALING THE CRANKCASE'S LOWER PART(N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Risk of damage!
Joining torque and angle of rotation must be observed without fail.

IMPORTANT: Changed procedure.
It is not necessary to remove the cylinder head and the crankshaft.

Necessary preliminary tasks:

- Remove **ENGINE** .
- Mount engine on assembly stand .
- Remove **CLUTCH** (if fitted).
- Remove left and right engine support arm See **2211100 REPLACING RIGHT ENGINE SUPPORT**

ARM (N52K) or **2211110 REPLACING LEFT ENGINE SUPPORT ARM (N52K)**

- Remove **OIL SUMP** .

Release screws (1).

Pull out oil pump intake pipe (2).

Tightening torque: **11 13 6AZ**

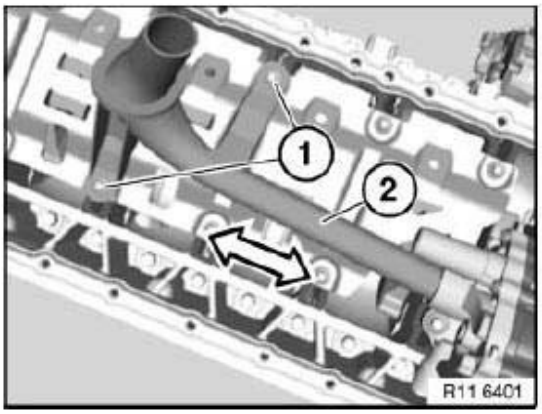


Fig. 127: Pulling Oil Pump Intake Pipe And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: **11 13 6AZ** .

Installation:

Replace aluminum screws.

Remove oil deflector (2).

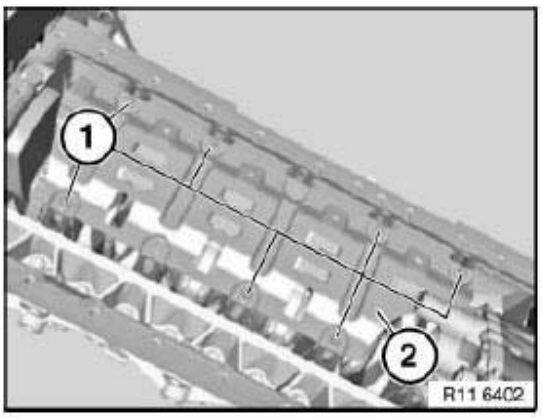


Fig. 128: Identifying Oil Deflector And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Secure oil pump sprocket with steel pin 6.0 mm (3) to oil pump.

IMPORTANT: Release central bolt (2) only together with steel pin 6.0 mm (3). Do not remove sprocket.

Release central bolt (2).

Tightening torque:**11 41 6AZ** .

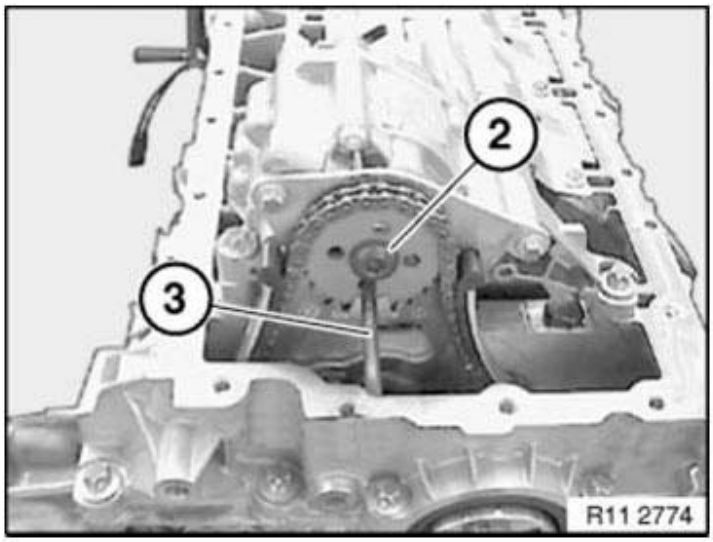


Fig. 129: Identifying Steel Pin And Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (2).

Tightening torque:**11 41 5AZ** .

Installation:

Replace aluminum screws.

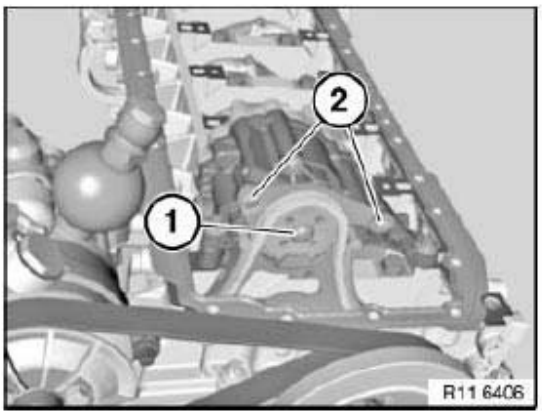


Fig. 130: Identifying Aluminum Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove screw plug (1) from crankcase at front.

NOTE: Replace gasket.

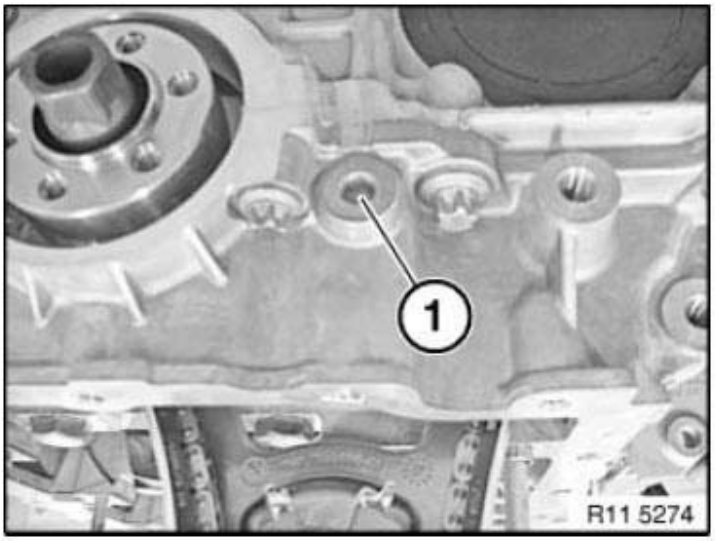


Fig. 131: Identifying Crankcase Screws Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) for oil pump triangular drive with special tool **11 8 640** .

NOTE: It is not necessary to remove the triangular drive.

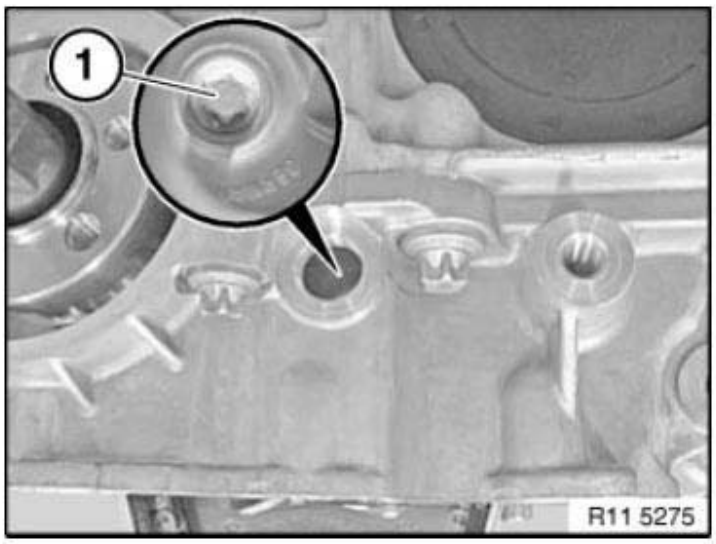


Fig. 132: Identifying Oil Pump Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Version 1:

IMPORTANT: Observe different screw lengths.
Release screws (1).
Tightening torque 11 41 2AZ .
Tightening torque 11 41 3AZ .

Installation:

Replace aluminum screws.

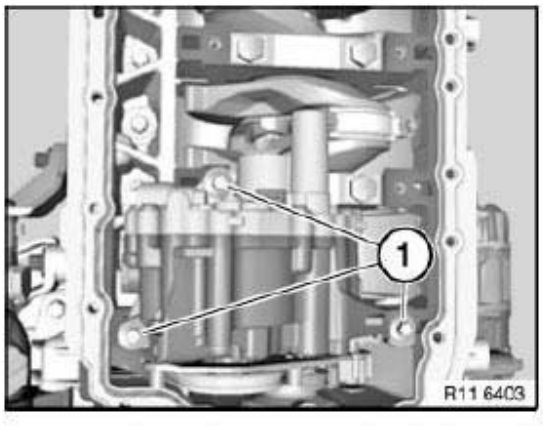


Fig. 133: Identifying Oil Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Version 2:

IMPORTANT: Observe different screw lengths.

Release oil pump screws (1).

Tightening torque: 11 41 2AZ .

Installation:

Replace aluminum screws.

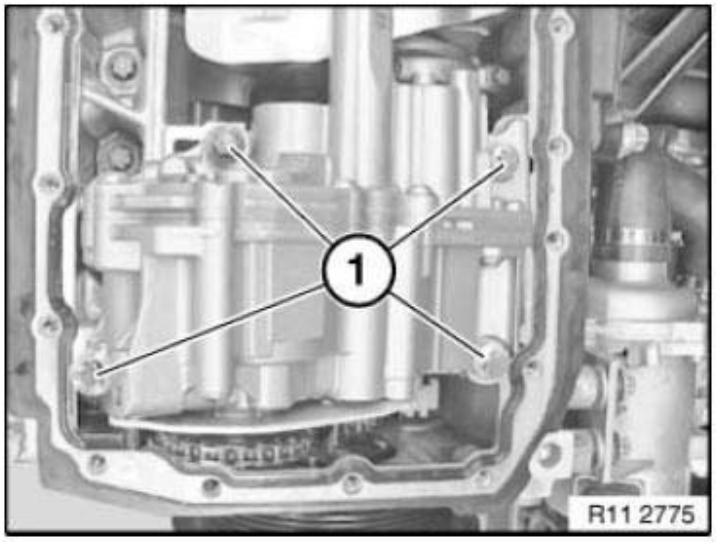


Fig. 134: Identifying Oil Pump Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Detach sprocket (1) in direction of arrow.

NOTE: The chain tensioner pushes the timing chain (3) of the triangular drive upward. Do not remove camshaft sprocket.

Remove oil pump (2) in direction of arrow.

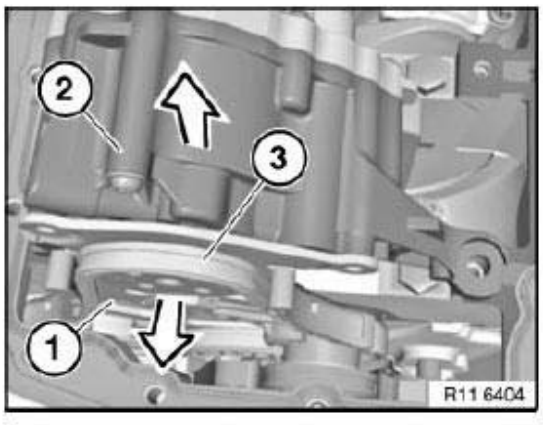


Fig. 135: Detaching Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check spacer bushings (1) for secure seating and damage; replace if necessary.

Align twin surface (3) on oil pump (2) to sprocket wheel.

Install oil pump (2).

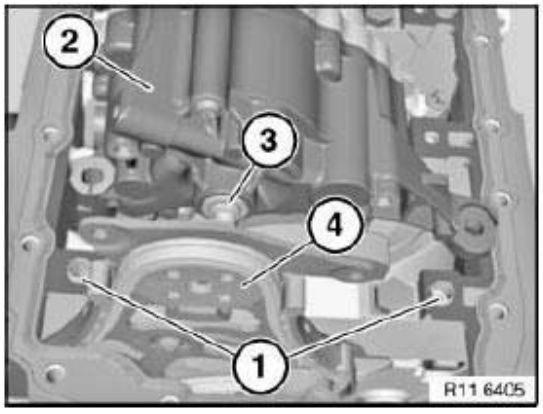


Fig. 136: Identifying Spacer Bushings And Oil Pump
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The special tool bore for the TDC position is located on the inlet side underneath the starter motor.

Rotate engine at central bolt and secure flywheel in position with special tool .

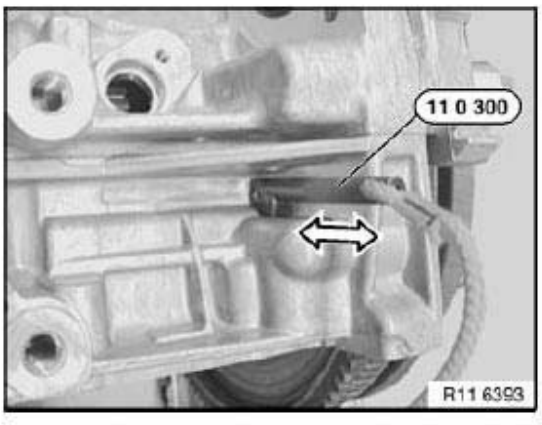


Fig. 137: Rotating Engine Central Bolt Using Special Tool (11 0 300)
Courtesy of BMW OF NORTH AMERICA, INC.

Secure flywheel with special tool (1) 11 9 260 and special tool (2) 11 9 266.

Tightening torque

NOTE: Make sure that the special tool (1) completely engages in the flywheel teeth (see arrow)

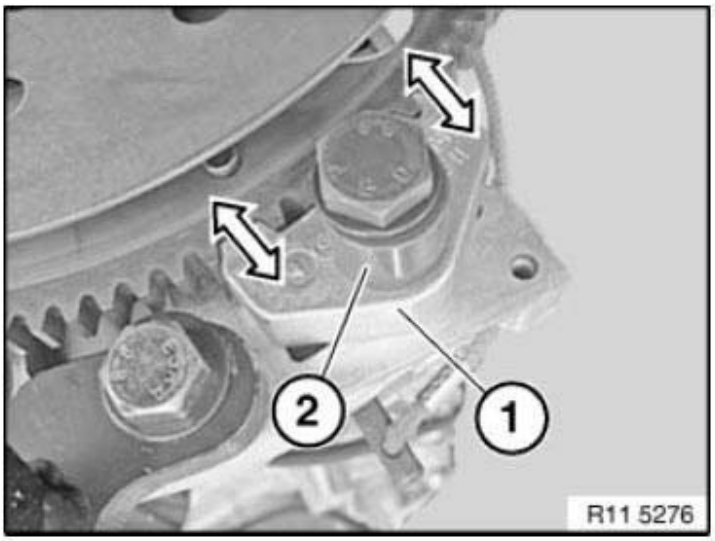


Fig. 138: Installing Flywheel Using Special Tool (11 9 260)
Courtesy of BMW OF NORTH AMERICA, INC.

Automatic transmission

Release flywheel bolts (1).

Release special tool (2).

Remove flywheel (3).

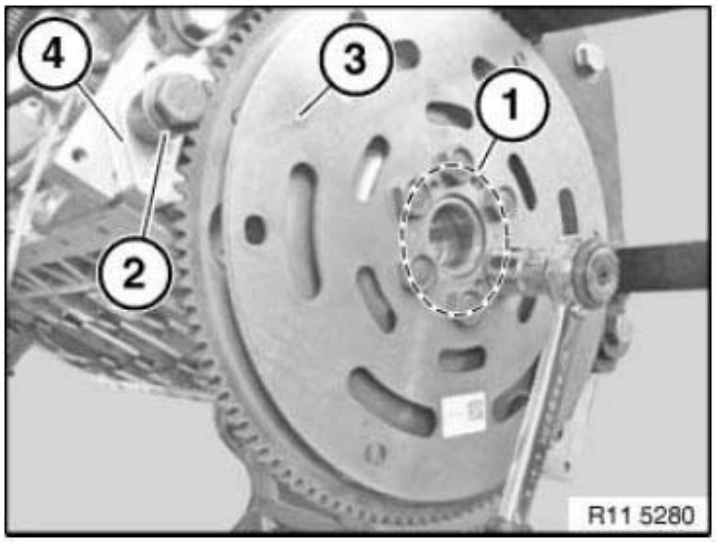


Fig. 139: Removing Flywheel Bolts Using Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Manual gearbox

IMPORTANT: Position crankshaft at TDC.

Remove dual-mass flywheel.

Secure flywheel with special tool 11 9 260 .

Remove **VIBRATION DAMPER** .

Release flywheel bolts with special tool 11 4 180 /

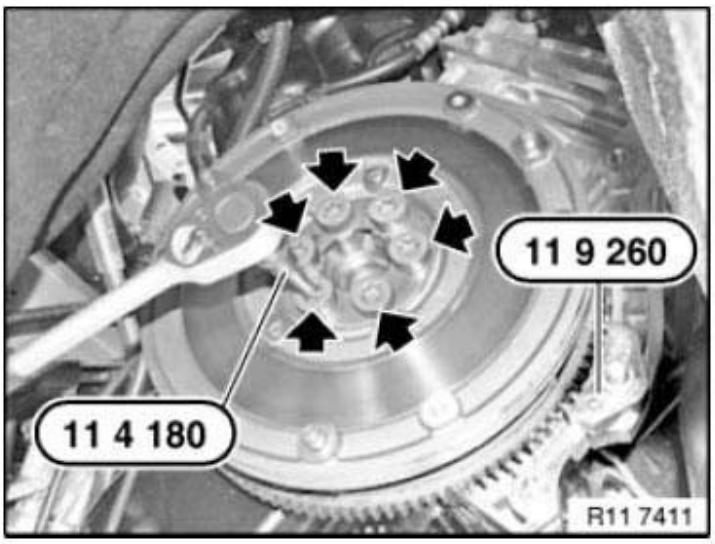


Fig. 140: Locating Flywheel Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

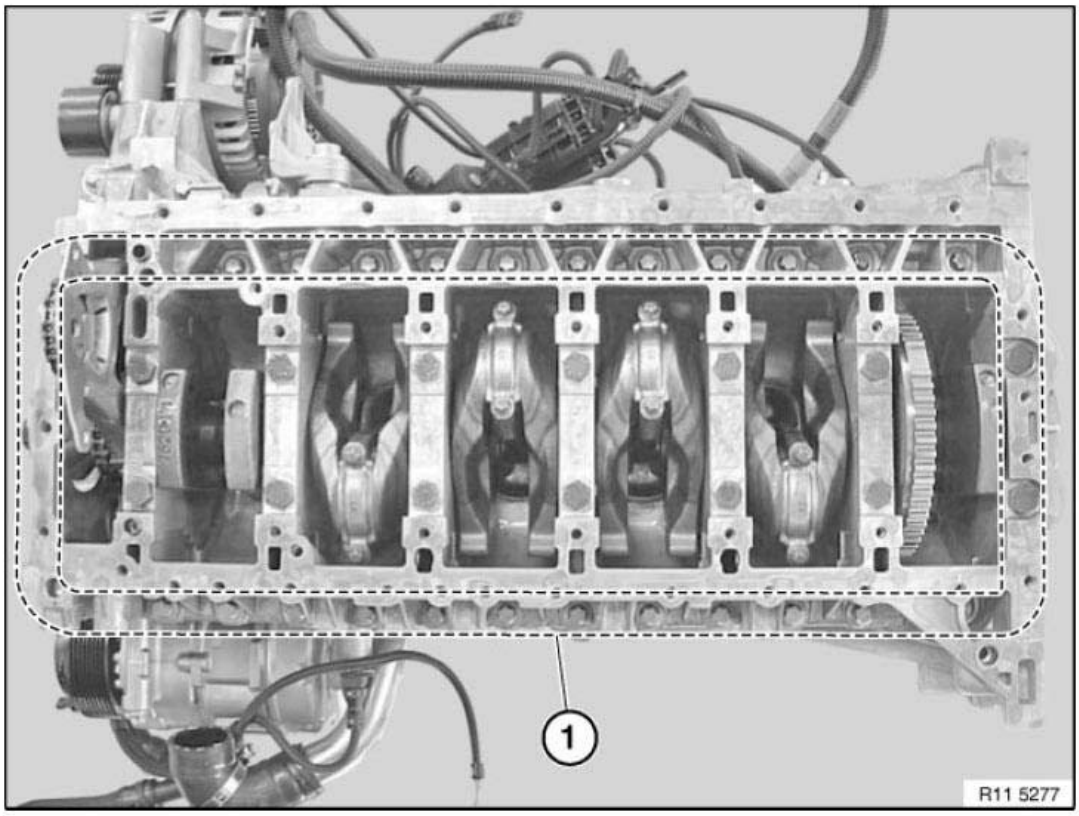


Fig. 141: Identifying Crankcase Bolts Along Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release all crankcase bolts (1) along line (2).

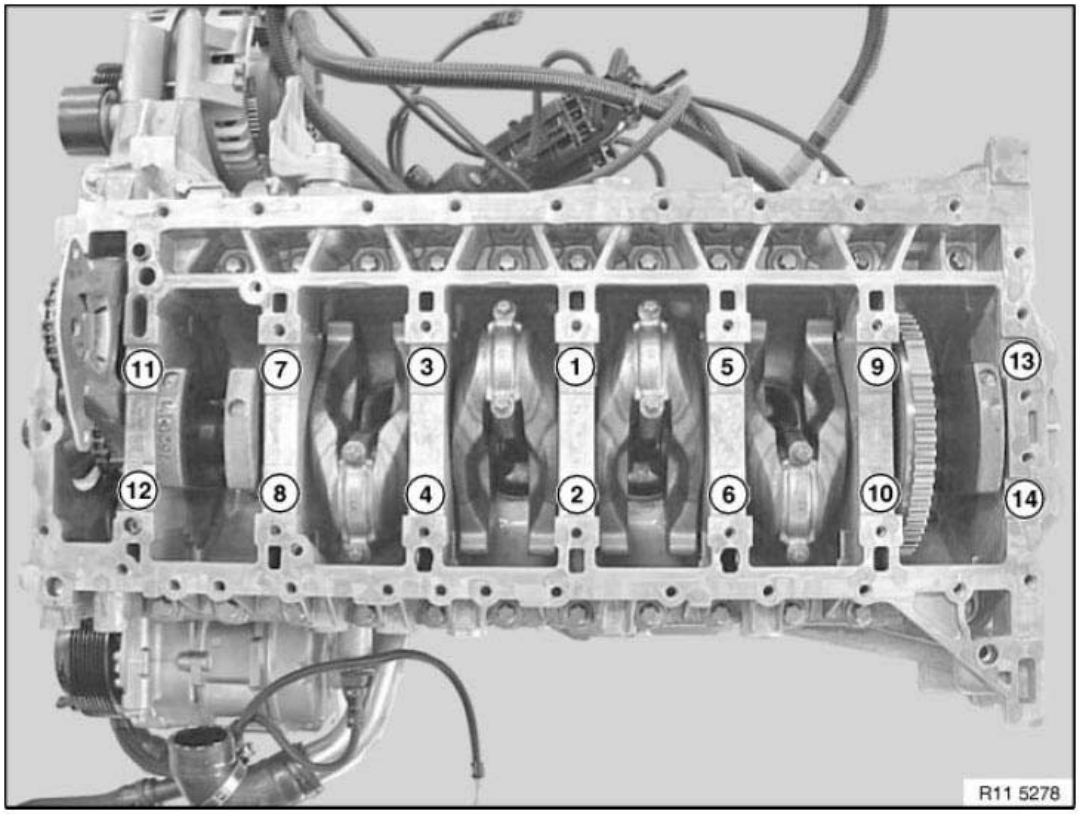


Fig. 142: Identifying Crankcase Bolts M10 In Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release crankcase bolts M10 in sequence 14 to 1.

Release crankcase lower section (1) from crankcase upper section (2) with suitable tool (3)

Remove crankcase lower section (1) upwards.

IMPORTANT: Do not rotate crankshaft without crankcase lower section (1) (risk of damage) .

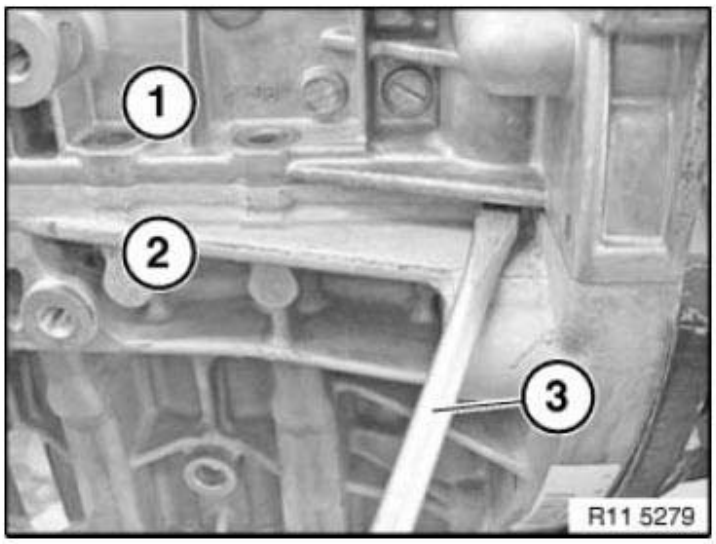


Fig. 143: Releasing Crankcase Lower Section From Crankcase Upper Section Using Tool
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Timing chain is pre-tensioned.
Do not raise crankshaft.

Carefully remove radial shaft seal (1).

Catch escaping engine oil with a cloth (2).

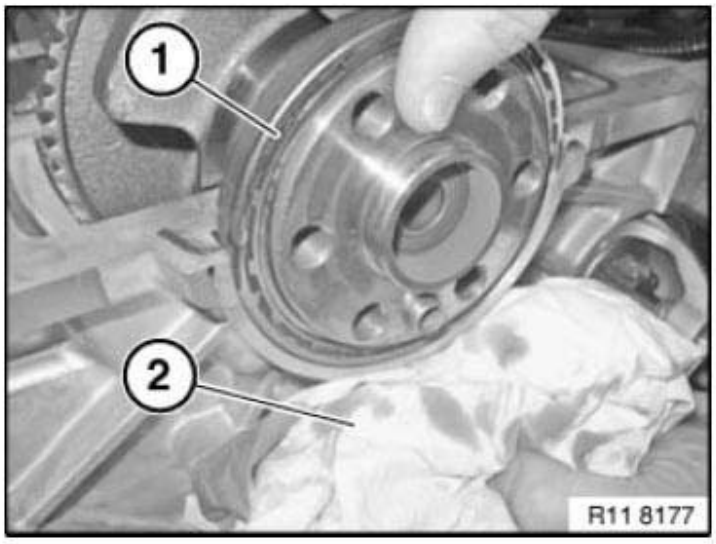


Fig. 144: Removing Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully remove radial shaft seal (1) towards front.

Catch escaping engine oil with a cloth (2).

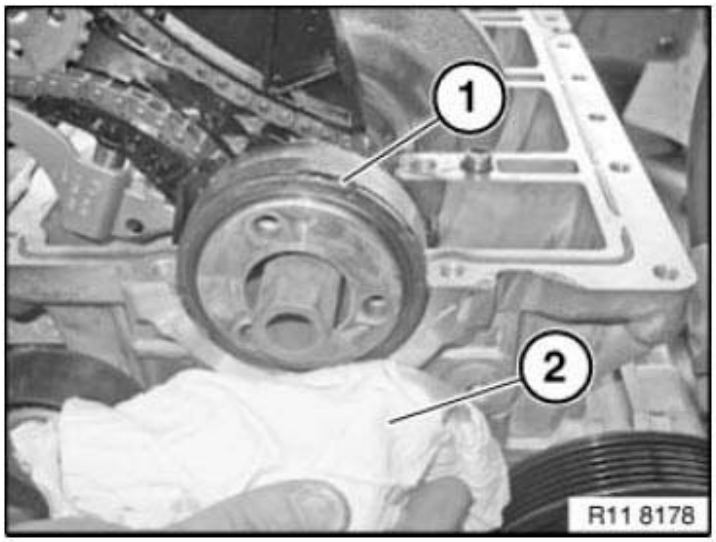


Fig. 145: Catching Escaping Engine Oil Using Cloth
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Protect crankcase against sealant residues with a cloth (1).

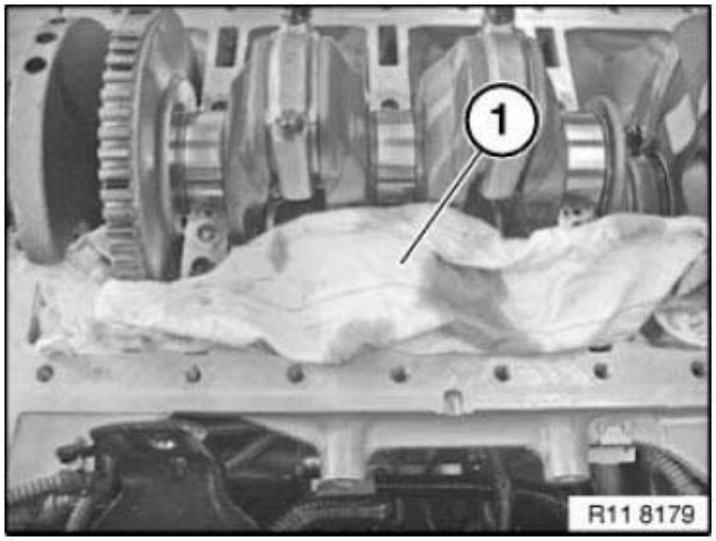


Fig. 146: Identifying Cloth For Protect Crankcase
Courtesy of BMW OF NORTH AMERICA, INC.

Remove sealant residues (1) with special tool 11 4 470 .

Remove injector nozzles (2) for liquid sealing compound on left and right.

Installation:

Replace injector nozzles (2).

Clean all threads with compressed air.

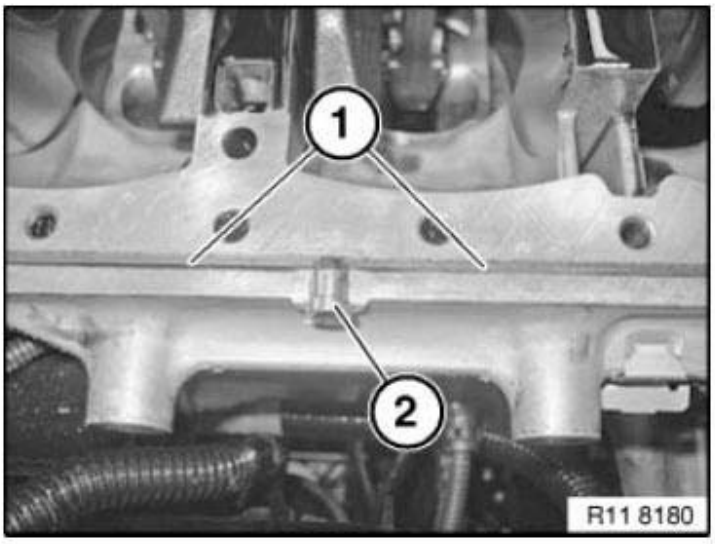


Fig. 147: Identifying Injector Nozzle And Sealant Residue
Courtesy of BMW OF NORTH AMERICA, INC.

Position crankcase lower section (1) on crankcase upper section.

Screw in all M10 crankcase bolts.

Joint all M10 crankcase bolts (1) **20 NM** from inside outwards.

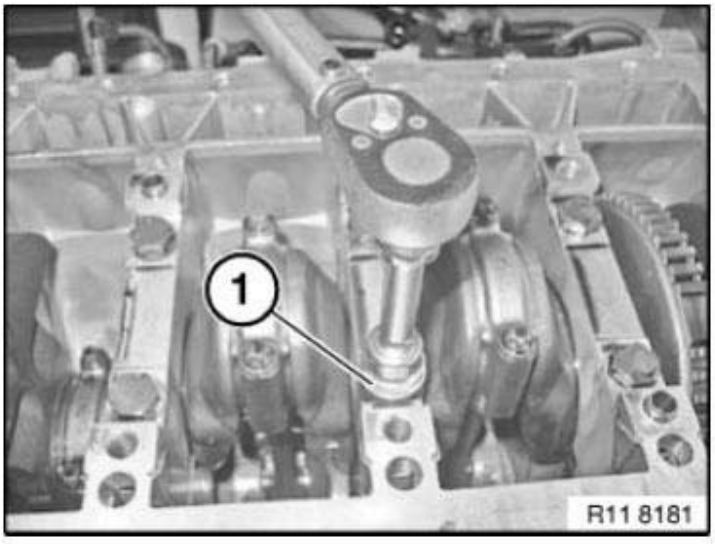


Fig. 148: Tightening M10 Crankcase Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Identify all M10 crankcase bolts with a colored marking (1) for checking.

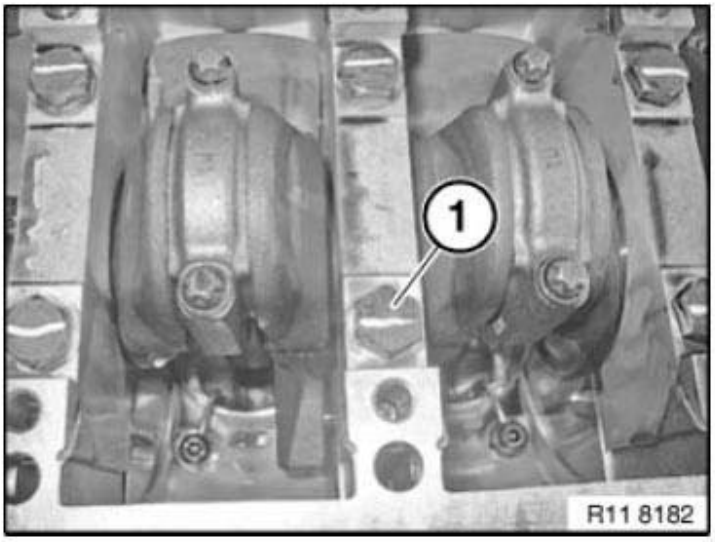


Fig. 149: Identify M10 Crankcase Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

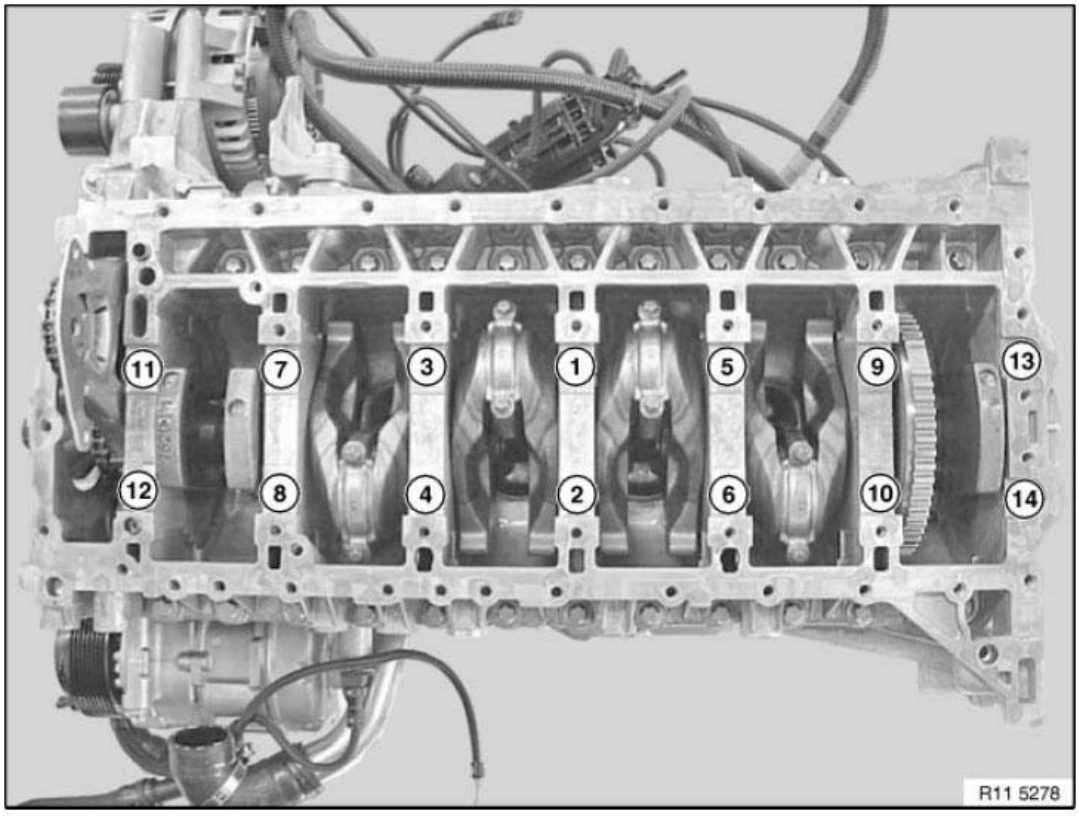


Fig. 150: Identifying M10 Crankcase Bolts In Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Secure crankcase bolts M10 in sequence 1 to 14 with special tool 00 9 120 .

Tightening torque: **11 11 1AZ.**

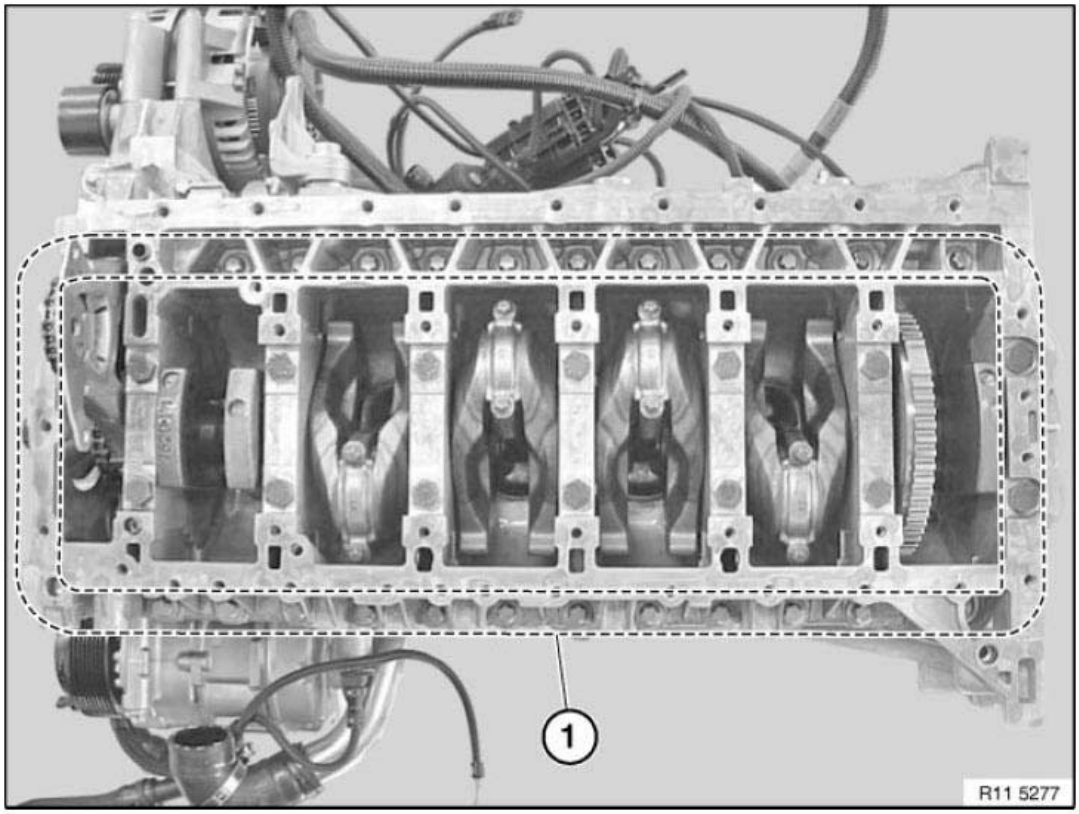


Fig. 151: Identifying Crankcase Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Insert all crankcase bolts (1).

IMPORTANT: Observe different lengths and sizes of the bolts.
Tightening torque: 11 11 2, 3 AND 4AZ.

Tighten screw (1) for oil pump triangular drive with special tool **11 8 640** .

NOTE: Replace screw.
Tightening torque: 11 41 4 AZ .

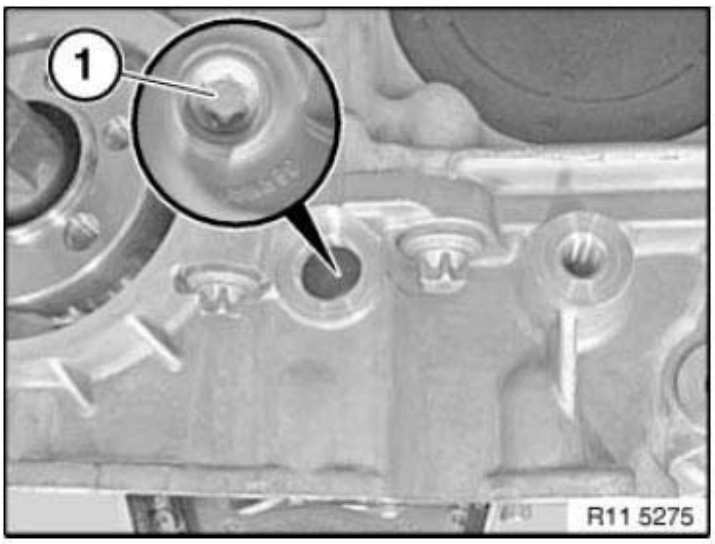


Fig. 152: Identifying Oil Pump Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten screw plug on front of crankcase.

Tightening torque: **11 11 8 AZ.**

Installation:

Replace sealing ring.

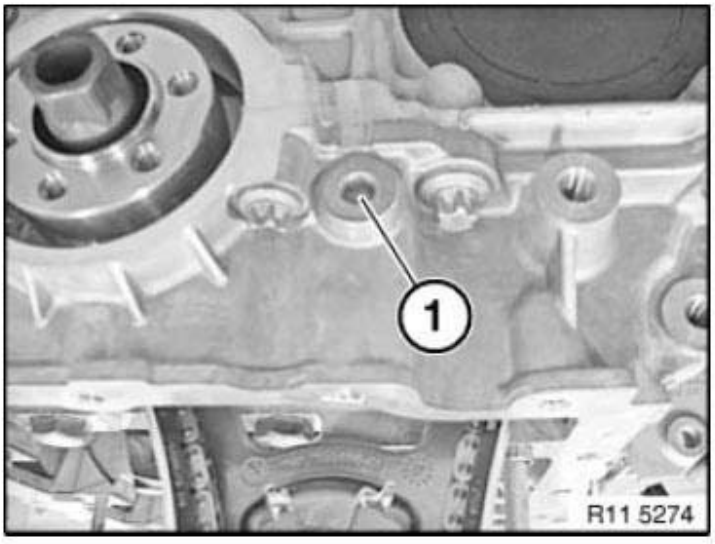


Fig. 153: Identifying Crankcase Screws Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare radial shaft seal (1) on special tool 11 8 220.

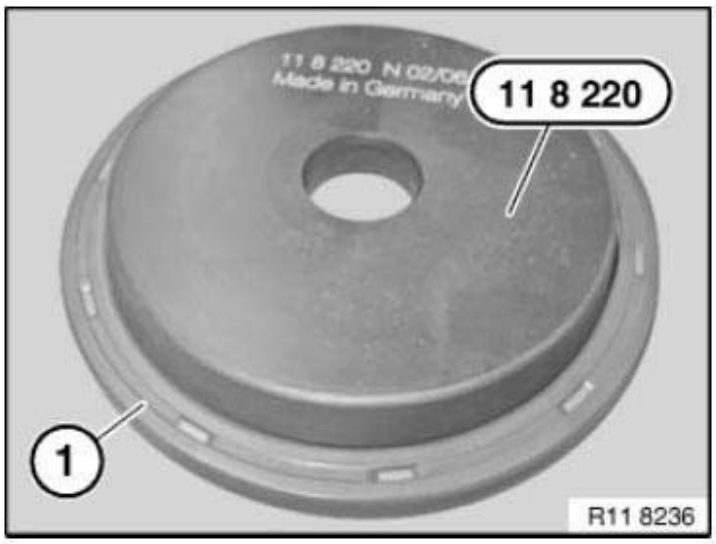


Fig. 154: Identifying Radial Shaft Seal And Special Tool (11 8 220)
Courtesy of BMW OF NORTH AMERICA, INC.

Position radial shaft seal (1) with special tool 11 8 220 on the crankshaft.

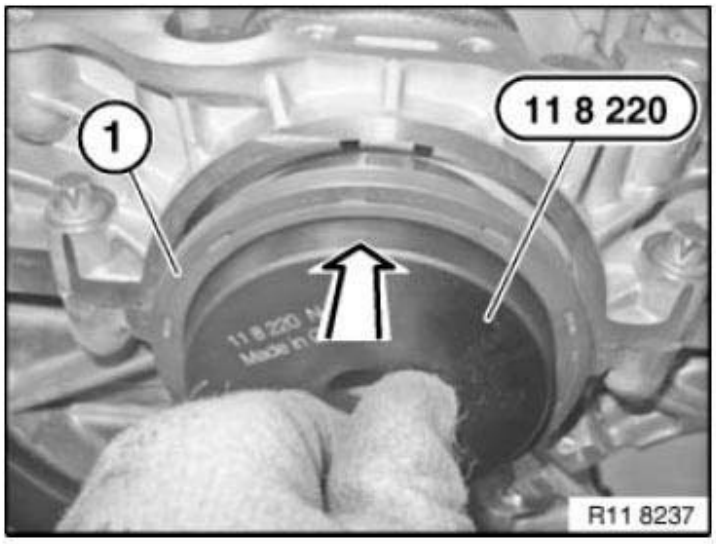


Fig. 155: Positioning Radial Shaft Seal On Crankshaft Using Special Tool (11 8 220)
Courtesy of BMW OF NORTH AMERICA, INC.

Brush radial shaft seal (1) over the special tool 11 8 220.

Move radial shaft seal (1) parallel up against the crankcase.

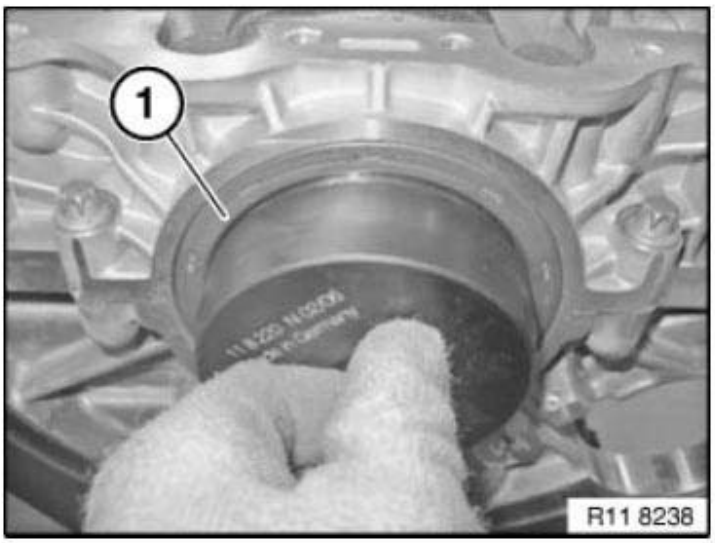


Fig. 156: Moving Radial Shaft Seal Parallel Up Against Crankcase
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 9 182 with screws (special tool 11 9 184) to crankshaft.

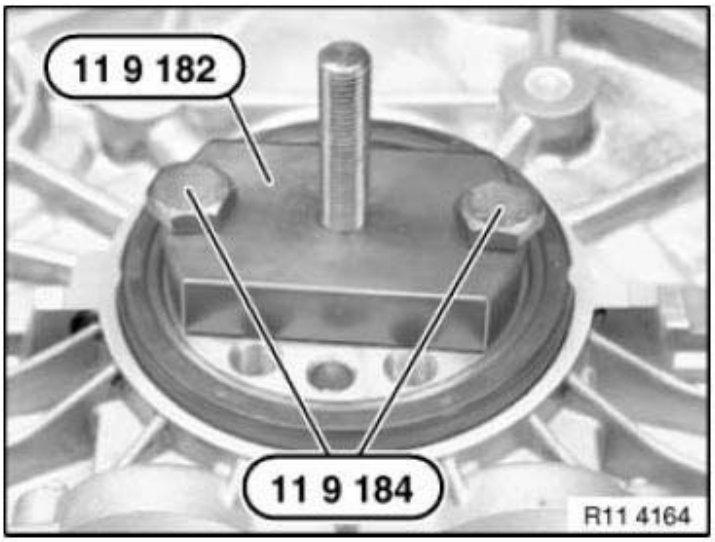


Fig. 157: Identifying Special Tools (11 9 182 And 11 9 184)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Prepare special tool 11 9 181 for installation. Connect special tool 11 9 185 onto special tool 11 8 181.

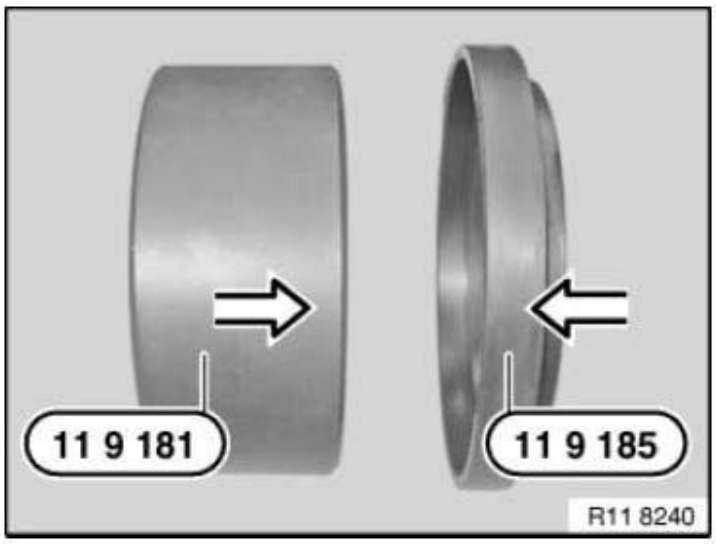


Fig. 158: Connecting Special Tool (11 9 185) Onto Special Tool (11 8 181)
Courtesy of BMW OF NORTH AMERICA, INC.

Pull on radial shaft seal with special tool 11 9 181 and 11 9 185 in combination with special tool 11 9 183.

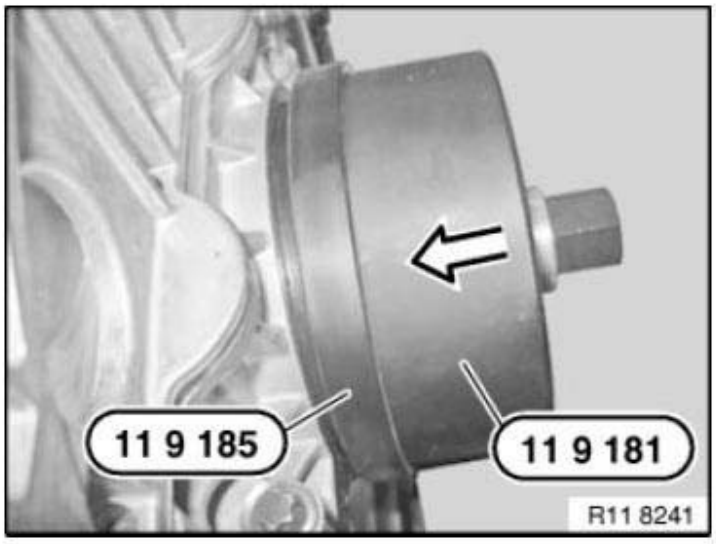


Fig. 159: Pulling Radial Shaft Seal Using Special Tool (11 9 181)
Courtesy of BMW OF NORTH AMERICA, INC.

Screw on radial shaft seal with special tool 11 9 183 to limit position.

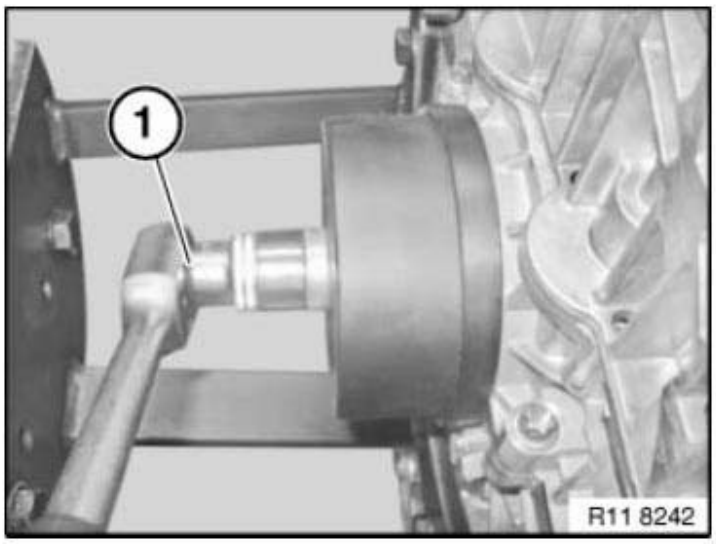


Fig. 160: Tightening Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing surface (1) and degrease thoroughly in area of housing partition.

Apply a light coat of oil to running surface (2) of radial seal.

NOTE: Graphic N42.

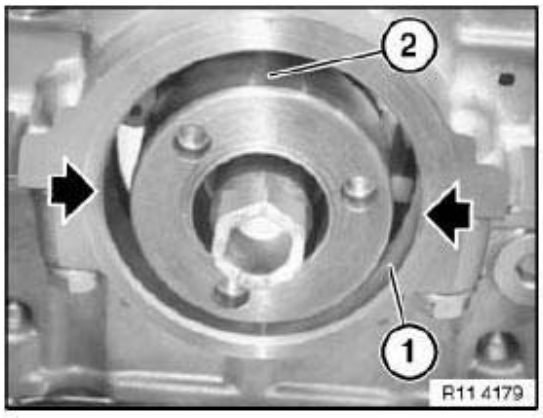


Fig. 161: Locating Sealing Surface And Running Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Push radial shaft seal (1) 11 9 235carefully in direction of arrow on the special tool.

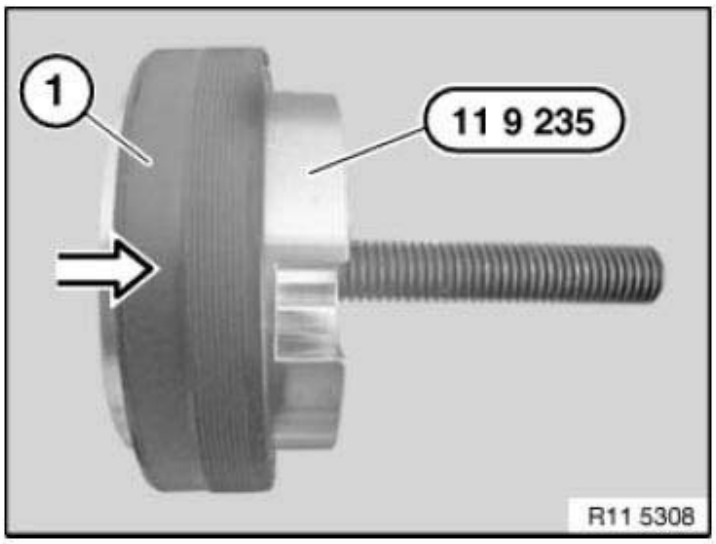


Fig. 162: Pushing Radial Shaft Seal Using Special Tool (11 9 235)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: 11 9 235Special tool can only be fastened with 2 opposite bolts. Determine hole pattern on special tool.

Screw special tool 11 9 235 with special tool 11 9 234 on crankshaft.

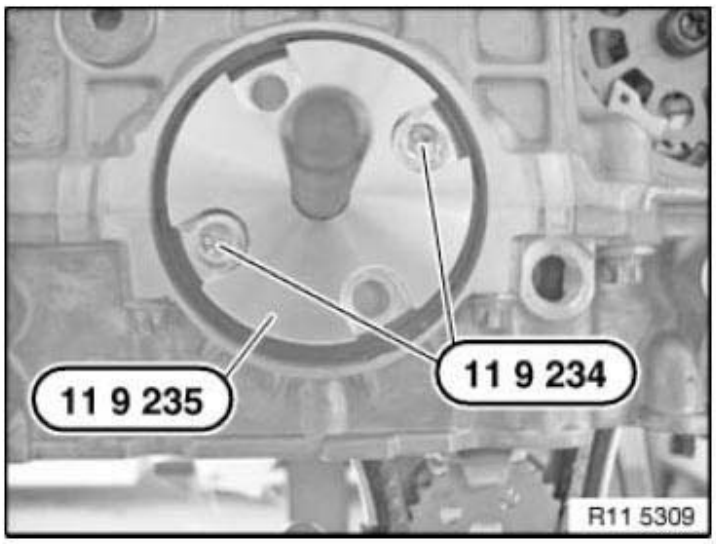


Fig. 163: Identifying Special Tools (11 9 234 And 11 9 235)
Courtesy of BMW OF NORTH AMERICA, INC.

Align groove (2) of radial shaft seal (1) centered to the housing partition (3.

IMPORTANT: After installation, the grooves must be filled with sealing compound.

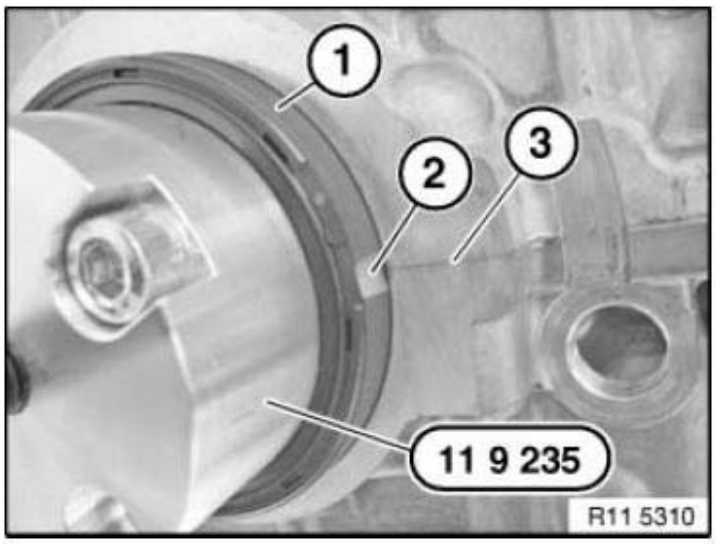


Fig. 164: Aligning Groove Of Radial Shaft Seal Centered To Housing Partition
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in radial seal with special

tool 11 9 231 in conjunction with special tool 11 9 233 until flush.

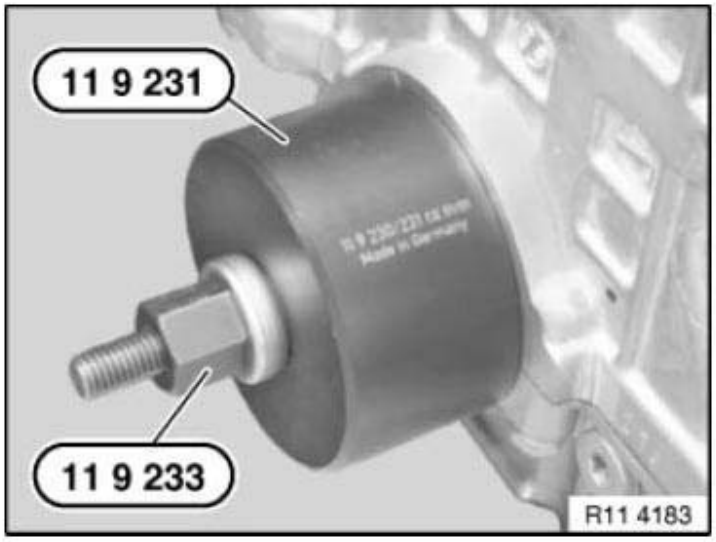


Fig. 165: Identifying Special Tools (11 9 231 And 11 9 233)
Courtesy of BMW OF NORTH AMERICA, INC.

Drive both injector nozzles (1) on left and right with special tool 11 9 360 into crankcase up to stop.

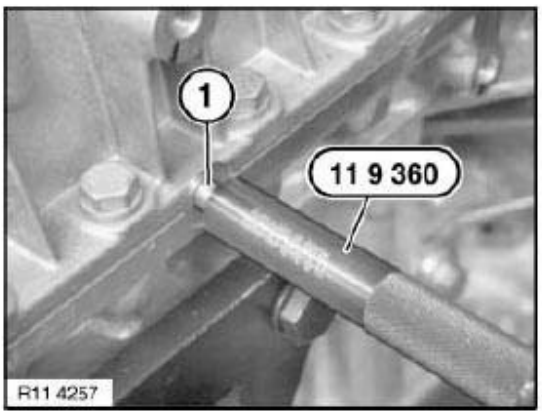


Fig. 166: Driving Nozzles In Crankcase Using Special Tool 11 9 360
Courtesy of BMW OF NORTH AMERICA, INC.

After fitting both sealing rings, check both sealing ducts for clearance.

Blow compressed air (1) at max. 6 bar into injector nozzle (2).

Compressed air must emerge at both sealing rings on left and right from the outlet bores.

IMPORTANT: If the compressed air does not flow out of all ducts. the crankcase must again be taken apart and cleaned.

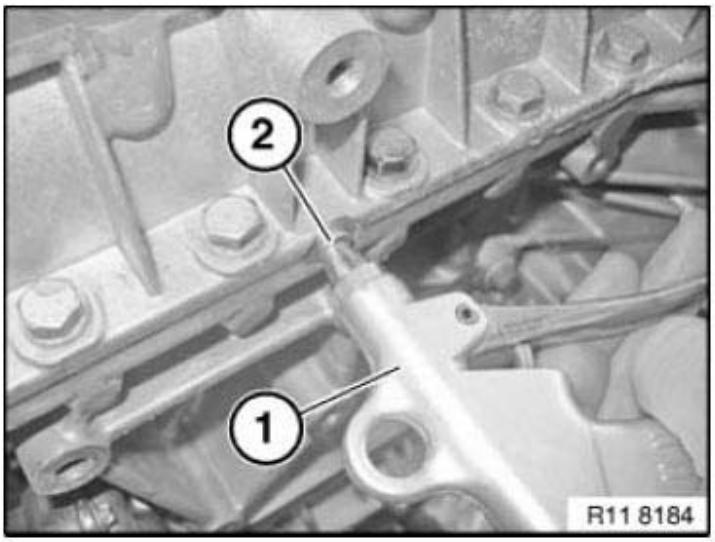


Fig. 167: Blowing Compressed Air Into Injector Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Use **PRIMER 1.3 AND LIQUID SEAL 1.4** .

Prepare liquid sealing compound (1) in special tool 11 4 370 .

Injector nozzles for injecting sealing compound are not required.

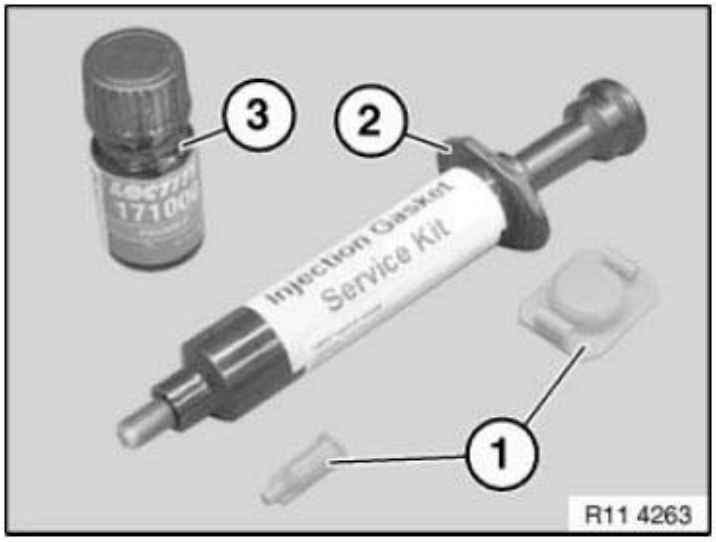


Fig. 168: Identifying Injector With Primer Bottle
Courtesy of BMW OF NORTH AMERICA, INC.

Slowly insert liquid sealing compound (1) with special tool 11 4 370 in direction of arrow.

Liquid sealing compound must emerge at radial shaft seals at front and rear.

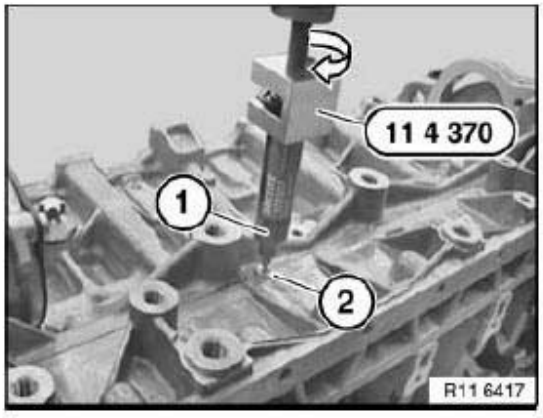


Fig. 169: Inserting Liquid Gasket Using Special Tool (11 4 370)
Courtesy of BMW OF NORTH AMERICA, INC.

Stop (seal off) escaping liquid gasket with primer 1.3.

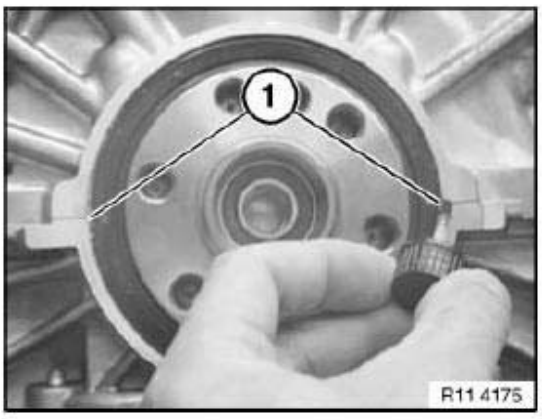


Fig. 170: Coating Sealing Compound Surface Using Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Stop (seal off) escaping liquid gasket with primer 1.3.

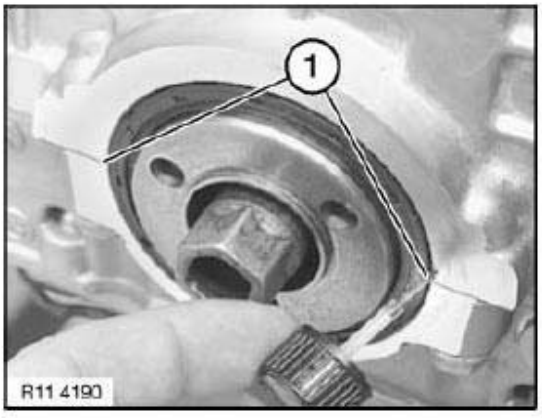


Fig. 171: Coating Housing Partition On Engine Block Using Brush Moistened With Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1122 FLYWHEEL

11 22 500 REMOVING AND INSTALLING/REPLACING FLYWHEEL (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:

Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove transmission See **2300017 REMOVING AND INSTALLING TRANSMISSION (GS6-17BG) N52K** or **2400030 REMOVING AND INSTALLING AUTOMATIC TRANSMISSION (6HP19Z) N52K**
- Remove **CLUTCH**

For vehicles with optional extra SA205 (automatic transmission)

Secure flywheel (1) with existing transmission bolt (2) and special tool 11 9 260 .

Installation:

Replace aluminum screws.

Unfasten flywheel screws.

Tightening torque **11 22 1AZ** .

Installation:

Flywheel (1) is secured with an alignment pin.

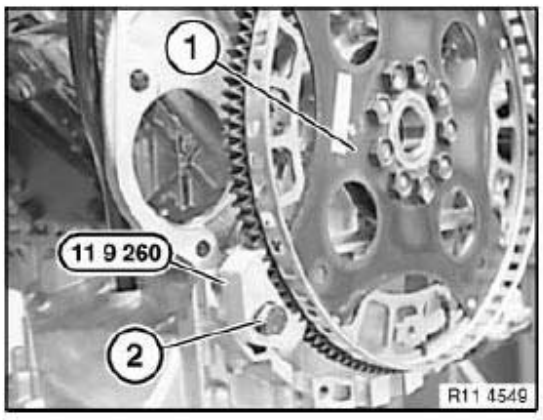


Fig. 172: Supporting Flywheel With Existing Transmission Bolt And Special Tool 11 9 260
Courtesy of BMW OF NORTH AMERICA, INC.

Fit new flywheel screws.

Clean all threads for flywheel screws in crankshaft.

For vehicles without optional extra SA205 (automatic transmission)

Secure flywheel with transmission bolt (1) and special tool 11 9 260 and 11 9 265.

Installation:

Replace aluminum screws.

Release flywheel bolts with special tool 11 4 180 /

Tightening torque **11 22 2AZ** .

Installation:

Flywheel is secured with a dowel pin.

Fit new flywheel screws.

Clean all threads for flywheel screws in crankshaft.

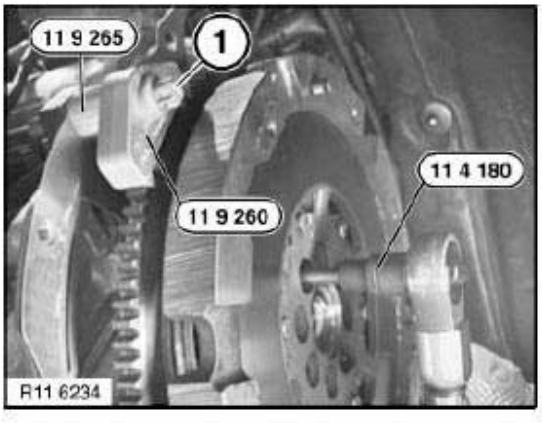


Fig. 173: Tightening Flywheel Bolts Using Special Tools (11 4 180)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1123 VIBRATION DAMPER

11 23 010 REMOVING AND INSTALLING/REPLACING VIBRATION DAMPER (N52K)

Necessary preliminary tasks:

- Remove **UNDERBODY PROTECTION** .
- Remove **DRIVE BELT**

Release screws (1).

Tightening torque **11 23 1AZ** .

Remove vibration damper (2).

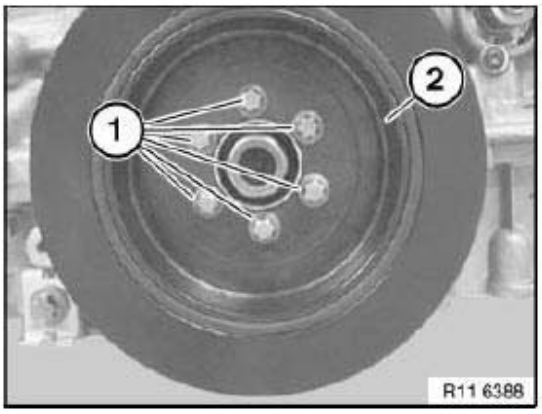


Fig. 174: Identifying Vibration Damper Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1124 CONNECTING ROD WITH BEARING

11 24 571 REPLACING ALL CONNECTING ROD BEARING SHELLS (N52K)

IMPORTANT: All crank pins are connected with the crankshaft.
Modified procedure: The colors of the connecting rod bearing shells are the same at the top and bottom.
The Blue/Red connecting rod bearing shell colors are no longer fitted in combination.

Necessary preliminary tasks:

- Remove **OIL SUMP**

IMPORTANT: All crankshaft crank pins are classified.

Possible classifications per connecting rod at top and bottom:

r: Red

b: Blue

Only **one** color may be fitted per big end bearing cap and connecting rod.

In direction of arrow from (1 to 2) crank pin (1 to 6).

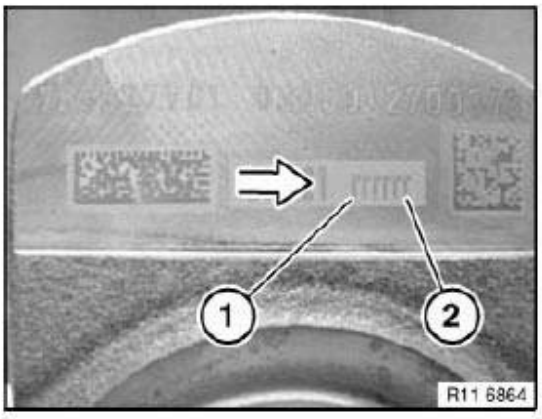


Fig. 175: Direction Of Fitting Color In Connecting Rod And Connecting Rod Bearing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Example:

Possible classification: rbbrrb

Cylinder 1: Classification Red/Red

Cylinder 2: Classification Blue/Blue

Cylinder 3: Classification Blue/Blue

Cylinder 4: Classification Red/Red

Cylinder 5: Classification Red/Red

Cylinder 6: Classification Blue/Blue

Release connecting rod bolts (1).

Remove connecting rod bearing cap (2).

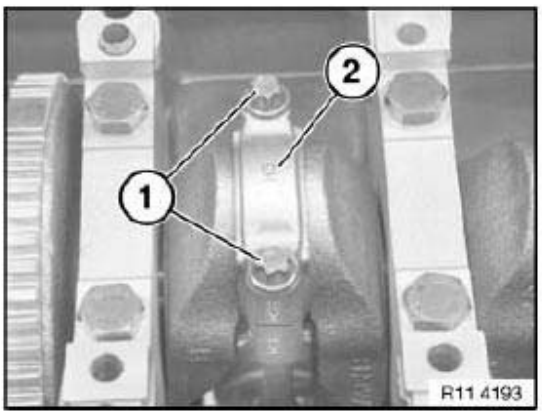


Fig. 176: Identifying Connecting Rod Bearing Cap And Connecting Rod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage to cylinder wall and to crankshaft.

Gently release connecting rod from crankshaft.

Remove connecting rod bearing shells (1 and 2).

Install new connecting rod bearing shells.

Installation:

Pay attention to guide lugs during installation.

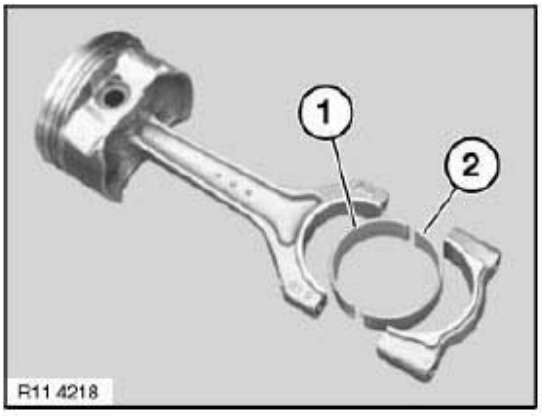


Fig. 177: Identifying Connecting Rod Bearing Shells
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: All crankshaft crank pins are classified.

In each case insert only one color of connecting rod bearing shell (1 and 2) for each connecting rod.

Check connecting rod bearing clearance.

Piston in BDC position.

To determine the connecting rod bearing play, make sure that the bearing points are clean and free from oil and grease.

Fit special tool 00 2 590 (Plastigage type PG 1) to oil-free crankshaft.

Fit connecting rod bearing cap so that pairing letters match up.

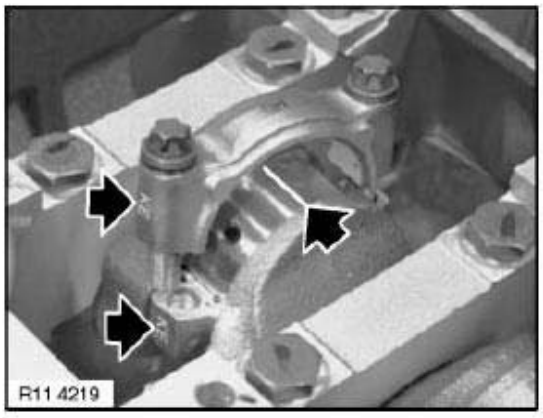


Fig. 178: Locating Bearing Cap Pairing Letters
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not distort connecting rods or crankshaft.

Use the old connecting rod bolts to check connecting rod clearance.

Tighten down connecting rod bolts with special tool 00 9 120 .

Tightening torque **11 24 1AZ** .

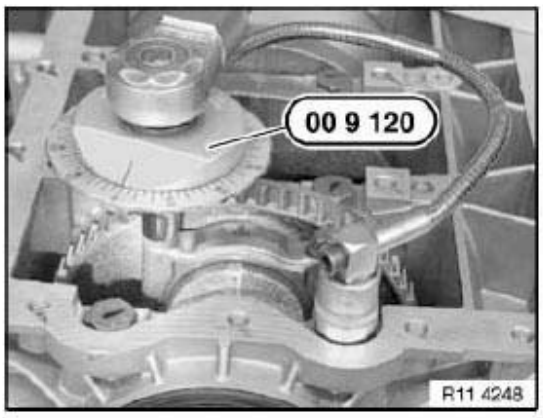


Fig. 179: Adjusting Connecting Rod Torsion Angle Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew connecting rod bearing cap. Read off connecting rod bearing play at width of flattened plastic thread on measurement scale.

Connecting rod bearing play. See **TED-TED-TDMUC1124-N52K-01B1S2 CONNECTING RODS AND BEARINGS N52K/B30** or **TED-TED-TDMUC1124-N52K-01B1S1 CONNECTING RODS AND BEARINGS N52K/B25**

- Remove Plastigage
- Coat crankshaft and connecting rod bearing shells with oil
- Install new connecting rod bolts and tighten down with special tool 00 9 120 .

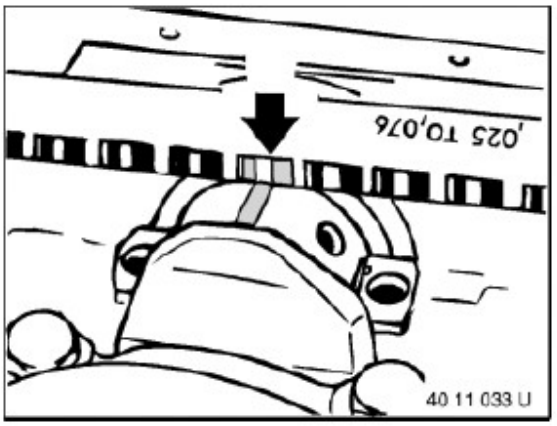


Fig. 180: Checking Bearing Clearance Width Of Crushed Plastic Thread (Plastigage)
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **11 24 1AZ** .

Assemble engine.

1125 PISTON WITH RINGS AND PIN

11 25 530 REMOVING AND INSTALLING OR REPLACING ALL PISTONS (N16)

WARNING: Protective goggles must be worn when working on the gudgeon pin circlip.

IMPORTANT: If pistons, connecting rods and bearing shells are reused, they must be reinstalled in the same places.

Connecting rods and connecting rod bearing caps are denoted with the same pairing letters; mixing them up will

result in engine damage.

Piston and gudgeon pins are paired and must not be fitted individually.

Necessary preliminary tasks:

- Remove engine.
- Mount engine on assembly stand.
- Remove intake plenum.
- Remove cylinder head.
- Remove oil sump.
- Remove oil pump.

NOTE: In event of heavy oil carbon residue:

Carefully remove oil carbon residue from cylinder wall.

NOTE: Graphic shows N46.

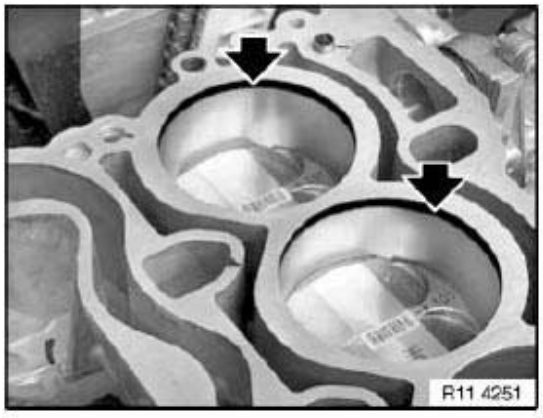


Fig. 181: Locating Oil Carbon Residue On Cylinder Wall
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Mark all pistons and conrods with a pen prior to removing.

Example N14:

Direction of arrow (1) points to camshaft drive.

Cylinder allocation (2) per cylinder.

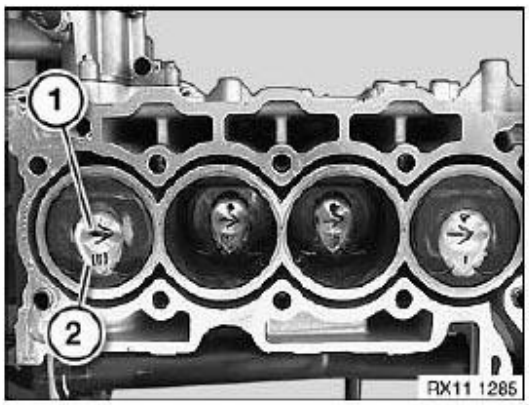


Fig. 182: Identifying Camshaft Drive Direction And Cylinder Allocation
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Mark all pistons and conrods with a pen prior to removing.

Example:

Mark cylinder assignment (1) for the respective cylinder.

Direction of arrow (2) points to timing chain drive.

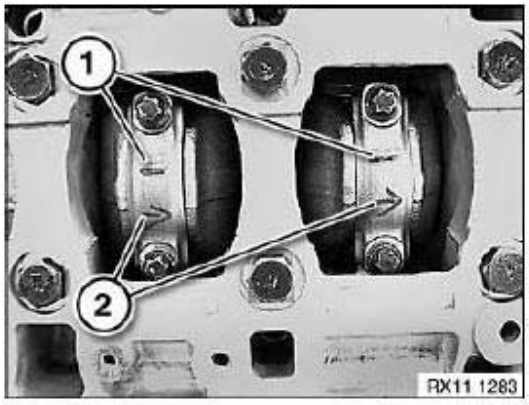


Fig. 183: Identifying Bearing Cap And Direction Of Arrow Towards Timing Chain Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Release connecting rod bolts (1).

Tightening torque, **11 24 1AZ** .

Remove conrod bearing cap.

IMPORTANT: Connecting rods and connecting rod bearing caps are denoted with the same pairing letters; mixing them up will result in engine damage.

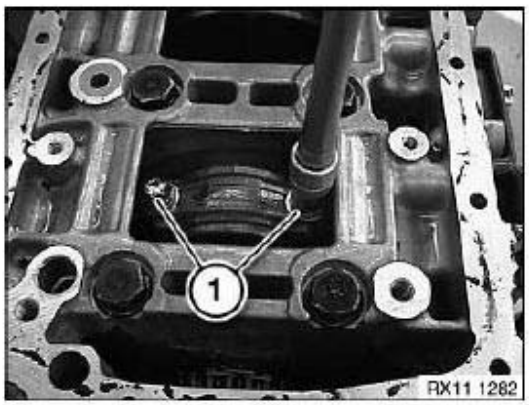


Fig. 184: Identifying Connecting Rod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

11 9 620 Attach special tool in conrod big end.

Press out connecting rod and piston to cylinder head side.

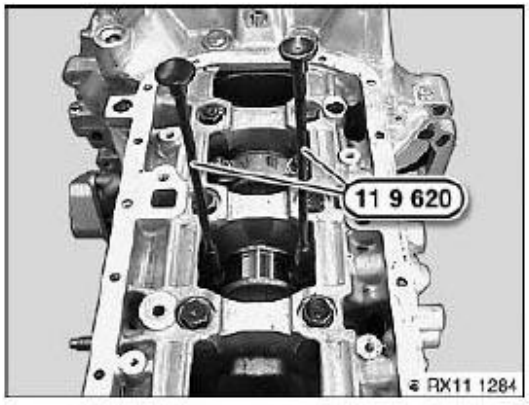


Fig. 185: Attaching Special Tool (11 9 620) In Conrod Big End
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Safety goggles must be worn for the next operation.

WARNING: Safety goggles must be worn.

IMPORTANT: Piston and gudgeon pins are paired and must not be fitted individually.

Lever out piston pin circlip with a screwdriver in direction of arrow.

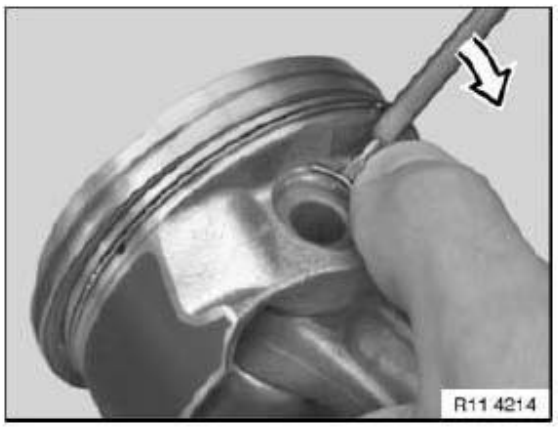


Fig. 186: Removing Piston Pin Circlip Using Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace connecting rods.

Installation note:

The gudgeon pin must be able to be pressed through the liner by hand with little force and must not display any significant play.

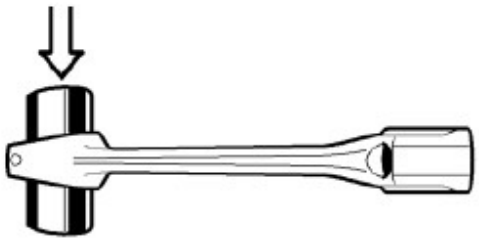


Fig. 187: Installing Gudgeon Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Measure piston installation clearance:

Measure piston diameter with micrometer at measuring point A from lower edge of piston and offset by 90° to piston pin axis.

Piston diameter at measuring point A.

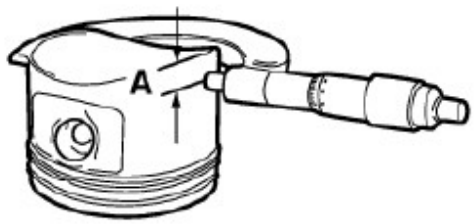


Fig. 188: Measuring Piston Diameter Using Micrometer
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust micrometer to cylinder bore of engine block. Set internal calliper on micrometer to zero. Measure bottom, center and top of cylinder bore in direction of travel and direction of engine rotation.

Diameter of cylinder bore.

Piston installation clearance.

Total permissible wear tolerance.

If necessary, replace piston.

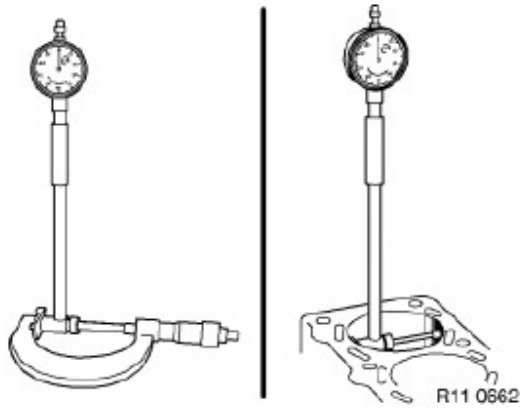


Fig. 189: Checking Cylinder Bore Diameter
Courtesy of BMW OF NORTH AMERICA, INC.

Install all piston rings.

Install all bearing shells.

Coat piston and piston rings with oil.

11 9 670 Pre-install piston in special tool.

Screw special tool 11 9 620 into connecting rod.

Installation note:

11 9 620 Check protective lugs on special tool for correct position and damage.

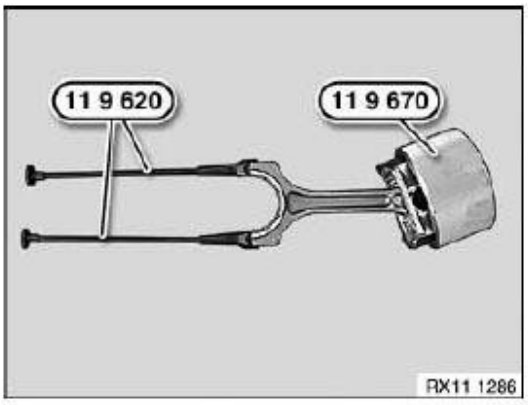


Fig. 190: Identifying Connecting Rod And Screw Special Tool (11 9 620)
Courtesy of BMW OF NORTH AMERICA, INC.

Insert piston with connecting rod in cylinder.

IMPORTANT: Risk of breakage of piston rings.
Press in piston with finger pressure only, do not drive in (see arrows).

Insert piston (1) so that arrow on piston crown points to camshaft drive.

If reusing the pistons, assign cylinder allocation (2) to correct cylinder.

Press in piston with special tool 11 9 670.

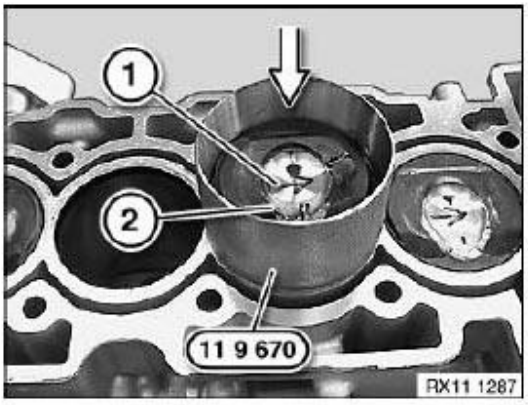


Fig. 191: Inserting Piston With Connecting Rod In Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Point of fracture (1) on conrod.
Conrod and conrod bearing cap are identified with pairing letters (2) and must not be mixed up.
Mixing them up or incorrectly fitting the connecting rod bearing cap on the big end will result in engine damage .

Both pairing letters (2) must be together on one side.

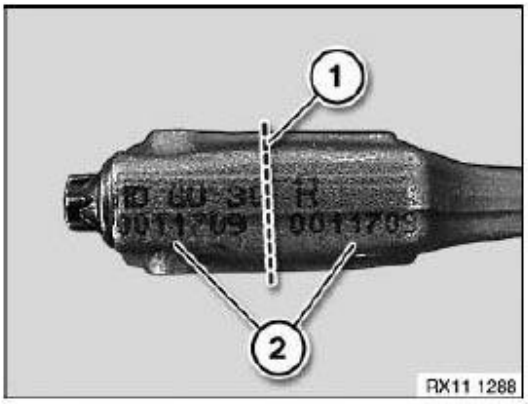


Fig. 192: Identifying Connecting Rod Pairing Letters
Courtesy of BMW OF NORTH AMERICA, INC.

Apply a light coat of oil to crankshaft journals.

Attach connecting rod to crankshaft journal.

Remove special tool 11 9 620.

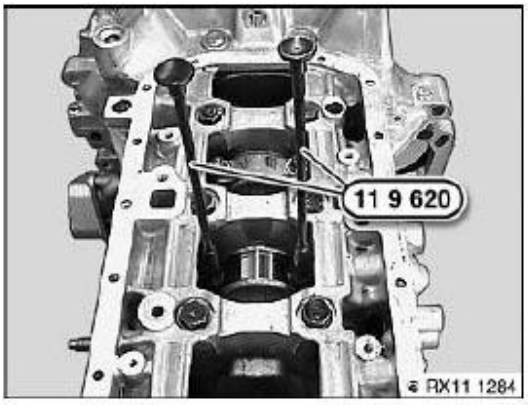


Fig. 193: Attaching Special Tool (11 9 620) In Conrod Big End
Courtesy of BMW OF NORTH AMERICA, INC.

Fit bearing caps (2) so that pairing letters match up.

Check cylinder identification markings (1).

Direction of arrow (2) points to timing chain drive.

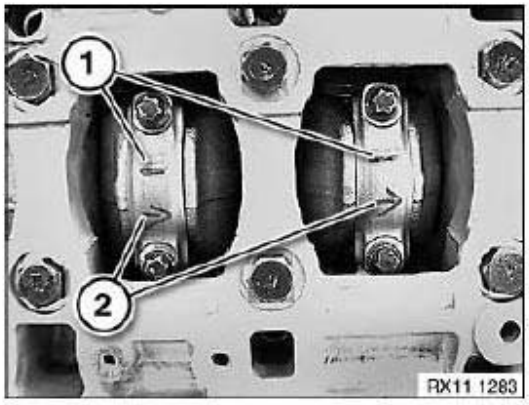


Fig. 194: Identifying Bearing Cap And Direction Of Arrow Towards Timing Chain Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Install new connecting rod bolts (1).

Carry out torsion angle tightening of conrods with special tool 00 9 120

Tightening torque: **11 24 1AZ**

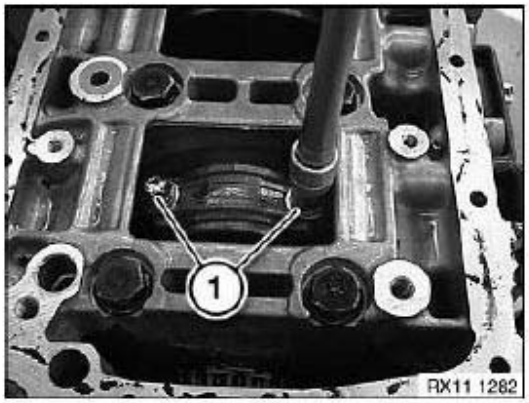


Fig. 195: Identifying Connecting Rod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 25 530 REMOVING AND INSTALLING/REPLACING ALL PISTONS (N52K)

WARNING: Risk of injury!
Carry out work on piston pin circlip wearing protective goggles only.

IMPORTANT: If piston, connecting rod, big end bearing cap and connecting rod bearing shell are to be reused, they must be installed in the same position.

Individual replacement of a connecting rod is not permitted. Connecting rods are classified by weight categories and are only available as a set for all cylinders.

Connecting rod and big end bearing cap are marked with identical pairing letters and must not be mixed up.

Danger of engine damage!

Piston and gudgeon pins are paired and must not be fitted individually.

Necessary preliminary tasks:

- Remove **ENGINE**
- Mount engine on assembly stand
- Remove intake **PLENUM**
- Remove **CYLINDER HEAD** .
- Remove **OIL SUMP**
- Remove **OIL PUMP**

NOTE: Carefully remove heavy oil carbon residues from the cylinder wall (arrow).

IMPORTANT: Do not use any metal-cutting tools.

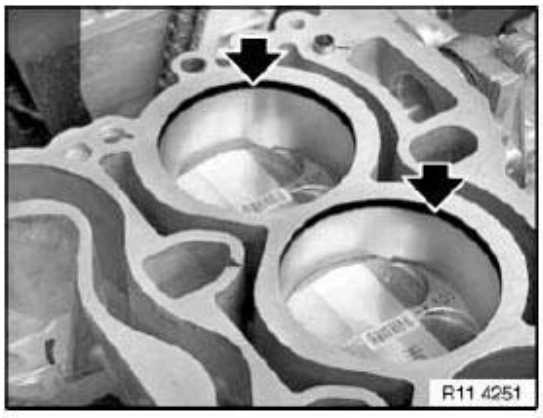


Fig. 196: Locating Oil Carbon Residue On Cylinder Wall
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Oil spray nozzle (2) must not be maladjusted or bent.

Risk of damage!

Do **not** release screw (1) of oil spray nozzle (2).

If necessary, readjust **OIL SPRAY NOZZLE** (2).

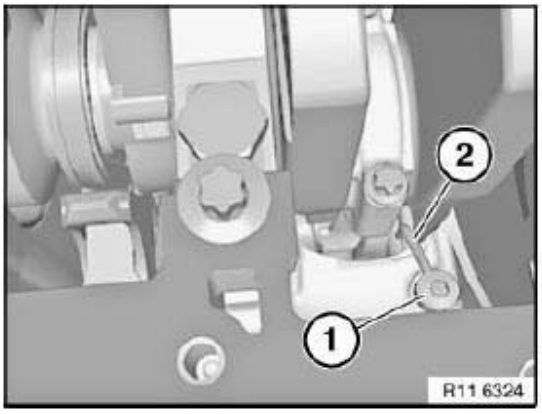


Fig. 197: Identifying Screw And Oil Spray Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Release connecting rod bolts (1).

Tightening torque **11 24 1AZ** .

Installation:

Replace screws.

Remove connecting rod bearing cap (2) in direction of arrow.

IMPORTANT: Connecting rod and big end bearing cap (2) are marked with identical pairing letters and must not be mixed up.

Danger of engine damage!

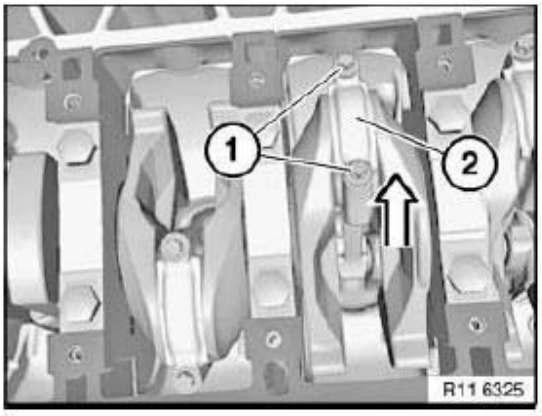


Fig. 198: Removing Connecting Rod Bearing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 11 8 330 to connecting rod.

Press out connecting rod and piston with special tool 11 8 330 towards cylinder head side.

NOTE: Special tool 11 8 330 also serves to prevent connecting rod and piston from falling down.

IMPORTANT: Do not touch the oil spray nozzle when removing the components.

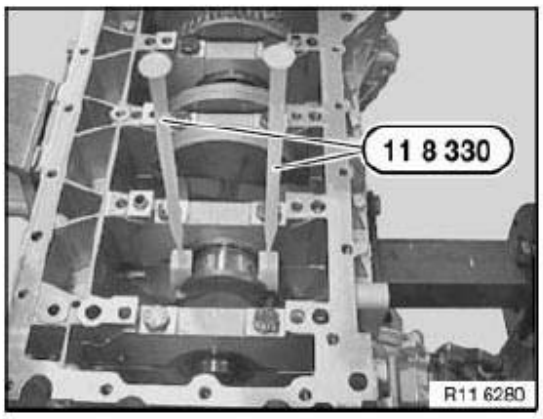


Fig. 199: Identifying Special Tool (11 8 330)
Courtesy of BMW OF NORTH AMERICA, INC.

Risk of damage!

Preliminary work

Clamp special tool 11 4 491 in vice.

Secure piston (1) with connecting rod to special tool 11 4 491 .

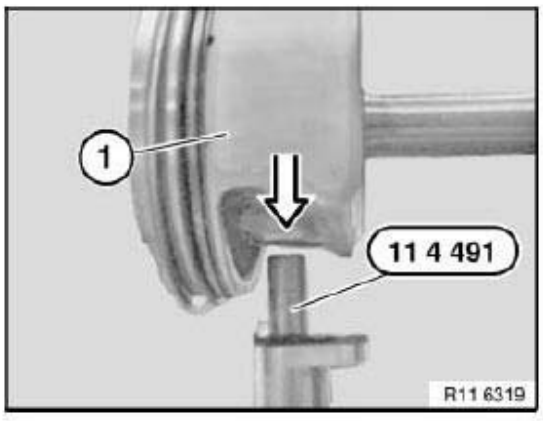


Fig. 200: Securing Piston Using Special Tool (11 4 491)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury!
Carry out work on piston pin circlip wearing protective goggles only.

WARNING: Safety goggles must be worn.

Lever out circlip for gudgeon pin with special tool 11 4 492 in direction of arrow.

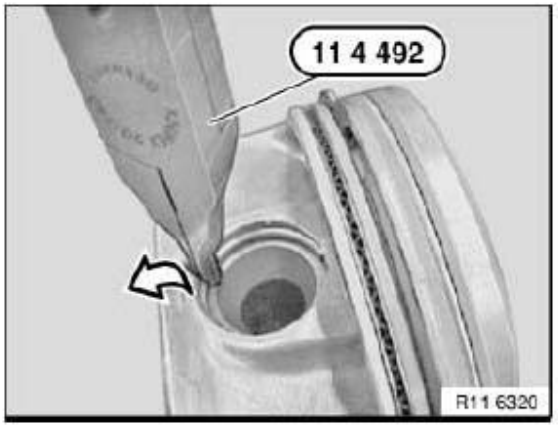
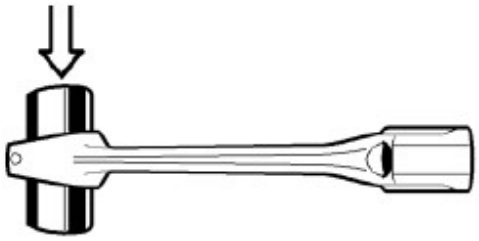


Fig. 201: Removing Gudgeon Pin Circlip Using Special Tool (11 4 492)
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace connecting rods.

IMPORTANT: Individual replacement of a connecting rod is not permitted. Connecting rods are classified by weight categories and are only available as a set for all cylinders.
Existing and new connecting rods must not be installed in mixed

combinations.



R11 4212

Fig. 202: Installing Gudgeon Pin
Courtesy of BMW OF NORTH AMERICA, INC.

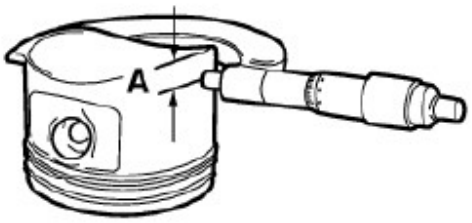
Installation:

It must be possible for the piston pin to be pressed with minimal force by hand through the small end bushing. There must be no noticeable play.

Measure piston installation clearance:

Measure piston diameter with micrometer at measuring point "A" from lower edge of piston and offset by 90° to piston pin axis.

Piston diameter See **PISTONS WITH RINGS AND PINS N52K/B30** or **PISTONS WITH RINGS AND PINS N52K/B25** at measuring point "A".



88 11 051 U

Fig. 203: Measuring Piston Diameter Using Micrometer
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust micrometer to cylinder bore of crankcase. Set internal caliper on micrometer to "zero". Measure bottom, center and top of cylinder bore in direction of travel and direction of engine rotation.

Diameter of cylinder bore.

Piston installation clearance.

Total permissible wear tolerance See **ENGINE BLOCK, CYLINDER CRANKCASE N52K/B30** ; **ENGINE BLOCK, CYLINDER CRANKCASE N52K/B25** ; **ENGINE IN GENERAL N52K/B30** ; **ENGINE IN GENERAL N52K/B25** ; **PISTONS WITH RINGS AND PINS N52K/B30** ; **PISTONS WITH RINGS AND PINS N52K/B25** ; **PISTONS WITH RINGS AND PINS N52K/B30** or **PISTONS WITH RINGS AND PINS N52K/B25** .

If necessary, replace piston.

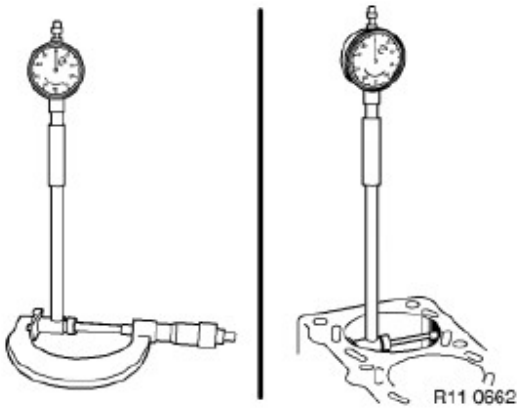


Fig. 204: Checking Cylinder Bore Diameter
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Safety goggles must be worn.

Insert gudgeon pin circlip (2) into groove (1) of special tool 11 4 493 .

Move piston pin circlip (2) into installation position.

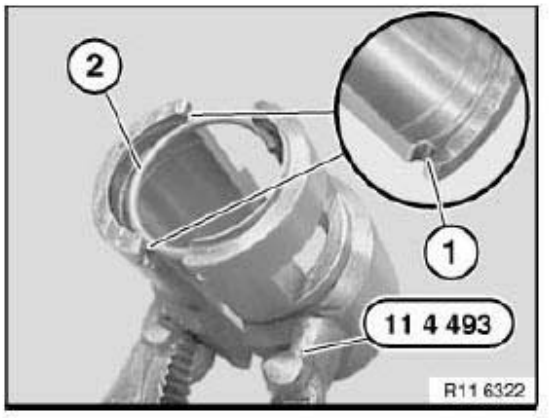


Fig. 205: Inserting Gudgeon Pin Circlip Into Groove Using Special Tool (11 4 493)

Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Safety goggles must be worn.

Guide lug and aperture on special tool 11 4 493 must point to piston crown. Only then can special tool 11 4 494 be correctly fitted.

When special tools 11 4 493 and 11 4 494 are correctly positioned, the circlip for gudgeon pin must be driven in with a plastic hammer in the direction of the arrow.

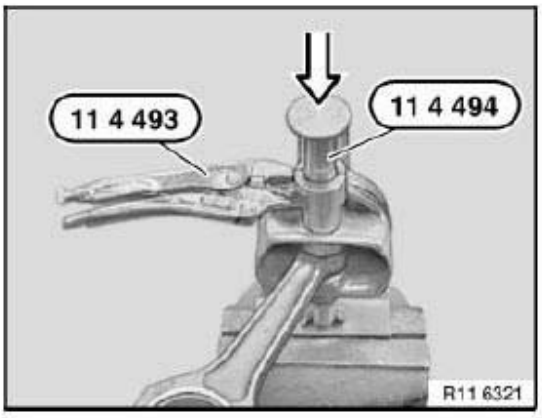


Fig. 206: Driving Piston Pin Using Plastic Hammer
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For vehicles with B30 engine.

Install all **PISTON RINGS** .

Install all **CONNECTING ROD BEARING SHELLS** .

Coat piston (2) and piston rings with oil.

Pre-install piston (2) in special tool 11 6 261.

Attach special tool 11 8 330 to connecting rod (1).

Installation:

11 8 330 Check protective lugs on special tool for correct position and damage.

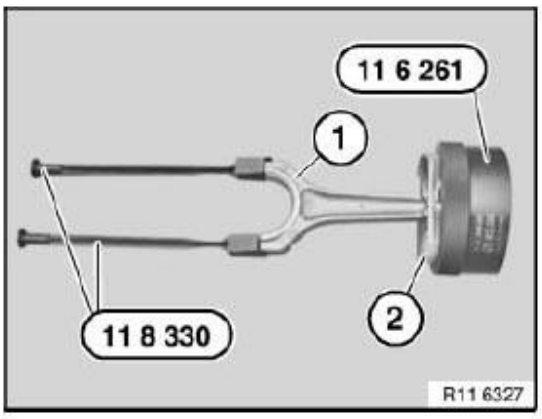


Fig. 207: Attaching Special Tool 11 8 330 To Connecting Rod
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For vehicles with B25 engine.

Install all **PISTON RINGS** .

Install all **CONNECTING ROD BEARING SHELLS** .

Coat piston (2) and piston rings with oil.

Pre-install piston (2) in special tool 11 6 241.

Attach special tool 11 8 330 to connecting rod (1).

Installation:

11 8 330 Check protective lugs on special tool for correct position and damage.

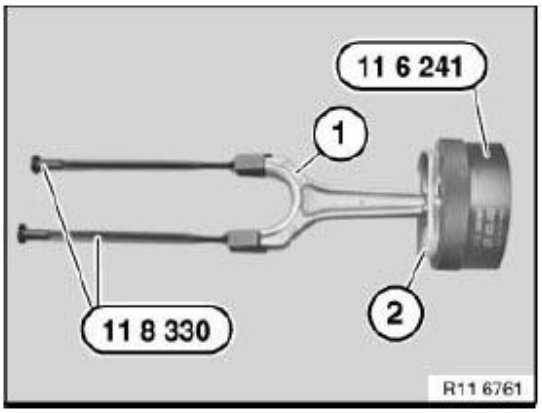


Fig. 208: Attaching Special Tool 11 8 330 To Connecting Rod
Courtesy of BMW OF NORTH AMERICA, INC.

Insert piston (1) with connecting rod in cylinder.

IMPORTANT: Do not touch the oil spray nozzle when installing the components.
Risk of damage!
Danger of piston ring failure.

Press in piston (1) at marked points (see arrows) with finger pressure only, do not drive in.

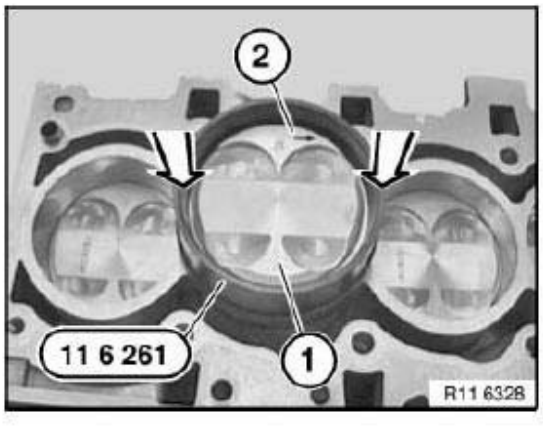


Fig. 209: Pressing Piston On Piston Crown Points
Courtesy of BMW OF NORTH AMERICA, INC.

Insert piston (1) so that arrow (2) on piston crown points to camshaft drive.

Press in piston (1) with special tool 11 6 261/11 6 241.

IMPORTANT: Connecting rod and big end bearing cap are marked with identical pairing letters (1) and must not be mixed up.
Mixing them up or incorrectly fitting the big end bearing cap on the connecting rod will result in engine damage .

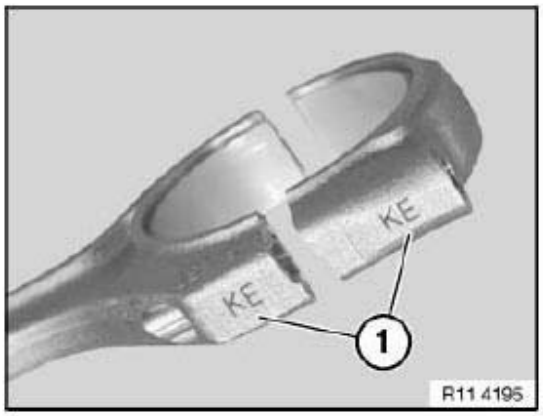


Fig. 210: Identifying Identification Pairing Letters On Conrod Bearing Cap

Courtesy of BMW OF NORTH AMERICA, INC.

Apply a light coat of oil to connecting rod bearing journal.

Join connecting rod and connecting rod bearing journal.

Detach special tool 11 8 330 .

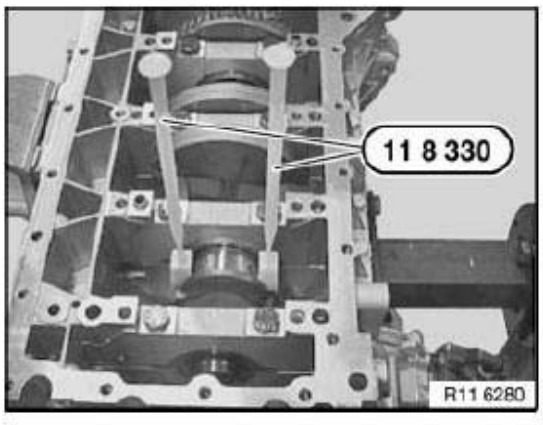


Fig. 211: Identifying Special Tool (11 8 330)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit big end bearing caps (2) so that pairing letters match up.

Installation:

Replace screws.

Install new connecting rod bolts (1).

IMPORTANT: Joining torque and angle of rotation must be observed without fail. Risk of damage!

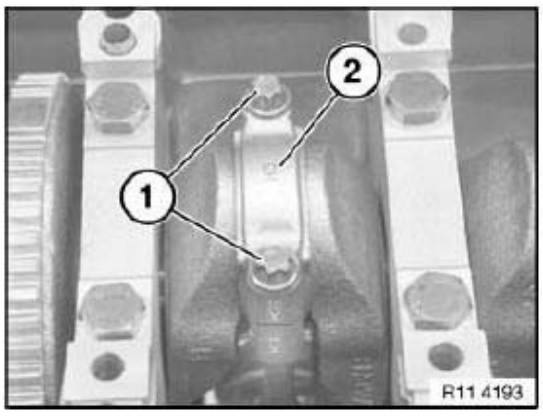


Fig. 212: Identifying Bearing Caps And Connecting Rod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **11 24 1AZ** .

If necessary, tighten connecting rod bolts to torsion angle with special tool 00 9 120 .

Tightening torque **11 24 1AZ** .

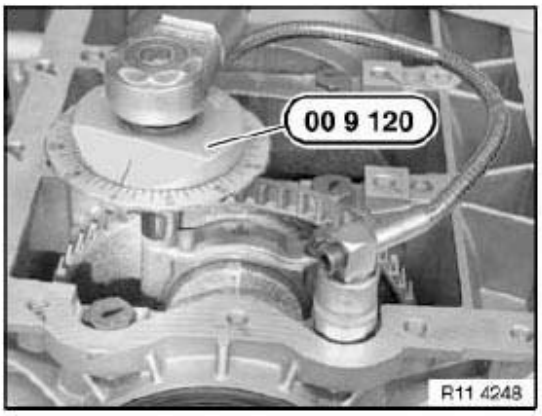


Fig. 213: Adjusting Conrod Torsion Angle Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 25 671 REPLACING PISTON RINGS ON ALL PISTONS (N52K)

Necessary preliminary tasks:

- Removing all **PISTONS**

Measuring axial clearance of piston rings in piston ring groove.

Technical Data See **PISTONS WITH RINGS AND PINS N52K/B30** ; **PISTONS WITH RINGS AND PINS N52K/B25** ; **PISTONS WITH RINGS AND PINS N52K/B30** or **PISTONS WITH RINGS AND PINS N52K/B25** .

NOTE: It is not possible to measure the axial clearance of the U-flex rings.

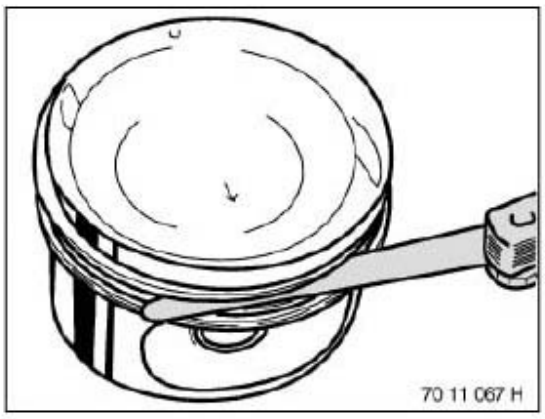


Fig. 214: Measuring Axial Clearance Of Piston Rings In Piston Ring Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Remove plain compression ring and stepped ring upwards with piston ring pliers.

The U-flex ring comprises two steel band rings and a support spring.

NOTE: The U-flex ring cannot be removed with piston ring pliers.
Put aside all piston rings in correct sequence and installation position.
It might not be possible to find the identification on used piston rings.

Installation:

New pistons may only be installed together with new piston rings.

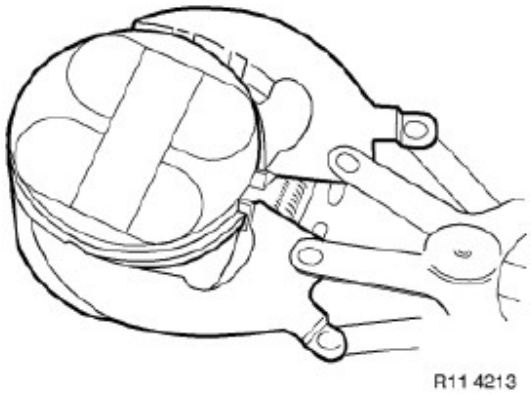


Fig. 215: Removing Compression Ring And Stepped Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Determine end clearance See **PISTONS WITH RINGS AND PINS N52K/B30** ; **PISTONS WITH RINGS AND PINS N52K/B25** ; **PISTONS WITH RINGS AND PINS N52K/B30** or **PISTONS WITH RINGS AND PINS N52K/B25** with a feeler gauge.

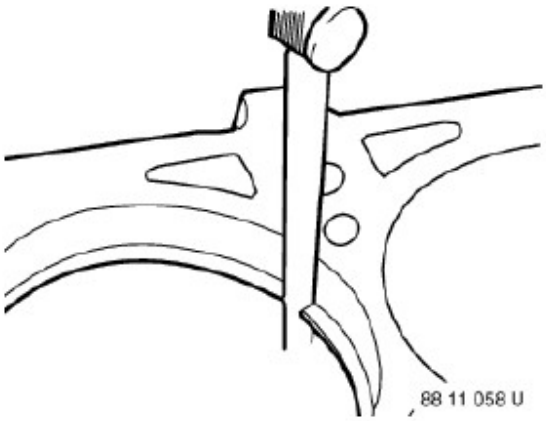


Fig. 216: Measuring Gap Using Feeler Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Schematic diagram of piston rings.

Installation:

Piston rings with "TOP" identification must point to piston crown.

1. Plain compression ring
2. Stepped ring "TOP"
3. U-flex ring

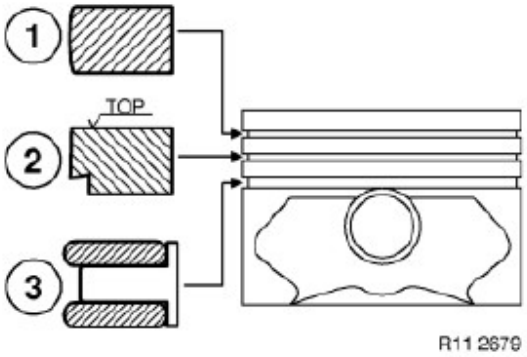


Fig. 217: Identifying Piston Rings
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The U-flex ring comprises two steel band rings (1) and a support spring (2).

Installation:

Insert support spring (2) into piston ring groove and then fit steel band rings (1) so that contact points are offset by approx. 120°.

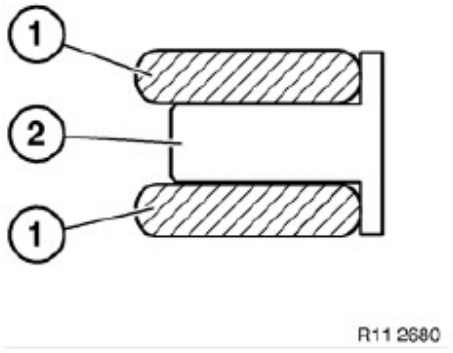


Fig. 218: Identifying Steel Band Ring And Support Spring
Courtesy of BMW OF NORTH AMERICA, INC.

The contact points (1) of the piston rings must be arranged offset by approx. 120°. However, the contact points (1) must not be arranged over the piston pin boss.

NOTE: Picture shows N52.

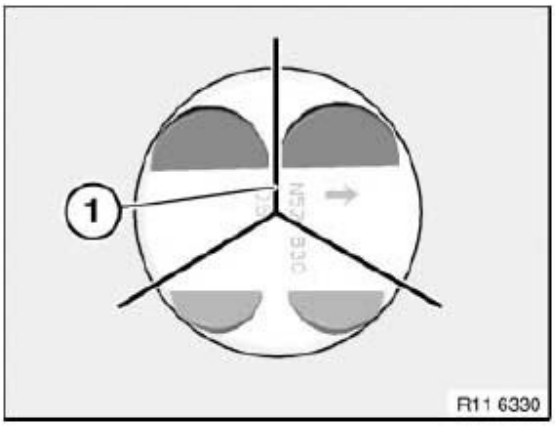


Fig. 219: Identifying Contact Points Of Piston Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1128 V-RIBBED BELT WITH TENSION DEFLECTOR ELEMENT

11 41 115 REMOVING AND INSTALLING/REPLACING HYDRAULIC VALVE (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .

Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove front **UNDERBODY PROTECTION**
- Have a cleaning cloth ready to catch escaping oil

Detach plug (1) from hydraulic valve (2).

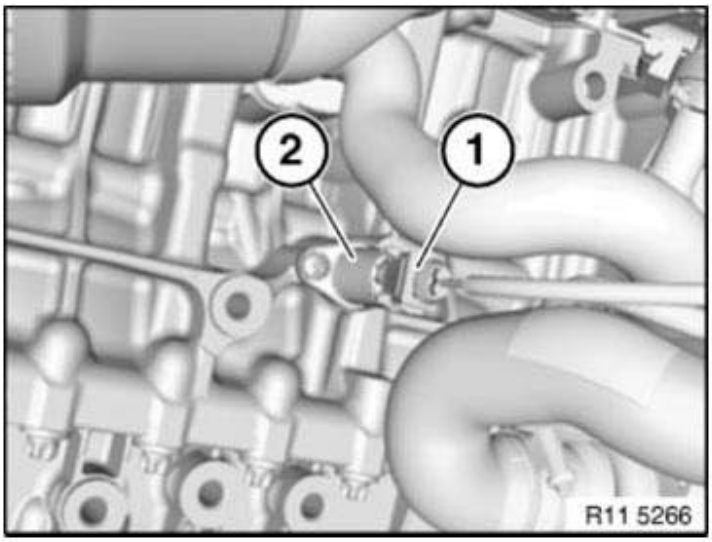


Fig. 220: Identifying Hydraulic Valve And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove hydraulic valve (2).

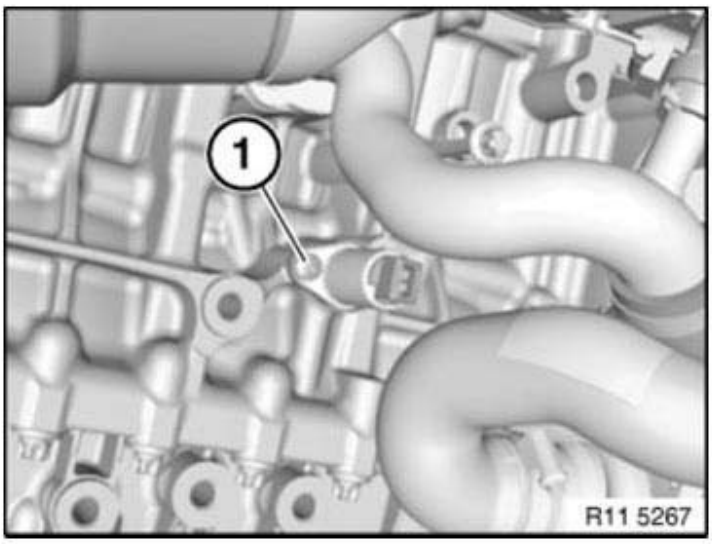


Fig. 221: Identifying Hydraulic Valve Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Replace O-ring (1).

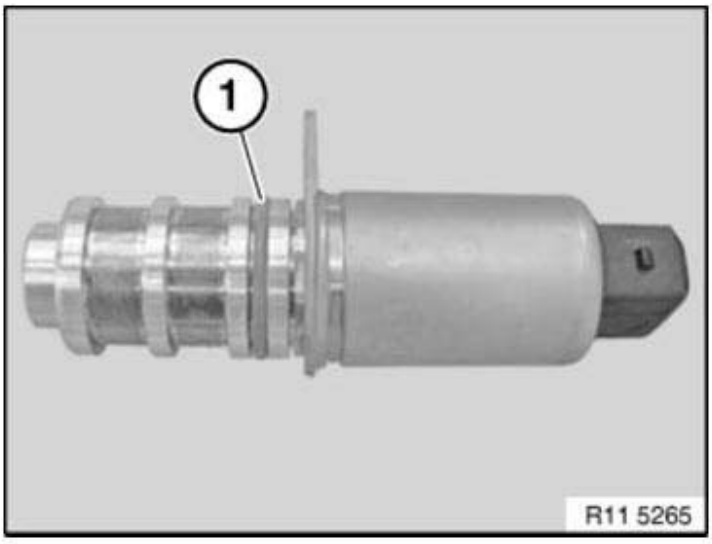


Fig. 222: Identifying O-Ring
Courtesy of BMW OF NORTH AMERICA, INC.

11 28 010 REPLACING ALTERNATOR DRIVE BELT (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **FAN COWL** with electric fan

Drive belt route

Turn belt tensioner (1) in direction of arrow until bore is flush on housing.

Secure belt tensioner (1) with special tool 11 3 340 .

Load is removed from tensioning pulley (2).

Remove drive belt upwards.

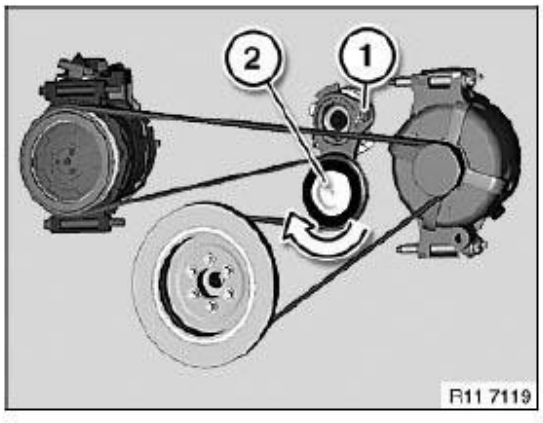


Fig. 223: Turning Belt Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Installation:

Check drive belt for correct installation position and, if reusing, observe direction of rotation. **Risk of damage** .

11 28 020 REPLACING TENSIONING DEVICE FOR ALTERNATOR DRIVE BELT (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical

corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **DRIVE BELT**

E9x only

Remove special tool 11 3 340 .

Release screw (3) on belt tensioner (4).

Tightening torque **11 28 1AZ** .

Installation:

Replace aluminum screws.

Remove belt tensioner (4).

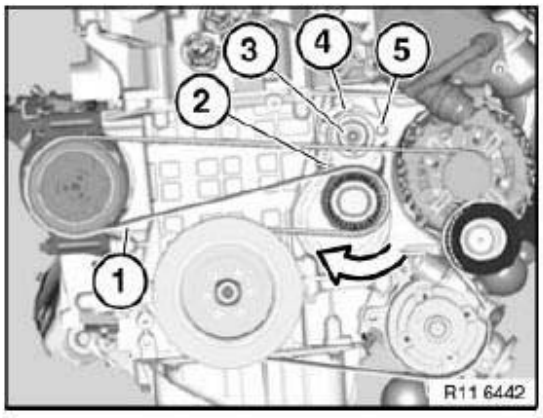


Fig. 224: Turning Belt Tensioner (E9X)
Courtesy of BMW OF NORTH AMERICA, INC.

E85, E89 only

Remove special tool 11 3 340 .

Release screw on belt tensioner (1).

Tightening torque **11 28 1AZ** .

Installation:

Replace aluminum screws.

Remove belt tensioner (1).

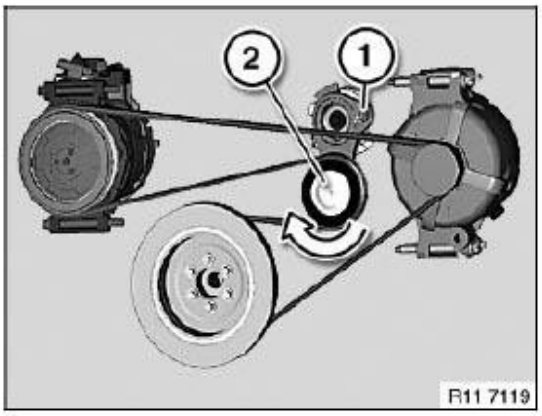


Fig. 225: Turning Belt Tensioner (E85, E89)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1131 CAMSHAFT

11 31 505 ADJUSTING TIMING OF CAMSHAFT(S) (N52K)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**

Remove fastener (1) in direction of arrow.

Installation:

Install fastener (1) with bore facing outwards.

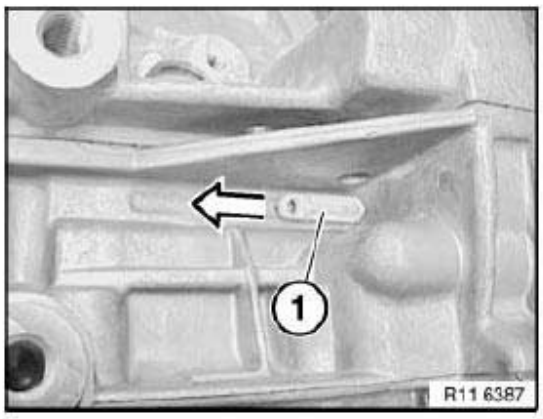


Fig. 226: Installing Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate crankshaft at central bolt into TDC position.

Slide special tool 11 0 300 in direction of arrow into special tool bore and secure crankshaft.

IMPORTANT: On vehicles with optional extra SA205 (automatic transmission), there is a large bore for the TDC position shortly before the special tool bore. This bore can be confused with the special tool bore.

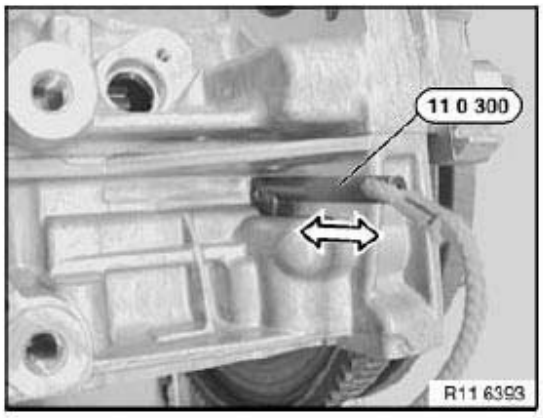


Fig. 227: Rotating Engine Central Bolt Using Special Tool (11 0 300)
Courtesy of BMW OF NORTH AMERICA, INC.

If the flywheel is secured in the correct special tool bore with special tool 11 0 300 , the engine can no longer be moved at the central bolt.

With 1st cylinder in firing TDC position, cams of inlet camshaft (1) at 1st cylinder point upwards at an angle.

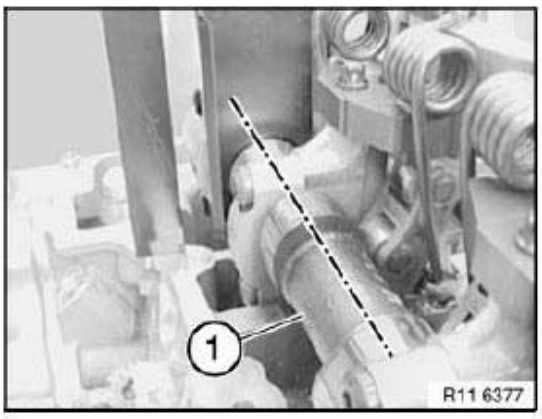


Fig. 228: Identifying Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Part numbers (2) on inlet and exhaust camshafts (1) point upwards.

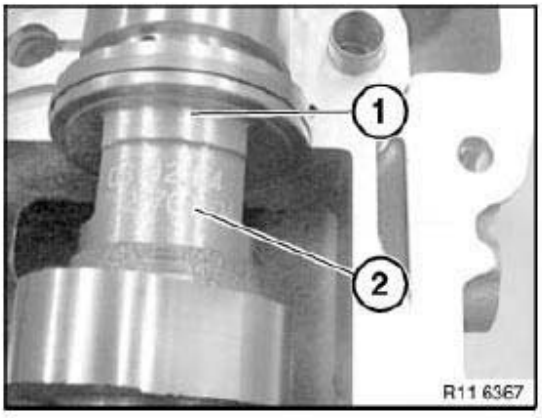


Fig. 229: Identifying Camshafts With Part Number
Courtesy of BMW OF NORTH AMERICA, INC.

With 1st cylinder in firing TDC position, cams of exhaust camshaft (3) at 6th cylinder point downwards at an angle.

Cam follower (1) is not actuated.

NOTE: When the engine is installed, the position of the exhaust camshaft (3) for the timing can only be checked with a mirror.

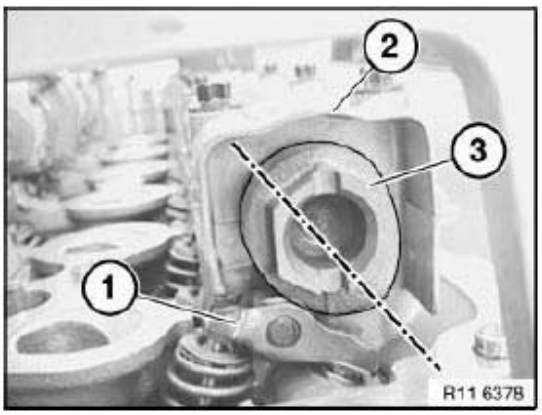


Fig. 230: Identifying Exhaust Camshaft And Cam Follower
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 283 to cylinder head with bolts (1).

NOTE: Fit special tool 11 4 282 underneath on side of inlet camshaft.

Mount special tool 11 4 281 on inlet and exhaust camshafts.

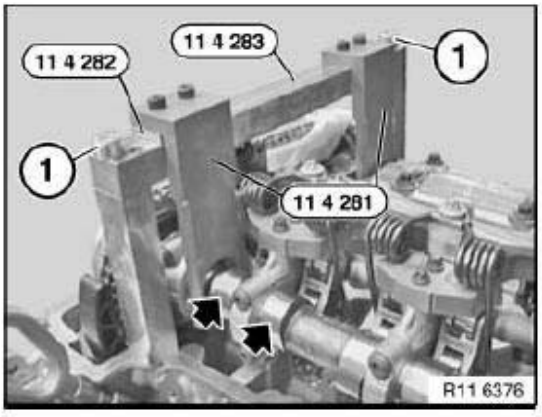


Fig. 231: Identifying Cylinder Head Bolts And Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Release central bolts (1).

Release central bolts (1) with special tool 11 4 280 only.

Release chain tensioner (2) (have a cleaning cloth ready).

NOTE: Picture in CAD and does not show special tools.

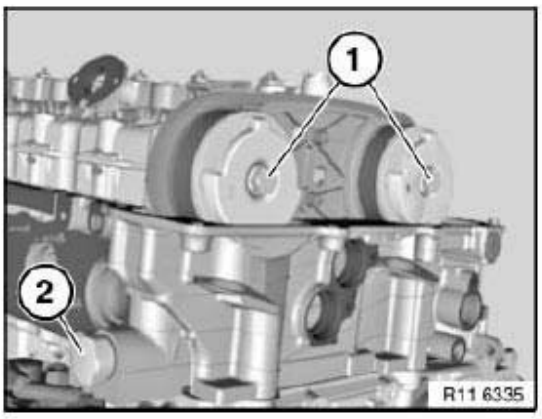


Fig. 232: Identifying Central Bolt And Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Turn sensor gears (2) in direction of arrow until locating pins (1) on special tool 11 4 290 match up.

Slide on special tool 11 4 290 in direction of arrow.

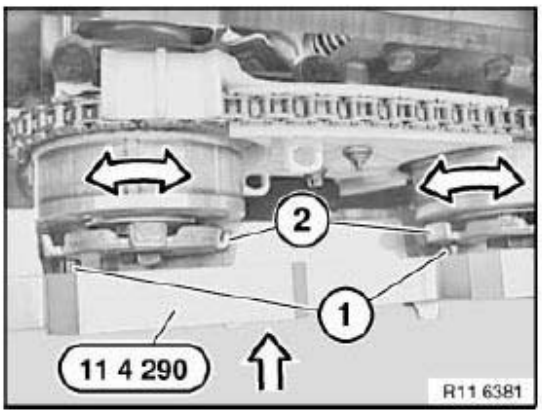


Fig. 233: Turning Sensor Gears
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 290 with bolts (1).

Screw special tool 11 9 340 into cylinder head.

Pretension timing chain with special tool 00 9 250 to **0.6 Nm** .

Secure both central bolts of inlet and exhaust adjustment units with special tool 00 9 120 to inlet and exhaust camshafts.

Tightening torque **11 36 1AZ** .

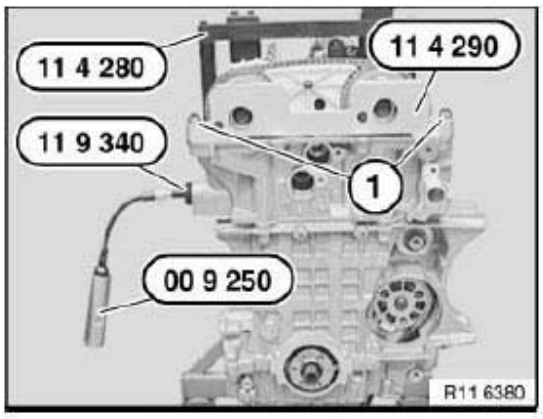


Fig. 234: Identifying Special Tools (11 4 280, 11 4 290, 11 9 340 And 00 9 250)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 005 CHECKING TIMING OF CAMSHAFT(S) (N52K)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove **UNDERBODY PROTECTION** .

Remove fastener (1) in direction of arrow.

Installation:

Install fastener (1) with bore facing outwards.

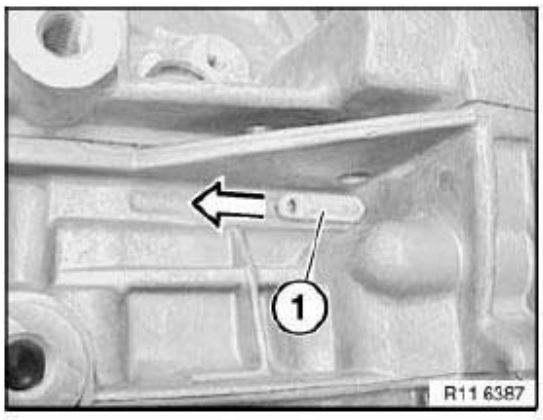


Fig. 235: Installing Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate crankshaft at central bolt into TDC position.

Slide special tool 11 0 300 in direction of arrow into dowel hole and secure crankshaft.

IMPORTANT: On vehicles with optional extra SA205 (automatic transmission), there is a large bore for the TDC position shortly before the special tool bore. This bore can be confused with the special tool bore.

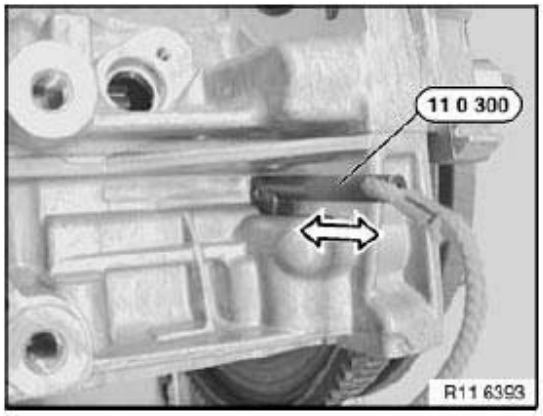


Fig. 236: Rotating Engine Central Bolt Using Special Tool (11 0 300)
Courtesy of BMW OF NORTH AMERICA, INC.

If the flywheel is secured in the correct dowel hole with special tool 11 0 300 , the engine can no longer be moved at the central bolt.

With 1st cylinder in firing TDC position, cams of inlet camshaft (1) at 1st cylinder point upwards at an angle.

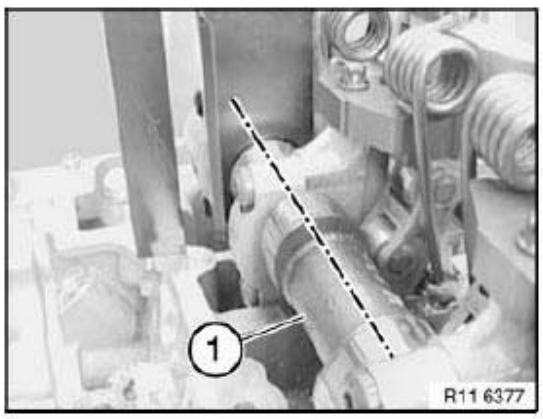


Fig. 237: Identifying Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

The timings are correct when the part numbers (2) on the inlet and exhaust camshafts (1) point upwards.

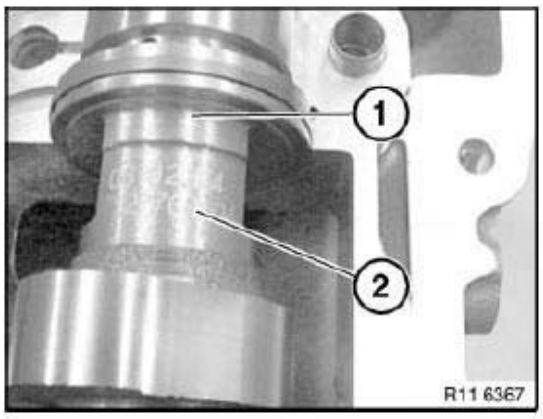


Fig. 238: Identifying Camshafts With Part Number
Courtesy of BMW OF NORTH AMERICA, INC.

With 1st cylinder in firing TDC position, cams of exhaust camshaft (3) at 6th cylinder point downwards at an angle.

Cam follower (1) is not actuated.

NOTE: When the engine is installed, the position of the exhaust camshaft (3) for the timing can only be checked with a mirror.

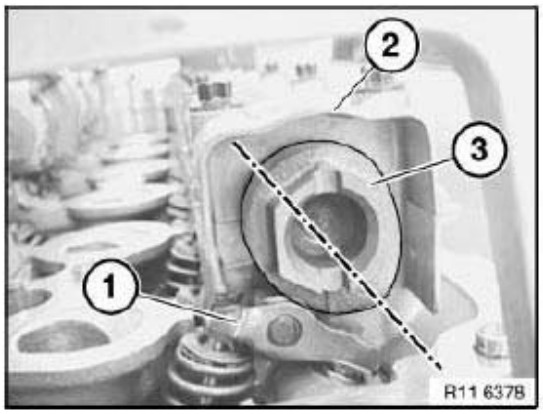


Fig. 239: Identifying Exhaust Camshaft And Cam Follower
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 283 with bolts (1) to cylinder head.

NOTE: Fit special tool 11 4 282 underneath on side of intake camshaft.

Mount special tool 11 4 281 on intake and exhaust camshafts.

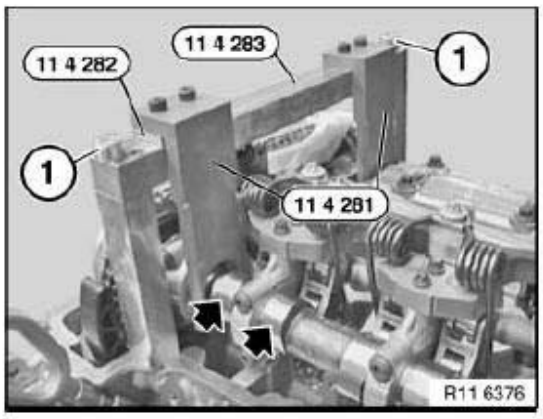


Fig. 240: Identifying Cylinder Head Bolts And Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, adjust **VALVE TIMING** .

Assemble engine.

11 31 090 INSTALLING AND REMOVING/REPLACING CHAIN TENSIONER PISTON (N52K)

Release chain tensioner (1).

Tightening torque **11 31 6AZ** .

IMPORTANT: Have a cleaning cloth ready. A small quantity of engine oil will emerge after the screw connection has been released.
Make sure no engine oil runs onto belt drive.

Installation:

No sealing ring is fitted during series-production assembly.

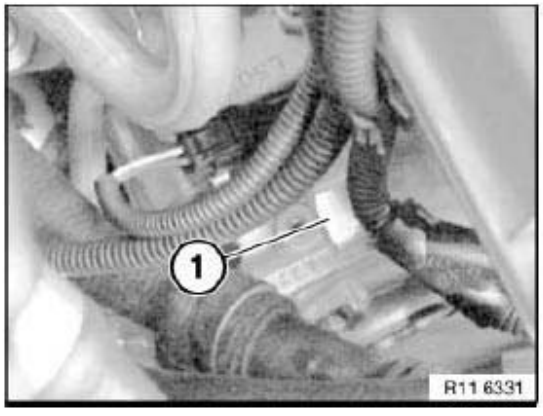


Fig. 241: Identifying Chain Tensioner

Courtesy of BMW OF NORTH AMERICA, INC.

A sealing ring must be fitted by service personnel when the chain tensioner is fitted.

If the chain tensioner is reused, its oil chamber must be drained. Place chain tensioner on a level working surface and slowly compress.

Repeat procedure twice.



Fig. 242: Compressing Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 028 REMOVING AND INSTALLING/REPLACING EXHAUST CAMSHAFT (N52K)

IMPORTANT: It is absolutely essential to follow an exact procedure for removing and installing the exhaust camshaft.
Risk of damage!
The upper and lower bearing strips must be pre-tensioned with a total of six special tools 11 4 461.

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove **EXHAUST CAMSHAFT ADJUSTER**
- Adjust **VALVE TIMING**

The screw connection of the bearing strips must be released from the outside inwards.

Lift out upper and lower bearing strips (1) with exhaust camshaft.

Remove upper bearing strip (1).

Remove exhaust camshaft from lower bearing strip.

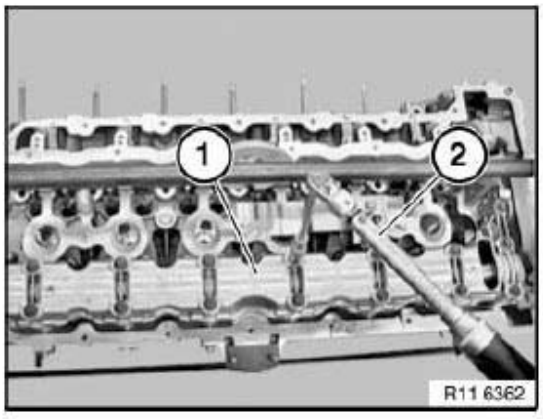


Fig. 243: Lifting Lower And Upper Bearing Strips With Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Markings of intake and exhaust camshafts are different.
Mixing up the intake and exhaust camshaft will result in engine damage .
A Exhaust camshaft.
E Intake camshaft

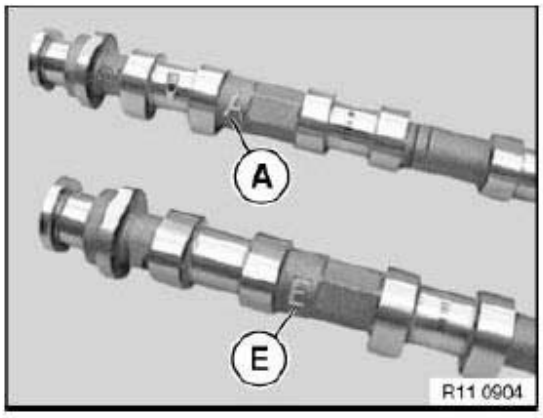


Fig. 244: Identifying Exhaust/Intake Camshafts Marks
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Plain compression rings (1) can easily break.

Plain compression rings (1) are engaged at joint.

Press plain compression rings (1) apart upwards and downwards and removed towards front.

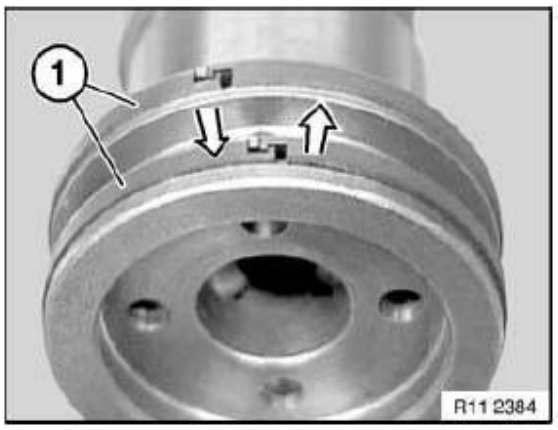


Fig. 245: Pressing Plain Compression Rings
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Removal on engine:
Set engine to ignition TDC at cylinder No. 1.
Removed cylinder head:
When using special tool 11 9 000 , it will be necessary to remove the aluminum profile insert.

Mounting bearing strip

Pre-install special tool 11 4 462 on cylinder no. 2.

Insert special tool 11 4 463 in screw connection of cylinder head cover.

IMPORTANT: Special tool 11 4 463 is a special screw.

Press down rocker arms (3) on cylinder no. 2 with spindle nut (2) of special tool 11 4 462.

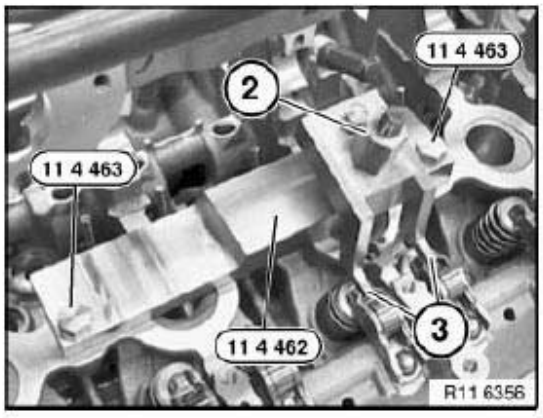


Fig. 246: Identifying Special Tools (11 4 463 And 11 4 462)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Before mounting the exhaust camshaft on the correct cam follower seat (1), pay attention to the hydraulic valve clearance adjustment element and the valve.

Refer to Removing and installing/replacing all **CAM FOLLOWERS** .

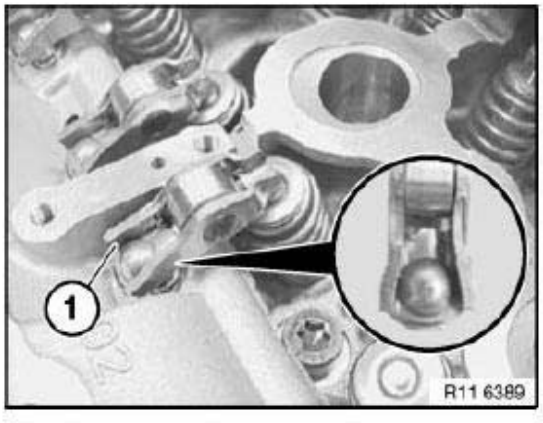


Fig. 247: Identifying Cam Follower Seat
Courtesy of BMW OF NORTH AMERICA, INC.

Position lower bearing strip (1) with exhaust camshaft (2) on rocker arms.

Align exhaust camshaft (2).

Cylinder nos. 2 and 4 are at valve overlap.

Cams (3) on cylinder no. 1 point upwards at an angle.

Part number (4) on mounting flats of exhaust camshaft (2) points upwards.

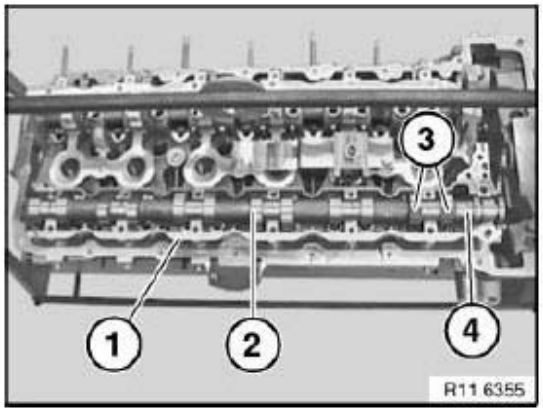


Fig. 248: Identifying Lower Bearing Strip With Exhaust Camshaft And Cams
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: There must be no adhesive residues in the cylinder head tapped holes. Clean threaded holes.

Fit upper bearing strip (1).

Insert bolts dry.

Tension down upper bearing strip (1) with exhaust camshaft at bearing points 3 and 5 through a 1/2 bolt turn.

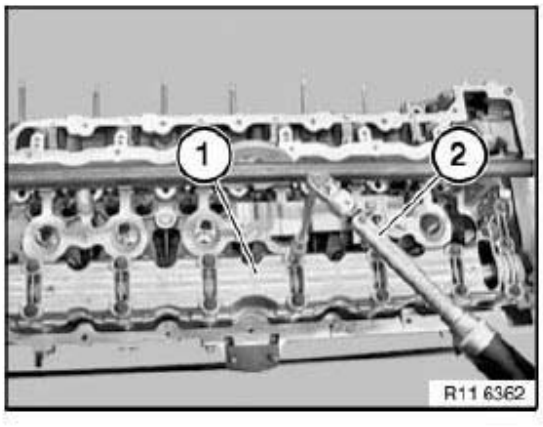


Fig. 249: Lifting Lower And Upper Bearing Strips With Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Join exhaust camshaft to upper and lower bearing strips (1) with torque wrench (2) from inside outwards to **8 Nm** .

Release all screws of upper bearing strip (1) from outside inwards by 90°.

Installation:

Upper and lower bearing strips must be aligned to each other at ground surfaces (1 and 2).

Make sure that the thrust piece and the legs of special tools 11 4 461 rest on the milled surfaces.

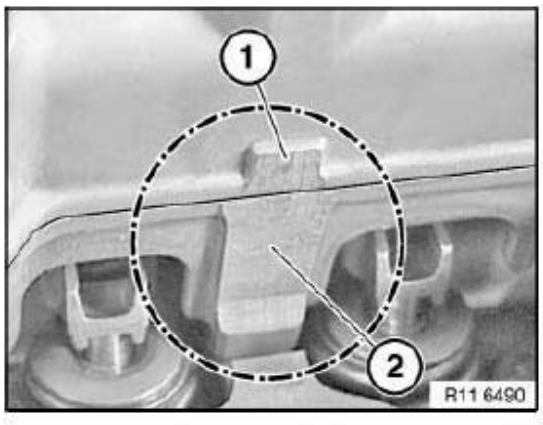


Fig. 250: Identifying Bearing Strips
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Schematic depiction of special tool 11 4 461 at upper bearing strip (1) and lower bearing strip (2).
Pre-tension all special tools 11 4 461 with special tool 11 4 350 only.

IMPORTANT: Tighten screw (3) on thrust piece to 2 Nm. Risk of damage!

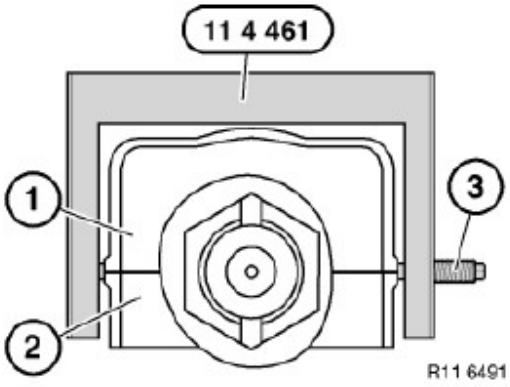


Fig. 251: Identifying Screw, Upper And Lower Bearing Bank And Special Tool (11 4 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 4 461 over screw connection of bearing strips.

Make sure that the legs rest exactly on the ground surfaces of the upper bearing strip (2) and lower bearing strip (1).

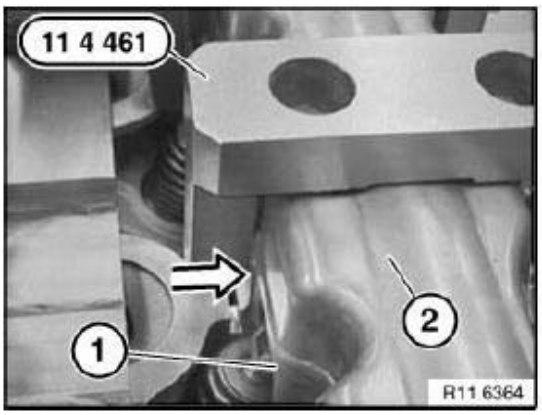


Fig. 252: Identifying Upper Bearing Strip And Lower Bearing Strip
Courtesy of BMW OF NORTH AMERICA, INC.

Initially tighten screw of special tool 11 4 461 to ground surfaces of upper bearing strip (1) and lower bearing strip (2).

IMPORTANT: Tighten screws on thrust piece to 2 Nm. Risk of damage!

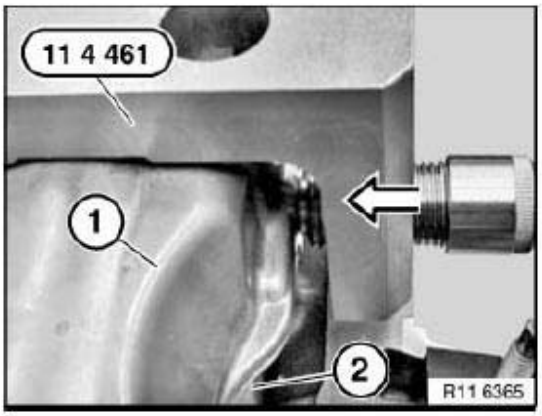


Fig. 253: Tightening Screw Of Special Tool (11 4 461) To Ground Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Set special tool 11 4 350 to 2 Nm.
Pre-tension all special tools 11 4 461 with special tool 11 4 350 only.

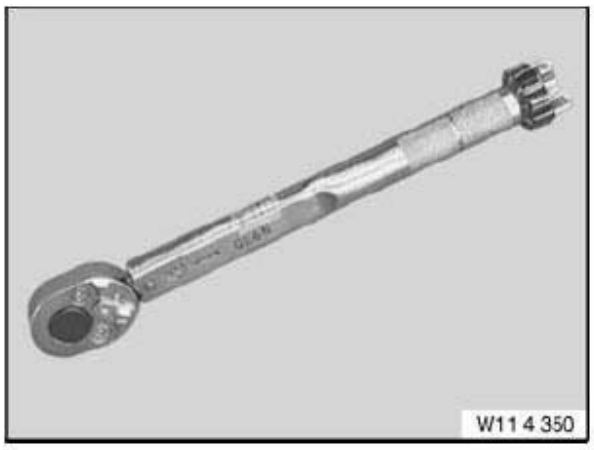


Fig. 254: Identifying Torque Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tools 11 4 461 with screw (1) to inside of cylinder head.

Mount special tool 11 4 461 with screw facing outwards on cylinder no. 2.

Position special tools 11 4 461 so that screw connections (2) of bearing strip are easily accessible.

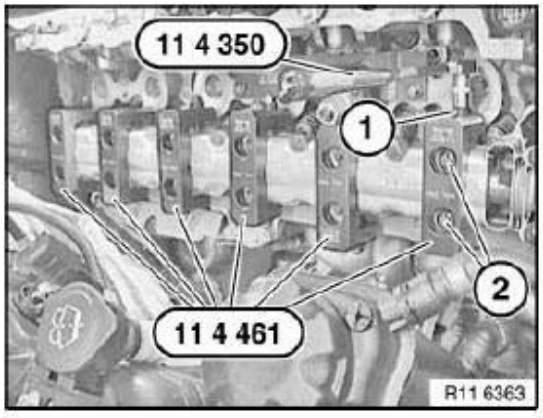


Fig. 255: Identifying Cylinder Head Screw And Special Tools (11 4 350 And 11 4 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten upper and lower bearing strips with special tool 00 9 120 .

Tightening torque **11 31 1AZ** .

IMPORTANT: Remove special tool 11 4 461 only when exhaust camshaft screw connection is completed.

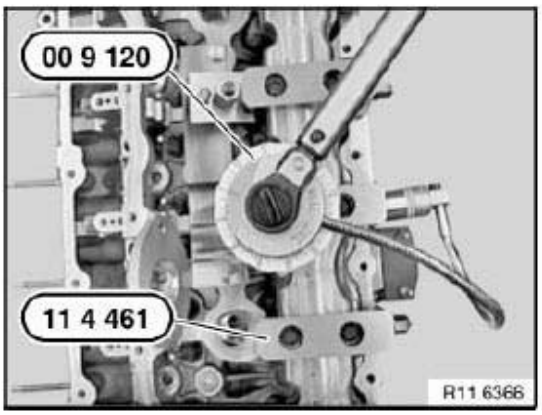


Fig. 256: Tightening Lower/Upper Bearing Strips Using Special Tool (00 9 120)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 025 REMOVING AND INSTALLING/REPLACING INTAKE CAMSHAFT (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove **INTAKE CAMSHAFT ADJUSTER**
- Remove **INTERMEDIATE LEVER**
- Adjust **VALVE TIMING**

NOTE: All bearing caps (1 and 2) are marked with numbers from 1 to 6.

Bearing cap (1) is a thrust bearing.

Release screws on bearing caps 1 to 6 (1 and 2).

Tightening torque **11 31 2AZ** .

Set all bearing caps down in special tool 11 4 481 in a neat and orderly fashion.

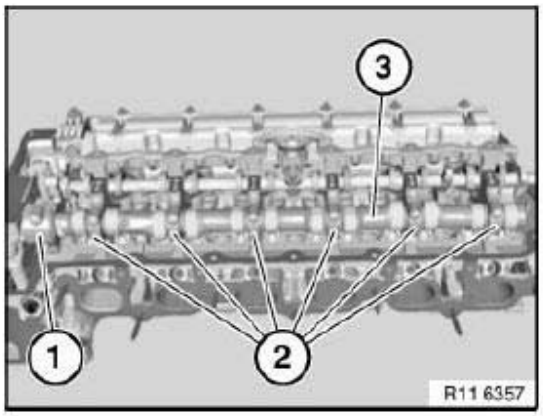


Fig. 257: Identifying Bearing Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Remove intake camshaft (2) towards top.

Installation:

Clean all bearing points and lubricate with oil.

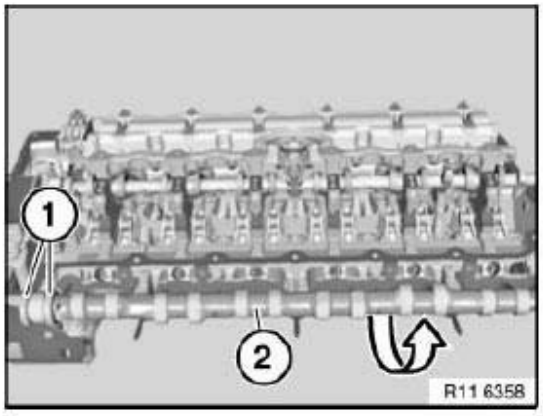


Fig. 258: Removing Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Plain compression rings (1) can easily break.

Plain compression rings (1) are engaged at joint.

Press plain compression rings (1) apart upwards and downwards and removed towards front.

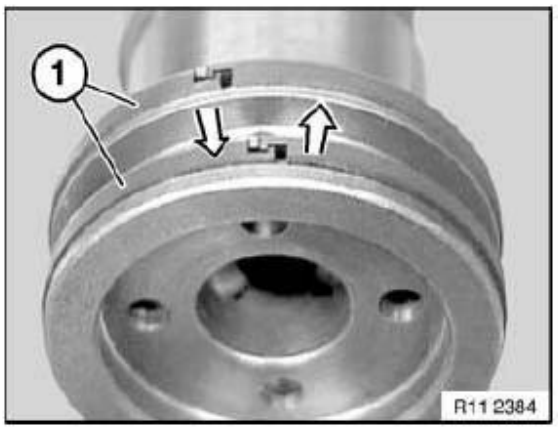


Fig. 259: Pressing Plain Compression Rings
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Markings of intake and exhaust camshafts are different.
Mixing up the intake and exhaust camshafts will result in engine damage .
A Exhaust camshaft.
E Intake camshaft

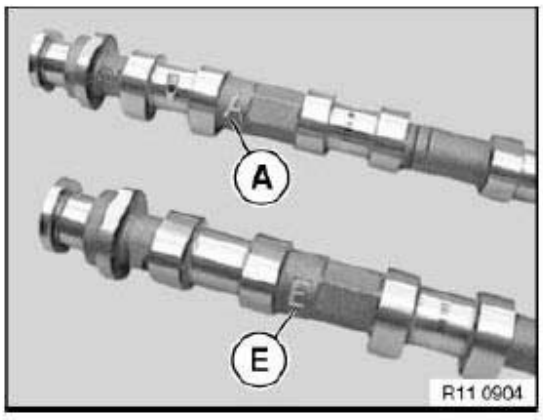


Fig. 260: Identifying Exhaust/Intake Camshafts Marks
Courtesy of BMW OF NORTH AMERICA, INC.

Insert intake camshaft (1) so that part number on mounting flats points upwards.

Position intake camshaft (1) so that cams point upwards at an angle.

Attach special tool 11 4 281 to mounting flats.

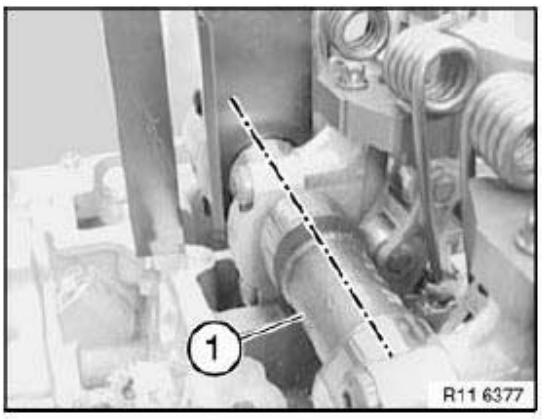


Fig. 261: Identifying Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 051 REPLACING TIMING CHAIN (N52K)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove all spark plugs
- Remove **CHAIN TENSIONER** .
- Remove **CRANKSHAFT RADIAL SEAL** at front
- Remove drive belt **TENSIONER**
- Remove **VIBRATION DAMPER**

Remove fastener (1) in direction of arrow.

Installation:

Install fastener (1) with bore facing outwards.

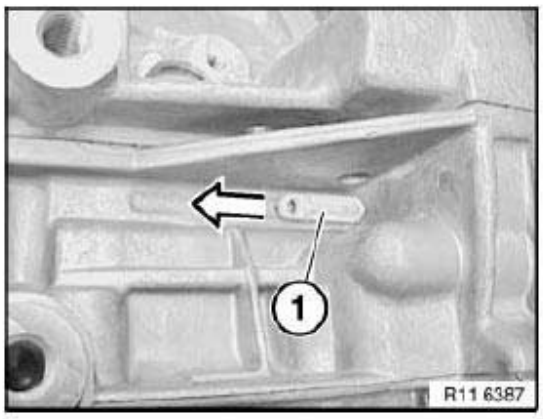


Fig. 262: Installing Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate crankshaft at central bolt into TDC position.

Slide special tool 11 0 300 in direction of arrow into special tool bore and secure crankshaft.

IMPORTANT: On vehicles with optional extra SA205 (automatic transmission), there is a large bore for the TDC position shortly before the special tool bore. This bore can be confused with the special tool bore.

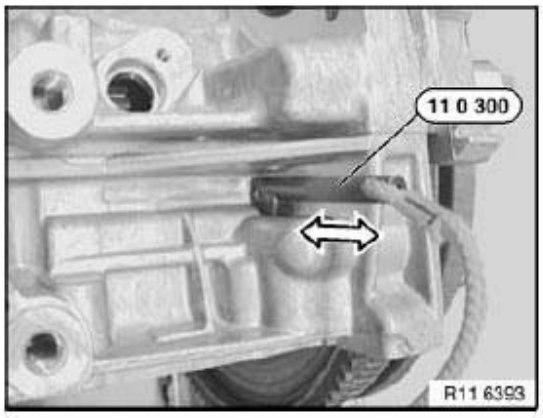


Fig. 263: Rotating Engine Central Bolt Using Special Tool (11 0 300)
Courtesy of BMW OF NORTH AMERICA, INC.

If the flywheel is secured in the correct special tool bore with special tool 11 0 300 , the engine can no longer be moved at the central bolt.

IMPORTANT: Do not remove special tool 11 0 300 to release central bolt (1).
Employ a second person for gripping when releasing central bolt (1).

Screw special tool 11 9 280 onto hub of vibration damper.

Release central bolt (1).

Tightening torque **11 21 1AZ** .

Remove hub towards front.

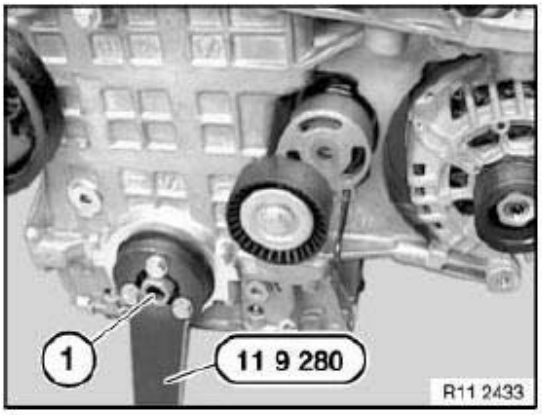


Fig. 264: Identifying Central Bolt With Special Tool (11 9 280)
Courtesy of BMW OF NORTH AMERICA, INC.

Open plug (1).

Tightening torque **11 31 7AZ** .

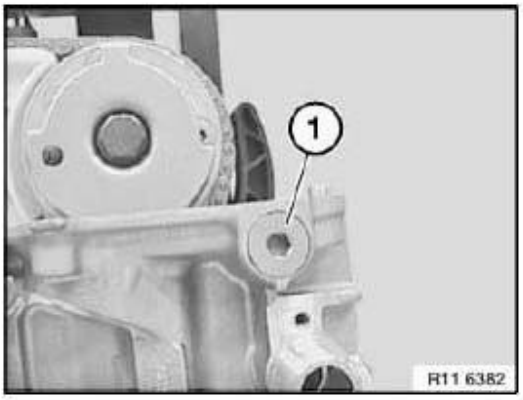


Fig. 265: Identifying Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Open plug (1).

Tightening torque **11 11 7AZ** .

Installation:

Replace aluminum screws.

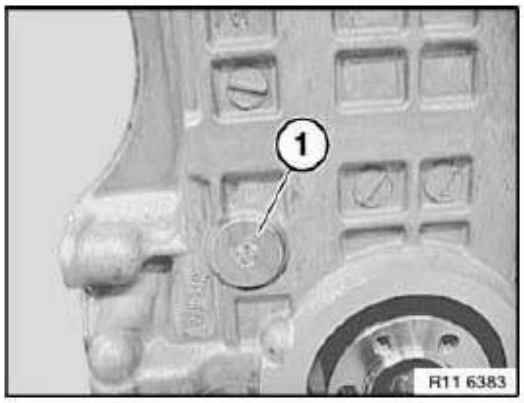


Fig. 266: Identifying Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release bearing pin (1) from timing chain module on cylinder head.

Tightening torque **11 31 5AZ** .

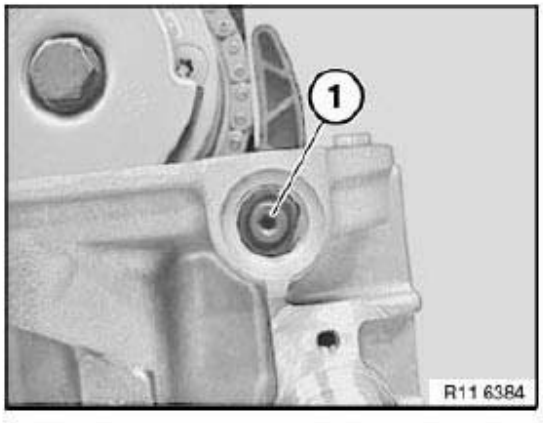


Fig. 267: Identifying Bearing Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Release bearing pin (1) from timing chain module on crankcase.

Tightening torque **11 31 4AZ** .

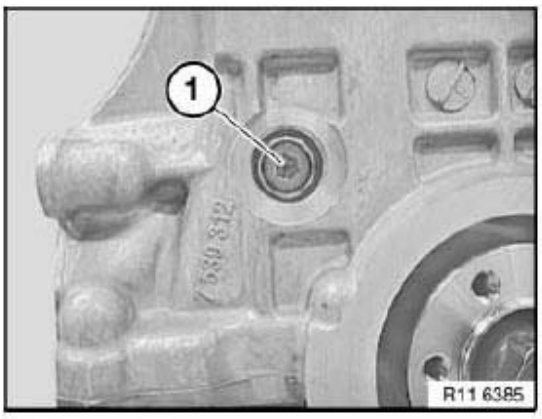


Fig. 268: Identifying Bearing Pin (Bottom)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Install special tool 11 4 280 to release the central bolts on the inlet and exhaust adjustment units.

Secure special tool 11 4 283 to cylinder head with bolts (1).

NOTE: Fit special tool 11 4 282 underneath on side of inlet camshaft.

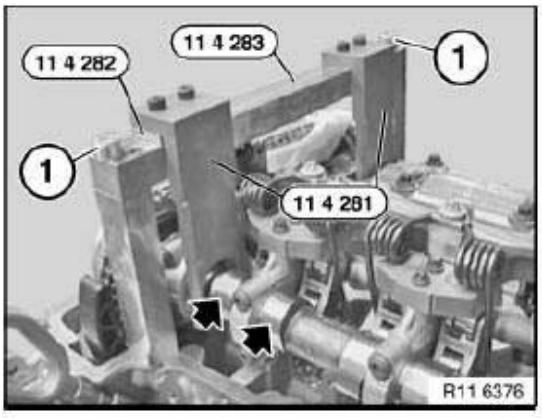


Fig. 269: Identifying Cylinder Head Bolts And Special Tools (11 4 283)
Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tool 11 4 281 on inlet and exhaust camshafts.

Do not remove special tool 11 4 280 .

Remove **INLET AND EXHAUST ADJUSTMENT UNIT** .

Release bolts (1) from timing chain module on cylinder head.

Tightening torque **11 31 3AZ** .

Remove chain module with timing chain and sprocket wheel upwards in direction of arrow.

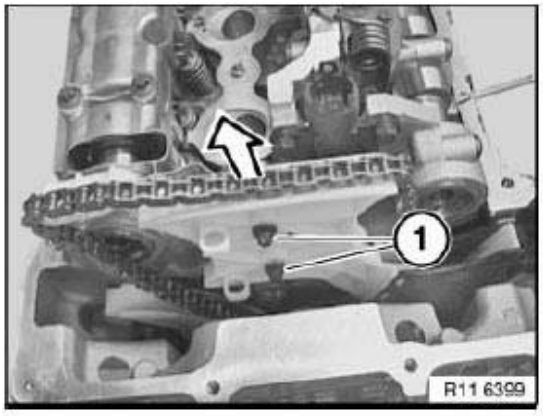


Fig. 270: Removing Chain Module With Timing Chain And Sprocket Wheel Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Note installation direction of sprocket wheel (2).

Collar (see arrow) on sprocket wheel (2) points to engine .

Incorrect assembly will result in engine damage .

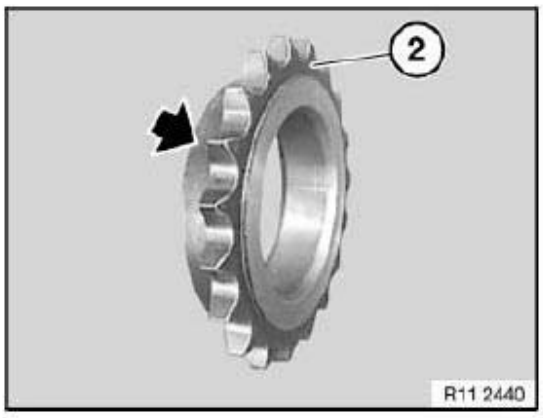


Fig. 271: Locating Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Pull timing chain (1) upwards until sprocket wheel (2) engages chain guide (3).

Install timing chain (1) and sprocket wheel (2) in this position.

Installation:

Always hold timing chain (1) under tension. Timing chain (1) may jam on chain guide (3).

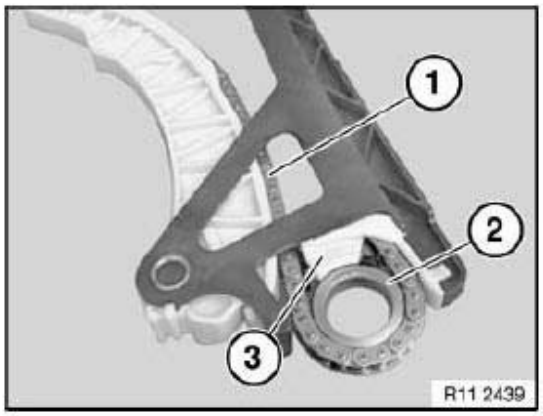


Fig. 272: Identifying Timing Chain And Chain Module
Courtesy of BMW OF NORTH AMERICA, INC.

Install hub with central bolt.

Tighten down special tool 11 5 200 with screws (1) to hub.

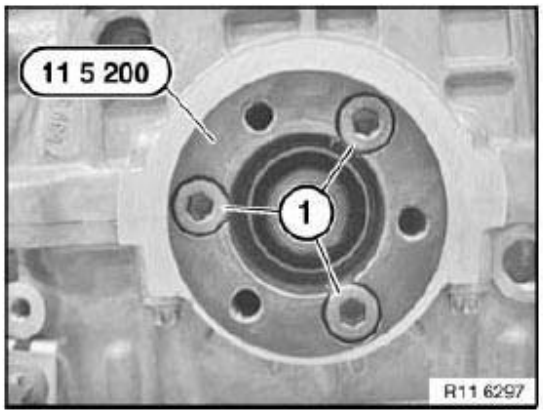


Fig. 273: Identifying Hub Screws With Special Tool (11 5 200)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **TENSIONER** for drive belt.

Screw in special tool 11 4 362 from special tool kit 11 4 360 .

Mount special tool 11 9 280 on 11 5 200 .

Support special tool 11 9 280 on special tool 11 4 362.

Special tool 11 0 300 secures crankshaft.

Tighten central bolt to jointing torque.

Tightening torque **11 21 1AZ** .

Mark central bolt and hub with paint.

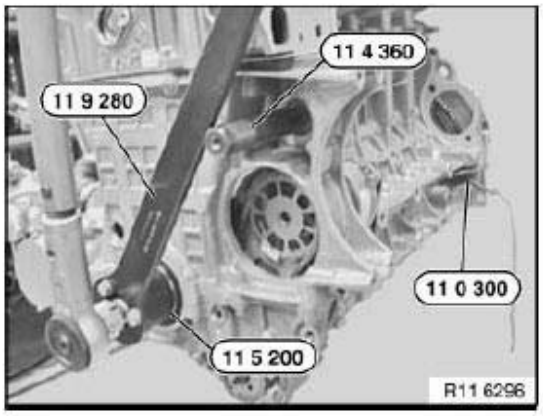


Fig. 274: Tightening Central Bolt Using Special Tools (11 9 280)
Courtesy of BMW OF NORTH AMERICA, INC.

Mark special tools with colored line (1).

See picture.

IMPORTANT: Do not remove the special tool while tightening the central bolt to torsion angle.
Risk of damage!

If necessary, tighten central bolt to torsion angle with special tool 00 9 140 .

Tightening torque **11 21 1AZ** .

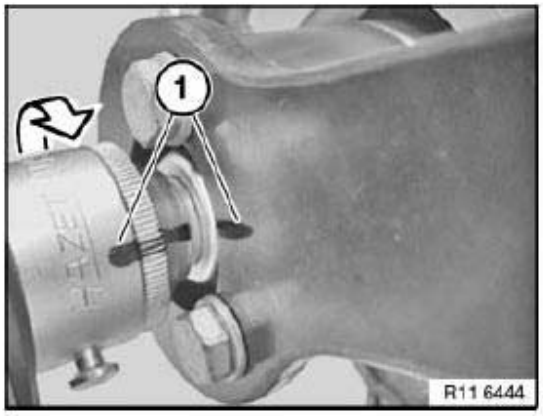


Fig. 275: Tightening Central Bolt And Colored Line
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten central bolt with a second person helping.

Tightening torque **11 21 1AZ** .

Install **INLET AND EXHAUST ADJUSTMENT UNITS** .

Install **CHAIN TENSIONER** .

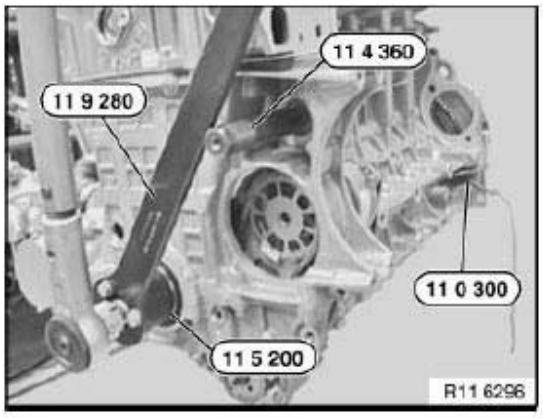


Fig. 276: Tightening Central Bolt Using Special Tools (11 9 280)
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine twice.

Check **TIMING** .

If necessary, adjust **VALVE TIMING** .

Assemble engine.

1133 ROCKER ARM WITH BEARING MOUNT

11 33 050 REMOVING AND INSTALLING/REPLACING ALL CAM FOLLOWERS (N52K)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove **INTERMEDIATE LEVER**
- Remove **EXHAUST CAMSHAFT** .

IMPORTANT: Rocker arms (1) are divided into bearing categories.

The tolerance classes are marked according to the picture in numbers from 1 to 5.
Already used rocker arms (1) may only be reused in the same position.
Detach cam followers (1) from HVCA element and remove.
Set down all cam followers (1) in neat order in special tool 11 4 480 .

Installation:

Before installing exhaust camshaft or intermediate levers, make sure cam followers (1) are correctly seated.

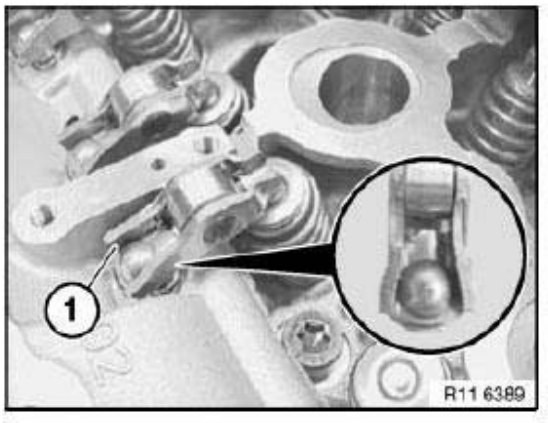


Fig. 277: Identifying Rocker Arms
Courtesy of BMW OF NORTH AMERICA, INC.

Remove HVCA element (1) in direction of arrow.

Installation:

If the HVCA elements (1) are reused, they must be placed together with the cam followers in neat order in special tool 11 4 480 .

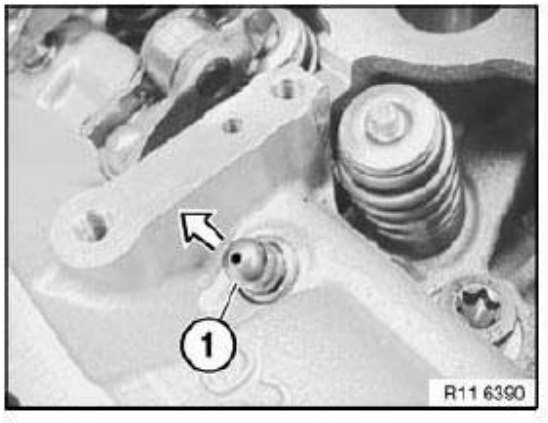


Fig. 278: Removing HVCA Element
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME; if necessary, readjust uniform mixture distribution.

1134 VALVES WITH SPRINGS

11 34 552 REMOVING AND INSTALLING/REPLACING ALL VALVES (N52K)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD**
- Remove **INTERMEDIATE LEVER**
- Remove **ECCENTRIC SHAFT**
- Remove **INLET CAMSHAFT**
- Remove **EXHAUST CAMSHAFT**
- Remove **CAM FOLLOWERS**
- Remove **VALVE SPRINGS**
- Remove **VALVE STEM SEALS**

Arrangement:

1. Valve
2. Valve stem seal with lower spring plate
3. Valve spring
4. Upper spring plate
5. Valve tapers

If the valves are to be reused, they must be placed in neat order in special tool 11 4 480 .

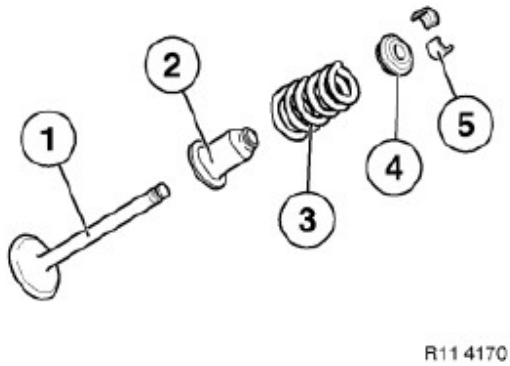


Fig. 279: Identifying Upper/Lower Spring Plate, Valve Spring And Valve Stem Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME; if necessary, readjust uniform mixture distribution.

11 34 715 REPLACING ALL VALVE SPRINGS (N52K)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD**
- Remove **EXHAUST CAMSHAFT** .
- Remove **INTERMEDIATE LEVER**
- Remove **INLET CAMSHAFT**
- Remove **CAM FOLLOWERS**

Place cylinder head on special tool 11 9 000 .

Press down **inlet valves** with special tool 11 9 017.

Press down **exhaust valves** with special tool 11 0 346.

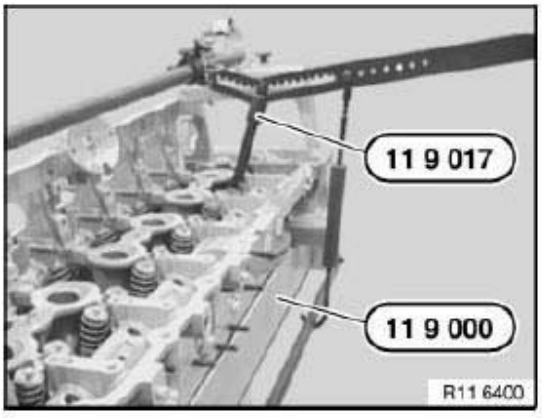


Fig. 280: Pressing Down Inlet Valves Using Special Tool (11 9 017)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove valve cotters with a magnet.

Remove valve spring with spring plates.

If the individual components are to be reused, they must be placed in neat order in special tool 11 4 480 .

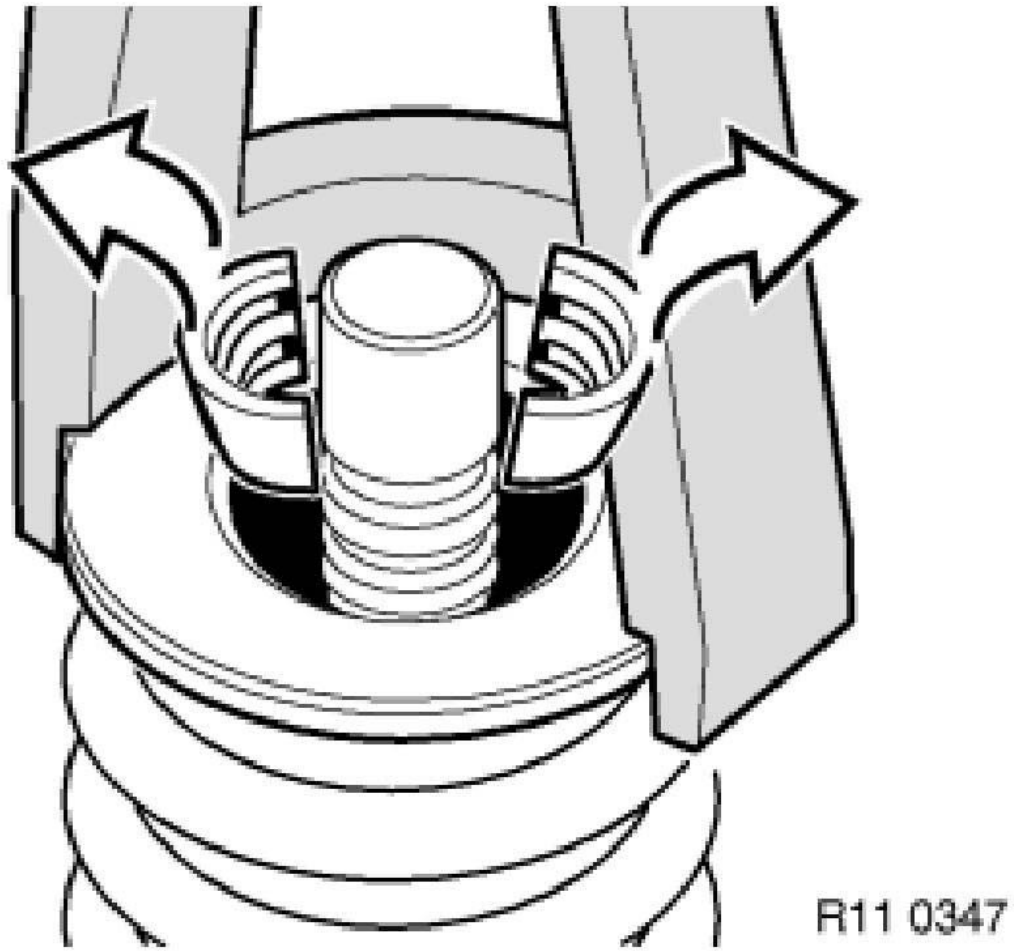


Fig. 281: Removing Valve Spring And Plate Spring
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect installation possible.
Incorrect installation will result in valve spring breakage.
Risk of mixing up the valve springs for the inlet and exhaust valves.

The valve spring is colour-coded (1) at the lower end.

Install the valve spring so that the larger diameter points to the lower spring plate.

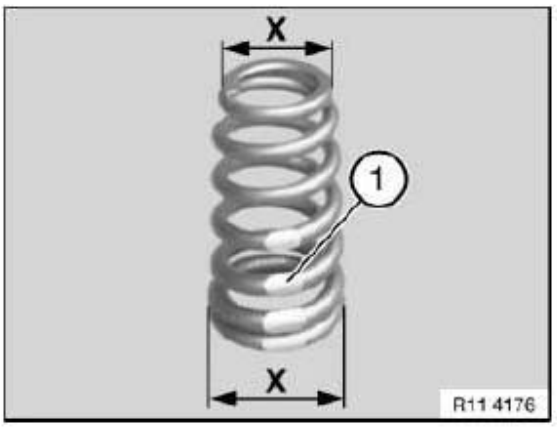


Fig. 282: Identifying Valve Spring Dimensions
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement:

1. Valve
2. Valve stem seal with lower spring plate
3. Valve spring
4. Upper spring plate
5. Valve tapers

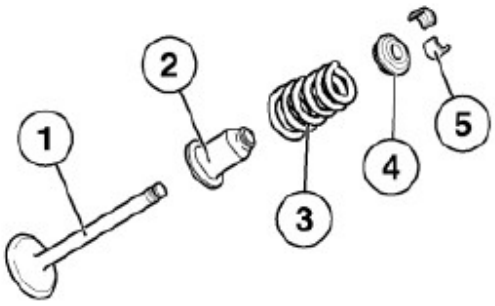


Fig. 283: Identifying Upper/Lower Spring Plate, Valve Spring And Valve Stem Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME; if necessary, readjust uniform mixture distribution.

11 34 560 REPLACING ALL VALVE STEM SEALS (N52K)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD** .
- Remove **INTERMEDIATE LEVER**
- Remove **ECCENTRIC SHAFT**
- Remove **INLET CAMSHAFT**
- Remove **EXHAUST CAMSHAFT** .
- Remove **CAM FOLLOWERS**

Firmly press special tool 11 1 480 onto old valve stem seals.

Detach valve stem seal from valve stem by turning and simultaneously pulling special tool 11 1 480 .

Installation:

Insert all **VALVES** .

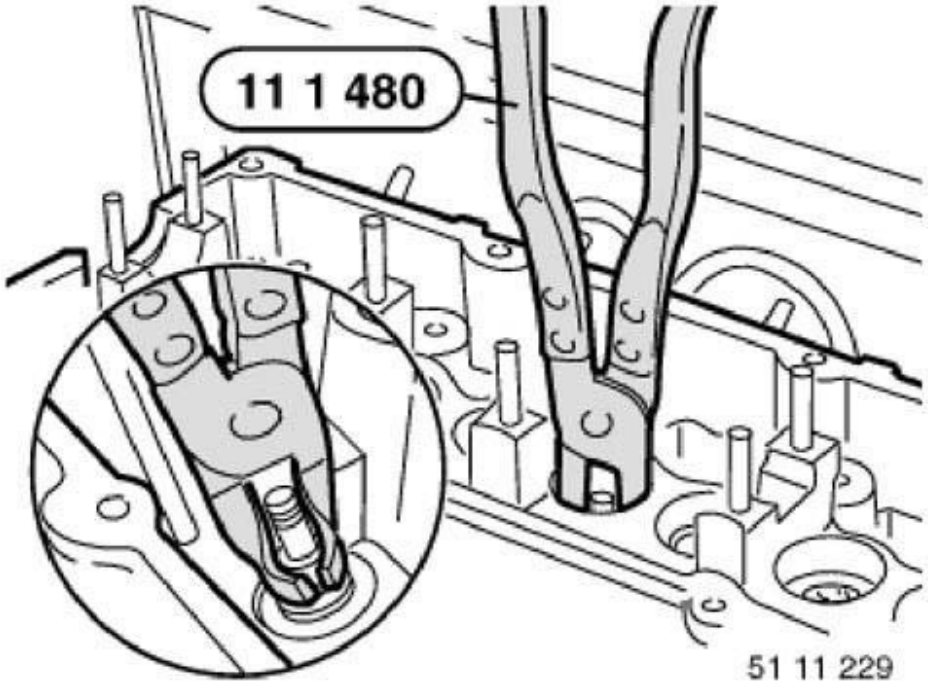


Fig. 284: Inserting Valves Using Special Tool (11 1 480)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For use on the N52K engine, special tool 11 6 380 must be remachined according to the picture with a 10 mm dia. drill bit to a depth of B = approx. 23 mm.
This modification has already been taken into account for reordering.

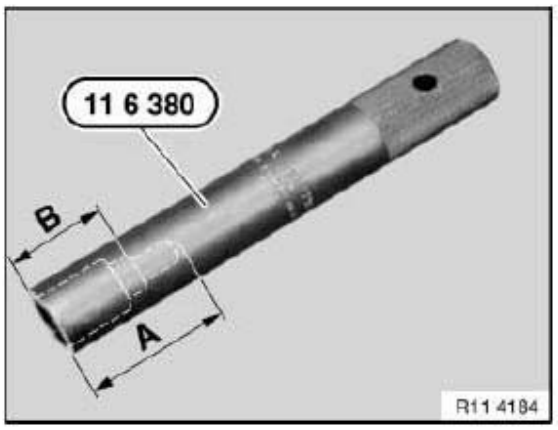


Fig. 285: Identifying Drilling Depth On Special Tool (11 6 380)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Different diameters at valve stem.
All valve stem seals are colour-coded.

For 5 mm dia. valves, the valve stem seal is marked red or brown.

For 6 mm dia. valves, the valve stem seal is marked green or light green.

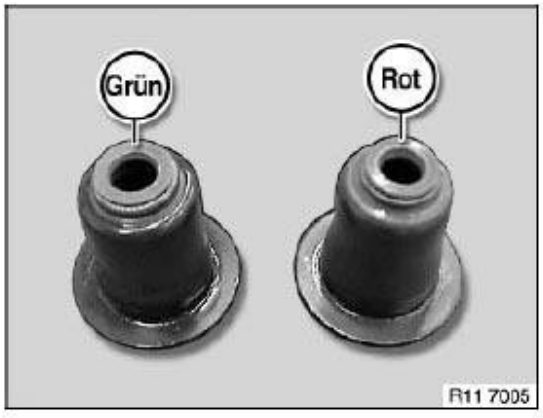


Fig. 286: Identifying Valve Stem Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit the mounting sleeves (plastic sleeves) contained in the delivery specification on the valve stem end.

Lubricate mounting sleeve.

Press on valve stem seal by hand with special tool 11 6 380 as far as it will go.

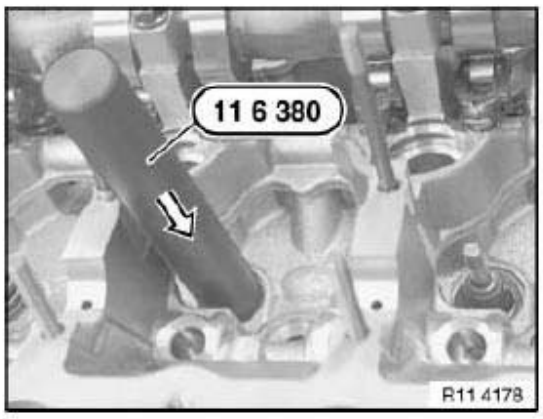


Fig. 287: Pressing Valve Stem Seal Using Special Tool (11 6 380)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1136 VARIABLE CAMSHAFT TIMING

11 36 655 REMOVING AND INSTALLING/REPLACING BOTH SOLENOID VALVES (N52K)

IMPORTANT: It is essential to observe conditions of absolute cleanliness when removing and installing the inlet and exhaust solenoid valves.
Possible malfunction if valves are contaminated:

- **Rough running**
- **OBD fault entry**
- **Exhaust emission characteristics**
- **Low engine power**

Necessary preliminary tasks:

- Remove **FAN COWL** (E89 only)

Disconnect plug connection (1) on inlet solenoid valve (2).

Release screw (3).

NOTE: Secure support and sealing ring against falling down.

Remove inlet solenoid valve (2) with bracket towards front.

Disconnect plug connection (6) on exhaust solenoid valve (5).

Release screw (4).

NOTE: Secure support and sealing ring against falling down.

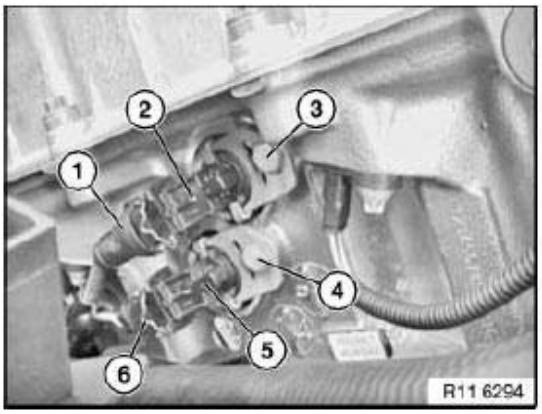


Fig. 288: Identifying Solenoid Valve, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove exhaust solenoid valve (5) with bracket towards front.

Tightening torque **11 36 3AZ** .

IMPORTANT: Risk of mixing up plug connections (1 and 6).

Installation:

Replace support and sealing rings.

Assemble engine.

Check function of DME.

11 36 046 REMOVING AND INSTALLING/REPLACING INLET AND EXHAUST ADJUSTMENT UNITS (N52K)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Check **TIMING**

IMPORTANT: Install special tool 11 4 280 to release the central bolts on the inlet and exhaust adjustment units and camshafts.

Fit special tool 11 4 283 with screws (1).

Fit special tool 11 4 281 on special tool 11 4 283.

IMPORTANT: Fit special tool 11 4 282 underneath on side of inlet camshaft.

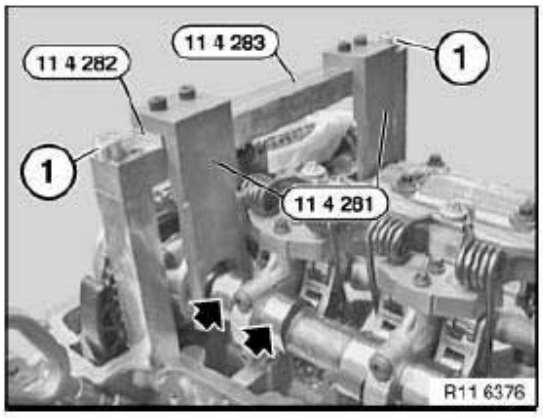


Fig. 289: Identifying Screws And Special Tools (11 4 283)
Courtesy of BMW OF NORTH AMERICA, INC.

Release chain tensioner (2).

Tightening torque **11 31 6AZ** .

Release central bolts on inlet and exhaust adjustment units (1).

Tightening torque **11 36 1AZ** .

Installation:

Replace central bolts.

NOTE: Picture in CAD and does not show special tools.

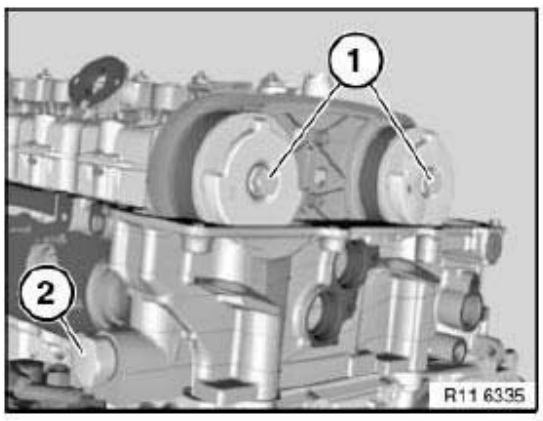


Fig. 290: Identifying Central Bolt And Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Remove exhaust adjustment unit (1) from exhaust camshaft.

Remove inlet adjustment unit (2) from inlet camshaft.

Installation:

To facilitate removal and installation of the inlet and exhaust adjustment units, turn the sensor gears at the opening downwards.

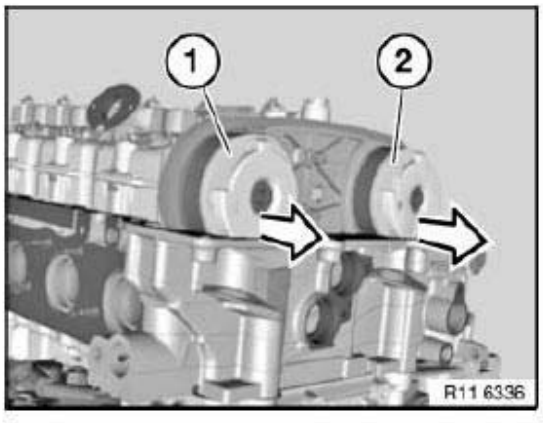


Fig. 291: Removing Exhaust Adjustment Unit From Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of mixing up the inlet and exhaust adjustment units. Danger of engine damage!

Inlet and exhaust adjustment units are different.

VANOS is marked with AUS/EX for the exhaust camshaft.

VANOS is marked with EIN/IN for the inlet camshaft.

Sensor gears can be fitted alternatively.

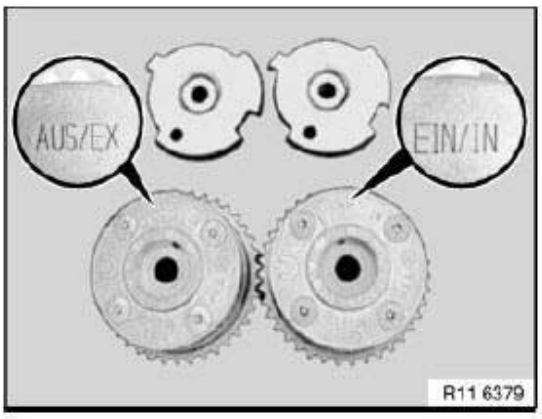


Fig. 292: Identifying AUS/EX Exhaust Camshaft Marks
Courtesy of BMW OF NORTH AMERICA, INC.

Position inlet and exhaust adjustment units on camshafts.

Installation position of inlet and exhaust adjustment units can be freely selected.

Insert central bolts (1).

Tightening torque **11 36 1AZ** .

Installation:

Replace central bolts.

IMPORTANT: Install special tool 11 4 280 to secure the central bolts on the inlet and exhaust adjustment units and camshafts.

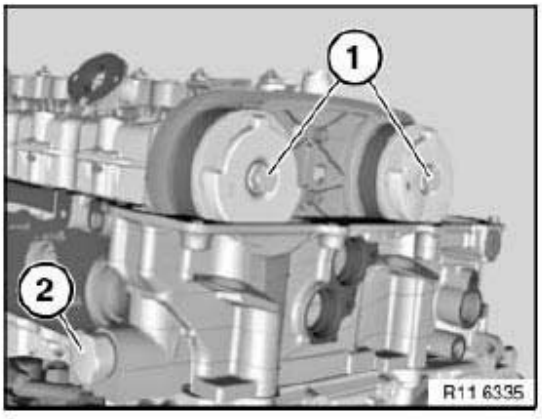


Fig. 293: Identifying Central Bolt And Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture in CAD and does not show special tools.

IMPORTANT: Incorrect installation possible!

Press clamping rail (1) by hand against guide rail and make sure timing chain is guided in clamping rail (1).

NOTE: Schematic representation of removed timing chain module.

Adjust **VALVE TIMING** .

Fit **CHAIN TENSIONER** .

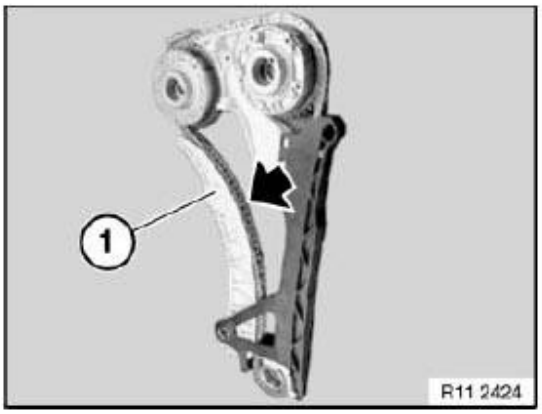


Fig. 294: Locating Chain Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1137 VARIABLE VALVE GEAR

11 37 005 REMOVING AND INSTALLING/REPLACING ECCENTRIC SHAFT (N52K)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove **INTERMEDIATE LEVER**

If necessary, move eccentric shaft (1) on twin surface to minimum lift (2).

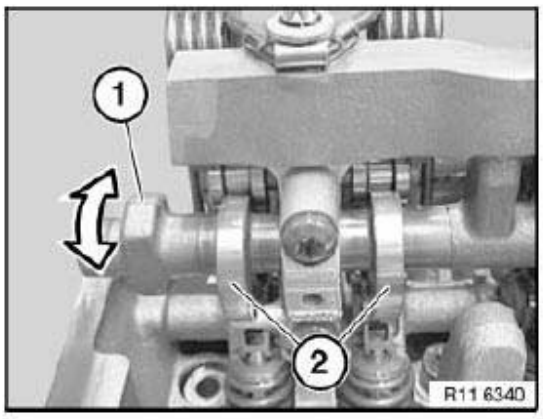


Fig. 295: Moving Eccentric Shaft On Twin Surface Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: All bearing caps (1 and 2) of eccentric shaft are marked with numbers from 1 to 6 (1 for 1st cylinder to 6 for 6th cylinder).
Bearing cap 6 (1) is provided with a stop.

Release screws on bearing cap 6 (1).

Release screws on bearing caps 1 to 5 (2).

Set all bearing caps down in special tool 11 4 481 in a neat and orderly fashion.

Remove eccentric shaft with gentle tilting and turning movements.

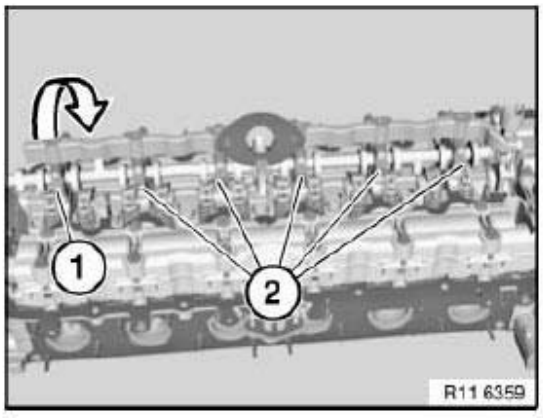


Fig. 296: Installing Bearing Cap On Bearing Cap Number
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Screw is not magnetic and must be secured against falling down.

Release screw.

Remove magnet wheel (1).

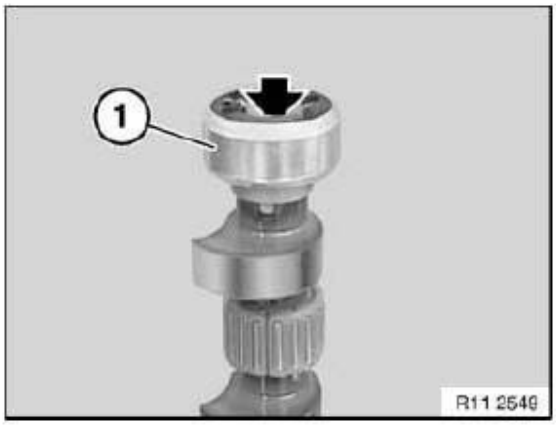


Fig. 297: Locating Magnet Wheel Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Magnet wheel (1) is highly magnetic and must be protected against metal filings/borings.
After removing, place magnet wheel (1) in a plastic bag (2) with a seal.

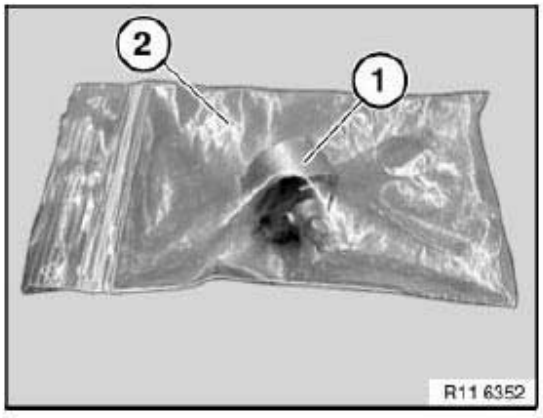


Fig. 298: Identifying Magnet Wheel In Plastic Bag
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Needle bearing (1) can break very easily.

Carefully pull needle bearing (1) apart at point of separation.

Remove all needle bearings (1) from eccentric shaft.

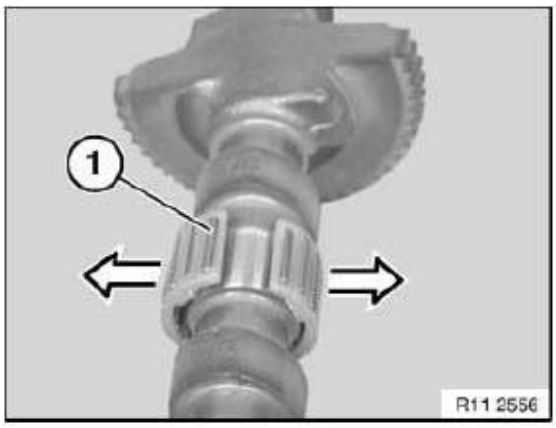


Fig. 299: Removing Needle Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Install bearing shells (1) as pictured.

NOTE: Always replace bearing shells (1) and needle bearings together.

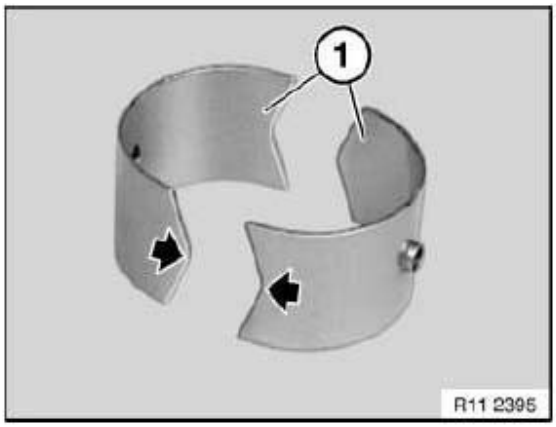


Fig. 300: Locating Bearing Shells Ends
Courtesy of BMW OF NORTH AMERICA, INC.

Install bearing shell (1) with tip facing down (see arrow) in cylinder head.

Install bearing shell (2) with tip facing up in bearing cap.

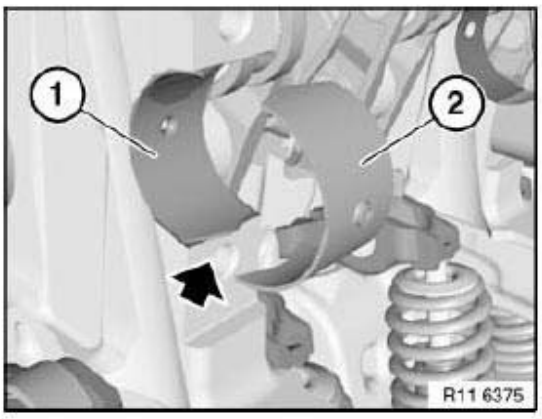


Fig. 301: Locating Bearing Shell Tip
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: All bearing caps (1 and 2) of eccentric shaft are marked with numbers from 1 to 6 (1 for 1st cylinder to 6 for 6th cylinder).
Bearing cap 6 (1) is provided with a stop.

Insert eccentric shaft.

Adjust eccentric shaft on dihedron to minimum stroke.

Fit all bearing caps (1 and 2).

Insert all screws.

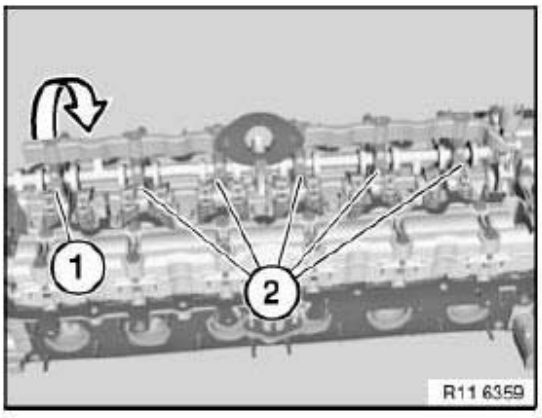


Fig. 302: Installing Bearing Cap On Bearing Cap Number
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **11 12 7AZ** .

Installation:

Spline teeth of eccentric shaft must be greased with **LONGTIME PD 1 (2.2)** .

Assemble engine.

11 37 010 REMOVING AND INSTALLING/REPLACING INTERMEDIATE LEVERS (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

NOTE: There are 2 different versions of the guide block

IMPORTANT: Establish size of guide blocks.
Version 1
Size 55.2 mm
Version 2
Size 58 mm
The description of version 2 starts on page 8.

Version 1

Size (1) 55.2 mm

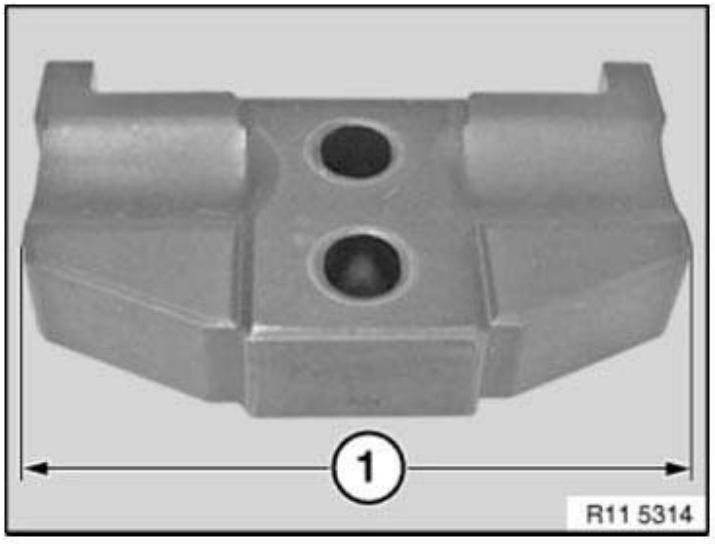


Fig. 303: Identifying Guide Block Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**

If necessary, move eccentric shaft (1) on twin surface to minimum lift (2).

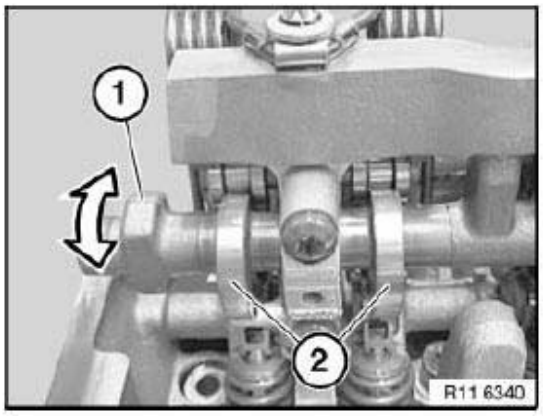


Fig. 304: Moving Eccentric Shaft On Twin Surface
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Oil spray nozzle must be removed from 3rd cylinder (make a note of installation position of oil spray nozzle).

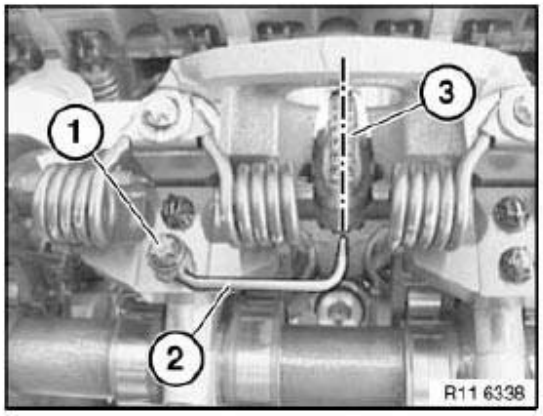


Fig. 305: Identifying Oil Spray Nozzle With Spray
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Oil spray nozzle must be removed from 3rd cylinder (make a note of installation position of oil spray nozzle).

Secure special tool 11 4 270 to guide block (2) using locking pliers (3).

IMPORTANT: Special tool 11 4 270 is only secured to guide block (2). The position of the locking pliers (3) on the special tool 11 4 270 must not be altered. Risk of damage!

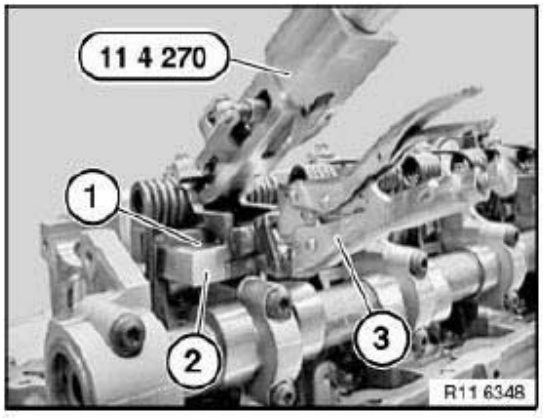


Fig. 306: Identifying Gripping Pliers, Guide Block And Special Tool (11 4 270)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury in event of incorrect use.

IMPORTANT: Improper handling. Risk of damage!

Secure both bearing pins (2) in torsion springs with knurled screw (1) of special tool 11 4 270 .

Press special tool 11 4 270 to stop in direction of arrow.

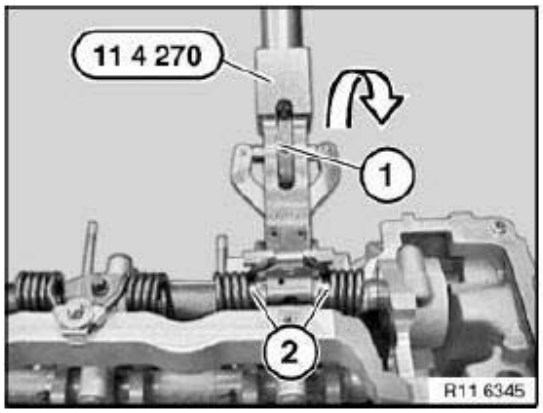


Fig. 307: Pressing Bearing Pins Using Special Tool (11 4 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (2) of torsion spring.

Tightening torque **11 37 2AZ** .

To avoid misalignment of screw (2) with torsion spring, it is necessary when releasing screw (2) to relieve the tension on the special tool 11 4 270 evenly.

IMPORTANT: Thread on cylinder head. Risk of damage!

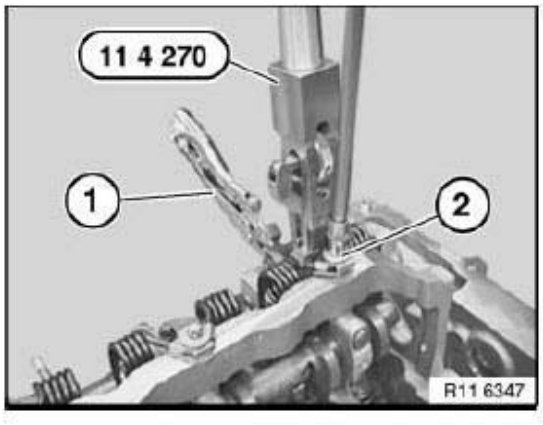


Fig. 308: Releasing Screw Of Torsion Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Release tension on torsion spring (1) with special tool 11 4 270 .

NOTE: Metal lug (2) can not be disassembled and must not be removed.

Installation:

Replace torsion spring (1) if metal lug (2) is faulty.

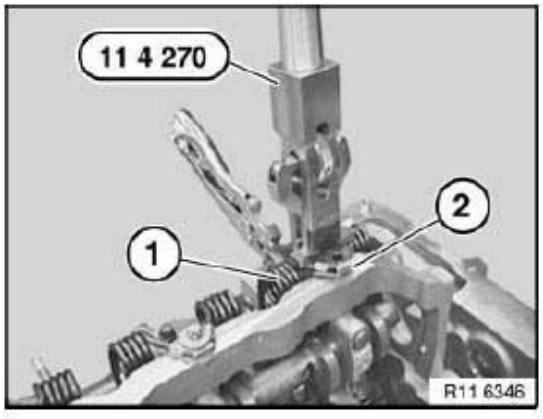


Fig. 309: Removing Metal Lugs Using Special Tool (11 4 270)

Courtesy of BMW OF NORTH AMERICA, INC.

Press torsion spring apart at positions (1).

Remove torsion spring towards top.

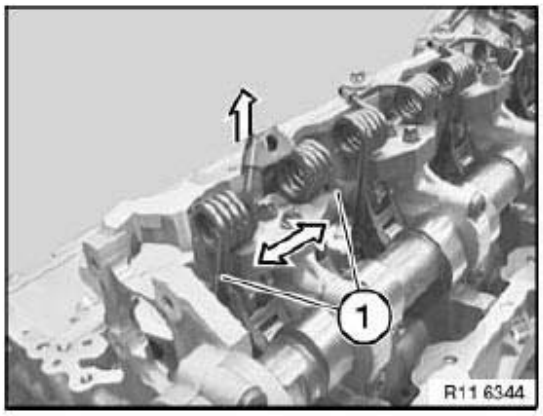


Fig. 310: Pressing Torsion Spring
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Uniform distribution must not be changed.
Place all components in clean and orderly condition in special tool 11 4 481.

All components must be reinstalled in the same positions in an engine which has already been in use.

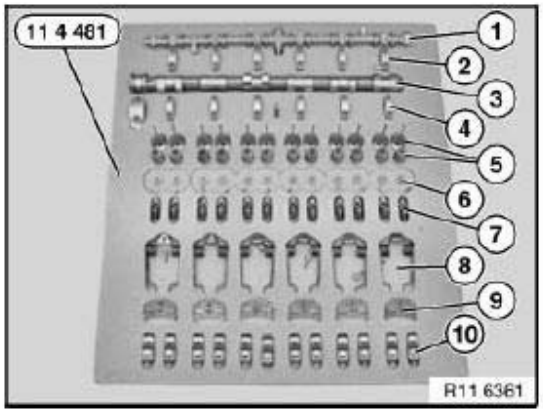


Fig. 311: Identifying Special Tool Kit
Courtesy of BMW OF NORTH AMERICA, INC.

1. Eccentric shaft with bearing
2. Bearing caps of eccentric shaft (set out in order)
3. Intake camshaft
4. Bearing caps of inlet camshaft (set out in order)

5. Intake valves with valve springs
6. Valve plates and valve cotters
7. Cam followers with HVCA elements (set out in order)
8. Torsion springs
9. Guide blocks (set out in order)
10. Intermediate levers (set out in order)

Release screws (1) on guide block (2).

Tightening torque **11 37 1AZ** .

Place all guide blocks (2) in neat order in special tool 11 4 481.

Installation:

Mixing up the guide blocks (2) will cause the engine to suffer idle-speed fluctuations.

This will result in maladjustment of **uniform distribution** .

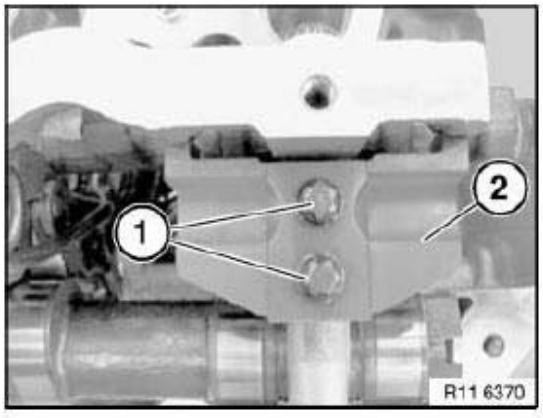


Fig. 312: Identifying Guide Block With Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

All contact surfaces (1) of guide block must be clean and free from oil and grease. If necessary, clean contact surfaces (1).

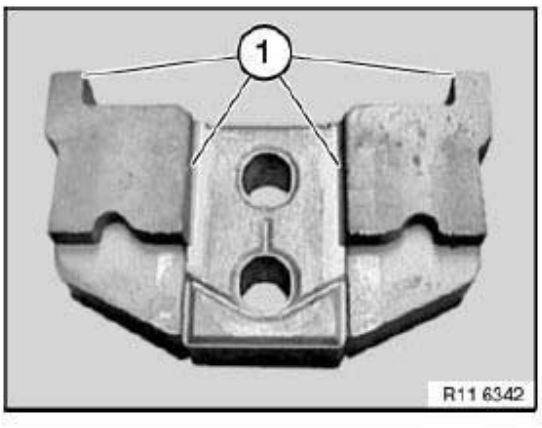


Fig. 313: Identifying Contact Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out intermediate levers (2).

Place all intermediate levers (2) in neat order in special tool 11 4 481.

Installation:

Mixing up the intermediate levers (2) will cause the engine to suffer idle-speed fluctuations.

Installation:

All contact surfaces (1) must be clean and free from oil and grease. If necessary, clean contact surfaces (1).

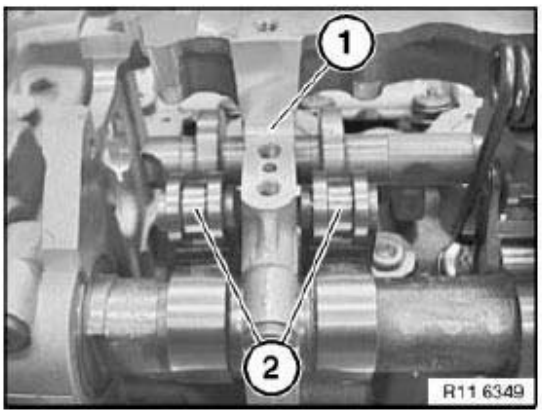


Fig. 314: Identifying Contact Surface And Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

All intermediate levers (1) are classified.

All intermediate levers (1) must be reinstalled in the same positions in an engine which has already been in use.

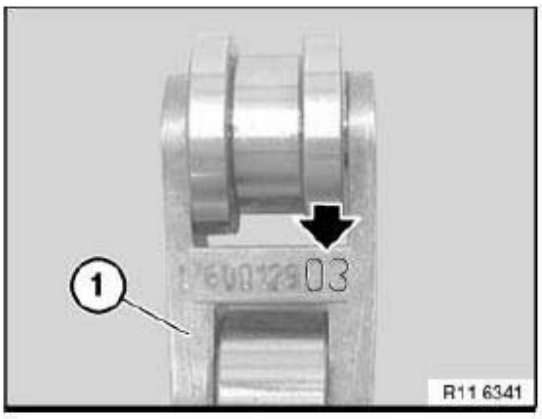


Fig. 315: Locating Marking On Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Before installing intermediate levers (2), make sure cam followers are correctly positioned.
Risk of damage!

Install intermediate levers (2).

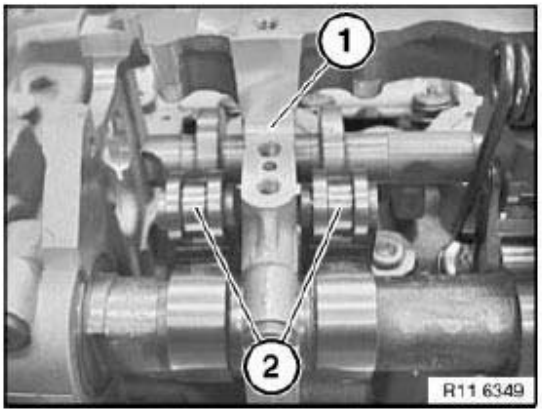


Fig. 316: Identifying Contact Surface And Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

Fit guide block (2) cleanly into opening.

