# ENGINE

## Engine - Repair Instructions - 135i

# 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
- Diarrhea
- Cramps/fits
- Unconsciousness

**Protective measures/rules of conduct**

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

**First aid measures**

- Do not induce vomiting.

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

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

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

**Danger of injury!**

Contact with eyes or skin may result in injury!

**Possible symptoms are:**

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

**Protective measures/rules of conduct**

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

**First aid measures**

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

**NOTE: Do not use solvents/thinners.**

## 00 SAFETY INSTRUCTIONS FOR HANDLING OIL

**WARNING: DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN!**
**RISK OF INJURY if oil comes into contact with eyes and skin!**

**Recycling**

Observe country-specific waste-disposal regulations.

**Measures if oil is unintentionally released**

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

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

## 11 00 MOUNTING ENGINE ON ASSEMBLY STAND (N54)

**Special tools required:**

For the following special tools, refer to **MAINTENANCE AND GENERAL INFORMATION - SPECIAL TOOLS** .

- 00 2 300

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 8 541
- 11 8 542

**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** . See **11 00 050 REMOVING AND INSTALLING ENGINE (N54)**.

Mount engine with special tool 11 8 541 on special tool 00 2 300.

Mount engine or engine block with special tool 11 8 542 to 11 8 541.

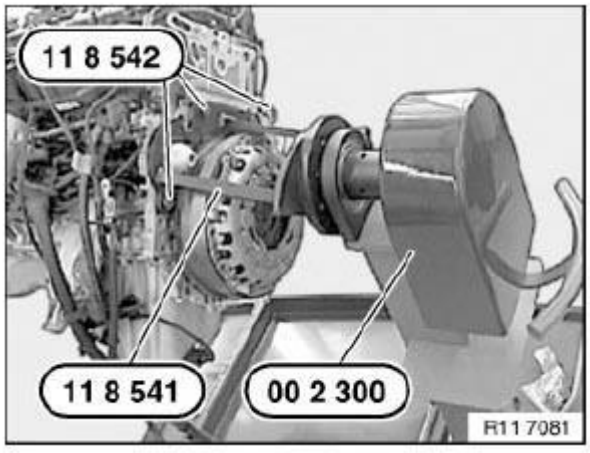



**Fig. 1: Identifying Special Tools For Mounting Engine**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**11 00 REMOVING AND INSTALLING/REPLACING IGNITION COIL COVER (N54)**

*Necessary preliminary tasks:*

- **Remove microfilter housing** . See **64 31 092 REMOVING AND INSTALLING/REPLACING MICROFILTER HOUSING (LOWER SECTION)** .

Release screws.

Tightening torque. See 11 12 7AZ in **CYLINDER HEAD WITH COVER** .

Remove ignition coil cover (1) towards top.

**NOTE: For purposes of improved clarity, illustration and descriptions shows wiring harness and tension strut removed.**

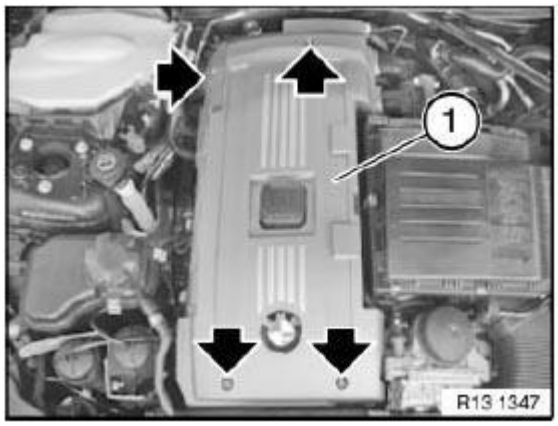



**Fig. 2: Removing Ignition Coil Cover**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**11 00... OVERVIEW OF CONSUMABLES (ELECTRONIC PARTS CATALOGUE - EPC)**

1.0 Sealing compound for **injection** .

**SEALING COMPOUND REFERENCE CHART FOR INJECTION**

| | Repair instructions (engine) | Designation EPC | Part number EPC | 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 FOR APPLICATION**

| | Designation in repair instruction | Designation EPC | Part number EPC | Application examples |
|---|---|---|---|---|
| 2.1 | M41, M47, M47TU, M47T2, M50, M51, M52, M52TU, M54, M57, M57TU, M57T2, M60, M62<br>N40, N42, N45, N45N, N46, N46N, N43, N47, N47S<br>N51, N52, N52N, N53, N54, N55, N57, N57S<br>N62, N62TU, N73, N73H S14, S38, S50, S52, S54, S62, S65, S85 | Drei Bond 1209 liquid gasket | 07 58 9 062 376 | For sealing junction points on crankcase |
| 2.2 | N12, N14, W16 | Loctite 5970 liquid gasket | 83 19 0 404 517 | Sealing between crankcase upper and lower halves |
| 2.3 | N12, N14, W16 | Loctite 273 liquid gasket | 83 19 0 443 083 | Sealing between cover sleeve and crankcase |

**11 00... SERVICE - ENGINE OIL (N54)**

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 9 240

**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. See 11 42 1AZ in **11 42 OIL FILTER AND PIPES** .

**NOTE: Engine oil flows out of the oil filter housing and back into the oil sump.**

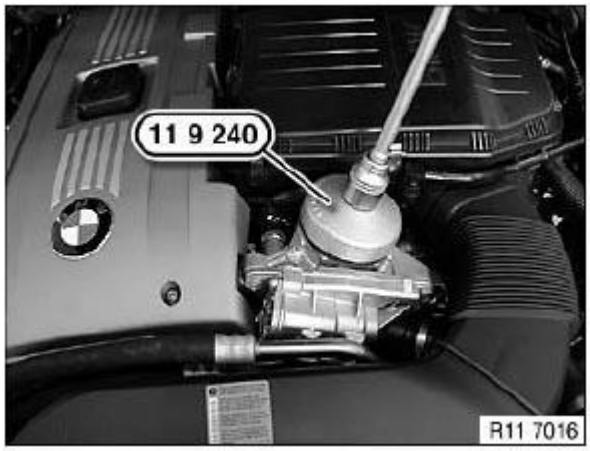



**Fig. 3: Identifying Special Tool 11 9 240 For Releasing Oil Filter**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**NOTE: Presentation: without underbody protection.**

Unclip service opening on underbody protection.