Tighten screws (1) hand-tight.

Check that intermediate levers are in correct installation position.

Release screws (1) by a 1/4 turn.

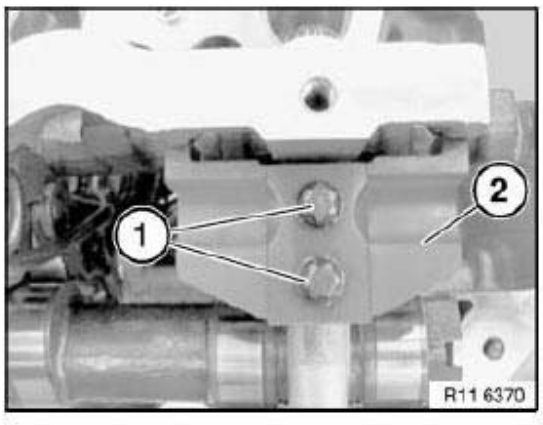


Fig. 317: Identifying Guide Block And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 450 to screw fixing (1) of eccentric shaft.

Move eccentric lever (3) on special tool 11 4 450 in direction of arrow.

Guide block is now pretensioned.

Insert screws (2) of guide blocks.

Tightening torque **11 37 1AZ** .

Installation:

At cylinder no. 3, the guide block can be pre-installed with one screw (internal) only.

Oil spray nozzle is fitted only after torsion spring has been installed.

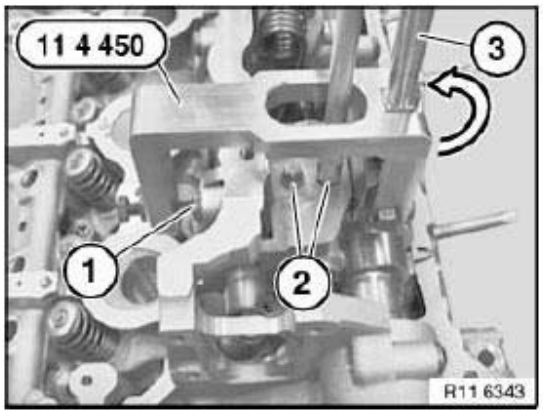


Fig. 318: Moving Eccentric Lever On Special Tool 11 4 450
Courtesy of BMW OF NORTH AMERICA, INC.

Install torsion spring (2) on guide block.

Installation:

Insert torsion spring (2) in intermediate lever (1) (see arrow).

Check that cam follower (3) is in correct installation position.

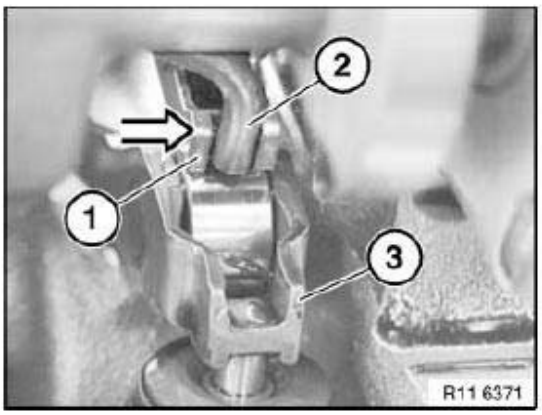


Fig. 319: Inserting Torsion Spring In Intermediate Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 270 to guide block (2) using locking pliers (3).

IMPORTANT: Special tool 11 4 270 is only secured to guide block (2). The position of the locking pliers (3) on the special tool 11 4 270 must not be altered. Risk of damage!

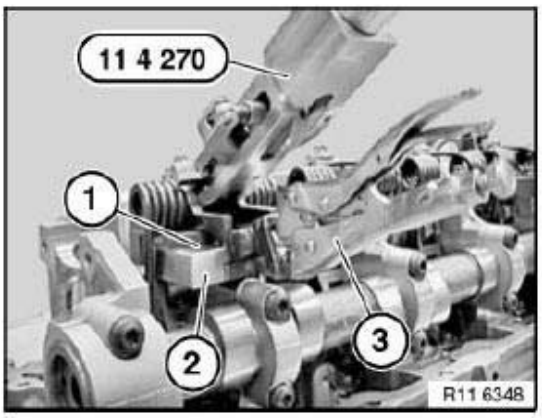


Fig. 320: Securing Special Tool 11 4 270 To Guide Block Using Locking Pliers
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury in event of incorrect use.

IMPORTANT: Improper handling. Risk of damage!

Secure both bearing pins (2) in torsion springs with knurled screw (1) of special tool 11 4 270 .

IMPORTANT: Check torsion spring on intermediate lever to ensure correct installation position.

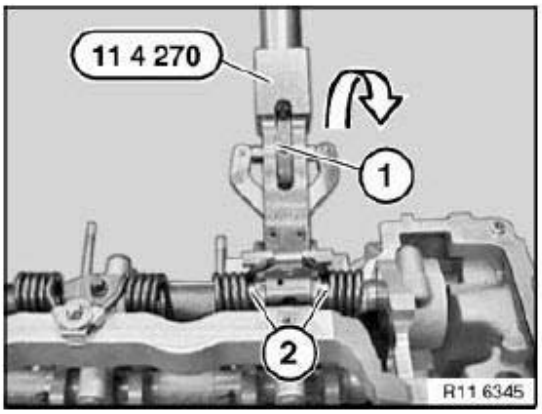


Fig. 321: Pressing Bearing Pins Using Special Tool (11 4 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Press special tool 11 4 270 to stop in direction of arrow.

Insert screw (2) of torsion spring.

Tightening torque **11 37 2AZ** .

To avoid misalignment of screw (2) with torsion spring, it is necessary when inserting screw (2) to increase tension on special tool 11 4 270 evenly.

IMPORTANT: Thread on cylinder head. Risk of damage!

Remove special tool 11 4 270 .

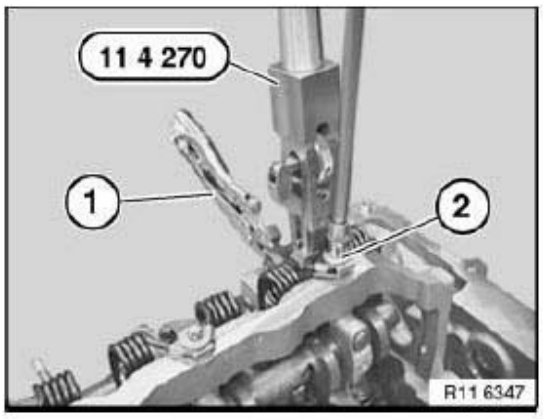


Fig. 322: Inserting Steel Screw
Courtesy of BMW OF NORTH AMERICA, INC.

At cylinder no. 3, adjust oil spray nozzle (2) so that oil spray points precisely towards spline teeth (3).

Insert screw (1) with oil spray nozzle (2) (external).

Tightening torque **11 37 4AZ** .

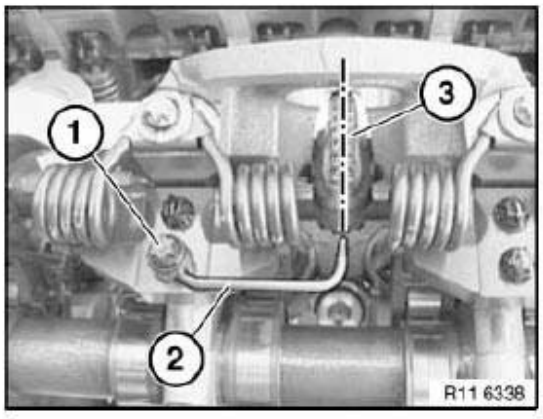


Fig. 323: Identifying Oil Spray Nozzle With Spray
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Version 2

Size (1) 58 mm

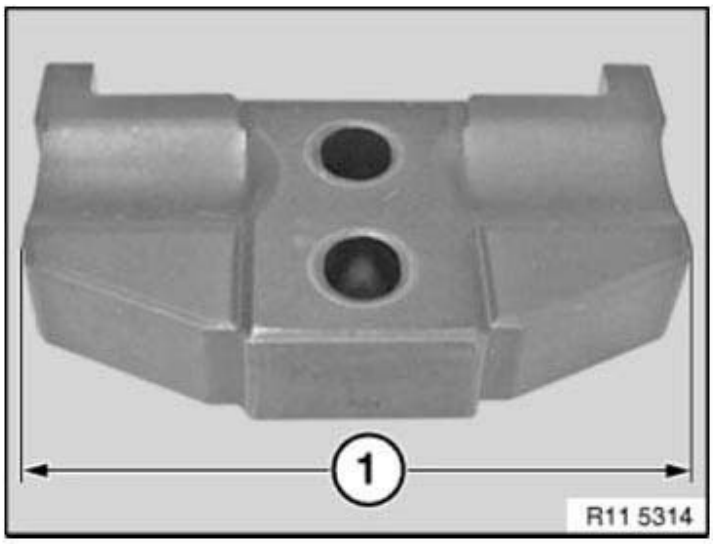


Fig. 324: Identifying Guide Block Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**

If necessary, move eccentric shaft (1) on twin surface to minimum lift (2).

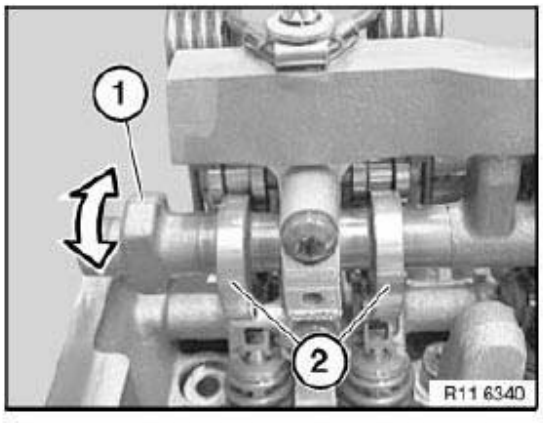


Fig. 325: Moving Eccentric Shaft On Twin Surface And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Oil spray nozzle must be removed from 3rd cylinder (make a note of installation position of oil spray nozzle).

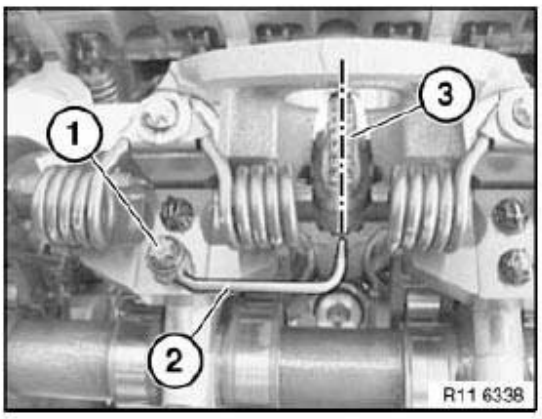


Fig. 326: Identifying Oil Spray Nozzle With Spray
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 7 110 on return spring (1) (see arrows).

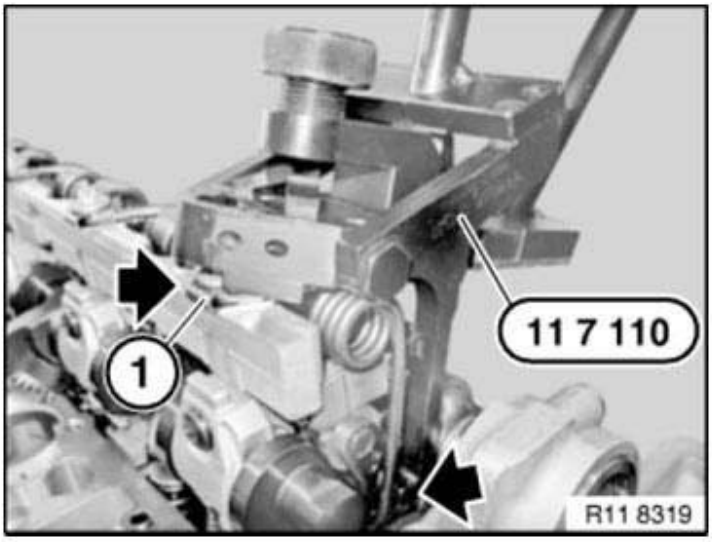


Fig. 327: Locating Special Tool (11 7 110) On Return Spring
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury in event of incorrect use.

IMPORTANT: Improper handling. Risk of damage!

Place special tool 11 7 110 flat on cylinder head.

Turn knurled screw (1) in direction of arrow until both clamping levers secure return spring in guide block.

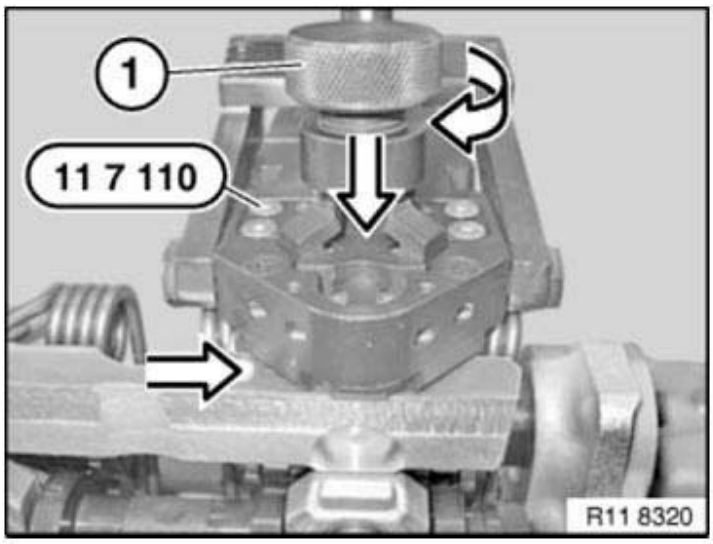


Fig. 328: Turning Knurled Screw Using Special Tool (11 7 110)
Courtesy of BMW OF NORTH AMERICA, INC.

Return spring is correctly preloaded when both clamping levers are parallel to guide block.

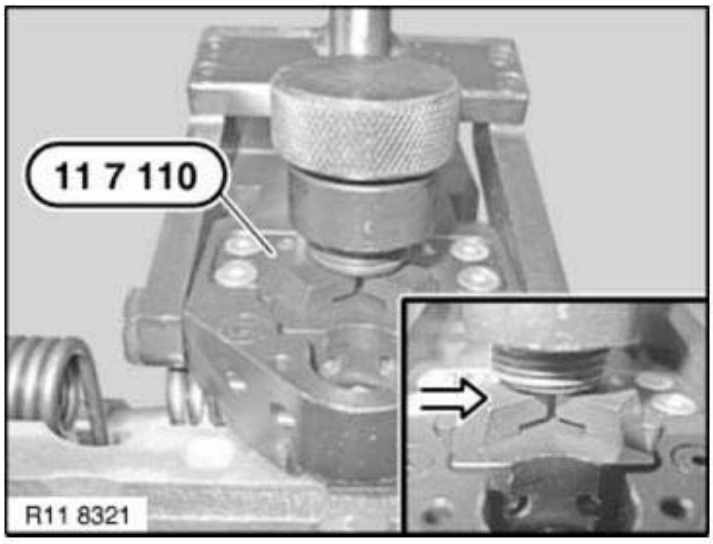


Fig. 329: Installing Return Spring Using Special Tool (11 7 110)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Left and right return springs (1) must be positioned in lateral guide of special tool 11 7 110 .

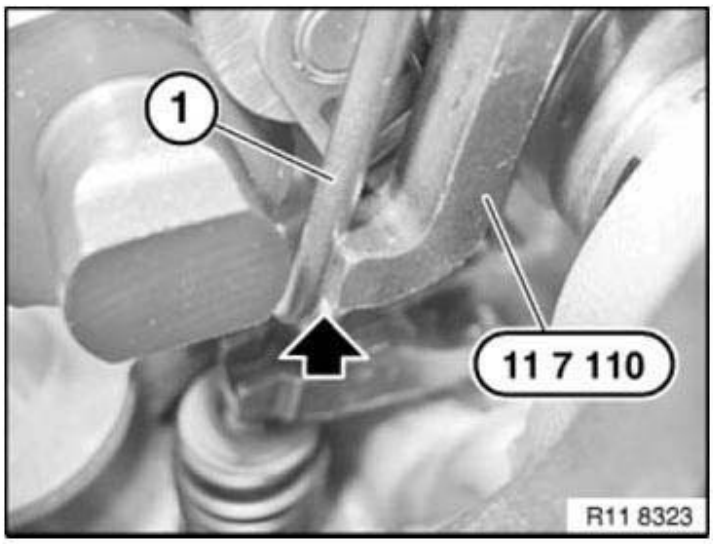


Fig. 330: Locating Return Springs Position In Lateral Special Tool (11 7 110)
Courtesy of BMW OF NORTH AMERICA, INC.

Preload return spring with lever (1) on special tool 11 7 110 in direction of arrow.

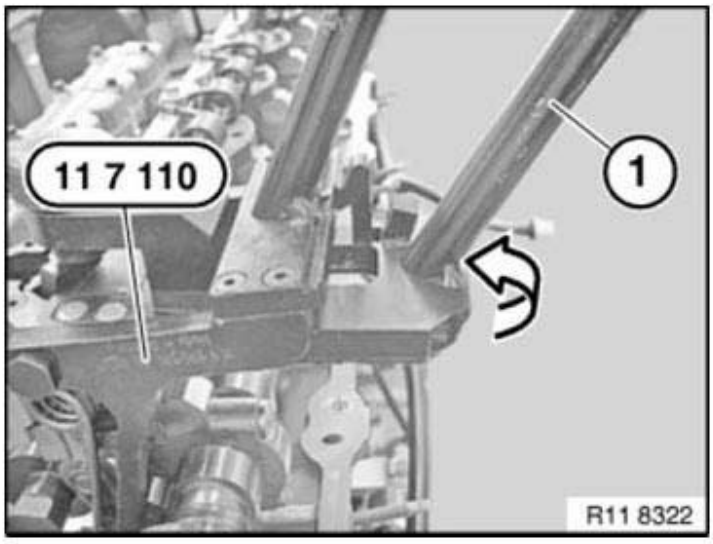


Fig. 331: Preloading Return Spring With Lever On Special Tool (11 7 110)
Courtesy of BMW OF NORTH AMERICA, INC.

Lock special tool 11 7 110 with catch on lever (1).

IMPORTANT: Screw fixing on return spring can only be released with special tool 11 7 110 secured.

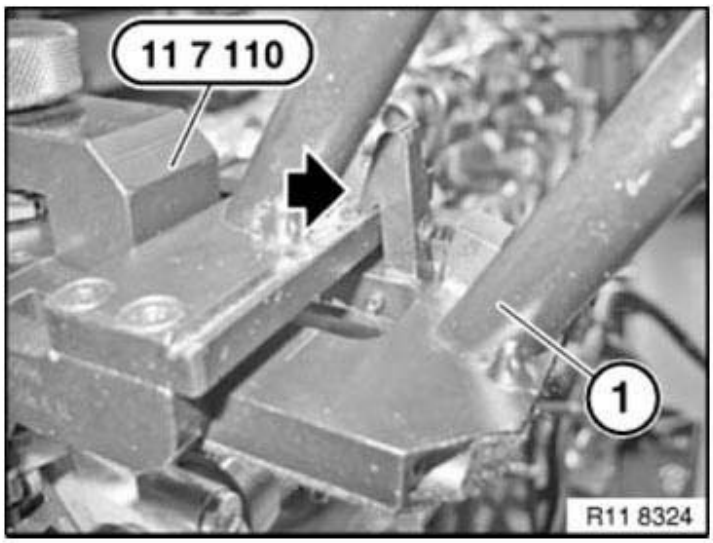


Fig. 332: Locking Special Tool (11 7 110) With Catch On Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

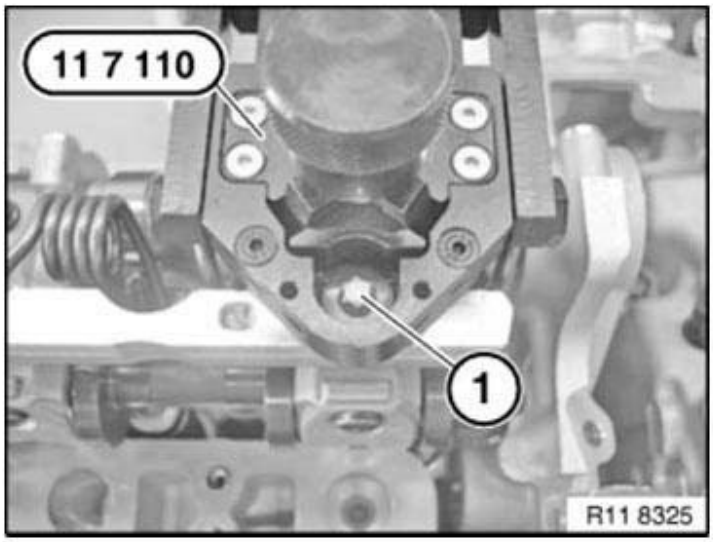


Fig. 333: Identifying Screws And Special Tool (11 7 110)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury in event of incorrect use.
Lever (1) is under pre-tension.

IMPORTANT: Improper handling.
Risk of damage!

Secure lever (1)

Press back latching hook (2).

Return spring tension can now be released.

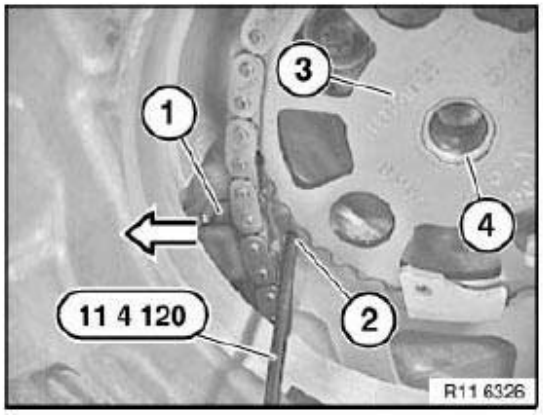


Fig. 334: Pressing Back Latching Hook Using Special Tool (11 7 110)
Courtesy of BMW OF NORTH AMERICA, INC.

Release knurled screw (1) on special tool 11 7 110 in direction of arrow.

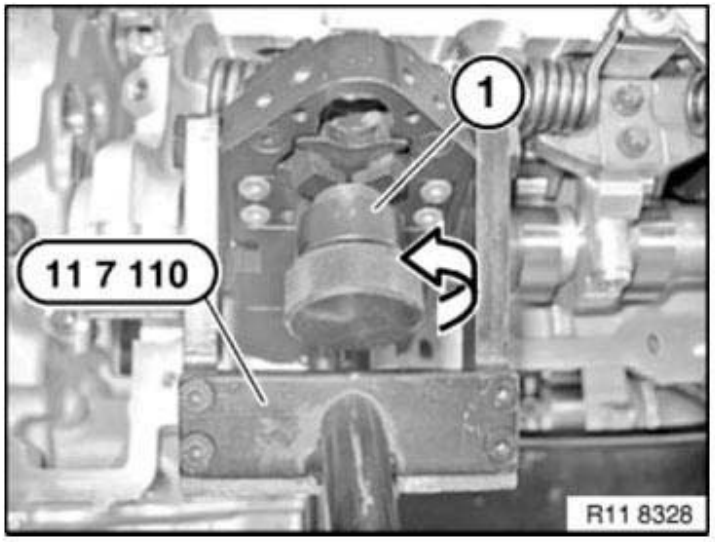


Fig. 335: Releasing Knurled Screw On Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

Release special tool 11 7 110 in direction of arrow from return spring (1).

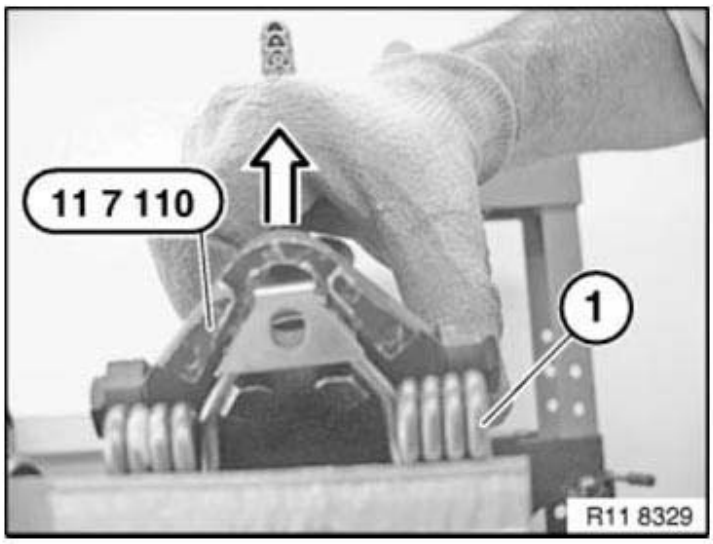


Fig. 336: Releasing Special Tool 11 7 110 From Return Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Press torsion spring apart at positions (1).

Remove torsion spring towards top.

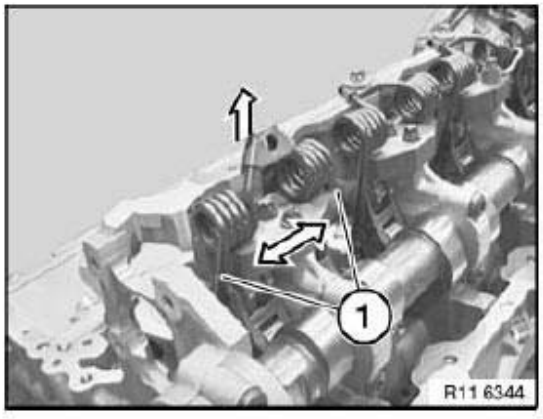


Fig. 337: Pressing Torsion Spring Position
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Uniform distribution must not be changed.
Place all components in clean and orderly condition in special tool 11 4 481.

All components must be reinstalled in the same positions in an engine which has already been in use.

1. Eccentric shaft with bearing
2. Bearing caps of eccentric shaft (set out in order)

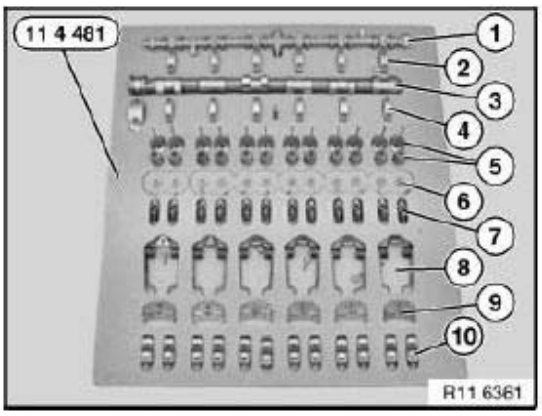


Fig. 338: Identifying Special Tool Kit
Courtesy of BMW OF NORTH AMERICA, INC.

3. Intake camshaft
4. Bearing caps of inlet camshaft (set out in order)
5. Intake valves with valve springs
6. Valve plates and valve cotters
7. Cam followers with HVCA elements (set out in order)
8. Torsion springs
9. Guide blocks (set out in order)
10. Intermediate levers (set out in order)

Release screws (1) on guide block (2).

Tightening torque **11 37 1AZ** .

Place all guide blocks (2) in neat order in special tool 11 4 481.

Installation:

Mixing up the guide blocks (2) will cause the engine to suffer idle-speed fluctuations.

This will result in maladjustment of **uniform distribution** .

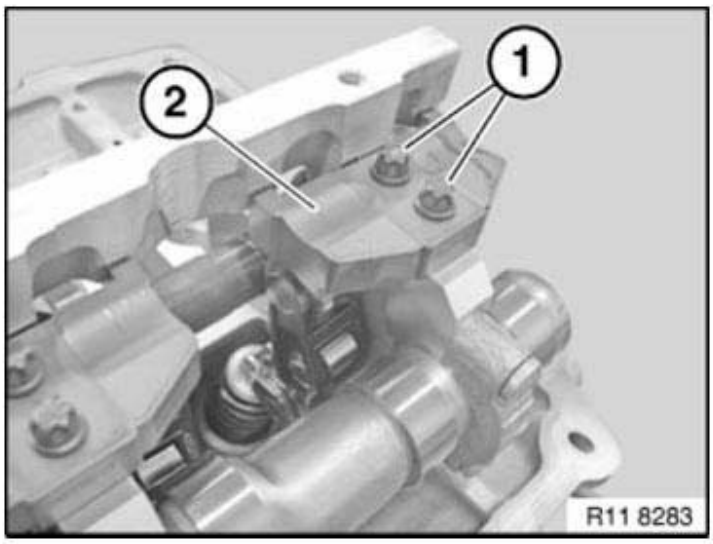


Fig. 339: Identifying Screws On Guide Block
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

All contact surfaces (1) of guide block must be clean and free from oil and grease. If necessary, clean contact surfaces (1).

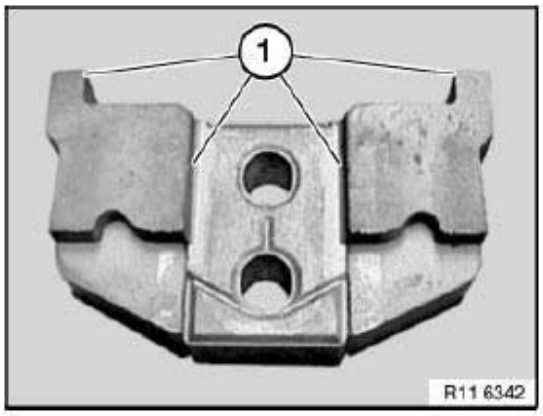


Fig. 340: Identifying Contact Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out intermediate levers (2).

Place all intermediate levers (2) in neat order in special tool 11 4 481.

Installation:

Mixing up the intermediate levers (2) will cause the engine to suffer idle-speed fluctuations.

Installation:

All contact surfaces (1) must be clean and free from oil and grease. If necessary, clean contact surfaces (1).

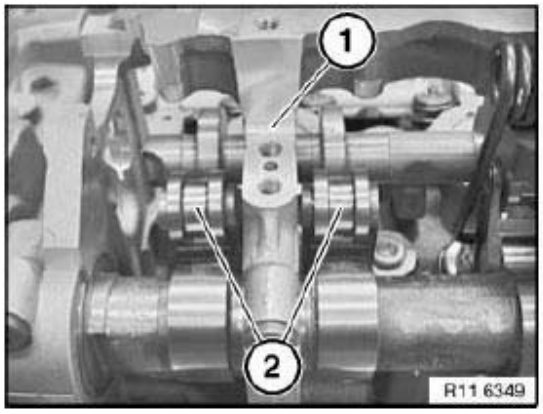


Fig. 341: Identifying Contact Surface And Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

All intermediate levers (1) are classified.

All intermediate levers (1) must be reinstalled in the same positions in an engine which has already been in use.

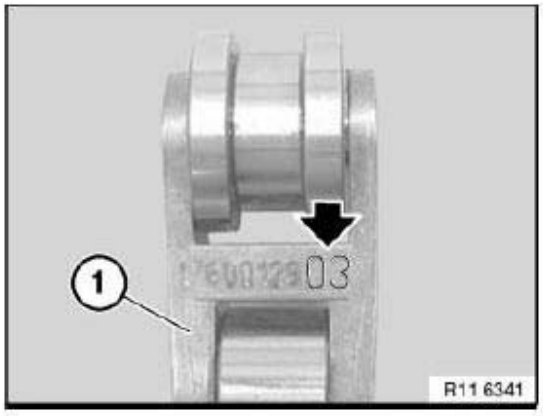


Fig. 342: Locating Marking On Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Before installing intermediate levers (2), make sure cam followers are correctly positioned.
Risk of damage!

Install intermediate levers (2).

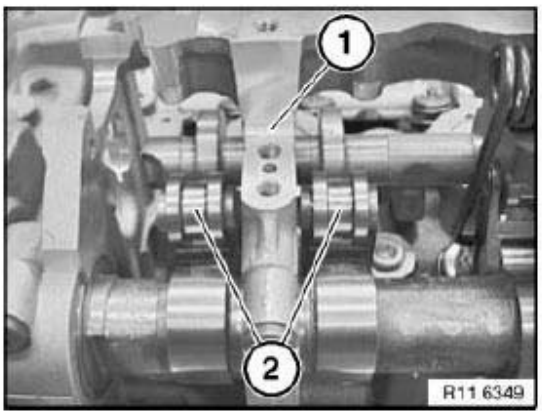


Fig. 343: Identifying Contact Surface And Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

Fit guide block (2) cleanly into opening.

Tighten screws (1) hand-tight.

Check that intermediate levers are in correct installation position.

Release screws (1) by a 1/4 turn.

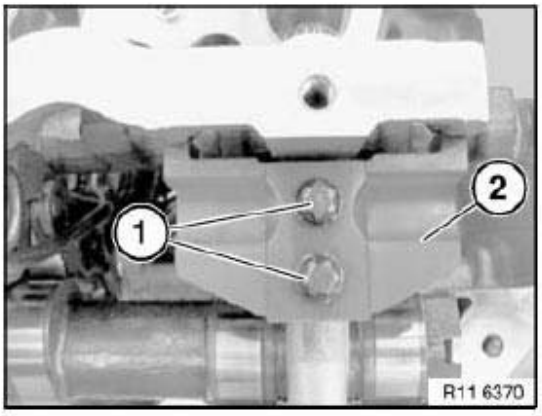


Fig. 344: Identifying Guide Block With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 450 to screw fixing (1) of eccentric shaft.

Move eccentric lever (3) on special tool 11 4 450 in direction of arrow.

Guide block is now pretensioned.

Insert screws (2) of guide blocks.

Tightening torque **11 37 1AZ** .

Installation:

At cylinder no. 3, the guide block can be pre-installed with one screw (internal) only.

Oil spray nozzle is fitted only after torsion spring has been installed.

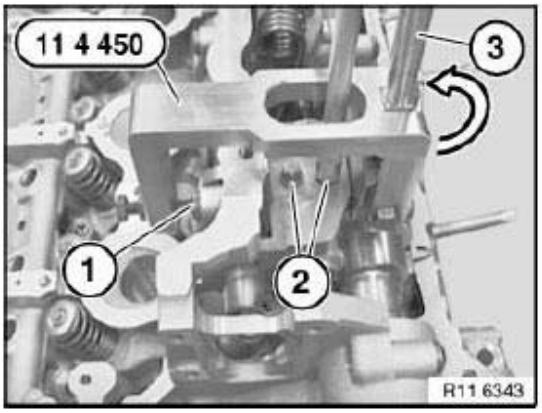


Fig. 345: Moving Eccentric Lever On Special Tool 11 4 450
Courtesy of BMW OF NORTH AMERICA, INC.

Install torsion spring (2) on guide block.

Installation:

Insert torsion spring (2) in intermediate lever (1) (see arrow).

Check that cam follower (3) is in correct installation position.

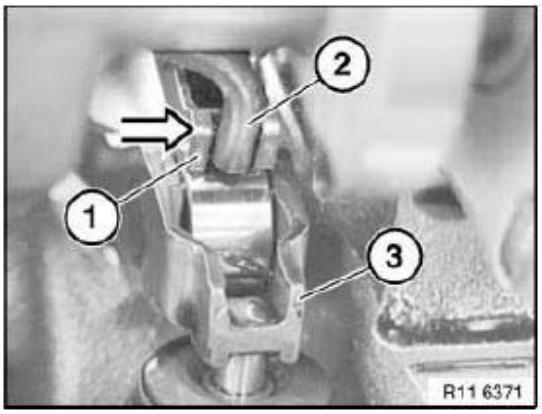


Fig. 346: Inserting Torsion Spring In Intermediate Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 7 110 on return spring.

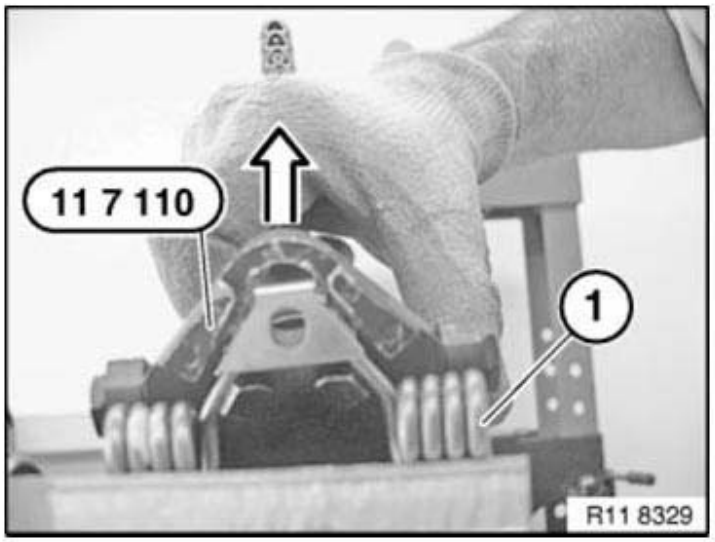


Fig. 347: Positioning Special Tool 11 7 110 On Return Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Clamp return spring with knurled screw (1) in direction of arrow.

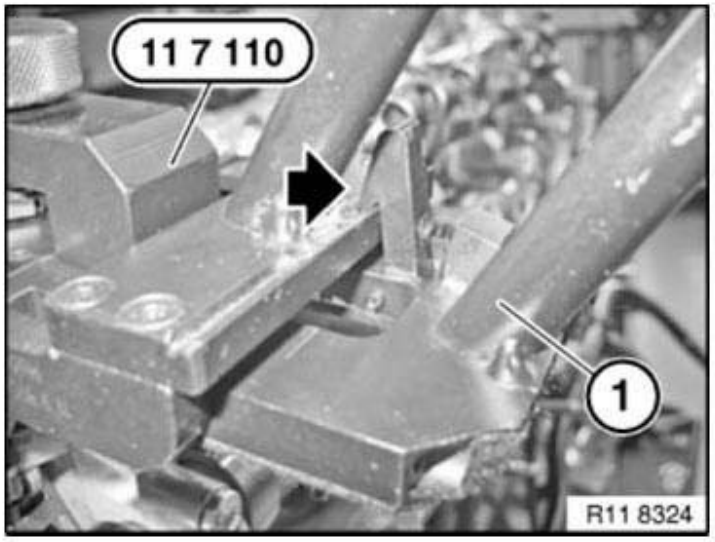


Fig. 348: Locating Clamp Return Spring With Knurled Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Return spring (1) is positioned correctly when catches (see arrows) are surrounding return spring (1).

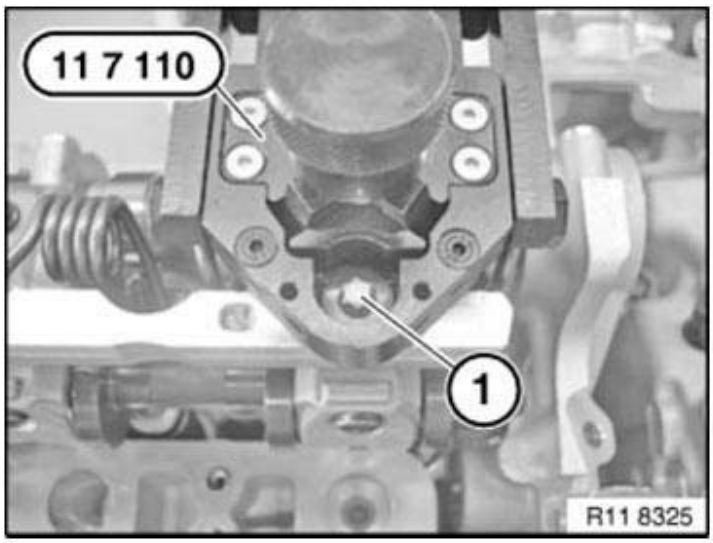


Fig. 349: Identifying Screws And Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury in event of incorrect use.

IMPORTANT: Improper handling.
Risk of damage!
Check return spring on intermediate lever to ensure correct installation position.

Press special tool 11 7 110 to stop in direction of arrow.

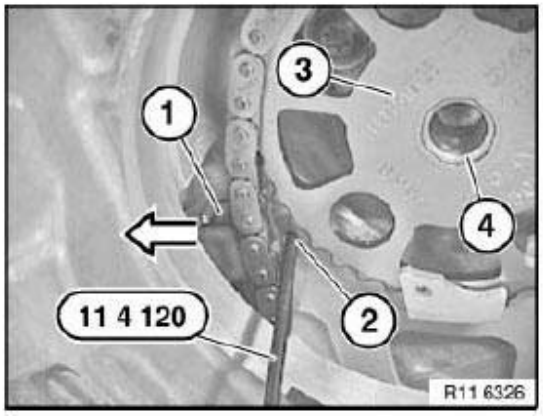


Fig. 350: Pressing Back Latching Hook Using Special Tool (11 7 110)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Pay attention to thread on cylinder head.

Risk of damage!

Tighten bolt (1).

Tightening torque **11 37 2AZ** .

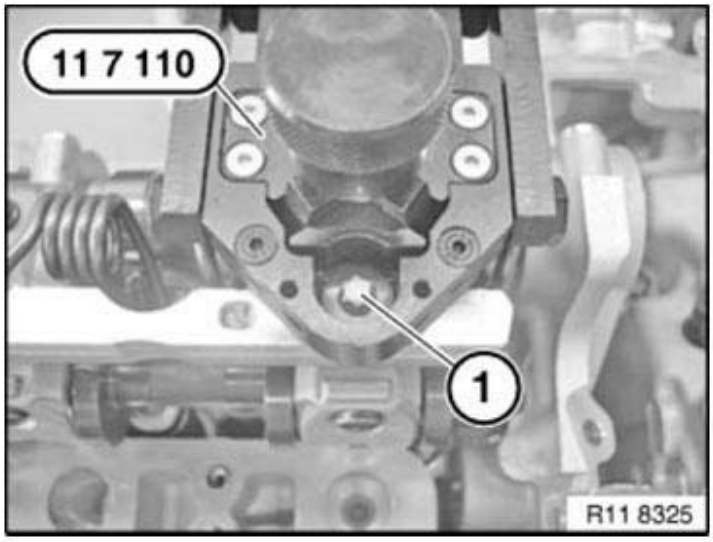


Fig. 351: Identifying Screws And Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

At cylinder no. 3, adjust oil spray nozzle (2) so that oil spray points precisely towards spline teeth (3).

Insert screw (1) with oil spray nozzle (2) (external).

Tightening torque **11 37 4AZ** .

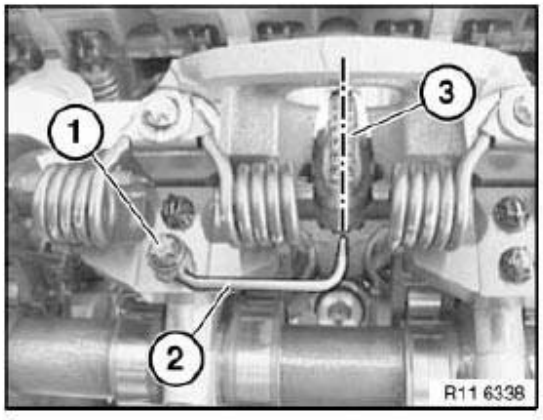


Fig. 352: Identifying Oil Spray Nozzle With Spray
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1140 OIL SUPPLY

11 40 000 CHECKING ENGINE OIL PRESSURE (N52, N52K)

IMPORTANT: The regulated oil pump can only be checked and measured with the diagnosis system.
Vehicles with a regulated oil pump have a HYDRAULIC VALVE fitted.
If a hydraulic valve is fitted, proceed in accordance with CHECKING ENGINE OIL PRESSURE .

Necessary preliminary tasks:

- Remove **ACOUSTIC COVER**
- Protect drive belt against dirt
- Have a cleaning cloth ready to catch escaping oil

Disconnect plug connection on oil pressure switch (3)

Remove oil pressure switch (3).

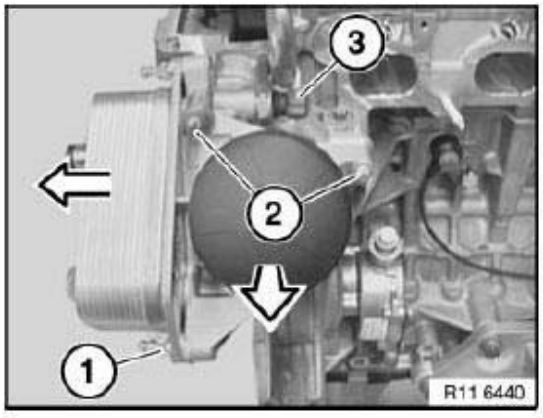


Fig. 353: Disconnecting Plug Connection On Oil Pressure Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool **11 4 050** with sealing ring.

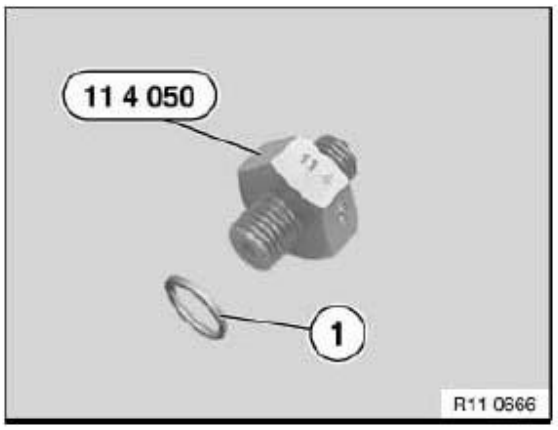


Fig. 354: Identifying Sealing Ring And Special Tool (11 4 050)
Courtesy of BMW OF NORTH AMERICA, INC.

Check engine oil pressure with diagnosis system.

Connect special tools 13 6 054 and 13 6 051.

Check engine oil pressure with pressure gauge.

Connect special tools 13 3 063 and 13 3 061.

Start engine and check engine oil pressure.

Specified values See or **TED-TED-TDMUC1141-N52K-01B1S1 OIL PUMP WITH STRAINER AND DRIVE N52K/B25** .

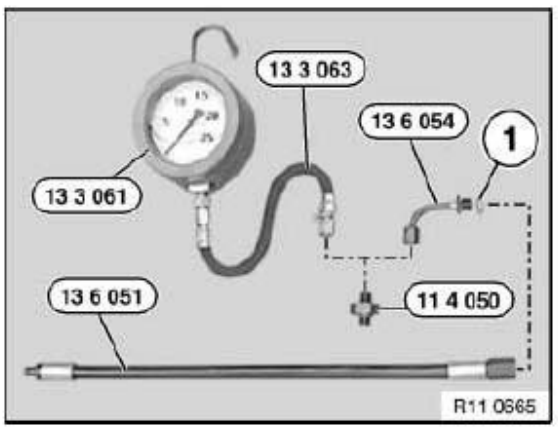


Fig. 355: Checking Engine Oil Pressure With Pressure Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 40 000 CHECKING ENGINE OIL PRESSURE (N53, N52K)

IMPORTANT: The regulated oil pump can only be checked and measured with the diagnosis system.
Vehicles with a regulated oil pump have a HYDRAULIC VALVE fitted.
Diagnosis path:

- **DME Motor Electronics**
- **Complete vehicle**
- **Drive**
- **Engine electronics**
- **Engine oil**
- **Oil-pressure control**

Special tool 11 9 250 must be converted for the N52k and N53.

Necessary preliminary tasks:

- Connect BMW diagnosis system to vehicle.
- Observe diagnosis instructions.
- Protect drive belt against dirt
- Have a cleaning cloth ready to catch escaping oil

Secure special tool 11 9 250 at hexagon head in a vice.

Release insert (2) using a screwdriver (1) in direction of arrow.

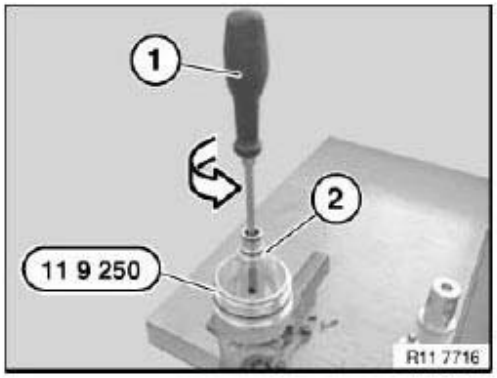


Fig. 356: Releasing Insert Using Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw piece (1) on special tool 11 6 410.

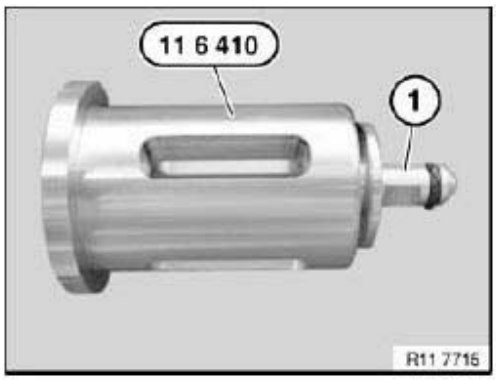


Fig. 357: Releasing Screw Piece On Special Tool 11 6 410
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool 11 6 410 in special tool 11 9 250.

Insert central screw with a screwdriver (1) hand-tight.

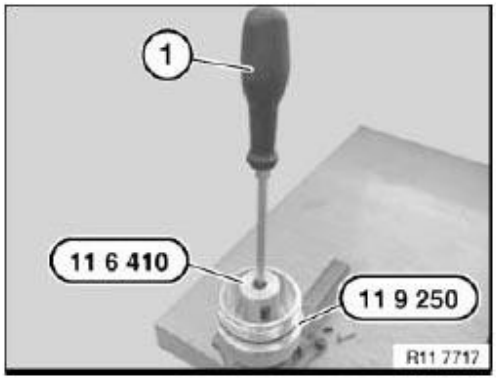


Fig. 358: Inserting Central Screw With Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screw piece (1) hand-tight in direction of arrow on special tool 11 6 410.

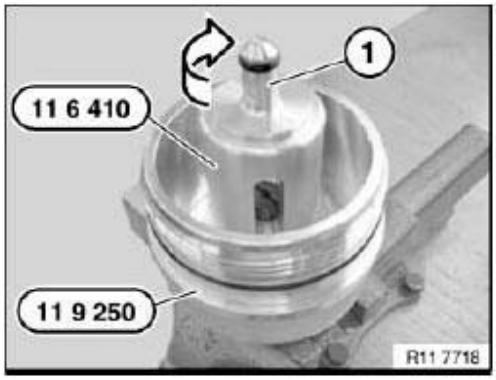


Fig. 359: Inserting Screw Piece With Special Tools (11 6 410 And 11 9 250)
Courtesy of BMW OF NORTH AMERICA, INC.

Release oil filter cap with special tool 11 9 240 .

Tightening torque: **11 42 1 AZ.**

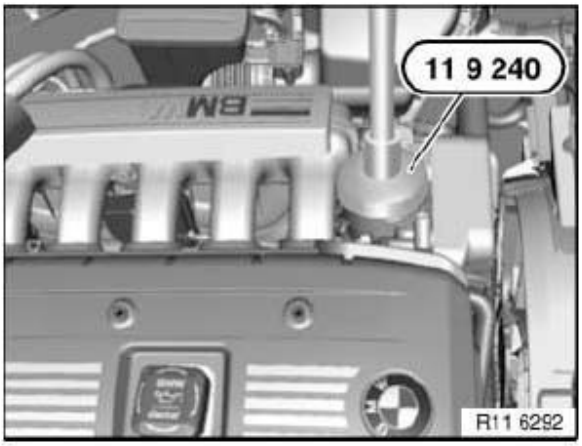


Fig. 360: Releasing Oil Filter Cap Using Special Tool (11 9 240)
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully detach filter element.

Installation:

Check all O-rings for damage, replace if necessary.

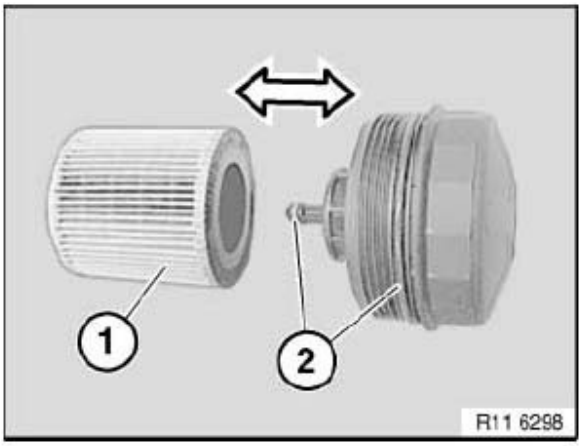


Fig. 361: Identifying Oil Filter Element And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Install filter element (1) in special tool 11 9 250.

Installation:

Coat O-ring with engine oil.

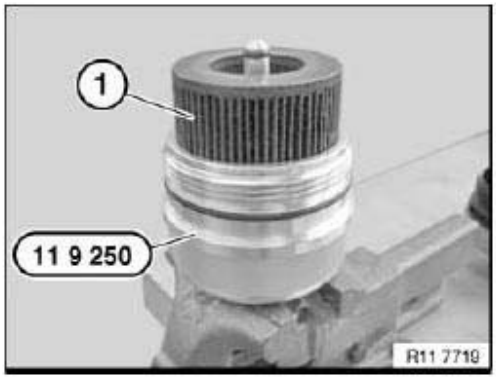


Fig. 362: Installing Filter Element Using Special Tool 11 9 250
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Engine oil pressure measurement is only possible with the diagnosis system.

Screw in special tool 11 9 250 with a filter element.

Secure special tool 13 6 051 with a sealing ring to special tool.

Start engine and check engine oil pressure.

Specified values See **OIL PUMP WITH STRAINER AND DRIVE N53, N52K/B30** or **OIL PUMP WITH STRAINER AND DRIVE N53, N52K/B25** .

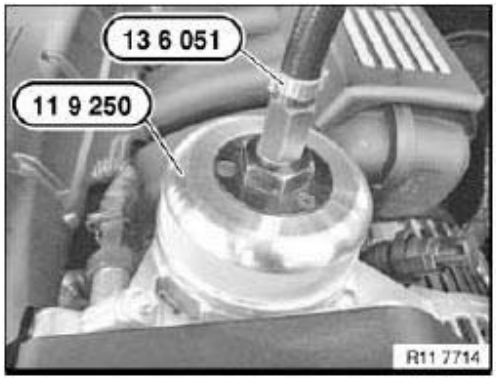


Fig. 363: Identifying Special Tool 13 6 051 With Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1141 OIL PUMP WITH FILTER AND DRIVE

11 66 000 REMOVING AND INSTALLING OR REPLACING VACUUM/OIL PUMP (N47 D20 O1)

IMPORTANT: It is possible to remove and install the vacuum oil pump without removing the transmission.

Necessary preliminary work:

- Removing oil sump.

Release screws (1).

Remove intake snorkel in direction of arrow.

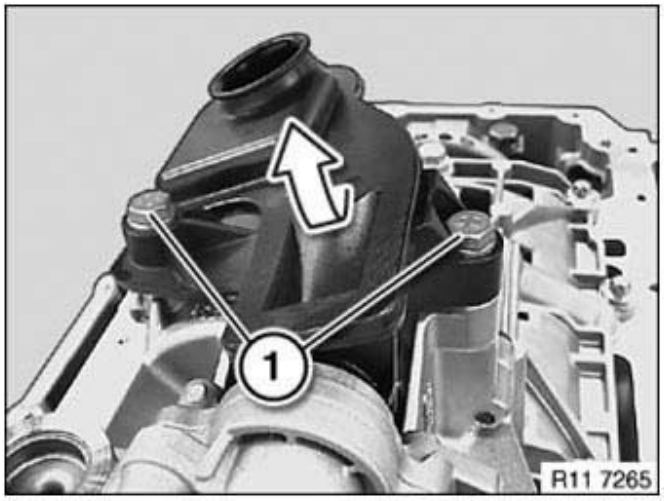


Fig. 364: Removing Intake Snorkel
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

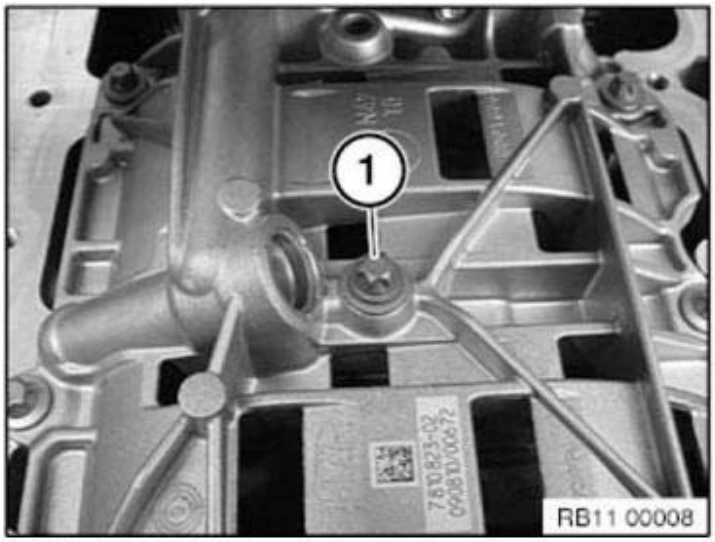


Fig. 365: Identifying Intake Snorkel Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation note:

Clean and blow out thread

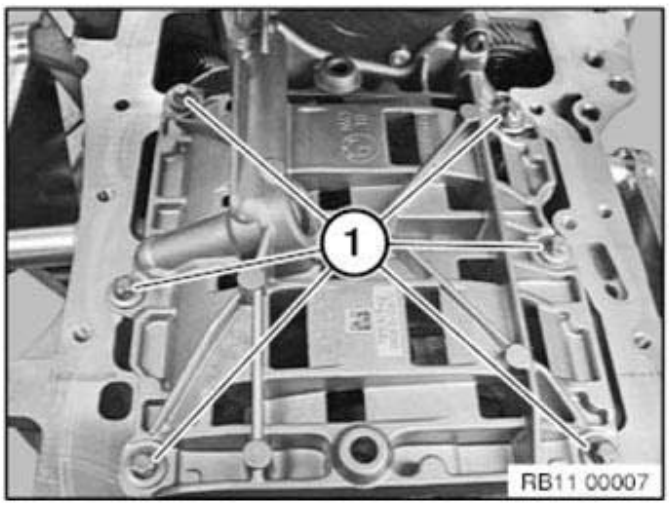


Fig. 366: Identifying Oil Vacuum Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

When installed, the oil pump chain must be fed out from the sprocket wheel of the oil pump drive gear; the sprocket wheel cannot be removed.

NOTE: Illustration shows gear case cover removed.

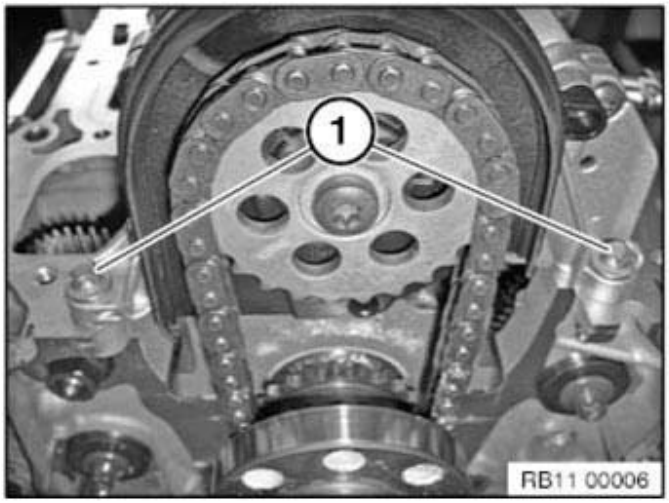


Fig. 367: Identifying Gear Case Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Oil vacuum pump must be fed out at chain drive (1).

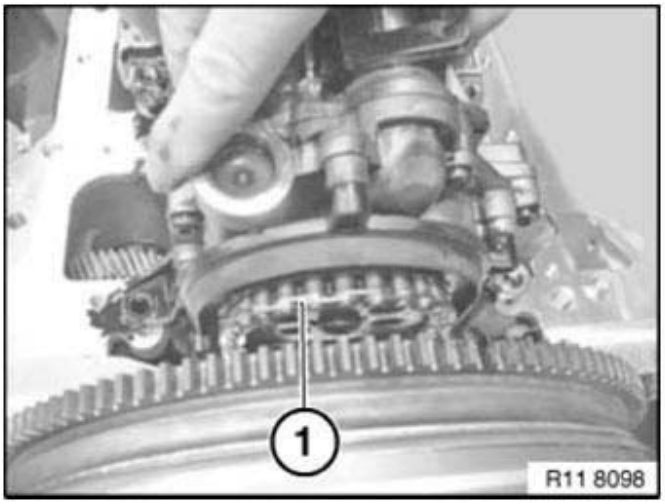


Fig. 368: Identifying Oil Vacuum Pump And Chain Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out oil vacuum pump (1) in direction of arrow and remove.

Installation in reverse sequence.

Installation note:

Clean all sealing surfaces.

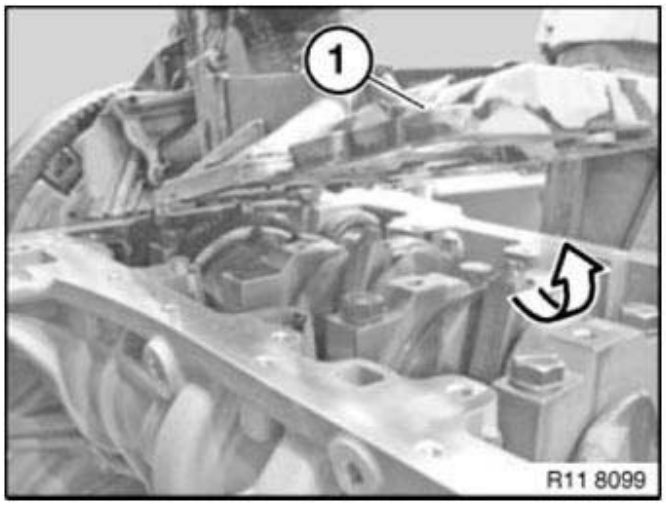


Fig. 369: Removing Oil Vacuum Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Install all screws (1) and tighten down.

Tightening torque: 11 41 1AZ.

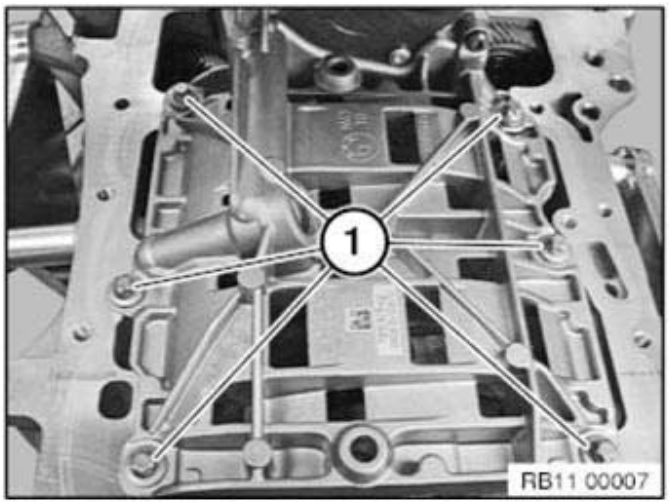


Fig. 370: Identifying Oil Vacuum Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Install and tighten down screws (1).

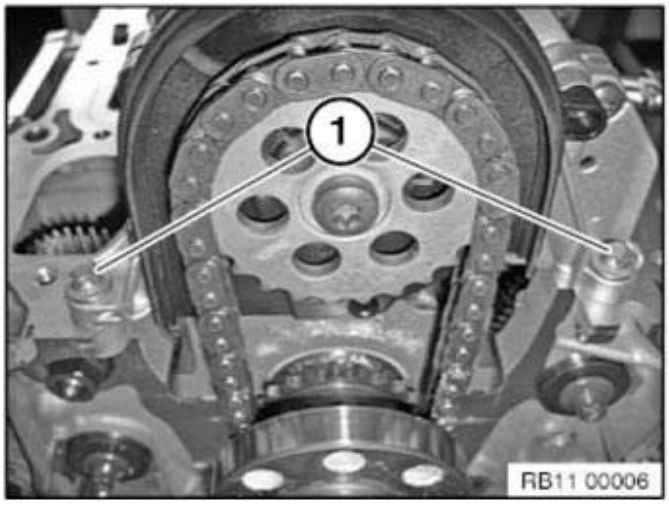


Fig. 371: Identifying Gear Case Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Clean and blow out thread

Insert and secure screw (1).

Secure screw (1) with special tool 00 9 120 .

Tightening torque, see 11 41 2AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE** .

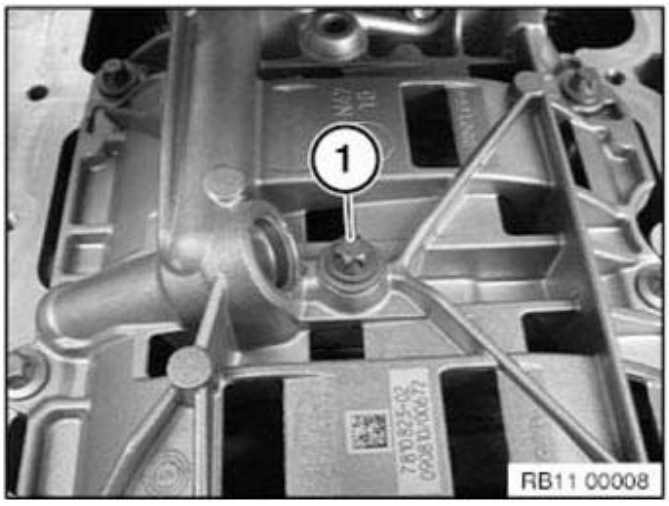


Fig. 372: Identifying Oil Vacuum Pump Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 41 010 REMOVING AND INSTALLING/REPLACING CHAIN MODULE FOR OIL PUMP/VACUUM PUMP (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove **OIL SUMP**
- Remove **DRIVE BELT**
- Remove drive belt **TENSIONER**
- Remove **VIBRATION DAMPER**
- Remove **SEALING COVER** for vacuum pump

Procedure on installed engine

Turn sprocket (3) with central bolt at crankshaft into position until special tool 11 0 290 can be secured.

Simultaneously secure special tool 11 0 290 to sprocket (3) and special tool 11 4 362.

Release screw (2) for sprocket (3).

Tightening torque **11 66 2AZ** .

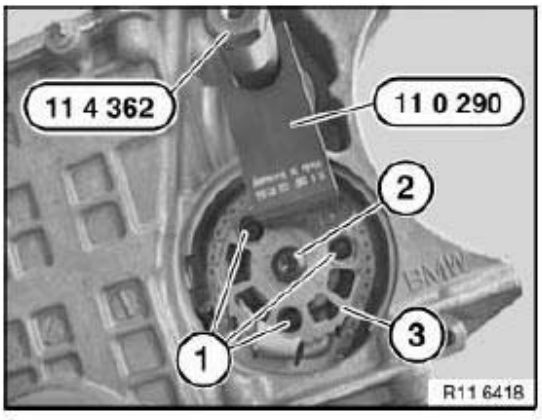


Fig. 373: Turning Sprocket With Central Bolt Using Special Tool (11 0 290)
Courtesy of BMW OF NORTH AMERICA, INC.

Press timing chain with chain tensioner (1) in direction of arrow.

Disconnect timing chain with special tool 11 4 120 .

Feed out sprocket (3) at hexagon head (4) of vacuum pump.

Installation:

If the chain module is replaced, a mounting bar (2) is already pre-installed.

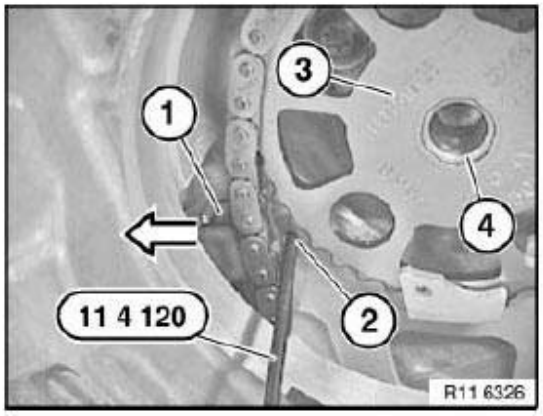


Fig. 374: Disconnecting Timing Chain Using Special Tool (11 4 120)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: To release bolt (1), insert a 6 mm drill bit between sprocket and oil pump housing.

Release screw (1) for sprocket.

Tightening torque **11 41 6AZ** .

Release screws (2) for chain module.

Tightening torque **11 41 5AZ** .

Installation:

Replace aluminum screws.

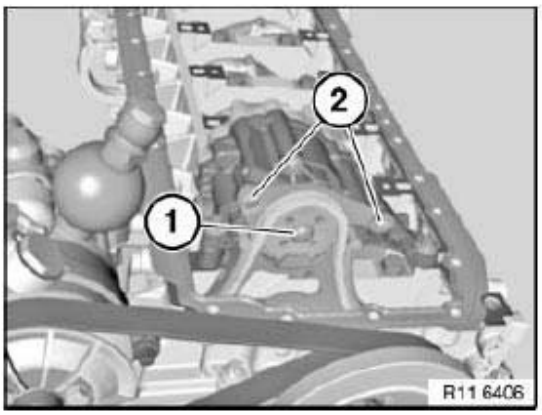


Fig. 375: Identifying Aluminum Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Secure crankshaft and camshaft with special tools 11 0 300 and 11 4 280 (refer to Checking **TIMING**).

IMPORTANT: Do not remove special tools 11 0 300 and 11 4 280 to release central bolt (1). Employ a second person for gripping when releasing central bolt (1).

Screw special tool 11 9 280 onto hub of vibration damper.

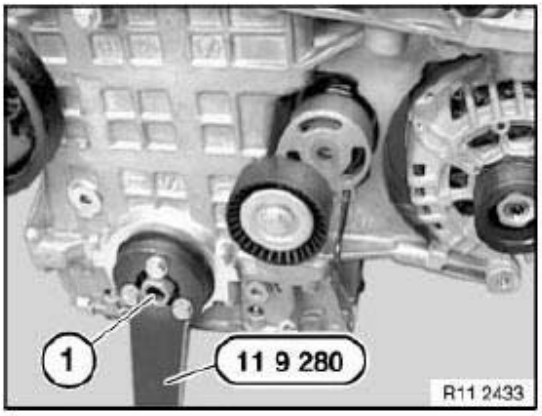


Fig. 376: Tightening Central Bolt Using Special Tool (11 9 280)
Courtesy of BMW OF NORTH AMERICA, INC.

Release central screw (1).

Tightening torque **11 21 1AZ** .

Installation:

Replace central bolt (1).

Remove hub (2) towards front.

Installation:

Replace **CRANKSHAFT RADIAL SEAL** at front.

Open screw plug on bedplate.

Tightening torque **11 11 8AZ** .

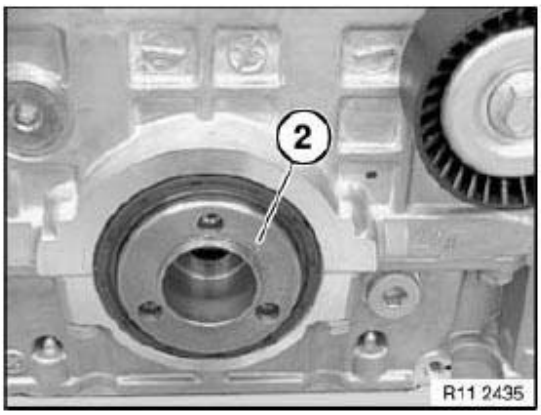


Fig. 377: Identifying Front Hub
Courtesy of BMW OF NORTH AMERICA, INC.

Release aluminum screw (1) with special tool **11 8 640** .

Tightening torque **11 41 4AZ** .

Installation:

Replace aluminum screws.

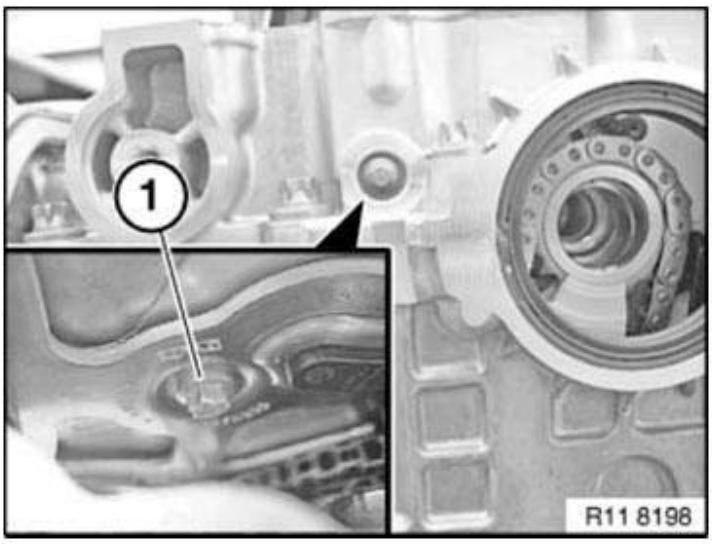


Fig. 378: Identifying Front Hub Aluminum Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove chain module (1) in direction of arrow.

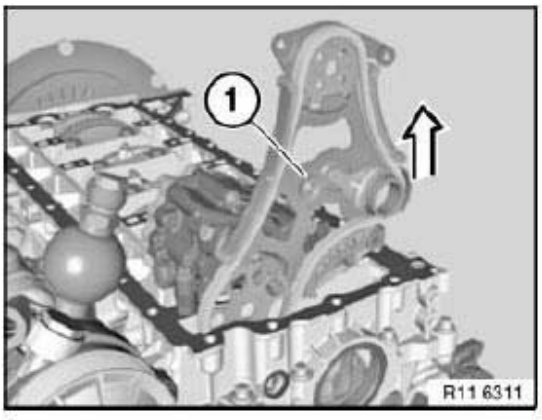


Fig. 379: Removing Chain Module
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Note installation direction of sprocket (2).
Collar (see arrow) on sprocket (2) points to engine .
Incorrect assembly will result in engine damage .

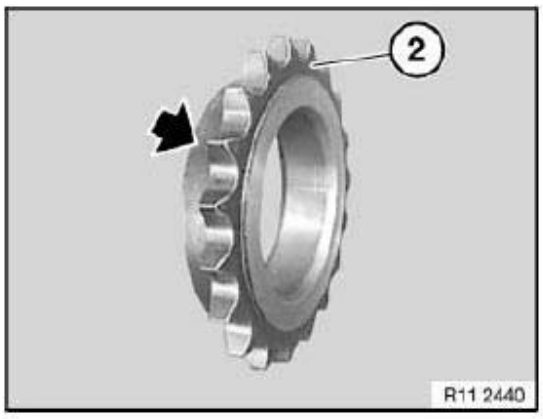


Fig. 380: Locating Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Procedure on removed engine

NOTE: Engine is mounted on special tool 11 4 440 .

Release screw (1) for sprocket.

Tightening torque **11 66 2AZ** .

Release screw (2) for sprocket.

Tightening torque **11 41 6AZ** .

Release central bolt (3).

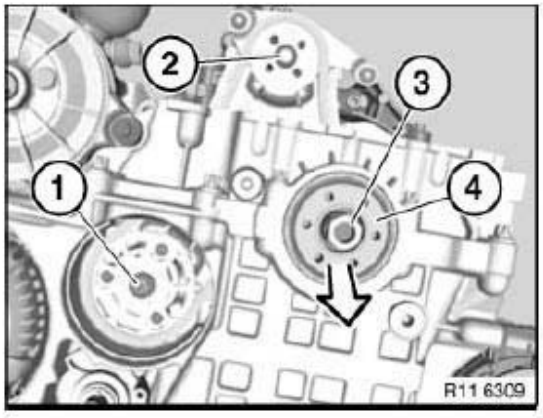


Fig. 381: Removing Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **11 21 1AZ** .

Installation:

Mark central bolt (3) with a colored dot.

Replace central bolt (3).

Remove hub (4) towards front.

All:

Install hub with new central bolt.

Tighten down special tool 11 5 200 with screws (1) to hub.

Do **not** remove special tools 11 0 300 and 11 4 280 .

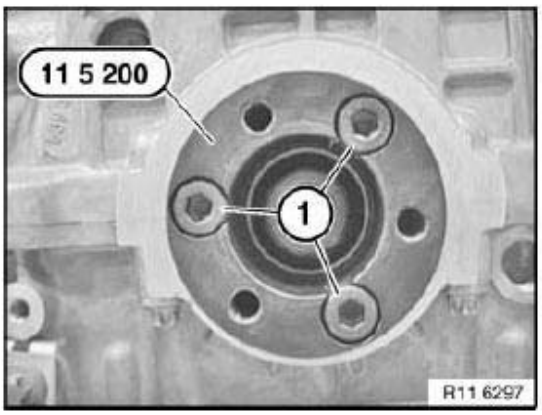


Fig. 382: Identifying Front Hub Screws And Special Tool (11 5 200)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **TENSIONER** for drive belt.

Screw in special tool 11 4 362 from special tool set 11 4 360 .

Mount special tool 11 9 280 on 11 5 200 .

Support special tool 11 9 280 on special tool 11 4 362.

Special tool 11 0 300 secures crankshaft.

Tighten central bolt to jointing torque.

Tightening torque **11 21 1AZ** .

Mark central bolt and hub with paint.

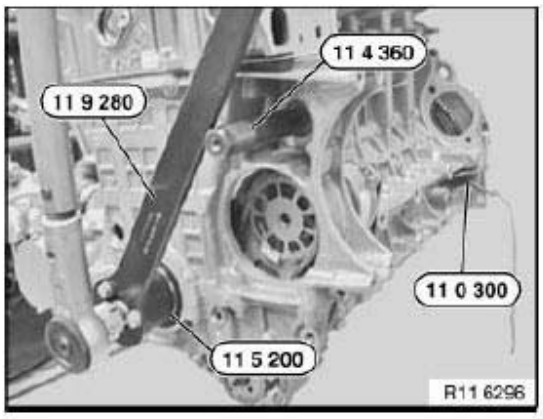


Fig. 383: Tightening Central Bolt Using Special Tools (11 9 280)
Courtesy of BMW OF NORTH AMERICA, INC.

Mark special tools with colored line (1).

See picture.

IMPORTANT: Do not remove the special tool while tightening the central bolt to angle of rotation.
Risk of damage!

If necessary, tighten central bolt to angle of rotation with special tool 00 9 140 .

Tightening torque **11 21 1AZ** .

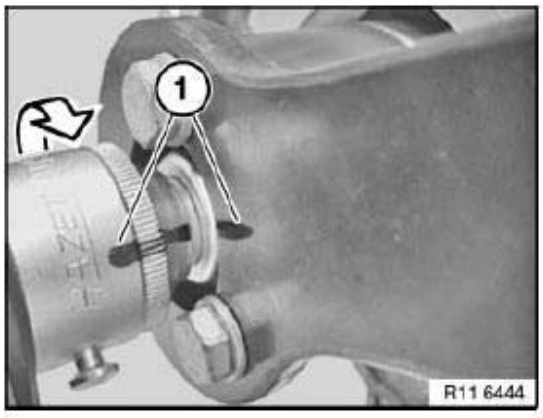


Fig. 384: Tightening Central Bolt And Colored Line
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace **CRANKSHAFT RADIAL SEAL** at front.

Assemble engine.

11 41 115 REMOVING AND INSTALLING/REPLACING HYDRAULIC VALVE (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove front **UNDERBODY PROTECTION**
- Have a cleaning cloth ready to catch escaping oil

Detach plug (1) from hydraulic valve (2).

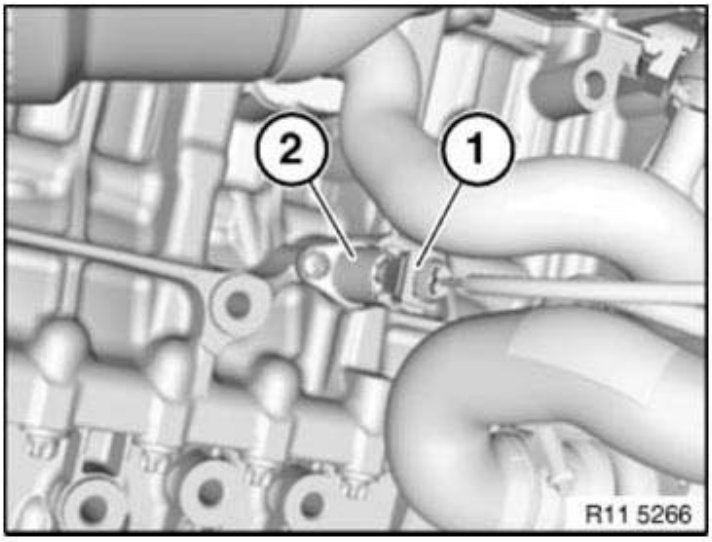


Fig. 385: Identifying Hydraulic Valve With Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove hydraulic valve (2).

Tightening torque

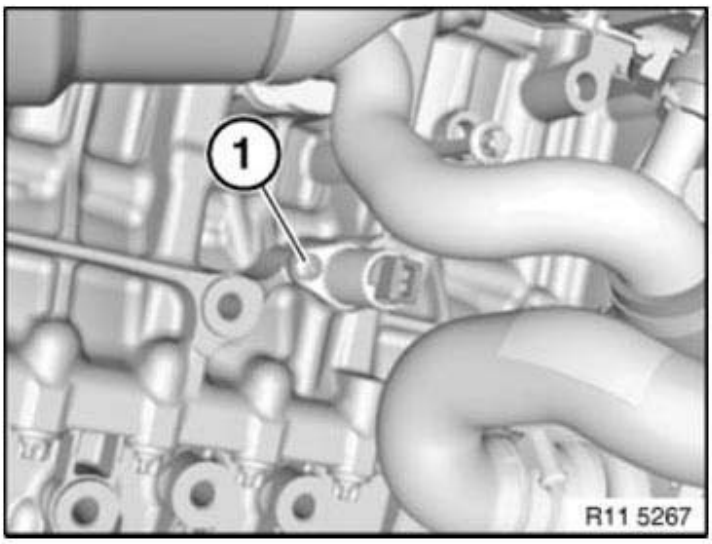


Fig. 386: Identifying Hydraulic Valve Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Replace O-ring (1).

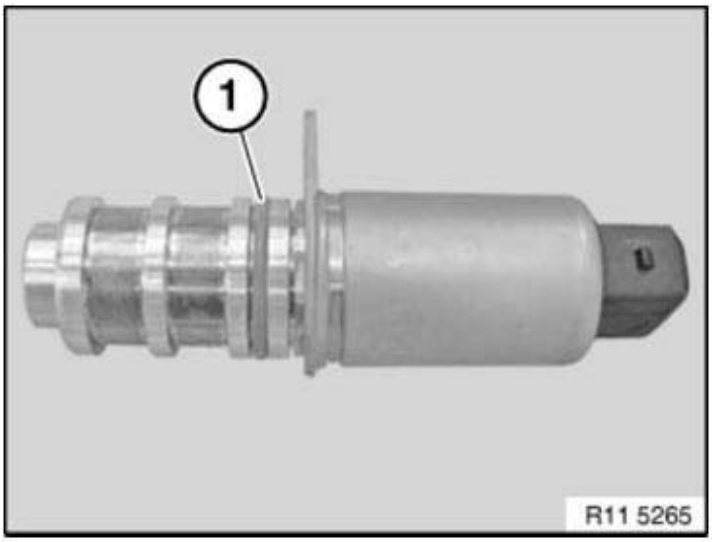


Fig. 387: Identifying O-Ring
Courtesy of BMW OF NORTH AMERICA, INC.

11 41 000 REMOVING AND INSTALLING/REPLACING OIL PUMP (N52K)

Necessary preliminary tasks:

- Remove **OIL SUMP**

Release screws (1).

Tightening torque **11 41 1AZ** .

Installation:

Replace aluminum screws.

Remove intake pipe (2) in direction of arrow.

Installation:

Replace sealing ring.

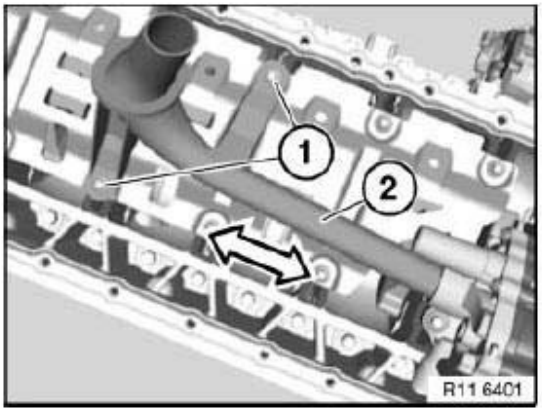


Fig. 388: Removing Oil Pump Intake Pipe And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: To release bolt (1), insert a 6 mm drill bit between sprocket wheel and oil pump housing.

Release bolt (1).

Tightening torque **11 41 6AZ** .

Release screws (2).

Tightening torque **11 41 5AZ** .

Installation:

Replace aluminum screws.

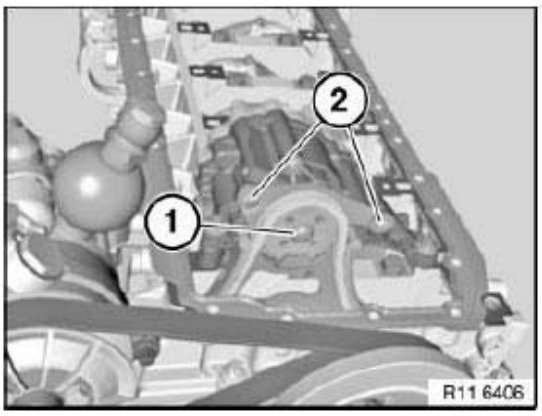


Fig. 389: Identifying Aluminum Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe different screw lengths.

Release screws (1).

Tightening torque **11 41 2AZ** .

Tightening torque **11 41 3AZ** .

Installation:

Replace aluminum screws.

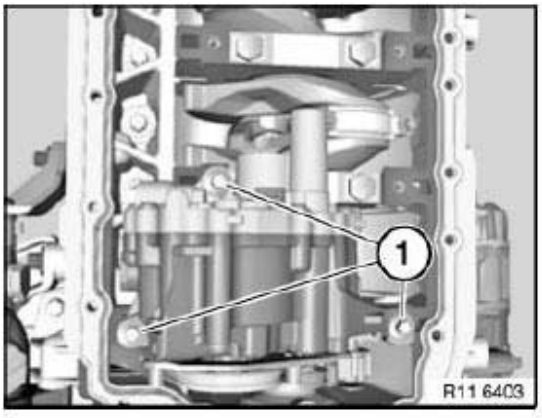


Fig. 390: Identifying Oil Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Detach sprocket wheel (1) in direction of arrow.

NOTE: Chain tensioner presses timing chain (3) upwards.

Do **not** remove sprocket wheel (1).

Remove oil pump (2) in direction of arrow.

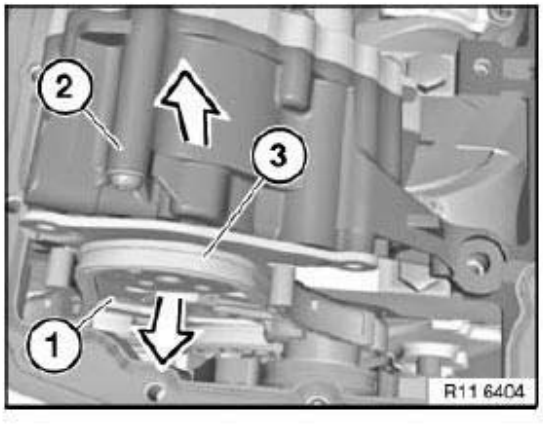


Fig. 391: Detaching Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check spacers (1) for secure seating and damage; replace if necessary.

Align twin surface (3) on oil pump (2) to sprocket wheel (4).

Install oil pump (2).

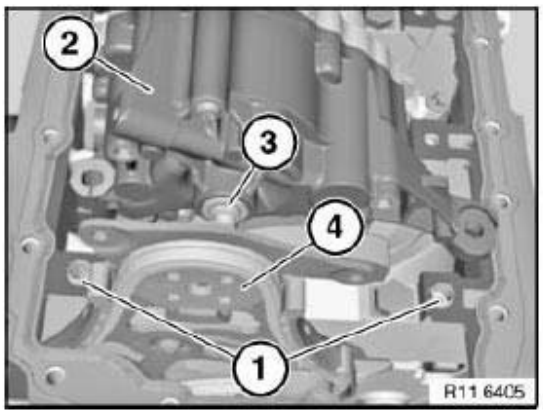


Fig. 392: Identifying Spacers, Oil Pump And Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1142 OIL FILTER AND LINES

11 42 020 REMOVING AND INSTALLING/REPLACING FULLFLOW OIL FILTER (N52)

WARNING: Danger of scalding!
Only perform these tasks on an engine that has cooled down.

Recycling

Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks:

- Drain **COOLANT** .
- Remove intake air **MANIFOLD** .
- Unfasten oil filter cover.
- Protect drive belt against dirt.

Release screw (1).

Tightening torque: **11 42 2AZ.**

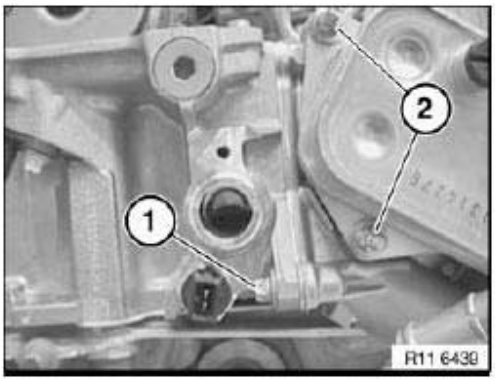


Fig. 393: Identifying Oil Filter Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (2).

NOTE: Have cleaning cloth ready to catch residual oil.

Tightening torque: **11 42 2AZ.**

Installation:

Replace all seals.

If necessary, replace filter element.

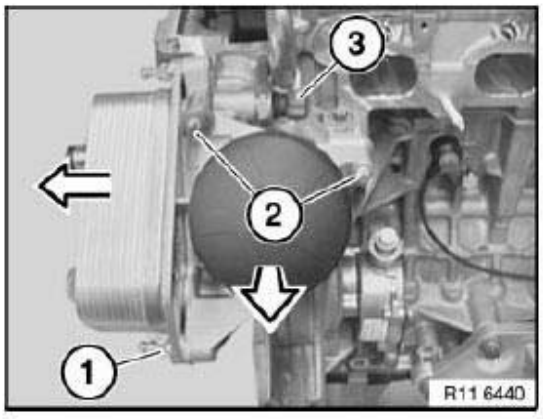


Fig. 394: Disconnecting Plug Connection On Oil Pressure Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

NOTE: Protect drive belt against dirt.

Installation:

VENTING INSTRUCTIONS must be observed without fail.

1151 WATER PUMP WITH DRIVE

11 51 000 REMOVING AND INSTALLING/REPLACING WATER PUMP (N52K)

WARNING: Danger of scalding!
Only perform this work after engine has cooled down.

Recycling

Catch and dispose of drained coolant in a suitable container.

Observe country-specific waste-disposal regulations.

IMPORTANT: If a water pump that has already been operated is reused, it must be filled with coolant immediately after removal.
Mixture ratio, water: coolant = 1 : 1

Protect plug connections against coolant and contamination.

Cover plug connections with suitable materials.

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **COOLANT THERMOSTAT**
- Remove front right **CROSS STRUT** (**E89 only**)

Loosen hose clamps (1).

Remove coolant hose.

Tightening torque **11 53 5AZ** .

Unfasten hose clip (2).

Remove coolant hose.

Tightening torque **11 53 3AZ** .

Disconnect plug connection (4).

Release screws (3).

Tightening torque **11 53 1AZ** .

Release screws (5).

Tightening torque **11 51 1AZ** .

Installation:

Replace aluminum screws.

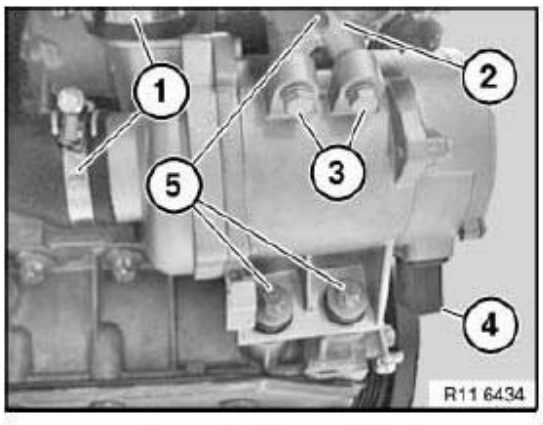


Fig. 395: Identifying Coolant Hose, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If the electric water pump is reused, it must be rotated one turn due to the breakaway torque at the blade wheels.

Assemble engine.

VENTING INSTRUCTIONS must be observed **without fail** .

1153 THERMOSTAT AND CONNECTIONS

11 53 000 REMOVING AND INSTALLING/REPLACING COOLANT THERMOSTAT (N52K)

WARNING: Risk of scalding!
Only perform these tasks on an engine that has cooled down.
Danger of injury!
Risk of skidding due to coolant on the floor.

Recycling

Catch and dispose of drained coolant in a suitable collecting vessel.

Observe country-specific waste disposal regulations.

IMPORTANT: Read and comply with GENERAL NOTES .
Protect plug connections against coolant and dirt contamination.
Cover plug connections with suitable materials.

Necessary preliminary work:

- Remove **FRONT UNDERBODY PROTECTION**

- Release **ANTI-ROLL BAR ON FRONT AXLE (E89 only)**
- Remove **FAN COWL (only E89, E70)**

NOTE: E89 only

Release screws (1) (only on front axle support)

Tightening torque **17 10 5AZ** .

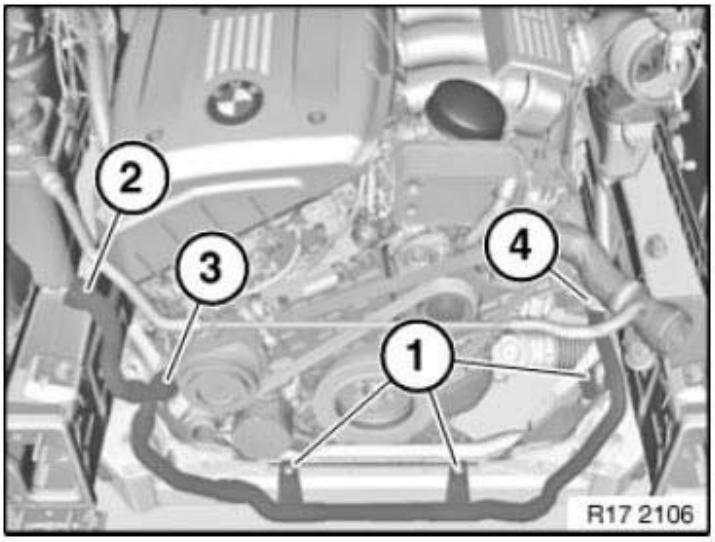


Fig. 396: Identifying Screws On Front Axle Support
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Illustration shows coolant thermostat removed.

Disconnect coolant hoses (arrows) on the thermostat (1) with clamping tongs.

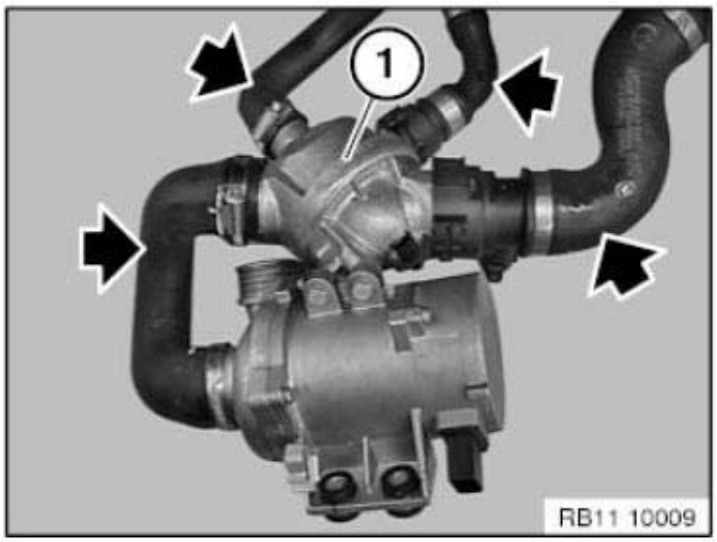


Fig. 397: Locating Coolant Hoses On Thermostat
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For a better overview, the picture and text refer to the component when removed.

Unfasten hose clamp (1).

Tightening torque **11 53 5AZ** .

Remove coolant hose.

Unfasten hose clamp (2).

Tightening torque **11 53 6AZ** .

Remove coolant hose.

Unlock and detach coolant hose (3).

Unlock and detach coolant hose (4).

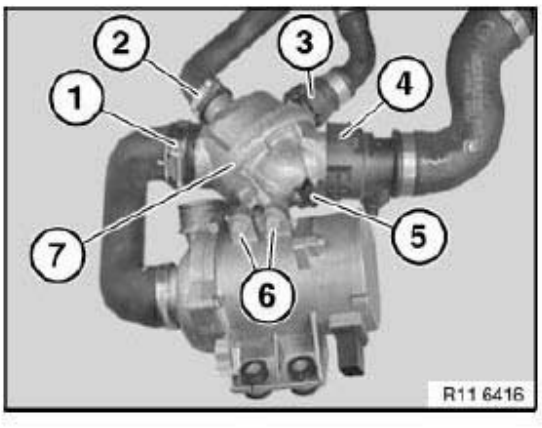


Fig. 398: Identifying Coolant Thermostat, Hose Clamps, Coolant Hoses And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (5).

Release screws (6).

Tightening torque **11 53 1AZ** .

Remove coolant thermostat (7).

Assemble engine.

FILL THE COOLING SYSTEM .

CHECK THE COOLING SYSTEM FOR TIGHTNESS AND FUNCTION.

1161 INTAKE MANIFOLD

11 61 050 REMOVING AND INSTALLING AIR INTAKE MANIFOLD (N52K)

Necessary preliminary tasks:

- Remove **TENSION STRUT**
- Remove **INTAKE FILTER HOUSING**
- Remove **IGNITION COIL COVER**

Open holder (2).

Disconnect plug connection (1) under of air intake manifold.

Release both crankcase breathers (3).

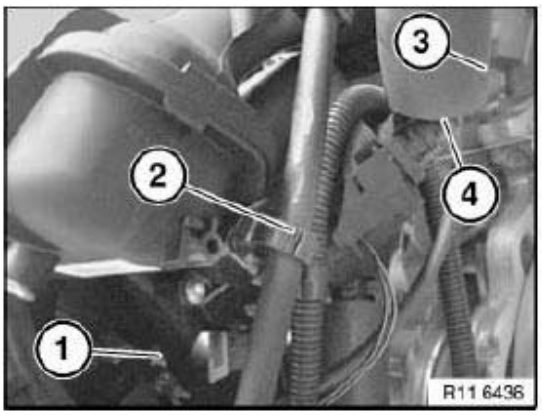


Fig. 399: Identifying Plug Connection, Crankcase Breathers And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Disconnect plug connection (3).

Release screws (4).

Detach engine wiring harness (2) from air intake manifold and lay to one side.

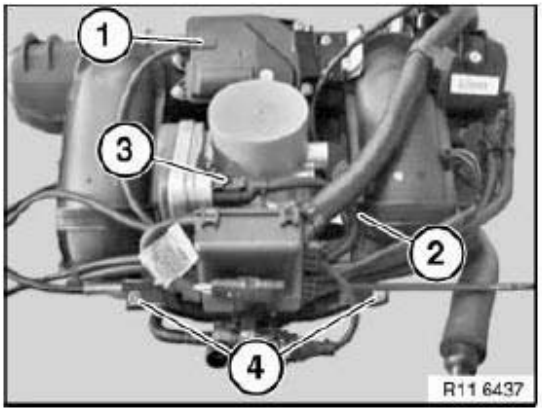


Fig. 400: Identifying Engine Wiring Harness, Plug Connections And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on oil pressure switch (2).

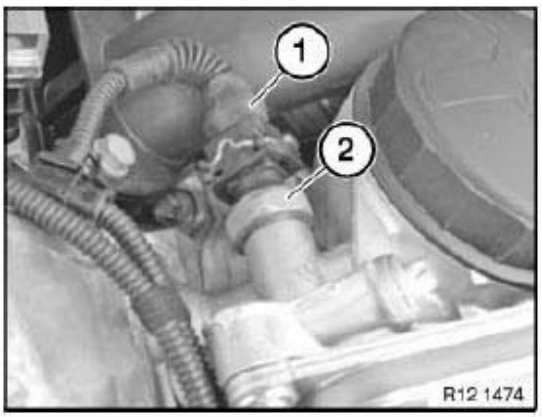


Fig. 401: Identifying Plug Connection On Oil Pressure Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Release fuel rail (2) and lay to one side.

NOTE: Do not detach fuel line.

Release screws (1).

Tightening torque **11 61 1AZ** .

Unscrew nuts (3).

Tightening torque **11 61 2AZ** .

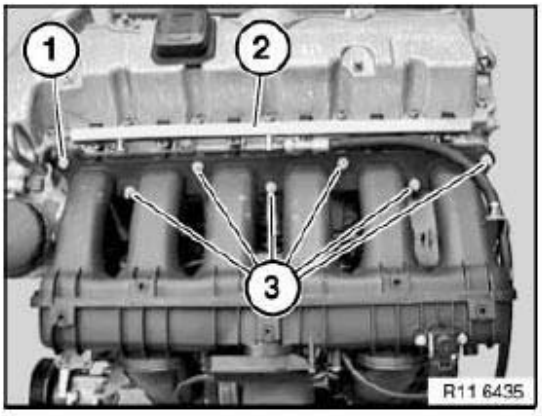


Fig. 402: Identifying Fuel Rail With Screw And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Raise air intake manifold approx. 10 cm.

Disconnect plug connections (1) at bottom.

Release tank vent line behind throttle valve assembly.

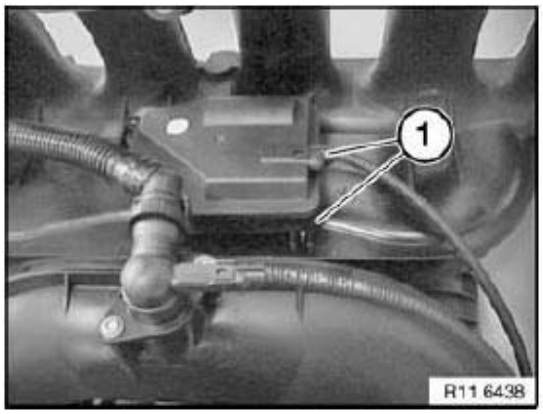


Fig. 403: Identifying Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace all seals.

Assemble engine.

1162 EXHAUST MANIFOLD

18 40 050 REMOVING AND INSTALLING/REPLACING FRONT EXHAUST MANIFOLD (N52K)

WARNING: Risk of injury!
Refrigerant circuit is under high pressure!
Follow safety instructions for handling refrigerant See 6450... INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A or 6450... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT R134A .
Avoid contact with refrigerant and refrigerant oil
Follow safety instructions for HANDLING REFRIGERANT OIL .

IMPORTANT: Risk of damage!
Restart engine only when A/C system has been correctly filled.
Follow INSTRUCTIONS for opening and replacing parts in refrigerant circuit.
If A/C system is opened for more than 24 hours:
Replace DESICCANT INSERT for A/C system.

Necessary preliminary tasks

- Remove **REAR EXHAUST MANIFOLD**
- Drain off **AIR CONDITIONING SYSTEM**

NOTE: **The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.**

Remove **CONTROL SENSOR** from cylinders 1 to 3.

Remove **MONITOR SENSOR** from cylinders 1 to 3.

Release screws (1).

Tightening torque **64 52 1AZ** .

Detach pressure and suction lines from A/C compressor.

Installation:

Replace all sealing rings and moisten with refrigerant oil.

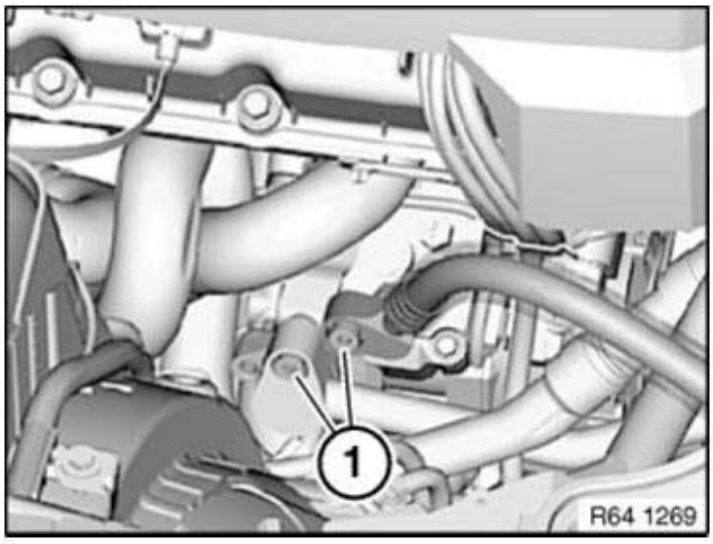


Fig. 404: Identifying Suction Lines Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts.

Remove exhaust manifold (1).

Installation:

Clean sealing faces and replace seals.

Replace nuts.

Tightening torque **18 40 1AZ** .

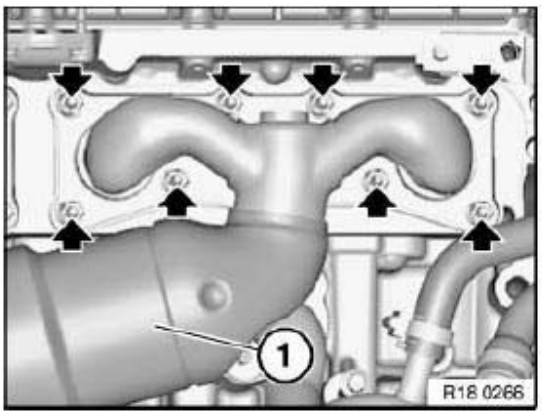


Fig. 405: Locating Exhaust Manifold Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Evacuate and fill **A/C SYSTEM** .

Check exhaust system for leaks.

18 40 060 REMOVING AND INSTALLING/REPLACING REAR EXHAUST MANIFOLD (N52K)

Necessary preliminary tasks

- Remove right **TENSION STRUT**
- Remove front **UNDERBODY PROTECTION**
- Remove rear **UNDERBODY PROTECTION**
- Remove **COMPLETE EXHAUST SYSTEM**

NOTE: The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.

Remove **CONTROL SENSOR** from cylinders 4 to 6.

Remove **MONITOR SENSOR** from cylinders 4 to 6.

Unscrew nuts.

Remove exhaust manifold (1).

Installation:

Clean sealing faces and replace seals.

Replace nuts.

Tightening torque **18 40 1AZ** .

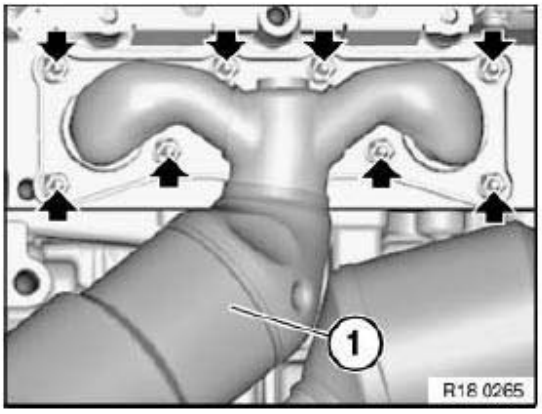


Fig. 406: Locating Exhaust Manifold Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check exhaust system for leaks.

1166 VACUUM PUMP

11 66 000 REMOVING AND INSTALLING OR REPLACING VACUUM/OIL PUMP (N47 D20 O1)

IMPORTANT: It is possible to remove and install the vacuum oil pump without removing the transmission.

Necessary preliminary work:

- Removing oil sump.

Release screws (1).

Remove intake snorkel in direction of arrow.

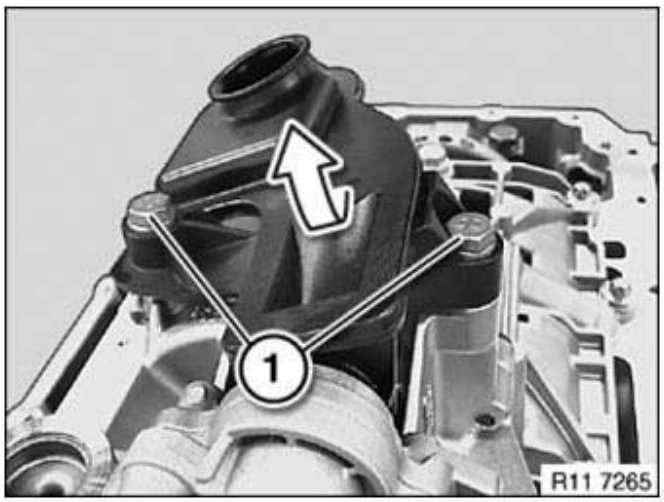


Fig. 407: Removing Intake Snorkel And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

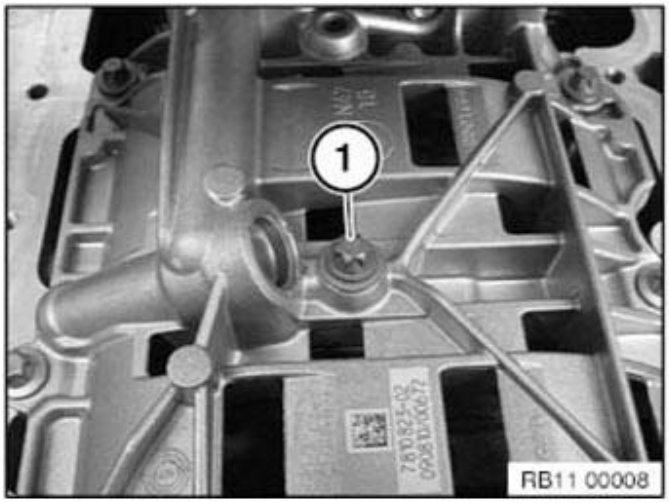


Fig. 408: Identifying Oil Vacuum Pump Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation note:

Clean and blow out thread

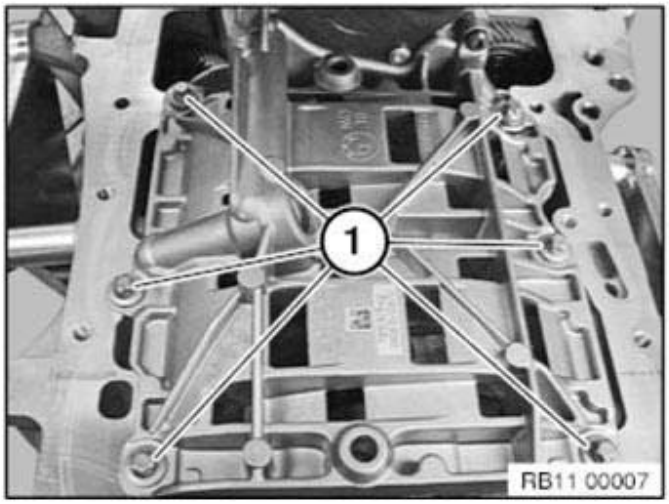


Fig. 409: Identifying Oil Vacuum Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

When installed, the oil pump chain must be fed out from the sprocket wheel of the oil pump drive gear; the sprocket wheel cannot be removed.

NOTE: Illustration shows gear case cover removed.

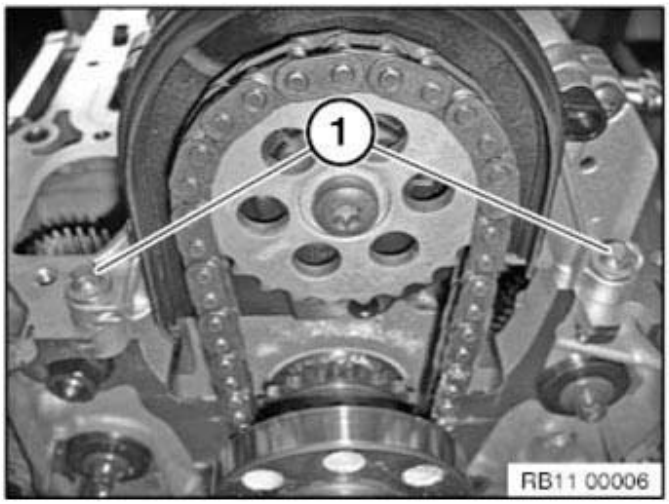


Fig. 410: Identifying Gear Case Cover Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Oil vacuum pump must be fed out at chain drive (1).

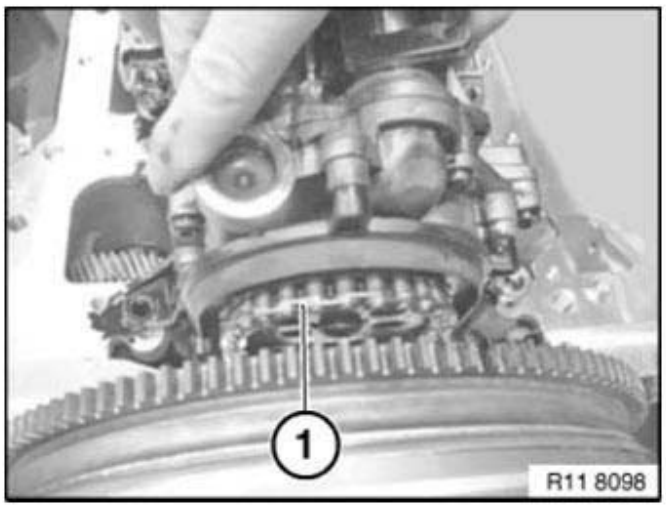


Fig. 411: Identifying Oil Vacuum Pump Chain Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out oil vacuum pump (1) in direction of arrow and remove.

Installation in reverse sequence.

Installation note:

Clean all sealing surfaces.

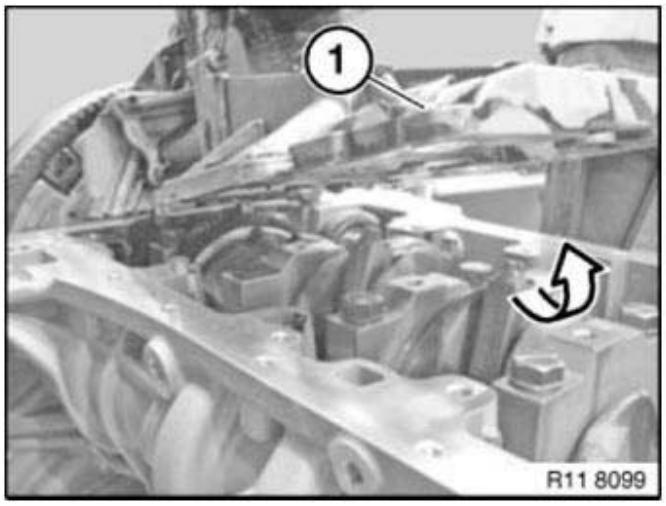


Fig. 412: Feeding Oil Vacuum Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Install all screws (1) and tighten down.

Tightening torque, see 11 41 1AZ in **OIL PUMP WITH STRAINER AND DRIVE** .

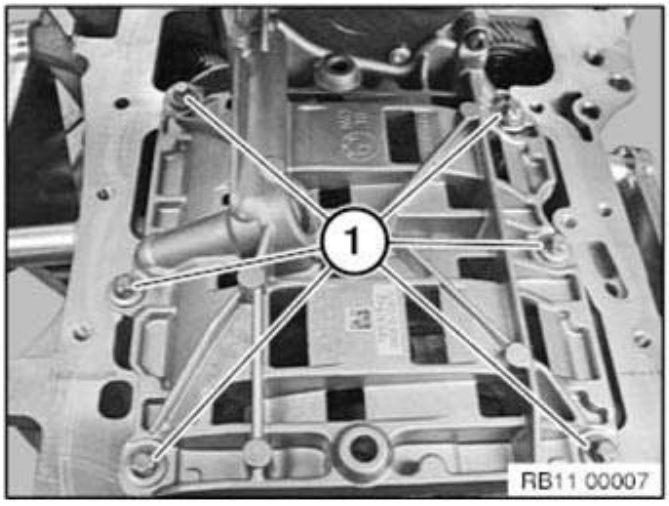


Fig. 413: Identifying Oil Vacuum Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Install and tighten down screws (1).

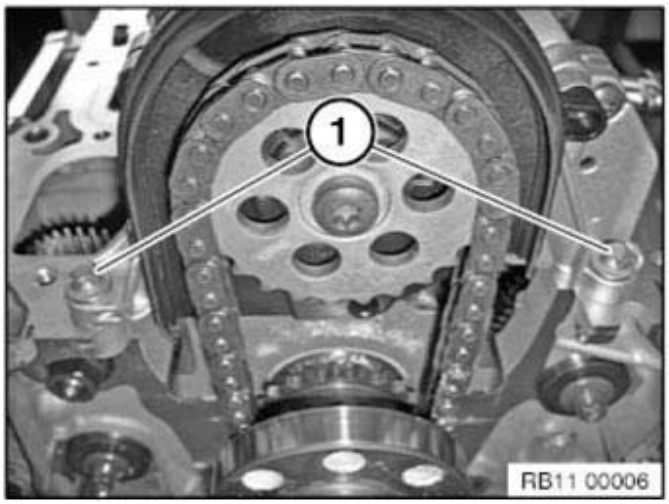


Fig. 414: Identifying Gear Case Cover Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Clean and blow out thread

Insert and secure screw (1).

Secure screw (1) with special tool 00 9 120 .

Tightening torque, see 11 41 2AZ in **OIL PUMP WITH STRAINER AND DRIVE** .

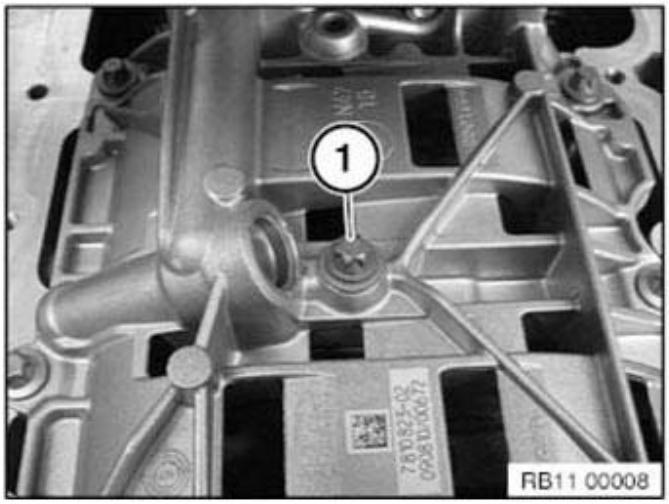


Fig. 415: Identifying Oil Vacuum Pump Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1178 EMISSION CONTROL, OXYGEN SENSOR

11 78 513 REPLACING BOTH LAMBDA OXYGEN CONTROL SENSORS (N52K)

WARNING: Scalding hazard!
Work should only be carried out on an exhaust system that has cooled down.

Installation:

The threads of new lambda control sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a lambda control sensor is to be reused, apply a thin and even coating of Never Seez compound to the thread only.

The part of the lambda control sensor which projects into the exhaust system branch (sensor ceramics) must not be cleaned and not coated with lubricant.

Lambda control sensor, cylinder nos. 1 to 3

NOTE: The lambda control sensor on the exhaust manifold of cylinder nos. 1 to 3 is accessible from above.
Disconnect plug connection.
Unclip the cable from the retainer.
Release lambda control sensor on exhaust manifold of cylinder nos. 1 to 3 with

special tool 11 7 020 .

Lambda control sensor, cylinder nos. 4 to 6

NOTE: The lambda control sensor on the exhaust manifold of cylinder nos. 4 to 6 is accessible from above.

Disconnect plug connection.

Unclip the cable from the retainer.

Release screws (1) on retaining plate.

Remove retaining plate (3).

Release lambda control sensor (2) on exhaust manifold of cylinder nos. 4 to 6 with special tool 11 7 020 .

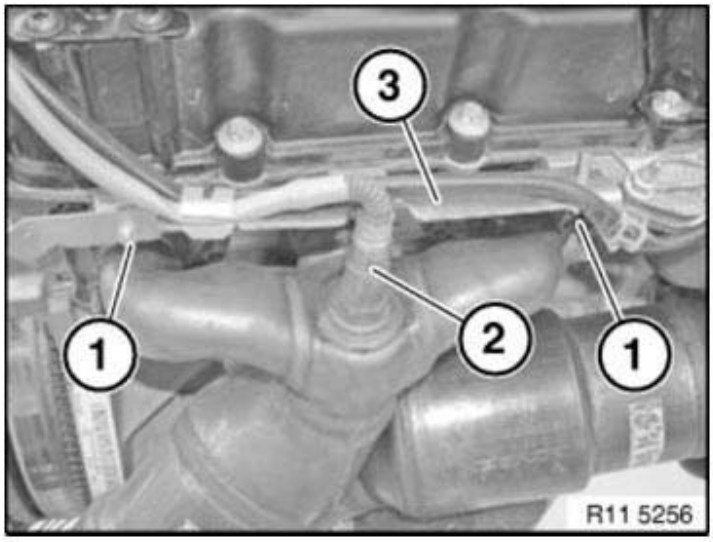


Fig. 416: Identifying Lambda Control Sensor, Retaining Plate And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

All:

Installation:

Cable color of lambda control sensor, cylinders nos. 1 to 3 = black.

Cable color of lambda control sensor, cylinders nos. 4 to 6 = grey.

Tightening torque **11 78 1AZ** .

Assemble engine.

Check function of DME.

11 78 613 REPLACING BOTH LAMBDA OXYGEN MONITORING SENSORS (N52K)

WARNING: Scalding hazard!
Work should only be carried out on an exhaust system that has cooled down.

Necessary preliminary tasks:

- Remove rear **UNDERBODY PROTECTION** .

Installation:

The threads of new lambda monitoring sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a lambda monitoring sensor is to be reused, apply a thin and even coating of Never Seez Compound to the thread only.

The part of the lambda monitoring sensor which projects into the exhaust system branch (sensor ceramics) must **not** be cleaned and **not** coated with lubricant.

Disconnect plug connection for oxygen monitoring sensor.

Release and tighten lambda monitoring sensor (1) on exhaust manifold of cylinder nos. 1 to 3 with special tool (2) 11 9 150 .

Tightening torque **11 78 1AZ** .

Installation:

Cable color of lambda monitoring sensor (1), cylinders nos. 1 to 3 = black.

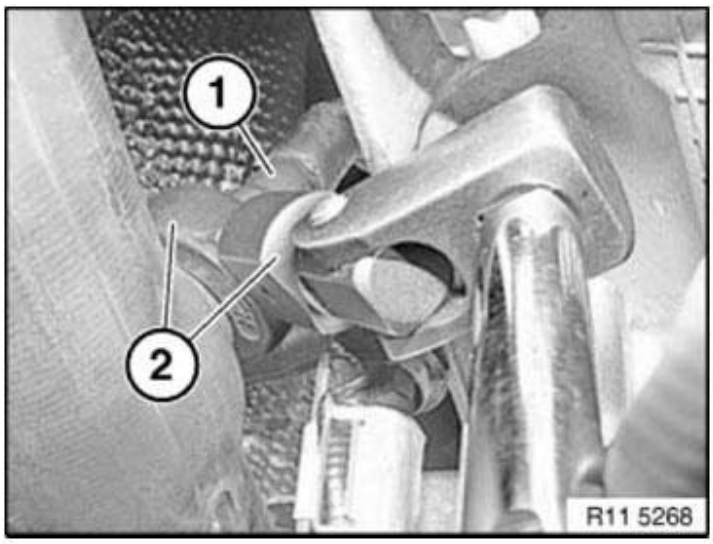


Fig. 417: Removing Lambda Monitoring Sensor Plug Connection Using Special Tool (11 9 150)
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection for oxygen monitoring sensor.

Release and tighten lambda monitoring sensor (1) on exhaust manifold of cylinder nos. 4 to 6 with special tool (2) 11 9 150 .

Tightening torque **11 78 1AZ** .

Installation:

Cable color of lambda monitoring sensor (1), cylinders nos. 4 to 6 = grey.

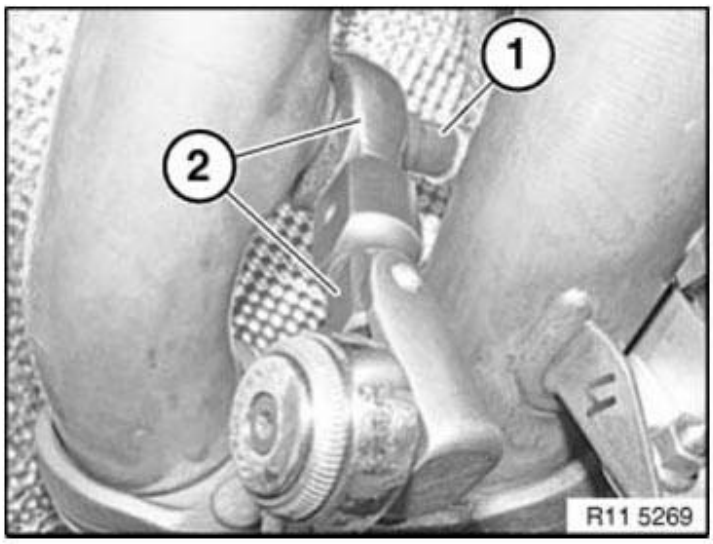


Fig. 418: Removing Lambda Monitoring Sensor Plug Connection Using Special Tool (11 9 150)

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

ENGINE

Engine - Repair - Z4

11 00 ENGINE, GENERAL

11 00 039 CHECKING COMPRESSION IN ALL CYLINDERS (N43/N53/N54)

- Read out fault memory of DME control unit
- Check stored faults
- Rectify faults
- Delete fault memory

IMPORTANT: High tension - mortal danger!

Interrupt power supply to ignition coils.

Read and comply with notes on compression pressure check.

Necessary preliminary tasks

- Remove spark plugs

Unscrew tip (1) from special tool 11 0 222.

IMPORTANT: Then check the Schrader valve that is now visible for secure seating.

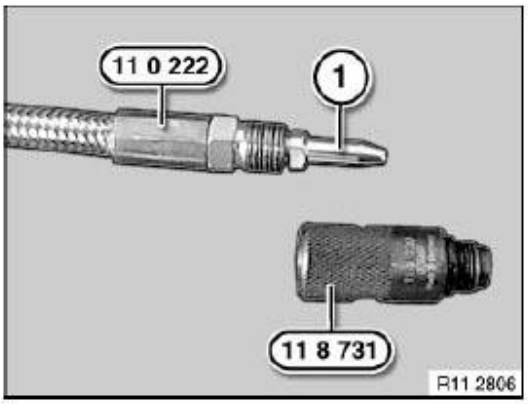


Fig. 1: Removing Tip From Special Tool 11 0 222
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare special tool 11 0 222 in conjunction with 11 8 732 and 11 8 731.

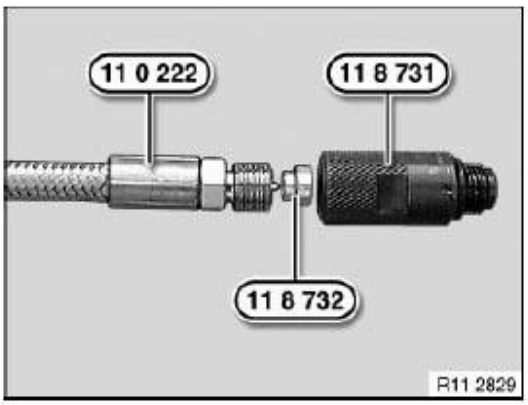


Fig. 2: Identifying Special Tool 11 0 222, 11 8 732 And 11 8 731
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 0 222 into special tool 11 8 731 to 10 Nm.

IMPORTANT: Oil thread on special tool 11 8 731.

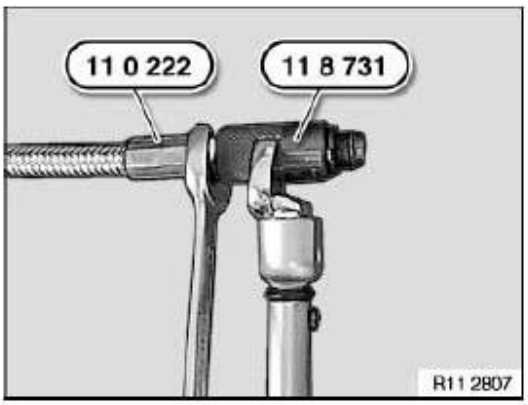


Fig. 3: Inserting Special Tool 11 0 222 Into Special Tool 11 8 731
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 0 222 by hand into spark plug thread and connect special tool 11 0 224.

Use adapter (1) if the compression pressure is being checked with the BMW diagnosis system.

Depress accelerator pedal and actuate starter until compression pressure stops rising.

- **NOMINAL VALUES** , compression pressure

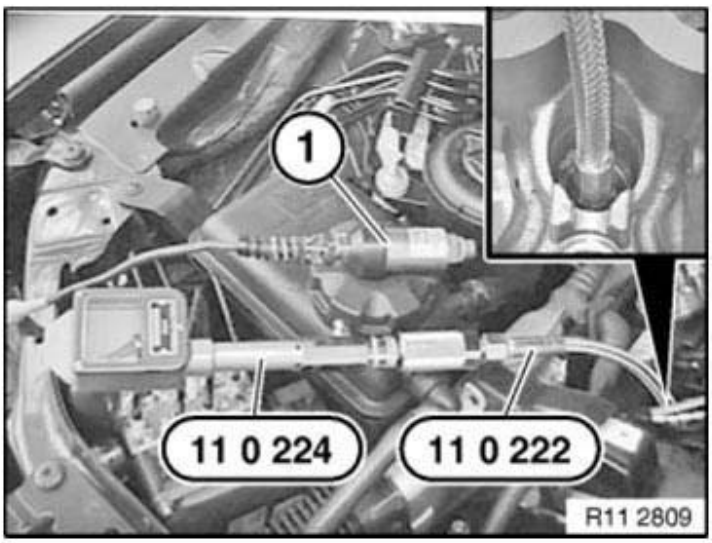


Fig. 4: Installing Special Tool 11 0 222 Into Spark Plug Thread
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine

Delete fault memory.

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

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

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

Protective measures/rules of conduct

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

First aid measures

- Do not induce vomiting.

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

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

ENGINE IDENTIFICATION

Punch engine numbers at marked surface with number punch.

Magnesium crankcase with sticker

M47/M47TU/M47T2

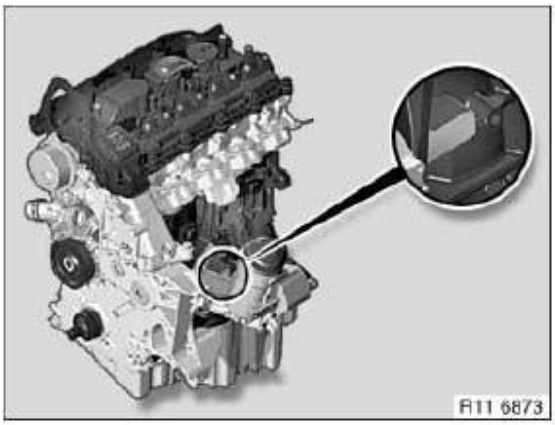


Fig. 5: Identifying Engine Identification Numbers Location (M47/M47TU/M47T2)
Courtesy of BMW OF NORTH AMERICA, INC.

M57/M57TU/M57T2

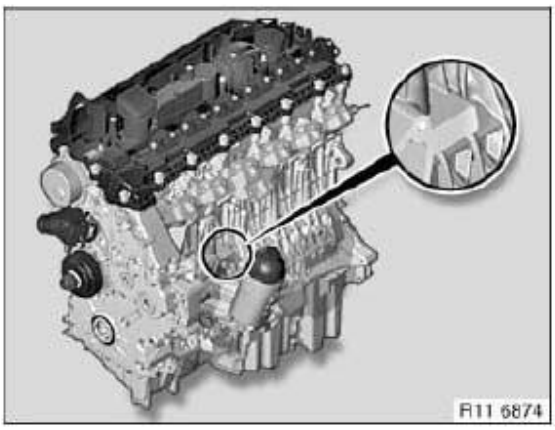


Fig. 6: Identifying Engine Identification Numbers Location - M57/M57TU/M57T2
Courtesy of BMW OF NORTH AMERICA, INC.

M67/M67TU

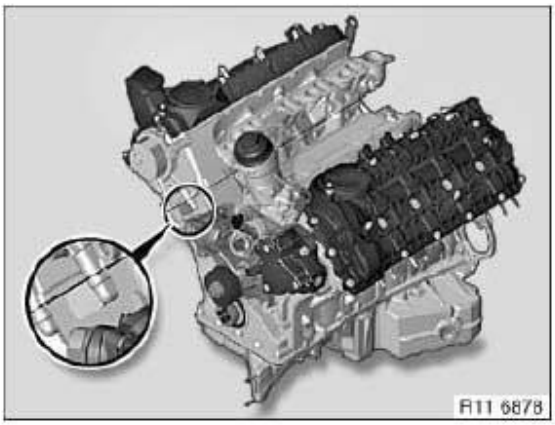


Fig. 7: Identifying Engine Identification Numbers Location - M67/M67TU
Courtesy of BMW OF NORTH AMERICA, INC.

N47/N47S/N47C/N57 N57S

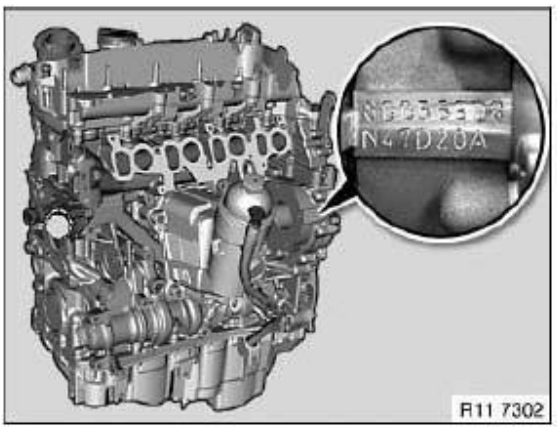


Fig. 8: Identifying Engine Identification Numbers Location - N47/N47S/N47C/N57 N57S
Courtesy of BMW OF NORTH AMERICA, INC.

M52/M52TU

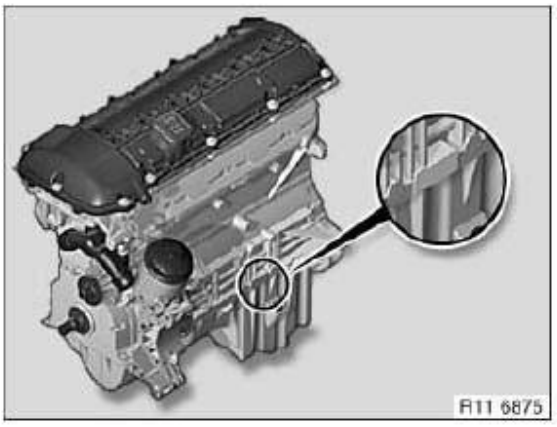


Fig. 9: Identifying Engine Identification Numbers Location (M52 / M52TU)
Courtesy of BMW OF NORTH AMERICA, INC.

M54

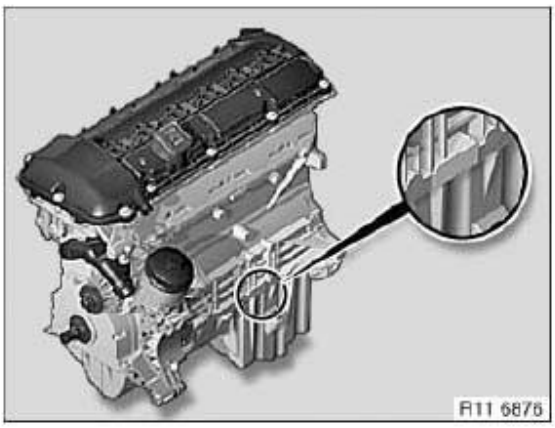


Fig. 10: Identifying Engine Identification Numbers Location (M54)
Courtesy of BMW OF NORTH AMERICA, INC.

M56

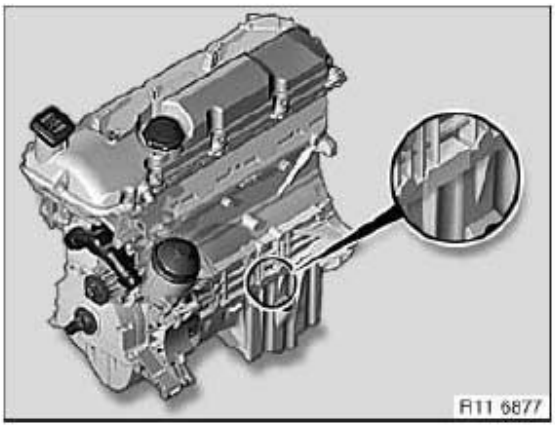


Fig. 11: Identifying Engine Identification Numbers Location - M56
Courtesy of BMW OF NORTH AMERICA, INC.

N40/N45/N45T/N43

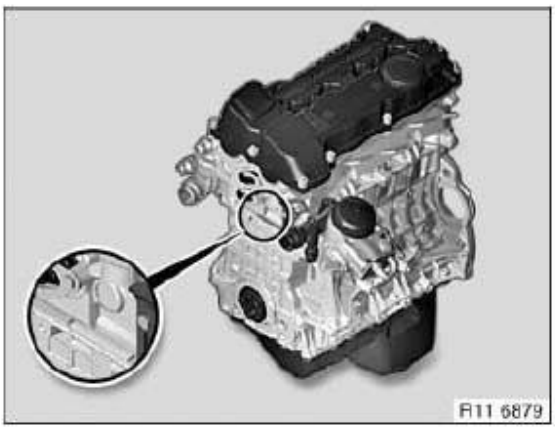


Fig. 12: Identifying Engine Identification Numbers Location - N40/N45/N45T/N43
Courtesy of BMW OF NORTH AMERICA, INC.

N42/N46/N46T

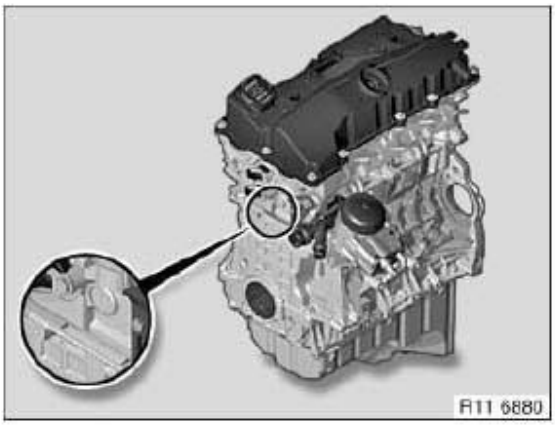


Fig. 13: Identifying Engine Identification Numbers Location - N42/N46/N46T
Courtesy of BMW OF NORTH AMERICA, INC.

N51/N52/N52K/N52T/N53/N54/N55

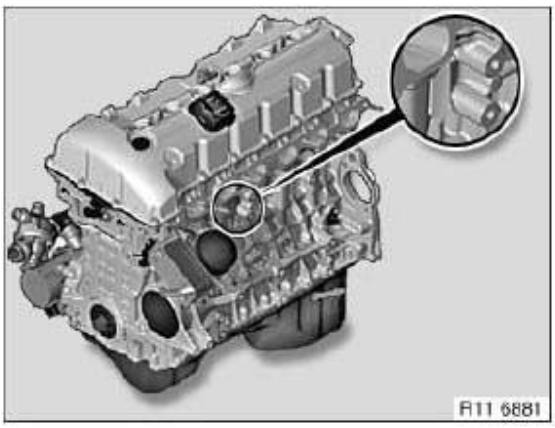


Fig. 14: Identifying Engine Identification Numbers Location - N51/N52/N52K/N52T/N53/N54/N55
Courtesy of BMW OF NORTH AMERICA, INC.

N62/N62TU

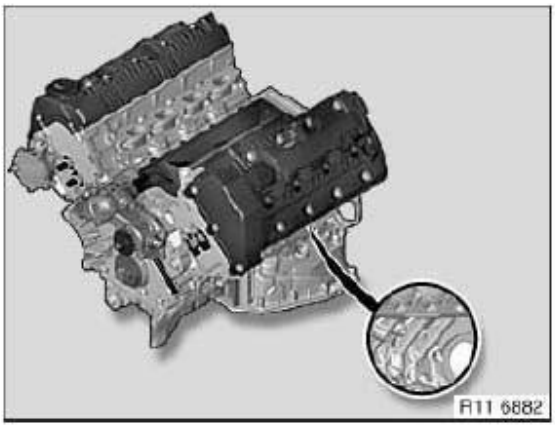


Fig. 15: Identifying Engine Identification Numbers Location - N62/N62TU
Courtesy of BMW OF NORTH AMERICA, INC.

N73

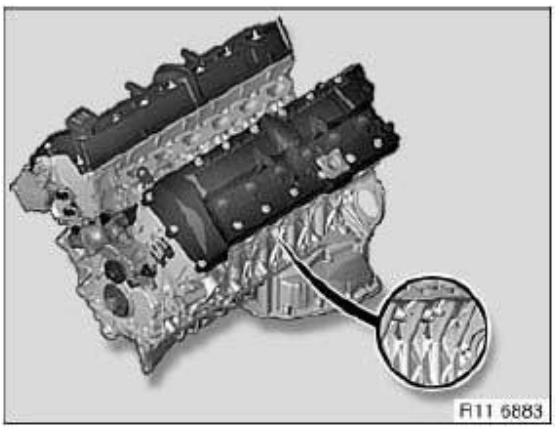


Fig. 16: Identifying Engine Identification Numbers Location - N73
Courtesy of BMW OF NORTH AMERICA, INC.

S54

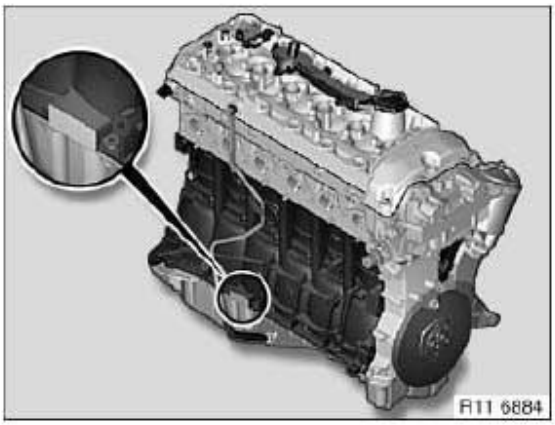


Fig. 17: Identifying Engine Identification Numbers Location - S54
Courtesy of BMW OF NORTH AMERICA, INC.

S85/S65

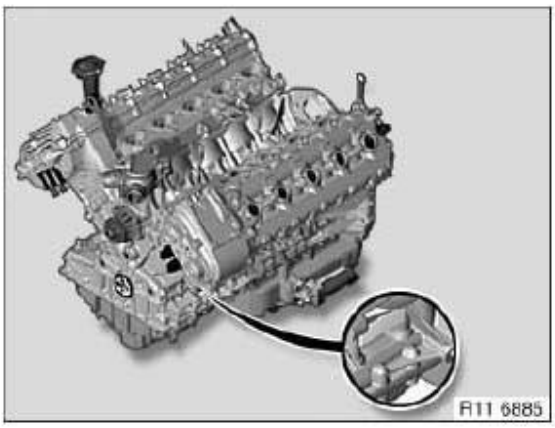


Fig. 18: Identifying Engine Identification Numbers Location - S85/S65
Courtesy of BMW OF NORTH AMERICA, INC.

W10/W11

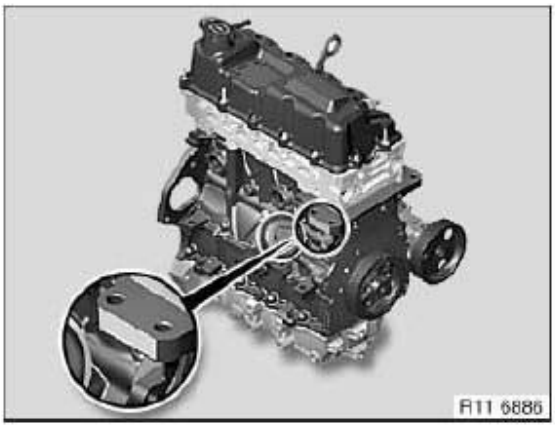


Fig. 19: Identifying Engine Identification - W10/W11
Courtesy of BMW OF NORTH AMERICA, INC.

N12/N14/N16/N18



Fig. 20: Identifying Engine Identification Numbers Location - N12/N14/N16/N18
Courtesy of BMW OF NORTH AMERICA, INC.

W17

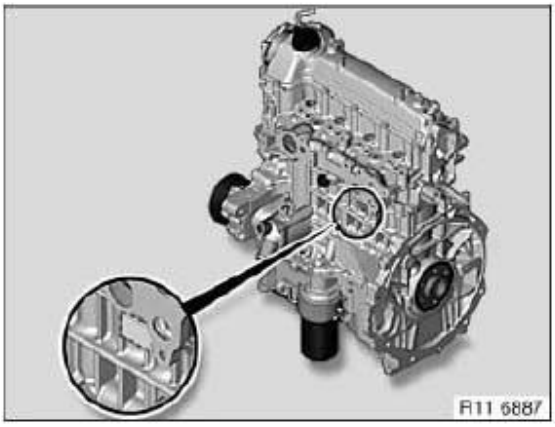


Fig. 21: Identifying Engine Identification Numbers Location - W17
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 00 ... ENGINE OIL SERVICE (N54, N54T)

WARNING: Risk of scalding!

Carry out work on the vehicle only when wearing oil- and heat-resistant protective gloves incl. forearm protection, face guard and protective apron.

IMPORTANT: Carry out the engine oil service only when the engine is at operating temperature.

Observe the exact engine oil filling capacity.

Overfilling the engine with engine oil will result in **engine damage.**

Checking and drip-off times (at least 10 minutes) must be observed.

IMPORTANT: Risk of damage!

Protect belt drive against dirt.

Cover with suitable materials.

Recycling

Catch and dispose of drained engine oil in a suitable collecting vessel.

Observe country-specific waste disposal regulations.

Release oil filter cover with special tool **11 9 240** .

Tightening torque **11 42 1AZ** .

NOTE: Engine oil flows out of the oil filter housing and back into the oil sump.

Picture shows E9x

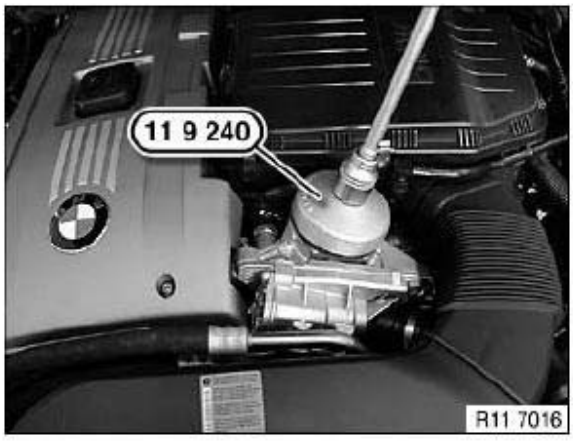


Fig. 22: Removing Oil Filter Cover Using Special Tool 11 9 240
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Presentation: without underbody protection.

Unclip service opening on underbody protection.

Remove screw plug (1) from oil sump and drain engine oil.

Tightening torque **11 13 1AZ** .

Installation note

Replace sealing ring.

Picture shows E9x

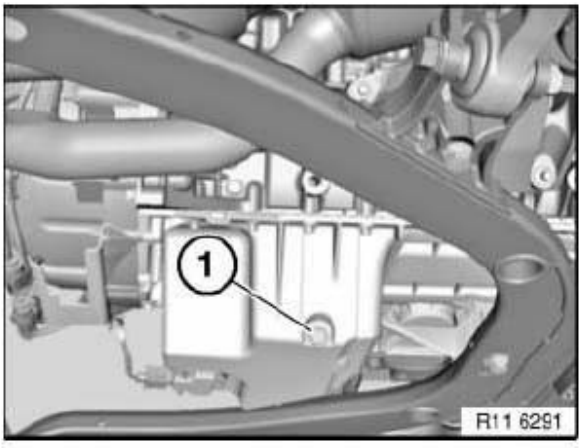


Fig. 23: Identifying Screw Plug On Oil Sump
Courtesy of BMW OF NORTH AMERICA, INC.

Remove and insert oil filter element (1) in direction of arrow.

Installation note:

Replace oil filter element (1) and sealing rings (2).

NOTE: Coat sealing rings (2) with engine oil.

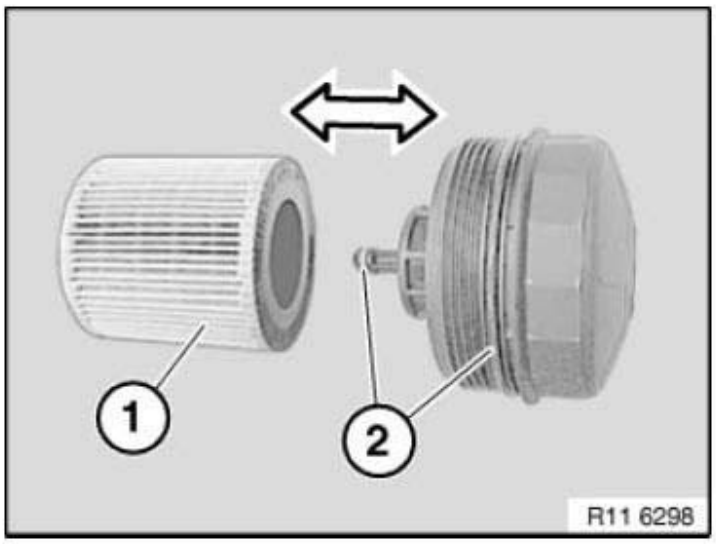


Fig. 24: Removing And Inserting Oil Filter Element
Courtesy of BMW OF NORTH AMERICA, INC.

Secure oil filter cover with special tool **11 9 240** .

Tightening torque **11 42 1AZ** .

NOTE: Pour in ENGINE OIL .

Start engine and run at idle until oil pressure indicator light goes out.

Switch off engine

Check oil filter cover and screw plug on oil sump for leaks.

Assemble engine.

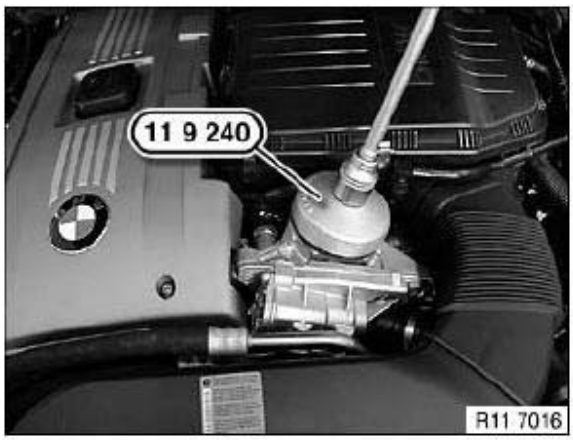


Fig. 25: Installing Oil Filter Cover Using Special Tool 11 9 240
Courtesy of BMW OF NORTH AMERICA, INC.

Checking engine oil level:

- Park vehicle on a horizontal surface
- Allow engine to run at operating temperature for three minutes with increased engine speed (approx. 1100 RPM)
- Read off engine oil level in instrument panel or on Control Display
- Top up engine oil if necessary

11 00 590 EXCHANGE ENGINE (N54, N54T)

Necessary preliminary tasks:

- Remove and install **ENGINE** .
- Mount engine on **ASSEMBLY STAND** .
- If necessary, remove foreign bodies from turbocharger group.
- Check all assemblies and convert to replacement power plant.

Remove transportation locks (1).

NOTE: Catch escaping engine oil with a suitable cloth (2).

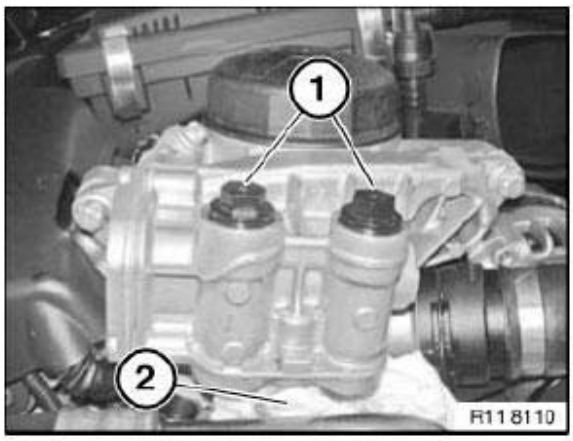


Fig. 26: Identifying Transportation Locks And Cloth
Courtesy of BMW OF NORTH AMERICA, INC.

Transportation locks (1) are no longer needed.

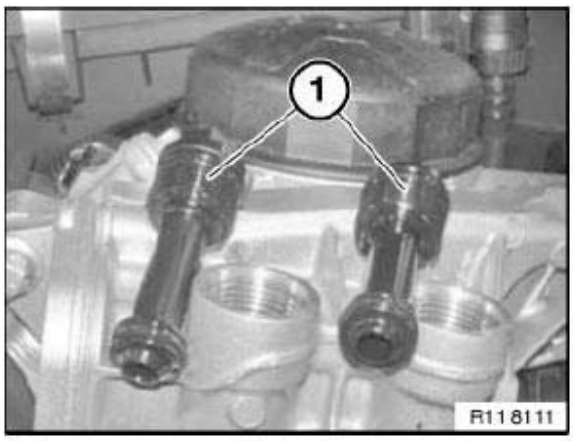


Fig. 27: Identifying Transportation Locks
Courtesy of BMW OF NORTH AMERICA, INC.

Modify screw plugs (1) from old power plant.

Insert screw plugs (1).

Tightening torque: **11 42 11AZ.**

Secure oil cooler lines with mounting bar (2).

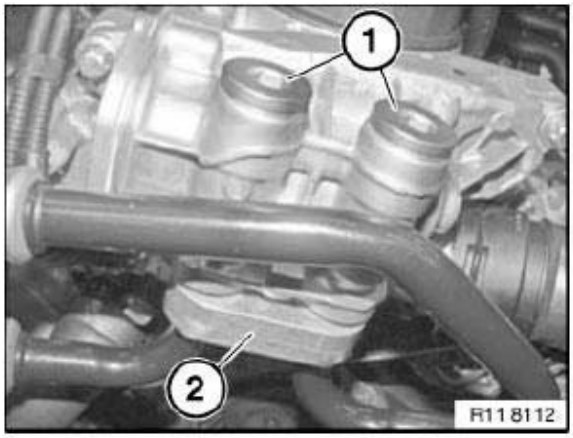


Fig. 28: Identifying Screw Plugs And Mounting Bar
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 00 MOUNTING ENGINE ON ASSEMBLY STAND (N54, N54T)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released .

Aluminum screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

Aluminum screws/bolts are not magnetic.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary work:

- Remove **ENGINE**

Use special tool 11 8 541 to mount engine on special tool **00 2 300** .

Mount engine or engine block with special tool 11 8 542 on 11 8 541.

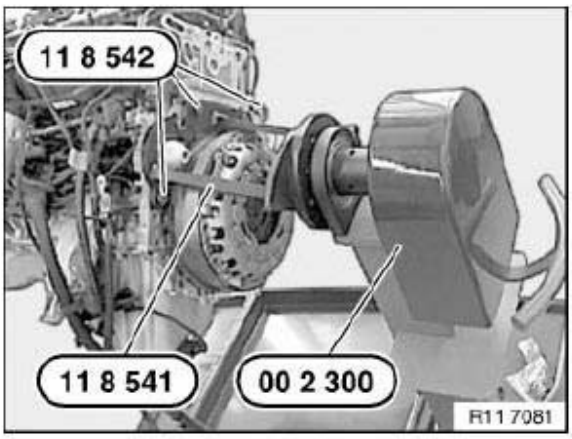


Fig. 29: Mounting Engine Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

11 00 ... OVERVIEW OF CONSUMABLES (ELECTRONIC PARTS CATALOGUE)

1.0 Sealing compound for **injection.**

SEALING COMPOUND REFERENCE CHART - INJECTION

	Repair instructions (engine)	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
1.1	N40, N42, N45, N46, N43, N45N, N46N	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 128367 sealing compound

1.2	N40, N42, N45, N46, N43, N45N, N46N	Loctite 128357 liquid gasket	83 19 7 536 051	Sealing between crankcase upper and lower halves
1.3	N51, N52, N53, N54, N52N, N55	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 193140 sealing compound
1.4	N51, N52, N53, N54, N52N, N55	Loctite 193140 liquid gasket	83 19 0 439 030	Sealing between crankcase upper and lower halves
1.5	S65, S85	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 193140 sealing compound
1.6	S65, S85	Loctite 193140 liquid gasket	83 19 0 439 030	Sealing between crankcase upper and lower halves

2.0 Sealing compound for **application.**

SEALING COMPOUND REFERENCE CHART - APPLICATION

	Designation in repair instructions	**Designation, Electronic Parts Catalogue**	**Part number, Electronic Parts Catalogue**	**Application examples**
2.1	M41, M47, M47TU, M47T2, M50, M51, M52, M52TU, M54, M57, M57TU, M57T2, M60, M62 N40, N42, N45, N45N, N46, N46N, N43, N47, N47top, N47C N47D1 N51, N52, N52N, N53, N54, N55, N57, N57S N62, N62TU, N63, N73, N73H, N74 S14, S38, S50, S52, S54, S62, S65, S85 N12, N14, N16, N18	Drei Bond 1209 liquid gasket	07 58 9 062 376	For sealing separation points on crankcase
2.2	N12, N14, N16, N18 W16, N47top, N47D1, N47C1 N57D1,	Loctite 5970 liquid gasket	83 19 0 404 517 83 19 0 404 517	Sealing between crankcase upper and lower sections. Sealing of gear case cover, oil sump, coolant pump,

				component carrier.
2.3	N12, N14, N16, N18 W16	Loctite 648 liquid gasket	07 58 9 067 732	Sealing between cover sleeve and crankcase

3.0 **Cleaning agent.**

CLEANING AGENT REFERENCE CHART

	Designation in repair instructions	**Designation, Electronic Parts Catalogue**	**Part number, Electronic Parts Catalogue**	**Application examples**
3.1	N45, N46, N45T, N46T, N43, N51, N52, N52Kp, N52TU, N53, N55, N63, N63S, N63Hyprid, N74	Cold cleaner (chlorine free)	83 19 0 026 956	Cleaning assemblies, washing engine

4.0 Lubricant for **application.**

LUBRICANT REFERENCE CHART - APPLICATION

	Designation in repair instructions	**Designation, Electronic Parts Catalogue**	**Part number, Electronic Parts Catalogue**	**Application examples**
4.1	N20, N42, N46, N46TU, N51, N52, N52KP, N52TU, N55, N62, N62TU, N73	Lubricating grease Longtime PD1	83 19 2 160 340	For greasing the splined shaft on actuator drive/gearing of intermediate shaft.
4.2	M47, M47TU, M47T2, M57, M57TU, M57T2,	High temperature paste	83 19 2 152 323	For greasing the threads on the exhaust turbocharger.
4.3	N12, N14, N16, N18 N40, N42, N45, N45TU N46, N46TU, N43. N51, N52, N52Kp, N52TU, N53, N54, N55. N62, N62TU, N63, N73, N73H, N74. S65, S85.	High temperature paste (NEVERSEEZ compound)	83 23 0 140 233	For greasing the threads on the oxygen sensors.
4.4	N47, N47O1 N47C1, N47T	Copper paste	81 22 9 400 794	For greasing the double hex head bolt

	N47D1 N57 N57D1			on the exhaust turbocharger.

5.0 Lubricants to loosen locked **screw connections.**

LUBRICANT REFERENCE CHART - SCREW CONNECTION

	Designation in repair instructions	**Designation, Electronic Parts Catalogue**	**Part number, Electronic Parts Catalogue**	**Application examples**
5.1	M47, M47TU, M47TU2, M57, M57TU, M57TU2. N47, N47C, N47D1, N57, N57D1, W16, W17,	Brunox lubricating grease	83 23 0 445 529	For releasing the glow elements

11 .. ... REMOVING AND INSTALLING/REPLACING ACOUSTIC COVER (N54, N54T)

Release screws (1).

Raise acoustic cover slightly and remove towards front.

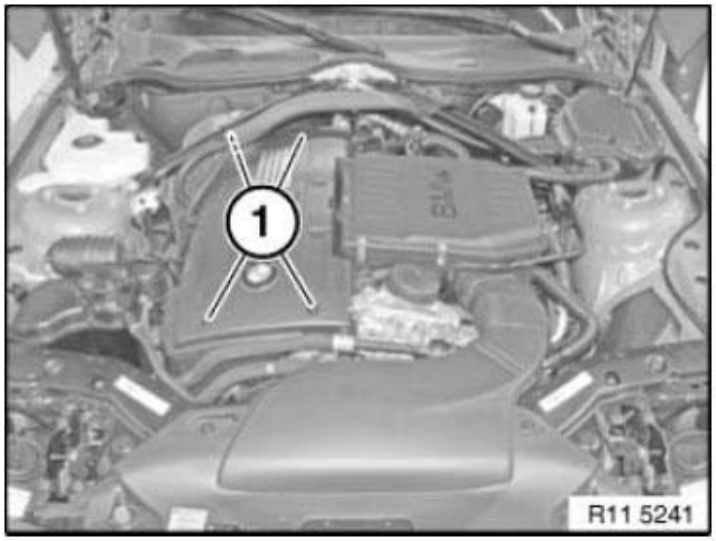


Fig. 30: Identifying Acoustic Cover Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

11 00 050 REMOVING AND INSTALLING ENGINE (N54, N54T)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

Aluminum screws/bolts are not magnetic.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Disconnect **BATTERY**
- Secure **ENGINE HOOD/BONNET**
- Remove **AIR FILTER HOUSING**
- Remove **FAN COWL** with electric fan
- Remove **RADIATOR**
- Remove **CAPACITOR FOR HEATING AND AIR CONDITIONING SYSTEM**
- Remove **CHARGE AIR COOLER**
- Remove **EXPANSION TANK** .
- Detach all coolant hoses from engine
- Remove rear **AIR DUCT**
- Detach vacuum line from brake booster
- Unfasten engine wiring harness from electronics box and lay to one side
- Remove **EXHAUST SYSTEM**
- Remove gearbox. See **2300018 REMOVING AND INSTALLING TRANSMISSION (GS6-53BZ) N54** or **28 00 001 REMOVING AND INSTALLING TWIN-CLUTCH GEARBOX (GS7D36SG) N54**
- Release **LOWER SECTION OF STEERING SPINDLE** from steering gear (do not remove)
- Release grounding strap on left engine support arm.

Release nut (1) and disconnect positive battery cable (2) from positive battery connection point.

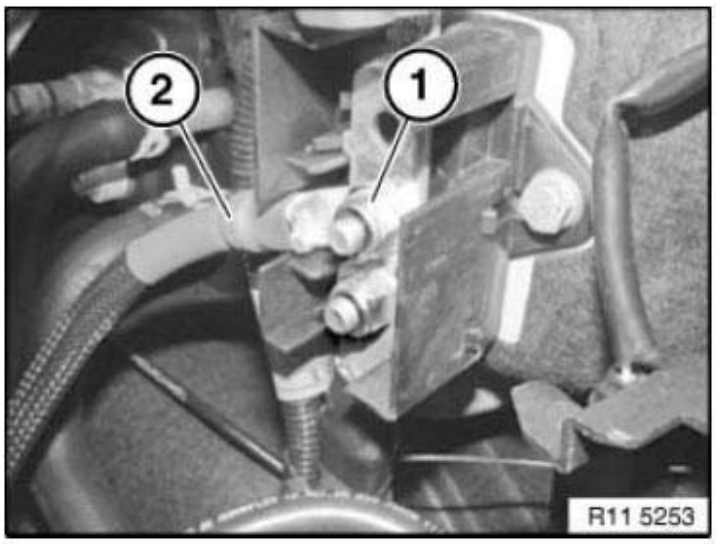


Fig. 31: Identifying Battery Cable And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect fuel lines (1).

Seal fuel lines with special tool 13 5 161 and

13 5 162.

Disconnect tank vent line (2).

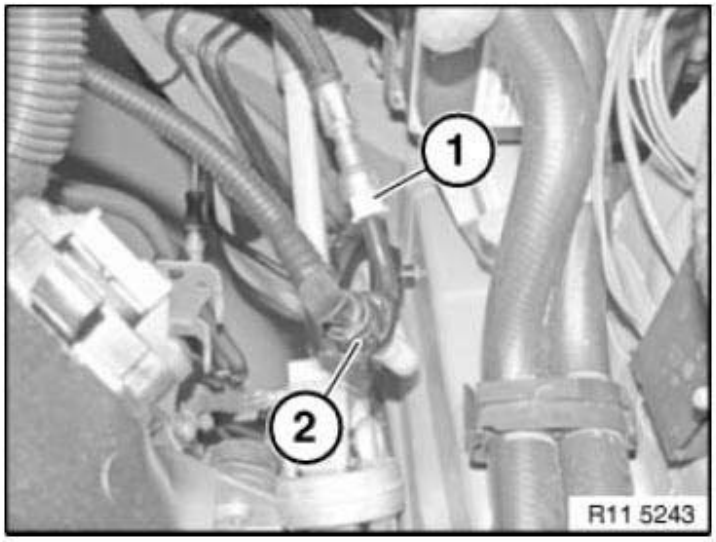


Fig. 32: Identifying Tank Vent Line And Fuel Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1) from engine oil pipe on oil-to-water heat exchanger.

Remove engine oil pipe.

Installation note:

Replace all seals.

Tightening torque **17 21 1AZ** .

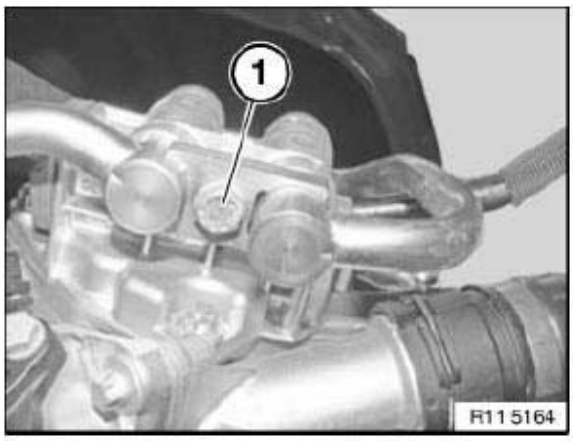


Fig. 33: Identifying Engine Oil Pipe Mounting Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **11 8 680** to lifting eye on gearbox side.

Press locking pin (1) in direction of arrow until locking balls (2) are loose.

Secure special tool **11 8 680** to lifting eye. Release locking pin (1).

Installation note:

Special tool **11 8 680** is mounted correctly if the locking balls (2) are locked.

Special tool **11 8 680** is firmly secured to lifting eye.

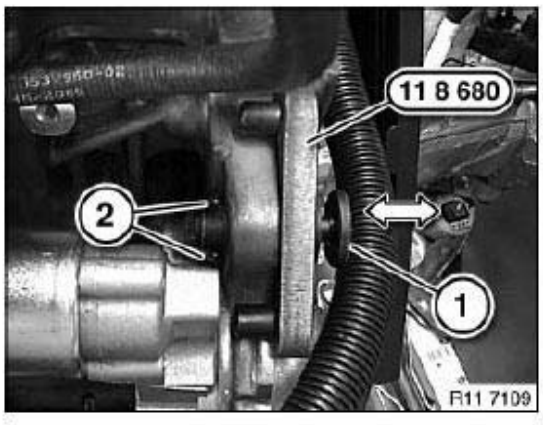


Fig. 34: Pressing Locking Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool **11 0 000** to special tool **11 8 680** in eye (1).

Picture shows E9x.

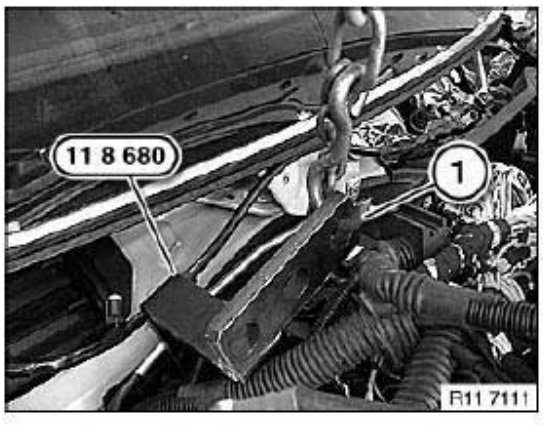


Fig. 35: Connecting Special Tool 11 0 000 To Special Tool 11 8 680
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) on engine mount on left and right.

Installation note:

Replace self-locking nut.

Tightening torque **22 11 2AZ** .

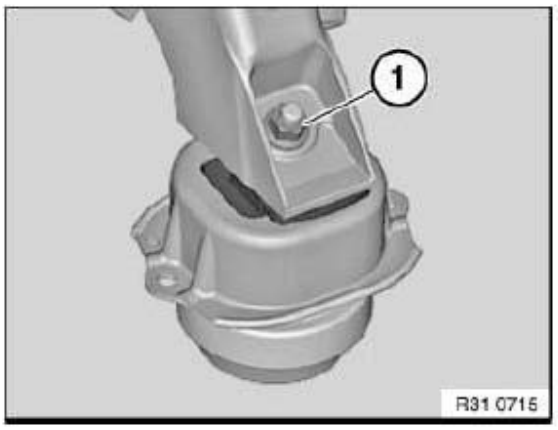


Fig. 36: Identifying Engine Mount Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in towing hook (1).

Suspend special tool (4) **11 0 000** from engine crane.

Suspend special tool **11 0 000** from the designated mounting eyelets (2) only.

Unscrew left and right engine mounts.

Remove left engine support arm.

Lift engine out with crane.

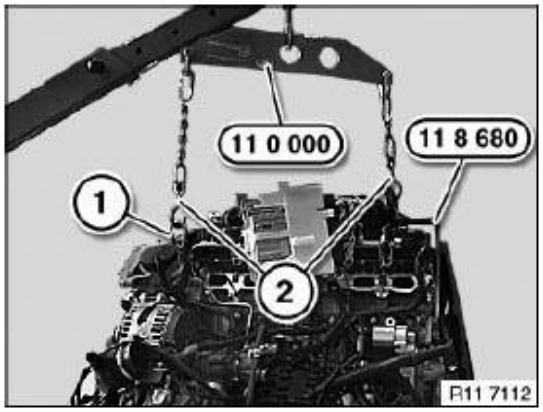


Fig. 37: Identifying Special Tools 11 0 000 And 11 8 680 On Engine Crane
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Secure special tool (1) **11 7 310** to steering box.

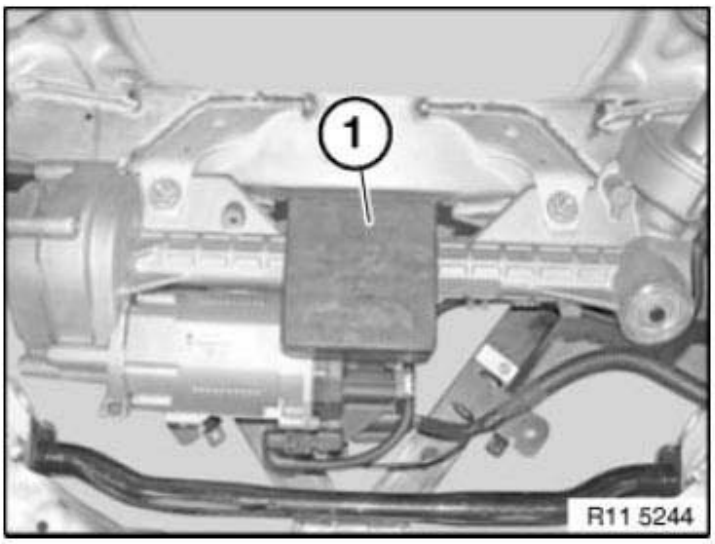


Fig. 38: Connecting Special Tool 11 7 310 To Steering Box
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Observe following in case of **REPLACEMENT ENGINE** .

Check function of Digital Diesel Electronics.

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 INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

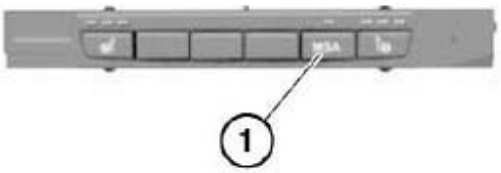
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



R61 1948

Fig. 39: Identifying MSA Switch In Passenger Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
- Workshop mode

  A = 10 mm
- Basic setting (engine hood/bonnet open)

  B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

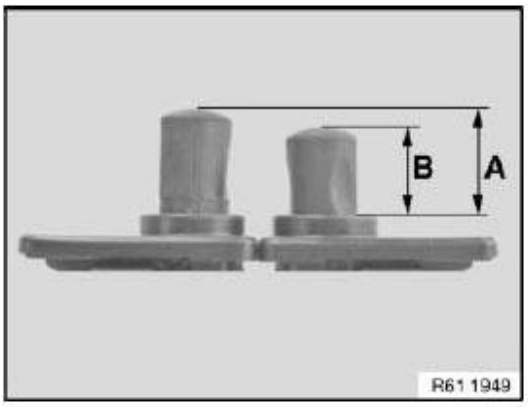


Fig. 40: Identifying Engine Hood/Bonnet Basic Setting And Workshop Mode
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!

RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released

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

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

11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N54, N54T)

WARNING: Danger of injury!

Observe following instructions relating to special tool:

1. Prior to each use, check the special tools for defects, modifications and operational reliability.
2. Damaged/modified special tools must not be used!
3. No changes or modifications may be made to the special tools!
4. Keep special tools dry, clean and free of grease.

Necessary preliminary tasks:

- Secure **ENGINE HOOD/BONNET**
- Remove rear **AIR DUCT**

Assemble transverse member 00 6 000 with special tools 00 6 030.

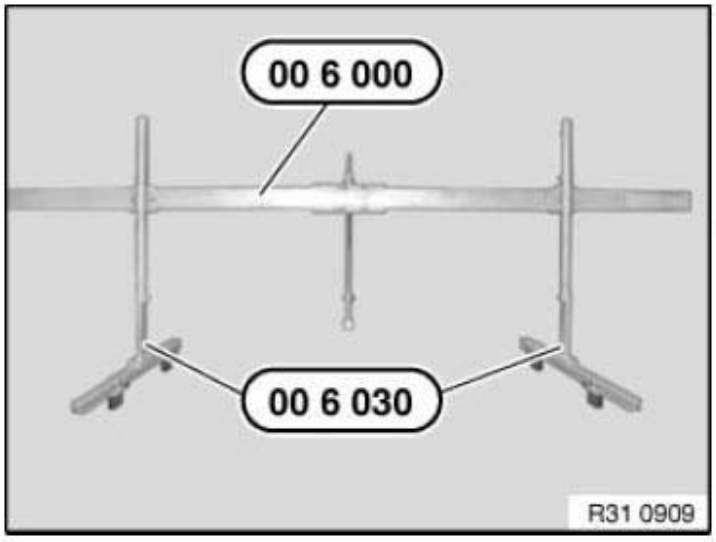


Fig. 41: Assembling Transverse Member 00 6 000 Using Special Tools 00 6 030
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in towing hook (1).

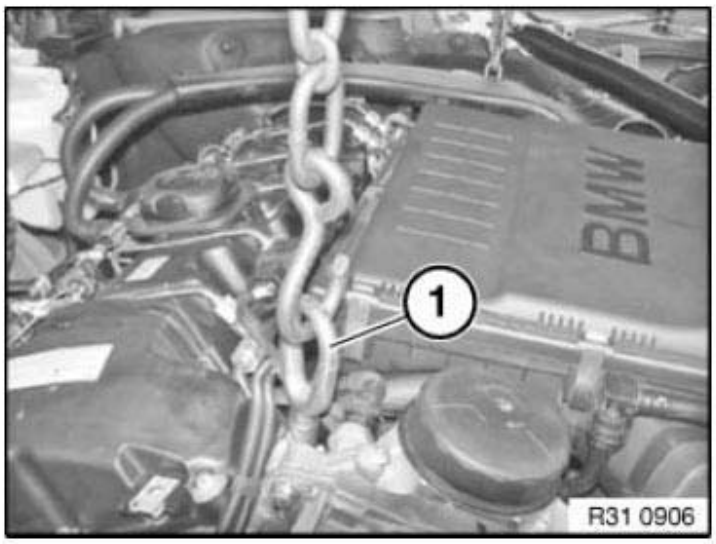


Fig. 42: Identifying Towing Hook
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Avoid a change of engine position in the transverse or longitudinal direction.

Always make sure there is sufficient clearance between the engine (or its attachment parts) and the body.

The support points on the left side are shown.

IMPORTANT: Risk of damage!

Position transverse member 00 6 030 with a 2nd person help on designated areas (1,2) of side panel.

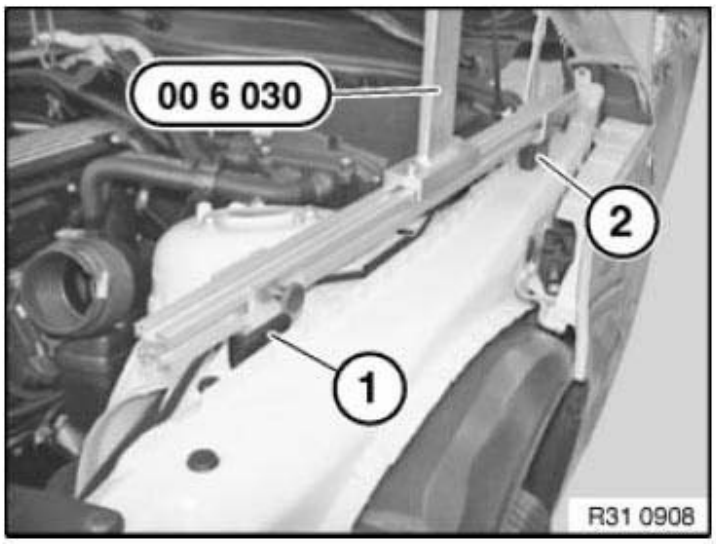


Fig. 43: Positioning Transverse Member 00 6 030 On Side Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **11 0 020** to spindle 00 6 002.

Fit suitable chains to special tool **11 0 020** and attach to engine towing hook or lifting eye.

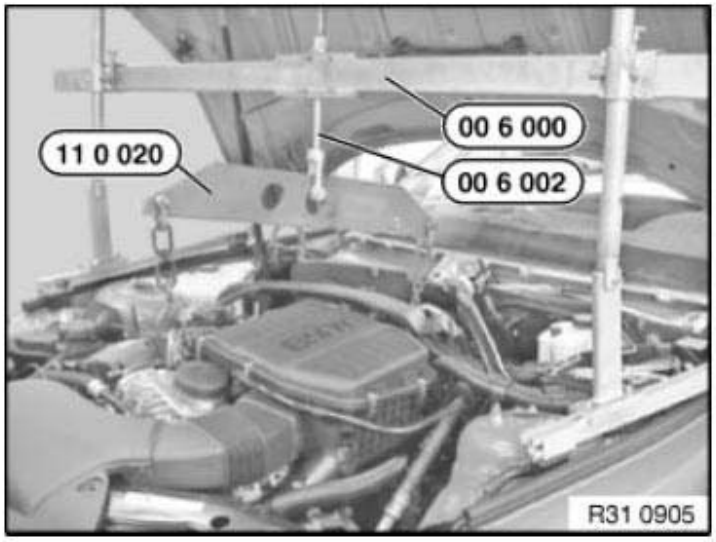


Fig. 44: Connecting Special Tool 110 020 To Engine Towing Hook Or Lifting Eye
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Danger of injury!

Tighten down all adjusting screws and nuts on transverse member 00 6 000.

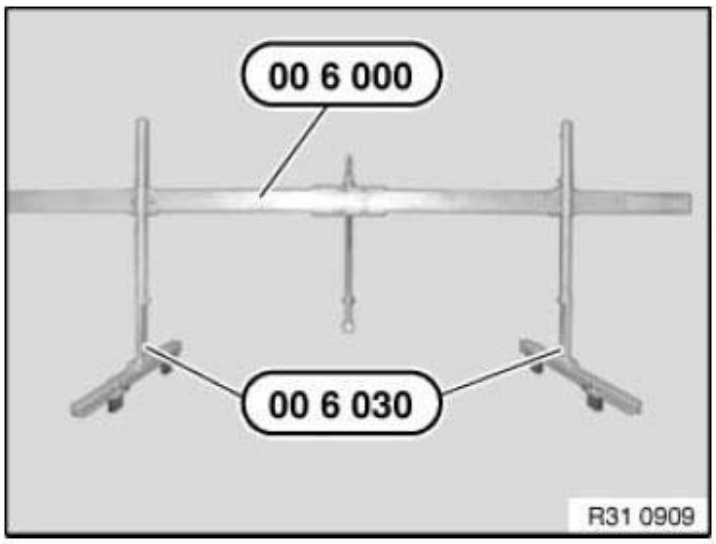


Fig. 45: Identifying Transverse Member On Special Tool 00 6 030
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Raise engine approx. 10 mm with transverse member.

Installation note:

Replace self-locking nuts.

Tightening torque **22 11 2AZ** .

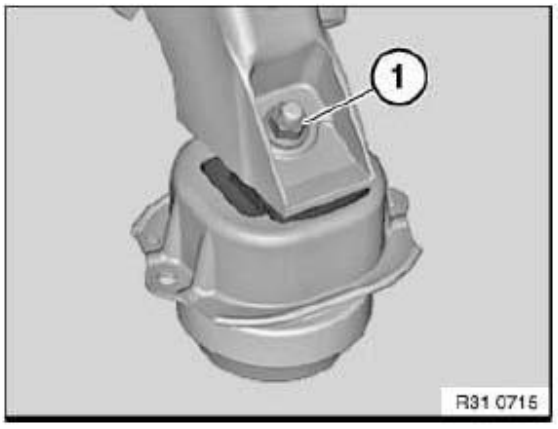


Fig. 46: Identifying Engine Mount Nut
Courtesy of BMW OF NORTH AMERICA, INC.

1112 CYLINDER HEAD WITH COVER

11 12 729 CHECKING CYLINDER HEAD FOR WATERTIGHTNESS (N54, N54T)

IMPORTANT: Pressure-test cylinder head to max. 3 bar.

Heat cylinder head to 60°.

Check for bubble formation in a water bath.

Necessary preliminary tasks:

- Remove **CYLINDER HEAD** .
- Disassemble **CYLINDER HEAD** .

NOTE: Observe mounting of special tool 11 4 341 on cylinder no. 1

Secure special tool 11 4 341 using bolts 11 4 345 tightened to **25 Nm**

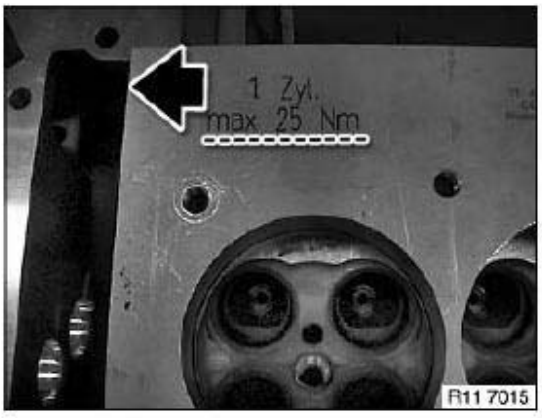


Fig. 47: Identifying Special Tool 11 4 345 On Engine Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

Extend special tool 11 4 341 with special tool 11 4 345.

Installation note:

1 cyl is marked.

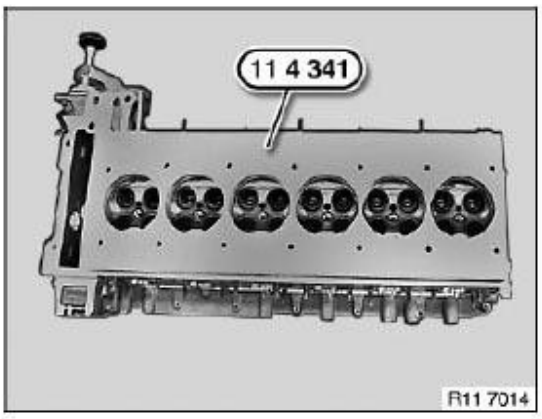


Fig. 48: Identifying Special Tool 11 4 341
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 4 342 with bolts (1), insert knurled screw in direction of arrow.

Sealing flange must rest flat.

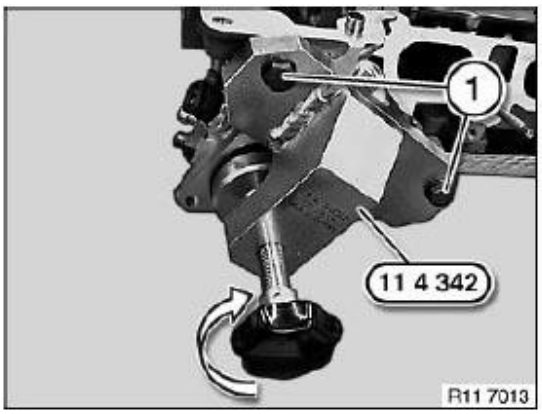


Fig. 49: Installing Special Tool (11 4 342)
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 344 with screws (1).

NOTE: Compressed air at valve (2) must not exceed 3 bar.

Heat cylinder head to 60°.

Check for bubble formation in a water bath.

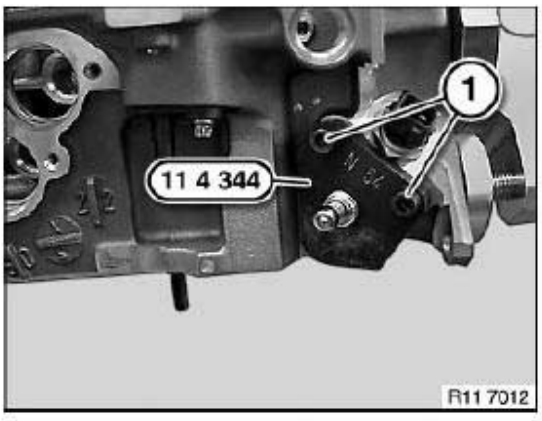


Fig. 50: Identifying Special Tool (11 4 344) With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 719 MILLING CYLINDER HEAD SEALING SURFACE (N54, N54T)

IMPORTANT: Remachining on cylinder head max. 0.3 mm

Necessary preliminary tasks:

- Remove **CYLINDER HEAD** .
- Remove **EXHAUST CAMSHAFT** .
- Remove **INTAKE CAMSHAFT** .
- Remove **ROLLER CAM FOLLOWERS** .
- Remove all **VALVES** .

Check evenness of cylinder head sealing faces with a standard straightedge (1).

NOTE: Max. deviation from flatness (longitudinal) 0.10 mm.

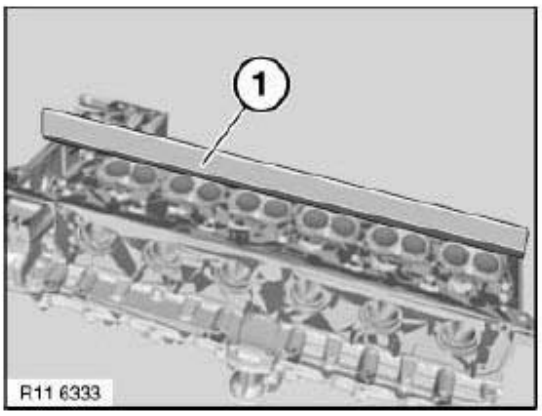


Fig. 51: Checking Cylinder Head Sealing Faces Evenness Using Standard Straight-Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Check evenness of cylinder head sealing faces with a standard straightedge (1).

NOTE: Max. deviation from flatness (transverse) 0.05 mm

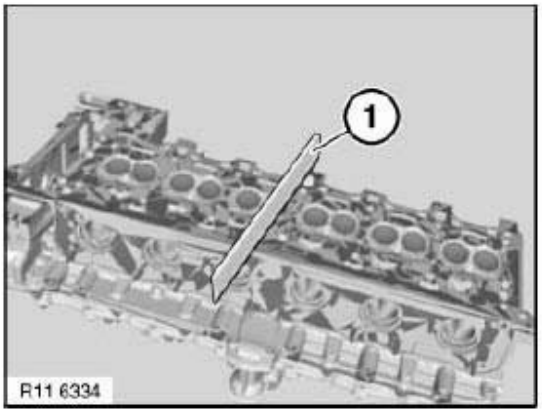


Fig. 52: Checking Cylinder Head Sealing Faces Evenness Using Standard Straight-Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Check cylinder head for **WATER LEAKS** .

Assemble engine.

11 12 100 REMOVING AND INSTALLING CYLINDER HEAD (N54, N54T)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

Aluminum screws/bolts are not magnetic.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove **ENGINE**
- Remove **INTAKE AND EXHAUST CAMSHAFT ADJUSTERS**

Release screws (1).

Unclip timing chain module (3) at junction (2) and remove towards top.

Set down timing chain.

IMPORTANT: If the timing chain is stowed in the gear case, the crankshaft must no longer be rotated.

This would cause the timing chain on the crankshaft sprocket to jam or jump.

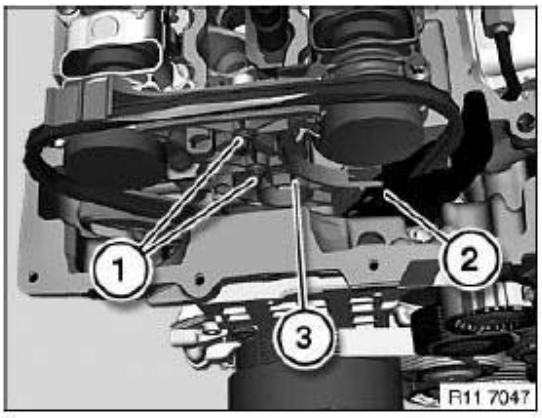


Fig. 53: Identifying Timing Chain Module And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The timing chain is lifted out with a hook only during assembly.

NOTE: The lowest screw can only be released when the timing chain module is pressed forward slightly.

IMPORTANT: Secure the lowest screw with a gripper against falling down.

Release screws (1).

Tightening torque **11 12 3AZ** .

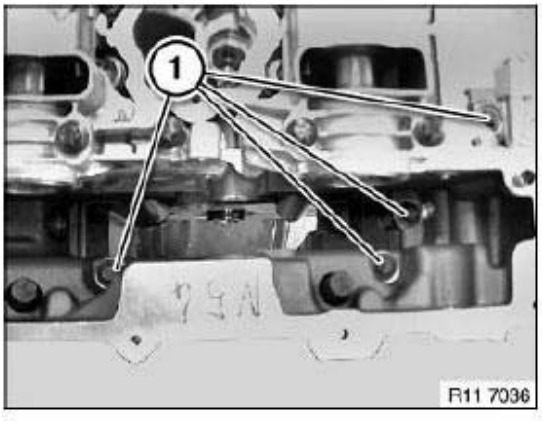


Fig. 54: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe different bolt heads.

Release cylinder head bolts (1) M9 with special tool **11 4 420** .

Tightening torque **11 12 2AZ** .

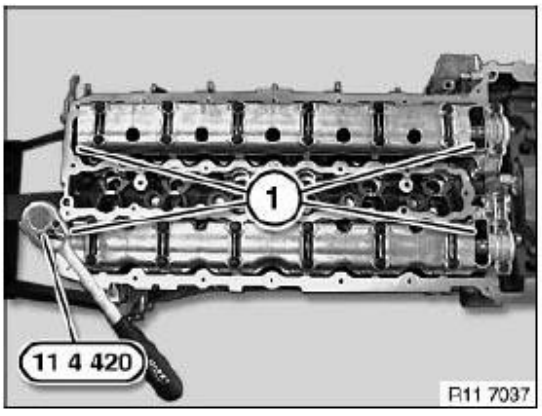


Fig. 55: Removing M9 Cylinder Head Bolts Using Special Tool 11 4 420
Courtesy of BMW OF NORTH AMERICA, INC.

Release cylinder head bolts (1) M10 with special tool **11 8 580** from outside inwards.

Tightening torque **11 12 1AZ** .

IMPORTANT: All cylinder head bolts must be replaced.

Risk of damage!

Jointing torque and angle of rotation must be observed without fail.

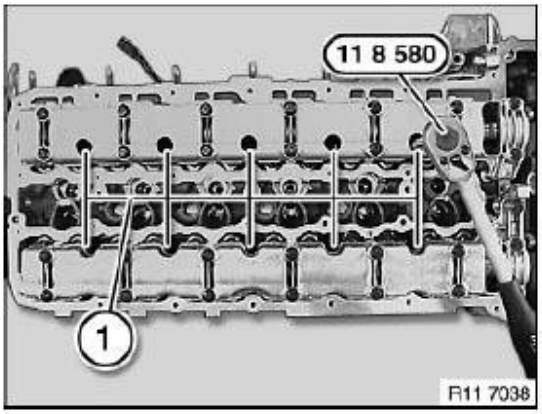


Fig. 56: Removing M10 Cylinder Head Bolts Using Special Tool 11 8 580
Courtesy of BMW OF NORTH AMERICA, INC.

Washers (1) of cylinder head bolts can only be removed with a magnet (2) between cylinder head and bearing strip.

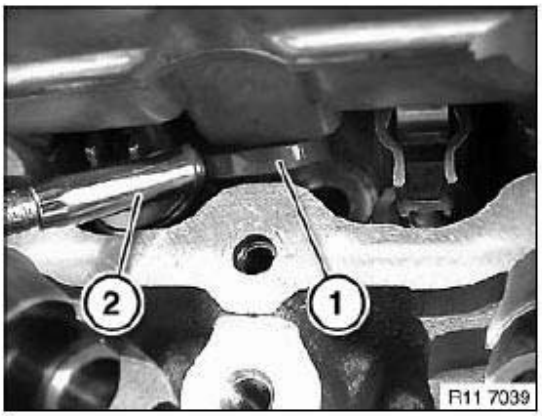


Fig. 57: Removing Cylinder Head Bolt Washer Using Magnet
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **11 0 320** with existing cylinder head cover bolts (1).

Tightening torque **11 12 4AZ** .

IMPORTANT: Removing and install cylinder head with a second person helping.

Weight of cylinder head with add-on parts is approx. 40 kg.

Do not set cylinder head down on sealing face, risk of damage to valves.

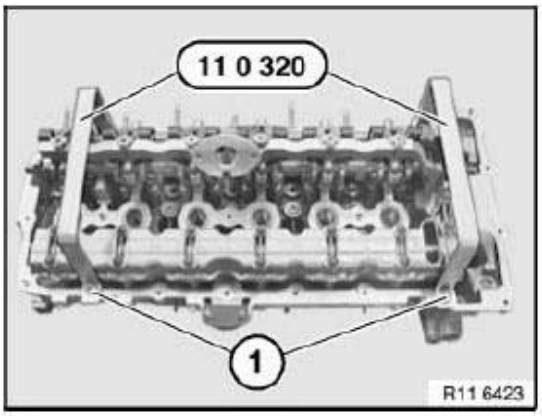


Fig. 58: Installing Cylinder Head Cover Using Special Tool 11 0 320
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Set down cylinder head with intake and exhaust camshafts on side only, risk of damage to valves (1).

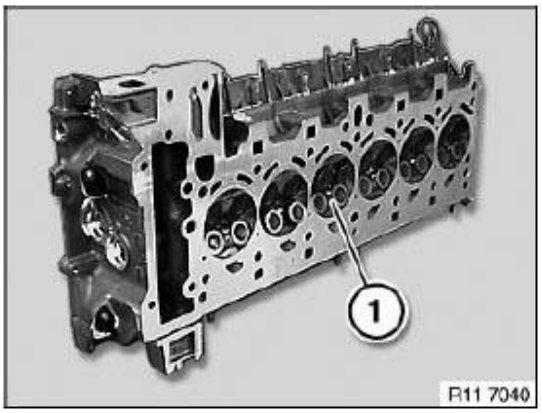


Fig. 59: Identifying Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Insert **11 4 430** special tool into bore holes.

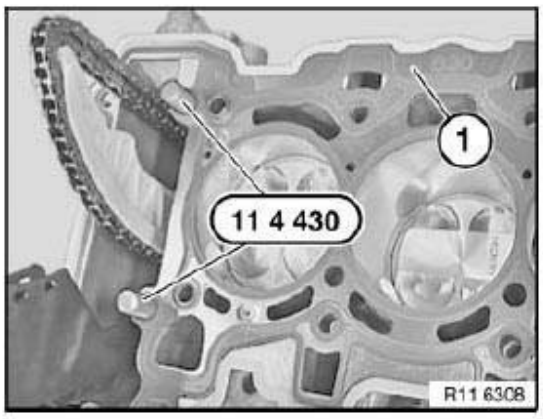


Fig. 60: Inserting Special Tool 11 4 430 Into Bore Holes
Courtesy of BMW OF NORTH AMERICA, INC.

Remove coarse residues on sealing surfaces with special tool 11 4 471 from cylinder head and crankcase.

IMPORTANT: Do not use any metal-cutting tools.

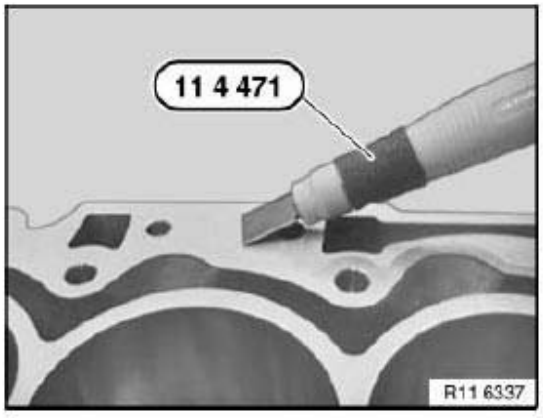


Fig. 61: Removing Coarse Residues On Sealing Surfaces Using Special Tool 11 4 471
Courtesy of BMW OF NORTH AMERICA, INC.

Remove fine residues on sealing surfaces with special tool 11 4 472 from cylinder head and crankcase.

IMPORTANT: Do not use any metal-cutting tools.

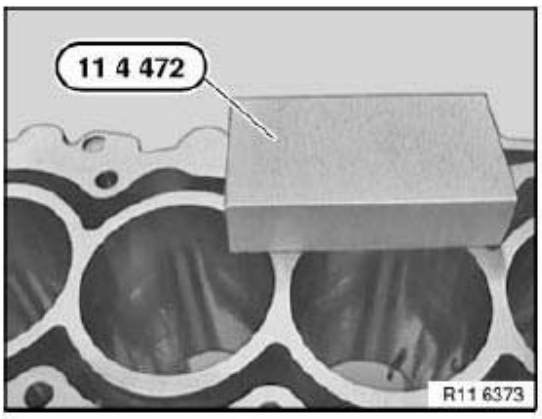


Fig. 62: Removing Fine Residues On Sealing Surfaces Using Special Tool 11 4 472
Courtesy of BMW OF NORTH AMERICA, INC.

There must be no fluids or contaminants in any of the threaded holes (1) for the cylinder head bolt connections.

Risk of cracking and corrosion!

Clean all threaded holes.

Installation note:

Replace **CYLINDER HEAD GASKET** .

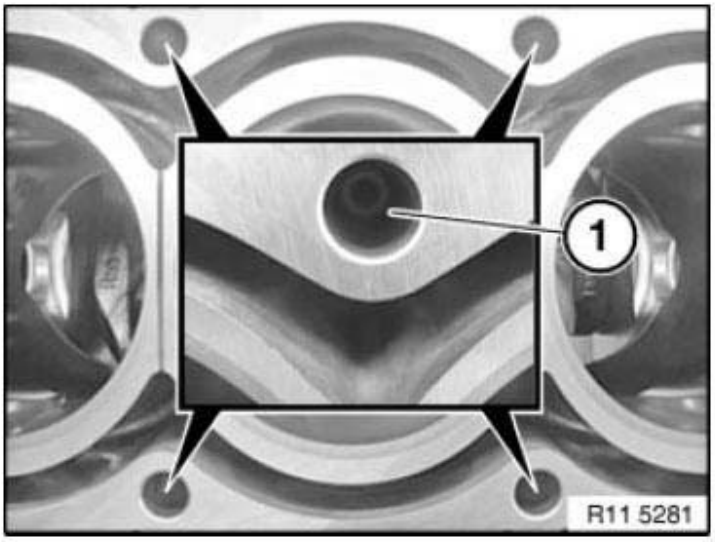


Fig. 63: Identifying Threaded Holes
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe sequence for tightening cylinder head bolts without fail.

Installation note:

Fit new cylinder head screws.

Insert cylinder head bolts (1 to 10) with special tool **11 8 580** .

Tightening torque **11 12 1AZ** .

Insert cylinder head bolts (11 to 14) with special tool **11 4 420** .

Tightening torque **11 12 2AZ** .

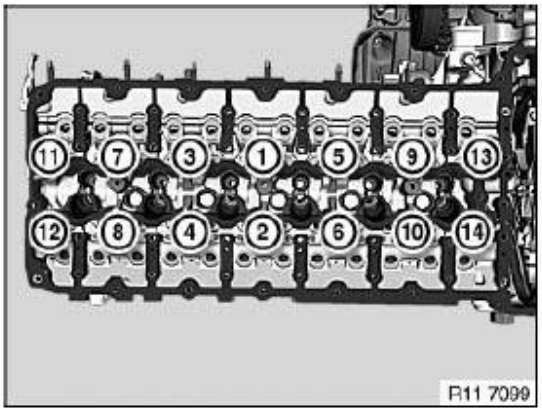


Fig. 64: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Graphic shows intake and exhaust camshafts removed.

Observe sequence for tightening cylinder head bolts without fail

IMPORTANT: The 2nd angle of rotation relates only to cylinder head bolts 1 to 10.

Installation note:

- **Jointing torque:**

  All cylinder head bolts 1 to 14 to 30 Nm

- **1st angle of rotation:**

  All cylinder head bolts 1 to 14 to 90°

- **2nd angle of rotation:**

  Only cylinder head bolts 1 to 10 to 90°

- **3rd angle of rotation:**

All cylinder head bolts 1 to 14 to 45°

Installation note:

Replace screws (1).

Tightening torque **11 12 3AZ** .

IMPORTANT: Secure the lowest screw with a gripper against falling down.

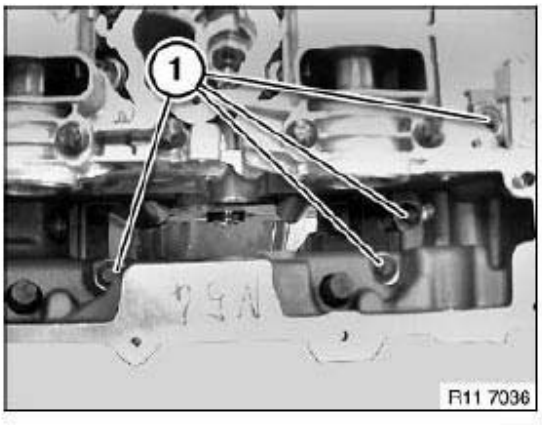


Fig. 65: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 000 REMOVING AND INSTALLING/SEALING CYLINDER HEAD COVER (N54, N54T)

Necessary preliminary tasks:

- Disconnect **BATTERY**
- Remove **ROD-TYPE IGNITION COILS**
- Unclip injector **WIRING HARNESS**
- Remove **INJECTORS**
- Remove right **TENSION STRUT**

Disconnect vacuum lines (2) from vacuum lines (1).

Unclip vacuum lines (1).

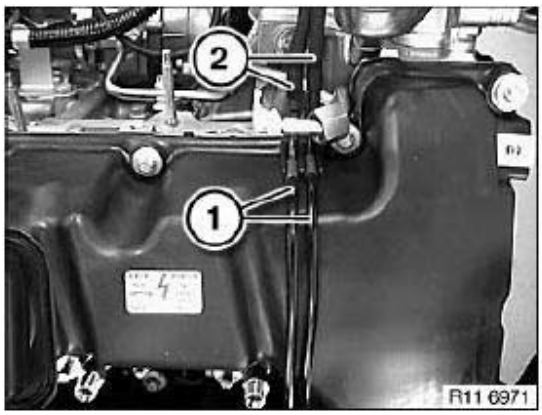


Fig. 66: Identifying Vacuum Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect vacuum lines (1) from vacuum lines (2).

Unclip vacuum line (2) and lay to one side.

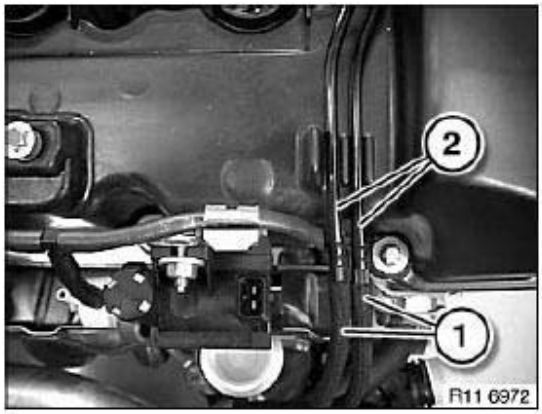


Fig. 67: Identifying Vacuum Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) with special tool **11 8 620** .

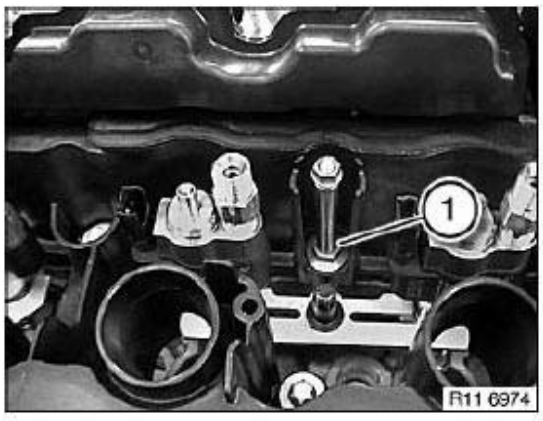


Fig. 68: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on cylinder head cover.



Fig. 69: Identifying Screws On Cylinder Head Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1 and 2) along lines.

Tightening torque **11 12 4AZ** .

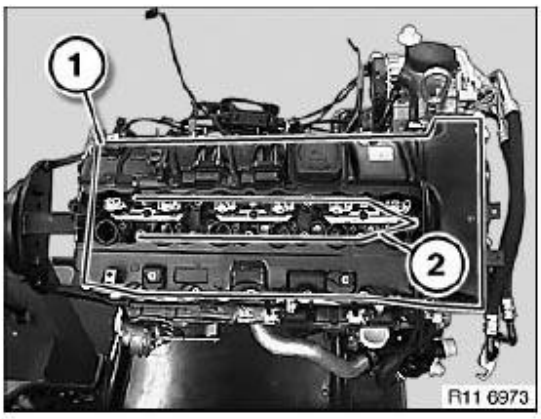


Fig. 70: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace gasket (1).

Press gasket (1) into cylinder head cover.

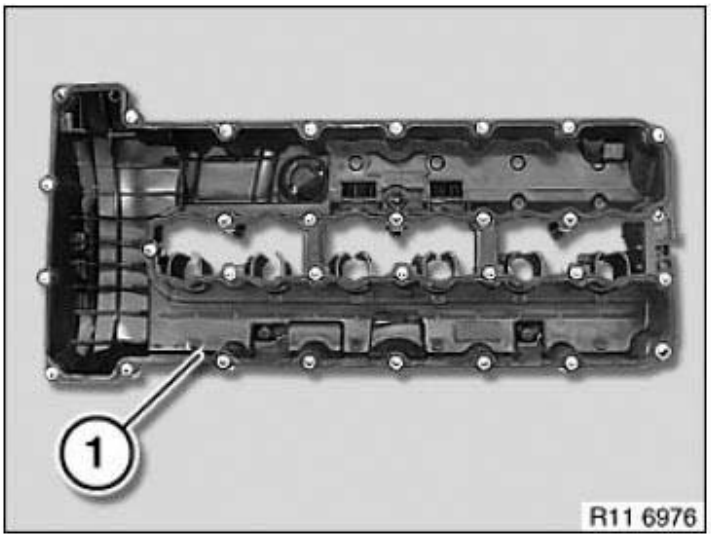


Fig. 71: Identifying Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 101 REPLACING CYLINDER HEAD GASKET (N54, N54T)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD** .

Insert **11 4 430** special tool into bore holes.

Remove head gasket.

IMPORTANT: Check identification (1) on cylinder head gasket (N54).

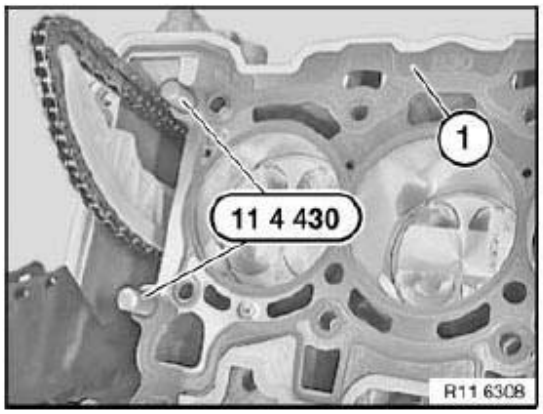


Fig. 72: Inserting 11 4 430 Special Tool Into Bore Holes
Courtesy of BMW OF NORTH AMERICA, INC.

There must be no fluids or contaminants in any of the threaded holes (1) for the cylinder head bolt connections.

IMPORTANT: Work on sealing surface on engine block and on cylinder head with special tool 11 4 470 only.

Do not use any metal-cutting tools.

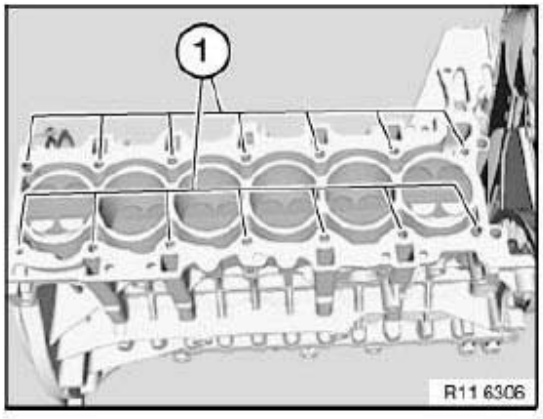


Fig. 73: Identifying Threaded Holes
Courtesy of BMW OF NORTH AMERICA, INC.

Identification (1) of head gasket (N54).

Gasket (3) is a beaded metal gasket with rubber coating.

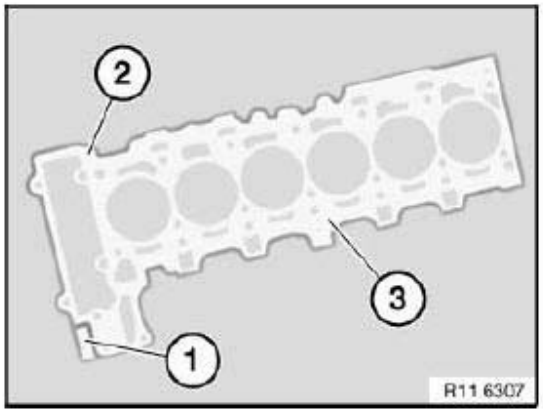


Fig. 74: Identifying Head Gasket Identification Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Check adapter sleeves (1) for damage and firm seating.

Place head gasket (2) in direction of arrow on engine block.

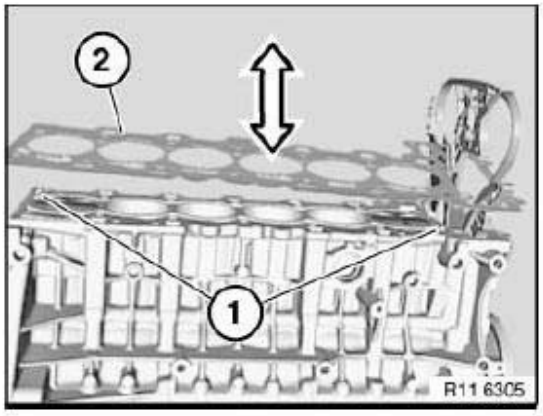


Fig. 75: Placing Head Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check cylinder head for DEVIATION FROM FLATNESS .

Check cylinder head for WATER LEAKS .

Assemble engine.

1113 OIL SUMP

11 13 000 REMOVING AND INSTALLING, SEALING OR REPLACING OIL SUMP (N54, N54T)

IMPORTANT: When working on the engine oil, coolant or fuel circuit, you must protect the alternator against contamination.

Risk of damage!

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

Aluminum screws/bolts are not magnetic.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove engine guard
- Secure engine in **INSTALLATION POSITION**
- **LOWERING FRONT AXLE**
- **Observe tightening specifications without fail during installation.**
- Drain and add **ENGINE OIL**

NOTE: On vehicles with option SA205 (automatic transmission), it is necessary to remove the transmission oil cooler lines from the oil sump.

Release bolts (3) on transmission.

Tightening torque **11 13 6AZ** .

Detach return hose (2).

IMPORTANT: Bolts of oil sump have different lengths.

Observe different tightening torques.

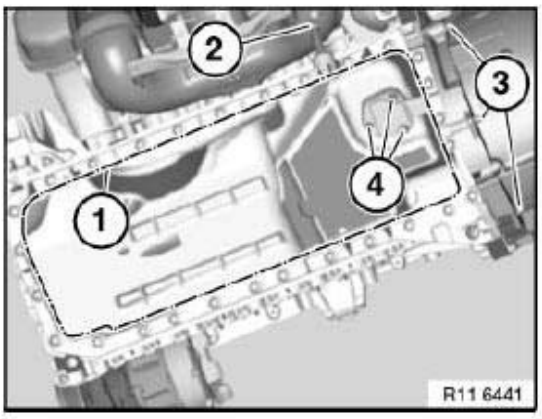


Fig. 76: Identifying Return Hose With Bolts And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts along line (1).

Tightening torque **11 13 2 AND 3AZ** .

Installation note:

Replace aluminum screws.

If necessary, release nuts (4). Remove oil level sensor.

Tightening torque **11 13 8AZ** .

Installation note:

Replace sealing ring.

IMPORTANT: There must be no adhesive residues in the lower crankcase retaining threads.

Clean retaining threads and sealing surfaces.

Installation note:

Replace all seals.

Assemble engine.

1114 HOUSING COVER

11 14 151 REPLACING CRANKSHAFT RADIAL SEAL (N54, N54T)

Necessary preliminary tasks:

- Remove See **2300018 REMOVING AND INSTALLING TRANSMISSION (GS6-53BZ) N54** or **28 00 001 REMOVING AND INSTALLING TWIN-CLUTCH GEARBOX (GS7D36SG) N54** .
- Remove **FLYWHEEL** .

NOTE: Radial shaft seal has six removal openings for removal with special tool 11 9 200 .

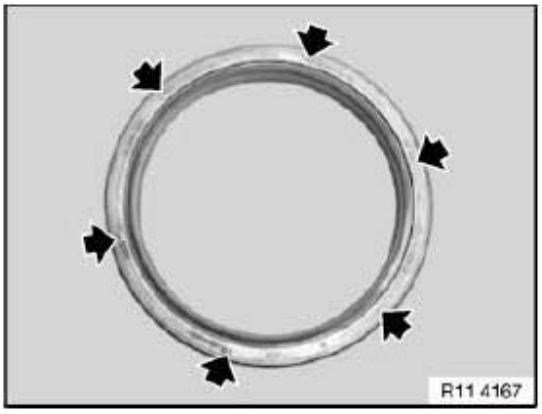


Fig. 77: Locating Crankshaft Radial Seal Removal Openings
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If necessary, remove rubber coating (1) on top side of radial shaft seal and expose a removal opening (2) (see graphic).

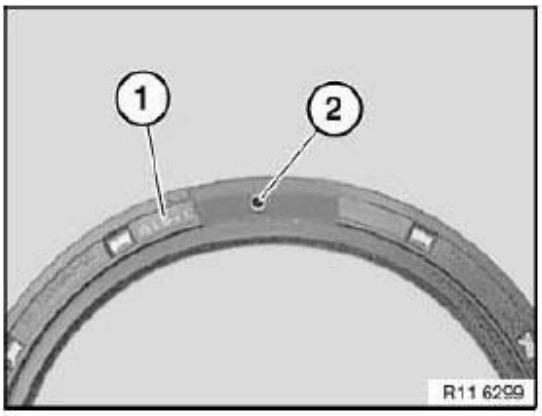


Fig. 78: Identifying Rubber Coating And Removal Opening
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool **11 9 200** . Insert sheet metal screws into removal opening of radial shaft seal and fasten without play (do **not** overtighten sheet metal screws).

Screw in spindle (1) slowly and carefully and detach radial shaft seal.

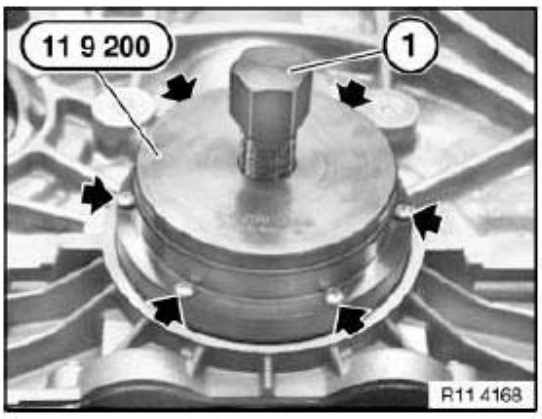


Fig. 79: Identifying Special Tool (11 9 200)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Clean sealing surface (1) and degrease thoroughly in area of housing partition.

Apply a light coat of oil to running surface (2) of radial shaft seal.

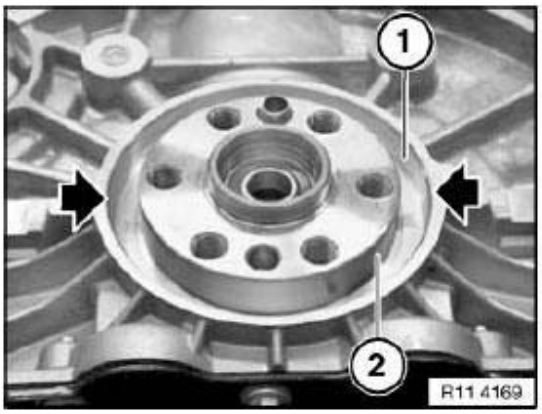


Fig. 80: Identifying Radial Shaft Running Surface Seal
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Support bush (4) is supplied with radial shaft seal (1).

When radial shaft seal (1) is installed, only support bush (4) may be used as a slip bush.

Radial shaft seal (1) has a groove (2) on both left and right sides.

IMPORTANT: After installation, grooves (2) must be filled with sealing compound.

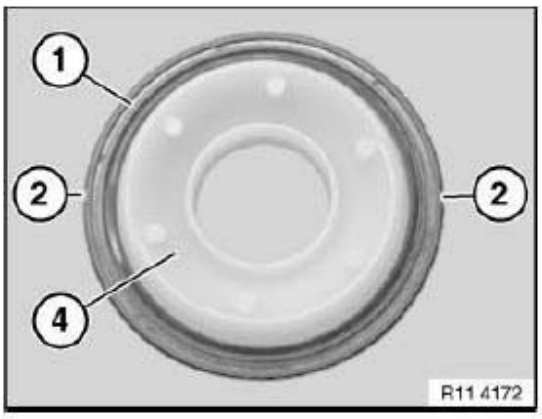


Fig. 81: Identifying Crankshaft Radial Seal, Grooves And Bushing
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The seal between the engine block and radial shaft seal is described below.

The engine block will not be leakproof at the outside of the radial shaft seal if you fail to comply with the individual work steps and the work sequence.

NOTE: The required parts are available from the BMW Parts Department (Electronic Parts Catalogue).

Remove screw caps (1) from injector (2).

Screw on metering needle.

Insert piston for pressing out.

Injector (2) contains the sealing compound Loctite, manufacturer's number 193140.

Bottle (3) contains the primer Loctite, manufacturer's number 171000.

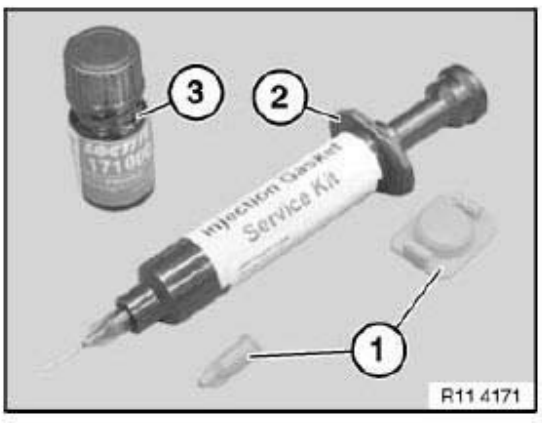


Fig. 82: Identifying Injector, Sealing Compound And Bottle
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Fit support bush (4) with radial shaft seal (1) on crankshaft.

Align groove (2) centrally to housing partition (3).

Coat both grooves (2) on radial shaft seal (1) with Loctite primer, manufacturer's number 171000, and expose to air for approx. one minute.

Push radial shaft seal (1) by hand as far as possible onto running surface.

Carefully remove support bush (4).

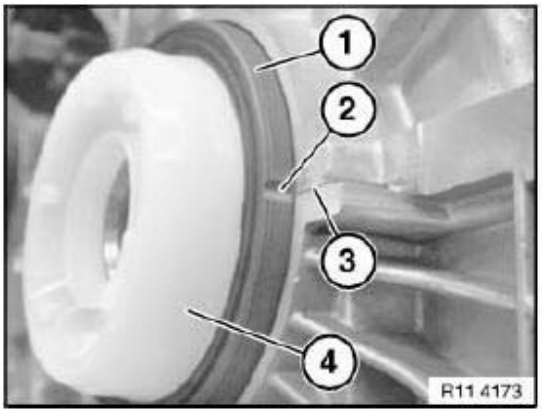


Fig. 83: Identifying Support Sleeve With Radial Shaft Seal On Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Spacer ring (1) is supplied with radial shaft seal.

Screw special tool 11 9 182 with screws (special tool 11 9 184) to crankshaft.

Fit spacer ring (1) on preassembled radial shaft seal.

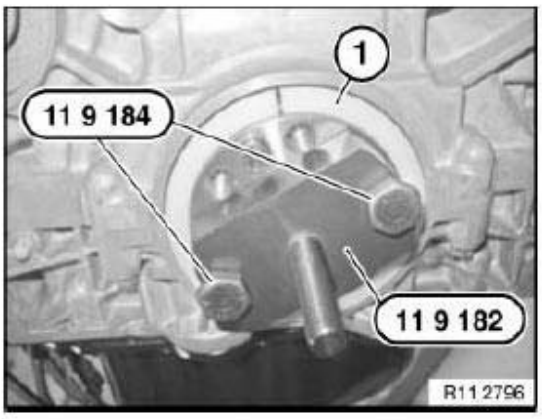


Fig. 84: Identifying Spacer Ring With Special Tool (11 9 182 And 11 9 183)
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in radial shaft seal and spacer ring with special tool 11 9 181 in conjunction with special tool 11 9 183.

Then remove spacer ring again.

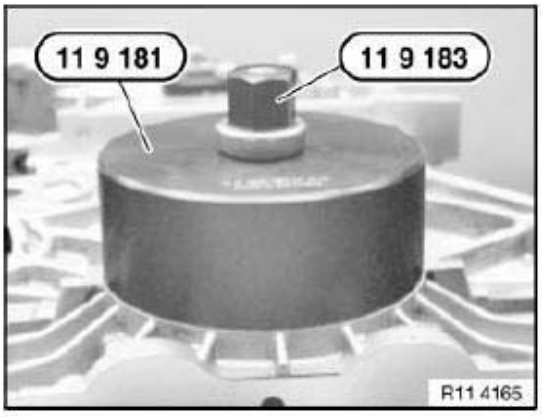


Fig. 85: Identifying Special Tool (11 9 181 And 11 9 183)
Courtesy of BMW OF NORTH AMERICA, INC.

Before filling with sealing compound:

Insert brush with Loctite primer, manufacturer's number 171000, as far as possible into grooves (1) on radial shaft seal and coat housing partition on engine block.

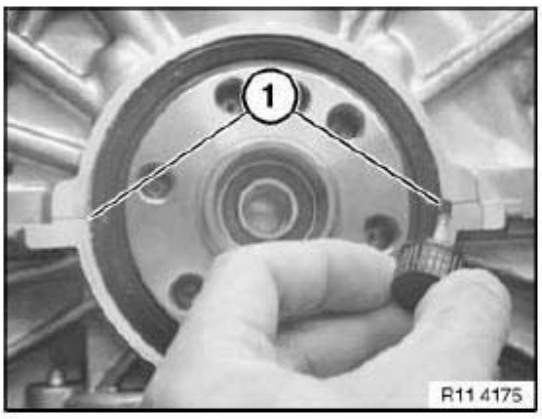


Fig. 86: Coating Surface Of Sealing Compound In Both Grooves Using Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Fill both grooves (1) flush with Loctite sealing compound, manufacturer's number 193140.

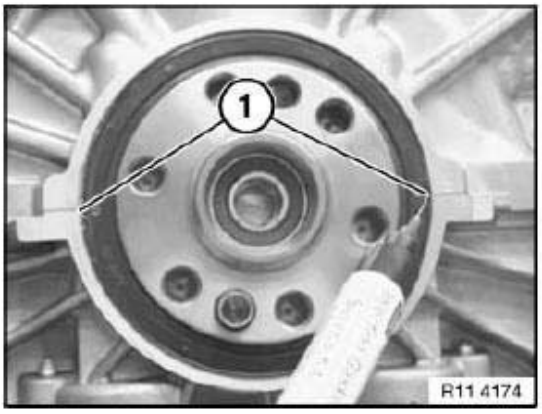


Fig. 87: Filling Both Grooves Flush With Loctite Sealing Compound
Courtesy of BMW OF NORTH AMERICA, INC.

Coat surface of sealing compound in both grooves (1) with Loctite primer, manufacturer's number 171000.

NOTE: Loctite primer, manufacturer's number 171000, binds the Loctite sealing compound, manufacturer's number 193140, and prevents leakage.

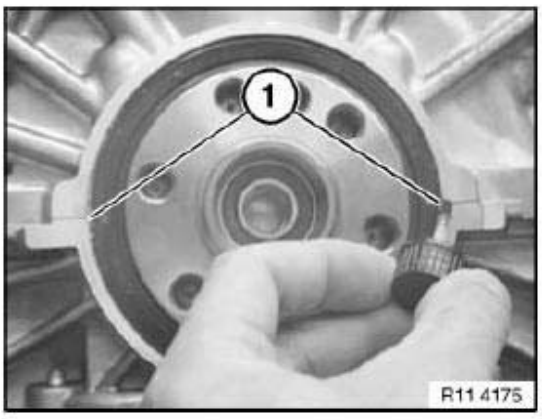


Fig. 88: Coating Surface Of Sealing Compound In Both Grooves Using Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 14 005 REPLACING FRONT CRANKSHAFT SEAL (N54, N54T)

Necessary preliminary tasks:

- Remove **VIBRATION DAMPER**

IMPORTANT: Do not release central bolt.