Remove screw plug (1) from oil sump and drain engine oil.

Tightening torque. See 11 13 1AZ in **OIL PUMP** .

*Installation:*

**Replace sealing ring** .

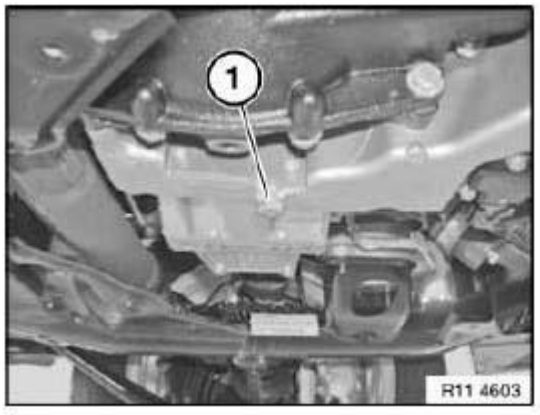



**Fig. 4: Identifying Screw Plug**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Remove and insert oil filter element (1) in direction of arrow.

*Installation:*

**Replace oil filter element (1) and sealing rings (2) and (3)** .

**NOTE: Coat sealing rings (2, 3) with engine oil.**

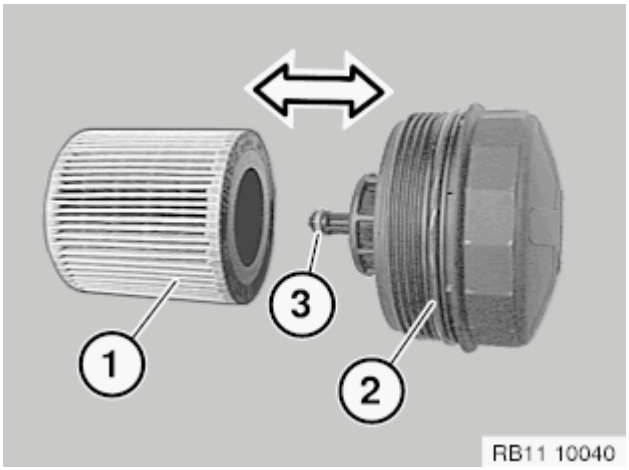



**Fig. 5: Identifying Oil Filter Element And Sealing Ring**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Secure oil filter cap with special tool 11 9 240.

Tightening torque. See 11 42 1AZ **11 42 OIL FILTER AND PIPES** .

**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.**

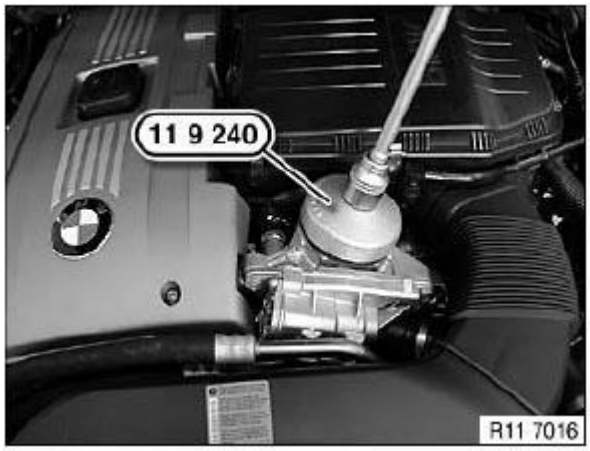



**Fig. 6: Identifying Special Tool 11 9 240 For Releasing Oil Filter**

**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

**11 00 039 CHECKING COMPRESSION IN ALL CYLINDERS (N43/ N53/ N54)**

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 0 222
- 11 0 224
- 11 8 731
- 11 8 732

- Read out fault memory of DME control unit
- Check stored faults
- Rectify faults
- Clear 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** . See **12 12 011 REPLACING ALL SPARK PLUGS (N53, N54, N63)** .

Unscrew tip (1) from special tool 11 0 222.

**IMPORTANT: Then check the Schrader valve that is now visible for secure seating.**

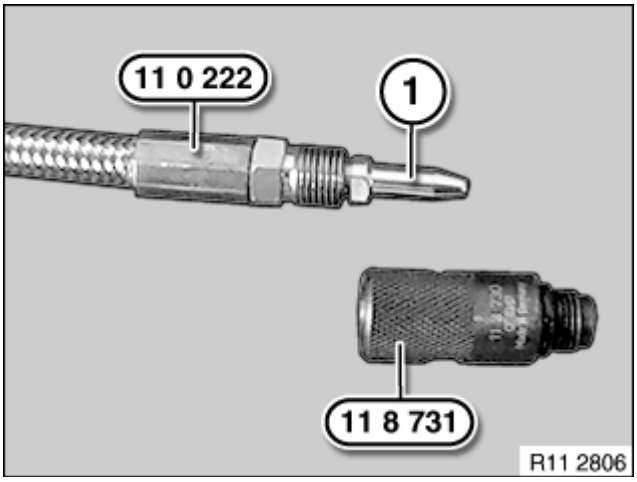



**Fig. 7: Identifying Tip On Special Tool 11 0 222**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Prepare special tool 11 0 222 in conjunction with 11 8 732 and 11 8 731.