Risk of damage!

If the central bolt is released, the sprockets of the timing chain and the oil pump will no longer be non-positively connected to the crankshaft. The camshafts may turn in relation to the crankshaft.

The timing must be ADJUSTED again.

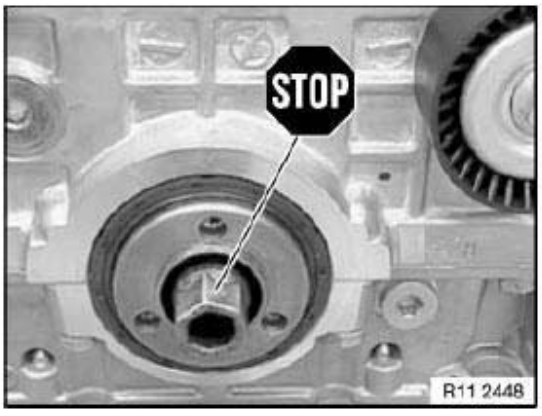


Fig. 89: Identifying Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Turn back special tool 11 9 222.

Push special tool 11 9 221 onto crankshaft hub.

IMPORTANT: When screws are tightened down (special tool 11 9 224) crankshaft seal is pressed inwards approx. 1 mm and thus slackened for subsequent removal.

Insert screws (special tool 11 9 224) and tighten down to approx. 20 Nm.

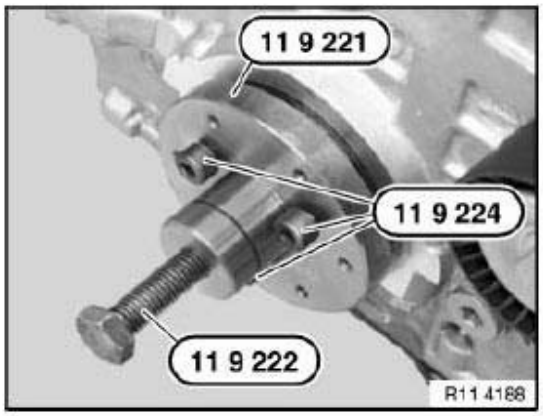


Fig. 90: Identifying Special Tool (11 9 221, 11 9 224 And 11 9 222)
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 0 371 to 80 Nm into crankshaft seal.

Screw in spindle 11 0 372.

Release crankshaft seal from crankcase.

NOTE: Repeat this operation several times if necessary.

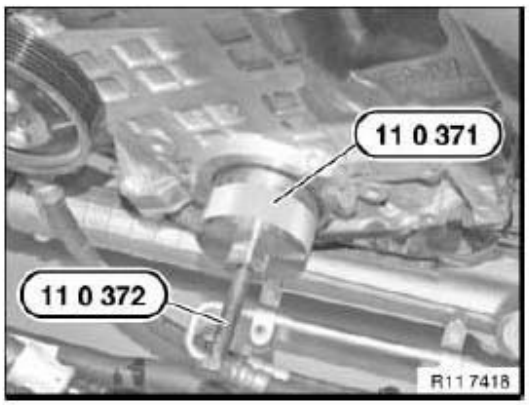


Fig. 91: Identifying Special Tool (11 0 372 And 11 0 371)
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully saw open crankshaft seal (1) at cutting line (2).

Remove crankshaft seal (1) from special tool 11 0 371.

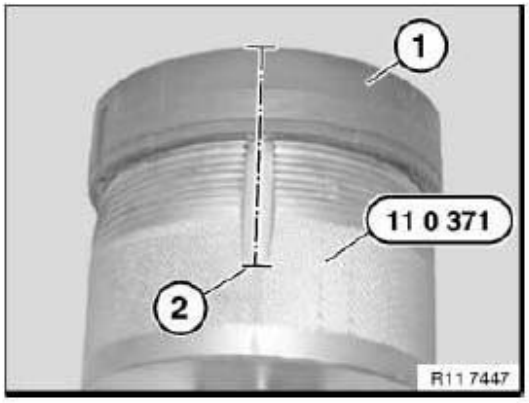


Fig. 92: Identifying Crankshaft Radial Seal And Cutting Line
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The following text describes installation and sealing between the engine block and crankshaft seal.

The engine block will not be leakproof at the outside of the crankshaft seal if you fail to comply with the individual work steps and the work sequence.

Installation note:

Clean sealing surface (1) and degrease thoroughly in area of crankcase partition.

Apply a light coat of oil to running surface (2) of the crankshaft seal.

NOTE: **Graphic shows an N42 engine by way of example.**

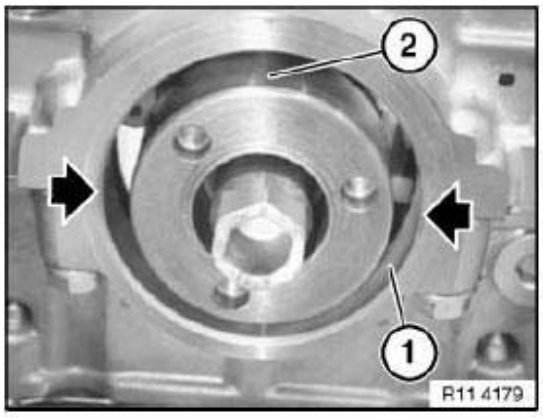


Fig. 93: Identifying Sealing Surface And Running Surface For Crankshaft Radial Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 9 232 with screws (special tool 11 9 234) to crankshaft hub.

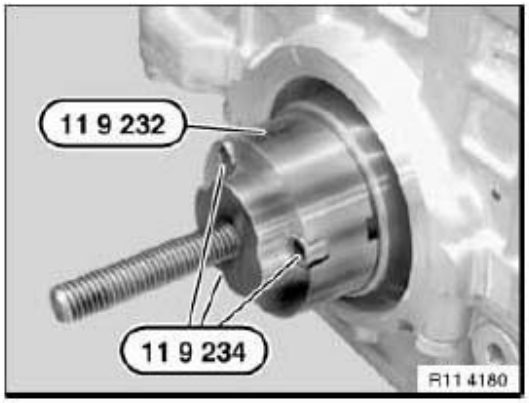


Fig. 94: Identifying Special Tool (11 9 232 And 11 9 234)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Support bush (1) is supplied with crankshaft seal (2).**

When crankshaft seal (2) is installed, only support bush (1) may be used as a slip bush.

Crankshaft seal (2) has a groove on both left and right sides.

IMPORTANT: After installation, the grooves must be filled with sealing compound.

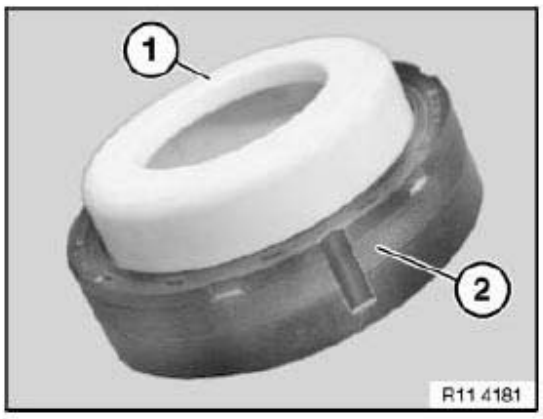


Fig. 95: Identifying Crankshaft Seal And Support Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The required parts are available from the BMW Parts Department (Electronic Parts Catalogue).

Remove screw caps (1) from injector (2).

Screw on metering needle.

Insert piston for pressing out or use special tool **11 4 370** .

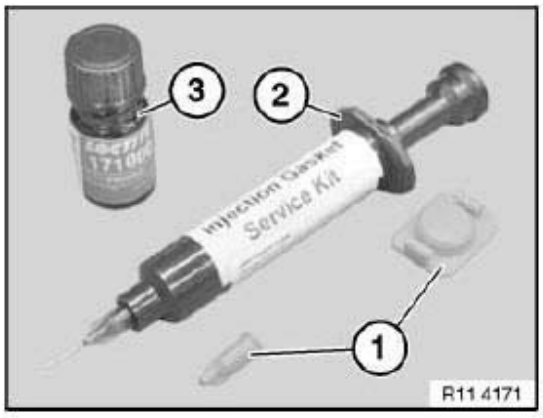


Fig. 96: Identifying Injector, Sealing Compound And Bottle
Courtesy of BMW OF NORTH AMERICA, INC.

Push support bush (1) with crankshaft seal (2) onto special tool 11 9 232.

IMPORTANT: Support bush (1) remains on special tool 11 9 232 until crankshaft seal is drawn in.

Align groove (3) centrally to crankcase partition (4).

Coat both grooves (3) on crankshaft seal (2) with Loctite primer, manufacturer's number 171000, and expose to air for approx. one minute.

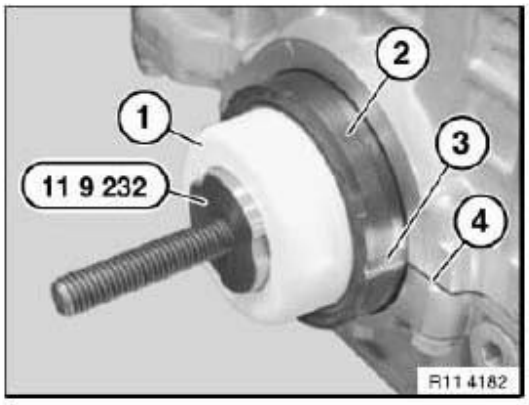


Fig. 97: Identifying Sleeve, Crankshaft Seal, Groove And Housing Partition With Special Tool (11 9 232)
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in crankshaft seal with special tool 11 9 231 in conjunction with special tool 11 9 233 until flush.

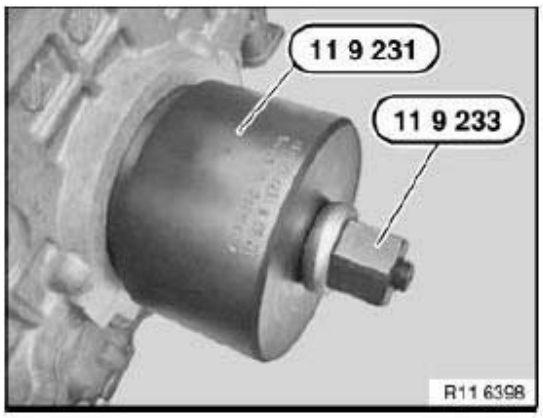


Fig. 98: Identifying Special Tool (11 9 231 And 11 9 233)
Courtesy of BMW OF NORTH AMERICA, INC.

Before filling with sealing compound:

Insert brush with Loctite primer, manufacturer's number 171000, as far as possible into grooves (1) on crankshaft seal and coat crankcase partition on engine block.

NOTE: Graphic shows an N42 engine by way of example.

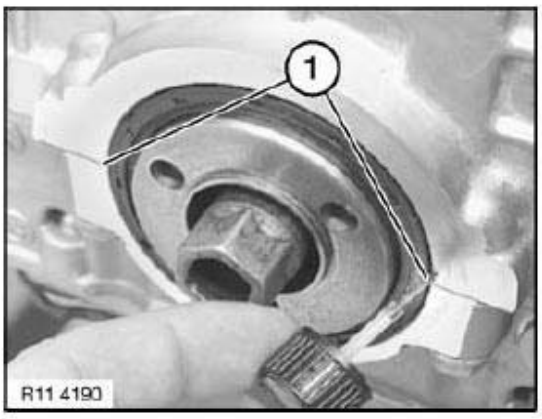


Fig. 99: Inserting Brush With Loctite Primer Into Grooves On Crankshaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Using injector/syringe (2), fill both grooves (3) flush with sealing compound.

NOTE: Graphic shows an N42 engine by way of example.

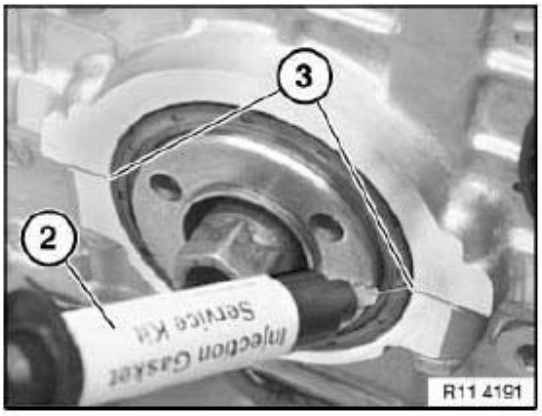


Fig. 100: Filling Grooves Flush With Sealant Using Injector/Syringe
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Loctite primer, manufacturer's number 171000, binds the Loctite sealing compound, manufacturer's number 128357, and prevents leakage.

Coat surface of sealing compound in both grooves (1) with Loctite primer, manufacturer's number 171000.

NOTE: Graphic shows an N42 engine by way of example.

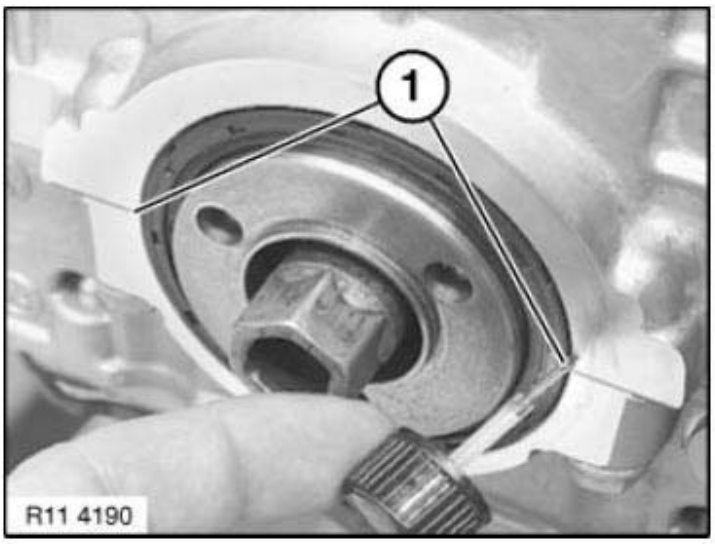


Fig. 101: Coating Surface Of Sealing Compound In Both Grooves Using Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

11 14 010 REPLACING SEALING CAP FOR VACUUM PUMP (N54, N54T)

Necessary preliminary tasks:

- Remove **FAN COWL**
- Remove alternator **DRIVE BELT**
- Remove both drive belt **TENSIONERS**

NOTE: For purposes of clarity, graphics show alternator and power steering pump removed.

Secure special tool 11 8 535 with special tools 11 8 531 and 11 8 537.

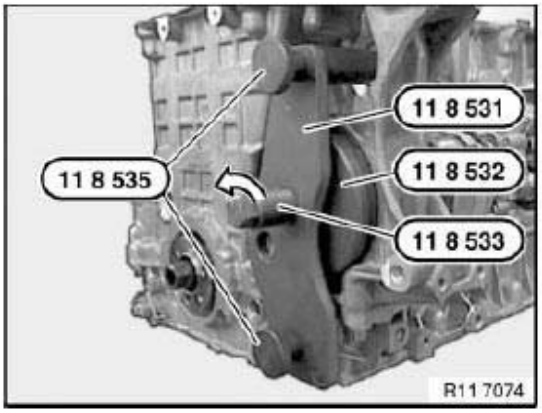


Fig. 102: Identifying Special Tools 11 8 535, 11 8 531 And 11 8 537

Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 8 537 by hand on sealing cover.

Screw in special tool 11 8 534.

NOTE: The sealing cover is pressed out diagonally during this work step

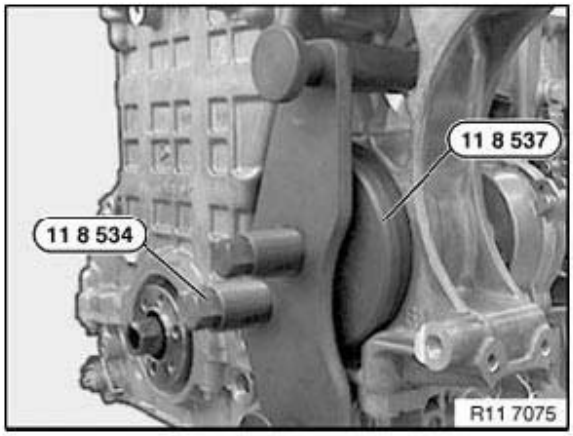


Fig. 103: Identifying Special Tools 11 8 537 And 11 8 534
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in new sealing cover (1) with special tools 11 8 532 and 11 8 533 until flush with crankcase upper section.

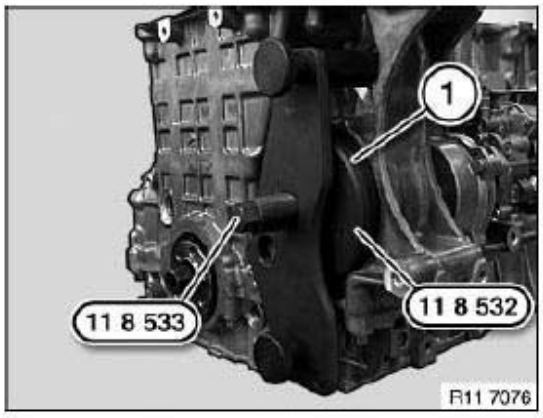


Fig. 104: Identifying Sealing Cover With Special Tools 11 8 532 And 11 8 533
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1121 CRANKSHAFT WITH BEARING

11 22 500 REMOVING AND INSTALLING/REPLACING FLYWHEEL (N54, N54T)

Necessary preliminary tasks:

- Remove **28 00 001 REMOVING AND INSTALLING TWIN-CLUTCH GEARBOX (GS7D36SG) N54**
- Remove **CLUTCH**

Enlarge special tool **11 9 260** with an elongated hole.

Enlarge elongated hole on special tool **11 9 260** to **8 mm.**



Fig. 105: Identifying Slot Dimension On Special Tool 11 9 260
Courtesy of BMW OF NORTH AMERICA, INC.

For vehicles with manual gearboxes

Secure flywheel with special tool **11 9 260** .

Release flywheel bolts with special tool **11 4 180** /

Tightening torque **11 22 2AZ** .

Installation note:

The flywheel is secured with a dowel pin.

Fit new flywheel screws

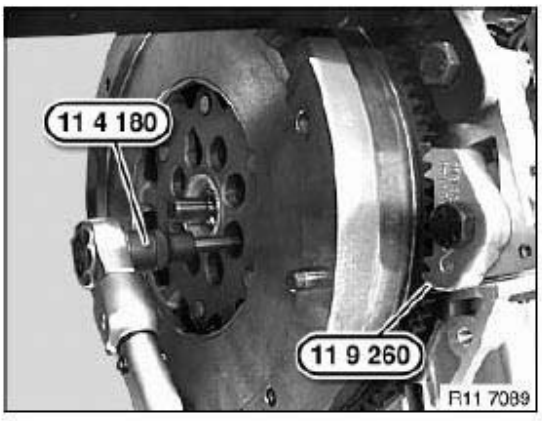


Fig. 106: Removing Flywheel Screws Using Special Tool 11 4 180
Courtesy of BMW OF NORTH AMERICA, INC.

For vehicles with automatic transmissions

Secure flywheel with special tool **11 9 260** .

Release flywheel screws with a suitable tool (1).

Tightening torque **11 22 1AZ** .

Installation note:

The flywheel is secured with a dowel pin.

Fit new flywheel screws

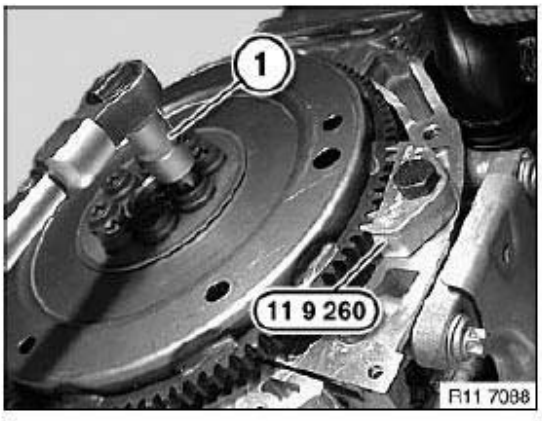


Fig. 107: Mounting Flywheel Using Special Tool 11 9 260
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 21 531 REPLACING ALL CRANKSHAFT MAIN BEARINGS (N54, N54T)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are not magnetic.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove **CRANKSHAFT**

Check setting of oil spray nozzles, adjusting if necessary

Attach special tool **11 8 510** to main bearing screw connection, secure with bolt (1).

Installation note:

The oil nozzle must be located precisely in the groove of special tool **11 8 510** .

If necessary, adjust oil nozzle.

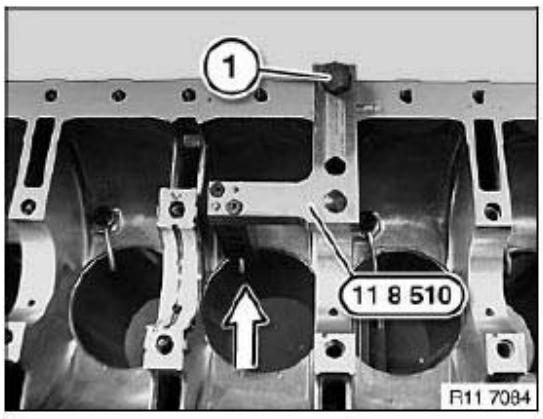


Fig. 108: Locating Oil Nozzle In Groove Of Special Tool 11 8 510
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust oil nozzle.

Release screw (1).

Tightening torque **11 11 5AZ** .

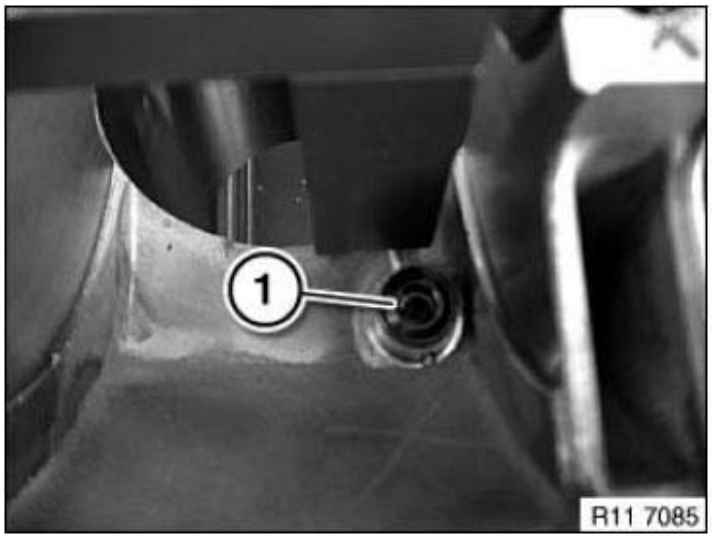


Fig. 109: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bearing shells (2) and (3).

NOTE: Guide bearing shell (3) is a thrust bearing.

Observe bearing classification. See **CRANKSHAFT AND BEARINGS** ; **CRANKSHAFT AND BEARINGS N54/B30** ; **CRANKSHAFT AND BEARINGS N54/B30** ; or **CRANKSHAFT AND BEARINGS N54/B30** .

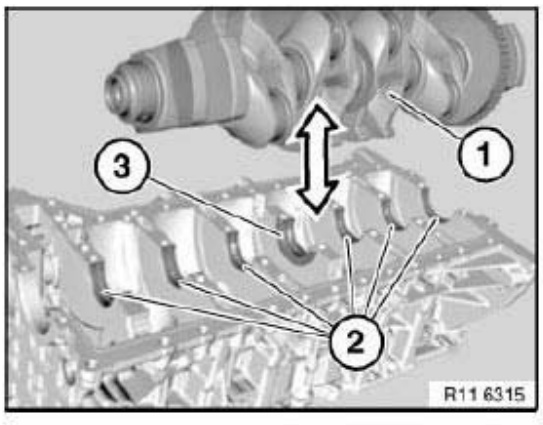


Fig. 110: Identifying Bearing Shells
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Bearing shell (1) with lubricant groove must be fitted in crankcase upper section.

Bearing shell (2) without lubricant groove must be fitted in crankcase lower section (bedplate).

IMPORTANT: Allocation of bearing points:

Bearing point 1 is at the front on the timing chain drive in the direction of travel.

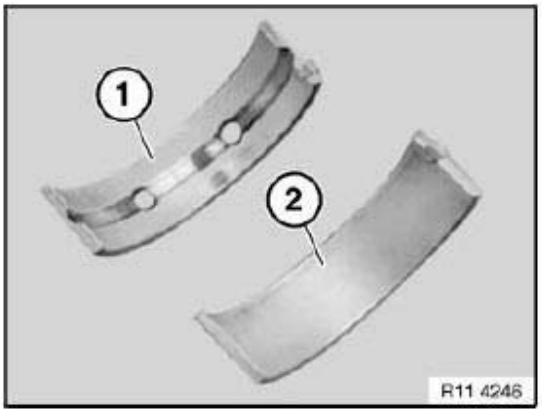


Fig. 111: Identifying Bearing Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Main bearing classification (1) for crankcase lower half (bedplate), code numbers 1 2 3, see table.

Observe bearing classification. See **CRANKSHAFT AND BEARINGS** ; **CRANKSHAFT AND BEARINGS N54/B30** ; **CRANKSHAFT AND BEARINGS N54/B30** ; **CRANKSHAFT AND BEARINGS N54/B30** .

Bearing classification (2) of **CONNECTING RODS** code letters b and r.

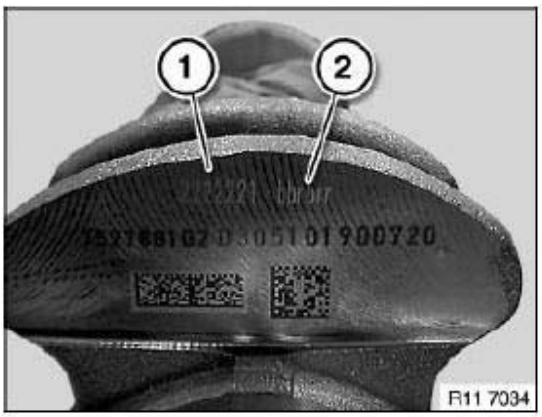


Fig. 112: Identifying Bearing Classifications
Courtesy of BMW OF NORTH AMERICA, INC.

Main bearing classification (1) in crankcase, code letters A/B or C, see table.

Installation note:

When all the letters and number code have been determined, the bearing shell color must be allocated.

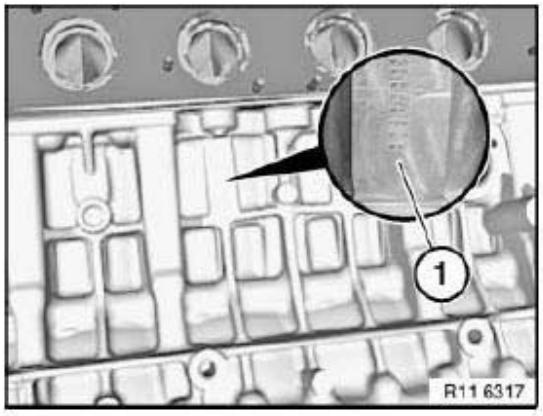


Fig. 113: Identifying Bearing Classification Of Crankcase Upper Section
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The letter/number combination produces a bearing shell pairing.

Identification by different colors.

IMPORTANT: First bearing point is on the timing drive.

The color combination Yellow and Red must not be fitted.

Engine damage will result if excessively small bearing play is determined.

Code letters on crankcase

Code letter A = bearing shell (1) color Yellow.

Code letter B = bearing shell (1) color Green.

Code letter C = bearing shell (1) color Red.

Code numbers on crankshaft

Code number 1 = bearing shell (2) Yellow.

Code number 2 = bearing shell (2) Green.

Code number 3 = bearing shell (2) Red.

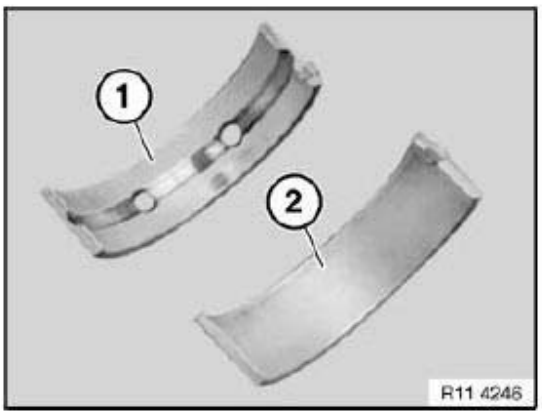


Fig. 114: Identifying Bearing Shell
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The color combination Yellow and Red must not be fitted; the bearing colors Green/Green must be selected for this color combination, see table.

Installation example

For bearing 1 with code letter **A** on the **crankcase** and code number 1 on the **crankshaft** bearing shell (1) with the color **Yellow** is required for the **crankcase** and bearing shell (2) with the color **Yellow** for the **crankcase lower half** (bedplate).

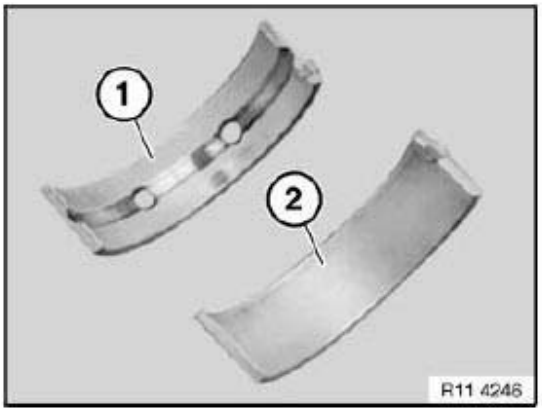


Fig. 115: Identifying Bearing Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Lager 2: **A** and **2** colors Yellow and Green.

Lager 3: **B** and **2** colors Green and Green.

Lager 4: **C** and **2** colors Red and Green.

Lager 5: **B** and **1** colors Green and Yellow.

Lager 6: **C** and **3** colors Red and Red.

Lager 7: **C** and **1** colors Green and Green.

The color combination **Yellow and Red** must not be fitted.

Installation note:

Possible color combinations for mounting the crankshaft in the crankcase.

CRANKCASE COLOR CODE REFERENCE CHART

(A 1) Crankcase/Yellow	**(B 1) Crankcase/Green**	**(C 1) Crankcase/Green**
(A 1) Crankcase lower half/**Yellow**	**(B 1)** Crankcase lower half/**Yellow**	**(C 1)** Crankcase lower half/**Green**

CRANKCASE COLOR CODE REFERENCE CHART

(A 2) Crankcase/Yellow	**(B 2) Crankcase/Green**	**(C 2) Crankcase/Red**
(A 2) Crankcase lower half/**Green**	**(B 2)** Crankcase lower half/**Green**	**(C 2)** Crankcase lower half/**Green**
(A 3) Crankcase/**Green**	**(B 3)** Crankcase/**Green**	**(C 3)** Crankcase/**Red**
(A 3) Crankcase lower half/**Green**	**(B 3)** Crankcase lower half/**Red**	**(C 3)** Crankcase lower half/**Red**

Insert all bearing shells (2 and 3).

IMPORTANT: Clean sealing surfaces.

Do not clean sealing faces with a metal-cutting tool.

Only use special tool **11 4 470** to clean sealing surfaces.

Determine bearing play with special tool **00 2 590** .

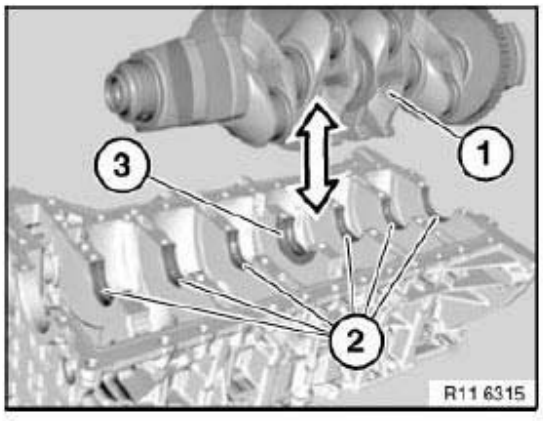


Fig. 116: Identifying Bearing Shells
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

All measuring points must be free from oil and grease.

Use used screws to determine bearing play.

Set up crankcase lower section (bedplate) with bearing shells.

Remove crankcase lower section (bedplate).

Read off bearing play at width of flattened plastic thread and measurement scale.

Crankshaft bearing play **radial** .

Installation note:

Remove plastic thread.

Apply a light coat of oil to bearing shells and crankshaft.

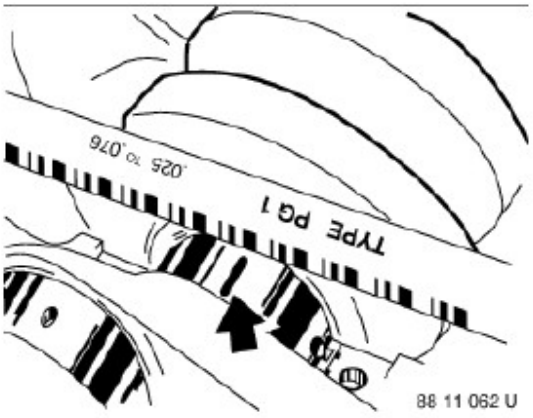


Fig. 117: Checking Radial Clearance At Width Of Flattened Plastic Thread (Plastigage)
Courtesy of BMW OF NORTH AMERICA, INC.

Install crankcase lower section (bedplate).

Assemble engine.

11 21 500 REPLACING CRANKSHAFT (N54, N54T)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

Aluminum screws/bolts are not magnetic.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove **ENGINE**
- Mount engine on **ASSEMBLY STAND**
- Remove **VIBRATION DAMPER**
- Remove **OIL SUMP**
- Remove **OIL PUMP**
- Remove **TRIANGULAR DRIVE** for oil pump
- Remove **TIMING CHAIN MODULE**
- Remove **CYLINDER HEAD** .
- Remove **FLYWHEEL**
- Removing all **PISTONS**

Release screws (1).

Tightening torque **11 13 5AZ** .

Installation note:

Replace aluminum screws.

Remove oil deflector (2).

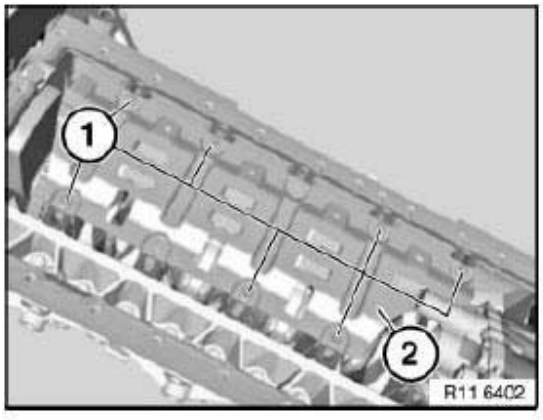


Fig. 118: Identifying Screws And Oil Deflector

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 11 2AZ** .

Unfasten screws (2).

Tightening torque **11 11 3AZ** .

Installation note:

Replace aluminum screws.

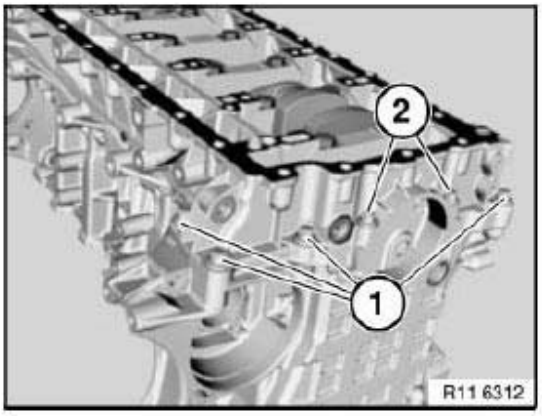


Fig. 119: Identifying Aluminum Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 11 4AZ** .

Unfasten screws (2).

Tightening torque **11 11 2AZ** .

Installation note:

Replace aluminum screws.

Release steel screws (1 to 14) from outside inwards.

Tightening torque **11 11 1AZ** .

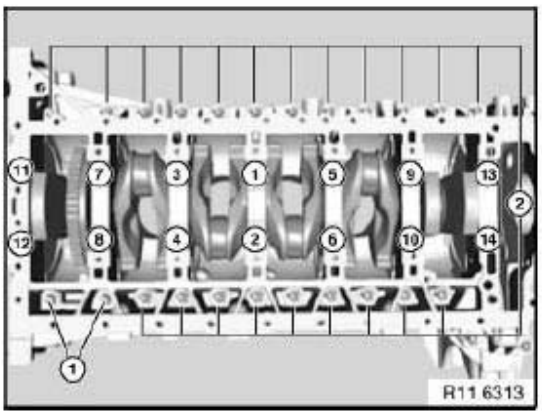


Fig. 120: Identifying Steel Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 11 3AZ** .

Installation note:

Replace aluminum screws.

Remove crankshaft lower section in upward direction.

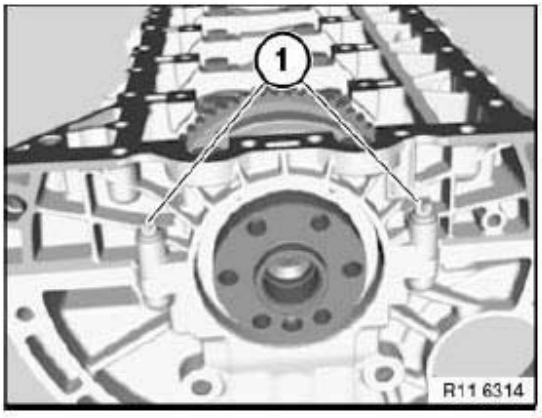


Fig. 121: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove both crankshaft seals (1).

NOTE: Graphic shows N46.

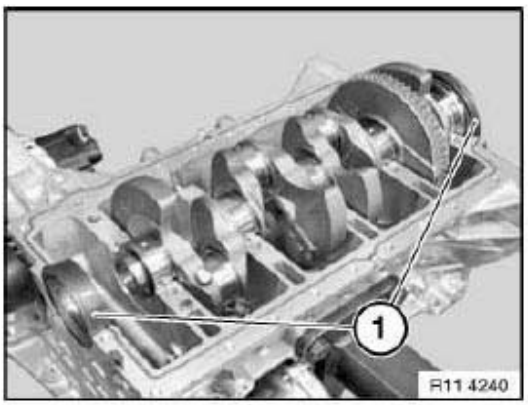


Fig. 122: Identifying Crankshaft Radial Seals
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **MAIN BEARING SHELLS** (2 and 3), replace if necessary.

Remove and install crankshaft (1) in direction of arrow.

IMPORTANT: Remove crankshaft with aid of a second person.

Weight of crankshaft approx. 25 kg.

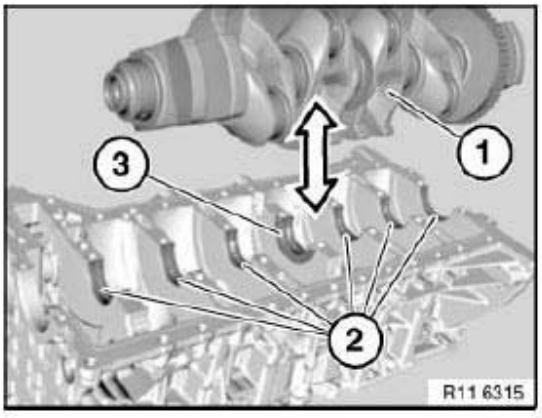


Fig. 123: Identifying Bearing Shells
Courtesy of BMW OF NORTH AMERICA, INC.

Check guide sleeves (1) for damage and correct seating.

Reinstall crankshaft.

Installation note:

Lubricate all bearing points with engine oil.

Clean all sealing surfaces.

NOTE: Graphic shows N46.

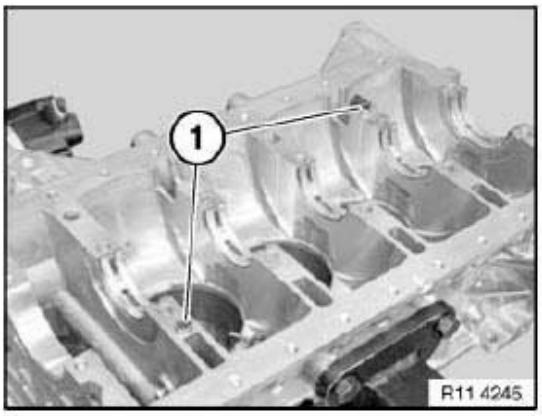


Fig. 124: Identifying Adapter Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten steel screws (1 to 14) from inside outwards.

Tightening torque **11 11 1AZ** .

Tighten screws (2) from inside outwards.

Tightening torque **11 11 2AZ** .

Tighten screws (1).

Tightening torque **11 11 4AZ** .

Installation note:

Replace aluminum screws.

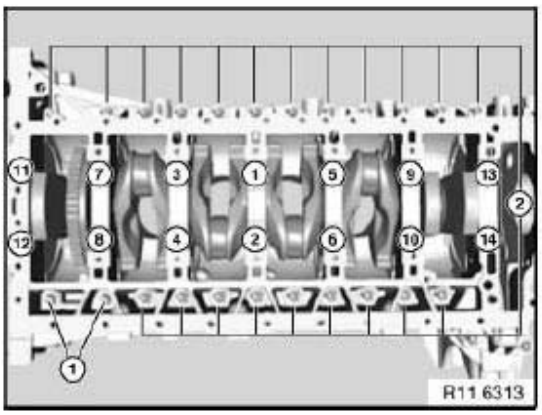


Fig. 125: Identifying Steel Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten aluminum screws exclusively with special tool **00 9 120** .

IMPORTANT: In the case of aluminum screws, jointing torque and angle of rotation must be observed without fail.

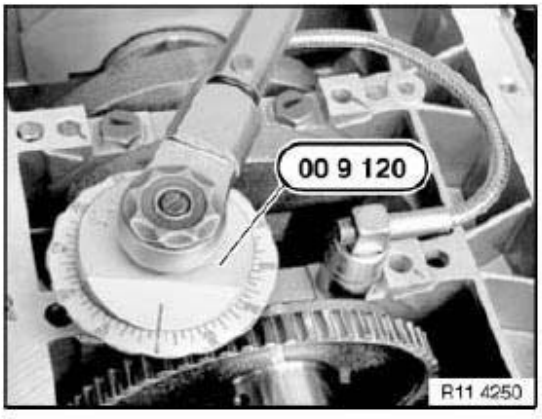


Fig. 126: Tightening Main Bearing Bolts Using Special Tool (00 9 120)
Courtesy of BMW OF NORTH AMERICA, INC.

Set up stand with magnetic base on special tool 11 4 440.

Set up special tool **00 2 510** on stand.

Position special tool **00 2 510** on crankshaft.

Move crankshaft in direction of arrow.

Determine bearing play. See **CRANKSHAFT AND BEARINGS** ; **CRANKSHAFT AND BEARINGS N54/B30** ; **CRANKSHAFT AND BEARINGS N54/B30** ; or **CRANKSHAFT AND BEARINGS N54/B30** .

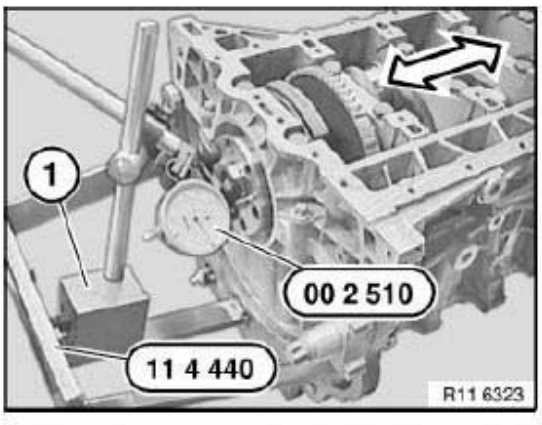


Fig. 127: Setting Up Stand With Magnetic Base On Special Tool 11 4 440
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Always replace nozzles (1).

Drive in both nozzles (1) with special tool **11 9 360** on left and right into crankcase.

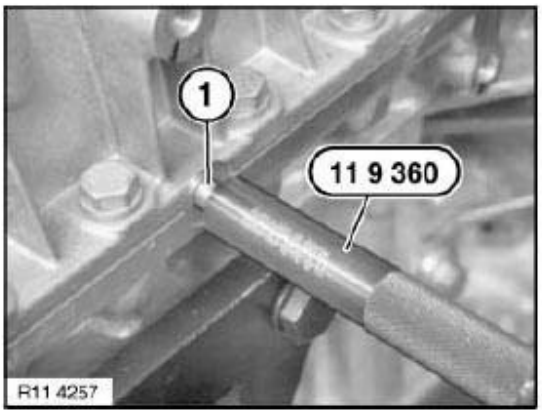


Fig. 128: Inserting Nozzles Using Special Tool 11 9 360
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

CRANKSHAFT SEAL - replace front.

CRANKSHAFT SEAL - replace rear.

Installation note:

Use **PRIMER 1.3 AND LIQUID GASKET 1.4** .

Prepare liquid sealing compound (1) in special tool **11 4 370** .

Screw on nozzle for injecting liquid gasket.

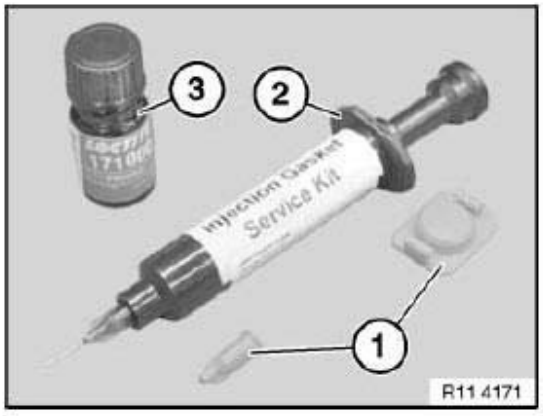


Fig. 129: Identifying Injector, Sealing Compound And Bottle
Courtesy of BMW OF NORTH AMERICA, INC.

Slowly insert liquid sealing compound (1) with special tool **11 4 370** in direction of arrow.

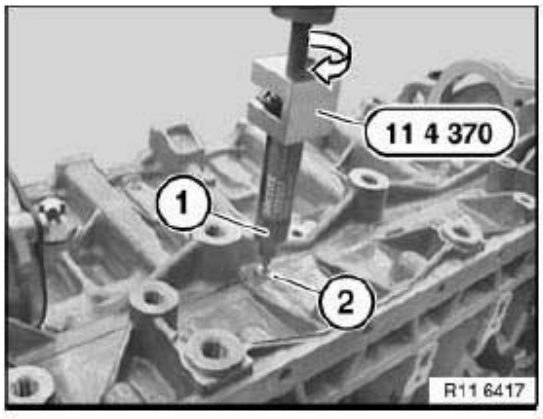


Fig. 130: Inserting Liquid Sealing Compound Using Special Tool 11 4 370
Courtesy of BMW OF NORTH AMERICA, INC.

Stop (seal off) escaping liquid sealing compound with primer 1.3.

(Graphic shows N40).

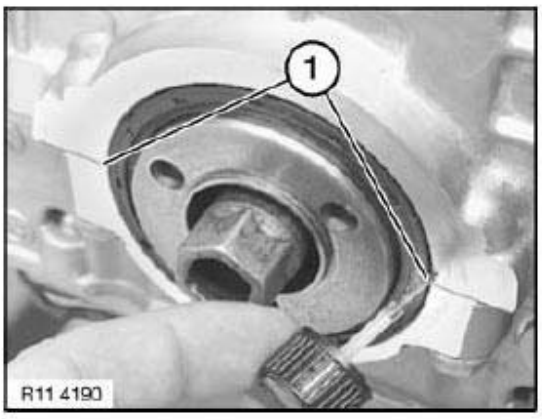


Fig. 131: Stopping Escaping Liquid Sealing Compound Using Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 21 505 SEALING CRANKCASE LOWER SECTION (N54, N54T)

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are not magnetic.

Risk of damage!

Jointing torque and angle of rotation must be observed without fail.

IMPORTANT: Changed procedure.

It is not necessary to remove the cylinder head and the crankshaft.

Necessary preliminary tasks:

- Remove **ENGINE** .

- **MOUNT ENGINE ON ASSEMBLY STAND** .
- Remove **CLUTCH** (if fitted).
- Remove left and right engine support arm. See **2211100 REPLACING RIGHT ENGINE SUPPORT ARM (N54)** ; or **2211110 REPLACING LEFT ENGINE SUPPORT ARM (N54)**
- Remove **OIL SUMP** .

Release screws (1).

Pull out oil pump intake pipe (2).

Tightening torque: **11 13 5AZ**

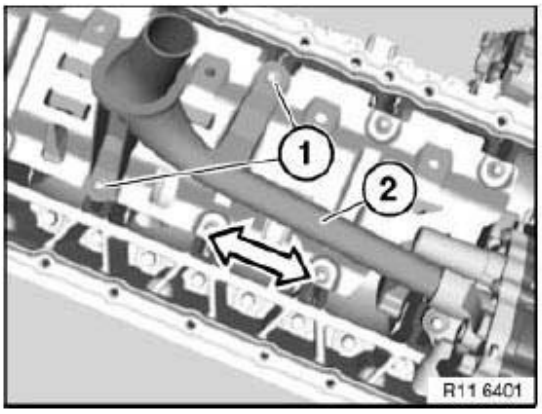


Fig. 132: Removing Pump Intake Pipe
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: **11 13 5AZ** .

Installation note:

Replace aluminum screws.

Remove oil deflector (2).

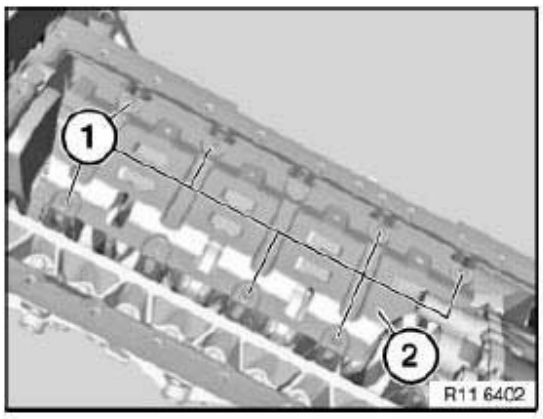


Fig. 133: Identifying Oil Deflector And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Secure oil pump drive gear with 6.0 mm dia. steel pin (3) to oil pump.

IMPORTANT: Release central bolt (2) only together with 6.0 mm dia. steel pin (3).

Do not remove sprocket.

Release central bolt (2).

Tightening torque: **11 41 4AZ** .

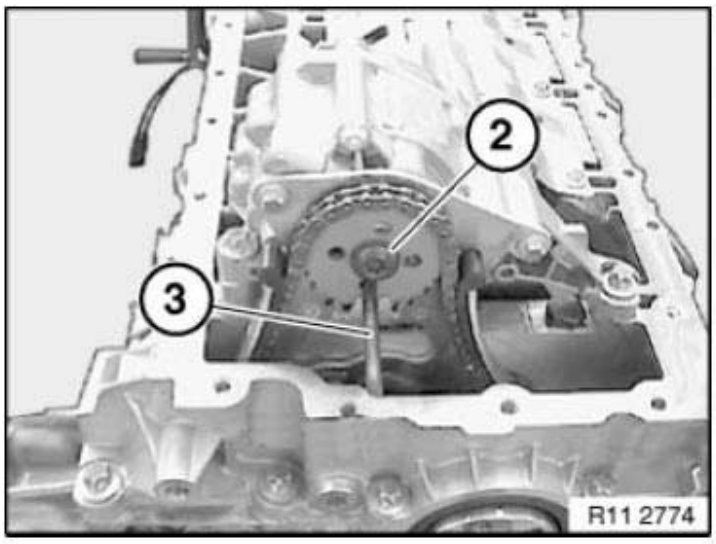


Fig. 134: Identifying Oil Pump Drive Gear And Steel Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (2).

Tightening torque: **11 41 3AZ** .

Installation note:

Replace aluminum screws.

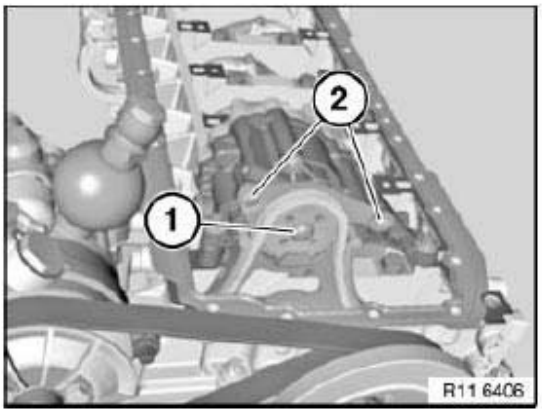


Fig. 135: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove screw plug (1) from crankcase at front.

NOTE: Replace gasket.

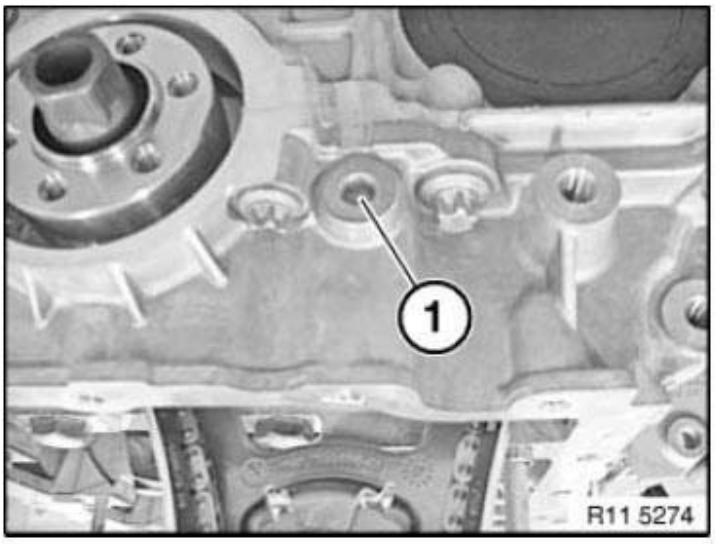


Fig. 136: Identifying Screw Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) for oil pump triangular drive with special tool **11 8 640** .

NOTE: **It is not necessary to remove the triangular drive.**

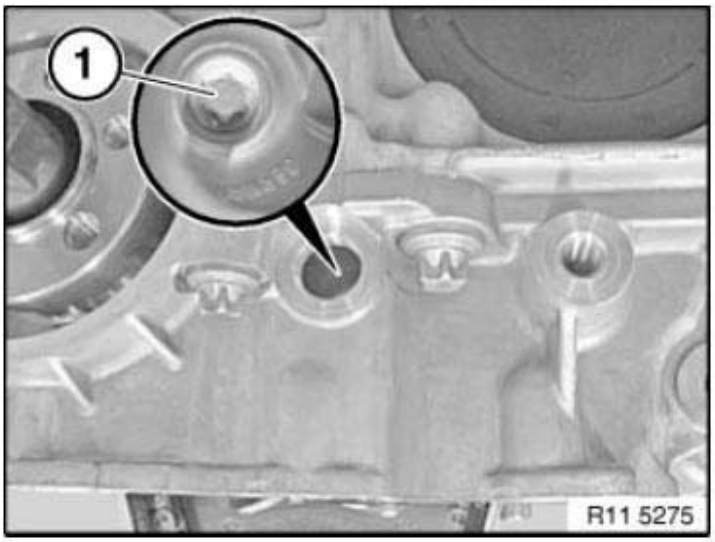


Fig. 137: Identifying Oil Pump Triangular Drive Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Version 1

IMPORTANT: **Observe different screw lengths.**

Release screws (1).

Tightening torque 11 41 2AZ .

Tightening torque 11 41 2AZ .

Installation note:

Replace aluminum screws.

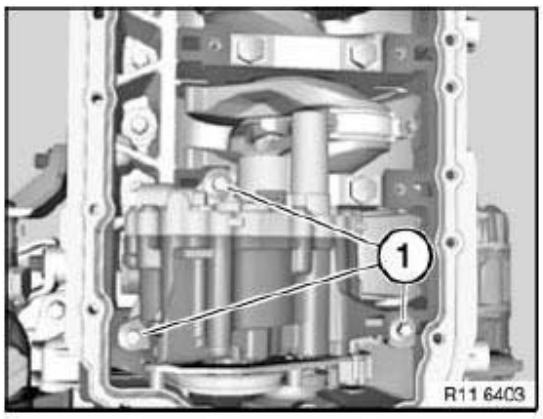


Fig. 138: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Version 2

IMPORTANT: Observe different screw lengths.

Release oil pump screws (1).

Tightening torque: 11 41 2AZ .

Installation note:

Replace aluminum screws.

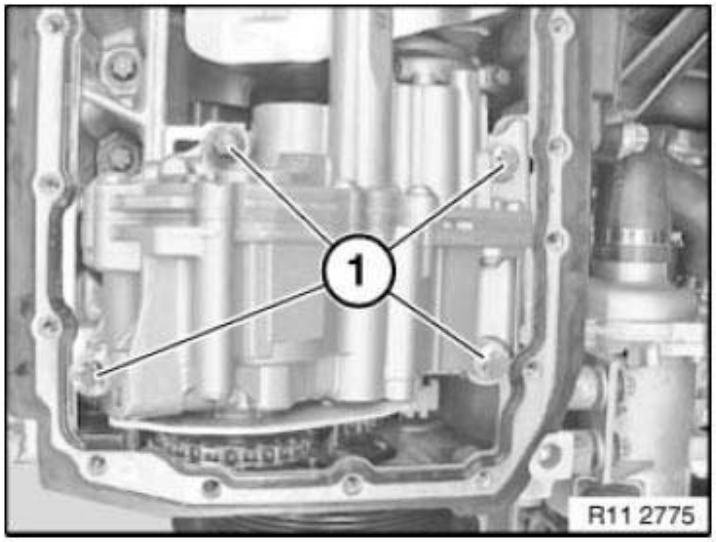


Fig. 139: Identifying Oil Pump Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Detach sprocket (1) in direction of arrow.

NOTE: The chain tensioner pushes the timing chain (3) of the triangular drive upward.

Do **not** remove camshaft sprocket.

Remove oil pump (2) in direction of arrow.

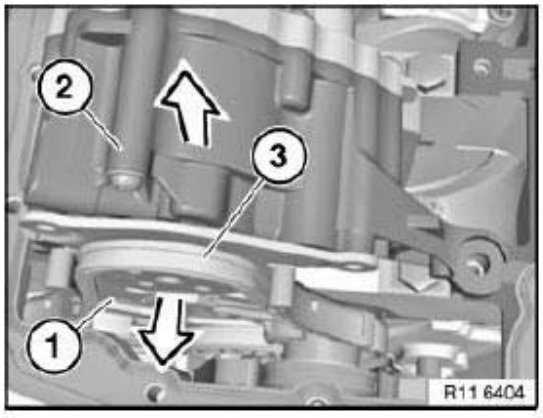


Fig. 140: Removing Sprocket
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check spacer bushings (1) for secure seating and damage; replace if necessary.

Align twin surface (3) on oil pump (2) to sprocket wheel.

Install oil pump (2).

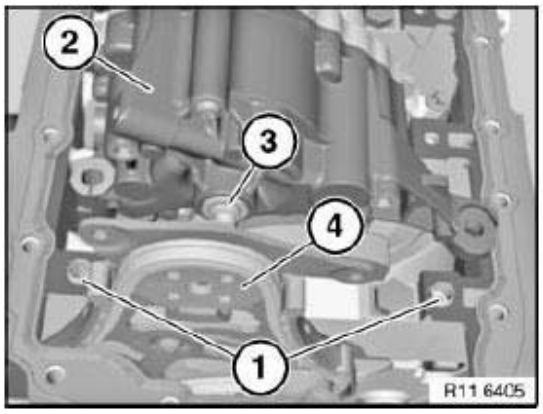


Fig. 141: Identifying Spacer Bushings And Oil Pump
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **The dowel hole for the TDC setting is located on the intake side underneath the starter motor.**

Rotate engine at central bolt and secure flywheel in position with special tool **11 0 300** .

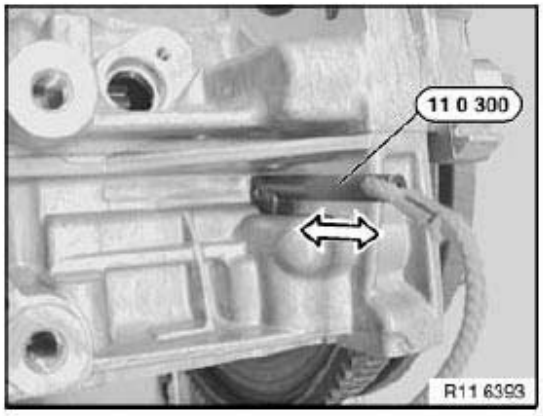


Fig. 142: Securing Flywheel In Position Using Special Tool 11 0 300
Courtesy of BMW OF NORTH AMERICA, INC.

Secure flywheel with special tool (1) 11 9 260 and special tool (2) 11 9 266.

NOTE: **Make sure that the special tool (1) completely engages in the flywheel teeth (see arrow)**

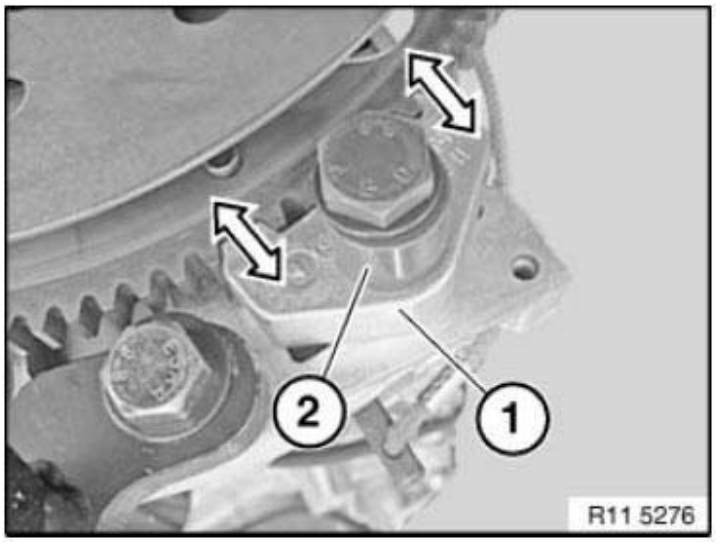


Fig. 143: Securing Flywheel Using Special Tool 11 9 260 And Special Tool 11 9 266
Courtesy of BMW OF NORTH AMERICA, INC.

Automatic transmission

Release flywheel bolts (1).

Release special tool (2).

Remove flywheel (3).

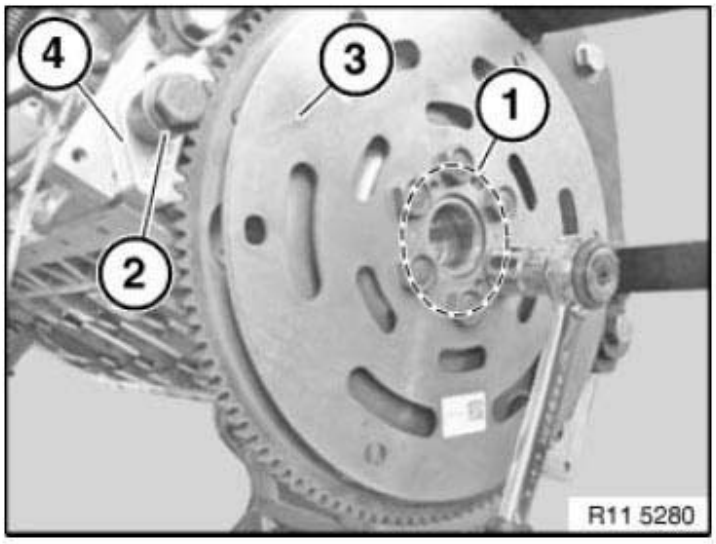


Fig. 144: Identifying Flywheel With Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Manual transmission

IMPORTANT: Position crankshaft at top dead center.

Remove dual-mass flywheel.

Secure flywheel with special tool **11 9 260** .

Remove **VIBRATION DAMPER** .

Release flywheel bolts with special tool **11 4 180** /

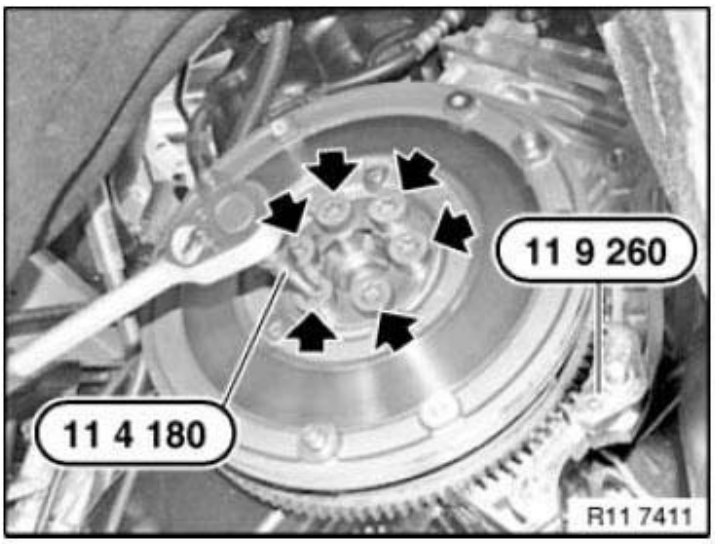


Fig. 145: Removing Flywheel Bolts Using Special Tool 11 4 180
Courtesy of BMW OF NORTH AMERICA, INC.

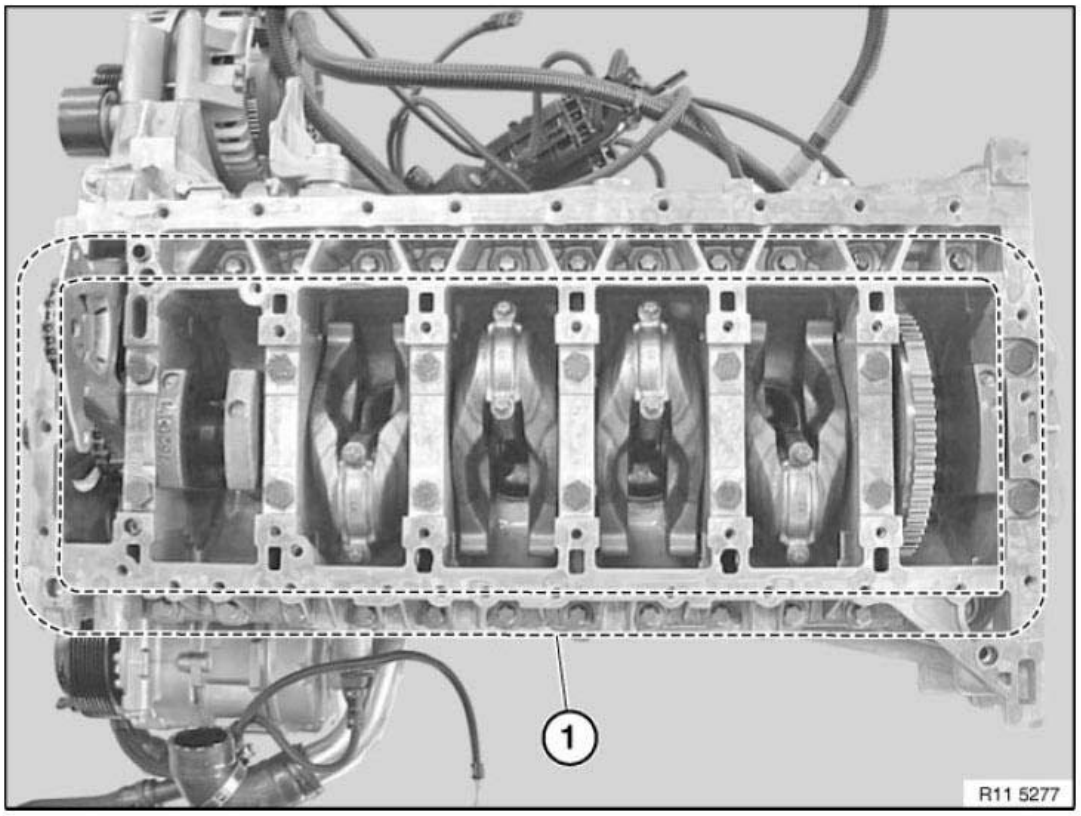


Fig. 146: Identifying Crankcase Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Release all crankcase bolts (1) along line (2).

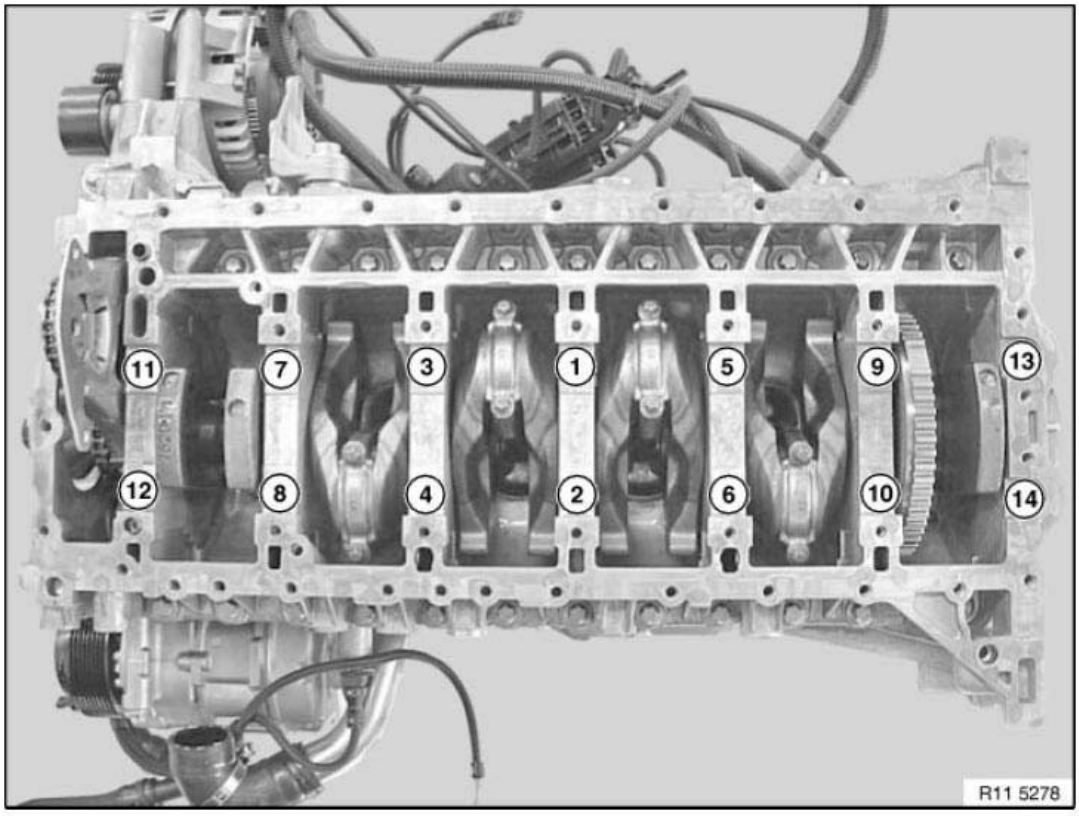


Fig. 147: Identifying Crankcase Bolt Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release crankcase bolts M10 in sequence 14 to 1.

Release crankcase lower section (1) from crankcase upper section (2) with suitable tool (3)

Remove crankcase lower section (1) upwards.

IMPORTANT: Do not rotate crankshaft without crankcase lower section (1) (risk of damage).

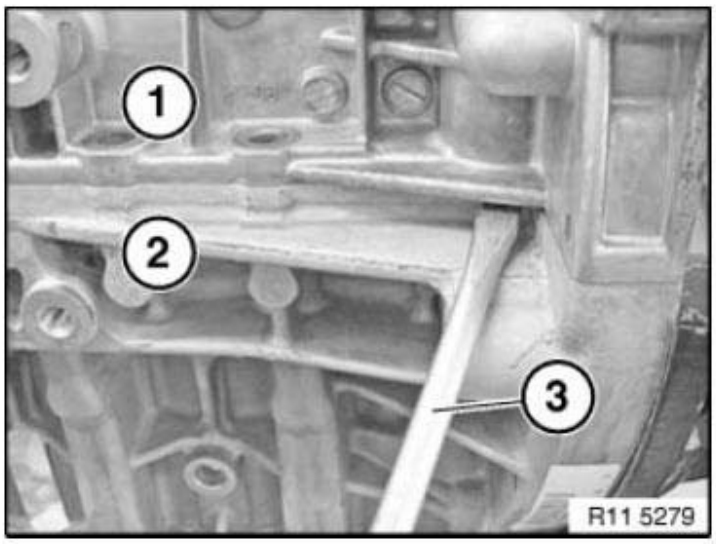


Fig. 148: Removing Crankcase Lower Section From Upper Section Using Tool
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Timing chain is preloaded.

Do not raise crankshaft.

Carefully remove radial shaft seal (1).

Catch escaping engine oil with a cloth (2).

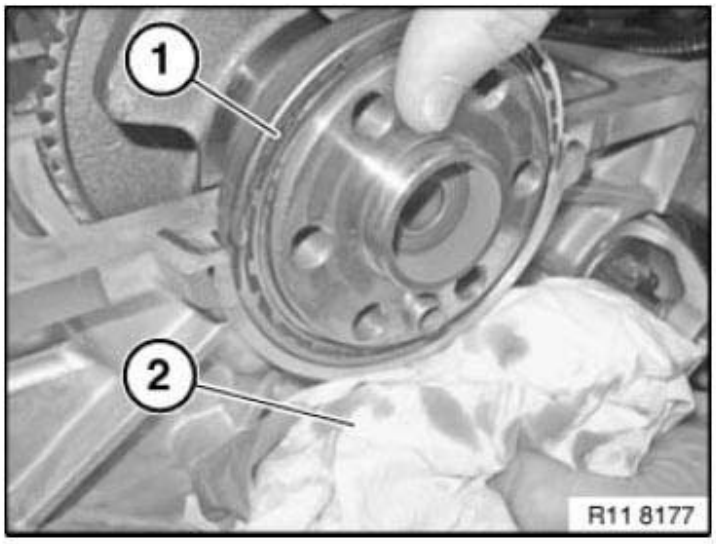


Fig. 149: Removing Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully remove radial shaft seal (1) towards front.

Catch escaping engine oil with a cloth (2).

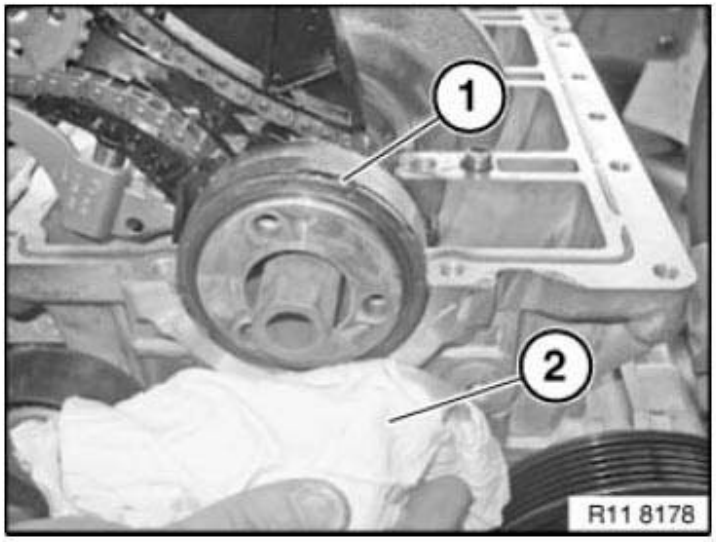


Fig. 150: Catching Escaping Engine Oil Using Cloth
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Protect crankcase against sealant residues with a cloth (1).

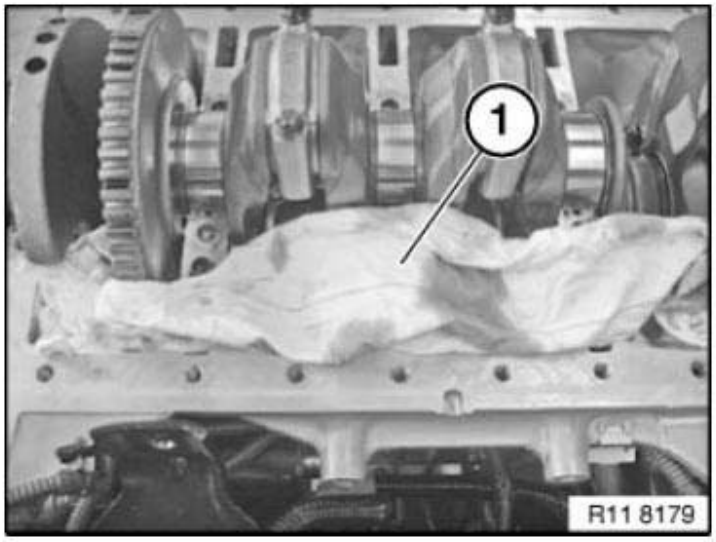


Fig. 151: Protecting Crankcase Against Sealant Residues Using Cloth
Courtesy of BMW OF NORTH AMERICA, INC.

Remove sealing compound residues (1) with special tool **11 4 470** .

Remove injector nozzles (2) for liquid sealing compound on left and right.

Installation note:

Replace injector nozzles (2).

Clean all threads with compressed air.

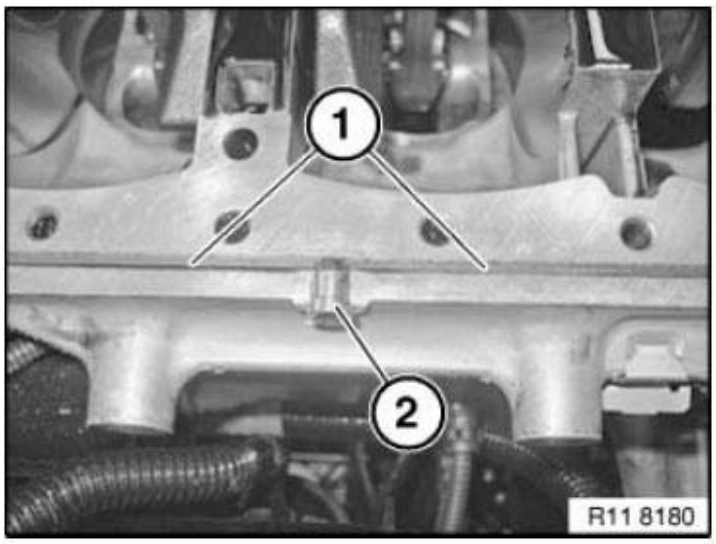


Fig. 152: Identifying Injector Nozzle And Sealing Compound Residue
Courtesy of BMW OF NORTH AMERICA, INC.

Position crankcase lower section (1) on crankcase upper section.

Screw in all M10 crankcase bolts.

Joint all M10 crankcase bolts (1) **20 NM** from inside outwards.

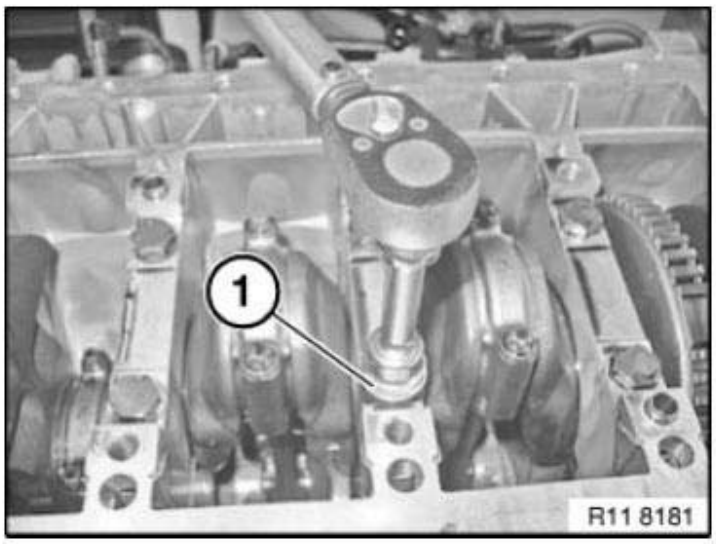


Fig. 153: Positioning Crankcase Lower Section On Crankcase Upper Section
Courtesy of BMW OF NORTH AMERICA, INC.

Identify all M10 crankcase bolts with a colored marking (1) for checking.

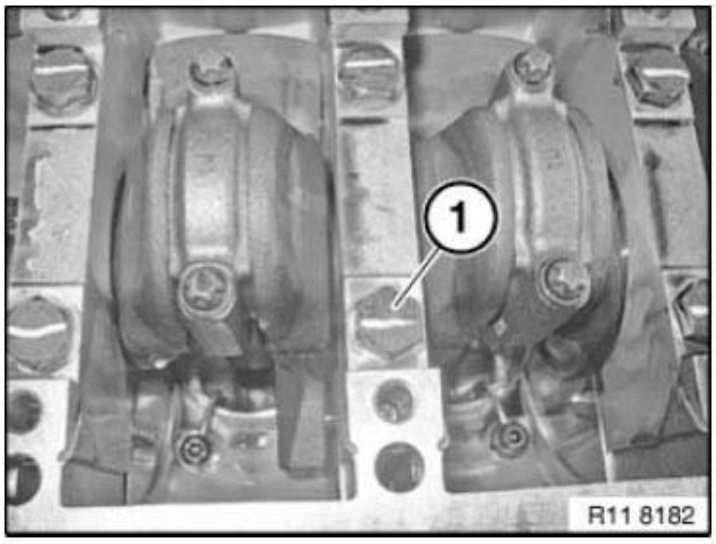


Fig. 154: Identifying M10 Crankcase Bolts With Colored Marking
Courtesy of BMW OF NORTH AMERICA, INC.

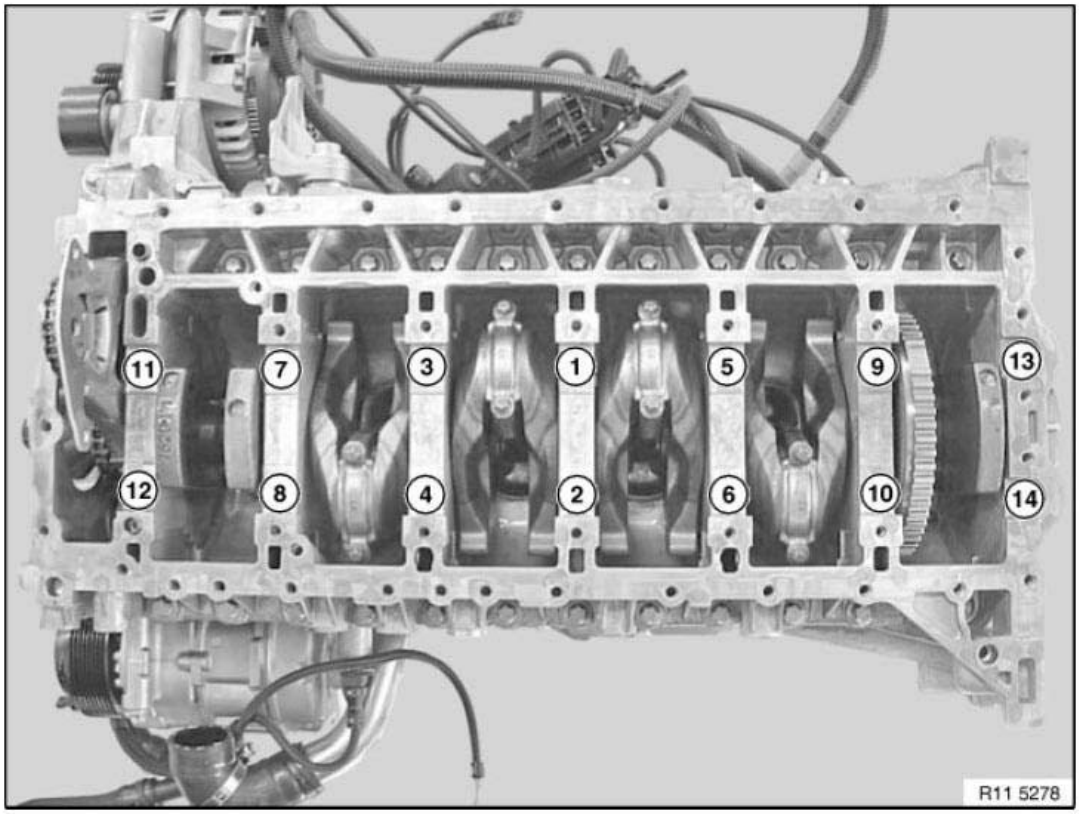


Fig. 155: Identifying M10 Crankcase Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Secure crankcase bolts M10 in sequence 1 to 14 with special tool **00 9 120** .

Tightening torque: **11 11 1AZ.**

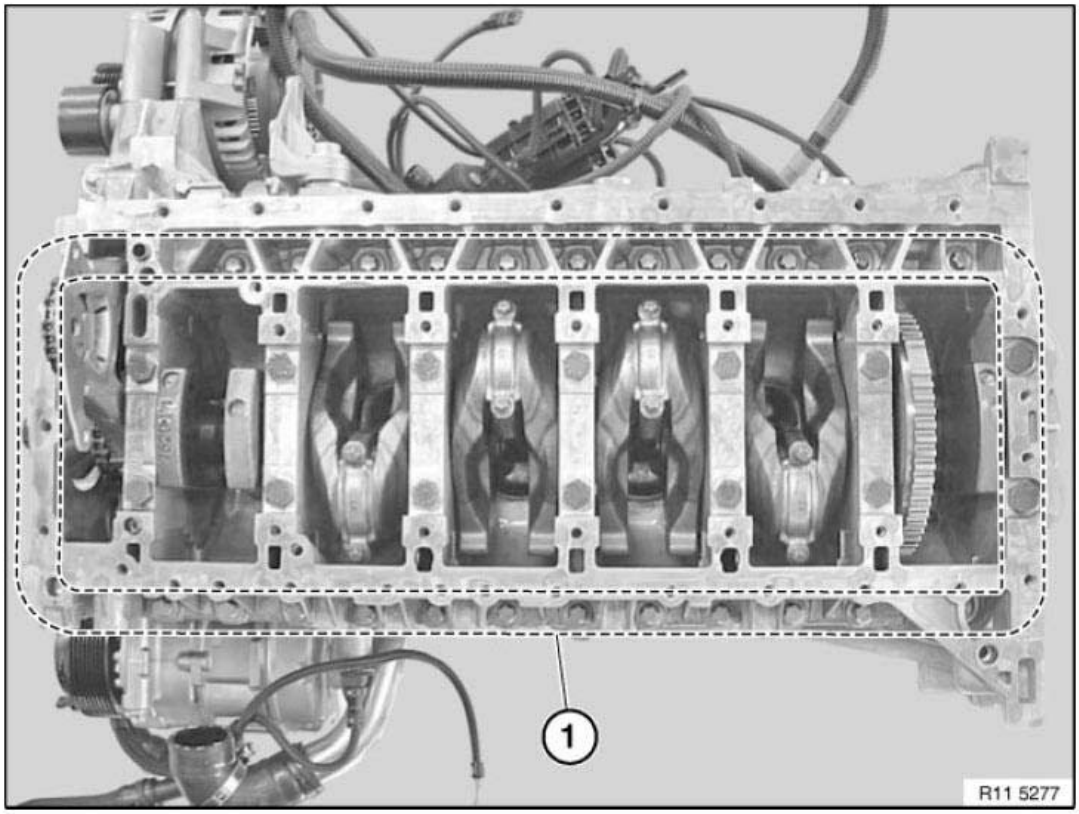


Fig. 156: Identifying Crankcase Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Insert all crankcase bolts (1).

IMPORTANT: Observe different lengths and sizes of the bolts.

Tightening torque: **11 11 2,3 AND 4AZ.**

Tighten screw (1) for oil pump triangular drive with special tool **11 8 640** .

NOTE: Replace screw.

Tightening torque: **11 41 4 AZ** .

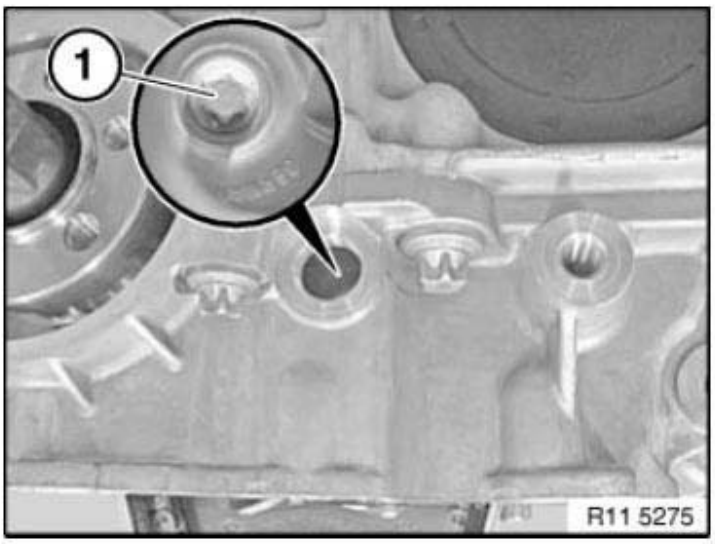


Fig. 157: Identifying Oil Pump Triangular Drive Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten screw plug on front of crankcase.

Tightening torque: **11 41 8.**

Installation note:

Replace sealing ring.

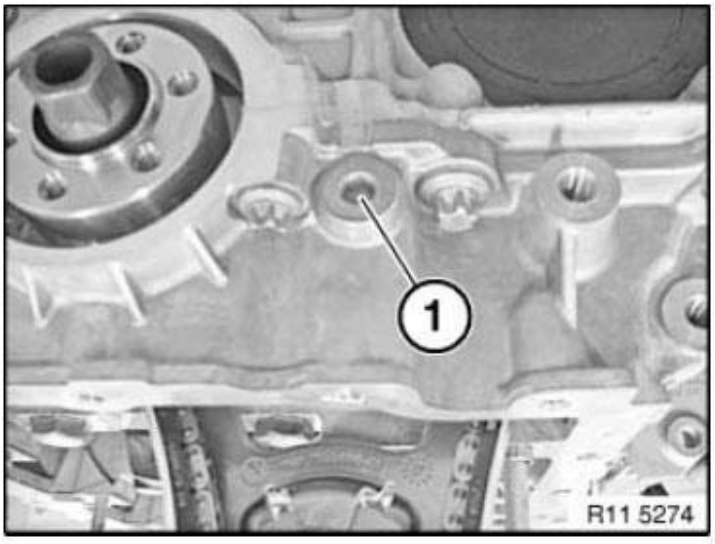


Fig. 158: Identifying Screw Plug On Front Of Crankcase
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare radial shaft seal (1) on special tool 11 8 220.

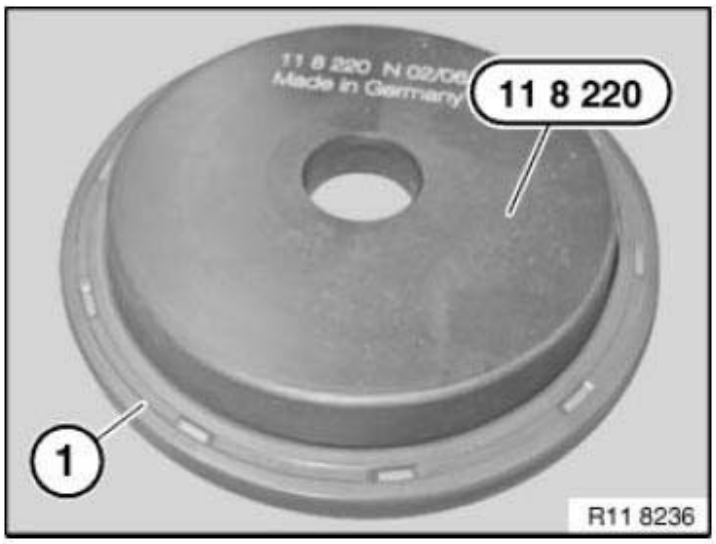


Fig. 159: Identifying Radial Shaft Seal On Special Tool 11 8 220
Courtesy of BMW OF NORTH AMERICA, INC.

Position radial shaft seal (1) with special tool 11 8 220 on crankshaft.

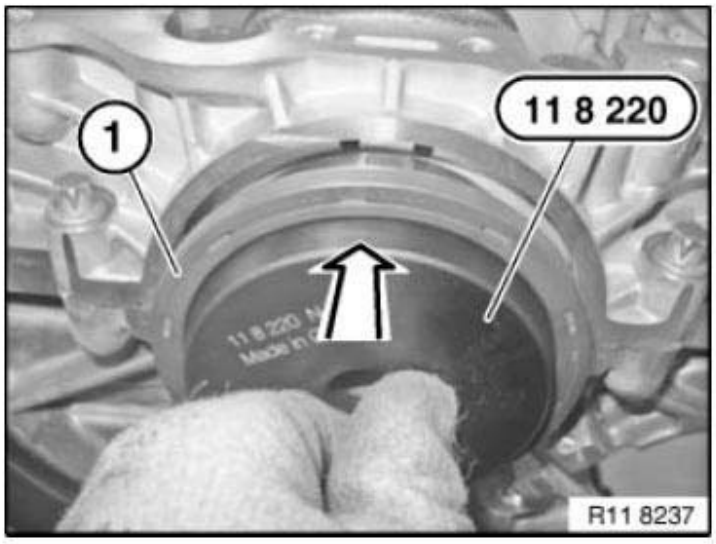


Fig. 160: Positioning Radial Shaft Seal On Crankshaft Using Special Tool 11 8 220
Courtesy of BMW OF NORTH AMERICA, INC.

Brush radial shaft seal (1) over special tool 11 8 220.

Move radial shaft seal (1) parallel up against the crankcase.

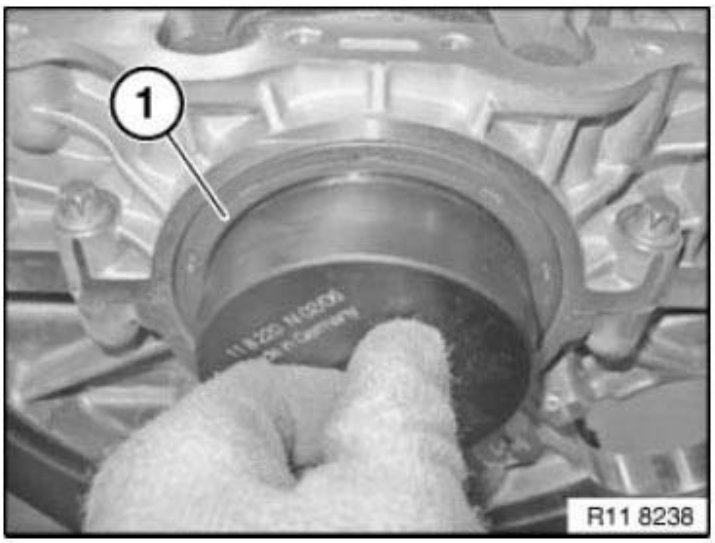


Fig. 161: Moving Radial Shaft Seal Parallel Up Against Crankcase
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 9 182 with screws (special tool 11 9 184) to crankshaft.

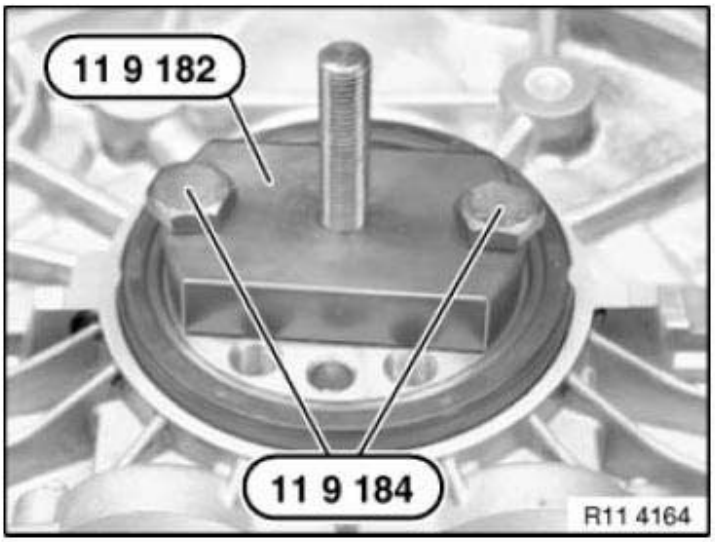


Fig. 162: Mounting Special Tool 11 9 182 Over Crankshaft Using Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Prepare special tool 11 9 181 for installation. Connect special tool 11 9 185 onto special tool 11 8 181.

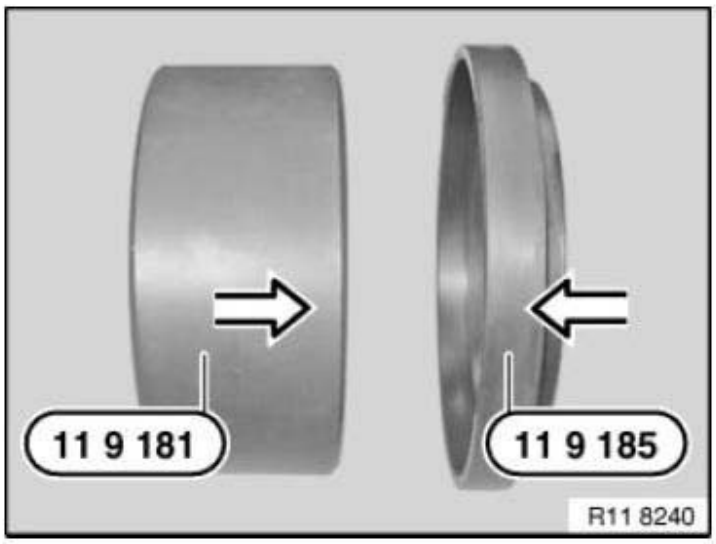


Fig. 163: Connecting Special Tool 11 9 185 To Special Tool 11 8 181
Courtesy of BMW OF NORTH AMERICA, INC.

Pull on radial shaft seal with special tool 11 9 181 and 11 9 185 in combination with special tool 11 9 183.

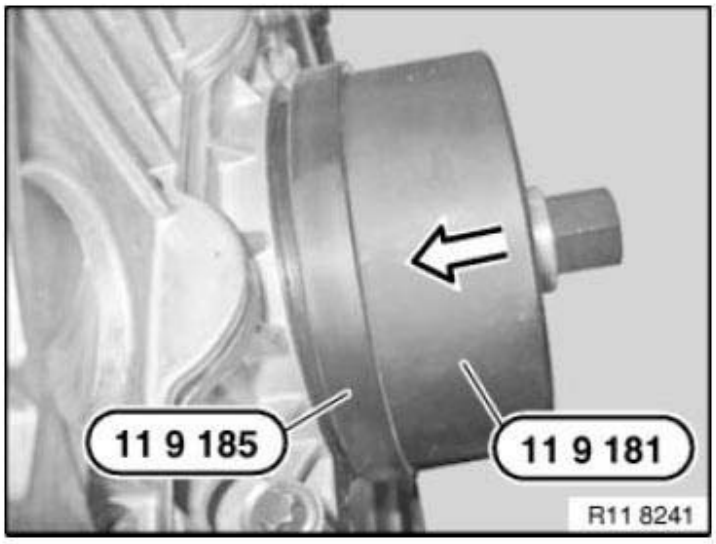


Fig. 164: Pulling Radial Shaft Seal Using Special Tool 11 9 181/11 9 185/11 9 183
Courtesy of BMW OF NORTH AMERICA, INC.

Screw on radial shaft seal with special tool 11 9 183 to limit position.

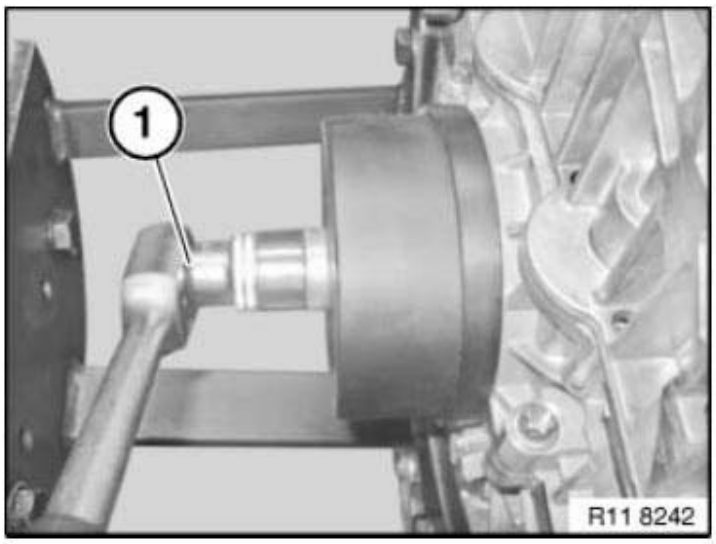


Fig. 165: Installing Radial Shaft Seal Using Special Tool 119 183
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Clean sealing surface (1) and degrease thoroughly in area of housing partition.

Apply a light coat of oil to running surface (2) of radial shaft seal.

NOTE: Graphic N42.

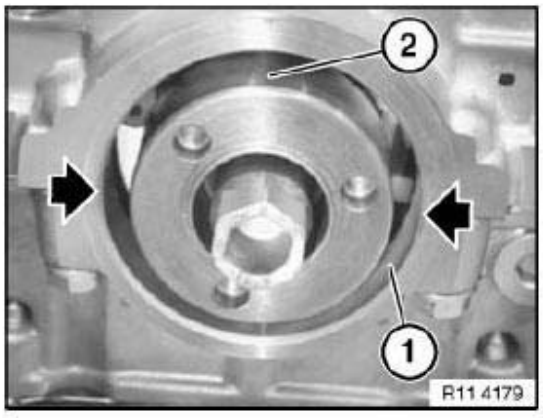


Fig. 166: Identifying Sealing Surface And Running Surface For Crankshaft Radial Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Push radial shaft seal (1) 11 9 235carefully in direction of arrow on the special tool.

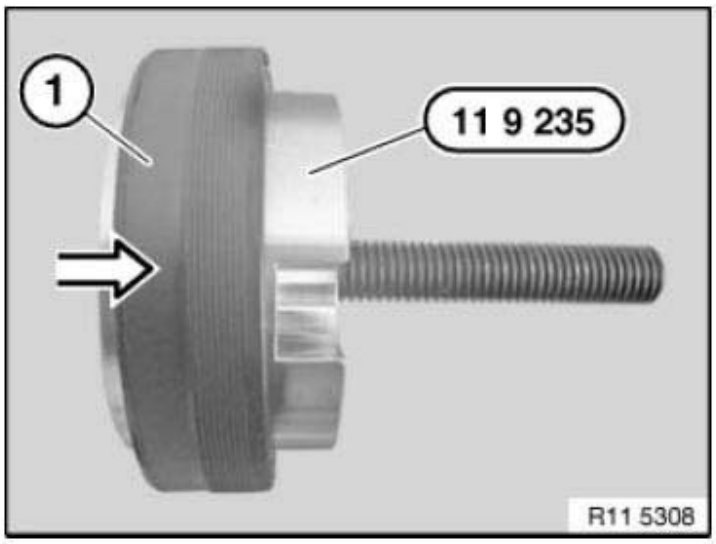


Fig. 167: Pushing Radial Shaft Seal 11 9 235 Carefully On Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: 11 9 235Special tool can only be fastened with

2 opposite bolts.

Determine hole pattern on special tool.

Screw special tool 11 9 235 with special tool 11 9 234 on crankshaft.

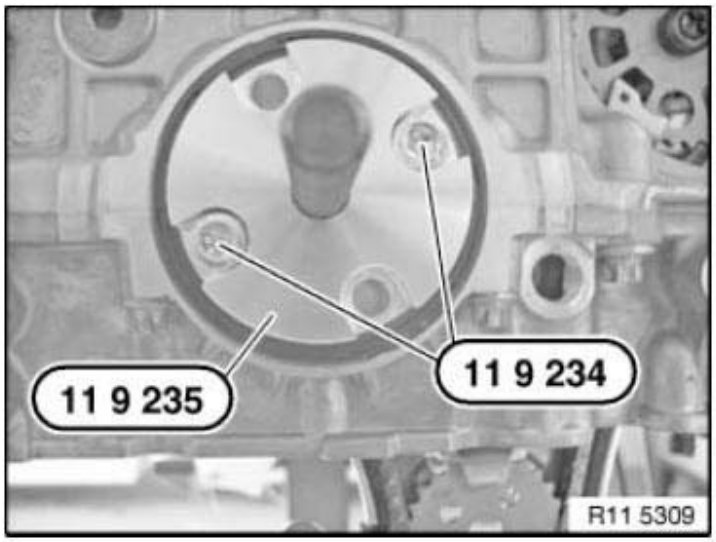


Fig. 168: Identifying Special Tools On Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Align groove (2) of radial shaft seal (1) centered to the housing partition (3.

IMPORTANT: After installation, the grooves must be filled with sealing compound.

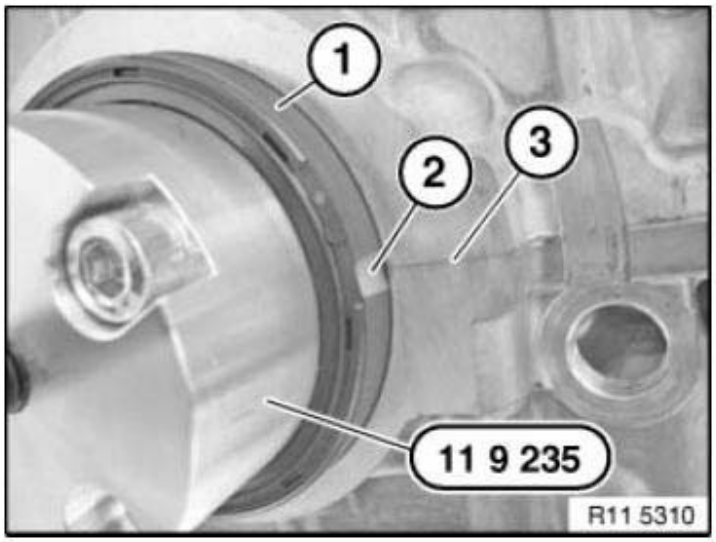


Fig. 169: Identifying Radial Shaft Seal Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in radial shaft seal with special tool 11 9 231 in conjunction with special tool 11 9 233 until flush.

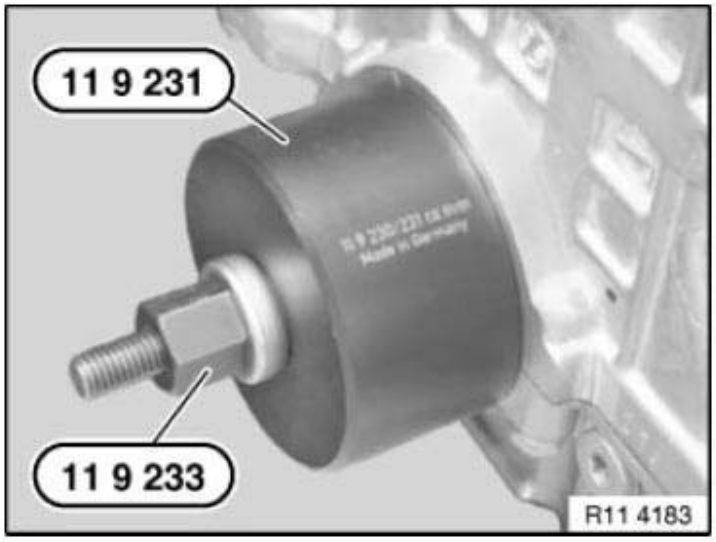


Fig. 170: Identifying Special Tools 119 231 And 11 9 233
Courtesy of BMW OF NORTH AMERICA, INC.

Drive both injector nozzles (1) on left and right with special tool **11 9 360** into crankcase up to stop.

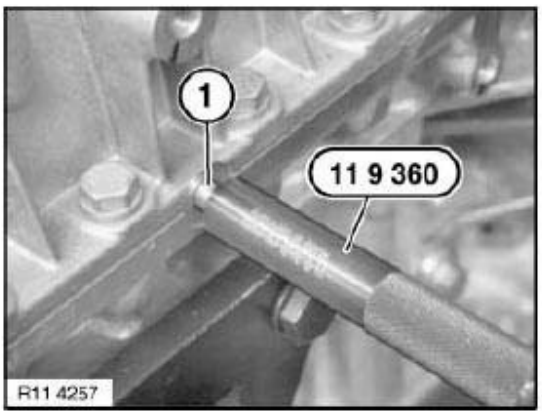


Fig. 171: Installing Nozzles Using Special Tool 11 9 360
Courtesy of BMW OF NORTH AMERICA, INC.

After fitting both sealing rings, check both sealing ducts for clearance.

Blow compressed air (1) at max. 6 bar into injector nozzle (2).

Compressed air must emerge at both sealing rings on left and right from the outlet bores.

IMPORTANT: If the compressed air does not flow out of all ducts. the crankcase must again be taken apart and cleaned.

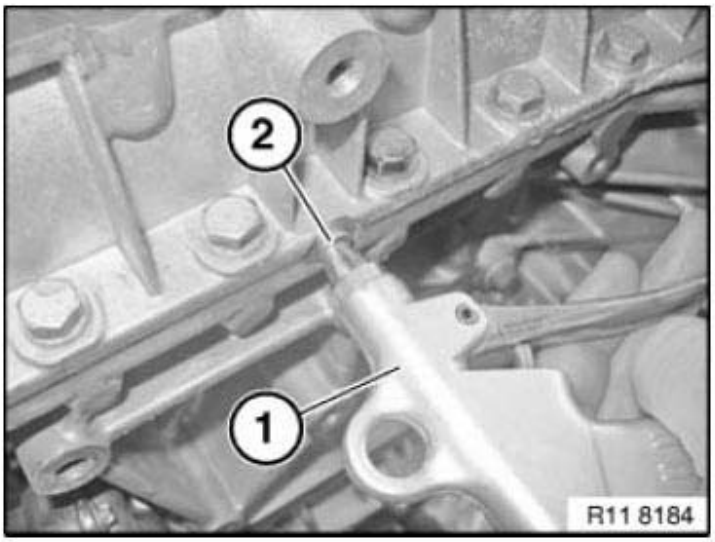


Fig. 172: Blowing Compressed Air Into Injector Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Use **PRIMER 1.3 AND LIQUID SEAL 1.4** .

Prepare liquid sealing compound (1) in special tool **11 4 370** .

Injector nozzles for injecting sealing compound are not required.

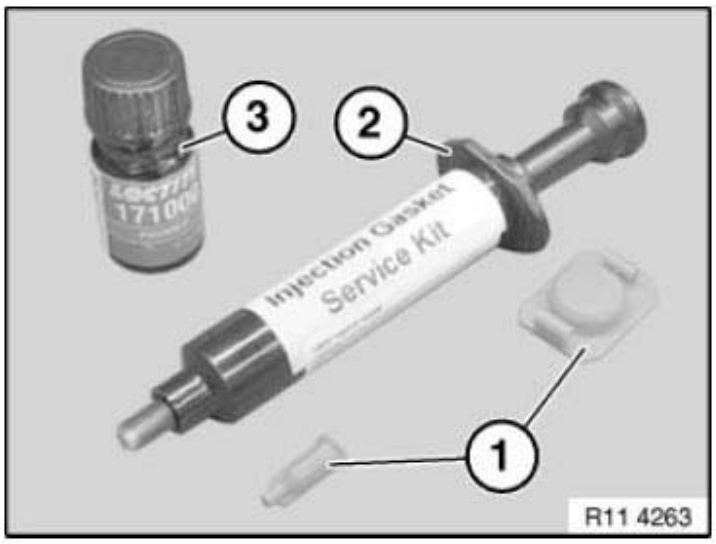


Fig. 173: Identifying Liquid Sealing Compound, Injector Nozzles And Primer Bottle
Courtesy of BMW OF NORTH AMERICA, INC.

Slowly insert liquid sealing compound (1) with special tool **11 4 370** in direction of arrow.

Liquid sealing compound must emerge at radial shaft seals at front and rear.

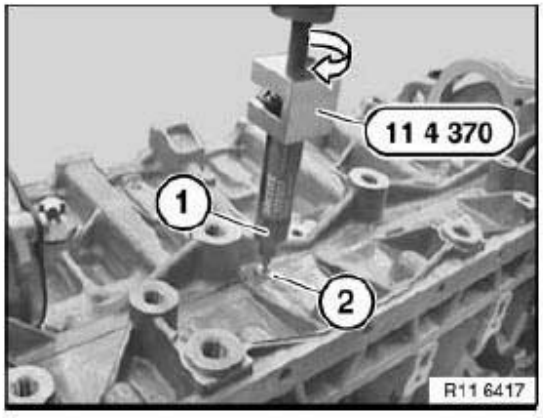


Fig. 174: Inserting Liquid Sealing Compound Using Special Tool 11 4 370
Courtesy of BMW OF NORTH AMERICA, INC.

Stop (seal off) escaping liquid sealing compound with primer 1.3.

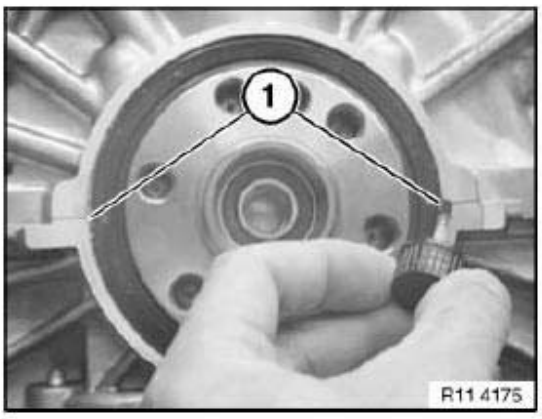


Fig. 175: Stopping Escaping Liquid Sealing Compound With Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Stop (seal off) escaping liquid sealing compound with primer 1.3.

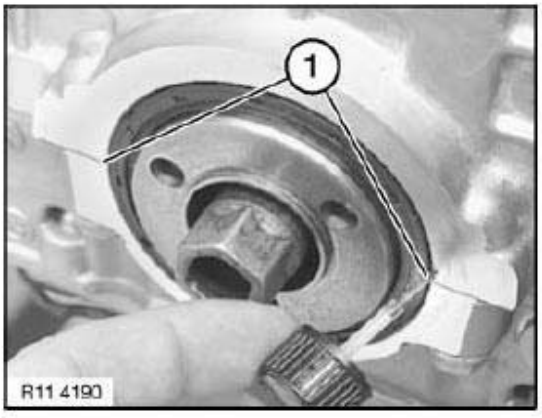


Fig. 176: Stopping Escaping Liquid Sealing Compound With Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1122 FLYWHEEL

11 22 500 REMOVING AND INSTALLING/REPLACING FLYWHEEL (N54, N54T)

Necessary preliminary tasks:

- Remove **TWIN-CLUTCH GEARBOX (GS7D36SG) N54**
- Remove **CLUTCH**

Enlarge special tool **11 9 260** with an elongated hole.

Enlarge elongated hole on special tool **11 9 260** to **8 mm** .



Fig. 177: Identifying Special Tool 11 9 260 With Elongated Hole
Courtesy of BMW OF NORTH AMERICA, INC.

For vehicles with manual gearboxes

Secure flywheel with special tool **11 9 260** .

Release flywheel bolts with special tool **11 4 180** /

Tightening torque **11 22 2AZ** .

Installation note:

The flywheel is secured with a dowel pin.

Fit new flywheel screws

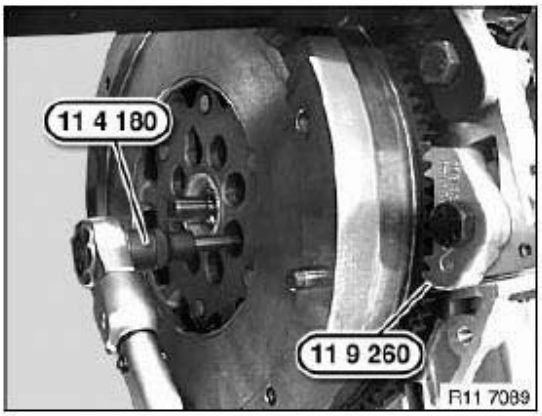


Fig. 178: Removing Flywheel Bolts Using Special Tool 11 4 180
Courtesy of BMW OF NORTH AMERICA, INC.

For vehicles with automatic transmissions

Secure flywheel with special tool **11 9 260** .

Release flywheel screws with a suitable tool (1).

Tightening torque **11 22 1AZ** .

Installation note:

The flywheel is secured with a dowel pin.

Fit new flywheel screws

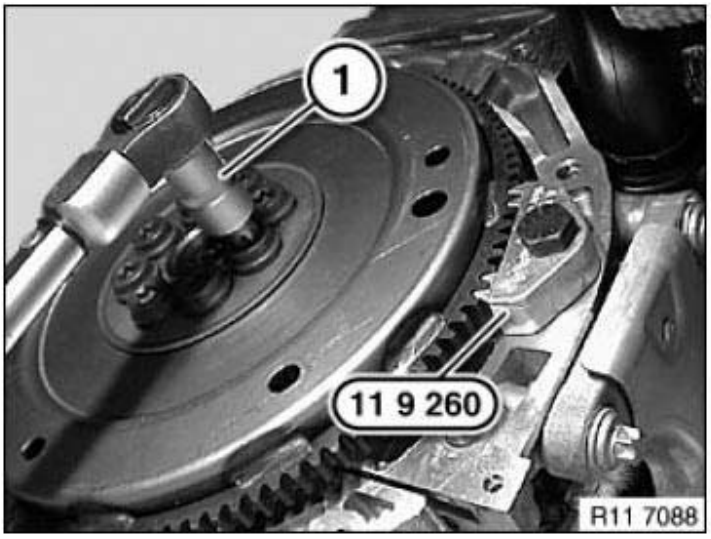


Fig. 179: Removing Flywheel Screws Using Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 22 513 REPLACING ROLLER BEARING FOR DUAL-MASS FLYWHEEL

Necessary preliminary tasks

- **TRANSMISSION** removed.
- Remove **CLUTCH RELEASE BEARING**

Pressing out roller bearing

Install special tool 23 4 031 in front of drive shaft spline teeth.

Screw in grease spindle 23 4 033 completely.

Brass tip must immerse fully into roller bearing.

Press in grease with grease gun **23 4 040** until roller bearing is disengaged from drive shaft.

When tensioning spring is compressed to full extent, release grease spindle and twist out slightly until spring is relieved.

Repeat grease press-in procedure until roller bearing has released completely.

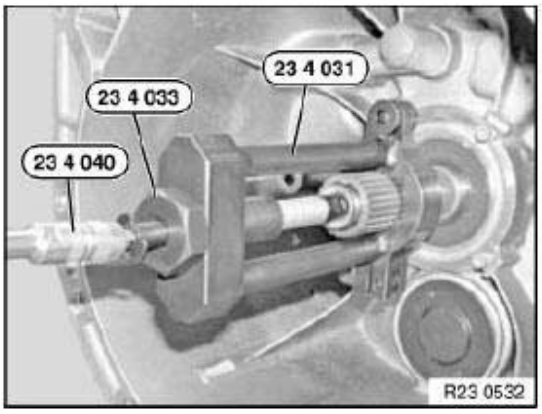


Fig. 180: Identifying Special Tools 23 4 033, 23 4 031 And 23 4 040
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 23 4 031.

Remove pressed-in grease (1) from drive shaft completely.

Then reinstall special tool.

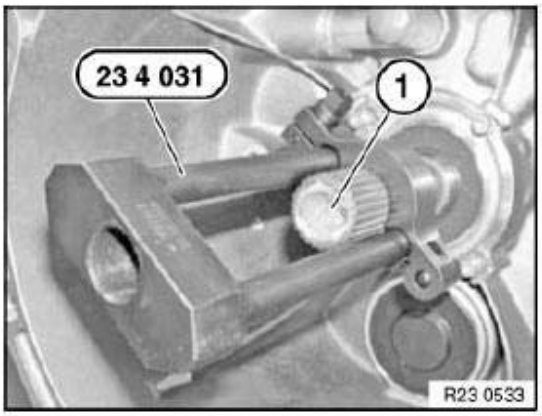


Fig. 181: Identifying Pressed-In Grease On Drive Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Pressing in roller bearing

Slide in pressure spindle 23 4 035.

Attach thrust piece 23 4 036 to pressure spindle.

Push roller bearing (1) onto thrust piece.

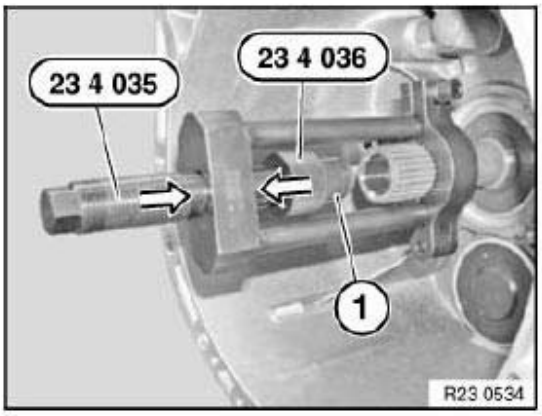


Fig. 182: Pushing Roller Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in pressure spindle (1) until roller bearing is fully pressed in.

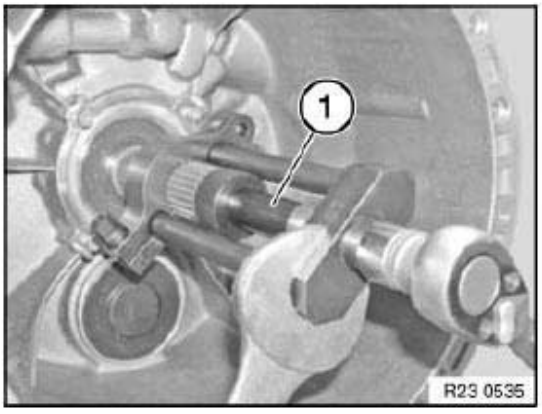


Fig. 183: Installing Pressure Spindle
Courtesy of BMW OF NORTH AMERICA, INC.

1123 VIBRATION DAMPER

11 23 010 REMOVING AND INSTALLING/REPLACING VIBRATION DAMPER (N54, N54T)

Necessary preliminary tasks:

- Remove front underbody protection

- Remove drive belt

Release screws (1).

Tightening torque **11 23 1AZ** .

Remove vibration damper (2).

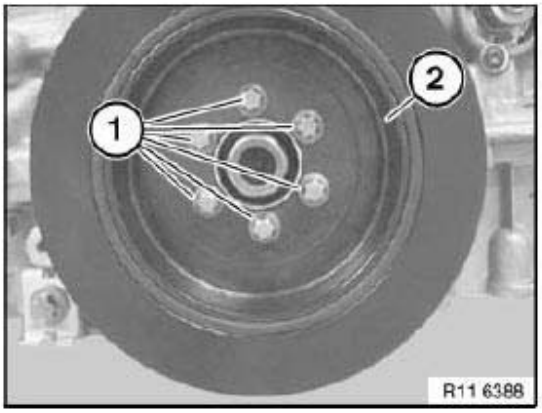


Fig. 184: Identifying Vibration Damper Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1124 CONNECTING ROD WITH BEARING

11 24 571 REPLACING ALL CONNECTING ROD BEARINGS (N54, N54T)

IMPORTANT: All crank pins are connected with the crankshaft.

Blue/Red bearing shell colors are no longer used in combination.

Necessary preliminary tasks:

- Remove all **PISTONS** .

IMPORTANT: All crankshaft crank pins are classified.

Bearing shell colors are different in the connecting and in the connecting rod bearing cap.

Possible classifications per connecting rod at top and bottom:

r: Connecting rod = Yellow.

Connecting rod bearing cap = Red.

b: Connecting rod = Violet.

Connecting rod bearing cap = Blue.

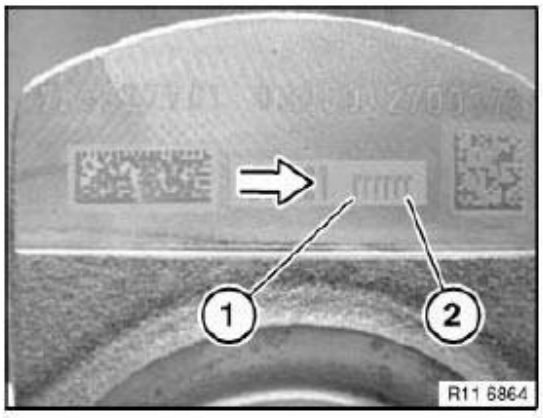


Fig. 185: Direction Of Fitting Color In Connecting Rod And Connecting Rod Bearing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Only one color may be fitted per connecting rod and connecting rod bearing cap.

In direction of arrow from (1 to 2) crank pin (1 to 6).

Example:

Possible classification: rbbrrb.

Zyl 1: Classification **r** = rod side Yellow bearing cap side Red.

Zyl 2: Classification **b** = rod side Violet bearing cap side Blue.

Zyl 3: Classification **b** = rod side Violet bearing cap side Blue.

Zyl 4: Classification **r** = rod side Yellow bearing cap side Red.

Zyl 5: Classification **r** = rod side Yellow bearing cap side Red.

Zyl 6: Classification **b** = rod side Violet bearing cap side Blue.

Install new connecting rod bearing shells.

In each case insert only one color of bearing shell (1 and 2) for each connecting rod.

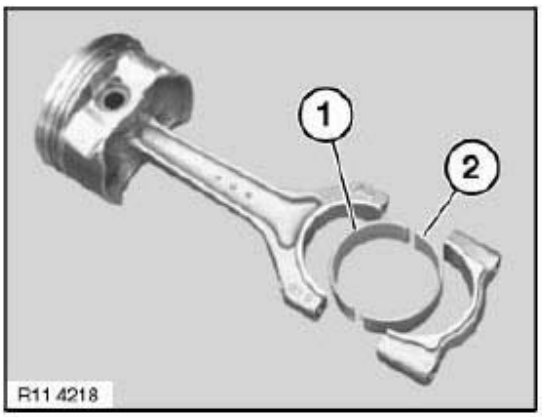


Fig. 186: Identifying Bearing Shell Colors
Courtesy of BMW OF NORTH AMERICA, INC.

Check connecting rod bearing clearance.

Piston in BDC position.

Fit special tool **00 2 590** (Plastigage type PG 1) to oil-free crankshaft.

Fit bearing cap so that pairing letters match up.

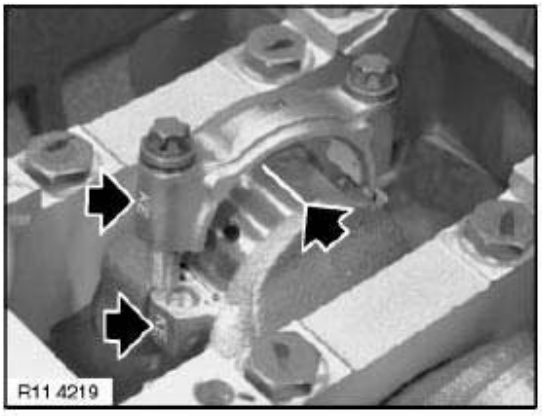


Fig. 187: Locating Bearing Cap Pairing Letters
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not distort connecting rods or crankshaft.

Use the old connecting rod bolts to check connecting rod clearance.

Tighten down connecting rod bolts with special tool **00 9 120** .

Tightening torque **11 24 1AZ** .

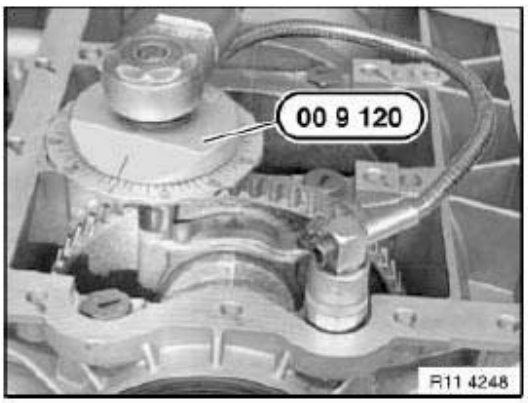


Fig. 188: Identifying Bearing Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bearing cap. Read off bearing clearance at width of crushed plastic thread with aid of measuring scale.

CONNECTING ROD BEARING PLAY.

- Remove plastic thread
- Coat crankshaft and bearing shells with oil.
- Install new connecting rod bolts and tighten down with special tool **00 9 120** .

Tightening torque **11 24 1AZ** .

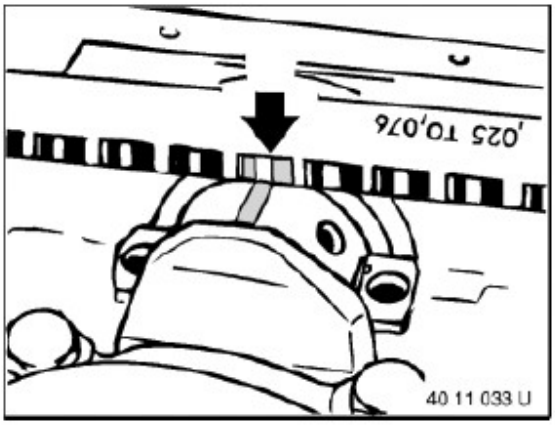


Fig. 189: Checking Connecting-Rod Bearing Play
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1125 PISTON WITH RINGS AND PIN

11 25 530 REMOVING AND INSTALLING OR REPLACING ALL PISTONS (N16)

WARNING: Protective goggles must be worn when working on the gudgeon pin circlip.

IMPORTANT: If pistons, connecting rods and bearing shells are reused, they must be reinstalled in the same places.

Connecting rods and connecting rod bearing caps are denoted with the same pairing letters; mixing them up will result in engine damage.

Piston and gudgeon pins are paired and must not be fitted individually.

Necessary preliminary tasks:

- Remove engine.
- Mount engine on assembly stand.
- Remove intake plenum.
- Remove cylinder head.
- Remove oil sump.
- Remove oil pump.

NOTE: In event of heavy oil carbon residue:

Carefully remove oil carbon residue from cylinder wall.

NOTE: Graphic shows N46.

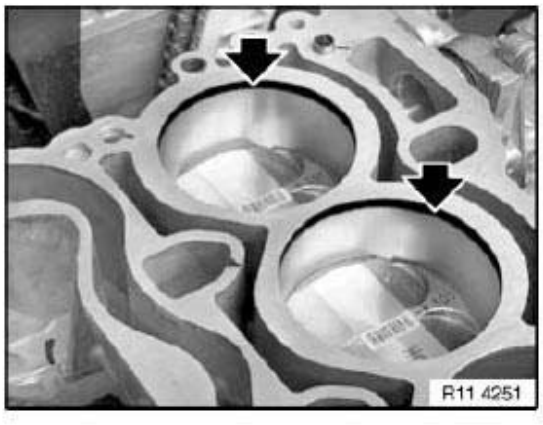


Fig. 190: Locating Oil Carbon Residue
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Mark all pistons and conrods with a pen prior to removing.

Example N14:

Direction of arrow (1) points to camshaft drive.

Cylinder allocation (2) per cylinder.

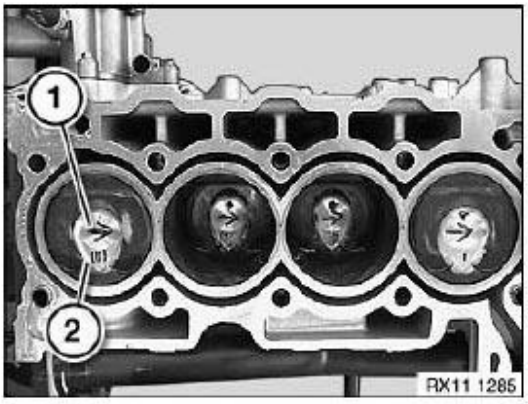


Fig. 191: Identifying Camshaft Drive Direction And Cylinder Allocation
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Mark all pistons and conrods with a pen prior to removing.

Example:

Mark cylinder assignment (1) for the respective cylinder.

Direction of arrow (2) points to timing chain drive.

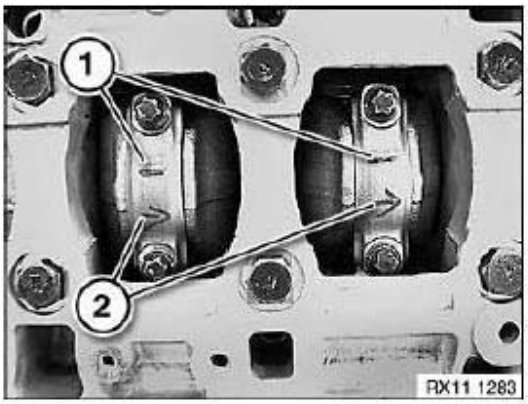


Fig. 192: Identifying Timing Chain Drive Direction And Cylinder Assignment Marks
Courtesy of BMW OF NORTH AMERICA, INC.

Release connecting rod bolts (1).

Tightening torque, **11 24 1AZ** .

Remove conrod bearing cap.

IMPORTANT: Connecting rods and connecting rod bearing caps are denoted with the same pairing letters; mixing them up will result in engine damage.

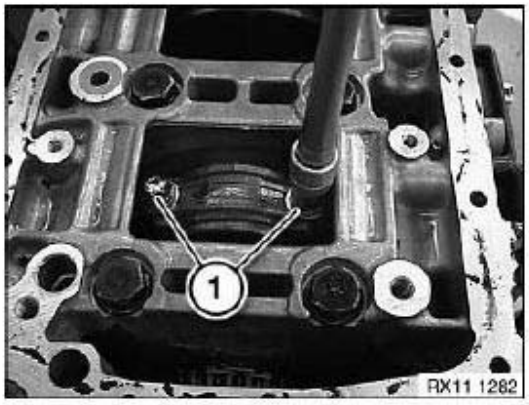


Fig. 193: Removing Connecting Rod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

11 9 620 Attach special tool in conrod big end.

Press out connecting rod and piston to cylinder head side.

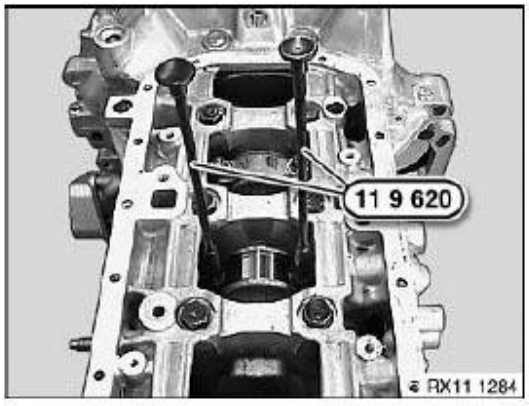


Fig. 194: Attaching Special Tool (11 9 620) In Conrod Big End
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Safety goggles must be worn for the next operation.

WARNING: Safety goggles must be worn.

IMPORTANT: Piston and gudgeon pins are paired and must not be fitted individually.

Lever out piston pin circlip with a screwdriver in direction of arrow.



Fig. 195: Removing Piston Pin Circlip
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace connecting rods.

Installation note:

The gudgeon pin must be able to be pressed through the liner by hand with little force and must not display any significant play.

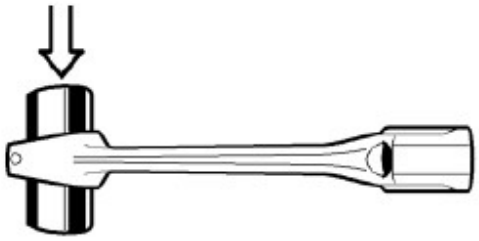


Fig. 196: Installing Gudgeon Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Measure piston installation clearance:

Measure piston diameter with micrometer at measuring point A from lower edge of piston and offset by 90° to piston pin axis.

Piston diameter at measuring point A.

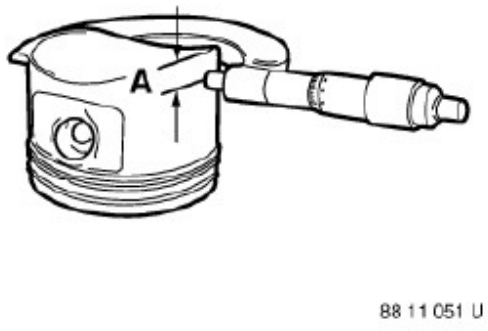


Fig. 197: Measuring Piston Diameter
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust micrometer to cylinder bore of engine block. Set internal calliper on micrometer to zero. Measure bottom, center and top of cylinder bore in direction of travel and direction of engine rotation.

Diameter of cylinder bore.

Piston installation clearance.

Total permissible wear tolerance.

If necessary, replace piston.

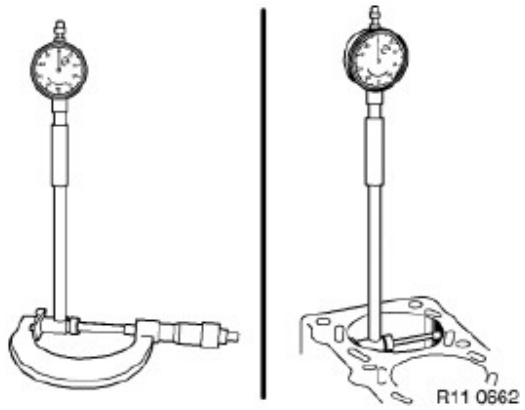


Fig. 198: Checking Cylinder Bore Diameter
Courtesy of BMW OF NORTH AMERICA, INC.

Install all piston rings.

Install all bearing shells.

Coat piston and piston rings with oil.

11 9 670 Pre-install piston in special tool.

Screw special tool 11 9 620 into connecting rod.

Installation note:

11 9 620 Check protective lugs on special tool for correct position and damage.

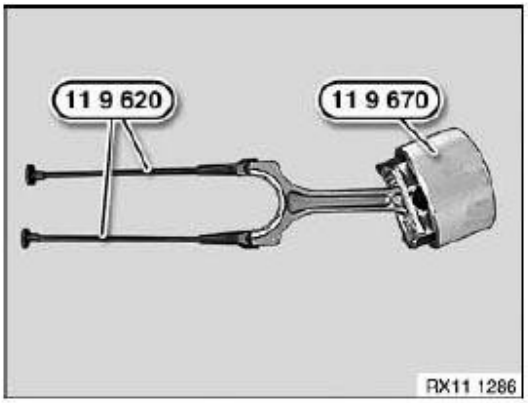


Fig. 199: Identifying Special Tool 11 9 620 And 11 9 670
Courtesy of BMW OF NORTH AMERICA, INC.

Insert piston with connecting rod in cylinder.

IMPORTANT: Risk of breakage of piston rings.

Press in piston with finger pressure only, do not drive in (see arrows).

Insert piston (1) so that arrow on piston crown points to camshaft drive.

If reusing the pistons, assign cylinder allocation (2) to correct cylinder.

Press in piston with special tool 11 9 670.

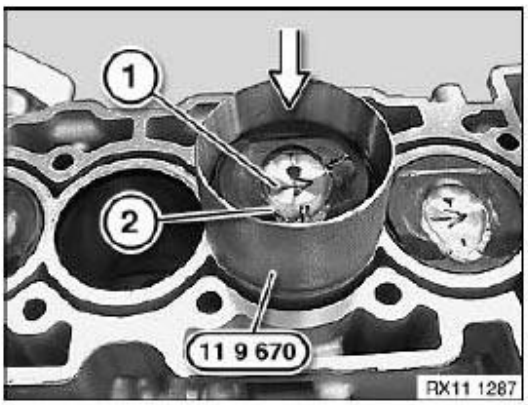


Fig. 200: Inserting Piston With Connecting Rod In Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Point of fracture (1) on conrod.

Conrod and conrod bearing cap are identified with pairing letters (2) and must not be mixed up.

Mixing them up or incorrectly fitting the connecting rod bearing cap on the big end will result in engine damage.

Both pairing letters (2) must be together on one side.

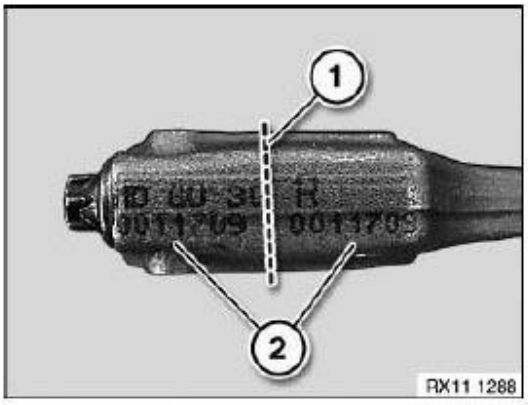


Fig. 201: Identifying Connecting Rod Pairing Letters
Courtesy of BMW OF NORTH AMERICA, INC.

Apply a light coat of oil to crankshaft journals.

Attach connecting rod to crankshaft journal.

Remove special tool 11 9 620.

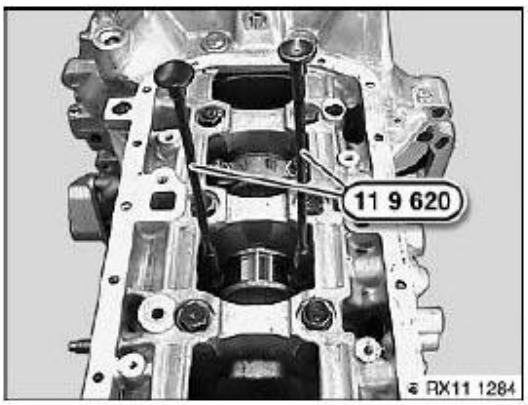


Fig. 202: Attaching Special Tool (11 9 620) In Conrod Big End
Courtesy of BMW OF NORTH AMERICA, INC.

Fit bearing caps (2) so that pairing letters match up.

Check cylinder identification markings (1).

Direction of arrow (2) points to timing chain drive.

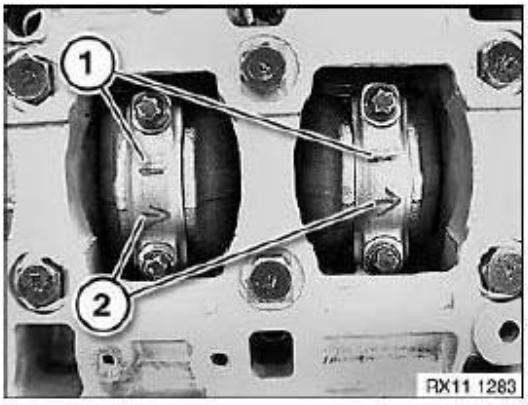


Fig. 203: Identifying Timing Chain Drive Direction And Cylinder Assignment Marks
Courtesy of BMW OF NORTH AMERICA, INC.

Install new connecting rod bolts (1).

00 9 120 Carry out torsion angle tightening of conrods with special tool.

Tightening torque: **11 24 1AZ**

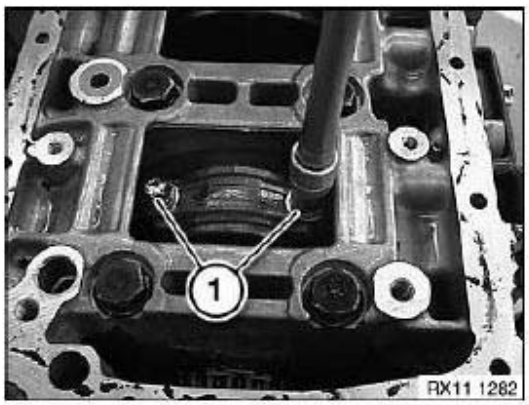


Fig. 204: Removing Connecting Rod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 25 530 REMOVING AND INSTALLING/REPLACING ALL PISTONS (N54, N54T)

WARNING: Protective goggles must be worn when working on the piston pin circlip.

IMPORTANT: If pistons, connecting rods and bearing shells are reused, they must be reinstalled in the same places.

Individual connecting rod replacement is not permitted; they are classified by weight group.

Connecting rods and connecting rod bearing caps are marked with the same pairing letters; mixing them up will result in engine damage.

Piston and gudgeon pins are paired and must not be fitted individually.

Necessary preliminary tasks:

- Remove **ENGINE**
- Mount engine on **ASSEMBLY STAND**
- Remove intake **PLENUM**
- Remove **CYLINDER HEAD**
- Remove **OIL SUMP**
- Remove **OIL PUMP**

NOTE: In event of heavy oil carbon residue:

Carefully remove oil carbon residue from cylinder wall.

NOTE: Graphic shows N46.

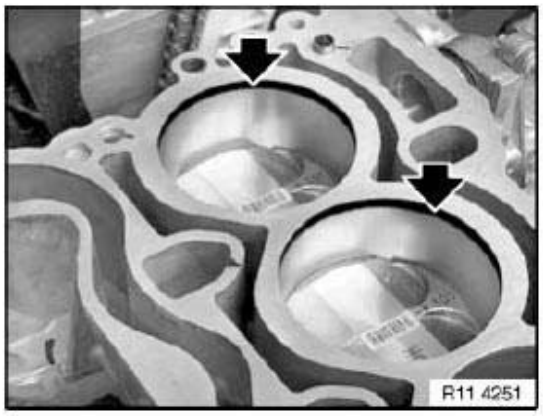


Fig. 205: Locating Oil Carbon Residue
Courtesy of BMW OF NORTH AMERICA, INC.

Do **not** release screw (1).

OIL SPRAY NOZZLE (2) must not be maladjusted or bent.

If necessary, readjust **(risk of damage).**

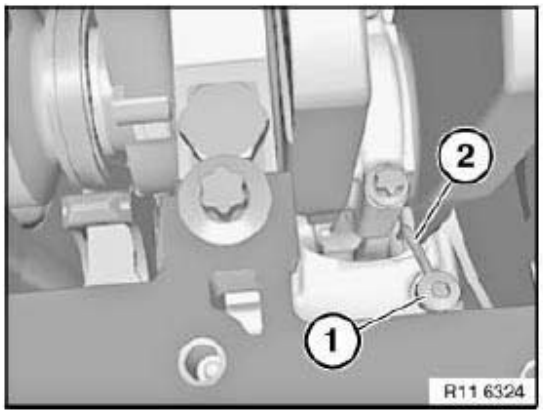


Fig. 206: Identifying Screw And Oil Spray Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Release connecting rod bolts (1).

Tightening torque **11 24 1AZ** .

Remove connecting rod bearing cap (2) in direction of arrow.

IMPORTANT: Connecting rods and connecting rod bearing caps are marked with the same pairing letters; mixing them up will result in engine damage.

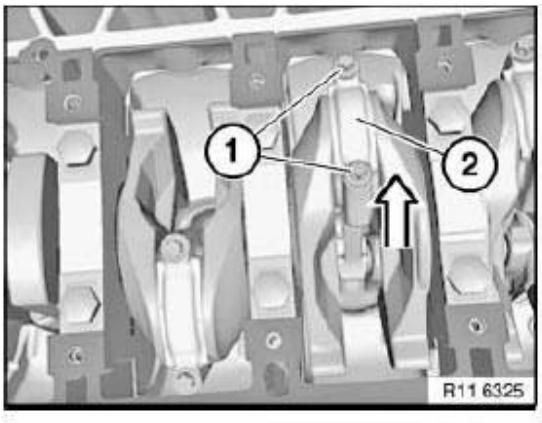


Fig. 207: Removing Connecting Rod Bearing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool **11 8 590** into big end of connecting rod.

Press out connecting rod and piston to cylinder head side.

IMPORTANT: Risk of damage to oil spray nozzle.

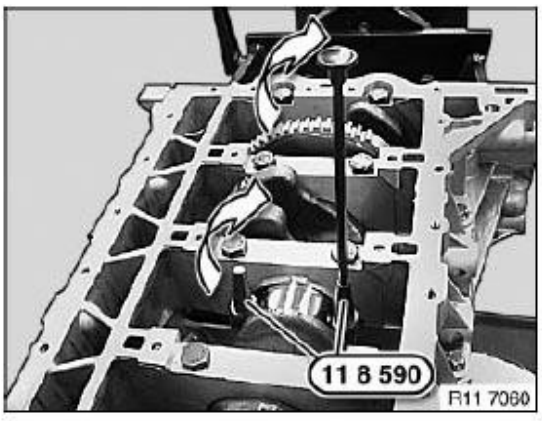


Fig. 208: Inserting Special Tool Into Big End Of Connecting Rod
Courtesy of BMW OF NORTH AMERICA, INC.

Preliminary work

Secure special tool 11 8 561 in vice.

Secure piston (1) with connecting rod to special tool 11 8 561.

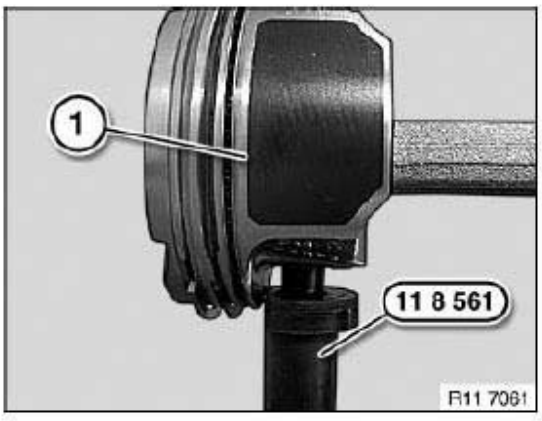


Fig. 209: Securing Piston Using Special Tool 11 8 561
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Safety goggles must be worn for the next operation.

WARNING: Safety goggles must be worn.

To lever out piston circlip (1), support with special tool **11 5 464** on piston (2).

Lever out piston circlip (1) with special tool **11 5 464** in direction of arrow.

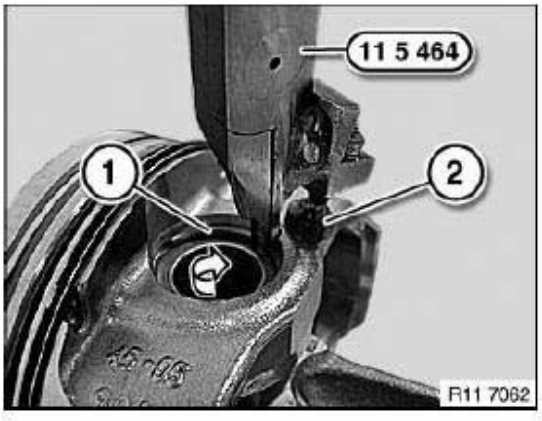


Fig. 210: Removing Piston Circlip Using Special Tool 11 5 464
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

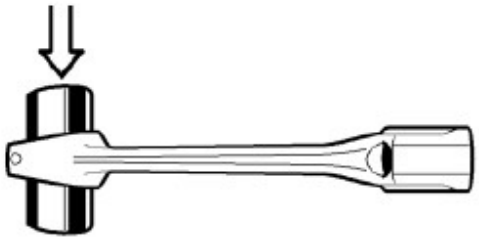
If necessary, replace connecting rods.

IMPORTANT: Connecting rods are divided into weight classes and are only available as a set.

Old and new connecting rods must not be installed in mixed combinations.

Installation note:

The gudgeon pin must be able to be pressed through the liner by hand with little force and must not display any significant play.



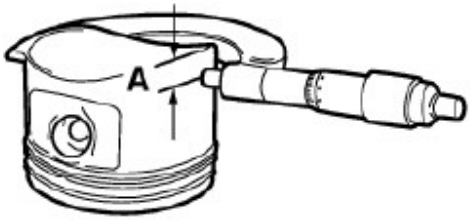
R11 4212

Fig. 211: Installing Gudgeon Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Measuring **PISTON INSTALLATION CLEARANCE** :

Measure piston diameter with micrometer at measuring point A from bottom edge of piston and offset at 90° to the axis of the gudgeon pin.

Piston diameter at measuring point A.



88 11 051 U

Fig. 212: Measuring Piston Diameter
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust micrometer to cylinder bore of engine block. Set internal calliper on micrometer to zero. Measure bottom, center and top of cylinder bore in direction of travel and direction of engine rotation.

Diameter of cylinder bore.

Piston installation clearance.

TOTAL PERMISSIBLE WEAR TOLERANCE .

Installation note:

If necessary, replace piston.

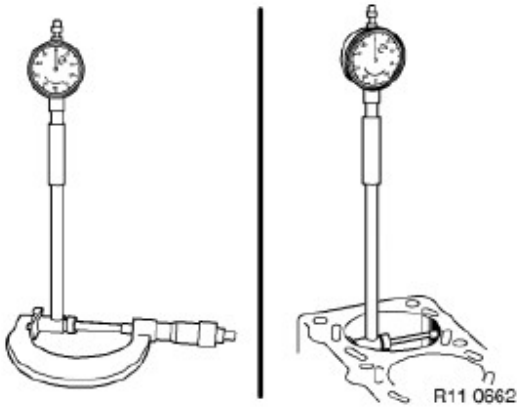


Fig. 213: Checking Cylinder Bore Diameter
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Safety goggles must be worn.

IMPORTANT: The opening of the piston pin circlip must be installed on the piston in the 6 o'clock position.

Risk of damage!

Insert piston circlip (2) into groove of special tool 11 8 562.

Bring piston circlip (2) into working position (1).

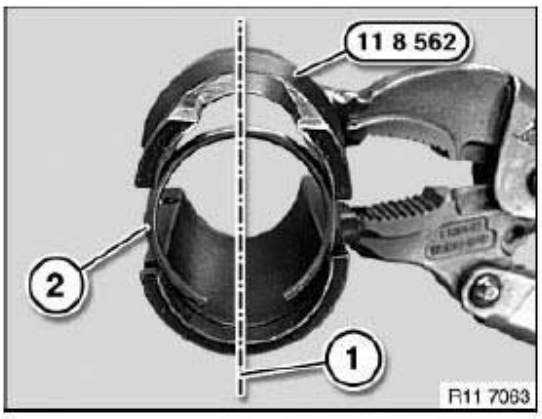


Fig. 214: Inserting Piston Circlip Into Groove Of Special Tool 11 8 562
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Safety goggles must be worn.

Slide on special tool 11 8 563 up to piston pin circlip (2)

Special tools 11 8 562 and 11 8 563 are prepared.

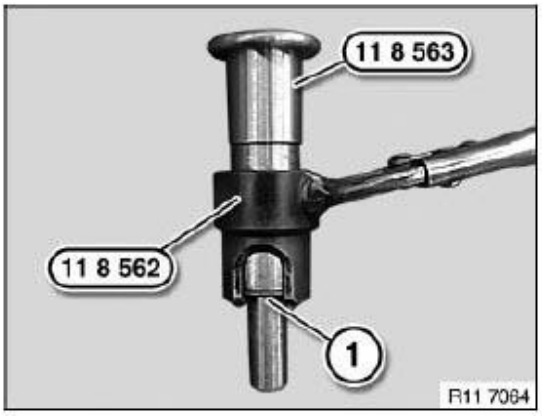


Fig. 215: Identifying Special Tools 11 8 562 And 11 8 563
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Safety goggles must be worn.

Opening on special tool 11 8 562 must point to piston crown; only then can special tool 11 8 563 be fitted correctly.

If the special tools 11 8 562 and 11 8 563 are not positioned correctly, the piston pin circlip must be driven in

using a plastic hammer in direction of arrow.

NOTE: See graphic.

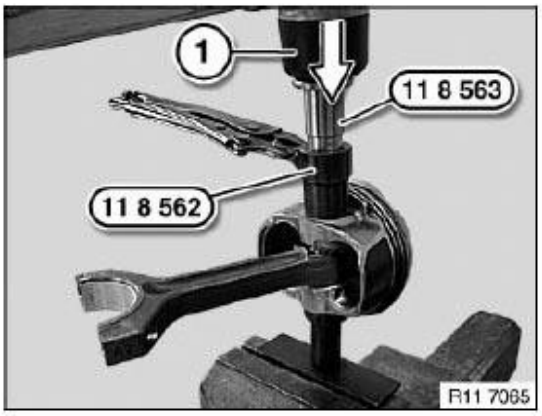


Fig. 216: Inserting Piston Pin Circlip
Courtesy of BMW OF NORTH AMERICA, INC.

Piston pin circlip is correctly installed when opening (1) points downwards.

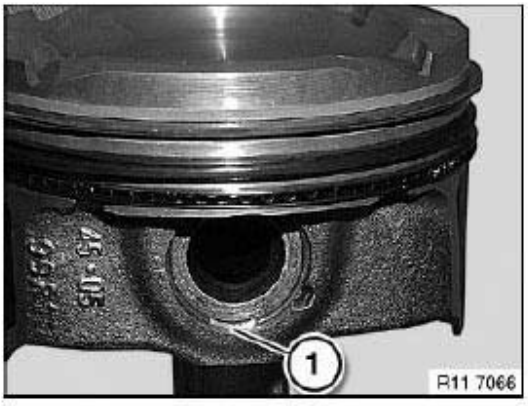


Fig. 217: Identifying Piston Pin Circlip Installation Position
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: B 30.

Install all **PISTON RINGS** .

Install all **BEARING SHELLS** .

Coat piston and piston rings with oil.

Pre-install piston (2) in special tool 11 8 141.

Screw on special tool **11 8 590** in connecting rod (2).

Installation note:

Make sure protective lugs (1) on special tool **11 8 590** are positioned correctly and check for damage.

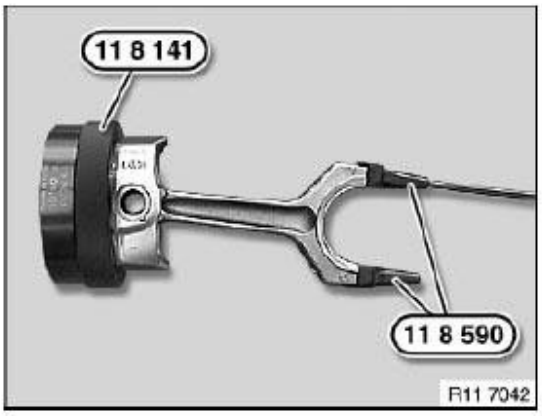


Fig. 218: Identifying Special Tools 11 8 590 And 11 8 141
Courtesy of BMW OF NORTH AMERICA, INC.

Insert piston with connecting rod in cylinder.

IMPORTANT: Risk of damage to oil spray nozzle.

Risk of breakage of piston rings.

Press in piston in direction of arrow with finger pressure only, do not drive in.

Insert piston so that arrow on piston crown points to camshaft drive.

Press in piston (1) with special tool 11 8 141.

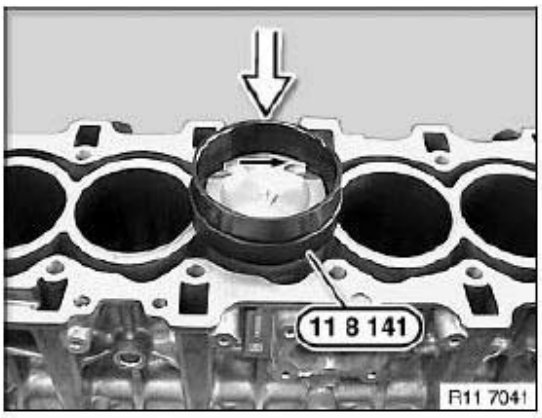


Fig. 219: Pressing Piston Using Special Tool 11 8 141
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Connecting rod and connecting rod bearing cap are marked with pairing letters (1) and must not be mixed up.

Swapping or incorrectly fitting the connecting rod bearing cap on the big end will result in engine damage .

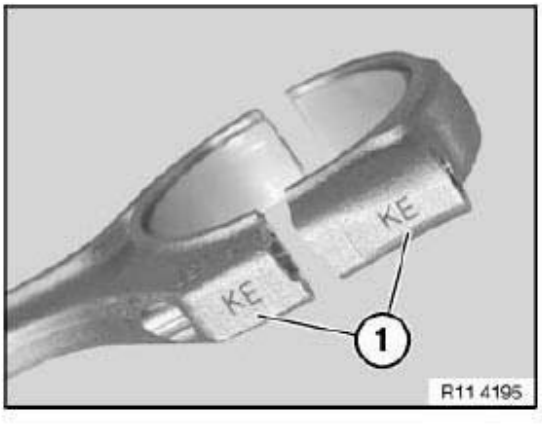


Fig. 220: Identifying Conrod Bearing Cap With Identification Marks
Courtesy of BMW OF NORTH AMERICA, INC.

Apply a light coat of oil to crank pin.

Assemble connecting rod and crankshaft journal.

Screw off special tool **11 8 560** in anticlockwise direction.

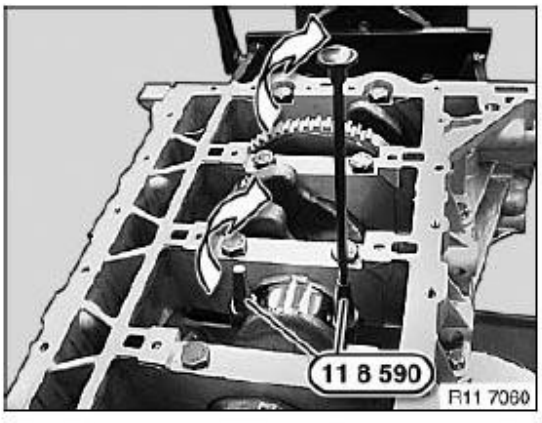


Fig. 221: Removing Special Tool In Counterclockwise Direction
Courtesy of BMW OF NORTH AMERICA, INC.

Fit bearing caps (2) so that pairing letters match up.

Install new connecting rod bolts (1).

Tightening torque **11 24 1AZ** .

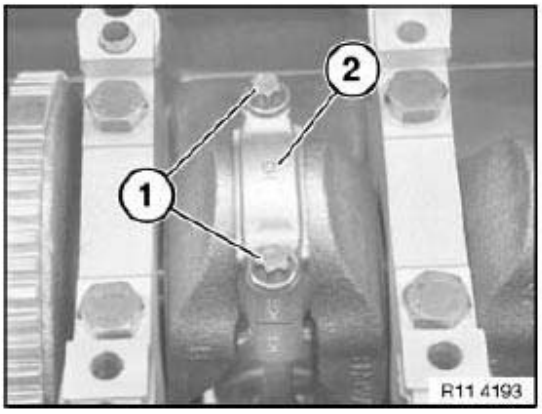


Fig. 222: Identifying Bearing Caps And Connecting Rod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust torsion angle of connecting rod with special tool **00 9 120** (see illustration).

Tightening torque **11 24 1AZ** .

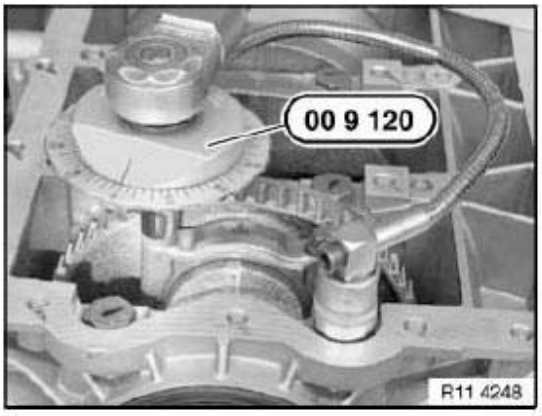


Fig. 223: Adjusting Conrod Torsion Angle Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 25 671 REPLACING PISTON RINGS ON ALL PISTONS (N54, N54T)

Necessary preliminary tasks:

- Remove all **PISTONS** .

Measuring axial clearance of piston rings in piston ring groove.

TECHNICAL DATA.

NOTE: It is not possible to measure the axial clearance of the oil scraper rings.

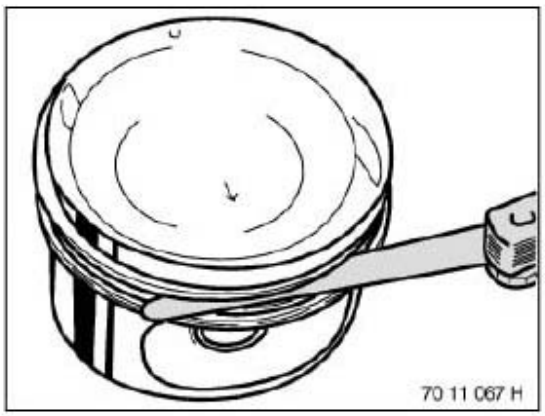


Fig. 224: Checking Piston Ring Clearance
Courtesy of BMW OF NORTH AMERICA, INC.

Remove compression ring and stepped ring upwards with piston ring pliers.

Oil scraper ring comprises two steel band rings and a support spring.

NOTE: Oil scraper ring cannot be removed with piston ring pliers.

Put aside piston rings in correct sequence and installation position.

It might not be possible to find the identification on used piston rings.

Installation note:

New pistons may only be installed together with new piston rings.

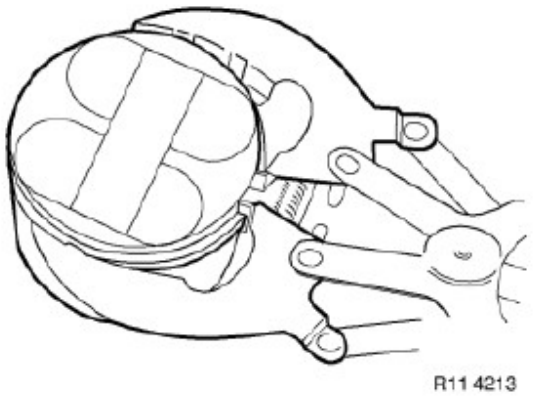


Fig. 225: Removing Compression Ring And Stepped Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Determine See **ENGINE BLOCK, CYLINDER CRANKCASE N54/B30** or **PISTONS WITH RINGS AND PINS N54/B30** with a feeler gauge.

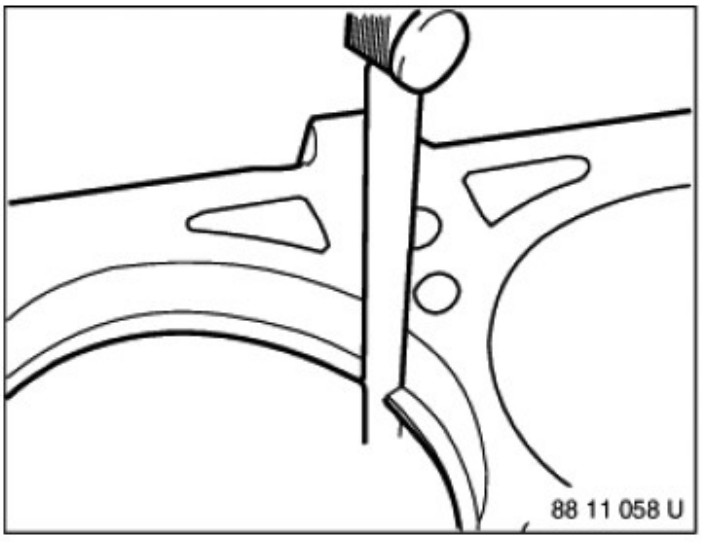


Fig. 226: Determining Piston Ring Gap Using Filler Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Schematic diagram of piston rings.

Installation note:

Piston rings with "TOP" identification must point to piston crown.

1. Plain compression ring
2. Piston ring "top"
3. Two-part oil scraper ring

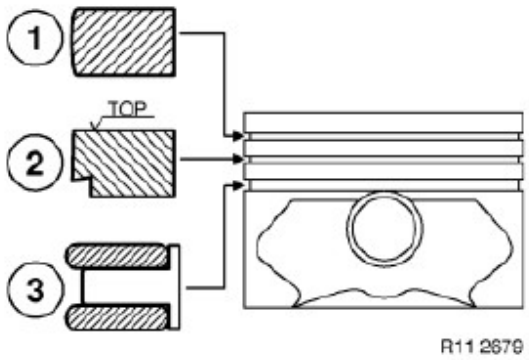


Fig. 227: Identifying Piston Rings
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Oil control ring comprises two steel band rings (1) and a support spring (2).

Installation note:

Insert support spring (2) into piston ring groove and then fit steel band rings (1) so that contact points are offset by approx. 120°.

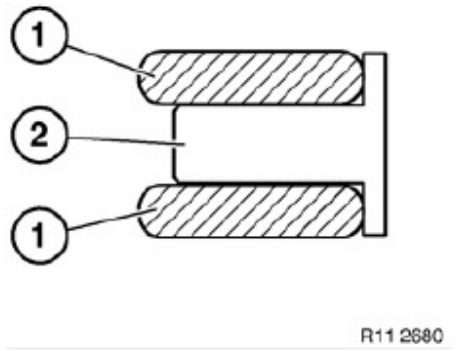


Fig. 228: Identifying Steel Band Ring And Support Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Offset the contact points (1) of the piston rings by approx. 120° to each other but do not position above the gudgeon pin boss.

NOTE: See graphic N52.

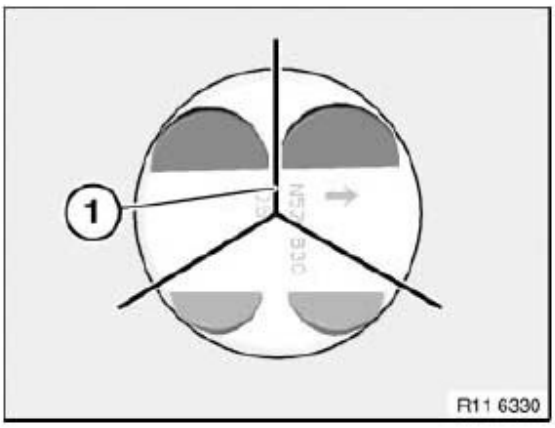


Fig. 229: Identifying Piston Rings Contact Point
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1128 V-RIBBED BELT WITH TENSIONER AND DEFLECTION ELEMENT

11 28 010 REPLACING DRIVE BELT FOR ALTERNATOR (N54, N54T)

IMPORTANT: Mark the direction of rotation of the drive belt if it is to be reused.

Depending on the build date (version), the idler pulleys can be fitted with and without grooves.

Necessary preliminary tasks:

- Remove **FAN COWL**

Unfasten hose clip (1).

Release quick-connect fastener (3) 90° on boost pressure hose in direction of arrow.

Pull off air hose (2).

Installation note:

Bring lock (3) back 90° into installation position.

Recirculated air hose must audibly snap into place.

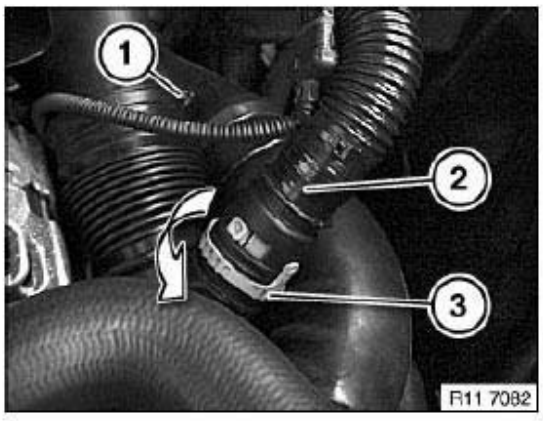


Fig. 230: Removing Quick-Connect Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip line (1) from holder (2) in direction of arrow.

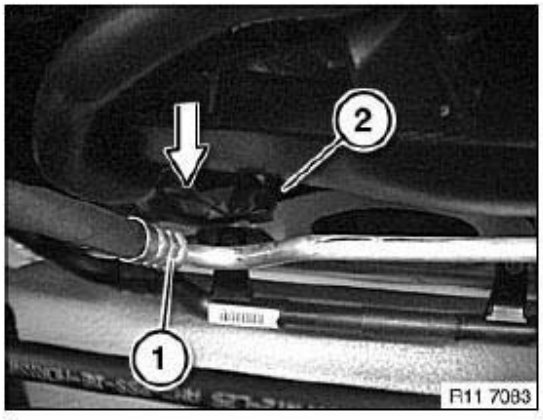


Fig. 231: Unclipping Line From Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release coolant hose (1) from bracket (2).

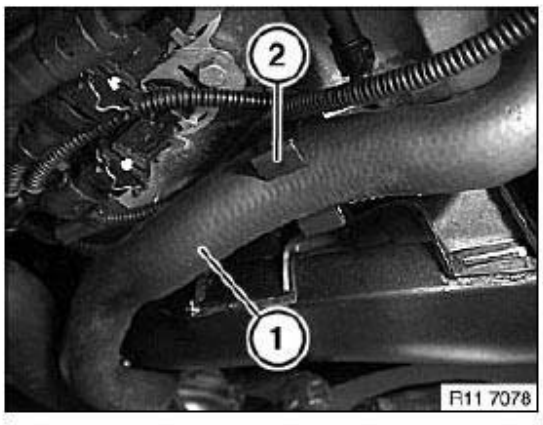


Fig. 232: Identifying Coolant Hose And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Fold air duct (2) down.

NOTE: Do not remove air duct (2).

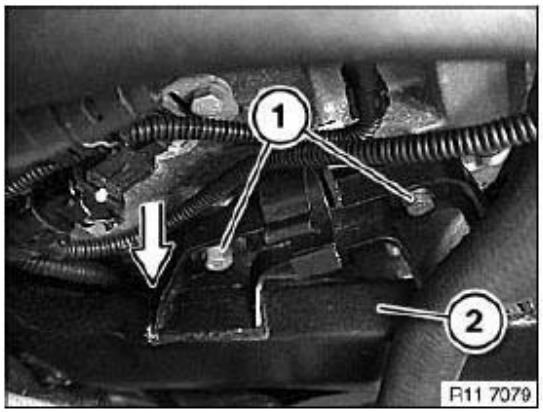


Fig. 233: Folding Air Duct Down
Courtesy of BMW OF NORTH AMERICA, INC.

Turn belt tensioner (1) in direction of arrow until bore is flush on housing.

Secure belt tensioner in place with special tool **11 3 340** .

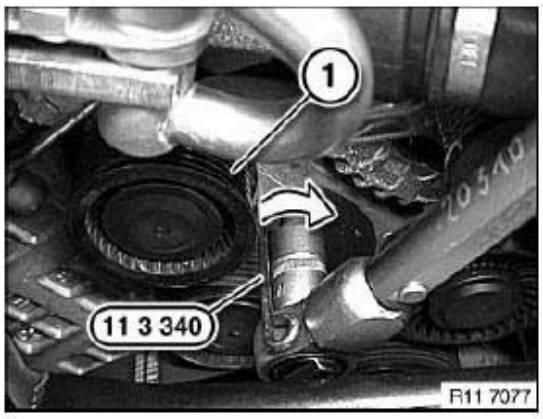


Fig. 234: Turning Belt Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Remove drive belt (1).

Installation note:

Mark the direction of rotation of the drive belt if it is to be reused.

Pretension tensioning pulley (1) in direction of arrow.

Remove special tool **11 3 340** .

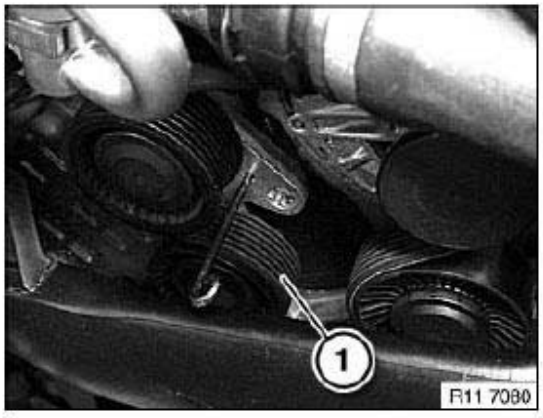


Fig. 235: Identifying Drive Belt
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Note arrangement of drive belt

Arrow shows the direction of rotation.

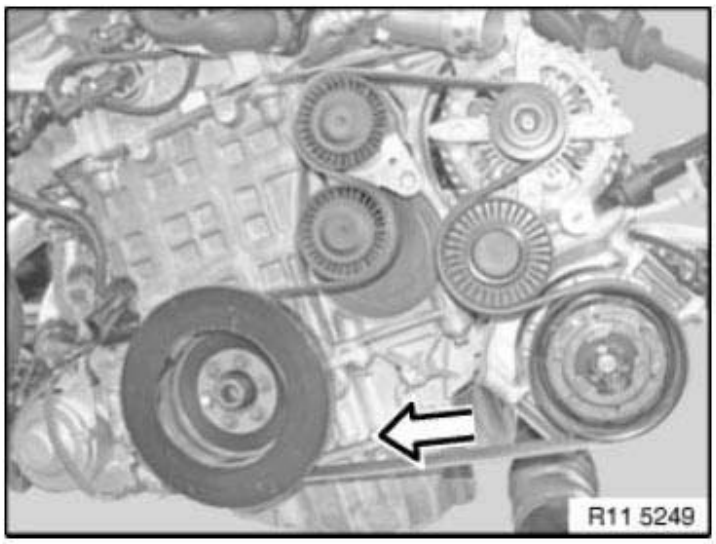


Fig. 236: Identifying Drive Belt Rotation Direction
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Installation note:

Risk of damage!

Check that drive belt is in correct installation position.

11 28 020 REPLACING TENSIONING DEVICE FOR ALTERNATOR DRIVE BELT (N54, N54T)

Necessary preliminary tasks:

- Remove **DRIVE BELT**

Remove protective cap on deflection pulley.

Remove special tool **11 3 340** .

Release screw (1) on belt tensioner.

Tightening torque **11 28 1AZ** .

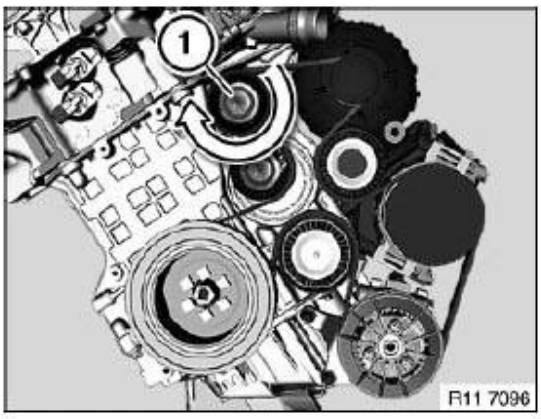


Fig. 237: Removing Screw On Belt Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement and direction of rotation of drive belt.

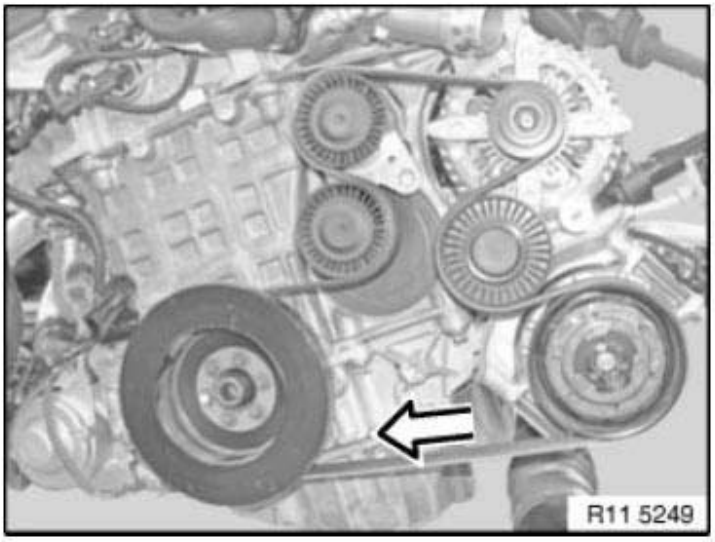


Fig. 238: Identifying Drive Belt Rotation Direction
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1131 CAMSHAFT

11 31 505 ADJUSTING CAMSHAFT TIMING (N54, N54T)

IMPORTANT: Risk of damage!

To open the central bolt at the camshaft, grip hexagon on rear of camshaft.

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**

Remove fastener (1) in direction of arrow.

Installation note:

Install fastener (1) with bore facing outwards.

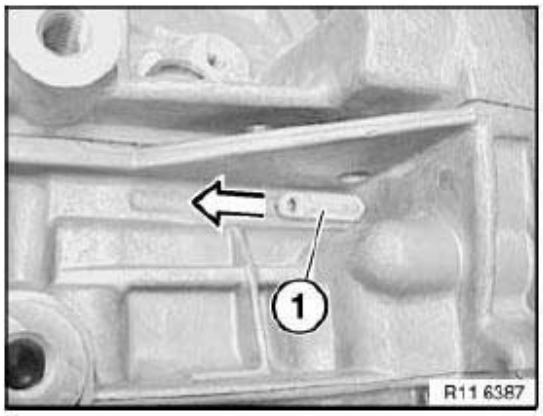


Fig. 239: Removing Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate crankshaft at central bolt into TDC position.

Slide in special tool **11 0 300** in direction of arrow and block crankshaft.

IMPORTANT: On engines with automatic transmissions, there is shortly before the special tool bore for the TDC position a large bore which can be confused with the special tool bore.

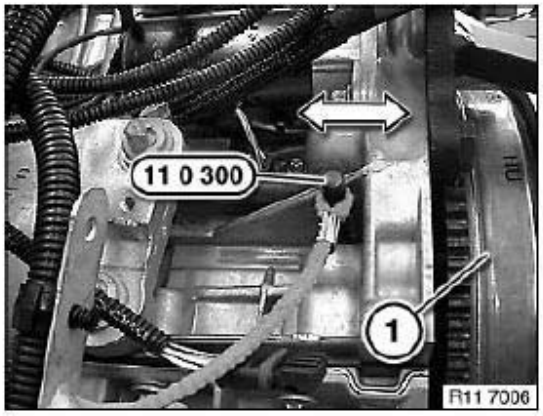


Fig. 240: Sliding In Special Tool 11 0 300
Courtesy of BMW OF NORTH AMERICA, INC.

If the flywheel is secured in the correct bore with special tool **11 0 300** , the engine can no longer be moved at the central bolt.

Fit special tool 11 4 283 with screws (1).

Fit special tool 11 4 281 on special tool 11 4 283.

IMPORTANT: If special tool 11 4 281 cannot be installed, the camshaft must be rotated at the hexagon head at the rear.

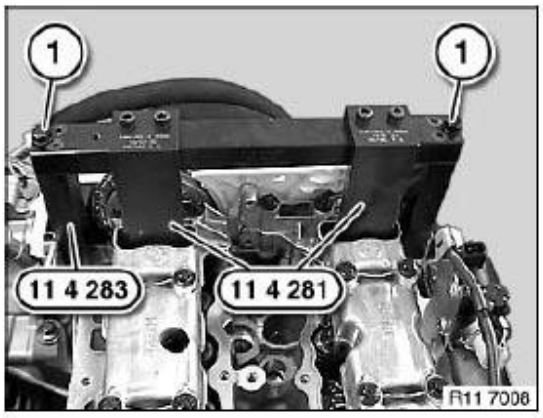


Fig. 241: Identifying Special Tool 11 4 280
Courtesy of BMW OF NORTH AMERICA, INC.

With cylinder No. 1 in ignition TDC position, cams of exhaust camshaft (2) and intake camshaft (1) at 6th cylinder point downwards at an angle.

NOTE: If the timing is adjusted while the engine is installed, the position of the camshaft can only be checked with a mirror.

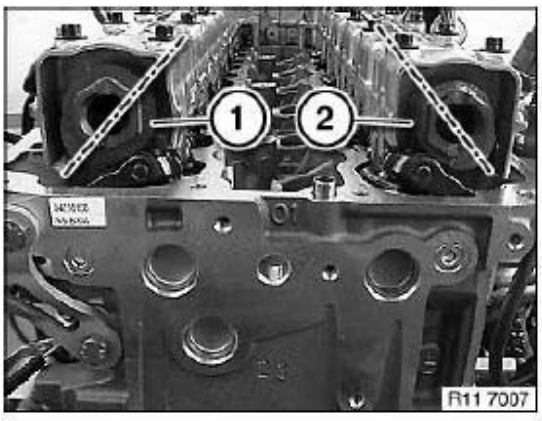


Fig. 242: Identifying Inlet And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Release central bolt (1) of exhaust camshaft.

Installation note:

Replace screw (1).

Tightening torque **11 36 1AZ** .

Release central bolt (2) of inlet camshaft.

Installation note:

Replace screw (2).

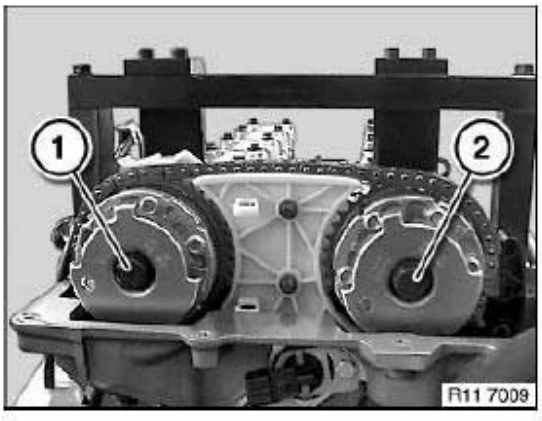


Fig. 243: Identifying Central Bolt Of Inlet And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **11 36 1AZ** .

Rotate increment wheels until retaining pins on special tool **11 8 520** match up.

Push special tool **11 8 520** onto cylinder head.

Secure special tool **11 8 520** with bolts (1 and 2).

NOTE: Bolts M6 x 45 (1 and 2) with captive washer.

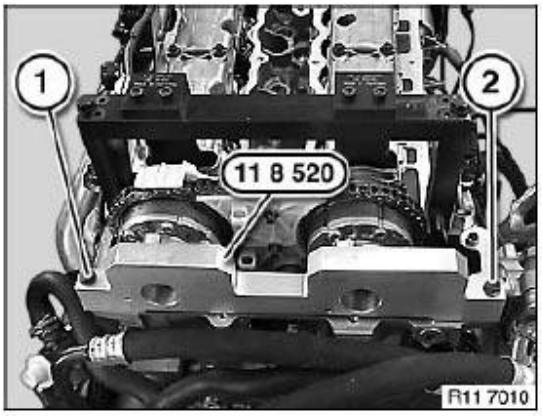


Fig. 244: Identifying Special Tool 11 8 520 With Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

REMOVE CHAIN TENSIONER (1).

Screw special tool **11 9 340** into cylinder head.

Pre-tension timing chain with special tool 00 9 250 **to 0.6 Nm.**

Tighten central bolts (2 and 3) with special tool 00 9 120 .

Tightening torque 11 36 1AZ .

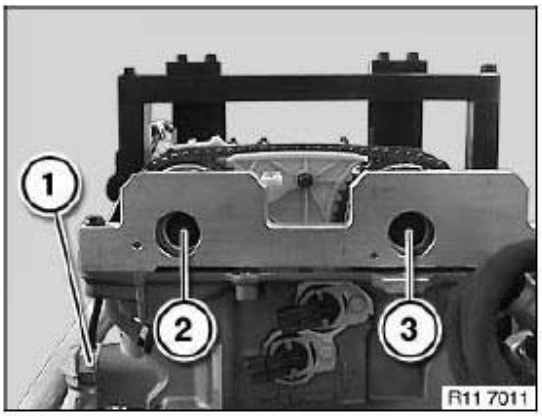


Fig. 245: Identifying Chain Tensioner And Central Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

11 31 005 CHECKING CAMSHAFT TIMING (N54, N54T)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove front **UNDERBODY PROTECTION**

Remove fastener (1) in direction of arrow.

Installation note:

Install fastener (1) with bore facing outwards.

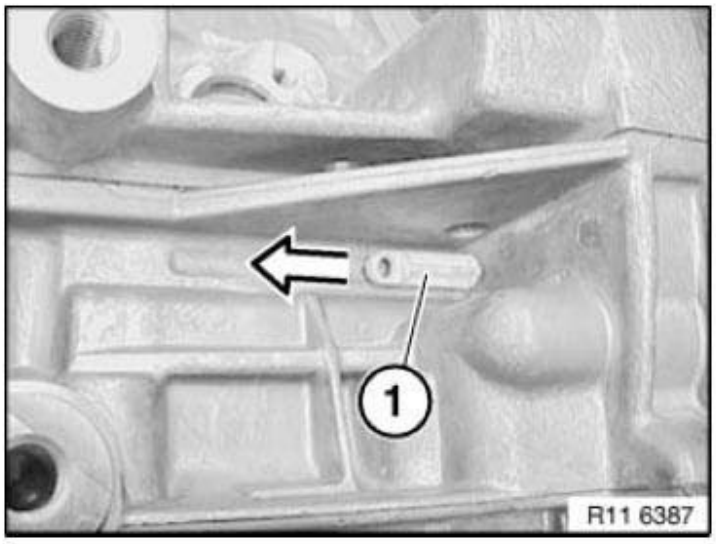


Fig. 246: Identifying Bearing Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate crankshaft at central bolt into TDC position.

Slide in special tool **11 0 300** in direction of arrow and block crankshaft.

IMPORTANT: On engines with automatic transmissions, there is shortly before the special tool bore for the TDC position a large bore which can be confused with the special tool bore.

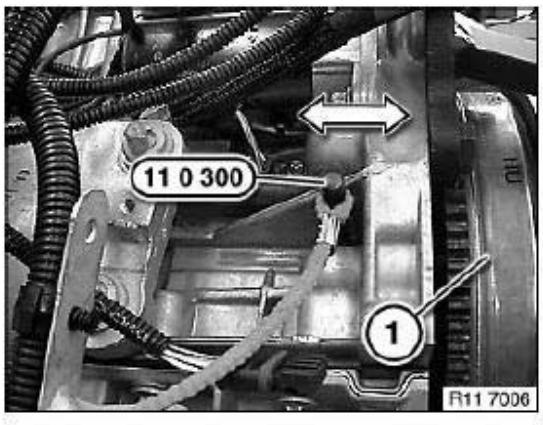


Fig. 247: Sliding In Special Tool 11 0 300
Courtesy of BMW OF NORTH AMERICA, INC.

If the flywheel is secured in the correct bore with special tool **11 0 300** , the engine can no longer be moved at the central bolt.

With 1st cylinder in ignition TDC position, cams of intake camshaft (1) at 6th cylinder point downwards at an angle.

With 1st cylinder in ignition TDC position, cams of exhaust camshaft (2) at 6th cylinder point downwards at an angle.

Roller cam follower is not actuated.

NOTE: If the timing is checked while the engine is installed, the position of the camshaft can only be checked with a mirror.

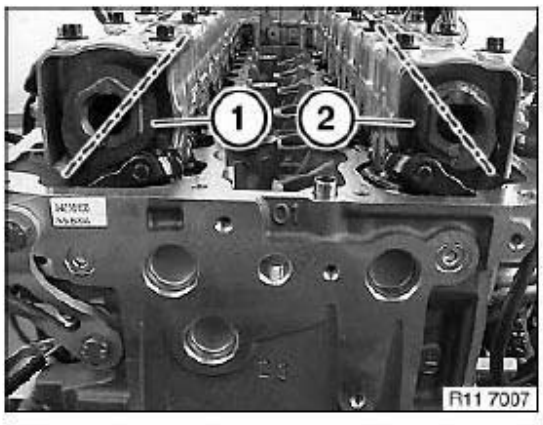


Fig. 248: Identifying Inlet And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 283 on cylinder head with screws (1).

Mount special tool 11 4 281 on intake and exhaust camshafts.

If the special tools 11 4 281 cannot be attached, the **TIMING** must be adjusted.

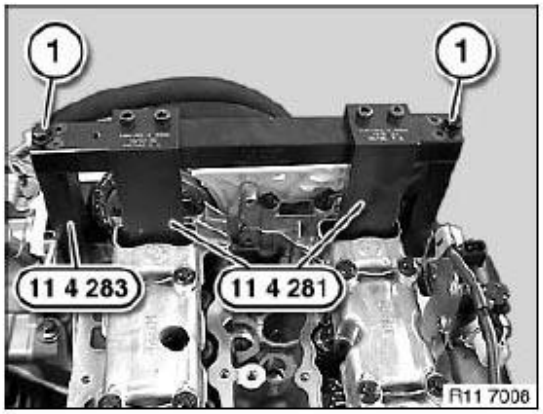


Fig. 249: Identifying Special Tool 11 4 280
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

11 31 090 INSTALLING AND REMOVING/REPLACING CHAIN TENSIONER PISTON (N54, N54T)

Necessary preliminary tasks

Remove **COOLANT EXPANSION TANK** (E89 only)

Release chain tensioner (1).

Tightening torque: **11 31 5AZ** .

IMPORTANT: Have a cleaning cloth ready. A small quantity of engine oil will emerge after the screw connection has been released.

Make sure no oil runs onto the belt drive.

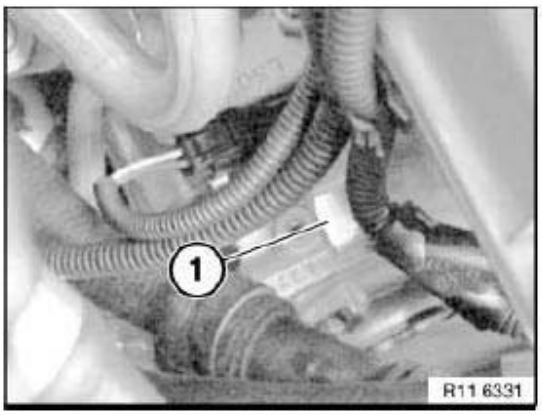


Fig. 250: Identifying Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

No sealing ring is fitted during series-production assembly.

A sealing ring must be fitted by service personnel when the chain tensioner is fitted.

If the chain tensioner is reused, its oil chamber must be drained. Place chain tensioner on a level working surface and slowly compress.

Repeat procedure twice.



Fig. 251: Compressing Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 028 REMOVING AND INSTALLING/REPLACING EXHAUST CAMSHAFT (N54/N54T)

IMPORTANT: Risk of damage!

It is absolutely essential to follow an exact procedure for removing and installing the exhaust camshaft.

The upper and lower bearing strips must be preloaded with a total of six special tools 11 8 553.

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove **EXHAUST ADJUSTING UNIT** for exhaust camshaft.
- Adjust **VALVE TIMING**

Release bearing cap screw connections from outside inwards.

Lift out lower and upper bearing strips (1) with camshaft.

NOTE: Graphic shows N52.

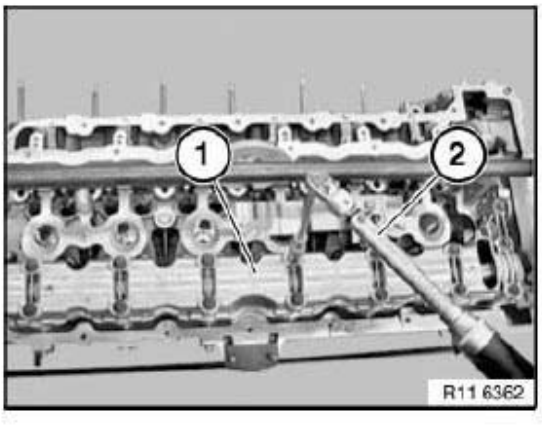


Fig. 252: Lifting Lower And Upper Bearing Strips With Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Both camshafts have different markings.

Mixing up the two camshafts will result in engine damage.

A Exhaust camshaft.

E Intake camshaft

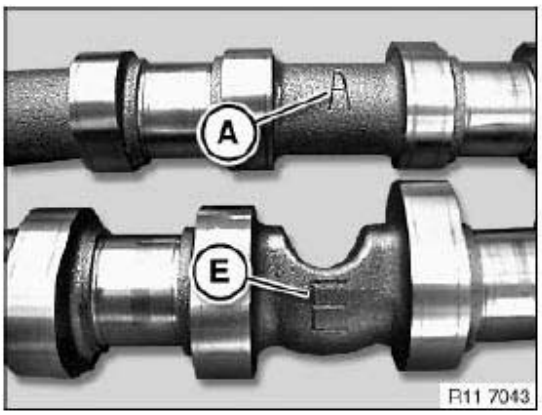


Fig. 253: Identifying Exhaust And Inlet Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Plain compression rings (1) are engaged at joint.

Press plain compression rings (1) apart upwards and downwards and removed towards front.

IMPORTANT: Plain rectangular compression rings (1) can easily break.

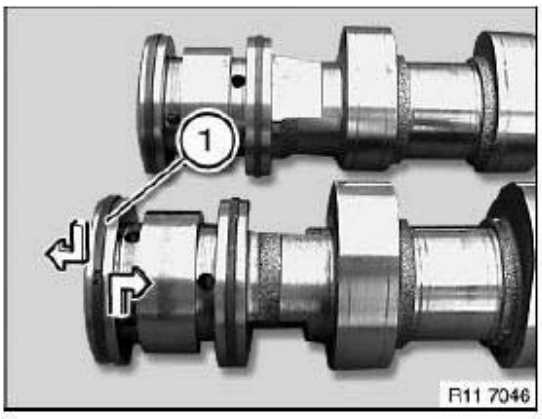


Fig. 254: Pressing Plain Compression Rings
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Removal on engine:

Engine at cylinder no. 1 firing TDC position.

Removed cylinder head:

When using special tool 11 9 000 , it will be necessary to remove the aluminum strip.

Installation note:

Before installing the exhaust camshaft, make sure the roller cam follower is correctly seated on the hydraulic valve clearance compensating element and the valve.

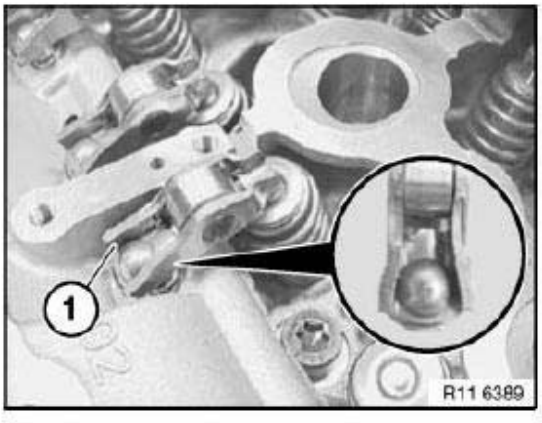


Fig. 255: Identifying Cam Follower Seat
Courtesy of BMW OF NORTH AMERICA, INC.

Installing camshaft bearing strip

Pre-install special tool 11 8 551 on cylinder no. 2.

Observe markings E and A

E: Intake side

A: Exhaust side

Insert special tool 11 8 552 in screw connection of cylinder head cover.

Press down roller cam follower (1) on cylinder no. 2 with spindle nut of special tool 11 8 551.

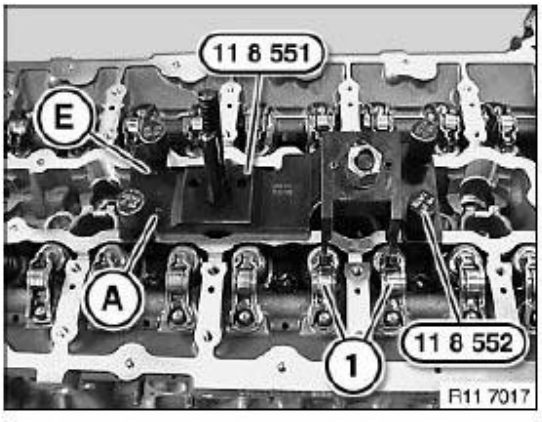


Fig. 256: Identifying Special Tools 11 8 551 And 11 8 552
Courtesy of BMW OF NORTH AMERICA, INC.

Lay lower bearing strip (1) on cylinder head.

Installation note:

Lubricate all bearing points with engine oil.

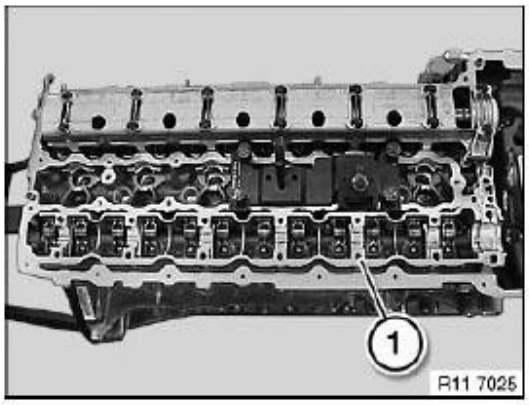


Fig. 257: Identifying Lower Bearing Strip On Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Insert exhaust camshaft (1) in lower bearing strip.

Installation note:

Lubricate all bearing positions and cams with engine oil.

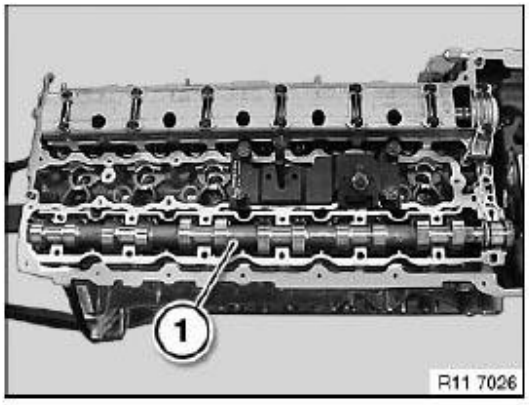


Fig. 258: Identifying Exhaust Camshaft In Lower Bearing Bank
Courtesy of BMW OF NORTH AMERICA, INC.

Installation position (1) of exhaust camshaft (2) at cylinder no. 1.

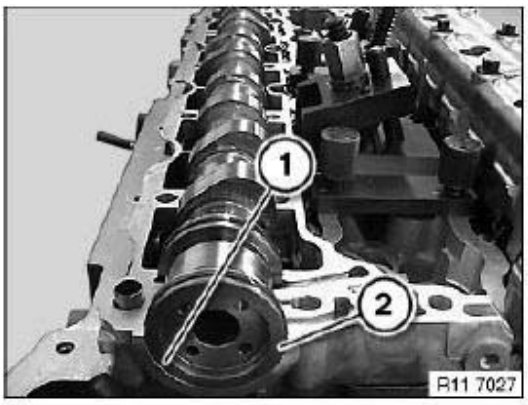


Fig. 259: Identifying Installation Position Of Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Join exhaust camshaft to lower and upper bearing strips with torque wrench from inside outwards to **8 Nm.**

Release all screws of bearing strip (1) from outside inwards by 90°.

Check position of exhaust camshaft (2) at cylinder no. 6.

Roller cam follower (1) is not actuated.

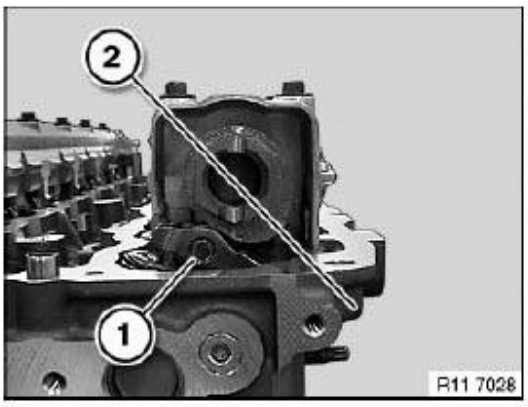


Fig. 260: Identifying Exhaust Camshaft Position And Cam Follower
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Lower and upper bearing strips must be aligned to each other at ground surfaces (1 and 2).

Bring thrust piece and legs of special tools 11 8 553 into contact at milled surfaces.

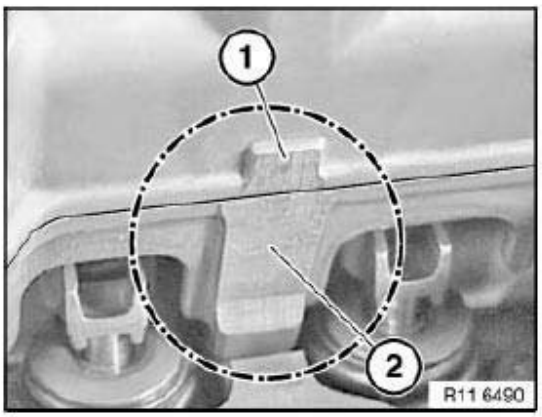


Fig. 261: Identifying Bearing Strips
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Schematic depiction of special tool 11 8 553 at upper bearing strip (1) and lower bearing strip (2).

IMPORTANT: Tighten screw (3) on thrust piece to 2 Nm.

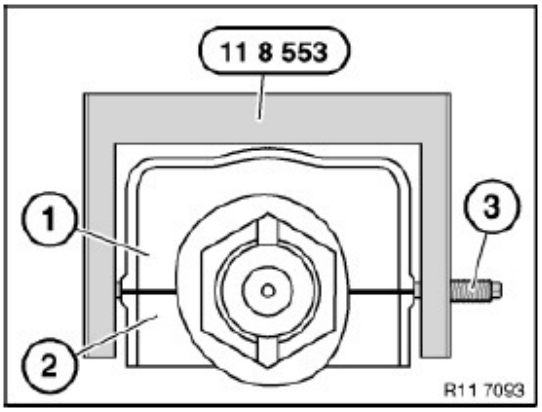


Fig. 262: Identifying Special Tool 11 8 553 Schematic Depiction On Bearing Strips
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 8 553 over screw connection of bearing strips.

NOTE: Make sure that legs come into exact contact on ground surfaces, lower bearing strip (1) and upper bearing strip (2).

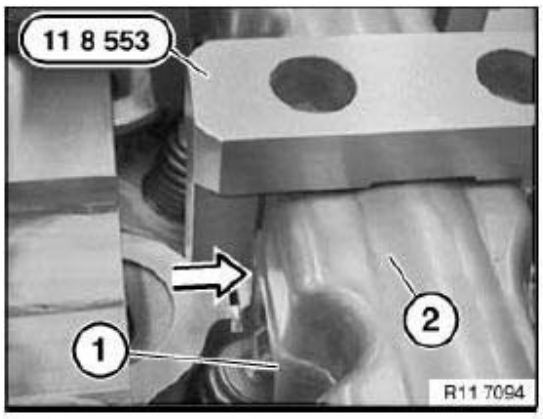


Fig. 263: Positioning Special Tool 11 8 553 Over Bearing Banks Screw Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Initially tighten screw of special tool 11 8 553 to ground surfaces of lower bearing strip (2) and upper bearing strip (1).

IMPORTANT: Tighten screws on thrust piece to 2 Nm.

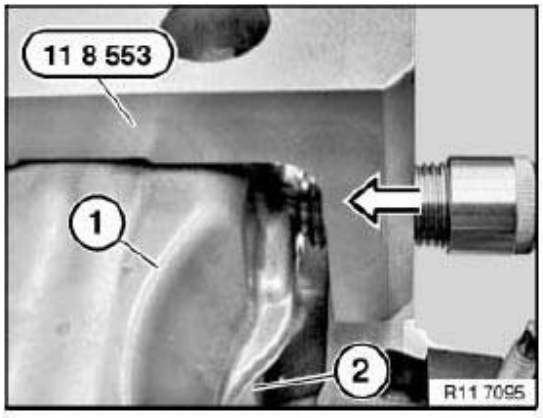


Fig. 264: Tightening Special Tool 11 8 553 Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Set special tool 11 4 350 to 2 Nm.

Pre-tension all special tools 11 8 553 with special tool **11 4 350** only.

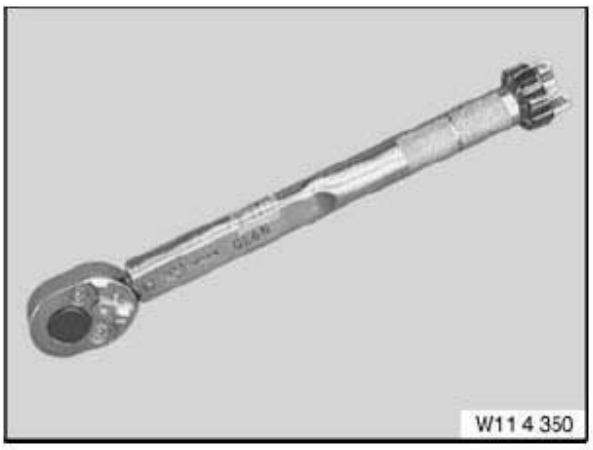


Fig. 265: Identifying 11 4 350 Torque Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tools 11 8 553 with screw (1) to inside of cylinder head.

On cylinder no. 2 mount special tool 11 8 553 with screw (1) facing outwards.

Position special tools **11 4 350** so that screw connections (2) of bearing strip are easily accessible.

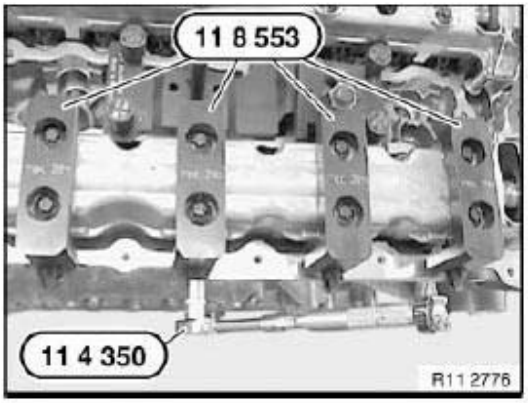


Fig. 266: Identifying Special Tools 11 8 553 And Special Tool 11 4 350
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten lower and upper bearing strips with special tool **00 9 120** .

Position special tool 11 8 553 over screw connection of bearing strips.

Tightening torque **11 31 1AZ** .

IMPORTANT: Remove special tool 11 8 553 only when camshaft screw connection is completed .

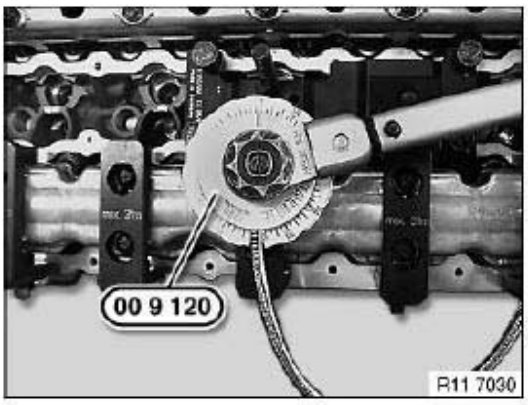


Fig. 267: Tightening Bearing Strips Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 025 REMOVING AND INSTALLING/REPLACING INTAKE CAMSHAFT (N54/N54T)

IMPORTANT: Risk of damage!

It is absolutely essential to follow an exact procedure for removing and installing the exhaust camshaft.

The upper and lower bearing strips must be pre-tensioned with a total of six special tools 11 8 553.

Special tool 11 8 550 can be used for intake and exhaust sides.

Necessary preliminary tasks:

Remove **CYLINDER HEAD COVER**

- Remove **INTAKE ADJUSTER** of intake camshaft

Release bearing cap screw connections from outside inwards.

Lift out lower and upper bearing strips (1) with camshaft.

NOTE: Graphic shows N52.

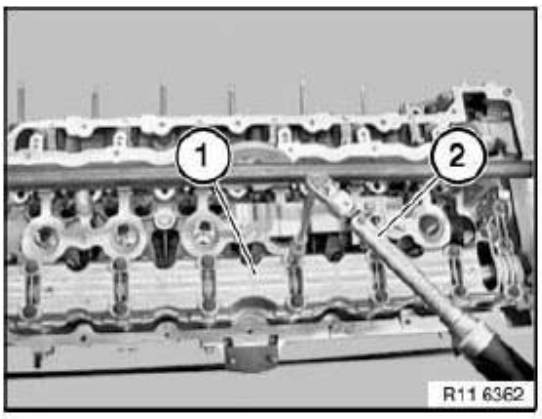


Fig. 268: Lifting Lower And Upper Bearing Strips With Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Remove upper bearing shell.

Remove intake camshaft (1) marked with (E).

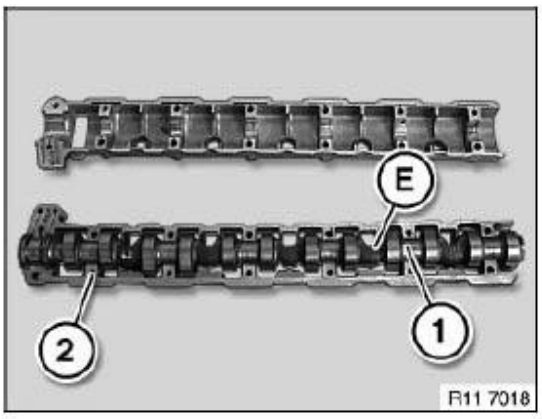


Fig. 269: Identifying Marked Inlet Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Both camshafts have different markings.

Mixing up the two camshafts will result in **engine damage.**

A Exhaust camshaft

E Intake camshaft

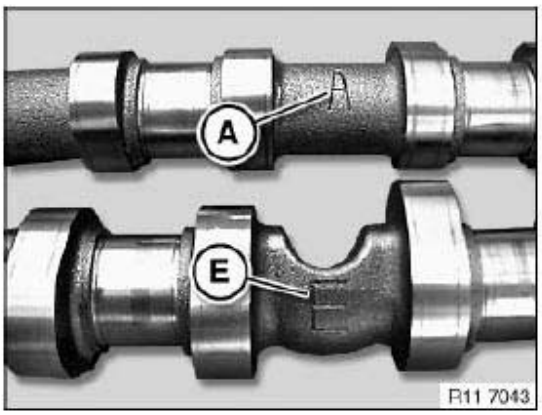


Fig. 270: Identifying Exhaust And Inlet Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Plain rectangular compression rings (1) can easily break.

Plain rectangular compression rings (1) are engaged at joint.

Press plain compression rings (1) apart upwards and downwards and removed towards front.

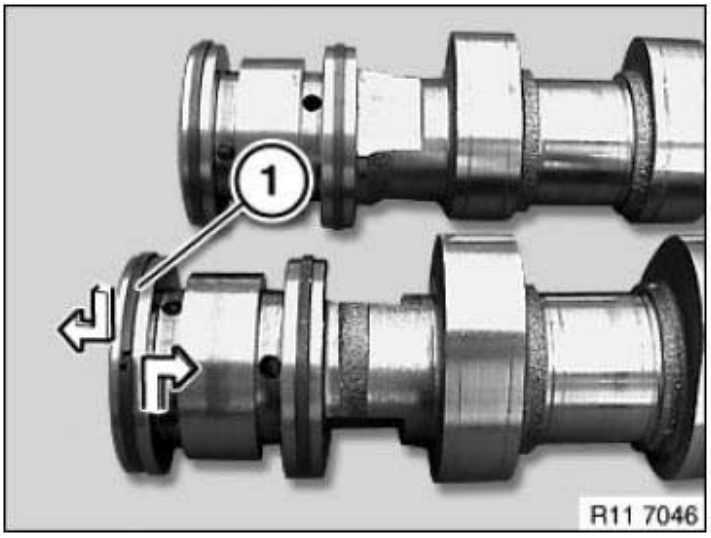


Fig. 271: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Removal on engine:

Engine at cylinder no. 1 firing TDC position.

Removed cylinder head:

When using special tool 11 9 000 , it will be necessary to remove the aluminum strip.

Installing camshaft bearing strip

Pre-install special tool 11 8 551 on cylinder nos. 2 and 3.

Insert special tool 11 8 552 in screw connection of cylinder head cover.

Special tool 11 8 551 is marked with letters E and A.

E= Intake side

A= Exhaust side

Press down roller cam follower on cylinder no. 3 with spindle nut (2) of special tool 11 8 551.

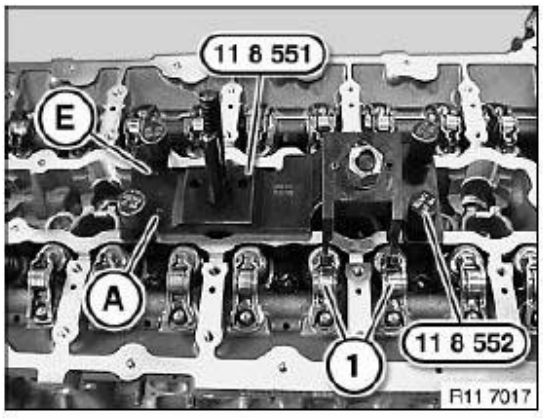


Fig. 272: Identifying Special Tools 11 8 551 And 11 8 552
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Before installing intake camshaft, make sure roller cam follower is correctly seated on hydraulic valve clearance compensating element and valve.

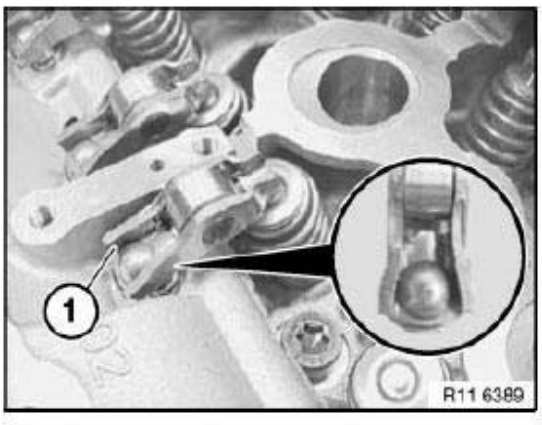


Fig. 273: Identifying Cam Follower Seat
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Pre-install bearing strip of intake camshaft.

Lubricate all bearing points in lower bearing strip with engine oil.

Installation note:

Lay intake camshaft (1) in bearing strip.

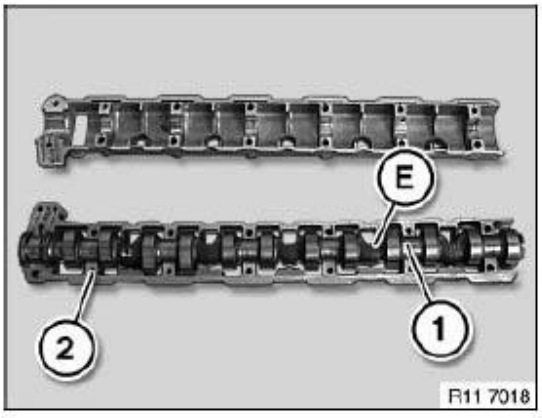


Fig. 274: Identifying Marked Inlet Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate intake camshaft (1) at cylinder no. 1 into position (2).

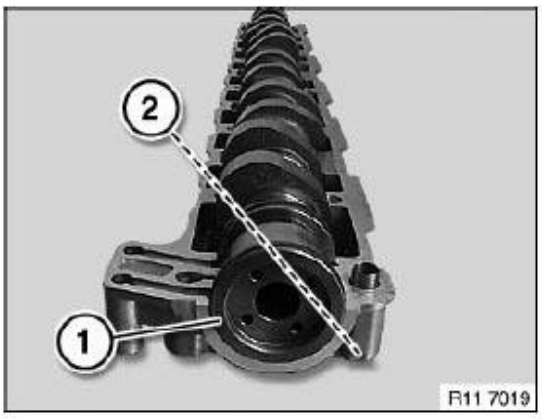


Fig. 275: Identifying Inlet Camshaft With Position
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Lower and upper bearing strips must be aligned to each other at ground surfaces (1 and 2).

Bring thrust piece and legs of special tools 11 8 553 into contact at milled surfaces.

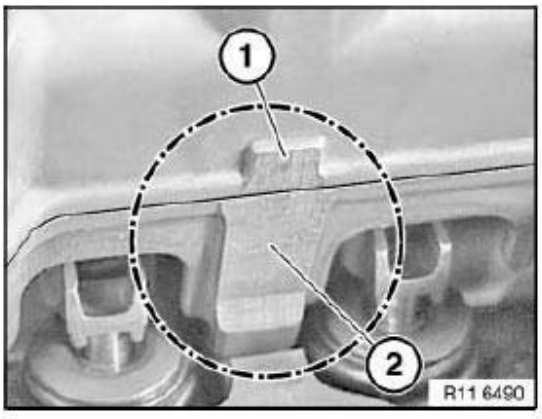


Fig. 276: Identifying Bearing Strips
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Schematic depiction of special tool 11 8 553 at lower bearing strip (1) and upper bearing strip (2).

IMPORTANT: Tighten screw (3) on thrust piece to 2 Nm.

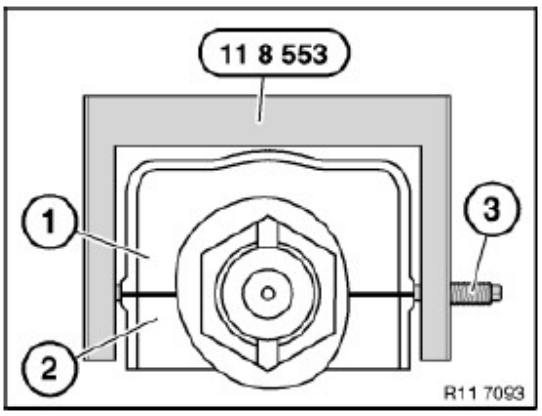


Fig. 277: Identifying Special Tool 11 8 553 Schematic Depiction On Bearing Strips
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 8 553 over screw connection of bearing strips.

Make sure that legs come into exact contact on ground surfaces, lower bearing strip (1) and upper bearing strip (2).

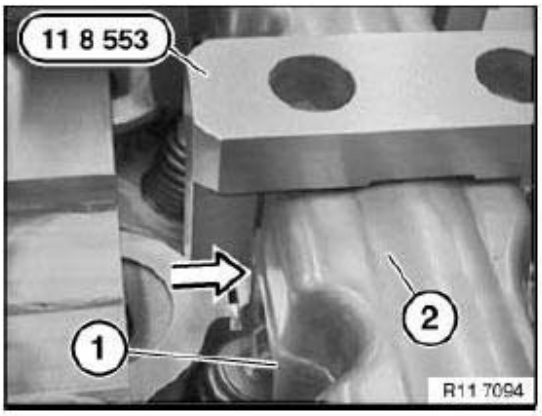


Fig. 278: Positioning Special Tool 11 8 553 Over Bearing Strips Screw Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Initially tighten screw of special tool 11 8 553 to ground surfaces of lower bearing strip (1) and upper bearing strip (2).

IMPORTANT: Tighten screws on thrust piece to 2 Nm.

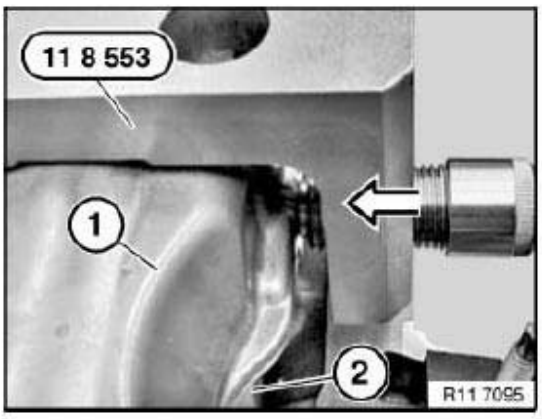


Fig. 279: Tightening Screw Of Special Tool 11 8 553
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Set special tool 11 4 350 to 2 Nm.

Pre-tension all special tools 11 8 553 with special tool 11 4 350 only.

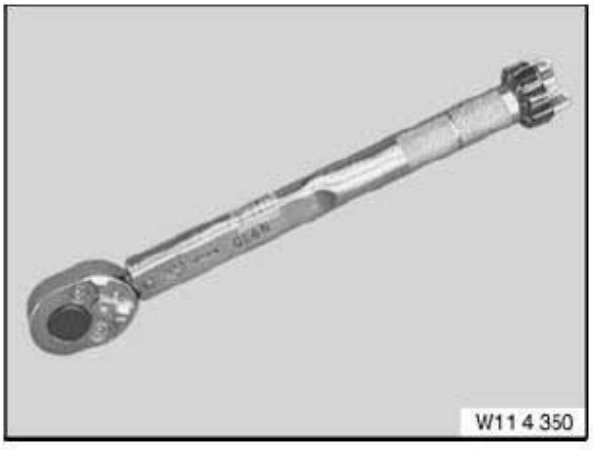


Fig. 280: Identifying 11 4 350 Torque Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Install upper and lower bearing strips (1).

Pre-install all special tools 11 8 553.

IMPORTANT: Secure special tool 11 8 553 to max. 2 Nm.

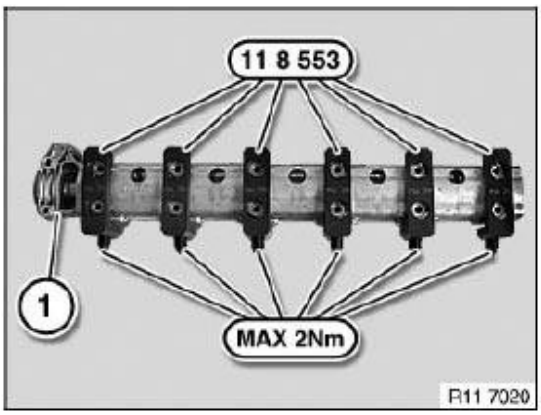


Fig. 281: Identifying Upper And Lower Bearing Strips With Special Tools 11 8 553
Courtesy of BMW OF NORTH AMERICA, INC.

Install intake camshaft with bearing strips (1) on cylinder head.

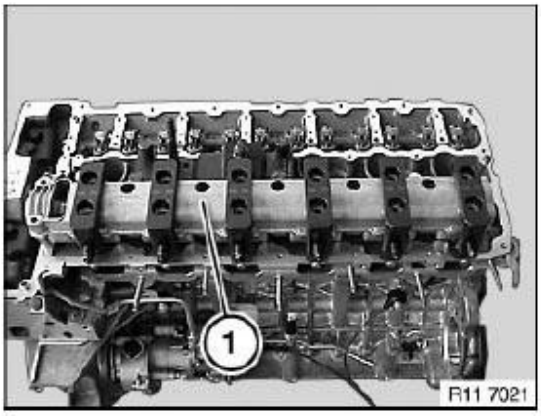


Fig. 282: Identifying Bearing Strips On Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Check position of intake camshaft (1) at cylinder no. 6.

Roller cam follower (2) is not actuated.

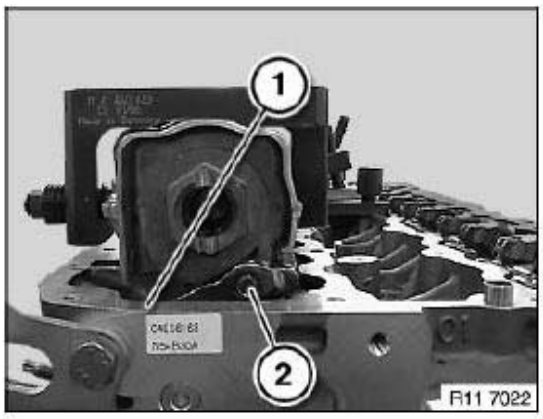


Fig. 283: Identifying Intake Camshaft And Roller Cam Follower
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten lower and upper bearing strips with special tool **00 9 120** .

Tightening torque **11 31 1AZ** .

IMPORTANT: Remove special tool 11 8 553 only when camshaft screw connection is completed.

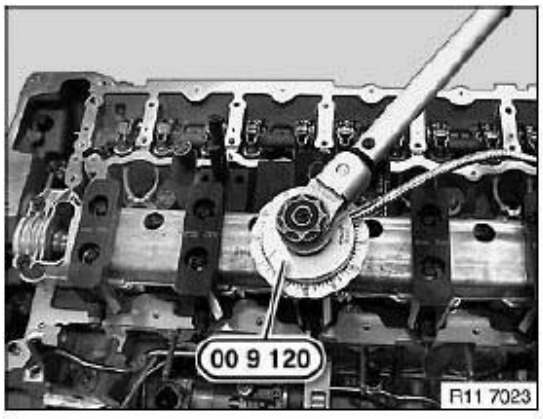


Fig. 284: Tightening Lower And Upper Bearing Strips Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust **VALVE TIMING** .

Assemble engine.