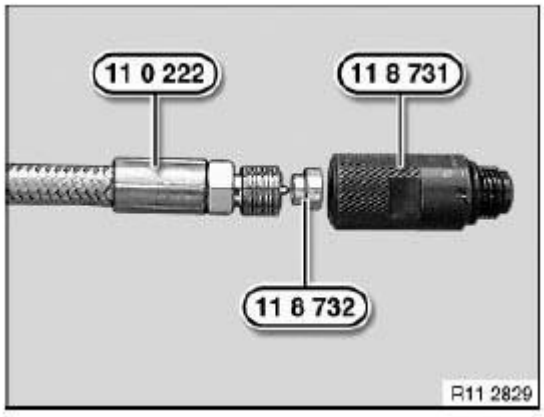



**Fig. 8: Identifying Special Tool 11 0 222, 11 8 732 And 11 8 731**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Screw special tool 11 0 222 into special tool 11 8 731 to 10 Nm.

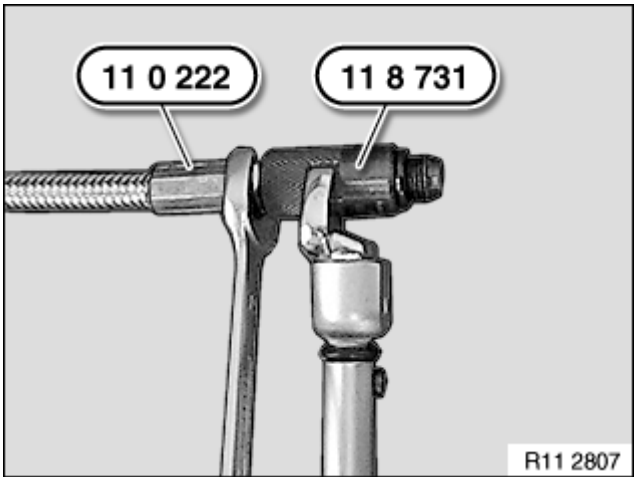



**Fig. 9: Screw In Special Tool 11 0 222 Into Special Tool 11 8 731**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT: Do not to forget to coat spark plug thread of special tool 11 8 731 with oil.**

Screw special tool 11 0 222 by hand into spark plug thread and connect special tool 11 0 224.

Use adapter lead (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.

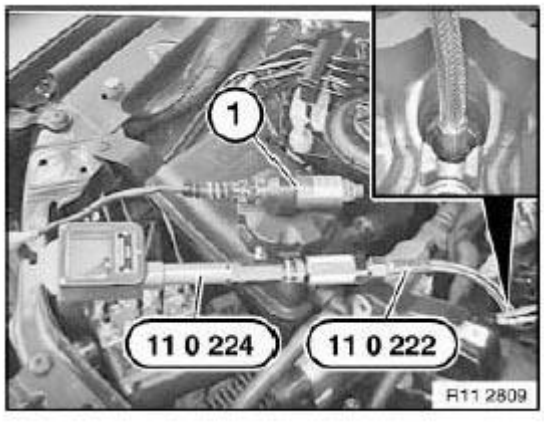



**Fig. 10: Identifying Special Tools 11 0 222 And 11 0 224**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine

Now clear the fault memory.

**11 00 050 REMOVING AND INSTALLING ENGINE (N54)**

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 0 000
- 11 5 281
- 11 5 282
- 11 7 310
- 11 8 680

**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 negative lead.
- Lift **engine bonnet/hood into assembly position** . See **51 00... SERVICE POSITION OF ENGINE HOOD/BONNET** .
- Drain off **engine oil** . See **11 00... SERVICE - ENGINE OIL (N54)**.
- Remove **air filter housing** . See **13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING (N54)** .
- Remove cover for cowl panel.
- Remove **fan cowl** with electric fan. See **17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N54)** .
- Remove **radiator** . See **17 11 000 REMOVING AND INSTALLING RADIATOR (N53, N54)** .
- Remove **expansion tank** . See **17 11 100 REMOVING AND INSTALLING/REPLACING COOLANT EXPANSION TANK (N53, N54)** .
- Detach all coolant hoses from engine.
- Release **oil lines** from oil-coolant heat exchanger. See **11 44 000 REMOVING AND INSTALLING/REPLACING OIL-COOLANT HEAT EXCHANGER (N54)**.
- Remove alternator **drive belt** . See **11 28 010 REPLACING ALTERNATOR DRIVE BELT (N54)**.
- Remove **A/C compressor** . See **64 52 521 REPLACING A/C SYSTEM COMPRESSOR (N54)** .
- Detach **pressure pipe** from both turbochargers. See **11 61 368 REMOVING AND INSTALLING/REPLACING REAR LEFT CHARGE-AIR DUCT (N54)**.
- Remove **fresh air duct** on left and right. See **51 71 371 REMOVING AND INSTALLING/REPLACING TENSION STRUT ON LEFT OR RIGHT SPRING STRUT DOME (CONVERTIBLE)** or **51 71 371 REMOVING AND INSTALLING/REPLACING TENSION STRUT ON LEFT OR RIGHT SPRING STRUT DOME (COUPE)** .
- Remove **intake air manifold** . See **11 61 050 REMOVING AND INSTALLING INTAKE AIR MANIFOLD (N54)**.

- Detach vacuum line from brake booster.
- Unfasten **ignition wiring harness** and lay to one side. See **12 51 100 REPLACING WIRING HARNESS SECTION FOR IGNITION COIL (N54)** .
- Release **engine wiring harness** from electronics box and lay to one side. See **12 51 001 REPLACING WIRING HARNESS SECTION FOR ENGINE (N54)** .
- Remove **exhaust system** . See **18 32 050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 1-3 (N54)** or **18 32 060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 4-6 (N54)** .
- Remove **catalytic exhaust-gas converters** . See **18 32 050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 1-3 (N54)** or **18 32 060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 4-6 (N54)** .
- Remove output shafts (AWD only).
- Remove **power steering pump** . See **PUMP AND OIL SUPPLY** .
- Remove reinforcement plate (AWD only).
- Remove **transmission** . See **24 00 030 REMOVING AND INSTALLING AUTOMATIC TRANSMISSION (GA6HP19Z) N54** or **23 00 018 REMOVING AND INSTALLING TRANSMISSION (GS6-53BZ) N54** .
- Release grounding strap on left engine support arm

Release bolts (1, 2).

Remove heater end plate (3).

*Installation:*

Make sure heater end plate is correctly seated.

M6x20 bolt must be fitted in middle.

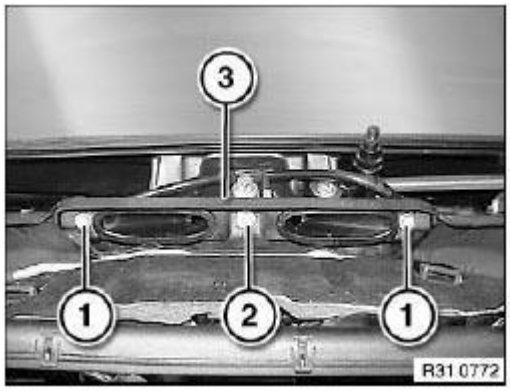



**Fig. 11: Identifying Heater End Plate With Mounting Bolts**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Support engine with special tool 11 7 310 on steering gear.

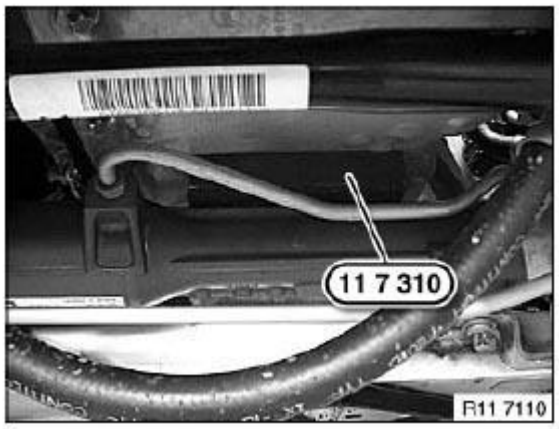



**Fig. 12: Identifying Special Tool 11 7 310 For Supporting Engine**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screws (1) for A/C lines.

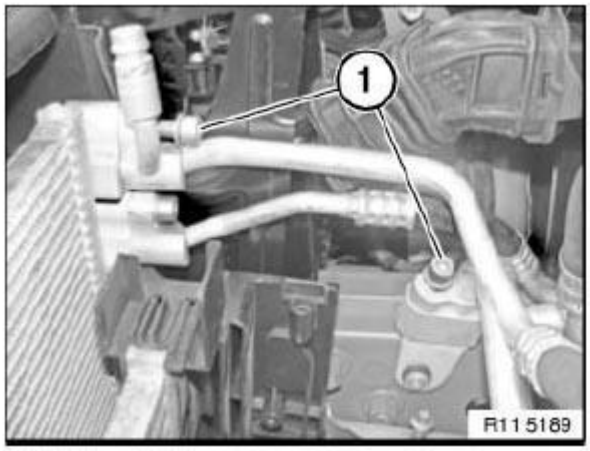



**Fig. 13: Identifying A/C Lines Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Disconnect fuel lines (1).

Seal off fuel lines with special tools 11 5 281 and 11 5 282.

Detach vacuum line from engine mount.

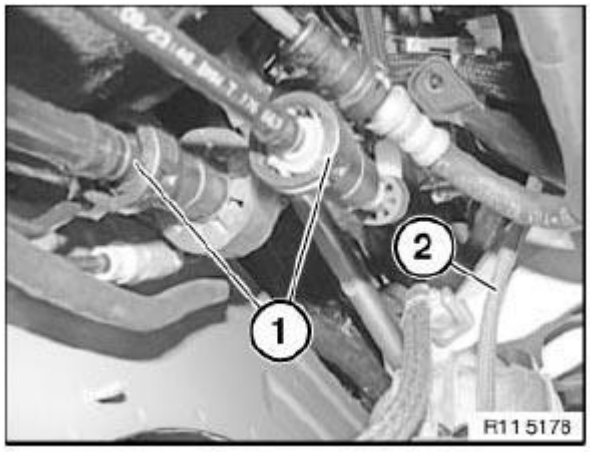



**Fig. 14: Identifying Fuel Lines**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Secure special tool 11 8 680 to lifting eye on transmission 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:*

Special tool 11 8 680 is correctly installed when locking balls (2) are arrested.

Special tool 11 8 680 is firmly secured to lifting eye.