11 31 051 REPLACING TIMING CHAIN (N54, N54T)

Necessary preliminary tasks:

- Remove **FAN COWL**
- Remove **CYLINDER HEAD COVER**
- Remove all spark plugs
- Remove **CHAIN TENSIONER** .
- Remove **CRANKSHAFT SEAL** at front
- Remove **BELT TENSIONER**
- Remove **VIBRATION DAMPER**
- Remove **INTAKE AND EXHAUST ADJUSTERS**

Remove fastener (1) in direction of arrow.

Installation note:

Install fastener (1) with bore facing outwards.

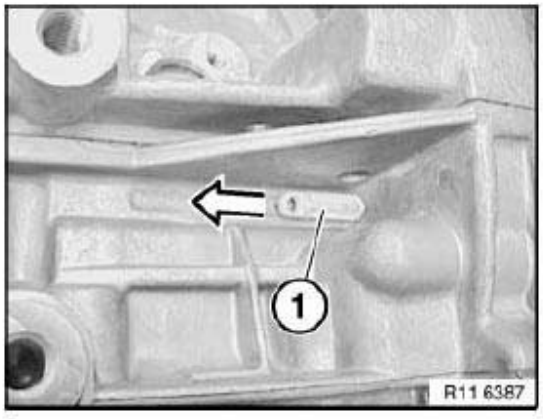


Fig. 285: Installing Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Secure engine in TDC firing position of cylinder no. 1 with special tool **11 0 300** .

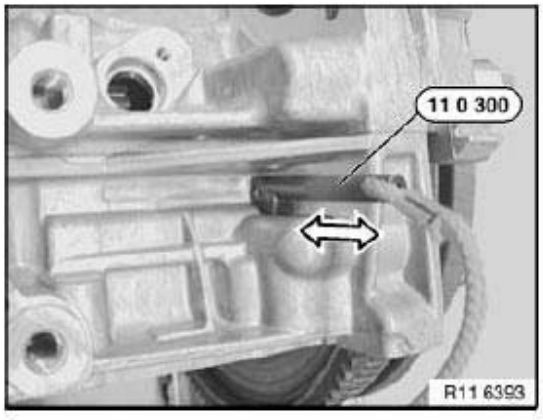


Fig. 286: Securing Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Mark flywheel and transmission housing with a line (1).

NOTE: Graphic shows automatic transmission.

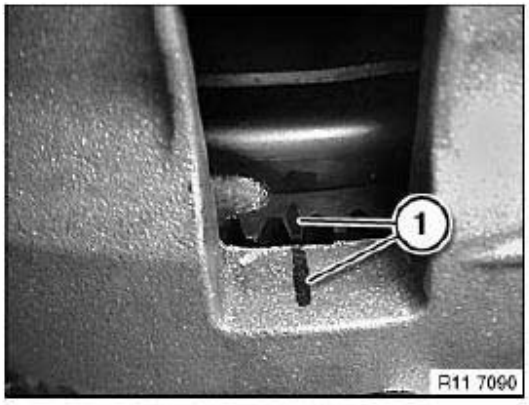


Fig. 287: Identifying Line On Flywheel And Transmission Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Do not remove special tool **11 4 280** .

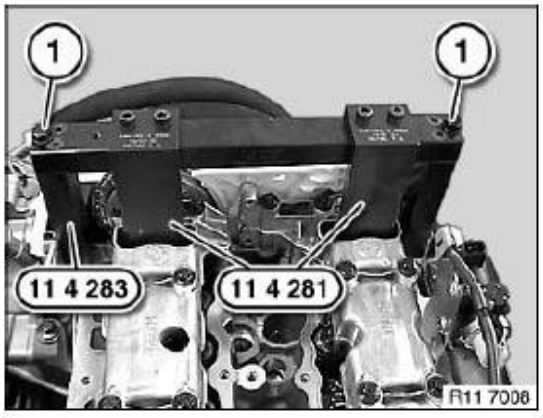


Fig. 288: Identifying Special Tool 11 4 280
Courtesy of BMW OF NORTH AMERICA, INC.

Procedure, transmission removed

Secure flywheel (crankshaft) with special tool **11 9 260** .

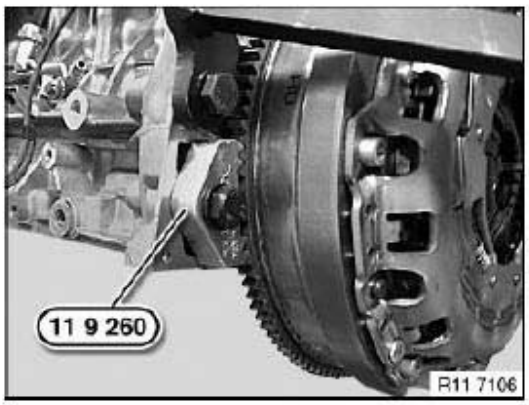


Fig. 289: Securing Flywheel (Crankshaft) Using Special Tool 11 9 260
Courtesy of BMW OF NORTH AMERICA, INC.

Block flywheel (crankshaft) with special tool **11 8 660** on gearbox.

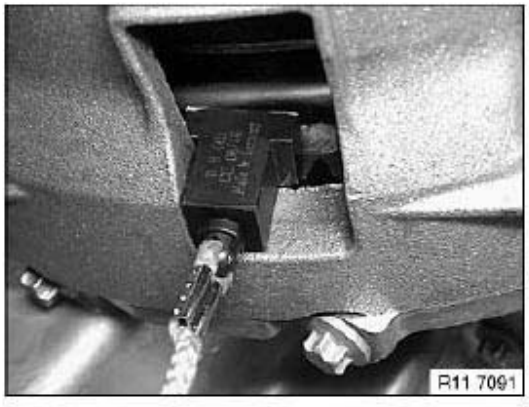


Fig. 290: Securing Flywheel (Crankshaft) Using Special Tool 11 8 660
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool **11 8 180** with screws (1).

Secure flywheel in direction of arrow.

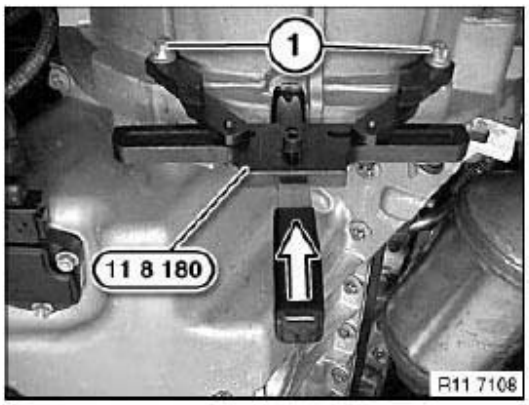


Fig. 291: Securing Flywheel
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To release central bolt (1), remove special tool 11 0 300 .

Release central bolt with a 3/4" socket (1) and if necessary with a 3/4" extension (2).

Tightening torque **11 21 1AZ** .

Remove central bolt with hub towards front.

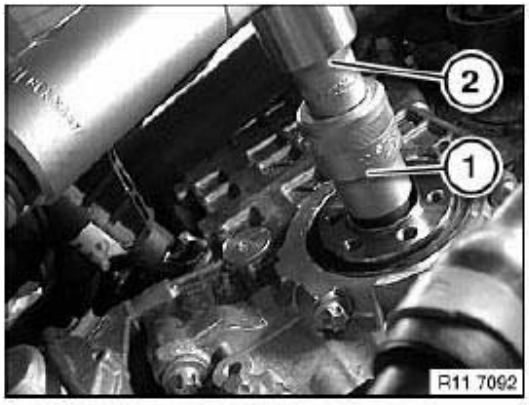


Fig. 292: Removing Central Bolt Using Socket
Courtesy of BMW OF NORTH AMERICA, INC.

Open plug (1).

Tightening torque **11 31 6AZ** .

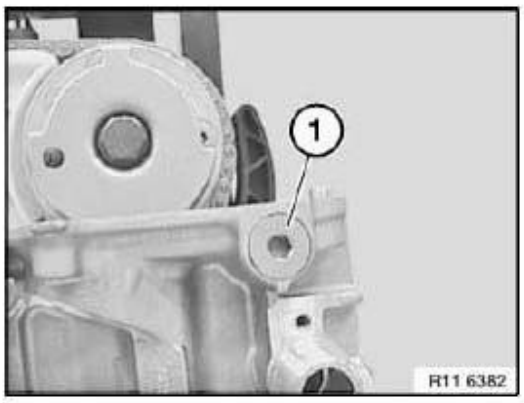


Fig. 293: Identifying Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Open plug (1).

Tightening torque **11 31 6AZ** .

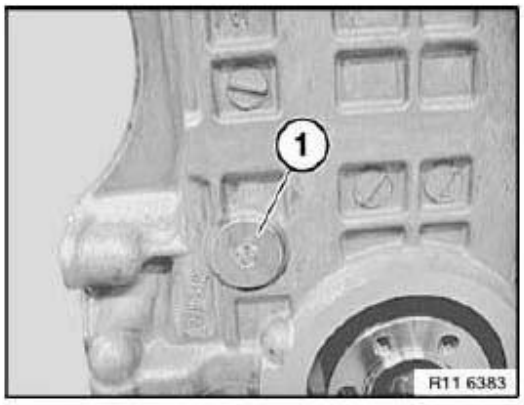


Fig. 294: Identifying Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on chain drive at top.

Tightening torque **11 31 2AZ** .

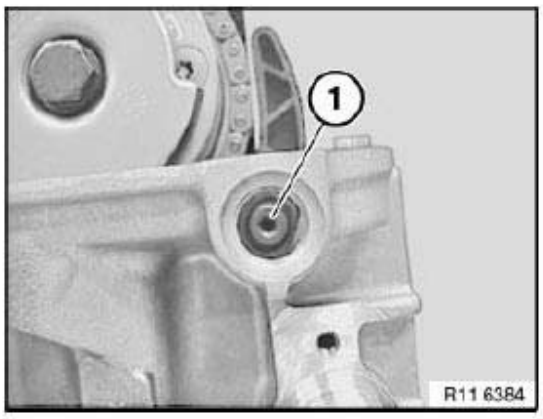


Fig. 295: Identifying Screw On Chain Drive At Top
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on chain drive at bottom.

Tightening torque **11 31 3AZ** .

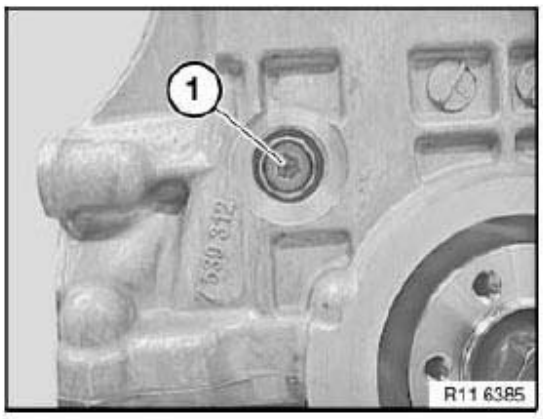


Fig. 296: Identifying Screw On Chain Drive At Bottom
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 31 2AZ** .

Remove timing chain module with timing chain and sprocket upwards in direction of arrow.

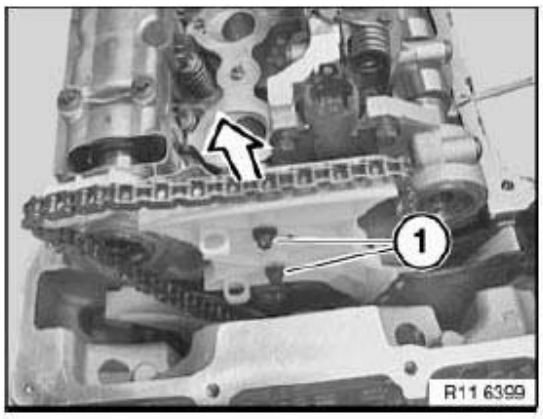


Fig. 297: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Note installation direction of sprocket (2).

Collar (see arrow) on sprocket (2) points to crankshaft.

Incorrect assembly will result in engine damage.

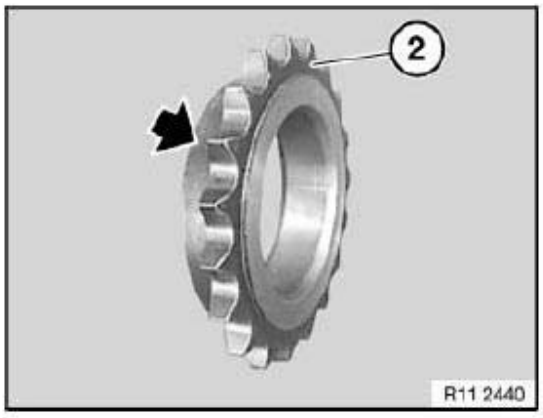


Fig. 298: Identifying Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Pull timing chain (1) upwards until sprocket (2) engages chain guide (3).

Install timing chain (1) and sprocket (2) in this position.

Installation note:

Always hold timing chain under tension.

Timing chain (1) may jam on chain module (3).

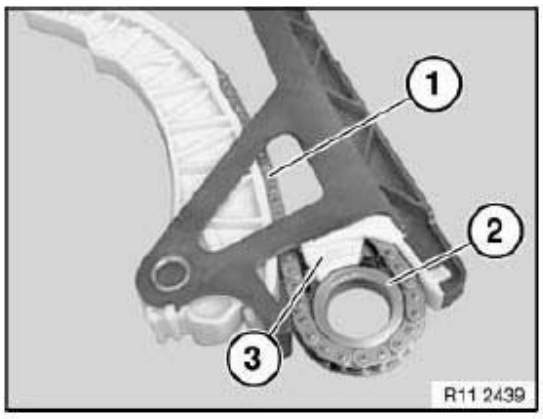


Fig. 299: Identifying Timing Chain And Chain Module
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The N54 engine requires special friction plates between the friction surfaces.

The engine will incur damage if the friction plates are damaged or are not fitted.

Friction plates (1 and 2) are clipped into place on sprocket wheel/oil pump module.

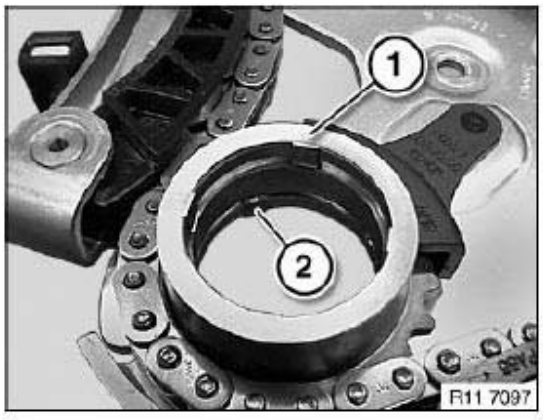


Fig. 300: Identifying Friction Plates
Courtesy of BMW OF NORTH AMERICA, INC.

Make sure friction plate (3) is in correct installation position.

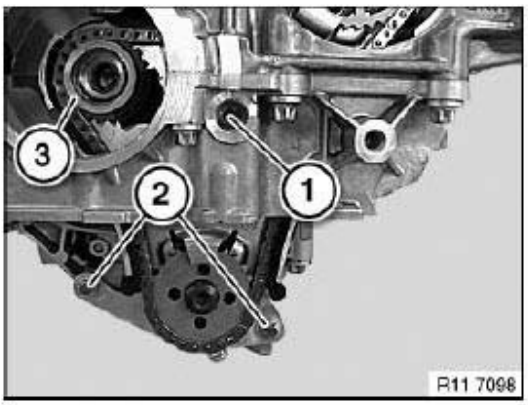


Fig. 301: Identifying Friction Plate Installation Position
Courtesy of BMW OF NORTH AMERICA, INC.

Push on friction plate (1) without retainers.

IMPORTANT: The N54 engine requires special friction plates between the friction surfaces.

The engine will incur damage if the friction plates are damaged or are not fitted.

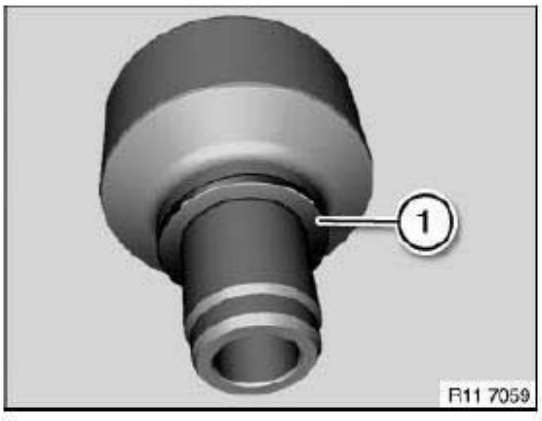


Fig. 302: Identifying Friction Plate Without Retainers
Courtesy of BMW OF NORTH AMERICA, INC.

Insert chain module from above and secure with bolt (1).

Make sure gear wheels (2) are in correct installation position.

Insert hub (3) with friction plate.

Tightening torque **11 21 1AZ** .

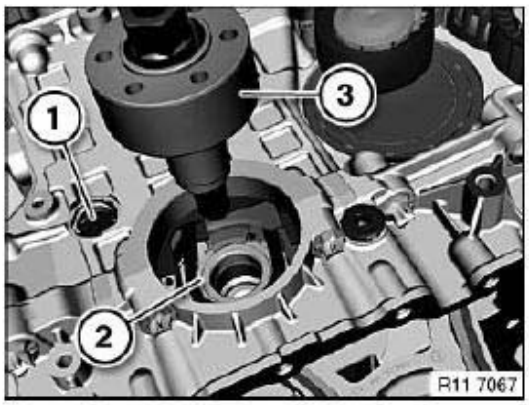


Fig. 303: Identifying Gear Wheels Installation Position
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **00 9 140** with magnet to engine support (1).

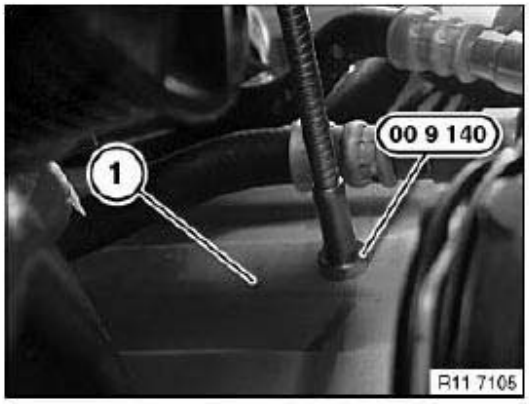


Fig. 304: Securing Special Tool 00 9 140 With Magnet To Engine Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt with special tool **00 9 140** .

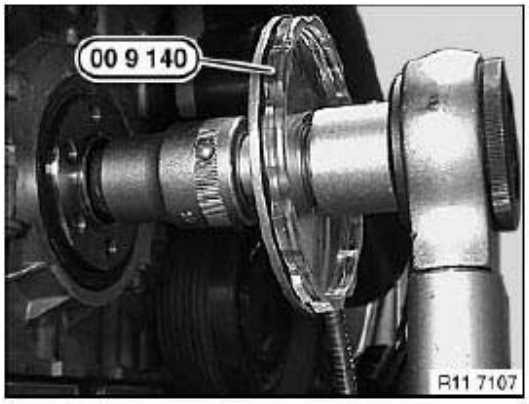


Fig. 305: Securing Central Bolt Using Special Tool 00 9 140
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **CRANKSHAFT SEAL** at front

Install **INTAKE AND EXHAUST ADJUSTERS** .

Install **CHAIN TENSIONER** .

Crank engine twice.

Check **TIMING** .

Assemble engine.

1133 ROCKER ARM WITH BEARING MOUNT

11 33 050 REMOVING AND INSTALLING OR REPLACING ALL ROCKER ARMS (N54, N54T)

IMPORTANT: Rocker arms (1) are divided into bearing categories.

The tolerance classes are identified in numbers from 1 to 6.

Already used rocker arms (1) may only be reused in the same position.

Classification is not required on the N54 engine. All numbers from 1 to 6 can be optionally installed as a replacement.

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove **INTAKE CAMSHAFT**
- Remove **EXHAUST CAMSHAFT** .

Detach roller cam followers (1) from hydraulic valve clearance compensating element and remove.

Set down roller cam followers in tidy and orderly fashion; if necessary, set down in special tool **11 4 480** .

Installation note:

Before installing exhaust and inlet camshafts, make sure roller cam followers are correctly seated.

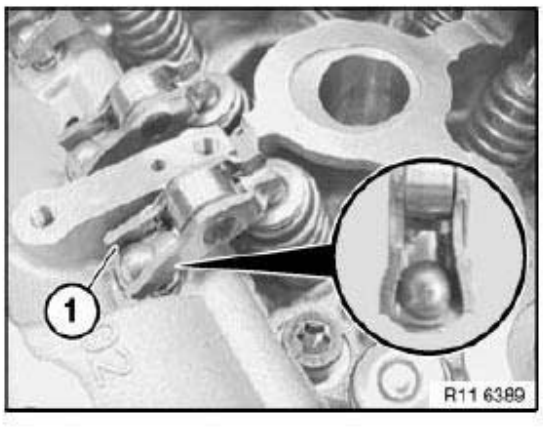


Fig. 306: Identifying Cam Follower Seat
Courtesy of BMW OF NORTH AMERICA, INC.

Remove hydraulic valve clearance compensating element in direction of arrow.

Installation note:

If the hydraulic valve clearance compensating elements are reused, they must be placed together with the roller cam followers in neat order if necessary in special tool **11 4 480** .

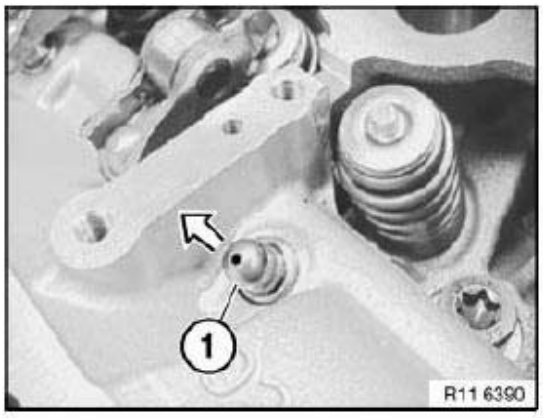


Fig. 307: Removing HVCA Element
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1134 VALVES WITH SPRINGS

11 34 552 REMOVING AND INSTALLING OR REPLACING ALL VALVES (N54, N54T)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD** .

- Remove **INTAKE CAMSHAFT** .
- Remove **EXHAUST CAMSHAFT** .
- Remove **ROLLER CAM FOLLOWER** .
- Remove **VALVE SPRINGS** .
- Remove **VALVE STEM SEALS** .

Arrangement:

1. Valve
2. Valve stem seal with spring plate, bottom
3. Valve spring
4. Top plate spring
5. Valve keys

If the valves are to be reused, set them down in special tool **11 4 480** in a tidy and orderly fashion.

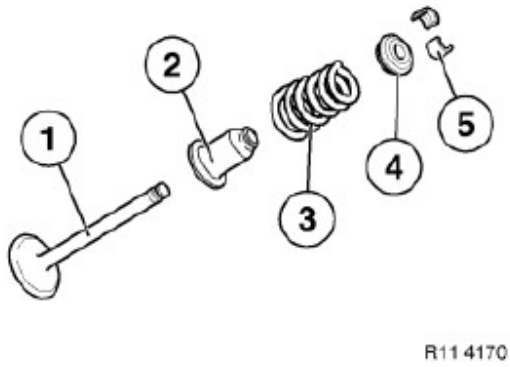


Fig. 308: Exploded View Of Valve Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

11 34 715 REPLACING ALL VALVE SPRINGS (N54, N54T)

IMPORTANT: Different valve stem diameters.

Mixing up the valve springs will result in damage to the engine.

Necessary preliminary tasks:

- Remove cylinder head cover
- Remove **CYLINDER HEAD** .

- Remove **EXHAUST CAMSHAFT** .
- Remove **INTAKE CAMSHAFT**
- Remove **ROLLER CAM FOLLOWERS**

Intake valves

Fit cylinder head on special tool **11 9 000** .

Press valve spring down on spring cup with special tools 11 0 009 and 11 9 017.

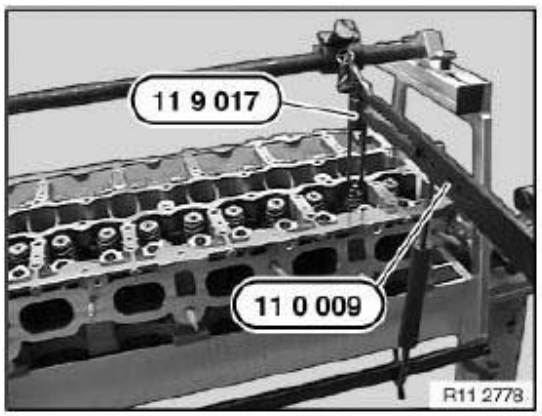


Fig. 309: Pressing Valve Spring Down On Spring Retainer Using Special Tools 11 0 009 And 11 9 017
Courtesy of BMW OF NORTH AMERICA, INC.

Exhaust valves

Fit cylinder head on special tool **11 9 000** .

Press valve spring down on spring cup with special tools 11 0 009 and 11 0 346.

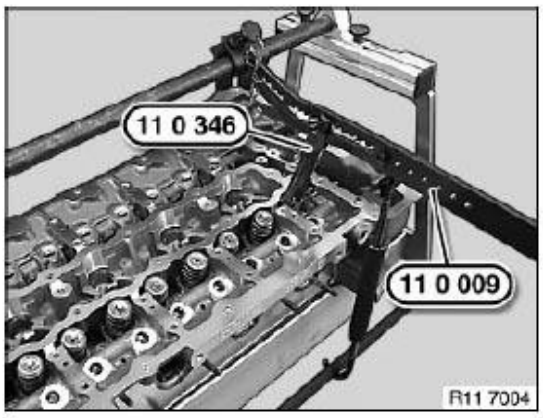


Fig. 310: Pressing Valve Spring Down On Spring Retainer Using Special Tools 11 0 009 And 11 0 346
Courtesy of BMW OF NORTH AMERICA, INC.

Remove valve tapers with a magnet.

Remove valve spring and spring retainer.

Set down on special tool **11 4 480** in a tidy and orderly fashion.

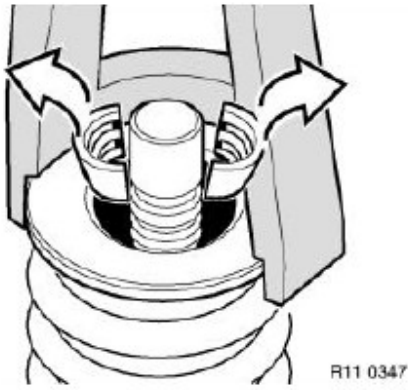


Fig. 311: Removing Valve Spring And Spring Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect installation possible.

Incorrect installation will result in valve spring breakage!

Color marking (1) is normally on lower end of valve spring.

Installation note:

Einlassventil: Violet/green or violet/yellow

Auslassventil: White/green or white/yellow

If the colors on the valve springs can no longer be identified, these must be replaced for safety reasons.

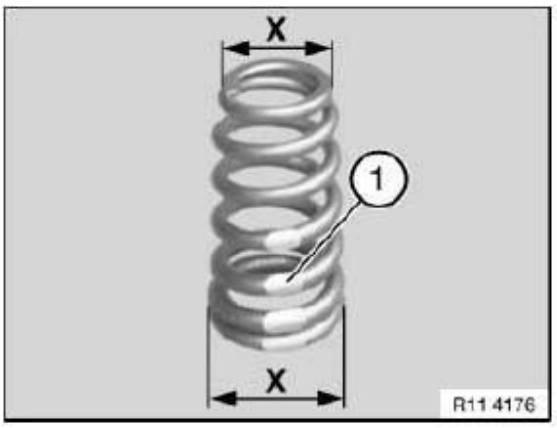


Fig. 312: Dimensions Of Valve Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement:

1. Valve
2. Valve stem seal with spring plate, bottom
3. Valve spring
4. Top plate spring
5. Valve keys

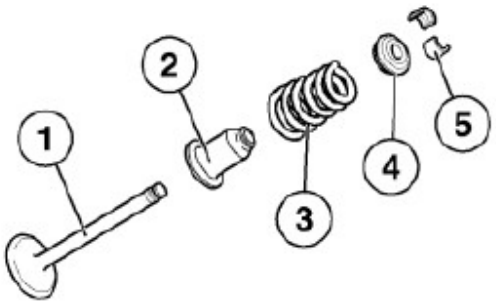


Fig. 313: Exploded View Of Valve Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME control unit.

11 34 560 REPLACING ALL VALVE STEM SEALS (N54, N54T)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD** .
- Remove **INTAKE CAMSHAFT** .
- Remove **EXHAUST CAMSHAFT** .
- Remove **ROLLER CAM FOLLOWER** .
- Remove all **VALVE SPRINGS** .

Firmly press special tool **11 1 480** onto old valve stem seals.

Detach valve stem seal from valve stem by turning and simultaneously pulling special tool **11 1 480** .

Installation note:

Insert all **VALVES** .

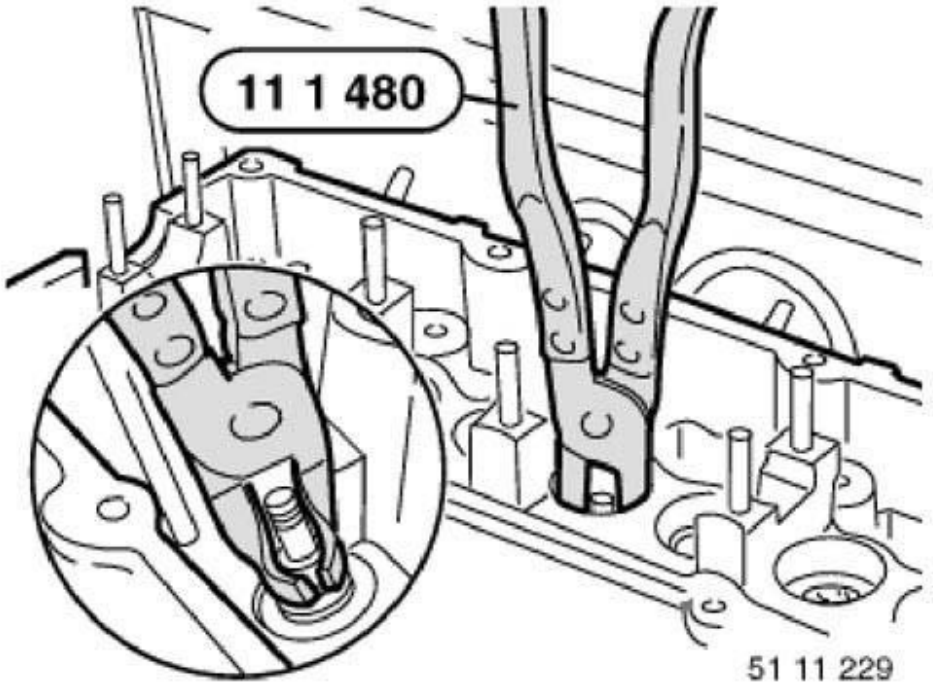


Fig. 314: Identifying Special Tool (11 1 480)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For use on the N54 engine, special tool 11 6 380 must be remachined according to the sketch with a 10 mm drill bit dia. to a depth of B = approx. 23 mm.

This modification has already been taken into account for reordering.

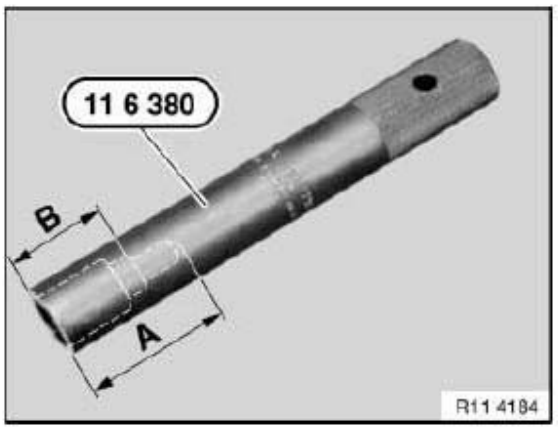


Fig. 315: Identifying Special Tool (11 6 380)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Different diameters at valve stem.

All valve stem seals are colour-coded.

Valve dia. 5 mm: valve stem seal is red or brown.

Valve dia. 6 mm: valve stem seal is green or light green.

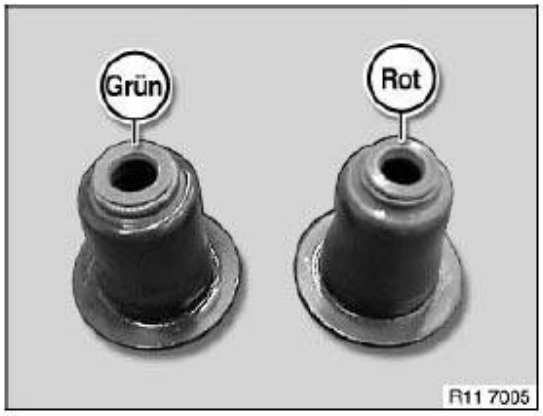


Fig. 316: Identifying Valve Stem Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Fit the mounting sleeves (plastic sleeves) supplied in the spare part on the valve stem end

Lubricate mounting sleeve.

Press on valve stem seal with special tool **11 6 380** by hand up to stop.

NOTE: Graphic shows N46.

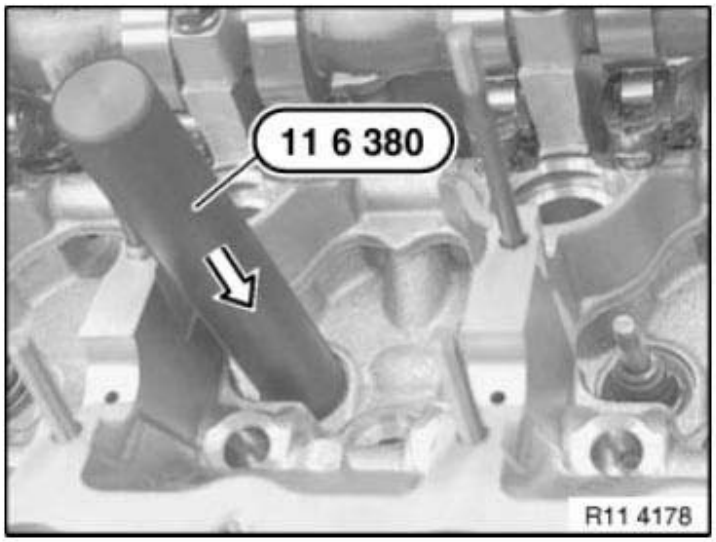


Fig. 317: Pressing Valve Stem Seal Using Special Tool 11 6 380
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1136 VARIABLE CAMSHAFT TIMING

11 36 655 REMOVING AND INSTALLING/REPLACING BOTH SOLENOID VALVES (N54, N54T)

IMPORTANT: Always check that the solenoid valves are clean during removal and installation.

Possible malfunctions if valves are contaminated:

- Rough running
- OBD incorrect entry
- Poor exhaust gas values
- Low engine power

IMPORTANT: Risk of damage!

Do not clean solenoid valves with compressed air.

Necessary preliminary tasks

- Read out fault memory in DME control unit
- Switch off ignition

- Remove **FAN COWL**

NOTE: Carefully press coolant hose and pressure line (not shown) to one side.

NOTE: Solenoid valve (2) controls the intake adjuster.

Solenoid valve (3) controls the exhaust adjuster.

Disconnect plug connections (1 and 4).

Installation note:

Do not mix up plug connections (1 and 4) of solenoid valves.

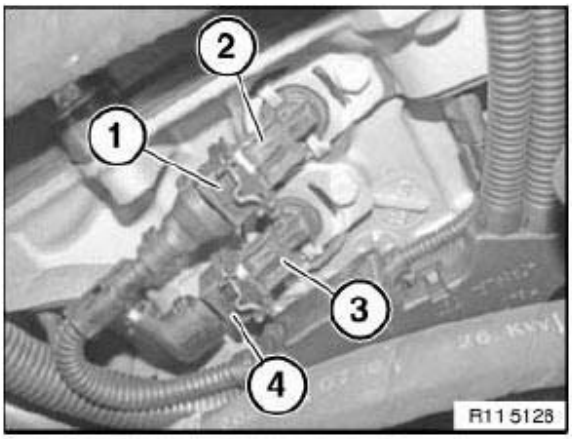


Fig. 318: Identifying Solenoid Valve Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Plug connections (1 and 4) must snap audibly into place!

Unfasten screws (3 and 4).

Tightening torque **11 36 3AZ** .

Carefully pull out solenoid valves (1 and 2).

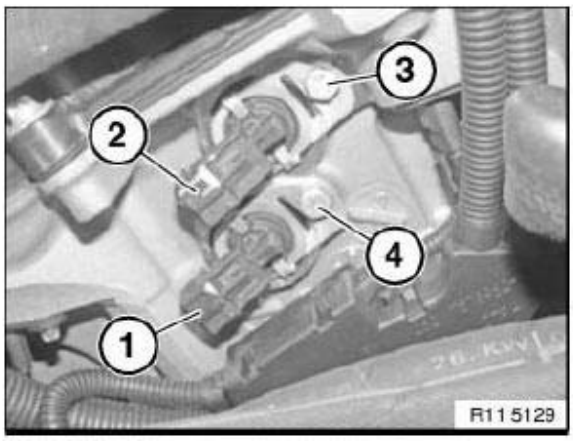


Fig. 319: Identifying Solenoid Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace sealing ring (1) on solenoid valve (2).

NOTE: Moisten sealing ring (1) with engine oil.

Avoid damaging, e.g. notches or scratches, the solenoid valve (2).

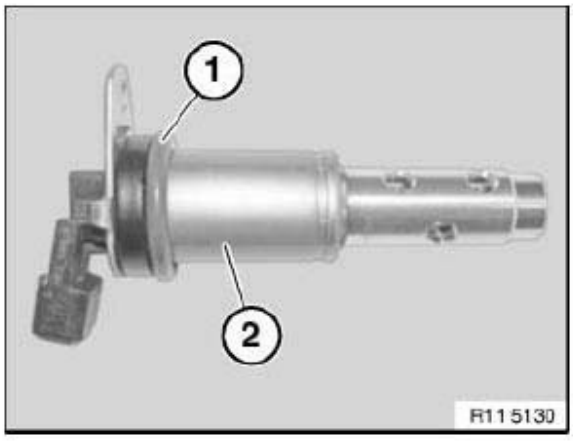


Fig. 320: Identifying Sealing Ring On Solenoid Valve
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Do not tilt solenoid valves (1 and 2) when inserting into cylinder head.

Carefully insert solenoid valves (1 and 2) up to stop.

Ensure correct installation position.

Insert screws (3 and 4) and tighten down.

Tightening torque **11 36 3AZ** .

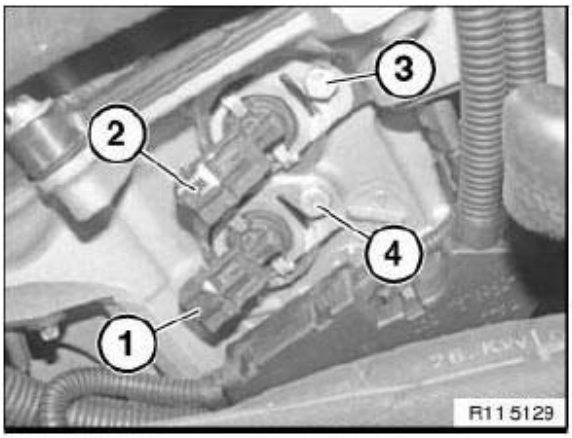


Fig. 321: Identifying Solenoid Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Delete fault memory.

Check function of DME control unit.

11 36 046 REMOVING AND INSTALLING/REPLACING INTAKE AND EXHAUST CAMSHAFT ADJUSTERS (N54, N54T)

IMPORTANT: To open central bolts, release at intake and exhaust adjusters with special tool 11 4 280 only.

Necessary preliminary tasks:

- Remove cylinder head cover

Remove fastener (1) in direction of arrow.

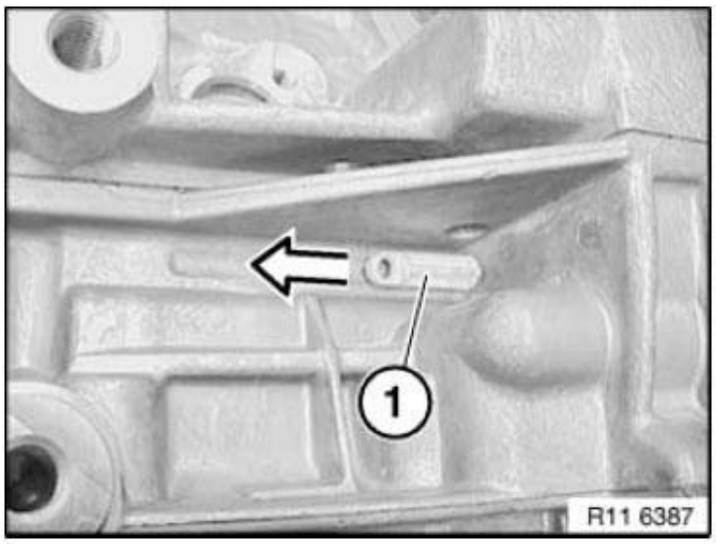


Fig. 322: Identifying Camshafts
Courtesy of BMW OF NORTH AMERICA, INC.

Slide in special tool **11 0 300** in direction of arrow.

Rotate flywheel (1) at central bolt until firing TDC position at cylinder no. 1 is reached.

IMPORTANT: The TDC bore can be mixed up in automatic transmissions.

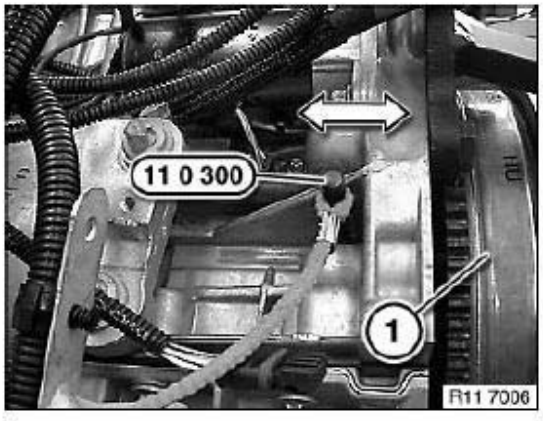


Fig. 323: Sliding Special Tool 11 0 300
Courtesy of BMW OF NORTH AMERICA, INC.

With cylinder No. 1 in ignition TDC position, intake camshaft (1) at 6th cylinder points downwards at an angle to the left.

With cylinder No. 1 in ignition TDC position, exhaust camshaft (2) at 6th cylinder points downwards at an angle to the right.

Installation note:

If the timing is checked while the engine is installed, this is only possible with a mirror.

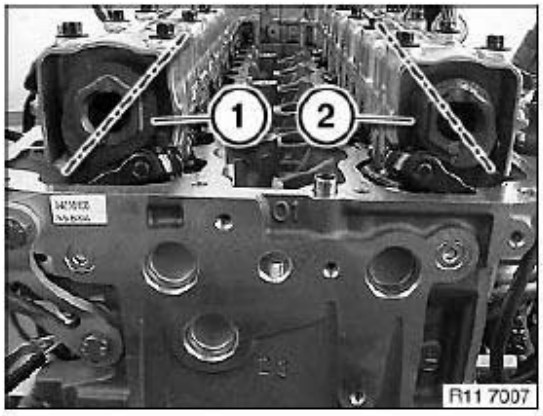


Fig. 324: Identifying Inlet And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 4 283 with screws (1).

Fit special tool 11 4 281 on special tool 11 4 283.

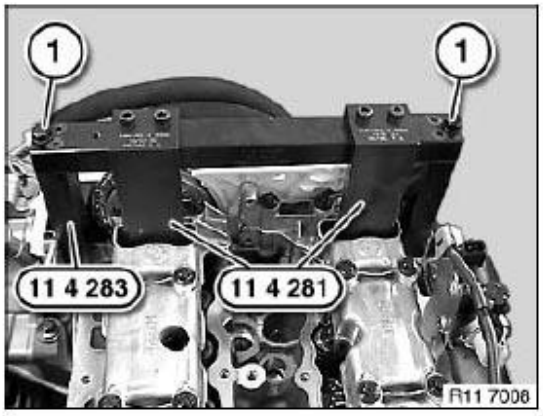


Fig. 325: Identifying Special Tool 11 4 280
Courtesy of BMW OF NORTH AMERICA, INC.

Release central bolt of exhaust camshaft adjuster (1).

Release central bolt of intake camshaft adjuster (2).

Tightening torque **11 36 1AZ** .

Release **CHAIN TENSIONER** .

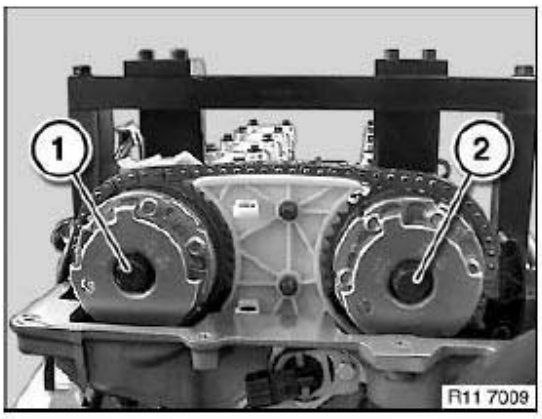


Fig. 326: Identifying Inlet And Exhaust Camshaft Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Detach exhaust camshaft adjuster (1) from exhaust camshaft.

Detach intake camshaft adjuster (2) from intake camshaft.

Installation note:

To facilitate removal and installation of the intake and exhaust adjusters, turn the increment wheels at the aperture downwards.

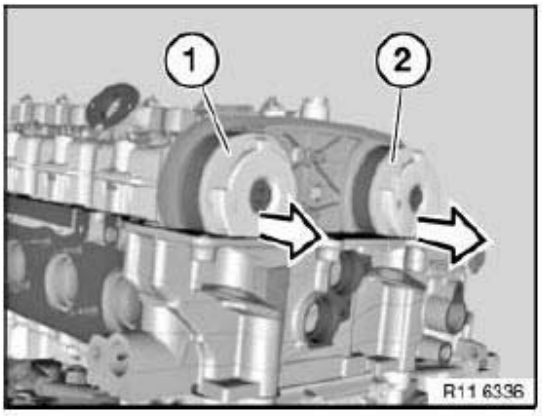


Fig. 327: Identifying Inlet/Exhaust Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT:

- **Risk of mixing up the intake and exhaust adjusters.**
- **Mixing up the intake and exhaust adjusters will cause damage to the engine.**

The intake and exhaust camshaft adjusters are different.

The variable camshaft timing control is marked with AUS and EX for the exhaust camshaft.

The variable camshaft timing control is marked with EIN and IN for the intake camshaft.

The increment wheels can be fitted alternatively.

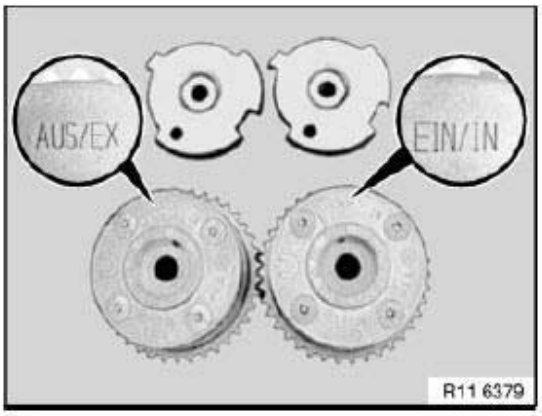


Fig. 328: Identifying AUS And EX Marks For Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Position intake and exhaust adjusters on camshafts.

Installation position of intake and exhaust adjusters can be freely selected.

Installation note:

Replace screws (1 and 2).

Insert screws (1 and 2).

Adjust **VALVE TIMING** .

Fit **CHAIN TENSIONER** .

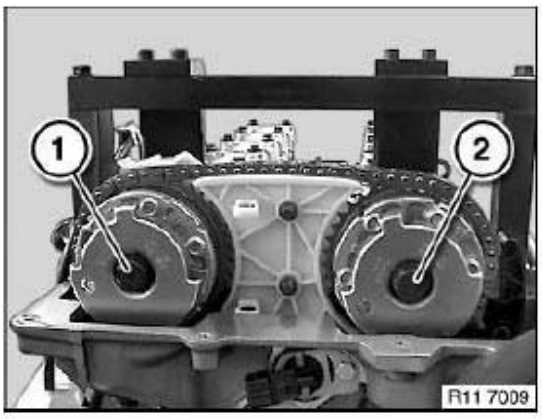


Fig. 329: Identifying Inlet And Exhaust Camshaft Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect installation possible.

Make sure that timing chain is guided in tensioning rail (1).

NOTE: Schematic representation on removed chain drive.

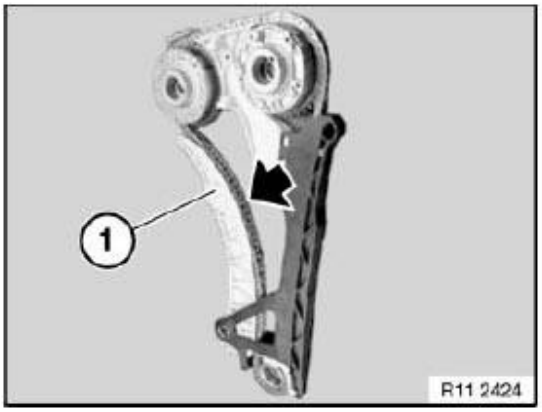


Fig. 330: Locating Tensioning Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

1140 OIL SUPPLY

11 40 000 CHECKING ENGINE OIL PRESSURE (N54, N54T)

Necessary preliminary tasks:

- Remove front **IGNITION COIL COVER**

Disconnect plug connection (1) on oil pressure switch.

Installation note:

Plug connection (1) must snap audibly into place!

Remove oil pressure switch (2).

Tightening torque **12 61 1AZ** .

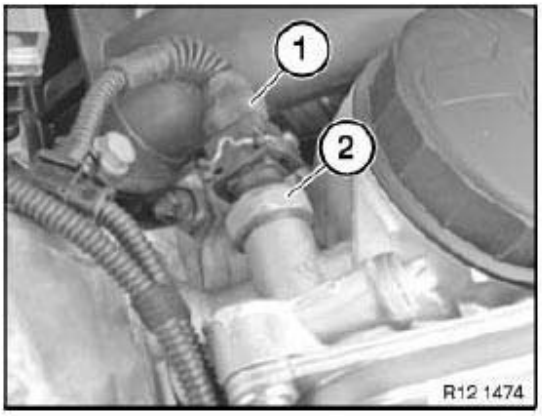


Fig. 331: Identifying Oil Pressure Sensor And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool **11 4 050** with sealing ring (1).

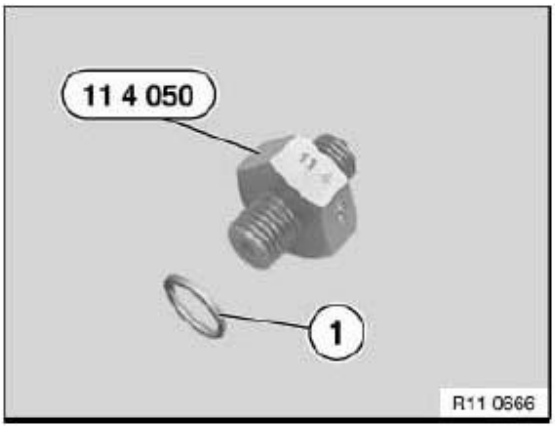


Fig. 332: Identifying Special Tool (11 4 050) And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Checking engine oil pressure with BMW diagnosis system

Connect special tools 13 6 054 and 13 6 051.

Checking engine oil pressure with pressure gauge

Connect special tools 13 3 063 and 13 3 061.

Start engine and check engine oil pressure.

Compare actual values with prescribed **SETPOINT VALUES** .

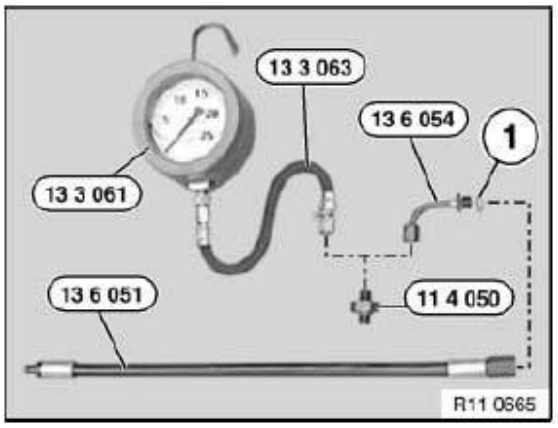


Fig. 333: Checking Engine Oil Pressure Using BMW Diagnosis System
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1141 OIL PUMP WITH FILTER AND DRIVE

11 41 000 REMOVING AND INSTALLING OIL PUMP (N54, N54T)

Necessary preliminary tasks:

- Remove **OIL SUMP**

Release screws (1).

Tightening torque **11 41 1AZ** .

Installation note:

Replace aluminum screws

Remove intake pipe (2) in direction of arrow.

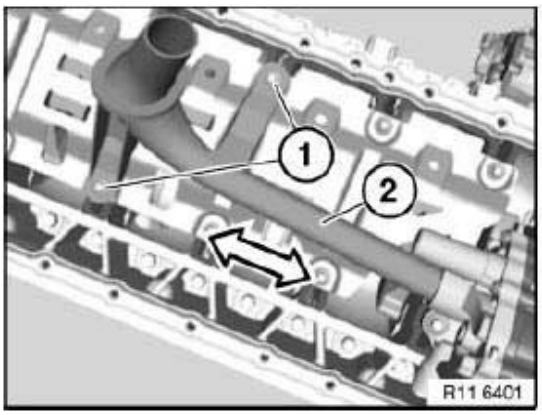


Fig. 334: Removing Intake Pipe
Courtesy of BMW OF NORTH AMERICA, INC.

Secure oil pump drive gear with special tool **11 0 300** to oil pump.

IMPORTANT: Release central bolt (2) only with special tool 11 0 300 .

Tightening torque **11 41 4AZ** .

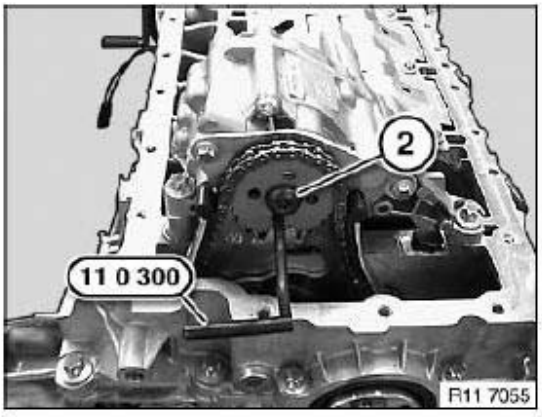


Fig. 335: Securing Oil Pump Drive Gear Using Special Tool 11 0 300
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (2).

Tightening torque **11 41 3AZ** .

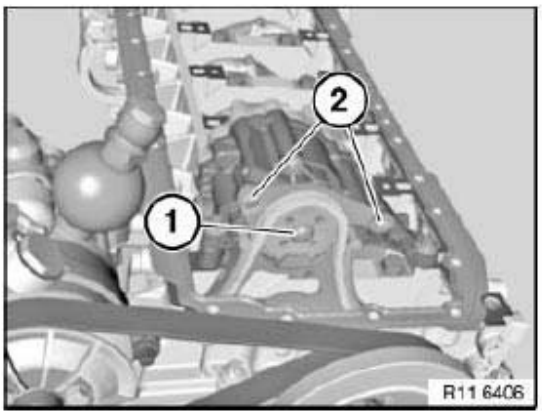


Fig. 336: Identifying Bolt And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 41 2AZ** .

Installation note:

Replace aluminum screws

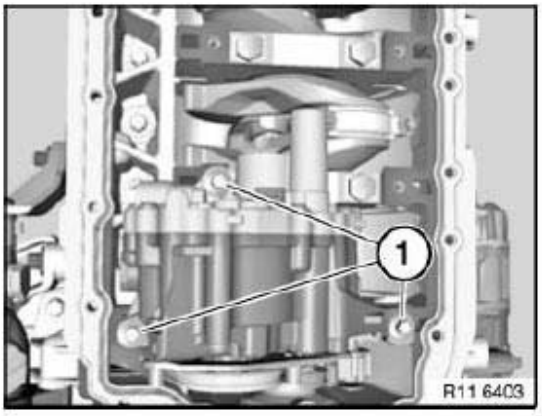


Fig. 337: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Pull of drive gear (1) in direction of arrow.

NOTE: The chain tensioner pushes the timing chain (3) of the triangular drive upward.

Do not remove drive gear.

Remove oil pump (2) in direction of arrow.

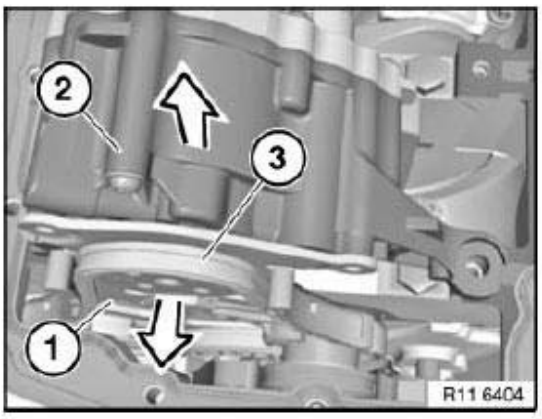


Fig. 338: Pulling Drive Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check spacer bushes (1) for damage and firm seating.

Replace spacer bushes (1) if necessary

Align mounting flats (3) on oil pump (2) to drive gear.

Install oil pump (2).

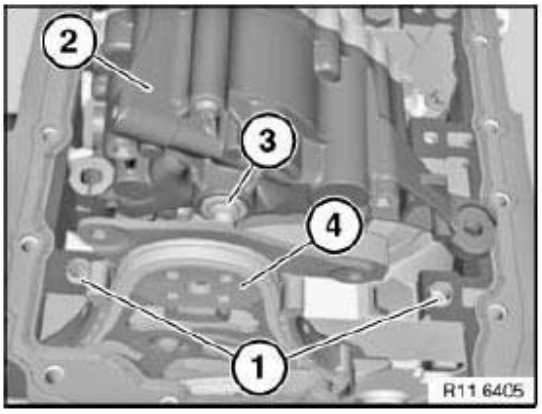


Fig. 339: Identifying Spacer Bushings And Oil Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 66 000 REMOVING AND INSTALLING OR REPLACING VACUUM/OIL PUMP (N47 D20 O1)

IMPORTANT: It is possible to remove and install the vacuum oil pump without removing the transmission.

Necessary preliminary work:

- Removing oil sump.

Release screws (1).

Remove intake snorkel in direction of arrow.

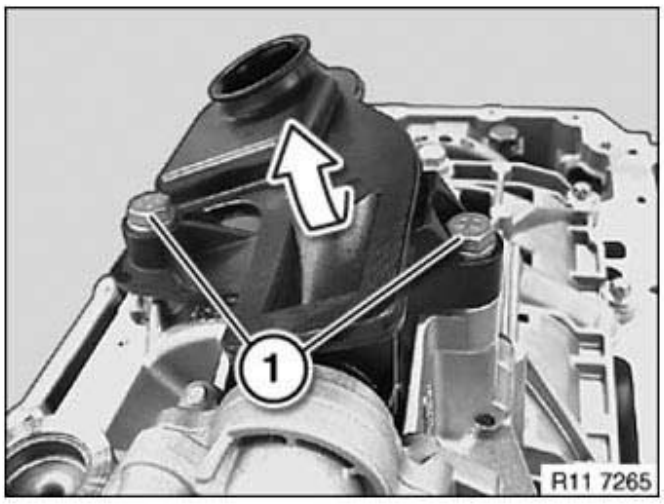


Fig. 340: Removing Intake Snorkel
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

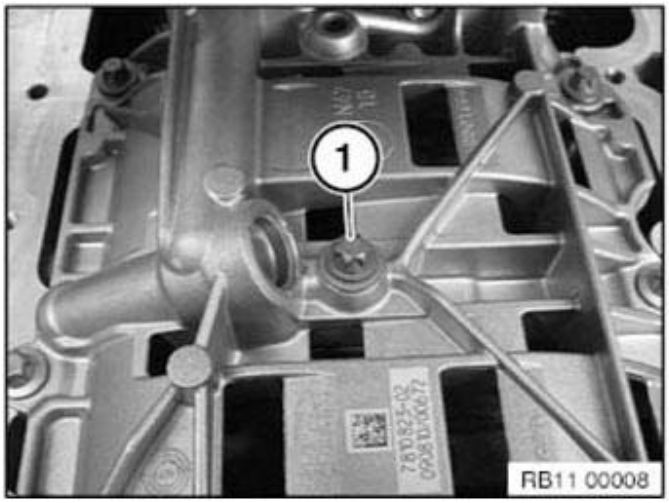


Fig. 341: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation note:

Clean and blow out thread

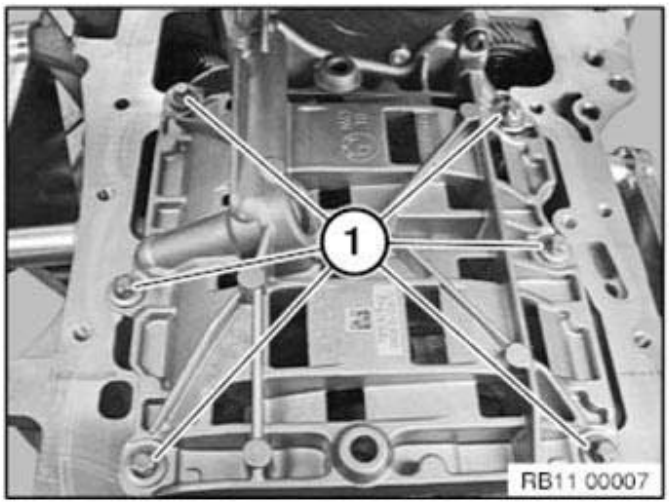


Fig. 342: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

When installed, the oil pump chain must be fed out from the sprocket wheel of the oil pump drive gear; the sprocket wheel cannot be removed.

NOTE: Illustration shows gear case cover removed.

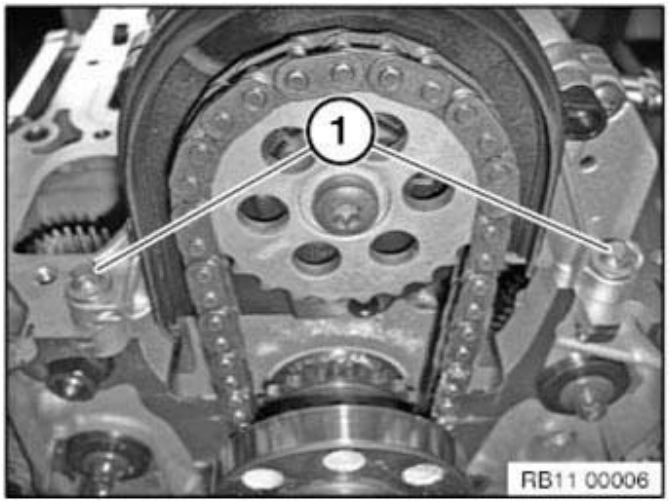


Fig. 343: Identifying Gear Case Cover Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Oil vacuum pump must be fed out at chain drive (1).

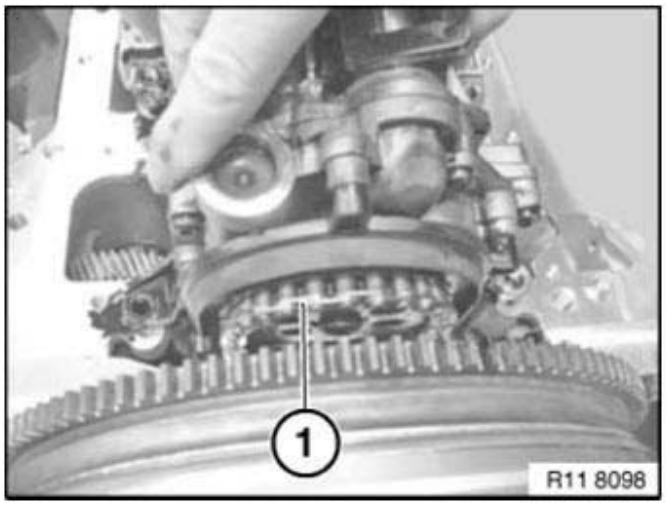


Fig. 344: Identifying Chain Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out oil vacuum pump (1) in direction of arrow and remove.

Installation in reverse sequence.

Installation note:

Clean all sealing surfaces.

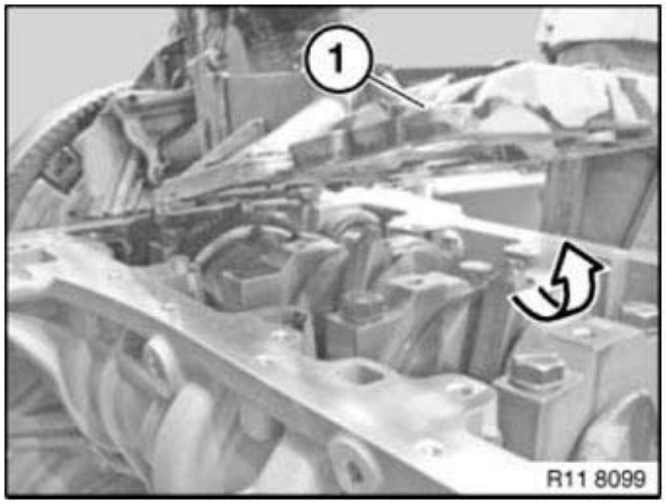


Fig. 345: Identifying Oil Vacuum Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Install all screws (1) and tighten down.

Tightening torque: **11 41 1AZ** .

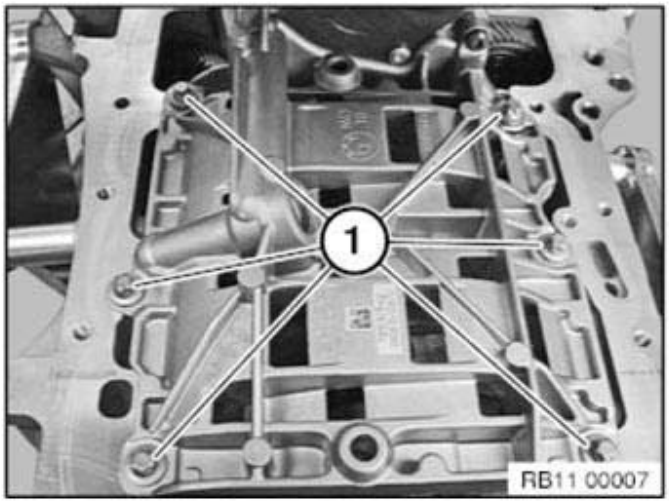


Fig. 346: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Install and tighten down screws (1).

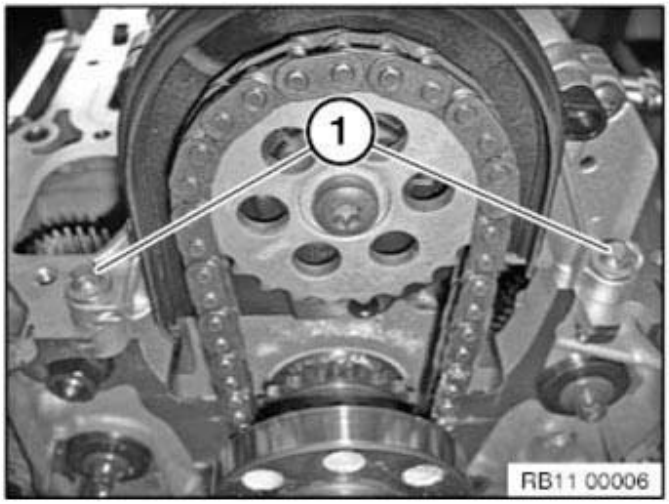


Fig. 347: Identifying Gear Case Cover Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Clean and blow out thread

Insert and secure screw (1).

Secure screw (1) with special tool **00 9 120** .

Tightening torque: **11 41 2AZ** .

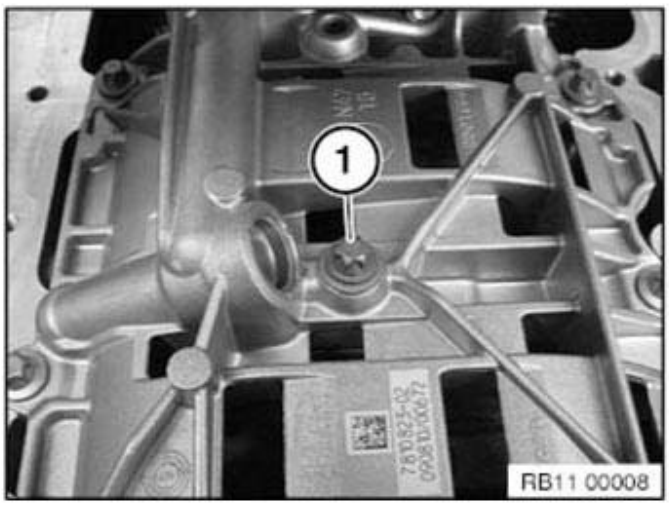


Fig. 348: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 41 010 REMOVING AND INSTALLING/REPLACING CHAIN MODULE FOR OIL PUMP/VACUUM PUMP (N54, N54T)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are not magnetic.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove **OIL SUMP**
- Remove **DRIVE BELT**
- Remove drive belt **TENSIONER**
- Remove **VIBRATION DAMPER**
- Remove vacuum pump **SEALING CAP**
- Remove **CHAIN TENSIONER** .

Turn sprocket (3) at central bolt (crankshaft) into position.

Screw special tool **11 8 650** into crankcase.

Position special tool **11 0 290** on sprocket

and on special tool **11 8 650** .

Release screw (1).

Tightening torque **11 66 2AZ** .

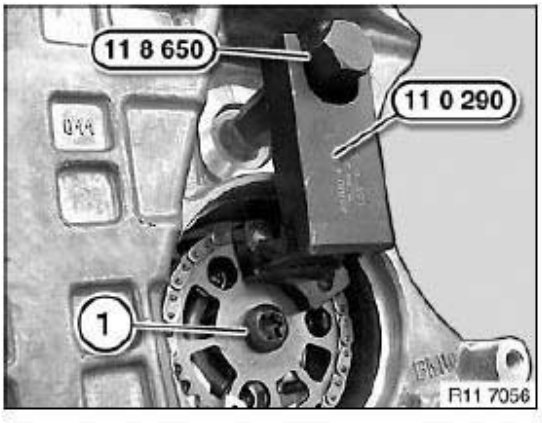


Fig. 349: Positioning Special Tool 11 0 290 On Sprocket Wheel And On Special Tool 11 8 650
Courtesy of BMW OF NORTH AMERICA, INC.

Press timing chain with chain tensioner (1) in direction of arrow.

Secure chain module with special tool **11 4 120** in hole (2).

Feed out sprocket (3) at hexagon head (4) of vacuum pump.

Installation note:

A lock pin is pre-installed if the triangular drive is replaced.

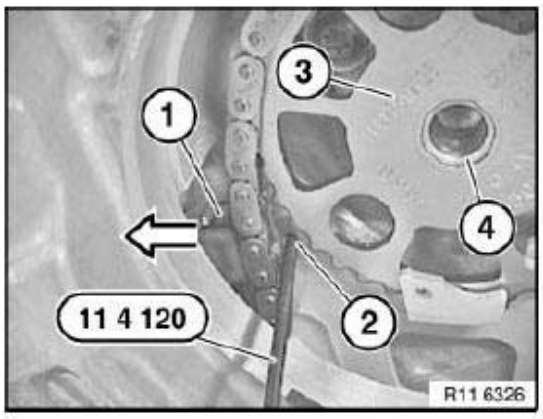


Fig. 350: Pressing Timing Chain Using Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (2).

Tightening torque **11 41 3AZ** .

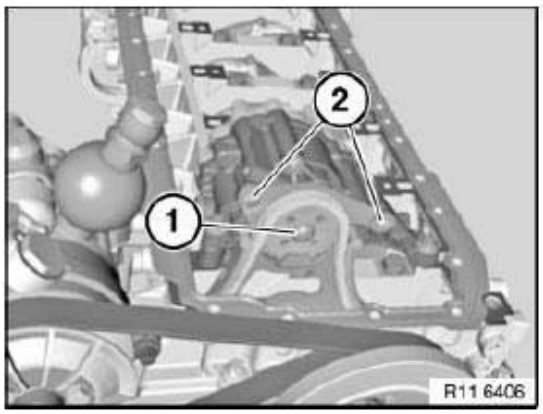


Fig. 351: Identifying Bolt And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Sprocket must be blocked in order to release central bolt (2).

Insert pin (1) with 6 mm dia. between sprocket and housing of oil pump.

Release oil pump central bolt (2).

Tightening torque **11 41 5AZ** .

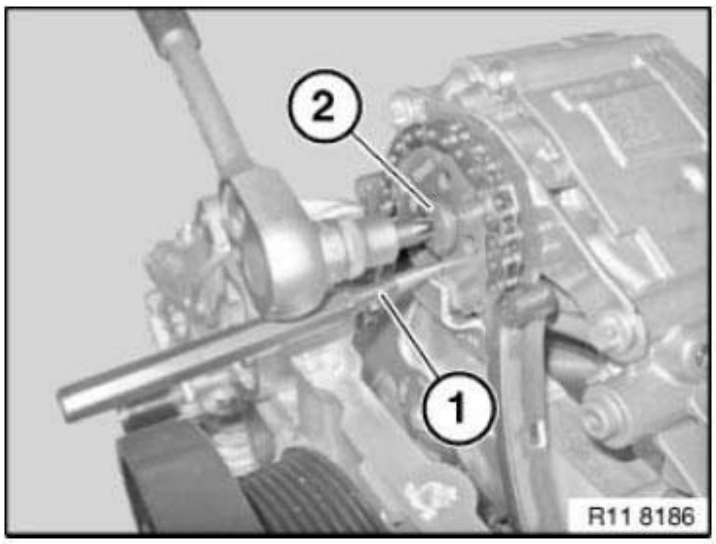


Fig. 352: Identifying Central Bolt And Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Secure **CRANKSHAFT AND CAMSHAFT** .

Do **not** remove special tools **11 0 300** and **11 4 280** .

Fit special tool 11 9 280.

Release central screw (1).

NOTE: A 3/4 inch tool is needed to release the central bolt.

A second person is required.

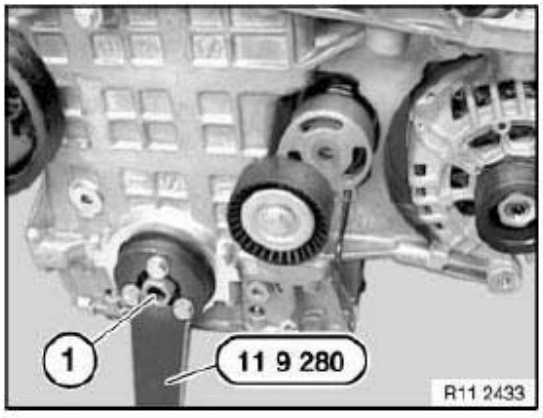


Fig. 353: Identifying Central Bolt With Special Tool (11 9 280)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove hub (2) towards front.

Installation note:

Replace front **CRANKSHAFT SEAL** .

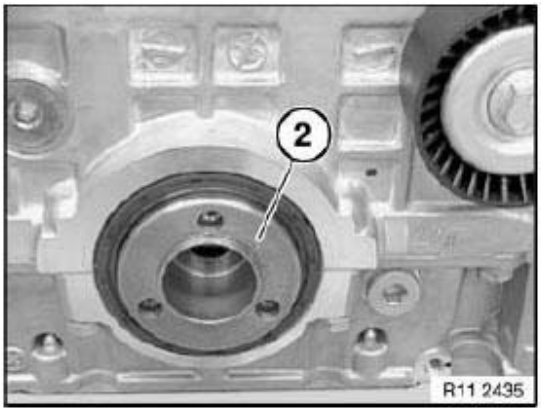


Fig. 354: Identifying Front Hub
Courtesy of BMW OF NORTH AMERICA, INC.

Open screw plug on bedplate.

Installation note:

Replace seal.

Release screw (1) with special tool **11 8 640** on triangular drive.

Tightening torque **11 41 3AZ** .

Installation note:

Replace aluminum screws.

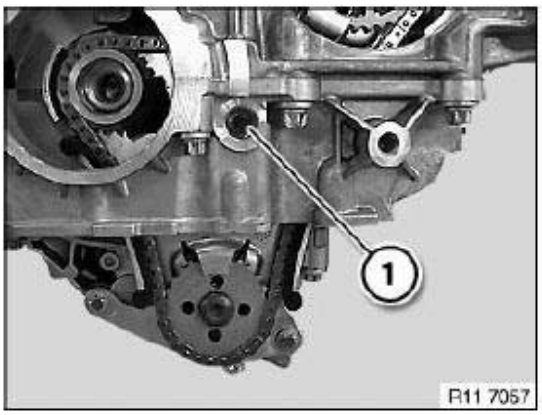


Fig. 355: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove triangular drive (1) in direction of arrow.

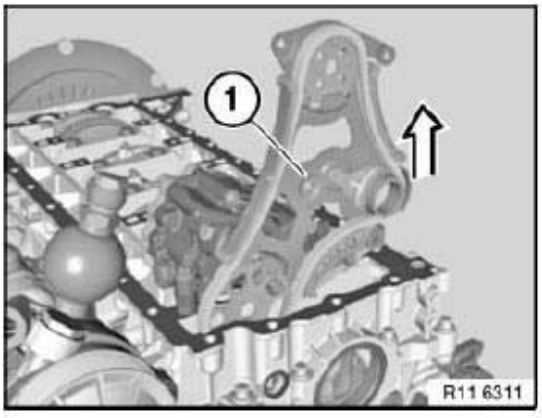


Fig. 356: Removing Chain Module
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Note installation direction of sprocket (2).

Collar on sprocket (2) points to **timing chain drive.**

Incorrect assembly will result in **engine damage.**

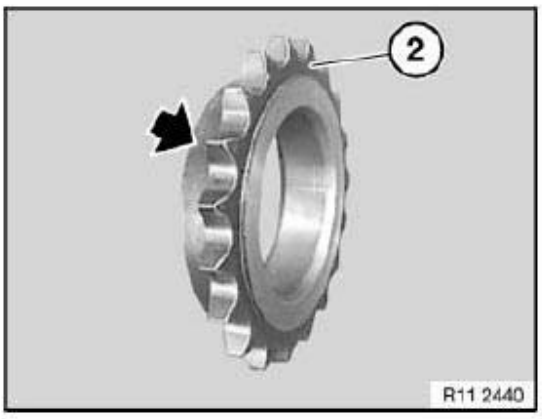


Fig. 357: Identifying Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The N54 engine requires special friction plates between the friction surfaces.

The engine will incur damage if the friction plates are damaged or are not fitted.

Friction plates (1 and 2) must be clipped into place on the oil pump module sprocket.

The third friction plate is attached to the crankshaft hub.

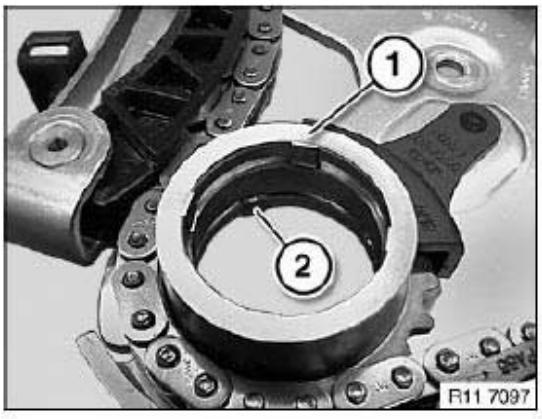


Fig. 358: Identifying Friction Plates
Courtesy of BMW OF NORTH AMERICA, INC.

Feed in oil pump chain module.

Secure oil pump chain module with screws (2).

Tightening torque **11 41 3AZ** .

Secure screw (1) with special tool **11 8 640** .

Tightening torque **11 41 3AZ** .

Installation note:

Check both friction plates (3) with retainers for correct installation position.

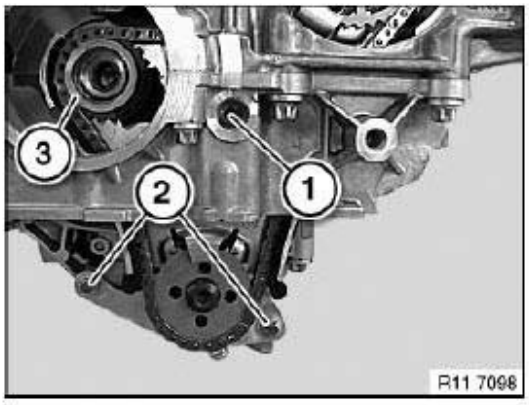


Fig. 359: Identifying Friction Plate Installation Position
Courtesy of BMW OF NORTH AMERICA, INC.

Push on friction plate (1) without retainers.

IMPORTANT: The N54 engine requires special friction plates between the friction surfaces.

The engine will incur damage if the friction plates are damaged or are not fitted.

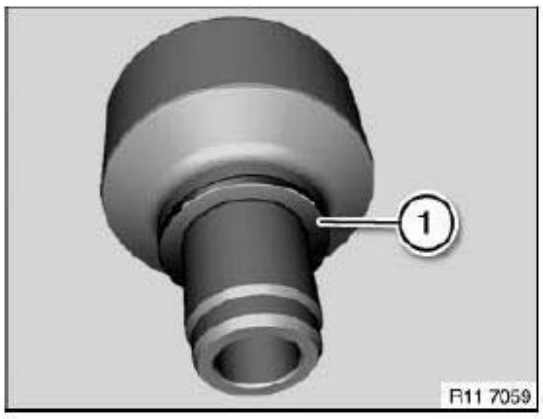


Fig. 360: Identifying Friction Plate Without Retainers
Courtesy of BMW OF NORTH AMERICA, INC.

Fit central bolt (1).

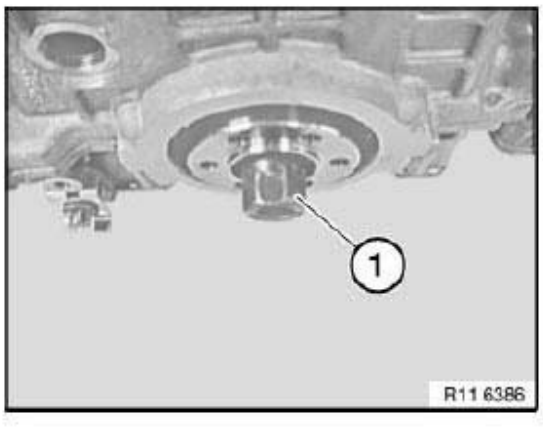


Fig. 361: Identifying Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tools **11 8 650** and **11 0 290** .

Tighten bolt (1).

Tightening torque **11 66 2AZ** .

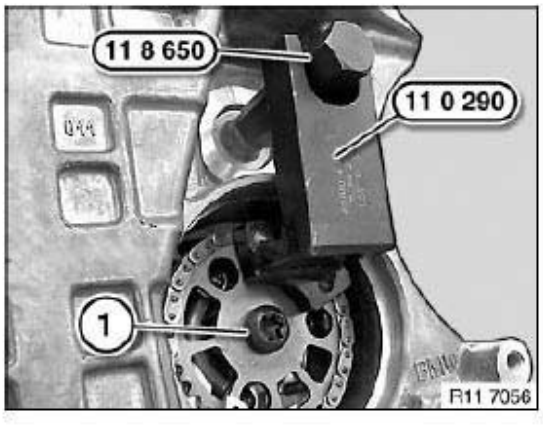


Fig. 362: Positioning Special Tool 11 0 290 On Sprocket Wheel And On Special Tool 11 8 650
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool **11 0 300** .

Tighten bolt (2).

Tightening torque **11 41 4AZ** .

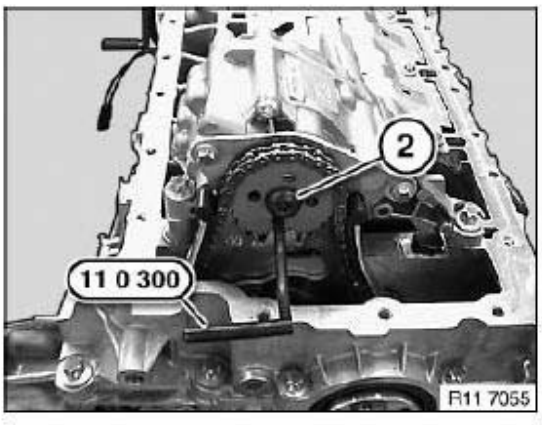


Fig. 363: Securing Oil Pump Drive Gear Using Special Tool 11 0 300
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down special tool **11 5 200** with screws (1) to hub.

Do **not** remove special tools **11 0 300** and **11 4 280** .

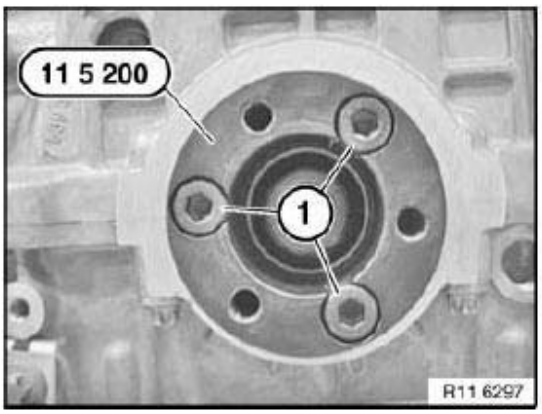


Fig. 364: Identifying Screws With Special Tool (11 5 200)
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten central bolt to jointing torque.

Tightening torque **11 21 1AZ** .

Mark torsion angle tightening on tool with stroke of paint (1).

See graphic.

IMPORTANT: Do not remove tool from central bolt during torsion angle tightening. Risk of damage!

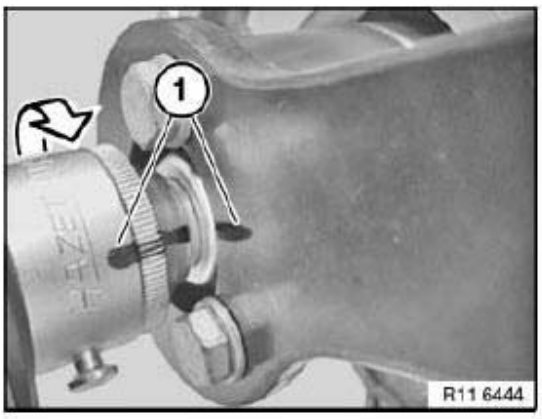


Fig. 365: Identifying Colored Line
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace front **CRANKSHAFT SEAL** .

Assemble engine.

1142 OIL FILTER AND LINES

11 42 020 REMOVING AND INSTALLING/REPLACING FULL-FLOW OIL FILTER (N54, N54T)

WARNING: Danger of scalding!

Only perform these tasks on an engine that has cooled down.

IMPORTANT: Risk of damage!

When working on the engine oil, coolant or fuel circuit, it is essential always to protect the alternator and belt drive against contamination.

Cover alternator with suitable materials.

Necessary preliminary tasks:

- Remove **INTAKE PLENUM**
- Drain **COOLANT**
- Unlock coolant hose and detach
- Remove **OIL-TO-WATER HEAT EXCHANGER**

Release oil filter cover with special tool **11 9 240** . Tightening torque **11 42 1AZ** .

NOTE: Engine oil flows out of the oil filter housing and back into the oil sump.

Installation note:

Replace sealing rings on oil filter cover.

Moisten sealing rings with engine oil.



Fig. 366: Releasing Oil Filter Cap Using Special Tool 11 9 240
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Release screw (2).

NOTE: Have cleaning cloth ready to catch residual oil.

Tightening torque: **11 42 2AZ.**

Installation note:

Replace all seals.

If necessary, replace filter element.

Modify oil pressure switch when replacing.

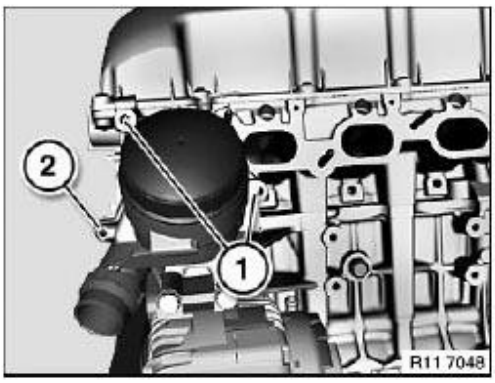


Fig. 367: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1144 OIL COOLER

11 44 000 REMOVING AND INSTALLING/REPLACING OIL-TO-WATER HEAT EXCHANGER (N54, N54T)

WARNING: Risk of scalding!

Only perform these tasks on an engine that has cooled down.

IMPORTANT: You must protect the alternator against contamination before carrying out any work on the oil or cooling circuit.

A residual amount of coolant emerges when the hoses are detached. A residual amount of oil emerges when the oil-coolant heat exchanger is released. Have a cleaning cloth ready.

Cover alternator with suitable apparatus.

Necessary preliminary tasks:

- Drain **COOLANT**
- Remove **FAN COWL**

Release screw (1).

Tightening torque **11 42 3AZ** .

Do not detach engine oil pipe from oil-to-water heat exchanger in downward direction.

Installation note:

Replace O-rings.

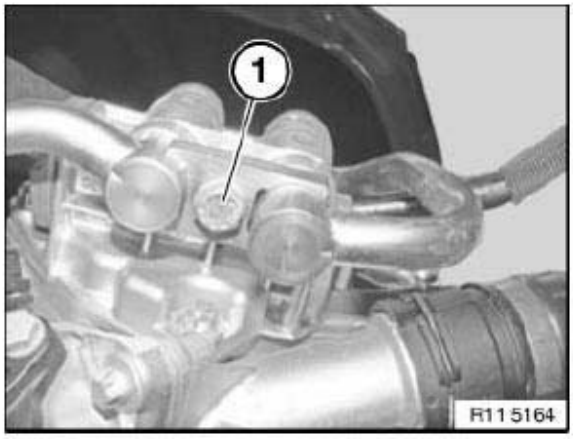


Fig. 368: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1) on oil-coolant heat exchanger.

Remove oil-coolant heat exchanger towards front.

Picture shows E9x

Installation note:

Replace seal.

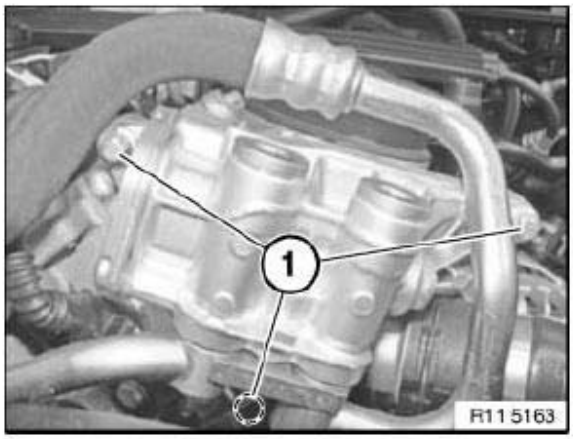


Fig. 369: Identifying Oil-Coolant Heat Exchanger Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Reassemble car and set in horizontal position.

Vent **COOLING SYSTEM** and check for water leaks.

Start engine and run at idle until oil pressure warning lamp goes out.

Turn off engine.

Wait approx. 5 minutes and check oil level.

Top up engine oil if necessary.

1151 WATER PUMP WITH DRIVE

11 51 000 REMOVING AND INSTALLING/RENEWING COOLANT PUMP (N54, N54T)

WARNING: Risk of scalding!

Only perform this work after engine has cooled down.

Recycling

Catch and dispose of drained coolant in a suitable container.

Observe country-specific waste disposal regulations.

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

Aluminum screws/bolts are not magnetic.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove **COOLANT THERMOSTAT**
- Remove **RIGHT DIAGONAL STRUT**

Release coolant hose (1).

Release coolant hose (3).

Disconnect plug connection (2).

Release screws (5).

Installation note:

Replace aluminum screws.

Tightening torque **11 51 1AZ** .

Installation note:

If a coolant pump is reused, it must be mechanically rotated once (breakaway torque at pump gears).

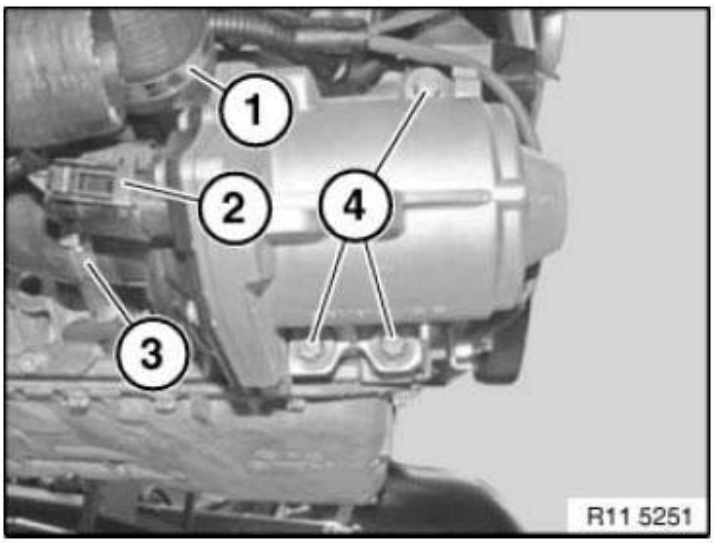


Fig. 370: Identifying Coolant Hose With Plug Connection And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

One coolant pump rotation will be sufficient.

Assemble engine.

VENTING INSTRUCTIONS must be observed without fail.

1153 THERMOSTAT AND CONNECTIONS

11 53 000 REMOVING AND INSTALLING/REPLACING COOLANT THERMOSTAT (N54, N54T)

WARNING: Risk of scalding!

Only perform these tasks on an engine that has cooled down.

Danger of injury!

Risk of skidding due to coolant on the floor.

Recycling

Catch and dispose of drained coolant in a suitable collecting vessel.

Observe country-specific waste disposal regulations.

IMPORTANT: Read and comply with GENERAL NOTES .

Protect plug connections against coolant and dirt contamination.

Cover plug connections with suitable materials.

Necessary preliminary work:

- Remove front **UNDERBODY PROTECTION**
- Release **FRONT STABILIZER** on front axle

Release screws (1) (only on front axle support)

Tightening torque **17 10 5AZ** .

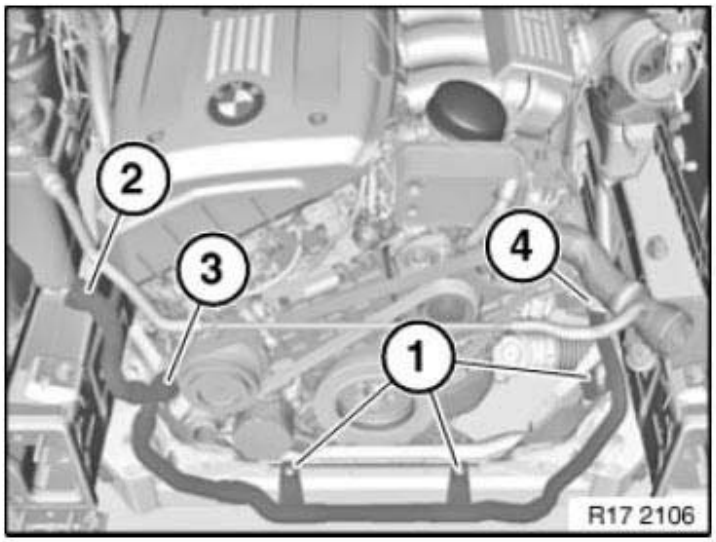


Fig. 371: Identifying Screws On Front Axle Support
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Illustration shows coolant thermostat removed.

Disconnect coolant hoses (arrows) on the thermostat (1) with clamping tongs.

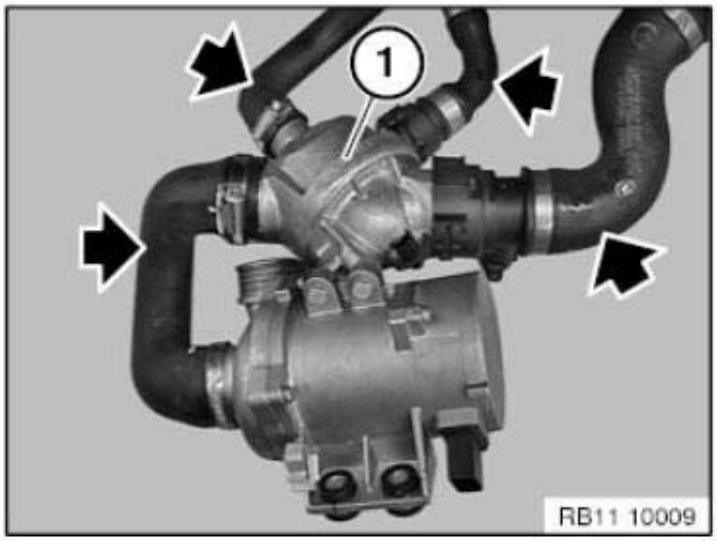


Fig. 372: Locating Coolant Hoses On Thermostat
Courtesy of BMW OF NORTH AMERICA, INC.

Release hose clamp (1) and detach coolant hose.

Release hose clamp (2) and detach coolant hose.

Unlock and detach coolant hose (3).

Unlock and detach coolant hose (4).

Disconnect plug connection (5).

Release screws (6).

Tightening torque **11 53 1AZ** .

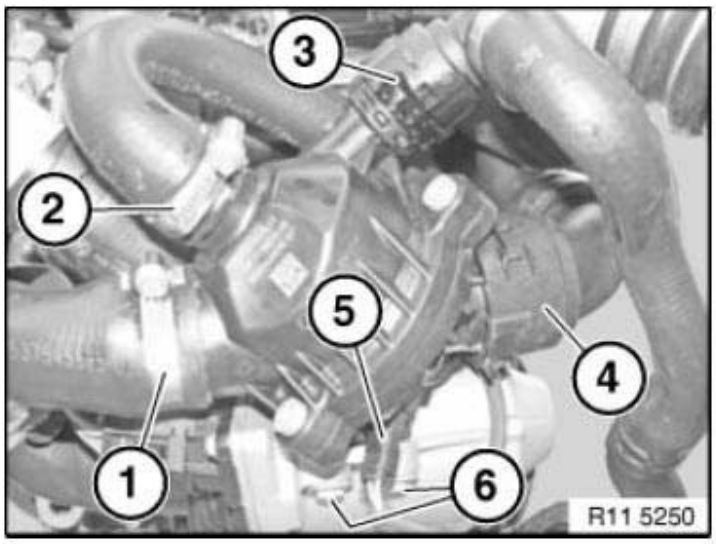


Fig. 373: Identifying Hose, Hose Clamp And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Fill the **COOLING SYSTEM** .

Check function of cooling system.

11 53 740 REMOVING AND INSTALLING/REPLACING FEED LINE (N54, N54T)

WARNING: Risk of scalding!

Only perform this work after engine has cooled down.

Recycling

Catch and dispose of drained coolant in a suitable container.

Observe country-specific waste disposal regulations.

Necessary preliminary tasks:

- Drain **COOLANT**
- Remove both See **1832050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 1-3 (N54)** or **1832060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 4-6 (N54)** .

Unfasten hose clip (1).

Tightening torque **11 51 4AZ** .

Detach coolant hose of feed line in direction of arrow from coolant pump (2).

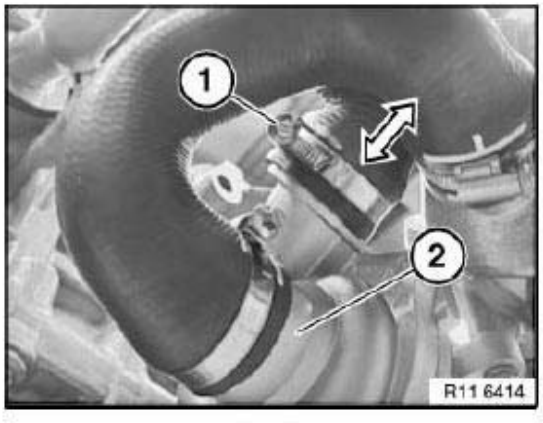


Fig. 374: Disconnecting Coolant Hose From Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Where necessary, to release the coolant feed lines (3 and 4), do not place pliers on the pipes.

Release screws (1 and 2).

Tightening torque **11 53 10AZ** .

If necessary, release coolant feed lines (3 and 4) with suitable pliers at connection.

Installation note:

Replace O-rings.

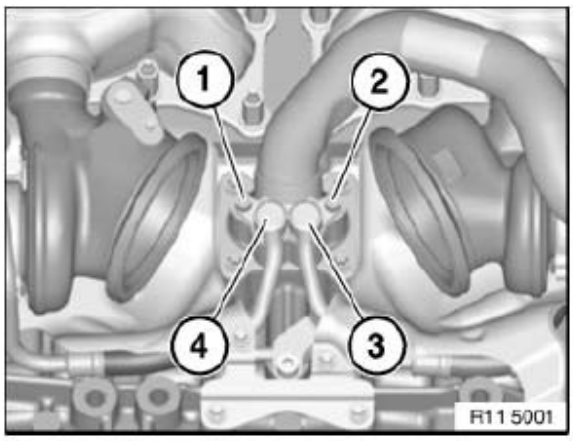


Fig. 375: Identifying Coolant Feed Lines And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purposes of clarity, the graphic shows the released coolant feed lines removed.

Release screws (1).

Tightening torque **11 53 3AZ** .

Remove feed line (2).

Installation note:

Replace seal.

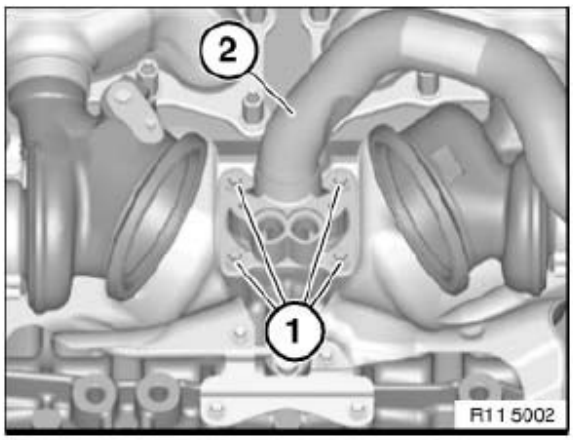


Fig. 376: Identifying Feed Line With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Top up **COOLANT** .

BLEEDING INSTRUCTIONS must be observed without fail.

1161 INTAKE MANIFOLD

11 61 365 REMOVING AND INSTALLING/REPLACING LEFT CHARGE AIR DUCT (N54, N54T)

Necessary preliminary tasks

- Remove **FAN COWL**
- Remove front **UNDERBODY PROTECTION**
- Remove **INTAKE SILENCER HOUSING**

IMPORTANT: Coat sealing rings of snap fasteners with lubricant.

Pressure pipes with quick-connect couplings cannot be fitted without antiseize agent.

Unlock quick-connect coupling.

Detach charge air duct (1) from charge air cooler (2).

Installation note:

- Coat sealing rings of snap fasteners with lubricant.
- Pressure pipes must audibly snap into place.

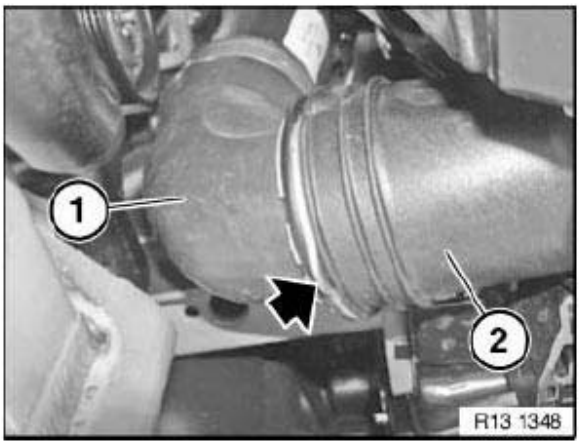


Fig. 377: Identifying Charge-Air Duct And Aircooler
Courtesy of BMW OF NORTH AMERICA, INC.

Release quick-connect couplings (1) by turning lock through 90°.

Detach recirculated-air hoses (2) and lay to one side.

Disconnect plug connection (3).

Unlock quick-connect coupling (5) and detach charge air duct (6) from throttle valve actuator.

Pull charge air duct (6) out of rubber grommet (4) and remove towards top.

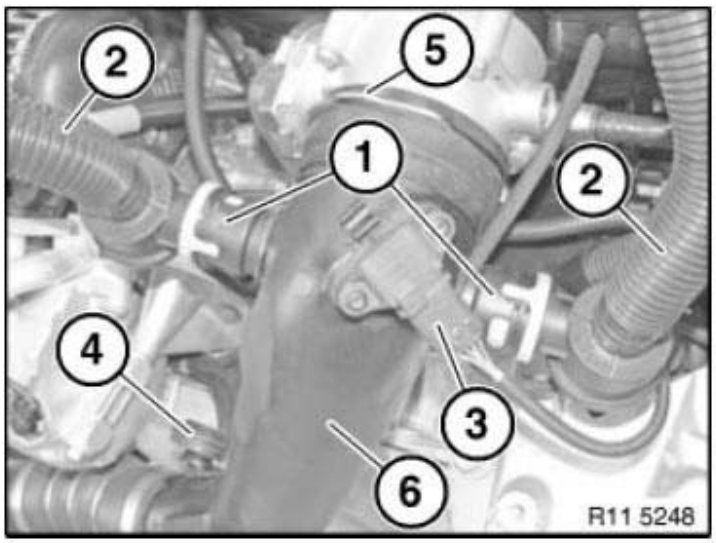


Fig. 378: Identifying Charge Air Duct, Air Hoses, Plug Connection And Grommet
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Bring lock (1) back 90° into installation position.

Pay attention to markings.

Recirculated-air hoses must snap audibly into place.

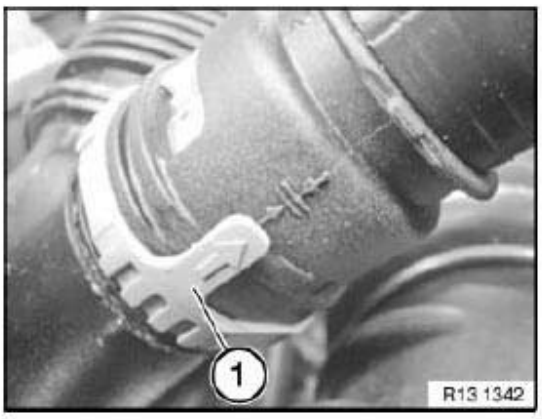


Fig. 379: Identifying Lock
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage! to sealing rings.

Special tool 11 8 670 is mandatory.

Attach charge air duct (1) with special tool **11 8 670** to charge air cooler (2).

Installation note:

Texts refer to and illustrations show the right side.

The procedure is identical for the left side.

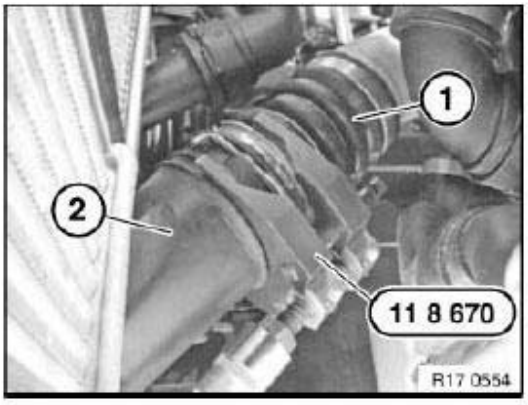


Fig. 380: Identifying Charge-Air Duct With Special Tool 11 8 670 To Intercooler
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Charge air hoses with clamp fastenings must be installed dry and free from grease!

If charge air hoses with clamp fastenings are not installed dry and free from grease, this may result in turbocharger failure!

11 61 362 REMOVING AND INSTALLING/REPLACING RIGHT CHARGE AIR DUCT (N54, N54T)

Necessary preliminary tasks

- Remove **COOLANT EXPANSION TANK**
- Remove **UNDERBODY PROTECTION**
- Remove right **TENSION STRUT**

IMPORTANT: Coat sealing rings of snap fasteners with lubricant.

Pressure pipes cannot be fitted without lubricant.

Mark vacuum hoses (1) and detach.

Mark vacuum hose (2) and detach.

Unscrew nuts (3).

Release screw (4).

Tightening torque, screw **11 65 6AZ** .

Raise bracket slightly.

Mark vacuum hose (5) on underside of pressure accumulator.

Remove vacuum accumulator with bracket.

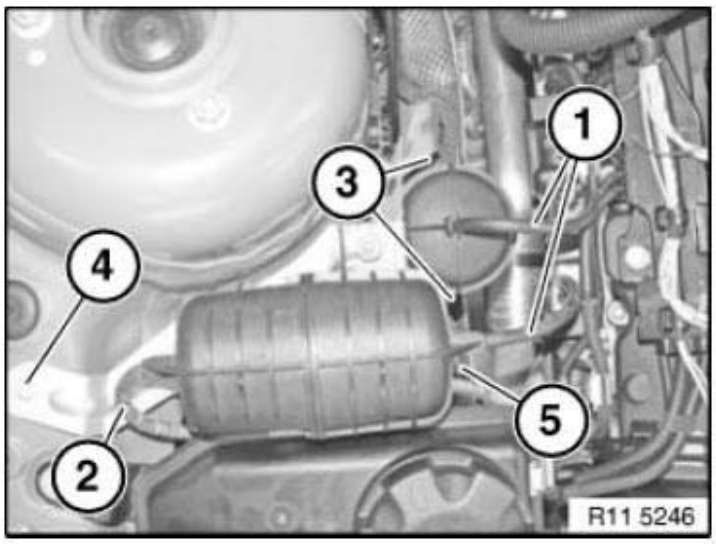


Fig. 381: Identifying Vacuum Hoses And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1) and screws (2), remove heat shield (3).

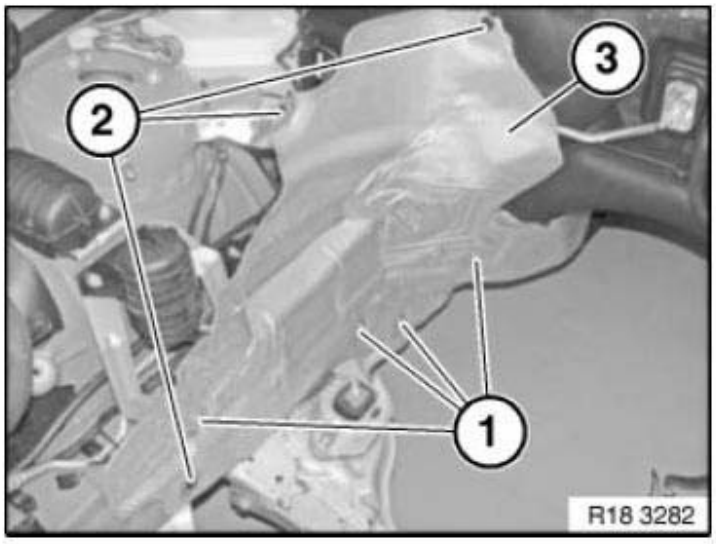


Fig. 382: Identifying Heat Shield With Mounting Nuts And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release clamps (1, 2), detach charge air duct (3).

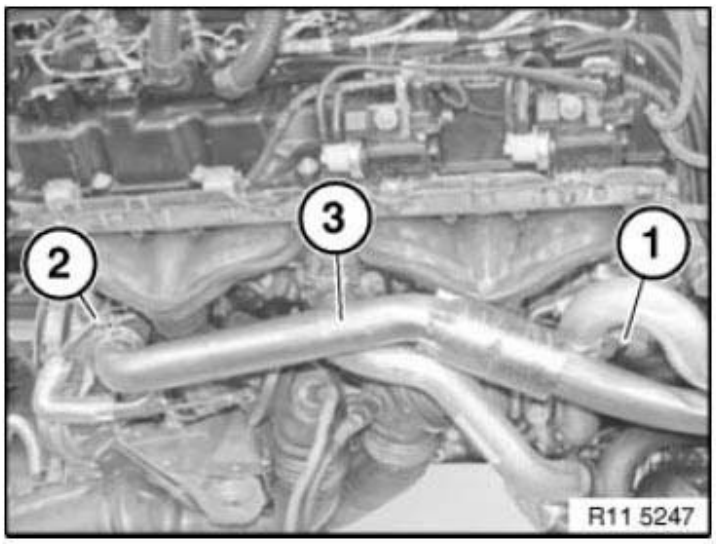


Fig. 383: Identifying Charge Air Duct With Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Faulty O-rings must be replaced.

Prior to fitting, coat O-ring with suitable antiseize agent.



Fig. 384: Locating O-Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach coolant hose (1).

Unlock quick-connect coupling.

Detach charge air duct (2) from charge air cooler (3) and remove towards top.

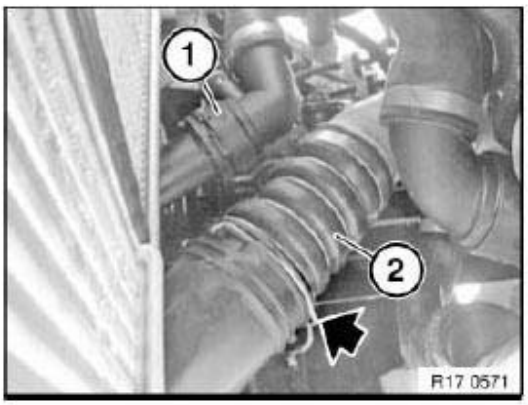


Fig. 385: Locating Coolant Hose And Charge-Air Duct From Intercooler
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage! to sealing rings!

Special tool **11 8 670** is mandatory.

Attach charge air duct (1) with special tool **11 8 670** to charge air cooler.

Installation note:

- Coat sealing rings of quick-connect couplings with antiseize agent.
- Pressure pipes must audibly snap into place

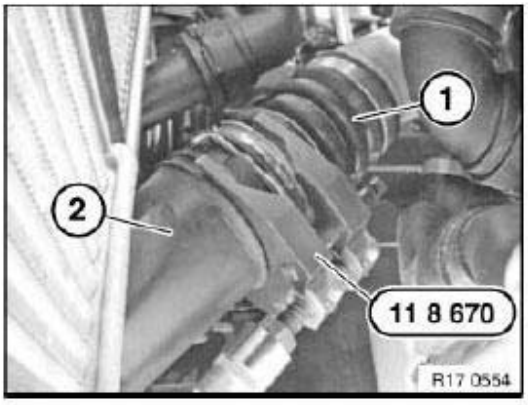


Fig. 386: Identifying Charge-Air Duct With Special Tool 11 8 670
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check DME (turbocharger) for correct operation.

11 61 050 REMOVING AND INSTALLING INTAKE PLENUM (N54, N54T)

Necessary preliminary tasks:

- Remove **INTAKE FILTER HOUSING**
- **REMOVE ENGINE COVER**
- If necessary, remove **TENSION STRUT** (risk of damage to charging pressure sensor)
- Release screws on **CHARGE AIR DUCT** at rear (do not remove)

Pull off vacuum hose (1).

Detach tank vent valve (2) from mounting.

Release hose (3) and lay to one side.

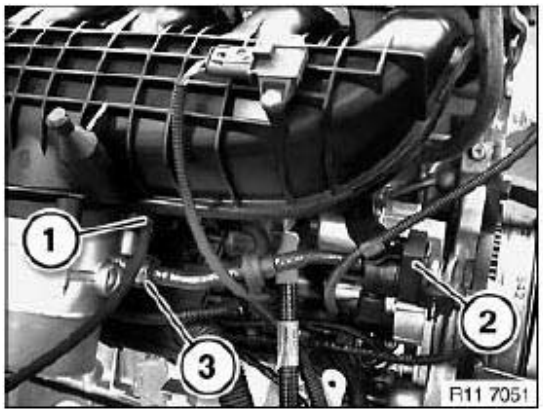


Fig. 387: Identifying Vacuum Hoses And Tank Vent Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on oil pressure switch (2).

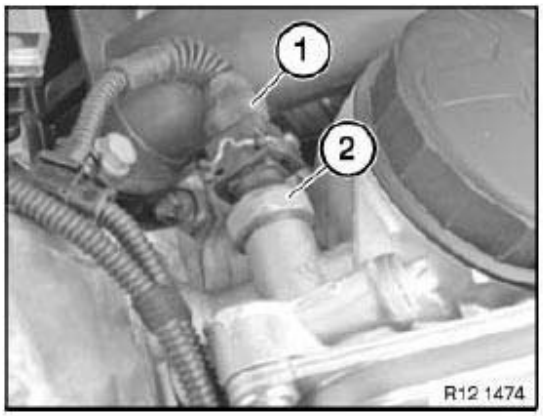


Fig. 388: Identifying Oil Pressure Sensor And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (2).

NOTE: Do not detach fuel line.

Unscrew nuts (3).

Release screw (4).

Tightening torque 11 61 1AZ .

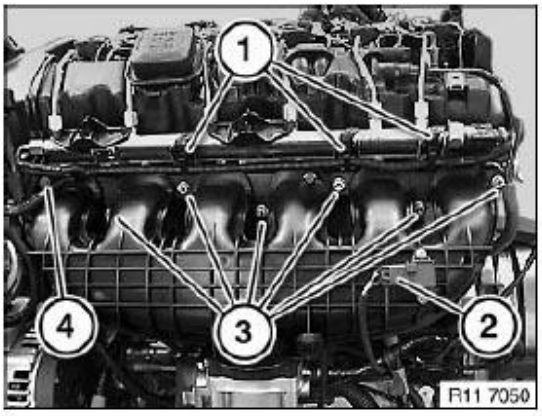


Fig. 389: Identifying Retainers, Plug Connection With Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Raise intake air manifold.

Release screws (1).

Place cable duct (2) to one side.

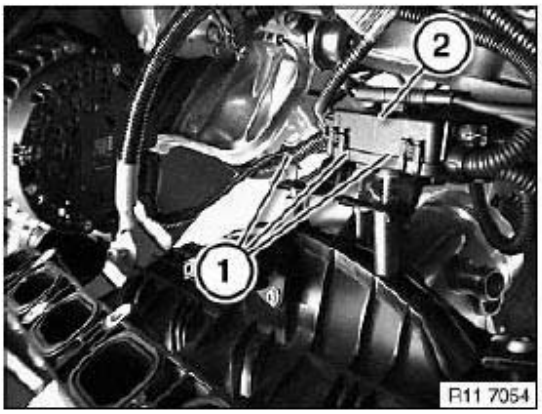


Fig. 390: Identifying Cable Duct And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Cut cable tie (1).

Installation note:

Replace all seals (3).

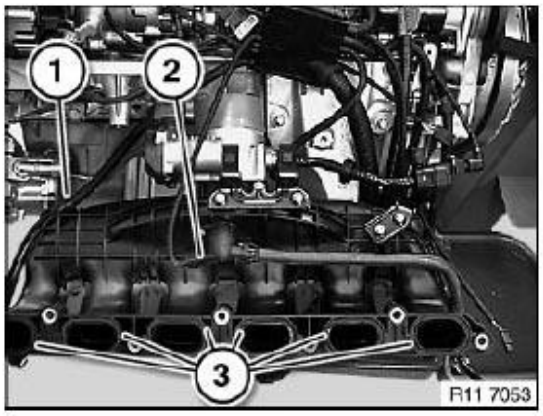


Fig. 391: Identifying Cable Tie, Plug Connection And Seals
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace all seals.

Assemble engine.

1165 SUPERCHARGER WITH CONTROL

11 65 022 REMOVING AND INSTALLING/REPLACE EXHAUST TURBOCHARGER FOR CYLINDERS 1-3 (N54, N54T)

IMPORTANT: It is not necessary to carry out a chassis/wheel alignment check to release the steering tie rod.

Necessary preliminary tasks:

- Remove both See **1832050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 1-3 (N54)** or **1832060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 4-6 (N54)**
- Release right **TIE ROD** from steering gear
- Drain **COOLANT**
- Remove coolant **EXPANSION TANK**
- Remove **COOLANT THERMOSTAT**

- Remove **COOLANT PUMP**
- Remove both vacuum accumulators with bracket
- Remove right **CHARGE-AIR DUCT**
- Drain **ENGINE OIL** and collect in a clean container, oil is reused

Release screws (1) and remove protective plate (2) above tie rod.

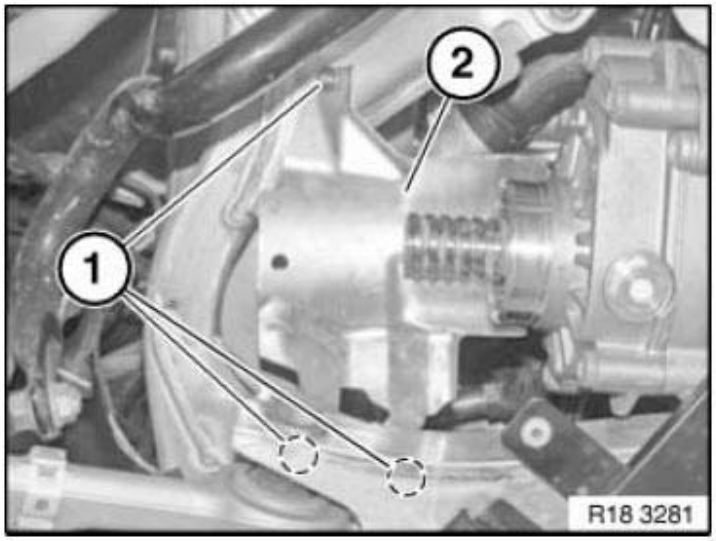


Fig. 392: Identifying Protective Plate And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 42 7AZ** .

Installation note:

Replace gasket.

Release screw (2).

Tightening torque **11 42 8AZ** .

Remove oil return pipe in direction of arrow.

Installation note:

Replace O-ring.

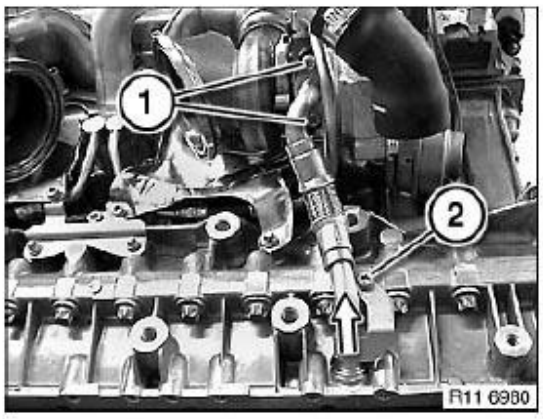


Fig. 393: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Undo screws (1 and 2)

Tightening torque **11 53 10AZ** .

Release coolant feed lines (3 and 4) if necessary with suitable pliers.

IMPORTANT: Do not place pliers on pipes. Risk of damage!

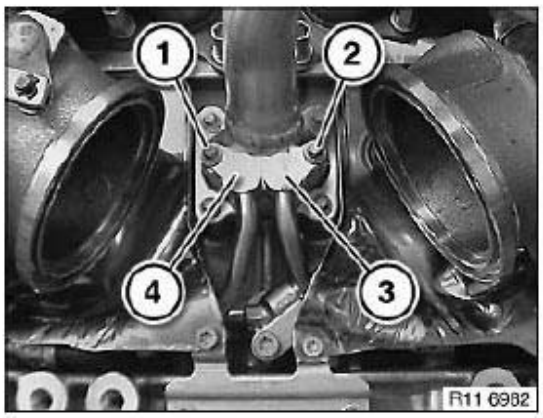


Fig. 394: Identifying Coolant Feed Line With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 53 3AZ** .

Remove feed line (2).

Installation note:

Replace O-ring.

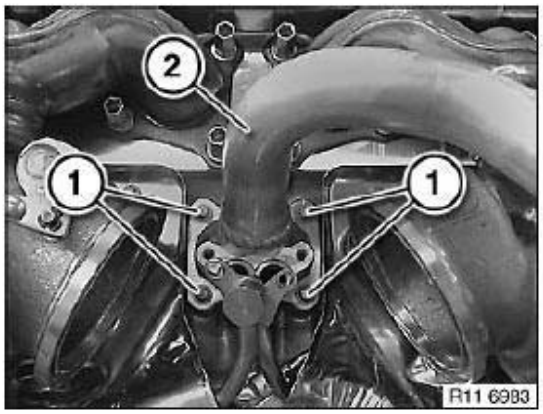


Fig. 395: Identifying Feed Line With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **11 53 8AZ** .

Release coolant return pipe at connection (2) if necessary with suitable pliers.

Release screw (3).

Tightening torque **11 53 9AZ** .

Release coolant return pipe at connection (4) if necessary with suitable pliers.

Unfasten coolant return pipe.

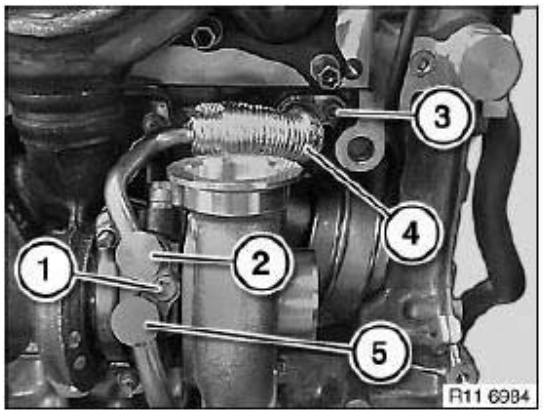


Fig. 396: Identifying Pipe Connections And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not place pliers on pipes. Risk of damage!

Release screws (1).

Tightening torque **11 65 2AZ** .

Remove retaining plate (2).

Release screws (3).

Tightening torque **11 65 2AZ** .

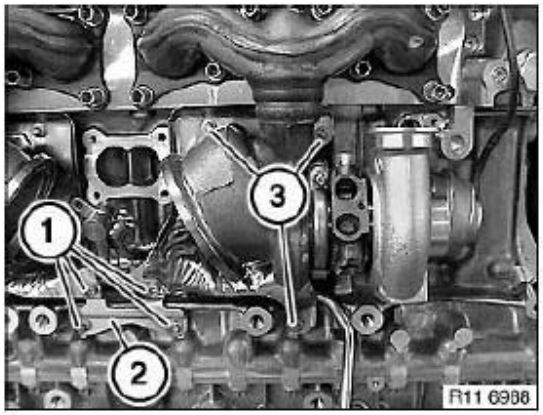


Fig. 397: Identifying Retaining Plate And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove heat shield (1) in direction of arrow.

NOTE: Carefully swing out heat shield (1) in direction of arrow.

Risk of damage!

Coolant feed pipe can be removed with heat shield (1).

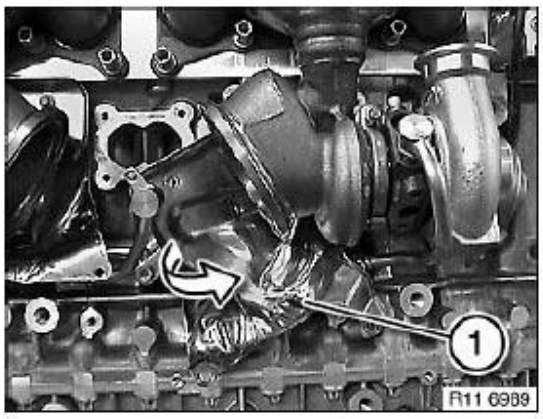


Fig. 398: Identifying Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 65 3AZ** .

Set holder (2) down on cylinder head cover.

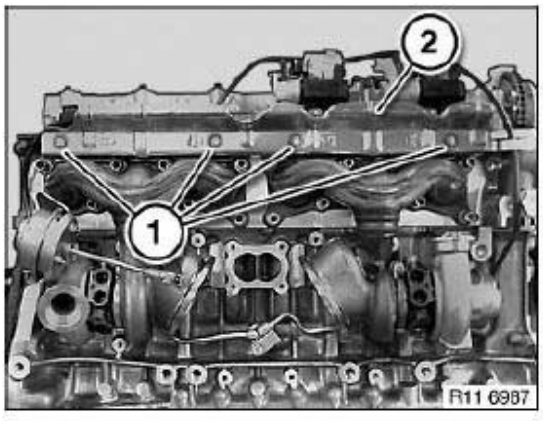


Fig. 399: Identifying Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **11 42 4AZ** .

Detach oil feed line in direction of arrow.

Installation note:

Replace O-ring.

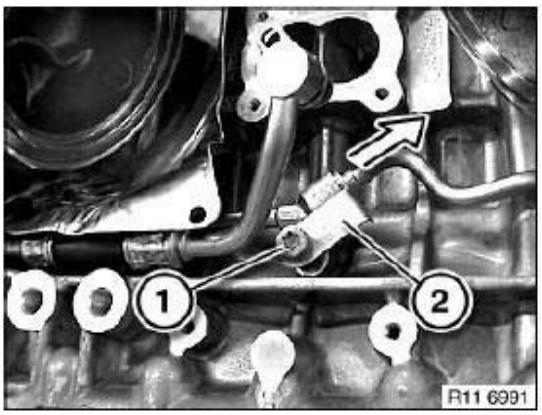


Fig. 400: Disconnecting Oil Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **11 42 5AZ** .

Release oil pressure line (2) if necessary with suitable pliers.

IMPORTANT: Do not place pliers on pipes. Risk of damage!

Installation note:

Replace O-rings.

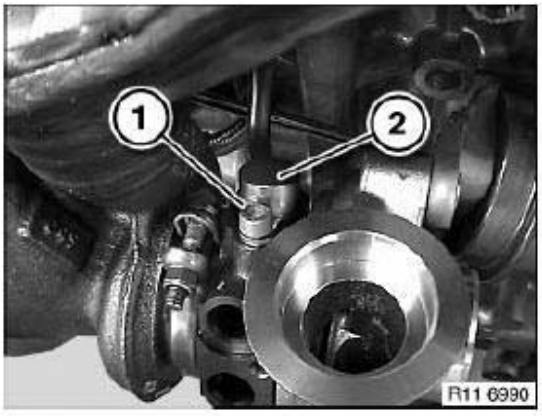


Fig. 401: Identifying Oil Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

Detach vacuum hose from vacuum unit (wastegate valve).

Unscrew nuts (1).

Tightening torque **11 65 1AZ** .

Remove turbocharger towards top.

IMPORTANT: Do not misuse linkage of vacuum unit (wastegate valve) for transportation.

Risk of damage!

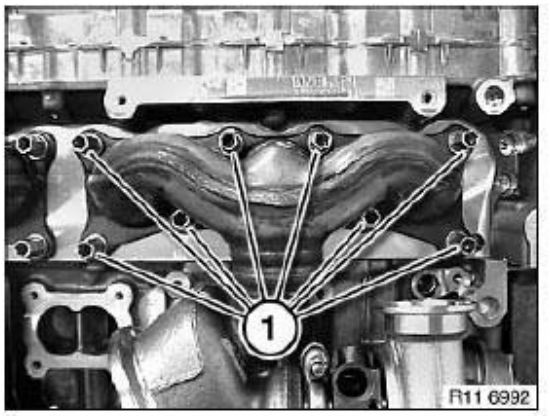


Fig. 402: Identifying Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (2).

Tightening torque **11 42 5AZ** .

IMPORTANT: Where necessary, to release the oil feed line (3), do not place pliers on the pipe.

Risk of damage!

If necessary, release oil feed line (3) with suitable pliers at connection and remove.

Installation note:

Replace O-rings.

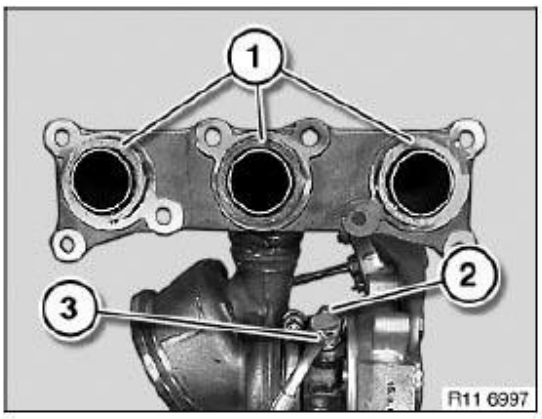


Fig. 403: Identifying Oil Feed Line And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace graphite sealing rings (1).

NOTE: Picture shows turbocharger for cylinders 4 to 6.

Assemble engine.

Delete fault memory in Digital Engine Electronics.

Check air intake system for leaks.

Observe DME instructions.

11 65 024 REMOVING AND INSTALLING/REPLACE EXHAUST TURBOCHARGER FOR CYLINDERS 4-6 (N54, N54T)

Necessary preliminary tasks:

- Remove both See **1832050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 1-3 (N54)** or **1832060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 4-6 (N54)**
- Drain **COOLANT**
- Remove coolant **EXPANSION TANK**
- Remove both vacuum reservoirs
- Remove right **CHARGE AIR DUCT**
- Drain **ENGINE OIL** and collect in a clean container, oil is reused
- Remove **RIGHT ENGINE SUPPORT ARM**

Release screws (1).

Tightening torque **11 42 7AZ** .

Installation note:

Replace gasket.

Release screw (2).

Tightening torque **11 42 8AZ** .

Remove oil return pipe in direction of arrow.

Installation note:

Replace O-ring.

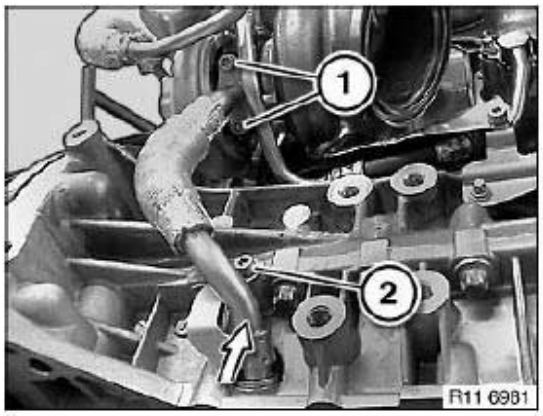


Fig. 404: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1 and 2).

Tightening torque **11 53 10AZ** .

Release coolant feed lines (3 and 4) if necessary with suitable pliers.

IMPORTANT: Do not place pliers on pipes. Risk of damage!

Installation note:

Replace O-rings.

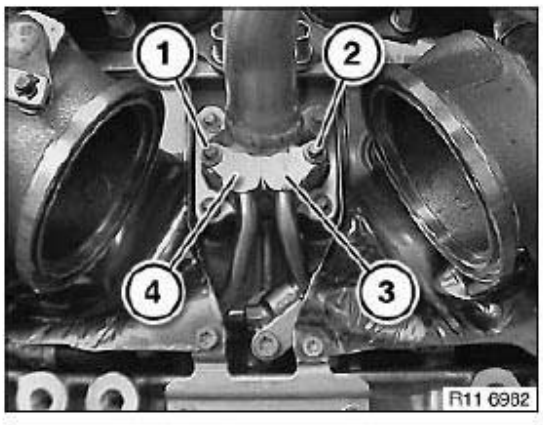


Fig. 405: Identifying Coolant Feed Line With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 53 3AZ** .

Remove feed line (2).

Installation note:

Replace O-ring.

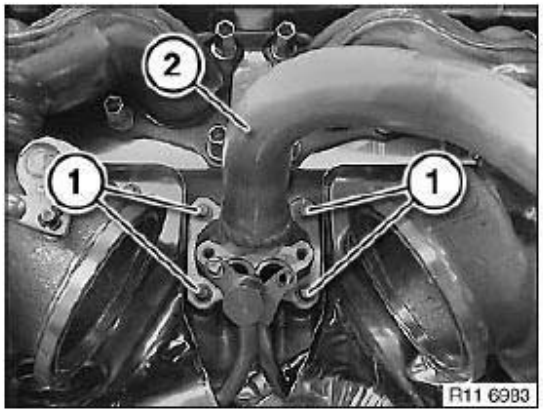


Fig. 406: Identifying Feed Line And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release snap ring (1) from linkage of wastegate valve and disengage linkage.

Release screw (5).

Tightening torque **11 53 9AZ** .

Release coolant return pipe if necessary with suitable pliers.

Release screw (4).

Tightening torque **11 53 8AZ** .

Release coolant feed pipe (2) if necessary with suitable pliers.

Release coolant return pipe (3) if necessary with suitable pliers and remove.

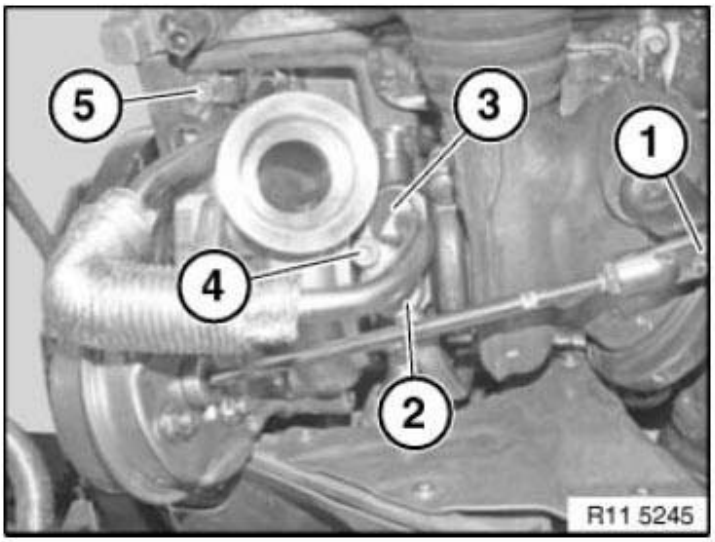


Fig. 407: Identifying Snap Ring, Coolant Return Line And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace O-rings.

IMPORTANT: Do not place pliers on pipes. Risk of damage!

Release screws (1).

Tightening torque **11 65 2AZ** .

Remove retaining plate (2).

Unfasten screws (3 and 4).

Tightening torque **11 65 2AZ** .

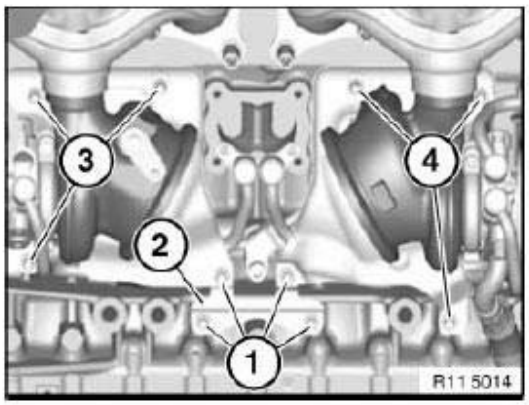


Fig. 408: Identifying Retaining Plates And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Carefully swing out heat shields (2 and 3) in direction of arrow.

Risk of damage!

Remove heat shield (3) in direction of arrow.

Remove heat shield (2) in direction of arrow.

NOTE: Coolant feed pipe (1) can be removed with heat shield (2).

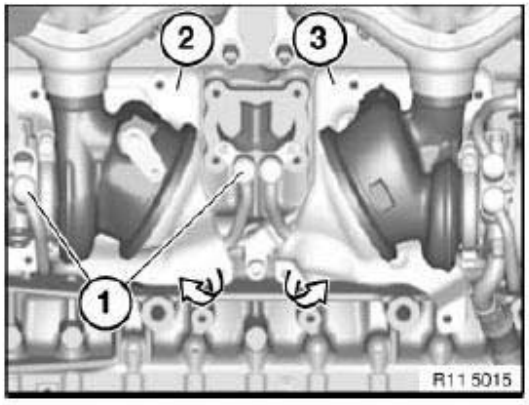


Fig. 409: Removing Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **11 42 4AZ** .

Detach oil feed line in direction of arrow.

Installation note:

Replace O-ring.

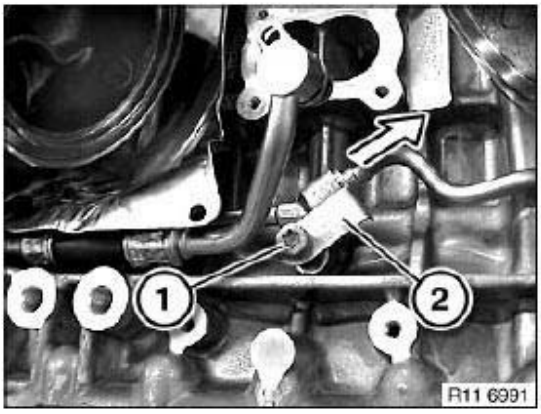


Fig. 410: Removing Oil Feed
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 65 3AZ** .

Set holder (2) down on cylinder head cover.

Picture shows E9x.

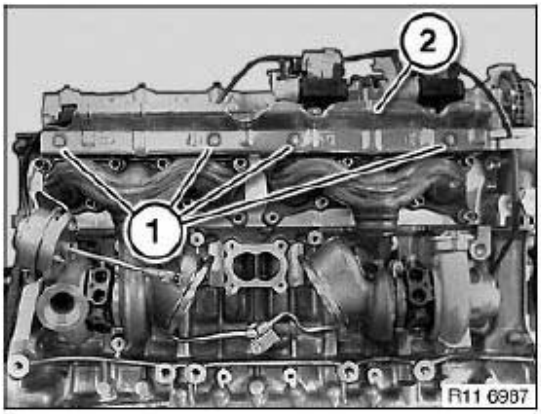


Fig. 411: Identifying Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Detach vacuum hose from vacuum unit (wastegate valve).

Unscrew nuts (1).

Remove turbocharger towards bottom.

Tightening torque **11 65 1AZ** .

IMPORTANT: Do not misuse linkage of vacuum unit (wastegate valve) for transportation.

Risk of damage!

Picture shows E9x.

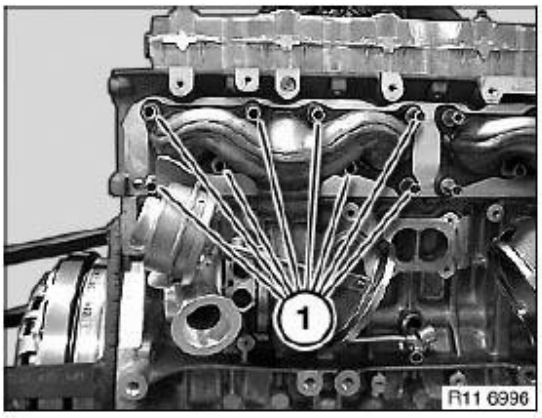


Fig. 412: Identifying Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (2).

Tightening torque **11 42 5AZ** .

IMPORTANT: Where necessary, to release the oil feed line (3), do not place pliers on the pipe.

Risk of damage!

If necessary, release oil feed line (3) with suitable pliers at connection and remove.

Installation note:

Replace O-rings.

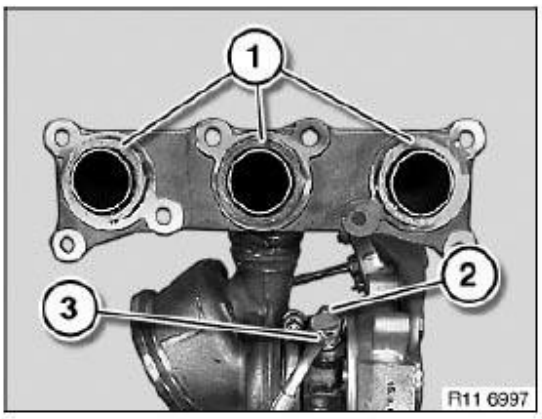


Fig. 413: Identifying Oil Feed Line And Graphite Sealing Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace graphite sealing rings (1).

Assemble engine.

Delete fault memory in Digital Engine Electronics.

Check air intake system for leaks.

Observe DME instructions.

11 65 580 REPLACING VACUUM UNIT (WASTEGATE VALVE) (N54, N54T)

IMPORTANT: Overpressure and vacuum lines are identified by the size of the seals and colour-coded Red and Blue and must not be mixed up with each other.

Build up pressure with Blue color.

Generate vacuum pressure with Red color.

Check ease of movement between turnbuckle and pin of adjusting lever (ensure rectangularity).

Note on ordering:

- Workshop equipment
- Workshop planning
- Workshop equipment catalogue
- Measuring and test equipment

- No. 81 29 0 426 464

Necessary preliminary tasks:

- Prepare BMW diagnosis system
- Start diagnosis program

Wahrnehmung:

1. Noises at exhaust turbocharger (clanking)

Oder Fault entry:

1. Drive
2. Engine electronics
3. Air supply
4. Charging pressure control

- Remove both exhaust turbochargers

Release locking clip (2).

Disengage linkage of vacuum unit (wastegate valve).

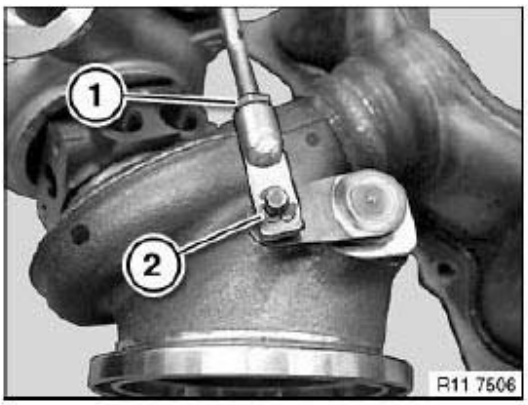


Fig. 414: Identifying Lock Nut And Locking Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Check linkage and valve for wear

Connect vacuum line (1) to vacuum unit (wastegate valve).

Vacuum linkage must retract to stop.

Wastegate valve must be sealed off by hand.

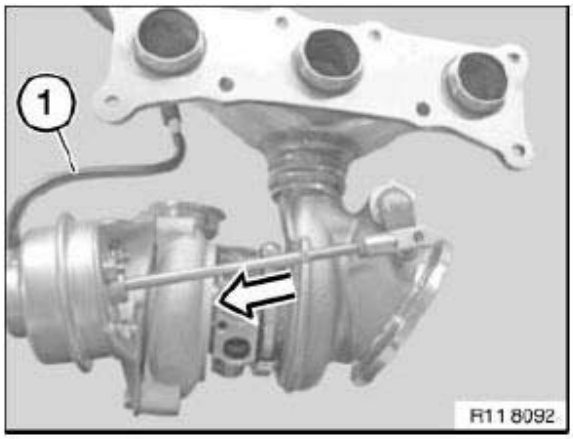


Fig. 415: Identifying Vacuum Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release lock nut on controller (1).

Press setting with measurement.

- Determine ambient pressure
- Seal stop cock (2) in direction of arrow
- Set controller (1) to **500 ± 10** mbar below ambient pressure (e.g. 980 - 500 = 480 mbar)

Open stop cock (2) again.

Wastegate linkage closes.

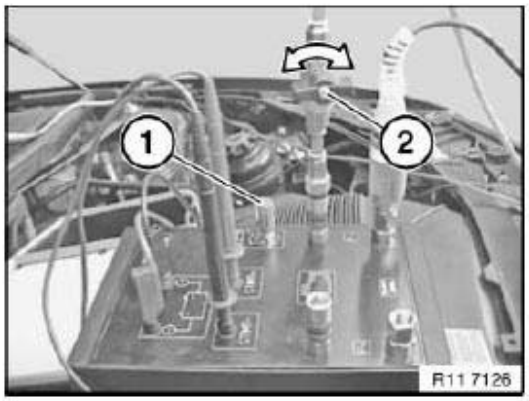


Fig. 416: Releasing Lock Nut On Controller
Courtesy of BMW OF NORTH AMERICA, INC.

Determine gap dimension.

Gap dimension between turnbuckle and adjusting lever.

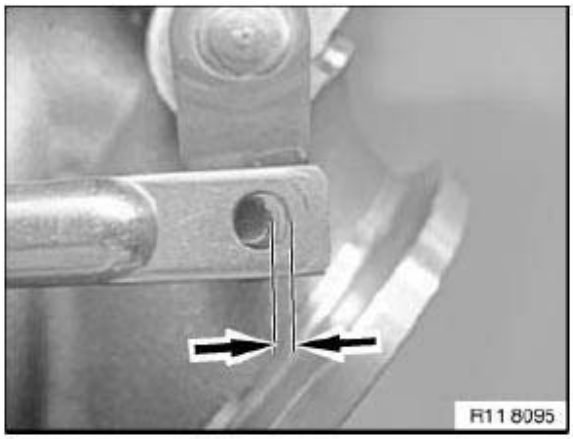


Fig. 417: Identifying Gap Dimension Between Turnbuckle And Adjusting Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Seal off wastegate valve (1) by hand in direction of arrow up to stop.

The turbocharger must be replaced if a 1.5 mm drill bit can be inserted as pictured.

NOTE: Gap dimension = 1.5 mm.

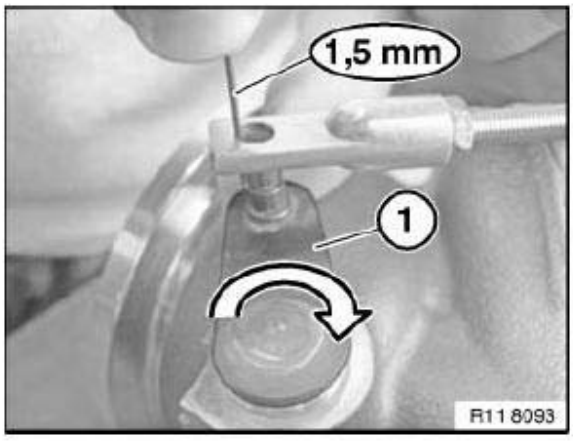


Fig. 418: Sealing Off Wastegate Valve
Courtesy of BMW OF NORTH AMERICA, INC.

The turbocharger is OK if a 1.5 mm drill bit cannot be inserted or can only be inserted at an angle as pictured.

NOTE: Gap dimension > or = 1.5 mm.

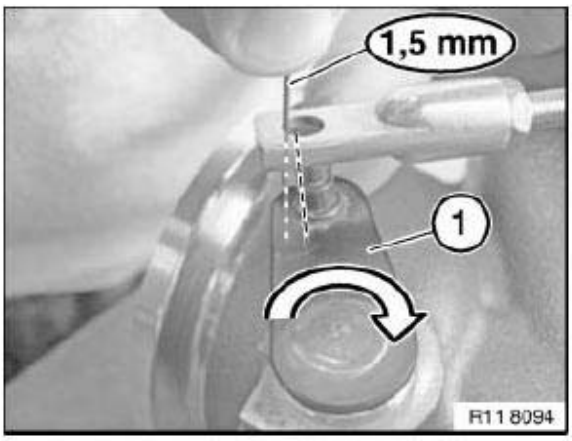


Fig. 419: Identifying Drill Bit Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (1 and 3).

Tightening torque **11 65 11AZ** .

Installation note:

Replace vacuum unit 2 (wastegate valve).

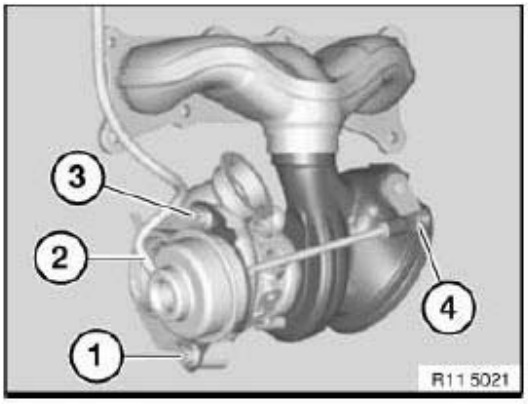


Fig. 420: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting vacuum unit (wastegate valve) linkage

Initial position of vacuum unit (wastegate valve) linkage depressurised.

Connect red vacuum line (1) to vacuum unit (wastegate valve).

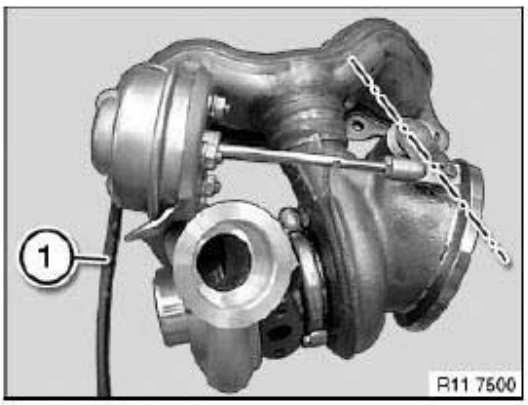


Fig. 421: Identifying Red Vacuum Line
Courtesy of BMW OF NORTH AMERICA, INC.

Vacuum pressure measurement

Prepare BMW diagnosis system on vacuum diagnosis unit.

1. Screw in pressure sensor.
2. Connect 12V battery cables (2) to vehicle battery positive and negative.
3. Connect 12V battery cables (3) to vehicle battery positive and negative **(pump operation max. 3 mins.)** .
4. Controller for vacuum connection.
5. Vacuum connection (Red).

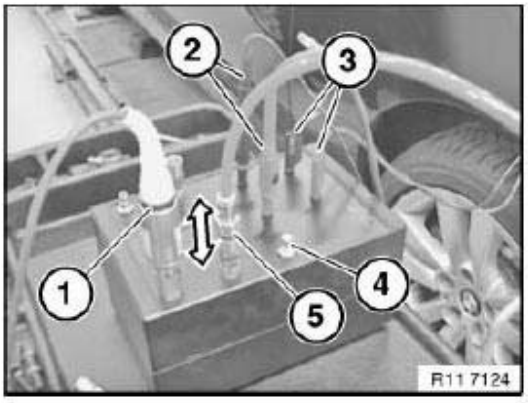


Fig. 422: Identifying Vacuum Pressure Measurement Set-Up
Courtesy of BMW OF NORTH AMERICA, INC.

Calibration for vacuum pressure measurement

Release lock nut on controller (1).

Press setting with measurement.

- Determine ambient pressure
- Seal stop cock (2) in direction of arrow
- Set controller (1) to **200 ± 10 mbar** below ambient pressure (e.g. 980 - 200 = 780 mbar).

Open stop cock (2) again.

Wastegate valve closes.

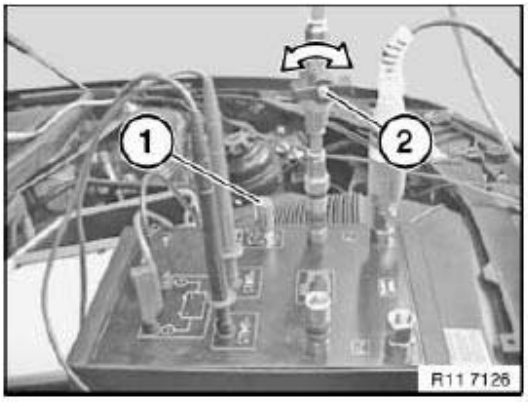


Fig. 423: Releasing Lock Nut On Controller
Courtesy of BMW OF NORTH AMERICA, INC.

Initial position (1) of wastegate linkage with preset vacuum pressure.

Wastegate valve virtually closed.

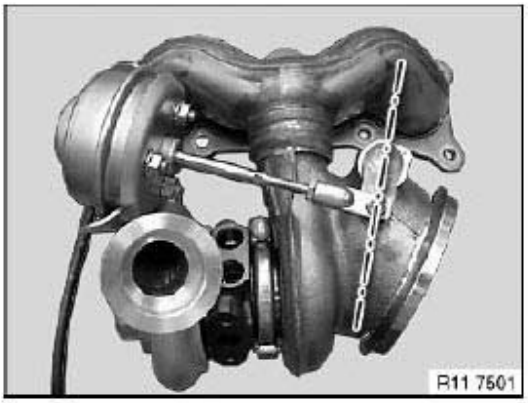


Fig. 424: Identifying Initial Position Of Wastegate Linkage With Preset Vacuum Pressure
Courtesy of BMW OF NORTH AMERICA, INC.

Checking turnability at wastegate valve

a. Wastegate valve can be turned with minimal force.

Adjustment at wastegate valve is OK.

b. Wastegate valve has play and can be turned without resistance, wastegate valve open too far.

   Carry out adjustment at wastegate valve, **shorten** linkage.

c. Wastegate valve cannot be turned, wastegate valve closed.

Carry out adjustment at wastegate valve, **lengthen** linkage.

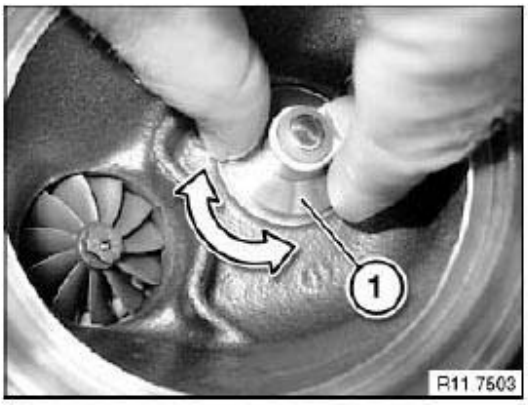


Fig. 425: Checking Wastegate Valve Turnability
Courtesy of BMW OF NORTH AMERICA, INC.

Adjustment at linkage

To **lengthen** linkage, turn turnbuckle (1) max. **180°** in **counterclockwise** direction.

To **shorten** linkage, turn turnbuckle (1) max. 180° in **clockwise** direction.

Engage turnbuckle (1) on adjusting lever in direction of arrow.

IMPORTANT: Check ease of movement between turnbuckle (1) and pin of adjusting lever (ensure rectangularity).

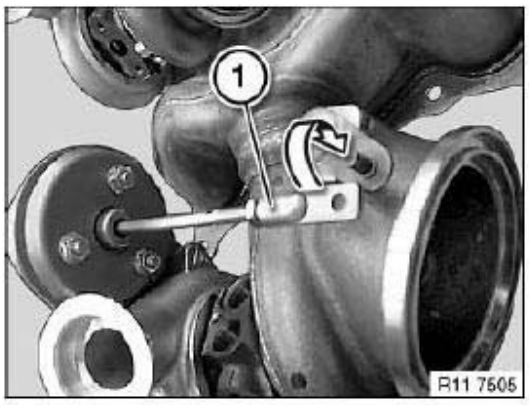


Fig. 426: Engaging Turnbuckle On Adjusting Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Check turnability at wastegate valve again.

Secure lock nut (1); to do so, secure turnbuckle against turning with a suitable tool.

Tightening torque **11 65 10AZ** .

Mount locking clip (2).

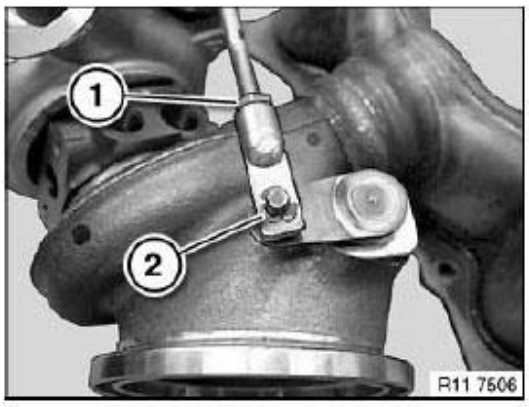


Fig. 427: Identifying Lock Nut And Locking Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Observe diagnosis instructions.

Execute test module for boost pressure control.

1166 VACUUM PUMP

11 66 000 REMOVING AND INSTALLING OR REPLACING VACUUM/OIL PUMP (N47 D20 O1)

IMPORTANT: It is possible to remove and install the vacuum oil pump without removing the transmission.

Necessary preliminary work:

- Removing oil sump.

Release screws (1).

Remove intake snorkel in direction of arrow.

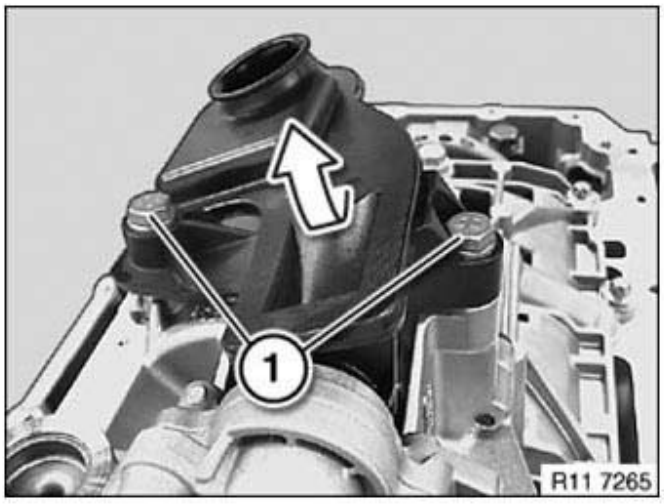


Fig. 428: Removing Intake Snorkel
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

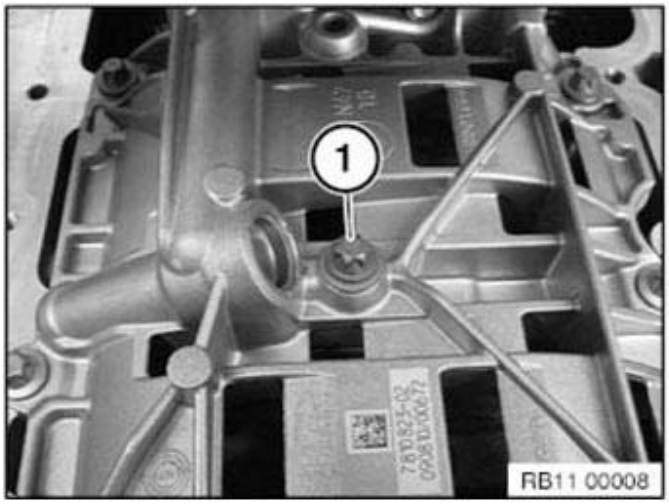


Fig. 429: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation note:

Clean and blow out thread

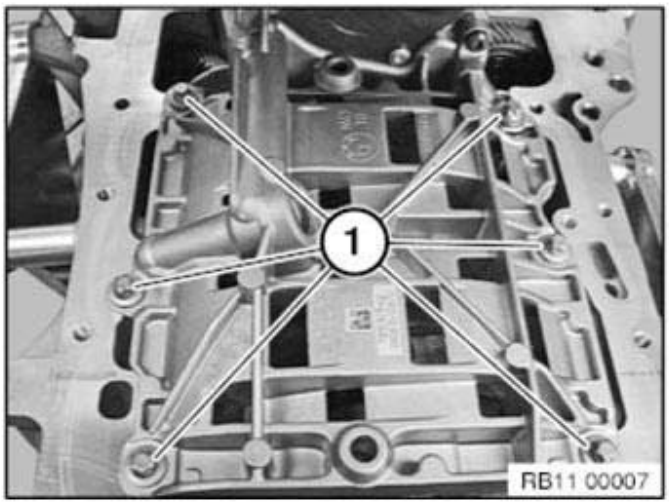


Fig. 430: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

When installed, the oil pump chain must be fed out from the sprocket wheel of the oil pump drive gear; the sprocket wheel cannot be removed.

NOTE: Illustration shows gear case cover removed.

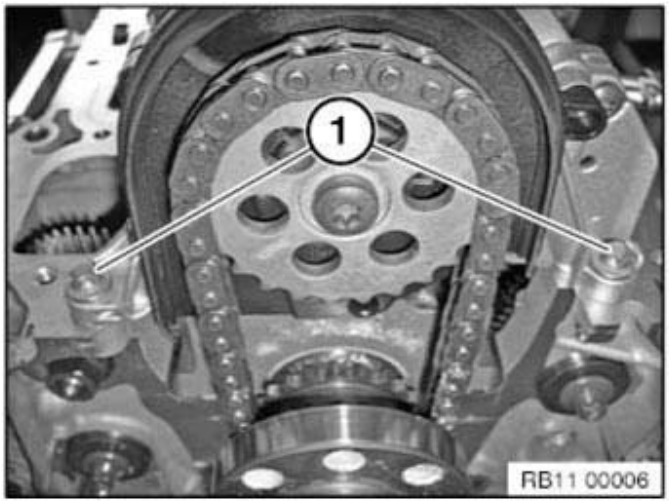


Fig. 431: Identifying Gear Case Cover Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Oil vacuum pump must be fed out at chain drive (1).

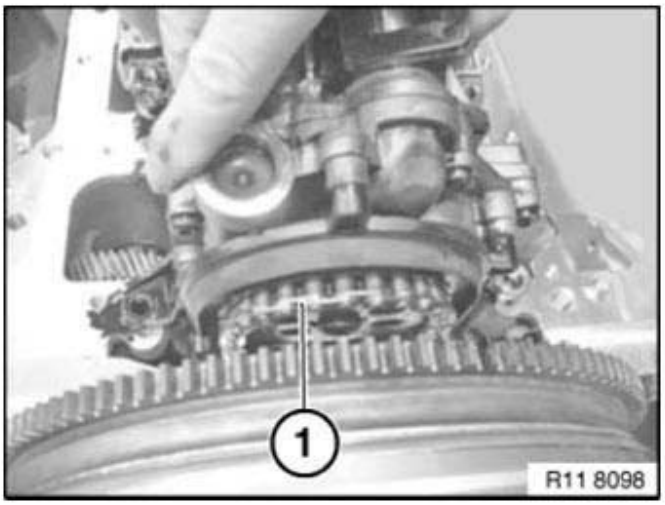


Fig. 432: Identifying Chain Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out oil vacuum pump (1) in direction of arrow and remove.

Installation in reverse sequence.

Installation note:

Clean all sealing surfaces.

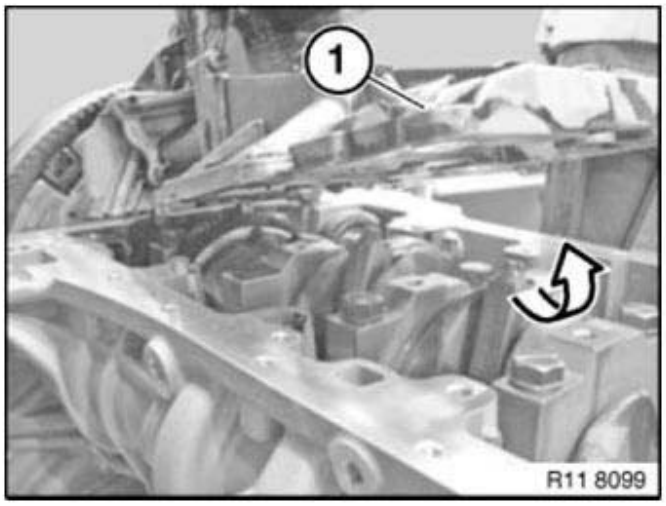


Fig. 433: Identifying Oil Vacuum Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Install all screws (1) and tighten down.

Tightening torque, see 11 41 1AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

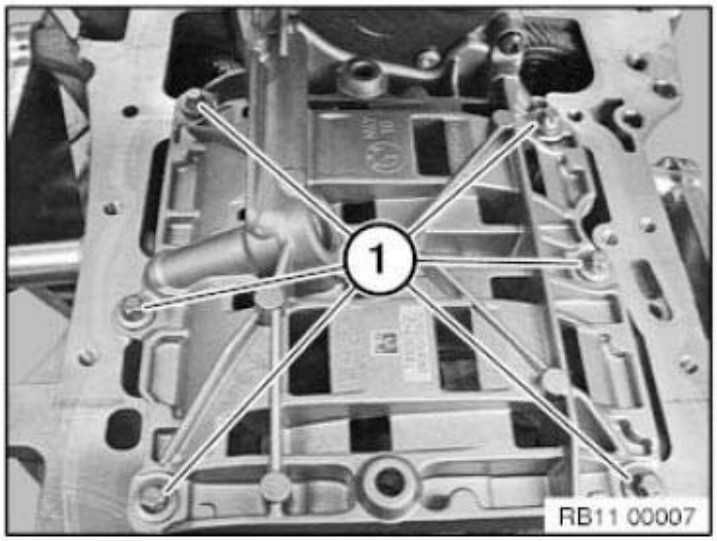


Fig. 434: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Install and tighten down screws (1).

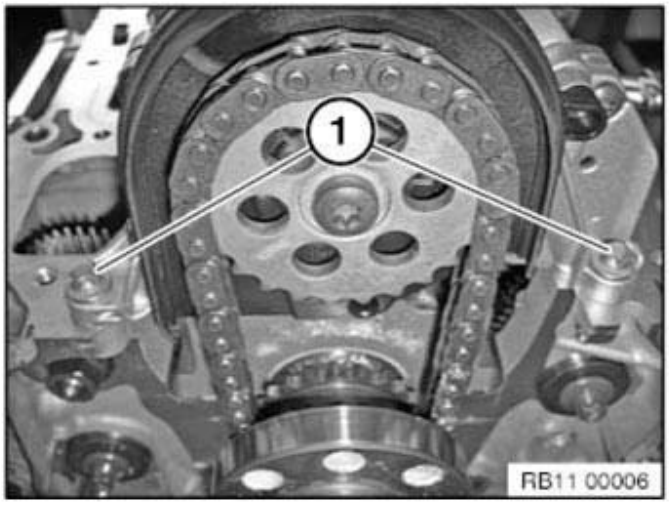


Fig. 435: Identifying Gear Case Cover Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Clean and blow out thread

Insert and secure screw (1).

Secure screw (1) with special tool **00 9 120** .

Tightening torque, see 11 41 2AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE** .

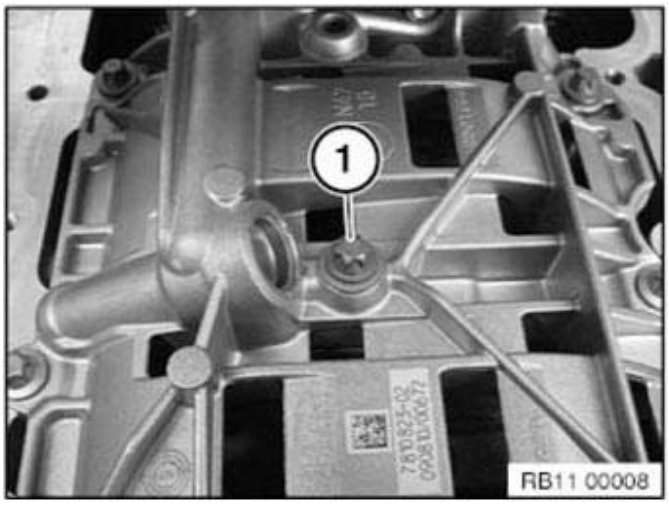


Fig. 436: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 66 000 REMOVING AND INSTALLING/REPLACING VACUUM PUMP (N54, N54T)

Necessary preliminary work:

- Remove **DRIVE BELT** .
- Remove **BELT TENSIONER** for drive belt.
- Remove **SEALING CAP** for vacuum pump.
- Remove **HIGH PRESSURE PUMP** .

Rotate crankshaft at central bolt.

Turn camshaft sprocket until drilled holes and screws of vacuum pump match up.

Screw in special tool **11 8 650** .

Secure special tool **11 0 290** in camshaft sprocket and to special tool **11 8 650** .

Release screw (1).

Tightening torque **11 66 2AZ** .

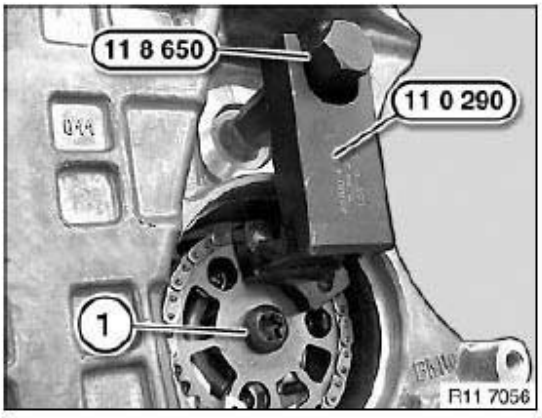


Fig. 437: Positioning Special Tool 11 0 290 On Sprocket Wheel And On Special Tool 11 8 650
Courtesy of BMW OF NORTH AMERICA, INC.

Press chain tensioner (1) with chain in direction of arrow.

Install special tool **11 4 120** .

Remove camshaft sprocket (2) in direction of arrow.

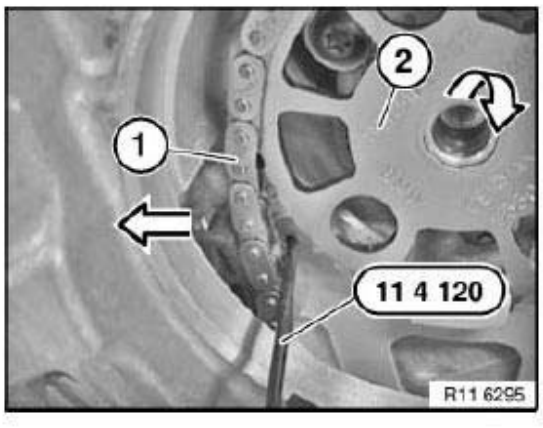


Fig. 438: Removing Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 66 1AZ** .

Release screws (1).

Secure screws (1) against falling.

Remove vacuum pump.

Installation note:

Replace gasket.

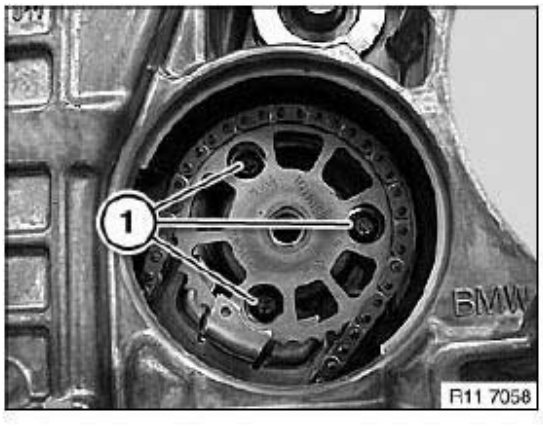


Fig. 439: Identifying Vacuum Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1178 EMISSION CONTROL, OXYGEN SENSOR

11 78 513 REPLACING BOTH OXYGEN CONTROL SENSORS (N54, N54T)

WARNING: Risk of burning!

Work should only be carried out on an exhaust system that has cooled down.

Necessary preliminary tasks:

- Remove **ACOUSTIC COVER**
- Release right **TIE ROD** from steering gear

NOTE: It is not necessary to conduct a chassis/wheel alignment check when the track rod is released.

Installation note:

If an oxygen sensor is reused, only apply a thin and uniform coat of Never Seez Compound (refer to BMW Parts Service) to thread.

The part of the oxygen control sensor which projects into the exhaust system branch (sensor ceramic) must not be cleaned or come into contact with lubricant.

Remove protective plate over steering gear.

Release screws (1) and remove protective plate (2).

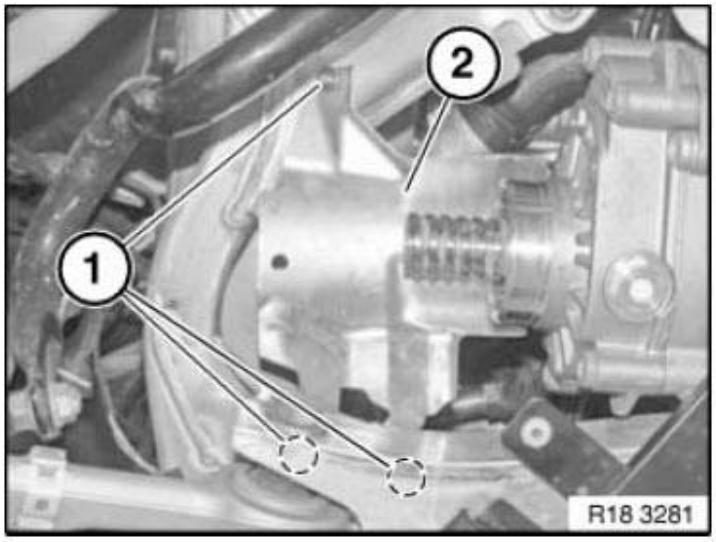


Fig. 440: Identifying Protective Plate And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection for oxygen control sensor, cylinders 1 to 3.

Release oxygen control sensor (1) with special tools **11 7 030** and **11 9 150** .

IMPORTANT: When using special tool 11 7 030 in conjunction with special tool 11 9 150 , it is essential to reduce the prescribed tightening torque by 3 Nm.

Tightening torque **11 78 1AZ** .

Installation note:

Cable color black, cylinders 1 to 3.

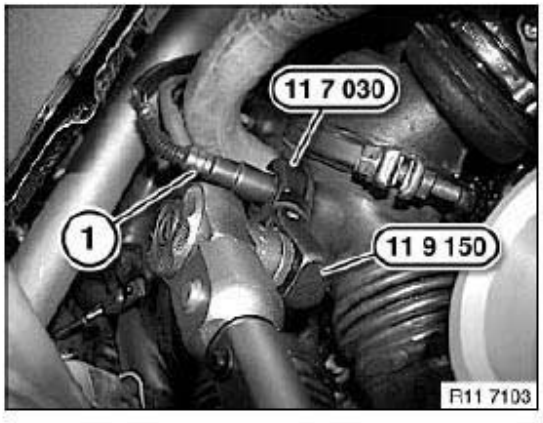


Fig. 441: Identifying Special Tool 11 7 030 And 11 9 150
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection for oxygen control sensor, cylinders 4 to 6.

Release oxygen control sensor (1) with special tools **11 7 030** and **11 9 150** .

IMPORTANT: When using special tool 11 7 030 in conjunction with special tool 11 9 150 , it is essential to reduce the prescribed tightening torque by 3 Nm.

Tightening torque **11 78 1AZ** .

Installation note:

Cable color grey, cylinders 4 to 6.

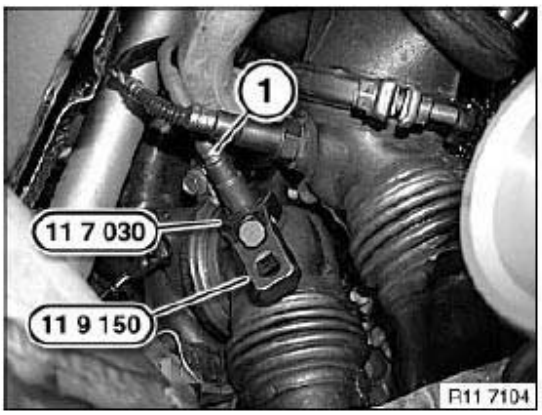


Fig. 442: Removing Oxygen Control Sensor Using Special Tools 11 7 030 And 11 9 150
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME control unit.

11 78 545 REPLACING BOTH OXYGEN MONITORING SENSORS (N54, N54T)

WARNING: Risk of burning!

Work should only be carried out on an exhaust system that has cooled down.

Necessary preliminary tasks:

- Remove rear **UNDERBODY PROTECTION**

Installation note:

If an oxygen sensor is to be reused, only apply a thin and uniform coat of Never Seez Compound (refer to BMW Parts Department) to thread.

The part of the oxygen monitoring sensor which projects into the exhaust system branch (sensor ceramic) must not be cleaned or come into contact with lubricant.

Disconnect plug connection for oxygen monitoring sensor.

Release monitoring sensor (1) with special tools **11 7 030** and **11 9 150** .

IMPORTANT: When using special tool 11 7 030 in conjunction with special tool 11 9 150 , it is essential to reduce the prescribed tightening torque by 3 Nm.

Tightening torque **11 78 1AZ** .

Installation note:

Cable color black, cylinders 1 to 3.

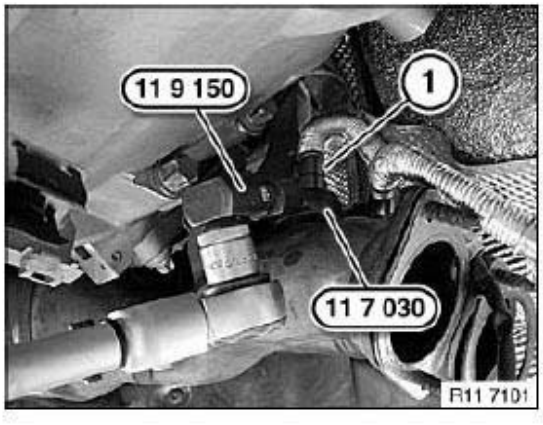


Fig. 443: Removing Monitor Sensor Using Special Tools 11 7 030 And 11 9 150
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Release insulation (2) in direction of arrow.

Disconnect plug connection for oxygen monitoring sensor.

Release monitoring sensor (1) with special tool **11 7 020** .

Tightening torque **11 78 1AZ** .

Installation note:

Cable color grey, cylinders 4 to 6.

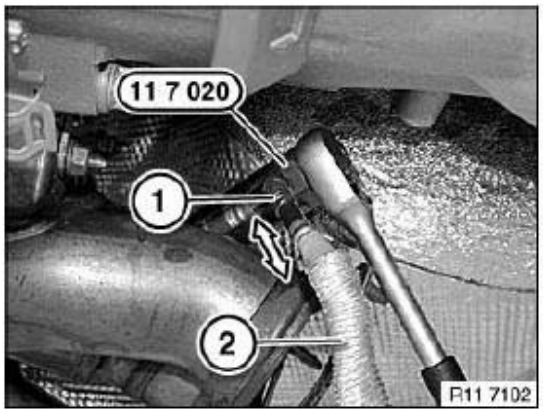


Fig. 444: Removing Insulation
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME control unit.

11 ENGINE

11-4060 ADAPTER

Adapter MW

Replaced by: 0491003

NOTE: For pressure gauge for checking the oil pressure - Replaced by 11 4 (0 491 003)

Storage Location

B9

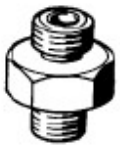
11-4050 ADAPTER

Adapter Minimum set: Mechanical tools MW

NOTE: (Adapter) For connecting pipe bend 13 6 054 to pressure gauge 13 3 061 or BMW diagnosis and information system for checking oil pressure

Storage Location

A4



W11 4 050

Fig. 1: Identifying Adapter (114050)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8330 ASSEMBLY TOOL

Assembly tool Minimum set: Mechanical tools MW

NOTE: For installing and removing connecting rod with piston

Storage Location

B47

A47

SI number

01 02 04 (069)

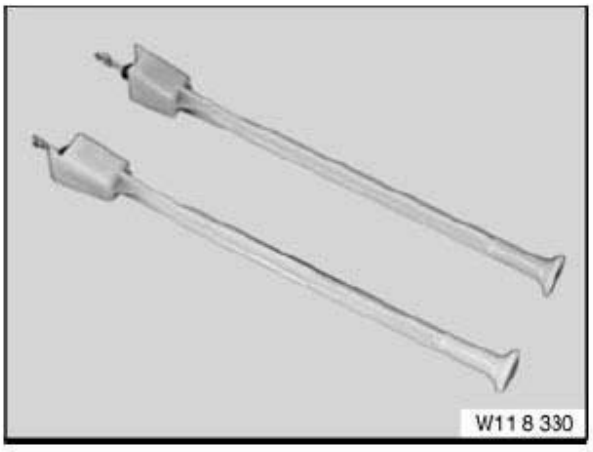


Fig. 2: Identifying Assembly Tool (118330)
Courtesy of BMW OF NORTH AMERICA, INC.

11-6380 BUSH

Bush Minimum set: Mechanical tools MW

NOTE: For fitting valve stem seal

Storage Location

B15

SI number

01 06 98 (306)

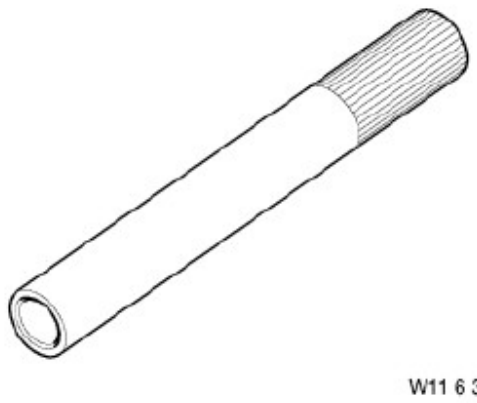


Fig. 3: Identifying Bush (116380)
Courtesy of BMW OF NORTH AMERICA, INC.

11-6260 BUSH

Bush Minimum set: Mechanical tools MW

NOTE: (Assembly bushes with case) For installing pistons of 85 mm diameter (urgently required for pistons with U-Flex ring)

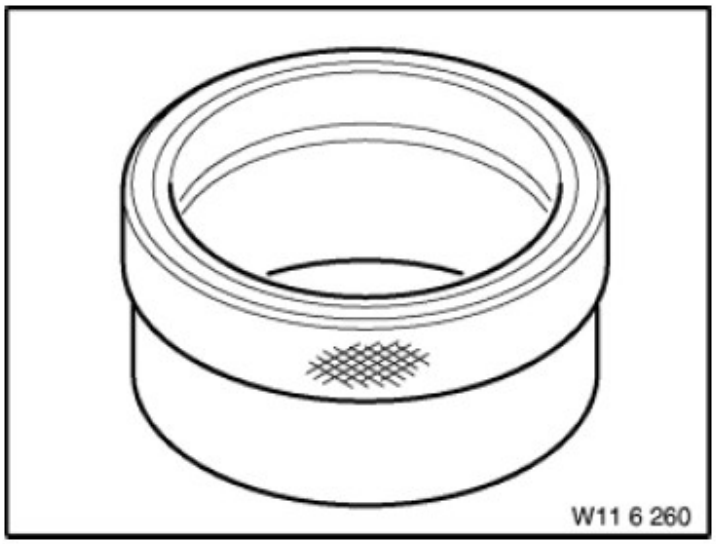


Fig. 4: Identifying Bush (116260)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

4 = 0493142 Bush

NOTE: (Assembly bush) Diameter 85.50 mm, stage 2

1 = 0493139 Bush

NOTE: (Assembly bush) Diameter 85.00 mm

2 = 0493140 Bush

NOTE: (Assembly bush) Diameter 85.08 mm, repair

3 = 0493141 Bush

NOTE: (Assembly bush) Diameter 85.25 mm, stage 1

9 = 0493323 Case

NOTE: (Case) For storing assembly bushes, gauge 11 6 270 and lever dial gauge 11 6 250

11-6240 BUSH

Bush MW

NOTE: (Assembly bush set) For fitting pistons (diameter 82 mm) with connecting rod into the crankcase. Engine: N52B25

SI number

01 02 06 (244)

Consisting of:

1 = 0495526 Bush

NOTE: (assembly bush 82.00 mm)

2 = 0495527 Bush

NOTE: (assembly bush 82.25 mm)

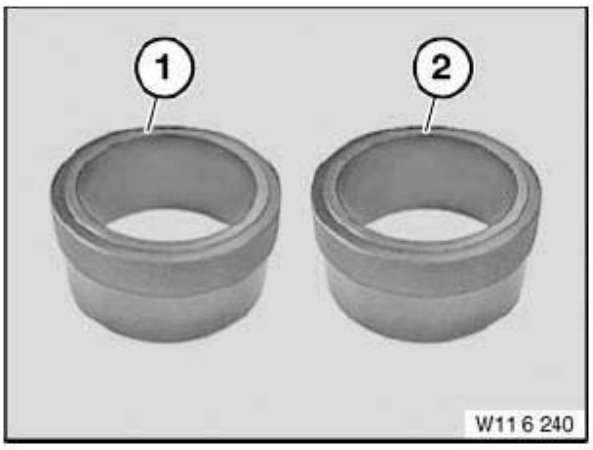


Fig. 5: Identifying Bush (116240)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0320 CLIP

Clip MW

NOTE: (Removal and fitting tool) For removing and installing cylinder head.

Storage Location

B51

SI number

01 17 04 (130)

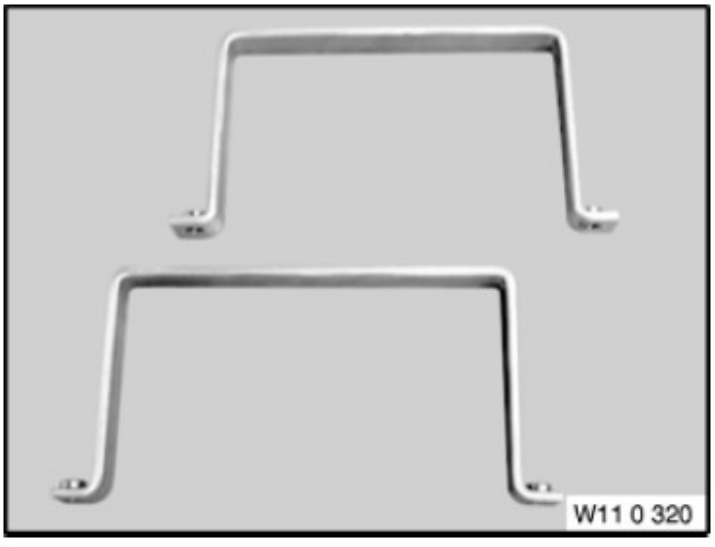


Fig. 6: Identifying Clip (110320)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0220 COMPRESSION TESTER

0490613 110220 Compression tester Minimum set: Mechanical tools MW

NOTE: (Compression pressure testing set) For all petrol and diesel engines.

SI number

01 09 92 (558)

Consisting of:

4 = 0490620 Probe

NOTE: (Test probe) For recording compression testers 11 0 224 and 11 0 160/engine: S14, S38, S50 - Replaced by 11 0 235 (0 493 129)

4 = 0490616 Card

NOTE: (Cards) 100 pieces For recording compression tester 11 0 221

4 = 0490622 Card

NOTE: (Cards) 100 pieces For recording compression tester 11 0 224

2 = 0494517 Adapter

NOTE: Measuring "absolute compression" at all cylinders. Engine: W17

2 = 0493634 Case

NOTE: With foam material insert for recording compression tester

16 = 0495279 Adapter

NOTE: M67, M67TU engine

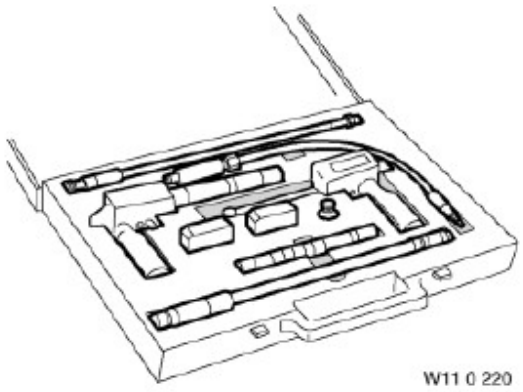


Fig. 7: Identifying Compression Tester (110220)
Courtesy of BMW OF NORTH AMERICA, INC.

4 = 0490614 Compression tester

NOTE: (Compression tester) For diesel engines.

4 = 0490615 Probe

NOTE: (Test probe) For recording compression testers 11 0 221 and 11 0 160/engine: M21, M41, M47, M51, M57, M57T2

4 = 0490617 Compression tester

NOTE: (Compression tester) For petrol engines.

4 = 0490618 Hose

NOTE: (Extension hose) For rubber tapered section with fitting 11 0 228

4 = 0490619 Probe

NOTE: (Test probe) For recording compression testers 11 0 224 and 11 0 160/engine: M10, M20, M30, M40, M42, M43, M44, M50, M52, M60, M62, M70, M73, N62, S50US, S52US, S62

4 = 0490621 Tapered section

NOTE: (Rubber tapered section) For recording compression testers 11 0 224 and 11 0 160.

4 = 0490625 Valve

NOTE: **(Non-return valve)**

4 = 0490626 Filter

NOTE: **(Filter) 3 x 3 mm**

9 = 0493129 Probe

NOTE: **(Test probe, screw-in) For measuring "absolute compression" at all cylinders, engine: S14, S38, S50B30, S50B32, S50US, S52US, S54, S85**

2 = 0493387 Probe

NOTE: **(Test probe) For recording compression tester 11 0 221 or DIS pressure sensor/engine: M47, M57, M57TU, M57T2**

11-0160 COMPRESSION TESTER

0490593 110160 Compression tester MW

Replaced by: 0490613

NOTE: **(Compression recorder) manufacturer VDO - Replaced by 11 0 220 (0 490 613)**

Consisting of:

1 = 0490594 Card

NOTE: **(Cards) For compression pressure inscriber Discontinuation and replaced by 11 0 220 (0 490 613)**

2 = 0490595 Pressure gauge

NOTE: **Compression pressure inscriber Discontinuation and replaced by 11 0 220 (0 490 613)**

3 = 0490596 Guard

NOTE: **(Rubber protection) Still available as replacement Discontinuation and replaced by 11 0 220 (0 490 613)**

4 = 0490597 Lines

NOTE: **Discontinuation and replaced by 11 0 220 (0 490 613)**

5 = 0490598 Adapter

NOTE: (test adapter for petrol engine) Engine: all, except M70 Discontinuation and replaced by 11 0 220 (0 490 613)

6 = 0490599 Adapter

NOTE: (test adapter for petrol engine) Engine: M70 Discontinuation and replaced by 11 0 220 (0 490 613)

7 = 0490600 Adapter

NOTE: (Test adapter extension) Discontinuation and replaced by 11 0 220 (0 490 613)

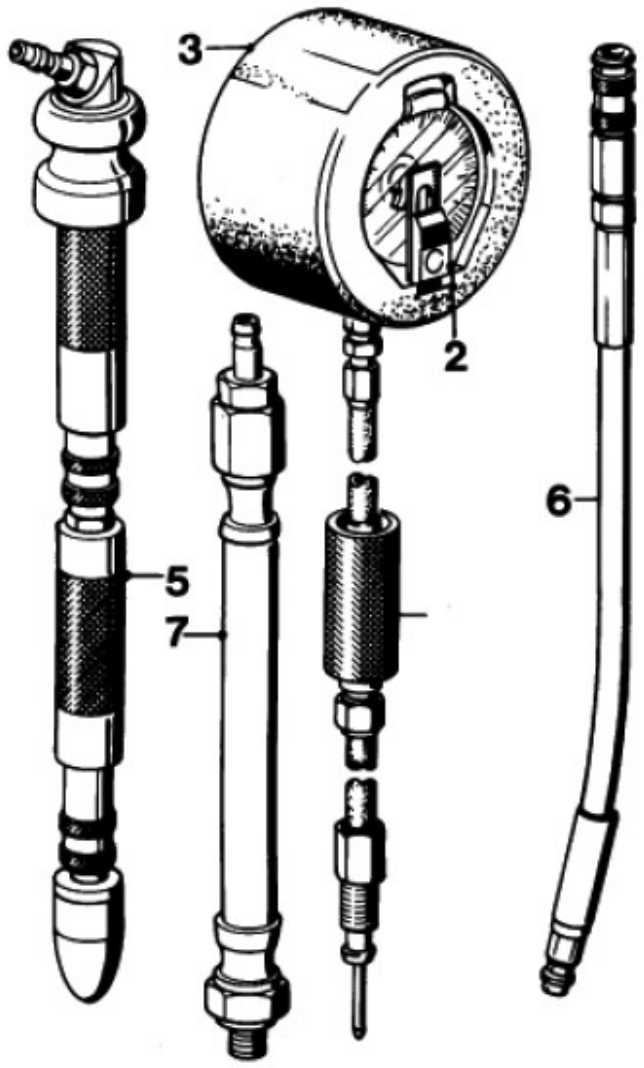


Fig. 8: Identifying Compression Tester (110160)
Courtesy of BMW OF NORTH AMERICA, INC.

11-7110 DEVICE

0496671 117110 Device MW

NOTE: For removing and installing throttle return springs for intermediate levers.

SI number

01 18 09 (578)

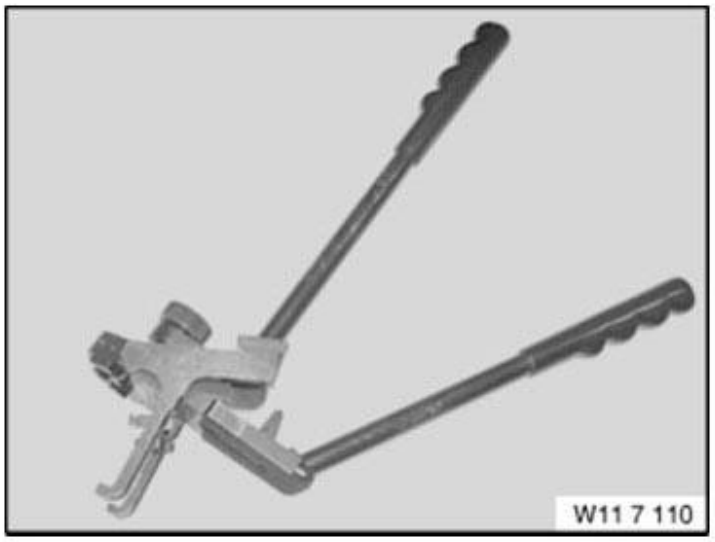


Fig. 9: Identifying Device (117110)
Courtesy of BMW OF NORTH AMERICA, INC.

11-2110 DEVICE

0490826 112110 Device MW

Replaced by: 0490504

NOTE: For retightening the connecting rod and cylinder head bolts - Replaced by 00 9 120 (0 490 504)

Consisting of:

1 = 0490827 Extension

NOTE: (Extension 1/1") Replaced by 00 9 120 (0 490 504)

2 = 0490828 Washer

NOTE: (Graduated disc 180°) Replaced by 00 9 120 (0 490 504)

3 = 0490829 Sleeve

NOTE: (Guide sleeve) Replaced by 00 9 120 (0 490 504)

4 = 0490830 Nut

NOTE: (Knurled nut) Replaced by 00 9 120 (0 490 504)

5 = 0490831 Wrench socket

NOTE: (Socket wrench insert WAF 10) Replaced by 00 9 120 (0 490 504)

6 = 0490832 Washer

NOTE: (Graduated disc up to 270°) Replaced by 00 9 120 (0 490 504)

7 = 0490833 Tab

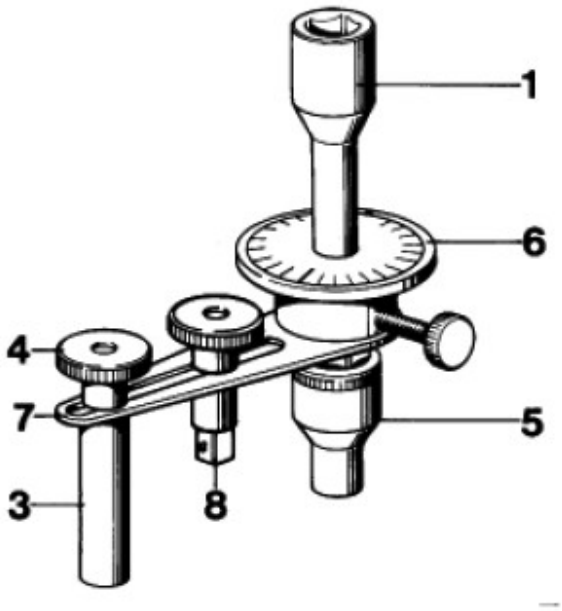


Fig. 10: Identifying Device (112110)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For counter-holding on the cylinder head Replaced by 00 9 120 (0 490 504)

8 = 0490834 Adapter

NOTE: (Adapter) Replaced by 00 9 120 (0 490 504)

11-4450 DEVICE

0495049 114450 Device Minimum set: Mechanical tools MW

NOTE: (Locating fixture) For securing sliding blocks during installation.

Storage Location

A52

SI number

01 17 04 (130)

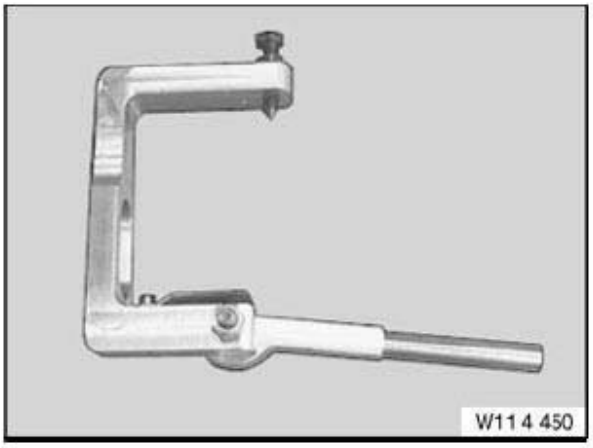


Fig. 11: Identifying Device (114450)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4340 DEVICE

0495014 114340 Device MW

NOTE: (Pressure testing fixture) For pressure-testing cylinder head.

SI number

01 17 04 (130)

Consisting of:

2 = 0495016 Plate

NOTE: **(Plate with thrust piece)**

1 = 0495015 Plate

NOTE: **(base plate with seal)**

3 = 0495017 Hose

NOTE: **(Hose with air connection)**

4 = 0495724 Plate

NOTE: **(Adapter plate with valve) N54**

5 = 0495725 Screw

NOTE: **(set of screws)N54**

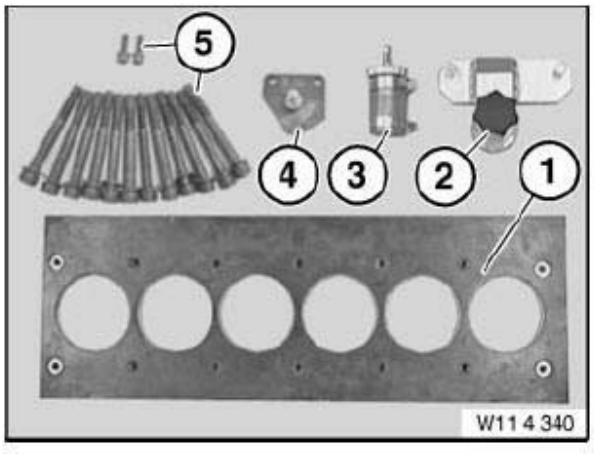


Fig. 12: Identifying Device (114340)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4370 DEVICE

0495024 114370 Device MW

NOTE: **(pressing fixture) For pressing out sealant for bedplate.**

Storage Location

A52

SI number

01 17 04 (130)



Fig. 13: Identifying Device (114370)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9000 DEVICE

0494362 119000 Device Minimum set: Mechanical tools MW

NOTE: (Cylinder head expander tool)

Storage Location

Individual

SI number

01 03 02 (833)

Consisting of:

17 = 0495028 Cage

NOTE: (Valve spring cage) Engine N52

1 = 0494366 Device

5 = 0494370 Quick fastener

7 = 0494372 Shaped part

NOTE: (Shaped part)

8 = 0494373 Shaped part

NOTE: (Shaped part) Shaped part made of plastic

9 = 0494374 Lever

2 = 0494367 Rod

3 = 0494368 Adapter

NOTE: (Sliding block)

4 = 0494369 Tab

6 = 0494371 Insert

NOTE: (Aluminum strip)

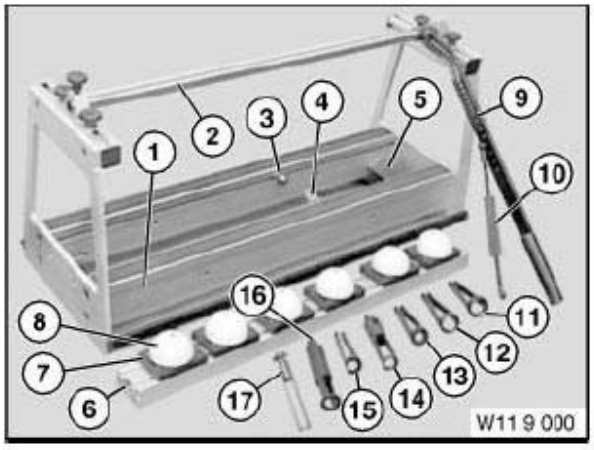


Fig. 14: Identifying Device (119000)
Courtesy of BMW OF NORTH AMERICA, INC.

10 = 0494375 Hook

11 = 0494376 Cage

NOTE: (Valve spring cage) Engine M41, M51, S50

12 = 0494377 Cage

NOTE: (Valve spring cage) Engine M43, M73

13 = 0494378 Cage

NOTE: (Valve spring cage) Engine M44, M52, M54, M56, M62, S52, S54, S62

14 = 0494379 Cage

NOTE: (Valve spring cage) Engine M47, M47TU, M57, M57TU, N40, N42, N62, N73

15 = 0494380 Cage

NOTE: (Valve spring cage) Engine M21, M40

11-4270 DEVICE

0495003 114270 Device Minimum set: Mechanical tools MW

Replaced by: 0496671

NOTE: (Assembly and disassembly tool) For removing and installing pressure spring for intermediate lever. Is replaced by 11 7 110 (0 496 671)

Storage Location

C51

B51

SI number

01 17 04 (130)

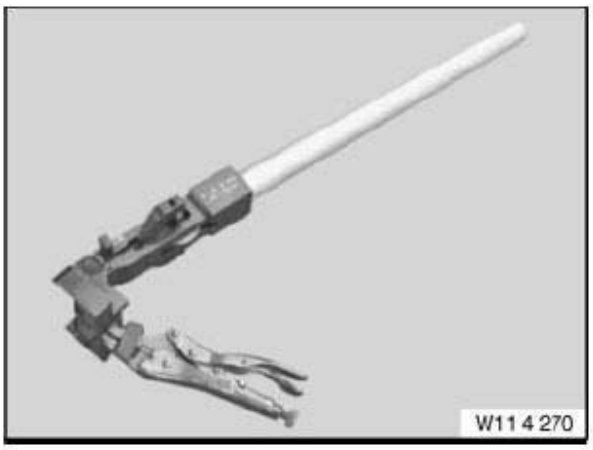


Fig. 15: Identifying Device (114270)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4080 DEVICE

0491008 114080 Device MW

Replaced by: 0491007

NOTE: For installation of the dipstick guide tube - Replaced by 11 4 070 (0 491 007)

11-9340 DEVICE

0493971 119340 Device Minimum set: Mechanical tools MW

NOTE: (Device) For tensioning timing chain when adjusting timing

Storage Location

B43

SI number

01 01 01 (662)

Consisting of:

1 = 0494032 Bolt

2 = 0494033 Spindle

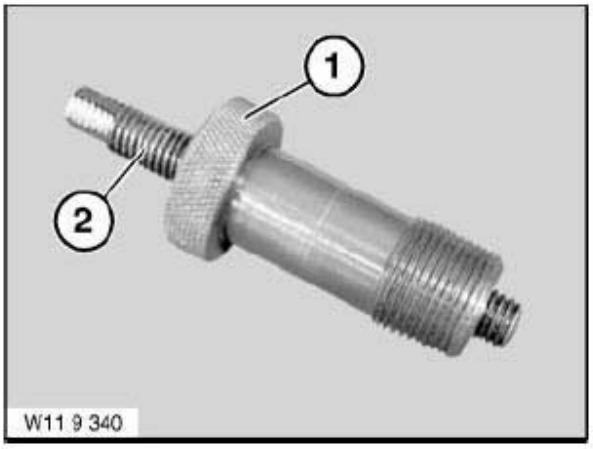


Fig. 16: Identifying Device (119340)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4360 DEVICE

0495019 114360 Device Minimum set: Mechanical tools MW

NOTE: **(Removal and mounting device) For removal and installation of cover of vacuum pump.**

SI number

01 17 04 (130)

Consisting of:

2 = 0495021 Adapter

NOTE: **(Adapter with knurled screw)**

1 = 0495020 Clip

3 = 0495022 Spindle

NOTE: **(pressure spindle)**

4 = 0495023 Spindle

NOTE: **(Drawing spindle)**

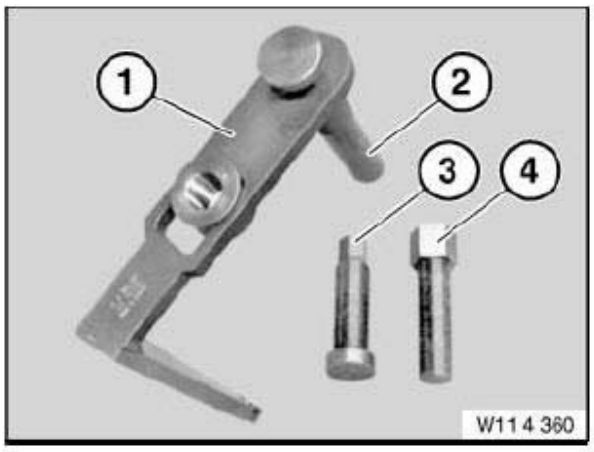


Fig. 17: Identifying Device (114360)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4460 DEVICE

0495050 114460 Device Minimum set: Mechanical tools MW

NOTE: **(Locating device) For locating the upper and lower bearing strips when installing the exhaust camshaft.**

SI number

01 17 04 (130)

Consisting of:

1 = 0495099 Tool

NOTE: (Press-down tool, 2nd cylinder)

2 = 0495100 Bolt

NOTE: (Screws M7 (2 pieces))

3 = 0495101 Synchronizing key

NOTE: (Synchronizing keys 6 pieces)

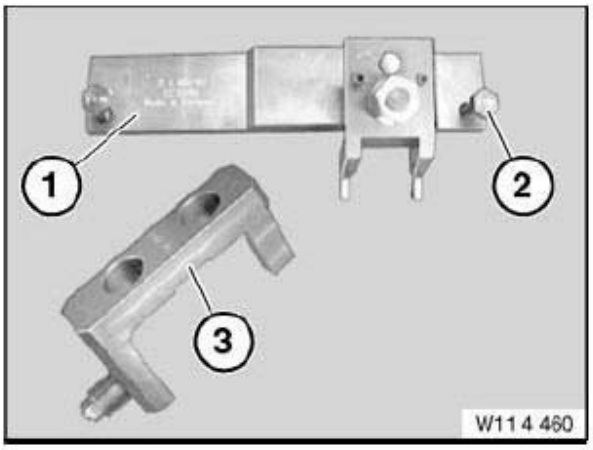


Fig. 18: Identifying Device (114460)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9150 EXTENSION

0493751 119150 Extension Minimum set: Mechanical tools MW

NOTE: (Socket wrench extension) For loosening and tightening the oxygen sensor

Storage Location

A42

SI number

01 15 00 (609)

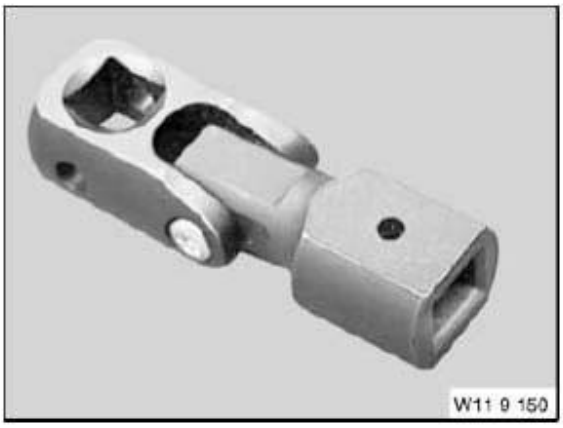


Fig. 19: Identifying Extension (119150)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9200 EXTRACTOR

0493933 119200 Extractor Minimum set: Mechanical tools MW

NOTE: For RSS out of engine block at rear

Storage Location

C43

SI number

01 01 01 (662)



Fig. 20: Identifying Extractor (119200)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9220 EXTRACTOR

0493934 119220 Extractor Minimum set: Mechanical tools MW

NOTE: For radial shaft seal out of engine block at front

Storage Location

C43

SI number

01 01 01 (662)

Consisting of:

1 = 0494040 Bolt

NOTE: Replaced by 11 9 225 (0 496 261)

1 = 0494041 Bolt

NOTE: (screws (6 pieces))

1 = 0494039 Synchronizing key

4 = 0494042 Bolt

NOTE: (Screws (3 pieces))

5 = 0496261 Bolt

6 = 0496262 Puller

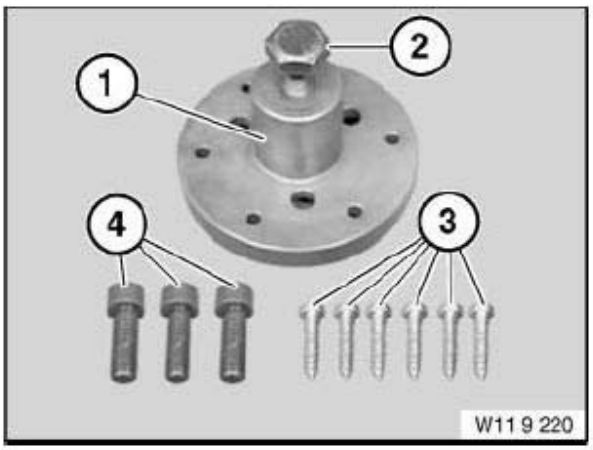


Fig. 21: Identifying Extractor (119220)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0340 FITTING AID

0490646 110340 Fitting aid MW

Replaced by: 0494362

NOTE: (fitting accessories) For removing and fitting the valve springs. Replaced by 11 9 000 (0 494 362)

SI number

01 12 93 (701)

Consisting of:

3 = 0490649 Hook

NOTE: (hook) Length 220 mm - Engine: all, except M10 Replaced by 11 9 000 (0 494 362)

5 = 0490651 Cage

NOTE: (Valve spring cage) Engine: M44, M52, M62, S62, S54 Replaced by 11 9 000 (0 494 362)

1 = 0490647 Cage

NOTE: (Valve spring cage) Engine: M43, M73

2 = 0490648 Lever

NOTE: (compression lever) Engine: all, except M10

6 = 0493285 Cage

NOTE: (Valve spring cage) Engine: M47, M47TU, M57, N40, N42, M67, M67TU

4 = 0490650 Cage

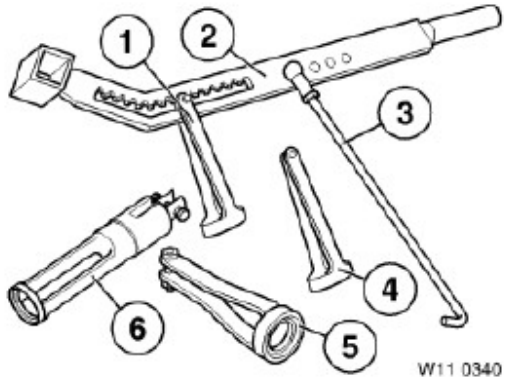


Fig. 22: Identifying Fitting Aid (110340)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: (valve spring cage) Replaced by 11 0345, engine: M52

11-1240 FITTING AID

0496084 111240 Fitting aid Minimum set: Mechanical tools MW

NOTE: (installation set) For installing elasto-belt.

SI number

01 01 07 (333)

Consisting of:

1 = 0496085 Fitting aid

NOTE: (Mounting tool)

2 = 0496086 Guard

NOTE: (Belt guard)

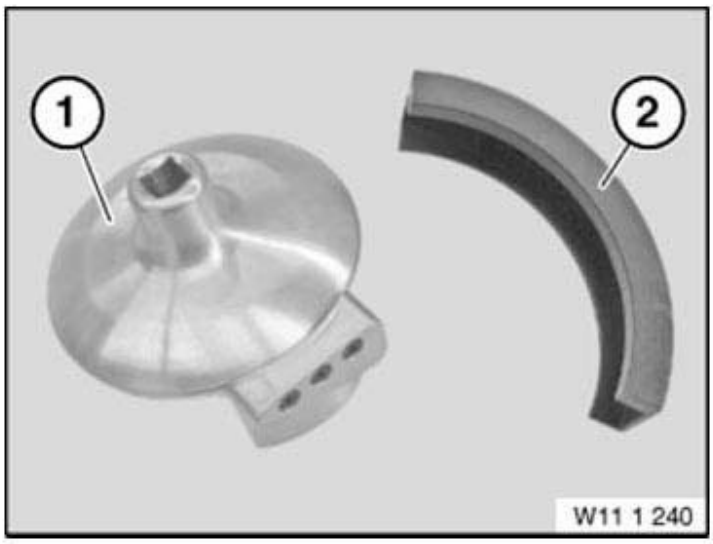


Fig. 23: Identifying Fitting Aid (11-1240)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4290 Gauge

0495008 114290 Gauge Minimum set: Mechanical tools MW

NOTE: For disconnecting camshaft sensor gears.

Storage Location

A52

A51

SI number

01 17 04 (130)

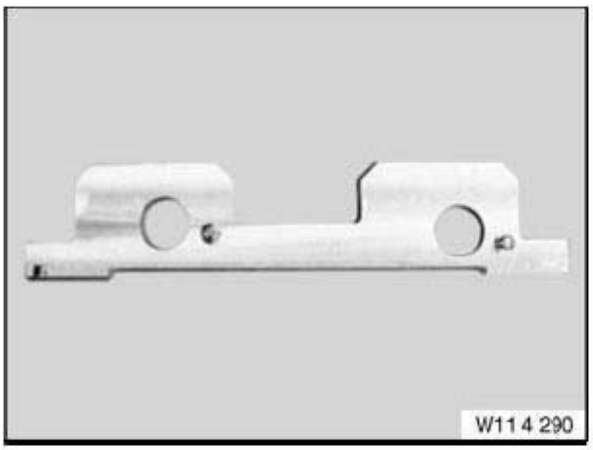


Fig. 24: Identifying Fitting Aid (11-1240)
Courtesy of BMW OF NORTH AMERICA, INC.

11-7440 GAUGE

0496942 117440 Gauge Minimum set: Mechanical tools MW

NOTE: For fixing the camshaft at the top dead center.

SI number

01 07 10 (634)

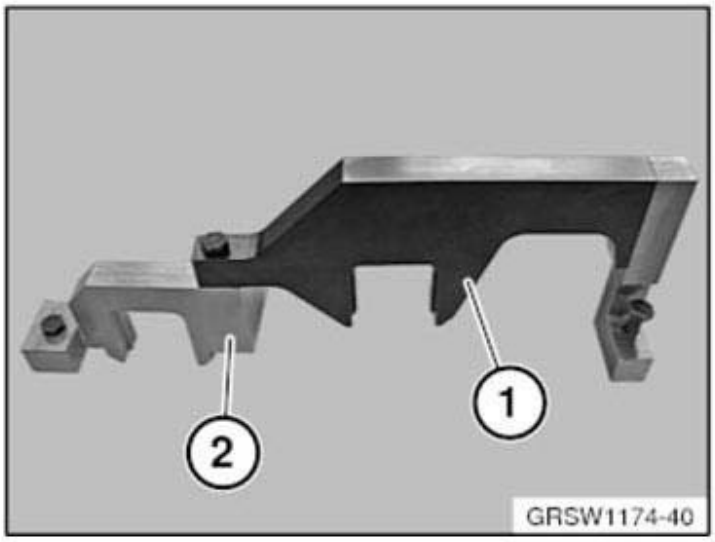


Fig. 25: Identifying Gauge (117440)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4280 GAUGE

0495004 114280 Gauge Minimum set: Mechanical tools MW

NOTE: For locating camshaft in TDC setting.

Storage Location

B52

SI number

01 17 04 (130)

Consisting of:

4 = 0495723 Bolt

NOTE: (Set of screws M6) Engine: N54

1 = 0495005 Gauge

2 = 0495006 Adapter

3 = 0495007 Retaining bracket

5 = 0496673 Bridge

NOTE: For securing camshaft at TDC.

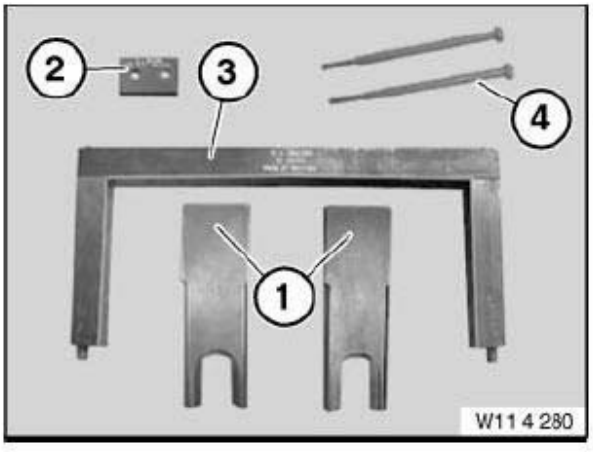


Fig. 26: Identifying Gauge (114280)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4250 GAUGE

0494999 114250 Gauge Minimum set: Mechanical tools MW

NOTE: (Gauge with adapter plate) For securing the oil spray nozzles.

SI number

01 17 04 (130)

Consisting of:

1 = 0495000 Gauge

2 = 0495001 Plate

NOTE: (Adapter plate)

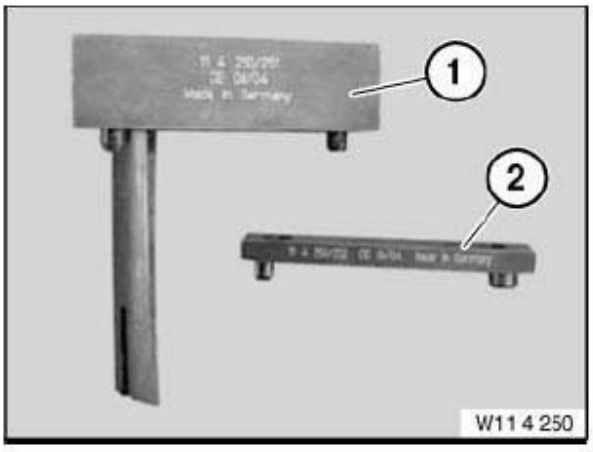


Fig. 27: Identifying Gauge (114250)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9260 HOLDER

0493938 119260 Holder Minimum set: Mechanical tools MW

NOTE: (Counter support with screw connection) For holding the flywheel when gearbox is removed

Storage Location

B43

SI number

01 01 01 (662)

Consisting of:

1 = 0494034 Holder

NOTE: (Individual counter support)

2 = 0494035 Screw

NOTE: (Bolt (thread M10) with washer) For screwing counter support

3 = 0494129 Bush

NOTE: (Bush for counter support) For counter support, for retaining flywheel when gearbox is removed Engine: N62, N73

4 = 0494130 Screw

NOTE: (Bolt (thread M12)) For counter support for retaining flywheel when gearbox is removed

5 = 0494793 Bush

6 = 0495216 Bush

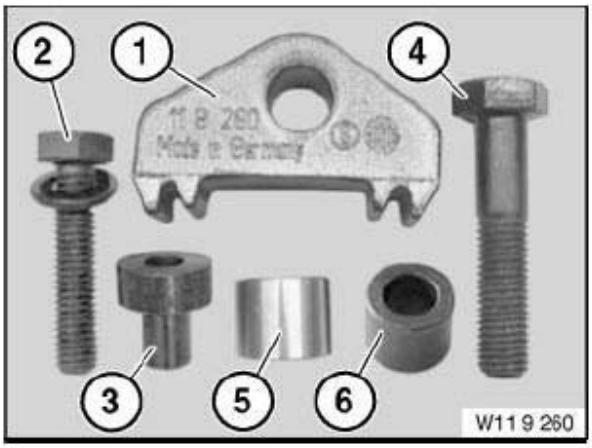


Fig. 28: Identifying Holder (119260)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For counter support, for retaining flywheel when gearbox is removed Engine: M57TU2

11-8180 HOLDER

0493587 118180 Holder Minimum set: Mechanical tools MW

NOTE: (Counter support) Blocking flywheel when releasing and tightening down central bolts on vibration absorber

Storage Location

C45

C46

SI number

01 12 99 (452)

Consisting of:

1 = 0494432 Basic body

NOTE: (Basic body) E65/M67, E38/M67 Discontinuation Replaced by 11 8 183 (0 494 434)

2 = 0494433 Shaped part

NOTE: (Shaped part)

3 = 0494434 Basic body

4 = 0494435 Adapter

NOTE: E65/M67

5 = 0494716 Adapter

NOTE: (Adapter with adjusting sleeve) E46 M47TU

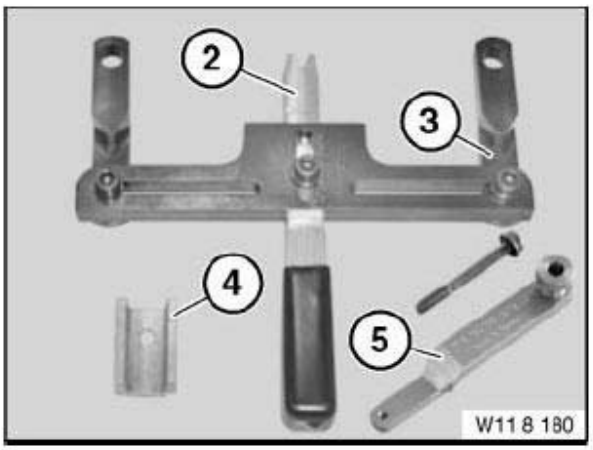


Fig. 29: Identifying Holder (118180)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9280 HOLDER

0493940 119280 Holder Minimum set: Mechanical tools MW

NOTE: (Counter support) For the crankshaft when releasing/tightening the central bolt

Storage Location

B43

C43

A43

SI number

01 01 01 (662)

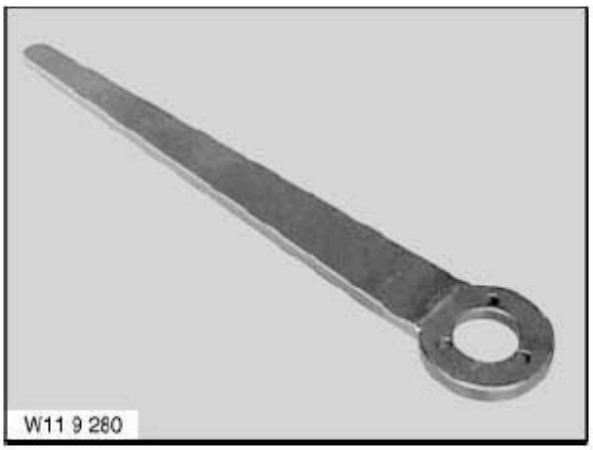


Fig. 30: Identifying Holder (119280)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9811 HOLDER

11 9 811 Holder

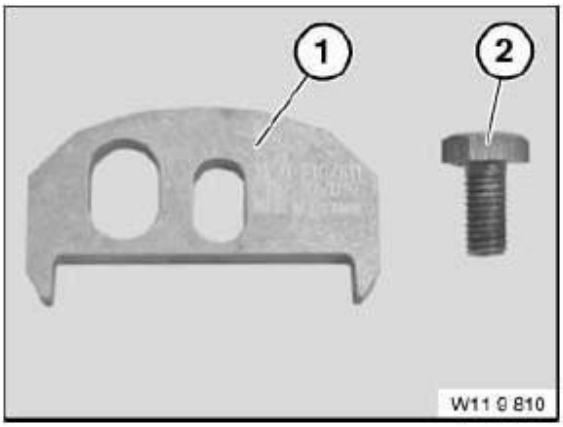


Fig. 31: Identifying Holder (119811)
Courtesy of BMW OF NORTH AMERICA, INC.