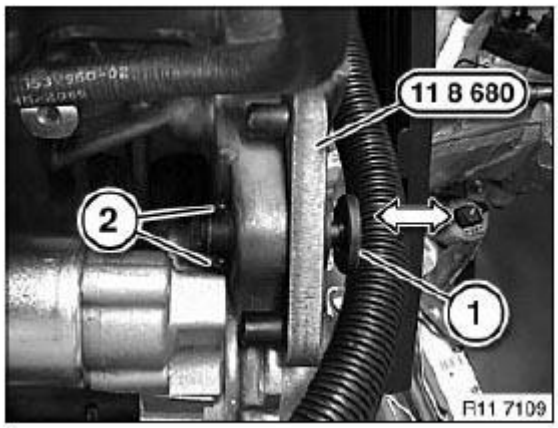



**Fig. 15: Pressing Locking Pin**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Suspend special tool 11 0 000 from special tool 11 8 680 in eye (1).

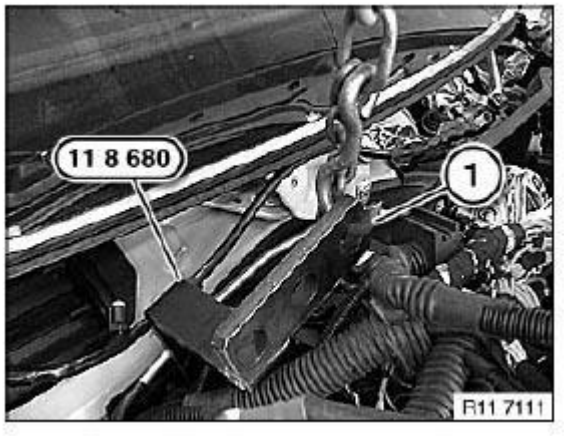



**Fig. 16: Identifying Special Tool 11 8 680 And Eye**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Screw in towing hook (1).

Suspend special tool 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.

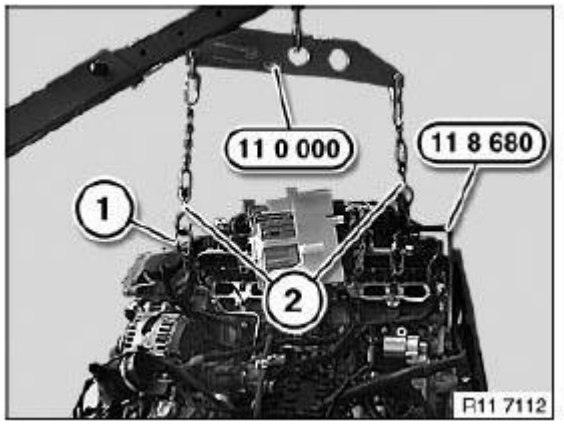



**Fig. 17: Identifying Special Tools 11 0 000 And 11 8 680**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation:*

Secure special tool 11 7 310 to steering gear.

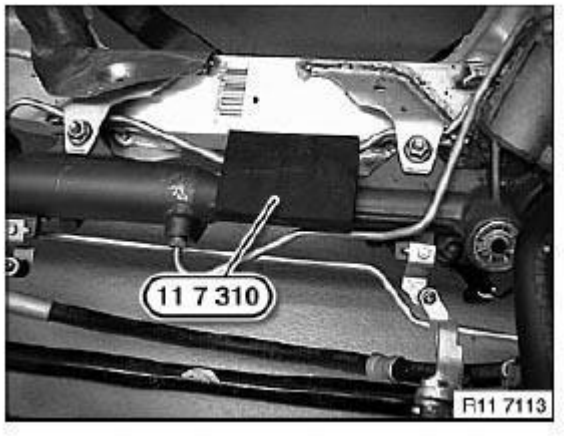



**Fig. 18: Identifying Special Tool 11 7 310**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

Observe following in case of **replacement engine** .

Check function of DME.

**11 00 590 REPLACEMENT POWER PLANT (N54)**

*Necessary preliminary tasks:*

- Remove and install **engine** . See **11 00 050 REMOVING AND INSTALLING ENGINE (N54)**.
- Mount engine on **assembly stand** . See **11 00 MOUNTING ENGINE ON ASSEMBLY STAND (N54)**.
- 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).**

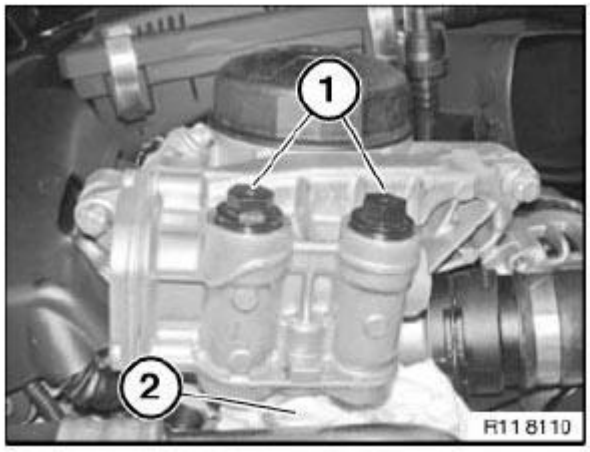



**Fig. 19: Identifying Transportation Locks And Cloth**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Transportation locks (1) are no longer needed.