11-2220 HOLDER

0490853 112220 Holder MW

Replaced by: 0490855

NOTE: (Counter support) - Nov. 88 Replaced by 11 2 240 (0 490 855)

11-4491 HOLDER

0495010 114491 Holder MW

NOTE: **(Installation bracket)**

Storage Location

A51

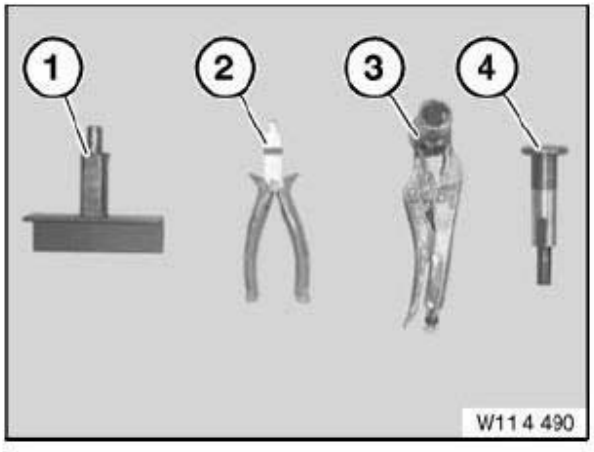


Fig. 32: Identifying Holder (114491)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0290 HOLDER

0495071 110290 Holder Minimum set: Mechanical tools MW

NOTE: **(Counter support) For removing and installing triangular drive (vacuum pump) on crankcase.**

Storage Location

A52

SI number

01 17 04 (130)



Fig. 33: Identifying Holder (110290)
Courtesy of BMW OF NORTH AMERICA, INC.

11-5463 INSTALLATION DRIFT

11 5 463 Installation drift

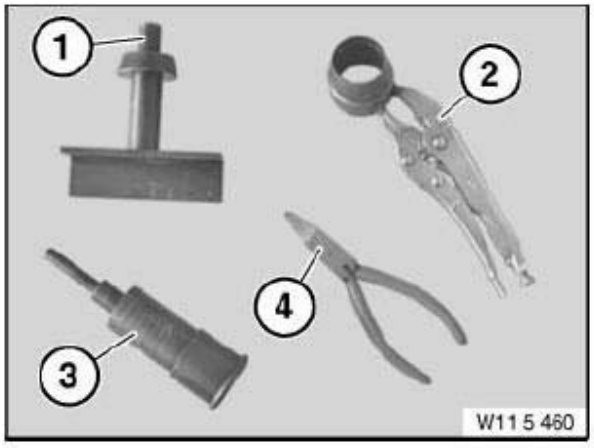


Fig. 34: Identifying Installation Drift (115463)
Courtesy of BMW OF NORTH AMERICA, INC.

11-5461 INSTALLATION HOLDER

11 5 461 Installation holder

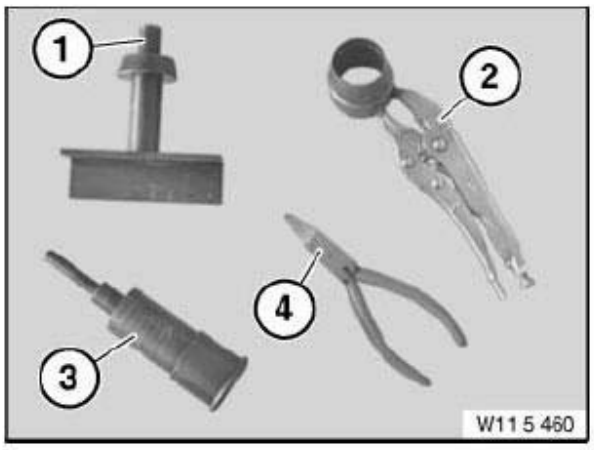


Fig. 35: Identifying Installation Holder (115461)
Courtesy of BMW OF NORTH AMERICA, INC.

11-5462 INSTALLATION PLIERS

11 5 462 Installation pliers

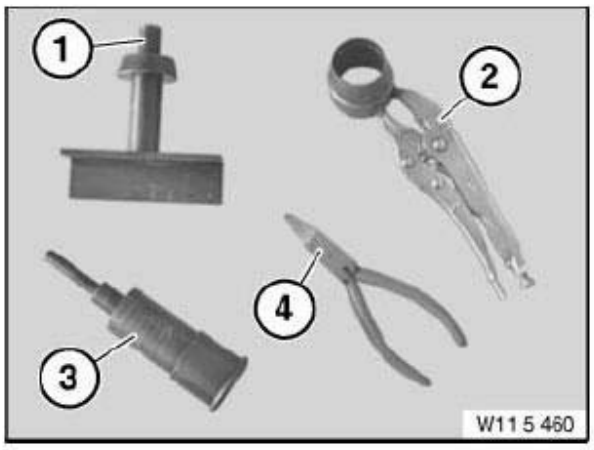


Fig. 36: Identifying Installation Pliers (115462)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0070 LIFTING GEAR

0490579 110070 Lifting gear Minimum set: Mechanical tools MW

NOTE: (Lifting gear) For removing and installing engines

SI number

01 16 96 (107)

Consisting of:

4 = 0493753 Shackle

NOTE: (Shackle) 2 x

1 = 0490580 Lifting gear

NOTE: (cross-member)

2 = 0490581 Chain

NOTE: (Chain) Version: long

3 = 0490582 Chain

NOTE: (Chain) Version: short

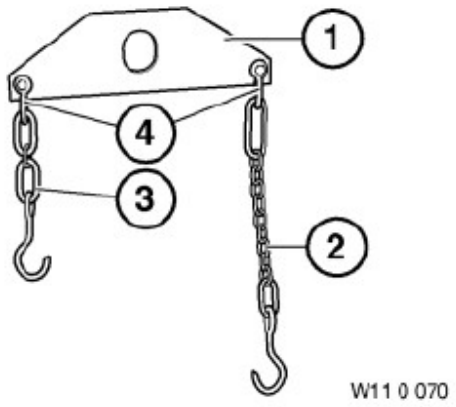


Fig. 37: Identifying Lifting Gear (110070)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0000 LIFTING GEAR

0490561 110000 Lifting gear Minimum set: Mechanical tools MW

NOTE: (Hoist) For removing and installing engines.

SI number

01 13 94 (888)

Consisting of:

1 = 0490562 Lifting gear

NOTE: (Cross-member)

2 = 0490563 Chain

NOTE: (Chain) Version: long

3 = 0490564 Chain

NOTE: (Chain) Version: short

4 = 0490565 Shackle

NOTE: (Shackle) 2 x

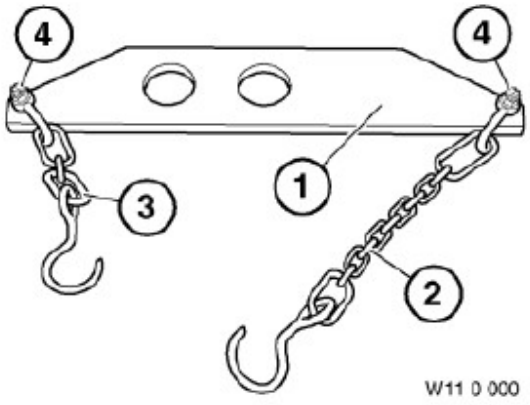


Fig. 38: Identifying Lifting Gear (110000)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0020 LIFTING GEAR

0490567 110020 Lifting gear Minimum set: Mechanical tools MW

NOTE: For removing and installing engines.

SI number

01 13 94 (888)

Consisting of:

1 = 0490568 Lifting gear

NOTE: **(Cross-member)**

2 = 0490569 Chain

NOTE: **(Chain)**

3 = 0490570 Chain

NOTE: **(Chain) Version: long**

4 = 0490571 Chain

NOTE: **(Chain) Version: short**

5 = 0490572 Shackle

NOTE: **(Shackle) 2 pieces**

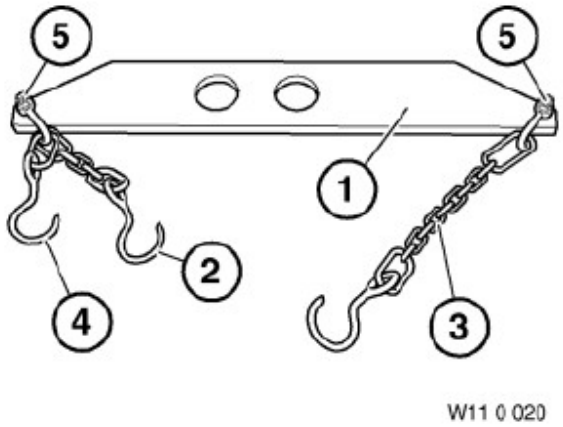


Fig. 39: Identifying Lifting Gear (110020)
Courtesy of BMW OF NORTH AMERICA, INC.

11-1310 MANDREL

0490739 111310 Mandrel MW

NOTE: **(Drift) For driving needle bearing out of crankcase (M20) and pressing out propeller shaft centering mount**



W11 1 310

Fig. 40: Identifying Mandrel (111310)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9360 MANDREL

0493973 119360 Mandrel Minimum set: Mechanical tools MW

NOTE: For driving valve into engine block (sealing compound)

Storage Location

A43

SI number

01 01 01 (662)

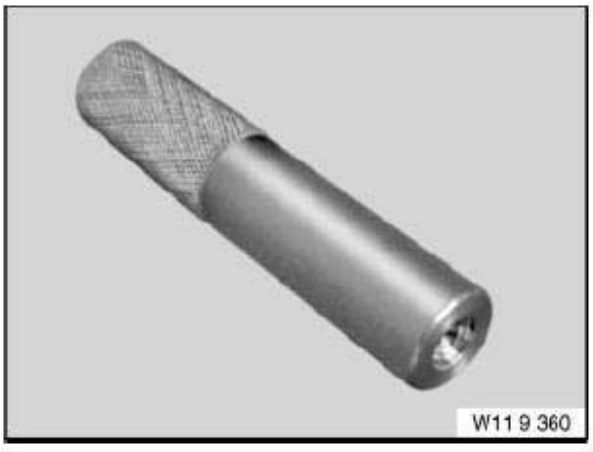


Fig. 41: Identifying Mandrel (119360)
Courtesy of BMW OF NORTH AMERICA, INC.

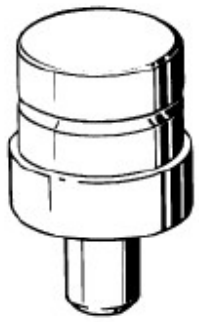
11-2030 MANDREL

0490818 112030 Mandrel Minimum set: Mechanical tools MW

NOTE: **(drift) For driving guide bearing into crankshaft (S14, S38, M10, M20, M21, M30, M40, M42, M50, M51 M52) and driving centering mount into propeller shaft**

Storage Location

A15



W11 2 030

Fig. 42: Identifying Mandrel (112030)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4494 MANDREL

0495013 114494 Mandrel MW

NOTE: **(Installation drift)**

Storage Location

A51

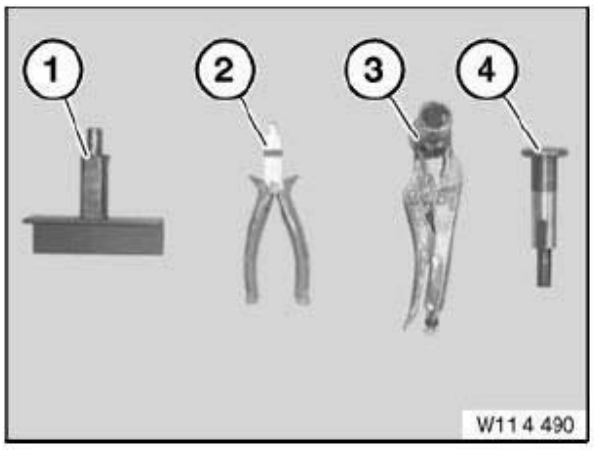


Fig. 43: Identifying Mandrel (114494)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0300 MANDREL

0495070 110300 Mandrel Minimum set: Mechanical tools MW

NOTE: (Alignment pin) For securing the flywheel at the TDC setting

Storage Location

A52

SI number

01 17 04 (130)

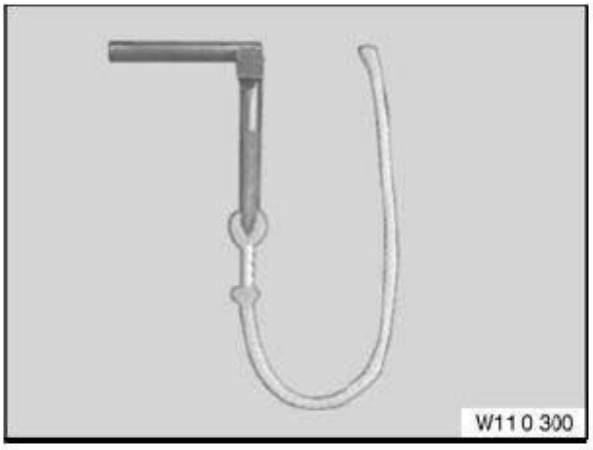


Fig. 44: Identifying Mandrel (110300)
Courtesy of BMW OF NORTH AMERICA, INC.

11-1170 MANDREL

0490721 111170 Mandrel MW

NOTE: (Mandrel) Replaced by 11 1 200

11-1190 MANDREL

0490723 111190 Mandrel MW

NOTE: (Drift) Replaced by 11 1 200

11-1140 MANDREL

0490718 111140 Mandrel MW

Replaced by: 0490724

NOTE: (Drift) Replaced by 11 1 200 (0 490 724)

11-4480 ODDMENTS TRAY

0495105 114480 Oddments tray Minimum set: Mechanical tools MW

NOTE: (Boards (2 pieces)) For setting down the individual components of the cylinder head.

SI number

01 17 04 (130)

Consisting of:

1 = 0495106 Oddments tray

NOTE: (Board for intake side)

2 = 0495107 Oddments tray

NOTE: (Board for exhaust side)

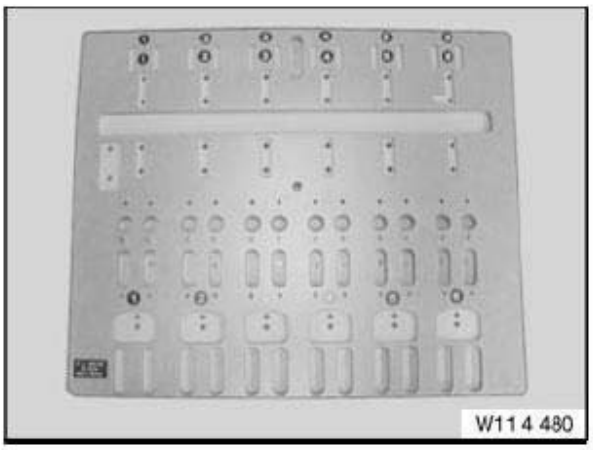


Fig. 45: Identifying Oddments Tray (114480)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9240 OIL FILTER WRENCH

0493936 119240 Oil filter wrench Minimum set: Mechanical tools MW

NOTE: **For unfastening and tightening oil filter cover**

Storage Location

A43

SI number

01 01 01 (662)



Fig. 46: Identifying Oil Filter Wrench (119240)
Courtesy of BMW OF NORTH AMERICA, INC.

11-3340 PIN

0490973 113340 Pin Minimum set: Mechanical tools MW

NOTE: **(lock pin (2 pieces)) For retaining the chain tensioner piston (e.g. when removing and installing the cylinder head) and to lock the drive belt tensioner**

Storage Location

B5

C5

SI number

01 09 91 (416)

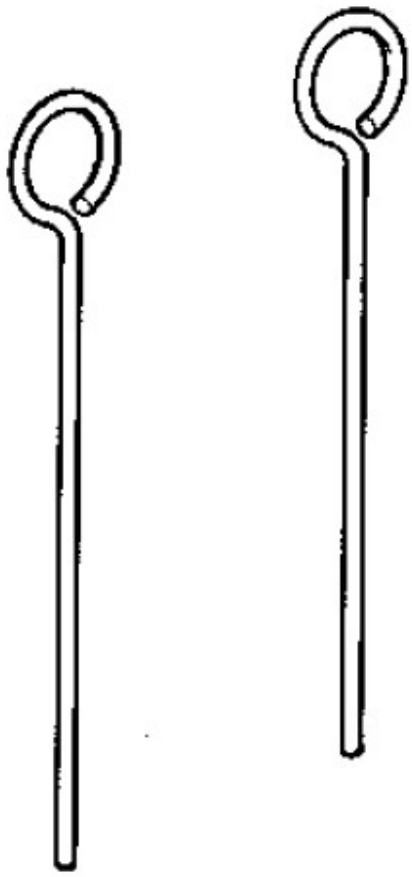


Fig. 47: Identifying Pin (113340)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4120 PIN

0491012 114120 Pin Minimum set: Mechanical tools MW

NOTE: **(lock pin) For chain tensioners, for locking the chain tensioner piston (e.g. during cylinder head removal and fitting)**

Storage Location

B5

C5

SI number

01 12 93 (701)



W 11 4 120

Fig. 48: Identifying Pin (114120)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8540 PLATE

0495736 118540 Plate MW

NOTE: (Fixture) For mounting engine on assembly stand.

SI number

01 20 06 (299)

Consisting of:

1 = 0495737 Fixture

NOTE: (Engine mount)

2 = 0495738 Screw

NOTE: (Set of screws (4 x))

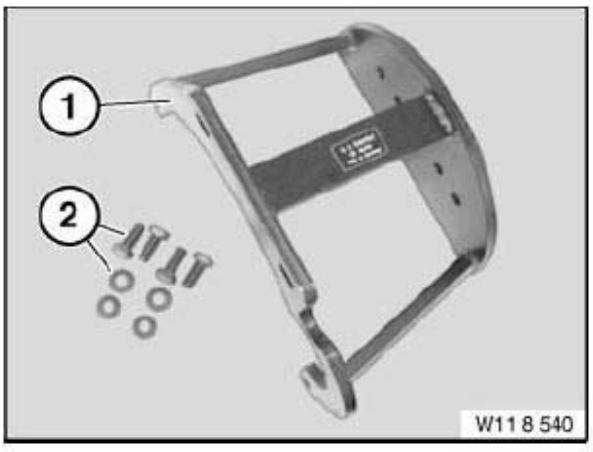


Fig. 49: Identifying Plate (118540)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4440 PLATE

0495048 114440 Plate MW

Replaced by: 0495736

NOTE: (Fixture) For mounting engine on assembly stand. Is replaced by 11 8 540 (0 495 736)

SI number

01 17 04 (130)

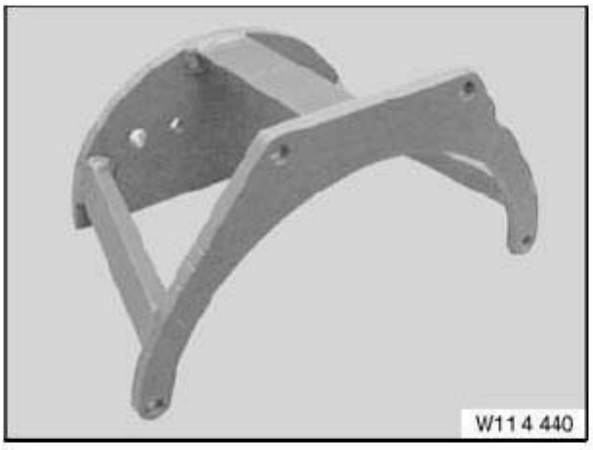


Fig. 50: Identifying Plate (114440)
Courtesy of BMW OF NORTH AMERICA, INC.

11-2090 PLIERS

0490824 112090 Pliers MW

Replaced by: 0490796

NOTE: For removal of the valve stem seals - Replaced by 11 1 480 (0 490 796)

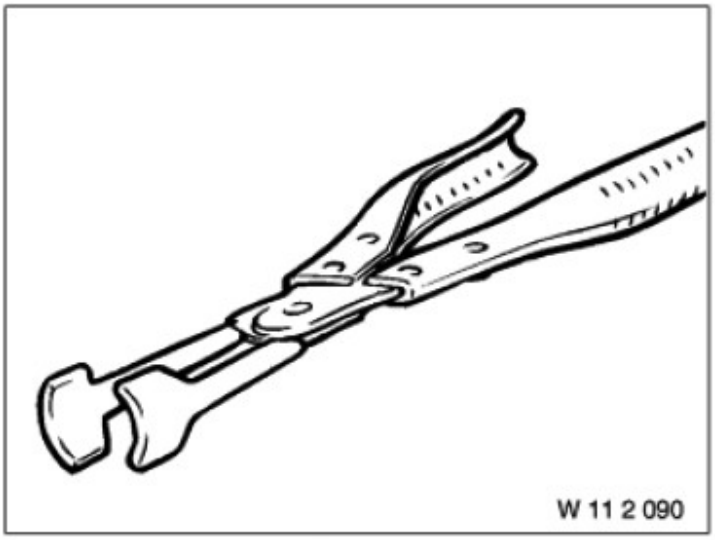


Fig. 51: Identifying Pliers (112090)
Courtesy of BMW OF NORTH AMERICA, INC.

11-1250 PLIERS

0490728 111250 Pliers MW

Replaced by: 0490796

NOTE: For removing and installing the valve stem seal. Only free for motorcycle! Replaced by 11 1 480 (0 490 796)

11-1480 PLIERS

0490796 111480 Pliers Minimum set: Mechanical tools MW

NOTE: For removing valve stem seal

Storage Location

B10

SI number

01 01 93 (621)

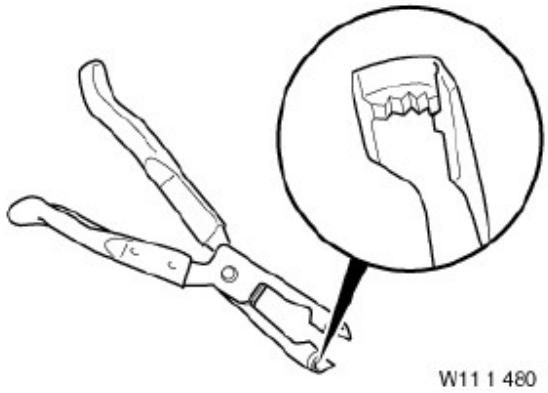


Fig. 52: Identifying Pliers (111480)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4492 PLIERS

0495011 114492 Pliers MW

NOTE: (Removal pliers)

Storage Location

A51

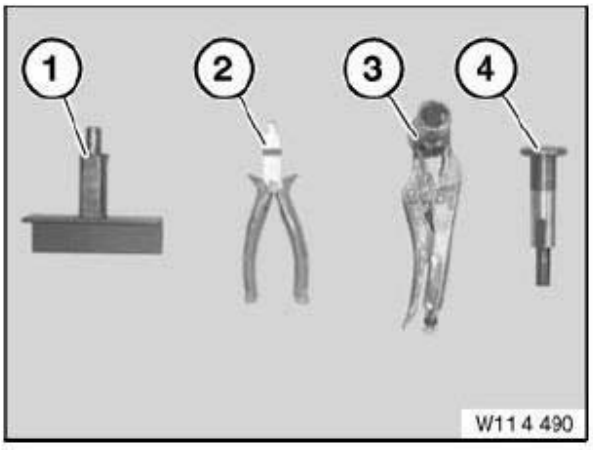


Fig. 53: Identifying Pliers (114492)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4493 PLIERS

0495012 114493 Pliers MW

NOTE: (Installation pliers)

Storage Location

A51

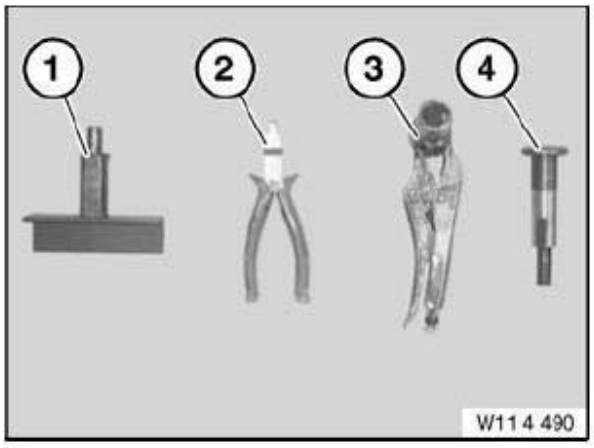


Fig. 54: Identifying Pliers (114493)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4430 PLUG

0495027 114430 Plug Minimum set: Mechanical tools MW

NOTE: (Seal plugs (2x)) For sealing off oil holes in oil pump.

Storage Location

A52

SI number

01 17 04 (130)



Fig. 55: Identifying Plug (114430)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0370 PULLER

0496266 110370 Puller Minimum set: Mechanical tools MW

NOTE: For removing front radial shaft seal.

Storage Location

C23

SI number

01 15 07 (390)

Consisting of:

1 = 0496275 Bell housing

NOTE: (thread housing)

2 = 0496276 Spindle

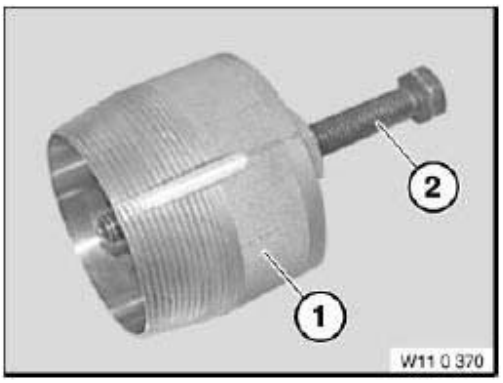


Fig. 56: Identifying Puller (110370)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8530 REMOVAL AND FITTING AID

0495728 118530 Removal and fitting aid Minimum set: Mechanical tools MW

NOTE: (Removal and mounting tool) For removal and installation of sealing cap of vacuum pump.

SI number

01 20 06 (299)

Consisting of:

8 = 0496704 Bush

In conjunction with: 11 8 530

1 = 0495729 Plate

NOTE: (Base plate)

2 = 0495730 Plate

NOTE: (Pressure plate)

3 = 0495731 Spindle

NOTE: (Spindle (pressure plate))

4 = 0495732 Spindle

NOTE: (Spindle (removal plate))

5 = 0495733 Screw

NOTE: (Set of screws M10 (N54))

6 = 0495734 Screw

NOTE: (Set of screws M11 incl. sleeve (N53))

7 = 0495735 Plate

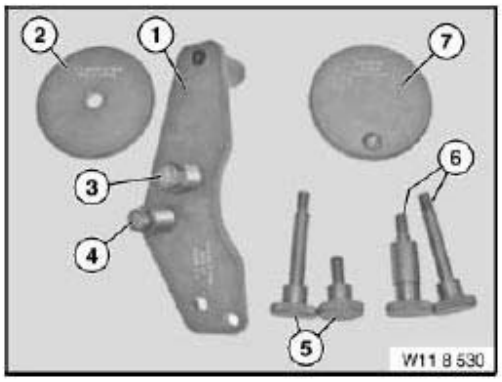


Fig. 57: Identifying Removal And Fitting Aid (118530)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: (Removal plate)

11-5464 REMOVAL PLIERS

11 5 464 Removal pliers

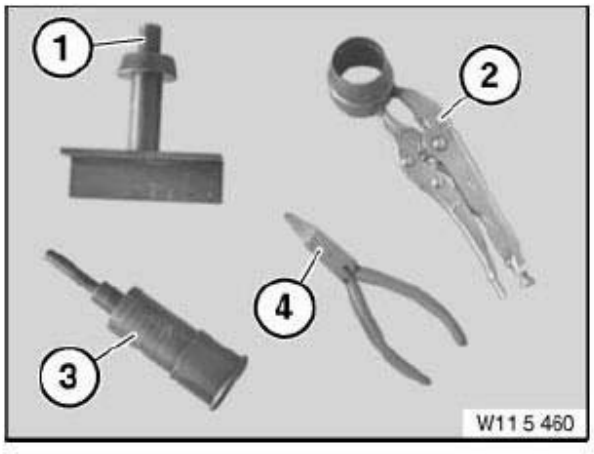


Fig. 58: Identifying Removal Pliers (115464)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9812 SCREW

11 9 812 Screw

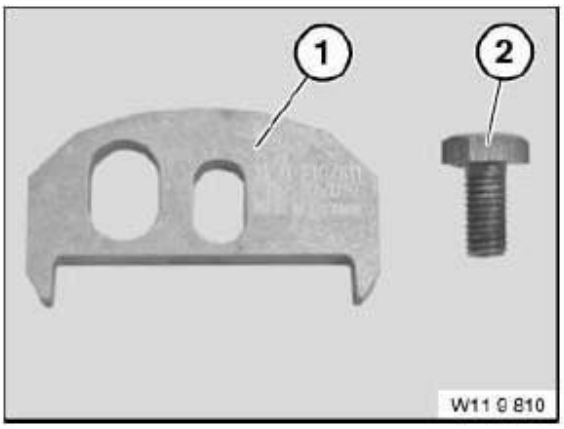


Fig. 59: Identifying Screw (119812)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4180 SCREWDRIVER INSERT

0491018 114180 Screwdriver insert Minimum set: Mechanical tools MW

NOTE: (Screwdriver insert Torx T60) For releasing and tightening down dual-mass flywheel - model year: from Jan 94

Storage Location

A11

SI number

01 02 94 (777)

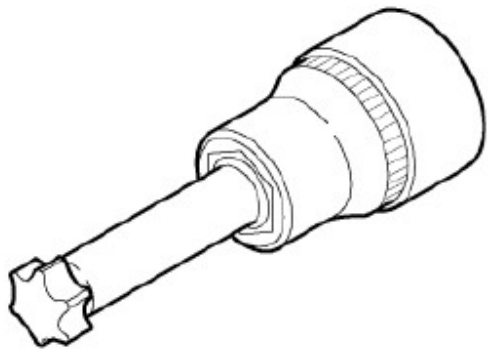


Fig. 60: Identifying Screwdriver Insert (114180)
Courtesy of BMW OF NORTH AMERICA, INC.

11-1380 SLEEVE

0490746 111380 Sleeve Minimum set: Mechanical tools MW

NOTE: (Assembly sleeve) For fitting the valve stem seal, diameter 7 mm

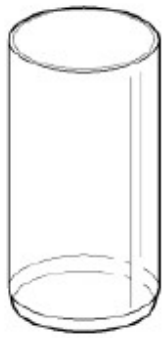


Fig. 61: Identifying Sleeve (111380)
Courtesy of BMW OF NORTH AMERICA, INC.

11-1350 SLEEVE

0490743 111350 Sleeve MW

Replaced by: 0490744

NOTE: (Assembly sleeves) For fitting the valve stem seal - Replaced by 11 1 360 (0 490 744)

11-8580 SOCKET WRENCH

0495747 118580 Socket wrench Minimum set: Mechanical tools MW

NOTE: **(wrench socket Torx T60) For removing and installing cylinder head (outside diameter 13.5 mm).**

Storage Location

B20

A20

SI number

01 20 06 (299)

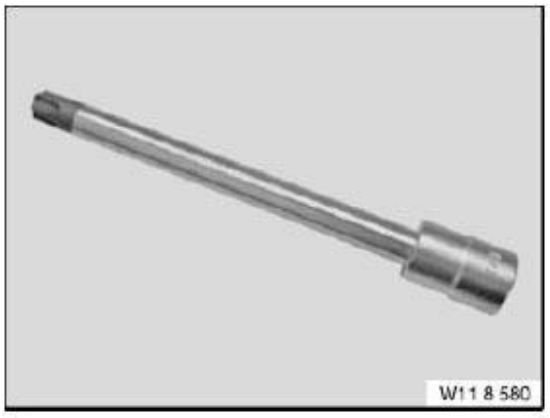


Fig. 62: Identifying Socket Wrench (118580)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4260 SOCKET WRENCH

0495002 114260 Socket wrench MW

NOTE: **For removing and installing lambda oxygen sensors.**

Storage Location

A52

SI number

01 17 04 (130)

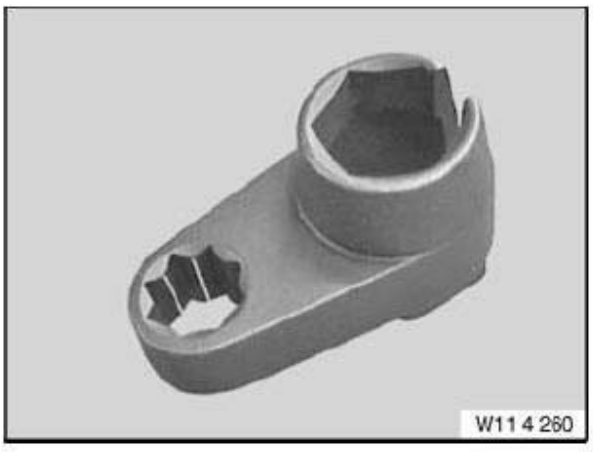


Fig. 63: Identifying Socket Wrench (114260)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9230 TOOL

0493935 119230 Tool Minimum set: Mechanical tools MW

NOTE: (Pulling device) For radial shaft seal at front of engine block

Storage Location

C43

SI number

01 01 01 (662)

Consisting of:

1 = 0494021 Bush

2 = 0494022 Spindle

4 = 0494024 Bolt

NOTE: (Screws (3 pieces))

5 = 0496670 Spindle

NOTE: N55

3 = 0494023 Nut

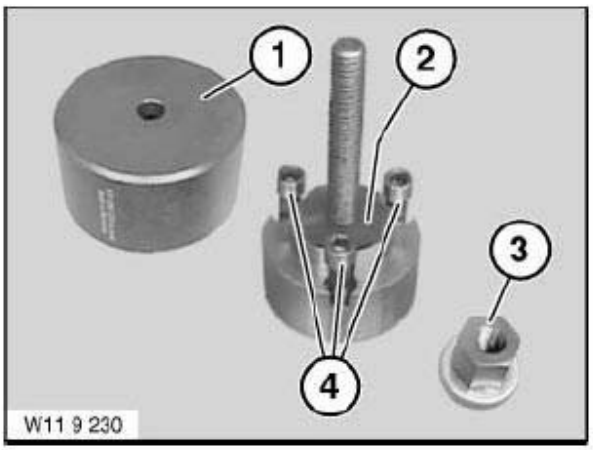


Fig. 64: Identifying Tool (119230)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4470 TOOL

0495102 114470 Tool Minimum set: Mechanical tools MW

NOTE: (cleaning kit) For cleaning sealing surfaces on magnesium crankcase/cylinder head.

SI number

01 17 04 (130)

Consisting of:

2 = 0495104 Extractor

NOTE: (grindstone)

1 = 0495103 Scraper

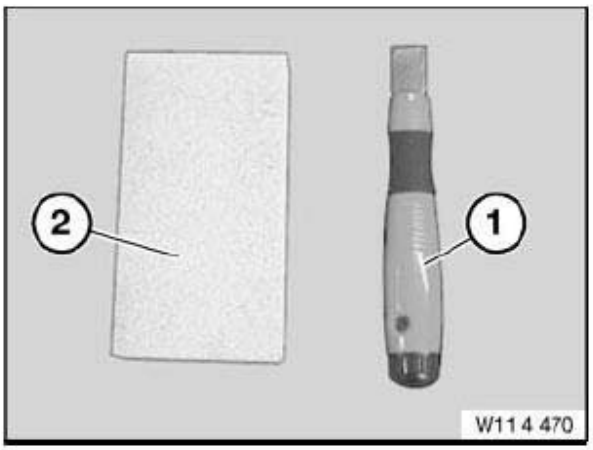


Fig. 65: Identifying Tool (114470)
Courtesy of BMW OF NORTH AMERICA, INC.

11-6370 TOOL

0493248 116370 Tool Minimum set: Mechanical tools MW

NOTE: (Extractor tool) For pulling off the valve stem seal

Storage Location

B15

SI number

01 06 98 (306)

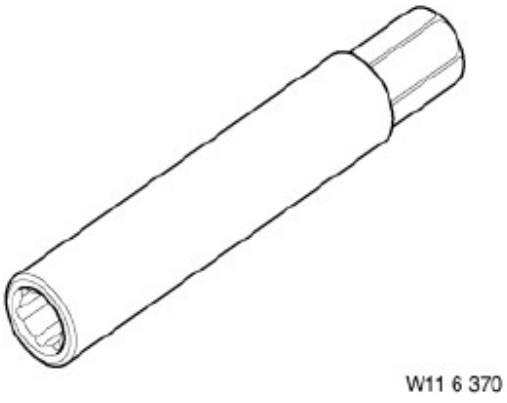


Fig. 66: Identifying Tool (116370)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9180 TOOL

0493881 119180 Tool Minimum set: Mechanical tools MW

NOTE: (pulling tool) For pulling radial shaft seal into engine block, rear

Storage Location

C43

SI number

01 01 01 (662)

Consisting of:

5 = 0496660 Ring

NOTE: For fitting rear radial shaft seal - rim offset 6.6 mm (N55).

1 = 0494028 Bush

2 = 0494029 Thrust piece

3 = 0494030 Nut

4 = 0494031 Screw

NOTE: (screws (2 x))

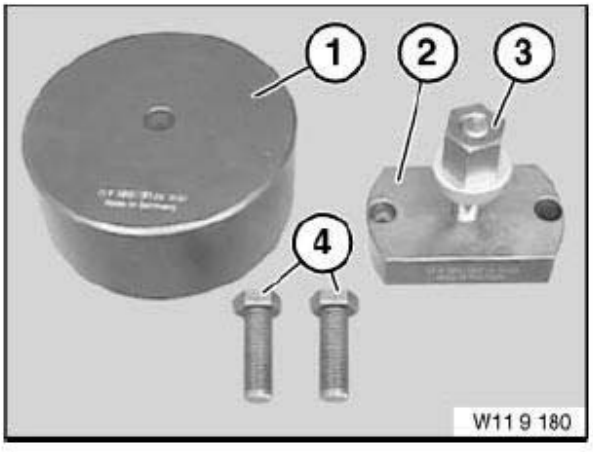


Fig. 67: Identifying Tool (119180)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4490 TOOL SET

0495009 114490 Tool set MW

NOTE: (Tool set) For removal and installation of gudgeon pin circlips.

SI number

01 17 04 (130)

Consisting of:

0495010

0495011

0495012

0495013

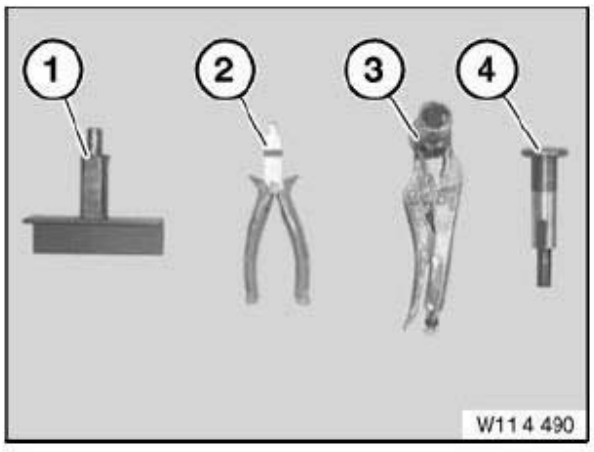


Fig. 68: Identifying Tool Set (114490)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4350 TORQUE WRENCH

0495018 114350 Torque wrench MW

NOTE: For installing camshaft bearing strips.

Storage Location

A51

SI number

01 17 04 (130)

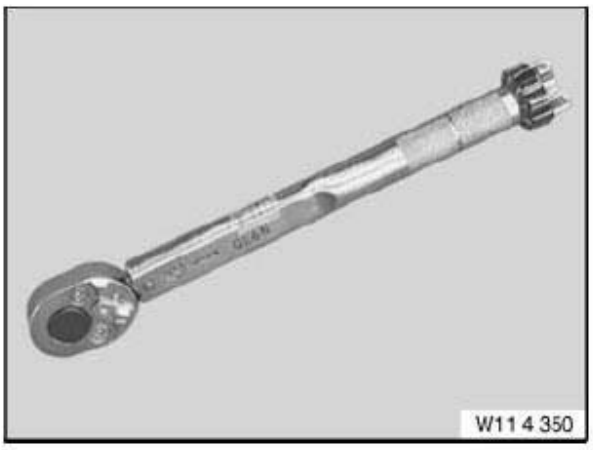


Fig. 69: Identifying Torque Wrench (114350)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8640 TORX

0495750 118640 Torx Minimum set: Mechanical tools MW

NOTE: (Torx) E10 For removing and installing oil pump triangular drive.

Storage Location

B19

SI number

01 20 06 (299)



Fig. 70: Identifying Torx (118640)
Courtesy of BMW OF NORTH AMERICA, INC.

11-5190 TORX

0495110 115190 Torx Minimum set: Mechanical tools MW

Replaced by: 0495747

NOTE: (Torx) T60 For assembly and disassembly of cylinder head. Replaced by 11 8 580 (0 495 747)

Storage Location

A51

SI number

01 17 04 (130)

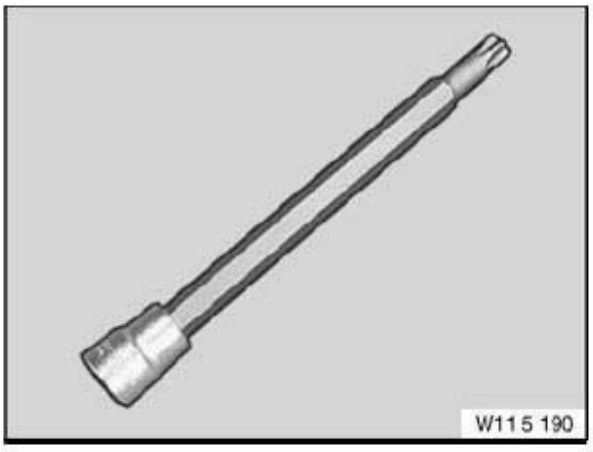


Fig. 71: Identifying Torx (115190)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4420 TORX

0495026 114420 Torx Minimum set: Mechanical tools MW

NOTE: (Torx) T50 For assembly and disassembly of cylinder head.

Storage Location

A51

SI number

01 17 04 (130)

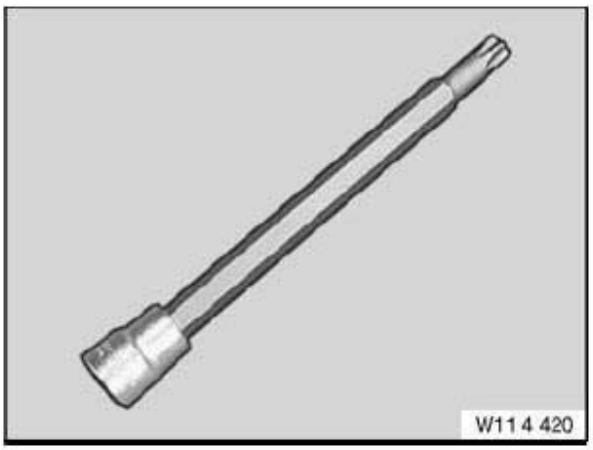


Fig. 72: Identifying Torx (114420)
Courtesy of BMW OF NORTH AMERICA, INC.

11-5200 WASHER

0495111 115200 Washer Minimum set: Mechanical tools MW

NOTE: (Shim) For slackening and tightening the central bolt.

Storage Location

B51

SI number

01 17 04 (130)

Consisting of:

2 = 0495211 Screw

NOTE: (Screws M8x40 mm (3 x))

1 = 0495210 Washer

NOTE: (Shim)

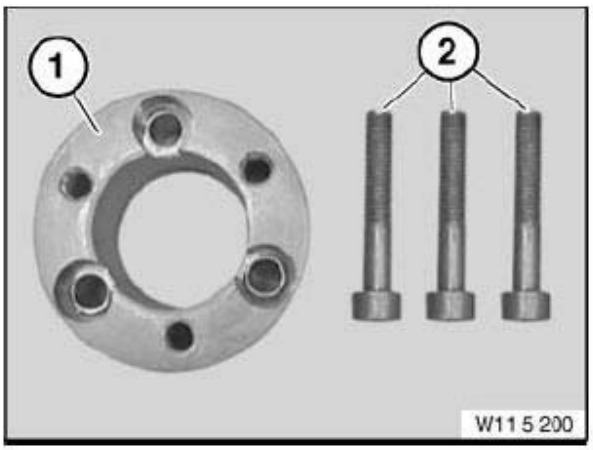


Fig. 73: Identifying Washer (115200)
Courtesy of BMW OF NORTH AMERICA, INC.

11-7020 WRENCH SOCKET

0491074 117020 Wrench socket Minimum set: Mechanical tools MW

NOTE: (Wrench socket 22 mm) For loosening and tightening the oxygen sensor



W11 7 020

Fig. 74: Identifying Wrench Socket (117020)
Courtesy of BMW OF NORTH AMERICA, INC.

11 ENGINE

11-8730 ADAPTER

Adapter Minimum set: Mechanical tools MW

NOTE: For compression testing.

Storage Location

C23

SI number

01 04 07 (352)

Consisting of:

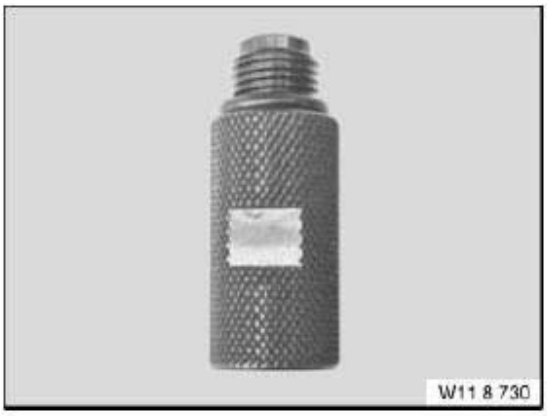


Fig. 1: Identifying Adapter (11-8730)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0496305 Adapter

2 = 0496306 Ring

NOTE: (Sealing ring) For secure connection of test probe 11 0 222 and adapter 11 8 730/731.

11-4060 ADAPTER

Adapter MW

Replaced by: 0491003

NOTE: **For pressure gauge for checking the oil pressure - Replaced by 11 4 030 (0 491 003)**

Storage Location

B9

11-8680 ADAPTER

Adapter MW

NOTE: **For securing engine during removal and installation.**

SI number

01 20 06 (299)



Fig. 2: Identifying Adapter (11-8680)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4050 ADAPTER

Adapter Minimum set: Mechanical tools MW

NOTE: **(Adapter) For connecting pipe bend 13 6 054 to pressure gauge 13 3 061 or BMW diagnosis and information system for checking oil pressure**

Storage Location

A4

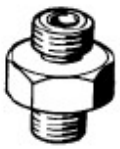


Fig. 3: Identifying Adapter (11-4050)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8590 ASSEMBLY TOOL

Assembly tool MW

NOTE: For installing piston with connecting rod in cylinder head.

Storage Location

B20

A20

SI number

01 20 06 (299)

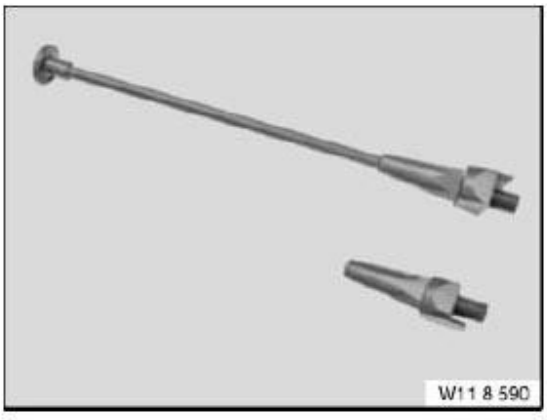


Fig. 4: Identifying Assembly Tool (11-8590)
Courtesy of BMW OF NORTH AMERICA, INC.

11-6380 BUSH

Bush Minimum set: Mechanical tools MW

NOTE: **For fitting valve stem seal**

Storage Location

B15

SI number

01 06 98 (306)

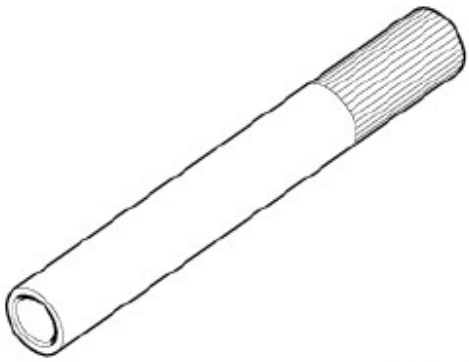


Fig. 5: Identifying Bush (11-6380)
Courtesy of BMW OF NORTH AMERICA, INC.

11-6260 BUSH

Bush Minimum set: Mechanical tools MW

NOTE: **(Assembly bushes with case) For installing pistons of 85 mm diameter (urgently required for pistons with U-Flex ring)**

Consisting of:



Fig. 6: Identifying Bush (11-6260)
Courtesy of BMW OF NORTH AMERICA, INC.

4 = 0493142 Bush

NOTE: (Assembly bush) Diameter 85.50 mm, stage 2

1 = 0493139 Bush

NOTE: (Assembly bush) Diameter 85.00 mm

2 = 0493140 Bush

NOTE: (Assembly bush) Diameter 85.08 mm, repair

3 = 0493141 Bush

NOTE: (Assembly bush) Diameter 85.25 mm, stage 1

9 = 0493323 Case

NOTE: (Case) For storing assembly bushes, gauge 11 6 270 and lever dial gauge 11 6 250

11-0320 CLIP

Clip MW

NOTE: (Removal and fitting tool) For removing and installing cylinder head.

Storage Location

B51

SI number

01 17 04 (130)

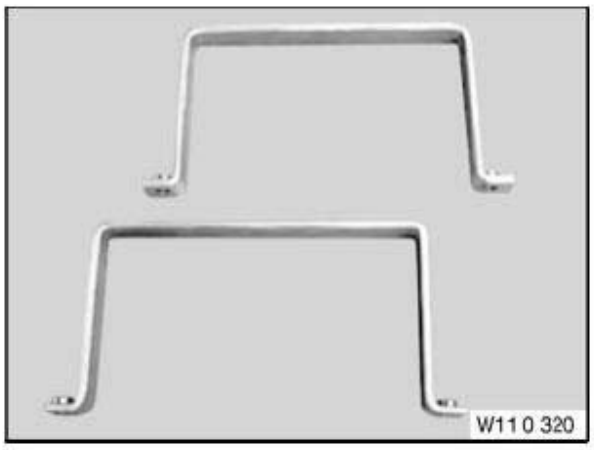


Fig. 7: Identifying Clip (11-0320)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0220 COMPRESSION TESTER

Compression tester Minimum set: Mechanical tools MW

NOTE: (Compression pressure testing set) For all petrol and diesel engines.

SI number

01 09 92 (558)

Consisting of:

4 = 0490620 Probe

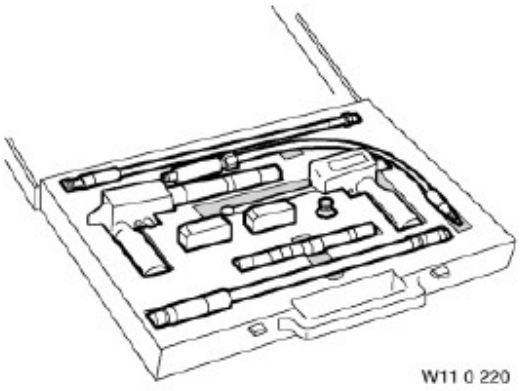


Fig. 8: Identifying Compression Tester (11-0220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: (Test probe) For recording compression testers 11 0 224 and 11 0 160/engine:

S14, S38, S50 - Replaced by 11 0 235 (0 493 129)

4 = 0490616 Card

NOTE: (Cards) 100 pieces For recording compression tester 11 0 221

4 = 0490622 Card

NOTE: (Cards) 100 pieces For recording compression tester 11 0 224

2 = 0494517 Adapter

NOTE: Measuring "absolute compression" at all cylinders. Engine: W17

2 = 0493634 Case

NOTE: With foam material insert for recording compression tester

16 = 0495279 Adapter

NOTE: M67, M67TU engine

4 = 0490614 Compression tester

NOTE: (Compression tester) For diesel engines.

4 = 0490615 Probe

NOTE: (Test probe) For recording compression testers 11 0 221 and 11 0 160/engine: M21, M41, M47, M51, M57, M57T2

4 = 0490617 Compression tester

NOTE: (Compression tester) For petrol engines.

4 = 0490618 Hose

NOTE: (Extension hose) For rubber tapered section with fitting 11 0 228

4 = 0490619 Probe

NOTE: (Test probe) For recording compression testers 11 0 224 and 11 0 160/engine: M10, M20, M30, M40, M42, M43, M44, M50, M52, M60, M62, M70, M73, N62,

S50US, S52US, S62

4 = 0490621 Tapered section

NOTE: **(Rubber tapered section) For recording compression testers 11 0 224 and 11 0 160.**

4 = 0490625 Valve

NOTE: **(Non-return valve)**

4 = 0490626 Filter

NOTE: **(Filter) 3 x 3 mm**

9 = 0493129 Probe

NOTE: **(Test probe, screw-in) For measuring "absolute compression" at all cylinders, engine: S14, S38, S50B30, S50B32, S50US, S52US, S54, S85**

2 = 0493387 Probe

NOTE: **(Test probe) For recording compression tester 11 0 221 or DIS pressure sensor/engine: M47, M57, M57TU, M57T2**

11-0160 COMPRESSION TESTER

Compression tester MW

Replaced by: 0490613

NOTE: **(Compression recorder) manufacturer VDO - Replaced by 11 0 220 (0 490 613)**

Consisting of:

1 = 0490594 Card

NOTE: **(Cards) For compression pressure inscriber Discontinuation and replaced by 11 0 220 (0 490 613)**

2 = 0490595 Pressure gauge

NOTE: **Compression pressure inscriber Discontinuation and replaced by 11 0 220 (0 490 613)**

3 = 0490596 Guard

NOTE: (Rubber protection) Still available as replacement Discontinuation and replaced by 11 0 220 (0 490 613)

4 = 0490597 Lines

NOTE: Discontinuation and replaced by 11 0 220 (0 490 613)

5 = 0490598 Adapter

NOTE: (test adapter for petrol engine) Engine: all, except M70 Discontinuation and replaced by 11 0 220 (0 490 613)

6 = 0490599 Adapter

NOTE: (test adapter for petrol engine) Engine: M70 Discontinuation and replaced by 11 0 220 (0 490 613)

7 = 0490600 Adapter

NOTE: (Test adapter extension) Discontinuation and replaced by 11 0 220 (0 490 613)

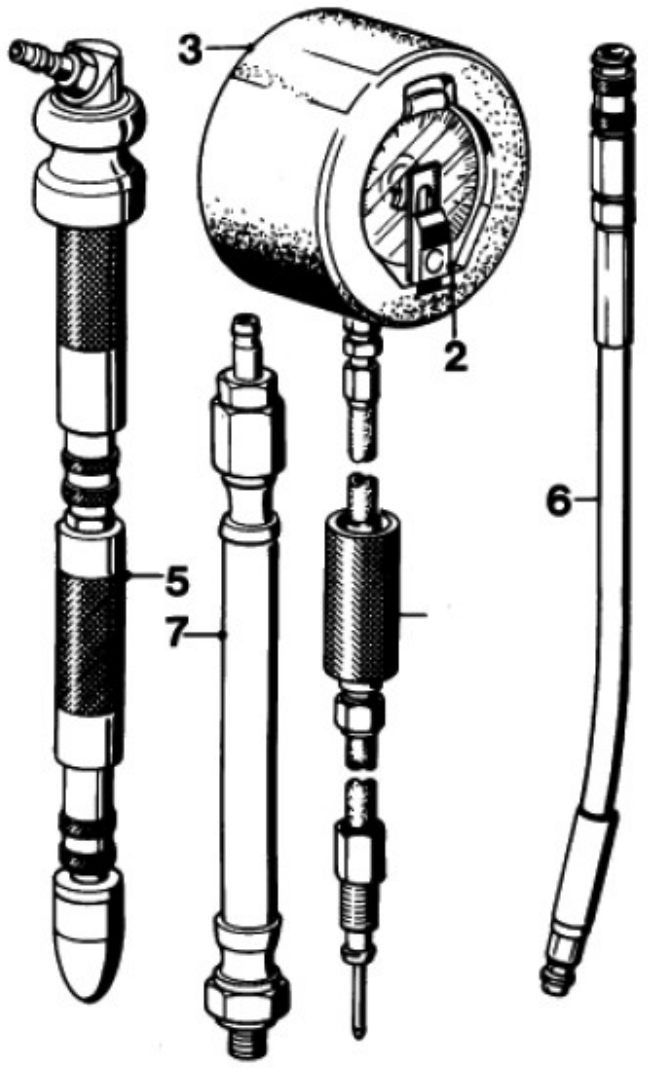


Fig. 9: Identifying Compression Tester (11-0160)
Courtesy of BMW OF NORTH AMERICA, INC.

11-2110 DEVICE

Device MW

Replaced by: 0490504

NOTE: **For retightening the connecting rod and cylinder head bolts - Replaced by 00 9 120 (0 490 504)**

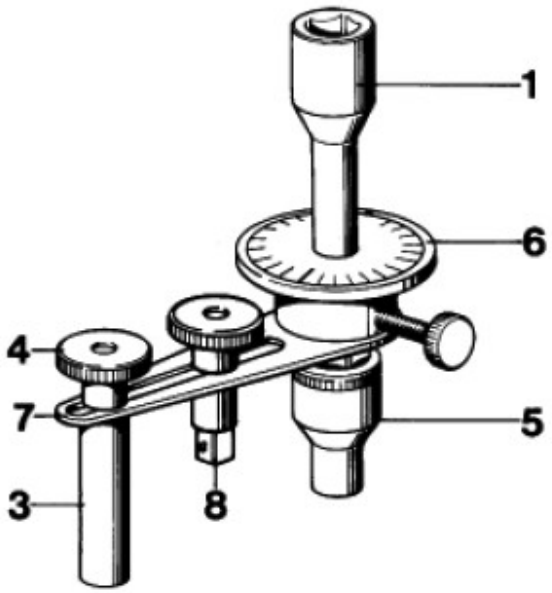
Consisting of:

1 = 0490827 Extension

NOTE: **(Extension 1/1") Replaced by 00 9 120 (0 490 504)**

2 = 0490828 Washer

NOTE: **(Graduated disc 180°) Replaced by 00 9 120 (0 490 504)**



W11 2 110

Fig. 10: Identifying Device (11-2110)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0490829 Sleeve

NOTE: **(Guide sleeve) Replaced by 00 9 120 (0 490 504)**

4 = 0490830 Nut

NOTE: **(Knurled nut) Replaced by 00 9 120 (0 490 504)**

5 = 0490831 Wrench socket

NOTE: **(Socket wrench insert WAF 10) Replaced by 00 9 120 (0 490 504)**

6 = 0490832 Washer

NOTE: **(Graduated disc up to 270°) Replaced by 00 9 120 (0 490 504)**

7 = 0490833 Tab

NOTE: **For counter-holding on the cylinder head Replaced by 00 9 120 (0 490 504)**

8 = 0490834 Adapter

NOTE: **(Adapter) Replaced by 00 9 120 (0 490 504)**

11-8910 DEVICE

Device MW

NOTE: **(Fixing device) For limiting the tilting motion of the engine when the transmission is removed or installed.**

SI number

01 24 08 (501)

Consisting of:

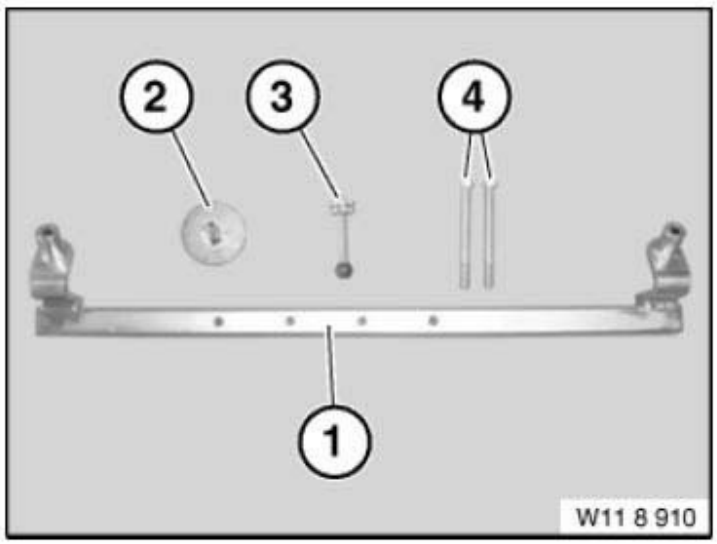


Fig. 11: Identifying Device (11-8910)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0496572 Basic body

2 = 0496573 Padding

3 = 0496574 Spindle

4 = 0496575 Screw

NOTE: (Screws (2 x))

11-4340 DEVICE

Device MW

NOTE: (Pressure testing fixture) For pressure-testing cylinder head.

SI number

01 17 04 (130)

Consisting of:

2 = 0495016 Plate

NOTE: (Plate with thrust piece)

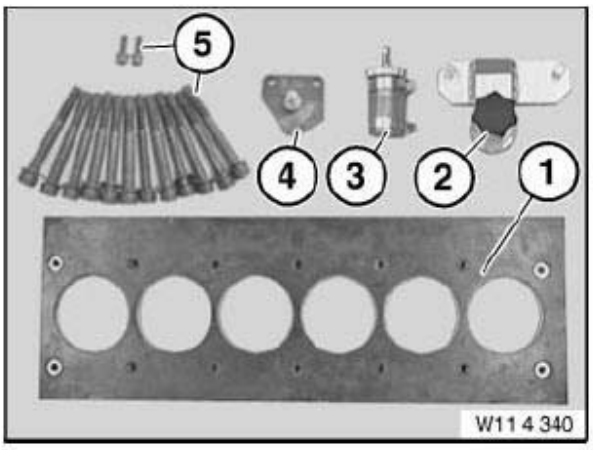


Fig. 12: Identifying Device (11-4340)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0495015 Plate

NOTE: (base plate with seal)

3 = 0495017 Hose

NOTE: (Hose with air connection)

4 = 0495724 Plate

NOTE: (Adapter plate with valve) N54

5 = 0495725 Screw

NOTE: (set of screws)N54

11-4370 DEVICE

Device MW

NOTE: (pressing fixture) For pressing out sealant for bedplate.

Storage Location

A52

SI number

01 17 04 (130)

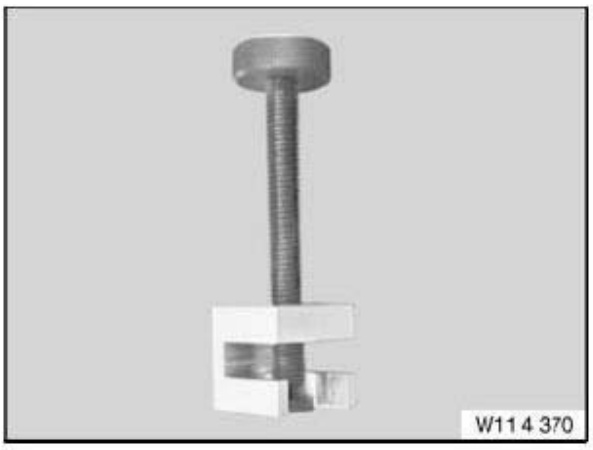


Fig. 13: Identifying Device (11-4370)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9000 DEVICE

Device Minimum set: Mechanical tools MW

NOTE: (Cylinder head expander tool)

Storage Location

Individual

SI number

01 03 02 (833)

Consisting of:

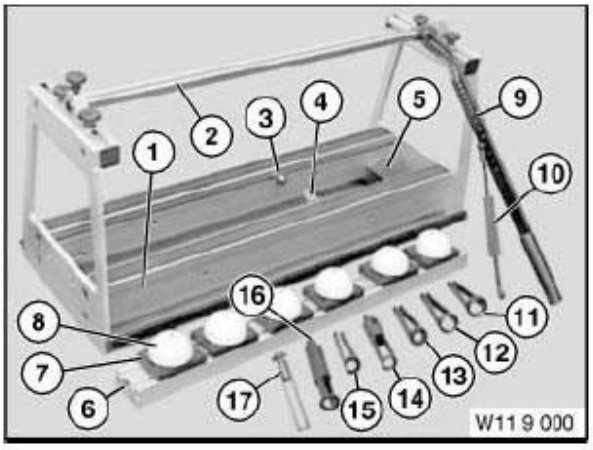


Fig. 14: Identifying Device (11-9000)

Courtesy of BMW OF NORTH AMERICA, INC.

17 = 0495028 Cage

NOTE: (Valve spring cage) Engine N52

1 = 0494366 Device

5 = 0494370 Quick fastener

7 = 0494372 Shaped part

NOTE: (Shaped part)

8 = 0494373 Shaped part

NOTE: (Shaped part) Shaped part made of plastic

9 = 0494374 Lever

2 = 0494367 Rod

3 = 0494368 Adapter

NOTE: (Sliding block)

4 = 0494369 Tab

6 = 0494371 Insert

NOTE: (Aluminum strip)

10 = 0494375 Hook

11 = 0494376 Cage

NOTE: (Valve spring cage) Engine M41, M51, S50

12 = 0494377 Cage

NOTE: (Valve spring cage) Engine M43, M73

13 = 0494378 Cage

NOTE: (Valve spring cage) Engine M44, M52, M54, M56, M62, S52, S54, S62

14 = 0494379 Cage

NOTE: (Valve spring cage) Engine M47, M47TU, M57, M57TU, N40, N42, N62, N73

15 = 0494380 Cage

NOTE: (Valve spring cage) Engine M21, M40

11-4080 DEVICE

Device MW

Replaced by: 0491007

NOTE: For installation of the dipstick guide tube - Replaced by 11 4 070 (0 491 007)

11-9340 DEVICE

Device Minimum set: Mechanical tools MW

NOTE: (Device) For tensioning timing chain when adjusting timing

Storage Location

B43

SI number

01 01 01 (662)

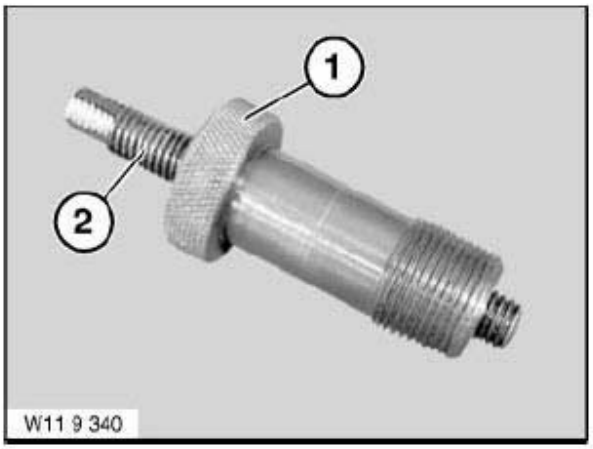


Fig. 15: Identifying Device (11-9340)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = 0494032 Bolt

2 = 0494033 Spindle

11-8550 DEVICE

Device Minimum set: Mechanical tools MW

NOTE: (Locking device) For holding the bearing strips in place when fitting intake camshaft.

SI number

01 20 06 (299)

Consisting of:

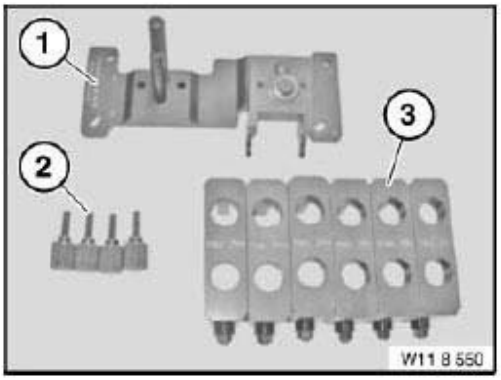


Fig. 16: Identifying Device (11-8550)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0495741 Screw

NOTE: (knurled screw (4 pieces))

1 = 0495740 Tool

NOTE: (hold-down tool)

3 = 0495742 Thrust piece

NOTE: **(thrust piece (6 pieces))**

11-9150 EXTENSION

Extension Minimum set: Mechanical tools MW

NOTE: **(Socket wrench extension) For loosening and tightening the oxygen sensor**

Storage Location

A42

SI number

01 15 00 (609)

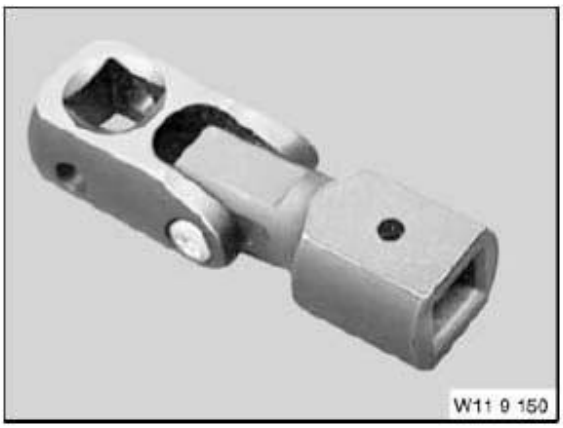


Fig. 17: Identifying Extension (11-9150)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9200 EXTRACTOR

Extractor Minimum set: Mechanical tools MW

NOTE: **For RSS out of engine block at rear**

Storage Location

C43

SI number

01 01 01 (662)



Fig. 18: Identifying Extractor (11-9200)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9220 EXTRACTOR

Extractor Minimum set: Mechanical tools MW

NOTE: For radial shaft seal out of engine block at front

Storage Location

C43

SI number

01 01 01 (662)

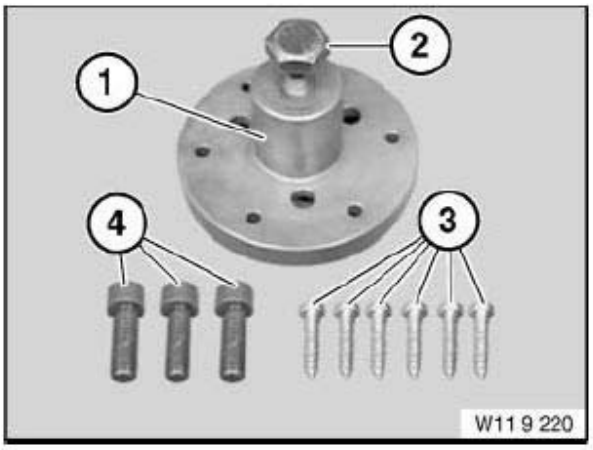


Fig. 19: Identifying Extractor (11-9220)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = 0494040 Bolt

NOTE: Replaced by 11 9 225 (0 496 261)

1 = 0494041 Bolt

NOTE: (screws (6 pieces))

1 = 0494039 Synchronizing key

4 = 0494042 Bolt

NOTE: (Screws (3 pieces))

5 = 0496261 Bolt

6 = 0496262 Puller

11-0340 FITTING AID

Fitting aid MW

Replaced by: 0494362

NOTE: (fitting accessories) For removing and fitting the valve springs. Replaced by 11 9 000 (0 494 362)

SI number

01 12 93 (701)

Consisting of:

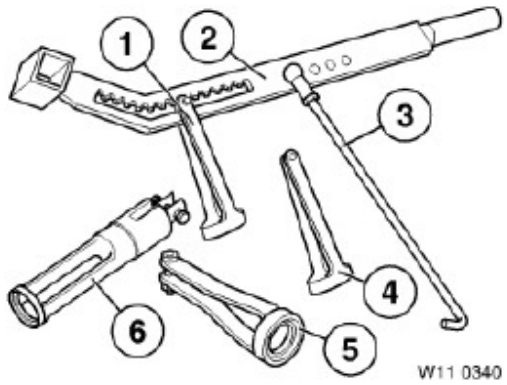


Fig. 20: Identifying Fitting Aid (11-0340)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0490649 Hook

NOTE: (hook) Length 220 mm - Engine: all, except M10 Replaced by 11 9 000 (0 494 362)

5 = 0490651 Cage

NOTE: (Valve spring cage) Engine: M44, M52, M62, S62, S54 Replaced by 11 9 000 (0 494 362)

1 = 0490647 Cage

NOTE: (Valve spring cage) Engine: M43, M73

2 = 0490648 Lever

NOTE: (compression lever) Engine: all, except M10

6 = 0493285 Cage

NOTE: (Valve spring cage) Engine: M47, M47TU, M57, N40, N42, M67, M67TU

4 = 0490650 Cage

NOTE: (valve spring cage) Replaced by 11 0345, engine: M52

11-7440 GAUGE

Gauge Minimum set: Mechanical tools MW

NOTE: **For fixing the camshaft at the top dead center.**

SI number

01 07 10 (634)

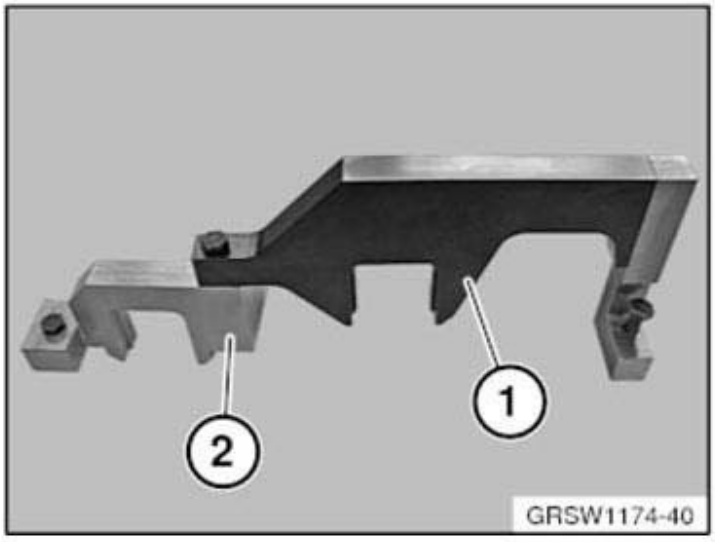


Fig. 21: Identifying Gauge (11-7440)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8510 GAUGE

Gauge MW

NOTE: **For securing oil spray nozzles**

Storage Location

B20

SI number

01 20 06 (299)

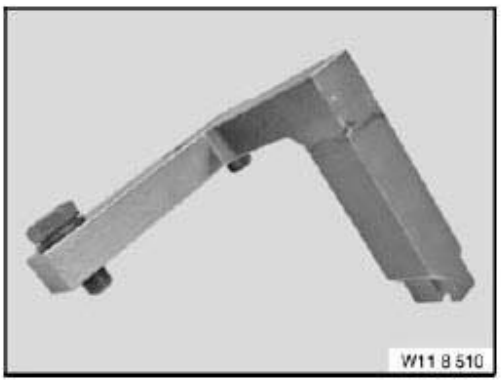


Fig. 22: Identifying Gauge (11-8510)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8520 GAUGE

Gauge Minimum set: Mechanical tools MW

NOTE: (gauge with screws) For disconnecting the camshaft sensor gears.

Storage Location

A19

A20

SI number

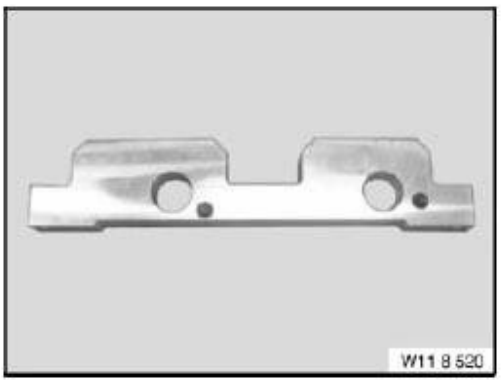


Fig. 23: Identifying Gauge (11-8520)
Courtesy of BMW OF NORTH AMERICA, INC.

01 20 06 (299)

Consisting of:

1 = 0495823 Gauge

2 = 0495825 Screw

NOTE: (screws M6x45 (2 x))

11-4280 GAUGE

Gauge Minimum set: Mechanical tools MW

NOTE: For locating camshaft in TDC setting.

Storage Location

B52

SI number

01 17 04 (130)

Consisting of:

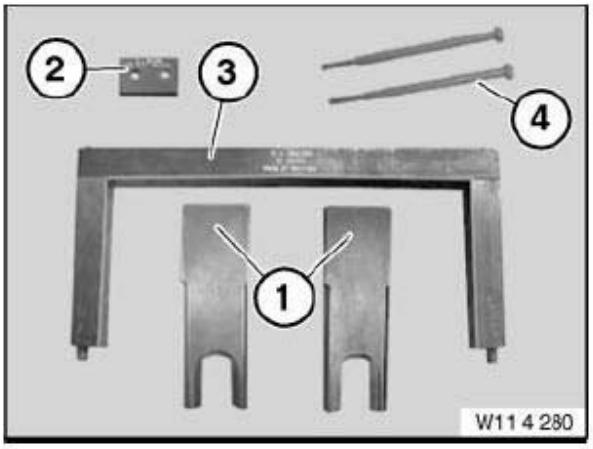


Fig. 24: Identifying Gauge (11-4280)
Courtesy of BMW OF NORTH AMERICA, INC.

4 = 0495723 Bolt

NOTE: (Set of screws M6) Engine: N54

1 = 0495005 Gauge

2 = 0495006 Adapter

3 = 0495007 Retaining bracket

5 = 0496673 Bridge

NOTE: For securing camshaft at TDC.

11-8660 HOLDER

Holder Minimum set: Mechanical tools MW

NOTE: (Counter support) For locking flywheel with A-transmission installed.

Storage Location

A19

C19

B19

SI number

01 20 06 (299)

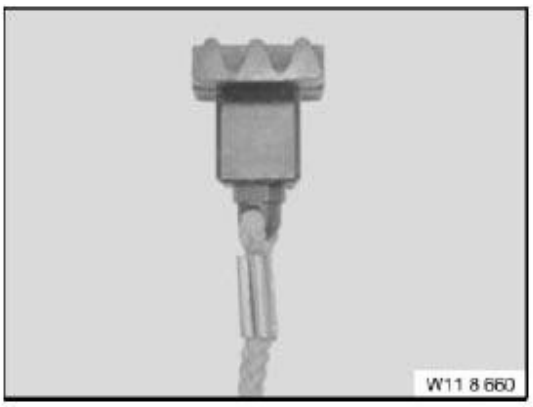


Fig. 25: Identifying Holder (11-8660)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9260 HOLDER

Holder Minimum set: Mechanical tools MW

NOTE: (Counter support with screw connection) For holding the flywheel when gearbox is removed

Storage Location

B43

SI number

01 01 01 (662)

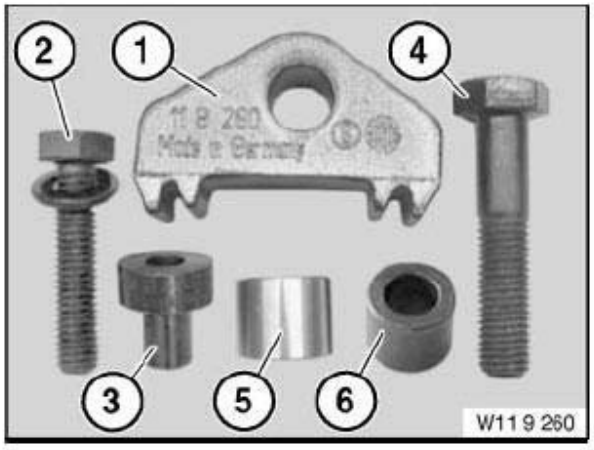


Fig. 26: Identifying Holder (11-9260)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = 0494034 Holder

NOTE: (Individual counter support)

2 = 0494035 Screw

NOTE: (Bolt (thread M10) with washer)

For screwing counter support

3 = 0494129 Bush

NOTE: (Bush for counter support) For counter support, for retaining flywheel when gearbox is removed Engine: N62, N73

4 = 0494130 Screw

NOTE: (Bolt (thread M12)) For counter support for retaining flywheel when gearbox is removed

5 = 0494793 Bush

6 = 0495216 Bush

NOTE: **For counter support, for retaining flywheel when gearbox is removed Engine: M57TU2**

11-8180 HOLDER

Holder Minimum set: Mechanical tools MW

NOTE: **(Counter support) Blocking flywheel when releasing and tightening down central bolts on vibration absorber**

Storage Location

C45

C46

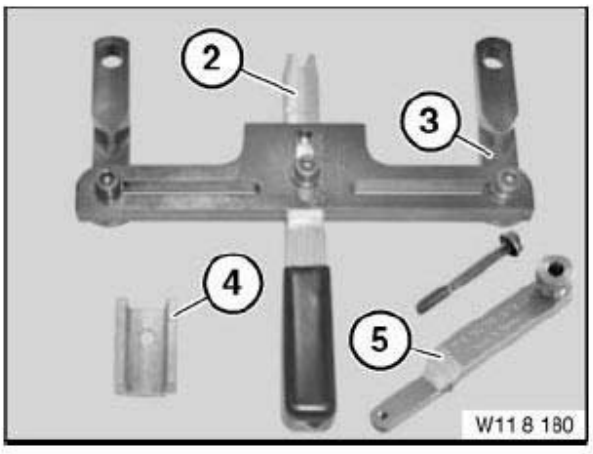


Fig. 27: Identifying Holder (11-8180)
Courtesy of BMW OF NORTH AMERICA, INC.

SI number

01 12 99 (452)

Consisting of:

1 = 0494432 Basic body

NOTE: **(Basic body) E65/M67, E38/M67 Discontinuation Replaced by 11 8 183 (0 494 434)**

2 = 0494433 Shaped part

NOTE: (Shaped part)

3 = 0494434 Basic body

4 = 0494435 Adapter

NOTE: E65/M67

5 = 0494716 Adapter

NOTE: (Adapter with adjusting sleeve) E46 M47TU

11-9811 HOLDER

Holder

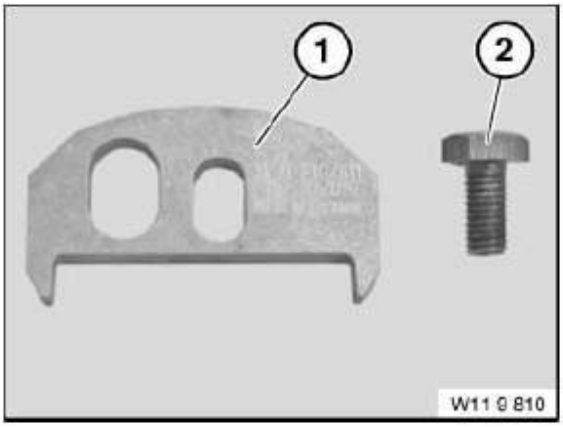


Fig. 28: Identifying Holder (11-9811)
Courtesy of BMW OF NORTH AMERICA, INC.

11-2220 HOLDER

Holder MW

Replaced by: 0490855

NOTE: (Counter support) - Nov. 88 Replaced by 11 2 240 (0 490 855)

11-4491 HOLDER

Holder MW

NOTE: (Installation bracket)

Storage Location

A51

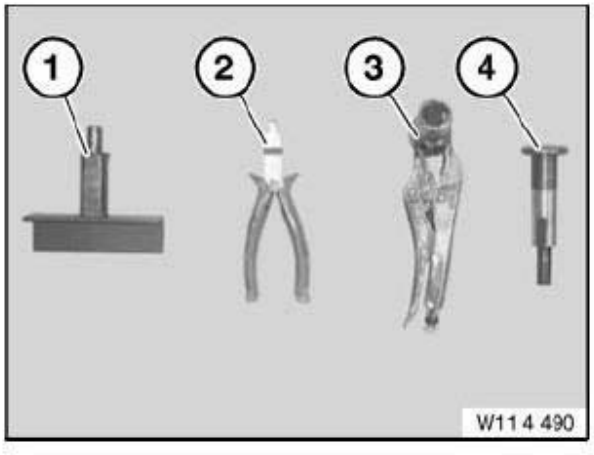


Fig. 29: Identifying Holder (11-4491)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8650 HOLDER

Holder Minimum set: Mechanical tools MW

NOTE: (Counter support) For removing and installing ring gear of oil pump drive.

Storage Location

C19

C20

SI number

01 20 06 (299)



Fig. 30: Identifying Holder (11-8650)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0290 HOLDER

Holder Minimum set: Mechanical tools MW

NOTE: (Counter support) For removing and installing triangular drive (vacuum pump) on crankcase.

Storage Location

A52

SI number

01 17 04 (130)



Fig. 31: Identifying Holder (11-0290)
Courtesy of BMW OF NORTH AMERICA, INC.

11-5463 INSTALLATION DRIFT

Installation drift

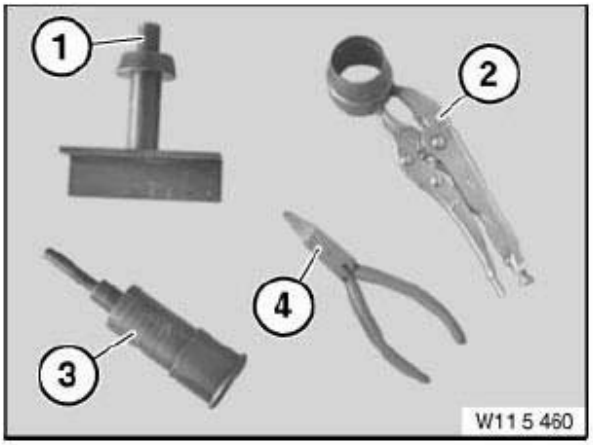


Fig. 32: Identifying Installation Drift (11-5463)
Courtesy of BMW OF NORTH AMERICA, INC.

11-5461 INSTALLATION HOLDER

Installation holder

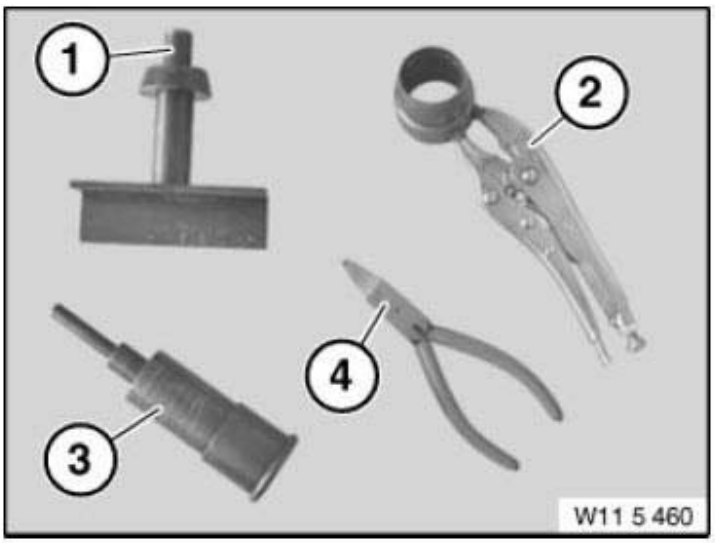


Fig. 33: Identifying Installation Holder (11-5461)
Courtesy of BMW OF NORTH AMERICA, INC.

11-5462 INSTALLATION PLIERS

Installation pliers

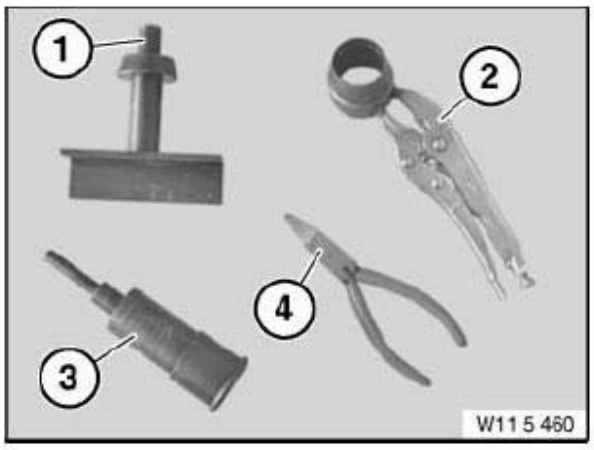


Fig. 34: Identifying Installation Pliers (11-5462)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0000 LIFTING GEAR

Lifting gear Minimum set: Mechanical tools MW

NOTE: (Hoist) For removing and installing engines.

SI number

01 13 94 (888)

Consisting of:

1 = 0490562 Lifting gear

NOTE: (Cross-member)

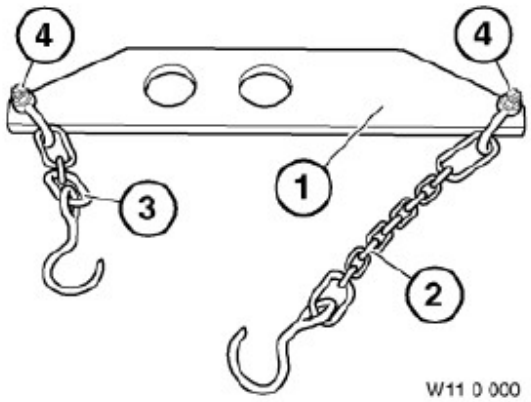


Fig. 35: Identifying Lifting Gear (11-0000)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0490563 Chain

NOTE: (Chain) Version: long

3 = 0490564 Chain

NOTE: (Chain) Version: short

4 = 0490565 Shackle

NOTE: (Shackle) 2 x

11-0020 LIFTING GEAR

Lifting gear Minimum set: Mechanical tools MW

NOTE: For removing and installing engines.

SI number

01 13 94 (888)

Consisting of:

1 = 0490568 Lifting gear

NOTE: (Cross-member)

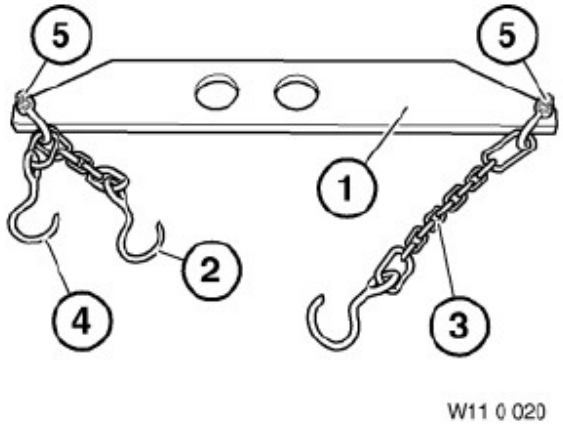


Fig. 36: Identifying Lifting Gear (11-0020)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0490569 Chain

NOTE: **(Chain)**

3 = 0490570 Chain

NOTE: **(Chain) Version: long**

4 = 0490571 Chain

NOTE: **(Chain) Version: short**

5 = 0490572 Shackle

NOTE: **(Shackle) 2 pieces**

11-1310 MANDREL

Mandrel MW

NOTE: **(Drift) For driving needle bearing out of crankcase (M20) and pressing out propeller shaft centering mount**



W11 1 310

Fig. 37: Identifying Mandrel (11-1310)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9360 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: **For driving valve into engine block (sealing compound)**

Storage Location

A43

SI number

01 01 01 (662)

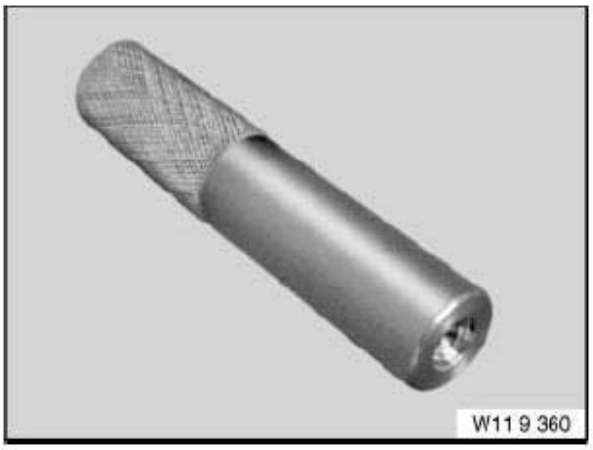


Fig. 38: Identifying Mandrel (11-9360)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9190 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (alignment pin) For securing flywheel at TDC position

Storage Location

B43

SI number

01 01 01 (662)

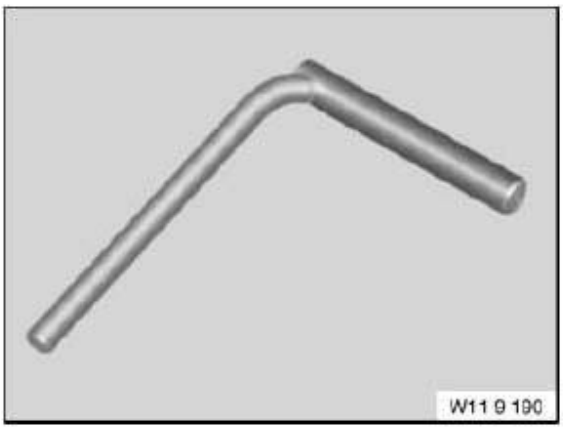


Fig. 39: Identifying Mandrel (11-9190)
Courtesy of BMW OF NORTH AMERICA, INC.

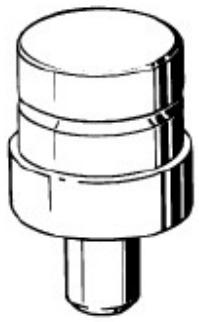
11-2030 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (drift) For driving guide bearing into crankshaft (S14, S38, M10, M20, M21, M30, M40, M42, M50, M51 M52) and driving centering mount into propeller shaft

Storage Location

A15



W11 2 030

Fig. 40: Identifying Mandrel (11-2030)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4494 MANDREL

Mandrel MW

NOTE: (Installation drift)

Storage Location

A51

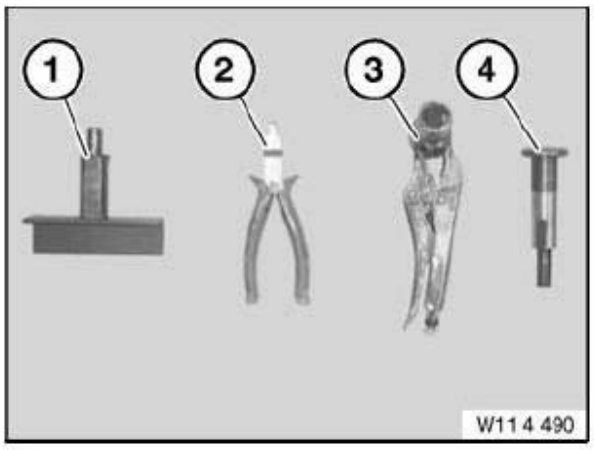


Fig. 41: Identifying Mandrel (11-4494)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0300 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (Alignment pin) For securing the flywheel at the TDC setting

Storage Location

A52

SI number

01 17 04 (130)



Fig. 42: Identifying Mandrel (11-0300)
Courtesy of BMW OF NORTH AMERICA, INC.

11-1170 MANDREL

Mandrel MW

NOTE: (Mandrel) Replaced by 11 1 200

11-1190 MANDREL

Mandrel MW

NOTE: (Drift) Replaced by 11 1 200

11-1140 MANDREL

Mandrel MW

Replaced by: 0490724

NOTE: (Drift) Replaced by 11 1 200 (0 490 724)

11-4480 ODDMENTS TRAY

Oddments tray Minimum set: Mechanical tools MW

NOTE: (Boards (2 pieces)) For setting down the individual components of the cylinder head.

SI number

01 17 04 (130)

Consisting of:

1 = 0495106 Oddments tray

NOTE: (Board for intake side)

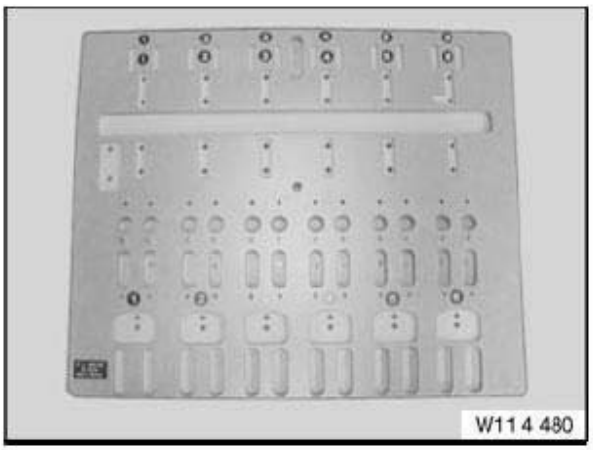


Fig. 43: Identifying Oddments Tray (11-4480)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0495107 Oddments tray

NOTE: (Board for exhaust side)

11-9240 OIL FILTER WRENCH

Oil filter wrench Minimum set: Mechanical tools MW

NOTE: For unfastening and tightening oil filter cover

Storage Location

A43

SI number

01 01 01 (662)



Fig. 44: Identifying Oil Filter Wrench (11-9240)
Courtesy of BMW OF NORTH AMERICA, INC.

11-3340 PIN

Pin Minimum set: Mechanical tools MW

NOTE: (lock pin (2 pieces)) For retaining the chain tensioner piston (e.g. when removing and installing the cylinder head) and to lock the drive belt tensioner

Storage Location

B5

C5

SI number

01 09 91 (416)

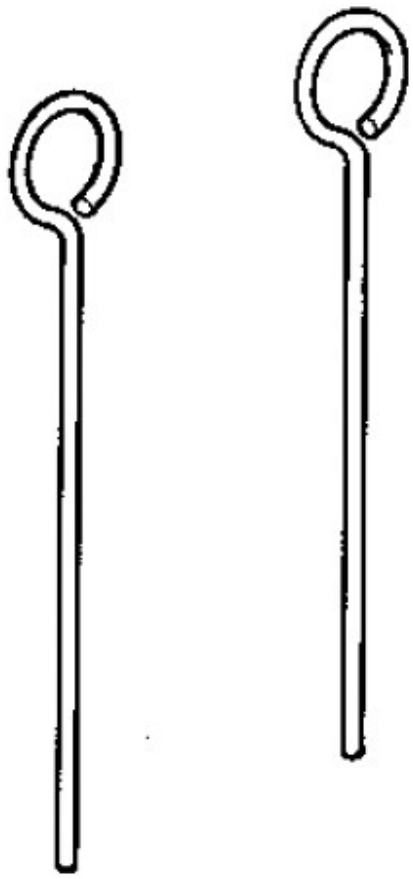


Fig. 45: Identifying Pin (11-3340)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4120 PIN

Pin Minimum set: Mechanical tools MW

NOTE: **(lock pin) For chain tensioners, for locking the chain tensioner piston (e.g. during cylinder head removal and fitting)**

Storage Location

B5

C5

SI number

01 12 93 (701)



Fig. 46: Identifying Pin (11-4120)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8540 PLATE

Plate MW

NOTE: (Fixture) For mounting engine on assembly stand.

SI number

01 20 06 (299)

Consisting of:

1 = 0495737 Fixture

NOTE: (Engine mount)

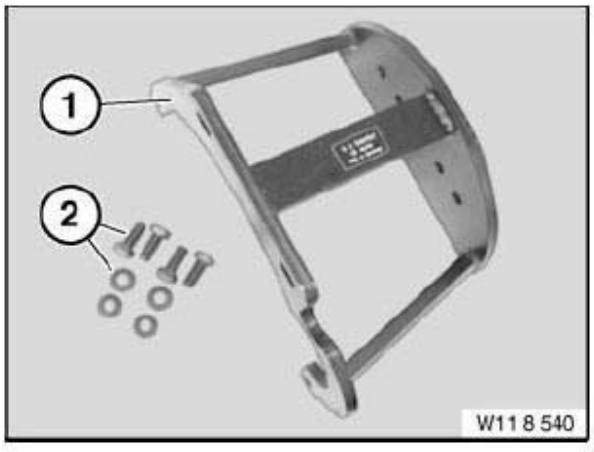


Fig. 47: Identifying Plate (11-8540)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0495738 Screw

NOTE: (Set of screws (4 x))

11-2090 PLIERS

Pliers MW

Replaced by: 0490796

NOTE: For removal of the valve stem seals - Replaced by 11 1 480 (0 490 796)

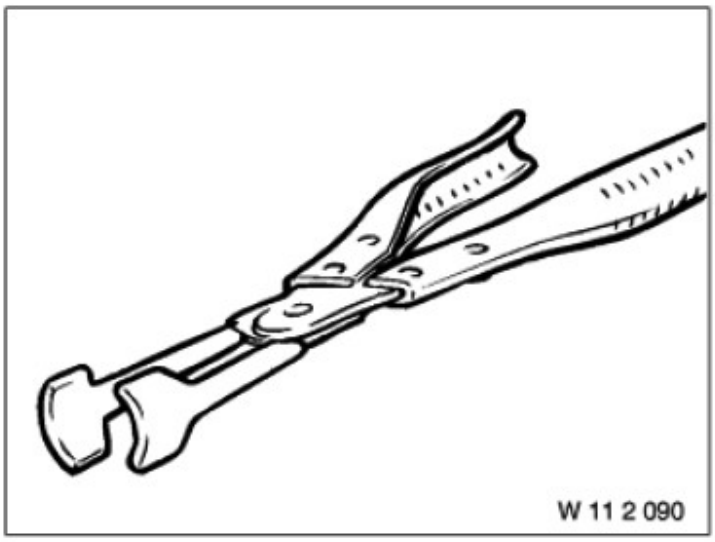


Fig. 48: Identifying Pliers (11-2090)
Courtesy of BMW OF NORTH AMERICA, INC.

11-1250 PLIERS

Pliers MW

Replaced by: 0490796

NOTE: For removing and installing the valve stem seal. Only free for motorcycle! Replaced by 11 1 480 (0 490 796)

11-1480 PLIERS

Pliers Minimum set: Mechanical tools MW

NOTE: For removing valve stem seal

Storage Location

B10

SI number

01 01 93 (621)

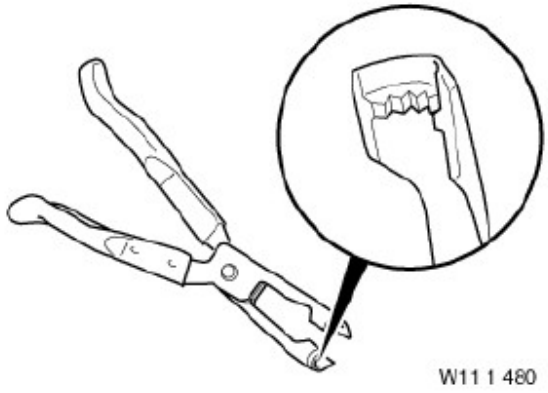


Fig. 49: Identifying Pliers (11-1480)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4492 PLIERS

Pliers MW

NOTE: (Removal pliers)

Storage Location

A51

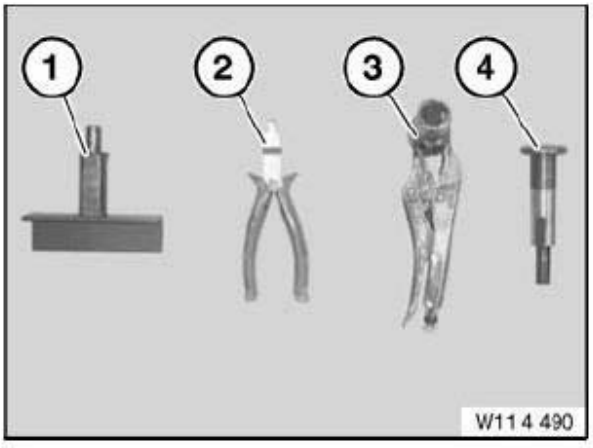


Fig. 50: Identifying Pliers (11-4492)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8670 PLIERS

Pliers MW

NOTE: For removing and installing boost air line.

Storage Location

C20

SI number

01 20 06 (299)

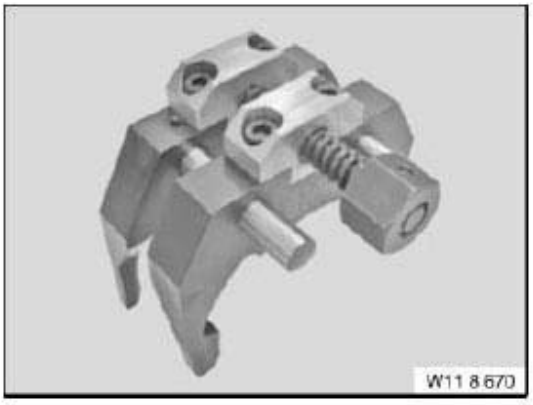


Fig. 51: Identifying Pliers (11-8670)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4493 PLIERS

Pliers MW

NOTE: (Installation pliers)

Storage Location

A51

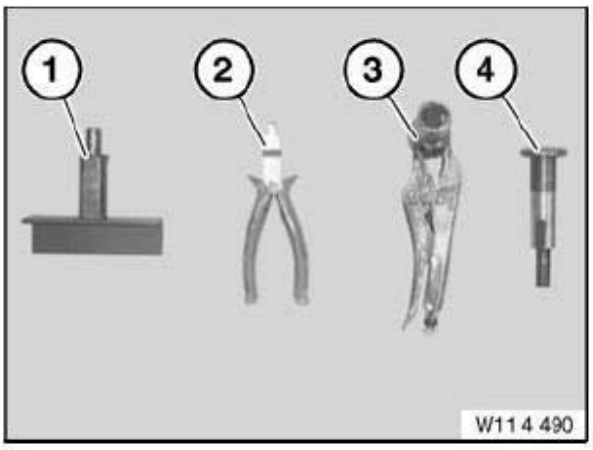


Fig. 52: Identifying Pliers (11-4493)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4430 PLUG

Plug Minimum set: Mechanical tools MW

NOTE: (Seal plugs (2x)) For sealing off oil holes in oil pump.

Storage Location

A52

SI number

01 17 04 (130)



Fig. 53: Identifying Plug (11-4430)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8530 REMOVAL AND FITTING AID

Removal and fitting aid Minimum set: Mechanical tools MW

NOTE: (Removal and mounting tool) For removal and installation of sealing cap of vacuum pump.

SI number

01 20 06 (299)

Consisting of:

8 = 0496704 Bush

In conjunction with: 11 8 530

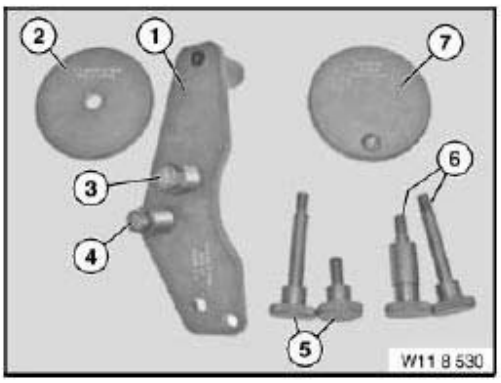


Fig. 54: Identifying Removal And Fitting Aid (11-8530)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0495729 Plate

NOTE: (Base plate)

2 = 0495730 Plate

NOTE: (Pressure plate)

3 = 0495731 Spindle

NOTE: (Spindle (pressure plate))

4 = 0495732 Spindle

NOTE: **(Spindle (removal plate))**

5 = 0495733 Screw

NOTE: **(Set of screws M10 (N54))**

6 = 0495734 Screw

NOTE: **(Set of screws M11 incl. sleeve (N53))**

7 = 0495735 Plate

NOTE: **(Removal plate)**

11-5464 REMOVAL PLIERS

Removal pliers

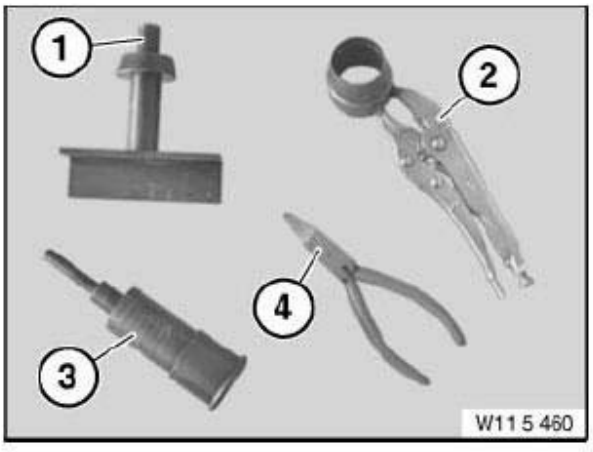


Fig. 55: Identifying Removal Pliers (11-5464)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9812 SCREW

Screw

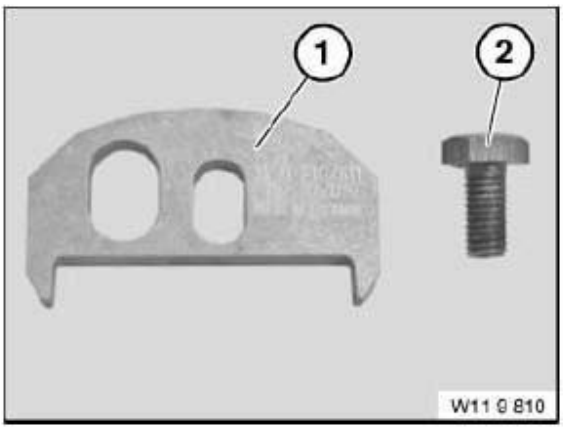


Fig. 56: Identifying Screw (11-9812)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4180 SCREWDRIVER INSERT

Screwdriver insert Minimum set: Mechanical tools MW

NOTE: (Screwdriver insert Torx T60) For releasing and tightening down dual-mass flywheel - model year: from Jan 94

Storage Location

A11

SI number

01 02 94 (777)

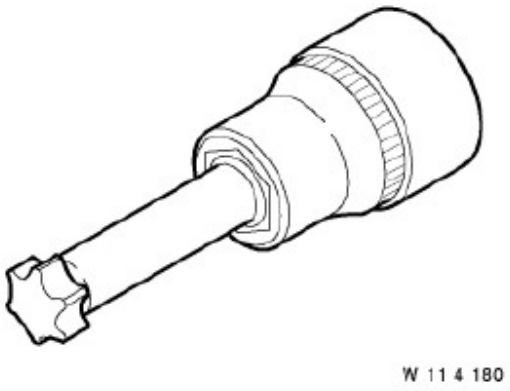
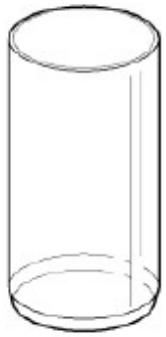


Fig. 57: Identifying Screwdriver Insert (11-4180)
Courtesy of BMW OF NORTH AMERICA, INC.

11-1380 SLEEVE

Sleeve Minimum set: Mechanical tools MW

NOTE: (Assembly sleeve) For fitting the valve stem seal, diameter 7 mm



W11 1 340

Fig. 58: Identifying Sleeve (11-1380)
Courtesy of BMW OF NORTH AMERICA, INC.

11-1350 SLEEVE

Sleeve MW

Replaced by: 0490744

NOTE: (Assembly sleeves) For fitting the valve stem seal - Replaced by 11 1 360 (0 490 744)

11-8580 SOCKET WRENCH

Socket wrench Minimum set: Mechanical tools MW

NOTE: (wrench socket Torx T60) For removing and installing cylinder head (outside diameter 13.5 mm).

Storage Location

B20

A20

SI number

01 20 06 (299)

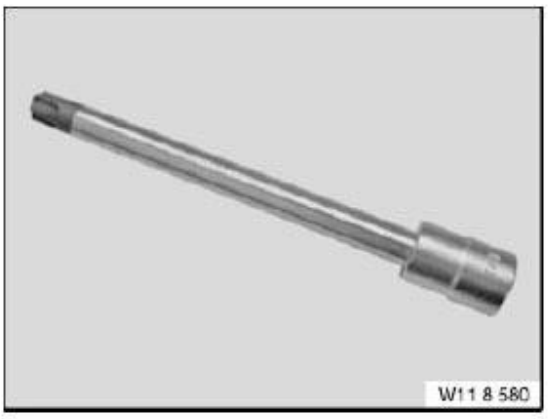


Fig. 59: Identifying Socket Wrench (11-8580)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4260 SOCKET WRENCH

Socket wrench MW

NOTE: For removing and installing lambda oxygen sensors.

Storage Location

A52

SI number

01 17 04 (130)

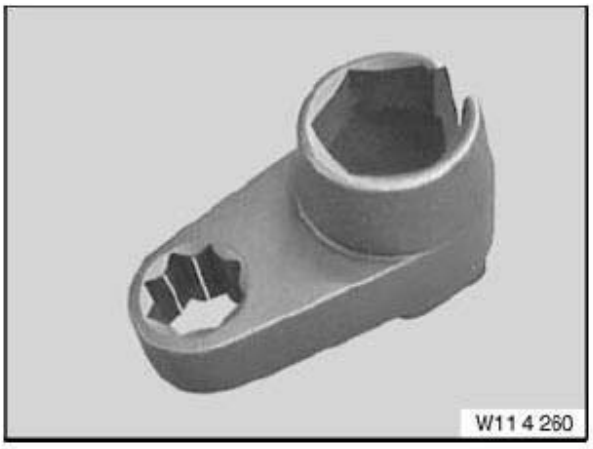


Fig. 60: Identifying Socket Wrench (11-4260)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8620 SOCKET WRENCH

Socket wrench Minimum set: Mechanical tools MW

NOTE: (Wrench socket AF 10) For fitting and removing the earth connector screws on the injectors

Storage Location

A19

SI number

01 20 06 (299)



Fig. 61: Identifying Socket Wrench (11-8620)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8610 SOCKET WRENCH

Socket wrench Minimum set: Mechanical tools MW

NOTE: (Wrench socket AF 5) For removing and installing the high-pressure pump (length 125 mm).

Storage Location

A20

SI number

01 20 06 (299)

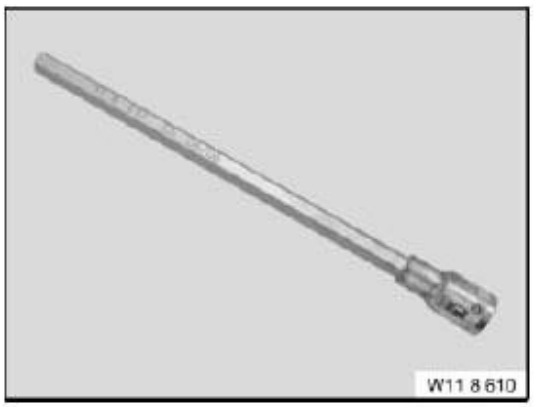


Fig. 62: Identifying Socket Wrench (11-8610)
Courtesy of BMW OF NORTH AMERICA, INC.

11-7030 SOCKET WRENCH INSERT

Socket wrench insert Minimum set: Mechanical tools MW

NOTE: (Wrench socket 22 mm) For loosening and tightening the oxygen sensor

Storage Location

A11

SI number

01 06 95 (963)

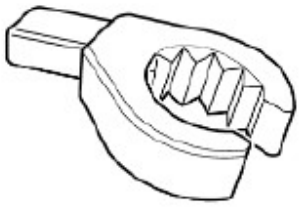


Fig. 63: Identifying Socket Wrench Insert (11-7030)
Courtesy of BMW OF NORTH AMERICA, INC.

11-7310 SPACER

Spacer Minimum set: Mechanical tools MW

NOTE: For supporting engine during removal and installation of transmission

Storage Location

B6

SI number

01 11 94 (858)

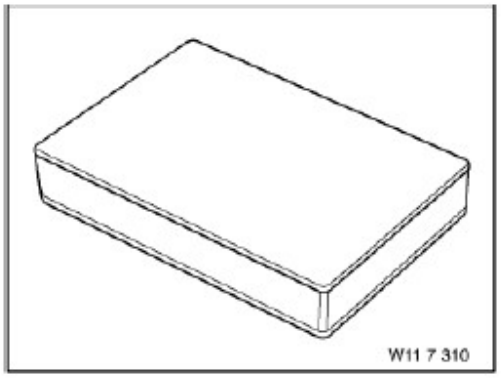


Fig. 64: Identifying Spacer (11-7310)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9230 TOOL

Tool Minimum set: Mechanical tools MW

NOTE: (Pulling device) For radial shaft seal at front of engine block

Storage Location

C43

SI number

01 01 01 (662)

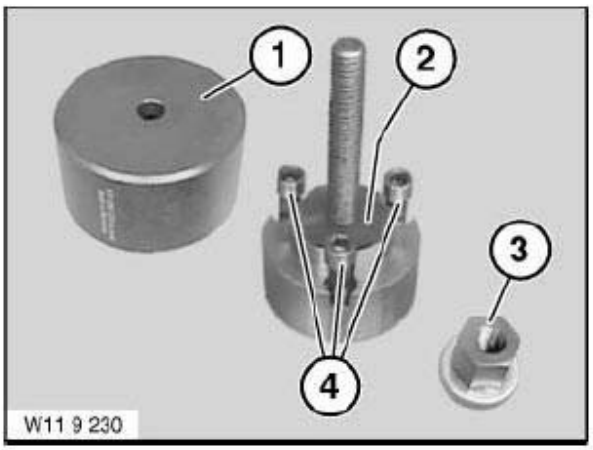


Fig. 65: Identifying Tool (11-9230)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = 0494021 Bush

2 = 0494022 Spindle

4 = 0494024 Bolt

NOTE: (Screws (3 pieces))

5 = 0496670 Spindle

NOTE: N55

3 = 0494023 Nut

11-4470 TOOL

Tool Minimum set: Mechanical tools MW

NOTE: (cleaning kit) For cleaning sealing surfaces on magnesium crankcase/cylinder head.

SI number

01 17 04 (130)

Consisting of:

2 = 0495104 Extractor

NOTE: **(grindstone)**

1 = 0495103 Scraper

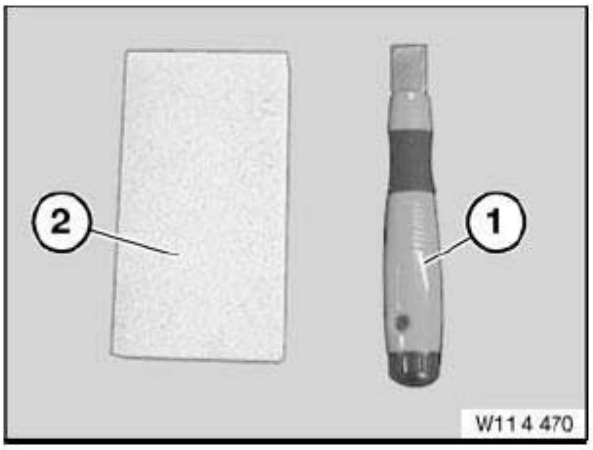


Fig. 66: Identifying Tool (11-4470)
Courtesy of BMW OF NORTH AMERICA, INC.

00-7300 TOOL

Tool MW

NOTE: **Infos available under the Technical Campaign Number 0013920100 and also under the PuMA Number 32600043.**

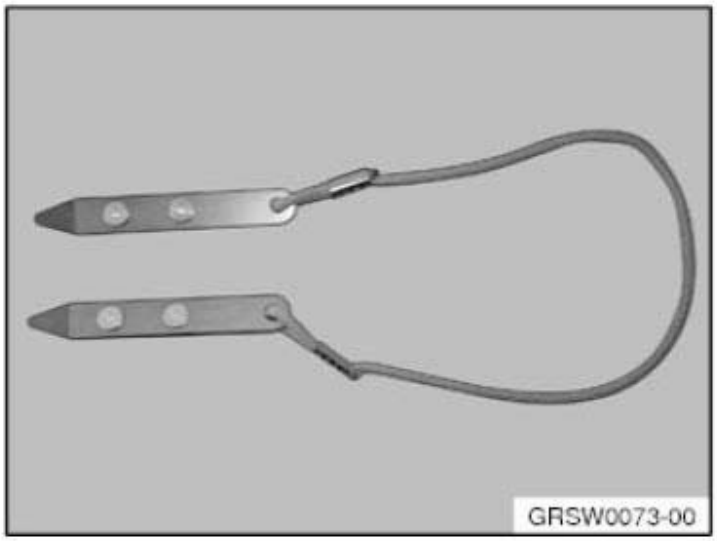


Fig. 67: Identifying Tool (00-7300)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9180 TOOL

Tool Minimum set: Mechanical tools MW

NOTE: (pulling tool) For pulling radial shaft seal into engine block, rear

Storage Location

C43

SI number

01 01 01 (662)

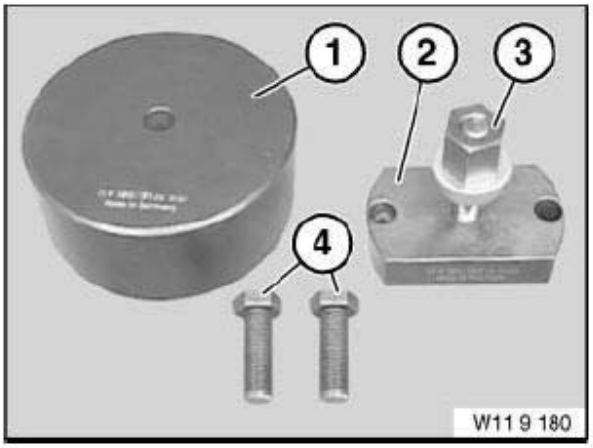


Fig. 68: Identifying Tool (11-9180)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

5 = 0496660 Ring

NOTE: For fitting rear radial shaft seal - rim offset 6.6 mm (N55).

1 = 0494028 Bush

2 = 0494029 Thrust piece

3 = 0494030 Nut

4 = 0494031 Screw

NOTE: (screws (2 x))

11-4490 TOOL SET

Tool set MW

NOTE: (Tool set) For removal and installation of gudgeon pin circlips.

SI number

01 17 04 (130)

Consisting of:

0495010

0495011

0495012

0495013

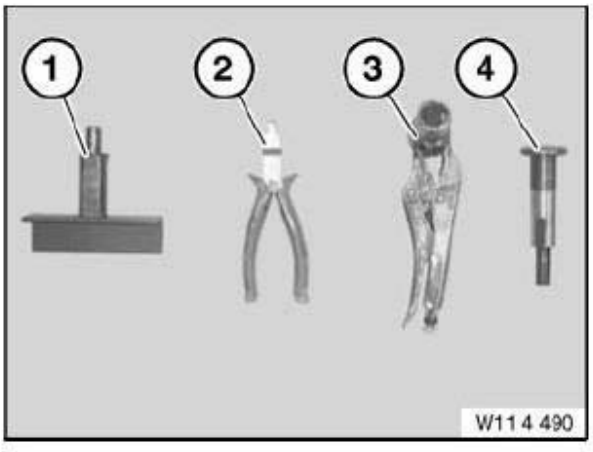


Fig. 69: Identifying Tool Set (11-4490)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8560 TOOL SET

Tool set MW

NOTE: (Tool set) For removal and installation of gudgeon pin circlips.

SI number

01 20 06 (299)

Consisting of:

1 = 0495744 Holder

NOTE: (Installation bracket)

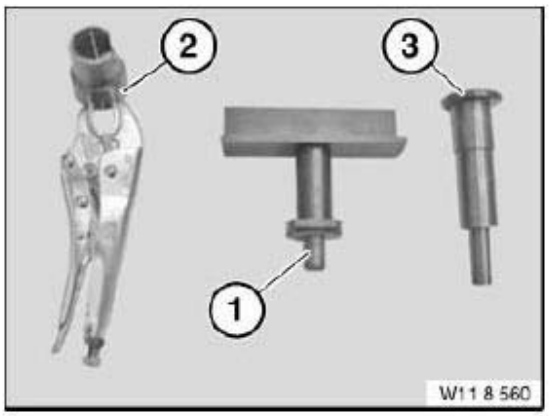


Fig. 70: Identifying Tool Set (11-8560)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0495745 Pliers

NOTE: (Installation pliers)

3 = 0495746 Mandrel

NOTE: (Installation mandrel)

4 = 0496658 Mandrel

NOTE: For installing circlip on gudgeon pin (N55).

11-4350 TORQUE WRENCH

Torque wrench MW

NOTE: For installing camshaft bearing strips.

Storage Location

A51

SI number

01 17 04 (130)

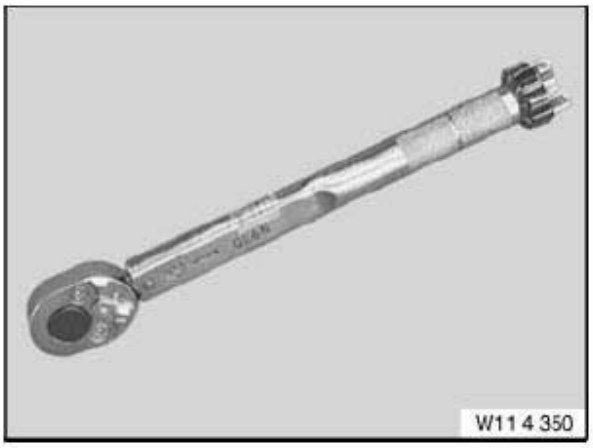


Fig. 71: Identifying Torque Wrench (11-4350)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8640 TORX

Torx Minimum set: Mechanical tools MW

NOTE: (Torx) E10 For removing and installing oil pump triangular drive.

Storage Location

B19

SI number

01 20 06 (299)



Fig. 72: Identifying Torx (11-8640)
Courtesy of BMW OF NORTH AMERICA, INC.

11-5190 TORX

Torx Minimum set: Mechanical tools MW

Replaced by: 0495747

NOTE: (Torx) T60 For assembly and disassembly of cylinder head. Replaced by 11 8 580 (0 495 747)

Storage Location

A51

SI number

01 17 04 (130)

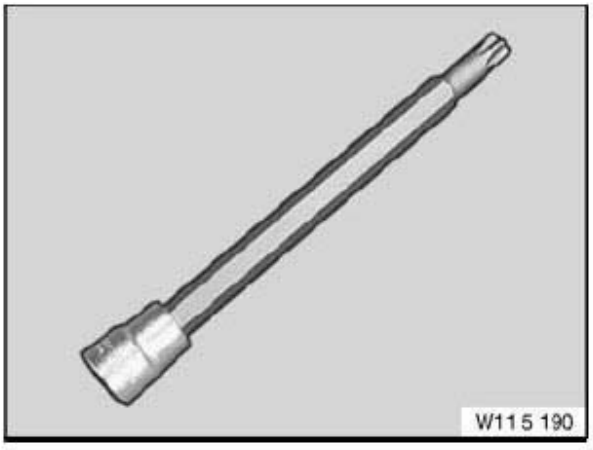


Fig. 73: Identifying Torx (11-5190)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4420 TORX

Torx Minimum set: Mechanical tools MW

NOTE: (Torx) T50 For assembly and disassembly of cylinder head.

Storage Location

A51

SI number

01 17 04 (130)

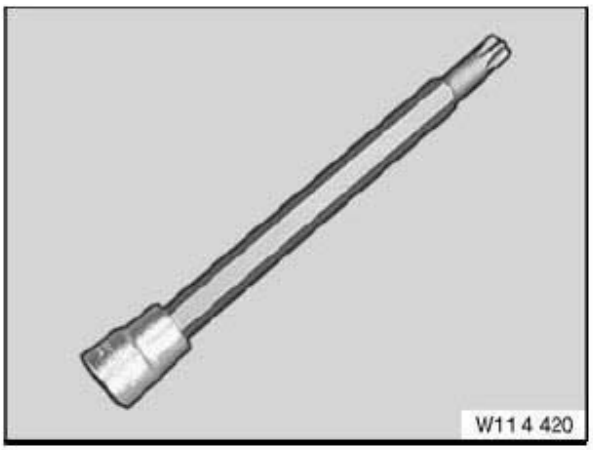


Fig. 74: Identifying Torx (11-4420)
Courtesy of BMW OF NORTH AMERICA, INC.

11-5200 WASHER

Washer Minimum set: Mechanical tools MW

NOTE: (Shim) For slackening and tightening the central bolt.

Storage Location

B51

SI number

01 17 04 (130)

Consisting of:

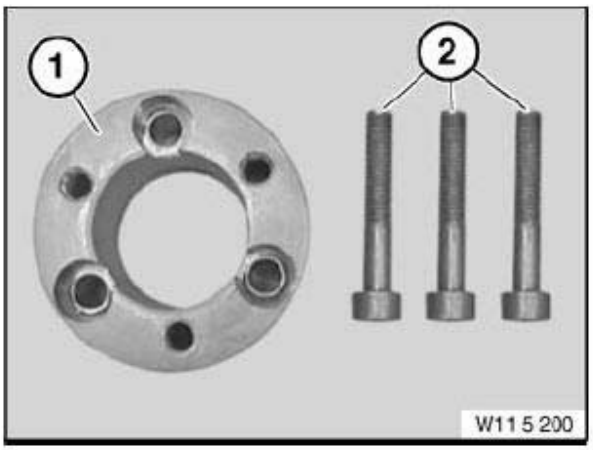


Fig. 75: Identifying Washer (11-5200)

Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0495211 Screw

NOTE: (Screws M8x40 mm (3 x))

1 = 0495210 Washer

NOTE: (Shim)

11-7020 WRENCH SOCKET

Wrench socket Minimum set: Mechanical tools MW

NOTE: (Wrench socket 22 mm) For loosening and tightening the oxygen sensor



W11 7 020

Fig. 76: Identifying Wrench Socket (11-7020)
Courtesy of BMW OF NORTH AMERICA, INC.

CAMSHAFT N52K/B25

11 31 CAMSHAFT N52K B25

CAMSHAFT SPECIFICATION

Guide bearing (width)	mm	$20.000^{+0.052}$
Radial play	mm	0.054...0.099
Axial play	mm	0.020...0.162

CAMSHAFT N52K/B30

11 31 CAMSHAFT N52K B30

CAMSHAFT SPECIFICATION

Guide bearing (width)	mm	$20.000^{+0.052}$
Radial play	mm	0.054...0.099
Axial play	mm	0.020...0.162

CONNECTING RODS AND BEARINGS N52K/B25

11 24 CONNECTING RODS AND BEARINGS N52K B25

CONNECTING RODS AND BEARINGS SPECIFICATION

Large connecting rod eye (without bearing)	mm	$53.600^{+0.016}$
Conrod bushing: Inside diameter	mm	$20.000^{+0.013}_{+0.004}$
Connecting rod bearing, installation clearance	mm	0.025... 0.061
Permissible total deviation of connecting rods in one engine (without bearing shells)	g	± 5

CONNECTING RODS AND BEARINGS N52K/B30

11 24 CONNECTING RODS AND BEARINGS N52K B30

CONNECTING RODS AND BEARINGS SPECIFICATION

Large connecting rod eye (without bearing)	mm	$53.600^{+0.016}$
Conrod bushing: Inside diameter	mm	$20.000 +0.013^{+0.004}$
Connecting rod bearing, installation clearance	mm	0.025... 0.061

Permissible total deviation of connecting rods in one engine (without bearing shells)	g	± 5

CRANKSHAFT AND BEARINGS

11 21 CRANKSHAFT AND BEARINGS N52K B30

CRANKSHAFT AND BEARINGS SPECIFICATION

Ground sizes of conrod bearing journals		
Identification mark (b)	mm	49.9820... 49.9924
Identification mark (R)	mm	49.9925... 50.0020
Radial conrod bearing play	mm	0.025 ... 0.061

CRANKSHAFT AND BEARINGS

11 21 CRANKSHAFT AND BEARINGS N52K B25

CRANKSHAFT AND BEARINGS SPECIFICATION

Ground sizes of conrod bearing journals		
Identification mark (b)	mm	49.9820... 49.9924
Identification mark (R)	mm	49.9925... 50.0020
Radial conrod bearing play	mm	0.025 ... 0.061

CRANKSHAFT AND BEARINGS N52K/B25

11 21 CRANKSHAFT AND BEARINGS N52K B25

CRANKSHAFT AND BEARINGS SPECIFICATION

Ground sizes of main bearing journals		main bearing journal
Original (designation S1)	mm	55.998 ... 55.993
Original (designation S2)	mm	55.992 ... 55.987
Original (designation S3)	mm	55.986 ... 55.981
Crankshaft bearing clearance, radial	mm	0.020 ... 0.046
Max. permitted runout at centre crankshaft journal	mm	0.150

CRANKSHAFT AND BEARINGS N52K/B25

11 21 CRANKSHAFT AND BEARINGS N52K B25

CRANKSHAFT AND BEARINGS SPECIFICATION

Grinding stages, crankshaft guide bearing		
Standard	mm	24.0 F8

Crankshaft axial play	mm	0.060 ... 0.250

CRANKSHAFT AND BEARINGS N52K/B30

11 21 CRANKSHAFT AND BEARINGS N52K B30

CRANKSHAFT AND BEARINGS SPECIFICATION

Grinding stages, crankshaft guide bearing		
Standard	mm	24.0 F8
Crankshaft axial play	mm	0.060 ... 0.250

CRANKSHAFT AND BEARINGS N52K/B30

11 21 CRANKSHAFT AND BEARINGS N52K B30

CRANKSHAFT AND BEARINGS SPECIFICATION

Ground sizes of main bearing journals		Guide bearing journal
Original (designation S1)	mm	64.998 ... 64.993
Original (designation S2)	mm	64.992 ... 64.987
Original (designation S3)	mm	64.986 ... 64.981
Crankshaft bearing clearance, radial	mm	0.020 ... 0.046
Max. permitted runout at centre crankshaft journal	mm	0.150

CYLINDER HEAD WITH COVER N52K/B25

11 12 CYLINDER HEAD WITH COVER N52K B25

CYLINDER HEAD WITH COVER SPECIFICATION

Cylinder head height: Original dimension	mm	112.000 ± 0.050
Machining limit	mm	111.700 ± 0.050
Valve guides are not available as replacement parts.		
Inside diameter of installed valve guide		
Original inlet valve	mm	$5.000^{+0.012}$
Original exhaust valve	mm	$6.000^{+0.012}$
Tilt clearance, maximum (wear between valve and valve guide)	mm	0.500

CYLINDER HEAD WITH COVER N52K/B30

11 12 CYLINDER HEAD WITH COVER N52K B30

CYLINDER HEAD WITH COVER SPECIFICATION

Cylinder head height: Original dimension	mm	112.000 ± 0.050
Machining limit	mm	111.700 ± 0.050
Valve guides are not available as replacement parts.		
Inside diameter of installed valve guide		
Original inlet valve	mm	$5.000^{+0.012}$
Original exhaust valve	mm	$6.000^{+0.012}$
Tilt clearance, maximum (wear between valve and valve guide)	mm	0.500

CYLINDER HEAD WITH VALVE SEAT COVER N52K/B25

11 12 CYLINDER HEAD WITH VALVE SEAT COVER N52K B25

CYLINDER HEAD WITH VALVE SEAT COVER SPECIFICATION

Valve seat angle	°	**45**
Correction angle: outer	°	15
Correction angle: inner	°	60
Valve seat width: Inlet	mm	$1.0^{+0.1}$
Valve seat width: Exhaust	mm	$1.2^{+0.1}$
Valve seat		
Valve seat surface: Outside dia. inlet	mm	$27.7^{+0.1}$
Valve seat surface: Outside dia. exhaust	mm	$26.6^{+0.1}$

CYLINDER HEAD WITH VALVE SEAT COVER N52K/B30

11 12 CYLINDER HEAD WITH VALVE SEAT COVER N52K B30

CYLINDER HEAD WITH VALVE SEAT COVER SPECIFICATION

Valve seat angle	°	45
Correction angle: outer	°	15
Correction angle: inner	°	60
Valve seat width: Inlet	mm	$1.0^{+0.1}$
Valve seat width: Exhaust	mm	$1.2^{+0.1}$
Valve seat		
Valve seat surface: Outside dia. inlet	mm	$27.7^{+0.1}$
Valve seat surface: Outside dia. exhaust	mm	$26.6^{+0.1}$

ENGINE BLOCK, CYLINDER CRANKCASE N52K/B25

11 11 ENGINE BLOCK, CYLINDER CRANKCASE N52K B25

ENGINE BLOCK, CYLINDER CRANKCASE SPECIFICATION

Bore	stage 0[a)]	mm	82.000+0.014
Bore	stage 00 (1))	mm	
Bore	stage 1 (1))	mm	$82.250^{+0.014}$
Permitted out-of-round of cylinder bore (1))		mm	0.005
Permitted conicity of cylinder bore (1))		mm	0.010
Permissible total wear tolerance between piston and cylinder (engine operated)		mm	0.150
(1) new status or recondition			

ENGINE BLOCK, CYLINDER CRANKCASE N52K/B30

11 11 ENGINE BLOCK, CYLINDER CRANKCASE N52K B30

ENGINE BLOCK, CYLINDER CRANKCASE SPECIFICATION

Bore	stage 0(1))	mm	85.000+0.014
Bore	stage 00 (1))	mm	
Bore	stage 1 (1))	mm	$85.250^{+0.014}$
Permitted out-of-round of cylinder bore (1))		mm	0.005
Permitted conicity of cylinder bore (1))		mm	0.010
Permissible total wear tolerance between piston and cylinder (engine operated)		mm	0.150
(1) new status or recondition			

ENGINE IN GENERAL N52K/B25

11 00 ENGINE IN GENERAL N52K B25

ENGINE SPECIFICATION

Cylinder		6
Bore	mm	82
Stroke	mm	79
Effective displacement	cm^3	2497
Compression ratio	:1	11
Max. permissible engine speed	rpm	6500±50
Permissible constant speed	rpm	6300
Compression pressure: Minimum and maximum values depending on position of Valvetronic.		9 ... 18
Compression pressure: Maximum deviation of all cylinders to each other.	bar	2

ENGINE IN GENERAL N52K/B30

11 00 ENGINE IN GENERAL N52K B30

ENGINE SPECIFICATION

Cylinder		6
Bore	mm	85
Stroke	mm	88
Effective displacement	cm^3	2996
Compression ratio	:1	10.7
Max. permissible engine speed	rpm	6550±50
Permissible constant speed	rpm	6300
Compression pressure: Minimum and maximum values depending on position of Valvetronic.		9 ... 18
Compression pressure: Maximum deviation of all cylinders to each other.	bar	2

OIL PUMP WITH STRAINER AND DRIVE N52K/B25

11 41 OIL PUMP WITH STRAINER AND DRIVE N52K B25

OIL PUMP WITH STRAINER AND DRIVE SPECIFICATION

Oil pressure at idle (engine at normal operating temperature)	min bar	1.5
Control pressure (engine at normal operating temperature)	bar	4.0 ... 6.0

OIL PUMP WITH STRAINER AND DRIVE N52K/B25

11 41 OIL PUMP WITH STRAINER AND DRIVE N52K B25

OIL PUMP WITH STRAINER AND DRIVE SPECIFICATION

Oil pressure at idle (engine at normal operating temperature)	min bar	1.5
Control pressure (engine at normal operating temperature)	bar	4.0 ... 6.0

OIL PUMP WITH STRAINER AND DRIVE N53, N52K/B25

11 41 OIL PUMP WITH STRAINER AND DRIVE N53/N52K B25

OIL PUMP WITH STRAINER AND DRIVE SPECIFICATION

Regulated pressure	bar	Observe diagnosis instruction

OIL PUMP WITH STRAINER AND DRIVE N53, N52K/B30

11 41 OIL PUMP WITH STRAINER AND DRIVE N53/N52K B30

OIL PUMP WITH STRAINER AND DRIVE SPECIFICATION

Regulated pressure	bar	Observe diagnosis instruction

OIL SUPPLY N52K/B25, B30

11 40 OIL SUPPLY N52K B25 B30

OIL SUPPLY SPECIFICATION

Oil grades and consumption: see **ENGINE - OPERATING FLUIDS**		
Filling capacity, engine oil change with oil filter element	Litres	6.50
Filling capacity engine oil change with oil filter element for auxiliary engine oil cooler	Litres	7.00

PISTONS WITH RINGS AND PINS

11 25 PISTONS WITH RINGS AND PINS N18

PISTONS WITH RINGS AND PINS SPECIFICATION

1st groove		
End clearance	mm	0.20 ... 0.40
End clearance (wear limit)	mm	0.95
Side clearance	mm	0.015 ... 0.070
2nd groove		
End clearance	mm	0.30 ... 0.55
End clearance (wear limit)	mm	1.06
Side clearance	mm	0.015 ... 0.060
3rd groove		
End clearance	mm	0.10 ... 0.40
End clearance (wear limit)	mm	0.82
Side clearance	mm	0.040 ... 0.10

PISTONS WITH RINGS AND PINS N52K/B25

11 25 PISTONS WITH RINGS AND PINS N52K B25

PISTONS WITH RINGS AND PINS SPECIFICATION

Piston and pin are paired to each other - replace together only.		
Measuring point "A" (position)	mm	10
Piston diameter at measuring point "A"		
Original (new dimension)	mm	$81.985^{\pm 0.014}$
Repair stage (new dimension)	mm	%
Oversize (new dimension)	mm	$82.235^{\pm 0.014}$

Piston installation clearance (piston new)	mm	0.000...0.043
Piston installation clearance (piston worn)	mm	0.020...0.047
Permissible total wear tolerance between piston and cylinder (engine operated)	mm	0.150

PISTONS WITH RINGS AND PINS N52K/B25

11 25 PISTONS WITH RINGS AND PINS N52K B25

PISTONS WITH RINGS AND PINS SPECIFICATION

1st groove		
End clearance	mm	0.180 ... 0.330
Axial play	mm	0.020 ... 0.060
2nd groove		
End clearance	mm	0.300 ... 0.500
Axial play	mm	0.020 ... 0.060
3rd groove		
End clearance	mm	cannot be measured
Axial play	mm	cannot be measured

PISTONS WITH RINGS AND PINS N52K/B30

11 25 PISTONS WITH RINGS AND PINS N52K B30

PISTONS WITH RINGS AND PINS SPECIFICATION

1st groove		
End clearance	mm	0.150 ... 0.300
Axial play	mm	0.020 ... 0.070
2nd groove		
End clearance	mm	0.300 ... 0.500
Axial play	mm	0.020 ... 0.060
3rd groove		
End clearance	mm	cannot be measured
Axial play	mm	cannot be measured

PISTONS WITH RINGS AND PINS N52K/B30

11 25 PISTONS WITH RINGS AND PINS N52K B30

PISTONS WITH RINGS AND PINS SPECIFICATION

Piston and pin are paired to each other - replace together only.		
Measuring point "A" (position)	mm	14

Piston diameter at measuring point "A"		
Original (new dimension)	mm	$84.990^{\pm 0.010}$
Repair stage (new dimension)	mm	%
Oversize (new dimension)	mm	$85.240^{\pm 0.010}$
Piston installation clearance (piston new)	mm	0.000...0.034
Piston installation clearance (piston worn)	mm	0.020...0.047
Permissible total wear tolerance between piston and cylinder (engine operated)	mm	0.150

VALVES WITH SPRINGS N52K/B25

11 34 VALVES WITH SPRINGS N52K B25

VALVES WITH SPRINGS SPECIFICATION

Plate dia.		
Inlet	mm	$32.2^{\pm 0.05}$
Exhaust	mm	27.0± 0.1
Stem		
Inlet	mm	$5.0^{-0.1}_{-0.06}$
Exhaust	mm	$6.0^{-0.1}_{-0.06}$

VALVES WITH SPRINGS N52K/B30

11 34 VALVES WITH SPRINGS N52K B30

VALVES WITH SPRINGS SPECIFICATION

Plate dia.		
Inlet	mm	$34.2^{\pm 0.05}$
Exhaust	mm	$29.0^{\pm 0.1}$
Stem		
Inlet	mm	$5.0^{-0.1}_{-0.06}$
Exhaust	mm	$6.0^{-0.1}_{-0.06}$

VIBRATION DAMPER N52K/B25

11 23 VIBRATION DAMPER N52K B25

VIBRATION DAMPER SPECIFICATION

Max. permitted radial runout	mm	0.100
Max. permitted axial runout	mm	0.100

VIBRATION DAMPER N52K/B30

11 23 VIBRATION DAMPER N52K B30

VIBRATION DAMPER SPECIFICATION

Max. permitted radial runout	mm	0.100
Max. permitted axial runout	mm	0.100

CAMSHAFT N54/B30

11 31 CAMSHAFT N54 B30

CAMSHAFT SPECIFICATIONS

Guide bearing (width)	mm	$20.000^{+0.052}$
Radial runout	mm	0.054...0.099
Axial play	mm	0.02 ... 0.162

CONNECTING RODS AND BEARINGS N54/B30

11 24 CONNECTING RODS AND BEARINGS N54 B30

CONNECTING RODS AND BEARINGS SPECIFICATIONS

Large connecting rod eye (without bearing)	mm	$53.600^{+0.016}$
Conrod bushing: Inside diameter	mm	$22^{+0.013}_{+0.004}$
Permissible total deviation of connecting rods in one engine (without bearing shells)	g	± 5

CRANKSHAFT AND BEARINGS

11 21 CRANKSHAFT AND BEARINGS N54 B30

CRANKSHAFT AND BEARINGS SPECIFICATIONS

Ground sizes of conrod bearing journals		
Stage (b)	mm	49.9730 ... 49.9834
Stage (r)	mm	49.9835 ... 49.9930
Radial conrod bearing play	mm	0.025 ... 0.070

CRANKSHAFT AND BEARINGS N54/B30

11 21 CRANKSHAFT AND BEARINGS N54 B30

CRANKSHAFT AND BEARINGS SPECIFICATIONS

Ground sizes of main bearing journals		**main bearing journal**
Original (designation S1)	mm	55.998...55.993
Original (designation S2)	mm	55.992...55.987
Original (designation S3)	mm	55.986...55.981

Crankshaft bearing clearance, radial	mm	0.020...0.046
Max. permitted runout at center crankshaft journal	mm	0.15

CRANKSHAFT AND BEARINGS N54/B30

11 21 CRANKSHAFT AND BEARINGS N54 B30

CRANKSHAFT AND BEARINGS SPECIFICATIONS

Ground sizes of main bearing journals		**Guide bearing journal**
Original (designation S1)	mm	64.998...64.993
Original (designation S2)	mm	64.992...64.987
Original (designation S3)	mm	64.986...64.981
Crankshaft bearing clearance, radial	mm	0.020...0.046
Max. permitted runout at center crankshaft journal	mm	0.15

CRANKSHAFT AND BEARINGS N54/B30

11 21 CRANKSHAFT AND BEARINGS N54 B30

CRANKSHAFT AND BEARINGS SPECIFICATIONS

Grinding stages, crankshaft guide bearing		
Standard	mm	24.0 F8
Size 1	mm	24.2 F8
Size 2	mm	24.4 F8
Crankshaft axial play	mm	0.060...0.250

CYLINDER HEAD WITH COVER N54/B30

11 12 CYLINDER HEAD WITH COVER N54 B30

CYLINDER HEAD WITH COVER SPECIFICATIONS

Cylinder head height: Original dimension	mm	112.00 ± 0.05
Machining limit	mm	111.70 ± 0.05
Valve guides are not available as replacement parts.		
Inside diameter of installed valve guide		
Original inlet valve	mm	$5.0^{+0.012}$
Original exhaust valve	mm	$6.0^{+0.012}$
Tilt clearance, maximum (wear between valve and valve guide)	mm	cannot be measured
Bearing of camshaft		
Guide bearing (width)	mm	22.000...22.052

CYLINDER HEAD WITH VALVE SEAT COVER N54/B30

11 12 CYLINDER HEAD WITH VALVE SEAT COVER N54 B30

CYLINDER HEAD WITH VALVE SEAT COVER SPECIFICATIONS

Valve seat angle	°	45
Correction angle: outer	°	15
Correction angle: inner	°	60
Valve seat width: Inlet	mm	$1.0^{+0.1}$
Valve seat width: Exhaust	mm	$1.2^{+0.1}$
Valve seat		
Valve seat surface: Outside dia. inlet	mm	$27.7^{+0.1}$
Valve seat surface: Outside dia. exhaust	mm	$26.6^{+0.1}$

ENGINE BLOCK, CYLINDER CRANKCASE N54/B30

11 11 ENGINE BLOCK, CYLINDER CRANKCASE N54 B30

ENGINE BLOCK, CYLINDER CRANKCASE SPECIFICATIONS

Bore _ stage 0[a)]	mm	$84.000^{+0.014}$
Bore stage 00 a)	mm	
Bore _ stage 1 a)	mm	$84.250^{+0.014}$
Permitted out-of-round of cylinder bore a)	mm	0.005
Permitted conicity of cylinder bore a)	mm	0.01
Permissible total wear tolerance between piston and cylinder (engine operated)	mm	0.15

[a)] new status or recondition

ENGINE IN GENERAL N54/B30

11 00 ENGINE IN GENERAL N54 B30

ENGINE IN GENERAL SPECIFICATIONS

Cylinder		6
Bore	mm	84
Stroke	mm	89.6
Effective displacement	cm^3	2979
Compression ratio	:1	10.2
Max. permissible engine speed	rpm	7000
Permissible constant speed	rpm	6550
Compression pressure: Minimum and maximum values depending on position of Valvetronic.		14...16
Compression pressure:	bar	2

Maximum deviation of all cylinders to each other.		

OIL PUMP WITH STRAINER AND DRIVE N54/B30

11 41 OIL PUMP WITH STRAINER AND DRIVE N54 B30

OIL PUMP WITH STRAINER AND DRIVE SPECIFICATIONS

Oil pressure at idle speed with engine at operating temperature	min bar	1.5
Control pressure with engine at operating temperature	bar	4.0...6.0

OIL SUPPLY E82, E88, E89/N54/B30

11 40 OIL SUPPLY E82/E88/E89/N54 B30

OIL SUPPLY SPECIFICATIONS

Oil grades and consumption: **see ENGINE - OPERATING FLUIDS**		
Filling capacity, engine oil change with oil filter element	Litres	6.50

PISTONS WITH RINGS AND PINS

11 25 PISTONS WITH RINGS AND PINS N18

PISTONS WITH RINGS AND PINS SPECIFICATIONS

1st groove		
End clearance	mm	0.20 ... 0.40
End clearance (wear limit)	mm	0.95
Side clearance	mm	0.015 ... 0.070
2nd groove		
End clearance	mm	0.30 ... 0.55
End clearance (wear limit)	mm	1.06
Side clearance	mm	0.015 ... 0.060
3rd groove		
End clearance	mm	0.10 ... 0.40
End clearance (wear limit)	mm	0.82
Side clearance	mm	0.040 ... 0.10

PISTONS WITH RINGS AND PINS N54/B30

11 25 PISTONS WITH RINGS AND PINS N54 B30

PISTONS WITH RINGS AND PINS SPECIFICATIONS

Piston and pin are paired to each other - replace together only.		

Measuring point "A" (position)	mm	15
Piston diameter at measuring point "A"		
Original (new dimension)	mm	$83.967^{+0.004}_{-0.009}$
Repair stage (new dimension)	mm	%
Oversize (new dimension)	mm	$84.217^{+0.004}_{-0.009}$
Piston installation clearance (piston new)	mm	0.000...0.034
Piston installation clearance (piston worn)	mm	0.020...0.047
Permissible total wear tolerance between piston and cylinder (engine operated)	mm	0.15

PISTONS WITH RINGS AND PINS N54/B30

11 25 PISTONS WITH RINGS AND PINS N54 B30

PISTONS WITH RINGS AND PINS SPECIFICATIONS

1st groove		
End clearance	mm	0.18...0.33
Axial play	mm	0.020...0.060
2nd groove		
End clearance	mm	0.30...0.50
Axial play	mm	0.020...0.060
3rd groove		
End clearance	mm	cannot be measured
Axial play	mm	cannot be measured

VALVES WITH SPRINGS N54/B30

11 34 VALVES WITH SPRINGS N54 B30

VALVES WITH SPRINGS SPECIFICATIONS

Plate dia.		
Inlet	mm	$31.4^{\pm 0.05}$
Exhaust		$28.0^{\pm}$ 0.1
Stem		
Inlet	mm	$5.0\ ^{-0.1}_{-0.06}$
Exhaust	mm	$6.0\ ^{-0.1}_{-0.06}$

VIBRATION DAMPER N54/B30

11 23 VIBRATION DAMPER N54 B30

VIBRATION DAMPER SPECIFICATIONS

Max. permitted radial runout	mm	0.10
Max. permitted axial runout	mm	0.10

AIR PUMP, LINES AND CONTROL VALVES

11 72 AIR PUMP, LINES AND CONTROL VALVES

TIGHTENING TORQUE SPECIFICATION - AIR PUMP, LINES AND CONTROL VALVES

	Type	Thread	Tightening specification	Measure
1AZ Secondary air valve to cylinder head	N52	M6		8 Nm
2AZ Secondary air pump to mounting bracket/pump carrier	N52	M6		8 Nm
3AZ Intake hose/intake line to body	N52	M6		8 Nm

CAMSHAFT

11 31 CAMSHAFT

TIGHTENING TORQUE SPECIFICATION - CAMSHAFT

	Type	Thread	Tightening specification	Measure
1AZ Upper and lower bearing strip of camshaft (steel screw 10.9)	N54	M7x70	Insert screws dry	
			Jointing torque	8 Nm
			Torque angle	60 °
2AZ Chain drive module to cylinder head	N54	M6x35		8.5 Nm
3AZ Guide rail to crankcase	N54	M8		20 Nm
4AZ Guide rail to cylinder head	N54	M7		14 Nm
5AZ Chain tensioner to cylinder head	N54	M22 x 1.5	Replace sealing ring	55 Nm
6AZ Screw plug in cylinder head	N54	M18x1.5		25 Nm

CASE COVERS

11 14 CASE COVERS

TIGHTENING TORQUE SPECIFICATION - CASE COVERS

	Type	Thread	Tightening specification	Measure
1AZ Transmission cover plate to crankcase Aluminum screws/bolts are permitted	N54	M6x16	Replace screws Thread repairs exclusively with Al Helicoil Jointing torque and angle of rotation must be observed without fail.	

with and without color coding (blue).			Jointing torque	4 Nm
			Torque angle	45 °

CONNECTING RODS AND BEARINGS

11 24 CONNECTING RODS AND BEARINGS

TIGHTENING TORQUE SPECIFICATION - CONNECTING RODS AND BEARINGS

	Type	Thread	Tightening specification	Measure
1AZ Connecting rod bolts	N54	M9	Replace, wash and oil screws	
			Jointing torque	20 Nm
			Torque angle	140 °

COOLANT PUMP WITH DRIVE

11 51 COOLANT PUMP WITH DRIVE

TIGHTENING TORQUE SPECIFICATION - COOLANT PUMP WITH DRIVE

	Type	Thread	Tightening specification	Measure
1AZ Coolant pump to crankcase	N54	M8 x 26	Replace screws. Thread repairs exclusively with aluminum Helicoil threaded insert. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	10 Nm
			Torque angle	90 °
2AZ ASA screw Coolant pump to bracket.	N54	M8 x 27		20.5 Nm
3AZ Hose clamp Coolant hose between coolant pump and coolant thermostat.	N54	L42-48		3 Nm
4AZ Hose clamp Coolant hose between coolant pump and feed line.	N54	L42-48		3 Nm

CRANKSHAFT AND BEARINGS

11 21 CRANKSHAFT AND BEARINGS

TIGHTENING TORQUE SPECIFICATION - CRANKSHAFT AND BEARINGS

	Type	Thread	Tightening specification	Measure
1AZ Torsion damper (hub) to crankshaft (central bolt 12.9)	N54	M16x80	Replace screws Lightly oil screws and threads	
			Jointing torque	100 Nm

			Torque angle	360 °

CRANKSHAFT AND BEARINGS

11 21 CRANKSHAFT AND BEARINGS

TIGHTENING TORQUE SPECIFICATION - CRANKSHAFT AND BEARINGS

	Type	Thread	Tightening specification	Measure
1AZ Increment wheel on crankshaft	S54	M5 10.9	Replace screws	
			Jointing torque	5.0 Nm
			Torque angle	45 °
Increment wheel on crankshaft		M5 10.9	Replace screws	13 Nm
Increment wheel on crankshaft		M5 8.8	Replace screws	5.5 Nm

CYLINDER HEAD WITH COVER

11 12 CYLINDER HEAD WITH COVER

TIGHTENING TORQUE SPECIFICATION - CYLINDER HEAD WITH COVER

	Type	thread	tightening specification	Measure
11AZ Cylinder head cover	All	M6		10 Nm
	All	M7		15 Nm
	M21	M8		15 Nm
12AZ Oil trap to cylinder head cover	M21	M8		17 Nm
13AZ Timing case to cylinder head	All	M7		15 Nm
	All	M8		20 Nm
14AZ Plug for oil channel (microencapsulated)	M47/M57	M12 x 1.5		20 Nm
15AZ Vent plugs to cylinder head (coolant)	M67			2 Nm

CYLINDER HEAD WITH CYLINDER HEAD COVER

11 12 CYLINDER HEAD WITH CYLINDER HEAD COVER

TIGHTENING TORQUE SPECIFICATION - CYLINDER HEAD WITH CYLINDER HEAD COVER

	Type	Thread	Tightening specification	Measure
1AZ Cylinder head bolt	N54	M11 x 135	Replace screws.	
			Jointing torque	30 Nm
			1st angle of rotation	90 °
			2. Angle of rotation	90 °
			3. Angle of rotation	45 °
			Replace screws.	

2AZ Cylinder head bolt	N54	M9 x 95 M9 x 125	Jointing torque	30 Nm
			1st angle of rotation	90 °
			2. Angle of rotation	omitted
			3. Angle of rotation	45 °
3AZ Cylinder head bolt	N54	M9 x 30 M9 x 70		22 Nm
4AZ Cylinder head cover to cylinder head.	N54	M6		8.5 Nm
5AZ Metal bracket to cylinder head.	N54	M6 x 16		8 Nm
6AZ Lifting eye to cylinder head.	N54	M8 x 20		19 Nm
7AZ Ignition coil cover to cylinder head cover.	N54	M6 x 20		4 Nm
8AZ Hexagon screw (2 x) Metal bracket for ignition coil cover to cylinder head cover.	N54	M6 x 12		4 Nm

EMISSIONS CONTROL, CONTROL SENSOR/MONITOR SENSOR

11 78 EMISSIONS CONTROL, CONTROL SENSOR/MONITOR SENSOR

TIGHTENING TORQUE SPECIFICATION - EMISSIONS CONTROL, CONTROL SENSOR/MONITOR SENSOR

	Type	Thread	Tightening specification	Measure
1AZ Control sensor/monitor sensor	N54	M18 x 1.5		50 Nm
2AZ Bracket, oxygen sensor, to transmission	N54	M8x16		20 Nm

EMISSIONS CONTROL, CONTROL SENSOR/MONITORING SENSOR

11 78 EMISSIONS CONTROL, CONTROL SENSOR/MONITORING SENSOR

TIGHTENING TORQUE SPECIFICATION - EMISSIONS CONTROL, CONTROL SENSOR/MONITORING SENSOR

	Type	Thread	Tightening specification	Measure
1AZ Control sensor/monitoring sensor	N74	M18 x 1.5		50 Nm
2AZ Bracket, oxygen sensor, to cylinder head cover	N74	M6		10 Nm

EMISSIONS-CONTROL, LAMBDA OXYGEN SENSOR

11 78 EMISSIONS-CONTROL, LAMBDA OXYGEN SENSOR

TIGHTENING TORQUE SPECIFICATION - EMISSIONS-CONTROL, LAMBDA OXYGEN SENSOR

	Type	Thread	Tightening specification	Measure
1AZ Oxygen control sensor; oxygen monitor sensor	All	M18 x 1.5		50 Nm

ENGINE BLOCK

11 11 ENGINE BLOCK

TIGHTENING TORQUE SPECIFICATION - ENGINE BLOCK

	Type	Thread	Tightening specification	Measure
1AZ Main bearing bolts (steel bolts 10.9)	N54	M10x100	Replace screws	
			Jointing torque	20 Nm
			Torque angle	70 °
2AZ Bedplate Aluminum screws/bolts are permitted with and without color coding (blue).	N54	M10x27	Replace screws Thread repairs exclusively with Al Helicoil. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	15 Nm
			Torque angle	90 °
3AZ Bedplate Aluminum screws/bolts are permitted with and without color coding (blue).	N54	M8x37	Replace screws Thread repairs exclusively with Al Helicoil. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	10 Nm
			Torque angle	90 °
4AZ Bedplate Aluminum screws/bolts are permitted with and without color coding (blue).	N54	M10x41	Replace screws Thread repairs exclusively with Al Helicoil. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	15 Nm
			Torque angle	90 °
5AZ Oil spray nozzles to engine block	N54		Hollow bolt	12 Nm
6AZ Screw plug, water drain	N54	M14x1.5	Replace seal	25 Nm
7AZ Screw plug, gear case upper section	N54	M22x1.5	Replace seal	50 Nm
8AZ Screw plug, gear case lower section	N54	M16x1.5	Replace seal	30 Nm

EXHAUST MANIFOLD

11 62 EXHAUST MANIFOLD

TIGHTENING TORQUE SPECIFICATION - EXHAUST MANIFOLD

	Type	Thread	Tightening specification	Measure
1AZ Exhaust manifold to cylinder head Coat screw connections with CRC copper paste	N54	M8	Replace nuts	20 Nm

EXHAUST MANIFOLD

11 62 EXHAUST MANIFOLD

TIGHTENING TORQUE SPECIFICATION - EXHAUST MANIFOLD

	Type	Thread	Tightening specification	Measure
1AZ Exhaust manifold to cylinder head Coat screw connections with CRC copper paste	All	M6	Replace nuts	10 Nm
	M50/M52/M52TU/M54/M56/S52/S50 US	M7	Replace nuts	20 Nm
	All/others	M7	Replace nuts	15 Nm
	M10	M8	Upper row of staybolts installed with bolt cement	23 Nm
	M21	M8	Replace nuts Retighten after 2000 km Slacken nuts by a 1/4 turn	12 Nm 12 Nm
	M41/M47/M47TU/M51/M57/M57TU	M8	Replace nuts	20 Nm
	All/others	M8	Replace nuts	23 Nm

FAN

11 52 FAN

TIGHTENING TORQUE SPECIFICATION - FAN

	Type	Thread	Tightening specification	Measure
1AZ Fan clutch on water pump Coupling nut (left-hand threads)	All			40 Nm
	M54			45 Nm
2AZ Fan to fan clutch	All			10 Nm

FLYWHEEL

11 22 FLYWHEEL

TIGHTENING TORQUE SPECIFICATION - FLYWHEEL

	Type	Thread	Tightening specification	Measure
1AZ Flywheel to crankshaft (automatic transmission)	N54	M12x1.5x25.5	Replace screws	
			1. Jointing torque	30 Nm
			2. Final tightening	125 Nm
2AZ DM flywheel to crankshaft (manual transmission)	N54	M12x1.5x25.35	Replace screw	120

INTAKE MANIFOLD

11 61 INTAKE MANIFOLD

TIGHTENING TORQUE SPECIFICATION - INTAKE MANIFOLD

	Type	Thread	Tightening specification	Measure
1AZ Hexagon screw Air intake manifold to cylinder head.	N54	M7 x 50		15 Nm
2AZ Hexagon nut Air intake manifold to cylinder head.	N54	AM7		15 Nm
3AZ Hose clamp Gaiter, rear charge-air duct to front charge-air duct.	N54	L65-72		3 Nm

INTAKE MANIFOLD

11 61 INTAKE MANIFOLD

TIGHTENING TORQUE SPECIFICATION - INTAKE MANIFOLD

	Type	thread	tightening specification	Measure
1AZ Intake manifold on cylinder head	All	M8		22 Nm
	All	M7		15 Nm
	All	M6		10 Nm
2AZ Soundproofing hood to holder	M60/1/M60/2/M62	M6		8 Nm

OIL FILTER AND PIPES

11- 42 OIL FILTER AND PIPES

TIGHTENING TORQUE SPECIFICATION - OIL FILTER AND PIPES

	Type	Thread	Tightening specification	Measure
1AZ Oil filter cap to oil filter housing	N54			25 Nm
2AZ Oil filter housing to cylinder head	N54	M8 x 78 M8 x 48 M8 x 28		22 Nm
3AZ Oil-coolant heat exchanger to oil filter housing.	N54	M8 x 20		16 Nm
4AZ ISA screw Assembly, oil feed line to crankcase top section	N54	M8 x 35		19 Nm
5AZ ISA screw Assembly, oil feed line to exhaust turbocharger	N54	M6 x 12		8 Nm
6AZ Oil pressure line to crankcase	N54	M8 x 12		20 Nm
7AZ ISA screw Oil return line to exhaust turbocharger	N54	M6 x 12		8 Nm
8AZ ISA screw Oil return line to crankcase bottom section	N54	M6 x 16		8 Nm

9AZ Oil feed to exhaust turbocharger	N54	M6 x 12		8 Nm
10AZ Oil return to crankcase	N54	M12 x 10		20 Nm
11AZ Screw plug to oil filter housing	N54	M20 x 1.5	Replace sealing ring	50 Nm

OIL PUMP WITH STRAINER AND DRIVE

11 41 OIL PUMP WITH STRAINER AND DRIVE

TIGHTENING TORQUE SPECIFICATION - OIL PUMP WITH STRAINER AND DRIVE

	Type	Thread	Tightening specification	Measure
1AZ Intake pipe to bedplate	N54	M6x30	Replace screws Thread repairs exclusively with Al Helicoil. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	4 Nm
			Torque angle	100 °
2AZ Oil pump to bedplate	N54	M8x123	Replace screws Thread repairs exclusively with Al Helicoil. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	10 Nm
			Torque angle	180 °
	N54	M8x31	Replace screws Thread repairs exclusively with Al Helicoil. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	10 Nm
			Torque angle	90 °
3AZ Chain module to crankcase and oil pump	N54	M6x16	Replace screws Thread repairs exclusively with Al Helicoil. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	4 Nm
			Torque angle	45 °
4AZ Sprocket to oil pump	N54	M8	Jointing torque	20 Nm
			Torque angle	45 °

OIL SUMP

11 13 OIL SUMP

TIGHTENING TORQUE SPECIFICATION - OIL SUMP

	Type	Thread	Tightening specification	Measure
1AZ Plug		M12 x		

Oil drain to oil sump.	N54	1.5	Replace sealing ring.	25 Nm
2AZ ASA screw Oil sump (aluminum) to crankcase lower half. Aluminum screws/bolts are permitted with and without color coding (blue).	N54	M8 x 26	Replace screw. Thread repairs exclusively with aluminum Helicoil threaded insert. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	8 Nm
			Torque angle	90 °
3AZ ASA screw Oil sump (aluminum) to crankcase lower half. Aluminum screws/bolts are permitted with and without color coding (blue).	N54	M8	Replace screw. Thread repairs exclusively with aluminum Helicoil threaded insert. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	8 Nm
			Torque angle	180 °
4AZ ASA screw Oil sump (aluminum) to crankcase lower half. Aluminum screws/bolts are permitted with and without color coding (blue).	N54	M8 x 36	Replace screw. Thread repairs exclusively with aluminum Helicoil threaded insert. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	8 Nm
			Torque angle	90 °
5AZ ASA screw Oil deflector to crankcase lower half. Aluminum screws/bolts are permitted with and without color coding (blue).	N54	M6 x 20	Replace screw. Thread repairs exclusively with aluminum Helicoil threaded insert. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	4 Nm
			Torque angle	90 °
6AZ ASA screw Transmission to oil sump.	N54	M8 x 50		19 Nm
7AZ Hexagon screw Holder, transmission oil cooler line, to oil sump.	N54	M6 x 30		8 Nm
8AZ Hexagon nut Oil level sensor to oil sump.	N54	M6		8 Nm
9AZ Transmission fluid cooler bracket to oil sump	N54	M8		9 Nm

THERMOSTAT AND CONNECTIONS

11 53 THERMOSTAT AND CONNECTIONS

TIGHTENING TORQUE SPECIFICATION - THERMOSTAT AND CONNECTIONS

	Type	Thread	Tightening specification	Measure
1AZ Thermostat housing to coolant pump.	N54	M6 x 25		8 Nm
2AZ Thermostat housing to coolant pump.	N54	M8 x 16		20 Nm
3AZ ASA screw Assembly, feed line to crankcase top section	N54	M6 x 20		9 Nm
4AZ Feed line to coolant pump.	N54	L42-48	Hose clamp	3 Nm
5AZ Feed line to thermostat	N54		Hose clamp	3 Nm
6AZ Coolant hose to cylinder head	N54	M6 x 23		9 Nm
7AZ ISA screw Coolant feed line to exhaust turbocharger	N54	M6 x 12		8 Nm
8AZ ISA screw Coolant return line to exhaust turbocharger	N54	M6 x 12		8 Nm
9AZ ISA screw Coolant return line to crankcase top section	N54	M6 x 16		8 Nm
10AZ ISA screw Coolant feed lines to assembly, feed line	N54	M6 x 16		8 Nm
11AZ EJOT screw Housing, coolant thermostat, to holder.	N54	M5 x 21.8		9 Nm
12AZ Hose clamp Coolant hose between coolant thermostat and radiator.	N54	L42-48		3 Nm

TURBOCHARGER AND CONTROL

11 65 TURBOCHARGER AND CONTROL

TIGHTENING TORQUE SPECIFICATION - TURBOCHARGER AND CONTROL

	Type	Thread	Tightening specification	Measure
1AZ Flange nut (with internal serrations) Exhaust turbocharger to cylinder head	N54	M7	Replace flange nut.	20 Nm
2AZ ASA screw Heat shield/retaining plate to crankcase top section	N54	M6 x 16		8 Nm
3AZ ASA screw Holder EPPC to cylinder head	N54	M6 x 20		9 Nm
4AZ Bracket, air duct, compressor 2, to cylinder head	N54	M6 x 15		9 Nm
5AZ Vacuum reservoir to bracket for vacuum reservoir	N54	M8		20 Nm

6AZ Bracket, vacuum reservoir, to body	N54	M6 x 14		5 Nm
7AZ Bracket to engine longitudinal member	N54	M6		5 Nm
8AZ EPPC to bracket, EPPC, with heat shield	N54	M6		5 Nm
9AZ Hexagon nut Vacuum unit (wastegate valve) to bracket	N54	M6		8 Nm
10AZ Lock nut to vacuum unit (wastegate valve) linkage	N54	M6		7 Nm
11AZ Hexagon screw Bracket, vacuum unit (wastegate valve), to turbocharger	N54	M8		20 Nm
12AZ Band clamp Charge-air duct to turbocharger.	N54	M6	Replace band clamp.	3.5 Nm

V-RIBBED BELT WITH TENSION AND DEFLECTION ELEMENT

11 28 V-RIBBED BELT WITH TENSION AND DEFLECTION ELEMENT

TIGHTENING TORQUE SPECIFICATION - V-RIBBED BELT WITH TENSION AND DEFLECTION ELEMENT

	Type	Thread	Tightening specification	Measure
1AZ ISA screw Belt tensioner with deflection pulley to engine block.	N54	M10 x 110		40 Nm
2AZ ISA screw Deflection pulley 80 x 30	N54	M10 x 40		38 Nm
3AZ ISA screw Deflection pulley 90 x 30	N54	M10 x 40		38 Nm
4AZ ASA screw Belt tensioner to crankcase upper section.	N54	M10 x 65		38 Nm
5AZ Deflection pulley 65 x 33	N54	M10 x 65		40 Nm
6AZ Deflection pulley 72 x 32	N54	M10 x 40		40 Nm
7AZ ISA screw Deflection pulley 73.8 x 24.92 to crankcase upper section.	N54	M10 x 40		38 Nm

VACUUM PUMP

11 66 VACUUM PUMP

TIGHTENING TORQUE SPECIFICATION - VACUUM PUMP

	Type	Thread	Tightening specification	Measure
1AZ Vacuum pump to crankcase	N54	M6x40	Flat mushroom head screw 10.9 Replace screws	11 Nm

2AZ Sprocket wheel to vacuum pump	N54	M10x30	Screw 12.9 washed and oiled	66 Nm

VARIABLE CAMSHAFT CONTROL

11 36 VARIABLE CAMSHAFT CONTROL

TIGHTENING TORQUE SPECIFICATION - VARIABLE CAMSHAFT CONTROL

	Type	Thread	Tightening specification	Measure
1AZ VANOS with sensor wheel to inlet and exhaust camshafts	N54	M10x94	Replace screw	
			Jointing torque	20 Nm
			Torque angle	180 °
2AZ Non-return valve VANOS to cylinder head	N54	M14 x 1.5		13 Nm
3AZ Solenoid valve holder to cylinder head	N54	M6x12		10 Nm

VIBRATION DAMPER

11 23 VIBRATION DAMPER

TIGHTENING TORQUE SPECIFICATION - VIBRATION DAMPER

	Type	Thread	Tightening specification	Measure
3AZ Belt pulley/vibration damper to hub	S38/B36	M8 10.9		34 Nm
	N40/N42/N45/N46/S38/B38	M8 10.9		34 Nm
	All/others	M8		22 Nm
4AZ Belt pulley to vibration damper	S38/B35	M8 8.8		22 Nm
	S50	M8 8.8		22 Nm
5AZ Sprocket with hub or hub to crankshaft	M40	M16 x 1.5	Replace screw	310 Nm
	M42/M43/M43TU/M44	M16 x 1.5	Replace screw	330 Nm
6AZ Hub to crankshaft	N40/N42/N45/N46	M16 x 1.5	Replace screw	300 Nm

VIBRATION DAMPER

11 23 VIBRATION DAMPER

TIGHTENING TORQUE SPECIFICATION - VIBRATION DAMPER

	Type	Thread	Tightening specification	Measure
1AZ ASA screw Vibration damper to crankshaft hub.	N54	M8 x 16		35 Nm

ENGINE SUSPENSION

22 11 011 REPLACING LEFT ENGINE MOUNT (N52K)

Necessary preliminary tasks

- Secure engine in **INSTALLATION POSITION**
- Remove underbody protection at front and rear

Release screws (1) and remove engine mount.

Tightening torque **22 11 1AZ** .

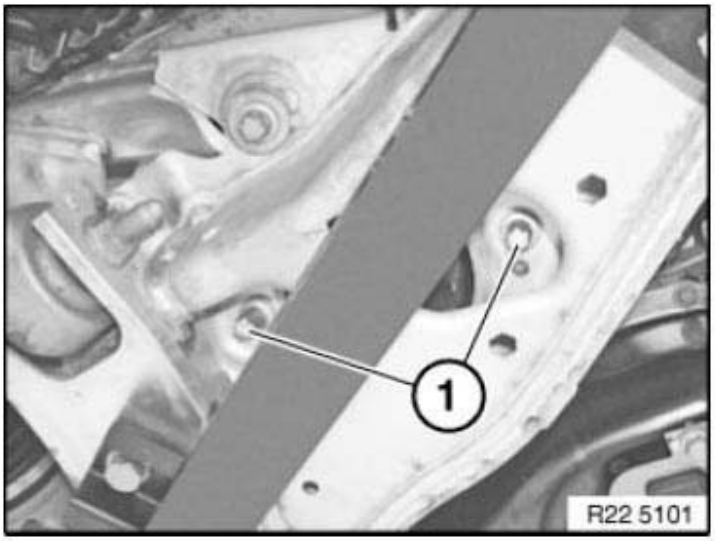


Fig. 1: Identifying Engine Mount Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Rubber section (1) of engine mount must point to middle of vehicle.

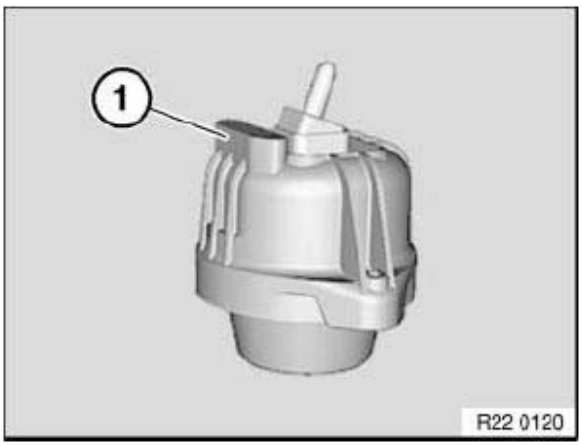


Fig. 2: Identifying Engine Mount Rubber Section
Courtesy of BMW OF NORTH AMERICA, INC.

22 11 110 REPLACING LEFT ENGINE SUPPORT ARM (N52K)

Necessary preliminary tasks

- Secure engine in **INSTALLATION POSITION**
- Remove underbody protection at front and rear

Release grounding strap (1) from engine support arm.

Unfasten screws (2).

Remove engine support arm.

Installation:

Aluminum screws/bolts **must** be replaced.

Tightening torque **22 11 3AZ**

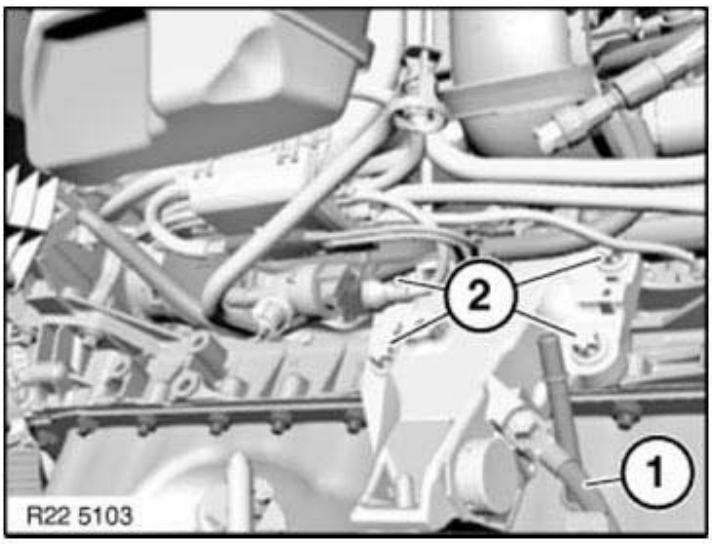


Fig. 3: Identifying Screw And Grounding Strap
Courtesy of BMW OF NORTH AMERICA, INC.

22 11 001 REPLACING RIGHT ENGINE MOUNT (N52K)

Necessary preliminary tasks

- Secure engine in **INSTALLATION POSITION**
- Remove front underbody protection

Release screws (1) and remove engine mount.

Tightening torque **22 11 1AZ** .

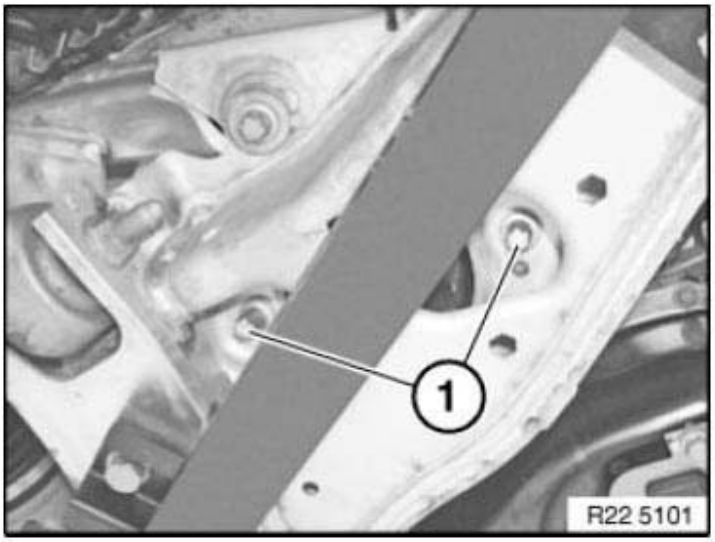


Fig. 4: Identifying Engine Mount Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Rubber section (1) of engine mount must point to middle of vehicle.

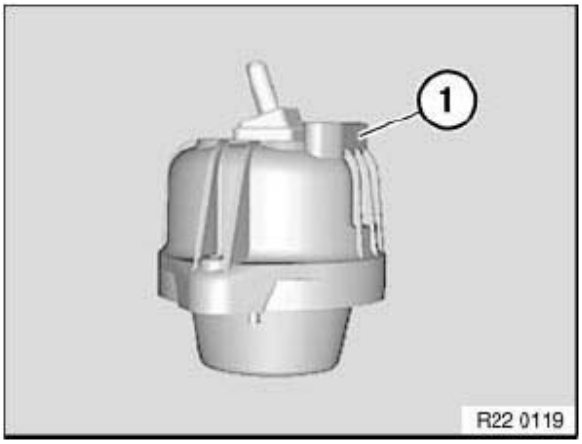


Fig. 5: Identifying Engine Mount Rubber Section
Courtesy of BMW OF NORTH AMERICA, INC.

22 11 100 REPLACING RIGHT ENGINE SUPPORT ARM (N52K)

Necessary preliminary tasks

- Secure engine in **INSTALLATION POSITION**
- Remove front underbody protection

Release screws (1).

Remove engine support arm from engine.

Installation:

Aluminum screws/bolts **must** be replaced.

Tightening torque **22 11 3AZ**

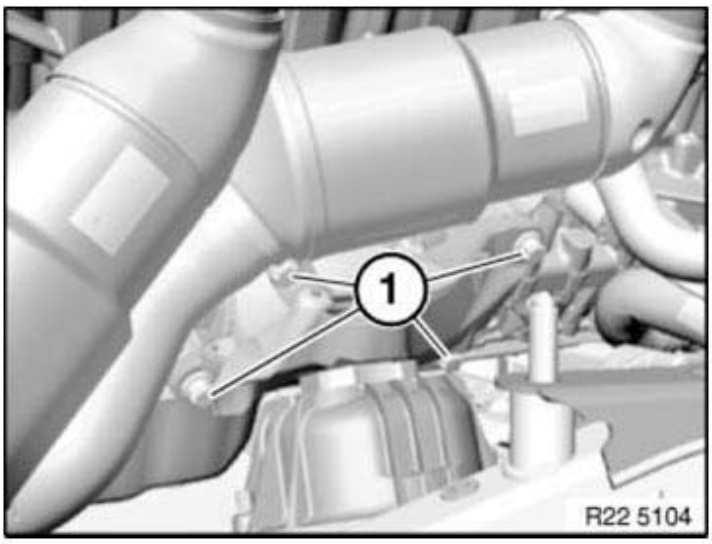


Fig. 6: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION SUSPENSION, MANUAL TRANSMISSION

22 31 050 REPLACING CROSS MEMBER FOR TRANSMISSION MOUNTING

NOTE: **Operations are identical to Replacing rubber mount See 2231001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING or 2231001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING (AUTOMATIC TRANSMISSION) for transmission mounting.**

22 31 001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING

Necessary preliminary work

- Remove rear **UNDERBODY PROTECTION**
- Remove heat shield
- Support transmission with jack.

Remove screws and nuts.

Remove transmission cross member.

Remove rubber mount from transmission cross member.

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

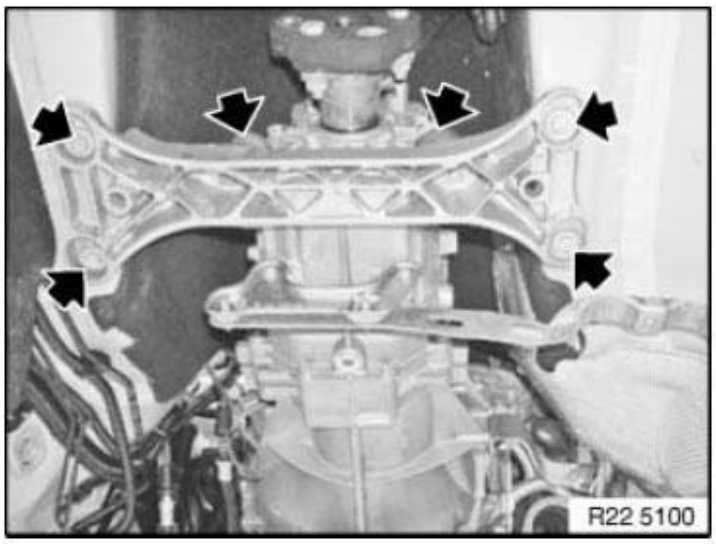


Fig. 7: Locating Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

22 31 001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING (AUTOMATIC TRANSMISSION)

Necessary preliminary work

- Remove rear **UNDERBODY PROTECTION**
- Remove heat shield
- Support transmission with jack.

Unfasten screws (1) and nuts (2).

Remove transmission cross member.

Remove rubber mount from transmission cross member.

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

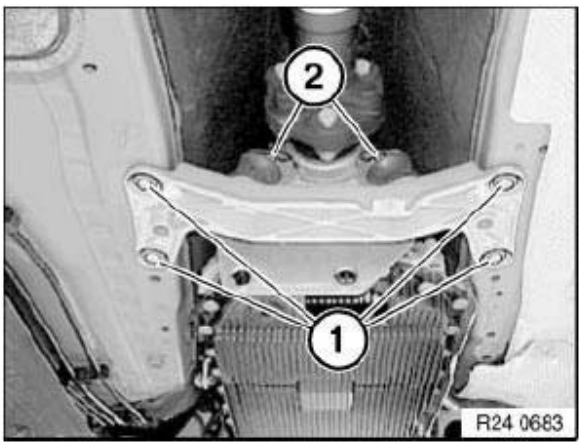


Fig. 8: Identifying Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION SUSPENSION, AUTOMATIC TRANSMISSION

22 31 050 REPLACING CROSS MEMBER FOR TRANSMISSION MOUNTING

NOTE: **Operations are identical to Replacing rubber mount See 2231001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING or 2231001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING (AUTOMATIC TRANSMISSION) for transmission mounting.**

22 31 001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING

Necessary preliminary work

- Remove rear **UNDERBODY PROTECTION**
- Remove heat shield
- Support transmission with jack.

Remove screws and nuts.

Remove transmission cross member.

Remove rubber mount from transmission cross member.

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

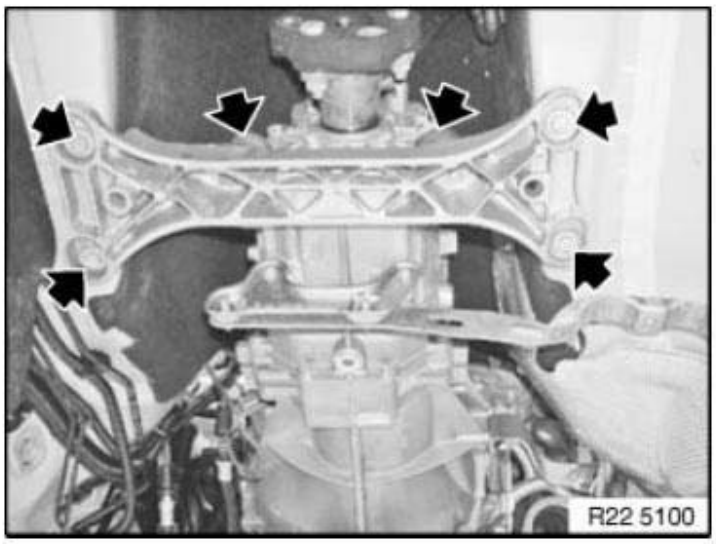


Fig. 9: Locating Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

22 31 001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING (AUTOMATIC TRANSMISSION)

Necessary preliminary work

- Remove rear **UNDERBODY PROTECTION**
- Remove heat shield
- Support transmission with jack.

Unfasten screws (1) and nuts (2).

Remove transmission cross member.

Remove rubber mount from transmission cross member.

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

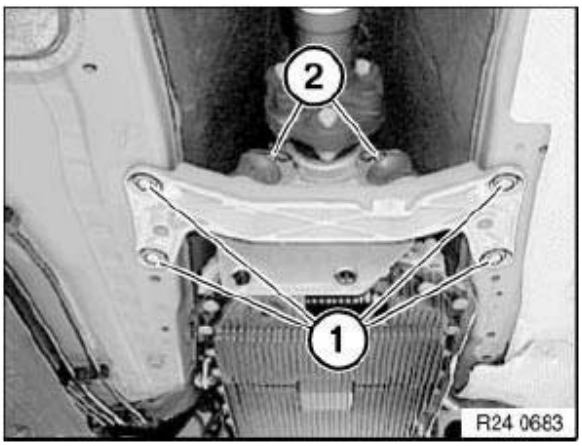


Fig. 10: Identifying Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

2211 ENGINE SUSPENSION

22 11 011 REPLACING LEFT ENGINE MOUNT (N54)

Necessary preliminary tasks

- Secure engine in **INSTALLATION POSITION**
- Remove rear underbody protection
- Detach ground cable from body

Release screws (1) and remove engine mount.

Tightening torque **22 11 1AZ** .

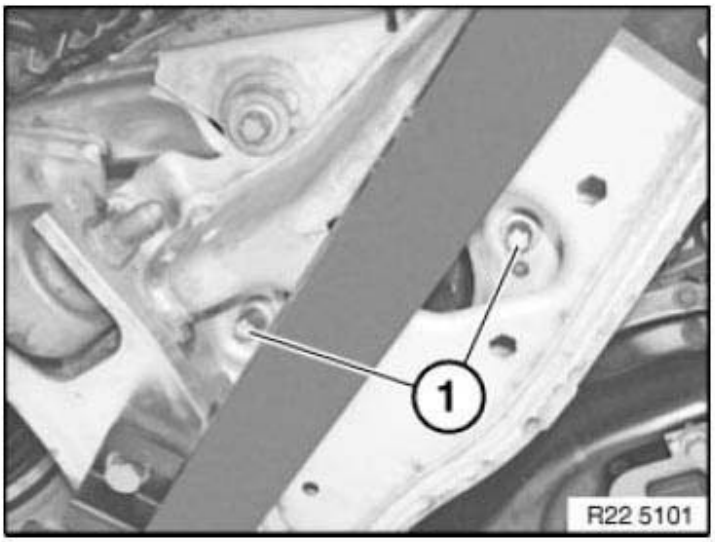


Fig. 1: Identifying Engine Mount Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Rubber section (1) of engine mount must point to middle of vehicle.

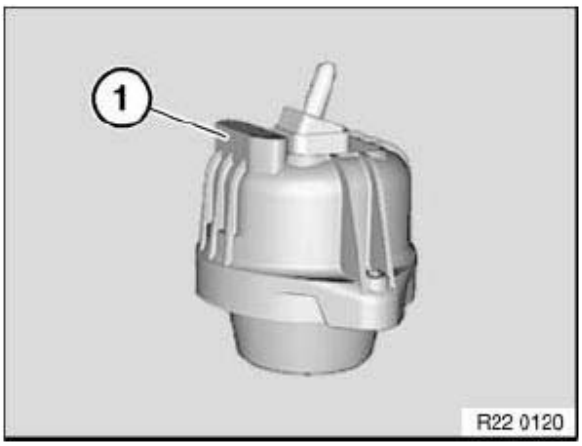


Fig. 2: Identifying Engine Mount Rubber Section
Courtesy of BMW OF NORTH AMERICA, INC.

22 11 110 REPLACING LEFT ENGINE SUPPORT ARM (N54)

Necessary preliminary tasks

- Secure engine in **INSTALLATION POSITION**
- Remove underbody protection at front and rear

Release grounding strap (1) from engine support arm.

Release screw (2).

Take off holder (3).

Release screws (4).

Remove engine support arm.

Tightening torque **22 11 3AZ**

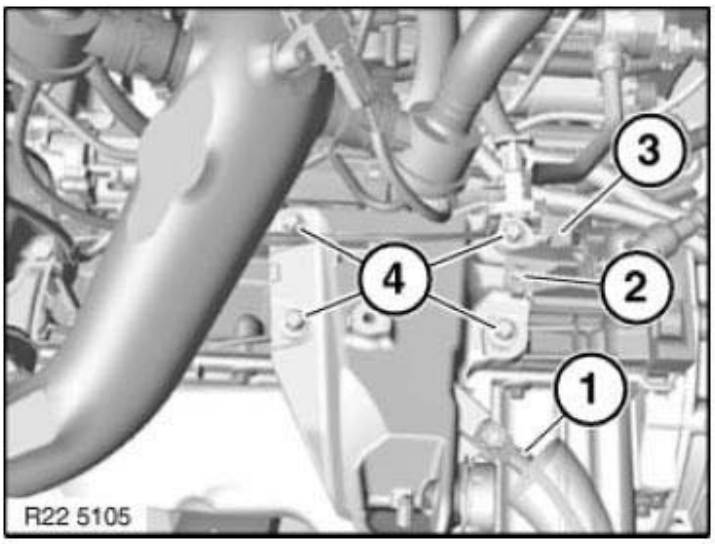


Fig. 3: Identifying Grounding Strap, Screw, Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

22 11 001 REPLACING RIGHT ENGINE MOUNT (N54)

Necessary preliminary tasks

- Secure engine in **INSTALLATION POSITION**
- Remove rear underbody protection
- Lower **FRONT AXLE SUPPORT**

Release screws (1) and remove engine mount.

Tightening torque **22 11 1AZ** .

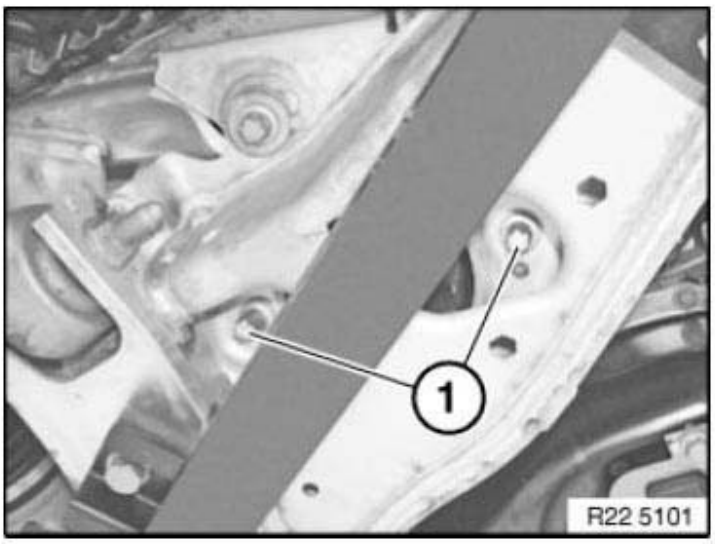


Fig. 4: Identifying Engine Mount Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Stop (1) is mounted on engine support arm.

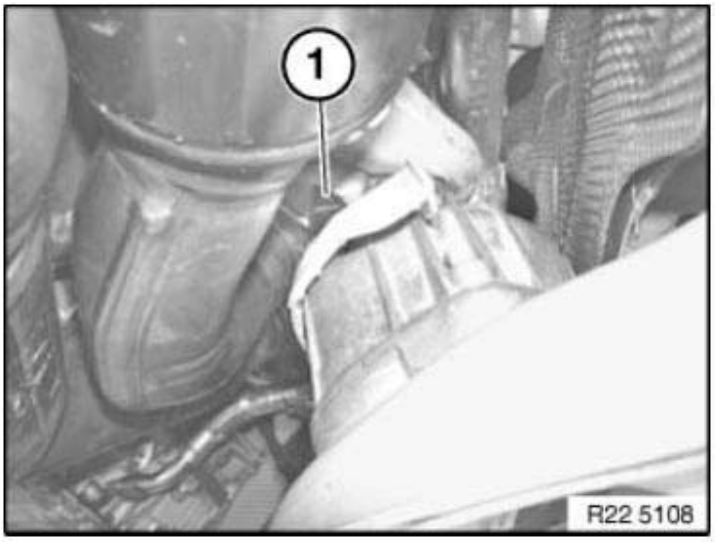


Fig. 5: Identifying Engine Support Arm Stop
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Rubber section (1) of engine mount must point to middle of vehicle.

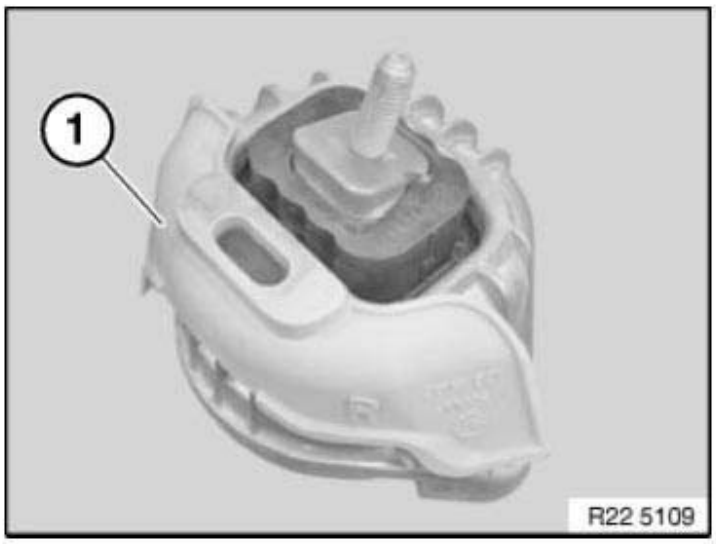


Fig. 6: Identifying Engine Mount Rubber Section
Courtesy of BMW OF NORTH AMERICA, INC.

22 11 100 REPLACING RIGHT ENGINE SUPPORT ARM (N54)

Necessary preliminary tasks

- Secure engine in **INSTALLATION POSITION**
- Remove underbody protection at front and rear
- Remove both catalytic converters. See **1832050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 1-3 (N54)** or **1832060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 4-6 (N54)**

Release screws (1).

Remove engine support arm from engine.

Tightening torque **22 11 3AZ**

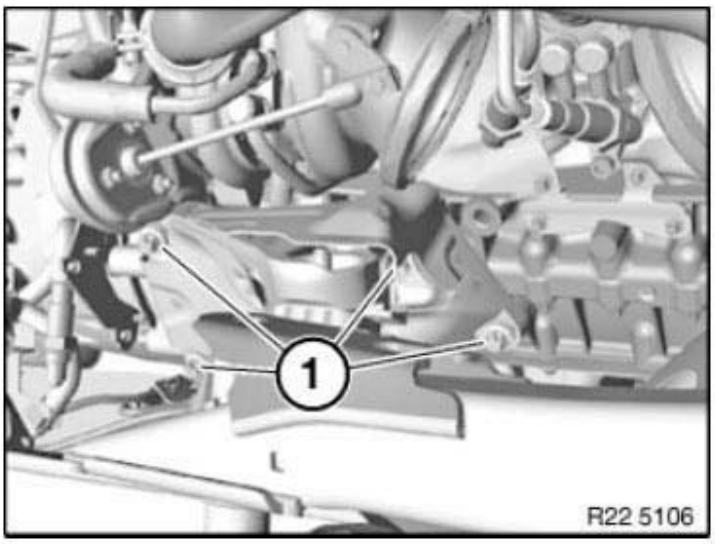


Fig. 7: Identifying Engine Support Arm Screws
Courtesy of BMW OF NORTH AMERICA, INC.

2231 TRANSMISSION SUSPENSION, MANUAL TRANSMISSION

22 31 050 REPLACING CROSS MEMBER FOR TRANSMISSION MOUNTING

NOTE: Operations are identical to Replacing RUBBER MOUNT for transmission mounting.

22 31 001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING

Necessary preliminary work

- Remove rear underbody protection
- Remove heat shield
- Support transmission with jack.

Remove screws and nuts.

Remove transmission cross member.

Remove rubber mount from transmission cross member.

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

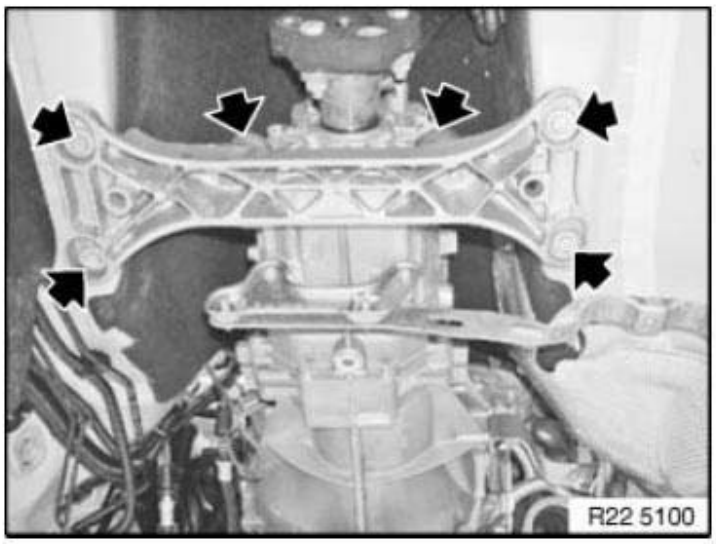


Fig. 8: Locating Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

2232 TRANSMISSION SUSPENSION, AUTOMATIC TRANSMISSION

22 31 050 REPLACING CROSS MEMBER FOR TRANSMISSION MOUNTING

NOTE: Operations are identical to Replacing RUBBER MOUNT for transmission mounting.

22 31 001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING

Necessary preliminary work

- Remove rear underbody protection.
- Remove heat shield
- Support transmission with jack.

Remove screws and nuts.

Remove transmission cross member.

Remove rubber mount from transmission cross member.

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

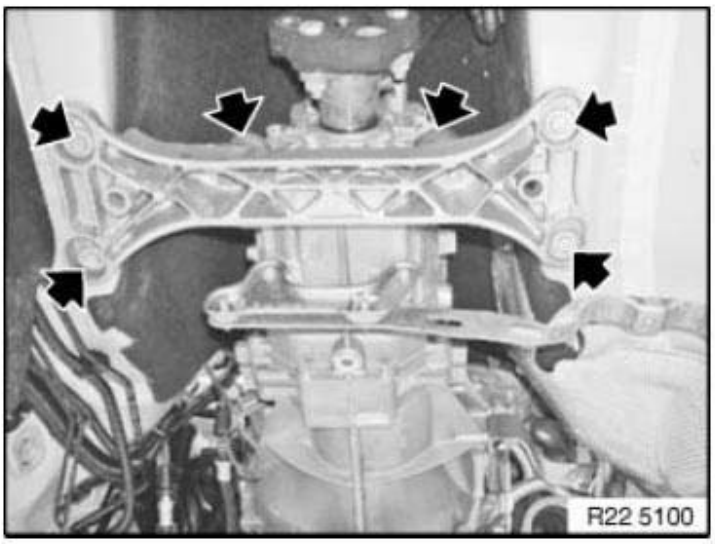


Fig. 9: Locating Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

ENGINE MOUNTING

22 11 ENGINE MOUNTING

TIGHTENING TORQUE SPECIFICATION - ENGINE MOUNTING

		Type
1AZ	Engine mount to front axle support	E52/E85/E86
		E65/E66/E67
		E60/E61/E63/E64/E83
		E53
		E87/E90/E91/E92/E93/E70/E71/E83/E81/E82/E88/E89/E84
		E70/E71/E72/E83/E84/E90/E91/E92/E93
		E92/E90/S65
2AZ	Engine mount to engine support arm	E60/E61/E63/E64/E65/E66/E67/E53/E83/E87/E90/E91/E92/E93/E70/E71/E81/E82/E88/E8
		E65/E66/E67
		E70/E71/E72/E83/E84/E90/E91/E92/E93
		E85/E86/E52
3AZ	Engine support arm to engine	E60/E61/E63/E64/E65/E66/E67/E70/E71/E72/E81/E82/E83/E84/E87/E88/E89/E90/E91/E9
		N51/N52/N52K/N53
		E60/E61/E65/E66/E67
		E85/E83
		E70/E71
		E53 (N62/M54)
		E53 (M57)
		N54/N55
		N42

4AZ	Engine mount to console	E65/E60/E61/E63/E64
5AZ	Console to front axle support	E65/E60/E61/E63/E64
6AZ	Vibration absorber to engine support	E70/E71
7AZ	Reinforcement plate to front axle support	E90/E91/E92
8AZ	Support angle to engine mount or front axle support	E90/E91/E92

TRANSMISSION MOUNTING

22 32 TRANSMISSION MOUNTING

TIGHTENING TORQUE SPECIFICATION - TRANSMISSION MOUNTING

		Type
1AZ	Bolt to transmission cross member	E60/E65/E66/E67
2AZ	Transmission bearing block to transmission	E60/E61/E63/E64/E65/E66/E67/E81/E82/E84/E85/E86/E87/E88/E89/E90/E91/
3AZ	Transmission mount to transmission/transmission cross member	E60/E61/E63/E64/E67/E81/E82/E84/E85/E86/E87/E88/E89/E90/E91/E92/E93
4AZ	Transmission cross member to body	E85/E86/E46/E83
		E60/E61/E63/E64/E67/E81/E82/E84/E87/E88/E89/E90/E91/E92/E93
		E53
		E70/E71/E72
5AZ	Transmission cross member to rubber mounts	E46/E53/E83
		E70/E71/E72
6AZ	Vibration absorber to transmission cross member	E60/E61

ENGINE MOUNTING

22 11 ENGINE MOUNTING

TIGHTENING TORQUE SPECIFICATION - ENGINE MOUNTING

	Type
1AZ Engine mount to front axle support	E52/E85/E86
	E65/E66/E67
	E60/E61/E63/E64/E83
	E53
	E87/E90/E91/E92/E93/E70/E71/E83/E81/E82/E88/E89/E84
	E70/E71/E72/E83/E84/E90/E91/E92/E93
	E92/E90/S65
2AZ Engine mount to engine support arm	E60/E61/E63/E64/E65/E66/E67/E53/E83/E87/E90/E91/E92/E93/E70/E71/E81/E82/E88/E89/E8
	E65/E66/E67
	E70/E71/E72/E83/E84/E90/E91/E92/E93
	E85/E86/E52
3AZ Engine support arm to engine	E60/E61/E63/E64/E65/E66/E67/E70/E71/E72/E81/E82/E83/E84/E87/E88/E89/E90/E91/E92/E9
	N51/N52/N52K/N53
	E60/E61/E65/E66/E67
	E85/E83
	E70/E71
	E53 (N62/M54)
	E53 (M57)
	N54/N55
	N42

4AZ Engine mount to console	E65/E60/E61/E63/E64
5AZ Console to front axle support	E65/E60/E61/E63/E64
6AZ Vibration absorber to engine support	E70/E71
7AZ Reinforcement plate to front axle support	E90/E91/E92
8AZ Support angle to engine mount or front axle support	E90/E91/E92

TRANSMISSION MOUNTING

22 32 TRANSMISSION MOUNTING

TIGHTENING TORQUE SPECIFICATION - TRANSMISSION MOUNTING

	Type
1AZ Bolt to transmission cross member	E60/E65/E66/E67
2AZ Transmission bearing block to transmission	E60/E61/E63/E64/E65/E66/E67/E81/E82/E84/E85/E86/E87/E88/E89/E90/E91/E92/E
3AZ Transmission mount to transmission/transmission cross member	E60/E61/E63/E64/E67/E81/E82/E84/E85/E86/E87/E88/E89/E90/E91/E92/E93
4AZ Transmission cross member to body	E85/E86/E46/E83
	E60/E61/E63/E64/E67/E81/E82/E84/E87/E88/E89/E90/E91/E92/E93
	E53
	E70/E71/E72
5AZ Transmission cross member to rubber mounts	E46/E53/E83
	E70/E71/E72
6AZ Vibration absorber to transmission cross member	E60/E61

1200 TROUBLESHOOTING

61 20 ... BATTERY REPLACEMENT INFORMATION

A vehicle battery is constructed for the installation location and the individual power requirements of the particular vehicle. These individual power requirements depend on the motorization and different types of optional equipment. The individually assigned vehicle battery is the ideal compromise between the power requirements of the vehicle electrical system and the weight and service life of the vehicle battery.

Vehicles with the automatic engine start-stop function or particular motorization and optional equipment are equipped with a special vehicle battery (AGM battery), since only this battery type can provide elevated power requirements over the extended service life. Installing a different vehicle battery can cause problems with vehicle electronics, can reduce functions or can cause leakage of battery acid.

In the event of an accident where the airbags are deployed in vehicles with a vehicle battery in the luggage compartment, the electrical connection between the vehicle battery and the trigger is automatically disconnected through pyrotechnics. This prevents a possible short circuit.

Proper operation of all of these safety and convenience functions requires a battery that conforms with specifications and that is properly registered in vehicles with energy management systems (IBS, power module).

Vehicles with energy management systems (IBS, power module): Register battery replacement

The vehicle electrical system is informed about the vehicle battery characteristic data, such as type, size, age and current power capacity. Therefore, only one work scope will be provided that is permitted by the current status of information.

When installing a new vehicle battery, the battery must be registered and thus must also be registered with the vehicle electrical system.

Diagnosis system:

Register battery replacement

- Service functions
- Body
- Voltage supply
- Register battery replacement
- Test plan

When retrofitting, a more powerful battery may be used. Standard batteries may always be replaced by AGM batteries with the same specifications.

When installing a battery of a different size or a different battery type, this change in vehicle data must be programmed into the vehicle data in accordance with specifications.

Programming system:

- Battery retrofitting

61 13 ... BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION

IMPORTANT:

1. **Identify cause of damage (e.g. sharp-edged body parts, faulty electrical loads, jammed mechanisms, corrosion caused by ingress of water, etc.).**
2. **Read out fault memory**
3. **Eliminate cause of damage.**
4. **Disconnect battery negative terminal**
5. **Make sure that no safety-related system according to circuit diagram (e.g. antilock braking system, active rear-axle kinematics, airbags, etc.) are influenced. Otherwise replace faulty wiring harness or use repair cable (sourcing reference: BMW Parts Service)**
6. **Carry out function test and read out fault memories again**
7. **Eliminate new faults if applicable and clear fault memories**

NOTE: **The repair range IV for vehicle electrical system contained the required special tools and individual parts for retrofitting and repair work with the aid of fan connectors.**
The case can no longer be ordered.

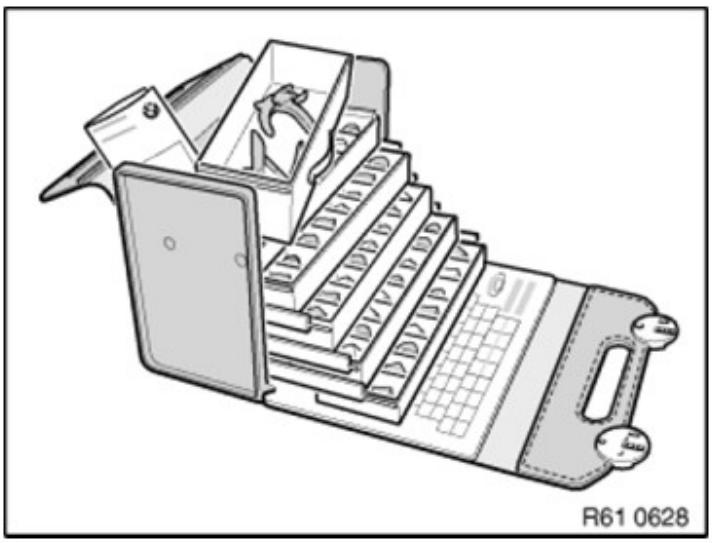


Fig. 1: Retrofitting Tool Box
Courtesy of BMW OF NORTH AMERICA, INC.

Choose repair kit.

Example: Repair kit, circular plug system D 2.5.

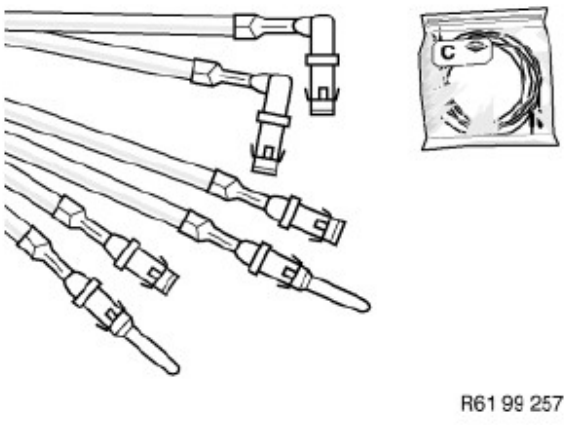


Fig. 2: Identifying Circular Plug System D 2.5
Courtesy of BMW OF NORTH AMERICA, INC.

Remove following parts:

1. Pre-packaged end of cable with requisite wire cross-section
2. Crimp connector for selected wire cross-section
3. Shrink-fit hose

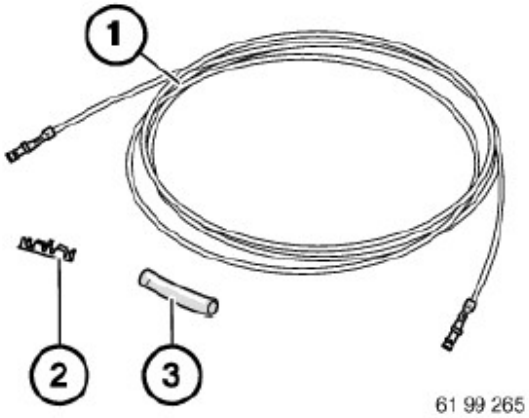


Fig. 3: Identifying Cable With Requisite Wire Cross-Section, Crimp Connector And Shrink-Fit Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Open secondary lock on housing.

Mark damaged contact (4) with socket number of housing and press it out of housing using appropriate special tool contained in special tool kit 61 0 300).

See repair instructions

INSTRUCTIONS FOR OPENING CONTACTS AND LOCKS of different plug contact systems.

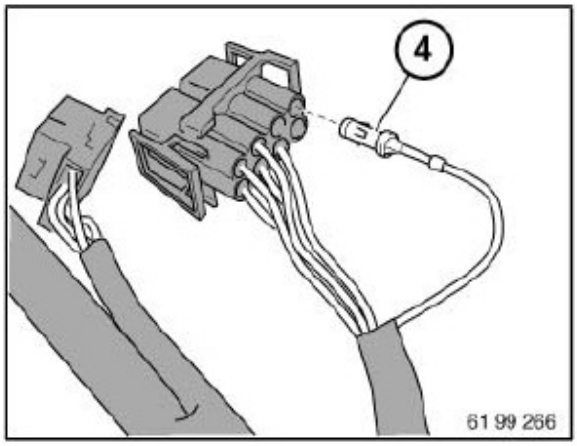


Fig. 4: Identifying Damaged Cable With Socket Number
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT:

- **Check maximum length of repair cable**
- **If more than one wire is to be repaired, the individual interfaces must be offset so that the wiring harness is not too thick at the repaired point.**

Adhere to following procedure:

- Cut off wire with faulty contact at point which is easily accessible
- Strip insulation from end of wire at wiring harness end
- Cut preassembled wire end to length and strip insulation

Refer also to repair instruction:

CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES

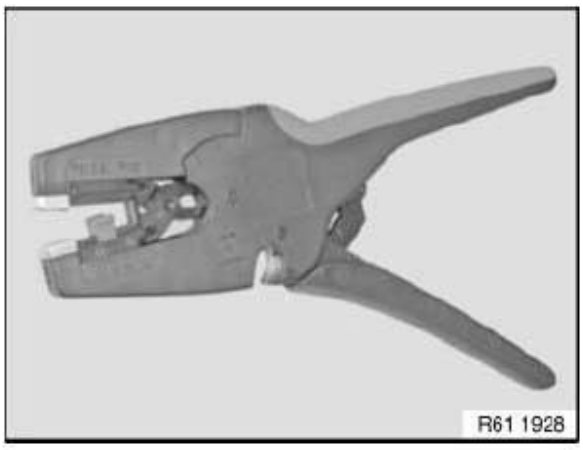


Fig. 5: Identifying Crimp Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Crimp butt connector on preassembled wire end.

Special tools:

- 61 4 328 (0.35 - 2.5 mm^2
- 61 0 240 (4.0 - 6.0 mm^2

See repair instructions

CRIMPING ON STOP PARTS

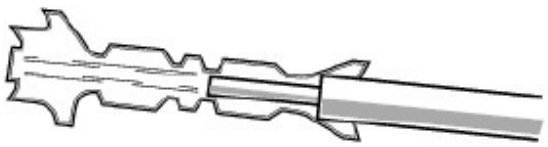


Fig. 6: Identifying Crimp Butt Connector On Preassembled Wire End
Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (8) onto free wire end.

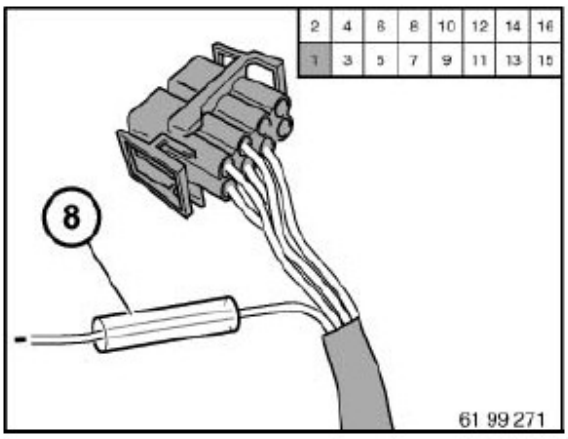


Fig. 7: Identifying Shrink-Fit Hose On Free Wire End
Courtesy of BMW OF NORTH AMERICA, INC.

Crimp unused wire end to butt connector.

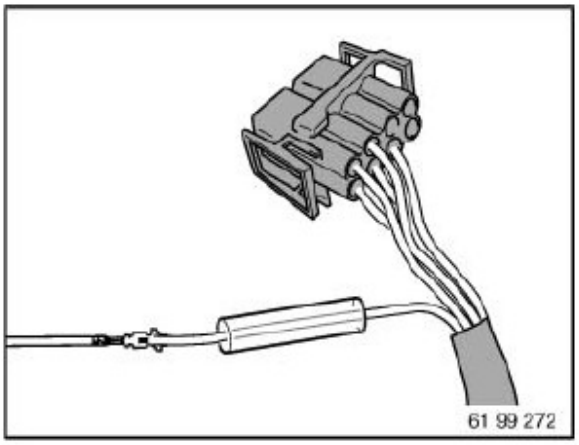


Fig. 8: Crimping Of Unused Wire End To Butt Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Pull shrink-on sleeve over butt connector.

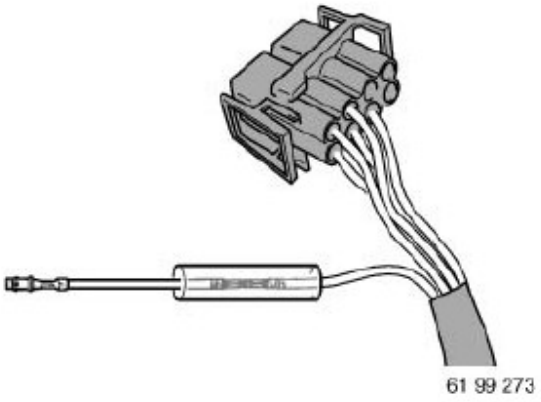


Fig. 9: Identifying Shrink-On Sleeve And Butt Connector
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not burn shrink-on sleeve.

With hot air blower, shrink the shrink-on sleeve on both sides (9) of shrink-fit hose until glue emerges uniformly all round.

Insert contact in housing.

Close secondary lock on housing.

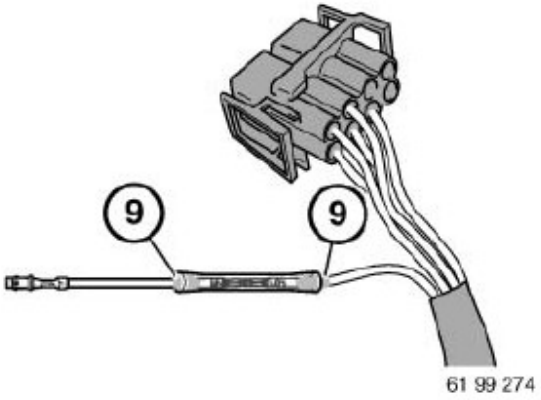


Fig. 10: Identifying Shrink On Shrink-On Sleeve Ends
Courtesy of BMW OF NORTH AMERICA, INC.

12 00 CONTENTS OF ENGINE ELECTRICAL SYSTEM GENERAL

General Information

- **WORKING ON IGNITION SYSTEM**
- **REMOVING AND INSTALLING ELECTRONIC CONTROL UNITS**
- Welding work (overload protection of control units)

- **Disconnecting and connecting battery**
- Disconnecting and connecting test equipment
- Component inspection:
- **EXTERNAL JUMP-STARTING AID**
- Compression testing

61 00 ... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY

Observe **SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY** .

Before disconnecting battery

Turn off the ignition and other electrical loads/consumers to prevent sparking when reconnecting.

NOTE: **If the ignition is not turned off when the battery is disconnected, fault memories may be set in some control units.**

IMPORTANT:

- **There is a danger of mixing up battery leads: If the battery positive and negative leads are the same color and you are in doubt, follow the polarity to the battery, then mark and cover the leads.**
- **The on-board computer and clock may lose your data.**

General notes on disconnecting battery

- Do not disconnect battery leads and leads from alternator and starter motor while engine is running.
- Cars with IBS on battery negative terminal:

  Do not under any circumstances pull/lever off pole shoes by force.

  Do not under any circumstances release socket-head cap screw of IBS.

- Disconnect terminal of **BATTERY NEGATIVE LEAD** from vehicle battery. Cover battery negative terminal(s) and secure.
- When work is carried out on the electrical system, faults may be caused in the fault memories of some control units when the battery is connected.
- When installing battery terminal: Tightening torque **61 21 1AZ** .

After connecting battery

IMPORTANT: **The scope of application of some systems may be restricted after a power supply interruption.**
Likewise, individual settings may be lost.
Settings or activations must be carried out, depending on the equipment specification.

For example:

- **If necessary, carry out adjustment of active steering**
- **If necessary, activate slide/tilt sunroof**
- **If necessary, activate POWER WINDOWS**

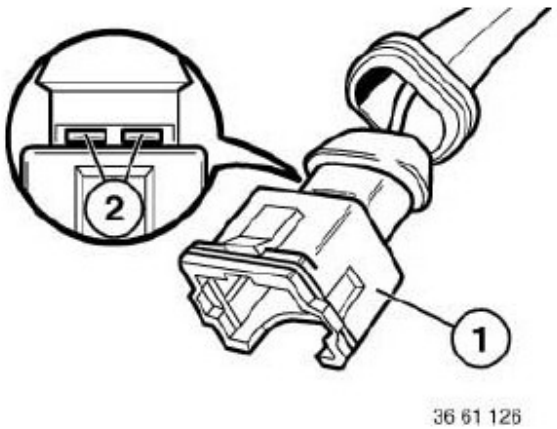
61 13 ... INSTRUCTIONS FOR OPENING CONTACTS AND LOCKS OF DIFFERENT PLUG CONTACT SYSTEMS

SPECIAL TOOL DESCRIPTION

Abbreviations of contacts and what they mean:	
ELA	**Strand seal**
D 1.5/2.5/3.5	**Round contacts with 1.5 mm, 2.5 mm or 3.5 mm diameter**
MDK	**Miniature double flat spring contact**
JPT	Junior Power timer
DFK	Double flat spring contacts
Elo	Electronic contacts
Elo Power	Electronic contacts for heavy load
MQS	Micro Quadlock system
MPQ	Micro Power Quadlock
MLK	Mini laminated contact
SLK	Sensor laminated contact
LSK	Load current contact
MLK	Mini laminated contact
Mcon	Multi contact

IMPORTANT: The contacts can be changed on ultrasonically welded plugs (1). Ultrasonically welded plugs (1) must be replaced completely.

Ultrasonic-welded connectors (1) can be identified by the welds (2) on their longitudinal side.



36 61 126

Fig. 11: Identifying Ultrasonic-Welded Connectors And Weld Area
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Special tools referred to in the repair instructions below are contained in the following special tool kits:

- **Release and pressing-off tool61 1 150 will be replaced on 09/2005 by 61 0 300 (BMW) and 61 0 400 (MINI)**
- **Release and pressing-off tool 61 1 100 (engine)**

12 00 ... INSTRUCTIONS FOR WORKING ON THE IGNITION SYSTEM

CAUTION: Always switch off ignition before working on ignition system.
Use only test leads which have been approved and belong to these testing instruments (e.g. DIS Tester).
Comply with operating instructions of the respective testing instrument used.
Comply with the country-specific safety regulations.
Never touch components under current with engine running!
Comply with instructions of DIS tester.
Do not connect any suppression capacitors or inspection lamps to terminal 1 on the ignition coil.
Terminal 1 of ignition coil must not be connected to ground or battery positive lead.
If an alarm system is subsequently installed, lead of terminal 1 must not be used for start prevention.
When working on ignition system, always disconnect supply leads to ignition coils.
High tension! - High tension!

IMPORTANT: Hazardous voltages occur at:

- Ignition lead
- spark-plug connectors
- spark plugs
- Ignition coil (high voltage at terminal 4 is approx. 40 kV)
- Lead of terminal 1 from ignition coil to DME control unit (high voltage approx. 350 V)

12 13 NOTES ON CHECKING IGNITION SYSTEM

Troubleshooting

- Fault in fuel injection system
- Spark plug faults
- Ignition coil faults

- Further fault patterns with evaluation

Oscillograms

- Normal oscillogram
- Oscillograms of ignition coils from different manufacturers

Check

- Secondary signal for stationary ignition distribution

61 00 ... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body components; use edge protection if necessary
- Secure additionally laid cables/lines with cable straps

The following additionally applies

Shielded lines

Contact points in the shield can cause problems with regard to noise radiation and interference immunity. Consequently, distinctions have to be drawn between the following types:

Coaxial line

- Shielded RTK031 coaxial lines may only be repaired with special crimping tools .

CVBS lines

- CVBS lines may not be repaired.
- CVBS lines must be replaced in their entirety.

HSD lines

- HSD lines may not be repaired.
- HSD lines must be replaced in their entirety.

Optical fibre cable:

NOTE: **Optical fibre cables are colored differently as follows:**

- **Green = MOST (M edia O riented Systems T ransport) optical fibre**
- **Yellow = ISIS (I ntelligent S afety I ntegration S ystem) optical fibre**
- **Orange = repair optical fibre cables**

IMPORTANT:

- **Optical fibre cables are permitted to show only one separation point (bridge), replace optical fibre cables if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid influence of heat > or = 85 °**

Treating cables and optical fibre cables

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional butt connectors.

NOTE:

- **The line is a twisted cable. If possible, maintain twist in line after repair.**

Airbag lines:

Repairing airbag cables

Ribbon cables:

Repairing ribbon cables Z

61 00 ... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- To ensure professional repairs, perform repair work only with BMW-approved or recommended special tools and spare parts
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies

Shielded lines (coaxial lines):

IMPORTANT: Shielded lines may not be repaired!

- **This may lead to indifferences in noise radiation and interference immunity at contact points in the shield**
- **To satisfy the requirements of the type approval, it is essential to replace shielded cables completely**

Fibre-optic cable:

NOTE: Fibre-optic cables are colored differently as follows:

- **Green = MOST (M edia O riented S ystems T ransport) optical fibre**
- **Yellow = ISIS (I ntelligent S afety I ntegration S ystem) optical fibre**
- **Orange=repair fibre-optic cables**

IMPORTANT:

- **Optical fibres may only reveal one separation point (bridge); renew optical fibre if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid effects of heat > or = 85 °**

Treating cables and fibre-optic cables See **6113... CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES TO LENGTH** or **6113... CRIMPING OPTICAL FIBRES**

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional **BUTT CONNECTORS AND HEAT-SHRINK HOSES** .

NOTE:

- **FlexRay lines may only reveal one separation point (bride); renew complete line if necessary**
- **The cable is a twisted cable. If possible, maintain twisted cable after repair**

Airbag lines:

REPAIRING AIRBAG CABLES

12 00 ... NOTES/INFORMATION ON REMOVING AND INSTALLING CONTROL UNITS

IMPORTANT:

- **Disconnecting the vehicle battery will cancel the fault memories of control units. Consequently, before disconnecting the car's battery, always interrogate the fault memories. Investigate stored faults and, once any**

faults have been remedied, cancel the fault memory.

- **Control unit plugs should only ever be connected and disconnected while the ignition is turned off.**
- **The removal and installation of components, relays, fuses etc. can cause faults to be stored in fault memories capable of self diagnosis. Always interrogate the fault memories after completing work on the electrical system.**
- **Investigate stored faults and, once any faults have been remedied, cancel the fault memory.**
- **If necessary, initialize power window units**

When replacing the DME/DDE control unit, observe the following:

- **In each case read out the hardware/software status of the relevant control unit using the BMW diagnosis system.**

  Comply with the instructions of the DIS diagnosis system on the steps pertaining to coding and programming.

  On vehicles with electronic vehicle immobilization, comply with the instructions of the BMW diagnosis system.

- **Each control unit is programmed with certain basic values, which serve as mean values. The control unit receives different input values, depending on engine condition, which are compared with the stored values. The adaptive system compares the input values with the stored map values. The control commands are routed to the relevant actuators.**
- **If the DME control unit is without current for a long time (more than one hour), its adaptive system loses the stored values. When a cleared control unit is restarted or a new control unit is installed, the adaptive system must read in and store the input values of the associated engine as new basic values itself.**
- **This procedure could lead to erratic idling and disturbed overrunning of the engine after starting. Depending on the engine it could require some time before all values are adapted to the engine condition.**
- **Therefore observe the following procedure before replacing or reinstalling a DME/DDE control unit:**
  1. **If possible before exchanging control unit, run engine up to operating temperature.**
  2. **Exchange control units and run the vehicle at alternating engine speeds.**

12 00 ... NOTES/INFORMATION ON START ASSISTANCE (JUMP STARTING)

Do not start the engine with help of starting sprays.

Preparation

Conform with the following when starting the engine with a jump starting cable.

- Ensure that the jump starting cable wires are of appropriate cross-section size.
- Only use fuse-protected jump starting cables.
- Check whether the current-supplying battery has 12 V voltage.
- If the engine is started from the battery of another vehicle, ensure that there is no contact between the bodies of both vehicles.

IMPORTANT: Never touch electrically live ignition system components: high voltage - danger of injury!

If the battery in the vehicle supplying power is weak, start the engine of this vehicle and let it run at idling speed.

Operation

It is essential to conform to the procedures so as to avoid injury to persons or damage to parts.

- Automatic transmission: select drive position "P", apply parking brake.
- Manual transmission: move gear lever to neutral position, apply parking brake.
- Ensure that the jump leads cannot get caught in rotating parts, e.g. fan.
- First connect both positive poles of the batteries with one jump starting cable (red).
- Use the battery positive terminal in the engine compartment for vehicles with the battery in the luggage compartment.
- Then use the second jump starting cable (black) to connect the negative post of the current-supplying battery with the earth/ground point (not the negative pole or the body) of the vehicle to be started.

IMPORTANT: Do not connect the second jump starting cable (black) with the negative pole of the battery in the vehicle to be started. Produced gas could be ignited by sparks.

Risk of explosion!

After the engine of the vehicle to be started has fired, first disconnect the jump starting cable between the negative pole and the earth/ground point. Then remove the starting cable from the positive poles.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode),

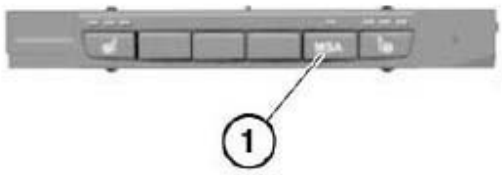
the information "switch closed" is output. The automatic engine start-stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



R61 1948

Fig. 12: Identifying Automatic Engine Start/Stop Button (MSA)
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
- Workshop mode

  A = 10 mm

- Basic setting (engine hood/bonnet open)

  B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

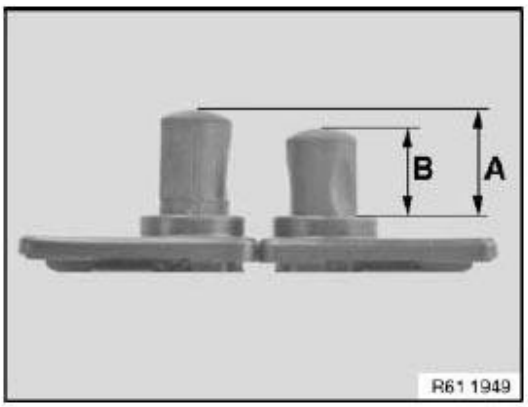


Fig. 13: Identifying Basic Setting For Engine Hood/Bonnet Basic
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

1212 IGNITION WIRES, SPARK PLUGS

12 12 011 REPLACING ALL SPARK PLUGS (N52K)

Necessary preliminary work:

- Switch off ignition.
- Remove **IGNITION COILS** .

IMPORTANT: Wear safety goggles.
Oil and dirt particles may get into your eyes!

Clean spark connector slot with compressed air.

Unscrew spark plugs with special tool 12 1 171 and an extension with a joint.

Installation note:

First, hand-thighten the spark plugs with special tool 12 1 171 and with an extension with a joint into the engine.

Then tighten the spark plugs using a torque wrench, special tool 12 1 171 and an extension with a joint.

Observe tightening torque.

Tightening torque **12 12 2AZ** .

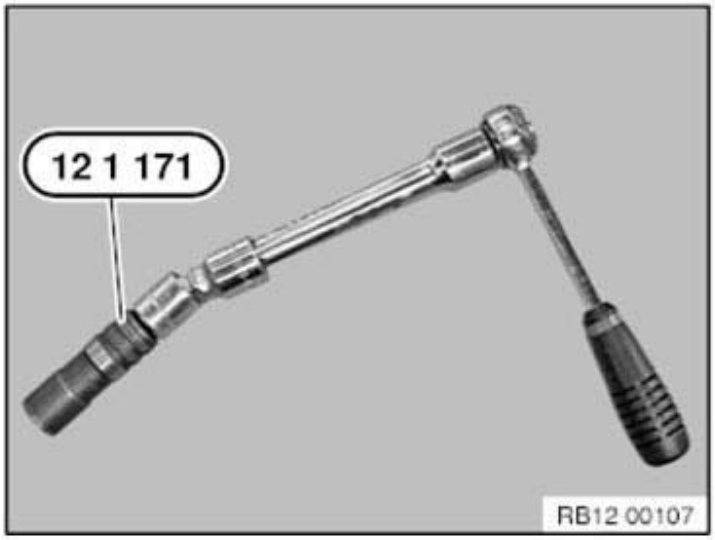


Fig. 14: Removing Spark Plug Using Special Tool (12 1 171)
Courtesy of BMW OF NORTH AMERICA, INC.

1213 IGNITION COIL

12 13 009 CHECKING ROD-TYPE IGNITION COILS (M54, M56, N40, N42, N43, N45, N46, N52, N62, N62TU, N73)

Necessary preliminary tasks:

- Read out fault memory in DME (Digital Engine Electronics)
- N52: Remove sound absorption hood

Unlock plug fastener (1) of ignition coil.

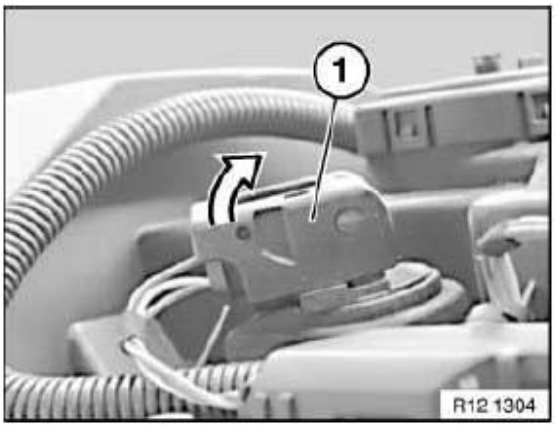


Fig. 15: Removing Ignition Coil Plug Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Detach plug (1) in direction of arrow.

Pull out ignition coil (2) towards top.

NOTE: Procedure applies to all rod-type ignition coils.

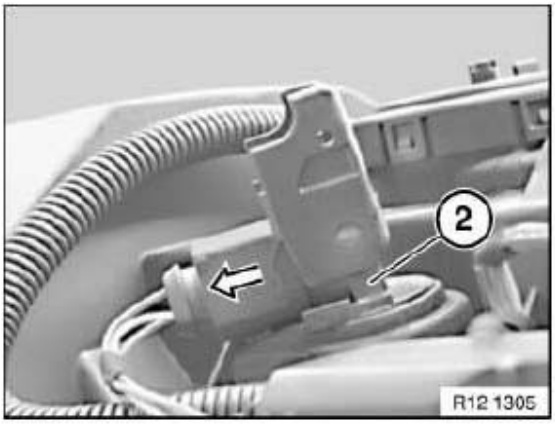


Fig. 16: Pulling Out Ignition Coil
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool 12 7 050 .

Installation:

Special tool 12 7 050 is attached between spark plug and rod-type ignition coil.

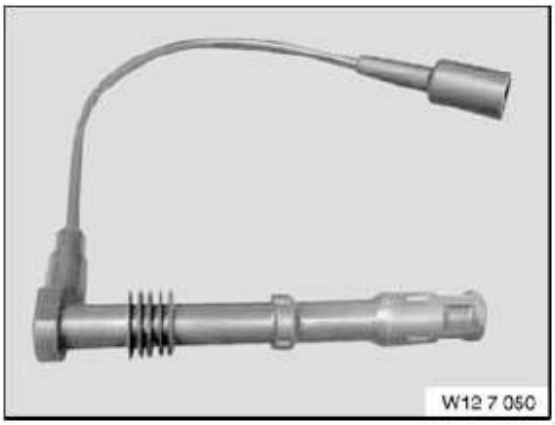


Fig. 17: Identifying Special Tool (12 7 050) Between Spark Plug And Rod-Type Ignition Coil
Courtesy of BMW OF NORTH AMERICA, INC.

Secondary measurement

Connect KV clip-on probe (1) of DIS Tester to special tool 12 7 050 .

Procedure on DIS Tester:

- Select <Measurement>.
- Select <Preset measurement>.
- Select <Secondary ignition signal>.
- Connect <TD cable to diagnostic head>.
- Select <static ignition distribution>.
- Select <Number of cylinders>.

For subsequent procedure, follow DIS instructions.

NOTE: Illustration shows: KV clip-on probe (1) US version.

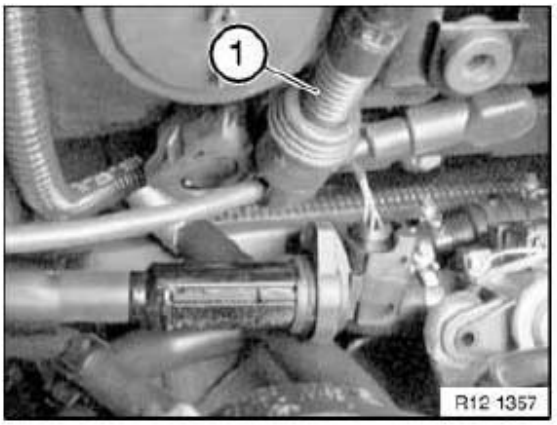


Fig. 18: Identifying KV Clip-On DIS Tester Probe
Courtesy of BMW OF NORTH AMERICA, INC.

Primary measurement

Connect 26-pin pin box with special tool 12 1 301 to connector (1) DME module 5.

Procedure on DIS Tester:

- Select <Measurement>.
- Select <Preset measurement>.
- Select <Ignition signal term.1>.

For subsequent procedure, follow DIS instructions.

NOTE: Pin assignment acc. to connection scheme.
Illustration shows N42.

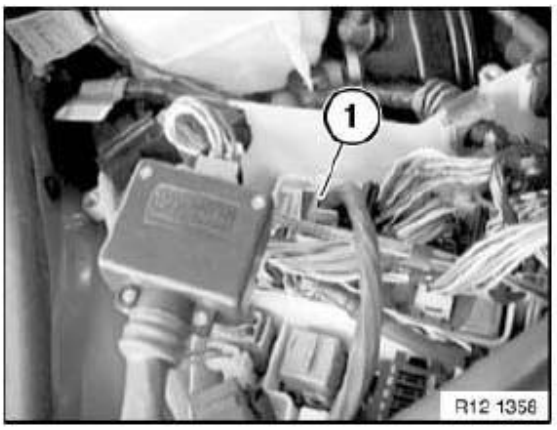


Fig. 19: Connecting 26-Pin Pin Box To Connector DME Module 5 Using Special Tool (12 1 301)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Ignition signal is a multiple spark ignition.

Illustration of multiple spark ignition

1. Start of ignition peak.
2. Level of ignition voltage.
3. Level of sparking voltage.
4. Spark duration.
5. Sparking voltage curve.
6. Start of decay process.
7. Decay process.

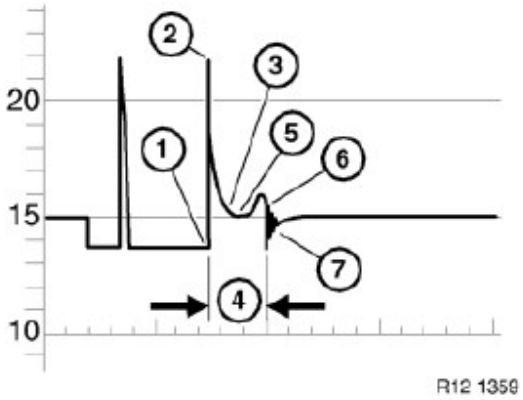


Fig. 20: Multiple Spark Ignition Illustration
Courtesy of BMW OF NORTH AMERICA, INC.

M54/M56/N40/N42/N45/N46/N62/N73:

The following ignition oscillogram applies to engines with multiple spark ignition from a production date of April 2001:

Depending on **engine temperature** (approx. -20° to 100°) and **engine speed** (< 2000 RPM.), some ignition voltage peaks (approx. 1-5 ignition peaks) can occur before the typical ignition voltage characteristic.

The additional ignition peaks play **no** role in diagnosis.

The **last** ignition peak (1) on the oscillogram is decisive.

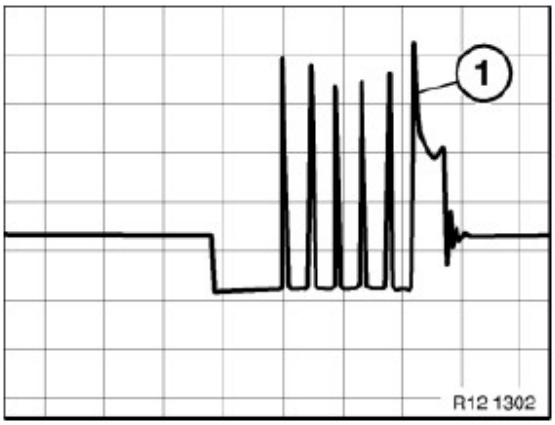


Fig. 21: Identifying Ignition Peaks Graph
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The display of the ignition voltage peak is approx. 20-25 % lower than the real value.
It is not the height of the ignition voltage peaks but rather the uniformity of all the cylinders that is important.
Differences of 3000 to 4000 volts are permitted.

12 13 NOTES ON CHECKING IGNITION SYSTEM

Troubleshooting

- Fault in fuel injection system
- Spark plug faults
- Ignition coil faults
- Further fault patterns with evaluation

Oscillograms

- Normal oscillogram
- Oscillograms of ignition coils from different manufacturers

Check

- Secondary signal for stationary ignition distribution

12 13 511 REPLACING IGNITION COILS (N52K)

Necessary preliminary tasks:

- Read out fault memory of DME control unit.
- Check stored fault messages
- Switch off ignition
- Remove **ACOUSTIC COVER**
- Remove right **TENSION STRUT**

Unlock plug fastener of ignition coil (1) and disconnect plug.

Pull ignition coil (1) up and out.

This procedure is applicable to all ignition coils.

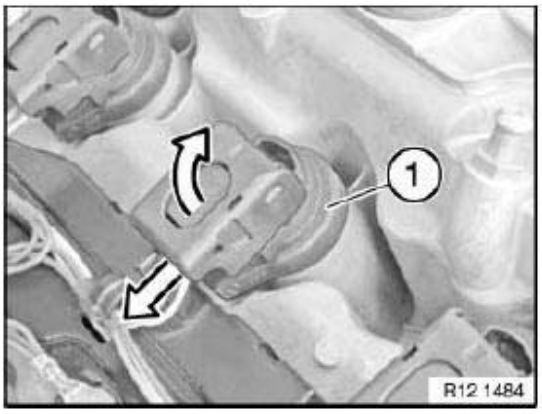


Fig. 22: Pulling Ignition Coil Up And Out
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check that rubber seal of ignition coil (1) is correctly seated.

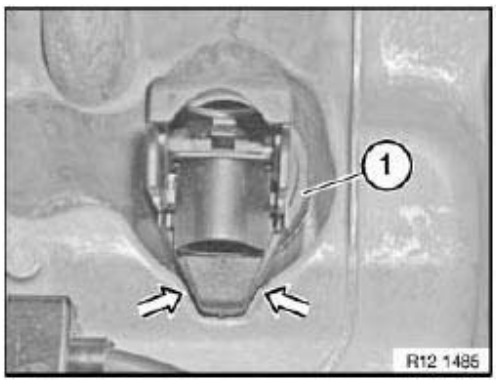


Fig. 23: Checking Ignition Coil Rubber Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Push plug (1) with plug fastener (2) open onto ignition coil.

Carefully close plug fastener (2) in direction of arrow.

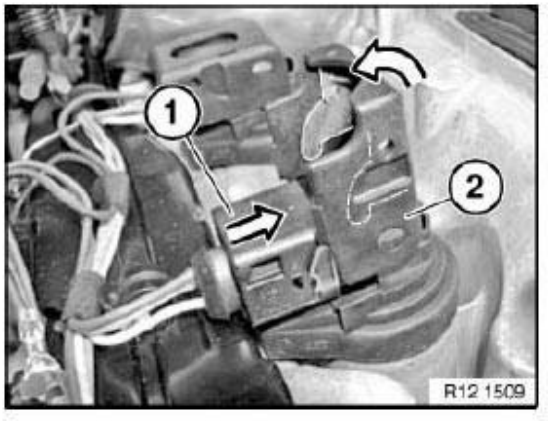


Fig. 24: Pushing Plug With Plug Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The plug fastener must snap into place without great effort.

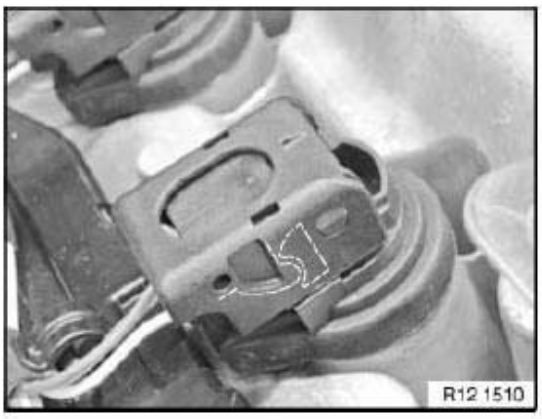


Fig. 25: Identifying Plug Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Now clear the fault memory.

1214 ELECTRONIC SWITCHING OR CONTROL UNITS

12 14 700 CODING CONTROL MODULE (DME/DDE)

Switch on ignition.

Connect MoDiC or DIS/GT1 Tester.

Select "Coding" program.

For subsequent procedure, follow instructions in MoDiC or DIS/GT1 Tester.

Carry out adjustment of following control units:

- EWS (electronic immobilizer)
- DME (Digital Motor Electronics) or
- DDE (Digital Diesel Electronics)

12 14 705 PROGRAMMING CONTROL UNIT (DME/DDE)

Switch on ignition.

Connect MoDiC or DIS/GT1 Tester.

Select "Programming".

For subsequent procedure, follow instructions in MoDiC or DIS/GT1 Tester.

Carry out adjustment of following control units:

- EWS (electronic immobilizer)
- DME (Digital Motor Electronics) or
- DDE (Digital Diesel Electronics)

12 14 600 REMOVING/REPLACING KNOCK SENSORS (N52K)

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are **released.**

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic.**

Jointing torque and angle of rotation must be observed without fail **(risk of damage).**

Necessary preliminary tasks:

- Read out fault memory of DME control unit
- Switch off ignition
- Remove **INTAKE AIR MANIFOLD**

Unlock plug (1) and remove.

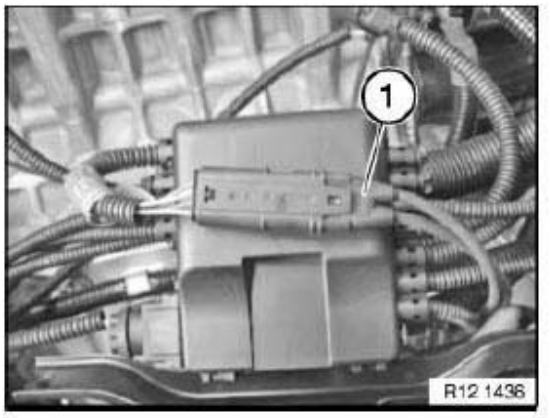


Fig. 26: Identifying Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws on both knock sensors (1) and remove knock sensors (1).

Installation:

Replace aluminum screws.

Tightening torque **13 62 3AZ** .

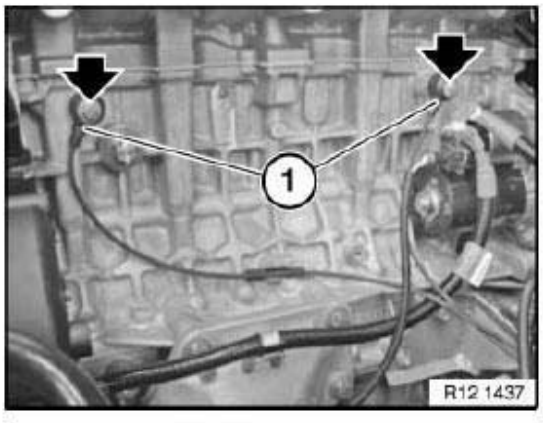


Fig. 27: Locating Knock Sensors
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean support face of knock sensors on engine block.

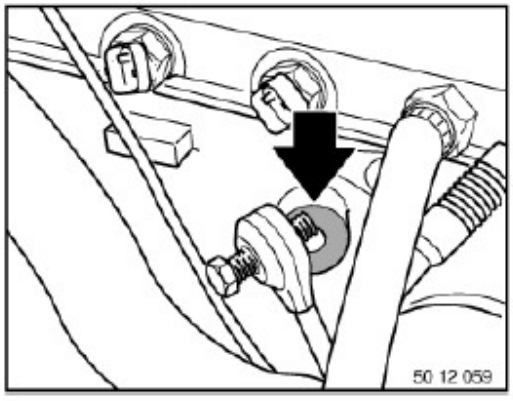


Fig. 28: Locating Knock Sensors Contact Surface On Engine Block
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
Now clear the fault memory.

12 14 550 REPLACING CONTROL UNIT (DME) (N52K)

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

Necessary preliminary tasks:

- Turn off ignition
- Disconnect **BATTERY NEGATIVE LEAD**

IMPORTANT: Follow instructions for REMOVING AND INSTALLING CONTROL UNITS

Replacement:

- Carry out programming/encoding

IMPORTANT: It is absolutely essential to read out the fault memory with the BMW diagnosis system and to create a fault memory printout.

Switch off ignition.

Release bolts along line (1).

Tightening torque **12 90 1AZ** .

Remove electronics box cover.

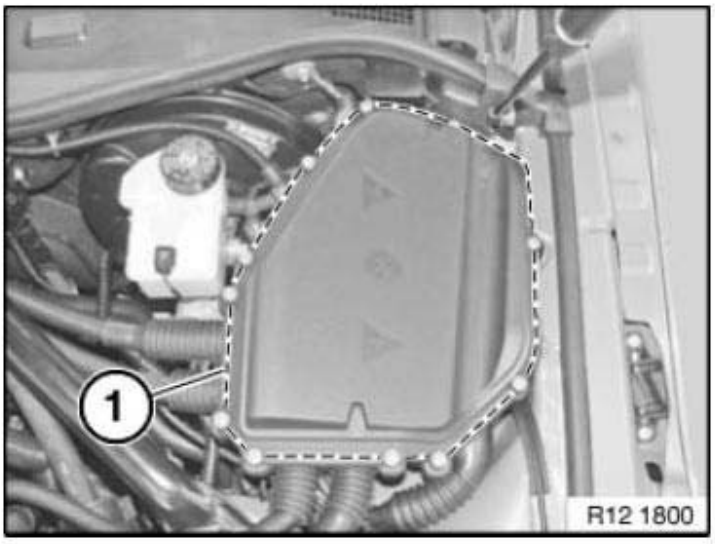


Fig. 29: Identifying Electronic Box Cover Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock battery positive lead (1), detach and lay to one side.

Release locks (2) in direction of arrow and pull control unit upwards slightly.

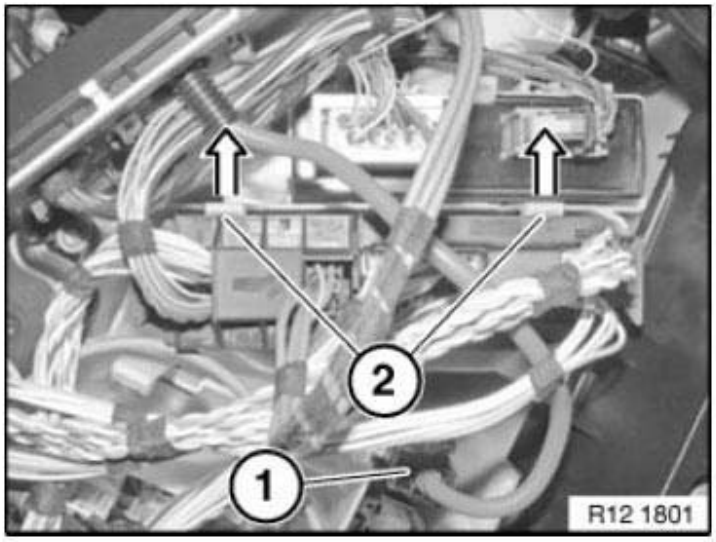


Fig. 30: Opening Control Unit Locks
Courtesy of BMW OF NORTH AMERICA, INC.

Pull control unit (1) upwards slightly until plug (2) can be released from control unit in direction of arrow.

Unlock plug (2) and detach from control unit (1).

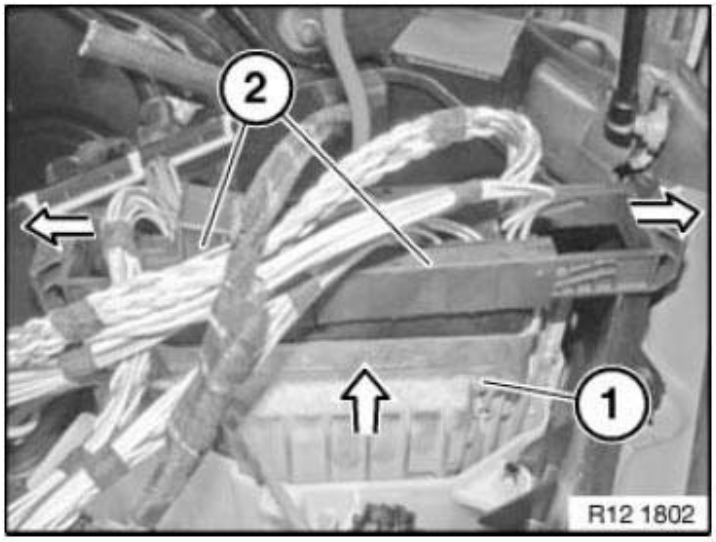


Fig. 31: Pulling Control Unit Upwards
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out control unit (1).

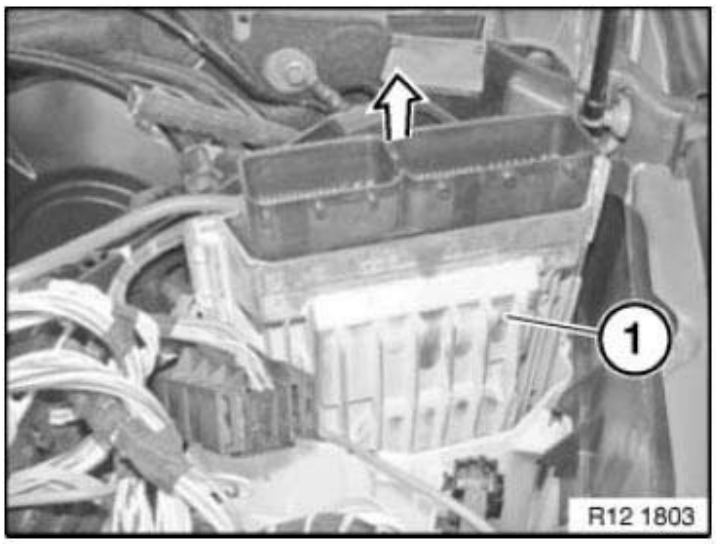


Fig. 32: Lifting Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
clear fault memory.

12 14 521 REPLACING CRANKSHAFT PULSE GENERATOR (N52K)

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

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are **released.**

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic.**

Jointing torque and angle of rotation must be observed without fail **(risk of damage).**

Necessary preliminary tasks:

- Read out fault memory of DME control unit

- Switch off ignition

NOTE: Installation location of pulse generator for crankshaft is underneath starter motor.

Detach plug (1) from crankshaft pulse generator (2).

Release screw.

Installation:

Replace aluminum screws.

Tightening torque **13 62 2AZ** .

Withdraw pulse generator (2) from crankcase.

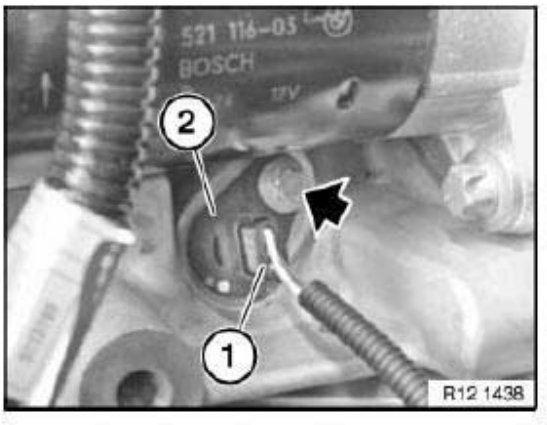


Fig. 33: Removing Plug From Crankshaft Pulse Generator
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing ring.

NOTE: Check stored fault messages.
Now clear the fault memory.

12 14 524 REPLACING PULSE GENERATOR ON EXHAUST CAMSHAFT (N52K)

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

Necessary preliminary tasks:

- Read out fault memory of DME control unit
- Switch off ignition

Unlock plug (1) and remove.

Release screw.

Installation:

Replace screw.

Tightening torque **13 62 1AZ** .

Remove pulse generator (2).

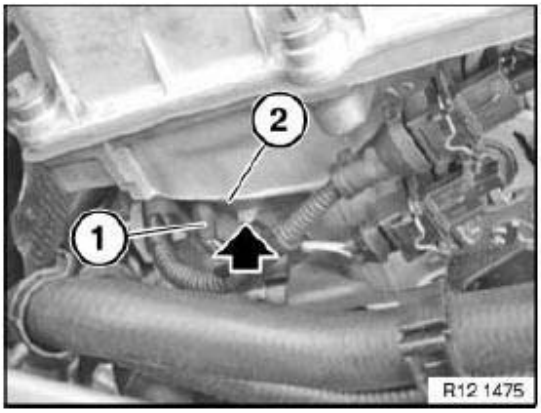


Fig. 34: Identifying Plug And Pulse Generator
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
Now clear the fault memory.

12 14 523 REPLACING PULSE GENERATOR ON INLET CAMSHAFT (N52K)

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

Necessary preliminary tasks:

- Read out fault memory of DME control unit
- Switch off ignition

Unlock plug (1) and remove.

Release screw.

Installation:

Replace screw.

Tightening torque **13 62 1AZ** .

Remove pulse generator (2).

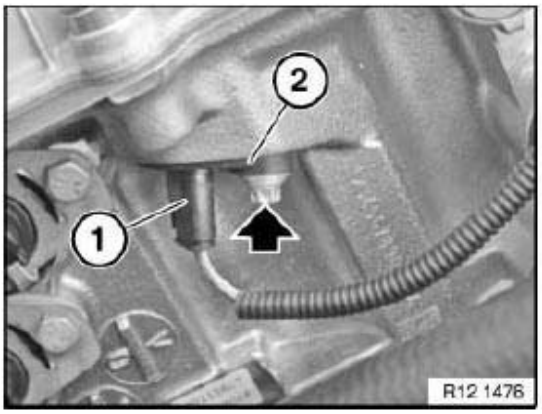


Fig. 35: Locating Pulse Generator With Plug
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
Now clear the fault memory.

1231 ALTERNATOR WITH DRIVE AND MOUNTING

12 31 020 REMOVING AND INSTALLING OR REPLACING ALTERNATOR (N52K)

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are **released.**

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic.**

Jointing torque and angle of rotation must be observed without fail **(risk of damage).**

Necessary preliminary tasks:

- Turn off ignition
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **INTAKE FILTER HOUSING**
- Remove **ALTERNATOR DRIVE BELT**

Unlock plug (1) and remove.

Slacken nut (2).

Installation:

Tightening torque **12 31 1AZ** .

Disconnect battery positive lead from alternator.

Release screws (3) and remove alternator.

Installation:

Replace aluminum screws.

Tightening torque **12 31 2AZ** .

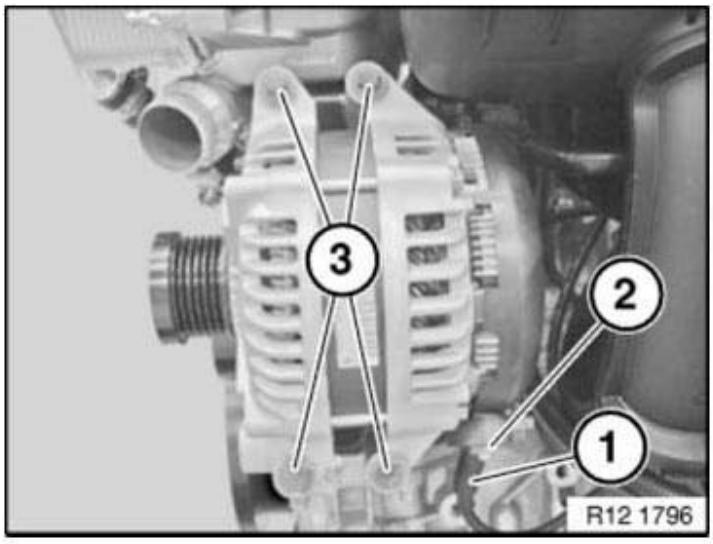


Fig. 36: Identifying Plug, Nut And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

12 31 ... REPLACING ALTERNATOR BELT PULLEY

Remove and install alternator drive belt.

Depending on alternator type, grip shaft with:

- hexagon socket
- multi-tooth socket or
- Torx socket wrench

Release nut with special tool 12 7 110 .

Installation:

TIGHTENING TORQUE, 12 31 2AZ/12 31 3AZ .

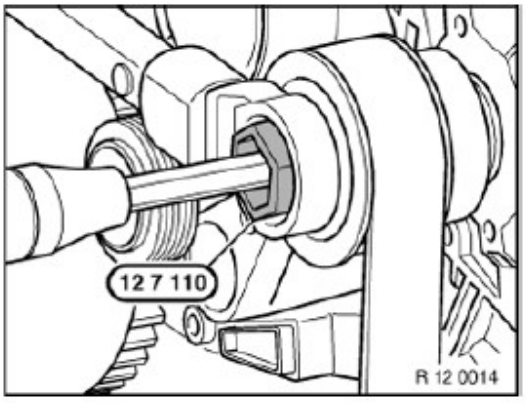


Fig. 37: Removing Nut Using Special Tool (12 7 110)
Courtesy of BMW OF NORTH AMERICA, INC.

12 31 ... REPLACING ALTERNATOR BELT PULLEY (WITH OVERRUNNING CLUTCH)

Special tools required

Remove and install alternator drive belt.

Grip alternator shaft with:

- internal serration

Release nut with special tools 12 7 120.

Installation:

Tightening torque **12 31 3AZ**

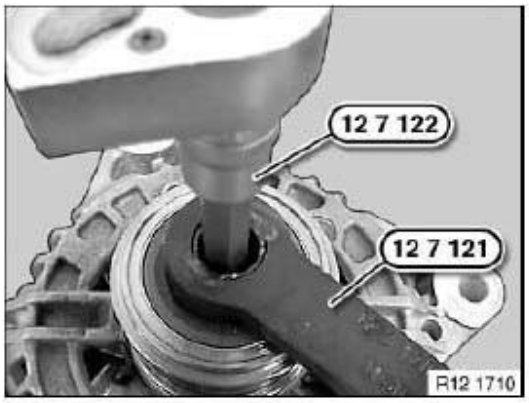


Fig. 38: Removing Nut Using Special Tool (12 7 120)
Courtesy of BMW OF NORTH AMERICA, INC.

1232 REGULATOR

12 32 501 REPLACING VOLTAGE REGULATOR

Necessary preliminary tasks:

- Switch off ignition
- Disconnect battery negative lead
- Remove alternator

Bosch

Release protective caps (1).

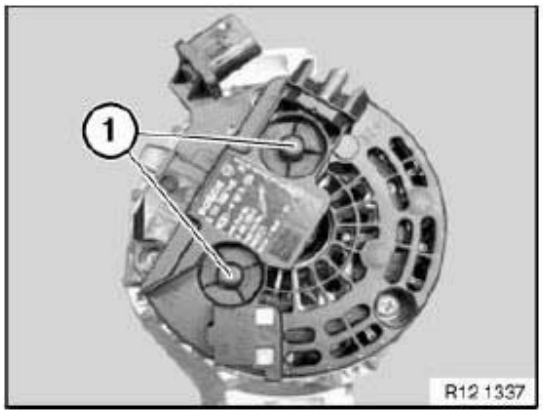


Fig. 39: Identifying Protective Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch

Release screw (1) and nuts (2), remove cover.

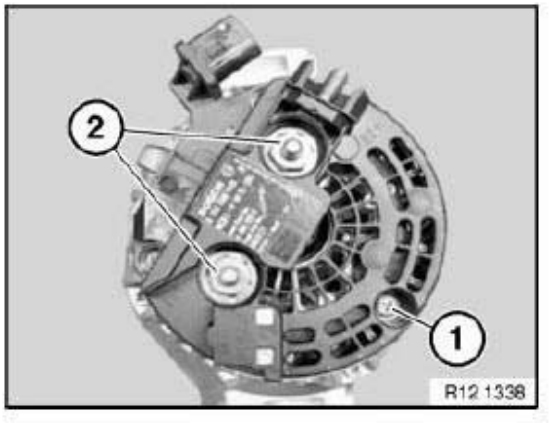


Fig. 40: Identifying Screw And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch

Release screws and remove regulator switch (1) in direction of arrow.

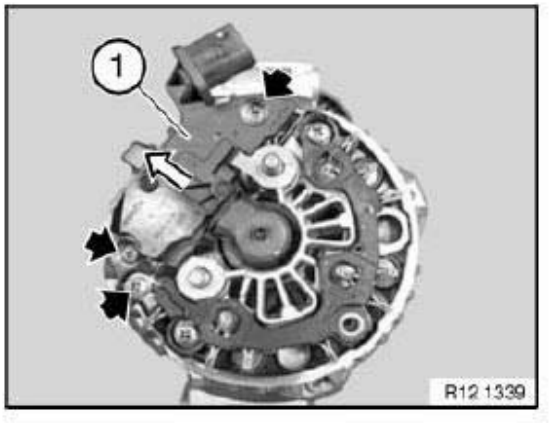


Fig. 41: Removing Regulator Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch

Installation:

Clean contact surfaces and check pretension of contact spring, replace regulator switch if necessary.

Measurement A = min. 5 mm.

Check collector ring for wear and recondition if necessary.

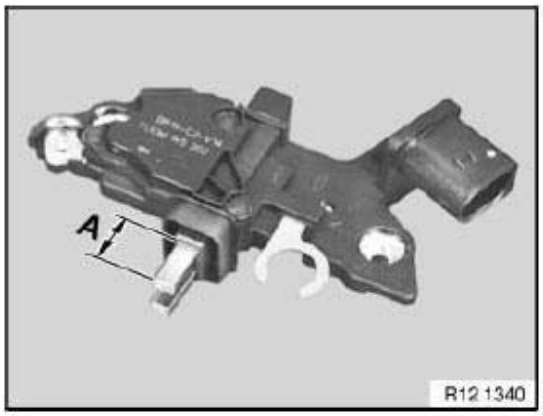


Fig. 42: Checking Contact Spring Pretension
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo

Slacken nut (1).

Slacken nut (2).

Release screws (3).

Release cover (4).

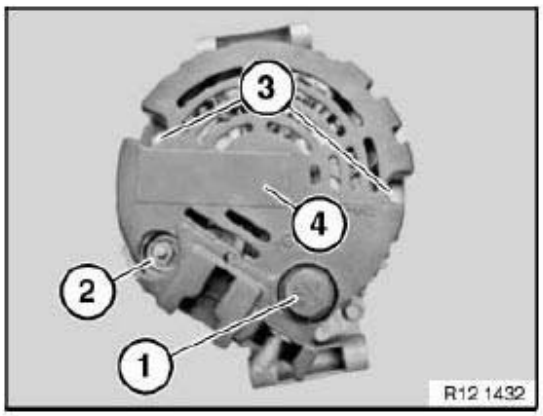


Fig. 43: Identifying Nut, Screw And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo

Release screws.

Remove regulator switch (1) towards top.

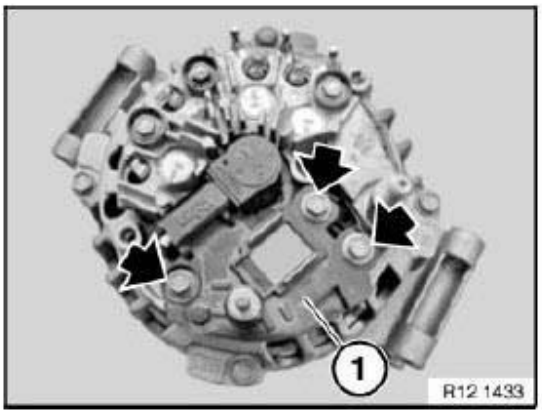


Fig. 44: Locating Regulator Switch Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo

Installation:

Clean contact surfaces and check pretension of contact spring, replace regulator switch if necessary.

Measurement A = min. 5 mm.

Check collector ring for wear and recondition if necessary.

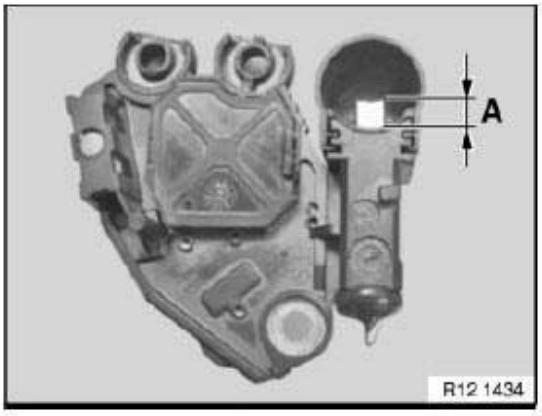


Fig. 45: Checking Regulator Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit new regulator (1) with attached mounting sleeve (2) or locked carbon brush.

Pull off mounting sleeve (2) and replace with cover (3).

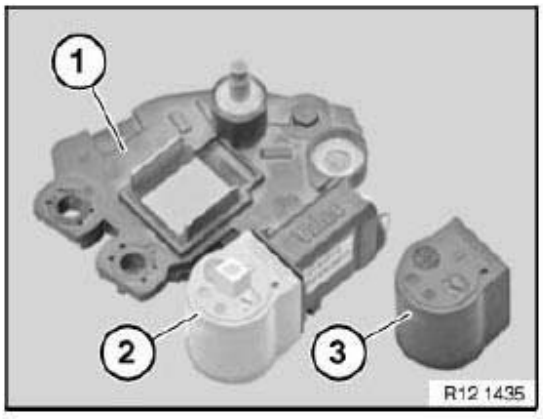


Fig. 46: Identifying Regulator, Mounting Sleeve And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

1241 STARTER WITH MOUNTING

12 41 020 REMOVING AND INSTALLING/REPLACING STARTER (N52K)

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are **released.**

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic.**

Jointing torque and angle of rotation must be observed without fail **(risk of damage).**

Necessary preliminary tasks

- Switch off ignition
- Clamp off **BATTERY NEGATIVE LEAD**
- Remove **INTAKE AIR MANIFOLD**

Unlock plug (1) and remove.

Unfasten nut.

Tightening torque **12 42 2AZ** .

Remove battery positive lead (2).

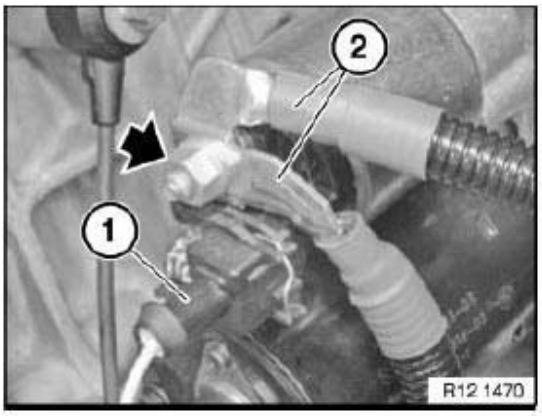


Fig. 47: Identifying Plug And Battery Positive Lead
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Installation:

Replace aluminum screws.

Tightening torque **12 41 1AZ** .

Unfasten screws (2).

Installation:

Replace aluminum screws.

Tightening torque **12 41 2AZ** .

Remove starter motor (3).

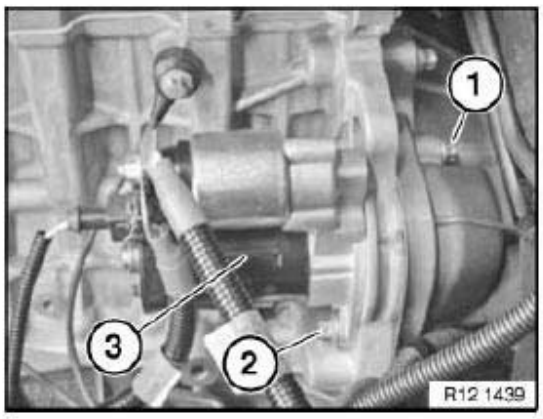


Fig. 48: Identifying Starter Motor And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check starter pinion and ring gear for damage. Replace starter if necessary.

Assemble engine.

12 41 041 REPLACING SOLENOID SWITCH

Turn off ignition.

Remove starter motor.

Release nut (1).

Remove cable lug (2).

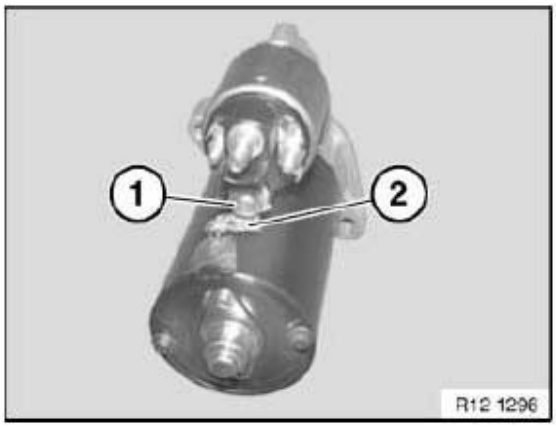


Fig. 49: Identifying Starter Motor Nut And Cable Lug
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Do not turn cable lug (2) while tightening down - risk of short circuit to starter motor housing.
Tightening torque, see 12 41 4AZ in 12 41 STARTER MOTOR WITH MOUNTING

Release screws (1).

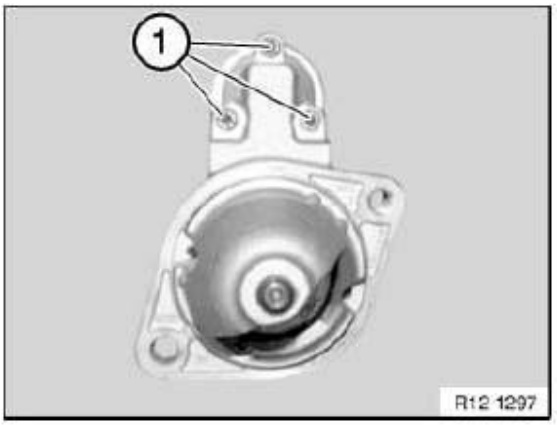


Fig. 50: Identifying Starter Motor Housing Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove solenoid switch (1) and spring (2).

Unhook pin (3).

Installation:

Check pin (3) for wear and apply grease.

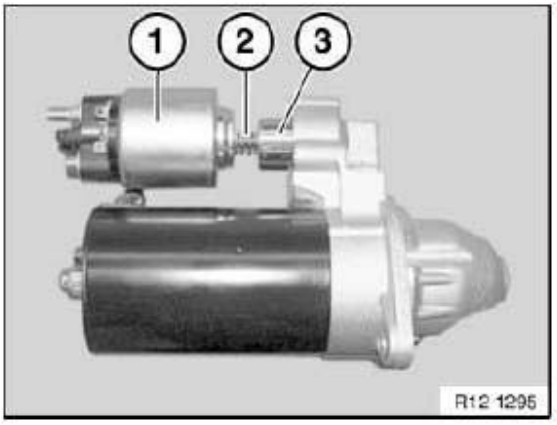


Fig. 51: Identifying Solenoid Switch, Spring And Pin
Courtesy of BMW OF NORTH AMERICA, INC.

1242 STARTER LEAD

12 42 500 REPLACING BATTERY POSITIVE LEAD BETWEEN STARTER, ALTERNATOR AND BATTERY POSITIVE TERMINAL (N52K)

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Switch off ignition
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **INTAKE AIR MANIFOLD**

Open cover.

Slacken nut (1).

Tightening torque **12 42 3AZ** .

Remove battery positive lead (2) from battery positive terminal.

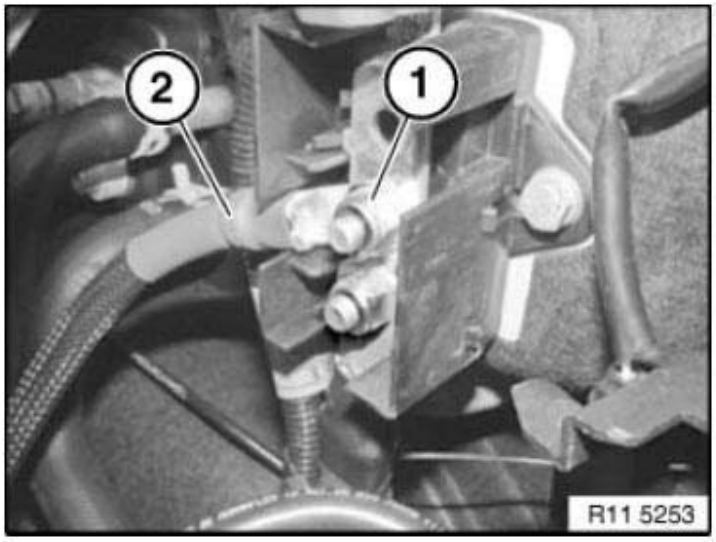


Fig. 52: Identifying Battery Cable And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) on starter.

Tightening torque **12 42 2AZ** .

Disconnect battery positive lead from starter.

Release nut (2) on alternator.

Tightening torque **12 42 1AZ** .

Release battery positive lead from retainer (3), feed out and remove.

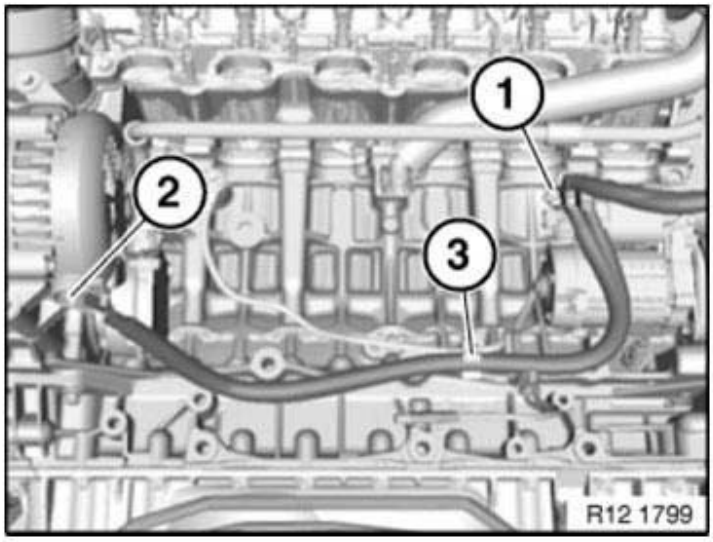


Fig. 53: Identifying Nut On Starter And Alternator
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
Now clear the fault memory.

12 42 540 REPLACING SAFETY BATTERY TERMINAL (SBK)

CAUTION: Observe safety regulations.
Investigate cause of triggering of safety battery terminal.
To do so, read out fault memory of airbag control unit. Note fault messages stored in memory. Rectify faults. Then clear fault memory.

Use of safety battery terminal:

- From model year 1998 in Series E38, E39, E46
- From 4/99 in E36/Z3
- in each of following new Series

The different models have different installation locations:

Battery in engine compartment

Safety battery terminal is replaced with cable up to battery positive support point.

Safety battery terminal is omitted as from 03/2002 from all E46 LHD models with 4-cylinder engines.

Battery in luggage compartment behind side trim panel

Remove side trim panel.

Follow instructions for disconnecting and connecting battery.

Disconnect and cover battery negative lead.

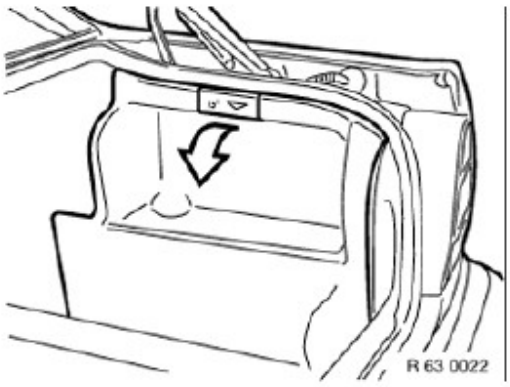


Fig. 54: Removing Luggage Compartment Battery
Courtesy of BMW OF NORTH AMERICA, INC.

Release front side trim panel partly and fold forward.



Fig. 55: Removing Front Side Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Battery in luggage compartment under floor trim panel

Follow instructions for disconnecting and connecting battery.

Fold back floor trim panel (1).

Lift cover (2) on battery negative lead.

Disconnect and cover battery negative lead (3).

Release nuts (4).

Remove battery cover.

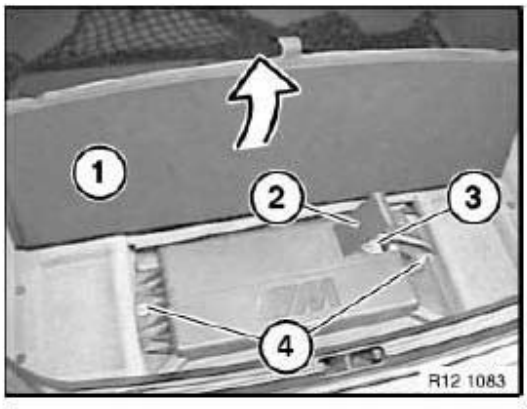


Fig. 56: Folding Back Floor Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Battery in luggage compartment under spare wheel

Remove spare wheel.

Release screws.

CAUTION: Do not kink air pipes.

Set air supply system (1) to one side.

Follow instructions for disconnecting and connecting battery.

Disconnect battery negative lead.

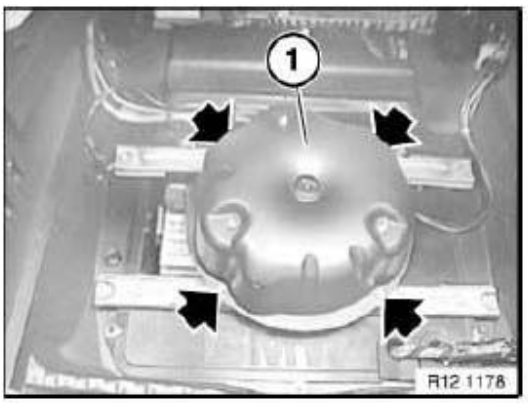


Fig. 57: Locating Air Supply System Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect supply cable (1) for vehicle electrical system.

Installation:

Remove faulty fuses and carry out troubleshooting.

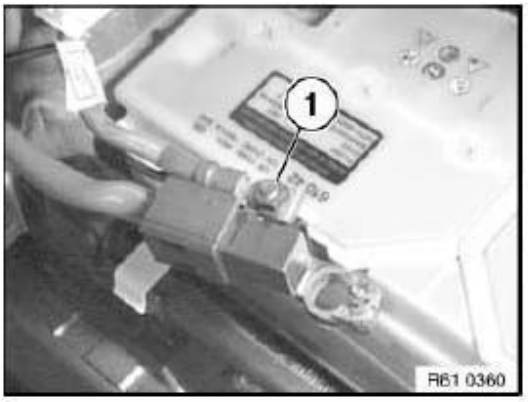


Fig. 58: Identifying Vehicle Electrical System Supply Cable
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Pay attention to interface.
The repair cable is always a standard length.
The heavy-current connector of the repair cable has a larger diameter than the battery positive lead.
In some Series (e.g. E46 touring), the heavy-current connector of the repair cable can lead to installation problems.
This is the case when the interface is in the area of the close-fitting trim panels.
Find matching interface (e.g. approx. 10 cm behind rear seat backrest in E46 touring).

Lay repair cable parallel to battery positive lead.

Mark interface of battery positive lead at end of repair cable.

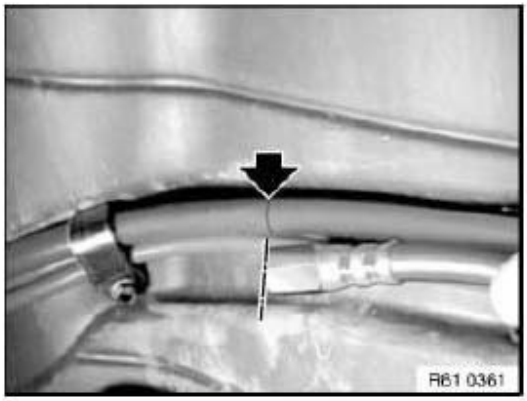


Fig. 59: Locating Interface Mark On Battery Positive Lead
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable ties (1).

Disconnect plug connection (2).

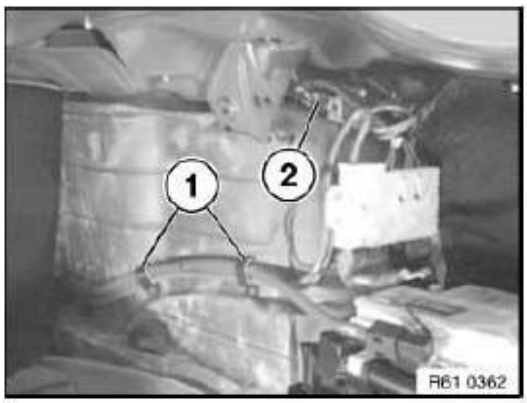


Fig. 60: Identifying Cable Ties And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Do not use bolt cutters or similar tools to cut through the cable. A cable end that has been squashed flat will no longer fit into the clamping sleeve.

Saw through battery positive cable at marked point with an iron saw.

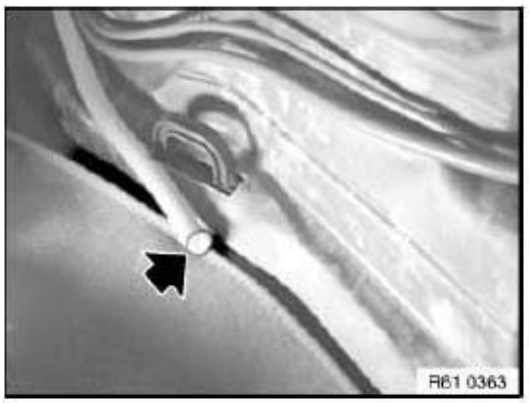


Fig. 61: Locating Cable End
Courtesy of BMW OF NORTH AMERICA, INC.

Strip insulation - length (A) - from cable end.

Distance (A) = 15 mm.

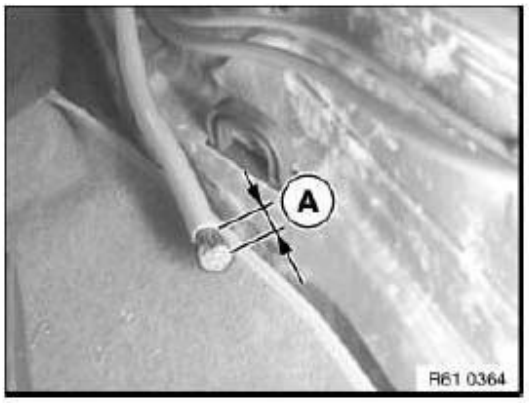


Fig. 62: Identifying Cable End Distance
Courtesy of BMW OF NORTH AMERICA, INC.

Push heavy-current connector (1) over stripped cable end and screw into position.

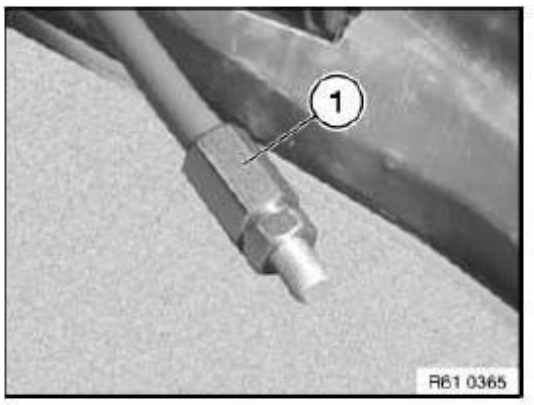


Fig. 63: Identifying Heavy-Current Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (3) over repair cable.

Screw threaded sleeve (1) of repair cable (2) to heavy-current connector.

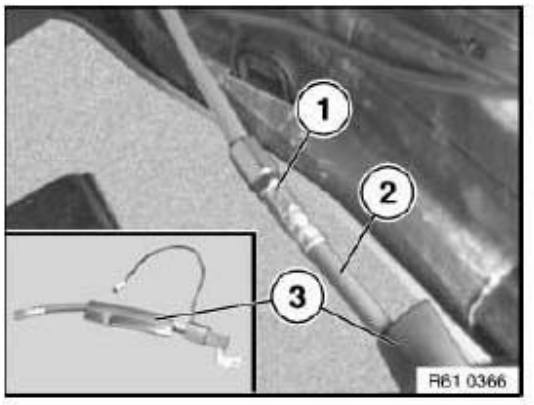


Fig. 64: Identifying Shrink-Fit Hose And Threaded Sleeve Of Repair Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (1) over connecting point and shrink on with a hot-air blower (2).

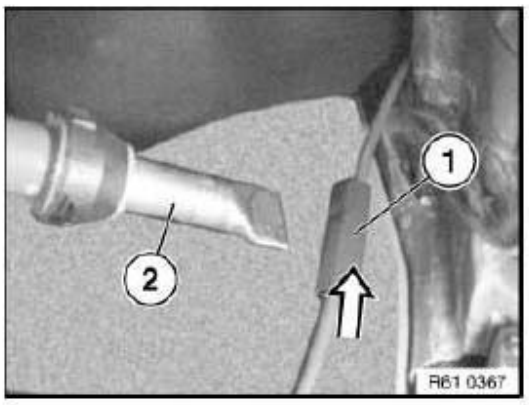


Fig. 65: Pushing Shrink-Fit Hose Over Connecting Point
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Heat up shrink-fit hose until it has settled completely around the connection point.

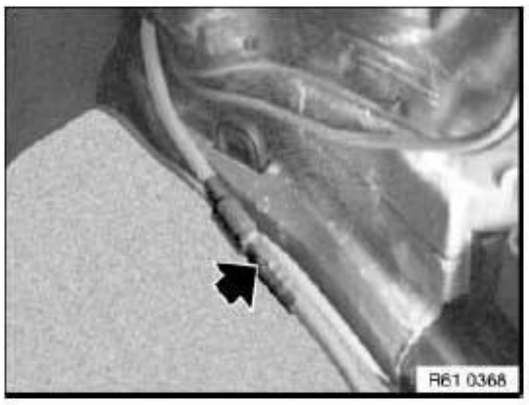


Fig. 66: Locating Shrink-Fit Hose
Courtesy of BMW OF NORTH AMERICA, INC.

When laying the repaired battery positive cable, observe the following:

- The shrink-fit hose must not be scuffed during any movement.
- The repair cable must not cause any disturbing noises during driving operation.

NOTE: Offsetting cutting line by approx. 10 cm produces excess length of battery positive lead (1).
Lay battery positive lead (1) without kinks or abrasions.
(Shown on E46 touring.)

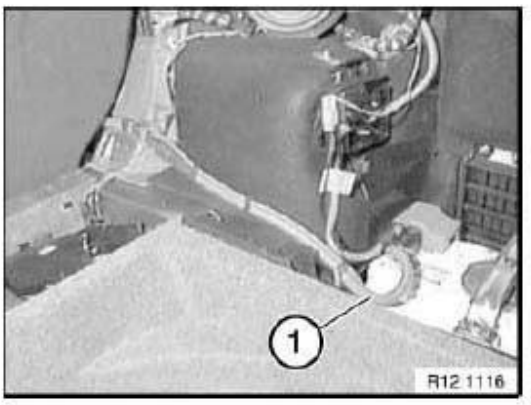


Fig. 67: Identifying Battery Positive Lead
Courtesy of BMW OF NORTH AMERICA, INC.

1251 ENGINE WIRING LOOM

12 51 001 REPLACING WIRING HARNESS SECTION FOR ENGINE (N52K)

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

Necessary preliminary tasks:

- Read out fault memory of DME control unit
- Turn off ignition
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove front **UNDERBODY PROTECTION**
- Remove rear **UNDERBODY PROTECTION**
- Partially remove **WIRING HARNESS** for ignition coils
- Remove **INTAKE AIR MANIFOLD**

Release bolts along line (1).

Tightening torque **12 90 1AZ** .

Remove electronics box cover.

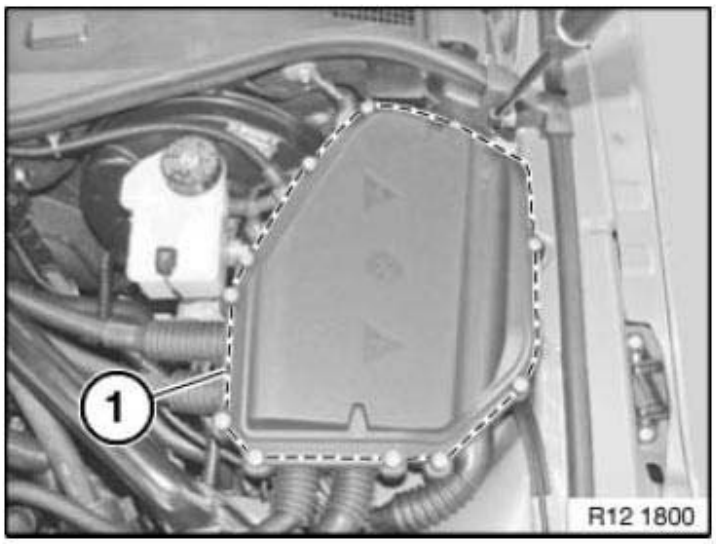


Fig. 68: Identifying Electronic Box Cover Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock battery positive lead (1), detach and lay to one side.

Release locks (2) in direction of arrows and pull control unit upwards slightly.

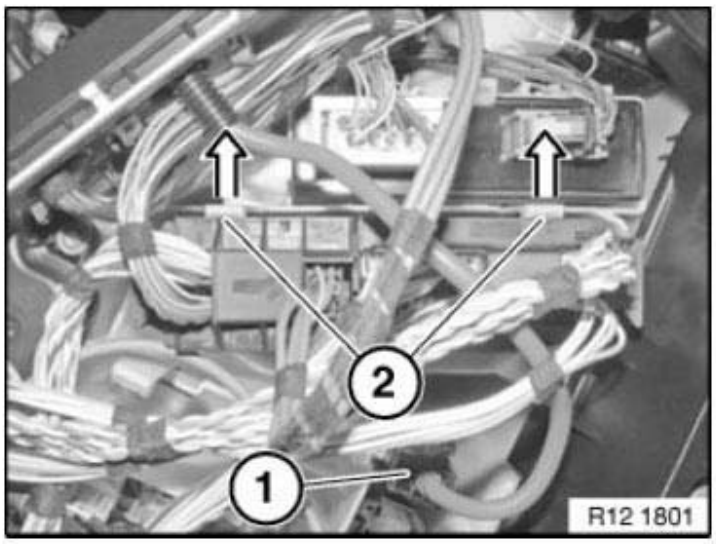


Fig. 69: Opening Control Unit Locks
Courtesy of BMW OF NORTH AMERICA, INC.

Pull control unit (1) upwards slightly until plug (2) can be released from control unit in direction of arrow.

Unlock plug (2) and detach from control unit (1).

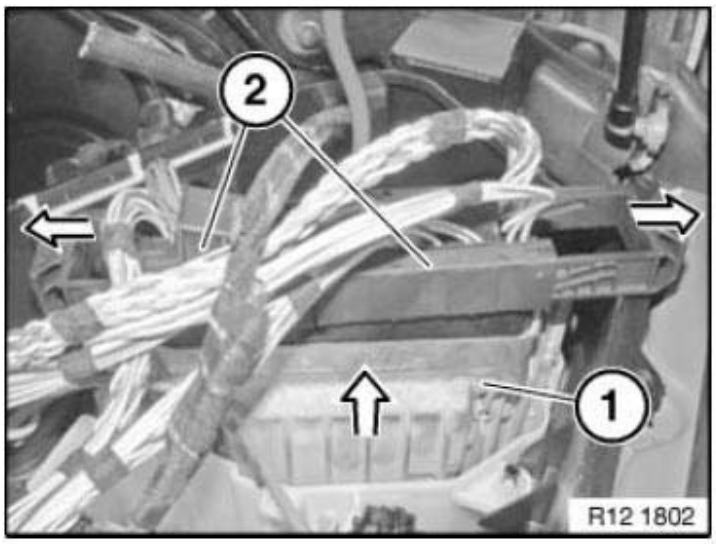


Fig. 70: Pulling Control Unit Upwards
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach all plugs from engine wiring harness in electronics box (1).

Unclip rubber grommet hold-down devices (2) and (3) and release engine wiring harness from electronics box.

Installation:

Make sure rubber grommets are correctly seated (watertightness).

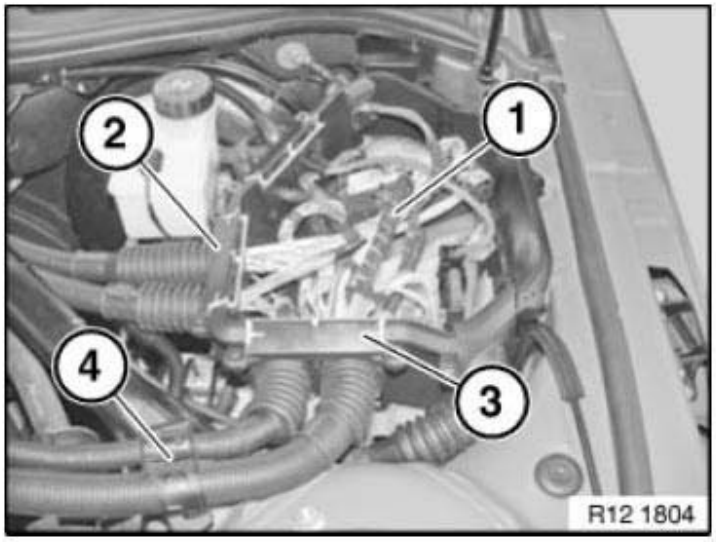


Fig. 71: Identifying Electronic Box With Rubber Grommet Hold Down Device And Plugs
Courtesy of BMW OF NORTH AMERICA, INC.

Long plug:

Press in retaining lugs and withdraw lock (1) in direction of arrow from plug housing.

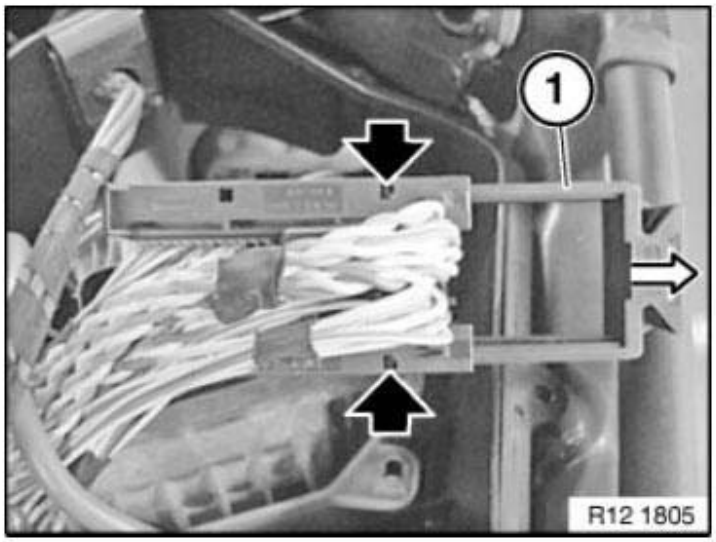


Fig. 72: Removing Locks By Pressing Retaining Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking tabs (1) in direction of arrow and pull contact carrier (2) out of housing.

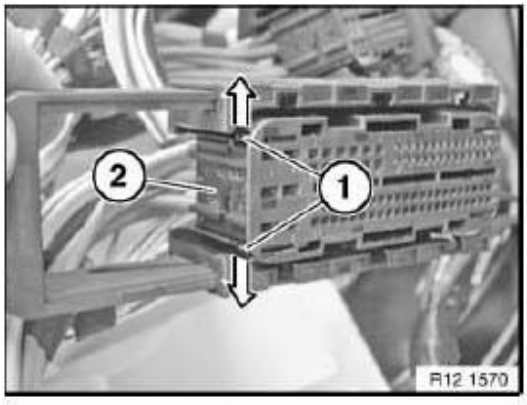


Fig. 73: Pressing Locking Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking tab (1) in direction of arrow and pull contact carrier (2) out of housing.

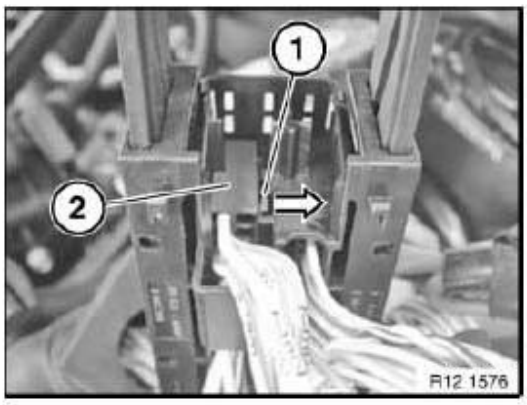


Fig. 74: Pressing Locking Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock locking tabs (1) in direction of arrow and pull contact carrier (2) out of housing.

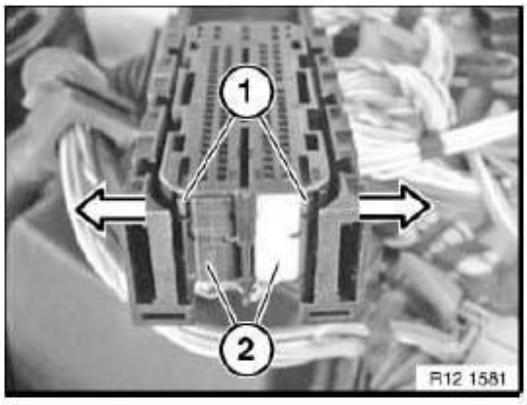


Fig. 75: Opening Locking Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Short plug:

Press in retaining lugs (1) and withdraw lock (2) in direction of arrow from plug housing.

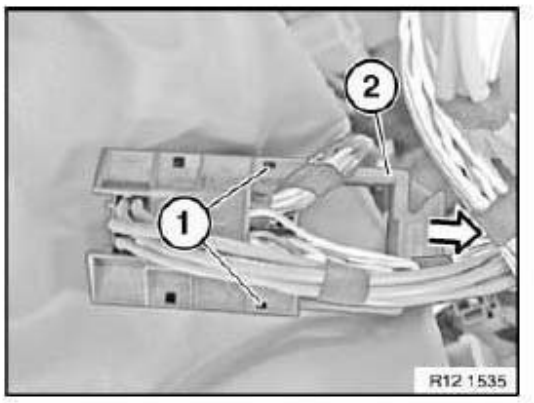


Fig. 76: Removing Locks From Plug Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking tabs (1) in direction of arrow and pull contact carrier (2) out of housing.

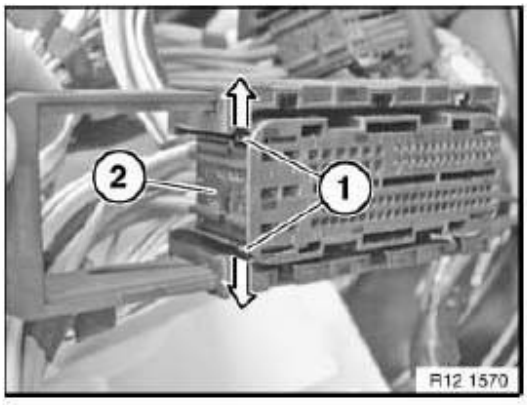


Fig. 77: Pressing Locking Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock locking tabs (1) in direction of arrow and pull contact carrier (2) out of housing.

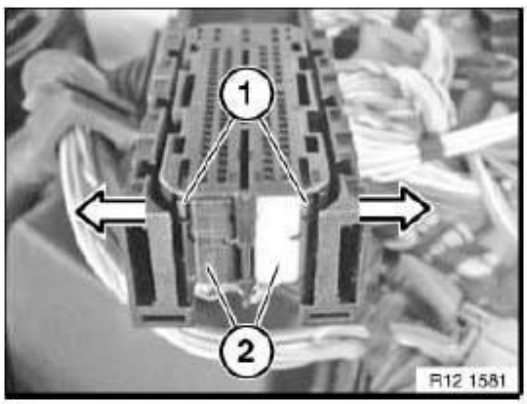


Fig. 78: Opening Locking Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cable duct upper section (1) and expose wiring harnesses.

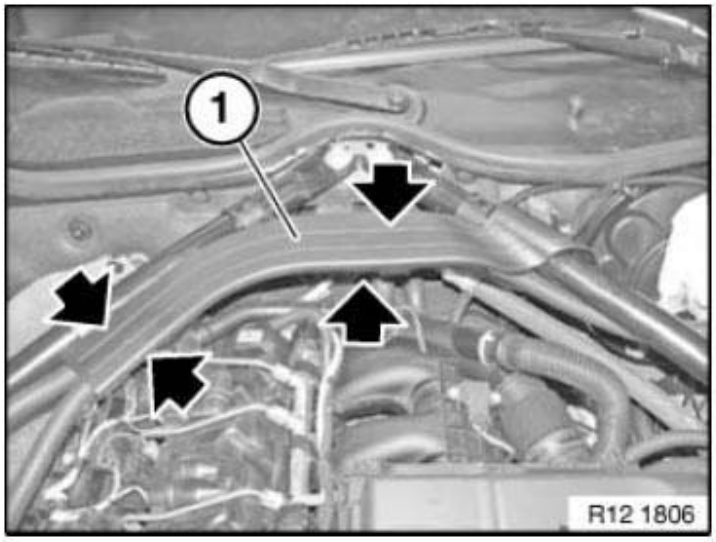


Fig. 79: Locating Wiring Harness In Cable Duct Upper Section
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cable duct (1) and remove from cylinder head cover.

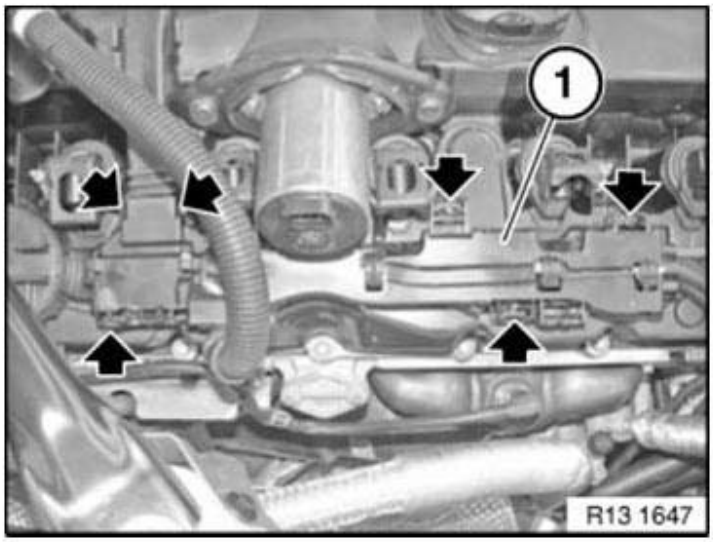


Fig. 80: Uncliping Cable Duct
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip plug connection (1) from holder (2) and disconnect.

Unclip wiring harness from holder (2).

Unclip holder (2) from fuel rail and remove.

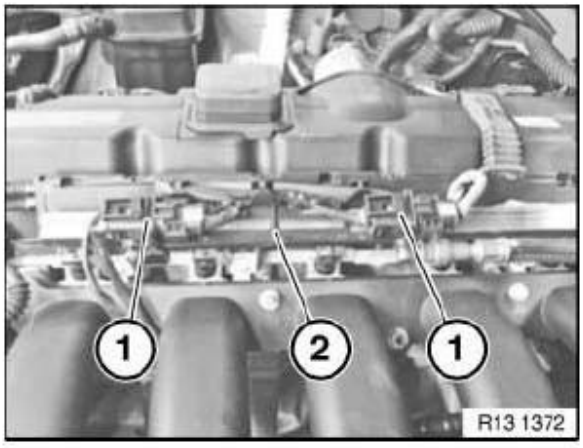


Fig. 81: Identifying Plug Connection And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Detach connector strip (2) in direction of arrow.

Do **not** remove fuel rail (3) and fuel line (1).

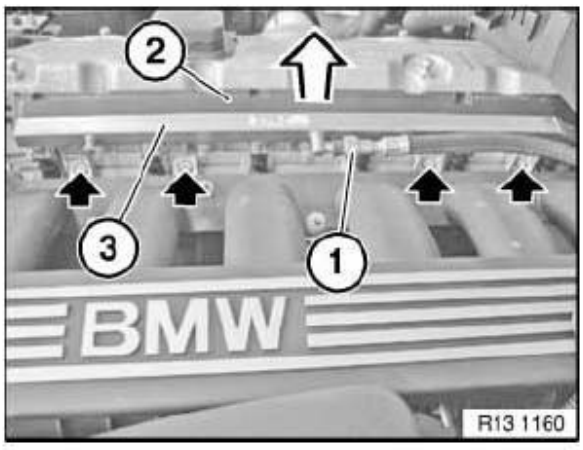


Fig. 82: Removing Connector Strip With Fuel Rail And Fuel Line
Courtesy of BMW OF NORTH AMERICA, INC.

WIRING HARNESS REPLACEMENT PROCEDURE

Work step	Note
Unlock plug connections on control sensors and disconnect	
Unlock plug on alternator and disconnect	
Unlock plug connection on knock sensors and disconnect	

Unlock plug on crankshaft sensor and disconnect	
Unlock plug on starter motor and disconnect	
Unlock plug on throttle valve assembly and disconnect	
Unlock plug connections on monitoring sensors and disconnect	
Unlock plug on oil condition sensor and disconnect	
Unlock plug on tank vent valve and remove	
Unlock plug on transmission and disconnect	
Unlock plug on air-mass meter and disconnect	
Unlock plug on differential-pressure sensor and disconnect	
Unlock plug on intake system servomotors and disconnect	
Unlock plug on eccentric shaft sensor and disconnect	
Unlock plug on solenoid valves and disconnect	
Unlock plug on coolant temperature sensor and disconnect	
Unlock plug on oil pressure sensor and disconnect	
Disconnect connector strip on fuel injectors	
Unlock plug on A/C compressor and disconnect	
Unlock plug on coolant thermostat and disconnect	
Unlock plug on hydraulic valve and disconnect	
Unlock plug on coolant pump and disconnect	
Release earth connection and remove Tightening torque **12 90 3AZ** .	

Release wiring harness if necessary from clips and retainers

Feed out wiring harness and remove.

Installation:

Check wiring harness routing.

Check plug connections for correct seating.

NOTE: Check stored fault messages.
clear fault memory.

12 51 100 REPLACING WIRING HARNESS SECTION FOR IGNITION COILS (N52K)

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are **released.**

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic.**

Jointing torque and angle of rotation must be observed without fail **(risk of damage).**

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

Necessary preliminary tasks:

- Read out fault memory of DME control unit
- Turn off ignition
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **IGNITION COIL COVER**

Release bolts along line (1).

Tightening torque **12 90 1AZ** .

Remove electronics box cover.

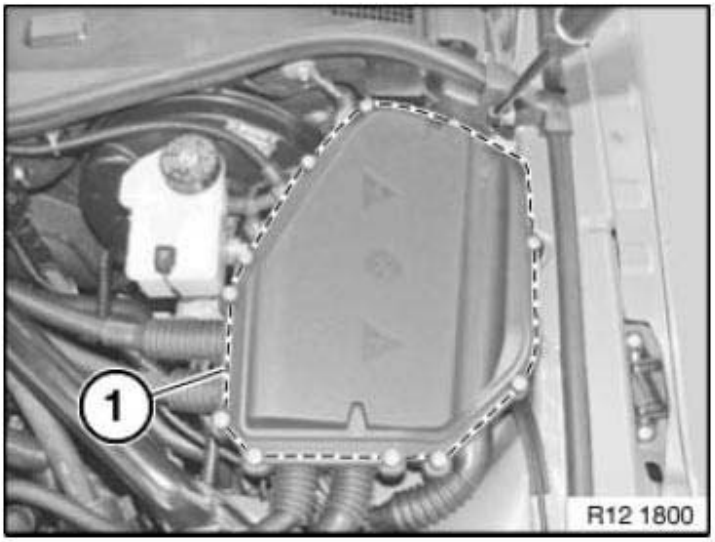


Fig. 83: Identifying Electronic Box Cover Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock battery positive lead (1), detach and lay to one side.

Release locks (2) in direction of arrows and pull control unit upwards slightly.

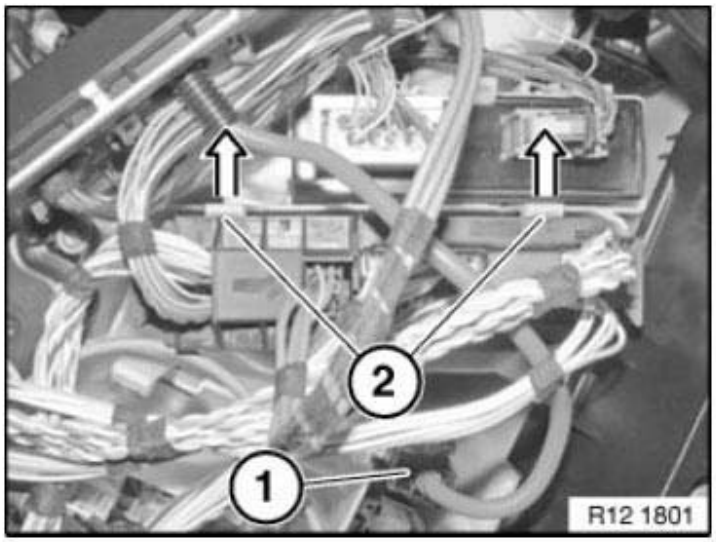


Fig. 84: Opening Control Unit Locks
Courtesy of BMW OF NORTH AMERICA, INC.

Pull control unit (1) upwards slightly until plug (2) can be released from control unit in direction of arrow.

Unlock plug (2) and detach from control unit (1).

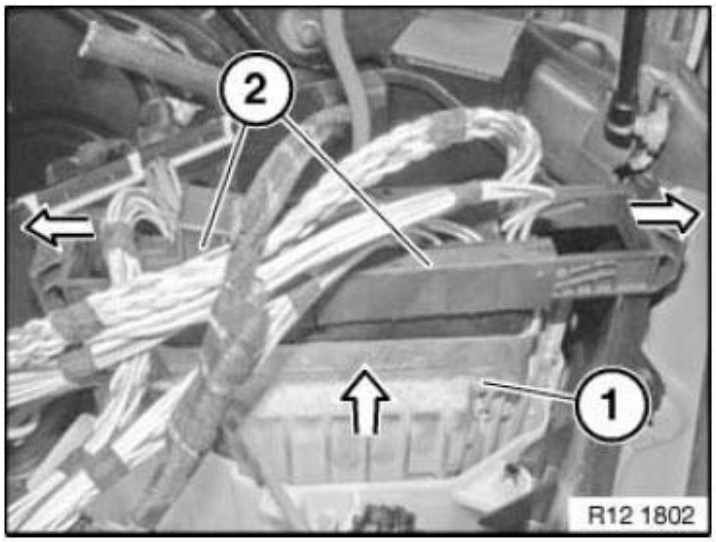


Fig. 85: Pulling Control Unit Upwards
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach all plugs (1) from ignition coil wiring harness in electronics box.

Unclip rubber grommet hold-down device (2) and release ignition coil wiring harness from electronics box.

Installation:

Make sure rubber grommets are correctly seated (watertightness).

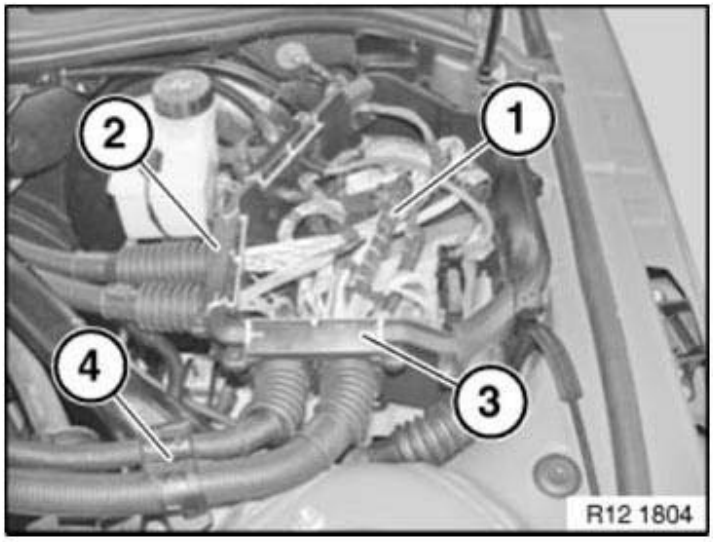


Fig. 86: Identifying Plugs And Rubber Grommet Hold Down Device
Courtesy of BMW OF NORTH AMERICA, INC.

Press in retaining lugs and withdraw lock (1) in direction of arrow from plug housing.

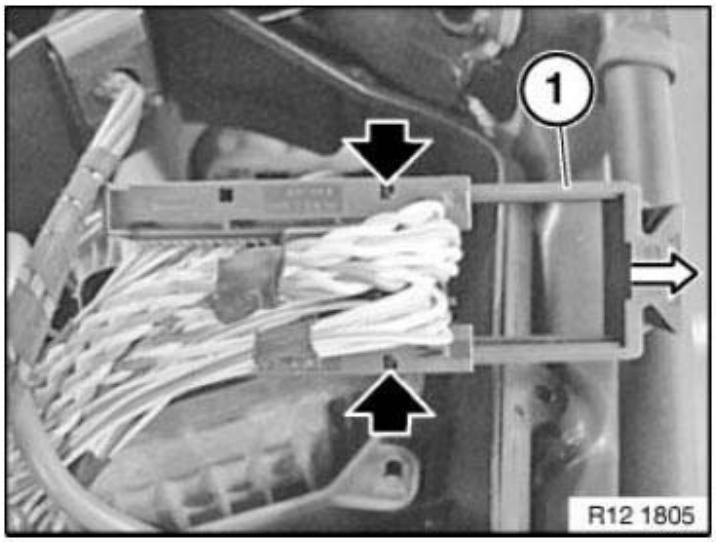


Fig. 87: Removing Locks By Pressing Retaining Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking tabs (1) in direction of arrow and pull contact carrier (2) out of housing.

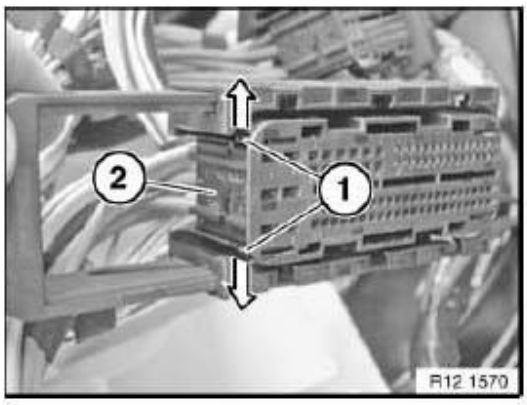


Fig. 88: Pressing Locking Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking tab (1) in direction of arrow and pull contact carrier (2) out of housing.

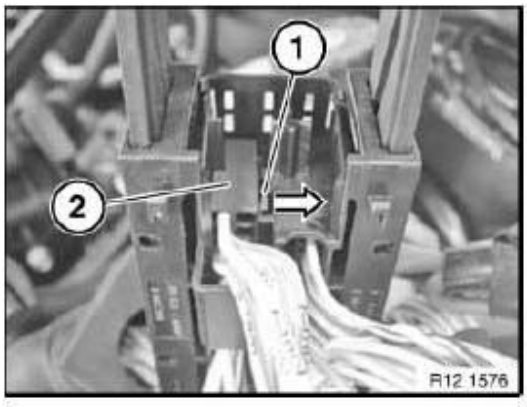


Fig. 89: Pressing Locking Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cable duct upper section (1) and expose wiring harnesses.

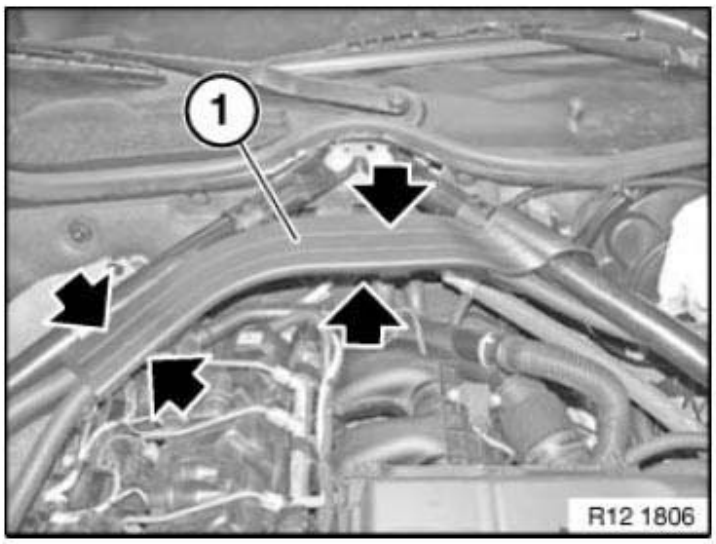


Fig. 90: Locating Wiring Harness In Cable Duct Upper Section
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and remove clip (1).

Unlock all plugs on ignition coils and disconnect.

Unlock plug (2) on Valvetronic servomotor and disconnect.

Release wiring harness from retainers and cable ties (3).

Replace defective cable ties.

Release nuts (4) and remove earth connections.

Tightening torque **12 90 2AZ** .

Feed out ignition coil wiring harness and remove.

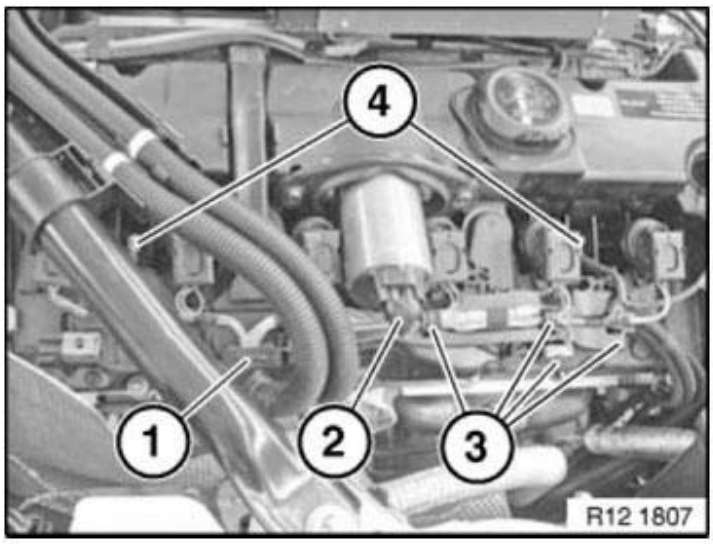


Fig. 91: Identifying Clip, Plug, Cable Ties And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Check wiring harness routing.

Check plug connections for correct seating.

Check stored fault messages.

clear fault memory.

1261 OIL PRESSURE/OIL TEMPERATURE/OIL GAUGE

12 61 285 REMOVING AND INSTALLING/RENEWING OIL LEVEL SENSOR FOR ENGINE OIL (N52K)

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

Necessary preliminary work

- Switch off ignition
- Remove front **UNDERBODY PROTECTION**
- Drain off **ENGINE OIL**

Release connector (1) and remove.

Unscrew nuts (2).

Tightening torque **12 61 2AZ** .

Remove oil level sensor.

Installation note:

Clean sealing surface on oil sump.

Replace gasket on oil level sensor.

An excessively low torque value will result in oil leaks.

An excessively high torque value will result in damage to the oil level sensor.

Top up engine oil.

Reinstall holder for ground cable.

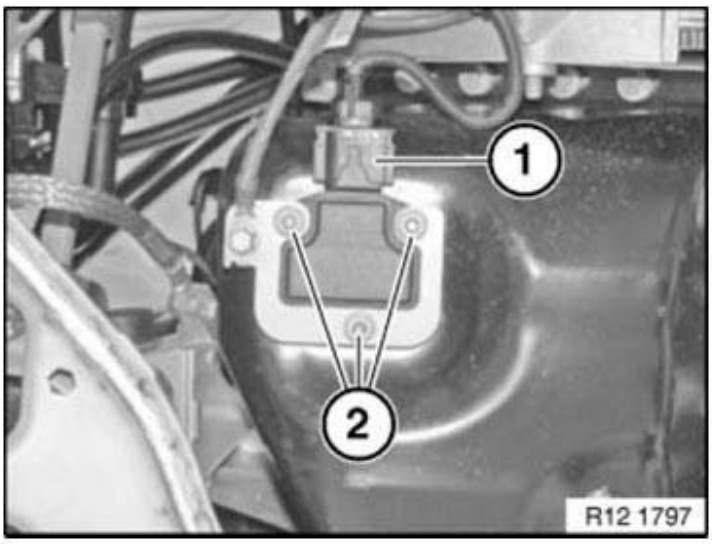


Fig. 92: Identifying Connector And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Delete fault memory.

12 61 280 REMOVING AND INSTALLING/REPLACING OIL PRESSURE SENSOR (N52K)

WARNING: Scalding hazard!
Only perform this task on an engine that has cooled down.

Necessary preliminary tasks:

- Remove **ACOUSTIC COVER**

Installation location

Oil filter housing, front left.

Engine oil may emerge when oil pressure sensor is replaced; have a cleaning cloth ready.

Unlock plug (1) and remove.

Release oil pressure sensor (2).

Tightening torque **12 61 1AZ** .

Installation:

Check engine oil level, top up engine oil if necessary.

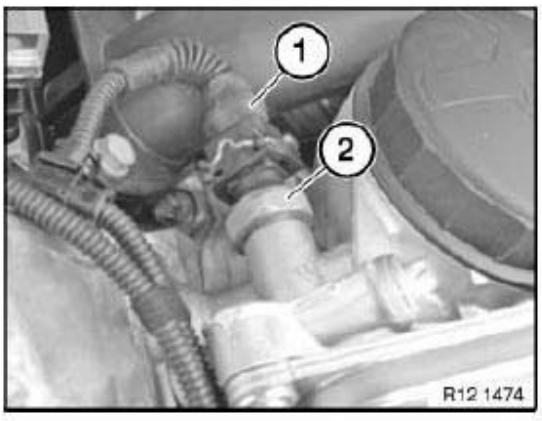


Fig. 93: Identifying Oil Pressure Sensor And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

1200 TROUBLESHOOTING

61 20 ... BATTERY REPLACEMENT INFORMATION

A vehicle battery is constructed for the installation location and the individual power requirements of the particular vehicle. These individual power requirements depend on the motorization and different types of optional equipment. The individually assigned vehicle battery is the ideal compromise between the power requirements of the vehicle electrical system and the weight and service life of the vehicle battery.

Vehicles with the automatic engine start-stop function or particular motorization and optional equipment are equipped with a special vehicle battery (AGM battery), since only this battery type can provide elevated power requirements over the extended service life. Installing a different vehicle battery can cause problems with vehicle electronics, can reduce functions or can cause leakage of battery acid.

In the event of an accident where the airbags are deployed in vehicles with a vehicle battery in the luggage compartment, the electrical connection between the vehicle battery and the trigger is automatically disconnected through pyrotechnics. This prevents a possible short circuit.

Proper operation of all of these safety and convenience functions requires a battery that conforms with specifications and that is properly registered in vehicles with energy management systems (IBS, power module).

Vehicles with energy management systems (IBS, power module): Register battery replacement

The vehicle electrical system is informed about the vehicle battery characteristic data, such as type, size, age and current power capacity. Therefore, only one work scope will be provided that is permitted by the current status of information.

When installing a new vehicle battery, the battery must be registered and thus must also be registered with the vehicle electrical system.

Diagnosis system:

Register battery replacement

- Service functions
- Body
- Voltage supply
- Register battery replacement
- Test plan

When retrofitting, a more powerful battery may be used. Standard batteries may always be replaced by AGM batteries with the same specifications.

When installing a battery of a different size or a different battery type, this change in vehicle data must be programmed into the vehicle data in accordance with specifications.

Programming system:

- Battery retrofitting

61 13 ... BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION

IMPORTANT:

1. **Identify cause of damage (e.g. sharp-edged body parts, faulty electrical loads, jammed mechanisms, corrosion caused by ingress of water, etc.).**
2. **Read out fault memory**
3. **Eliminate cause of damage.**
4. **Disconnect battery negative terminal**
5. **Make sure that no safety-related system according to circuit diagram (e.g. antilock braking system, active rear-axle kinematics, airbags, etc.) are influenced.**

   Otherwise replace faulty wiring harness or use repair cable (sourcing reference: BMW Parts Service)

6. **Carry out function test and read out fault memories again**
7. **Eliminate new faults if applicable and clear fault memories**

NOTE: **The repair range IV for vehicle electrical system contained the required special tools and individual parts for retrofitting and repair work with the aid of fan connectors.**

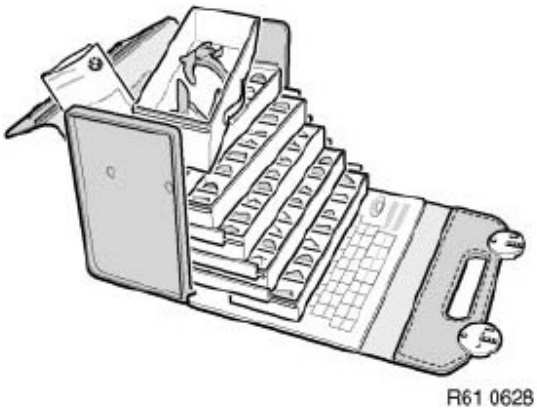


Fig. 1: Identifying Wiring Harness Repair Kit
Courtesy of BMW OF NORTH AMERICA, INC.

Choose repair kit.

Example: Repair kit, circular plug system D 2.5.

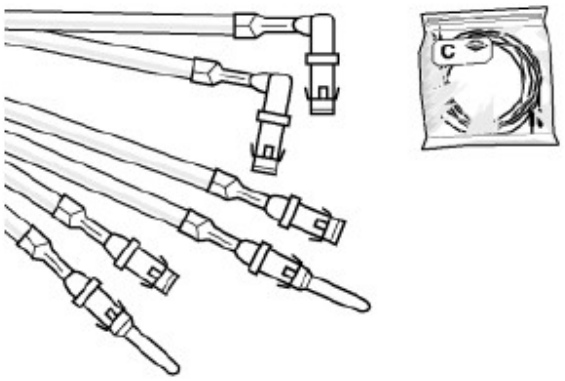


Fig. 2: Identifying Repair Kit, Circular Plug System D 2.5
Courtesy of BMW OF NORTH AMERICA, INC.

Remove following parts

1. Pre-packaged end of cable with requisite wire cross-section
2. Crimp connector for selected wire cross-section
3. Shrink-fit hose

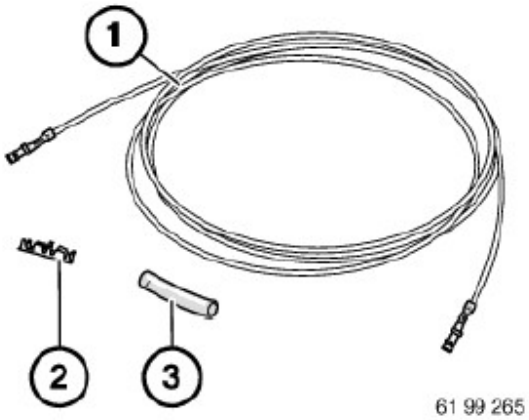


Fig. 3: Identifying Cable With Wire Cross-Section, Crimp Connector And Shrink-Fit Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Open secondary lock on housing.

Mark damaged contact (4) with socket number of housing and press it out of housing using appropriate special tool contained in special tool kit 61 0 300).

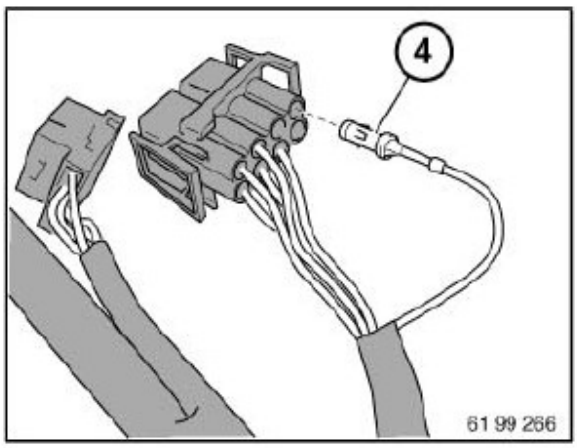


Fig. 4: Identifying Damaged Cable With Socket Number
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT:

- **Check maximum length of repair cable**
- **If more than one wire is to be repaired, the individual interfaces must be offset so that the wiring harness is not too thick at the repaired point.**

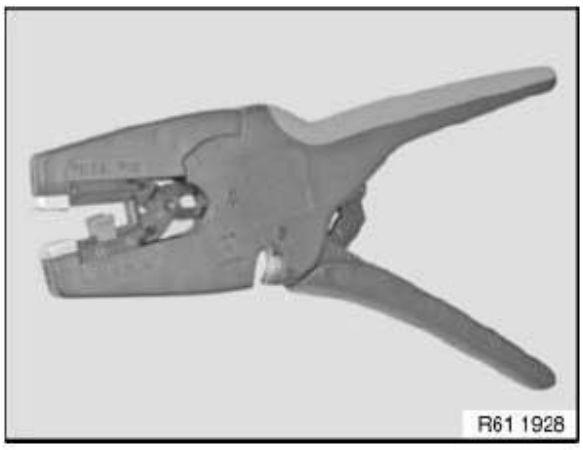


Fig. 5: Identifying Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Adhere to following procedure

- Cut off wire with faulty contact at point which is easily accessible
- Strip insulation from end of wire at wiring harness end
- Cut preassembled wire end to length and strip insulation

Crimp butt connector on preassembled wire end.

Special tools:

- 61 4 328 (0.35 - 2.5 mm^2
- 61 0 240 (4.0 - 6.0 mm^2



61 99 270

Fig. 6: Identifying Crimp Butt Connector On Preassembled Wire End
Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (8) onto free wire end.

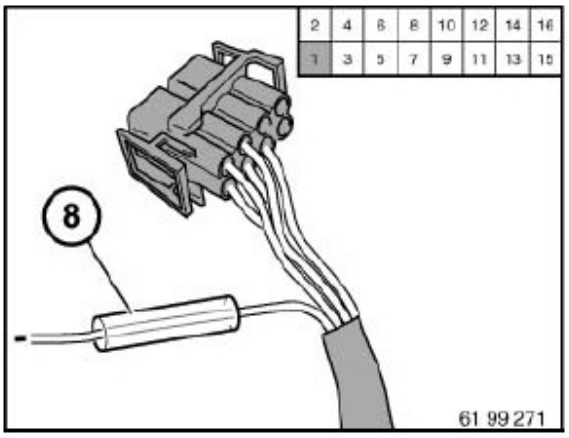


Fig. 7: Identifying Shrink-Fit Hose On Free Wire End
Courtesy of BMW OF NORTH AMERICA, INC.

Crimp unused wire end to butt connector.

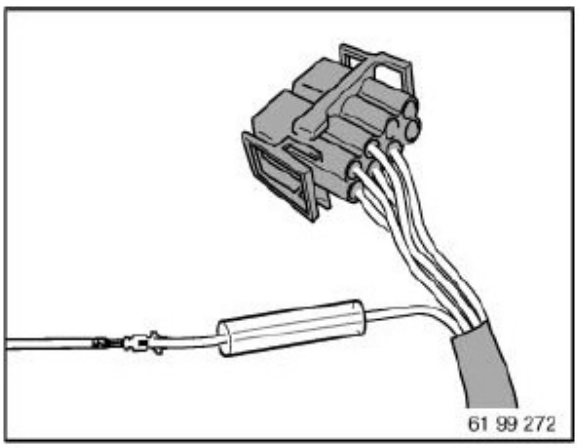


Fig. 8: Crimping Unused Wire End To Butt Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Pull shrink-on sleeve over butt connector.

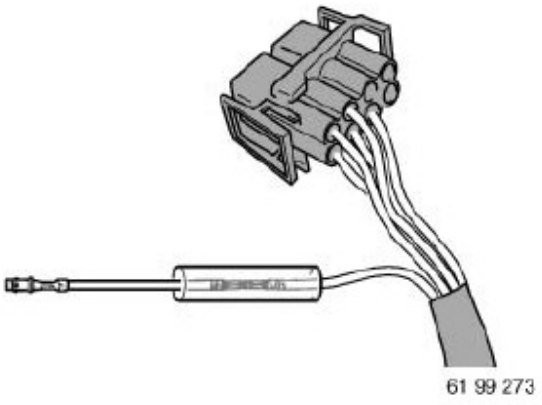


Fig. 9: Identifying Shrink-On Sleeve Over Butt Connector
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not burn shrink-on sleeve.

With hot air blower, shrink the shrink-on sleeve on both sides (9) of shrink-fit hose until glue emerges uniformly all round.

Insert contact in housing.

Close secondary lock on housing.

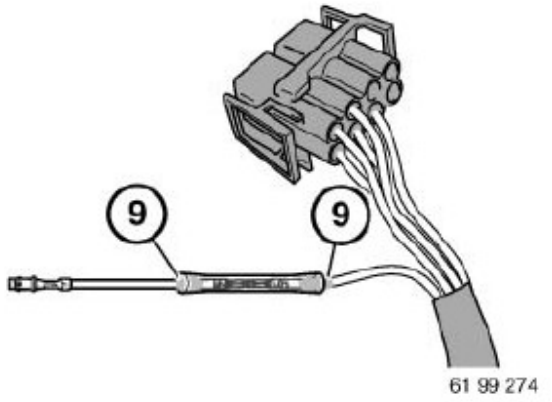


Fig. 10: Identifying Shrink-On Sleeve Ends
Courtesy of BMW OF NORTH AMERICA, INC.

12 00 ... INSTRUCTIONS FOR WORKING ON THE IGNITION SYSTEM

CAUTION: Always switch off ignition before working on ignition system.
Use only test leads which have been approved and belong to these testing instruments (e.g. DIS Tester).
Comply with operating instructions of the respective testing instrument used.
Comply with the country-specific safety regulations.
Never touch components under current with engine running!
Comply with instructions of DIS tester.
Do not connect any suppression capacitors or inspection lamps to terminal 1 on the ignition coil.
Terminal 1 of ignition coil must not be connected to ground or battery positive lead.
If an alarm system is subsequently installed, lead of terminal 1 must not be used for start prevention.
When working on ignition system, always disconnect supply leads to ignition coils.

High tension! - High tension!

IMPORTANT: Hazardous voltages occur at:

- **Ignition lead**
- **spark-plug connectors**
- **spark plugs**
- **Ignition coil (high voltage at terminal 4 is approx. 40 kV)**
- **Lead of terminal 1 from ignition coil to DME control unit (high voltage approx. 350 V)**

12 13 NOTES ON CHECKING IGNITION SYSTEM

Troubleshooting

- Fault in fuel injection system
- Spark plug faults
- Ignition coil faults
- Further fault patterns with evaluation
- Additional fault notes for troubleshooting

Oscillograms

- Normal oscillators
- Oscillograms of ignition coils from different manufacturers

Check

- Secondary signal for stationary ignition distribution

61 00 ... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body components; use edge protection if necessary
- Secure additionally laid cables/lines with cable straps

The following additionally applies

Shielded lines

Contact points in the shield can cause problems with regard to noise radiation and interference immunity. Consequently, distinctions have to be drawn between the following types:

Coaxial line

- Shielded RTK031 coaxial lines may only be repaired with special crimping tools .

CVBS lines

- CVBS lines may not be repaired.
- CVBS lines must be replaced in their entirety.

HSD lines

- HSD lines may not be repaired.
- HSD lines must be replaced in their entirety.

Optical fibre cable:

NOTE: Optical fibre cables are colored differently as follows:

- Green = **MOST** (**M** edia **O** riented **S** ystems **T** ransport) optical fibre
- Yellow = **ISIS** (**I** ntelligent **S** afety **I** ntegration **S** ystem) optical fibre
- Orange = repair optical fibre cables

IMPORTANT:

- **Optical fibre cables are permitted to show only one separation point (bridge), replace optical fibre cables if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid influence of heat = 85°**

Treating cables and optical fibre cables

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional butt connectors.

NOTE:

- **The line is a twisted cable. If possible, maintain twist in line after repair.**

Airbag lines:

Repairing airbag cables

Ribbon cables:

Repairing ribbon cables Z

61 00 ... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- To ensure professional repairs, perform repair work only with BMW-approved or recommended special tools and spare parts

- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies

Shielded lines (coaxial lines):

IMPORTANT: Shielded lines may not be repaired!

- **This may lead to indifferences in noise radiation and interference immunity at contact points in the shield**
- **To satisfy the requirements of the type approval, it is essential to replace shielded cables completely**

Fibre-optic cable:

NOTE: Fibre-optic cables are colored differently as follows:

- Green = **MOST** (**M** edia **O** riented **S** ystems **T** ransport) optical fibre
- Yellow = **ISIS** (**I** ntelligent **S** afety **I** ntegration **S** ystem) optical fibre
- Orange=repair fibre-optic cables

IMPORTANT:

- **Optical fibres may only reveal one separation point (bridge); renew optical fibre if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid effects of heat > or = 85°**

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional **BUTT CONNECTORS AND HEAT-SHRINK HOSES** .

NOTE:

- **FlexRay lines may only reveal one separation point (bride); renew complete line if necessary**
- **The cable is a twisted cable. If possible, maintain twisted cable after repair**

12 00 ... NOTES/INFORMATION ON REMOVING AND INSTALLING CONTROL UNITS

IMPORTANT:

- **Disconnecting the vehicle battery will cancel the fault memories of control units. Consequently, before disconnecting the car's battery, always interrogate the fault memories. Investigate stored faults and, once any**

faults have been remedied, cancel the fault memory.

- **Control unit plugs should only ever be connected and disconnected while the ignition is turned off.**
- **The removal and installation of components, relays, fuses etc. can cause faults to be stored in fault memories capable of self diagnosis. Always interrogate the fault memories after completing work on the electrical system.**
- **Investigate stored faults and, once any faults have been remedied, cancel the fault memory.**
- **If necessary, initialize power window units**

When replacing the DME/DDE control unit, observe the following:

- In each case read out the hardware/software status of the relevant control unit using the BMW diagnosis system.

  Comply with the instructions of the DIS diagnosis system on the steps pertaining to coding and programming.

  On vehicles with electronic vehicle immobilization, comply with the instructions of the BMW diagnosis system.

- Each control unit is programmed with certain basic values, which serve as mean values. The control unit receives different input values, depending on engine condition, which are compared with the stored values. The adaptive system compares the input values with the stored map values. The control commands are routed to the relevant actuators.
- If the DME control unit is without current for a long time (more than one hour), its adaptive system loses the stored values. When a cleared control unit is restarted or a new control unit is installed, the adaptive system must read in and store the input values of the associated engine as new basic values itself.
- This procedure could lead to erratic idling and disturbed overrunning of the engine after starting. Depending on the engine it could require some time before all values are adapted to the engine condition.
- Therefore observe the following procedure before replacing or reinstalling a DME/DDE control unit:
  1. If possible before exchanging control unit, run engine up to operating temperature.
  2. Exchange control units and run the vehicle at alternating engine speeds.

12 00 ... NOTES/INFORMATION ON START ASSISTANCE (JUMP STARTING)

Do not start the engine with help of starting sprays.

Preparation

Conform with the following when starting the engine with a jump starting cable.

- Ensure that the jump starting cable wires are of appropriate cross-section size.

- Only use fuse-protected jump starting cables.
- Check whether the current-supplying battery has 12 V voltage.
- If the engine is started from the battery of another vehicle, ensure that there is no contact between the bodies of both vehicles.

IMPORTANT: Never touch electrically live ignition system components: high voltage - danger of injury!

If the battery in the vehicle supplying power is weak, start the engine of this vehicle and let it run at idling speed.

Operation

It is essential to conform to the procedures so as to avoid injury to persons or damage to parts.

- Automatic transmission: select drive position "P", apply parking brake.
- Manual transmission: move gear lever to neutral position, apply parking brake.
- Ensure that the jump leads cannot get caught in rotating parts, e.g. fan.
- First connect both positive poles of the batteries with one jump starting cable (red).
- Use the battery positive terminal in the engine compartment for vehicles with the battery in the luggage compartment.
- Then use the second jump starting cable (black) to connect the negative post of the current-supplying battery with the earth/ground point (not the negative pole or the body) of the vehicle to be started.

IMPORTANT: Do not connect the second jump starting cable (black) with the negative pole of the battery in the vehicle to be started. Produced gas could be ignited by sparks.

Risk of explosion!

After the engine of the vehicle to be started has fired, first disconnect the jump starting cable between the negative pole and the earth/ground point. Then remove the starting cable from the positive poles.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

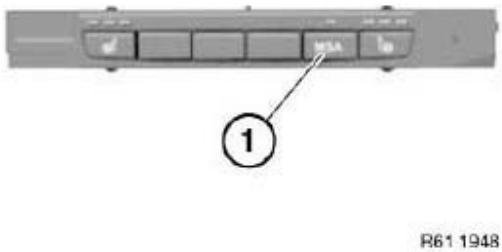


Fig. 11: Identifying MSA Switch In Passenger Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm

  - Basic setting (engine hood/bonnet open)

    B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

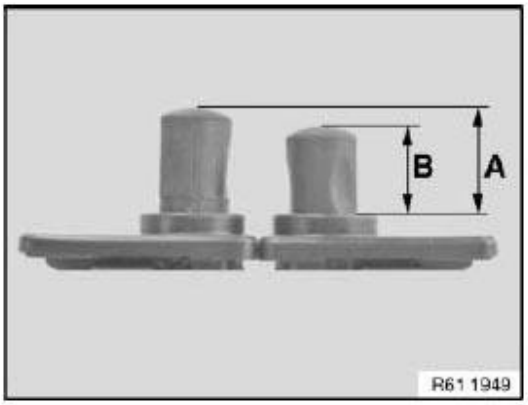


Fig. 12: Identifying Engine Hood/Bonnet Basic Setting And Workshop Mode
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

1212 IGNITION WIRES, SPARK PLUGS

12 12 011 REPLACING ALL SPARK PLUGS (N54)

Necessary preliminary work

- Switch off ignition.
- Remove **IGNITION COILS** .

IMPORTANT: Wear safety goggles.

Oil and dirt particles may get into your eyes!

Clean spark plug slot with compressed air.

Unscrew the spark plugs with special tool **12 1 220** and an extension with a minimum kink of 8°.

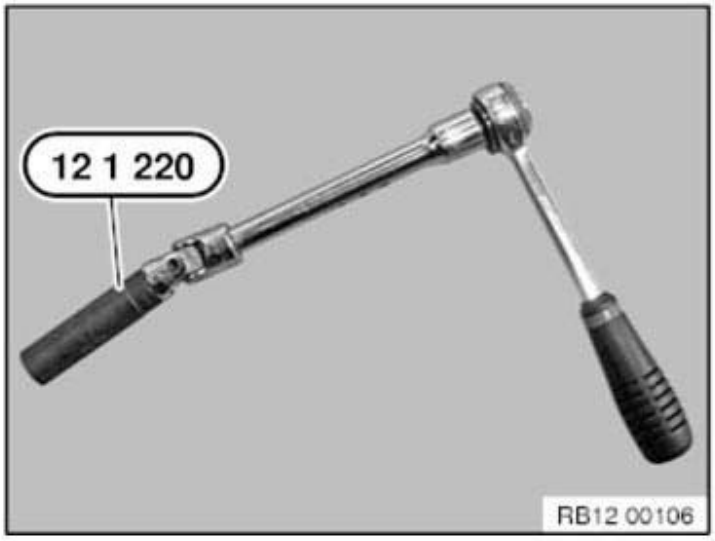


Fig. 13: Removing Spark Plugs Using Special Tool (12 1 220)
Courtesy of BMW OF NORTH AMERICA, INC.

Attach new spark plug (1) **12 1 230** to special tool.

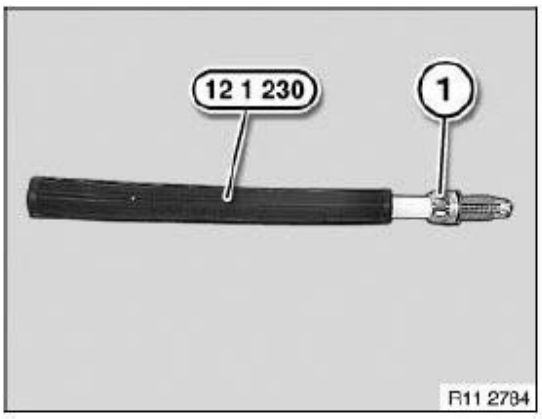


Fig. 14: Attaching Spark Plug To Special Tool (12 1 230)
Courtesy of BMW OF NORTH AMERICA, INC.

Screw the spark plug hand-tight with special tool **12 1 230** into the cylinder head plug thread to the limit position.

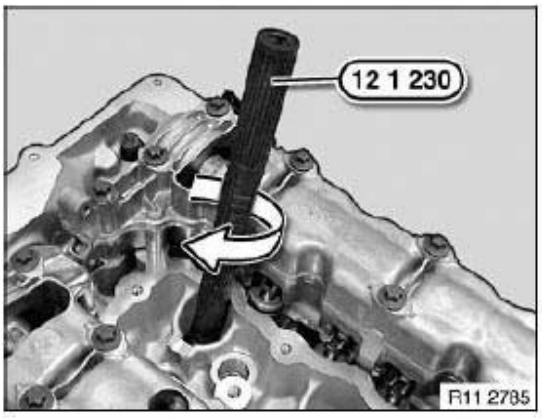


Fig. 15: Installing Spark Plug Using Special Tool (12 1 230)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Tighten the spark plugs with a torque wrench, special tool **12 1 220** and an extension with a minimum kink of 8°.

Observe tightening torque.

Tightening torque **12 12 2AZ** .

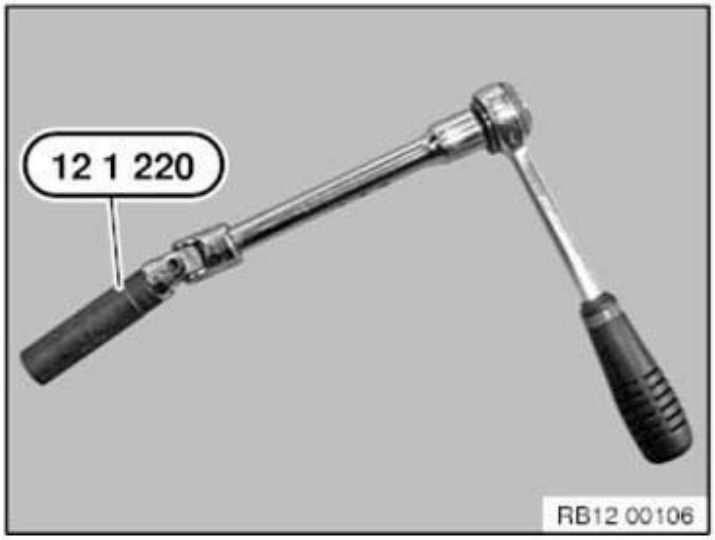


Fig. 16: Removing Spark Plugs Using Special Tool (12 1 220)
Courtesy of BMW OF NORTH AMERICA, INC.

1213 IGNITION COIL

12 13 CARRYING OUT ENGINE CLEANING (N54, N53, N43)

IMPORTANT: When cleaning the engine, it is absolutely essential to keep the ignition coil covers fitted in order to protect the injectors.

12 13 NOTES ON CHECKING IGNITION SYSTEM

Troubleshooting

- Fault in fuel injection system
- Spark plug faults
- Ignition coil faults
- Further fault patterns with evaluation
- Additional fault notes for troubleshooting

Oscillograms

- Normal oscillators
- Oscillograms of ignition coils from different manufacturers

Check

- Secondary signal for stationary ignition distribution

12 13 511 REPLACING IGNITION COILS (N54)

Necessary preliminary tasks

- Read out fault memory of DME control unit.
- Switch off ignition.
- Remove **ACOUSTIC COVER**
- Remove right **TENSION STRUT**

IMPORTANT: Ignition coils must not be fouled by fuel.

The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!

Unlock plug catch (1) of ignition coil (2) and disconnect plug.

Pull ignition coil (2) up and out.

This procedure is applicable to all ignition coils.

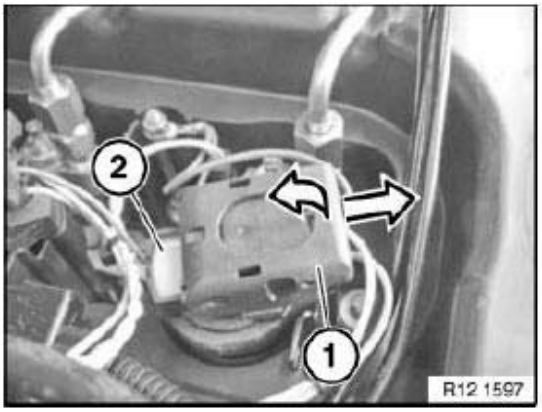


Fig. 17: Removing Ignition Coil
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check that rubber seal of ignition coil (1) is correctly seated.

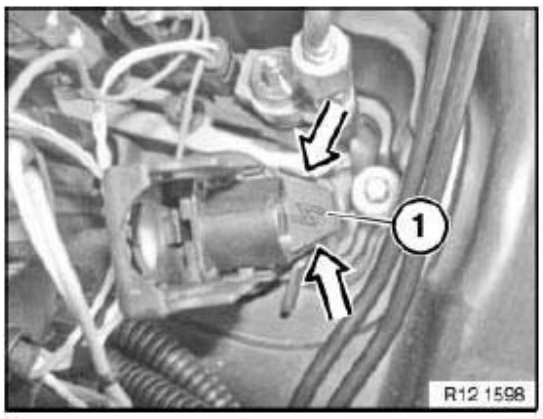


Fig. 18: Identifying Ignition Coil Rubber Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Push plug (1) with plug catch (2) open onto ignition coil.

Carefully close plug catch (2) in direction of arrow.

The plug catch must snap into place without great effort.

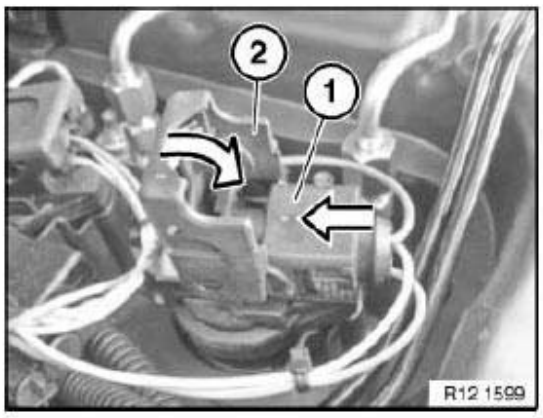


Fig. 19: Closing Plug Catch
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Now clear the fault memory.

1214 ELECTRONIC SWITCHING OR CONTROL UNITS

12 14 700 CODING CONTROL MODULE (DME/DDE)

Switch on ignition.

Connect MoDiC or DIS/GT1 Tester.

Select "Coding" program.

For subsequent procedure, follow

instructions in MoDiC or DIS/GT1 Tester. Carry out adjustment of following control units:

- EWS (electronic immobilizer)
- DME (Digital Motor Electronics)

  or

- DDE (Digital Diesel Electronics)

Refer to "Diagnosis and Coding" service information bulletins on subject of coding.

12 14 705 PROGRAMMING CONTROL UNIT (DME/DDE)

Switch on ignition.

Connect MoDiC or DIS/GT1 Tester.

Select "Programming".

For subsequent procedure, follow instructions in MoDiC or DIS/GT1 Tester.

Carry out adjustment of following control units:

- EWS (electronic immobilizer)
- DME (Digital Motor Electronics)

  or

- DDE (Digital Diesel Electronics)

Refer to "Diagnosis and Coding" service information bulletins on subject of programming.

12 14 600 REMOVING/REPLACING KNOCK SENSORS (N54)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks

- Read out fault memory of DME control unit.
- Switch off ignition.
- Remove **INTAKE AIR MANIFOLD** .

Unlock plug (1) and remove.

Feed out plug (1) behind feed line, remove **FEED LINE** if necessary.

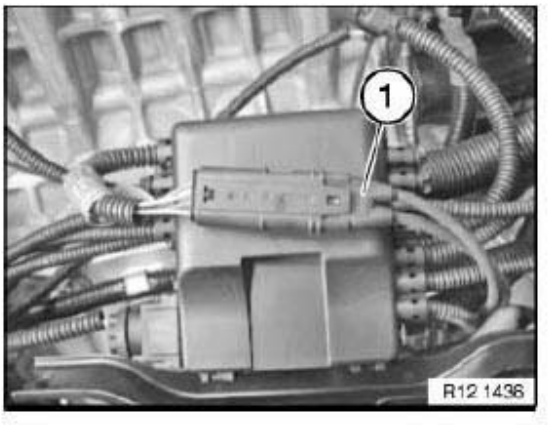


Fig. 20: Identifying Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws on both knock sensors (1) and remove knock sensors (1).

Installation:

- Replace aluminum screws.
- Tightening torque **13 62 5AZ** .

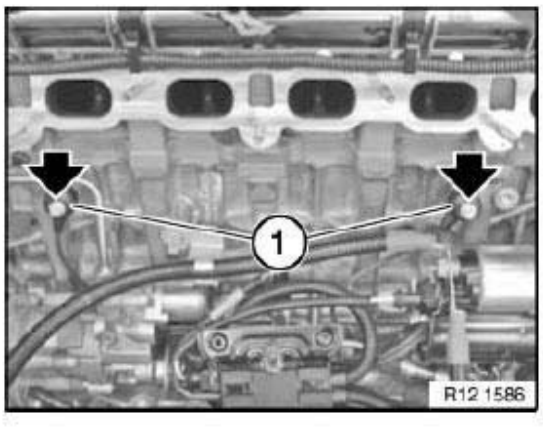


Fig. 21: Locating Knock Sensors
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Clean contact surface of knock sensors on engine block.

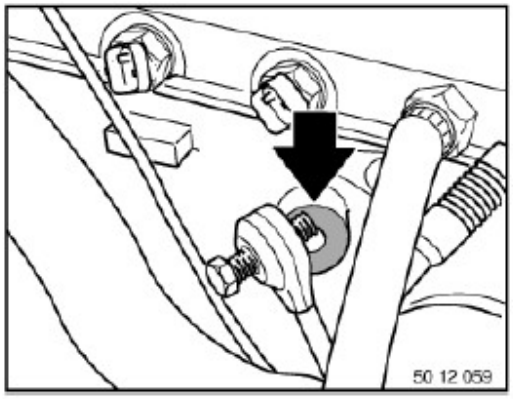


Fig. 22: Locating Contact Surface Of Knock Sensors On Engine Block
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Add final details to vehicle.

Check stored fault message.

Now clear the fault memory.

12 14 550 REPLACING CONTROL UNIT (DME) (N54)

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

Necessary preliminary tasks

- Turn off ignition
- Disconnect **BATTERY NEGATIVE LEAD**

IMPORTANT: Follow INSTRUCTIONS for removing and installing control units

Replacement

- Carry out programming/encoding
- If no data can be read out from the previous control unit, carry out injection quantity adjustment (description at end of instruction).

IMPORTANT: It is absolutely essential to read out the fault memory with the BMW diagnosis system and to create a fault memory printout.

Switch off ignition.

Release bolts along line (1).

Tightening torque **12 90 1AZ** .

Remove electronics box cover.

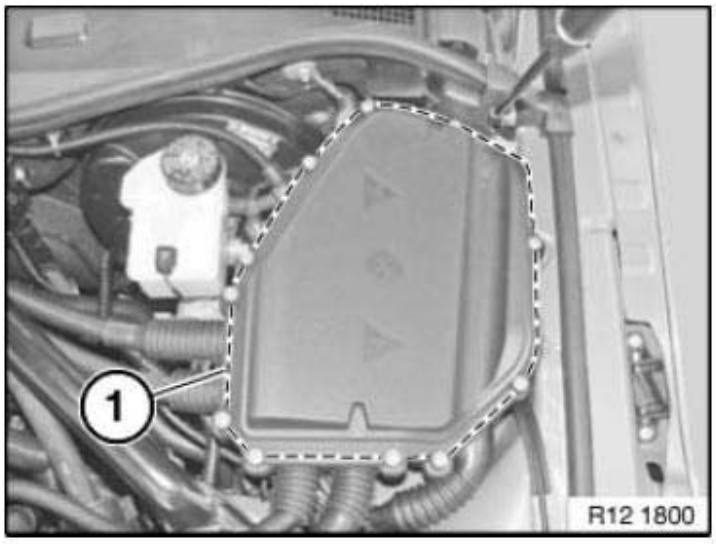


Fig. 23: Identifying Electronic Box Cover Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock battery positive lead (1), detach and lay to one side.

Release locks (2) in direction of arrow and pull control unit upwards slightly.

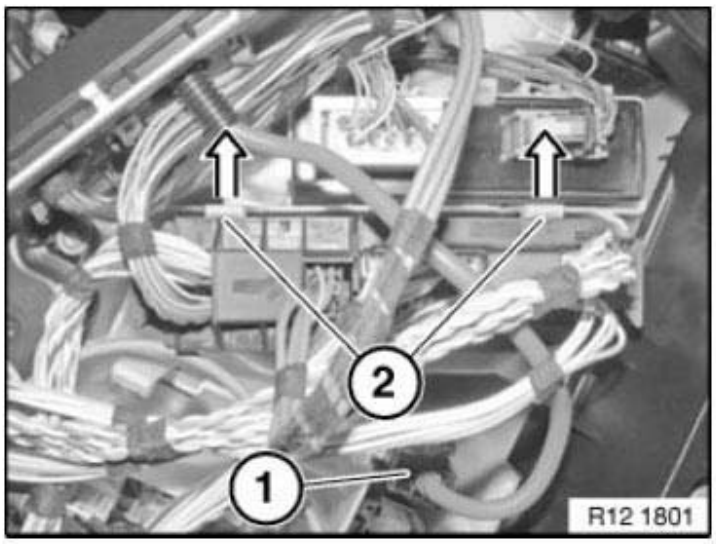


Fig. 24: Opening Control Unit Locks
Courtesy of BMW OF NORTH AMERICA, INC.

Pull control unit (1) upwards slightly until plug (2) can be released from control unit in direction of arrow.

Unlock plug (2) and detach from control unit (1).

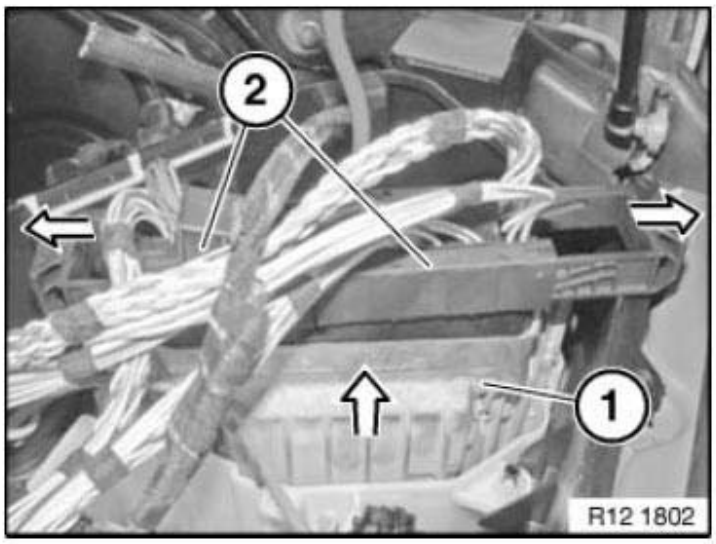


Fig. 25: Pulling Control Unit Upwards
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out control unit (1).

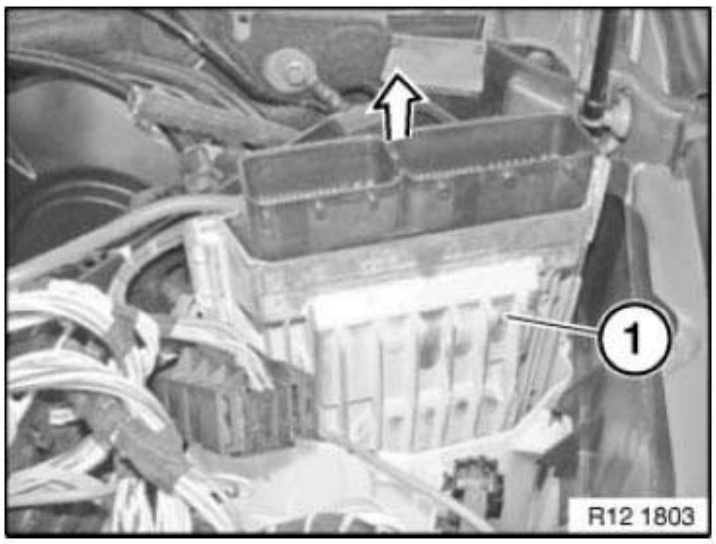


Fig. 26: Lifting Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Injector adjustment

If the DME control unit has been replaced, it will also be necessary to carry out adjustment of the injectors!

Injector adjustment is carried out with the aid of so-called adjustment values.

The adjustment values are printed in two blocks of three digits on each injector.

The adjustment values must be stored in the new control unit!

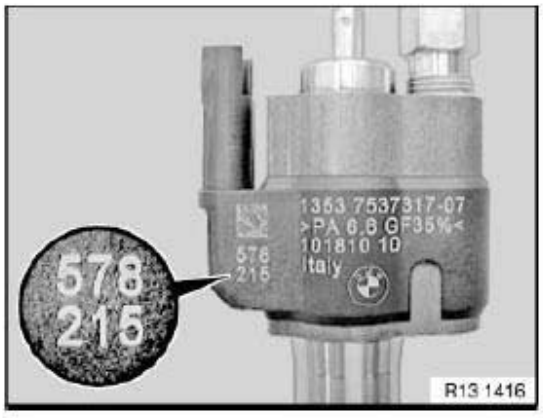


Fig. 27: Identifying Adjustment Value Printed In Blocks Of Digits On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

If injector adjustment is not carried out, the engine may run roughly or fail to start.

Read off the adjustment values and enter according to the installation location (cylinder) of the injectors:

- Connect DIS Tester
- Identify car
- Select "Function selection"
- Select "Service functions"
- Select "Engine electronics"
- Select "Adjustment programs"
- Select "Adjust injectors"
- Select "Test schedule"
- The adjustment value must be entered for each cylinder.



Fig. 28: Identifying Adjustment Value Printed In Blocks Of Digits On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
clear fault memory.

12 14 521 REPLACING CRANKSHAFT PULSE GENERATOR (N54)

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Switch off ignition

NOTE: Installation location of pulse generator for crankshaft is underneath starter motor.

Detach plug (1) from crankshaft pulse generator (2).

Release screw.

Installation:

Replace aluminum screws.

Tightening torque **13 62 4AZ** .

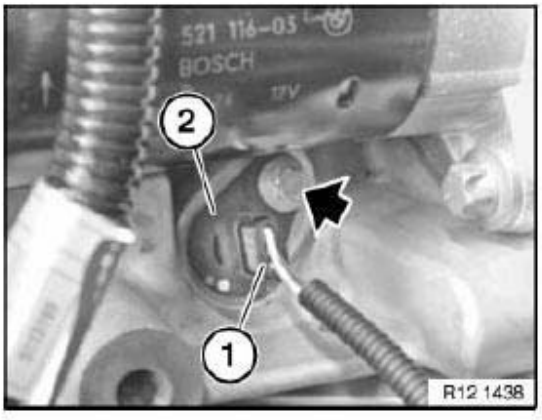


Fig. 29: Locating Crankshaft Pulse Generator With Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Withdraw pulse generator (2) from crankcase.

Installation:

Replace sealing ring.

NOTE: Check stored fault messages.
Now clear the fault memory.

12 14 524 REPLACING PULSE GENERATOR ON EXHAUST CAMSHAFT (N54)

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC

DISCHARGE) .

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Switch off ignition
- Remove **FAN COWL**

Unlock plug (1) and remove.

Release screw.

Tightening torque **13 62 3AZ** .

Remove pulse generator (2).

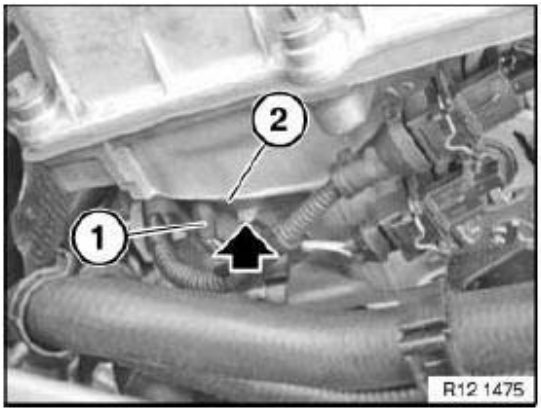


Fig. 30: Locating Plug And Pulse Generator
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
Now clear the fault memory.

12 14 523 REPLACING PULSE GENERATOR ON INLET CAMSHAFT (N54)

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Switch off ignition
- **REMOVE FAN COWL**

Unlock plug (1) and remove.

Release screw.

Tightening torque **13 62 3AZ** .

Remove pulse generator (2).

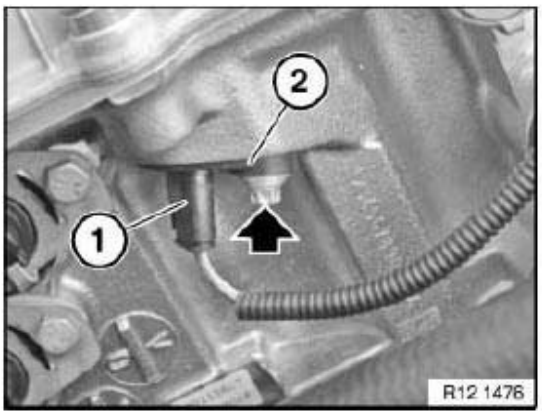


Fig. 31: Locating Pulse Generator With Plug
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
Now clear the fault memory.

12 14 651 REPLACING SUCTION PRESSURE SENSOR ON CHARGE-AIR DUCT (N54)

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Switch off ignition
- Remove **INTAKE FILTER HOUSING**

NOTE: The installation location of the suction pressure sensor is at the rear end of the charge-air duct.

Unlock plug (1) and remove.

Release screws and pull suction pressure sensor (2) out of charge-air duct.

Tightening torque **13 62 2AZ** .

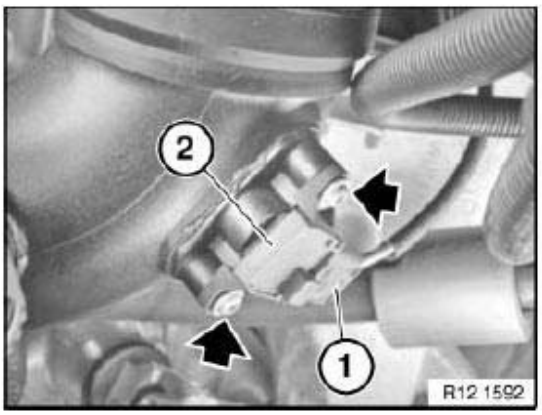


Fig. 32: Identifying Suction Pressure Sensor And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check sealing ring for damage. Replace sealing ring if damaged.

When installing, coat sealing ring with suitable antiseize agent.

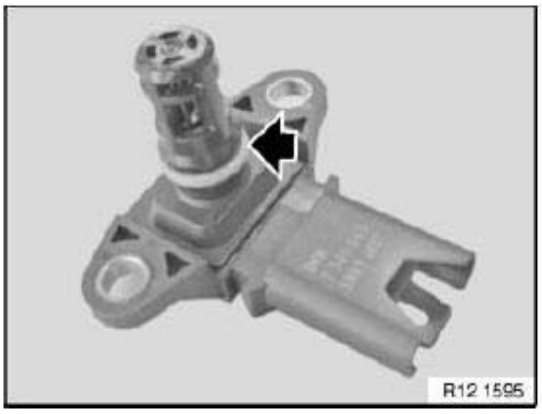


Fig. 33: Locating Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Add final details to vehicle.
Check stored fault messages.
Now clear the fault memory.

12 14 650 REPLACING SUCTION PRESSURE SENSOR ON INTAKE AIR MANIFOLD (N54)

Necessary preliminary tasks

- Read out fault memory of DME control unit

- Switch off ignition

NOTE: The installation location of the suction pressure sensor is at the rear end of the intake air manifold.

Unlock plug (1) and remove.

Release screws and pull suction pressure sensor (2) out of intake air housing.

Tightening torque **13 62 2AZ** .

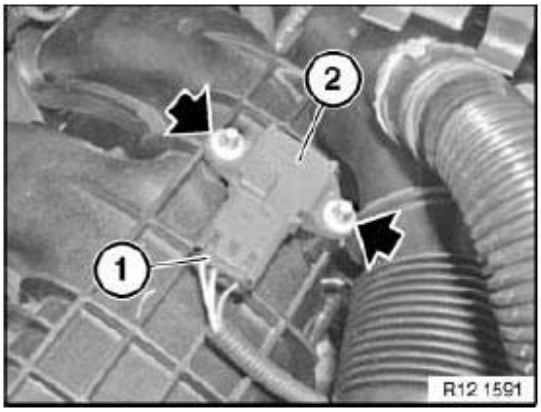


Fig. 34: Identifying Suction Pressure Sensor And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check sealing ring for damage. Replace sealing ring if damaged.

When installing, coat sealing ring with suitable antiseize agent.

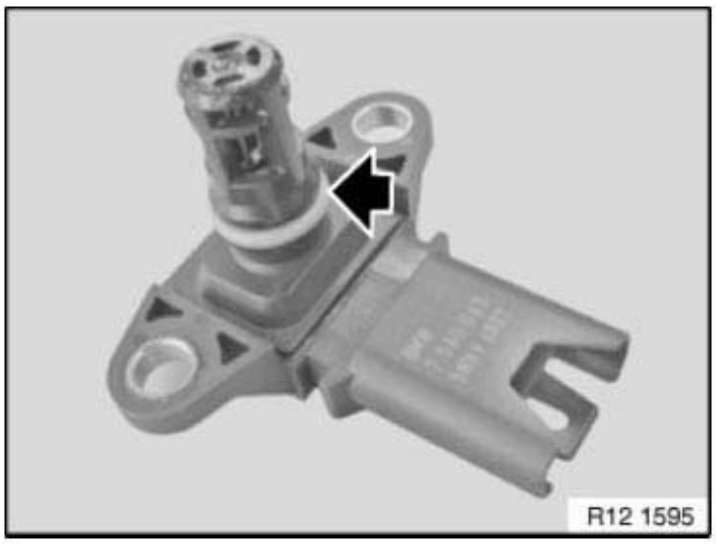


Fig. 35: Locating Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
Now clear the fault memory.

1231 ALTERNATOR WITH DRIVE AND MOUNTING

12 31 020 REMOVING AND INSTALLING OR REPLACING ALTERNATOR (N54)

Necessary preliminary tasks

- Turn off ignition
- Disconnect **BATTERY NEGATIVE LEAD** and cover
- Remove **INTAKE FILTER HOUSING**
- Release **CHARGE-AIR DUCT** at front, do not remove
- Remove alternator **DRIVE BELT**

NOTE: In order to remove the alternator, it is necessary to remove the air-conditioning compressor for the air conditioning system.
In so doing:

- **Do not draw off A/C system refrigerant.**
- **Do not detach refrigerant lines from A/C compressor.**
- **Do not remove A/C compressor; instead, remove from bracket only and place to one side.**

See 64 52 521 REPLACING AIR CONDITIONING COMPRESSOR (N54) .

NOTE: **For purposes of improved clarity, illustrations and description show A/C compressor removed.**

Release bolts a few turns until bracket (1) is loose. Do **not** remove bracket (1).

Tightening torque, see **64 52 A/C COMPRESSOR** .

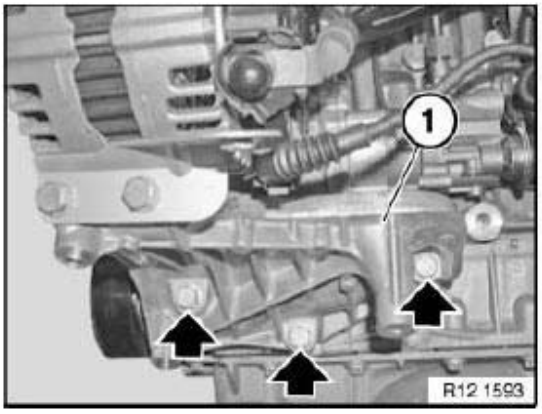


Fig. 36: Locating Bracket Mounting Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) and remove.

Remove protective cap (2) and release nut underneath.

Tightening torque **12 42 1AZ** .

Remove battery positive lead.

Release screws (3).

Tightening torque **12 31 1AZ** .

Tightening torque **12 31 2AZ** .

Remove alternator.

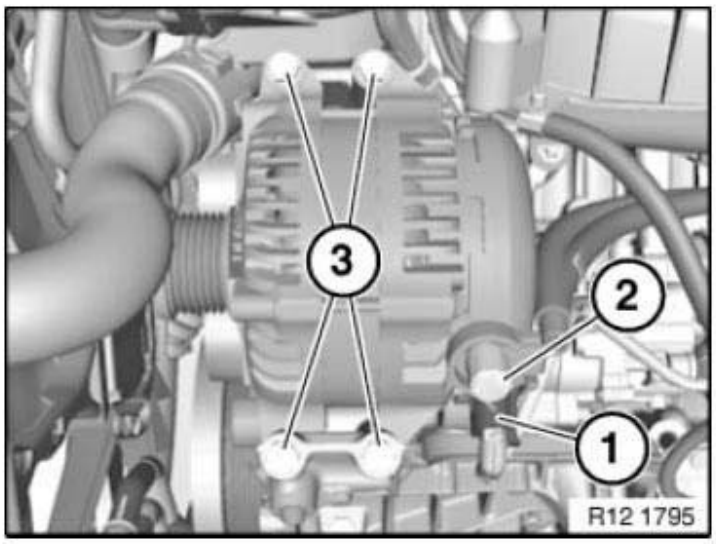


Fig. 37: Identifying Alternator Plug And Protective Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

12 31 ... REPLACING ALTERNATOR BELT PULLEY

Remove and install alternator drive belt.

Depending on alternator type, grip shaft with:

- hexagon socket
- multi-tooth socket or
- Torx socket wrench

Release nut with special tool 12 7 110.

Installation:

TIGHTENING TORQUE, 12 31 2AZ/12 31 3AZ .

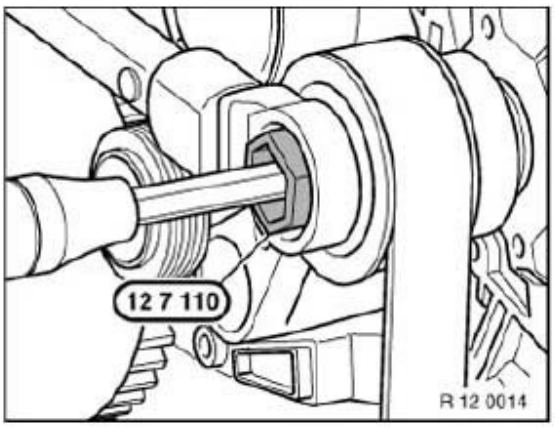


Fig. 38: Removing Belt Pulley Mounting Nut Using Special Tool (12 7 110)
Courtesy of BMW OF NORTH AMERICA, INC.

12 31 ... REPLACING ALTERNATOR BELT PULLEY (WITH OVERRUNNING CLUTCH)

Remove and install alternator drive belt.

Grip alternator shaft with:

- internal serration

Release nut with special tools 12 7 120.

Installation:

Tightening torque, see 12 31 3AZ in **12 31 ALTERNATOR WITH DRIVE AND MOUNTING PARTS** .

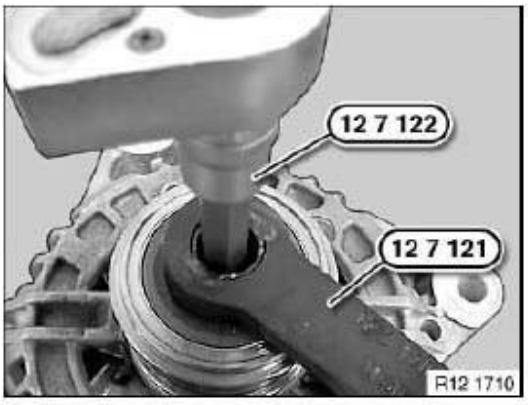


Fig. 39: Removing Nut Using Special Tools (12 7 120)
Courtesy of BMW OF NORTH AMERICA, INC.

1232 REGULATOR

12 32 501 REPLACING VOLTAGE REGULATOR

Necessary preliminary tasks

- Switch off ignition
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove alternator

Bosch

Release protective caps (1).

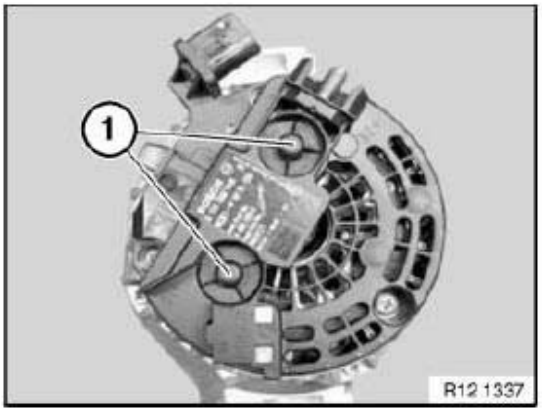


Fig. 40: Identifying Protective Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch

Release screw (1) and nuts (2), remove cover.

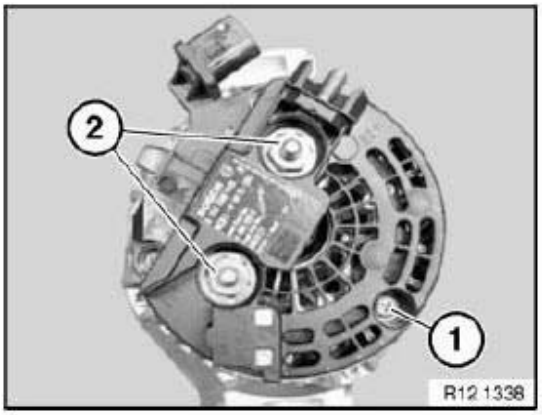


Fig. 41: Identifying Screw And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch

Release screws and remove regulator switch (1) in direction of arrow.

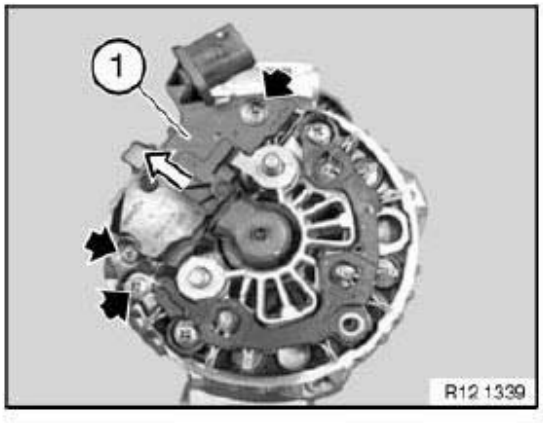


Fig. 42: Removing Regulator Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch

Installation:

Clean contact surfaces and check pretension of contact spring, replace regulator switch if necessary.

Measurement A = min. 5 mm.

Check collector ring for wear and recondition if necessary.

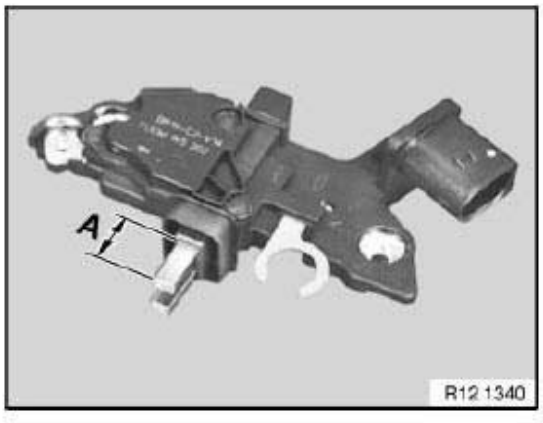


Fig. 43: Identifying Regulator Switch Dimensions
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo

Slacken nut (1).

Slacken nut (2).

Release screws (3).

Release cover (4).

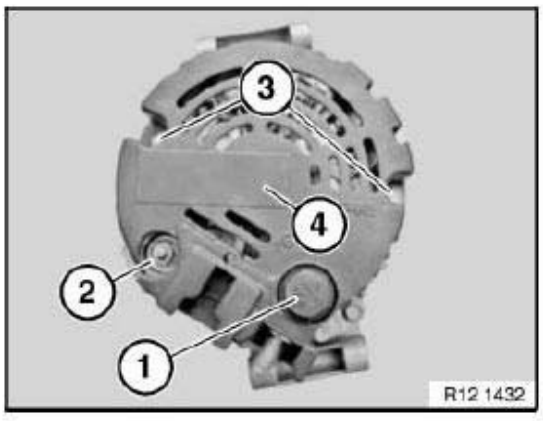


Fig. 44: Identifying Nut, Screw And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo

Release screws.

Remove regulator switch (1) towards top.

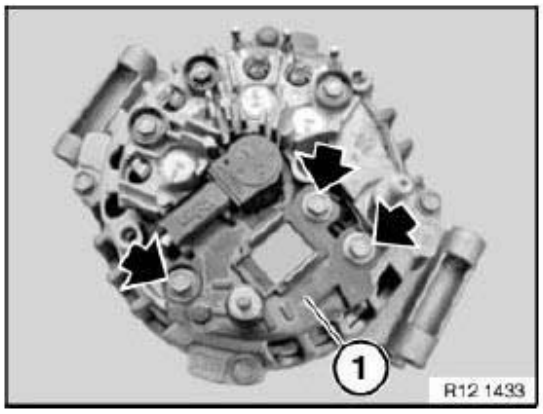


Fig. 45: Locating Regulator Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo

Installation:

Clean contact surfaces and check pretension of contact spring, replace regulator switch if necessary.

Measurement A = min. 5 mm.

Check collector ring for wear and recondition if necessary.

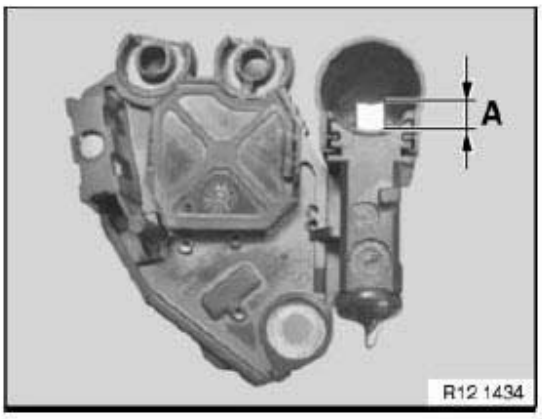


Fig. 46: Identifying Regulator Switch Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit new regulator (1) with attached mounting sleeve (2) or locked carbon brush.

Pull off mounting sleeve (2) and replace with cover (3).

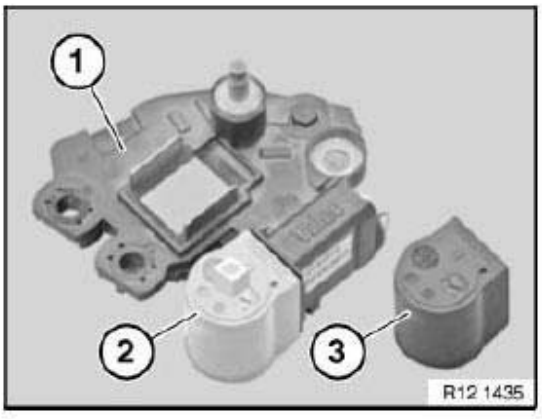


Fig. 47: Identifying Regulator, Mounting Sleeve And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

1241 STARTER WITH MOUNTING

12 41 020 REMOVING AND INSTALLING/REPLACING STARTER MOTOR (N54)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks

- Switch off ignition
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **INTAKE AIR MANIFOLD**

Unlock plug (1) and remove.

Release nuts (2) and disconnect battery positive leads.

Tightening torque **12 42 2AZ** .

Release screws (3).

Installation:

Replace aluminum screws.

Tightening torque **12 41 1AZ** .

Remove starter motor (4).

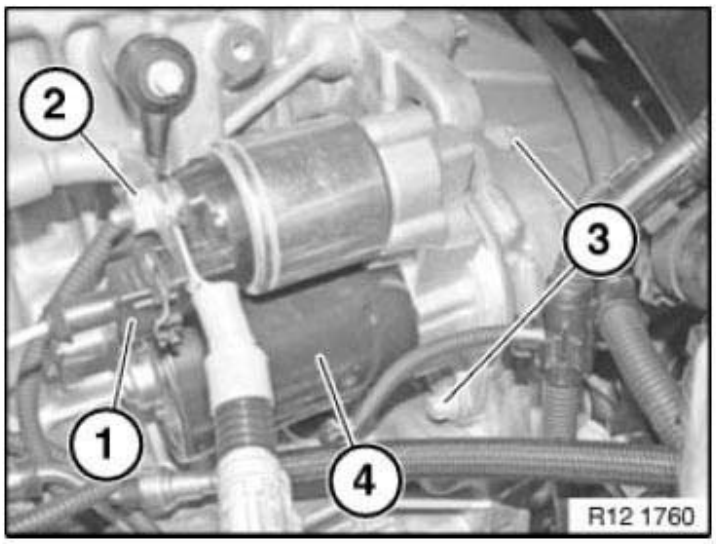


Fig. 48: Identifying Plug, Nuts And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check starter pinion and ring gear for damage. Replace starter if necessary.

Assemble engine.

12 41 041 REPLACING SOLENOID SWITCH

Turn off ignition.

Remove starter motor.

Release nut (1).

Remove cable lug (2).

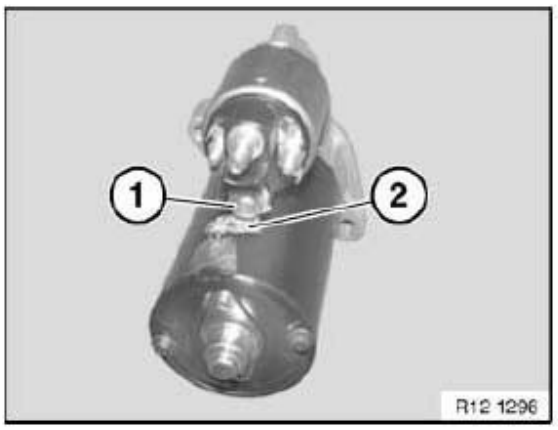


Fig. 49: Identifying Starter Motor Nut And Cable Lug
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Do not turn cable lug (2) while tightening down - risk of short circuit to starter motor housing.
Tightening torque 12 41 4AZ

Release screws (1).

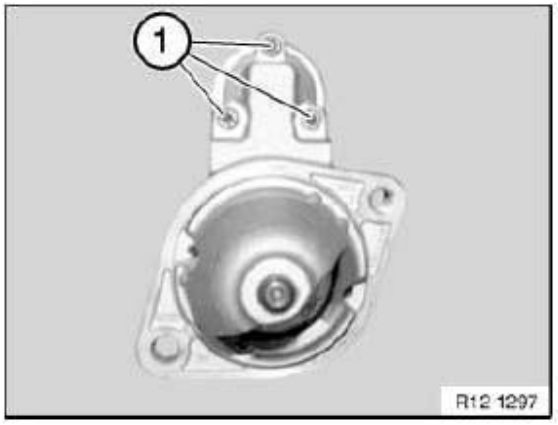


Fig. 50: Identifying Starter Motor Housing Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove solenoid switch (1) and spring (2).

Unhook pin (3).

Installation:

Check pin (3) for wear and apply grease.

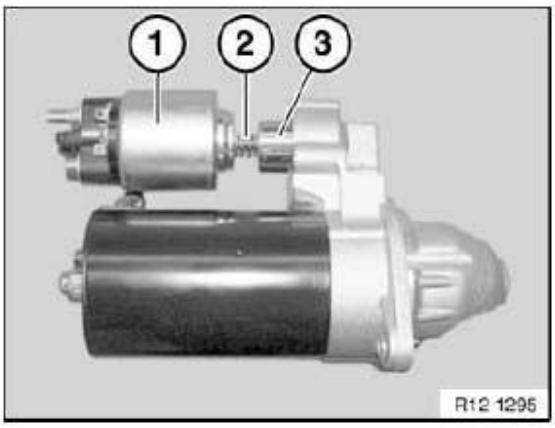


Fig. 51: Identifying Solenoid Switch, Spring And Pin
Courtesy of BMW OF NORTH AMERICA, INC.

1242 STARTER LEAD

12 42 500 REPLACING BATTERY POSITIVE LEAD BETWEEN STARTER, ALTERNATOR AND BATTERY POSITIVE TERMINAL (N54)

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Switch off ignition
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **INTAKE AIR MANIFOLD**

Open cover.

Slacken nut (1).

Tightening torque **12 42 3AZ** .

Remove battery positive lead (2) from battery positive terminal.

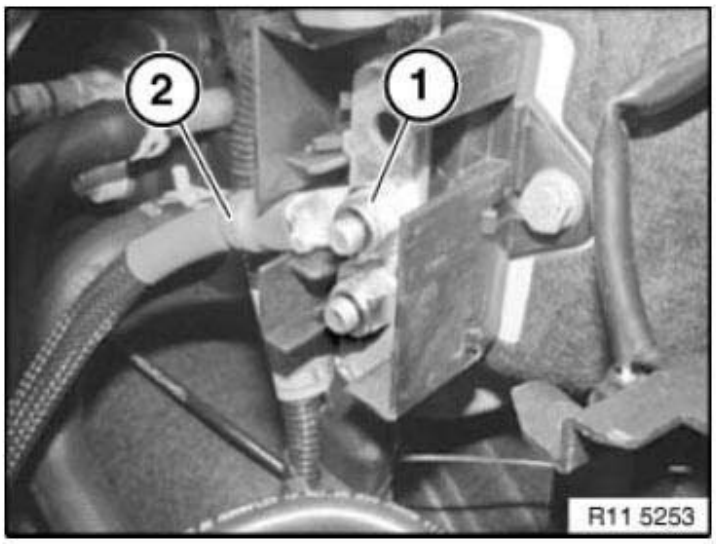


Fig. 52: Identifying Battery Positive Lead And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) on starter.

Tightening torque **12 42 2AZ** .

Disconnect battery positive lead from starter.

Release nut (2) on alternator.

Tightening torque **12 42 1AZ** .

Release battery positive lead from retainer (3), feed out and remove.

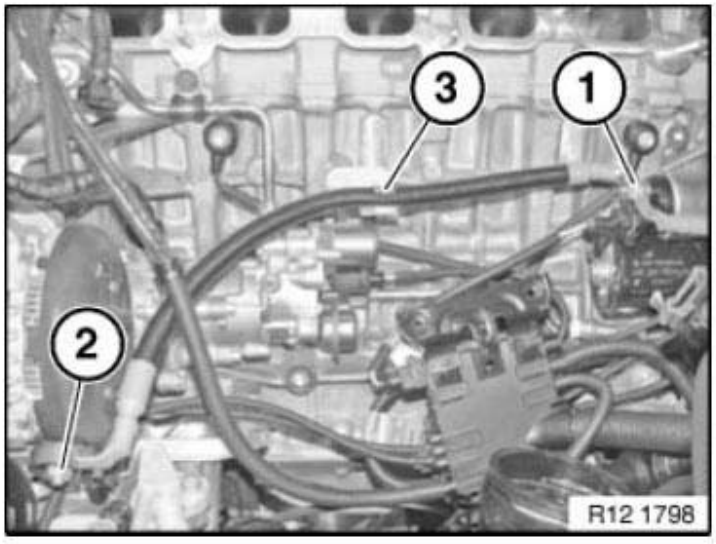


Fig. 53: Identifying Retainer And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Add final details to vehicle.
Check stored fault messages.
Now clear the fault memory.

12 42 540 REPLACING SAFETY BATTERY TERMINAL (SBK)

CAUTION: Observe safety regulations.
Investigate cause of triggering of safety battery terminal.
To do so, read out fault memory of airbag control unit. Note fault messages stored in memory. Rectify faults. Then clear fault memory.

Use of safety battery terminal:

- From model year 1998 in Series E38, E39, E46
- From 4/99 in E36/Z3
- in each of following new Series

The different models have different installation locations:

Battery in engine compartment

Safety battery terminal is replaced with cable up to battery positive support point.

Safety battery terminal is omitted as from 03/2002 from all E46 LHD models with 4-cylinder engines.

Battery in luggage compartment behind side trim panel

Remove side trim panel.

Follow instructions for disconnecting and connecting battery.

Disconnect and cover **BATTERY NEGATIVE LEAD** .

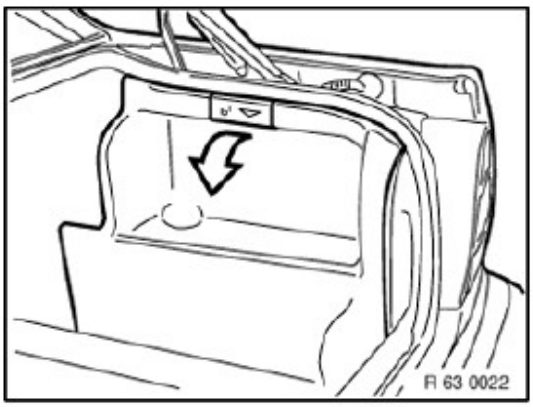


Fig. 54: Removing Side Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Release front side trim panel partly and fold forward.



Fig. 55: Removing Front Side Trim Panel Partly
Courtesy of BMW OF NORTH AMERICA, INC.

Battery in luggage compartment under floor trim panel

Follow instructions for disconnecting and connecting battery.

Fold back floor trim panel (1).

Lift cover (2) on battery negative lead.

Disconnect and cover battery negative lead (3).

Release nuts (4).

Remove battery cover.

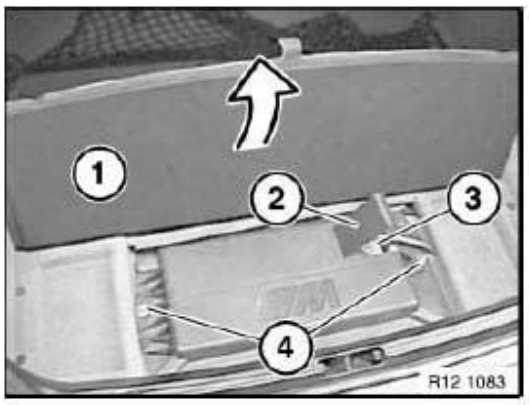


Fig. 56: Folding Back Floor Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Battery in luggage compartment under spare wheel

Remove spare wheel.

Release screws.

CAUTION: Do not kink air pipes.

Set air supply system (1) to one side.

Follow instructions for disconnecting and connecting battery.

Disconnect **BATTERY NEGATIVE LEAD** .

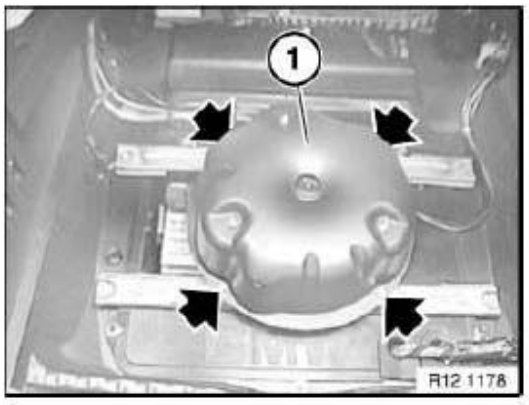


Fig. 57: Locating Air Supply System Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect supply cable (1) for vehicle electrical system.

Installation:

Remove faulty fuses and carry out troubleshooting.

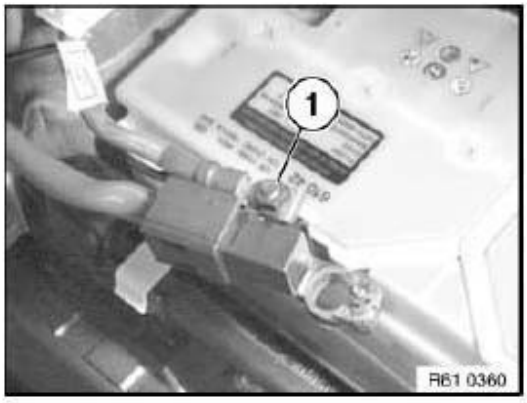


Fig. 58: Identifying Vehicle Electrical System Supply Cable
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Pay attention to interface.

The repair cable is always a standard length.

The heavy-current connector of the repair cable has a larger diameter than the battery positive lead.

In some Series (e.g. E46 touring), the heavy-current connector of the repair cable can lead to installation problems.

This is the case when the interface is in the area of the close-fitting trim panels.

Find matching interface (e.g. approx. 10 cm behind rear seat backrest in E46 touring).

Lay repair cable parallel to battery positive lead.

Mark interface of battery positive lead at end of repair cable.

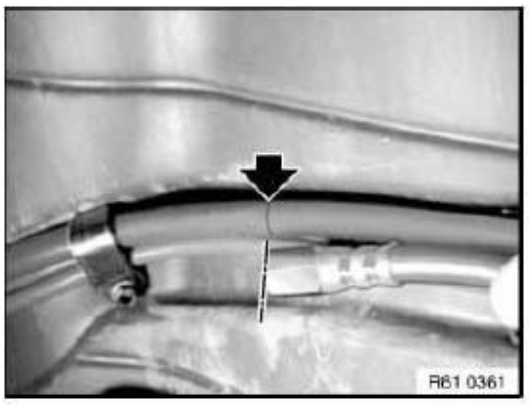


Fig. 59: Locating Interface Mark On Battery Positive Lead
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable ties (1).

Disconnect plug connection (2).

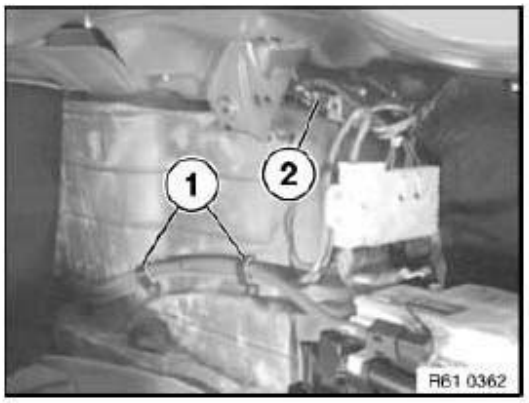


Fig. 60: Identifying Cable Ties And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Do not use bolt cutters or similar tools to cut through the cable. A cable end that has been squashed flat will no longer fit into the clamping sleeve.

Saw through battery positive cable at marked point with an iron saw.

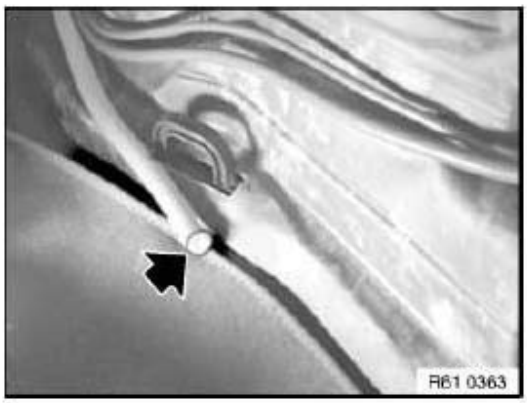


Fig. 61: Locating Cable End
Courtesy of BMW OF NORTH AMERICA, INC.

Strip insulation - length (A) - from cable end.

Distance (A) = 15 mm.

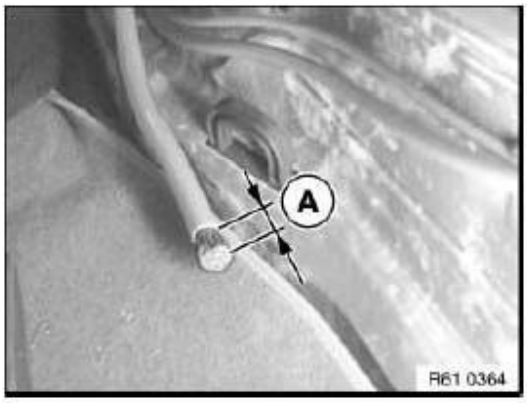


Fig. 62: Identifying Strip Insulation Length From Cable End
Courtesy of BMW OF NORTH AMERICA, INC.

Push heavy-current connector (1) over stripped cable end and screw into position.

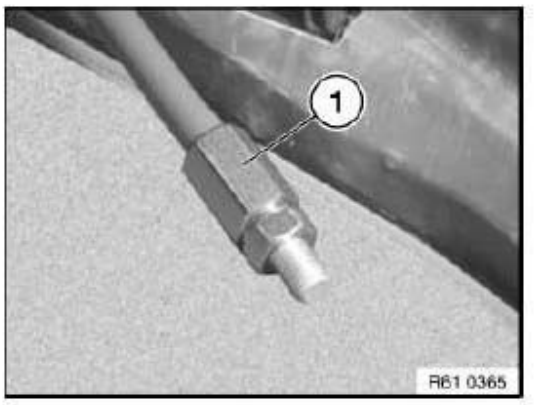


Fig. 63: Identifying Heavy-Current Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (3) over repair cable.

Screw threaded sleeve (1) of repair cable (2) to heavy-current connector.

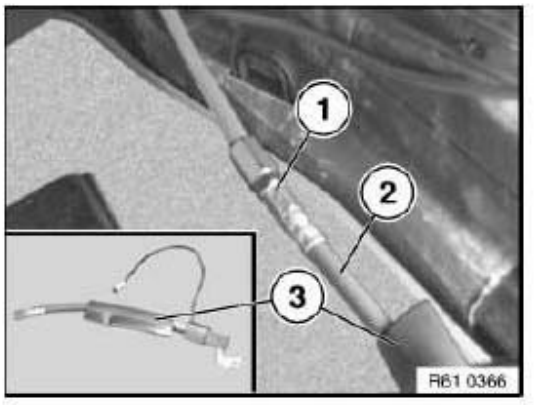


Fig. 64: Identifying Shrink-Fit Hose And Threaded Sleeve Of Repair Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (1) over connecting point and shrink on with a hot-air blower (2).

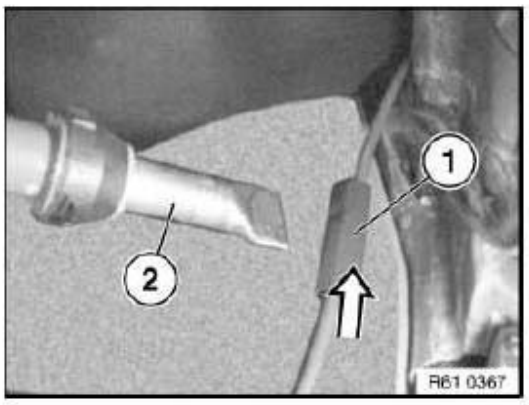


Fig. 65: Pushing Shrink-Fit Hose Over Connecting Point
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Heat up shrink-fit hose until it has settled completely around the connection point.

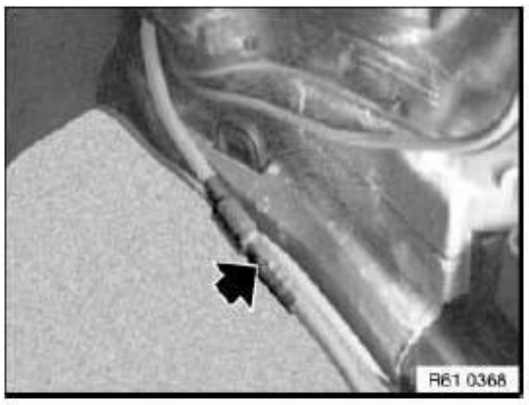


Fig. 66: Locating Shrink-Fit Hose
Courtesy of BMW OF NORTH AMERICA, INC.

When laying the repaired battery positive cable, observe the following:

- The shrink-fit hose must not be scuffed during any movement.
- The repair cable must not cause any disturbing noises during driving operation.

NOTE: Offsetting cutting line by approx. 10 cm produces excess length of battery positive lead (1).
Lay battery positive lead (1) without kinks or abrasions.
(Shown on E46 touring.)

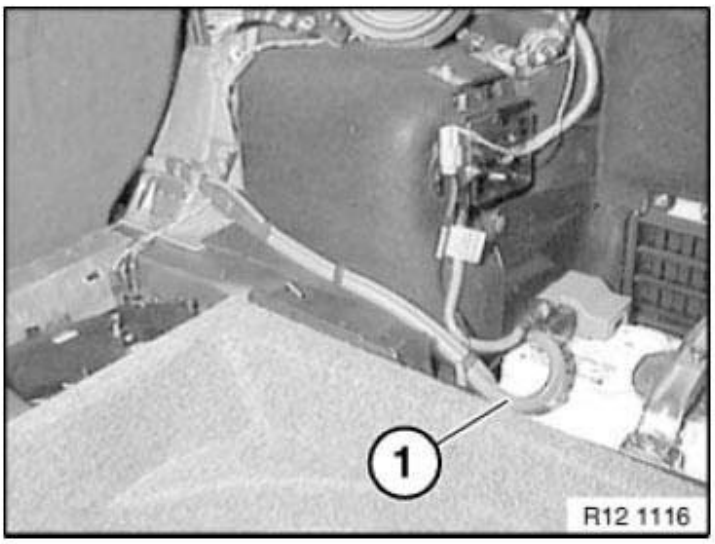


Fig. 67: Identifying Battery Positive Lead
Courtesy of BMW OF NORTH AMERICA, INC.

1251 ENGINE WIRING LOOM

12 51 001 REPLACING WIRING HARNESS SECTION FOR ENGINE (N54)

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Turn off ignition
- Disconnect **BATTERY NEGATIVE LEAD**
- Partially remove **WIRING HARNESS** for ignition coils and injectors
- Remove **INTAKE AIR MANIFOLD**
- Remove front **UNDERBODY PROTECTION**
- Remove rear underbody protection

Release bolts along line (1).

Tightening torque **12 90 1AZ** .

Remove electronics box cover.

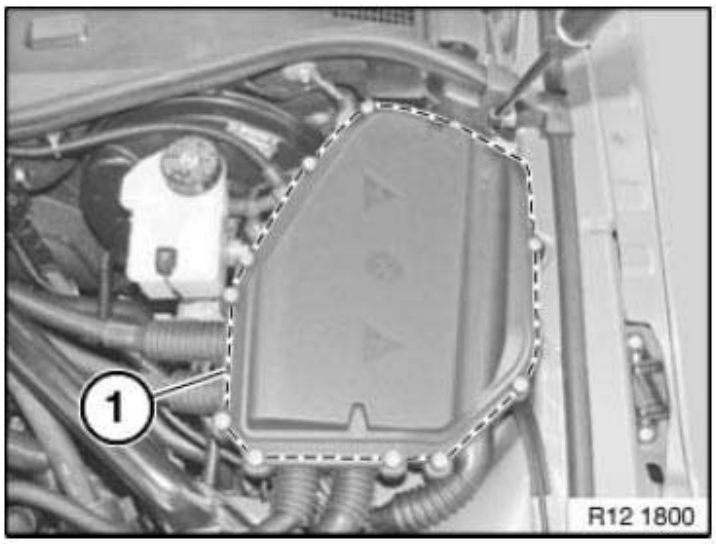


Fig. 68: Identifying Electronics Box Cover Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock battery positive lead (1), detach and lay to one side.

Release locks (2) in direction of arrows and pull control unit upwards slightly.

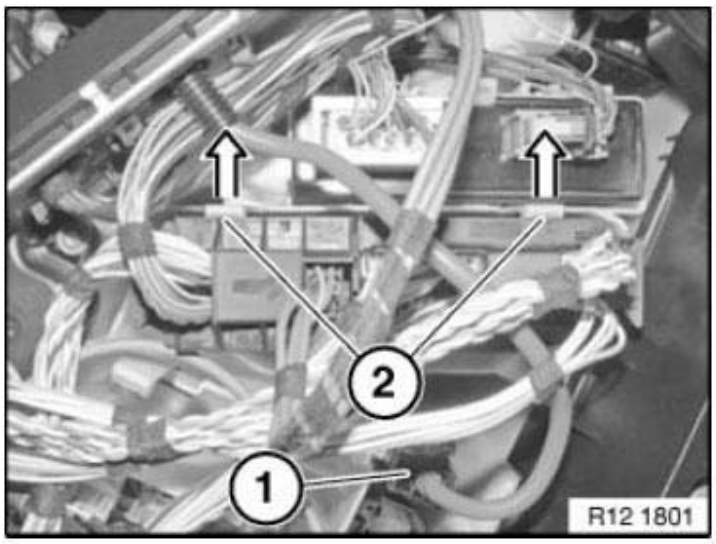


Fig. 69: Opening Control Unit Locks
Courtesy of BMW OF NORTH AMERICA, INC.

Pull control unit (1) upwards slightly until plug (2) can be released from control unit in direction of arrow.

Unlock plug (2) and detach from control unit (1).

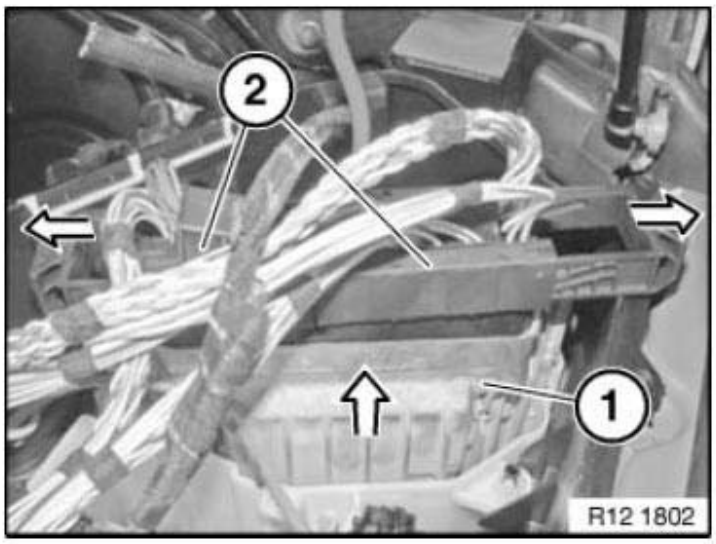


Fig. 70: Pulling Control Unit Upwards
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach all plugs from engine wiring harness in electronics box (1).

Unclip rubber grommet hold-down devices (2) and (3) and release engine wiring harness from electronics box.

Installation:

Make sure rubber grommets are correctly seated (watertightness).

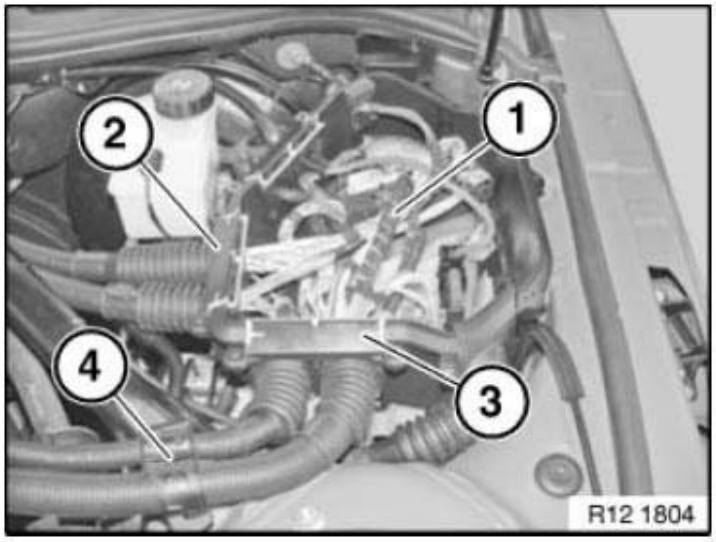


Fig. 71: Identifying Electronic Box With Rubber Grommet Hold Down Device
Courtesy of BMW OF NORTH AMERICA, INC.

Long plug:

Press in retaining lugs and withdraw lock (1) in direction of arrow from plug housing.

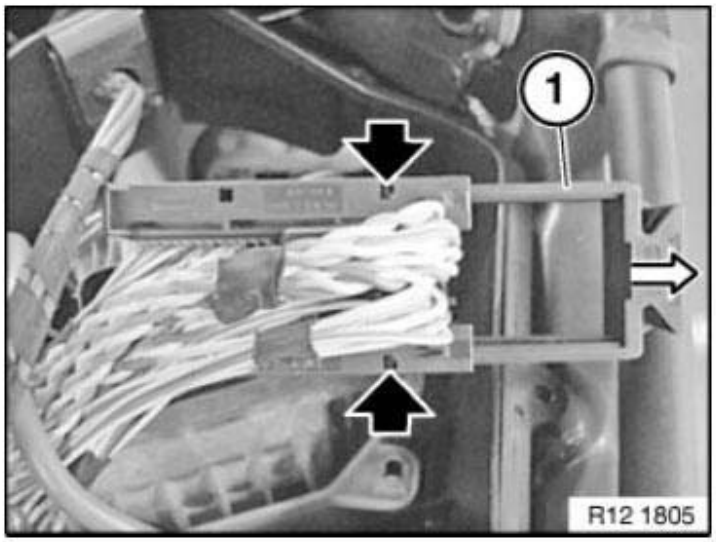


Fig. 72: Removing Locks From Plug Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking tabs (1) in direction of arrow and pull contact carrier (2) out of housing.

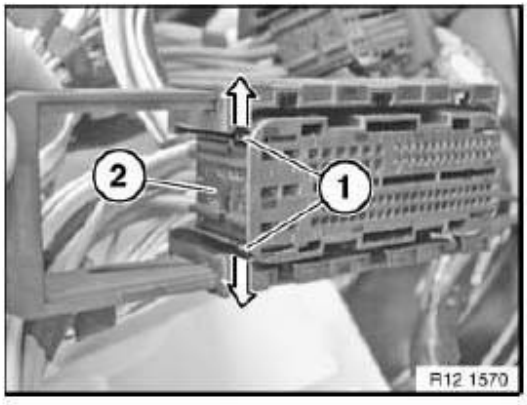


Fig. 73: Pressing Locking Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking tab (1) in direction of arrow and pull contact carrier (2) out of housing.

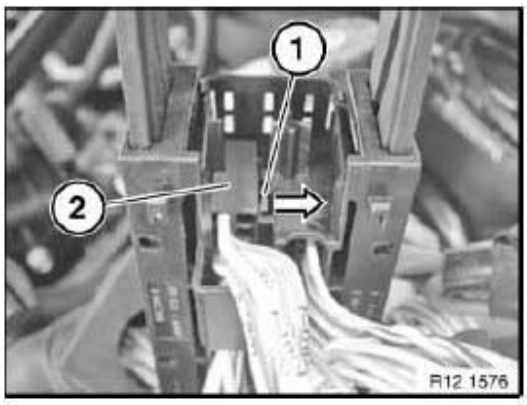


Fig. 74: Pressing Locking Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock locking tabs (1) in direction of arrow and pull contact carrier (2) out of housing.

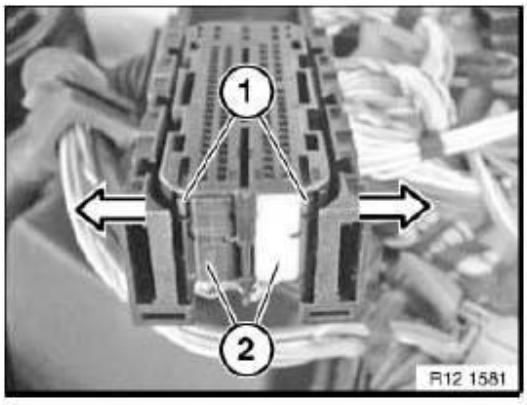


Fig. 75: Opening Locking Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Short plug

Press in retaining lugs (1) and withdraw lock (2) in direction of arrow from plug housing.

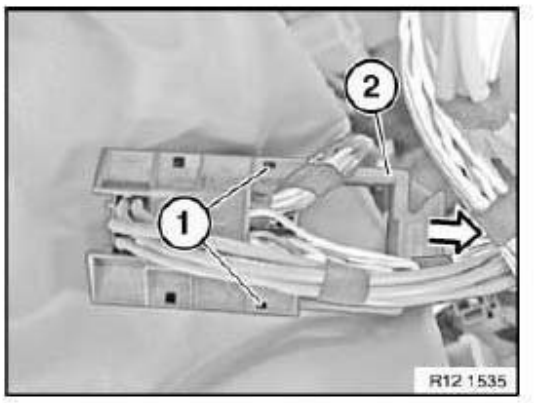


Fig. 76: Removing Locks From Plug Hosing
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking tabs (1) in direction of arrow and pull contact carrier (2) out of housing.

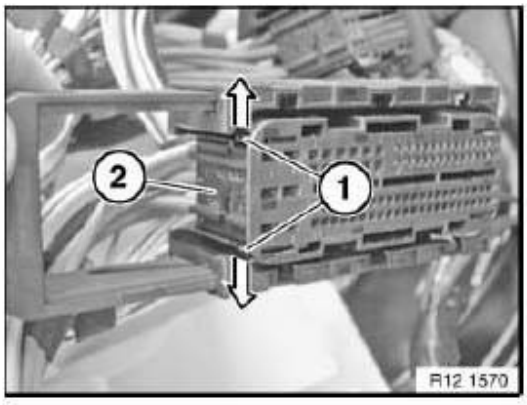


Fig. 77: Pressing Locking Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock locking tabs (1) in direction of arrow and pull contact carrier (2) out of housing.

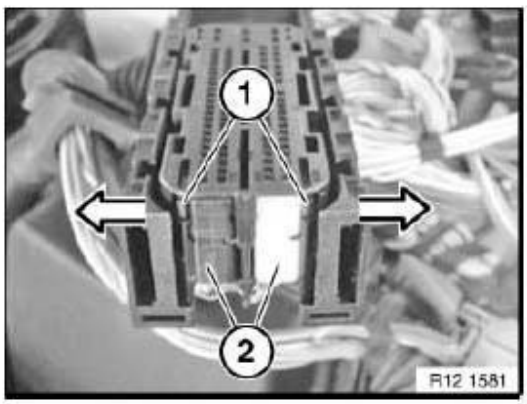


Fig. 78: Opening Locking Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cable duct upper section (1) and expose wiring harnesses.

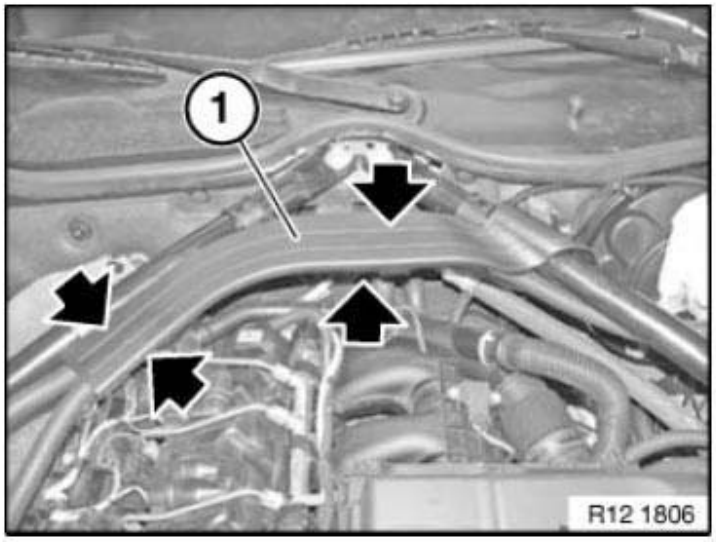


Fig. 79: Locating Wiring Harness In Cable Duct Upper Section
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew screws (1).

Tightening torque **12 90 4AZ** .

Remove cable duct (2).

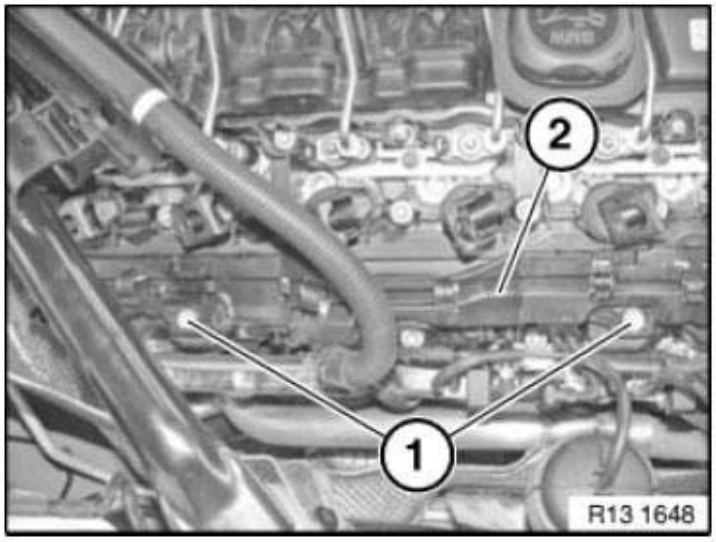


Fig. 80: Identifying Cable Duct And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

ENGINE WIRING HARNESS REPLACEMENT PROCEDURE

Work step	**Note**
Unlock plug connections on control sensors and disconnect	
Unlock plug on heating element and disconnect	
Unlock plug on alternator and disconnect	
Unlock plug on intake pressure sensor and disconnect	
Unlock plug on throttle valve assembly and disconnect	
Unlock plug connection on knock sensors and disconnect	
Unlock plug on crankshaft sensor and disconnect	
Unlock plug on starter motor and disconnect	
Unlock plug on crankshaft pulse sensor and disconnect	
Unlock plug on high-pressure pump and disconnect	
Unlock plug on air-conditioning compressor and disconnect	
Unlock plug on transmission and disconnect	
Unlock plug on tank venting valve and disconnect	
Unlock plug connections on monitoring sensors and disconnect	
Unlock plug on oil condition sensor and disconnect	
Unlock plug on intake temperature sensor and disconnect	
Unlock plug on oil pressure sensor and disconnect	
Unlock plug on coolant temperature sensor and disconnect	
Unlock plug on intake camshaft pulse sensor and disconnect	
Unlock plug on Valvetronic valves and disconnect	
Unlock plug on exhaust camshaft pulse sensor and disconnect	
Unlock plug on both pressure converters and disconnect	
Unlock plug on coolant thermostat and disconnect	
Unlock plug on coolant pump and disconnect	
Release earth connection on crankcase lower section Tightening torque **12 90 3AZ** .	

Release wiring harness from clips and retainers.

Feed out wiring harness and remove.

Installation:

Check wiring harness routing.

Check plug connections for correct seating.

NOTE: Check stored fault messages.
clear fault memory.

12 51 100 REPLACING WIRING HARNESS SECTION FOR IGNITION AND INJECTORS (N54)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Turn off ignition
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **ACOUSTIC COVER**

Release bolts along line (1).

Tightening torque **12 90 1AZ** .

Remove electronics box cover.

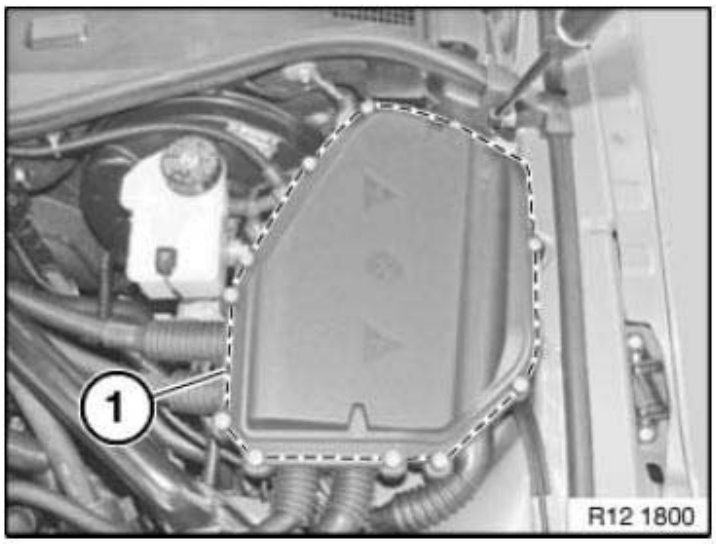


Fig. 81: Identifying Electronics Box Cover Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock battery positive lead (1), detach and lay to one side.

Release locks (2) in direction of arrows and pull control unit upwards slightly.

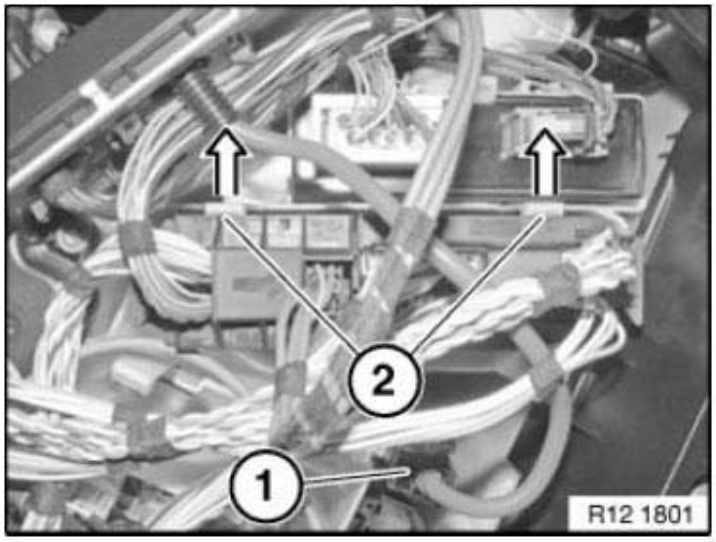


Fig. 82: Opening Locks
Courtesy of BMW OF NORTH AMERICA, INC.

Pull control unit (1) upwards slightly until plug (2) can be released from control unit in direction of arrow.

Unlock plug (2) and detach from control unit (1).

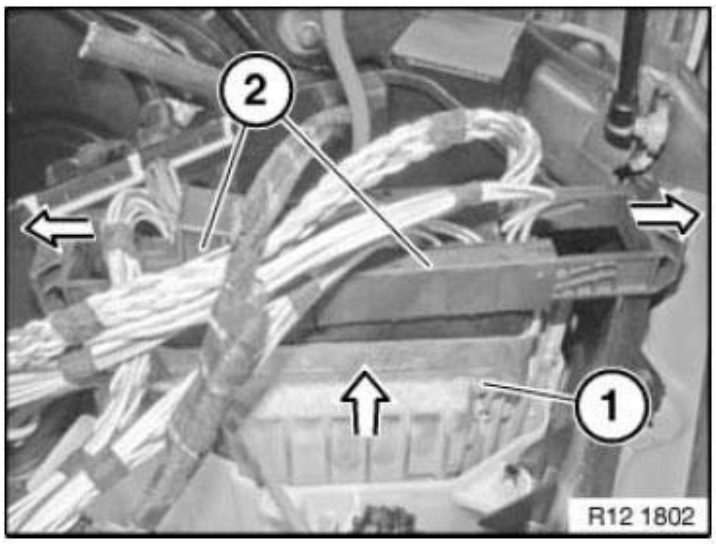


Fig. 83: Pulling Control Unit Upwards
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach all plugs (1) from ignition coil wiring harness in electronics box.

Unclip rubber grommet hold-down device (2) and release ignition coil wiring harness from electronics box.

Installation:

Make sure rubber grommets are correctly seated (watertightness).

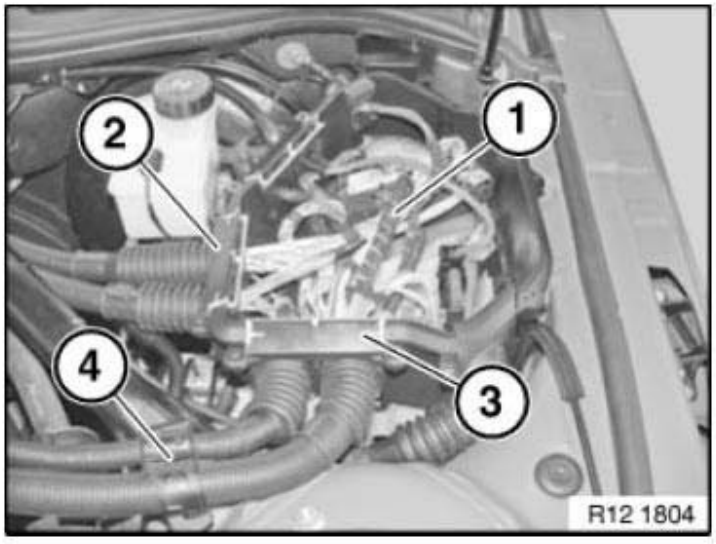


Fig. 84: Identifying Electronic Box With Rubber Grommet Hold Down Device And Plugs
Courtesy of BMW OF NORTH AMERICA, INC.

Press in retaining lugs and withdraw lock (1) in direction of arrow from plug housing.

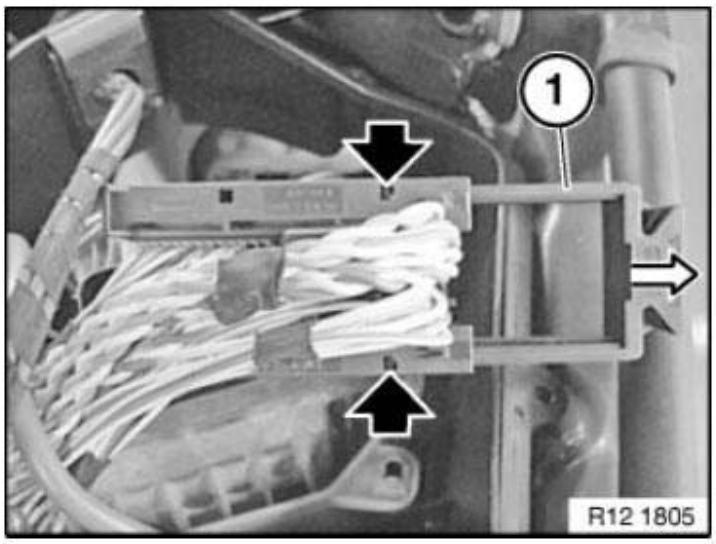


Fig. 85: Removing Locks By Pressing Retaining Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking tabs (1) in direction of arrow and pull contact carrier (2) out of housing.

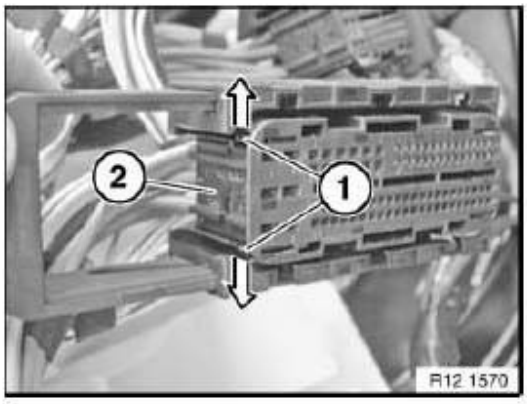


Fig. 86: Pressing Locking Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking tab (1) in direction of arrow and pull contact carrier (2) out of housing.

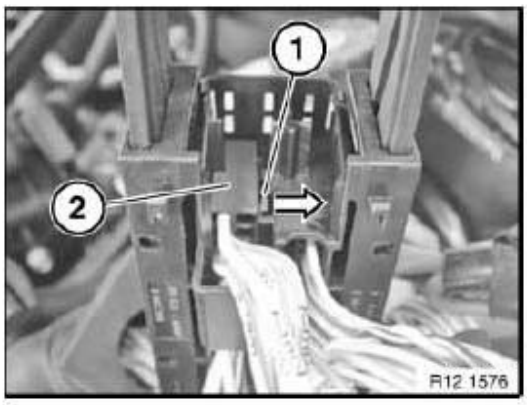


Fig. 87: Pressing Locking Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cable duct upper section (1) and expose wiring harnesses.

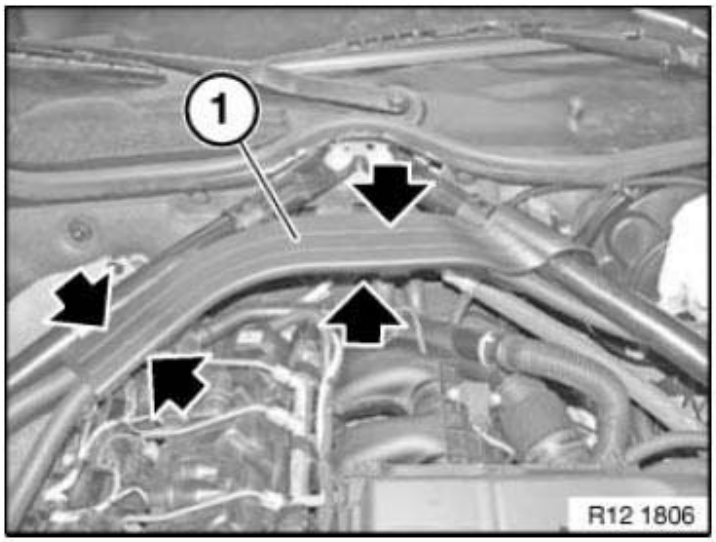


Fig. 88: Locating Wiring Harness In Cable Duct Upper Section
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and remove clip (1).

Release nuts (2) and remove earth connections.

Tightening torque **12 90 2AZ** .

Unlock all plugs on ignition coils and injectors and detach.

Release wiring harness (3) from retainers and cable ties, feed out and remove.

Replace defective cable ties.

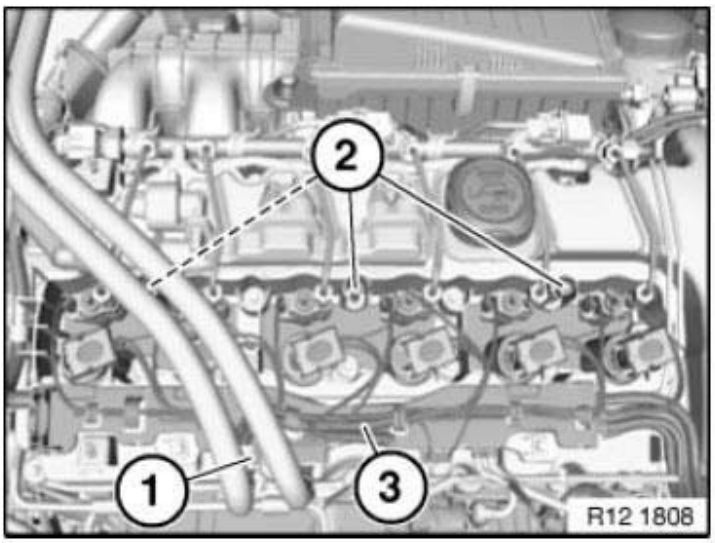


Fig. 89: Identifying Wiring Harness With Clips And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check wiring harness routing.
Check plug connections for correct seating.
Check stored fault messages.
clear fault memory.

1261 OIL PRESSURE OIL TEMPERATURE OIL GAUGE

12 61 285 REMOVING AND INSTALLING/REPLACING OIL LEVEL SENSOR FOR ENGINE OIL (N54)

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Necessary preliminary work

- Switch off ignition
- Remove front **UNDERBODY PROTECTION**
- Drain off **ENGINE OIL**

Release connector (1) and remove.

Unscrew nuts.

Tightening torque **12 61 2AZ** .

Remove oil level sensor (2).

Installation note:

Clean sealing surface on oil sump.

Replace gasket on oil level sensor.

An excessively low torque value will result in oil leaks.

An excessively high torque value will result in damage to the oil level sensor.

Top up engine oil.

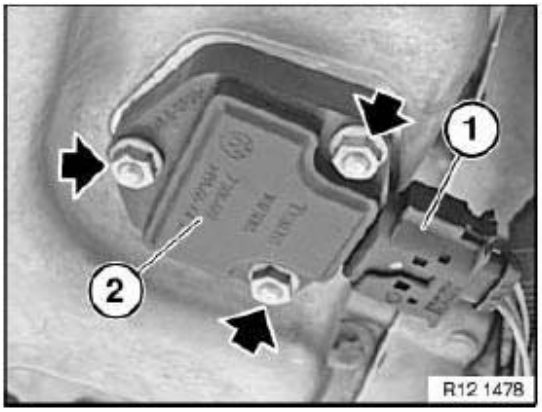


Fig. 90: Identifying Oil Level Sensor And Connector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Delete fault memory.

12 61 280 REMOVING AND INSTALLING/REPLACING OIL PRESSURE SENSOR (N54)

Necessary preliminary tasks

- Switch off ignition
- Remove **ACOUSTIC COVER**

WARNING: Scalding hazard!

Only perform this task on an engine that has cooled down.

Installation location

Oil filter housing, front left.

Engine oil may emerge when oil pressure sensor is replaced; have a cleaning cloth ready.

Unlock plug (1) and remove.

Release oil pressure sensor (2).

Tightening torque, **12 61 1AZ** .

Installation:

Check engine oil level, top up engine oil if necessary.

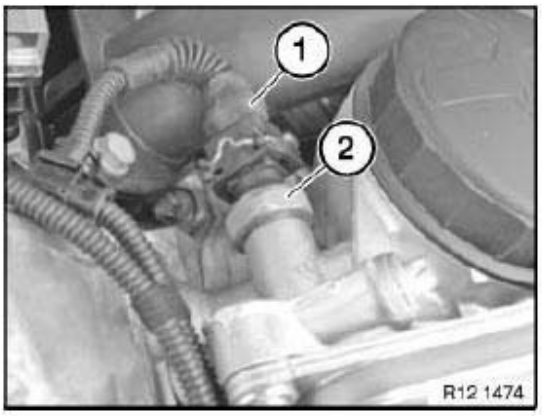


Fig. 91: Identifying Oil Pressure Sensor With Plug
Courtesy of BMW OF NORTH AMERICA, INC.

12 ENGINE ELECTRICAL SYSTEM

12-8010 ADAPTER

Adapter MW

NOTE: **(plug adapter for CNG wiring harness) For reducing the gas pressure in the CNG system**

Storage Location

W 2..

SI number

01 14 95 (014)

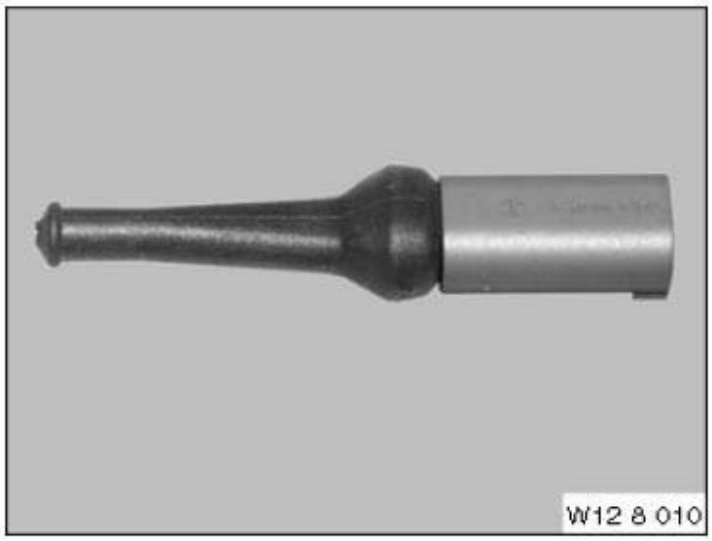


Fig. 1: Identifying Adapter (128010)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7011 ADAPTER

Adapter MW

NOTE: **(Electronic engine power control adapter) For checking of electronic engine power control safety circuit with 20-pin engine connector**

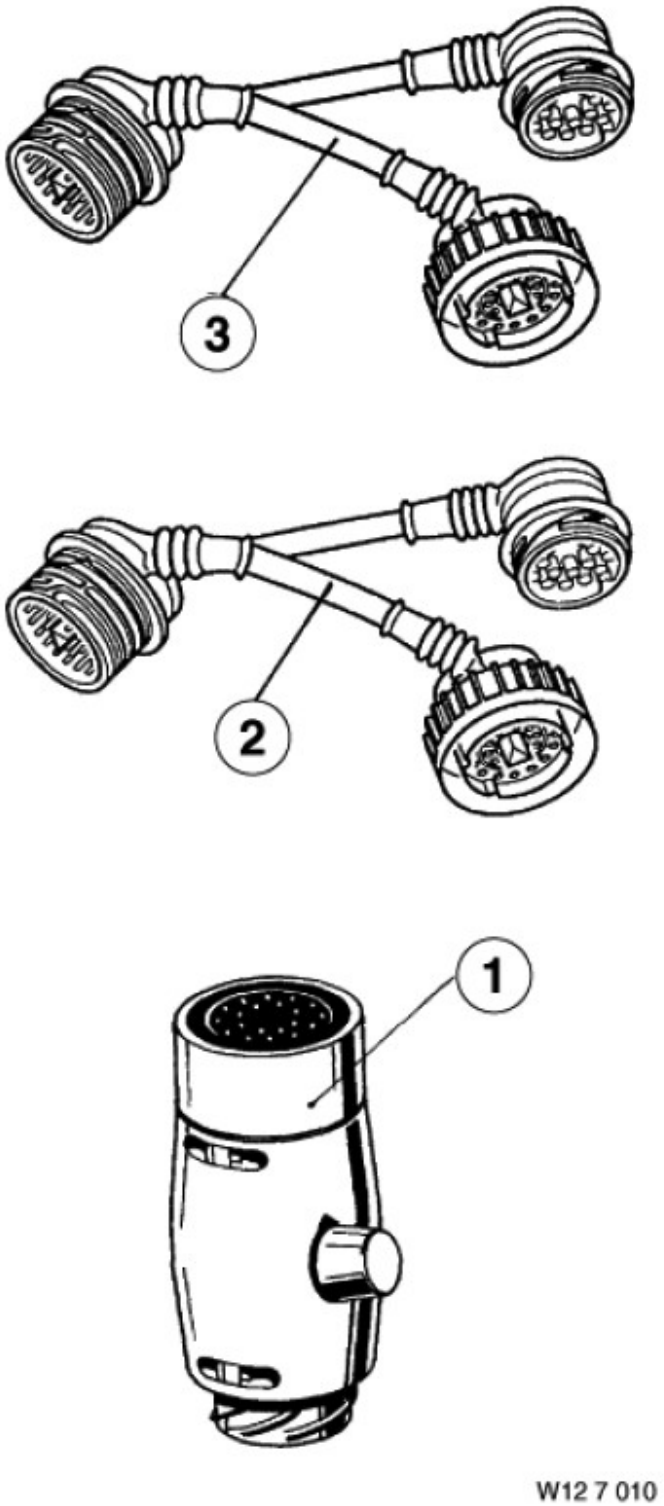


Fig. 2: Identifying Adapter (127011)
Courtesy of BMW OF NORTH AMERICA, INC.

12-8000 ADAPTER

Adapter MW

NOTE: (Test adapter, 56-pin) For checking the engine wiring harness on compressed natural gas vehicles

Storage Location

W 2..

SI number

01 14 95 (014)

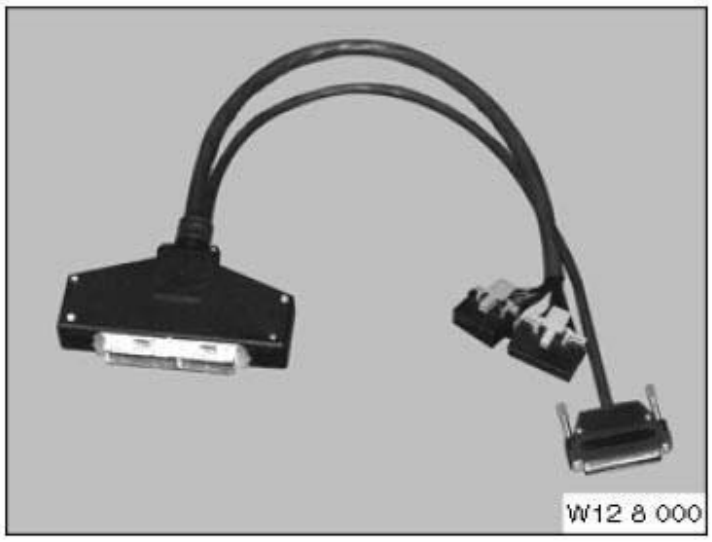


Fig. 3: Identifying Adapter (128000)
Courtesy of BMW OF NORTH AMERICA, INC.

12-1300 ADAPTER

Adapter MP

NOTE: (Adapter kit) For 134-pin module connector For diagnosis and troubleshooting in Digital Motor Electronics and transmission control unit - from model year 98

SI number

02 04 97 (248)

Consisting of:

2 = 0491135 Adapter cable

NOTE: (Adapter cable) 9-pin

2 = 0491136 Measuring module

NOTE: (Measuring module) 24-pin

2 = 0491137 Measuring module

NOTE: (Measuring module) 40-pin

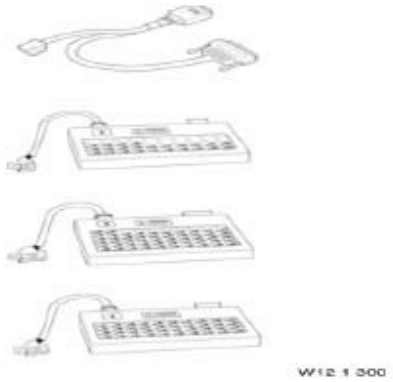


Fig. 4: Identifying Adapter (121300)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0491138 Measuring module

NOTE: (Measuring module) 52-pin Delivered from 08/2004 in combination with 12 1 305 (zero-encoded protective cap for new SGM control unit in E6x).

4 = 0495069 Cap

NOTE: (Zero-encoded protective cap for test box, 52-pin (12 1300/304)) New connector in E61/E61/E63 and E64 on SGM control unit protective cap 12 1 300/305 for diagnosis on wiring harness. From 08/2004 protective cap will be supplied with test box.