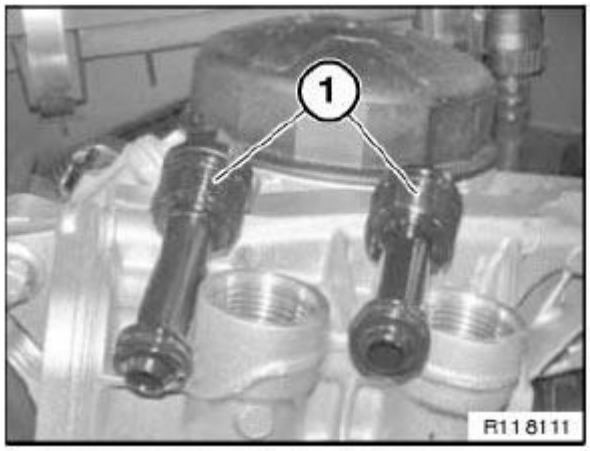



**Fig. 20: Identifying Transportation Locks**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Modify screw plugs (1) from old power plant.

Insert screw plugs (1).

Tightening torque. See 11 42 11AZ in **11 42 OIL FILTER AND PIPES** .

Secure oil cooler lines with mounting bar (2).

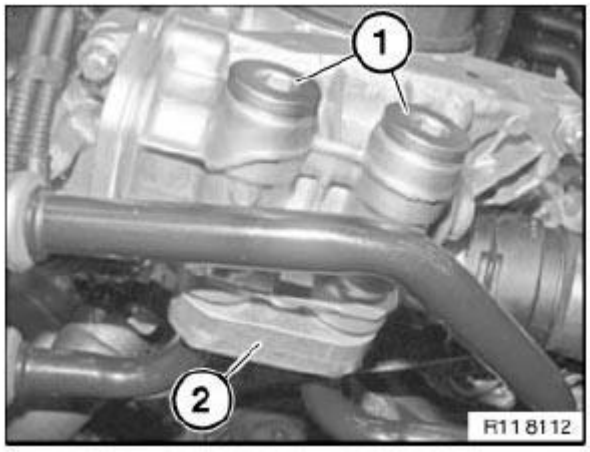



**Fig. 21: Identifying Screw Plugs And Mounting Bar**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

**11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N52)**

**Special tools required:**

For the following special tools, refer to **MAINTENANCE AND GENERAL INFORMATION - SPECIAL TOOLS** .

- 00 0 200
- 00 0 202
- 00 0 204
- 00 0 208
- 11 0 000

**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 bonnet/hood in service position** . See **51 00... SERVICE POSITION OF ENGINE HOOD/BONNET** .

- Remove **cowl panel cover** . See **51 13 115 REMOVING AND INSTALLING/REPLACING COWL PANEL COVER** .
- Remove **intake filter housing** . See **11 00 050 Removing And Installing Engine (N54)**.
- Remove both **tension struts from spring strut dome** . See **51 71 371 REMOVING AND INSTALLING/REPLACING TENSION STRUT ON LEFT OR RIGHT SPRING STRUT DOME (CONVERTIBLE)** or **51 71 371 REMOVING AND INSTALLING/REPLACING TENSION STRUT ON LEFT OR RIGHT SPRING STRUT DOME (COUPE)** .
- Remove acoustic cover
- Remove hose for crankshaft ventilation.

Release screws (1, 2).

Remove bulkhead (3).

*Installation:*

Make sure bulkhead is correctly seated.

M6x20 screw must be fitted in middle.

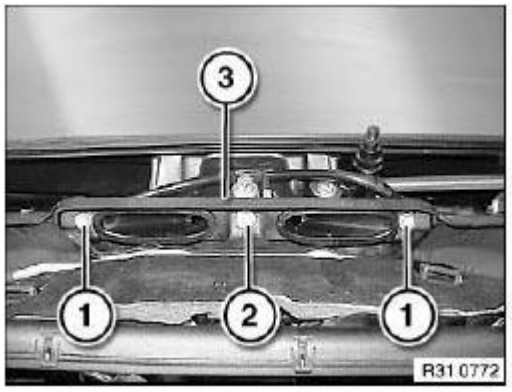



**Fig. 22: Identifying Screws In Bulkhead**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble crossmember 00 0 200 with special tools 00 0 202, 00 0 204, 00 0 208.

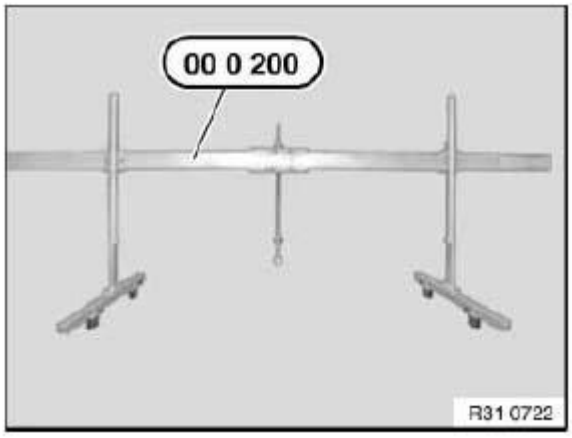



**Fig. 23: Identifying Cross Member 00 0 200**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**NOTE: Use towing hook (72 15 8 108 670).**

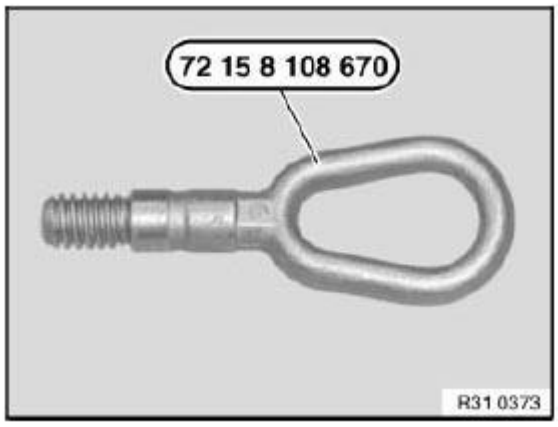



**Fig. 24: Identifying Towing Hook (72 15 8 108 670)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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.**

**IMPORTANT: Risk of damage!**
**With the aid of an assistant and the supports (2), place crossmember 00 0 200 on the screw connections of the side panels.**

Screw in towing hook (1) and tighten down to approx. 30 Nm.