12-7012 ADAPTER CABLE

Adapter cable MW

NOTE: (Adapter cable, 25-pin) Encoding A

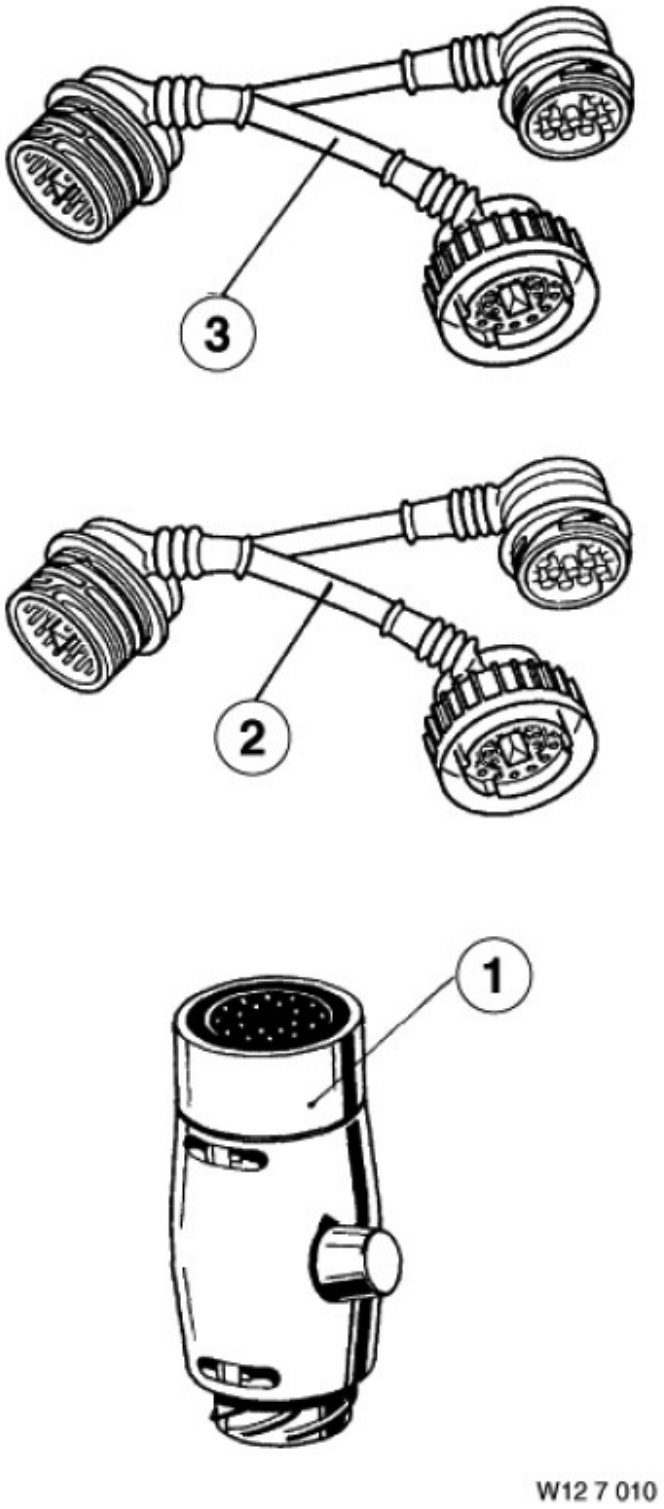


Fig. 5: Identifying Adapter Cable (127012)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7013 ADAPTER CABLE

Adapter cable MW

NOTE: **(Adapter cable 25-pin) For checking/encoding B of electronic engine power control safety circuit - model series: E31/engine: M70**

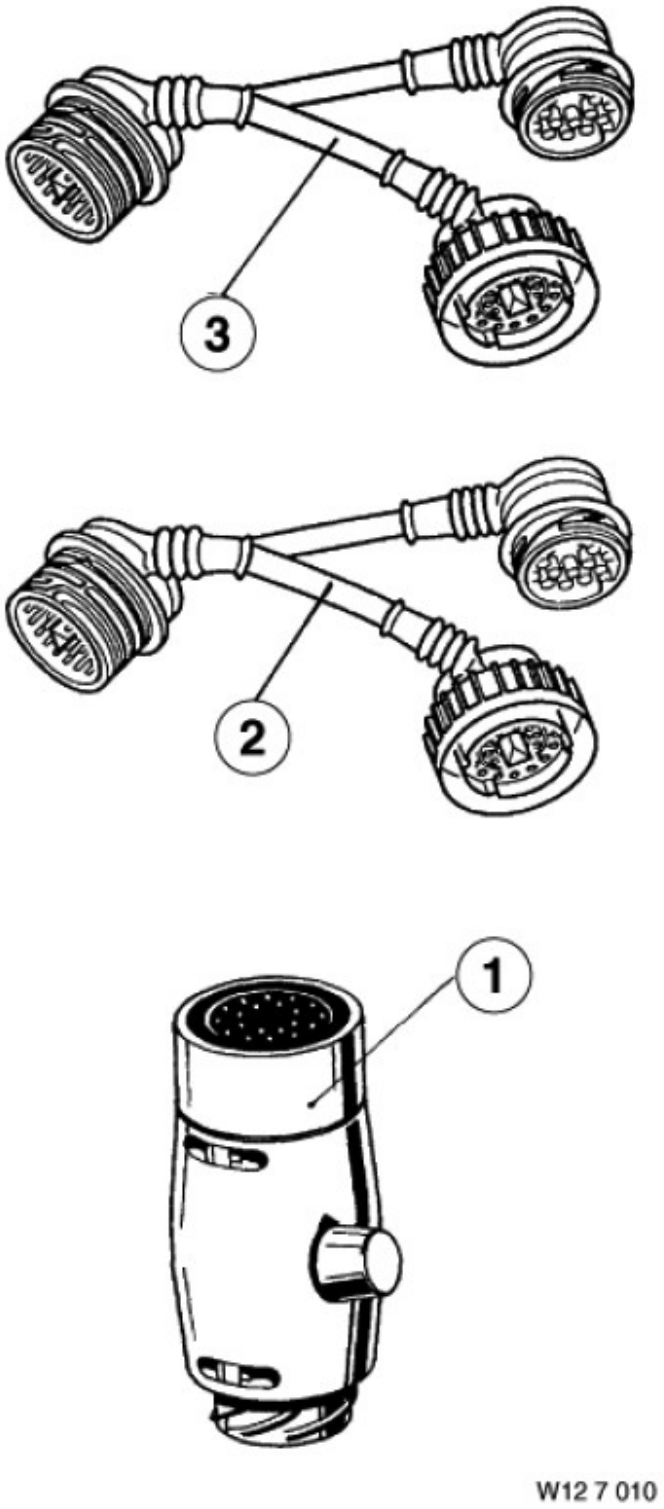


Fig. 6: Identifying Adapter Cable (127013)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7050 ADAPTER CABLE

Adapter cable Minimum set: Measuring and testing equipment MP

NOTE: For engines with rod-type ignition coils for measuring secondary voltage

Storage Location

F 104

SI number

02 01 01 (671)

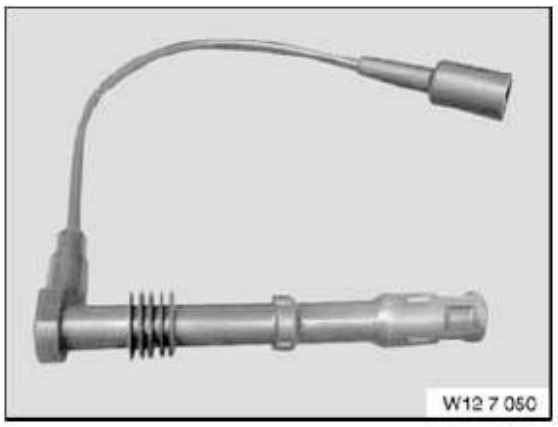


Fig. 7: Identifying Adapter Cable (127050)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7420 ADAPTER CABLE

Adapter cable Minimum set: Measuring and testing equipment MP

NOTE: (V adapter cable set 58-pin) For diagnosis and troubleshooting at control unit DDE 5.0 04/04 Coding with special pliers (002250) removed - for N46, N52 and S85 engine. Set 12 7 420 consisting of 12 7 421 adapter cable and 12 7 422 cover plate 05/2004 set modification SI 2 03 04 (106)

Storage Location

Q204

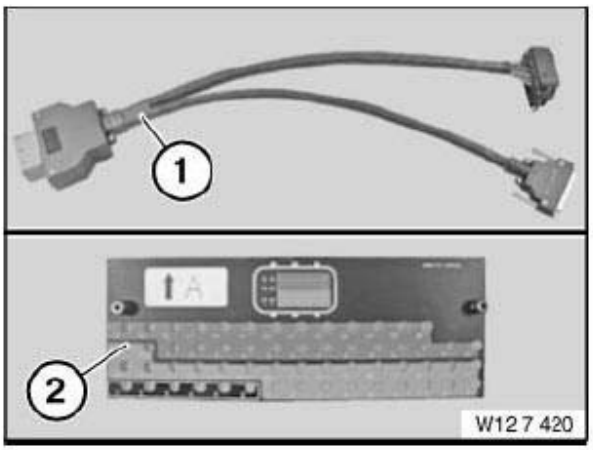


Fig. 8: Identifying Adapter Cable (127420)
Courtesy of BMW OF NORTH AMERICA, INC.

SI number

02 05 01 (479)

Consisting of:

1 = 0494963 Adapter cable

NOTE: (Adapter cable 58-pin)

2 = 0494964 Plate

NOTE: (Cover plate for test box) For pin allocation on 105-pin test box (61 4 380)

12-7060 ANTISTATIC MAT

Antistatic mat MW

NOTE: (Antistatic mat) ESD (Electronic Static Discharge) = electrostatic discharge For protection against ESD during repairs to electronic components. (Replaces the subnumber 12 7 192 from EPROM tool kit 12 7 190)

SI number

02 06 04 (128)

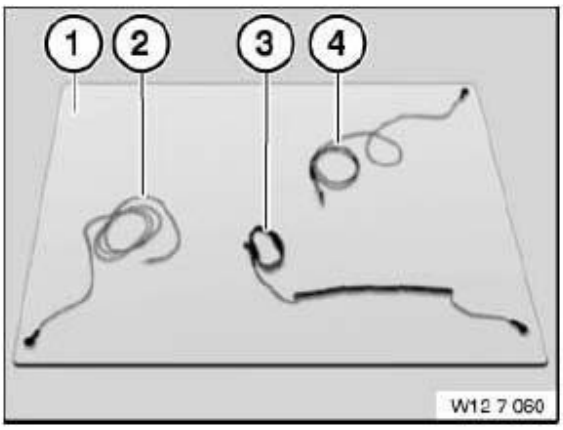


Fig. 9: Identifying Antistatic Mat (127060)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7121 COUNTERHOLDER WRENCH

Counterholder wrench

In conjunction with: Socket

NOTE: Alternator N42 engine

12-7019 OPERATING INSTRUCTIONS

Operating instructions MW

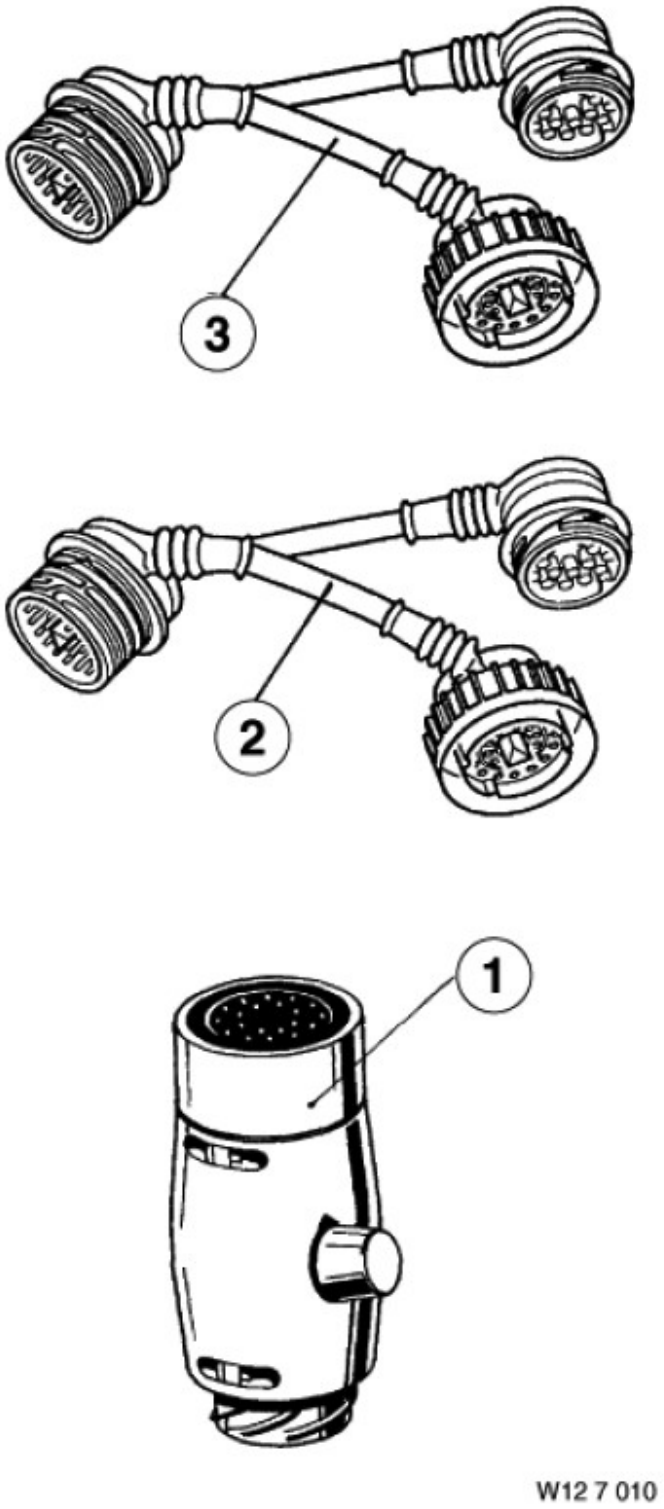


Fig. 10: Identifying Operating Instructions (127019)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7122 SOCKET

Socket

In conjunction with: Counterholder wrench

NOTE: Hazet 8808 lg10

SI number

1 28 03 (051)

12-7110 SOCKET WRENCH INSERT

Socket wrench insert Minimum set: Mechanical tools MW

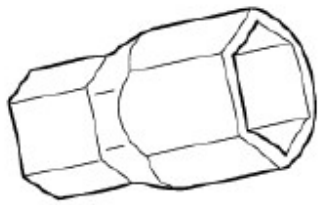
NOTE: (Socket wrench insert WAF 24) For removing and installing the belt pulley on the alternator

Storage Location

A12

SI number

01 12 93 (701)



W 12 7 110

Fig. 11: Identifying Socket Wrench Insert (127110)
Courtesy of BMW OF NORTH AMERICA, INC.

12-1200 TORQUE LIMITER

Torque limiter Minimum set: Mechanical tools MW

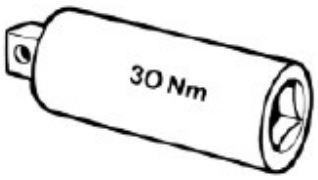
NOTE: (torque limiter) 30 Nm For tightening the spark plugs to a limited torque setting

Storage Location

A9

SI number

01 05 92 (507)



W 12 1 200

Fig. 12: Identifying Torque Limiter (121200)
Courtesy of BMW OF NORTH AMERICA, INC.

12-1305 ZERO-CODED COVER CAP FOR 52-PIN TEST BOX (12 1300/304)

Zero-coded cover cap for 52-pin test box (12 1300/304)

NOTE: New plugs in E61/E61/E63 and E64 on SGM control unit Cover cap 12 1 300/305 for diagnosis on wiring harness. From 08/2004 cover cap will be supplied with test box.

SI number

2 07 04 (138)

12 ENGINE ELECTRICAL SYSTEM

12-8010 ADAPTER

Adapter MW

NOTE: **(plug adapter for CNG wiring harness) For reducing the gas pressure in the CNG system**

Storage Location

W 2..

SI number

01 14 95 (014)

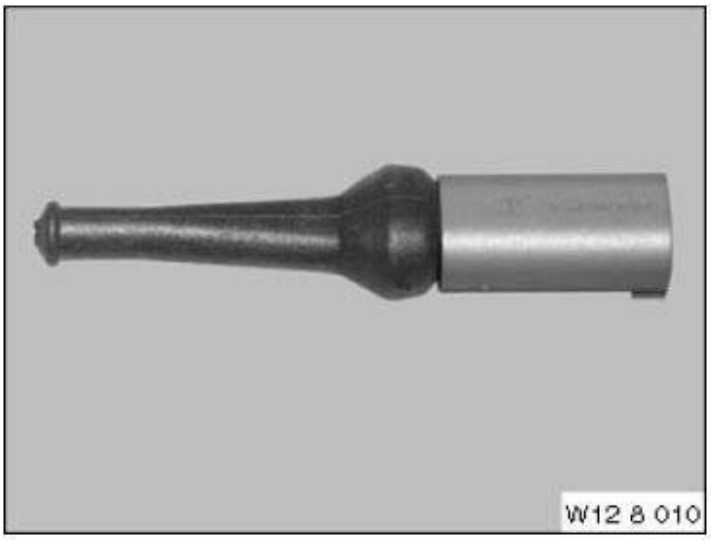


Fig. 1: Identifying Adapter (12-8010)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7011 ADAPTER

Adapter MW

NOTE: **(Electronic engine power control adapter) For checking of electronic engine power control safety circuit with 20-pin engine connector**

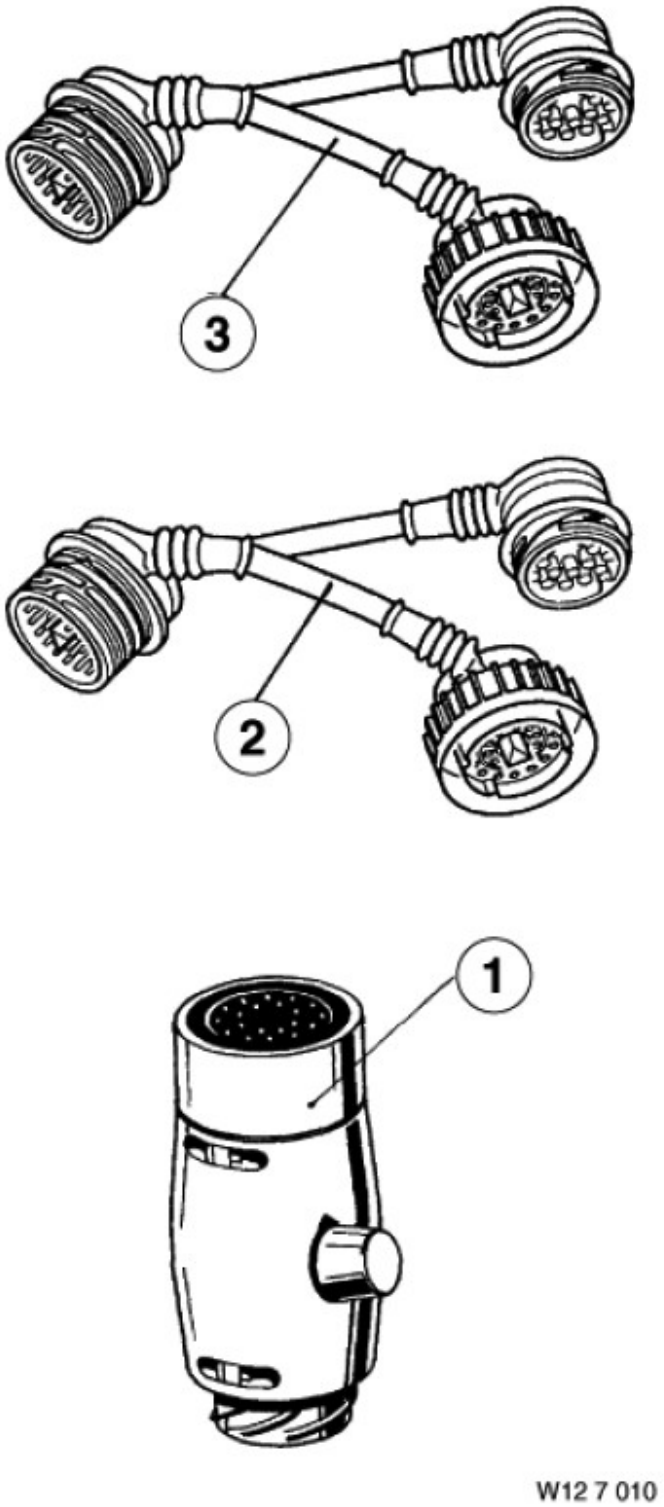


Fig. 2: Identifying Adapter (12-7011)
Courtesy of BMW OF NORTH AMERICA, INC.

12-8000 ADAPTER

Adapter MW

NOTE: (Test adapter, 56-pin) For checking the engine wiring harness on compressed natural gas vehicles

Storage Location

W 2..

SI number

01 14 95 (014)

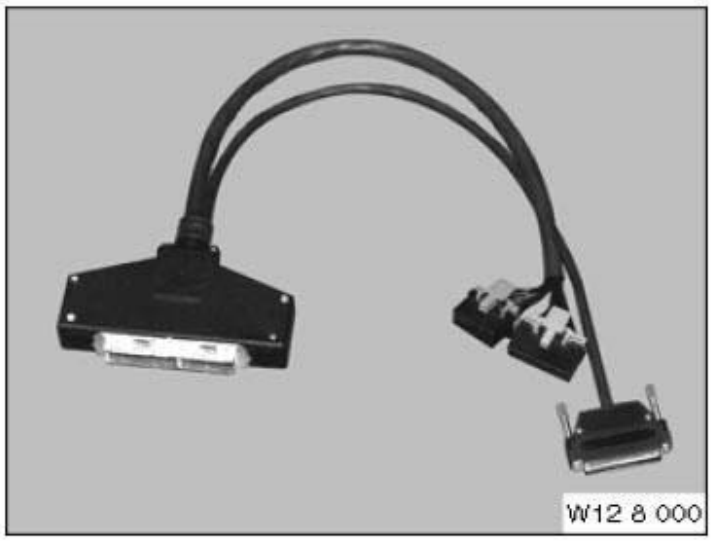


Fig. 3: Identifying Adapter (12-8000)
Courtesy of BMW OF NORTH AMERICA, INC.

12-1300 ADAPTER

Adapter MP

NOTE: (Adapter kit) For 134-pin module connector For diagnosis and troubleshooting in Digital Motor Electronics and transmission control unit - from model year 98

SI number

02 04 97 (248)

Consisting of:

2 = 0491135 Adapter cable

NOTE: (Adapter cable) 9-pin

2 = 0491136 Measuring module

NOTE: (Measuring module) 24-pin

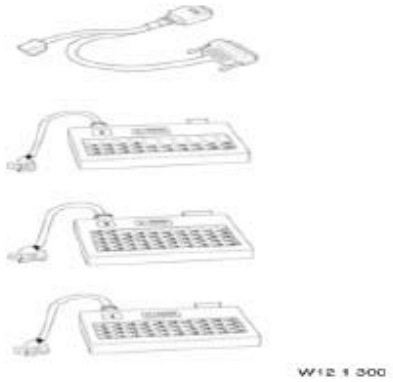


Fig. 4: Identifying Adapter (12-1300)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0491137 Measuring module

NOTE: (Measuring module) 40-pin

2 = 0491138 Measuring module

NOTE: (Measuring module) 52-pin Delivered from 08/2004 in combination with 12 1 305 (zero-encoded protective cap for new SGM control unit in E6x).

4 = 0495069 Cap

NOTE: (Zero-encoded protective cap for test box, 52-pin (12 1300/304)) New connector in E61/E61/E63 and E64 on SGM control unit protective cap 12 1 300/305 for diagnosis on wiring harness. From 08/2004 protective cap will be supplied with test box.

12-7012 ADAPTER CABLE

Adapter cable MW

NOTE: (Adapter cable, 25-pin) Encoding A

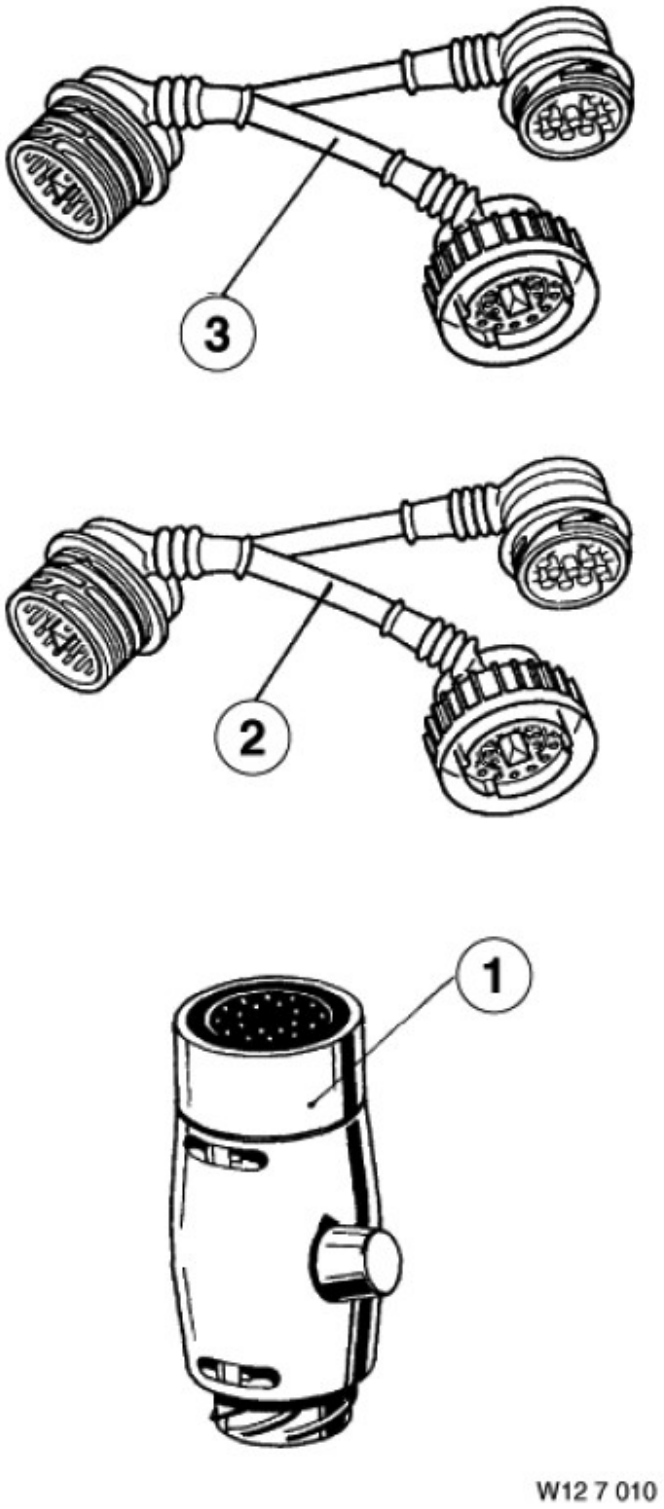


Fig. 5: Identifying Adapter Cable (12-7012)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7013 ADAPTER CABLE

Adapter cable MW

NOTE: **(Adapter cable 25-pin) For checking/encoding B of electronic engine power control safety circuit - model series: E31/engine: M70**

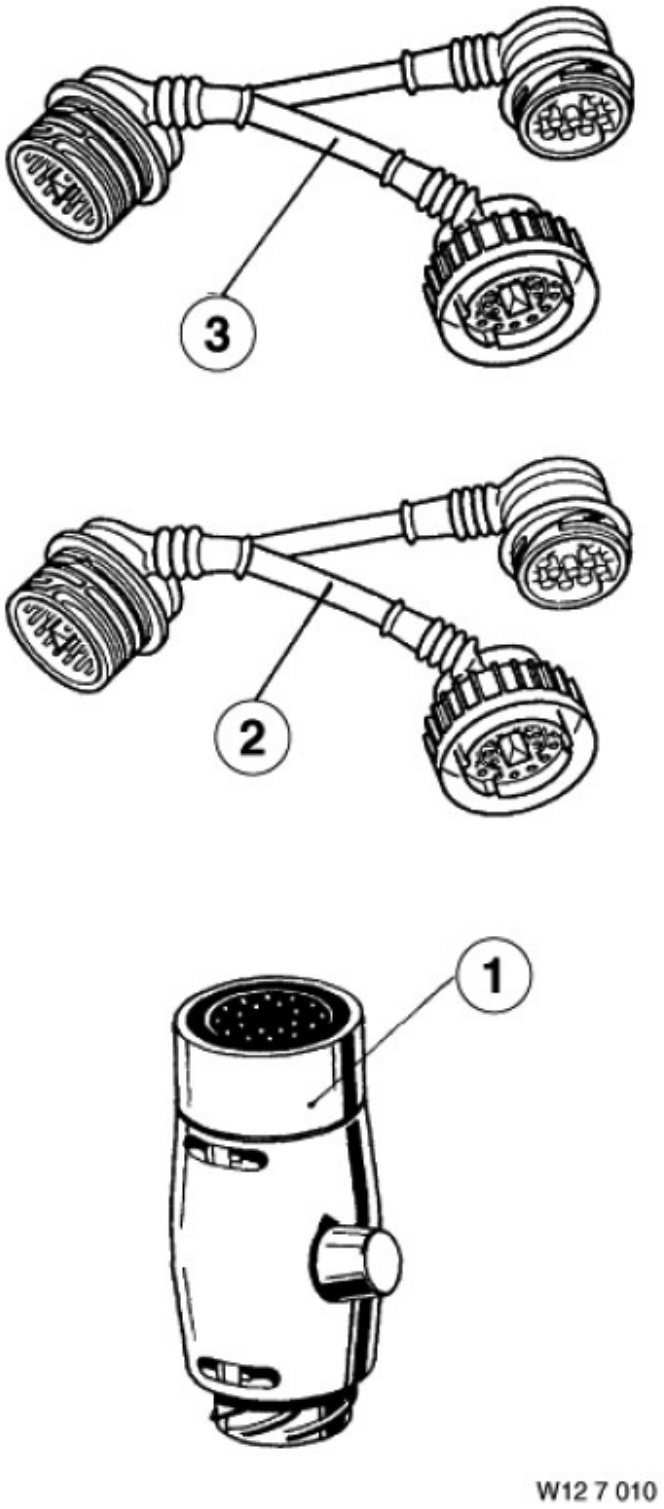


Fig. 6: Identifying Adapter Cable (12-7013)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7060 ANTISTATIC MAT

Antistatic mat MW

NOTE: (Antistatic mat) ESD (Electronic Static Discharge) = electrostatic discharge For protection against ESD during repairs to electronic components. (Replaces the subnumber 12 7 192 from Eprom tool kit 12 7 190)

SI number

02 06 04 (128)

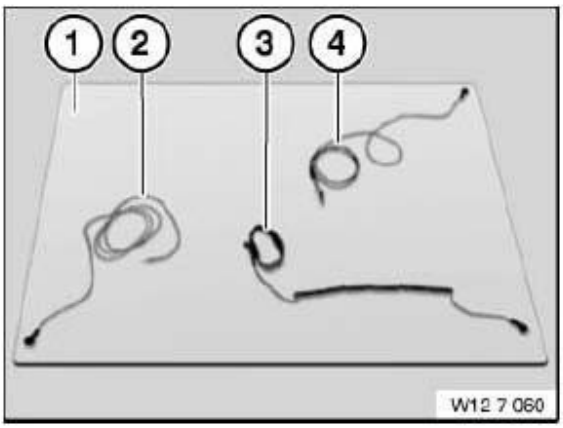


Fig. 7: Identifying Antistatic Mat (12-7060)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7121 COUNTERHOLDER WRENCH

Counterholder wrench

In conjunction with: Socket

NOTE: Alternator N42 engine

12-1230 FITTING AID

Fitting aid MW

NOTE: Fitting aid for spark plug installation. Original BERU ZMH 001 rubber hose 0 890 00 001.

SI number

01 04 07 (352)

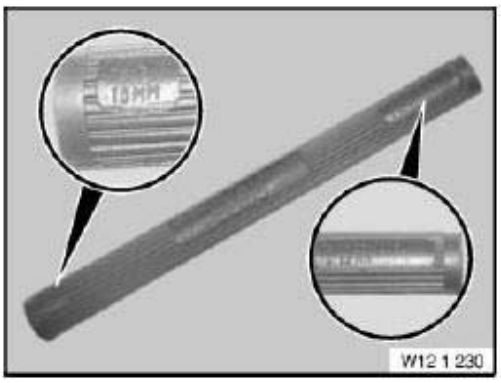


Fig. 8: Identifying Fitting Aid (12-1230)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7019 OPERATING INSTRUCTIONS

Operating instructions MW

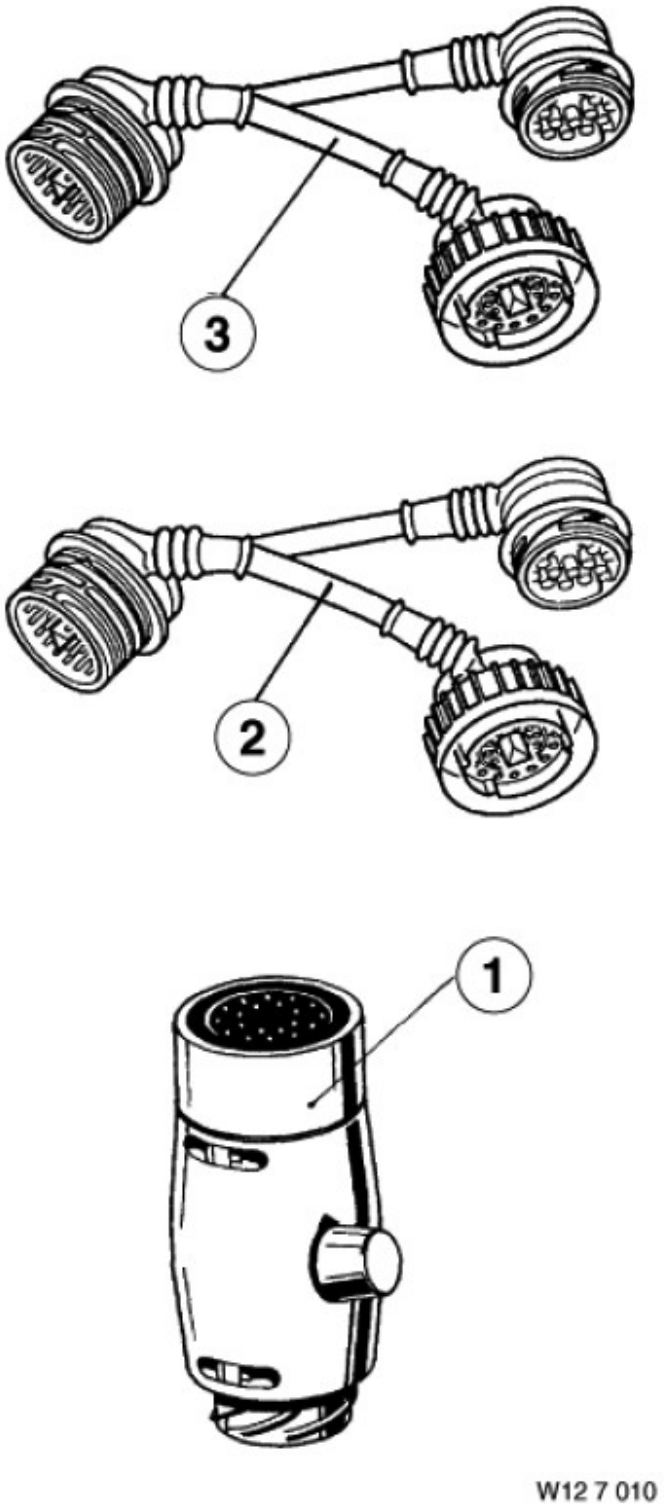


Fig. 9: Identifying Operating Instructions (12-7019)
Courtesy of BMW OF NORTH AMERICA, INC.

12-1220 SOCKET

Socket Minimum set: Mechanical tools MW

NOTE: For removing and installing the spark plugs (WAF 14 bihexal).

SI number

01 04 06 (246)



Fig. 10: Identifying Socket (12-1220)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7122 SOCKET

Socket

In conjunction with: Counterholder wrench

NOTE: Hazet 8808 lg 10

SI number

1 28 03 (051)

12-1305 ZERO-CODED COVER CAP FOR 52-PIN TEST BOX (12 1300/304)

Zero-coded cover cap for 52-pin test box (12 1300/304)

NOTE: New plugs in E61/E61/E63 and E64 on SGM control unit Cover cap 12 1 300/305 for diagnosis on wiring harness. From 08/2004 cover cap will be supplied with test box.

SI number

2 07 04 (138)

ALTERNATOR LEAD

12 42 ALTERNATOR LEAD

TIGHTENING TORQUE SPECIFICATION - ALTERNATOR LEAD

		Type	Thread	Tightening specification	Measure
1AZ	Battery positive lead to alternator	N52K	M8		19 Nm
2AZ	Battery positive lead to starter	N52K	M8		13 Nm
3AZ	Battery positive lead to battery positive terminal	N52K	M8	Flange nut	15 Nm

ALTERNATOR WITH DRIVE AND MOUNTING PARTS

12 31 ALTERNATOR WITH DRIVE AND MOUNTING PARTS

TIGHTENING TORQUE SPECIFICATION - ALTERNATOR WITH DRIVE AND MOUNTING PARTS

		Type	Thread	Tightening specification	Measure
1AZ	Wires to alternator				
Terminal D+		M10/M20			5 Nm
		All/others	M6		7 Nm
Terminal B+		S38/B38			8 Nm
		All/others	M8		13 Nm
2AZ	Pulley	All			45 Nm
3AZ	Pulley (ribbed drive belt)	Alternator with cooling jacket			80 Nm
		all others			70 Nm
		N42, N46 Valeo			75 Nm
		N42, N46 Bosch			65 Nm
4AZ	Rear holder	All			3.5 Nm
5AZ	Fillister head screw for wire holder	All			3.5 Nm
6AZ	Alternator on	M40/M42/M43/M44			43 Nm

	bearing block				
7AZ	Alternator to crankcase	N42, N46, N62	M8		21 Nm
8AZ	Belt pulley (ribbed V-belt) with freewheel (Ina) fitted to Bosch and Valeo alternators	N42, N43			80 Nm

ALTERNATOR WITH DRIVE AND MOUNTING PARTS

12 31 ALTERNATOR WITH DRIVE AND MOUNTING PARTS

TIGHTENING TORQUE SPECIFICATION - ALTERNATOR WITH DRIVE AND MOUNTING PARTS

		Type	Thread	Tightening specification	Measure
1AZ	Battery positive lead to alternator	N52K	M8		19 Nm
2AZ	Alternator to crankcase	N52K	M8x82	Replace screws Jointing torque Torque angle	 10 Nm 190 °

BRACKET FOR OIL LEVEL SENSOR EARTH STRAP

12 52 BRACKET FOR OIL LEVEL SENSOR EARTH STRAP

TIGHTENING TORQUE SPECIFICATION - BRACKET FOR OIL LEVEL SENSOR EARTH STRAP

		Type	Thread	Tightening specification	Measure
1AZ	Earth strap to bracket and cable bracket on transmission	N43/N45T/N51/N52/N52K/N53/N54	M6		8 Nm

CONTROL UNIT HOUSING

12 90 CONTROL UNIT HOUSING

TIGHTENING TORQUE SPECIFICATION - CONTROL UNIT HOUSING

		Type	Thread	Tightening specification	Measure
1AZ	Assembly of upper	E32/E34/E36			5 Nm

	and lower sections				
2AZ	Center section to body	E32/E34			3 Nm
3AZ	Control unit holder in E box	E36			5 Nm
4AZ	Control unit box cover	E38/E39/E52			4 Nm
		E46			6 Nm
		E53/E36/7/E54			3 Nm
5AZ	Electronics box to firewall	E65	Plastic screw		6 Nm

COOLANT TEMPERATURE

12 62 COOLANT TEMPERATURE

TIGHTENING TORQUE SPECIFICATION - COOLANT TEMPERATURE

		Type	Thread	Tightening specification	Measure
1AZ	Temperature sensor to water flange (glow time/coolant temperature gauge)	M21			18 Nm
		M51			13 Nm
2AZ	Temperature switch (5.5 °C/17 °C) to fuel filter/cylinder head	M21			18 Nm
3AZ	Coolant temperature sensor (2- pin plug-in connection)	S38/S50			13 Nm
		S85	M12/1.52		13.5 Nm
		All/others			20 Nm
4AZ	Remote thermometer sensor (2-pin plug-in connection)	All			20 Nm
Remote thermometer sensor (4-pin plug-in connection)		M62			16 Nm
		S62	M12 x 1.5		14 Nm
5AZ	Remote thermometer sensor on coolant	S50			18 Nm

	flange				
6AZ	Temperature sensor - air	S38/S50			13 Nm
7AZ	Temperature sensor - oil	S38/S50			13 Nm

ELECTRONICS BOX, WIRING HARNESS (N54, N52K)

12 90 ELECTRONICS BOX, WIRING HARNESS (N54, N52K)

TIGHTENING TORQUE SPECIFICATION - ELECTRONICS BOX, WIRING HARNESS (N54, N52K)

		Type	Thread	Tightening specification	Measure
1AZ	Electronics box lid to electronics box	N54/N52K			5 Nm
2AZ	Earth cable to cylinder head cover	N52K/N54	M5		5 Nm
3AZ	Earth cable to holder, electric coolant pump	N52K/N54	M8	Replace aluminium screw Jointing torque Torque angle	 8 Nm 45 °
4AZ	Cable duct to cylinder head cover	N54	M6		8 Nm

ENGINE OIL PRESSURE, ENGINE OIL TEMPERATURE, OIL CONDITION DISPLAY

12 61 ENGINE OIL PRESSURE, ENGINE OIL TEMPERATURE, OIL CONDITION DISPLAY

TIGHTENING TORQUE SPECIFICATION - ENGINE OIL PRESSURE, ENGINE OIL TEMPERATURE, OIL CONDITION DISPLAY

		Type	Thread	Tightening specification	Measure
1AZ	Engine oil pressure switch/engine oil temperature sensor	N52K/N54	M12x1.5	 Jointing torque Torque angle	 20 Nm 16 °
2AZ	Oil condition sensor for engine oil	N52K/N54	M6	Jointing torque 2 Nm	8.5 Nm

GOVERNOR

12 32 GOVERNOR

TIGHTENING TORQUE SPECIFICATION - GOVERNOR

		Type	thread	tightening specification	Value
1AZ	Regulator switch	All	M4		2 Nm
		All	M5		4 Nm

OIL PRESSURE, OIL TEMPERATURE, OIL LEVEL DISPLAY

12 61 OIL PRESSURE, OIL TEMPERATURE, OIL LEVEL DISPLAY

TIGHTENING TORQUE SPECIFICATION - OIL PRESSURE, OIL TEMPERATURE, OIL LEVEL DISPLAY

		Type	Thread	Tightening specification	Measure
1AZ	Oil-pressure switch/oil-temperature switch	All	M12x1.5		27 Nm
2AZ	Level switch for engine oil	N62/N73/M67TU		Jointing torque 2 Nm	8.5 Nm
3AZ	Oil pressure switch	N46	M12 x 1.5		27 Nm
4AZ	Level sensor to oil sump	N46	M6		9 Nm

SENDERS FOR CONTROL UNIT

12 72 SENDERS FOR CONTROL UNIT

TIGHTENING TORQUE SPECIFICATION - SENDERS FOR CONTROL UNIT

		Type	Thread	Tightening specification	Measure
1AZ	Lever to pedal value sender	E32/E34/E31/E36			9 Nm
2AZ	Pedal value sender to pedal console	E32/E34/E31			5 Nm

SPARK PLUGS

12 12 SPARK PLUGS

TIGHTENING TORQUE SPECIFICATION - SPARK PLUGS

		Type	Thread	Tightening specification	Measure
1AZ	Spark plugs (ungreased)	All	M12x1.25		23 ± 3 Nm
		All	M14x1.25		30 ± 3 Nm

STARTER LINE

12 42 STARTER LINE

TIGHTENING TORQUE SPECIFICATION - STARTER LINE

		Type	Thread	Tightening specification	Measure
1AZ	Starter line to jump-start connection point	N52, N52K, N51, N53	M8		19 Nm
2AZ	Starter line to jump-start connection point	E70/N52K	M8		13 Nm

STARTER MOTOR WITH MOUNTING

12 41 STARTER MOTOR WITH MOUNTING

TIGHTENING TORQUE SPECIFICATION - STARTER MOTOR WITH MOUNTING

		Type	Thread	Tightening specification	Measure
1AZ	Starter motor mounting to crankcase	N52K	M10x85	Replace screw	
				Jointing torque	20 Nm
				Torque angle	180 °
2AZ	Starter motor mounting to crankcase	N52K	M10x30	Replace screw	
				Jointing torque	20 Nm
				Torque angle	90 °

WIRES TO STARTER

12 42 WIRES TO STARTER

TIGHTENING TORQUE SPECIFICATION - WIRES TO STARTER

		Type	Thread	Tightening specification	Measure
1AZ	Battery positive terminal in/on distribution box	E32/E34/E31/E36/E46/E87/E90/E85/E86/E81	M8		20 Nm
		E39/M57	M8		11 Nm
		E38/M67	M8		11 Nm
		E46/M47TU	M8		11 Nm
		E60/N62	M8		15 Nm
		E65/N62/N73	M8		15 Nm
2AZ	Wiring harness on distributor	E36/M41	M8		10 Nm

ALTERNATOR LEAD

12 42 ALTERNATOR LEAD

TIGHTENING TORQUE SPECIFICATION - ALTERNATOR LEAD

	Type	Thread	Tightening specification	Measure
1AZ Battery positive lead to alternator	N54	M8		19 Nm
2AZ Battery positive lead to starter	N54	M8		13 Nm
3AZ Battery positive lead to battery positive terminal	N54	M8	Flange nut	15 Nm

ALTERNATOR WITH DRIVE AND MOUNTING PARTS

12 31 ALTERNATOR WITH DRIVE AND MOUNTING PARTS

TIGHTENING TORQUE SPECIFICATION - ALTERNATOR WITH DRIVE AND MOUNTING PARTS

	Type	Thread	Tightening specification	Measure
1AZ Wires to alternator				
Terminal D+	M10/M20			5 Nm
	All/others	M6		7 Nm
Terminal B+	S38/B38			8 Nm
	All/others	M8		13 Nm
2AZ Pulley	All			45 Nm
3AZ Pulley (ribbed drive belt)	Alternator with cooling jacket			80 Nm
	all others			70 Nm
	N42, N46 Valeo			75 Nm
	N42, N46 Bosch			65 Nm
4AZ Rear holder	All			3.5 Nm
5AZ Fillister head screw for wire holder	All			3.5 Nm
6AZ Alternator on bearing block	M40/M42/M43/M44			43 Nm

7AZ Alternator to crankcase	N42, N46, N62	M8		21 Nm
8AZ Belt pulley (ribbed V-belt) with freewheel (Ina) fitted to Bosch and Valeo alternators	N42, N43			80 Nm

ALTERNATOR WITH DRIVE AND MOUNTING PARTS

12 31 ALTERNATOR WITH DRIVE AND MOUNTING PARTS

TIGHTENING TORQUE SPECIFICATION - ALTERNATOR WITH DRIVE AND MOUNTING PARTS

	Type	Thread	Tightening specification	Measure
1AZ Alternator to crankcase, top	N54	M8 x 85		19 Nm
1AZ Alternator to crankcase with A/C compressor carrier	N54	M8x105		19 Nm

BRACKET FOR OIL LEVEL SENSOR EARTH STRAP

12 52 BRACKET FOR OIL LEVEL SENSOR EARTH STRAP

TIGHTENING TORQUE SPECIFICATION - BRACKET FOR OIL LEVEL SENSOR EARTH STRAP

	Type	Thread	Tightening specification	Measure
1AZ Earth strap to bracket and cable bracket on transmission	N43/N45T/N51/N52/N52K/N53/N54	M6		8 Nm

CONTROL UNIT HOUSING

12 90 CONTROL UNIT HOUSING

TIGHTENING TORQUE SPECIFICATION - CONTROL UNIT HOUSING

	Type	Thread	Tightening specification	Measure
1AZ Assembly of upper and lower sections	E32/E34/E36			5 Nm
2AZ Center section to body	E32/E34			3 Nm
3AZ Control unit holder in E box	E36			5 Nm
4AZ Control unit box cover	E38/E39/E52			4 Nm
	E46			6 Nm
	E53/E36/7/E54			3 Nm
5AZ Electronics box to firewall	E65	Plastic screw		6 Nm

COOLANT TEMPERATURE

12 62 COOLANT TEMPERATURE

TIGHTENING TORQUE SPECIFICATION - COOLANT TEMPERATURE

	Type	Thread	Tightening specification	Measure
1AZ Temperature sensor to water flange (glow time/coolant temperature gauge)	M21			18 Nm
	M51			13 Nm
2AZ Temperature switch (5.5°C/17°C) to fuel filter/cylinder head	M21			18 Nm
3AZ Coolant temperature sensor (2-pin plug-in connection)	S38/S50			13 Nm
	S85	M12/1.52		13.5 Nm
	All/others			20 Nm
4AZ Remote thermometer sensor (2-pin plug-in connection)	All			20 Nm
Remote thermometer sensor (4-pin plug-in connection)	M62			16 Nm
	S62	M12 x 1.5		14 Nm
5AZ Remote thermometer sensor on coolant flange	S50			18 Nm
6AZ Temperature sensor - air	S38/S50			13 Nm
7AZ Temperature sensor - oil	S38/S50			13 Nm

ELECTRONICS BOX, WIRING HARNESS (N54, N52K)

12 90 ELECTRONICS BOX, WIRING HARNESS (N54, N52K)

TIGHTENING TORQUE SPECIFICATION - ELECTRONICS BOX, WIRING HARNESS

	Type	Thread	Tightening specification	Measure
1AZ Electronics box lid to electronics box	N54/N52K			5 Nm
2AZ Earth cable to cylinder head cover	N52K/N54	M5		5 Nm
3AZ Earth cable to holder, electric coolant pump	N52K/N54	M8	Replace aluminium screw	
			Jointing torque	8 Nm
			Torque angle	45 °
4AZ Cable duct to cylinder head cover	N54	M6		8 Nm

ENGINE OIL PRESSURE, ENGINE OIL TEMPERATURE, OIL CONDITION DISPLAY

12 61 ENGINE OIL PRESSURE, ENGINE OIL TEMPERATURE, OIL CONDITION DISPLAY

TIGHTENING TORQUE SPECIFICATION - ENGINE OIL PRESSURE, ENGINE OIL TEMPERATURE, OIL CONDITION DISPLAY

	Type	Thread	Tightening specification	Measure
1AZ Engine oil pressure switch/engine oil temperature sensor	N52K/N54	M12x1.5		
			Jointing torque	20 Nm
			Torque angle	16 °
2AZ Oil condition sensor for engine oil	N52K/N54	M6	Jointing torque 2 Nm	8.5 Nm

ENGINE OIL PRESSURE, ENGINE OIL TEMPERATURE, OIL CONDITION DISPLAY

12 61 ENGINE OIL PRESSURE, ENGINE OIL TEMPERATURE, OIL CONDITION DISPLAY

TIGHTENING TORQUE SPECIFICATION - ENGINE OIL PRESSURE, ENGINE OIL TEMPERATURE, OIL CONDITION DISPLAY

	Type	Thread	Tightening specification	Measure
1AZ Engine oil pressure switch	N54	M12x1.5	1. Tightening 2. Further angle of rotation	20 Nm 16°±2°
2AZ Oil condition sensor	N54	M6		8 Nm

GOVERNOR

12 32 GOVERNOR

TIGHTENING TORQUE SPECIFICATION - GOVERNOR

	Type	thread	tightening specification	Value
1AZ Regulator switch	All	M4		2 Nm
	All	M5		4 Nm

OIL PRESSURE, OIL TEMPERATURE, OIL LEVEL DISPLAY

12 61 OIL PRESSURE, OIL TEMPERATURE, OIL LEVEL DISPLAY

TIGHTENING TORQUE SPECIFICATION - OIL PRESSURE, OIL TEMPERATURE, OIL LEVEL DISPLAY

	Type	Thread	Tightening specification	Measure
1AZ Oil-pressure switch/oil-temperature switch	All	M12x1.5		27 Nm
2AZ Level switch for engine oil	N62/N73/M67TU		Jointing torque 2 Nm	8.5 Nm
3AZ Oil pressure switch	N46	M12 x 1.5		27 Nm
4AZ Level sensor to oil sump	N46	M6		9 Nm

SENDERS FOR CONTROL UNIT

12 72 SENDERS FOR CONTROL UNIT

TIGHTENING TORQUE SPECIFICATION - SENDERS FOR CONTROL UNIT

	Type	Thread	Tightening specification	Measure
1AZ Lever to pedal value sender	E32/E34/E31/E36			9 Nm
2AZ Pedal value sender to pedal console	E32/E34/E31			5 Nm

SPARK PLUGS

12 12 SPARK PLUGS

TIGHTENING TORQUE SPECIFICATION - SPARK PLUGS

	Type	Thread	Tightening specification	Measure
1AZ Spark plugs (ungreased)	All	M12x1.25		23 ± 3 Nm
	All	M14x1.25		30 ± 3 Nm

STARTER MOTOR WITH MOUNTING

12 41 STARTER MOTOR WITH MOUNTING

TIGHTENING TORQUE SPECIFICATION - STARTER MOTOR WITH MOUNTING

	Type	Thread	Tightening specification	Measure
1AZ Starter to crankcase	N54	M10x30		38 Nm
2AZ Starter to transmission housing	N54	M10x85		38 Nm

WIRES TO STARTER

12 42 WIRES TO STARTER

TIGHTENING TORQUE SPECIFICATION - WIRES TO STARTER

	Type	Thread	Tightening specification	Measure
1AZ Battery positive terminal in/on distribution box	E32/E34/E31/E36/E46/E87/E90/E85/E86/E81	M8		20 Nm
	E39/M57	M8		11 Nm
	E38/M67	M8		11 Nm
	E46/M47TU	M8		11 Nm
	E60/N62	M8		15 Nm
	E65/N62/N73	M8		15 Nm
2AZ Wiring harness on distributor	E36/M41	M8		10 Nm

1.0 GENERAL INFORMATION

Detachable joints such as exhaust manifold bolts and exhaust system flange connections can be treated with a grease able to withstand high temperatures and corrosive conditions.

Use Copper Paste (former BMW Part No. 81 22 9 400 794).

BMW PART NUMBER SPECIFICATION

3M	Part No. 8945
CRC	Part No. 3046010

1800 EXHAUST SYSTEM, COMPLETE

18 00 020 REMOVING AND INSTALLING COMPLETE EXHAUST SYSTEM (N52K)

WARNING: Scalding hazard!
Only perform this work after engine has cooled down.
Danger of injury!
Removal of the exhaust system must be carried out with the assistance of a second person.

Necessary preliminary tasks

- Remove **REINFORCEMENT PLATE** from rear axle
- Remove left **TENSION STRUT** on rear axle

Support exhaust system with special tool 31 2 220.

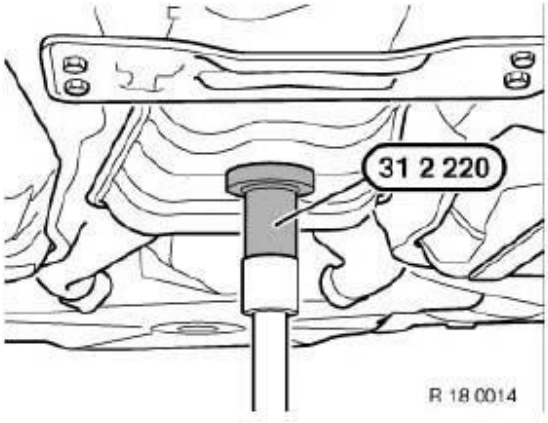


Fig. 1: Support Exhaust System With Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **18 31 1AZ** .

Remove holder (2).

Installation:

Replace seals.

Replace self-locking nuts.

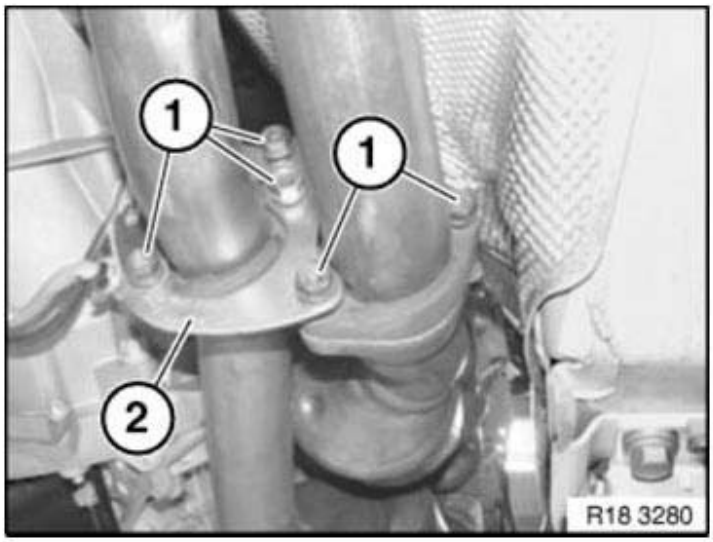


Fig. 2: Identifying Nuts And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew screws (1) and (2).

Tightening torque **18 31 2AZ** .

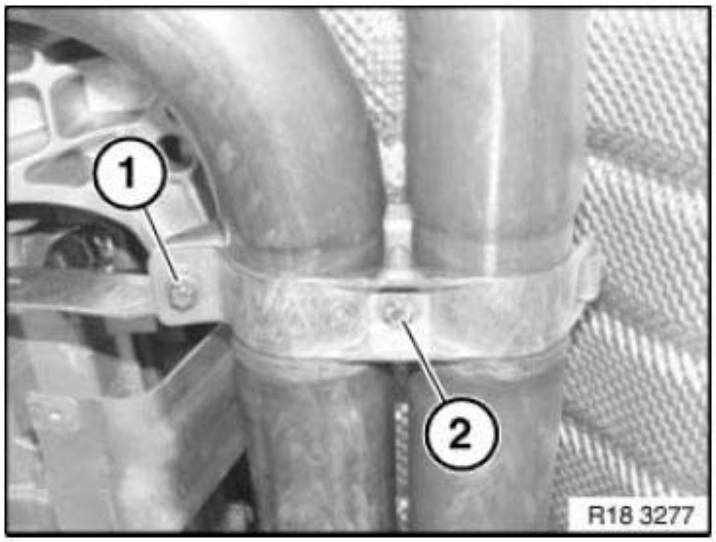


Fig. 3: Identifying Bracket With Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on rubber mount.

Tightening torque **18 31 3AZ** .

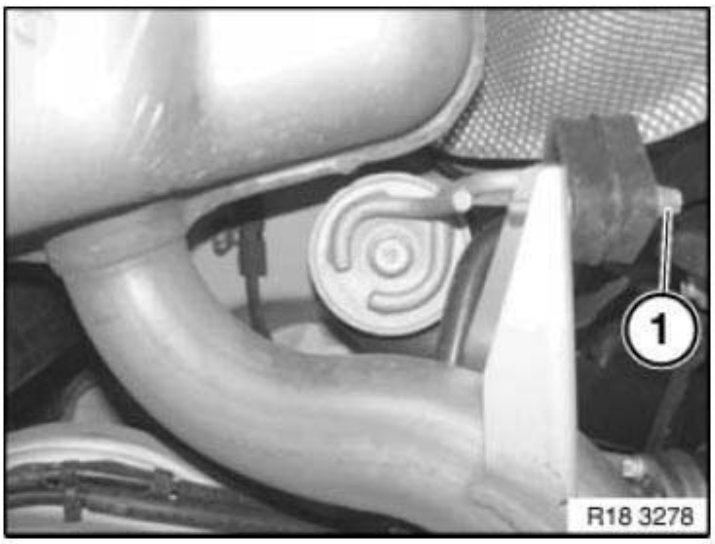


Fig. 4: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **18 31 4AZ** .

Lower and remove exhaust system with assistance of a second person.

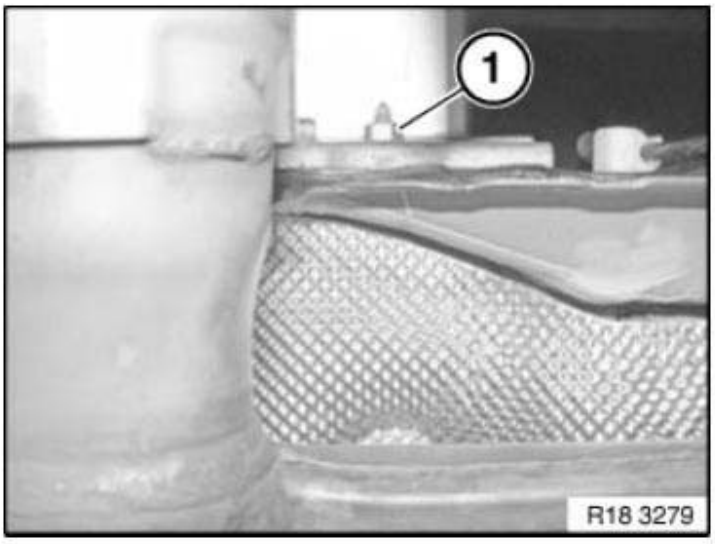


Fig. 5: Identifying Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check rubber mount for damage.

If necessary, replace damaged rubber mounts.

Check exhaust system for leaks.

1810 MUFFLERS, DIESEL

18 12 040 REPLACING FRONT SILENCER (N52K)

WARNING: Scalding hazard!
Only perform these tasks on an engine that has cooled down.

Support front silencer with special tool 31 2 220.

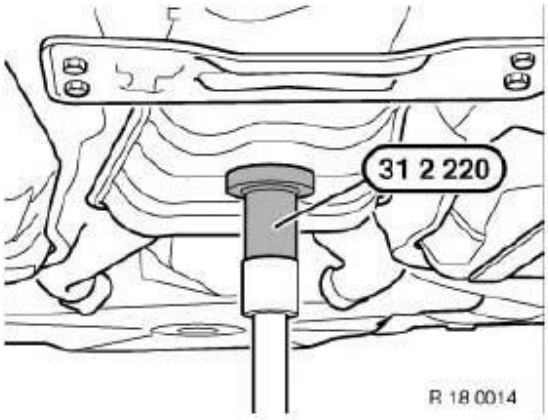


Fig. 6: Support Front Silencer With Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the cutting line is not marked by a punch mark in the pipe, determine the cutting line by means of the pipe length on the new front silencer.
Carry over cutting line to faulty front silencer and mark.
Cut through exhaust pipes at marked point with a suitable tool.

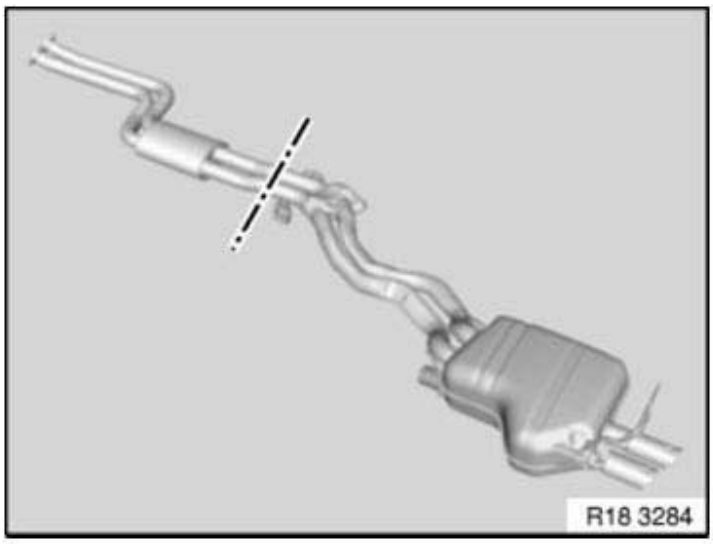


Fig. 7: Cutting Exhaust Pipes Through Marked Point Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **18 31 1AZ** .

Remove holder (2).

Installation:

Replace self-locking nuts.

Replace seal.

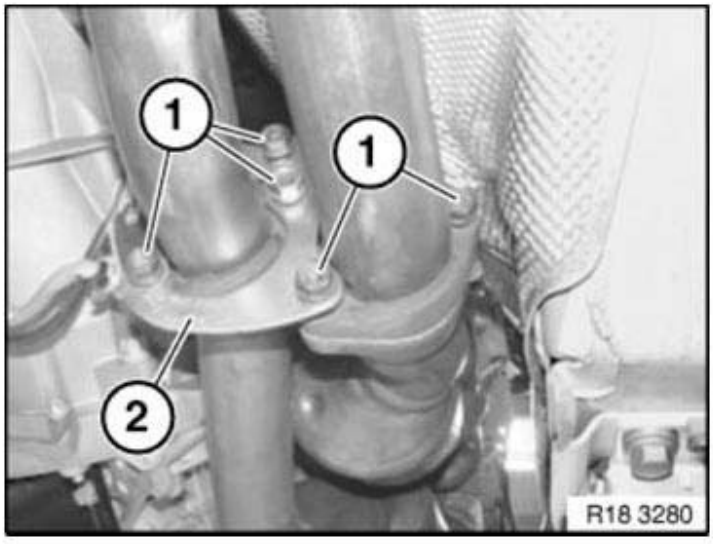


Fig. 8: Identifying Self-Locking Nuts And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew screws (1) and (2).

Tightening torque **18 31 2AZ** .

Lower and remove front silencer with assistance of a second person.

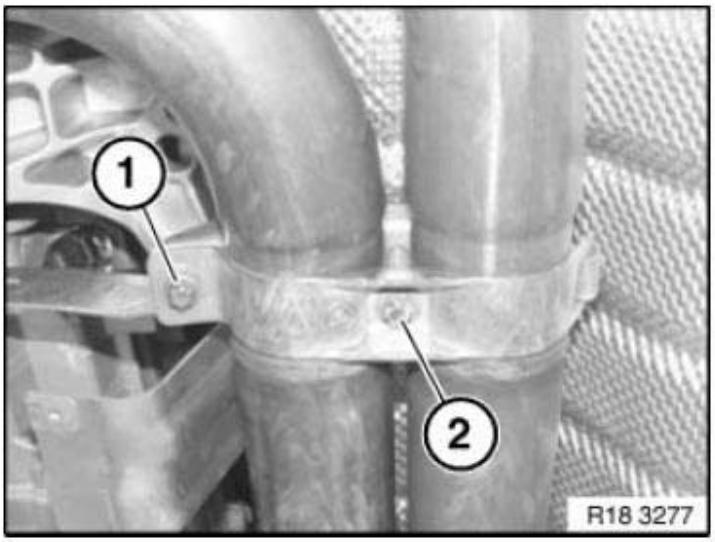


Fig. 9: Identifying Bracket With Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Align front silencer to rear silencer and connect with clamps.

Centre clamp and tighten down.

Tightening torque **18 31 5AZ** .

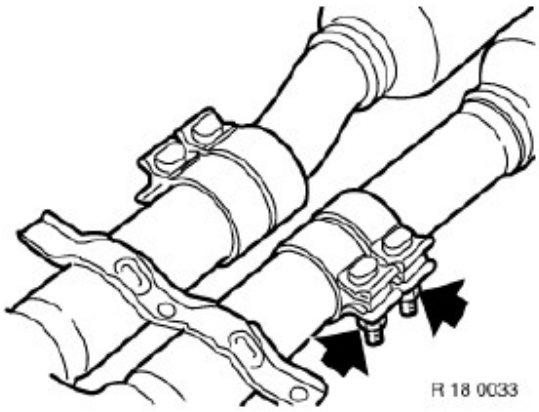


Fig. 10: Locating Clamps Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

18 10 031 REPLACING REAR SILENCER (N52K)

WARNING: Scalding hazard!
Only perform these tasks on an engine that has cooled down.

Necessary preliminary tasks

- Remove **REINFORCEMENT PLATE** from rear axle
- Remove left **TENSION STRUT** on rear axle

Support rear silencer with special tool 31 2 220.

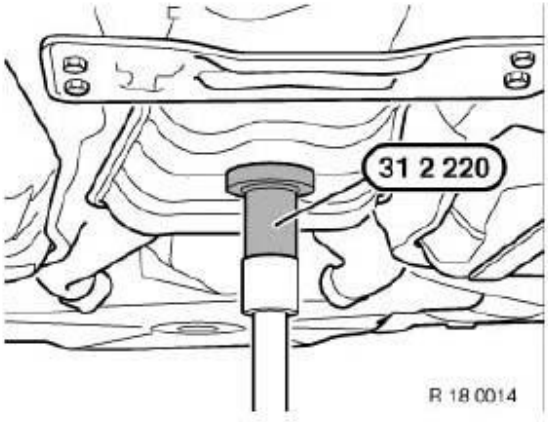


Fig. 11: Support Rear Silencer With Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **If the cutting line is not marked by a punch mark in the pipe, determine the cutting line by means of the pipe length on the new rear silencer.**
Carry over cutting line to faulty rear silencer and mark.
Cut through exhaust pipes at marked point with a suitable tool.

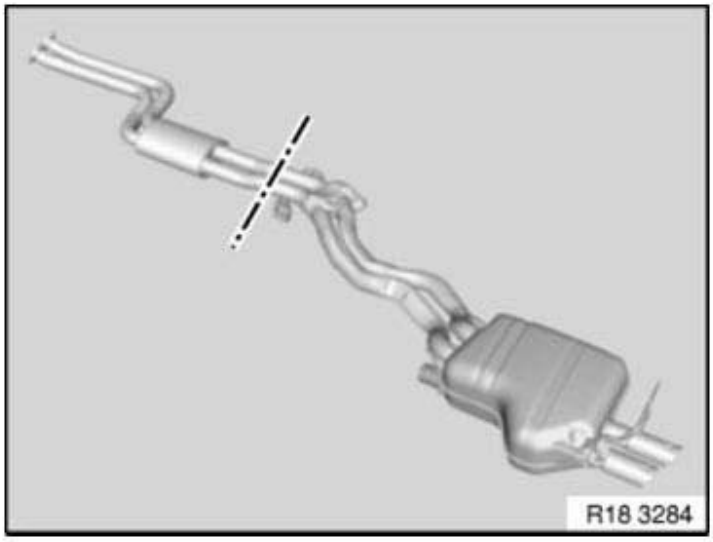


Fig. 12: Cutting Exhaust Pipes Through Marked Point Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten nut.

Tightening torque **18 31 3AZ** .

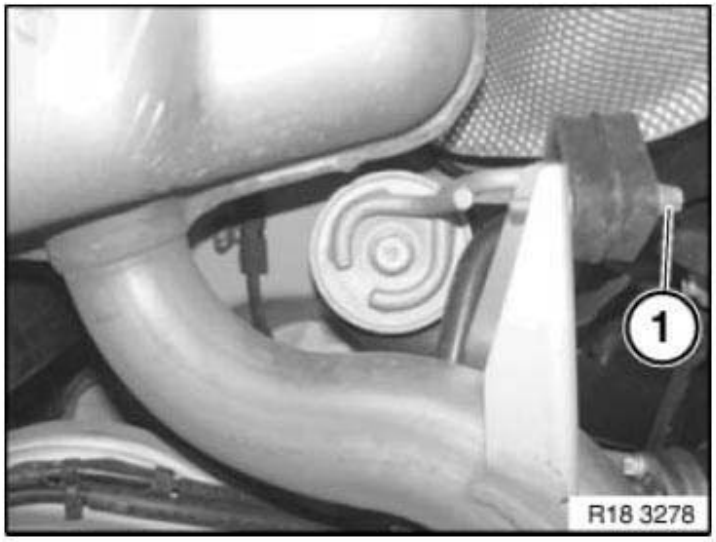


Fig. 13: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **18 31 4AZ** .

Lower and remove rear silencer with assistance of a second person.

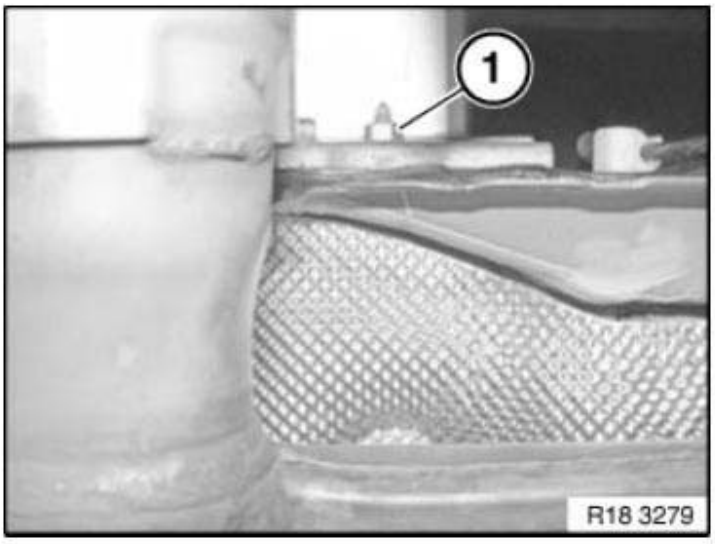


Fig. 14: Identifying Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect front silencer to rear silencer by means of clamp and align.

Centre clamp and tighten down.

Tightening torque **18 31 5AZ** .

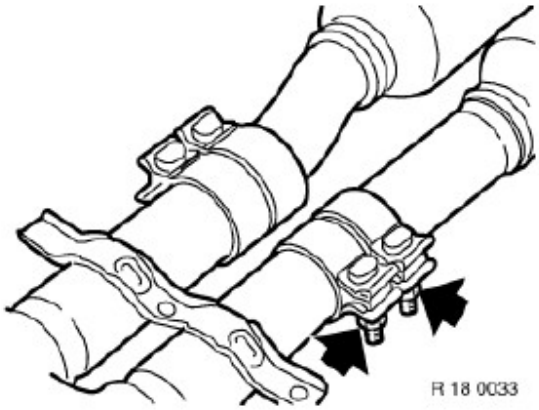


Fig. 15: Locating Clamps Bolts

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

Check rubber mount for damage.

If necessary, replace damaged rubber mounts.

1812 MUFFLERS, PETROL

18 12 040 REPLACING FRONT SILENCER (N52K)

WARNING: Scalding hazard!
Only perform these tasks on an engine that has cooled down.

Support front silencer with special tool 31 2 220.

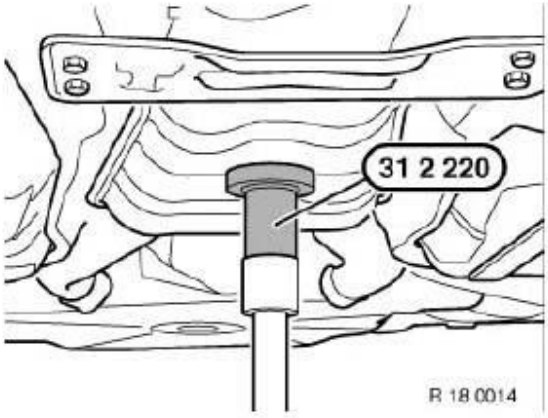


Fig. 16: Support Front Silencer With Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the cutting line is not marked by a punch mark in the pipe, determine the cutting line by means of the pipe length on the new front silencer.
Carry over cutting line to faulty front silencer and mark.
Cut through exhaust pipes at marked point with a suitable tool.

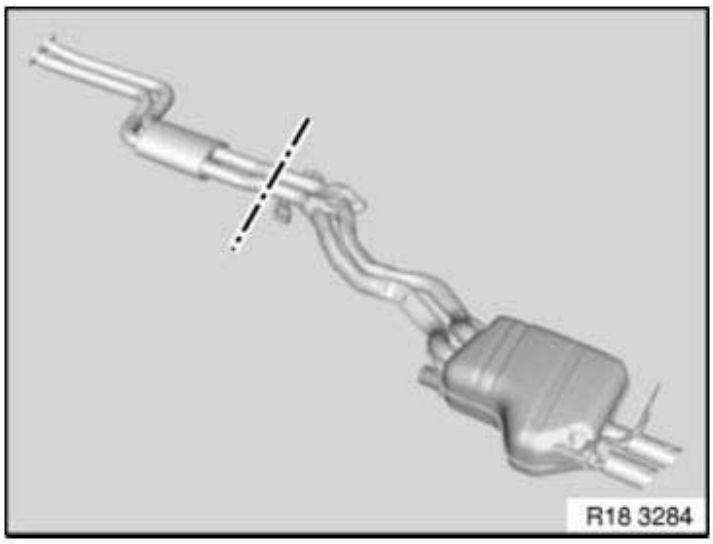


Fig. 17: Cutting Exhaust Pipes Through Marked Point Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **18 31 1AZ** .

Remove holder (2).

Installation:

Replace self-locking nuts.

Replace seal.

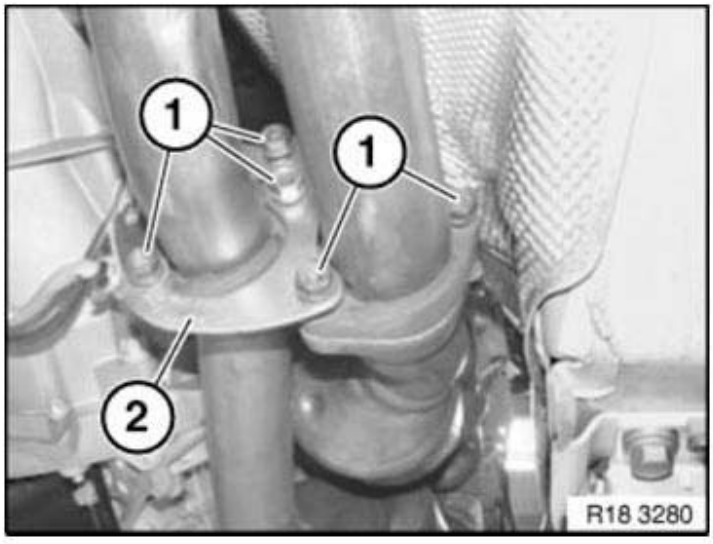


Fig. 18: Identifying Self-Locking Nuts And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew screws (1) and (2).

Tightening torque **18 31 2AZ** .

Lower and remove front silencer with assistance of a second person.

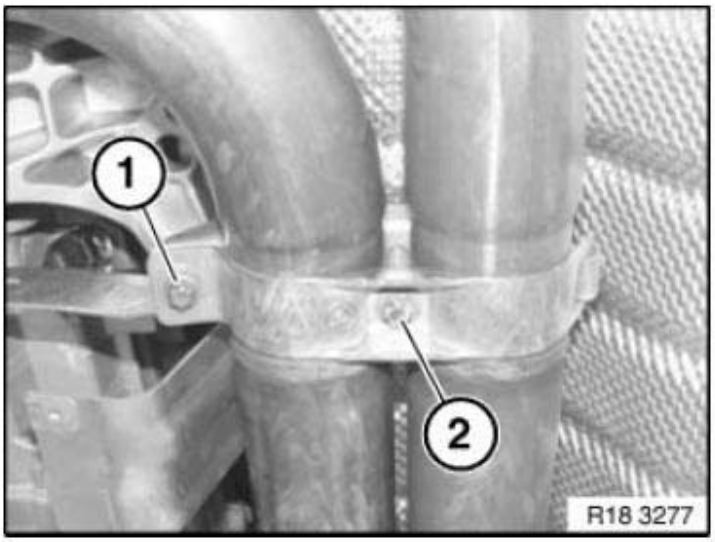


Fig. 19: Identifying Bracket With Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Align front silencer to rear silencer and connect with clamps.

Centre clamp and tighten down.

Tightening torque **18 31 5AZ** .

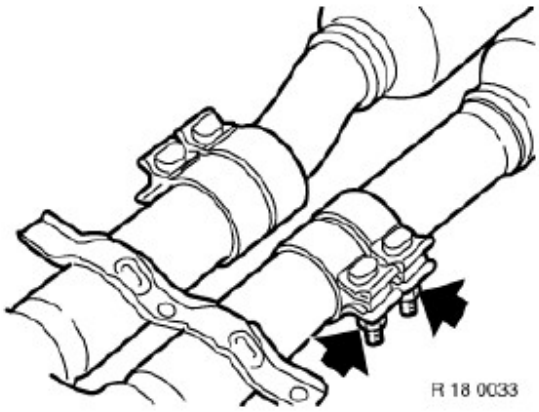


Fig. 20: Locating Clamps, Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

18 10 031 REPLACING REAR SILENCER (N52K)

WARNING: Scalding hazard!
Only perform these tasks on an engine that has cooled down.

Necessary preliminary tasks

- Remove **REINFORCEMENT PLATE** from rear axle
- Remove left **TENSION STRUT** on rear axle

Support rear silencer with special tool 31 2 220.

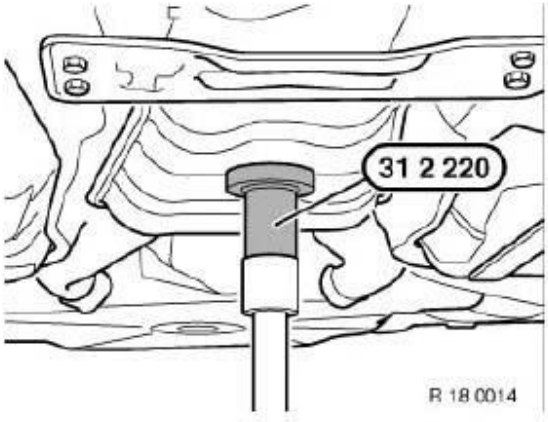


Fig. 21: Support Rear Silencer With Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **If the cutting line is not marked by a punch mark in the pipe, determine the cutting line by means of the pipe length on the new rear silencer.**
Carry over cutting line to faulty rear silencer and mark.
Cut through exhaust pipes at marked point with a suitable tool.

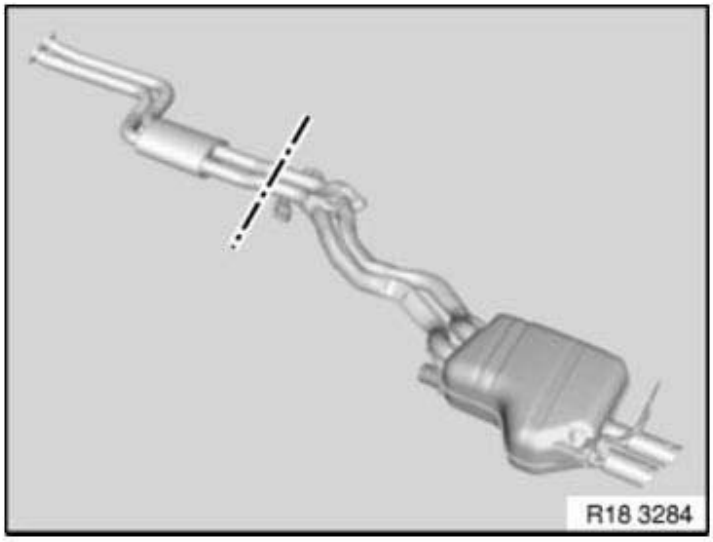


Fig. 22: Cutting Exhaust Pipes Through Marked Point Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten nut.

Tightening torque **18 31 3AZ** .

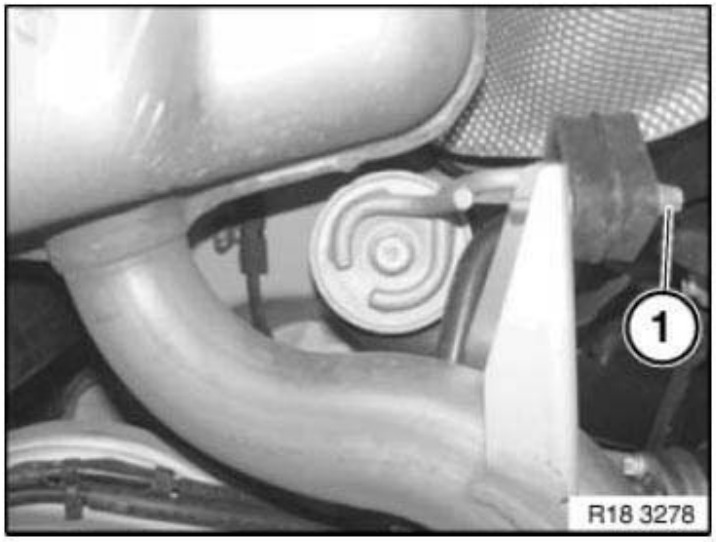


Fig. 23: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **18 31 4AZ** .

Lower and remove rear silencer with assistance of a second person.

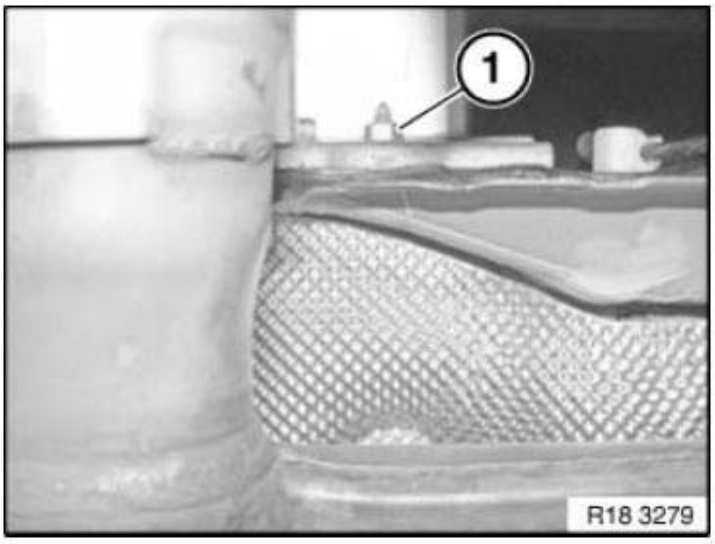


Fig. 24: Identifying Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect front silencer to rear silencer by means of clamp and align.

Centre clamp and tighten down.

Tightening torque **18 31 5AZ** .

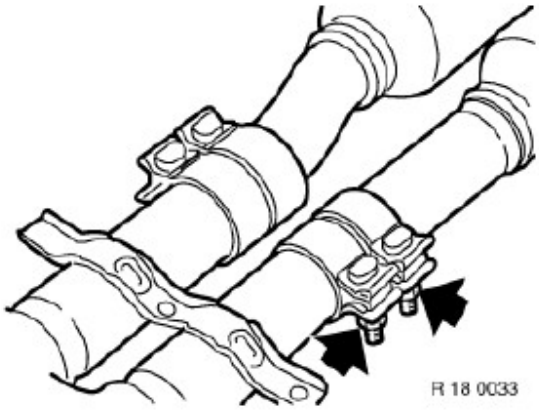


Fig. 25: Locating Clamps Bolts

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Check exhaust system for leaks.**
Check rubber mount for damage.
If necessary, replace damaged rubber mounts.

1840 EXHAUST MANIFOLD WITH INTEGRATED CATALYTIC CONVERTER

18 40 050 REMOVING AND INSTALLING/REPLACING FRONT EXHAUST MANIFOLD (N52K)

WARNING: **Risk of injury!**
Refrigerant circuit is under high pressure!
Follow safety instructions for handling refrigerant See 6450... INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A or 6450... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT R134A .
Avoid contact with refrigerant and refrigerant oil
Follow safety instructions for HANDLING REFRIGERANT OIL .

IMPORTANT: **Risk of damage!**
Restart engine only when A/C system has been correctly filled.
Follow INSTRUCTIONS for opening and replacing parts in refrigerant circuit.
If A/C system is opened for more than 24 hours:
Replace DESICCANT INSERT for A/C system.

Necessary preliminary tasks

- Remove **REAR EXHAUST MANIFOLD**
- Drain off **AIR CONDITIONING SYSTEM**

NOTE: **The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.**

Remove **CONTROL SENSOR** from cylinders 1 to 3.

Remove **MONITOR SENSOR** from cylinders 1 to 3.

Release screws (1).

Tightening torque **64 52 1AZ** .

Detach pressure and suction lines from A/C compressor.

Installation:

Replace all sealing rings and moisten with refrigerant oil.

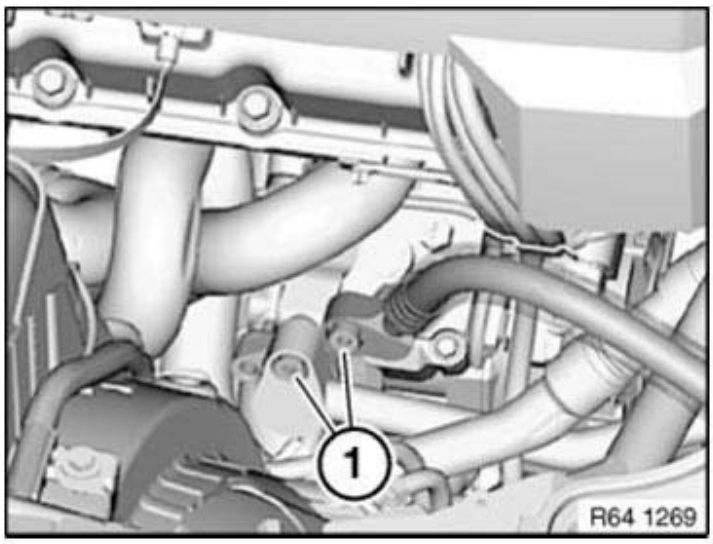


Fig. 26: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts.

Remove exhaust manifold (1).

Installation:

Clean sealing faces and replace seals.

Replace nuts.

Tightening torque **18 40 1AZ** .

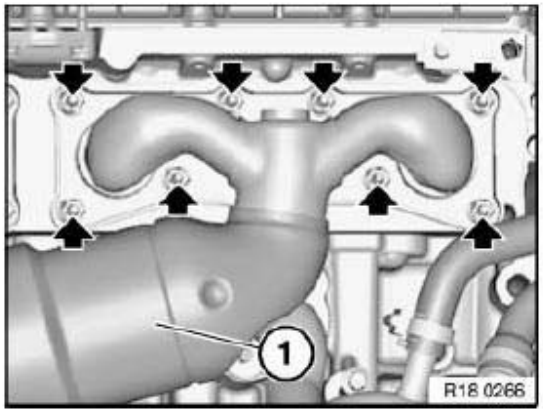


Fig. 27: Identifying Exhaust Manifold Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Evacuate and fill **A/C SYSTEM** .

Check exhaust system for leaks.

18 40 060 REMOVING AND INSTALLING/REPLACING REAR EXHAUST MANIFOLD (N52K)

Necessary preliminary tasks

- Remove right **TENSION STRUT**
- Remove front **UNDERBODY PROTECTION**
- Remove rear **UNDERBODY PROTECTION**
- Remove **COMPLETE EXHAUST SYSTEM**

NOTE: The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.

Remove **CONTROL SENSOR** from cylinders 4 to 6.

Remove **MONITOR SENSOR** from cylinders 4 to 6.

Unscrew nuts.

Remove exhaust manifold (1).

Installation:

Clean sealing faces and replace seals.

Replace nuts.

Tightening torque **18 40 1AZ** .

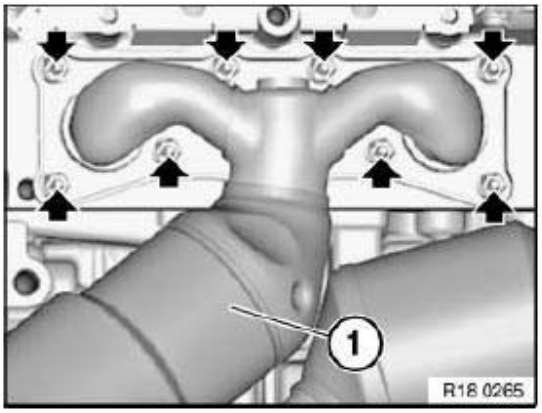


Fig. 28: Identifying Exhaust Manifold Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check exhaust system for leaks.

ENGINE

Exhaust System - Repair - Z4

1800 EXHAUST SYSTEM, COMPLETE

18 00 020 REMOVING AND INSTALLING COMPLETE EXHAUST SYSTEM (N54)

WARNING: Scalding hazard!

Only perform this work after engine has cooled down.

Risk of injury!

Removal of the exhaust system must be carried out with the assistance of a second person.

Necessary preliminary tasks

- Remove **REINFORCEMENT PLATE ON REAR AXLE** from rear axle
- Remove **LEFT OR RIGHT TENSION STRUT** on left and right from rear axle

Support exhaust system with special tool 31 2 220.

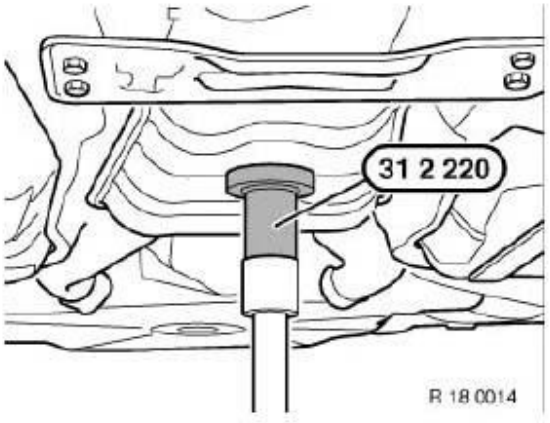


Fig. 1: Supporting Exhaust System Using Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **18 31 1AZ** .

Installation:

Replace seals.

Replace nuts (1).

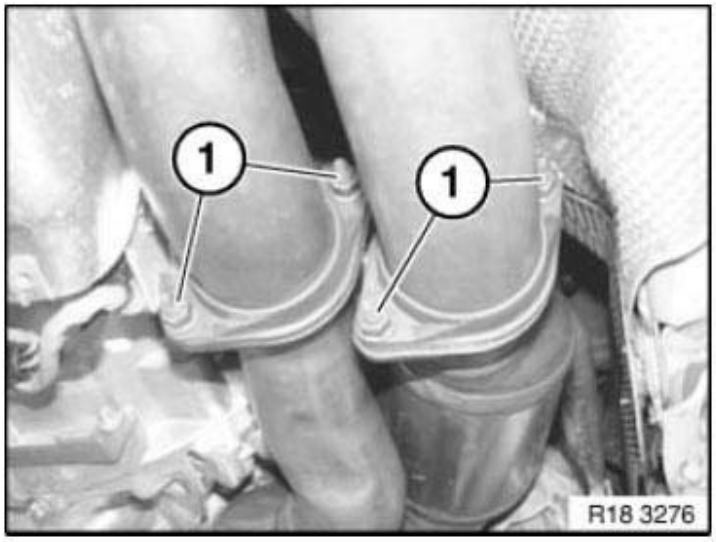


Fig. 2: Identifying Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew screws (1) and (2).

Tightening torque **18 31 2AZ** .

Remove retaining clip.

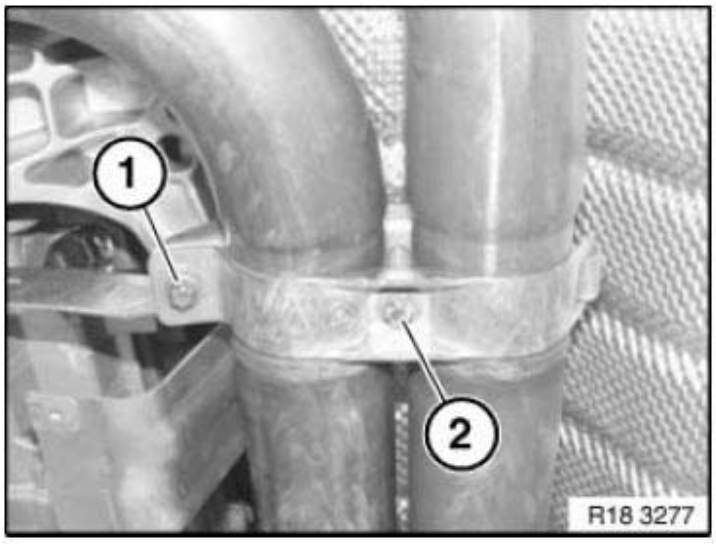


Fig. 3: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Release screw (1) on rubber mount.

Tightening torque **18 31 3AZ** .

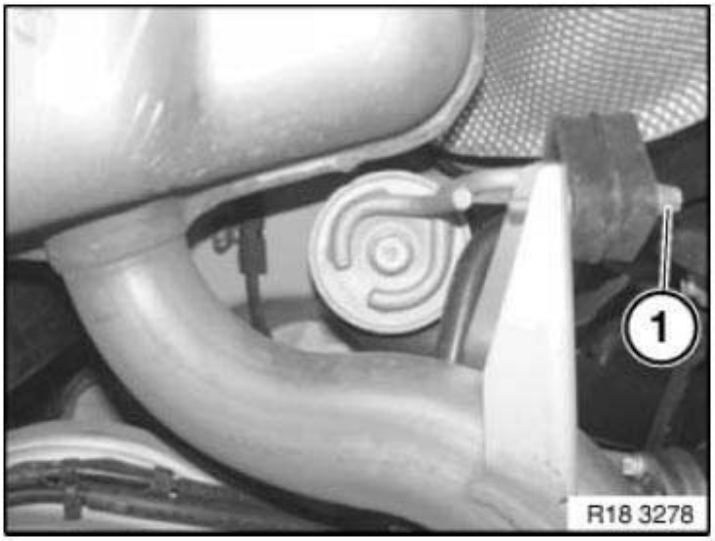


Fig. 4: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **18 31 4AZ** .

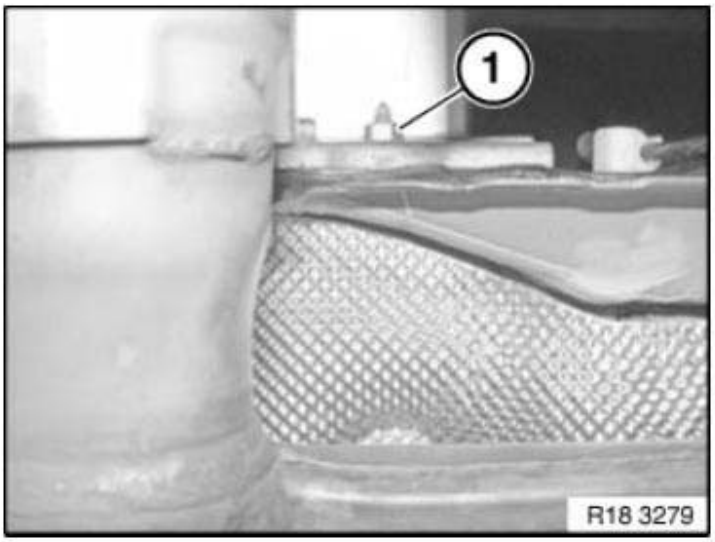


Fig. 5: Identifying Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off vacuum hose (1).

Slacken nut (2).

Tightening torque **18 31 4AZ** .

Lower and remove exhaust system with assistance of a second person.

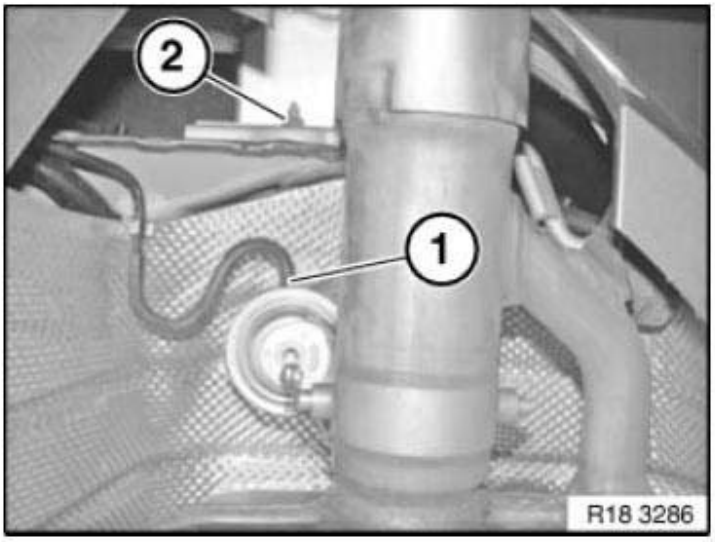


Fig. 6: Identifying Slacken Nut And Vacuum Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check rubber mount for damage.

If necessary, replace damaged rubber mounts.

Check exhaust system for leaks.

18 32 050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 1-3 (N54)

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks

- Remove front **UNDERBODY PROTECTION**
- Remove rear **UNDERBODY PROTECTION**

- Remove **EXHAUST SYSTEM**
- Release right **TIE ROD** from steering gear

NOTE: The oxygen sensors are in danger of being damaged when the catalytic exhaust-gas converters are removed and installed.

Remove CONTROL SENSOR , cylinders 1 to 3.

Remove MONITOR SENSOR from cylinders 1 to 3.

Release screws (1).

Remove guard plate (2).

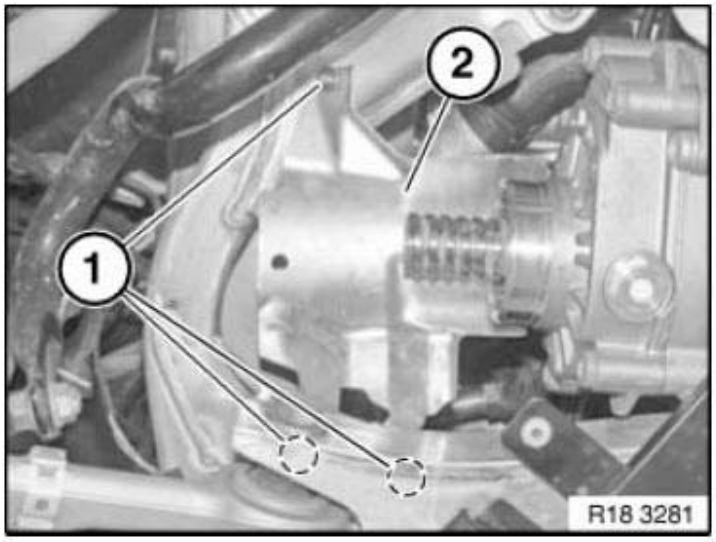


Fig. 7: Locating Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **18 20 2AZ** .

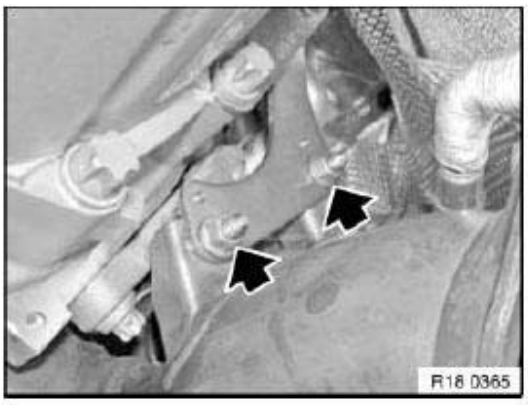


Fig. 8: Locating Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and remove holder (1).

Replace aluminium screws.

Tightening torque, manual gearbox **23 00 2AZ** .

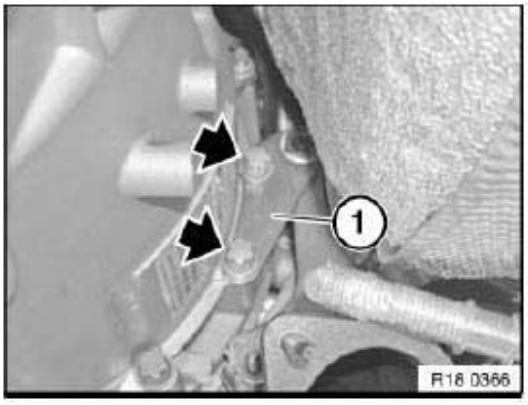


Fig. 9: Identifying Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release clamp. Clamp must be replaced each time it is released.

Tightening torque **18 31 3AZ** .

In so doing, secure catalytic converter (1) against falling out.

Feed out catalytic converter (1) and remove.

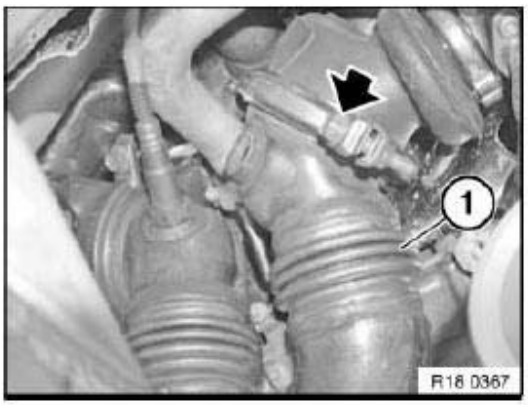


Fig. 10: Identifying Catalytic Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing face. Replace seal and clamp.

Align catalytic converter to exhaust system connecting piece and tighten down.

Add final details to vehicle.

Check exhaust system for leaks.

18 32 060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 4-6 (N54)

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks

- Remove **CATALYTIC CONVERTER** for cylinders 1-3

NOTE: The oxygen sensors are in danger of being damaged when the catalytic exhaust-gas converters are removed and installed.

Remove CONTROL SENSOR , cylinders 4 to 6.

Remove MONITOR SENSOR from cylinders 4 to 6.

Release clamp. Clamp must be replaced each time it is released.

Tightening torque **18 31 3AZ** .

In so doing, secure catalytic converter (1) against falling out.

Feed out catalytic converter (1) and remove.

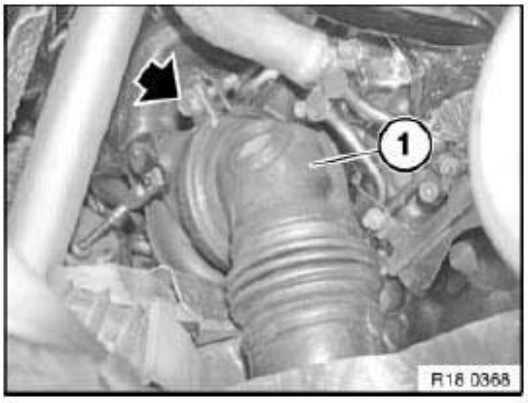


Fig. 11: Identifying Catalytic Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing face. Replace seal and clamp.

Align catalytic converter to exhaust system connection flange and tighten down.

Check exhaust system for leaks.

Add final details to vehicle.

1810 MUFFLERS, DIESEL

18 32 085 REPLACE BOTH EXHAUST PIPES WITH CATALYTIC CONVERTERS (N54)

WARNING: Scalding hazard!

Only perform these tasks on an engine that has cooled down.

Support front silencer with special tool 31 2 220 and secure against falling out.

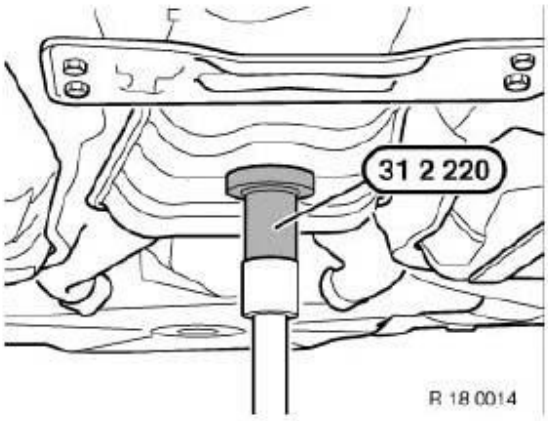


Fig. 12: Supporting Exhaust System Using Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the cutting line is not marked by a punch mark in the pipe, determine the cutting line by means of the pipe length on the new front silencer.

Carry over cutting line to faulty front silencer and mark.

Cut through exhaust pipes at marked point with a suitable tool.

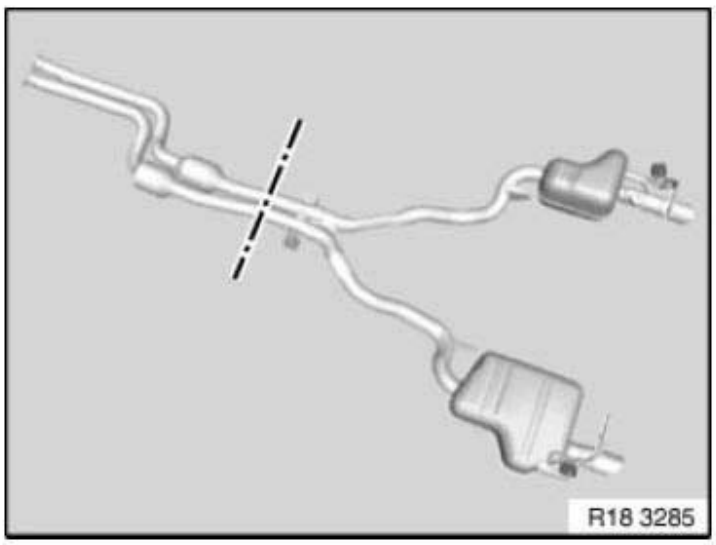


Fig. 13: Cutting Exhaust Pipes Through Marked Point Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **18 31 1AZ** .

Replace self-locking nuts.

Replace seals.

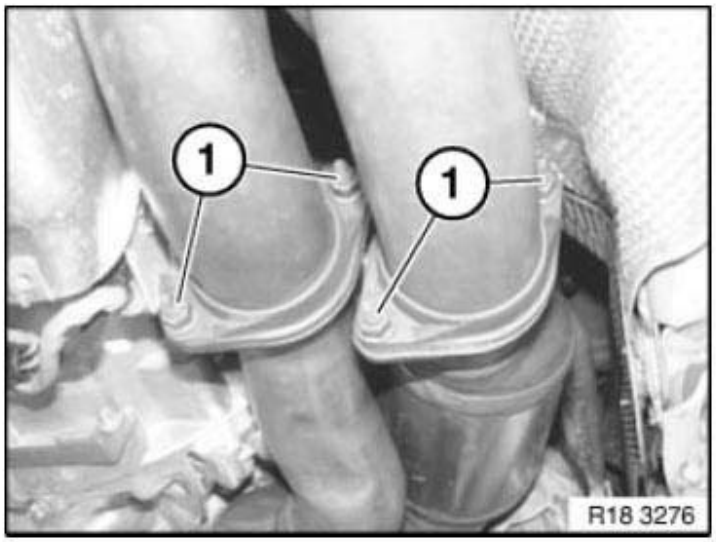


Fig. 14: Identifying Self-Locking Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt and remove bracket (1).

Tightening torque **18 31 2AZ** .

Lower and remove front silencer with assistance of a second person.

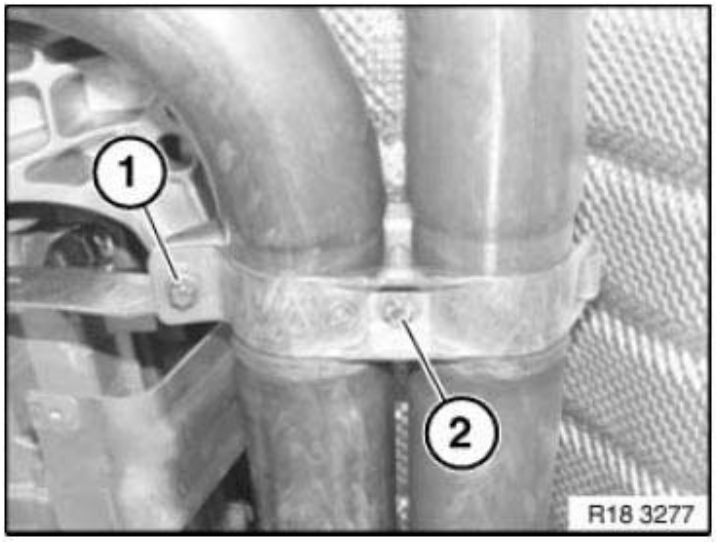


Fig. 15: Identifying Bracket With Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect front silencer to rear silencer by means of clamp and align.

Centre clamp and tighten down.

Tightening torque **18 20 3AZ** .

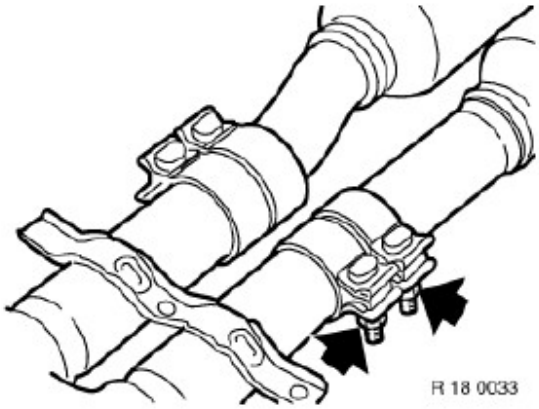


Fig. 16: Locating Clamps Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

18 10 034 REPLACING BOTH REAR SILENCERS

WARNING: Scalding hazard!

Only perform these tasks on an engine that has cooled down.

Necessary preliminary tasks

- Remove **REINFORCEMENT PLATE ON REAR AXLE** from rear axle
- Remove **LEFT OR RIGHT TENSION STRUT** on left and right from rear axle

Support rear silencer with special tool 31 2 220.

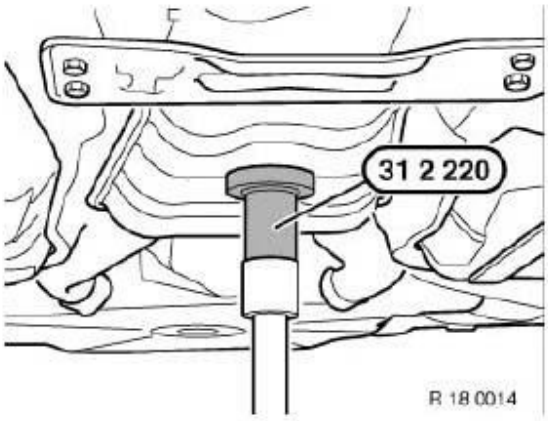


Fig. 17: Supporting Rear Silencer Using Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the cutting line is not marked by a punch mark in the pipe, determine the cutting line by means of the pipe length on the new rear silencer.

Carry over cutting line to faulty rear silencer and mark.

Cut through exhaust pipes at marked point with a suitable tool.

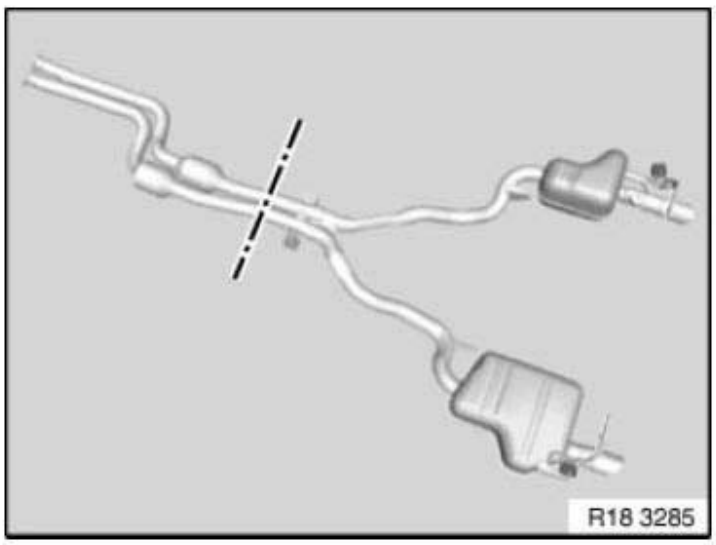


Fig. 18: Cutting Exhaust Pipes Through Marked Point Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Release screw (1) on rubber mount.

Tightening torque **18 31 4AZ** .

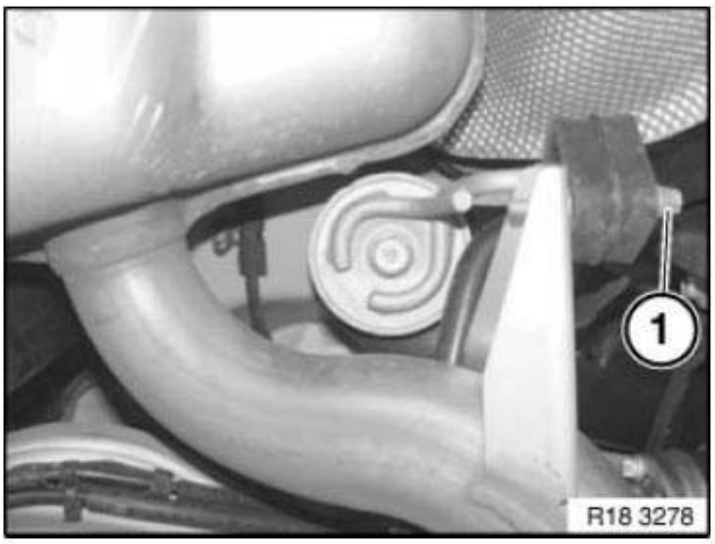


Fig. 19: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **18 31 5AZ** .

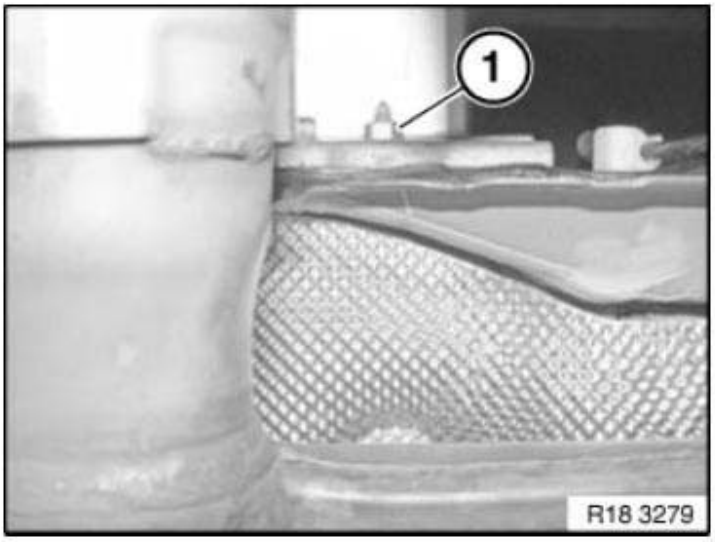


Fig. 20: Identifying Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off vacuum hose (1).

Slacken nut (2).

Tightening torque **18 31 5AZ** .

Lower and remove rear silencer with assistance of a second person.

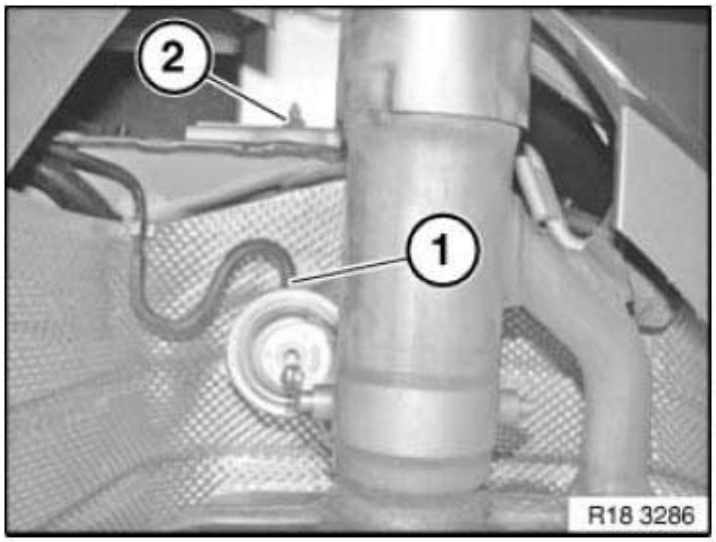


Fig. 21: Identifying Vacuum Hose And Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect front pipes to rear silencers by means of clamps and align.

Centre clamps and tighten down.

Tightening torque **18 20 3AZ** .

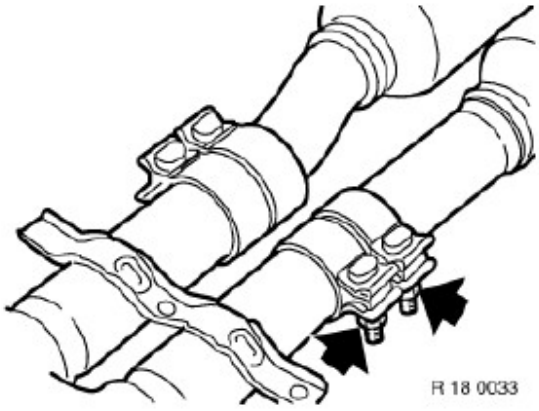


Fig. 22: Locating Clamps Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

Check rubber mount for damage.

If necessary, replace damaged rubber mounts.

1812 MUFFLERS, PETROL

18 32 085 REPLACE BOTH EXHAUST PIPES WITH CATALYTIC CONVERTERS (N54)

WARNING: Scalding hazard!

Only perform these tasks on an engine that has cooled down.

Support front silencer with special tool 31 2 220 and secure against falling out.

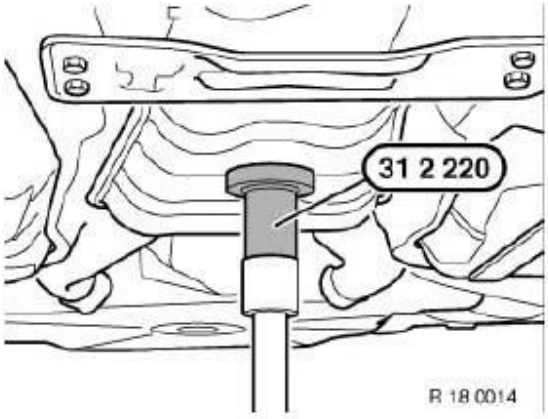


Fig. 23: Supporting Front Silencer Using Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the cutting line is not marked by a punch mark in the pipe, determine the cutting line by means of the pipe length on the new front silencer.

Carry over cutting line to faulty front silencer and mark.

Cut through exhaust pipes at marked point with a suitable tool.

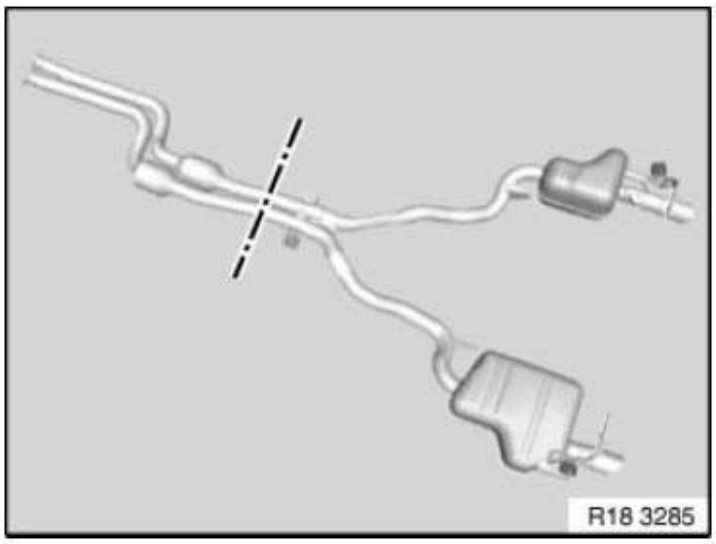


Fig. 24: Cutting Exhaust Pipes Through Marked Point Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **18 31 1AZ** .

Replace self-locking nuts.

Replace seals.

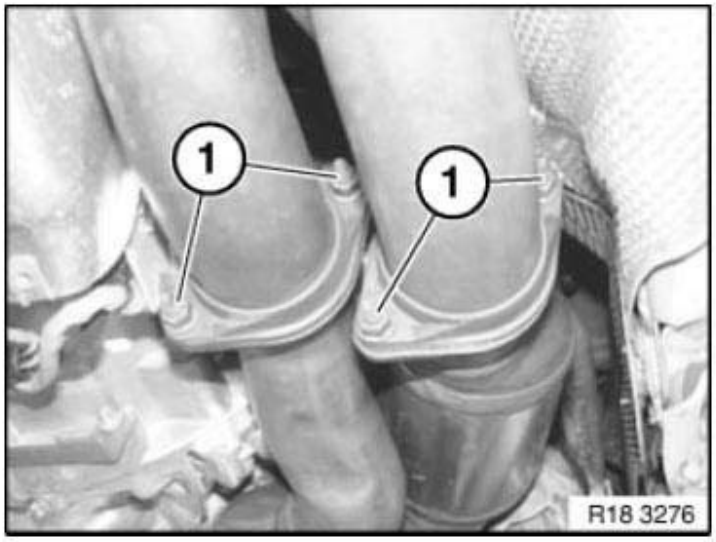


Fig. 25: Identifying Self-Locking Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt and remove bracket (1).

Tightening torque **18 31 2AZ** .

Lower and remove front silencer with assistance of a second person.

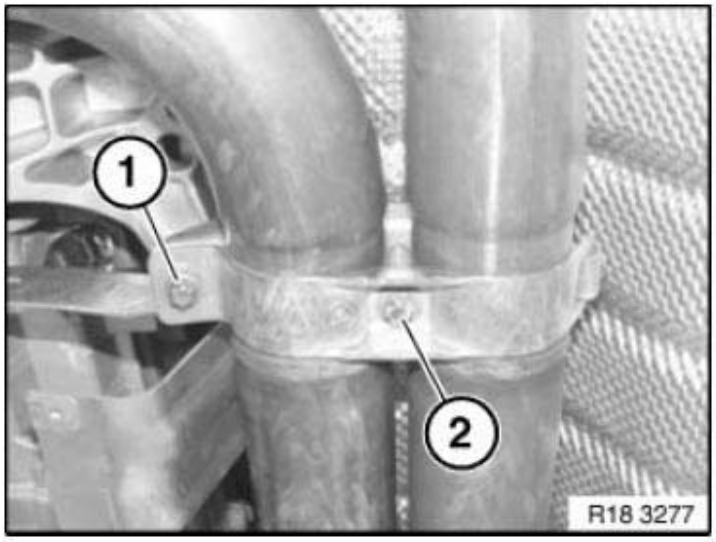


Fig. 26: Identifying Bracket With Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect front silencer to rear silencer by means of clamp and align.

Centre clamp and tighten down.

Tightening torque **18 20 3AZ** .

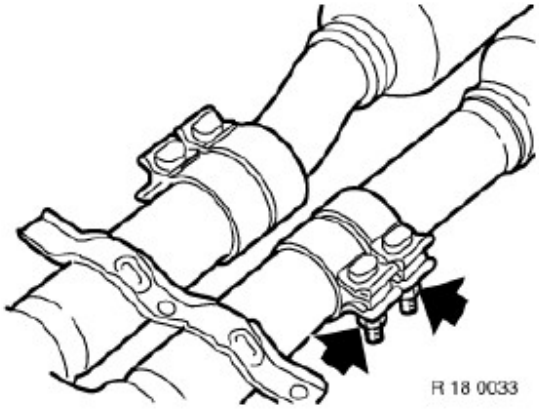


Fig. 27: Locating Clamps Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Check exhaust system for leaks.**

18 10 034 REPLACING BOTH REAR SILENCERS (N54)

WARNING: **Scalding hazard!**

Only perform these tasks on an engine that has cooled down.

Necessary preliminary tasks

- Remove **REINFORCEMENT PLATE ON REAR AXLE** from rear axle
- Remove **LEFT OR RIGHT TENSION STRUT** on left and right from rear axle

Support rear silencer with special tool 31 2 220.

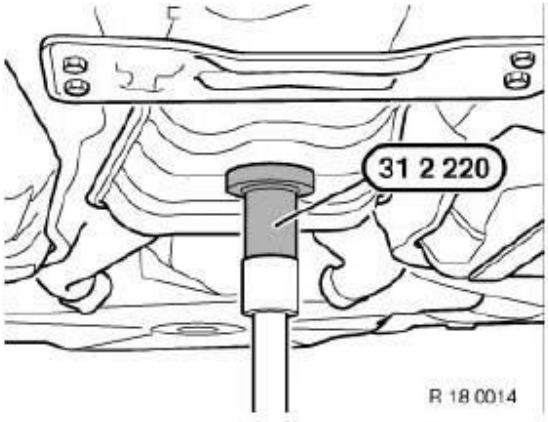


Fig. 28: Supporting Rear Silencer Using Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **If the cutting line is not marked by a punch mark in the pipe, determine the cutting line by means of the pipe length on the new rear silencer.**

Carry over cutting line to faulty rear silencer and mark.

Cut through exhaust pipes at marked point with a suitable tool.

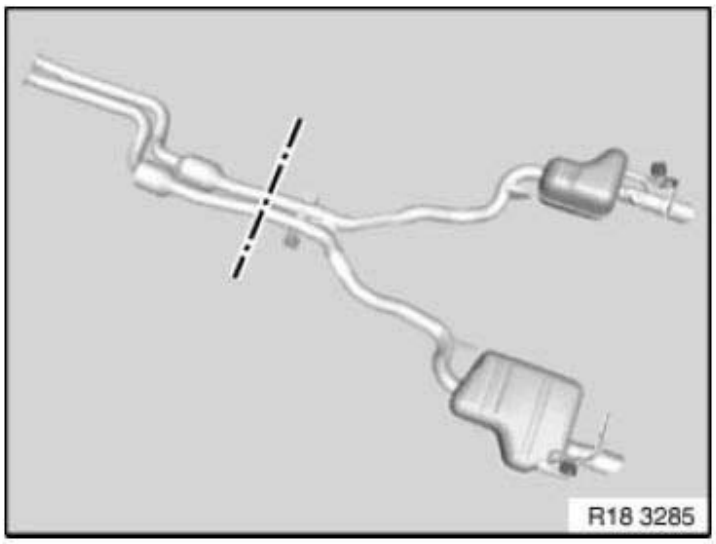


Fig. 29: Cutting Exhaust Pipes Through Marked Point Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Release screw (1) on rubber mount.

Tightening torque **18 31 4AZ** .

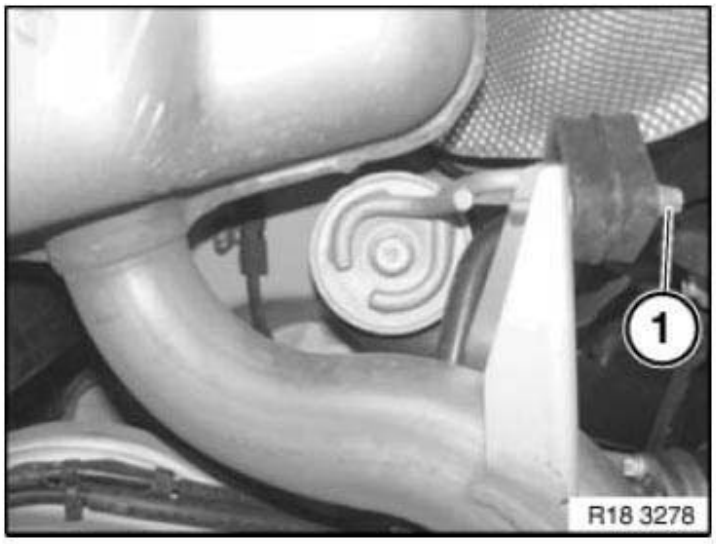


Fig. 30: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **18 31 5AZ** .

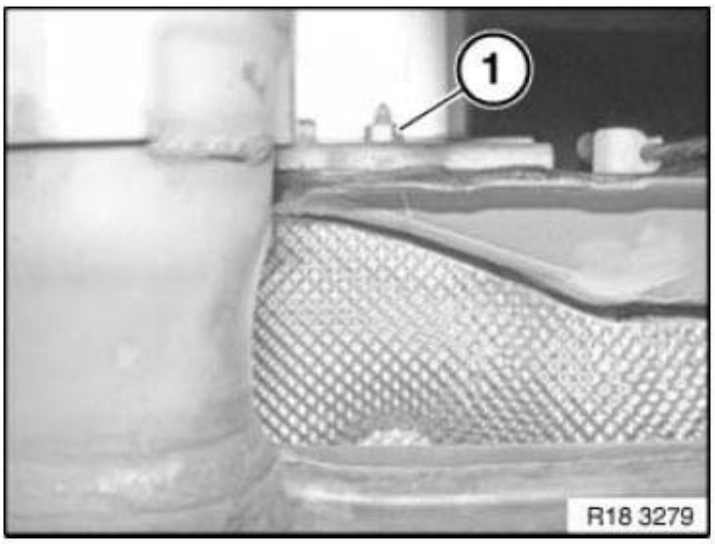


Fig. 31: Identifying Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off vacuum hose (1).

Slacken nut (2).

Tightening torque **18 31 5AZ** .

Lower and remove rear silencer with assistance of a second person.

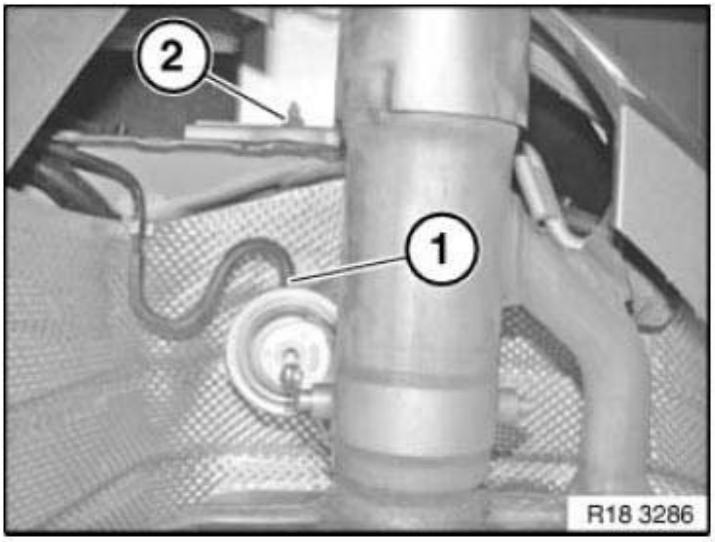


Fig. 32: Identifying Slacken Nut And Vacuum Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect front pipes to rear silencers by means of clamps and align.

Centre clamps and tighten down.

Tightening torque **18 20 3AZ** .

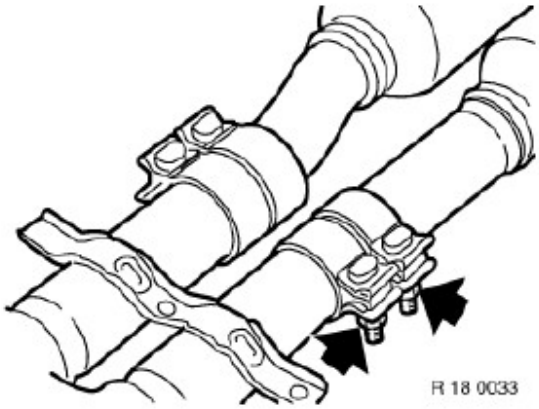


Fig. 33: Locating Clamps Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

Check rubber mount for damage.

If necessary, replace damaged rubber mounts.

1831 EXHAUST PIPE WITH MOUNTING

18 32 050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 1-3 (N54)

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks

- Remove front **UNDERBODY PROTECTION**
- Remove rear **UNDERBODY PROTECTION**
- Remove **EXHAUST SYSTEM**
- Release right **TIE ROD** from steering gear

NOTE: The oxygen sensors are in danger of being damaged when the catalytic exhaust-gas converters are removed and installed.

Remove CONTROL SENSOR , cylinders 1 to 3.

Remove MONITOR SENSOR from cylinders 1 to 3.

Release screws (1).

Remove guard plate (2).

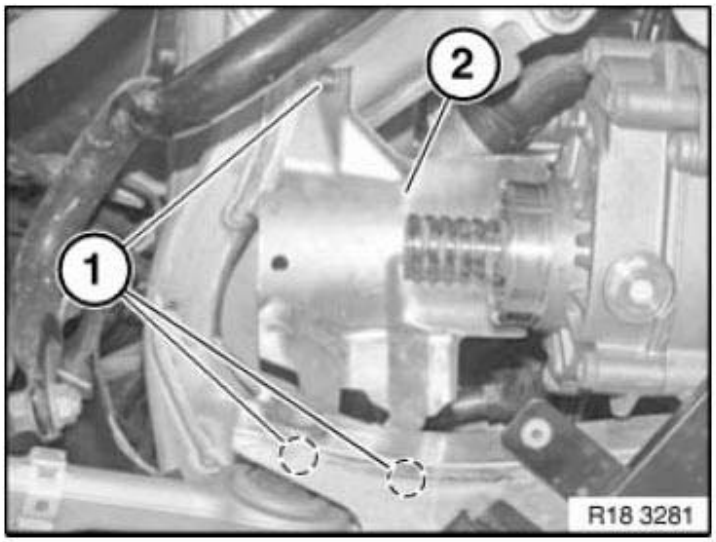


Fig. 34: Identifying Screws And Guard Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **18 20 2AZ** .

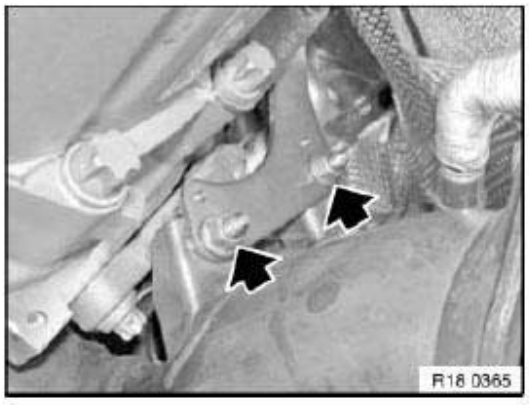


Fig. 35: Locating Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and remove holder (1).

Replace aluminium screws.

Tightening torque, automatic transmission 24 00 2AZ.

Tightening torque, manual gearbox **23 00 2AZ** .

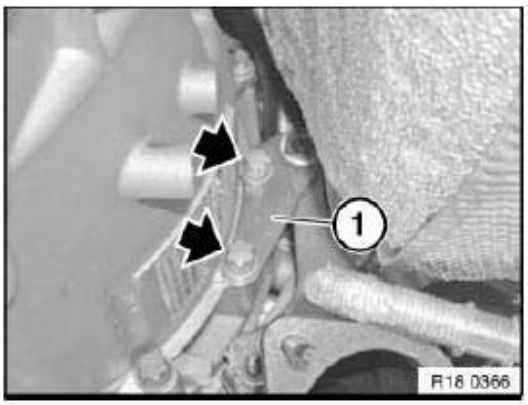


Fig. 36: Identifying Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release clamp. Clamp must be replaced each time it is released.

Tightening torque **18 31 3AZ** .

In so doing, secure catalytic converter (1) against falling out.

Feed out catalytic converter (1) and remove.

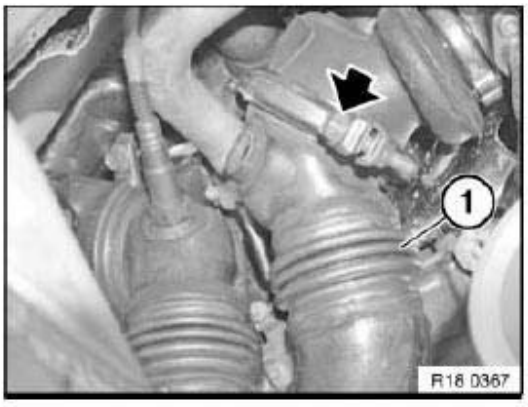


Fig. 37: Identifying Catalytic Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing face. Replace seal and clamp.

Align catalytic converter to exhaust system connecting piece and tighten down.

Add final details to vehicle.

Check exhaust system for leaks.

18 32 060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 4-6 (N54)

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks

- Remove **CATALYTIC CONVERTER** for cylinders 1-3

NOTE: The oxygen sensors are in danger of being damaged when the catalytic exhaust-gas converters are removed and installed.

Remove CONTROL SENSOR , cylinders 4 to 6.

Remove MONITOR SENSOR from cylinders 4 to 6.

Release clamp. Clamp must be replaced each time it is released.

Tightening torque **18 31 3AZ** .

In so doing, secure catalytic converter (1) against falling out.

Feed out catalytic converter (1) and remove.

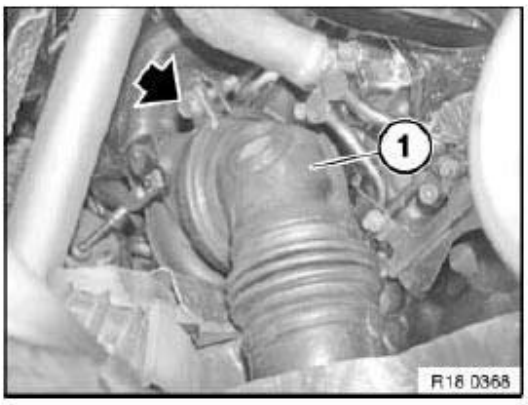


Fig. 38: Identifying Catalytic Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing face. Replace seal and clamp.

Align catalytic converter to exhaust system connection flange and tighten down.

Check exhaust system for leaks.

Add final details to vehicle.

1832 EXHAUST CATALYTIC CONVERTER

18 32 050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 1-3 (N54)

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks

- Remove front **UNDERBODY PROTECTION**
- Remove rear **UNDERBODY PROTECTION**
- Remove **EXHAUST SYSTEM**
- Release right **TIE ROD** from steering gear

NOTE: The oxygen sensors are in danger of being damaged when the catalytic exhaust-gas converters are removed and installed.

Remove CONTROL SENSOR , cylinders 1 to 3.

Remove MONITOR SENSOR from cylinders 1 to 3.

Release screws (1).

Remove guard plate (2).

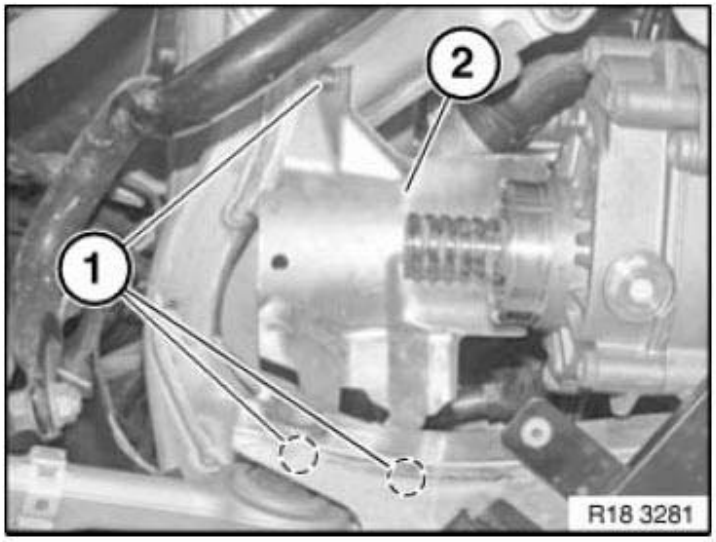


Fig. 39: Identifying Screws And Guard Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **18 20 2AZ** .

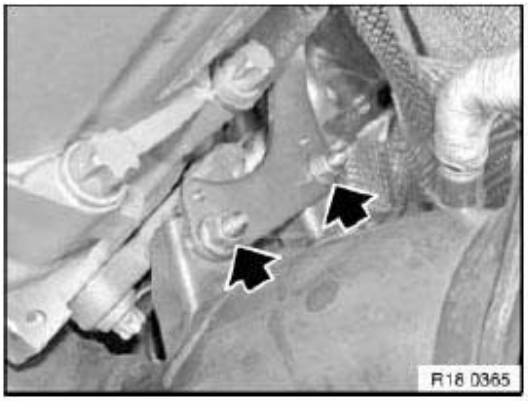


Fig. 40: Locating Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and remove holder (1).

Replace aluminium screws.

Tightening torque, manual gearbox **23 00 2AZ** .

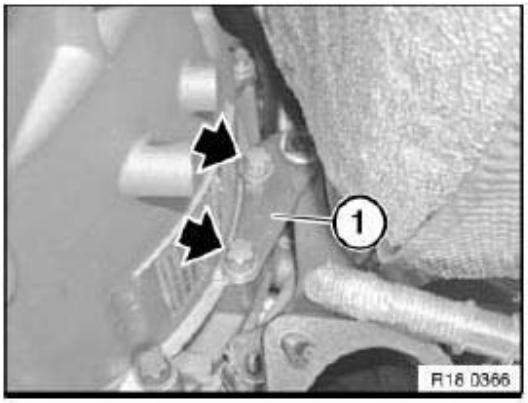


Fig. 41: Identifying Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release clamp. Clamp must be replaced each time it is released.

Tightening torque **18 31 3AZ** .

In so doing, secure catalytic converter (1) against falling out.

Feed out catalytic converter (1) and remove.

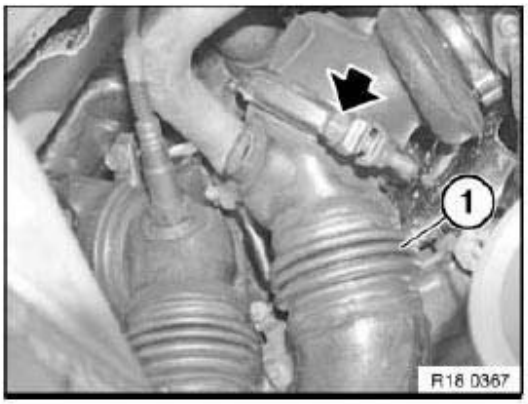


Fig. 42: Identifying Catalytic Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing face. Replace seal and clamp.

Align catalytic converter to exhaust system connecting piece and tighten down.

Add final details to vehicle.

Check exhaust system for leaks.

18 32 060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 4-6 (N54)

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks

- Remove **CATALYTIC CONVERTER** for cylinders 1-3

NOTE: The oxygen sensors are in danger of being damaged when the catalytic exhaust-gas converters are removed and installed.

Remove CONTROL SENSOR , cylinders 4 to 6.

Remove MONITOR SENSOR from cylinders 4 to 6.

Release clamp. Clamp must be replaced each time it is released.

Tightening torque **18 31 3AZ** .

In so doing, secure catalytic converter (1) against falling out.

Feed out catalytic converter (1) and remove.

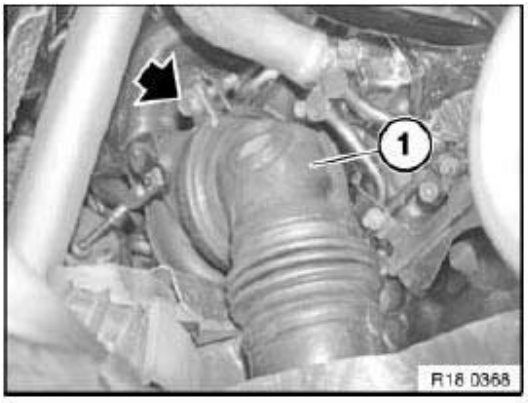


Fig. 43: Identifying Catalytic Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing face. Replace seal and clamp.

Align catalytic converter to exhaust system connection flange and tighten down.

Check exhaust system for leaks.

Add final details to vehicle.

18 32 085 REPLACE BOTH EXHAUST PIPES WITH CATALYTIC CONVERTERS (N54)

WARNING: Scalding hazard!

Only perform these tasks on an engine that has cooled down.

Support front silencer with special tool 31 2 220 and secure against falling out.

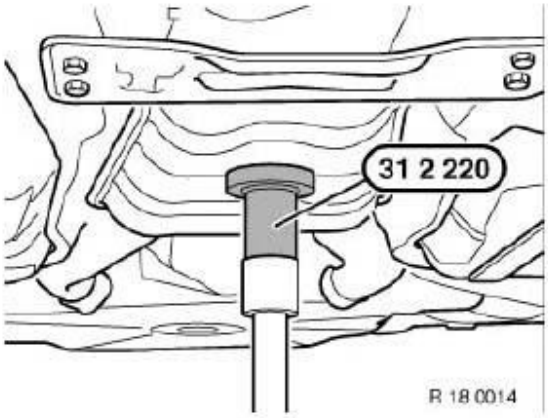


Fig. 44: Supporting Front Silencer Using Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the cutting line is not marked by a punch mark in the pipe, determine the cutting line by means of the pipe length on the new front silencer.

Carry over cutting line to faulty front silencer and mark.

Cut through exhaust pipes at marked point with a suitable tool.

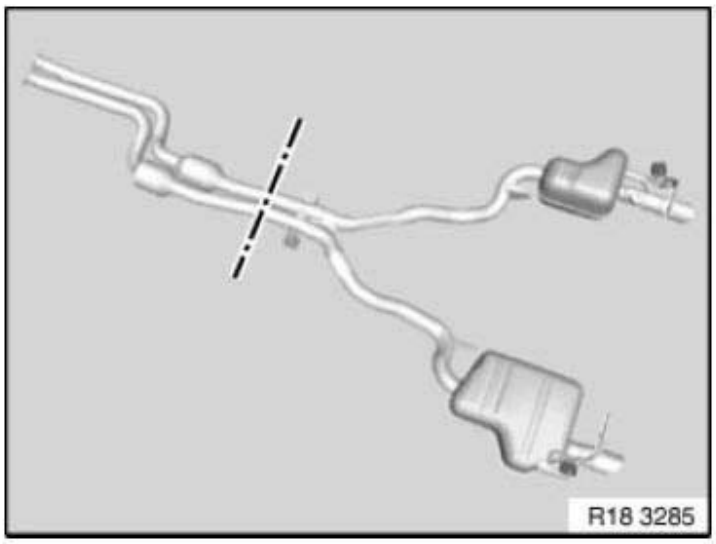


Fig. 45: Cutting Exhaust Pipes Through Marked Point Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **18 31 1AZ** .

Replace self-locking nuts.

Replace seals.

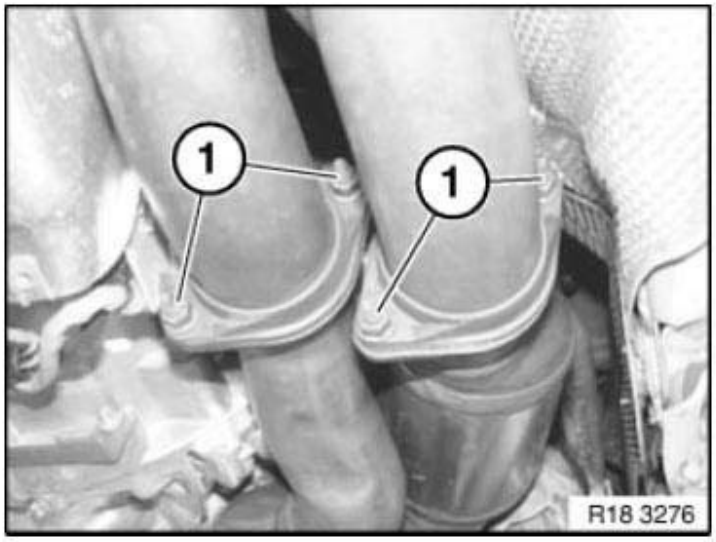


Fig. 46: Identifying Self Locking Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt and remove bracket (1).

Tightening torque **18 31 2AZ** .

Lower and remove front silencer with assistance of a second person.

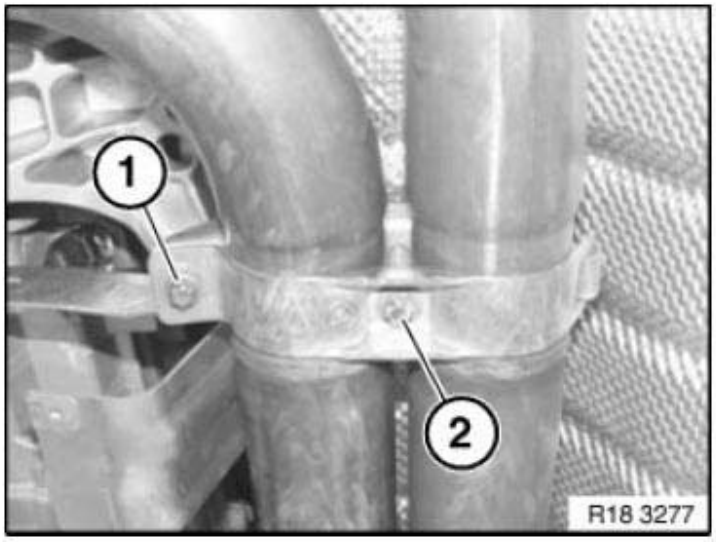


Fig. 47: Identifying Bracket With Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect front silencer to rear silencer by means of clamp and align.

Centre clamp and tighten down.

Tightening torque **18 20 3AZ** .

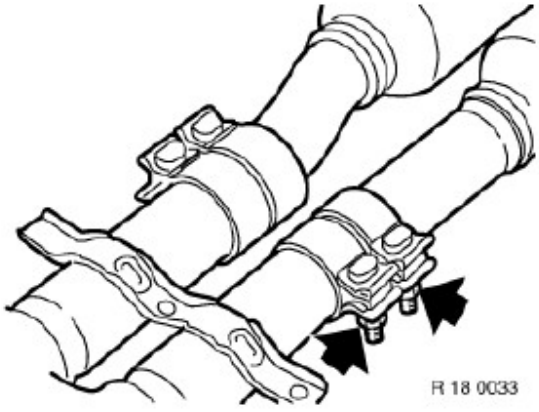


Fig. 48: Locating Clamps Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Check exhaust system for leaks.**

18 EXHAUST SYSTEM

18-0110 GAUGE

Gauge MW

NOTE: **For securing catalytic converter in installation position.**

SI number

01 20 06 (299)

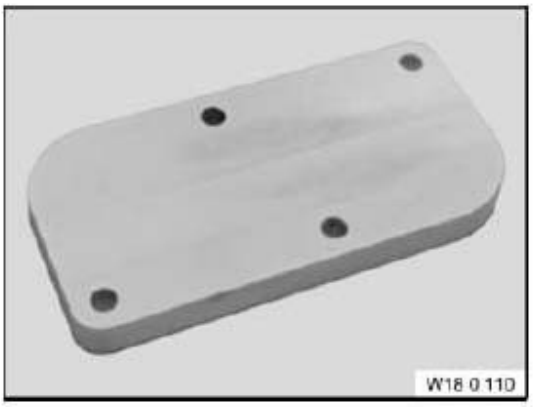


Fig. 1: Identifying Gauge (18-0110)
Courtesy of BMW OF NORTH AMERICA, INC.

18-0100 SOCKET WRENCH

Socket wrench MW

NOTE: **(Socket wrench) Socket wrench set For removal and installation of the diesel particulate filter.**

Storage Location

A20

SI number

01 27 05 (235)

Consisting of:

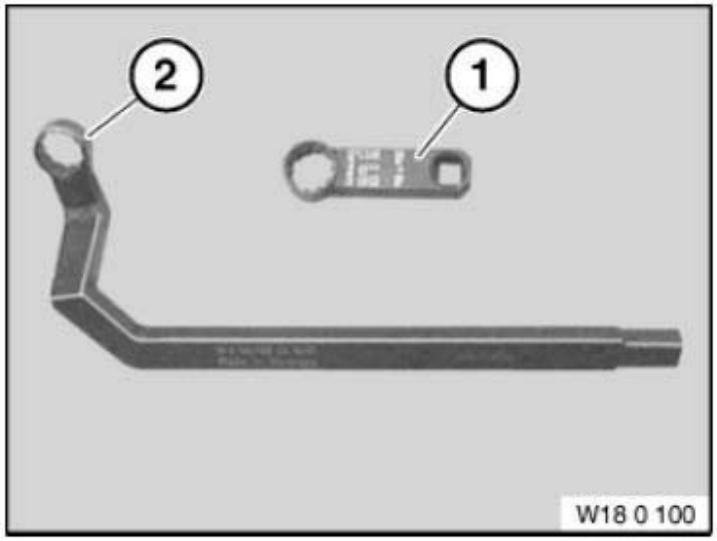


Fig. 2: Identifying Socket Wrench (18-0100)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0495499 Socket wrench

NOTE: (Socket wrench) short version

2 = 0495500 Socket wrench

NOTE: (Socket wrench) offset version

EXHAUST ASSEMBLY

18 00 EXHAUST ASSEMBLY

TIGHTENING TORQUE SPECIFICATION - EXHAUST ASSEMBLY

		Type	Thread	Tightening specification	Measure
1AZ	Primary catalytic converter to turbocharger/or jacket pipe to catalytic converter	M57/M57TU	M10		42 Nm
		M67			15 Nm
		M30/M70		Tighten down compression spring with nut uniformly to full extent, then slacken by 1.5 turns	10 Nm
		M51		Preload compression springs with nut to 27± 1 mm	
		S50	M10		30 Nm
		S54/ECE	M10		27 Nm
		S54/US	M10		24 Nm
2AZ	Exhaust pipe to flow section	E23			25 Nm
3AZ	Clamp for final muffler	All	M8		15 Nm
4AZ	Catalytic converter on silencer	E36/M42/M43/M44		Version with compression spring: Evenly preload compression springs with nuts to 30 mm	
5AZ	Connection of positive and negative leads to E catalytic converter	M73			5 Nm
6AZ	Rear muffler to intermediate	E53	M8		30 Nm

	muffler				
7AZ	Vacuum tank to retaining plate	E46/M54	M8		10 Nm
8AZ	Exhaust system to exhaust manifold	M40/M42/M43/M44	M10		45 Nm
9AZ	Primary cat. to exhaust system	M57TU/E65			55 Nm

EXHAUST MANIFOLD

18 40 EXHAUST MANIFOLD

TIGHTENING TORQUE SPECIFICATION - EXHAUST MANIFOLD

	Type	Thread	Tightening specification	Measure
1AZ Exhaust manifold to cylinder head	N52K	M7 nut		20 Nm

EXHAUST PIPE WITH CATALYTIC CONVERTER/COMPLETE SYSTEM

18 31 EXHAUST PIPE WITH CATALYTIC CONVERTER/COMPLETE SYSTEM

TIGHTENING TORQUE SPECIFICATION - EXHAUST PIPE WITH CATALYTIC CONVERTER/COMPLETE SYSTEM

		Type	Thread	Tightening specification	Measure
1AZ	Exhaust system to front pipe with exhaust manifold	N52K	M10		45 Nm
2AZ	Exhaust system to bracket, transmission	N52K	M8		21 Nm
3AZ	Exhaust system to rear differential	N52K	M8		21 Nm
4AZ	Rear silencer to body	N52K	M8		21 Nm
5AZ	Clamp to exhaust system	N52K	M10		45 Nm

OIL COOLER PIPES

17 22 OIL COOLER PIPES

TIGHTENING TORQUE SPECIFICATION - OIL COOLER PIPES

		Type	Thread	Tightening specification	Measure
1AZ	Transmission oil cooler line to transmission	N52K	M8x28		20 Nm
2AZ	Transmission oil cooler line to oil sump	N52K	M6		10 Nm
3AZ	Transmission oil cooler line to transmission sump	N52K	M6x35		8 Nm
4AZ	Transmission oil cooler line to transmission oil-water heat exchanger	N52K	M6x35		8 Nm

5AZ	Engine oil cooler lines to oil module/engine oil cooler	N52K	M8		20 Nm

ENGINE

Exhaust System - Tightening Torques - Z4

EXHAUST ASSEMBLY

18 00 EXHAUST ASSEMBLY

TIGHTENING TORQUE SPECIFICATION - EXHAUST ASSEMBLY

	Type	Thread	Tightening specification	Measure
1AZ Primary catalytic converter to turbocharger/or jacket pipe to catalytic converter	M57/M57TU	M10		42 Nm
	M67			15 Nm
	M30/M70		Tighten down compression spring with nut uniformly to full extent, then slacken by 1.5 turns	10 Nm
	M51		Preload compression springs with nut to 27±1 mm	
	S50	M10		30 Nm
	S54/ECE	M10		27 Nm
	S54/US	M10		24 Nm
2AZ Exhaust pipe to flow section	E23			25 Nm
3AZ Clamp for final muffler	All	M8		15 Nm
4AZ Catalytic converter on silencer	E36/M42/M43/M44		Version with compression spring: Evenly preload compression springs with nuts to 30 mm	
5AZ Connection of positive and negative leads to E catalytic converter	M73			5 Nm
6AZ Rear muffler to intermediate muffler	E53	M8		30 Nm
7AZ Vacuum tank to retaining plate	E46/M54	M8		10 Nm
8AZ Exhaust system to exhaust manifold	M40/M42/M43/M44	M10		45 Nm
9AZ Primary cat. to exhaust system	M57TU/E65			55 Nm

EXHAUST PIPE WITH CATALYTIC CONVERTER/COMPLETE SYSTEM

18 31 EXHAUST PIPE WITH CATALYTIC CONVERTER/COMPLETE SYSTEM

TIGHTENING TORQUE SPECIFICATION - EXHAUST PIPE WITH CATALYTIC

CONVERTER/COMPLETE SYSTEM

	Type	Thread	Tightening specification	Measure
1AZ Exhaust system to front pipe with catalytic converter	N54	M8		21 Nm
2AZ Exhaust system to bracket, transmission	N54	M8		19 Nm
3AZ Catalytic converter to exhaust turbocharger	N54	M8	Replace profile clamp and screw	13 Nm
4AZ Exhaust system to rear differential	N54	M8		19 Nm
5AZ Rear muffler to body	N54	M8		19 Nm

EXHAUST SYSTEM SUSPENSION

18 20 EXHAUST SYSTEM SUSPENSION

TIGHTENING TORQUE SPECIFICATION - EXHAUST SYSTEM SUSPENSION

	Type	Thread	Tightening specification	Measure
1AZ Clamp to front pipe holder	N54	M8		19 Nm
2AZ Bracket, primary cat., to primary cat.	N54	M8		19 Nm
3AZ Clamp to exhaust system	N54	M10		45 Nm

1600 DRAWING OFF OF FUEL, SYSTEM CLEANING

16 00 100 CHECKING FUEL TANK AND TANK VENTILATION SYSTEM FOR LEAKS

Necessary preliminary tasks

- Remove cover for carbon canister

The following procedure is only applicable to vehicles **without** the tank leak diagnosis module.

Comply with the following conditions in order to obtain plausible test results:

- Content of fuel tank:
  1. Maximum 90 %
  2. Minimum 13 % (reserve telltale must not light up).
- Park the car in the workshop at least 2 hours before the test so that the fuel temperature is approximately that of the workshop temperature (ideal fuel temperature approx. 10 ... 20 °C).

Disconnect line to evaporation strainer (1) from carbon canister.

IMPORTANT: Risk of breakage!
Carefully remove evaporation strainer from carbon canister.

Using special tool 16 1 070, seal opening (2) for evaporation strainer on carbon canister.

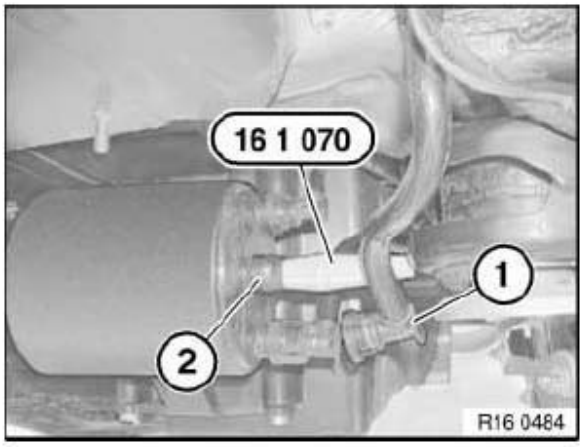


Fig. 1: Identifying Evaporation Strainer And Seal Opening With Special Tool (16 1 070)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove fuel filler cap and connect special tool 16 1 174 to fuel filler neck.

Clamp special tool 16 1 174 on fuel filler neck with adjusting wheel (1).

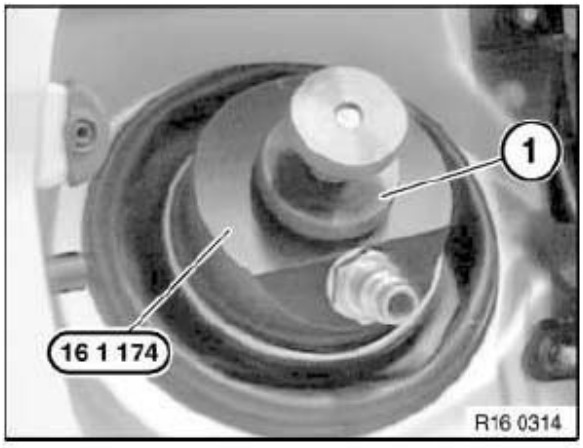


Fig. 2: Clamping Special Tool (16 1 174) On Fuel Filler Neck Adjusting Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Turn pressure regulator on special tool 16 1 171 counterclockwise up to stop.

Connect special tool 16 1 171 using compressed air line (1) to garage compressed air system (8 ... 10 bar).

Connect pressure sensor (2) from Diagnosis and Information System with a measuring range of 0 ... 25 bar.

IMPORTANT: Do not yet connect fast-release coupling (3) of special tool 16 1 171.

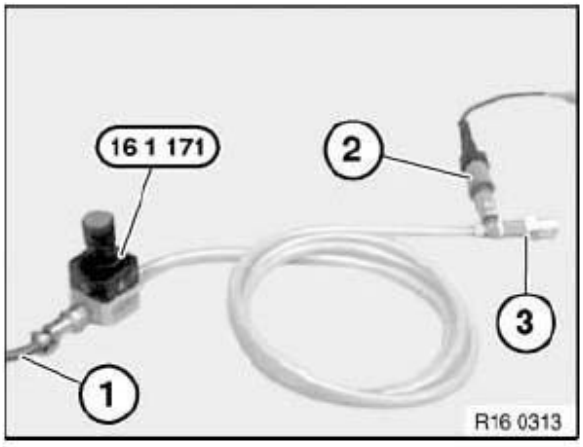


Fig. 3: Connecting Special Tool (16 1 171) To Garage Compressed Air System Using Compressed Air Line
Courtesy of BMW OF NORTH AMERICA, INC.

1. Select "Measurement" function on Diagnosis and Information System (DIS).
2. Using pressure regulator on special tool 16 1 171, increase pressure by 0.20 bar.
3. Connect special tool 16 1 174 to fast-release coupling of special tool 16 1 171.
4. Wait until the value at the Diagnosis and Information System has levelled out.
5. Using pressure regulator on special tool 16 1 171, reset gauge pressure in fuel tank to 0.20 bar.

IMPORTANT: Do not under any circumstances increase pressure by more than 0.30 bar as this would result in damage to the fuel tank and venting system.

Using special tool 13 3 010 , disconnect delivery line from special tool 16 1 171 to fuel filler neck.

Allow a rest period of approx. 20 sec.

Read off and note down starting pressure value.

Wait approx. 120 sec.

Read off final pressure value and compare with starting pressure value.

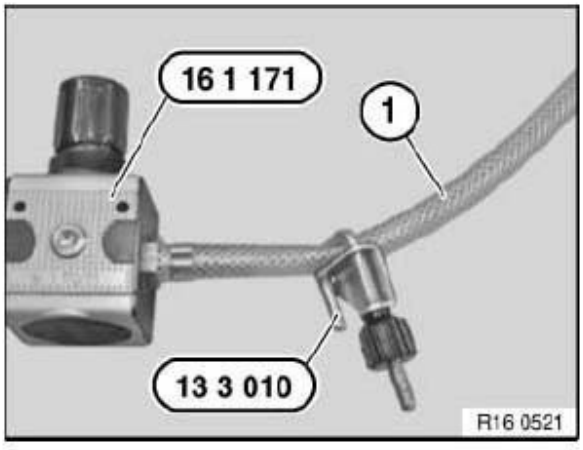


Fig. 4: Disconnecting Delivery Line From Fuel Filler Neck Using Special Tool (16 1 171)
Courtesy of BMW OF NORTH AMERICA, INC.

Measurement evaluation

- Pressure drop up to 0.01 bar:

  System OK

- Pressure drop over 0.02 bar:

  System leaking beyond permitted levels

If the system is leaking, a leak test must be carried out and the defective components replaced.

16 00 510 CONDUCTING LEAK TEST ON FUEL TANK AND TANK VENTING SYSTEM

Pressurize fuel tank and tank venting system.

NOTE: When leak-testing with a leak tester device, follow the operation instructions of the device manufacturer.

IMPORTANT: Emerging fuel vapors!
These tasks should only be performed in well ventilated rooms or with a suitable extractor facility provided.
Observe country-specific accident prevention and occupational safety regulations.

The leak test can be carried out with a leak detector.

Possible causes may be:

- **FUEL FILLER CAP LEAKING**
- Tank vent line leaking (fuel tank - carbon canister).
- Tank vent line leaking (engine compartment).
- Locking ring on fuel filter leaking
- Carbon canister - shut-off valve leaking

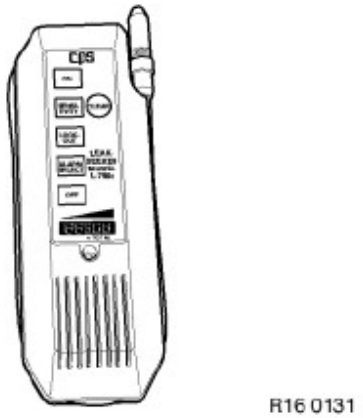


Fig. 5: Identifying Fuel Tank And Tank Venting System
Courtesy of BMW OF NORTH AMERICA, INC.

16 00 005 DRAINING AND FILLING FUEL TANK

IMPORTANT: Observe country-specific safety regulations.
Ensure adequate ventilation in the place of work!

Connect the exhaust and extraction systems to the exhaust tailpipe.
The electric fuel pump must not operate without fuel! After completing repairs but before starting the engine for the first time, fill the fuel tank with min. 5 l fuel through the fuel filler pipe.
Do not damage non-return flap when pulling out extraction hose.

Drawing off fuel

Start engine and allow to run.

The electric fuel pump runs.

In this way, the fuel is repumped through the suction jet pump from the left to the right side of the fuel tank.

NOTE: Fuel can be drawn out of left and right sides of tank through filler neck, leaving only a small residue. The residual amount is drawn off via the service opening.

Insert special tool 16 1 080 into fuel filler neck.

Special tool 16 1 080 has two different diameters for petrol/gasoline and diesel vehicles!

Slide extraction hose of extractor unit, refer to BMW Service Workshop Equipment and Planning Documentation, through special tool 16 1 080 into the fuel filler pipe, turning in the process if necessary.

Insertion length approx. 118 cm.

Draw off fuel with suction unit (refer to BMW Service Workshop Equipment) as far as possible.

Follow drawing off of fuel on fuel gauge in instrument cluster.

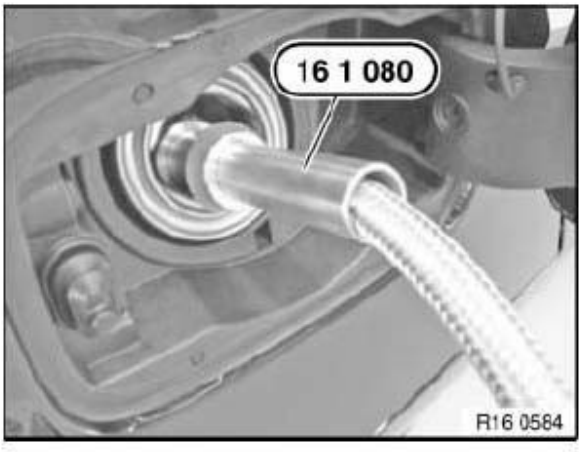


Fig. 6: Identifying Special Tool (16 1 080)
Courtesy of BMW OF NORTH AMERICA, INC.

Drawing off residual fuel amount

Drawing off residual fuel amount is not included in the time value of this operation.

Remove **FUEL FILTER** .

Drawing off residual fuel amount, right side:

Draw off residual fuel amount in right tank half through service opening (A).

Drawing off residual fuel amount, left side:

Feed extraction hose through service opening above saddle into left tank half (B).

Residual fuel amount can be drawn off.

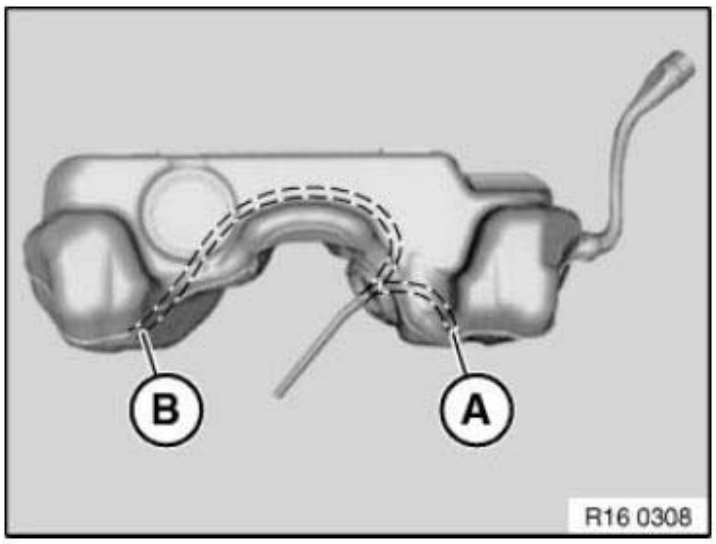


Fig. 7: Identifying Fuel Tank Service Openings
Courtesy of BMW OF NORTH AMERICA, INC.

Extracting fuel after a defect in the suction jet pump or fuel pump

Draw off right half of tank completely through fuel filler pipe.

Remove **FUEL FILTER** .

Insert extraction hose through service opening in tank, fuel (also residual quantity) can be drawn off.

Fuel filling

Insert special tool 16 1 080 into fuel filler neck.

Special tool 16 1 080 has two different diameters for petrol/gasoline and diesel vehicles!

Slide extraction hose of extractor unit, refer to BMW Service Workshop Equipment, approx. 40 cm into fuel filler pipe.

Fill fuel from suction extractor unit.

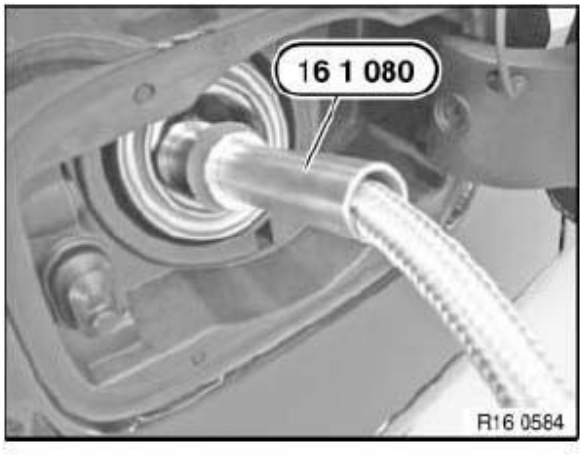


Fig. 8: Identifying Special Tool (16 1 080)
Courtesy of BMW OF NORTH AMERICA, INC.

16 00 510 LEAK TEST ON FUEL TANK AND TANK VENTILATION SYSTEM (DMTL)

IMPORTANT: On vehicles with tank leak diagnosis modules (DMTL), do not work with external pressurization as the tank ventilation system will leak under this condition.
On account of the escaping fuel vapors, these tasks should only be carried out in well ventilated rooms or with a suitable extractor facility provided.
Observe country-specific accident prevention and occupational safety regulations.

In the Diagnosis and Information System (DIS), go to the "Function and component selection" page.

By selecting:

- Service functions
- Drive
- Digital Motor Electronics
- Activation DMTL pump

Adopt test module in test schedule.

Switch to the test schedule and implement the "Activation DMTL pump" test module.

Leak diagnosis pump pressurizes fuel tank and tank ventilation system.

Carry out leak test.

Terminate test module after completing leak test.

NOTE: Leak diagnosis pump is automatically shut down after approx. 15 minutes due to risk of overheating. Allow pump to cool down for at least 15 minutes. Then continue procedure.

The leak test can be carried out with a leak detector. Follow manufacturer's operating instructions in doing so.

Possible causes of leaks are:

- **FUEL FILLER CAP LEAKING**
- Tank vent line leaking (fuel tank - carbon canister).
- Tank vent line leaking (engine compartment).
- Locking ring on fuel filter leaking

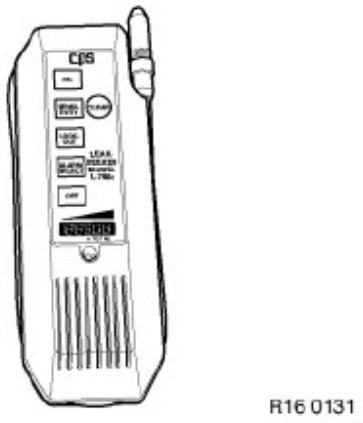


Fig. 9: Identifying Fuel Tank And Tank Venting System
Courtesy of BMW OF NORTH AMERICA, INC.

1611 FUEL TANK WITH MOUNTING

16 11 130 CHECKING FILLER CAP PRESSURE RELIEF VALVE

Set pressure regulator on special tool 16 1 171 fully in "-" direction.

Connect special tool 16 1 171 via compressed air line (1) to workshop/garage compressed air system (8...10 bar).

Connect pressure sensor (2) from Diagnosis and Information System.

Connect special tool 16 1 172 to quick-connect coupling (3).

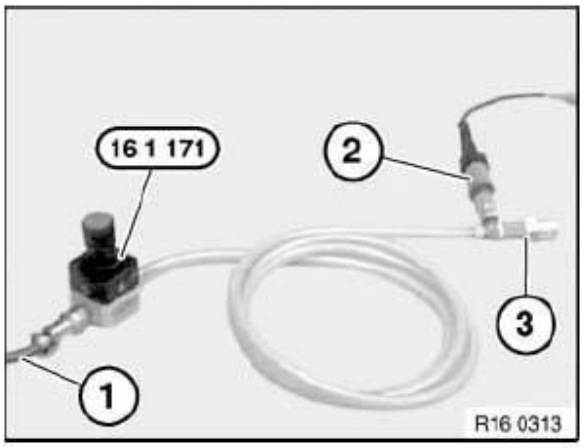


Fig. 10: Connecting Special Tool (16 1 171) To Garage Compressed Air System Using Compressed Air Line
Courtesy of BMW OF NORTH AMERICA, INC.

Install tank cap on special tool 16 1 172.



Fig. 11: Identifying Fuel Filler Cap With Special Tool (16 1 172) And (16 1 173)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Only the absolute pressure is indicated in the display of the Diagnosis and Information System (DIS). The current ambient air pressure is already displayed without additional pressurization.

Check testing equipment for leaks

Select "Measurement/Pressure" function on Diagnosis and Information System (DIS).

Increase pressure by 0.2 bar with pressure regulator on special tool 16 1 171.

Using special tool 13 3 010 , clamp off supply line from special tool 16 1 171.

Read off and note down pressure.

Wait 60 seconds.

Read off pressure again and compare with starting pressure value.

Measurement evaluation:

PRESSURE MEASUREMENT CHART

Pressure drop > 0.012 bar	Test equipment leaking. Check connection points for leaks.

Check filler cap pressure relief!

Select "Measurement/Pressure" function on Diagnosis and Information System (DIS).

Increase pressure by 0.3 bar with pressure regulator on special tool 16 1 171.

Using special tool 13 3 010 , clamp off supply line from special tool 16 1 171.

Read off and note down pressure.

Wait 60 seconds.

Read off pressure value again and compare with starting pressure value.

Measurement evaluation:

PRESSURE MEASUREMENT CHART

Pressure drop > 0.012 bar	Filler cap pressure relief valve faulty. Replace filler cap.

16 11 030 REMOVING AND INSTALLING FUEL TANK

IMPORTANT: After installing fuel tank (before initial engine starting):

- **Check ground connection at fuel filler neck to body for continuity.**

  If necessary, clean contact surface between body and fuel filler pipe screw connection.

- **Fill fuel tank with min. 5 l fuel.**

After installation:

Carry out wheel alignment check.

Necessary preliminary tasks

- Draw off **FUEL FROM FUEL TANK**
- Remove **FUEL FILLER CAP WITH COVER HOUSING**
- Remove **REAR AXLE**
- Remove tunnel thermal insulation

Detach cable ties (1) on rotary catch.

Disconnect plug (2) from fuel filter.

Press lock (3) towards fuel filter and detach feed line (4).

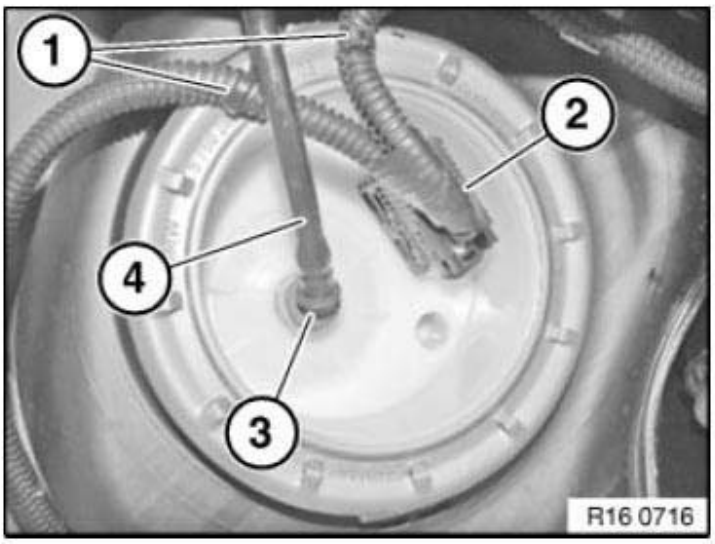


Fig. 12: Identifying Cable Ties, Plug And Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation:

Tightening torque **16 11 1AZ** .

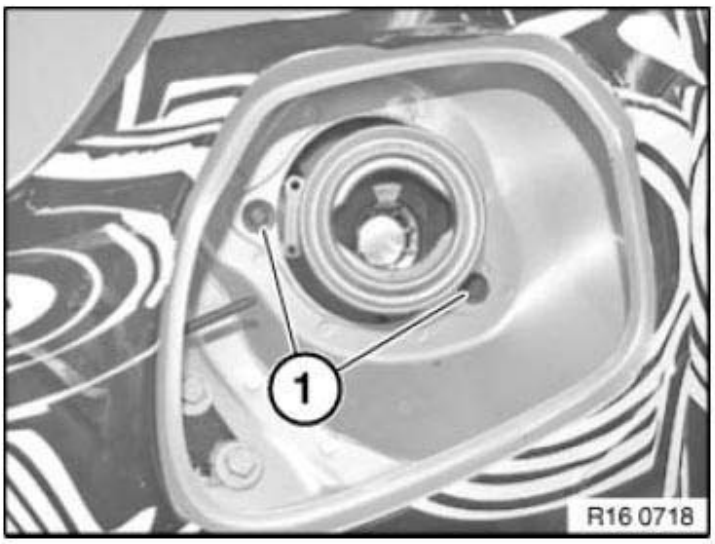


Fig. 13: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Installation:

Tightening torque **16 11 3AZ** .

Detach grounding strap (2) from stud.

Disconnect service vent lines (3) and unclip from holder.

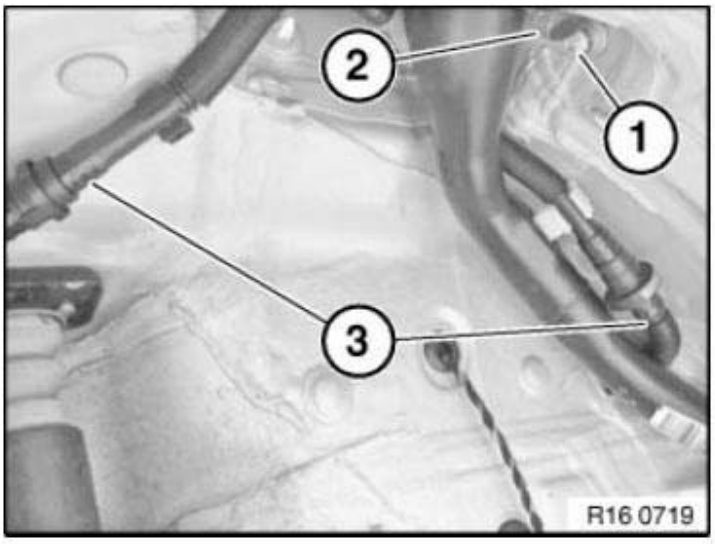


Fig. 14: Identifying Slacken Nut, Grounding Strap And Vent Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip line (1) from fuel tank (2).

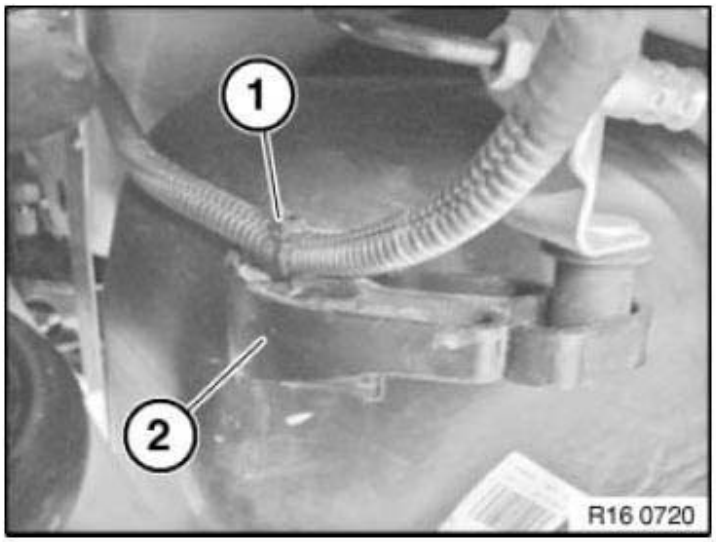


Fig. 15: Unclipping Line From Fuel Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) and unclip line (2).

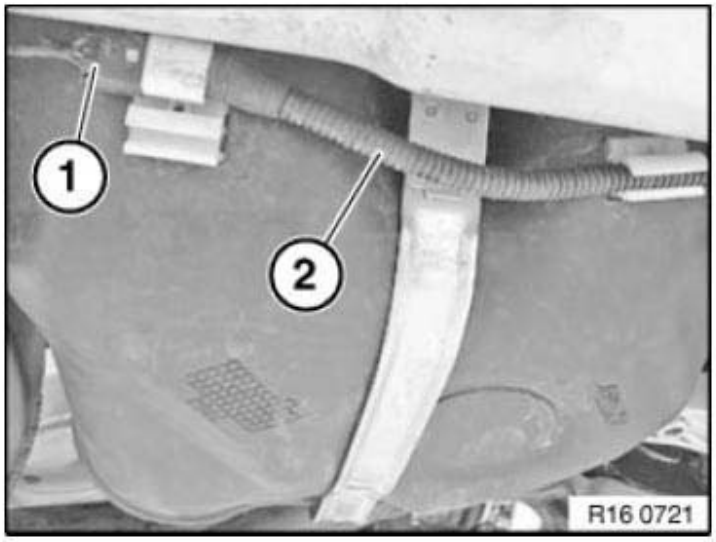


Fig. 16: Identifying Plug Connection And Fuel Line
Courtesy of BMW OF NORTH AMERICA, INC.

Detach fuel feed line from holder (1).

Heavily support the fuel tank.

Unscrew nuts (3).

Installation:

Tightening torque **16 11 2AZ** .

Swing clamping bands (2) downwards and disengage.

Lower fuel tank downwards.

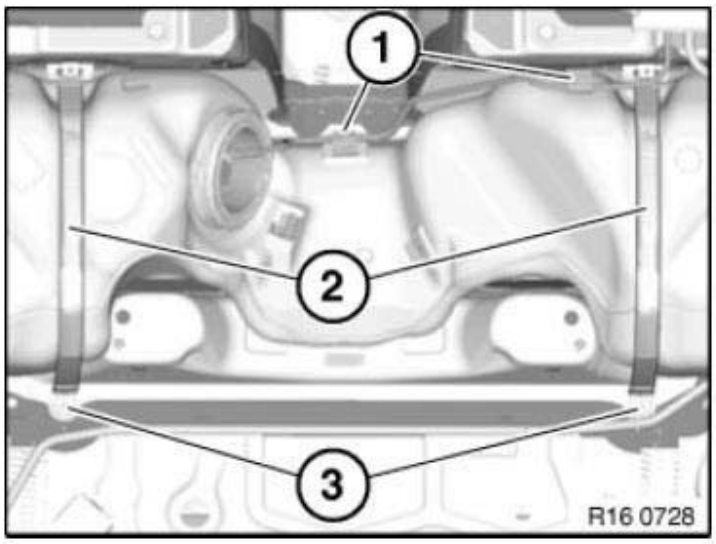


Fig. 17: Identifying Fuel Feed Line Holder, Clamping Bands And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Before engaging clamping bands (1), make sure rubber damper (2) is correctly seated.

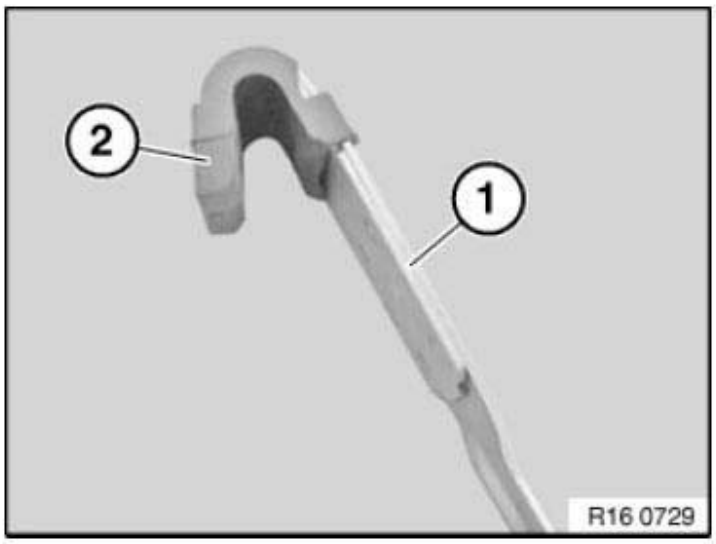


Fig. 18: Identifying Clamping Bands And Rubber Damper
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Pay attention to top vent line (1) when installing fuel tank.

Feed vent line (1) through opening (2) into wheel arch.

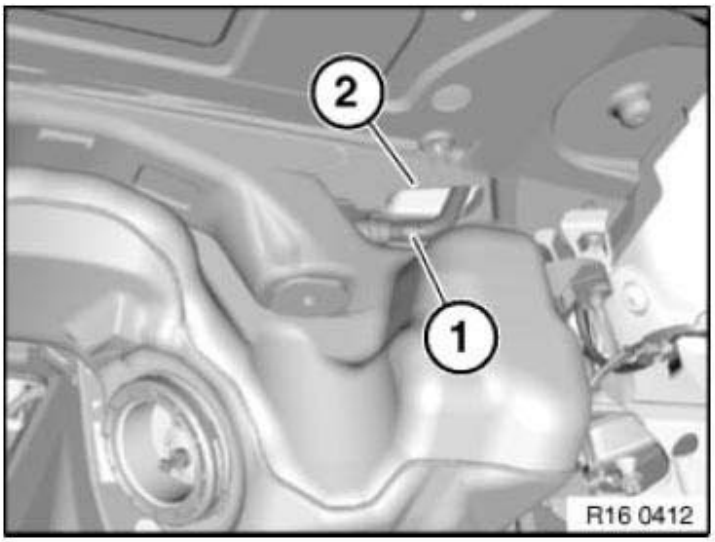


Fig. 19: Identifying Vent Line In Wheel Arch
Courtesy of BMW OF NORTH AMERICA, INC.

When replacing fuel tank:

- Modify **FUEL PUMP** .
- Modify **FUEL FILTER** .

16 11 048 REMOVING AND INSTALLING/REPLACING FUEL FILTER WITH PRESSURE REGULATOR

Recycling

Fuel escapes when fuel lines are detached. Have a collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!
Avoid skin contact (wear gloves and protective goggles).

Ensure absolute cleanliness when working on the open fuel system. Contaminants in the fuel tank can impair driving operation or may even result in vehicle breakdown!

Necessary preliminary tasks:

- Draw off **FUEL FROM FUEL TANK** .
- Remove **EXHAUST SYSTEM (N52K)** or **1800 EXHAUST SYSTEM (N54)** .
- Remove tunnel thermal insulation.

Detach cable ties (1) on rotary catch.

Disconnect plug (2) from fuel filter.

Press lock (3) towards fuel filter and detach feed line (4).

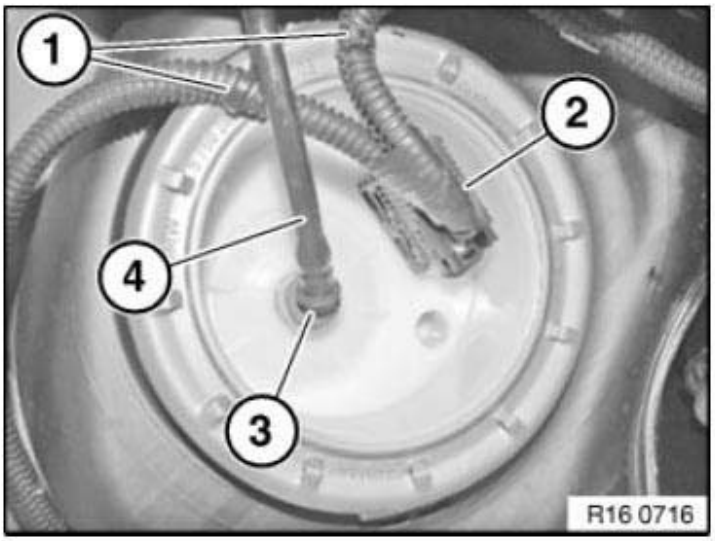


Fig. 20: Identifying Cable Ties, Plug And Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw cap with special tool 16 1 020.

Installation:

Tightening torque 16 14 2AZ.

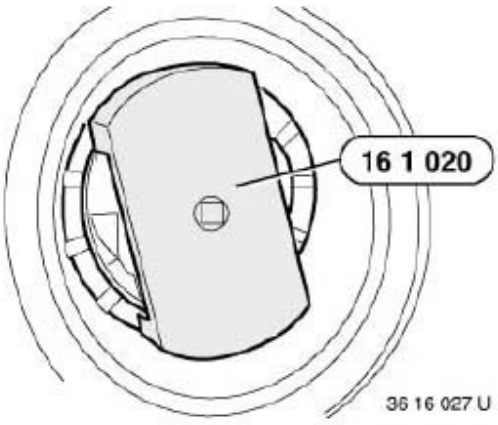


Fig. 21: Removing Screw Cap Using Special Tool (16 1 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

After tightening to specified torque, make sure the notch (2) on the rotary catch is located between the two markings (1) on the fuel tank.

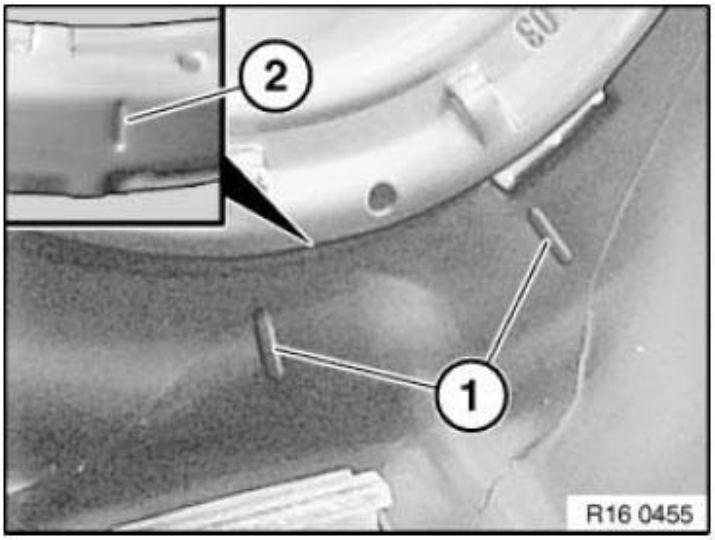


Fig. 22: Identifying Notch On Rotary Catch With Markings On Fuel Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The fuel filter can only be installed in one position.

When installing, make sure lug (1) of fuel filter engages in corresponding opening (2) on fuel tank.

Always replace seal (3).

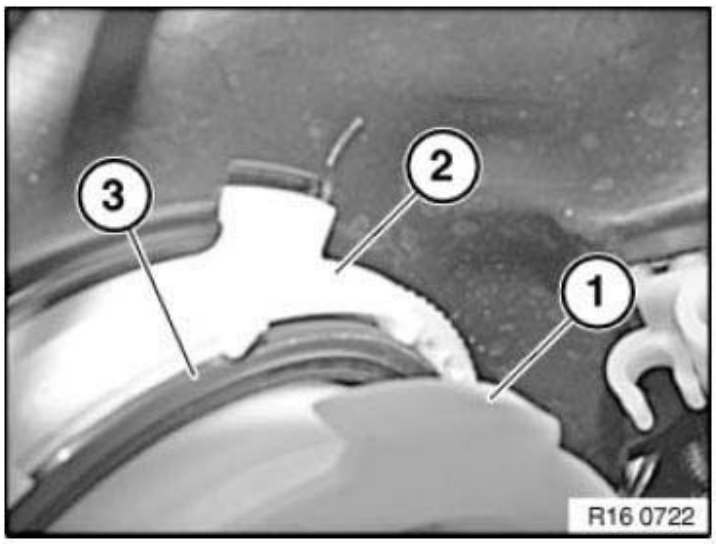


Fig. 23: Identifying Lug, Fuel Tank Opening And Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1).

Disconnect lines (2) and (3) from fuel filter.

NOTE: Lines (2) and (3) must not be switched round as they have different diameters. Fuel filter and pressure regulator together form a single unit and can only be replaced as such.

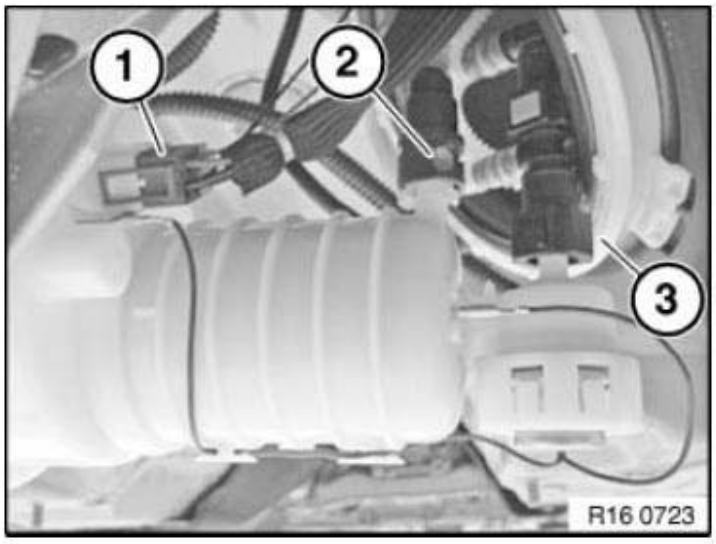


Fig. 24: Identifying Plug Connection And Fuel Filter Lines
Courtesy of BMW OF NORTH AMERICA, INC.

1612 FUEL DELIVERY, SENSOR FOR DISPLAY

16 12 010 REMOVING AND INSTALLING OR REPLACING CARBON CANISTER

Necessary preliminary tasks

- Remove cover for carbon canister

Unlock quick-release fasteners (1) and disconnect vent lines.

Release screws (2) and swing out carbon canister (3).

Installation:

Tightening torque **16 13 1AZ** .

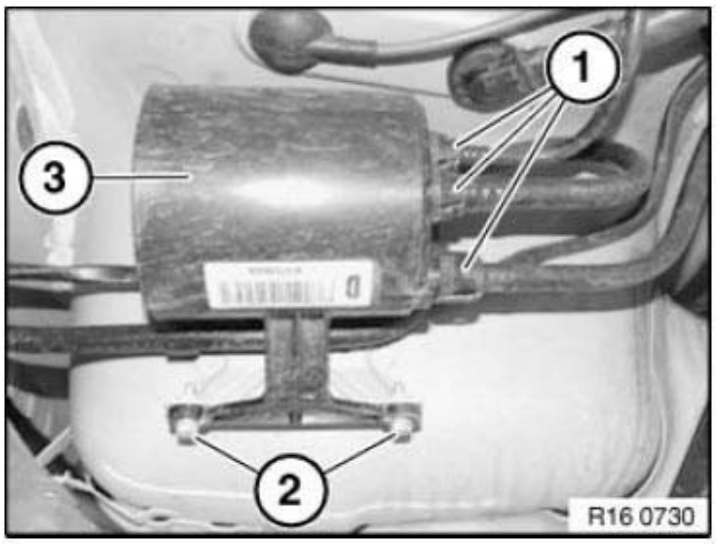


Fig. 25: Identifying Quick-Release Fasteners, Screws And Carbon Canister
Courtesy of BMW OF NORTH AMERICA, INC.

16 12 010 REMOVING AND INSTALLING/REPLACING CARBON CANISTER (US VERSION)

Necessary preliminary tasks

- Remove cover for carbon canister

Disconnect plug connection (1).

Unlock quick-release fasteners (2) and disconnect vent lines.

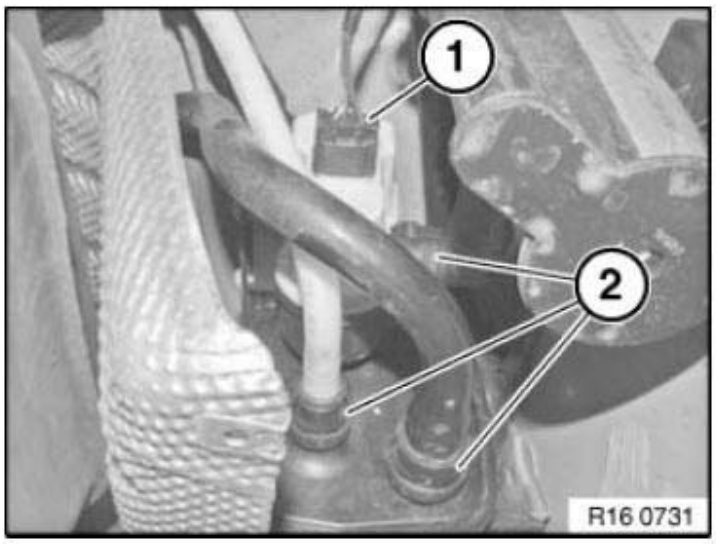


Fig. 26: Identifying Plug Connection And Quick-Release Fasteners
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and swing out carbon canister (2).

Installation:

Tightening torque **16 13 1AZ** .

The following components must be modified when the carbon canister is replaced:

- **DIAGNOSIS MODULE**

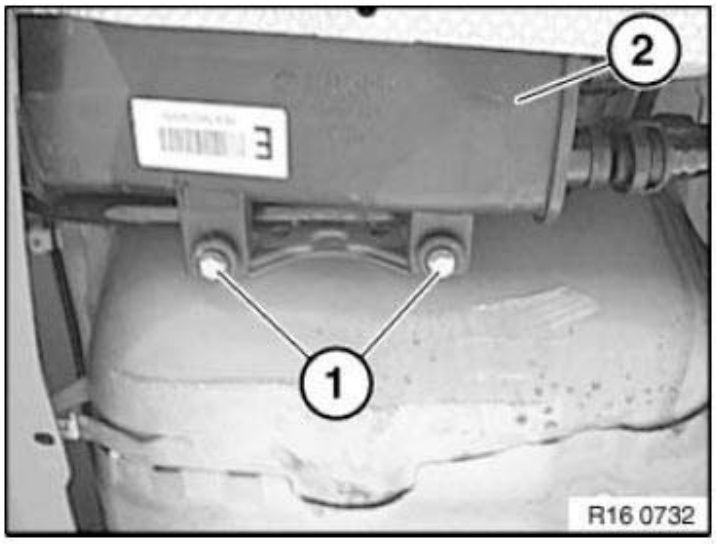


Fig. 27: Identifying Carbon Canister Screws
Courtesy of BMW OF NORTH AMERICA, INC.

16 12 000 REMOVING AND INSTALLING/REPLACING SENSOR FOR FUEL GAUGE

Necessary preliminary tasks:

- Remove **FUEL PUMP WITH FUEL LEVEL SENSOR**

Press plug connection (1) in direction of fuel pump.

Unlock lug (2) with a screwdriver and detach plug connection (1).

Installation:

Check locking of plug connection by pulling.

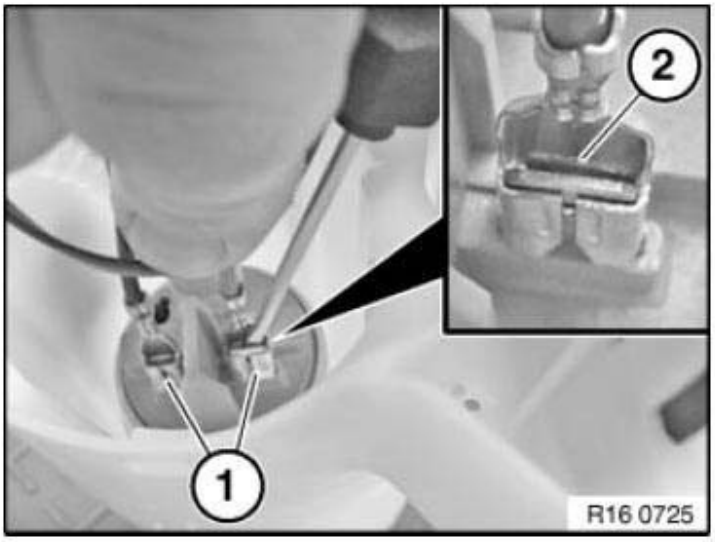


Fig. 28: Identifying Plug Connection And Lug
Courtesy of BMW OF NORTH AMERICA, INC.

Release lugs (1) in direction of arrow.

Lift out tank fill level sensor (2).

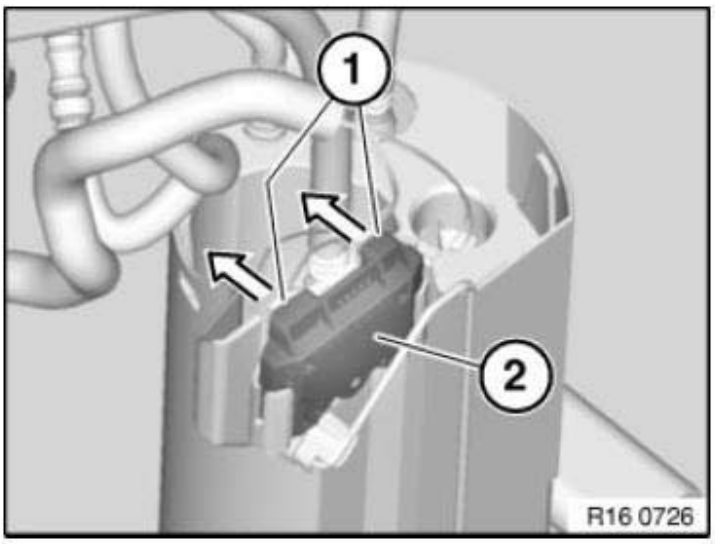


Fig. 29: Lifting Out Tank Fill Level Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

1613 FUEL DEAERATION

16 13 015 REMOVING AND INSTALLING/REPLACING TANK LEAK DIAGNOSIS MODULE (PETROL/GASOLINE CARS WITH US DMTL VERSION)

Necessary preliminary tasks

- Remove **CARBON CANISTER**

Release screws (1).

Disconnect tank leak diagnosis module (2) from carbon canister in direction of arrow.

Installation:

Replace sealing ring.

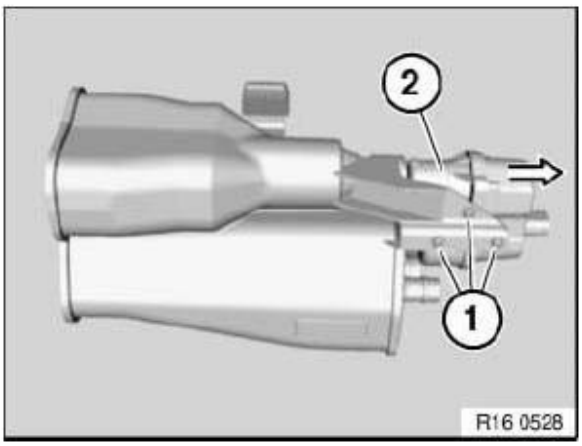


Fig. 30: Identifying Tank Leak Diagnosis Module With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

1614 FUEL PUMP

16 14 500 REMOVING AND INSTALLING OR REPLACING CONTROL UNIT FOR ELECTRIC FUEL PUMP

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

Necessary preliminary tasks

- Remove right luggage compartment **WHEEL ARCH TRIM**

Disconnect plug connection (1).

Unscrew nuts (2).

Installation:

Tightening torque **16 14 1AZ** .

Remove control unit (3).

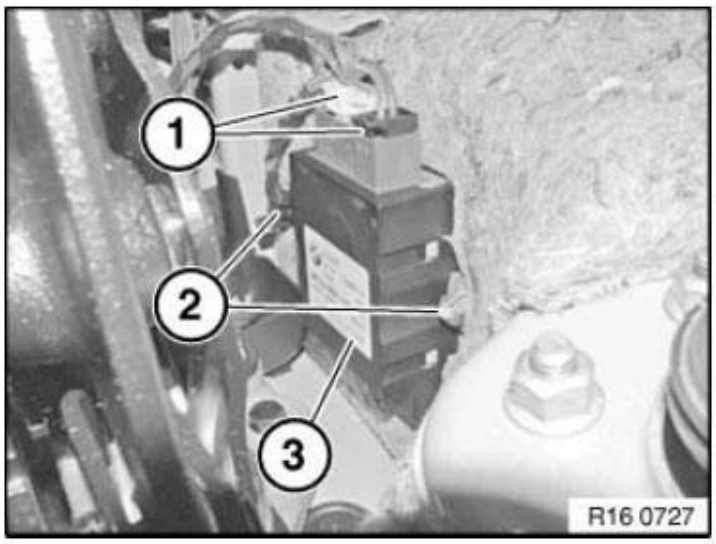


Fig. 31: Identifying Plug Connection, Nuts And Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Carry out programming/coding

16 14 060 REMOVING AND INSTALLING/REPLACING DUST FILTER FOR TANK LEAKAGE DIAGNOSIS MODULE

Necessary preliminary tasks

- Remove cover for carbon canister

Unlock quick-connect coupling (1) and detach vent lines.

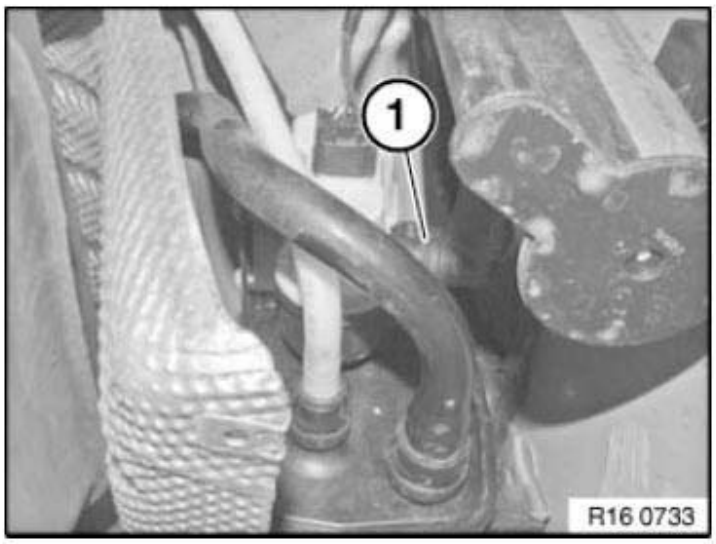


Fig. 32: Identifying Quick-Connect Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock quick-connect coupling (1) and detach vent lines (2) from dust filter.

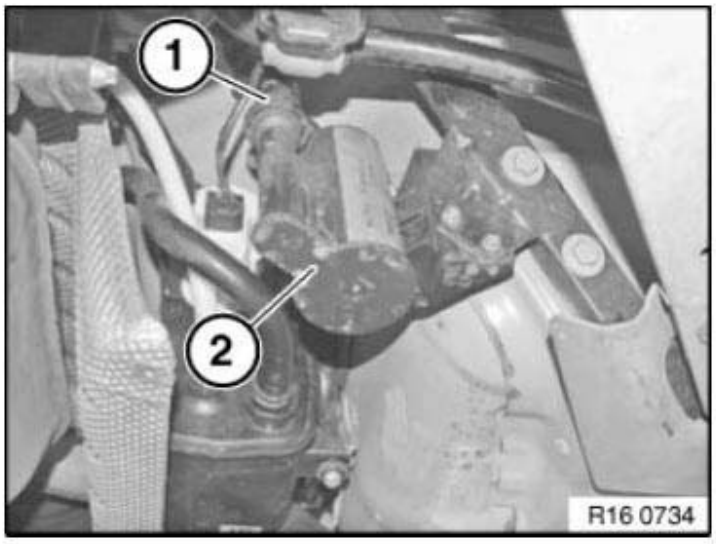


Fig. 33: Identifying Quick-Connect Coupling And Vent Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Slide dust filter (2) in direction of arrow from holder.

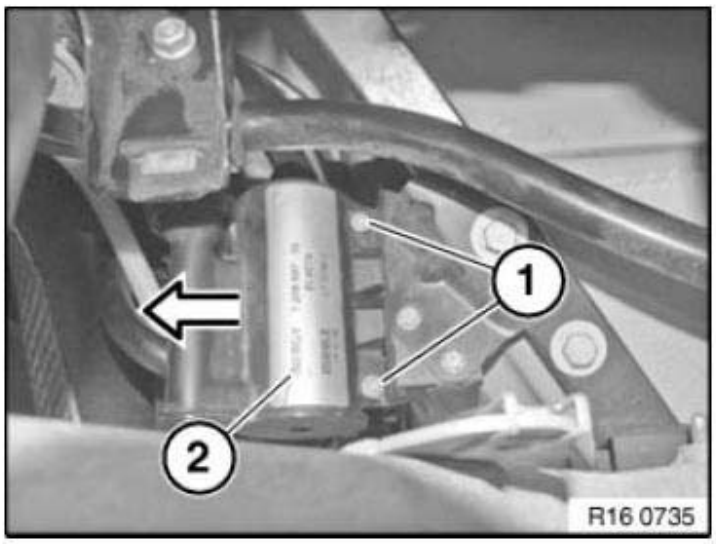


Fig. 34: Sliding Dust Filter From Holder
Courtesy of BMW OF NORTH AMERICA, INC.

16 14 015 REMOVING AND INSTALLING/REPLACING FUEL PUMP WITH FUEL LEVEL SENSOR

Necessary preliminary tasks

- Remove **FUEL FILTER** .

Disconnect fuel line (1).

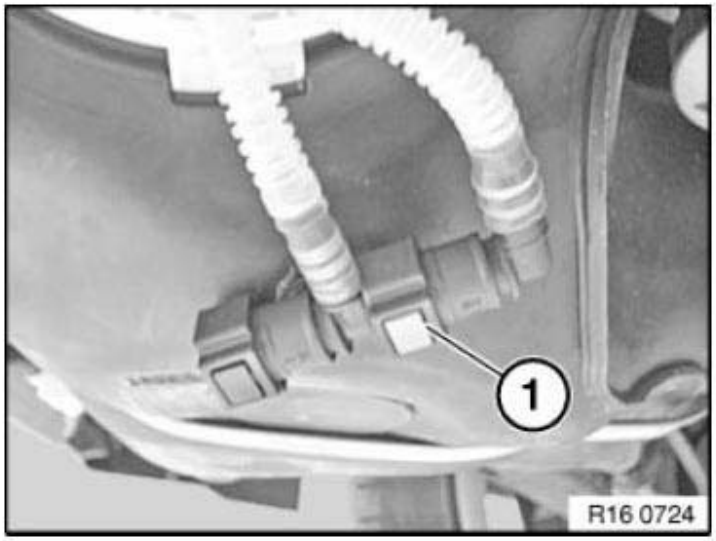


Fig. 35: Identifying Fuel Line
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug.

To do so, bend lug (1) on both sides outwards and pull plug apart.

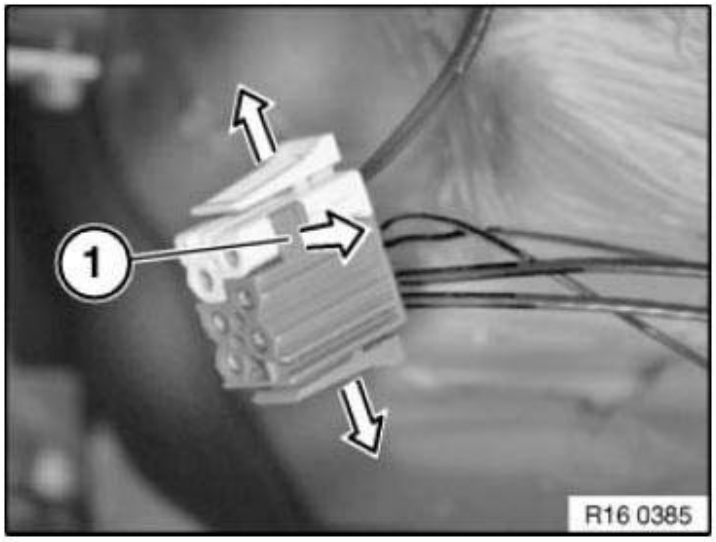


Fig. 36: Pulling Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect line (2) from fuel pump.

Unlock fuel pump by pressing lug (1).

Release fuel pump upwards from catch.

Remove fuel pump with sensor through service aperture.

Installation:

When installed, fuel pump must clearly be heard to snap into place.

Do not bend sensor arm during installation.

Line (2) must not be kinked!

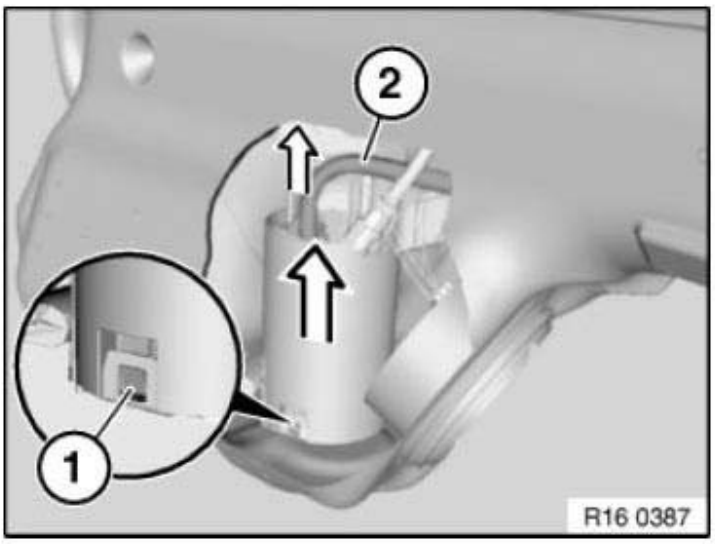


Fig. 37: Removing Fuel Pump From Catch And Service Aperture
Courtesy of BMW OF NORTH AMERICA, INC.

16 FUEL SUPPLY

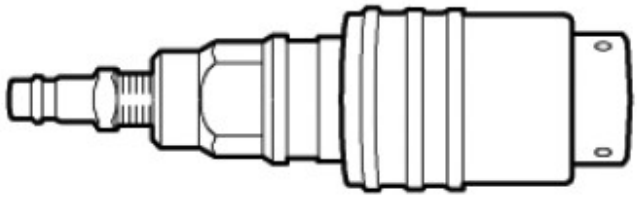
16-8010 ADAPTER

Adapter MW

NOTE: For connecting the workshop compressed air supply to the CNG system via the CNG filling connection.

SI number

01 14 95 (014)



W16 8 010

Fig. 1: Identifying Adapter (16-8010)
Courtesy of BMW OF NORTH AMERICA, INC.

16-1080 HOSE

Hose Minimum set: Mechanical tools MW

NOTE: (Hose guide) For unlocking new fuel tank flap systems with safety lock (incorrect fuelling, diesel/petrol/gasoline)

Storage Location

B19

SI number

01 16 06 (282)



Fig. 2: Identifying Hose (16-1080)
Courtesy of BMW OF NORTH AMERICA, INC.

16-8020 LIFTING GEAR

Lifting gear MW

NOTE: (Lifting beam) For removing and installing the gas tank

SI number

01 14 95 (014)



W16 8 020

Fig. 3: Identifying Lifting Gear (16-8020)
Courtesy of BMW OF NORTH AMERICA, INC.

FUEL TANK AND MOUNTING PARTS E89

16 11 FUEL TANK AND MOUNTING PARTS E89

FUEL TANK AND MOUNTING PARTS SPECIFICATIONS

Tank volume/reserve	ltr.	55/8
Venting: via integrated compensation volume in tank, by carbon canister to intake area.		

FUEL PUMP

16 14 FUEL PUMP

TIGHTENING TORQUE SPECIFICATION - FUEL PUMP

	Type	Thread	Tightening specification	Measure
1AZ El. fuel pump ECU to body	E89	M6		5 Nm

FUEL TANK AND MOUNTING PARTS

16 11 FUEL TANK AND MOUNTING PARTS

TIGHTENING TORQUE SPECIFICATION - FUEL TANK AND MOUNTING PARTS

	Type	Thread	Tightening specification	Measure
1AZ Fuel filler pipe to body	E89	M5		8 Nm
2AZ Clamping band to body	E89	M8		19 Nm
3AZ Grounding strap to body	E89			8 Nm

TANK VENTILATION

16 13 TANK VENTILATION

TIGHTENING TORQUE SPECIFICATION - TANK VENTILATION

	Type	Thread	Tightening specification	Measure
1AZ Carbon canister to body	E89	M6		8 Nm

1.0 FUELS FOR GASOLINE ENGINES

Use only unleaded gasoline in vehicles equipped with a catalytic converter.

Fuels containing up to and including 10% of ethanol or other oxygenates with up to 2.8% oxygen by weight, that is, 15% MTBE (methyl tertiary butyl ether) or 3% methanol plus an equivalent amount of co-solvent, will not void the applicable warranties with respect to defects in materials or workmanship.

Although, usage of such alcohol fuel blends may result in driveability, starting, and stalling problems due to reduced volatility and lower energy content of the fuel. Those driveability problems may be especially evident under certain environmental conditions, such as: high or low ambient temperatures and high altitude.

Only specially adapted vehicles (FFV-Flexible Fuel Vehicles) can run on high alcohol fuel blends. BMW, for the various technical and environmental reasons explained below, does not offer FFV models.

Usage of E85, or any other high alcohol content blend (e.g. E30) in BMW vehicles, will cause various driveability complaints (cold start problems, stalling, reduced performance, poor fuel economy, etc.), may cause excessive emissions, and may cause irreversible damage to engine, emission control and fuel delivery systems due to incompatibility of materials with alcohols.

General Notes Regarding E85 Fuel.

E85 fuel contains 85% (by volume) of ethanol and 15% of gasoline. Ethanol can be produced chemically from ethylene or biologically from grains, agricultural wastes, or any organic material containing starch or sugar. In the US, ethanol is mainly produced from corn and is classified as a renewable fuel.

Similar to gasoline, ethanol contains hydrogen and carbon; with additional oxygen molecules build into its chemical chain. This chemical structure makes ethanol's burning process slightly cleaner compared to the gasoline (lower tailpipe emissions).

On the other hand, due to lower carbon content, ethanol provides 27% less energy (for identical volume) then gasoline, resulting in the reduced fuel economy of E85 vehicles (approximately 22% higher consumption). Increased fuel consumption requires the appropriately enlarged fuel tank capacities (usually 30% increase), and the specific DME calibrations for the E85 lower Stoichiometric air/fuel ratio (10 compared to 14.7 for gasoline engines).

E85 fuel volatility is typically lower then gasoline (RVP 6-10 psi, compared to 8-15 psi for gasoline). Lower fuel volatility will reduce vehicle evaporative emissions, but it may cause cold starting problems especially with lower ambient temperatures.

Under certain environmental conditions, mainly lower ambient temperatures, ethanol separates from gasoline/alcohol mixture and absorbs water. The ethanol absorbed water molecules are heavier then gasoline or ethanol, they remain at the bottom of fuel tank and when introduced into combustion process they tend to form

an extremely lean mixture resulting in misfire, rough idle and cold starting problems.

Certain materials, commonly used with gasoline are totally incompatible with alcohols. When these materials come in contact with ethanol, they may dissolve in the fuel, which may damage engine components and may result in poor vehicle driveability.

Some metals (e.g. zinc, brass, lead, aluminum) become degraded by long exposure to ethanol fuel blends. Also, some nonmetallic materials used in automotive industry such as: natural rubber, polyurethane, cork gasket material, leather, polyvinyl chloride (PVC), polyamides, methyl-methacrylate plastics, and certain thermo & thermoset plastics degrade when in contact with fuel ethanol.

In order to safely and effectively operate a motor vehicle running on E85, the vehicle must be compatible with alcohol use. Some manufacturers have developed vehicles called FFV (Flexible Fuel Vehicle) that can operate on any blend of ethanol and gasoline (from 0% ethanol and 100% gasoline, up to 85% ethanol and 15% gasoline). Ethanol FFVs are similar to gasoline vehicles, with main differences in materials used in fuel management and delivery systems, and DME control module calibrations. In some cases, also E85 vehicles require special lubricating oils.

Aftermarket conversions of gasoline-powered vehicles to ethanol-fueled vehicles, although possible, are not recommended due to internal materials and DME software incompatibility, as well, as the high costs of conversion.

TOP TIER DETERGENT GASOLINE

Deposit-control additives have been required by the EPA in all gasoline from 1995, however, since the introduction of the lowest additive concentration (LAC) most gasoline manufacturers have actually reduced the concentration level of detergent additives by up to 50%.

Low content of cleaning additives results in an excessive accumulation of deposits on fuel injectors, the intake valves, the exhaust manifold or inside the combustion chamber. Due to deposits build-up, customers may experience various driveability problems (e.g. cold start problems, rough idle), increased emissions with Service Engine Soon light illumination, reduced engine performance and poor fuel economy.

In order to increase the level of detergent additives in gasoline, the TOP TIER Detergent Gasoline requirements were approved by four automotive companies (BMW, GM, Honda and Toyota).

Usage of the TOP TIER Gasoline will help keep engines cleaner, and will reduce deposits-related concerns.

A number of gasoline retailers have already met the TOP TIER Detergent Gasoline requirements and are offering this product in all octane grades in all of their respective marketing areas. The current TOP TIER Gasoline retailers are: QuickTrip®, ChevronTexaco®; ConocoPhillips®; 76®; Shell®; Entec Stations®; MFA Oil Company®; Kwik Trip®/Kwik Star®; The Somerset Refinery, Inc.®; Aloha Petroleum®; Jiffy Mart®; Mahalo®; Trip-Par Oil Company®. All gasoline outlets carrying the brand of the approved retailer must conform to TOP TIER requirements on products advertised as such.

BMW recommends using TOP TIER Detergent Gasoline of minimum octane rating of AKI 91 and with alcohol content of less then 10% by volume (or any other oxygenates with up to 2.8% of oxygen by weight). Only the exclusive usage of TOP TIER Gasoline provides the full benefit of reducing deposits build-up.

ALCOHOL DETECTION PROCEDURE

Fuel Blends containing a high percentage (10% and above) of alcohol, mainly ethanol, are becoming more commercially available. Usage of E85, or any other high alcohol content blend (e.g. E30) in BMW vehicles, will cause various driveability complaints (cold start problems, stalling, reduced performance, poor fuel economy, etc.), may cause excessive emissions, and may cause irreversible damage to engine, emission control and fuel delivery systems due to incompatibility of materials with alcohols.

In order to correctly diagnose various driveability complaints caused by fuel blends with a high level of ethanol content, BMW is providing you with an alcohol detection test tool.

Distribution of the following tool will be through the Automatic Tool Shipment Program. Additional tools may be purchased through your PDC. All prices on this bulletin are introductory prices and are only valid during the Automatic Tool Shipment.

Procedure

Safety Precautions:

Gasoline is highly flammable; observe normal precautions for working with flammable liquids. Perform all tests away from any source of ignition. A class B fire extinguisher must be available. Wear protective eye protection with side shields and Nitrile rubber gloves for handling syringe. Please adhere to any applicable OSHA regulations when handling Gasoline. Dispose of the mixture according to local, state and federal regulations.

Fill a clean container with gasoline drawn from the fuel system of the affected vehicle then fill another container with water. Only a small amount of fuel is needed to perform the test (5 ounces of each fluid).

Slowly draw 3cc of water into the syringe. Note: To remove air, draw at least 5cc to 6cc of water, invert the syringe and squirt the water out until the top rim of the rubber plunger is at the 3cc mark.

Slowly draw gasoline into the syringe until the fluid reaches the 12cc mark. Place your finger over the tip of the syringe, vigorously shake the syringe for one minute. Relieve built-up pressure by occasionally removing your finger.

Place the syringe on a flat surface with the nozzle pointing up, allow the syringe to stand for one minute.

If alcohol is present in the fuel, it will separate from the gasoline and dissolve in the water.

Empty the syringe and rinse thoroughly with water, allow drying and apply a silicone lubricant to the rubber plunger before storing.

ALCOHOL PERCENTAGE REFERENCE

Boundary Line	% Alcohol	Boundary Line	% Alcohol
9.0cc	0%	5.0cc	45%
8.6cc	5%	4.5cc	55%
8.1cc	10%	4.1cc	60%
7.7cc	15%	3.6cc	65%

7.2cc	20%	3.2cc	70%
6.8cc	25%	2.7cc	75%
6.3cc	30%	2.3cc	80%
5.9cc	35%	1.8cc	85%
5.4cc	40%	1.4cc	90%

WARRANTY INFORMATION

Components damage/malfunctions, or any driveability problems caused by use of fuels containing more then 10% ethanol (or other oxygenates with more then 2.8% oxygen by weight) will not be covered under BMW warranties with respect to defects in materials or workmanship. Please document the results found on the vehicle repair order whenever performing this test



Alcohol Detection Test Tool
Order PN 83 30 0 420 667

Fig. 1: Identifying Alcohol Detection Test Tool
Courtesy of BMW OF NORTH AMERICA, INC.

ANTI-KNOCK PROPERTIES

The anti-knock value is the quality rating for gasoline and is a requirement for controlled combustion. Anti-knock value is expressed with an octane number. A higher number indicates better anti-knock properties of a gasoline. Internationally approved methods are used to determine the Research Octane Number (RON) and the Motor Octane Number (MON). In the United States the Anti-Knock Index (AKI) is displayed at the gas pumps.

$$AKI = \frac{RON + MON}{2}$$

Fig. 2: Identifying Formula
Courtesy of BMW OF NORTH AMERICA, INC.

BOILING RANGE AND VAPOR PRESSURE

Gasolines must be highly volatile. The boiling range and vapor pressure values are used for evaluation. Gasolines do not have a boiling "point", but rather a boiling "line", since they are produced from a mixture of various hydrocarbon components.