Secure special tool 11 0 000 to spindle 00 0 202.

Fit suitable chains to special tool 11 0 000 and attach to towing hook (1) or engine lifting eye.

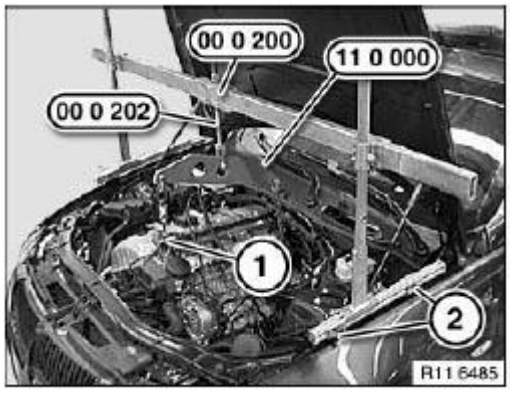



**Fig. 25: Identifying Towing Hook, Supports With Special Tools**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**WARNING: Risk of injury!**
**Tighten down all adjusting screws and nuts on cross member 00 0 200.**

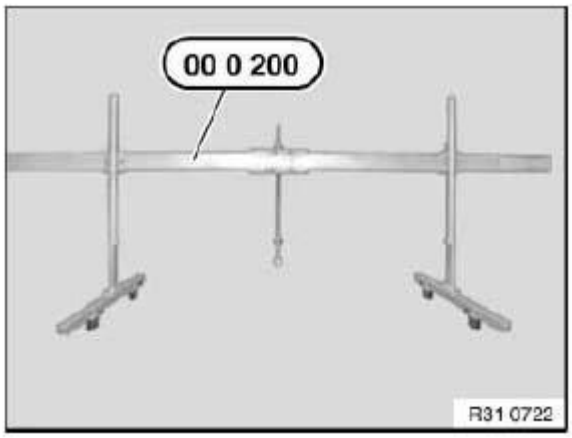



**Fig. 26: Identifying Crossmember 00 0 200**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Unscrew nuts (1).

Raise engine approx. 10 mm with cross member.

*Installation:*

Replace self-locking nuts.

Tightening torque. See 22 11 2AZ in **22 11 ENGINE SUSPENSION** .

Check vacuum lines of engine mounts for correct position and connection.

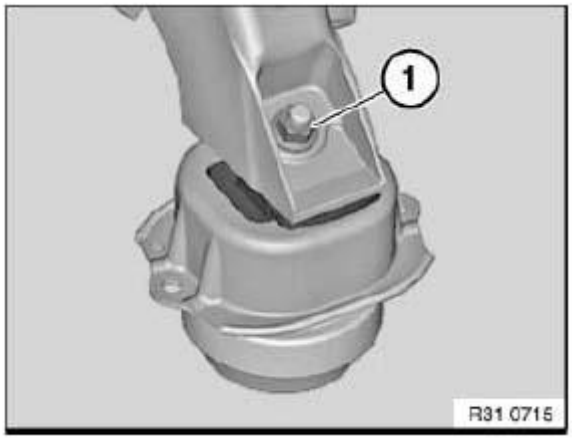



**Fig. 27: Identifying Nuts**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**ENGINE IDENTIFICATION**

Drive in engine numbers at marked surface with impact tool.