The boiling line (boiling range) and therefore vapor pressure have influence on, for example,

- vapor lock
- starting behavior
- evaporation loss
- transition and driving behavior
- engine oil dilution
- perfect combustion

The boiling range is different for summer and winter gasolines. The vapor pressure test is another means of determining the behavior of a gasoline.

SPECIFIC GRAVITY

The specific gravity is determined by gasoline components. The volume changes with the temperature. Due to the different compositions there are different values for premium grade and regular grade gasolines.

CALORIFIC VALUE

The calorific value expresses the power content of a gasoline. The calorific value of a combustible fuel/air mixture is of prime importance for the power output of engines.

PURITY, COMBUSTION DEPOSITS

Gasolines must be free of contamination. Pumps, jets, injectors, valves and lines must not be clogged or plugged up. Residue and deposits in the intake system and combustion chamber will impair engine operation. The solid residue from evaporation of gasoline provides information on the degree of contamination.

SULFUR CONTENT

The sulfur content of all gasolines should be as low as possible. In this manner there will be less sulfuric acids or sulfur acids in the combustion residue, which would lead to corrosion and sulfuric emissions on an engine running without reaching operating temperature.

1.1 MINIMUM OCTANE AND AKI RATINGS FOR GASOLINE ENGINES

Up to 2005 model year

MINIMUM OCTANE AND AKI RATINGS FOR GASOLINE ENGINES

	Leaded Gasoline	
	Premium Grade	**Regular Grade**
RON (Research Octane No.)		at least 91.0
MON (Motor Octane No.)		at least 82.7

AKI*		at least 93.0	at least 87.0
		Unleaded Gasoline	
	Premium Grade	**Mid-Range**	**Grade Regular Grade**
RON	at least 98.0	at least 95.0	at least 91.0
MON	at least 88.0	at least 85.0	at least 82.5
AKI*	at least 93.0	at least 90.0	at least 87.0

*Anti-Knock Index $AKI = \frac{RON + MON}{2}$

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

1.2 SUMMARY OF FUEL GRADE REQUIREMENTS

SUMMARY OF FUEL GRADE REQUIREMENTS

				Unleaded Gasoline	
Engine	**Vehicle**	**Model**	**Model Year**	**Regular** (AKI at least 87.0)	**Premium** (AKI at least 93.0)
M10	E30	318i	'84-'85	X	
M20	E30	25e/es	'85-'88	X	
	E30	325i/iX	thru '91	X	
	E30	325iC	thru '93	X	
	E28	528e	thru '88	X	
	E34	525i	'89-'90	X	
M30	E28	535i	'85-'88	X	
	E34	535i	thru '93	X	
	E24	635CSi, L6	thru '89	X	
	E23	735i/iL, L7	thru '87	X	
	E32	735i/iL	thru '92	X	
M42	E30	318i/is/iC	'91-'92		X
	E36	318i/is/iC/ti	thru '95		X
M44	E36	318i, Z3	'96-'98		X
	E36	318is/iC	'96-'97		X
	E36	318ti	'96-'99		X
M50	E36	325i/is	'92		X
	E34	525i/iT	'91-'92		X
M50TU	E36	325i/is	'93-'95		X
	E36	325iC	'94-'95		X
	E34	525i/iT	'93-'95		X
M52	E36	323is/iC	'98-'99		X
	E36	328i	'96-'98		X
	E36	328is/iC	'96-'99		X

	E36	Z3	'97-'98	X
	E39	528i	'97-'98	X
M52TU	E46	323i, 328i	'99-'00	X
	E46	323Ci, 328Ci	'00	X
	E36	Z3 2.3/2.8	'99-'00	X
	E39	528i/iT	'99-'00	X
N52	E60	525i, 530i	'05-present	X
	E61	525xiT, 530xiT	'05-present	X
	E90	325i, 330i	'05-present	X
M54	E36	Z3	'01-'03	X
	E46	325i/Ci/CiCiT	'01-present	X
	E46	325xi/xiT	'01-present	X
	E46	330i/Ci/CiC	'01-present	X
	E46	330xi	'01-present	X
	E39	525i/iT	'01-present	X
	E39	530i	'01-present	X
	E53	X5 3.0i	'01-present	X
	E60	525i, 530i	'03-present	X
	E83	X3	'04-present	X
	E85	Z4	'03-present	X
M60	E34	530i/iT, 540i	'94-'95	X
	E32	740i/iL	'93-'94	X
	E38	740i/iL	'95	X
	E31	840Ci	'94-'95	X
M62	E39	540i	'97-'03	X
	E39	540iT	'99-'03	X
	E38	740i/iL	'96-'01	X
	E31	840Ci	'96-'97	X
	E53	X5	'00-'03	X
N62	E53	X5	'04-'05	X
	E60	545i	'03-'05	X
	E63	645Ci	'04-'05	X
	E64	645CiC	'04-'05	X
	E65	745i	'02-'05	X
	E66	745Li	'02-'05	X
N62TU	E53	X5	'05-present	X
	E60	550i	'03-present	X
	E63	650Ci	'04-present	X
	E65	750i	'05-present	X
	E66	750Li	'05-present	X
M70	E32	750iL	'88-'94	X
	E31	850i/Ci	'91-'94	X
M73	E38	750iL	'95-'01	X

	E31	850Ci	'95-'97	X
N73	E66	760Li	'04-present	X
S14	E30	M3	'88-'91	X
S38	E24	M6	'87-'88	X
	E28	M5	'88	X
	E34	M5	'91-'93	X
S50	E36	M3	'95	X
S52	E36	M3	'96-'99	X
	E36	MZ3	'98-'00	X
S54	E36	MZ3	'01-'02	X
	E46	M3	'01-'02	X
S62	E39	M5	'00-'03	X
	E52	Z8	'00-present	X
S70	E31	850CSi	'94-'95	X

2.0 FUEL SYSTEM CLEANER PLUS

Recent field experiences have shown a significant increase in various driveability complaints due to excessive carbon deposits in engine's combustion chambers, on the intake valves and fuel injectors.

The overall rise in carbon deposits accumulation is generally attributed to poor gasoline quality, namely, low level of cleaning additives and fuel contamination.

TECHNICAL BACKGROUND

Combustion chamber deposit formation is a by-product of the gasoline burning process. Fuel injector and intake valve deposits may become less troublesome with the recently introduced Top Tier Detergent Gasoline deposit control standards, which are exceeding the detergent requirements imposed by the EPA since 1995.

However, vehicles that do not exclusively use a Top Tier Detergent Gasoline, or are regularly driven in severe service conditions, such as stop-and-go traffic, high ambient temperatures, and high altitude can experience performance problems caused by intake system and combustion chamber deposits.

The most common customer complaints may include:

FUEL INJECTORS

Deposits at the injector's tip can impact fuel flow, upsetting the air/fuel mixture ratio.

Symptoms: Hesitation or stumble during acceleration, even loss of power. Poor fuel efficiency. Increased emissions of HC and CO. "Service Engine Soon" light illumination due to intermittent misfire faults, or lean mixture adaptation values

INTAKE VALVES:

Deposits at the valves and on the intake manifold ports can absorb fuel during the warm-up phase, leaning out

the air/fuel mixture ratio. Carbon build-up may disturb mixture flow at low throttle conditions/idle speeds.

Symptoms: Poor driveability, loss of power, unstable/rough idle, increased emissions of HC, CO and NOx. "Service Engine Soon" light illumination due to intermittent misfire faults.

COMBUSTION CHAMBER:

Combustion Chamber Deposit Interference, or CCDI, occurs when there is a contact between carbon deposits on the piston crown and cylinder head. The noise can be confused or misdiagnosed as ping, knock or other noises that could indicate a mechanical failure. CCDI occurs first as a cold start noise that can fade as the engine warms to operating temperature. The noise will reoccur at the next cold start. As deposits build, there is an increase in compression temperature that may cause pre-ignition detonations.

Symptoms: Knocking, pinging, run-on, poor acceleration, octane requirement increase, increased emissions of NOx, engine idle speed surges.

Depending on the manufacturer, fuels may contain various additives such as: oxidation and corrosion inhibitors, metal deactivators, emulsifiers, anti-icing agents & dyes, plus they are required to include some form of an intake system deposit control package. Unfortunately, not all fuels are created equal, and some additive packages are not effective enough to maintain integrity of the intake systems in high performance engines, or engines operating in severe environmental conditions. Even worse, the intake system deposit control additives in some fuels may actually contribute to the combustion chamber deposits accumulation, and to the problems associated with those deposits: knock, run-on and increased emissions of oxides of nitrogen.

RECOMMENDATION

BMW recommends using TOP TIER Detergent Gasoline of minimum octane rating of AKI 91 and with alcohol content of less then 10% by volume (or any other oxygenates with up to 2.8% of oxygen by weight). Only the exclusive usage of TOP TIER Detergent Gasoline provides the full benefit of reducing deposits formation.

If the TOP TIER Detergent Gasoline is unavailable, we recommend BMW Group Fuel System Cleaner Plus (PN 82 14 0 413 341) be added to the gas tank. For optimum cleaning and deposits control, add a 20 fl. oz. bottle every 3,000 miles when refueling.

Regular use of BMW Group Fuel System Cleaner Plus can help address carbon deposits related symptoms listed above. By removing these deposits, an engine may experience restored power, performance and fuel efficiency, a smoother idle running, lower emissions, and reduced octane requirement.

BMW Group Fuel System Cleaner Plus uses polyether amine TECHRON® based technology developed and patented by Chevron. BMW Group Fuel System Cleaner Plus has proven to clean up deposits in fuel injectors, ports & intake valves and reduces the harmful effects of combustion chamber deposits. It helps restore performance lost due to deposit buildup.

Chevron and BMW have run an extensive "no harm" tests with polyether amine technology. When used as directed, it will not harm catalytic converters, oxygen sensors, or any other mechanical components of the engine, or fuel delivery system.

The effectiveness of the additive depends on its presence in the gasoline in large concentrations for short

periods of time. One treatment is usually sufficient, but a second treatment (one 20 oz bottle per each, consecutive full tank of gas) may give additional benefits. To keep your fuel intake system clean, we recommend usage at every 3000 miles.

Additionally, vehicle's fuel sending units equipped with silver plated resistor card/contacts are especially vulnerable to attacks by elemental sulfur and/or hydrogen sulfide found in fuels. Adding BMW Group Fuel System Cleaner Plus immediately upon noticing erratic fuel gauge behavior may, in many cases, restore proper performance due to the additive's ability to remove the harmful sulfur compounds from the sending unit's contact surface. Additionally, BMW Group Fuel System Cleaner Plus can help protect the fuel gauge from future malfunctioning by coating all metal surfaces of the fuel system.



BMW Group Fuel System Cleaner Plus.
PN 82 14 0 413 341,
1 bottle, 20 fl. oz.
Ordering in multiples of 6 bottles per case.

Fig. 4: Identifying BMW Group Fuel System Cleaner Plus
Courtesy of BMW OF NORTH AMERICA, INC.

WARRANTY INFORMATION

Because carbon deposit build-up is related to fuel quality, it cannot be considered as a defect in vehicle's materials or workmanship. Consequently, usage of BMW Group Fuel System Cleaner Plus is not covered under the terms of the BMW New Vehicle Limited Warranty or maintenance plan.

ENGINE PERFORMANCE

Fuel System - Repair - Z4

1300 CHECKING SETTING ENGINE EMISSION

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output.

The automatic engine start-stop function is active.

An automatic engine start is possible.

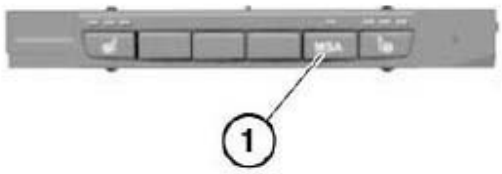
Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated

by:

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



R61 1948

Fig. 1: Identifying MSA Switch In Passenger Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm

  - Basic setting (engine hood/bonnet open)

B = 7 mm

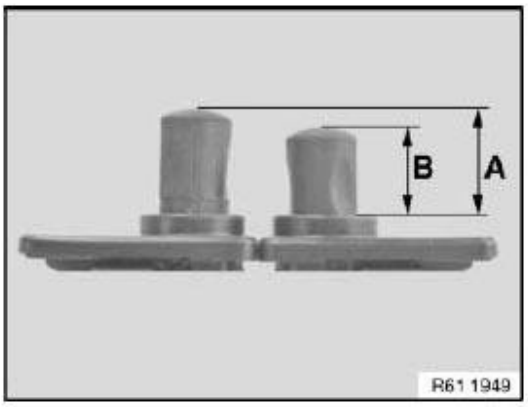


Fig. 2: Identifying Engine Hood/Bonnet Basic Setting And Workshop Mode
Courtesy of BMW OF NORTH AMERICA, INC.

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

When working with diagnosis tools

- Observe instructions in diagnosis tool

1331 FUEL PUMP WITH DRIVE AND LINE

13 31 032 CHECK FUEL PRESSURE

Necessary preliminary work

- Connect BMW diagnosis system.

IMPORTANT: Lines are under pressure!

Wear protective goggles and gloves.

Fuel can emerge spontaneously at high velocity when the fuel line is released!

Recycling

Catch and dispose of escaping fuel with auxiliary materials.

Observe country-specific waste disposal regulations.

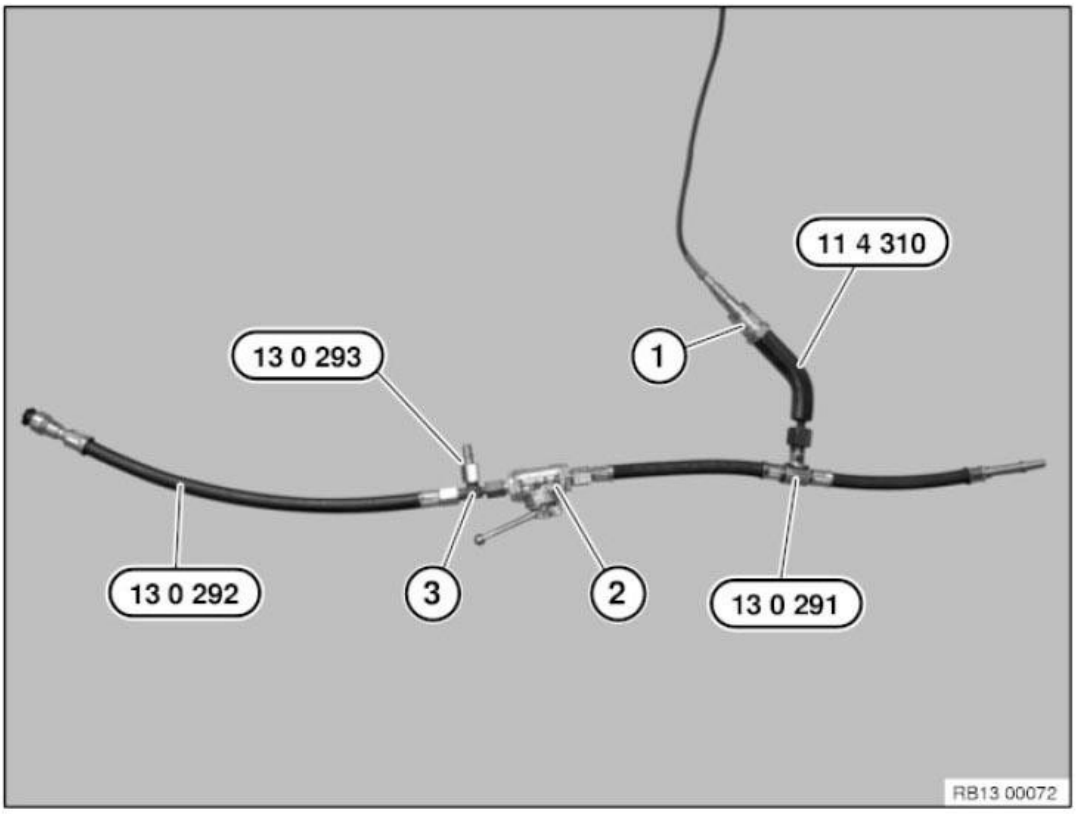


Fig. 3: Checking Fuel Delivery Pressure Using Pressure Sensor, Special Tools And Adapters
Courtesy of BMW OF NORTH AMERICA, INC.

Check fuel delivery pressure

To check the fuel delivery pressure, special tool **13 0 290** must be assembled as follows.

Screw adapter 11 4 310 onto line 13 0 291.

Screw the IMIB 100 bar pressure sensor (1) onto adapter 11 4 310.

Alternatively, the pressure gauge from the set of special tools **13 3 060** can be screwed onto line 13 0 291.

Between lines 13 0 291 and 13 0 292, mount a shutoff tap (2) and a T-piece (3) from the set of special tools **13 3 060** .

Close up T-piece (3) from the set of special tools with the cap 13 0 293.

NOTE: The graphic shows F07 The procedure is identical for other vehicles.

Remove circlip (1).

Unlock and detach fuel line (2) to fuel tank from fuel line (2) to high pressure pump.

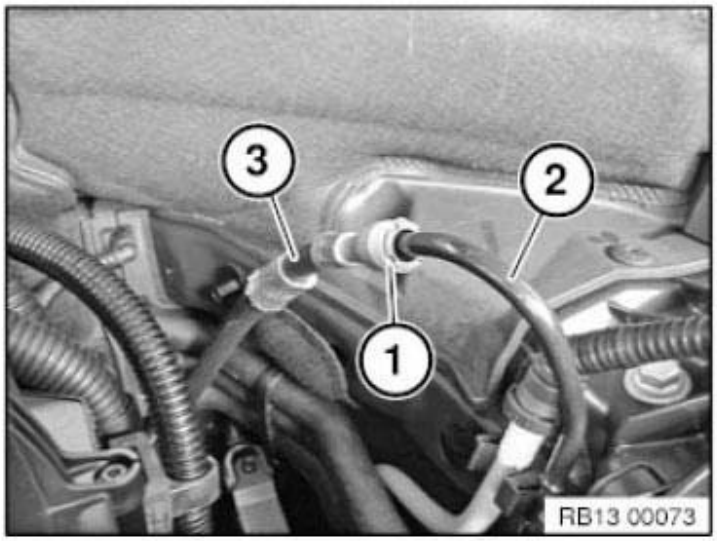


Fig. 4: Identifying Circlip, Fuel Line And Fuel Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool (1) **13 0 290** into detached fuel line with IMIB fuel pressure sensor (100 bar).

Connect IMIB with fuel pressure sensor.

Establish fuel delivery pressure. Read off fuel delivery pressure on IMIB and compare with values in diagnosis system.

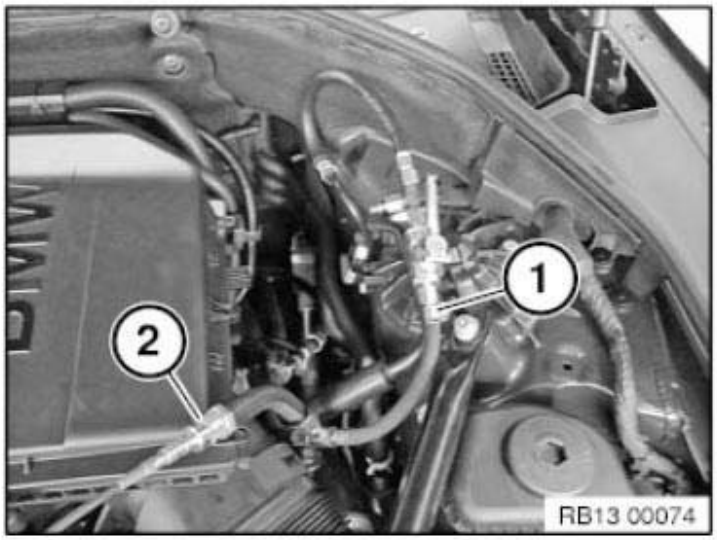


Fig. 5: Installing Special Tool (13 0 290) With Fuel Pressure Sensor To Fuel Line
Courtesy of BMW OF NORTH AMERICA, INC.

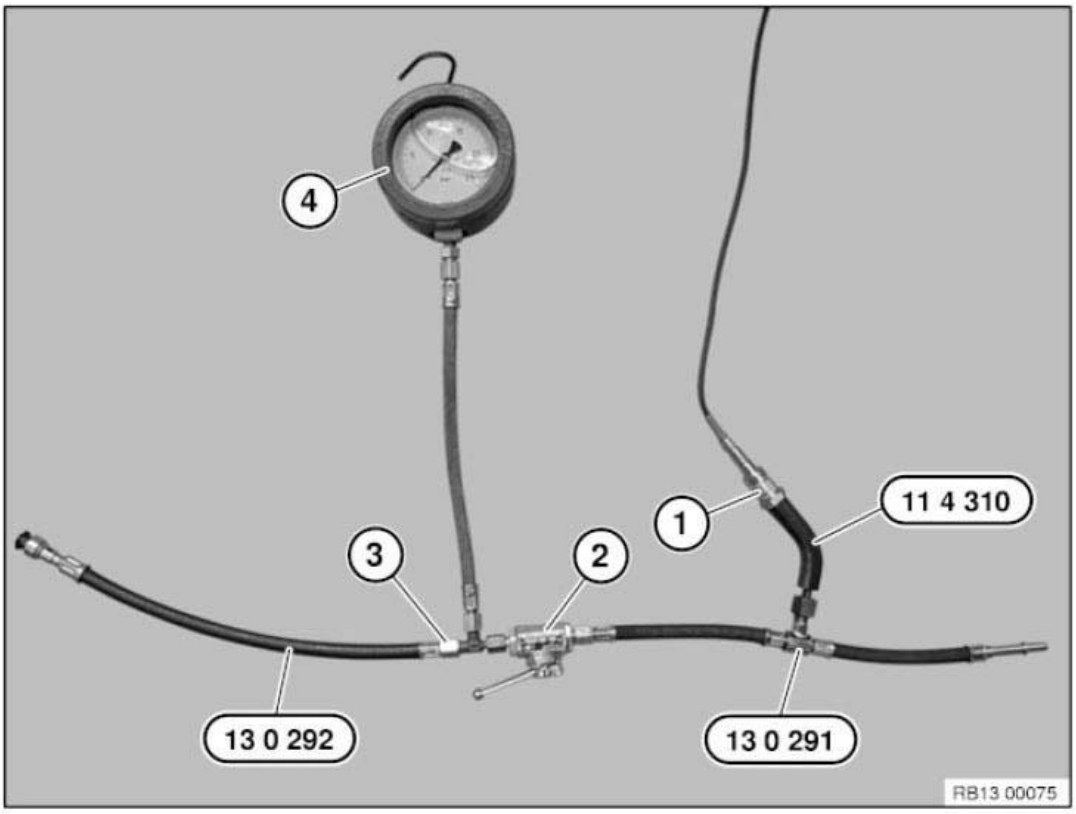


Fig. 6: Checking Fuel Delivery Pressure Using Pressure Sensor, Special Tools And Adapters
Courtesy of BMW OF NORTH AMERICA, INC.

Check fuel holding pressure

To check the fuel holding pressure, special tool **13 0 290** must be assembled as follows.

Screw adapter 11 4 310 onto line 13 0 291.

Screw the IMIB 100 bar pressure sensor (1) onto adapter 11 4 310.

Alternatively, the pressure gauge from the set of special tools **13 3 060** can be screwed onto line 13 0 291.

Between lines 13 0 291 and 13 0 292, mount a shutoff tap (2) and a T-piece (3) from the set of special tools **13 3 060** .

Mount pressure gauge (4) from special tool set **13 3 060** onto T-piece (3) from special tool set **13 3 060** .

NOTE: The graphic shows F07 The procedure is identical for other vehicles.

Remove circlip (1).

Unlock and detach fuel line (2) to fuel tank from fuel line (2) to high pressure pump.

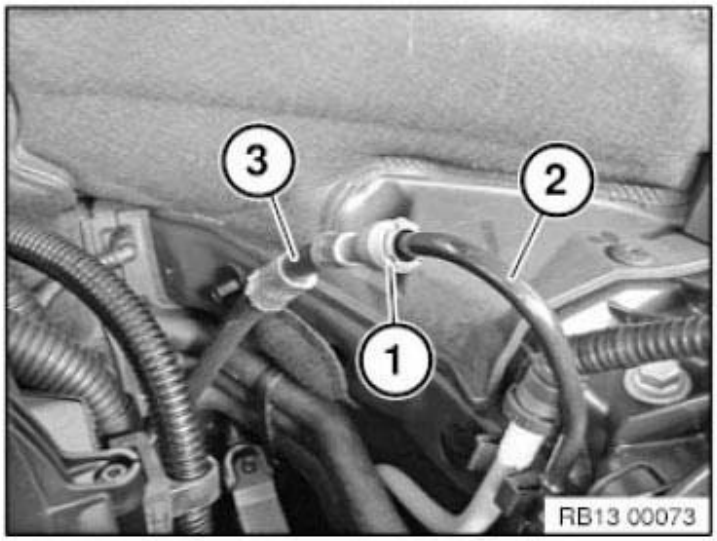


Fig. 7: Identifying Circlip, Fuel Line And Fuel Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool (1) **13 0 290** with pressure gauge (2) and IMIB 100 bar fuel pressure sensor (3) into the detached fuel line.

Establish fuel delivery pressure.

Close shutoff tap (4) and switch off the engine.

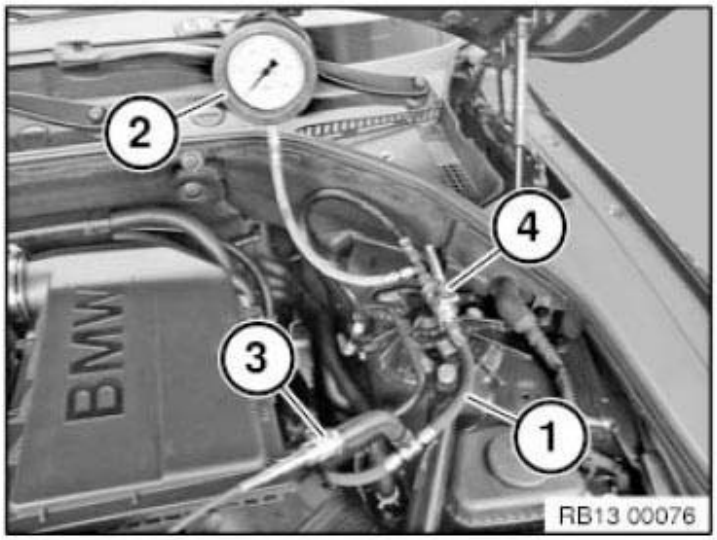


Fig. 8: Installing Special Tool (13 0 290) With Pressure Gauge And Fuel Pressure Sensor To Fuel Line
Courtesy of BMW OF NORTH AMERICA, INC.

Read off fuel holding pressure of high pressure pump from IMIB tester and compare with values in diagnosis system.

Read off fuel holding pressure to fuel tank on pressure gauge (2) and compare with values in diagnosis system.

Assemble engine.

Check fuel system for leak tightness.

13 31 ... NOTES ON FUEL PRESSURE CHECK (REFERENCE PRESSURE: ENVIRONMENT)

Feature of this version with ambient pressure:

The connection for the vacuum hose of the fuel pressure regulator is located between the throttle and the air cleaner or on the air cleaner.

Test precondition:

The correct fuel pressure regulator is fitted.

- Using the EPC, check whether the fuel pressure regulator suitable for the car is fitted:

  Connect test adapter.

Description of operation :

The control function of the fuel pressure regulator must be guaranteed under all operating conditions. The fuel pump must always be able to generate a higher fuel pressure than the pressure regulated by the pressure regulator.

The injection rate is adjusted by means of the injection time; the injection time is controlled by the DME.

Description of operation: fuel return line

When the engine is at a standstill and the ignition key is in position 0, the fuel return line after the pressure regulator is at zero pressure.

Description of operation: pressure retaining function

The pressure regulator closes when the engine is at a standstill and the ignition key is in position 0. The fuel pressure in the delivery line is retained over an extended period. A non-return valve closes in the fuel pump. These measures help to retain the fuel pressure in the fuel system. Extended starting times are thus avoided.

Complaint: drive characteristic faults, lack of power

- Run engine at idle speed and measure fuel pressure.

If the measured value is less than the nominal value - 0.2 bar:

- Line cross-sections in fuel feed are constricted or fuel filter is clogged, or

- Fuel pump voltage supply is not O.K.: e.g. as a result of high contact resistance (corrosion) in plug connection between wiring harness and fuel pump.

If the measured value is greater than the nominal value + 0.2 bar:

- Turn off engine stop and then observe measured value.
- If measured value drops to nominal value, then line cross-sections in fuel return are constricted or clogged.
- Check the fuel lines for kinks.

If no kinks are visible:

- Replace return lines

If measured value remains too high, then pressure regulator is in all probability faulty.

IMPORTANT: With less likelihood, the return line may be completely blocked. When the pressure regulator is removed, fuel could escape under pressure!

- Have a cleaning cloth ready and catch and dispose of escaping fuel.
- Replace the return line but not the pressure regulator.

Complaint: starting problems

- Run engine briefly at idle speed and switch off.
- Note down measured value while engine is stopped.
- Read off measured value again after approx. 20 to 30 minutes while engine is stopped.

Special tool 13 3 010 (hose clamp) is required for the following test.

If the measured value has dropped by more than 0.5 bar:

- Start engine and wait briefly for a stable pressure increase.
- Switch off the engine and immediately pinch off the delivery line just before the pressure gauge with the special tool 13 3 010.
- Note down measured value
- Read off measured value again after approx. 20 to 30 minutes while engine is stopped

If the measured value has now dropped by less than 0.5 bar, the following faults can be present:

- Fault in delivery lines
- Fault in in-tank delivery hose
- Faulty pressure-holding non-return valve in fuel pump

Check components. Replace faulty components.

If the measured value has dropped by more than 0.5 bar again:

- Replace pressure regulator

NOTE:

- **All the fuel hoses and hose clips which were detached within the framework of the checks must be replaced.**
- **Interrogate fault memory of DME control unit. Check stored fault messages. Rectify faults. Now clear the fault memory.**

1351 INJECTION PUMP, REGULATOR, MIXTURE REGULATOR

13 53 192 REMOVING AND INSTALLING/REPLACING A PRESSURE LINE (N54)

WARNING: Observe warning on cylinder head cover.

Clamp off BATTERY NEGATIVE LEAD (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

WARNING: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**
- **High-pressure lines may be rescrewed a maximum of 10 times.**

Necessary preliminary tasks

- Remove **IGNITION COIL** of corresponding cylinder

NOTE:

- **Ignition coils must not be fouled by fuel!**

  The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail! Cloths/rags must therefore be used to prevent fuel from getting into the spark plug slots!

- **Before installing ignition coils, clean spark plug slots with compressed air.**
- **Make sure the spark plug slot is absolutely clean.**

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

WARNING: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity from the fuel injectors!

To reduce the fuel pressure, place rag over fuel injector and carefully tap against the fuel injector with a spanner.

There is a risk of injury if the fuel pressure is not reduced!

NOTE: The following description applies to all pressure lines.

First release rail pressure lines to reduce existing fuel pressure if necessary. Fuel must not get into the spark plug slot. Then release pressure line on injector.

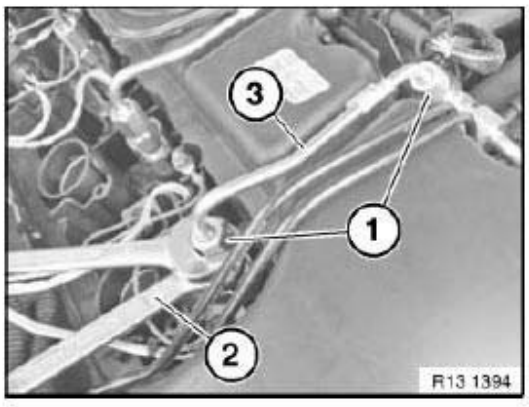


Fig. 9: Identifying Pressure Line, Wrench And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1), gripping the injector with a wrench (2) in so doing.

Disconnect pressure line (3).

IMPORTANT: If several pressure lines are removed, ensure that each pressure line is reinstalled in its original location (cylinder).

Mark pressure lines.

Close off injector with protective cap (1).

Protective caps are available from BMW Parts Service.

Seal rail with a matching plug from special tool kit **32-1270 PLUG** .

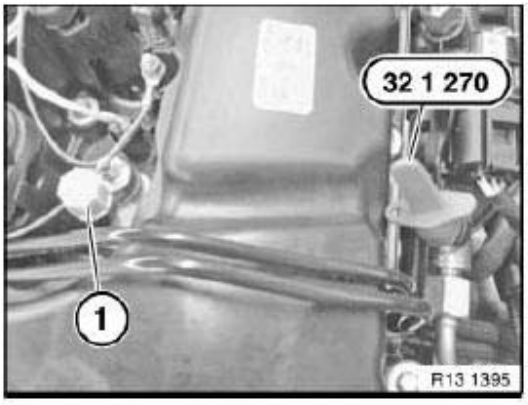


Fig. 10: Identifying Seal High-Pressure Rail With Matching Plug From Special Tool Kit (32 1 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Seal pressure line (1) with a matching plug from special tool kit **32-1270 PLUG** .

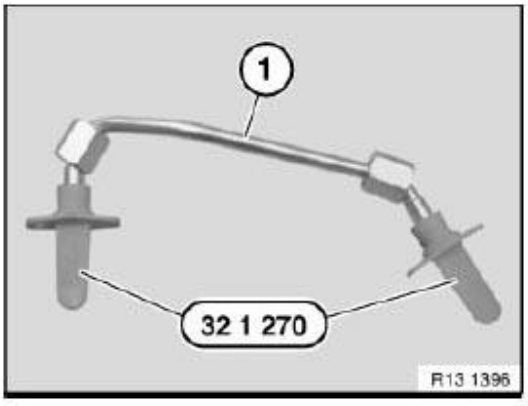


Fig. 11: Identifying Seal Pressure Line With Matching Plug From Special Tool Kit (32 1 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Installing pressure line

Installation of pressure rail is described separately from removal.

Same procedure for all pressure lines.

Copper seals that may be fitted (1) are no longer needed and must be removed.

If using the pressure line, apply a light coating of gear oil to the thread. New pressure lines are already coated.

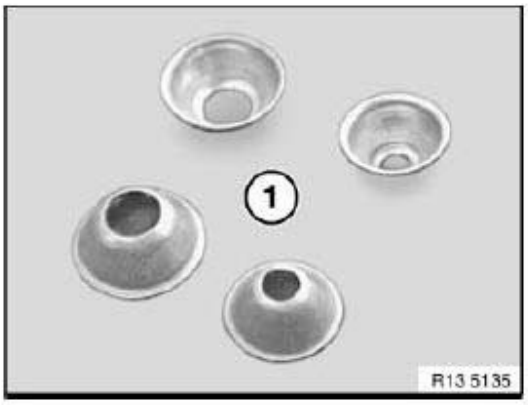


Fig. 12: Identifying Copper Seals
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Connect pressure line (1) without tension only.

To ensure distortion-free installation of the pressure line and to avoid damaging the thread, it must be possible for both nuts to be screwed on easily by hand!

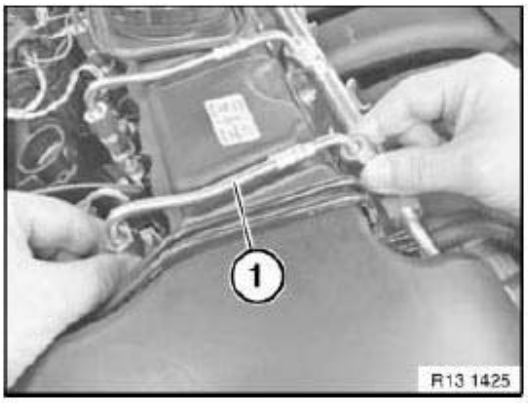


Fig. 13: Identifying Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

If the nuts cannot be easily screwed on by hand, the **injector must be turned into the installation position!**

NOTE: **Description of "Turning injector into installation position" in the following two work steps.**

Only if injector has to be turned into installation position

- Release bolt a few turns until holding-down element (1) is slackened.
- Turn injector (2) in direction of arrow until nuts on pressure line can be easily screwed on by hand.

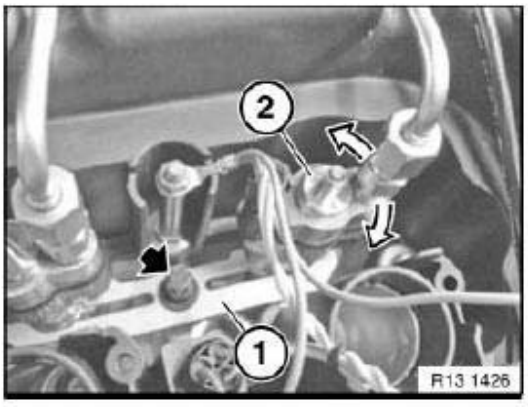


Fig. 14: Turning Injector With Nuts On Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

- To do so, engage wrench on hexagon head of injector if necessary.
- Tighten nuts on pressure line hand-tight.

IMPORTANT: **Do not under any circumstances pull injector out of bore!**

If the injector is pulled out of the bore hole, the PTFE sealing ring must be replaced! Replacing PTFE sealing ring, refer to 13 53 310 .

Tighten down screw for holding-down element (1).

Tightening torque **13 53 5AZ** .

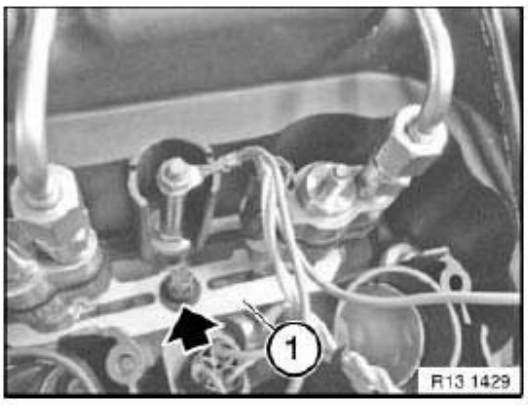


Fig. 15: Identifying Holding-Down Element
Courtesy of BMW OF NORTH AMERICA, INC.

Adhere to tightening sequence

- First tighten down nut (1) on injector.
- Then tighten down nut (2) on rail.

When tightening nut (1) on injector, grip hexagon head of injector with wrench (3).

Tighten down nuts with special tool 37 1 151.

Tightening torque **13 53 8AZ** .

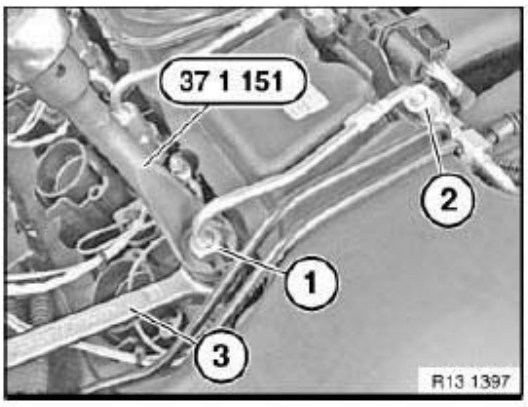


Fig. 16: Identifying Down Nut On Injector And Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

13 53 332 REMOVING AND INSTALLING/REPLACING FEED LINE (N54)

WARNING: Disconnect BATTERY NEGATIVE LEAD (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

Wear protective goggles.

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

IMPORTANT: Ignition coils must not be fouled by fuel.

The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!

Cover ignition coil with suitable means.

Necessary preliminary tasks

- Remove **INTAKE AIR MANIFOLD**

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

Unlock and detach fuel line (1).

Catch and dispose of escaping fuel.

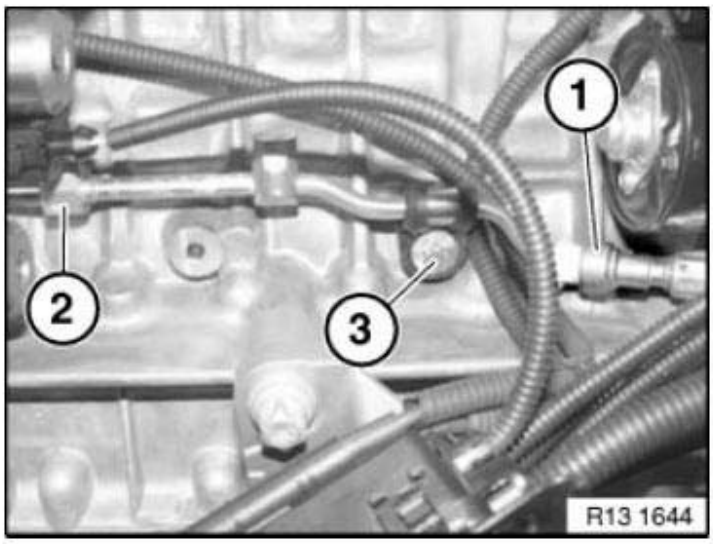


Fig. 17: Identifying Fuel Line, Slacken Nut And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Seal fuel lines with special tools (1) 13 5 161 and (2) 13 5 162.

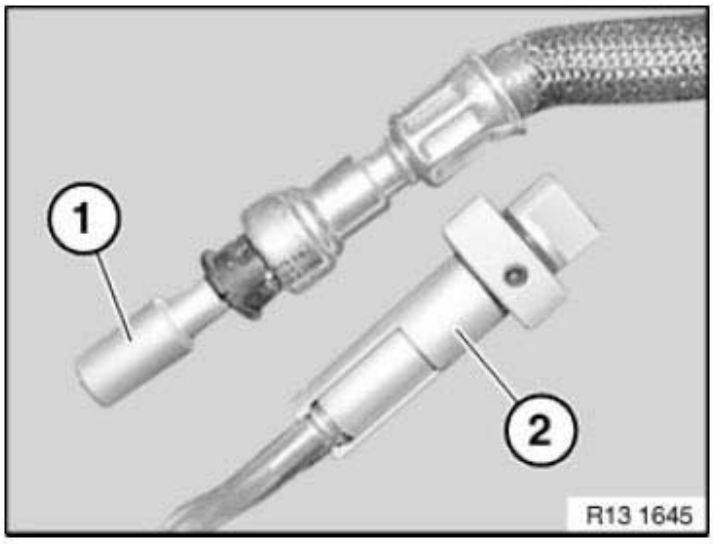


Fig. 18: Identifying Seal Fuel Lines With Special Tools (13 5 161) And (13 5 162)
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (2).

Release screw (3).

Remove feed line.

Close off feed line and high-pressure pump with a matching plug from special tool kit **32-1270 PLUG** .

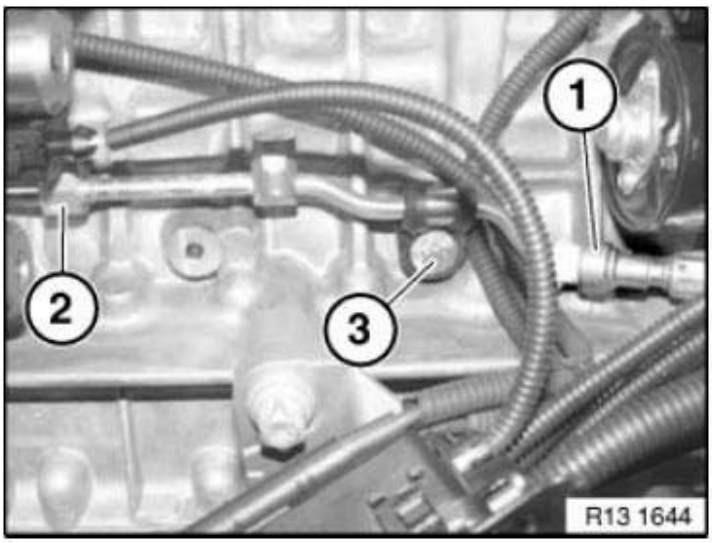


Fig. 19: Identifying Fuel Line, Slacken Nut And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Follow sequence of screw connections:

1. Tighten down nut (2) with special tool **13 5 020** .

   Tightening torque **13 53 6AZ** .

2. Replace aluminum screw (3).

   Tighten down screw (3).

   Tightening torque **13 53 9AZ** .

3. Connect fuel line (3).

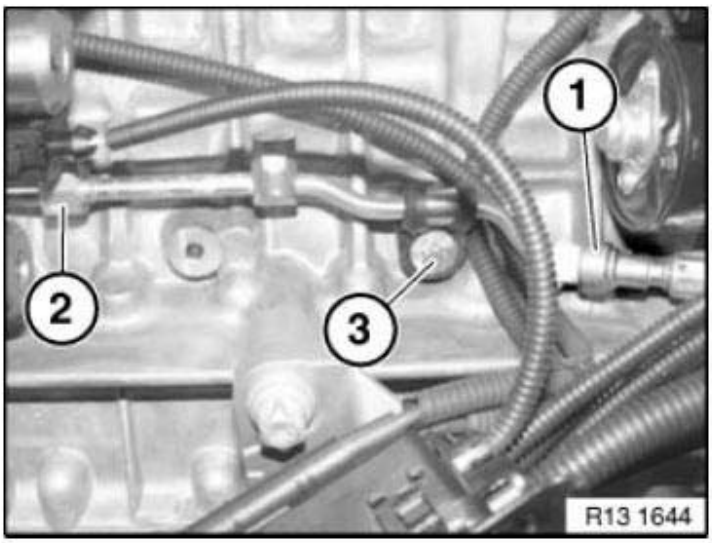


Fig. 20: Tightening Down Nut And Screw Using Special Tool (13 5 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

13 51 017 REMOVING AND INSTALLING/REPLACING HIGH-PRESSURE FUEL PUMP (N54)

WARNING: Observe warning on cylinder head cover.

Disconnect BATTERY NEGATIVE LEAD (risk of fire due to short circuit on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

IMPORTANT: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced dirt contamination can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt contamination before removing lines or separate components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

IMPORTANT: Ignition coils must not be contaminated by fuel.

The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!

Cover ignition coil with suitable means.

Necessary preliminary work

- Remove **THROTTLE BODY**

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

Apply silicone-free multifunction spray (part number 83 23 0 418 567) on to supports (1) of base well bracket (2).

Unplug connector (3) and (4) from base well.

Slide base well (2) in direction of arrow.

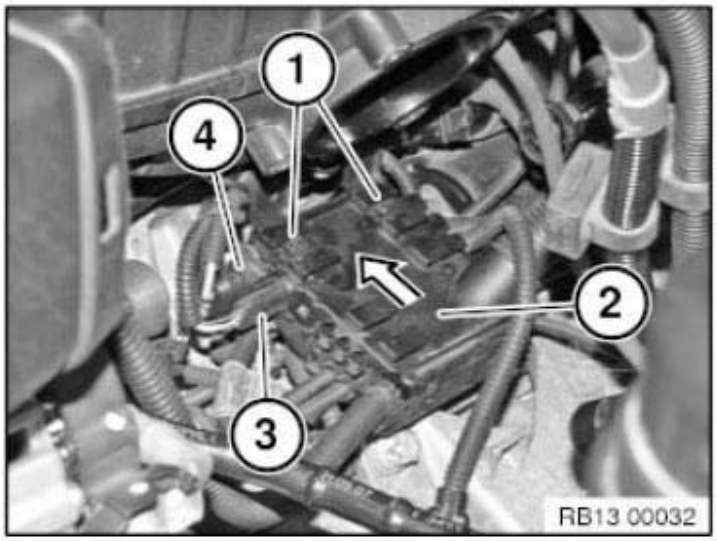


Fig. 21: Applying Silicone-Free Multifunction Spray On Base Well Bracket Supports
Courtesy of BMW OF NORTH AMERICA, INC.

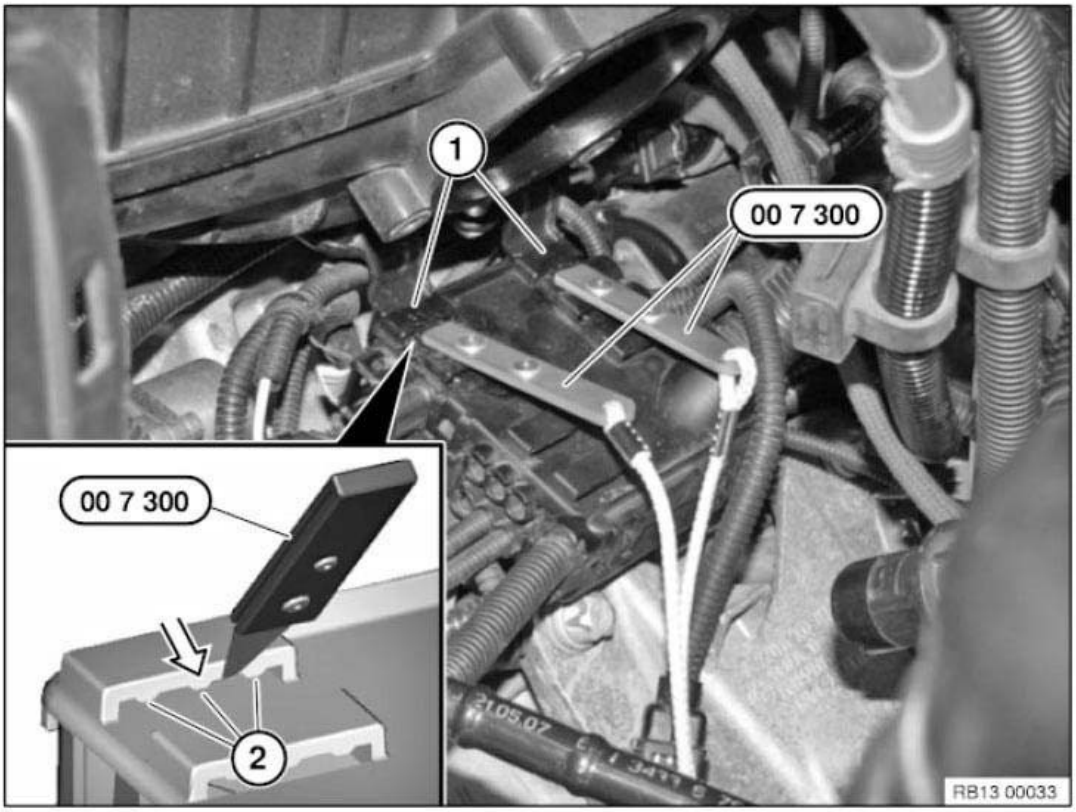


Fig. 22: Inserting Special Tools (00 7 300) In Base Well Mounting Points
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool **00 7 300** in mounting points (1) on base well.

NOTE: Place tips of special tool 00 7 300 between retainers (2) and then centre (arrow).

Detach base well (1) from bracket (2) with special tool **00 7 300** .

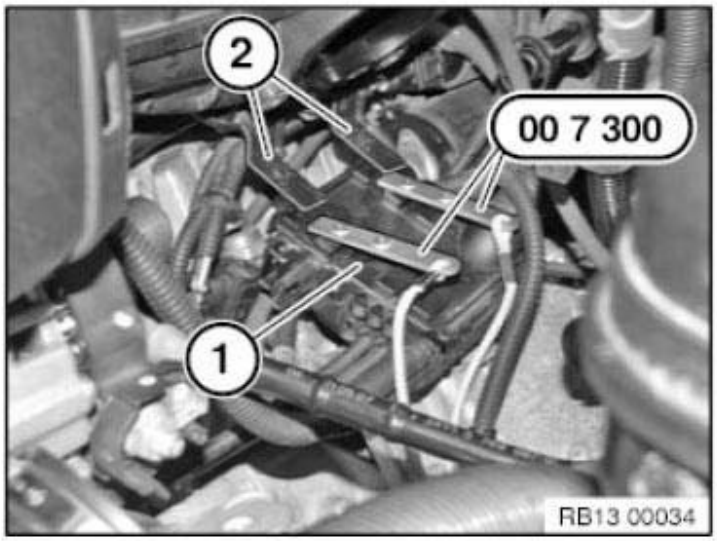


Fig. 23: Removing Base Well From Bracket Using Special Tool (00 7 300)
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock connector (1) and remove.

Unlock and detach fuel line (2).

Catch and dispose of escaping fuel.

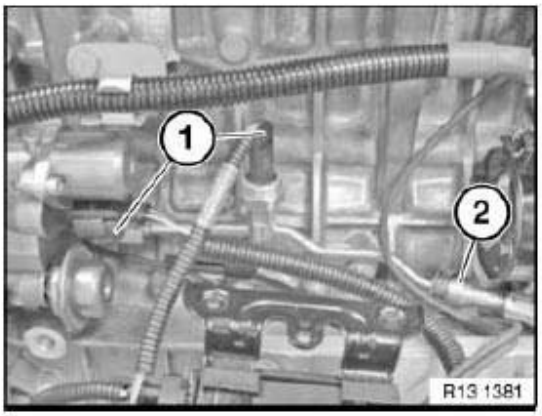


Fig. 24: Identifying Connector And Fuel Line
Courtesy of BMW OF NORTH AMERICA, INC.

Seal fuel lines with special tools 13 5 281 and 13 5 282.

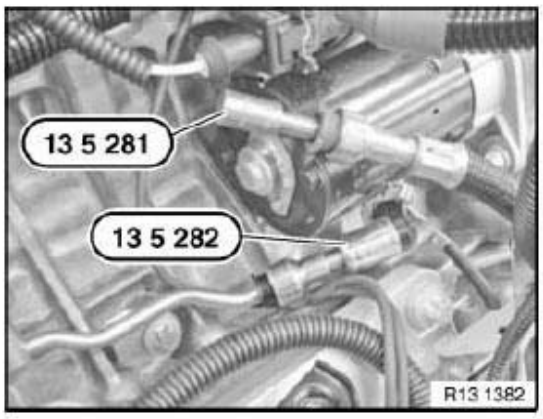


Fig. 25: Identifying Seal Fuel Lines With Special Tools (13 5 281) And (13 5 282)
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Release screw (2).

Installation note:

- Replace aluminum screw (2).

Remove feed line (3).

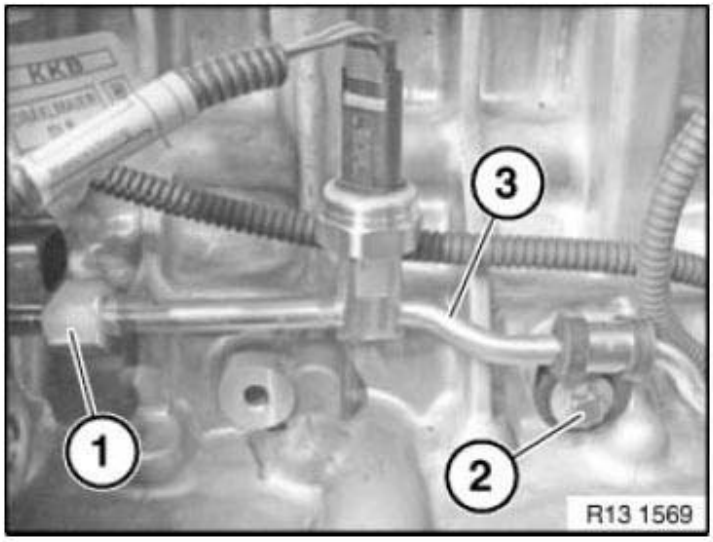


Fig. 26: Identifying Slacken Nut, Screw And Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Seal feed line with matching plug from set of special tools **32-1270 PLUG** .

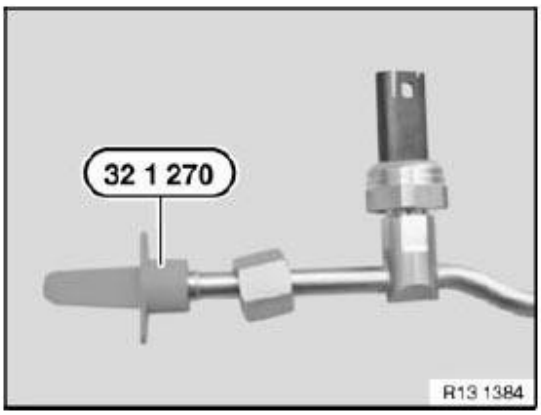


Fig. 27: Identifying Seal Feed Line With Matching Plug From Special Tool Kit (32 1 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

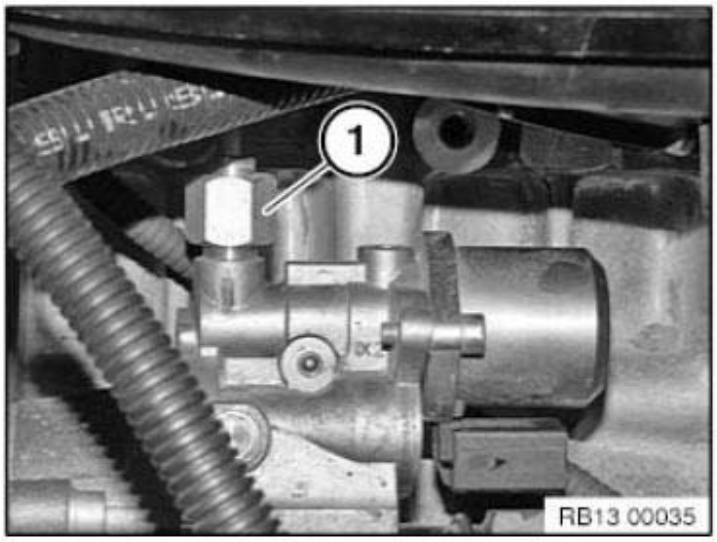


Fig. 28: Identifying Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Undo screws (1) and raise acoustic cover (2) in front area.

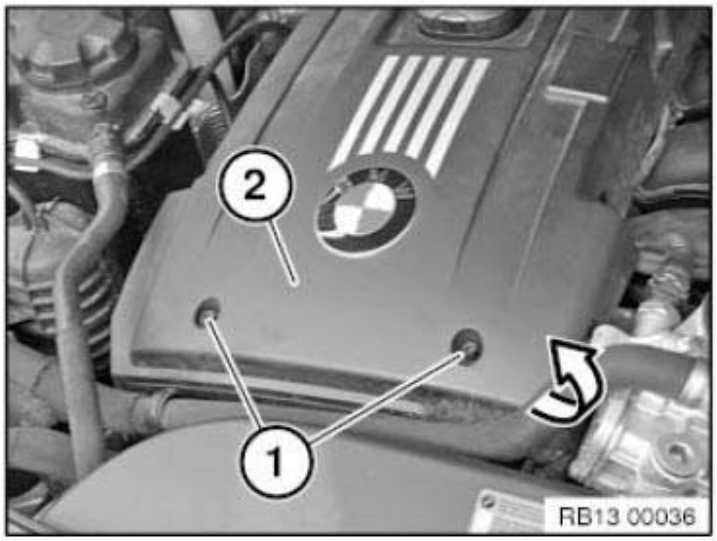


Fig. 29: Raising Acoustic Cover In Front Area
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

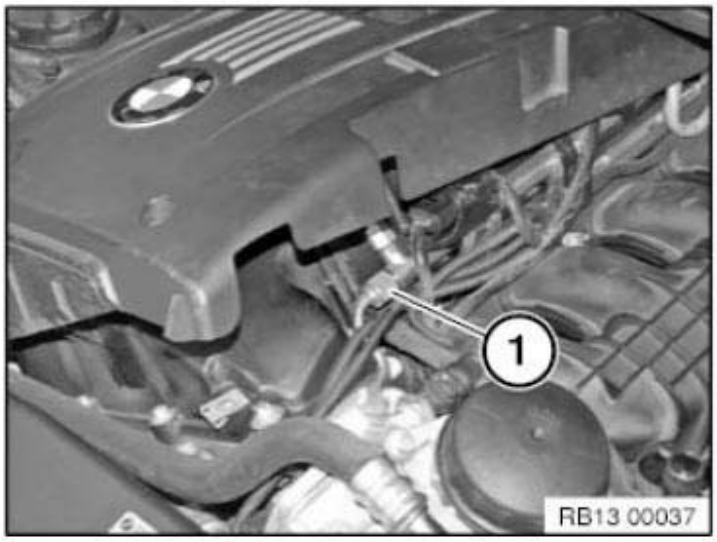


Fig. 30: Identifying Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Seal fuel line connections of high pressure pump (1) with matching plugs from set of special tools **32-1270 PLUG** .

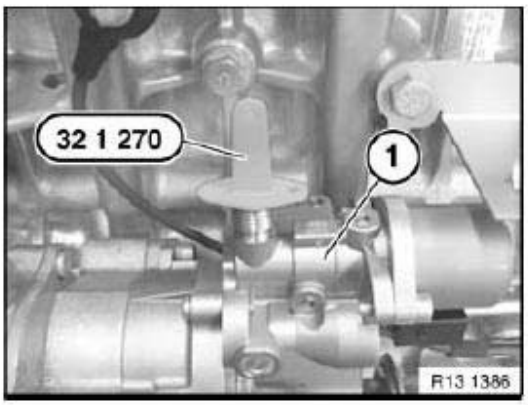


Fig. 31: Identifying Seal Fuel Line Connections Of High-Pressure Pump With Matching Plugs From Special Tool Kit (32 1 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts with special tool **11 8 610** .

Detach high pressure pump (1) and remove.

Engine oil can escape when pump is detached; have a cleaning cloth ready.

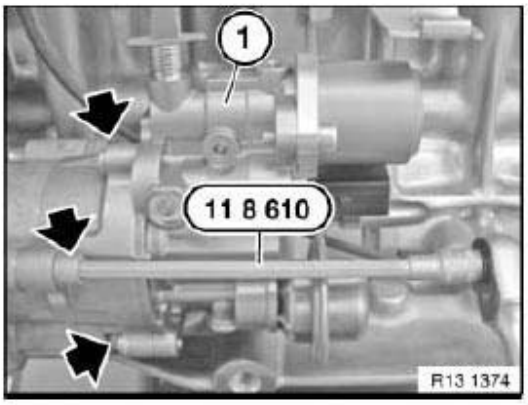


Fig. 32: Removing High-Pressure Pump Using Special Tool (11 8 610)
Courtesy of BMW OF NORTH AMERICA, INC.

Installing high pressure pump

Installation of high pressure pump is described separately from removal.

Replace sealing ring (1).

Clean contact surfaces.

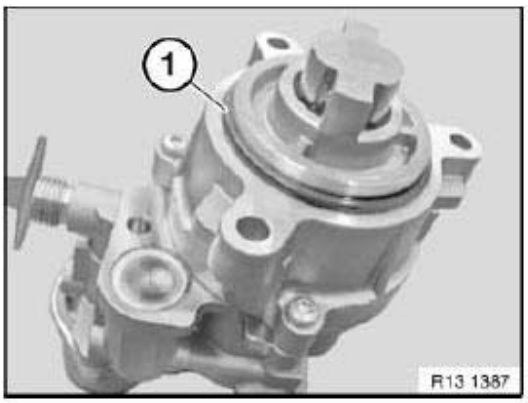


Fig. 33: Identifying Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

When installing, turn high pressure pump (1) if necessary in direction of arrow until bore holes for screws are flush.

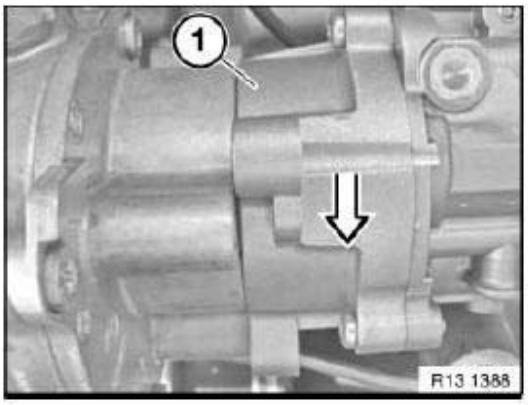


Fig. 34: Identifying High-Pressure Pump
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Only hand-tighten screws (1) of high pressure pump (2) with special tool 11 8 610 .

This helps ensure that no strain is produced when the high pressure line is tightened.

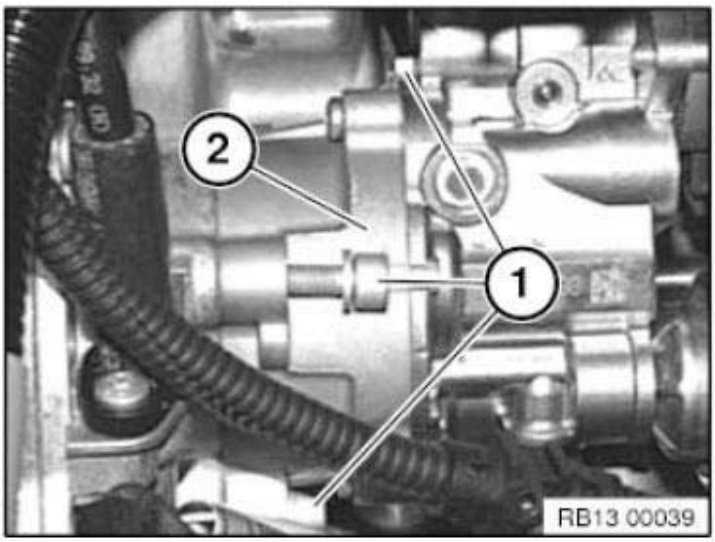


Fig. 35: Identifying High Pressure Pump With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Copper seals that may be fitted on the high pressure line are no longer needed and must be removed.

If reusing pressure line, lightly grease threads of pressure connections.

Threads of new pressure lines are already coated.

Only hand-tighten nut (1).

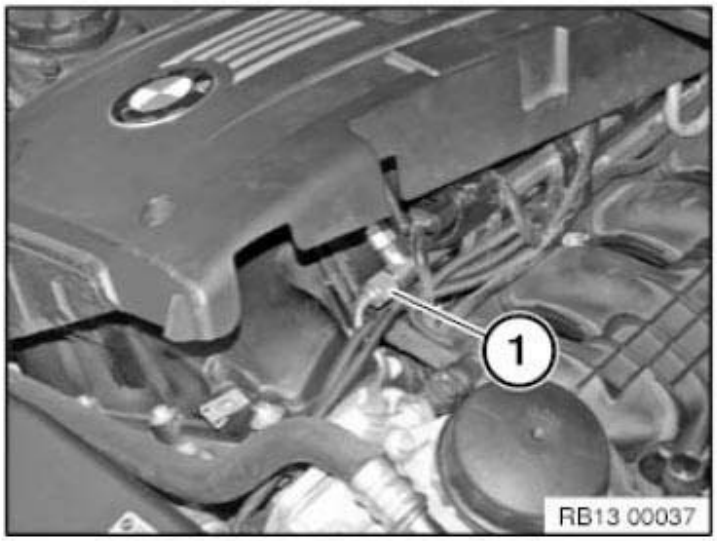


Fig. 36: Identifying Hand-Tightened Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Only hand-tighten nut (1).

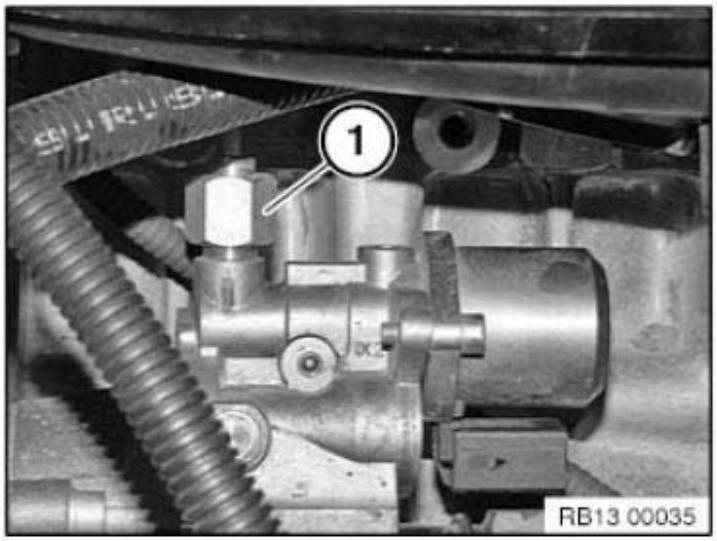


Fig. 37: Identifying Hand-Tightened Nut
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Feed lines with a soldered bracket must be replaced by the new version with elastomer clamp holder. Observe installation position of fuel low-pressure sensor. Lines for solenoid switches are laid behind fuel line.

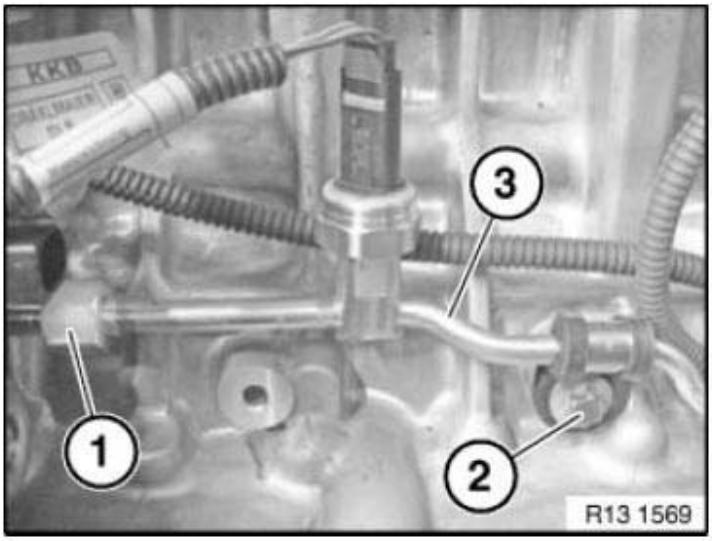


Fig. 38: Identifying Feed Line, Hand-Tighten Nut And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Install feed line (3).

Only **hand-tighten** nut (1).

Tighten screw (2). Replace aluminum screw.

Tightening torque **13 53 9AZ.**

Tighten down screws with special tool **11 8 610** .

Tightening torque **13 51 1AZ.**

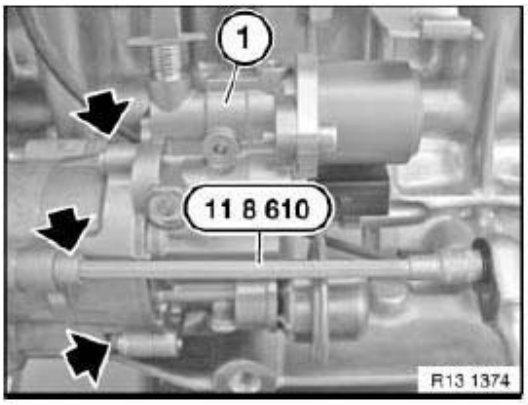


Fig. 39: Installing High-Pressure Pump Using Special Tool (11 8 610)
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten nut (1).

Tightening torque **13 53 7AZ.**

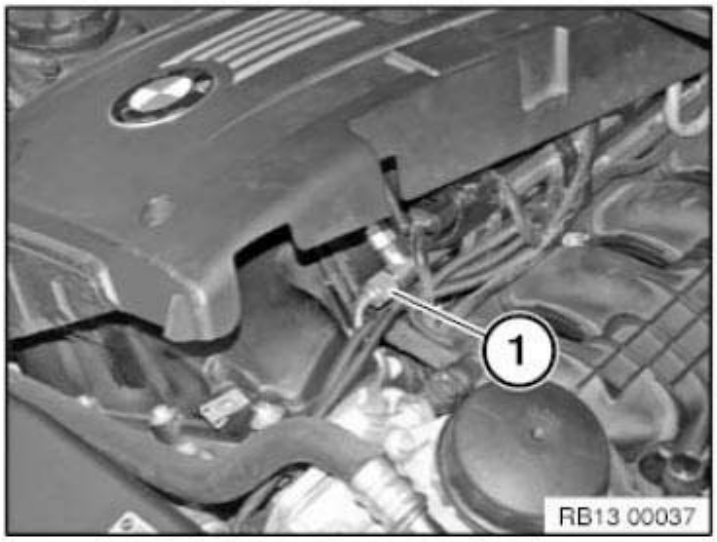


Fig. 40: Identifying Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down nut (1) with special tool **13 5 020** .

Tightening torque **13 53 7AZ.**

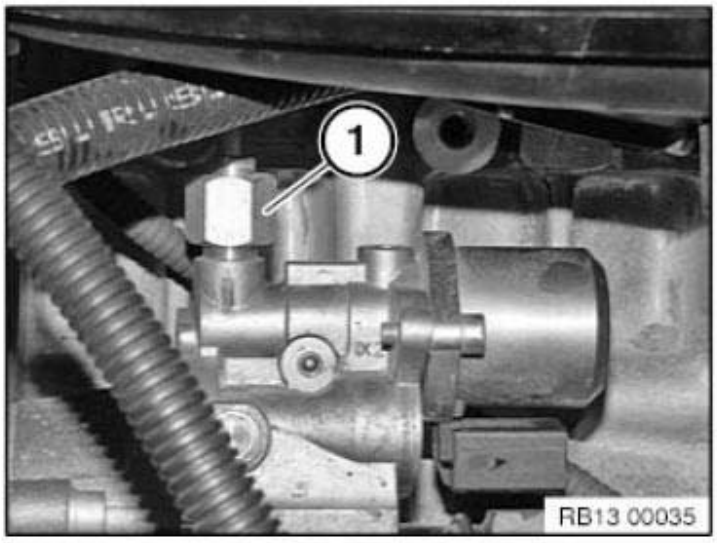


Fig. 41: Identifying Nut And Special Tool (13 5 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down nut (1) with special tool **13 5 020** .

Tightening torque **13 53 6AZ.**

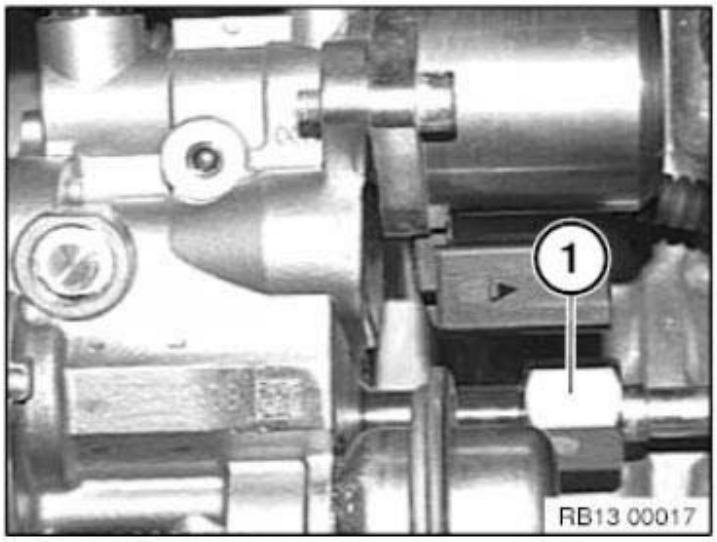


Fig. 42: Tightening Down Nut Using Special Tool (13 5 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Install and lock connector (1).

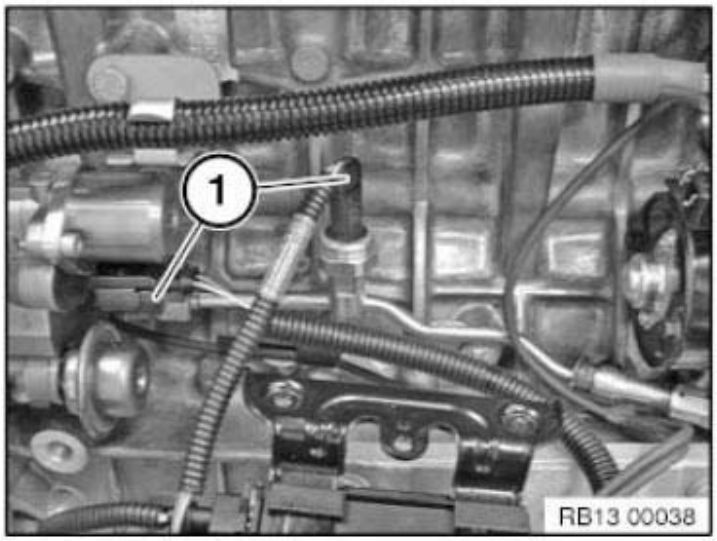


Fig. 43: Identifying Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Slide base well (2) on to bracket (1) as as far as it will go.

Install and lock connector (3) and (4).

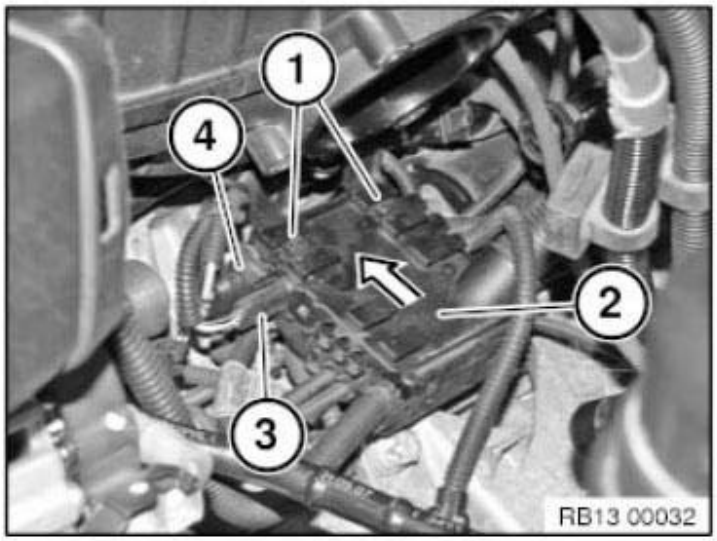


Fig. 44: Identifying Bracket, Connector And Slide Base Well
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for leak tightness.

Check function of DME.

13 53 158 REMOVING AND INSTALLING/REPLACING HIGH-PRESSURE RAIL (N54)

WARNING: Observe warning on cylinder head cover.

Disconnect BATTERY NEGATIVE LEAD (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

IMPORTANT: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

IMPORTANT: When working on the oil, coolant or fuel circuit, you must protect the alternator against contamination.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

Necessary preliminary tasks

- Remove **PRESSURE LINES**
- Remove **INTAKE FILTER HOUSING**

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

Unlock plug (1) and remove.

Pull connector holder off high-pressure rail.

Remove all holders for wiring harness from high-pressure rail.

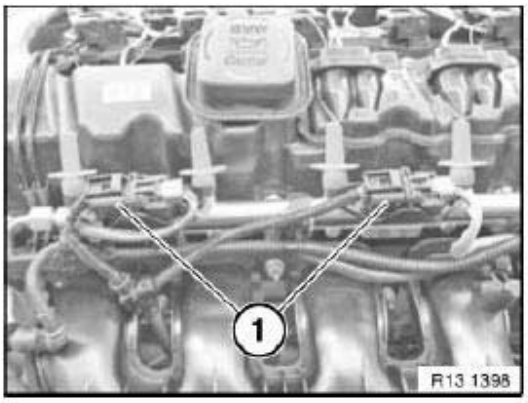


Fig. 45: Identifying Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Unlock and disconnect plug (2) on high-pressure sensor.

Release screws (3) and remove high-pressure rail (4).

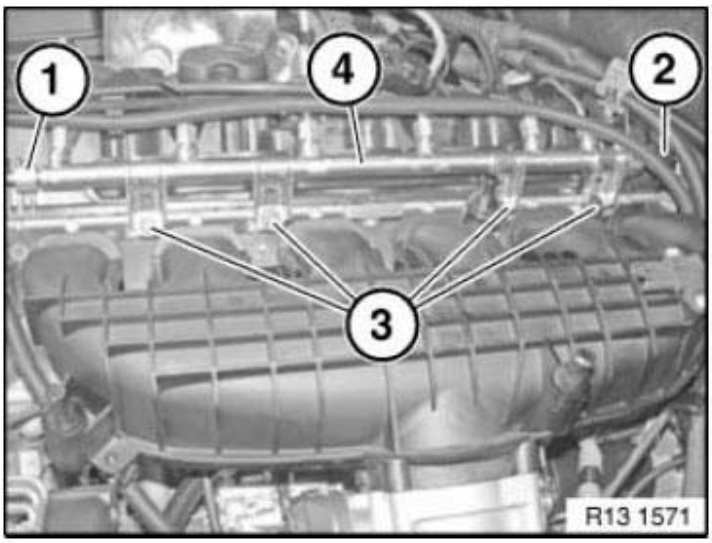


Fig. 46: Identifying Nut, Plug, High-Pressure Rail And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installing high-pressure rail

Installation of high-pressure rail is described separately from removal.

Install high-pressure rail (4); in so doing, tighten screws (3) and nut (1) hand-tight only.

NOTE:

- **It must still be possible for the high-pressure rail to slide on the cylinder head.**
- **Nut (2) must be able to be screwed on easily by hand.**

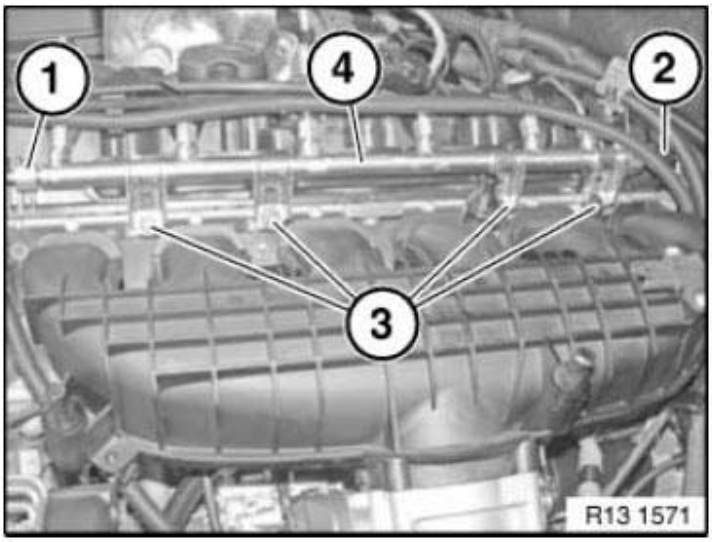


Fig. 47: Identifying Nut, Screws And High Pressure Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Push on plug for high-pressure sensor (2).

Fitting pressure lines

(Same procedure for all pressure lines)

Connect pressure line (1). Tightening nuts hand-tight only.

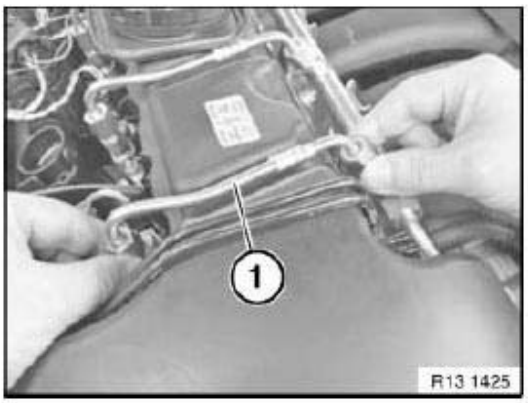


Fig. 48: Identifying Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Connect pressure line (1) without tension only.

To ensure distortion-free installation of the pressure line and to avoid damaging the thread, it must be possible for both nuts to be screwed on easily by hand!

If the nuts cannot be easily screwed on by hand, the injector must be turned into the installation position.

NOTE: Description of "Turning injector into installation location" in the following work step.

Only if one injector has to be turned into installation position

- Release bolt a few turns until holding-down element (1) is slackened.
- Turn injector (2) in direction of arrow until nuts on pressure line can be easily screwed on by hand.
- To do so, engage wrench on hexagon head of injector (2) if necessary.

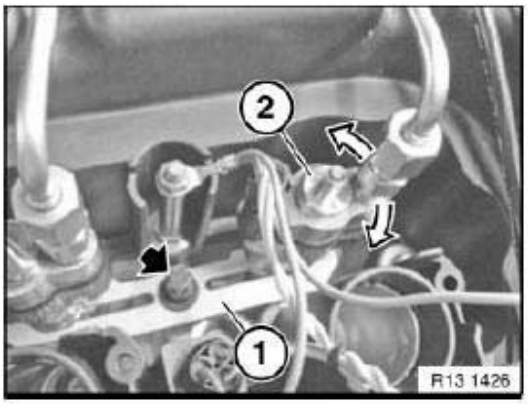


Fig. 49: Turning Injector With Nuts On Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

- Tighten nuts on pressure line hand-tight.

IMPORTANT: Do not under any circumstances pull injector out of bore!

If the injector is pulled out of the bore hole, the PTFE sealing ring must be replaced!

Replacing PTFE sealing ring, refer to 13 53 310 .

Tighten down screws (1).

Tightening torque

13 53 1AZ .

Tighten nut (2).

Tightening torque

13 53 7AZ .

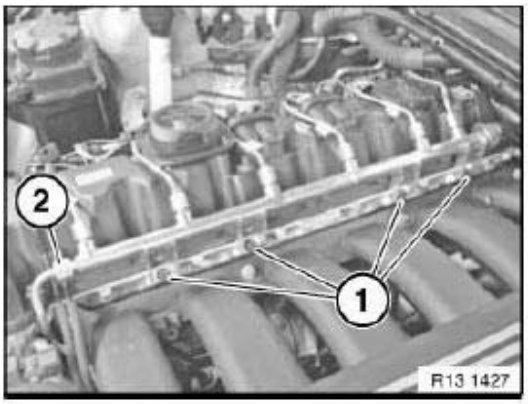


Fig. 50: Identifying Screws And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down screw for holding-down element (1).

Tightening torque **13 53 5AZ** .

NOTE: This work step is only necessary if one of the holding-down elements has been slackened beforehand.

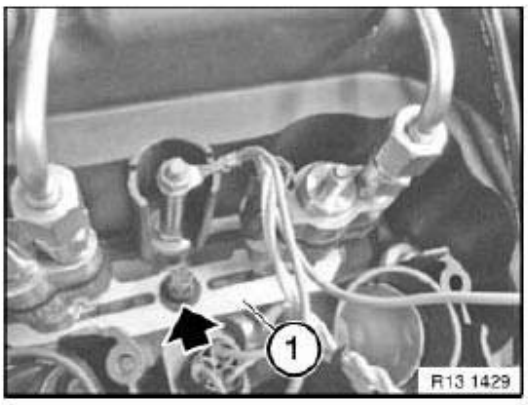


Fig. 51: Identifying Holding-Down Element
Courtesy of BMW OF NORTH AMERICA, INC.

Adhere to tightening sequence

- First tighten down nut (1) on injector.
- Then tighten down nut (2) on high-pressure rail.

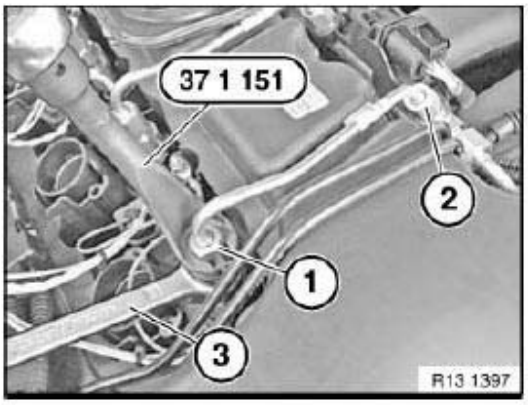


Fig. 52: Identifying Nut On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

When tightening nut (1) on injector, grip hexagon head of injector with wrench (3).

Tighten down nuts with special tool 37 1 151.

Tightening torque **13 53 8AZ** .

Assemble engine.

Check fuel system for leaks.

Check function of DME.

13 53 596 REPLACING HIGH-PRESSURE FUEL SENSOR (N54)

WARNING: Observe warning on cylinder head cover.

Clamp off BATTERY NEGATIVE LEAD (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

IMPORTANT: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

Necessary preliminary tasks

- Remove **ACOUSTIC COVER** .

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

Unlock plug (1) and remove.

Release high-pressure sensor (2) and remove.

Tightening torque **13 53 3AZ** with special tool 32 2 100.

Seal rail (3) if necessary with a matching plug from special tool kit **32-1270 PLUG** .

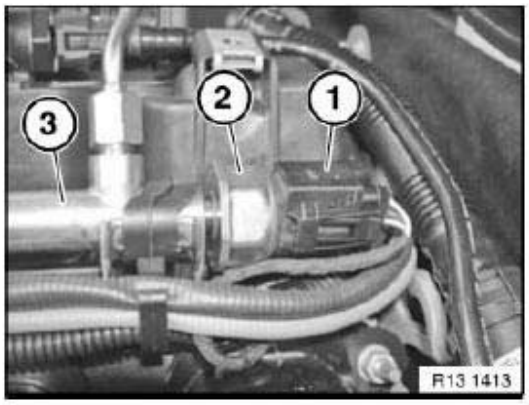


Fig. 53: Identifying Plug, High Pressure Sensor And Seal Rail
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If reusing:

The high-pressure sensor may only be screwed back in 3 times!

Therefore mark the sensor with a blue dot each time it is screwed back in.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

1353 INJECTION NOZZLE AND LINES

13 53 192 REMOVING AND INSTALLING/REPLACING A PRESSURE LINE (N54)

WARNING: Observe warning on cylinder head cover.

Clamp off BATTERY NEGATIVE LEAD (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

WARNING: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**
- **High-pressure lines may be rescrewed a maximum of 10 times.**

Necessary preliminary tasks

- Remove **IGNITION COIL** of corresponding cylinder

NOTE:

- **Ignition coils must not be fouled by fuel!**

  The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail! Cloths/rags must therefore be used to prevent fuel from getting into the spark plug slots!

- **Before installing ignition coils, clean spark plug slots with compressed air.**
- **Make sure the spark plug slot is absolutely clean.**

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

WARNING: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity from the fuel injectors!

To reduce the fuel pressure, place rag over fuel injector and carefully tap against the fuel injector with a spanner.

There is a risk of injury if the fuel pressure is not reduced!

NOTE: **The following description applies to all pressure lines.**

First release rail pressure lines to reduce existing fuel pressure if necessary. Fuel must not get into the spark plug slot. Then release pressure line on injector.

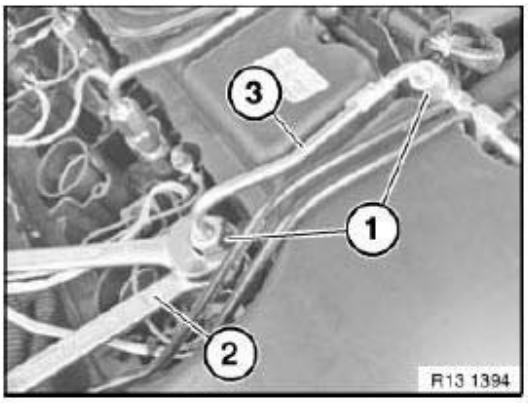


Fig. 54: Identifying Pressure Line, Wrench And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1), gripping the injector with a wrench (2) in so doing.

Disconnect pressure line (3).

IMPORTANT: If several pressure lines are removed, ensure that each pressure line is reinstalled in its original location (cylinder).

Mark pressure lines.

Close off injector with protective cap (1).

Protective caps are available from BMW Parts Service.

Seal rail with a matching plug from special tool kit **32-1270 PLUG** .

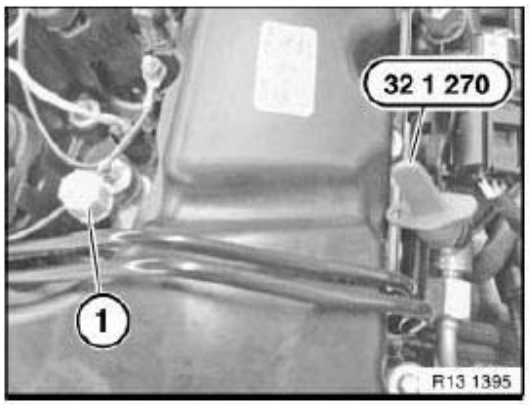


Fig. 55: Sealing High-Pressure Rail With Matching Plug From Special Tool Kit (32 1 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Seal pressure line (1) with a matching plug from special tool kit **32-1270 PLUG** .

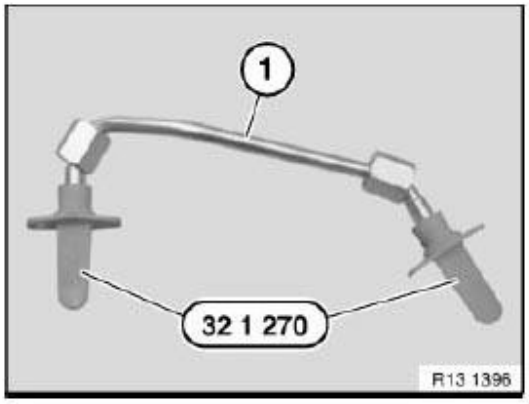


Fig. 56: Seal Pressure Line With Matching Plug From Special Tool Kit (32 1 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Installing pressure line

Installation of pressure rail is described separately from removal.

Same procedure for all pressure lines.

Copper seals that may be fitted (1) are no longer needed and must be removed.

If using the pressure line, apply a light coating of gear oil to the thread. New pressure lines are already coated.

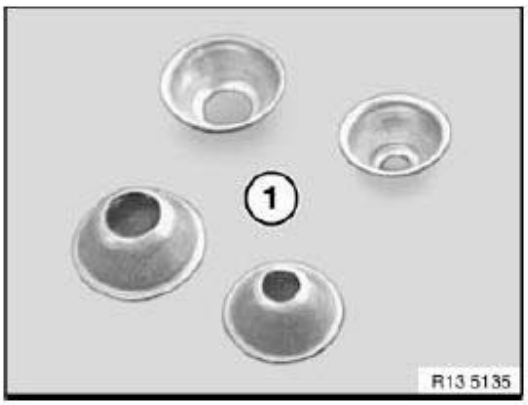


Fig. 57: Identifying Copper Seals
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Connect pressure line (1) without tension only.

To ensure distortion-free installation of the pressure line and to avoid damaging the thread, it must be possible for both nuts to be screwed on easily by hand!

If the nuts cannot be easily screwed on by hand, the injector must be turned into the installation position!

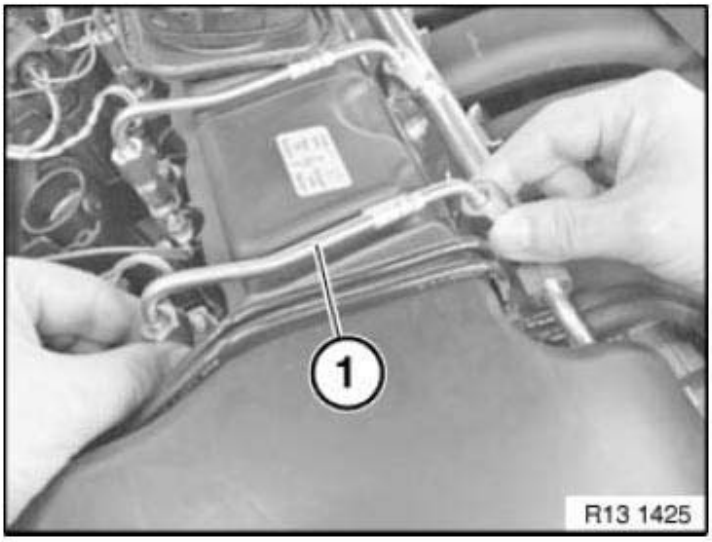


Fig. 58: Connecting Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Description of "Turning injector into installation position" in the following two work steps.

Only if injector has to be turned into installation position

- Release bolt a few turns until holding-down element (1) is slackened.
- Turn injector (2) in direction of arrow until nuts on pressure line can be easily screwed on by hand.

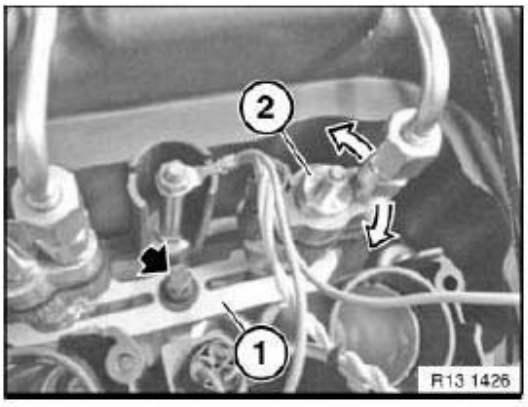


Fig. 59: Turning Injector Nuts On Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

- To do so, engage wrench on hexagon head of injector if necessary.
- Tighten nuts on pressure line hand-tight.

IMPORTANT: Do not under any circumstances pull injector out of bore!

If the injector is pulled out of the bore hole, the PTFE sealing ring must be replaced! Replacing PTFE sealing ring, refer to 13 53 310 .

Tighten down screw for holding-down element (1).

Tightening torque **13 53 5AZ** .

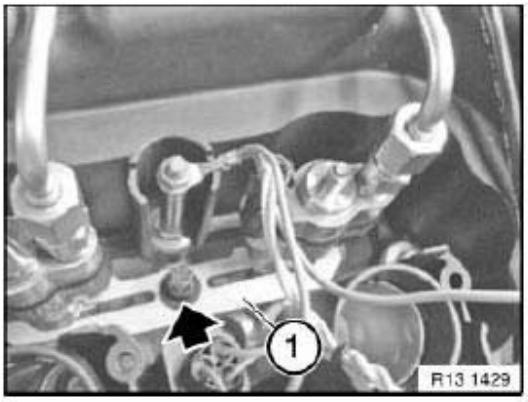


Fig. 60: Identifying Holding-Down Element
Courtesy of BMW OF NORTH AMERICA, INC.

Adhere to tightening sequence

- First tighten down nut (1) on injector.
- Then tighten down nut (2) on rail.

When tightening nut (1) on injector, grip hexagon head of injector with wrench (3).

Tighten down nuts with special tool 37 1 151.

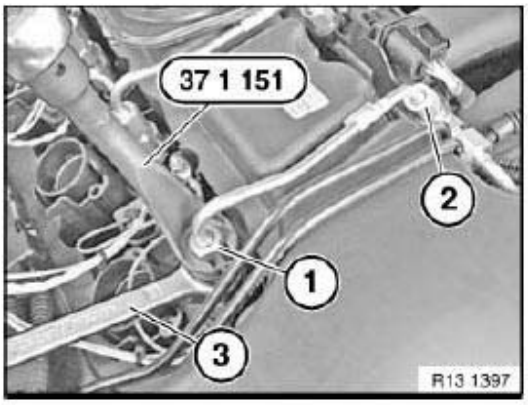


Fig. 61: Identifying Nut On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **13 53 8AZ** .

Assemble engine.

Check fuel system for leaks.

Check function of DME.

13 53 310 REMOVING AND INSTALLING/REPLACING AN INJECTOR (N54)

WARNING: Observe warning on cylinder head cover.

Disconnect BATTERY NEGATIVE LEAD (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

WARNING: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity from the fuel injectors!

To reduce the fuel pressure, place rag over fuel injector and carefully tap against the fuel injector with a spanner.

There is a risk of injury if the fuel pressure is not reduced!

IMPORTANT: When assembling, it is essential to adhere to screwing sequences and tightening torques!

Failure to comply with this requirement may result in leaks!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**
- **High-pressure lines may be rescrewed a maximum of 10 times.**

IMPORTANT: Injectors are not waterproof!

Carry out engine cleaning/washing only with ignition coil cover fitted.

Necessary preliminary tasks

- Remove **IGNITION COIL** of corresponding cylinder

NOTE:

- **Ignition coils must not be fouled by fuel!**

  The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail! Cloths/rags must therefore be used to prevent fuel from getting into the spark plug slots!

- **Before installing ignition coils, clean spark plug slots with compressed air.**
- **Make sure the spark plug slot is absolutely clean.**
- **Remove PRESSURE LINE of corresponding cylinder**

NOTE: The following description applies to all injectors.

Unlock plug (1) and remove.

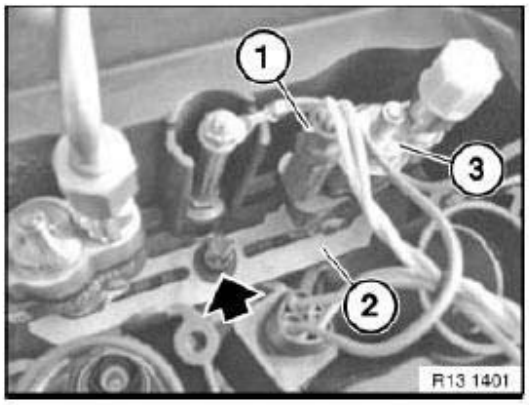


Fig. 62: Identifying Holding-Down Device, Plug And Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw and remove hold-down device (2).

Remove injector (3).

NOTE: If several injectors are removed, ensure that each injector is reinstalled in its original location (cylinder).

Mark injectors.

Procedure in event of stuck injector

Mount special tool 13 0 180 on injector (1).

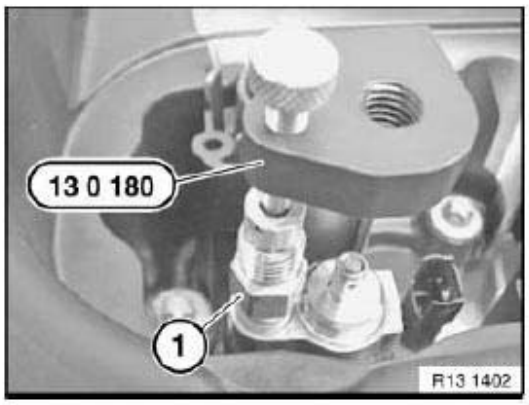


Fig. 63: Identifying Special Tool (13 0 180) On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tool **13 5 250** .

Carefully knock out injector (1) with special tools **13 0 180** and **13 5 250** .

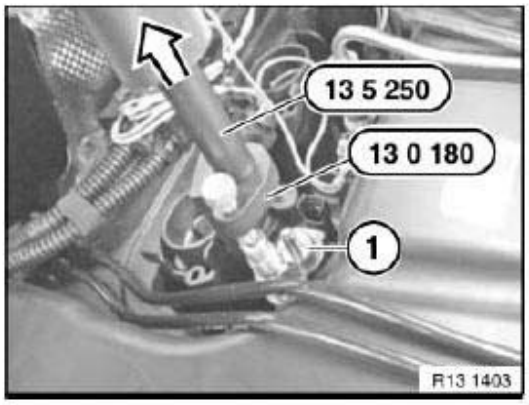


Fig. 64: Knock Out Injector With Special Tools (13 0 180) And (13 5 250)
Courtesy of BMW OF NORTH AMERICA, INC.

After removing, fit protective caps (1 and 3) to injector tip and fuel line connection.

Protective caps are available from BMW Parts Department.

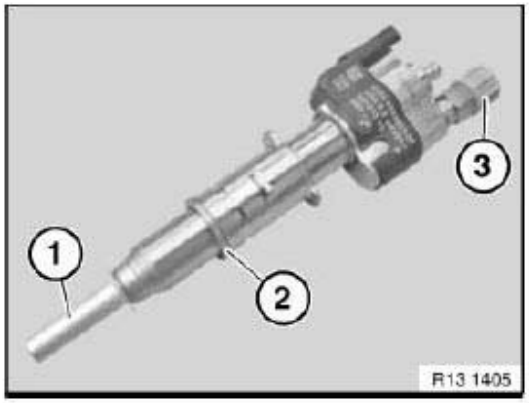


Fig. 65: Fit Protective Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

When installing a new injector:

- Replace uncoupling element (2).
- Remove protective cap (1) from injector tip max. 10 min. before installation (PTFE sealing ring swells up).

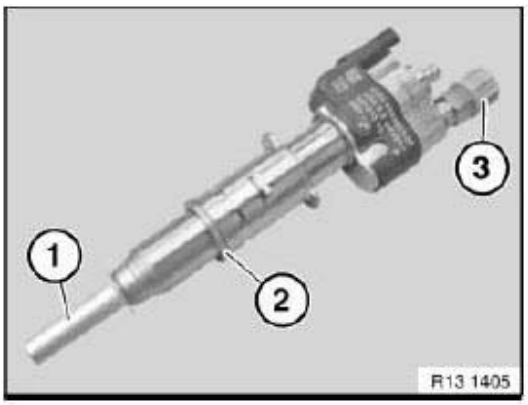


Fig. 66: Identifying Fit Protective Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

When reusing fuel injector:

- Replace uncoupling element (2).
- Replace PTFE sealing ring (1).

A PTFE seal which has been heated once by engine operation must be replaced before the fuel injector is reinstalled.

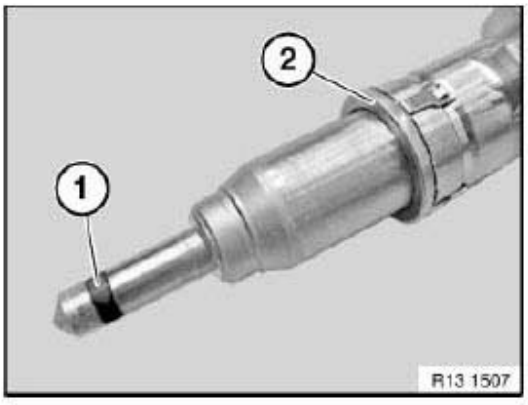


Fig. 67: Identifying PTFE Sealing Ring And Uncoupling Element
Courtesy of BMW OF NORTH AMERICA, INC.

Replacing PTFE sealing ring

Before replacing PTFE sealing ring (1), make sure hands and work surface are clean and free of oil.

Avoid mechanical contact with injector tip (2).

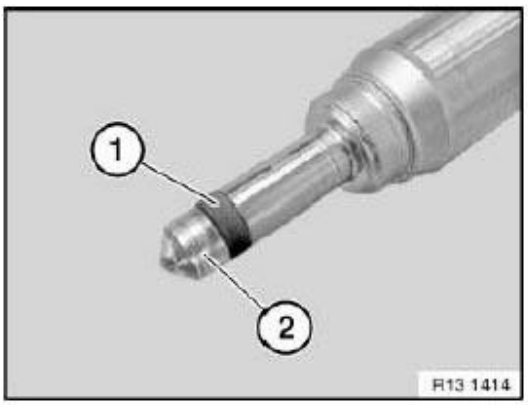


Fig. 68: Identifying PTFE Sealing Ring And Injector Tip
Courtesy of BMW OF NORTH AMERICA, INC.

Remove PTFE sealing ring (1) with special tool 13 0 191 from injector (2).

Use a fluff-free cloth only to remove combustion residues from cylindrical part of injector tip (do not use ultrasound or other tools/agents).

Do not clean injector tip.

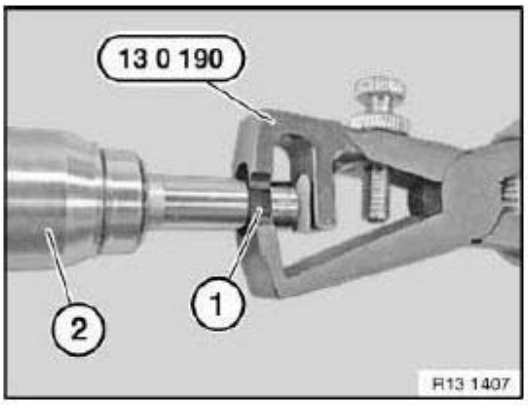


Fig. 69: Removing PTFE Sealing Ring From Injector Using Special Tool (13 0 191)
Courtesy of BMW OF NORTH AMERICA, INC.

Slide new PTFE sealing ring (1) onto mounting taper 13 0 195.

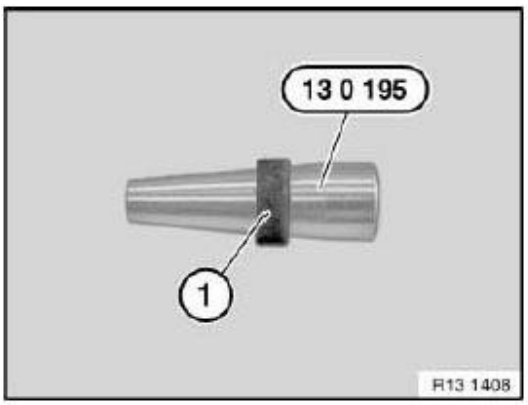


Fig. 70: Identifying PTFE Sealing Ring Onto Mounting Taper (13 0 195)
Courtesy of BMW OF NORTH AMERICA, INC.

User fingers and mounting taper 13 0 195 to slide PTFE sealing ring (1) onto injector (2).

NOTE:

- **Do not use fingernails to slide PTFE sealing ring on.**
- **Do not use any lubricating agents.**
- **The sealing ring is expanded when slid on.**

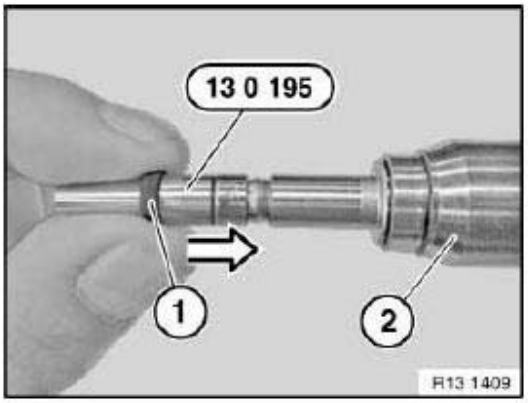


Fig. 71: Sliding PTFE Sealing Ring Onto Injector Using Fingers And Mounting Taper (13 0 195)
Courtesy of BMW OF NORTH AMERICA, INC.

To bring the expanded PTFE sealing ring to its installation dimension, slide three assembly sleeves with decreasing diameters onto the injector.

Slide assembly sleeve (1) with large opening first onto injector (1).

Do not use any lubricating agents.

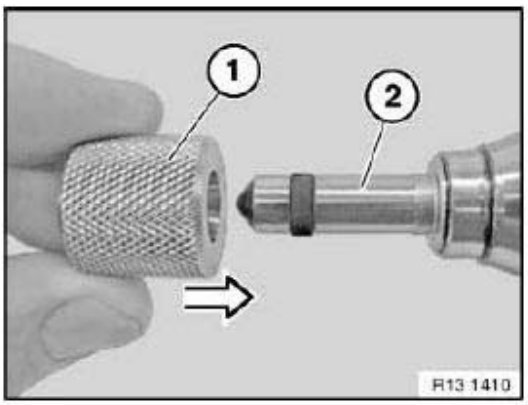


Fig. 72: Sliding Mounting Sleeve Onto Injector
Courtesy of BMW OF NORTH AMERICA, INC.

First slide assembly sleeve 13 0 192 (large diameter) onto injector (1).

Then slide assembly sleeve 13 0 193 (medium diameter) onto injector (1).

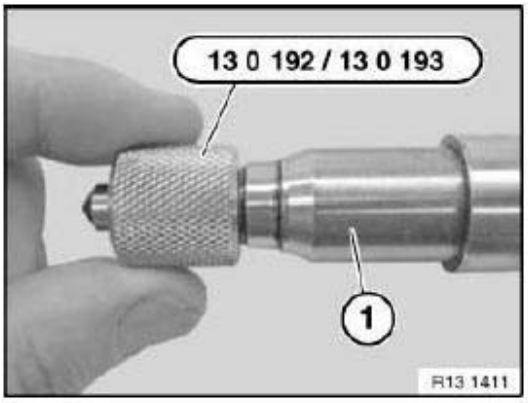


Fig. 73: Sliding Mounting Sleeve (13 0 192) Onto Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Finally, press injector (1) into assembly sleeve 13 0 194 (small diameter).

Installation:

Install injector within 10 minutes or slide on protective cap (**Fig. 115**) (PTFE sealing ring swells up).

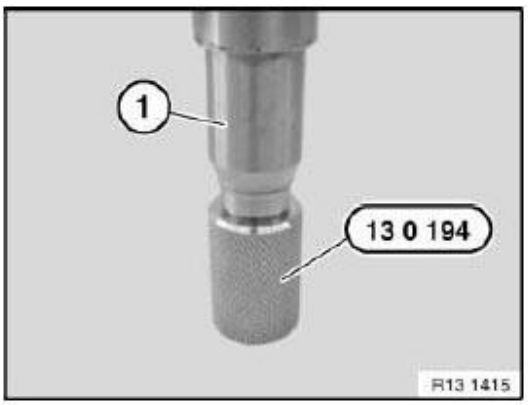


Fig. 74: Installing Injector Into Mounting Sleeve (13 0 194)
Courtesy of BMW OF NORTH AMERICA, INC.

Installing injector

Installation of injector is described separately from removal.

Before installing injector in engines that have been run

- Check injector bore for dirt.

  Clean **only dirty** injector bores.

  Important - do not damage injector!

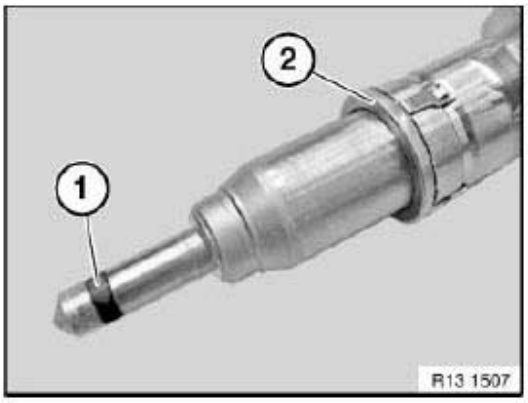


Fig. 75: Identifying PTFE Sealing Ring And Uncoupling Element
Courtesy of BMW OF NORTH AMERICA, INC.

- Clean injector bore: To do so, preferably slide injector without uncoupling element (2) but with new PTFE sealing ring (1) in and out of injector bores several times.

  The PTFE sealing ring must then be replaced.

- Clean contact surfaces of uncoupling elements (2) in cylinder head.
- Replace uncoupling element (2).

IMPORTANT: Injector adjustment!

An injector adjustment must be carried out if an injector is replaced or changed on the cylinder side.

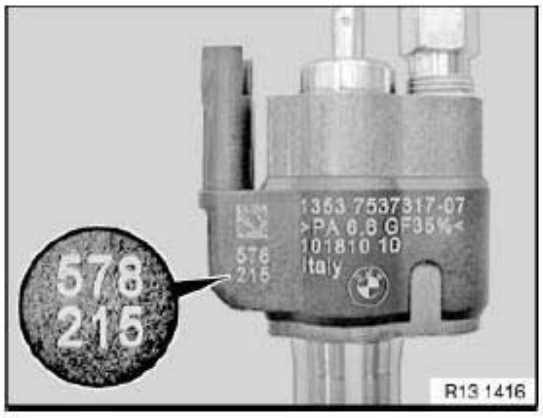


Fig. 76: Identifying Adjustment Value Printed In Blocks Of Digits On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Injector adjustment is carried out with the aid of a so-called adjustment value.

The adjustment value is printed in two blocks of three digits on the injector.

The adjustment value must be read off **before** installation!

Enter the adjustment value according to the installation position (cylinder) of the injector.

If injector adjustment is not carried out, the engine may run roughly or fail to start.

Description of injector adjustment at end of instruction.



Fig. 77: Identifying Adjustment Value Printed In Blocks Of Digits On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Installing injector

Installation:

Install hold-down device (1) with curvature facing upwards.

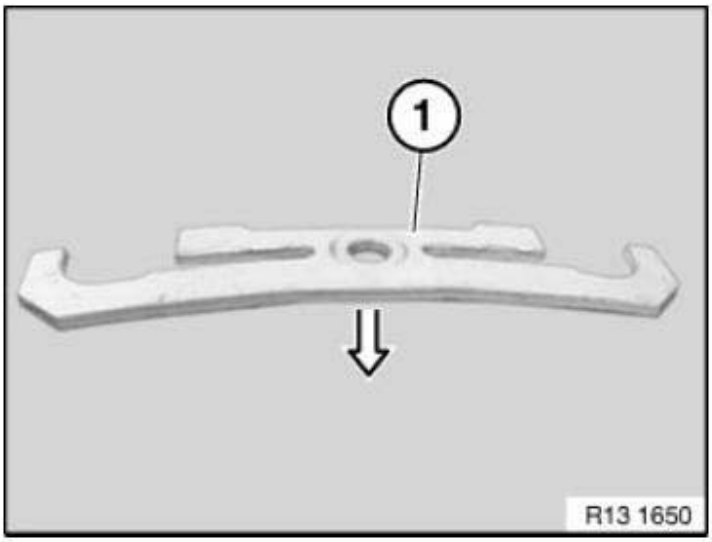


Fig. 78: Installing Hold-Down Device With Curvature
Courtesy of BMW OF NORTH AMERICA, INC.

Install injector (3).

Install hold-down device (2).

IMPORTANT: Tighten screw hand-tight only so that hold-down device (2) is slack and if necessary injector can still be turned.

Connect contact plug (1).

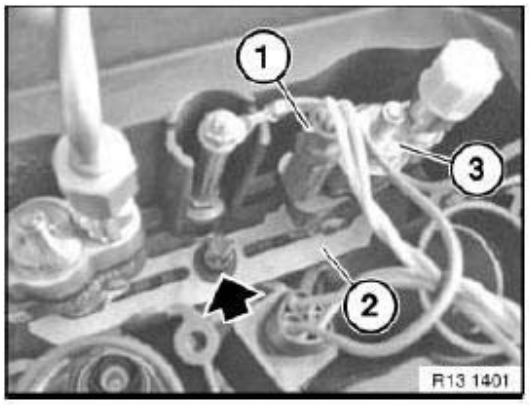


Fig. 79: Identifying Plug, Holding-Down Element And Injector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Make sure hold-down device (1) is correctly seated.

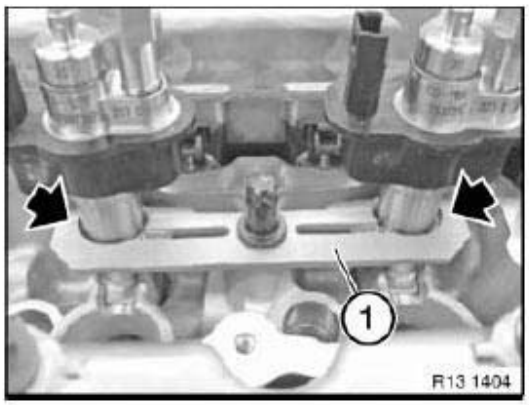


Fig. 80: Locating Holding-Down Element
Courtesy of BMW OF NORTH AMERICA, INC.

Copper seals (1) that may be fitted on the pressure lines are no longer needed and must be removed.

If using the pressure line, apply a light coating of gear oil to the thread. New lines are already pretreated.

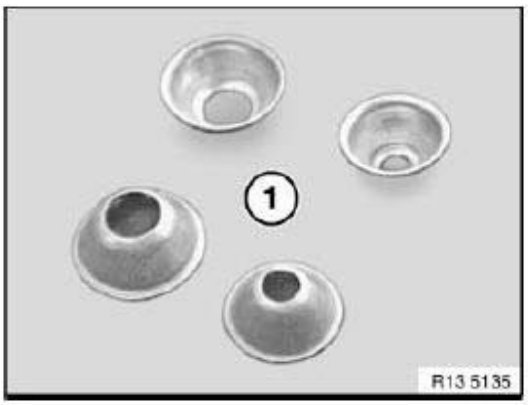


Fig. 81: Identifying Copper Seals
Courtesy of BMW OF NORTH AMERICA, INC.

Connect pressure line (1), tightening nuts hand-tight only in the process.

IMPORTANT: Connect pressure line (1) without tension only.

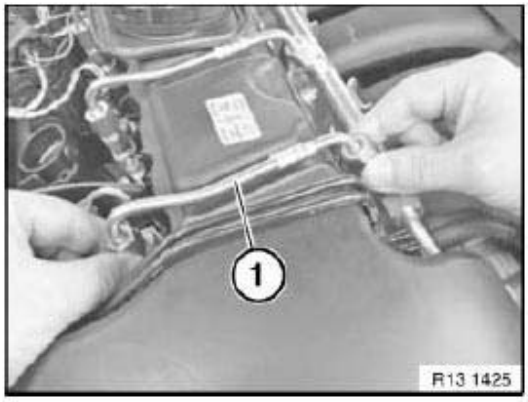


Fig. 82: Connecting Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

To ensure distortion-free installation of the pressure line and to avoid damaging the thread, it must be possible for both nuts to be screwed on easily by hand!

If the nuts cannot be screwed on easily by hand, the injector must if necessary be turned a little.

Turn injector (2) if necessary in direction of arrow until nuts on pressure line can be easily screwed on by hand.

Tighten nuts on pressure line hand-tight.

Then tighten down bolt for hold-down device (1).

Tightening torque **13 53 5AZ** .

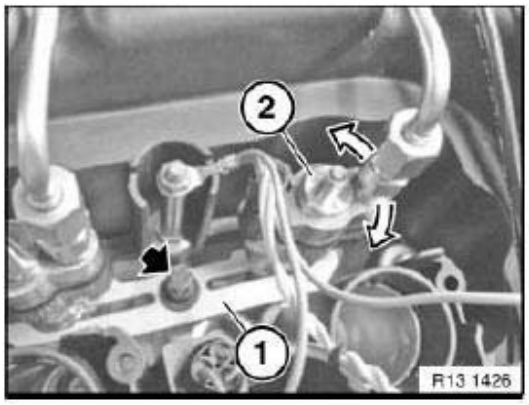


Fig. 83: Turning Injector With Nuts On Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

Adhere to tightening sequence

- First tighten down nut (1) on injector.
- Then tighten down nut (2) on rail.

When tightening nut (1) on injector, grip hexagon head of injector with wrench (3).

Tighten down nuts with special tool 37 1 151.

Tightening torque **13 53 8AZ** .

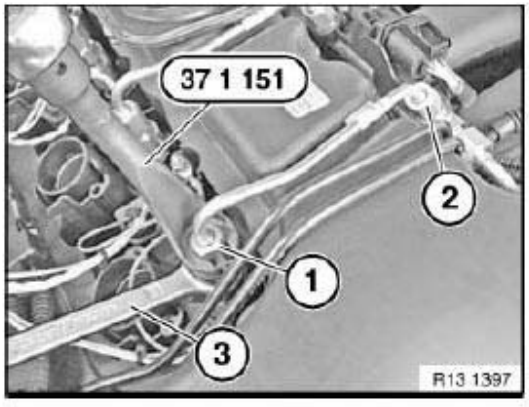


Fig. 84: Tightening Down Nut On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Carrying out injector adjustment

- Connect DIS Tester

- Identify car
- Select "Function selection"
- Select "Service functions"
- Select "Engine electronics"
- Select "Adjustment programs"
- Select "Adjust injectors"
- Change "Test schedule"
- For each replaced injector, the adjustment value must be entered according to the installation position (cylinder).

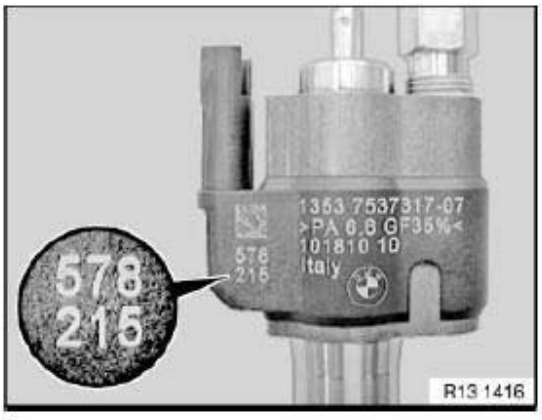


Fig. 85: Identifying Adjustment Value Printed In Blocks Of Digits On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Clean spark plug slot.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

13 53 332 REMOVING AND INSTALLING/REPLACING FEED LINE (N54)

WARNING: Disconnect BATTERY NEGATIVE LEAD (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

Wear protective goggles.

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

IMPORTANT: Ignition coils must not be fouled by fuel.

The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!

Cover ignition coil with suitable means.

Necessary preliminary tasks

- Remove **INTAKE AIR MANIFOLD**

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

Unlock and detach fuel line (1).

Catch and dispose of escaping fuel.

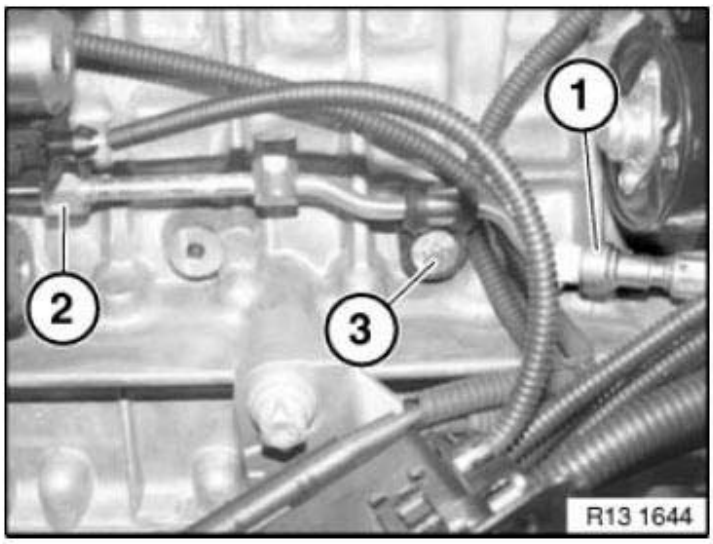


Fig. 86: Identifying Fuel Line, Nut And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Seal fuel lines with special tools (1) 13 5 161 and (2) 13 5 162.

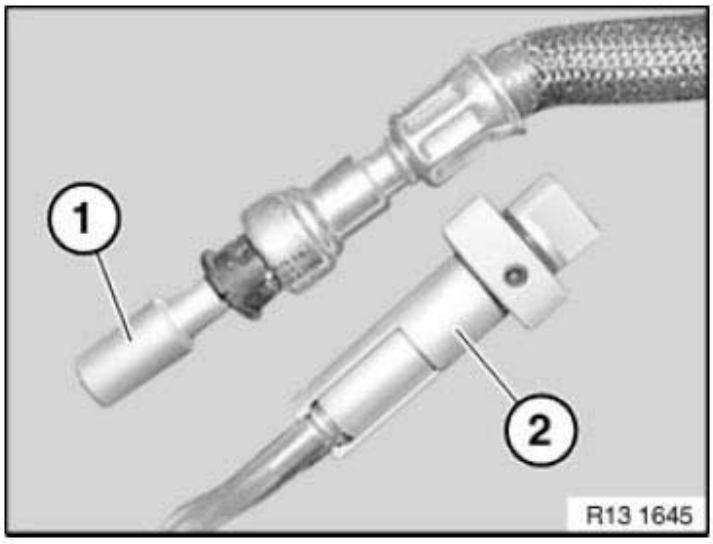


Fig. 87: Seal Fuel Lines With Special Tools (13 5 161) And (13 5 162)
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (2).

Release screw (3).

Remove feed line.

Close off feed line and high-pressure pump with a matching plug from special tool kit **32-1270 PLUG** .

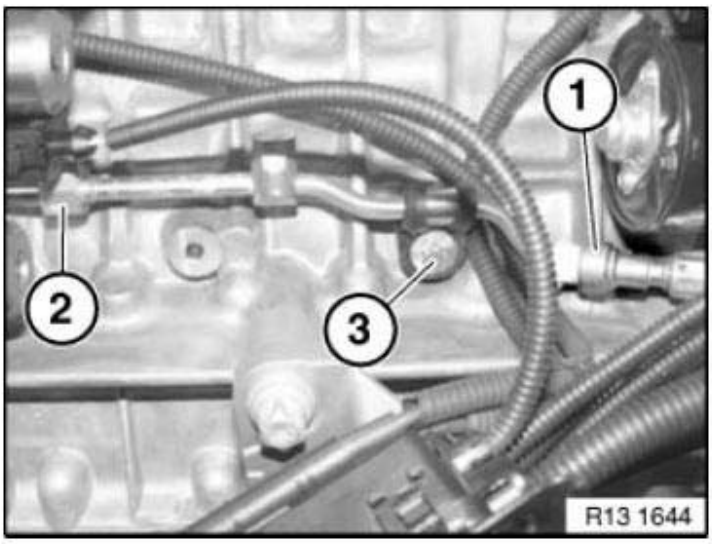


Fig. 88: Identifying Fuel Line, Nut And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Follow sequence of screw connections:

1. Tighten down nut (2) with special tool **13 5 020** .

   Tightening torque **13 53 6AZ** .

2. Replace aluminum screw (3).

   Tighten down screw (3).

   Tightening torque **13 53 9AZ** .

3. Connect fuel line (3).

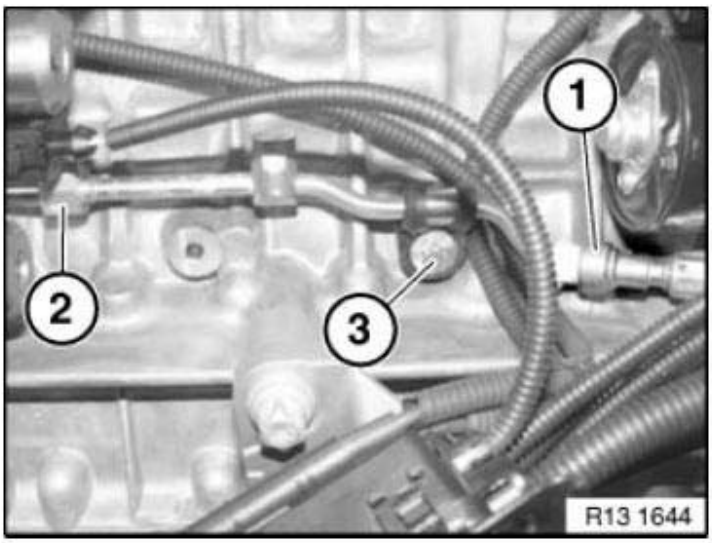


Fig. 89: Identifying Nut, Fuel Line And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

13 53 158 REMOVING AND INSTALLING/REPLACING HIGH-PRESSURE RAIL (N54)

WARNING: Observe warning on cylinder head cover.

Disconnect BATTERY NEGATIVE LEAD (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

IMPORTANT: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

IMPORTANT: When working on the oil, coolant or fuel circuit, you must protect the alternator against contamination.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

Necessary preliminary tasks

- Remove **PRESSURE LINES**
- Remove **INTAKE FILTER HOUSING**

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

Unlock plug (1) and remove.

Pull connector holder off high-pressure rail.

Remove all holders for wiring harness from high-pressure rail.

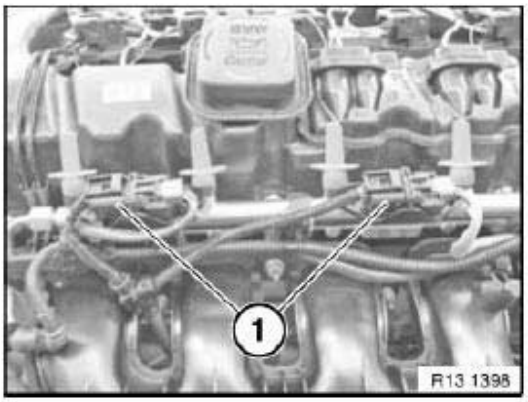


Fig. 90: Identifying Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Unlock and disconnect plug (2) on high-pressure sensor.

Release screws (3) and remove high-pressure rail (4).

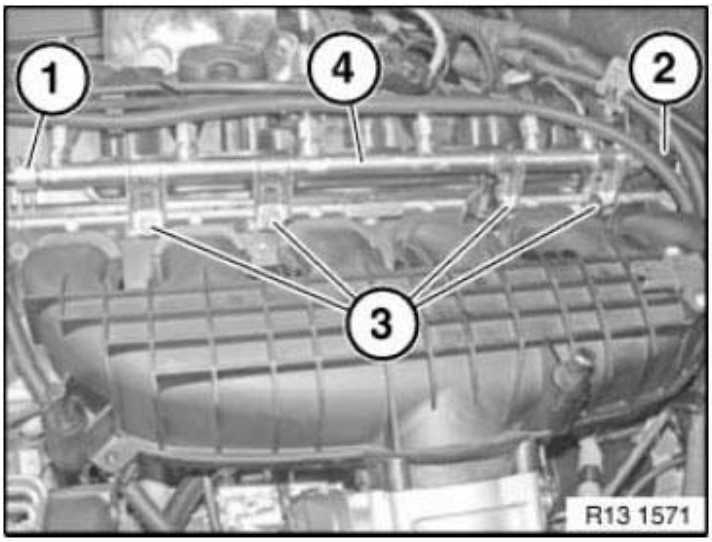


Fig. 91: Identifying Fuel Line, Nut, High-Pressure Rail And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installing high-pressure rail

Installation of high-pressure rail is described separately from removal.

Install high-pressure rail (4); in so doing, tighten screws (3) and nut (1) hand-tight only.

NOTE:

- **It must still be possible for the high-pressure rail to slide on the cylinder head.**
- **Nut (2) must be able to be screwed on easily by hand.**

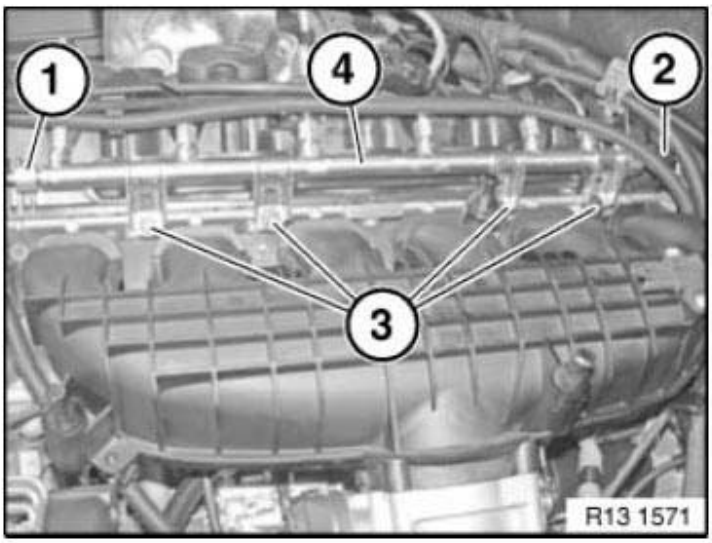


Fig. 92: Identifying High Pressure Rail, Nut And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Push on plug for high-pressure sensor (2).

Fitting pressure lines

(Same procedure for all pressure lines)

Connect pressure line (1). Tightening nuts hand-tight only.

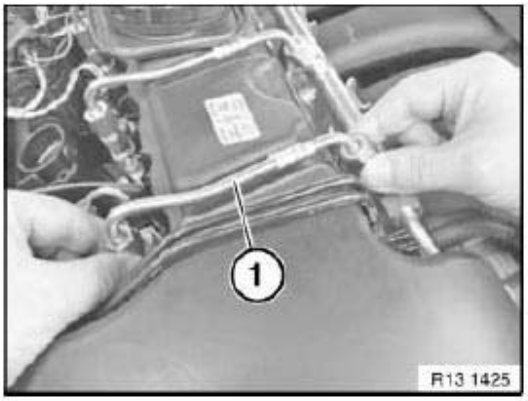


Fig. 93: Connecting Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Connect pressure line (1) without tension only.

To ensure distortion-free installation of the pressure line and to avoid damaging the thread, it must be possible for both nuts to be screwed on easily

by hand!

If the nuts cannot be easily screwed on by hand, the injector must be turned into the installation position.

NOTE: Description of "Turning injector into installation location" in the following work step.

Only if one injector has to be turned into installation position

- Release bolt a few turns until holding-down element (1) is slackened.
- Turn injector (2) in direction of arrow until nuts on pressure line can be easily screwed on by hand.
- To do so, engage wrench on hexagon head of injector (2) if necessary.
- Tighten nuts on pressure line hand-tight.

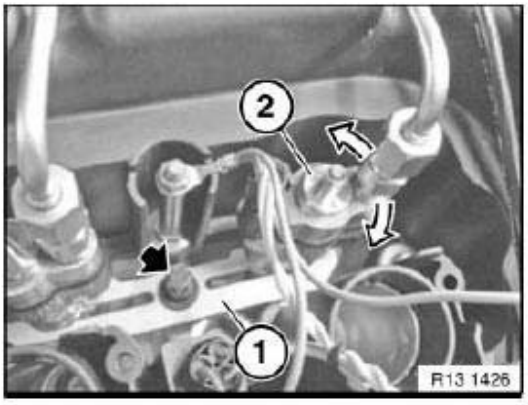


Fig. 94: Turning Injector With Nuts On Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not under any circumstances pull injector out of bore!

If the injector is pulled out of the bore hole, the PTFE sealing ring must be replaced!

Replacing PTFE sealing ring, refer to 13 53 310 .

Tighten down screws (1).

Tightening torque

13 53 1AZ .

Tighten nut (2).

Tightening torque

13 53 7AZ .

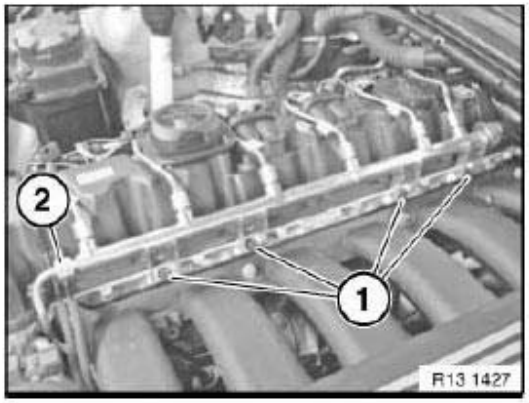


Fig. 95: Identifying Down Screws And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down screw for holding-down element (1).

Tightening torque **13 53 5AZ** .

NOTE: This work step is only necessary if one of the holding-down elements has been slackened beforehand.

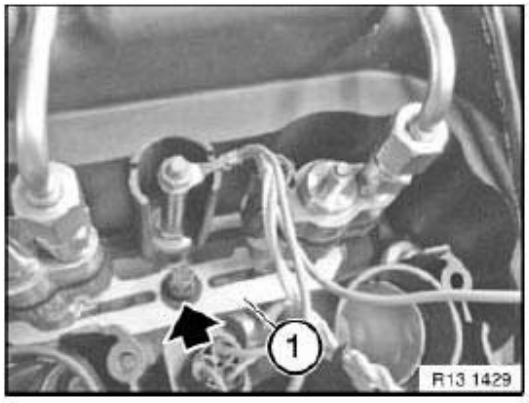


Fig. 96: Identifying Holding-Down Element
Courtesy of BMW OF NORTH AMERICA, INC.

Adhere to tightening sequence

- First tighten down nut (1) on injector.
- Then tighten down nut (2) on high-pressure rail.

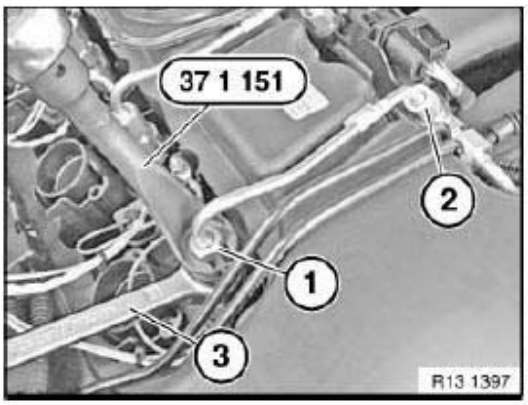


Fig. 97: Identifying Nut On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

When tightening nut (1) on injector, grip hexagon head of injector with wrench (3).

Tighten down nuts with special tool 37 1 151.

Tightening torque **13 53 8AZ** , see **13 53 FUEL INJECTION NOZZLES AND PIPES** .

Assemble engine.

Check fuel system for leaks.

Check function of DME.

13 53 596 REPLACING HIGH-PRESSURE FUEL SENSOR (N54)

WARNING: Observe warning on cylinder head cover.

Clamp off BATTERY NEGATIVE LEAD (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

IMPORTANT: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

Necessary preliminary tasks

- Remove **ACOUSTIC COVER** .

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

Unlock plug (1) and remove.

Release high-pressure sensor (2) and remove.

Tightening torque **13 53 3AZ** with special tool 32 2 100.

Seal rail (3) if necessary with a matching plug from special tool kit **32-1270 PLUG** .

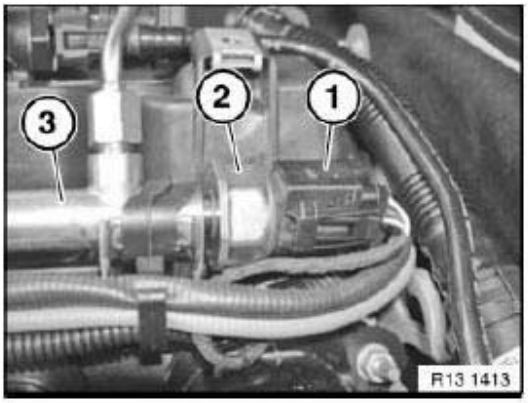


Fig. 98: Identifying Plug, High-Pressure Sensor And Seal Rail
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If reusing:

The high-pressure sensor may only be screwed back in 3 times!

Therefore mark the sensor with a blue dot each time it is screwed back in.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

1354 THROTTLE AND OPERATION

11 61 365 REMOVING AND INSTALLING/REPLACING LEFT CHARGE AIR DUCT (N54, N54T)

Necessary preliminary tasks

- Remove **FAN COWL**
- Remove front **UNDERBODY PROTECTION**
- Remove **INTAKE SILENCER HOUSING**

IMPORTANT: Coat sealing rings of snap fasteners with lubricant.

Pressure pipes with quick-connect couplings cannot be fitted without antiseize agent.

Unlock quick-connect coupling.

Detach charge air duct (1) from charge air cooler (2).

Installation note:

- Coat sealing rings of snap fasteners with lubricant.
- Pressure pipes must audibly snap into place.

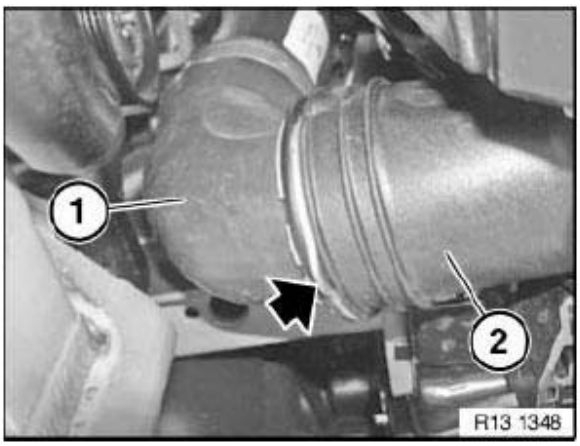


Fig. 99: Removing Charge-Air Duct From Intercooler
Courtesy of BMW OF NORTH AMERICA, INC.

Release quick-connect couplings (1) by turning lock through 90°.

Detach recirculated-air hoses (2) and lay to one side.

Disconnect plug connection (3).

Unlock quick-connect coupling (5) and detach charge air duct (6) from throttle valve actuator.

Pull charge air duct (6) out of rubber grommet (4) and remove towards top.

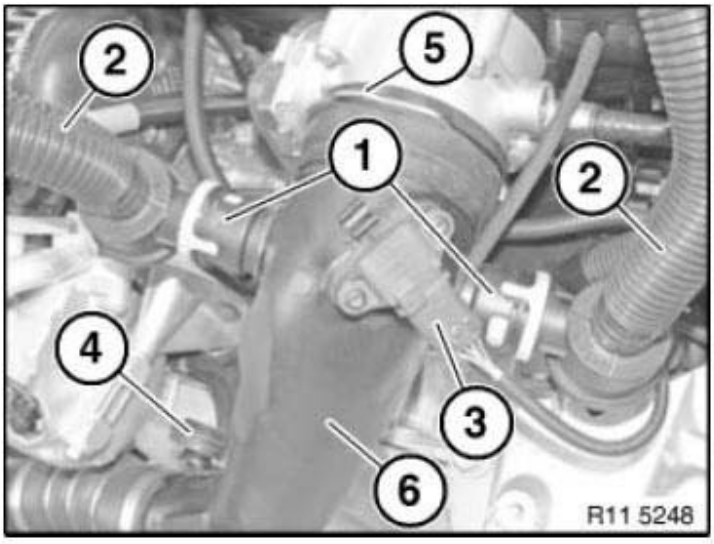


Fig. 100: Identifying Quick-Connect Couplings, Plug Connection, Charge Air Duct And Rubber Grommet
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Bring lock (1) back 90° into installation position.

Pay attention to markings.

Recirculated-air hoses must snap audibly into place.

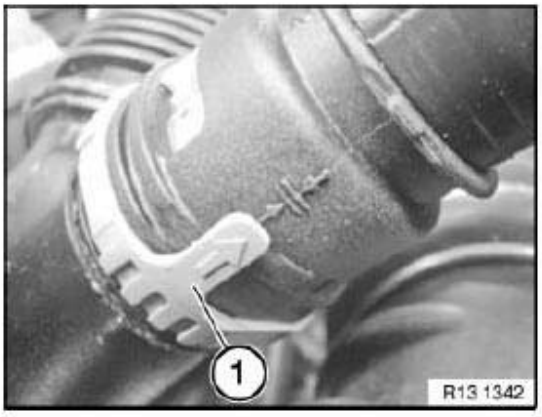


Fig. 101: Identifying Bring Lock
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage! to sealing rings.

Special tool 11 8 670 is mandatory.

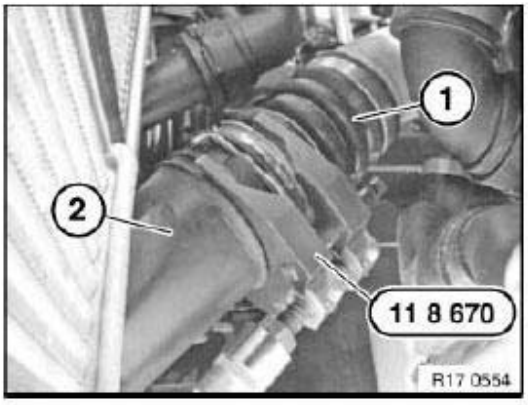


Fig. 102: Identifying Charge-Air Duct With Special Tool (11 8 670)
Courtesy of BMW OF NORTH AMERICA, INC.

Attach charge air duct (1) with special tool **11 8 670** to charge air cooler (2).

Installation note:

Texts refer to and illustrations show the right side.

The procedure is identical for the left side.

IMPORTANT: Charge air hoses with clamp fastenings must be installed dry and free from grease!

If charge air hoses with clamp fastenings are not installed dry and free from grease, this may result in turbocharger failure!

11 61 362 REMOVING AND INSTALLING/REPLACING RIGHT CHARGE AIR DUCT (N54, N54T)

Necessary preliminary tasks

- Remove **COOLANT EXPANSION TANK**
- Remove **UNDERBODY PROTECTION**
- Remove right **TENSION STRUT**

IMPORTANT: Coat sealing rings of snap fasteners with lubricant.

Pressure pipes cannot be fitted without lubricant.

Mark vacuum hoses (1) and detach.

Mark vacuum hose (2) and detach.

Unscrew nuts (3).

Release screw (4).

Tightening torque, screw **11 65 6AZ** .

Raise bracket slightly.

Mark vacuum hose (5) on underside of pressure accumulator.

Remove vacuum accumulator with bracket.

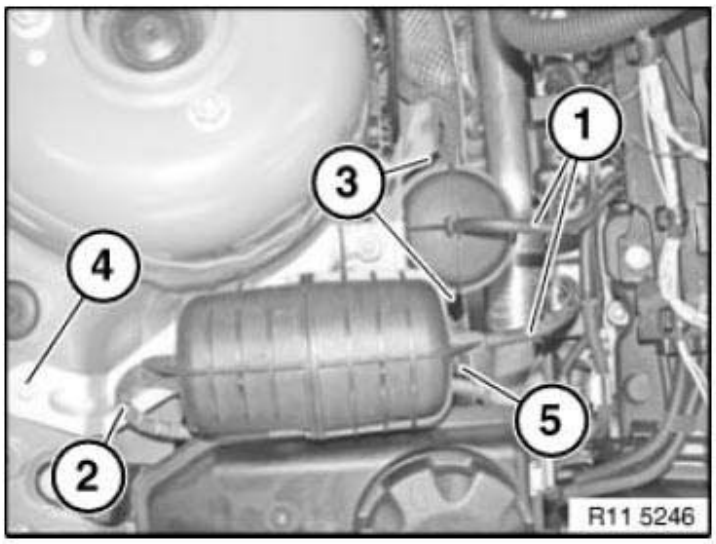


Fig. 103: Identifying Vacuum Hose, Nuts And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1) and screws (2), remove heat shield (3).

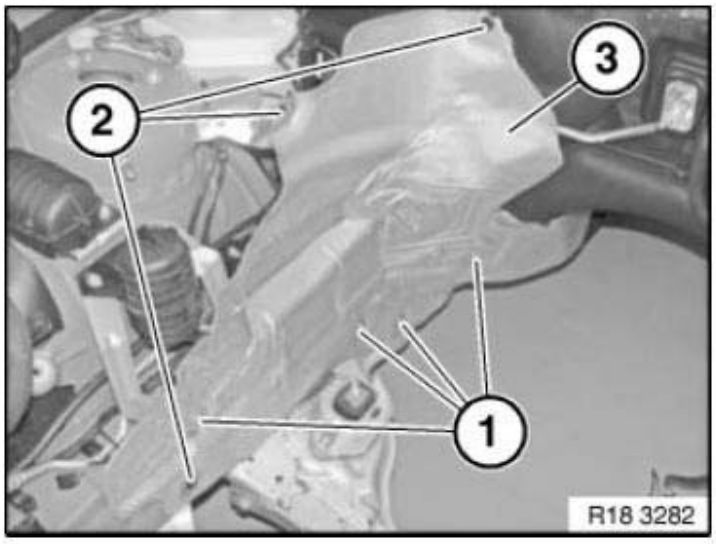


Fig. 104: Identifying Nuts, Screws And Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Release clamps (1, 2), detach charge air duct (3).

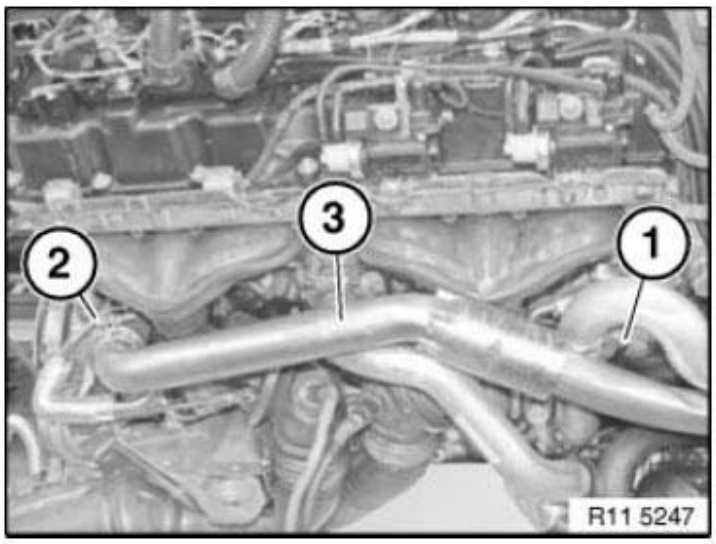


Fig. 105: Identifying Clamps And Air Duct
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Faulty O-rings must be replaced.

Prior to fitting, coat O-ring with suitable antiseize agent.



Fig. 106: Locating O-Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach coolant hose (1).

Unlock quick-connect coupling.

Detach charge air duct (2) from charge air cooler (3) and remove towards top.

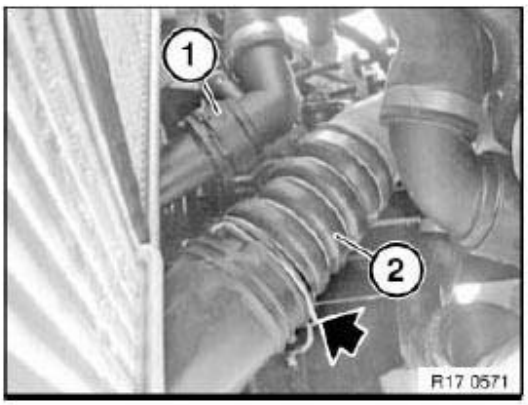


Fig. 107: Identifying Coolant Hose And Charge-Air Duct
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage! to sealing rings!

Special tool 11 8 670 is mandatory.

Attach charge air duct (1) with special tool **11 8 670** to charge air cooler.

Installation note:

- Coat sealing rings of quick-connect couplings with antiseize agent.
- Pressure pipes must audibly snap into place

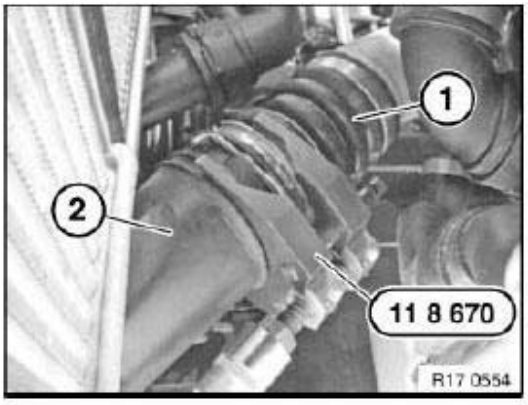


Fig. 108: Identifying Charge-Air Duct Using Special Tool (11 8 670)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check DME (turbocharger) for correct operation.

13 54 030 REMOVING AND INSTALLING/SEALING THROTTLE VALVE ASSEMBLY (N54)

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Necessary preliminary tasks

- Switch off ignition
- Remove left **CHARGE-AIR DUCT**

Unlock and disconnect line (1).

Unlock connector (2) and remove.

Release screws.

Tightening torque **13 54 1AZ** .

Remove throttle assembly (3).

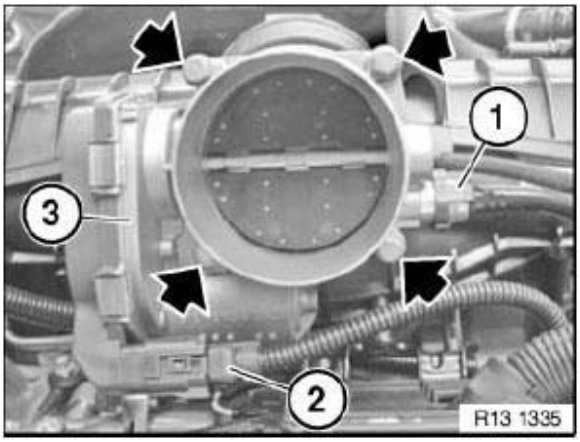


Fig. 109: Locating Throttle Assembly And Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Replace sealing ring (1) of throttle assembly (2).

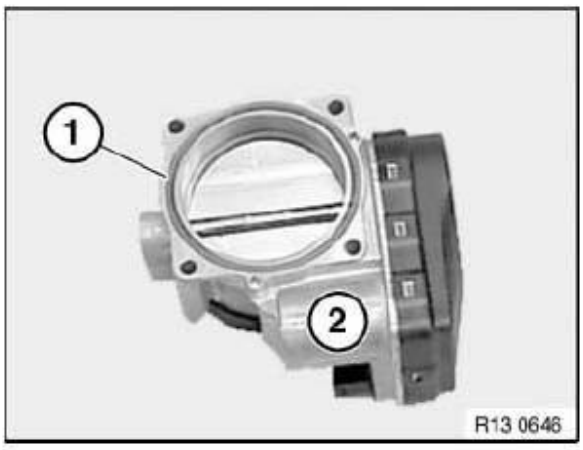


Fig. 110: Identifying Sealing Ring Of Throttle Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check stored fault messages.

Now clear the fault memory.

1362 SENSOR FOR CONTROL UNIT

13 62 531 REPLACING COOLANT TEMPERATURE SENSOR (N54)

WARNING: Danger of scalding!

Only perform these tasks on an engine that has cooled down.

Recycling

Catch and dispose of escaping coolant.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Switch off ignition
- Remove **ACOUSTIC COVER**

NOTE: Coolant temperature sensor is mounted on cylinder head at front.

Unlock plug (1) and remove.

Release temperature sensor (2).

Installation:

Tightening torque **13 62 1AZ** .

.

Check **COOLING SYSTEM** for leaks.

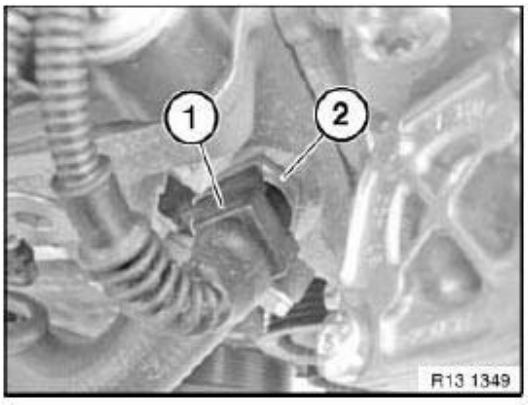


Fig. 111: Identifying Plug And Temperature Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.

Now clear the fault memory.

1364 START VALVES

13 53 310 REMOVING AND INSTALLING/REPLACING AN INJECTOR (N54)

WARNING: Observe warning on cylinder head cover.

Disconnect BATTERY NEGATIVE LEAD (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

WARNING: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity from the fuel injectors!

To reduce the fuel pressure, place rag over fuel injector and carefully tap against the fuel injector with a spanner.

There is a risk of injury if the fuel pressure is not reduced!

IMPORTANT: When assembling, it is essential to adhere to screwing sequences and tightening torques!

Failure to comply with this requirement may result in leaks!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**
- **High-pressure lines may be rescrewed a maximum of 10 times.**

IMPORTANT: Injectors are not waterproof!

Carry out engine cleaning/washing only with ignition coil cover fitted.

Necessary preliminary tasks

- Remove **IGNITION COIL** of corresponding cylinder

NOTE:

- **Ignition coils must not be fouled by fuel!**

  The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!

  Cloths/rags must therefore be used to prevent fuel from getting into the spark plug slots!

- **Before installing ignition coils, clean spark plug slots with compressed air.**
- **Make sure the spark plug slot is absolutely clean.**
- **Remove PRESSURE LINE of corresponding cylinder**

NOTE: The following description applies to all injectors.

Unlock plug (1) and remove.

Release screw and remove hold-down device (2).

Remove injector (3).

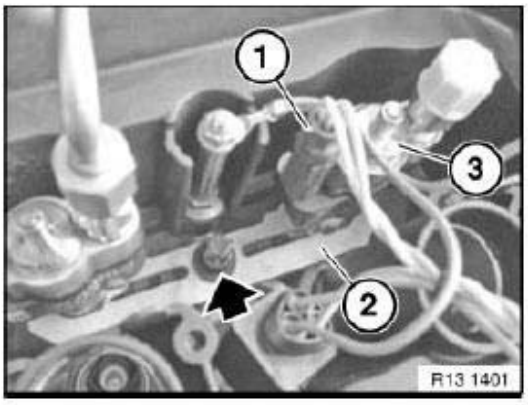


Fig. 112: Identifying Holding-Down Element And Injector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If several injectors are removed, ensure that each injector is reinstalled in its original location (cylinder).

Mark injectors.

Procedure in event of stuck injector

Mount special tool 13 0 180 on injector (1).

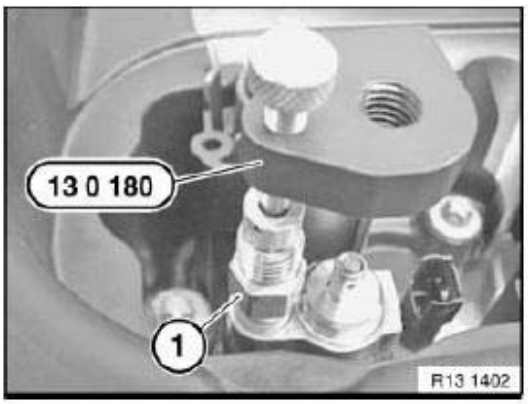


Fig. 113: Identifying Special Tool (13 0 180) On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tool **13 5 250** .

Carefully knock out injector (1) with special tools **13 0 180** and **13 5 250** .

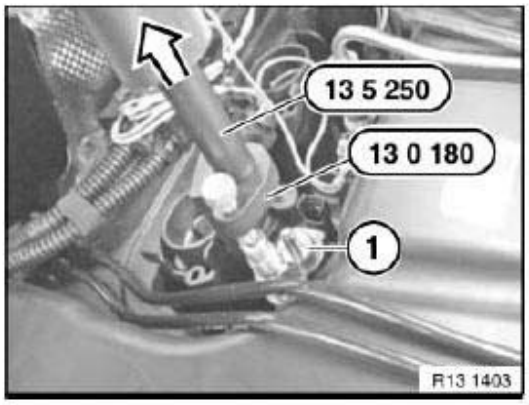


Fig. 114: Knock Out Injector With Special Tools (13 0 180) And (13 5 250)
Courtesy of BMW OF NORTH AMERICA, INC.

After removing, fit protective caps (1 and 3) to injector tip and fuel line connection.

Protective caps are available from BMW Parts Department.

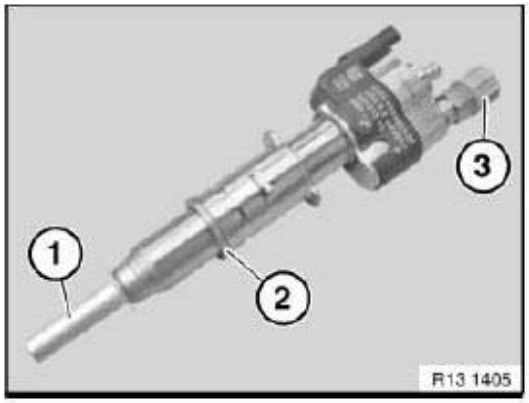


Fig. 115: Fit Protective Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

When installing a new injector:

- Replace uncoupling element (2).
- Remove protective cap (1) from injector tip max. 10 min. before installation (PTFE sealing ring swells up).

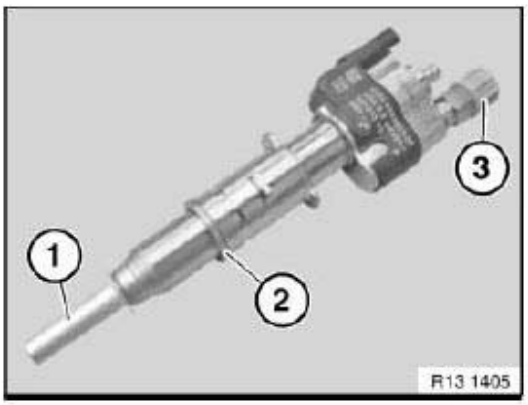


Fig. 116: Fit Protective Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

When reusing fuel injector:

- Replace uncoupling element (2).
- Replace PTFE sealing ring (1).

A PTFE seal which has been heated once by engine operation must be replaced before the fuel injector is reinstalled.

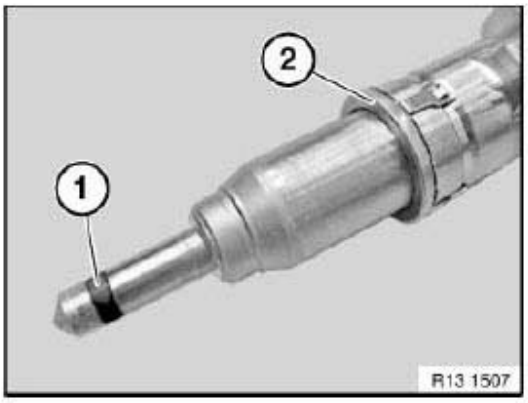


Fig. 117: Identifying PTFE Sealing Ring And Uncoupling Element
Courtesy of BMW OF NORTH AMERICA, INC.

Replacing PTFE sealing ring

Before replacing PTFE sealing ring (1), make sure hands and work surface are clean and free of oil.

Avoid mechanical contact with injector tip (2).

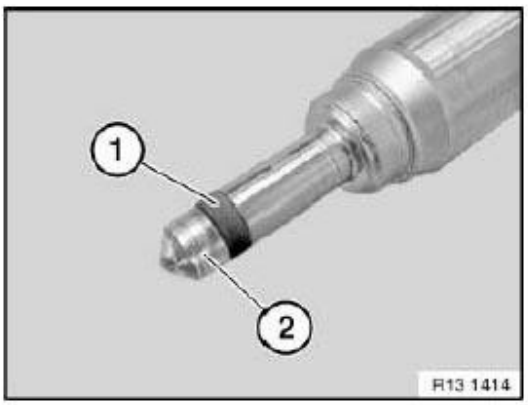


Fig. 118: Identifying PTFE Sealing Ring And Injector Tip
Courtesy of BMW OF NORTH AMERICA, INC.

Remove PTFE sealing ring (1) with special tool 13 0 191 from injector (2).

Use a fluff-free cloth only to remove combustion residues from cylindrical part of injector tip (do not use ultrasound or other tools/agents).

Do not clean injector tip.

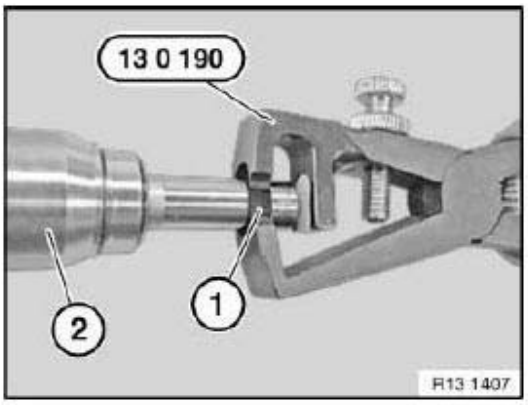


Fig. 119: Removing PTFE Sealing Ring From Injector Using Special Tool (13 0 191)
Courtesy of BMW OF NORTH AMERICA, INC.

Slide new PTFE sealing ring (1) onto mounting taper 13 0 195.

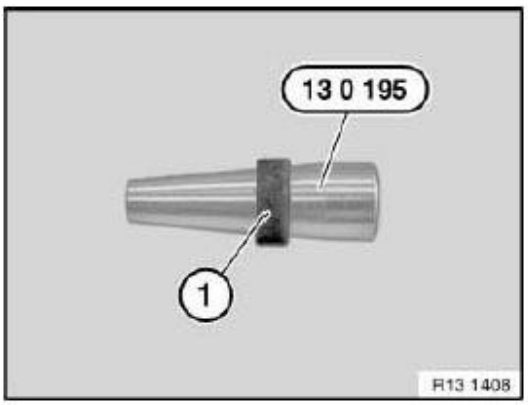


Fig. 120: Identifying PTFE Sealing Ring Onto Mounting Taper (13 0 195)
Courtesy of BMW OF NORTH AMERICA, INC.

User fingers and mounting taper 13 0 195 to slide PTFE sealing ring (1) onto injector (2).

NOTE:

- **Do not use fingernails to slide PTFE sealing ring on.**
- **Do not use any lubricating agents.**
- **The sealing ring is expanded when slid on.**

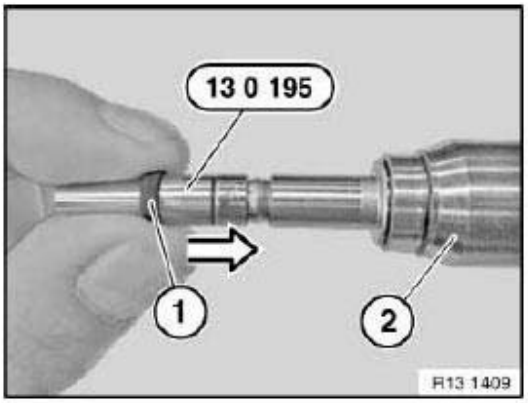


Fig. 121: Sliding PTFE Sealing Ring Onto Injector Using Fingers And Mounting Taper (13 0 195)
Courtesy of BMW OF NORTH AMERICA, INC.

To bring the expanded PTFE sealing ring to its installation dimension, slide three assembly sleeves with decreasing diameters onto the injector.

Slide assembly sleeve (1) with large opening first onto injector (1).

Do not use any lubricating agents.

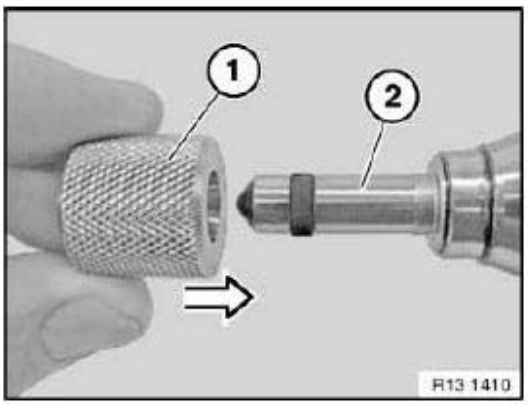


Fig. 122: Sliding Mounting Sleeve Onto Injector
Courtesy of BMW OF NORTH AMERICA, INC.

First slide assembly sleeve 13 0 192 (large diameter) onto injector (1).

Then slide assembly sleeve 13 0 193 (medium diameter) onto injector (1).

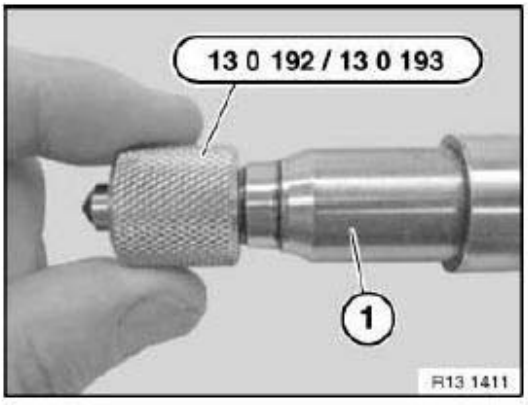


Fig. 123: Sliding Assembly Sleeve (13 0 192) Onto Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Finally, press injector (1) into assembly sleeve 13 0 194 (small diameter).

Installation:

Install injector within 10 minutes or slide on protective cap (**Fig. 116**) (PTFE sealing ring swells up).

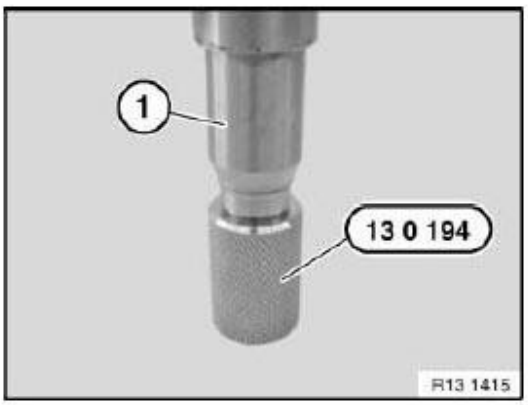


Fig. 124: Identifying Injector Into Assembly Sleeve (13 0 194)
Courtesy of BMW OF NORTH AMERICA, INC.

Installing injector

Installation of injector is described separately from removal.

Before installing injector in engines that have been run

- Check injector bore for dirt.

  Clean **only dirty** injector bores.

  Important - do not damage injector!

- Clean injector bore: To do so, preferably slide injector without uncoupling element (2) but with new PTFE sealing ring (1) in and out of injector bores several times.

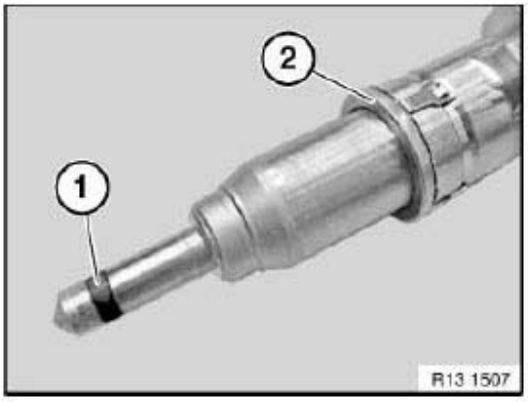


Fig. 125: Identifying PTFE Sealing Ring And Uncoupling Element
Courtesy of BMW OF NORTH AMERICA, INC.

The PTFE sealing ring must then be replaced.

- Clean contact surfaces of uncoupling elements (2) in cylinder head.
- Replace uncoupling element (2).

IMPORTANT: Injector adjustment!

An injector adjustment must be carried out if an injector is replaced or changed on the cylinder side.

Injector adjustment is carried out with the aid of a so-called adjustment value.

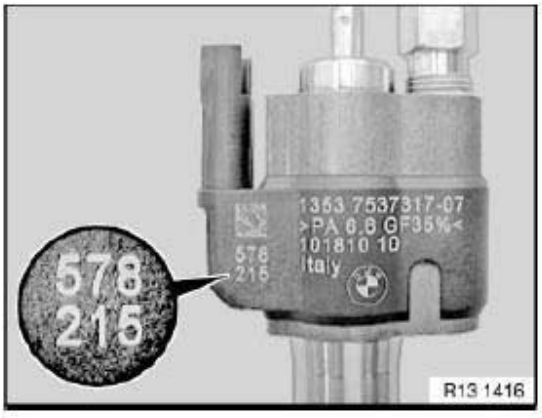


Fig. 126: Identifying Adjustment Value Printed In Blocks Of Digits On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

The adjustment value is printed in two blocks of three digits on the injector.

The adjustment value must be read off **before** installation!

Enter the adjustment value according to the installation position (cylinder) of the injector.

If injector adjustment is not carried out, the engine may run roughly or fail to start.

Description of injector adjustment at end of instruction.



Fig. 127: Identifying Adjustment Value Printed In Blocks Of Digits On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Installing injector

Installation:

Install hold-down device (1) with curvature facing upwards.

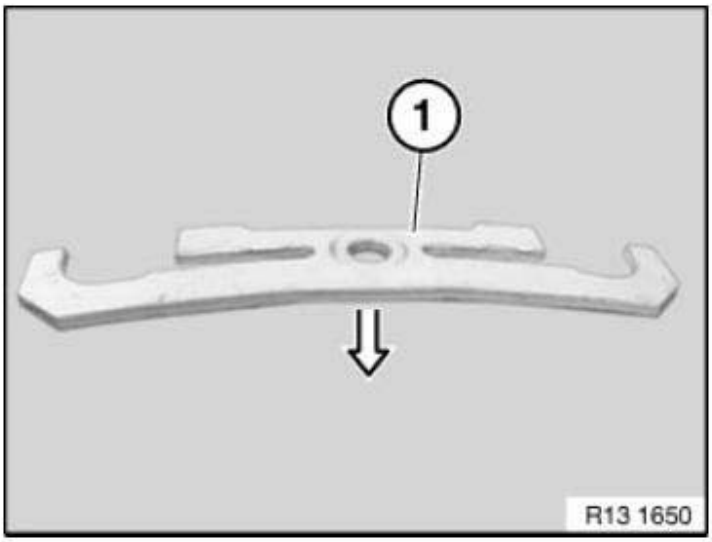


Fig. 128: Identifying Hold-Down Device With Curvature
Courtesy of BMW OF NORTH AMERICA, INC.

Install injector (3).

Install hold-down device (2).

IMPORTANT: Tighten screw hand-tight only so that hold-down device (2) is slack and if necessary injector can still be turned.

Connect contact plug (1).

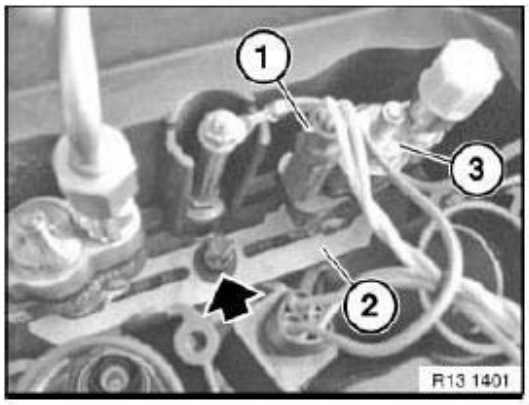


Fig. 129: Identifying Holding-Down Element, Plug And Injector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Make sure hold-down device (1) is correctly seated.

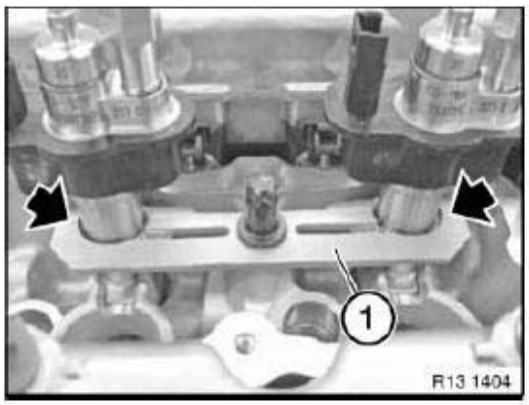


Fig. 130: Locating Holding-Down Element
Courtesy of BMW OF NORTH AMERICA, INC.

Copper seals (1) that may be fitted on the pressure lines are no longer needed and must be removed.

If using the pressure line, apply a light coating of gear oil to the thread. New lines are already pretreated.

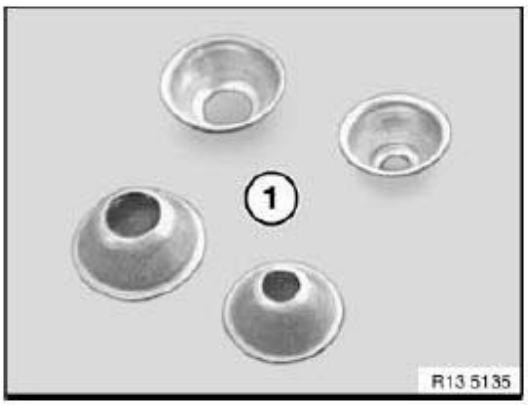


Fig. 131: Identifying Copper Seals
Courtesy of BMW OF NORTH AMERICA, INC.

Connect pressure line (1), tightening nuts hand-tight only in the process.

IMPORTANT: Connect pressure line (1) without tension only.

To ensure distortion-free installation of the pressure line and to avoid damaging the thread, it must be possible for both nuts to be screwed on easily by hand!

If the nuts cannot be screwed on easily by hand, the injector must if necessary be turned a little.

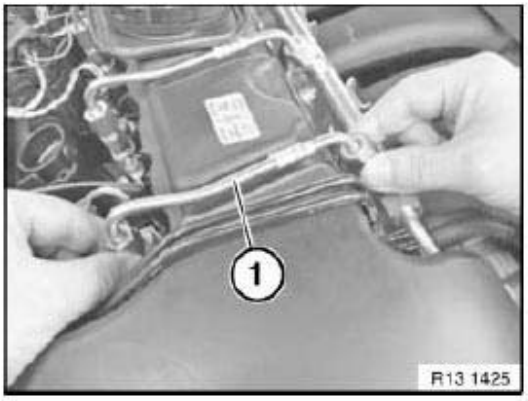


Fig. 132: Connecting Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

Turn injector (2) if necessary in direction of arrow until nuts on pressure line can be easily screwed on by hand.

Tighten nuts on pressure line hand-tight.

Then tighten down bolt for hold-down device (1).

Tightening torque **13 53 5AZ** .

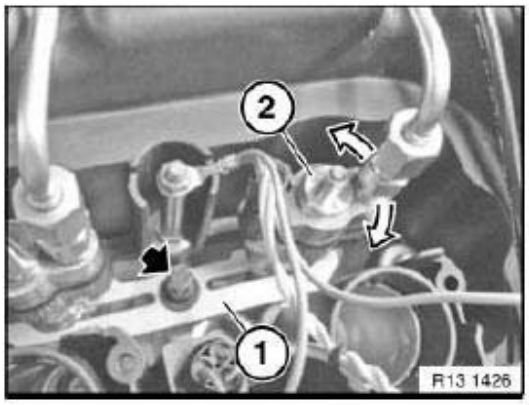


Fig. 133: Turning Injector With Nuts On Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

Adhere to tightening sequence

- First tighten down nut (1) on injector.
- Then tighten down nut (2) on rail.

When tightening nut (1) on injector, grip hexagon head of injector with wrench (3).

Tighten down nuts with special tool 37 1 151.

Tightening torque **13 53 8AZ** .

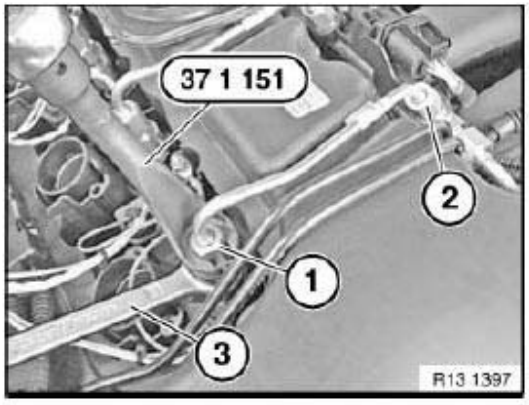


Fig. 134: Identifying Nut On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Carrying out injector adjustment

- Connect DIS Tester

- Identify car
- Select "Function selection"
- Select "Service functions"
- Select "Engine electronics"

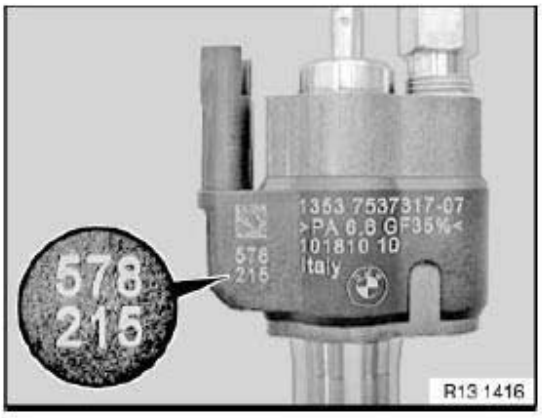


Fig. 135: Identifying Adjustment Value Printed In Blocks Of Digits On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

- Select "Adjustment programs"
- Select "Adjust injectors"
- Change "Test schedule"
- For each replaced injector, the adjustment value must be entered according to the installation position (cylinder).

Clean spark plug slot.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

1371 INTAKE SILENCER

13 71 170 AIR DUCT, REAR (N54)

IMPORTANT: Risk of damage through lever action at the top on the air duct!

Air duct may break!

Necessary preliminary tasks

- Remove left **TENSION STRUT**
- Remove front **UNDERBODY PROTECTION**

NOTE: For purposes of clarity, the pictures show the engine removed.

Release sheet metal nuts (1).

Unfasten screws (2).

Remove heat shield (3).

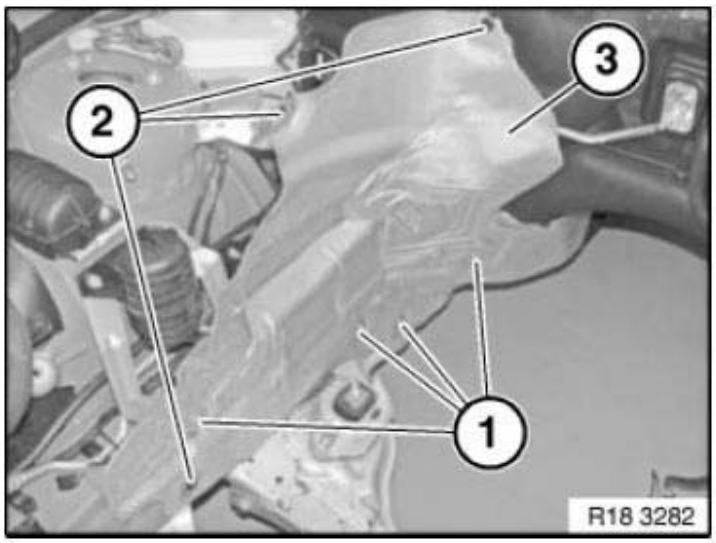


Fig. 136: Identifying Sheet Metal Nuts, Screws And Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect line (1).

Unlock connector (2) and remove.

Unlock and disconnect quick-connect coupling (3).

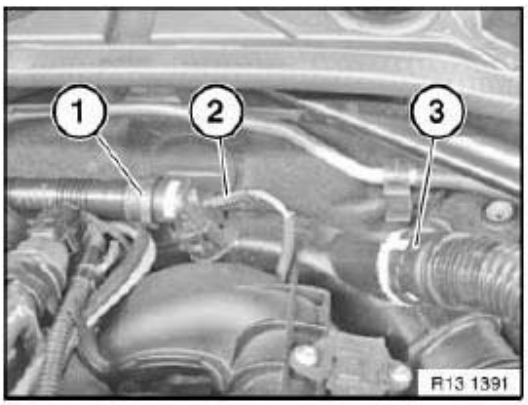


Fig. 137: Identifying Quick-Connect Coupling And Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Turn lock (1) until arrow markings are flush.

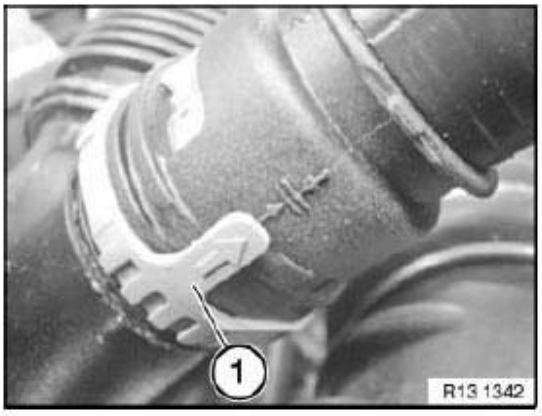


Fig. 138: Turn Lock (1) Until Arrow Markings Are Flush
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not detach air duct in upward direction.

Risk of damage!

Air duct may break!

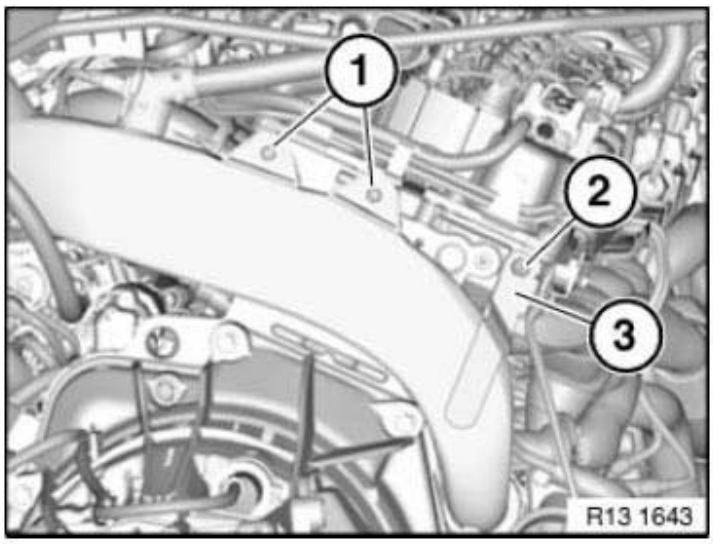


Fig. 139: Identifying Screw And Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **13 71 8AZ** .

Release screw (2) and remove bracket (3).

Tightening torque **13 71 12AZ** .

NOTE: Illustration with engine removed.

Pull off air duct (1) from turbocharger, feed out and remove.

NOTE: Illustration with engine removed.

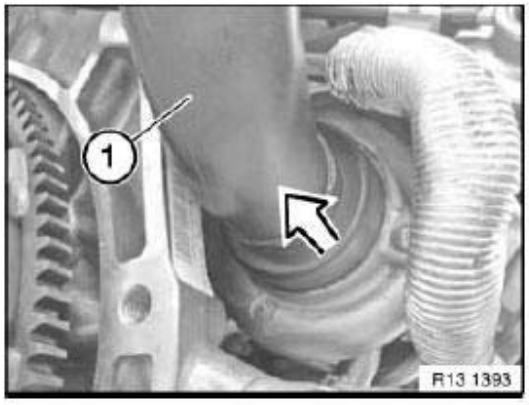


Fig. 140: Removing Air Duct From Turbocharger

Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check sealing ring (1) for damage.

Replace damaged sealing ring.

Make sure sealing ring (1) is correctly seated in air duct (2).

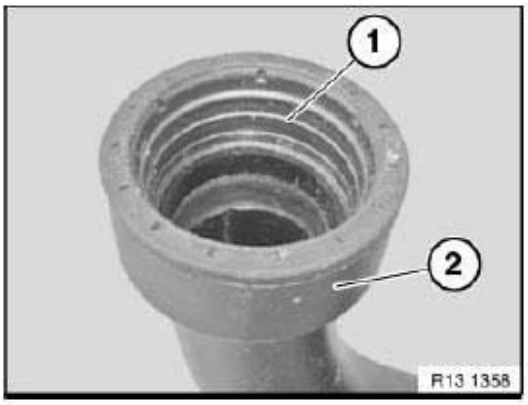


Fig. 141: Identifying Sealing Ring And Air Duct
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check air duct for leaks.

13 71 160 REMOVING AND INSTALLING/REPLACING FRONT AIR DUCT (N54)

IMPORTANT: Risk of damage through lever action at the top on the air duct!

Air duct may break!

Necessary preliminary tasks

- Remove **FAN COWL**
- Draining **COOLANT**

Unlock and remove coolant hose (1).

Release quick-connect coupling (2) by turning lock and detach.

Release hose clamp and detach air duct (3).

Tightening torque **13 71 5AZ** .

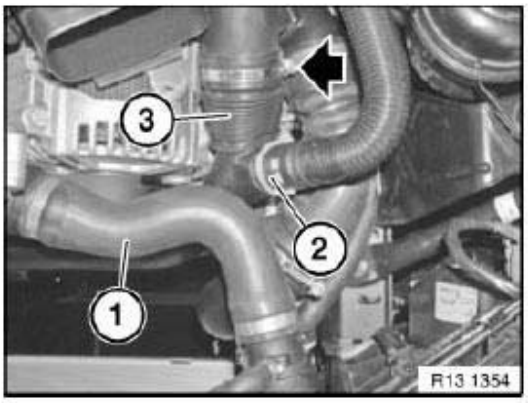


Fig. 142: Locating Hose Clamp And Air Duct
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Turn lock (1) back until arrow markings are flush.

Push air hose onto air duct.

Air hose must audibly snap into place.

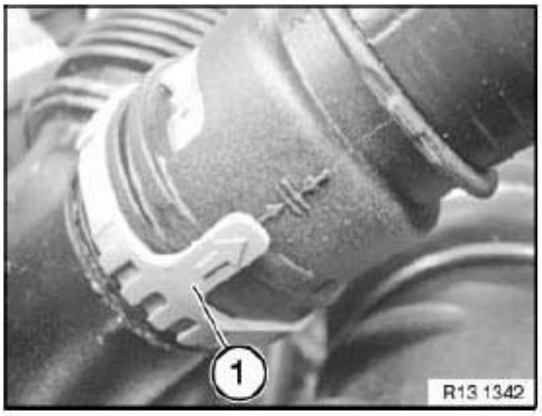


Fig. 143: Turn Lock (1) Back Until Arrow Markings Are Flush
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts and detach coolant hose (1).

Tightening torque **11 53 6AZ** .

Installation:

Check sealing ring.

Replace damaged sealing ring.

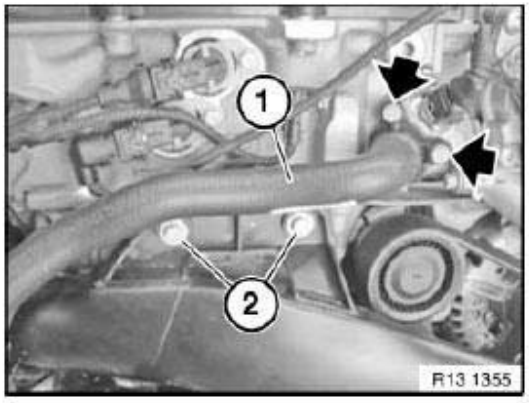


Fig. 144: Locating Bolts And Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (2).

Tightening torque **13 71 6AZ** .

Unclip A/C line (1) from holder.

Unlock and detach coolant hose (2) from coolant thermostat and release from holder (4).

Release coolant hose (3) from holder (4) and lay downwards to one side.

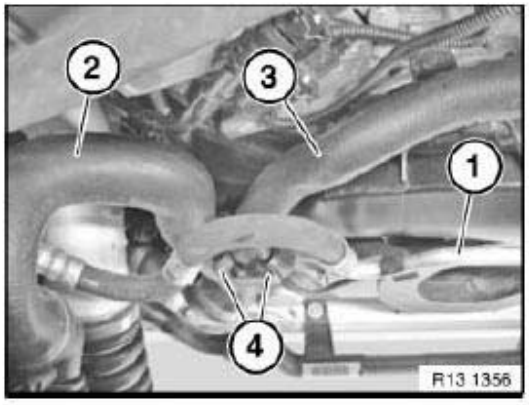


Fig. 145: Identifying Coolant Hose From Holder
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Detach air duct from turbocharger.

Risk of damage through lever action at the top on the air duct!

Air duct may break!

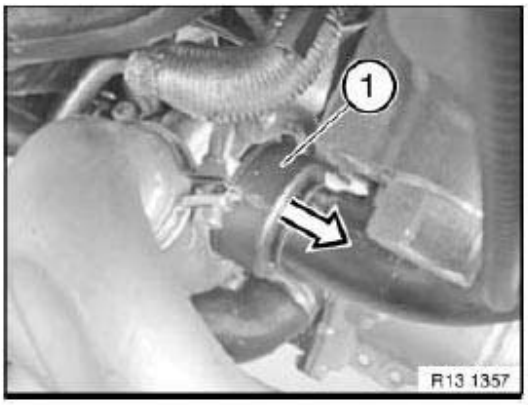


Fig. 146: Detaching Air Duct From Turbocharger
Courtesy of BMW OF NORTH AMERICA, INC.

Detach air duct (1) in direction of arrow.

NOTE: Illustration with engine removed.

Installation

Check sealing ring (1) for damage.

Replace damaged sealing ring.

Make sure sealing ring (1) is correctly seated in air duct (2).

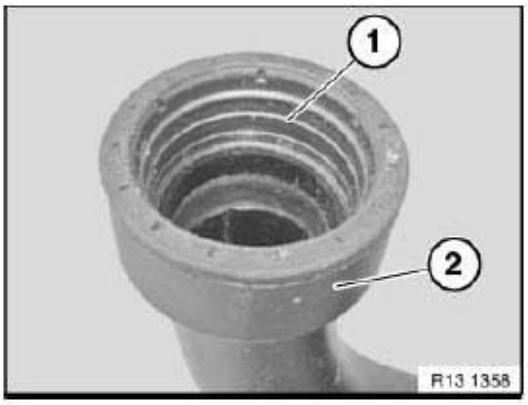


Fig. 147: Identifying Sealing Ring And Air Duct
Courtesy of BMW OF NORTH AMERICA, INC.

13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING (N54)

Necessary preliminary tasks

- Remove intake duct

Unlock and disconnect line (1).

Unclip line (1) from intake filter housing.

Release clamp and detach air intake hose.

Tightening torque **13 71 5AZ** .

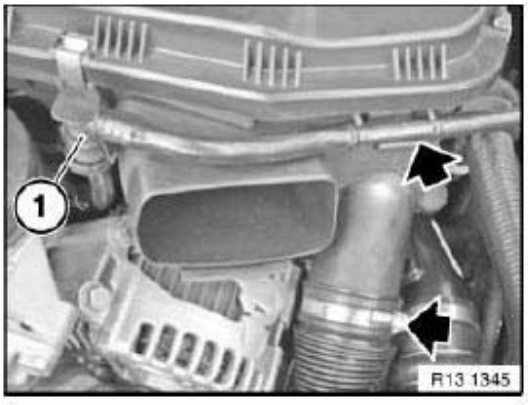


Fig. 148: Locating Clamp And Air Intake Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Release clamp and detach air duct.

Tightening torque **13 71 5AZ** .

Pull off wiring harness holders (1) in upward direction.

Detach intake filter housing (2) from bearing journal and remove.

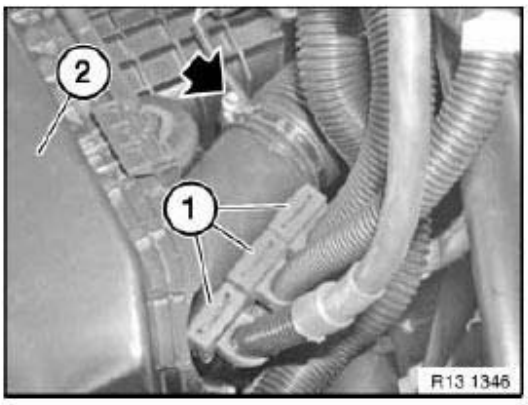


Fig. 149: Identifying Wiring Harness Holders And Intake Filter Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure intake filter housing is correctly seated on bearing journal.

NOTE: Assemble engine.

1390 CARBON CANISTER VENTILATION

13 90 500 REPLACING TANK VENT VALVE (N54)

Necessary preliminary tasks

- Check stored fault messages
- Switch off ignition
- Remove **INTAKE FILTER HOUSING**

Installation location

The tank vent valve is located at the rear below the intake air manifold.

Unlock plug (1) and remove.

Unlock hose (2) and detach.

Unlock hose (3) on throttle valve assembly and disconnect.

Detach tank vent valve (4) from holder and remove.

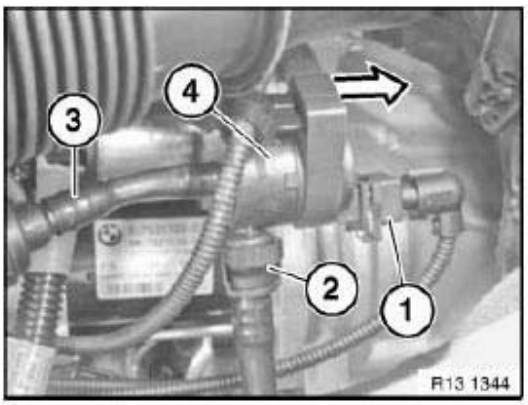


Fig. 150: Detaching Tank Vent Valve From Holder
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Read out fault memory of DME control unit.

Now clear the fault memory.

13 FUEL SYSTEM

13-5270 ADAPTER

Adapter Minimum set: Mechanical tools MW

NOTE: (Adapter hose with coupling connector) For the DIS pressure sensor or pressure gauge 13 3 061 for measuring the fuel feed pressure

Storage Location

C3

A3

B3

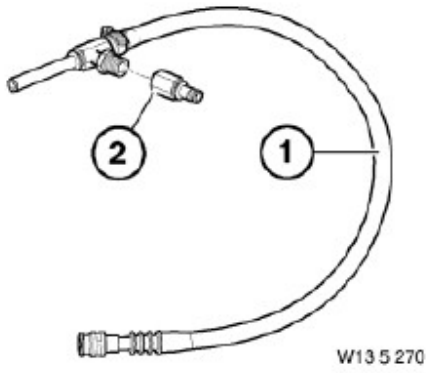


Fig. 1: Identifying Adapter (13-5270)
Courtesy of BMW OF NORTH AMERICA, INC.

SI number

01 18 96 (163)

Consisting of:

1 = 0491311 Adapter

NOTE: (Adapter hose)

2 = 0491312 Adapter

NOTE: (Adapter) For connecting the DIS pressure sensor

13-0100 ADAPTER

Adapter MW

Replaced by: 0491221

NOTE: Replaced by 13 0 094 (0 491 221)

Storage Location

B15

13-6050 ADAPTER

Adapter Minimum set: Mechanical tools MW

NOTE: (Adapter set for BMW DIS) For measuring oil and fuel pressures

Storage Location

A3

A4

SI number

01 12 94 (859)

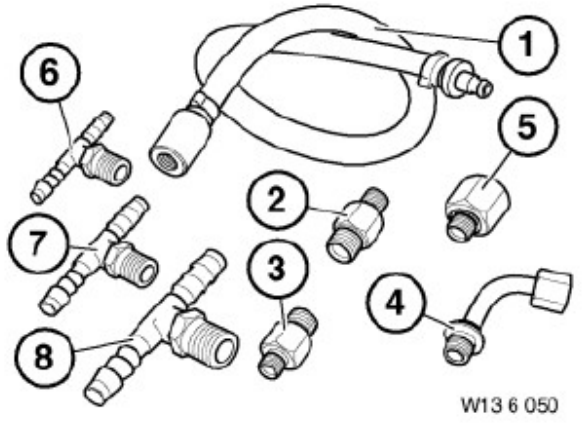


Fig. 2: Identifying Adapter (13-6050)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

4 = 0495067 T-piece

NOTE: (T-piece) T-piece for line dia. 12 mm

1 = 0491341 Hose

NOTE: (Connecting hose) For connecting reducers 13 6 052, 13 6 053, 13 6 55 and adapters 11 4 050, 11 4 160, 11 4 170, 13 5 131 to BMW DIS

2 = 0491342 Adapter

NOTE: (Adapter) For pipe bends 24 0 023, 24 0 024, 24 0 140

3 = 0491343 Adapter

NOTE: (Adapter) Reducer for adapter 16 1 300

4 = 0491344 Adapter

NOTE: (Adapter)

= 0491345

5 = 0491345 T-piece

NOTE: (T-piece) Reducer for T-pieces 13 6 056 and 13 6 057

6 = 0491346 T-piece

NOTE: (T-piece) T-piece for line dia. 6 mm

7 = 0491347 T-piece

NOTE: (T-piece) T-piece for line dia. 8 mm

13-8010 ADAPTER

Adapter MW

NOTE: For activating the diagnostic function of the CNG control unit (indicator light in the instrument panel), and for actuating the high pressure shut-off valve

Storage Location

W 2..

SI number

01 14 95 (014)



Fig. 3: Identifying Adapter (13-8010)
Courtesy of BMW OF NORTH AMERICA, INC.

13-0132 ADAPTER

Adapter

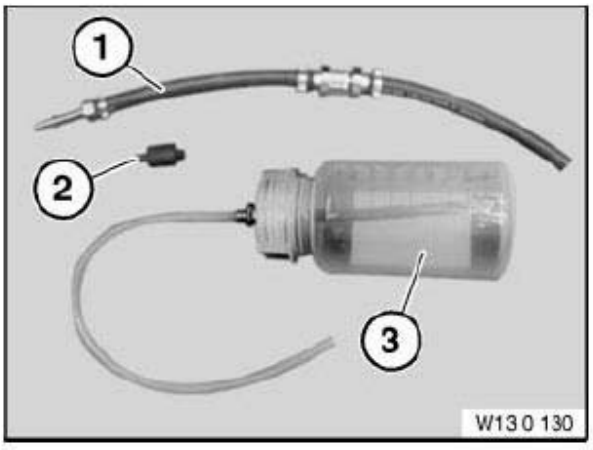


Fig. 4: Identifying Adapter (13-0132)
Courtesy of BMW OF NORTH AMERICA, INC.

13-0131 COMPRESSED AIR HOSE WITH FILTER

Compressed air hose with filter

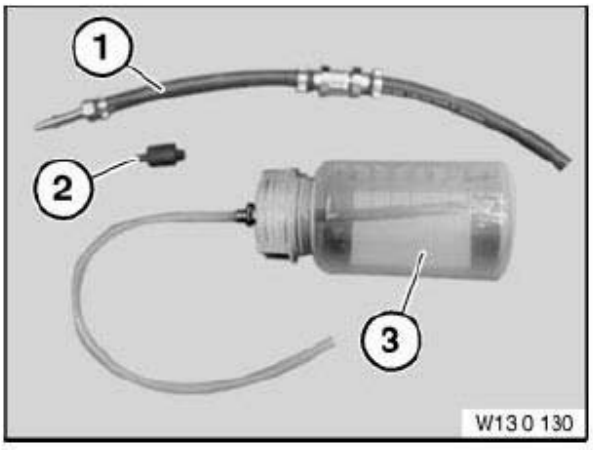


Fig. 5: Identifying Compressed Air Hose With Filter (13-0131)
Courtesy of BMW OF NORTH AMERICA, INC.

13-0133 CONTAINER

Container

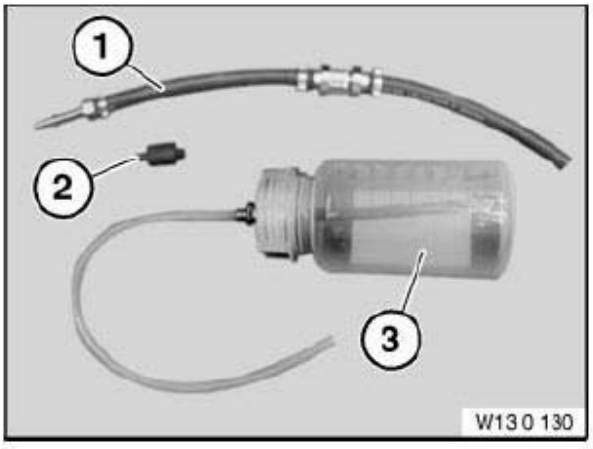


Fig. 6: Identifying Container (13-0133)
Courtesy of BMW OF NORTH AMERICA, INC.

13-5110 DEVICE

Device MW

Replaced by: 0491020

NOTE: (Centring device) For oil pump - Replaced by 11 4 100 (0 491 020)

13-3060 DEVICE

Device MW

NOTE: For checking fuel pressure and oil pressure

Consisting of:

1 = 0491260 Pressure gauge

NOTE: (Pressure gauge 0...25 bar)

2 = 0491261 Valve

NOTE: (Valve) 2-way valve, engine: all except S50, S54, N73

3 = 0491262 Lines

NOTE: (Connection lines (2 x)) For check of fuel and oil pressure

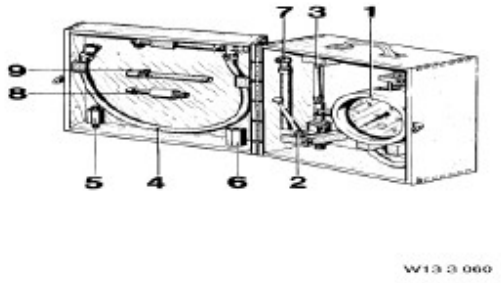


Fig. 7: Identifying Device (13-3060)
Courtesy of BMW OF NORTH AMERICA, INC.

4 = 0491263 Lines

NOTE: (Connection line) With T-piece for L-Jetronic, all except N73

5 = 0491264 Connection piece

NOTE: (Connection piece, distributor)

All except N73

6 = 0491265 Connection piece

NOTE: (Connection piece warm-up sensor) All except N73

7 = 0491266 Hose

NOTE: (Connecting hose) For checking fuel pump fuel delivery rate, all except N73

= 0491267

8 = 0491267 Connection piece

NOTE: (Connection piece, distributor) All except N73

9 = 0491268 Connection piece

NOTE: For warm-up sensor with hose, all except N73

13-0190 FITTING AID

Fitting aid Minimum set: Mechanical tools MW

NOTE: (Installation set) For removing and installing the Teflon rings on the injector.

SI number

01 20 06 (299)

Consisting of:

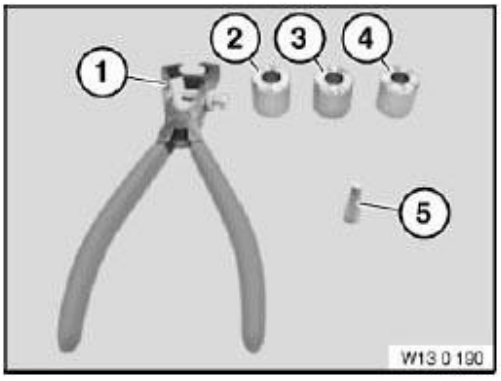


Fig. 8: Identifying Fitting Aid (13-0190)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0495757 Pliers

2 = 0495758 Sleeve

NOTE: (Assembly sleeve 1)

3 = 0495759 Sleeve

NOTE: (Assembly sleeve 2)

4 = 0495760 Sleeve

NOTE: (Assembly sleeve 3)

5 = 0495761 Fitting aid

NOTE: (Mounting cone)

13-5020 KEY

Key Minimum set: Mechanical tools MW

NOTE: (Ignition key) SW17 For releasing and tightening the fuel injection lines

Storage Location

A9



W13 5 020

Fig. 9: Identifying Key (13-5020)
Courtesy of BMW OF NORTH AMERICA, INC.

13-0290 LINES

Lines Minimum set: Mechanical tools MW

NOTE: Two fuel lines. Auxiliary lines for 13 3 060. For fuel pressure check in all direct injectors in comb. with IMIB and 100 bar sensor.

SI number

01 27 09 (598)

Consisting of:

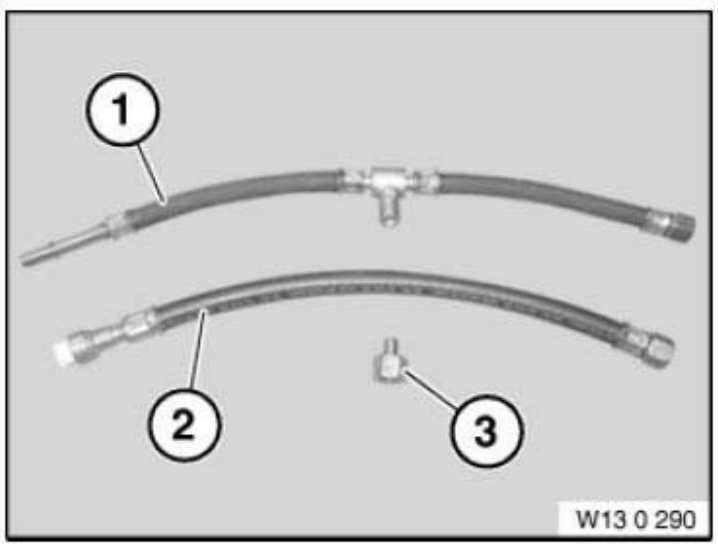


Fig. 10: Identifying Lines (13-0290)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0496824 Lines

NOTE: With connection for 13 3 060 or 11 4 310.

2 = 0496825 Lines

3 = 0496826 Fastener

13-8020 MEASURING DEVICE

Measuring device MW

NOTE: (measuring device) With connection parts for checking and adjusting low pressure regulator

SI number

01 14 95 (014)

Consisting of:

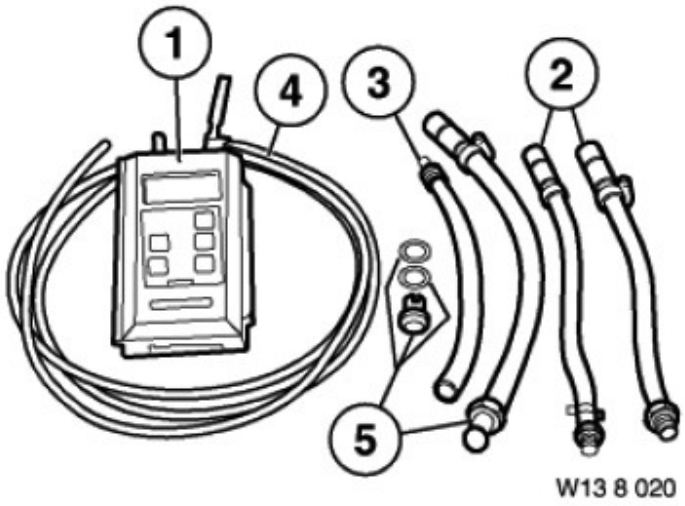


Fig. 11: Identifying Measuring Device (13-8020)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0491362 Measuring device

NOTE: (measuring device) Without adapter hoses

2 = 0491363 Adapter

NOTE: (adapter hose (2 pieces)) With M6 connecting nipple and quick-release coupling

3 = 0491364 Adapter

NOTE: (adapter hose) With counter piece for quick-release coupling

4 = 0491365 Adapter

NOTE: (adapter hoses) With T-piece for intake pressure connection

5 = 0491366 Adapter

NOTE: (adapter hose) With quick-release coupling and ring connection with banjo bolt for testing the output pressure at the metering unit

13-0070 PROBE

Probe MW

Replaced by: 0491217

NOTE: **(Exhaust gas probe) For vehicles with catalytic converter - Other: only Japan and USA Replaced by 13 0 090 (0 491 217)**

13-5250 PULLER

Puller Minimum set: Mechanical tools MW

NOTE: **For removing injector nozzles or injectors from cylinder head**

Storage Location

A11

B11

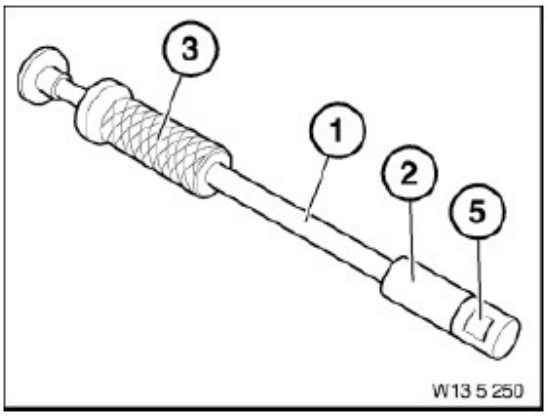


Fig. 12: Identifying Puller (13-5250)
Courtesy of BMW OF NORTH AMERICA, INC.

SI number

01 06 98 (306)

Consisting of:

5 = 0495579 Adapter

NOTE: **For removing steering shaft on E85. Refer to SI 01 11 06 (265)**

1 = 0493338 Rod

NOTE: **(Guide rod)**

2 = 0493339 Bush

NOTE: **(Threaded bush)**

3 = 0493340 Weight

NOTE: **(Weight)**

4 = 0493379 Claw

NOTE: **(Clamping claw) For dismantling injector nozzles/engine: M57**

13-5160 SEAL

Seal Minimum set: Mechanical tools MW

NOTE: **(Caps (2 pieces)) To close off the fuel lines when removing and installing the engine.**

Storage Location

A26

SI number

01 22 08 (498)

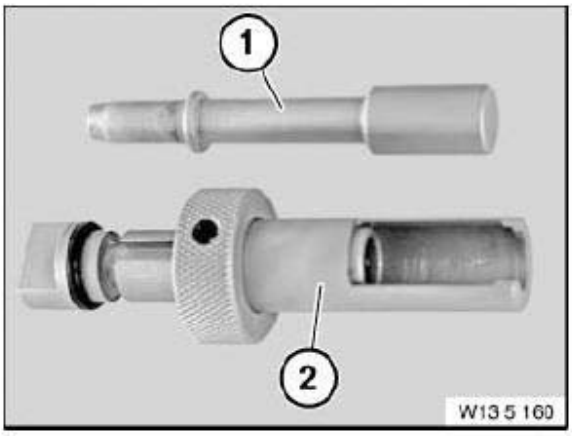


Fig. 13: Identifying Seal (13-5160)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = 0496567 Seal

NOTE: **(Cap (2 pieces)) To close off the quick connectors**

2 = 0496568 Seal

NOTE: (Cap (2 pieces)) To close off the fuel lines.

13-5280 SEAL

Seal MW

Replaced by: 0496565

NOTE: (Caps) To close off the fuel lines when removing and installing the engine. 13 5 280 discontinued from 10/2008. Replaced by 13 5 160 (0 496 565)

Storage Location

B3

C3

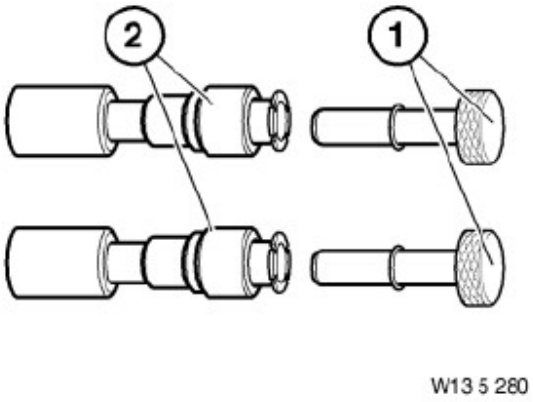


Fig. 14: Identifying Seal (13-5280)
Courtesy of BMW OF NORTH AMERICA, INC.

SI number

01 18 96 (163)

Consisting of:

1 = 0491314 Seal

NOTE: (Cap) 2 pieces, for closing off the quick connectors

2 = 0491315 Seal

NOTE: **(Cap) 2 pieces, for closing off the fuel lines**

13-6058 T-PIECE FOR 12 MM DIA. LINE

T-piece for 12 mm dia. line

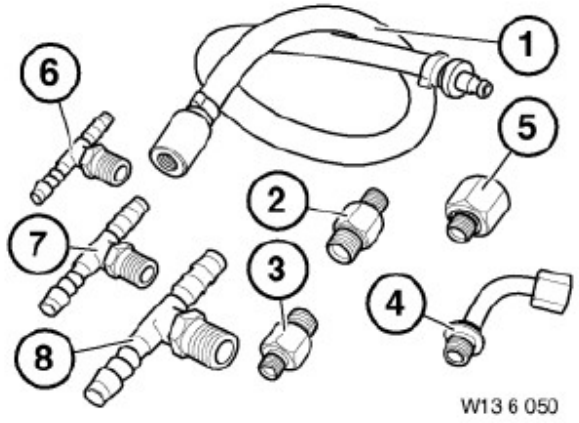


Fig. 15: Identifying T-Piece For 12 mm Dia. Line (13-6058)
Courtesy of BMW OF NORTH AMERICA, INC.

Z13-3010 TERMINAL

Terminal Minimum set: Mechanical tools MW

NOTE: **(Hose clip) For removing a hose during repair work**



Fig. 16: Identifying Terminal (13-3010)
Courtesy of BMW OF NORTH AMERICA, INC.

13-0180 TOOL

Tool Minimum set: Mechanical tools MW

NOTE: **(Drive-out tool) For striking out seized injectors.**

Storage Location

A19

SI number

01 20 06 (299)

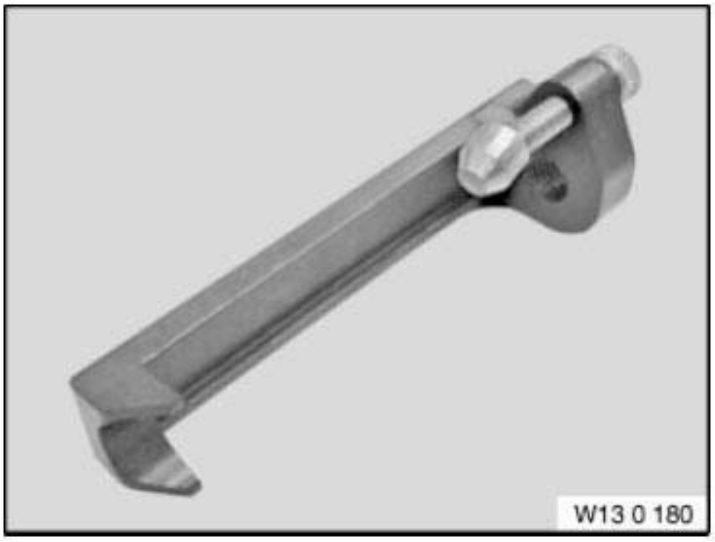


Fig. 17: Identifying Tool (13-0180)
Courtesy of BMW OF NORTH AMERICA, INC.

INJECTORS AND LINES, FUEL PRESSURE REGULATOR N53, N54

13 53 INJECTORS AND LINES, FUEL PRESSURE REGULATOR N53/N54

INJECTORS AND LINES, FUEL PRESSURE REGULATOR SPECIFICATIONS

Testing pressure	bar ± 0.2	5

AIR INTAKE SILENCER

13 71 AIR INTAKE SILENCER

TIGHTENING TORQUE SPECIFICATION - AIR INTAKE SILENCER

	Type	Thread	Tightening specification	Measure
1AZ Clean-air gaiter to throttle valve	N52K	Hose clamp		3 Nm
2AZ Gaiter to intake muffler	N52K	Hose clamp		3 Nm
3AZ Intake silencer to body	N52K	M6		8 Nm
4AZ Intake duct to front wall	N52K/N54	self-tapping screw		2 Nm
5AZ Air duct to air silencer	N54	Hose clamp		3 Nm
6AZ Air duct to crankcase	N54	M6		9 Nm
7AZ Charge-air duct to bracket	N54	M6		9 Nm
8AZ Air duct, compressor to basic engine	N54	M6		9 Nm
9AZ Pressure sensor to charge-air duct	N54	M6		2 Nm
10AZ Engine sound system to charge-air duct	N54	Hose clamp		3 Nm
11AZ Engine sound line to sound system	N54	Hose clamp		3 Nm
12AZ Holder for air duct to cylinder head	N54	M6		9 Nm
13AZ Air intake hose to throttle valve assembly	N52K	Hose clamp		3 Nm

CARBURETOR

13 11 CARBURETOR

TIGHTENING TORQUE SPECIFICATION - CARBURETOR

	Type	thread	tightening specification	Measure
1AZ Carburetor to intake manifold	M10/M20/M30			10 Nm
2AZ Carburetor to insulating flange	M10/M20/M30			10 Nm
3AZ Insulating flange to intake manifold	M10/M20/M30			10 Nm
4AZ Idling shut off valve; max.	M10/M20/M30			5 Nm
5AZ Flow valve; max.	M10/M20/M30			28 Nm
6AZ Throttle valve assembly to float housing; max.	M10/M20/M30			9 Nm
8AZ Throttle valve control to carburetor; max.	2BE			3 Nm

9AZ Warm-up regulator to engine	M10/M20/M30			23 Nm

FUEL FILTER

13 32 FUEL FILTER

TIGHTENING TORQUE SPECIFICATION - FUEL FILTER

	Type	Thread	Tightening specification	Measure
1AZ Fuel line to filter housing and injection pump				
Coupling nut	M21/M51/M41	M14 x 1.5		14 Nm
Adapter	M21/M51/M41	M12 x 1.5		9 Nm
Hollow bolt	M21/M51/M41	M14 x 1.5		14 Nm
2AZ Fuel filter to holder	M51/M41	M8		22 Nm
3AZ Air duct to fuel cooler	M47			5.7 Nm
	M57			2 Nm
4AZ Fuel filter cover	M47			25 Nm
5AZ Fuel filter with holder to body	N42			8.8 Nm

FUEL INJECTION NOZZLES AND PIPES

13 53 FUEL INJECTION NOZZLES AND PIPES

TIGHTENING TORQUE SPECIFICATION - FUEL INJECTION NOZZLES AND PIPES

	Type	Thread	Tightening specification	Measure
1AZ Rail, high-pressure side, to cylinder head	N54	M7 x 16		13 ± 2 Nm
2AZ High-pressure line to cylinder head	N54	M7 x 16		13 ± 2 Nm
3AZ High-pressure fuel sensor	N54	M10		30 Nm
4AZ Low pressure fuel sensor	N54	M10		20 Nm
5AZ Hold-down device to cylinder head	N54	M7 x 20		13 ± 2 Nm
6AZ Feed line to high-pressure pump	N54	M14	Coat screw connection with transmission oil	30 Nm
7AZ High-pressure line to rail and high-pressure pump	N54	M14	Coat screw connection with transmission oil	30 ± 3 Nm
8AZ High-pressure lines to rail and injector	N54	M12	Coat screw connection with transmission oil	23±3 Nm

9AZ Fuel delivery line	N54	M8 x 17	Replace screw	
			1. Tightening	10 Nm
			2. Angle-of-rotation tightening	90° ± 15°
10AZ Bracket, fuel line, to engine support frame	N54	M6 x 12		8 Nm

FUEL INJECTORS

13 64 FUEL INJECTORS

TIGHTENING TORQUE SPECIFICATION - FUEL INJECTORS

	Type	Thread	Tightening specification	Measure
1AZ Fuel injector to intake manifold	All	M6		10 Nm
2AZ Coupling nut on fuel injector	All/with K-Jetr.			25 Nm

FUEL PUMP WITH DRIVE AND PIPES

13 31 FUEL PUMP WITH DRIVE AND PIPES

TIGHTENING TORQUE SPECIFICATION - FUEL PUMP WITH DRIVE AND PIPES

	Type	thread	tightening specification	Measure
1AZ Fuel pump to engine	All			12 Nm
2AZ Fuel pipe coupling bolt	All/with K-Jetr.	M8		9 Nm
3AZ Fuel pipe coupling bolt	All/with K-Jetr.	M12		20 Nm
4AZ Fuel pipe to pressure regulator	All/with L-Jetr.			30 Nm
5AZ Return pipe connector to pressure regulator	All/with L-Jetr.			27 Nm

INJECTION PUMP, CONTROL RECEPTACLE

13 51 INJECTION PUMP, CONTROL RECEPTACLE

TIGHTENING TORQUE SPECIFICATION - INJECTION PUMP, CONTROL RECEPTACLE

	Type	Thread	Tightening specification	Measure
1AZ Plug for high pressure section of injection pump	M21/M51/M41			25 Nm
2AZ Distributor injection pump to holder	M21/M51/M41			25 Nm
3AZ Electric shutoff to injection pump	M21/M51/M41			20 ± 5 Nm

4AZ Electric cold start valve to injection pump	M21			20 Nm
5AZ Coupling bolt (OUT) to injection pump (fuel return)	M21/M51/M41			25 Nm
6AZ Pressure valve holder to injection pump	M21/M51			45 Nm
7AZ Expansion element housing (temperature dependent idling speed boost) to injection pump	M21			18 Nm
8AZ Distributor injection pump to flange and console	M21/M51/M41			22 Nm
9AZ Electr. line on fuel cutout device	M51/M41			2.5 Nm
10AZ Fuel feed line to injection pump (VP44)	M47			30 Nm
11AZ Fuel return line to injection pump (VP44)	M47			25 Nm
12AZ Plug for static basic adjustment (injection pump VP44)	M47			13 Nm
13AZ Blocking screw for injection pump shaft without spacer plate (injection pump VP44)	M47			31 Nm
14AZ Blocking screw for injection pump shaft with spacer plate (injection pump VP44)	M47			13 Nm
15AZ Injection line (union nut) to injection pump (VP44)	M47			30 Nm

INJECTION PUMP, CONTROL

13 51 INJECTION PUMP, CONTROL

TIGHTENING TORQUE SPECIFICATION - INJECTION PUMP, CONTROL

	Type	Thread	Tightening specification	Measure
1AZ High-pressure fuel pump to vacuum pump	N54, N53	M6x25		9 Nm

SENDERS FOR CONTROL UNIT

13 62 SENDERS FOR CONTROL UNIT

TIGHTENING TORQUE SPECIFICATION - SENDERS FOR CONTROL UNIT

	Type	Thread	Tightening specification	Measure
1AZ Coolant temperature sensor	N54	M12x1.5		13.5 Nm
2AZ Intake pressure sensor	N54	K50x16		3.75 Nm
3AZ Camshaft sensor to cylinder head	N54	M6x16		8 Nm
4AZ Crankshaft sensor to crankcase	N54	M6x16		8 Nm
5AZ Knock sensor to crankcase	N54	M8x30		21.5 Nm

SENDERS FOR CONTROL UNIT

13 62 SENDERS FOR CONTROL UNIT

TIGHTENING TORQUE SPECIFICATION - SENDERS FOR CONTROL UNIT

	Type	Thread	Tightening specification	Measure
1AZ Temperature time switch	M21/M51			18 Nm
2AZ Temperature sensor, water	M60/1/M60/2/M21/M51			18 Nm
	all others			13 Nm
3AZ Temperature switch	All			28 Nm
4AZ Temperature sensor, air	All			13 Nm
5AZ Charge-air pressure sensor to bracket	M51/M41			4 Nm
Charge-air pressure sensor to intake manifold	M47			5 Nm
6AZ Dual temperature sensor (4-pin plug connection)	M41/M43/M44/S50/S52/M52/M57/M67/M62/M73			13 Nm
7AZ Air-mass sensor on lower section of intake filter housing	M51			3.5 Nm
Air-mass flow sensor to cylinder head cover	M47/M47TU/M57/M57TU/M57T2			4.5 Nm
8AZ Pulse generator, camshaft to cylinder head cover	M57			4.5 Nm
	M47TU/M57TU			3.5 Nm
	M57T2			2.3 Nm
9AZ Intake neck on air-mass flow sensor	M47			9 Nm

THROTTLE AND ACTUATOR

13 54 THROTTLE AND ACTUATOR

TIGHTENING TORQUE SPECIFICATION - THROTTLE AND ACTUATOR

	Type	Thread	Tightening specification	Measure
1AZ Throttle-valve assembly to intake manifold	N54	M6 x 50		8 Nm