M47/M47TU/M47T2

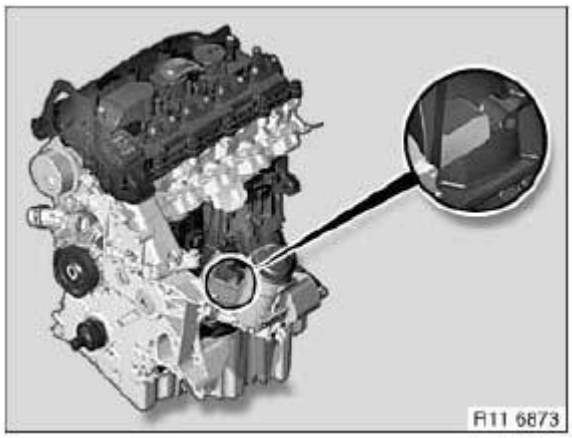



**Fig. 28: Identifying Engine Number Location (M47/M47TU/M47T2)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

M57/M57TU/M57T2

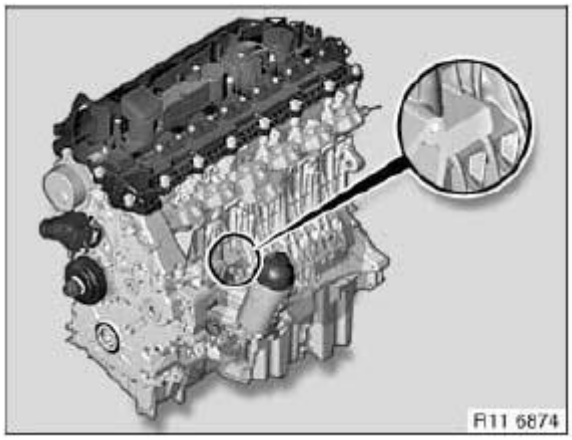



**Fig. 29: Identifying Engine Number Location (M57/M57TU/M57T2)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

M67/M67TU

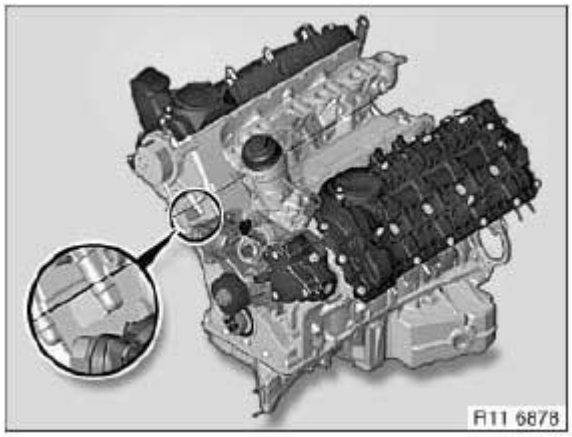



**Fig. 30: Identifying Engine Number Location (M67/M67TU)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

N47/N47S

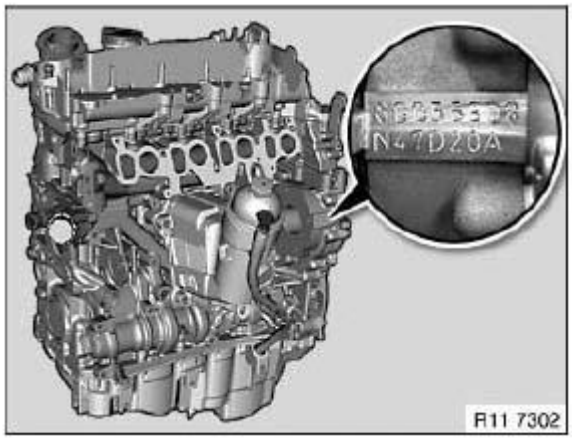



**Fig. 31: Identifying Engine Number Location (N47/N47S)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

M52/M52TU

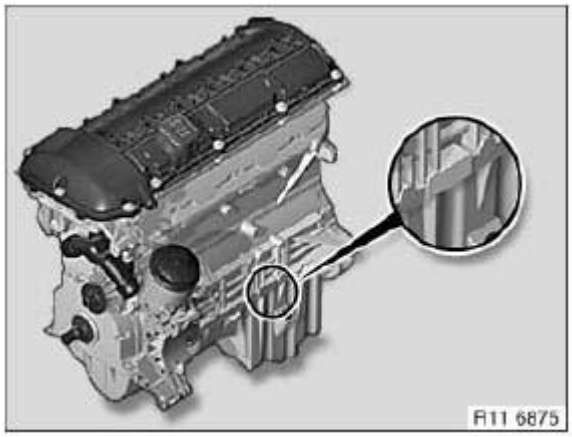



**Fig. 32: Identifying Engine Number Location (M52/M52TU)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

M54

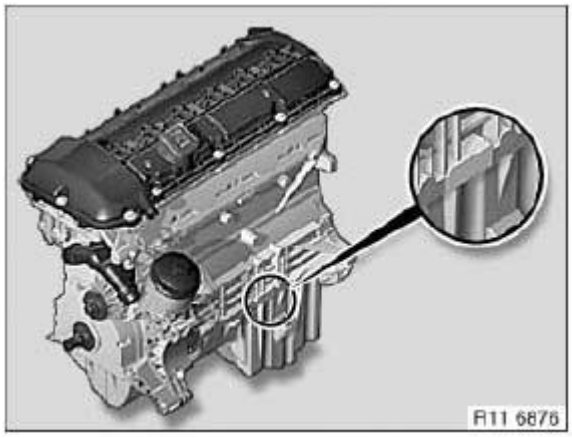



**Fig. 33: Identifying Engine Number Location (M54)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

M56

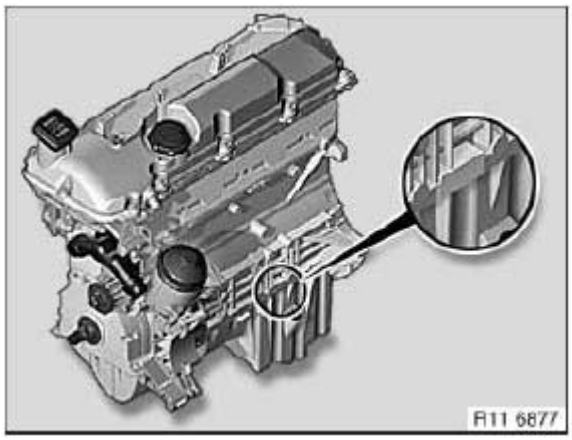



**Fig. 34: Identifying Engine Number Location (M56)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

N40/N45/N45T/N43

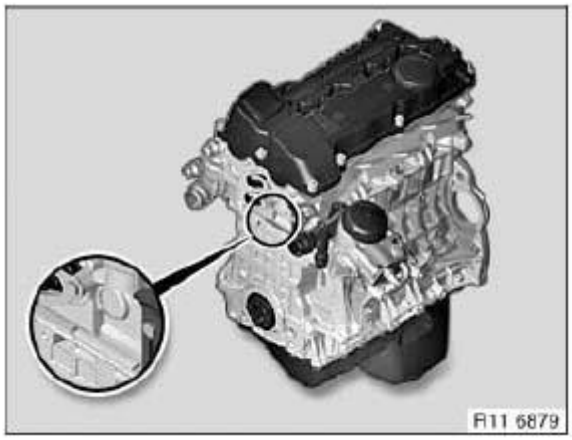



**Fig. 35: Identifying Engine Number Location (N40/N45/N45T/N43)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

N42/N46/N46T

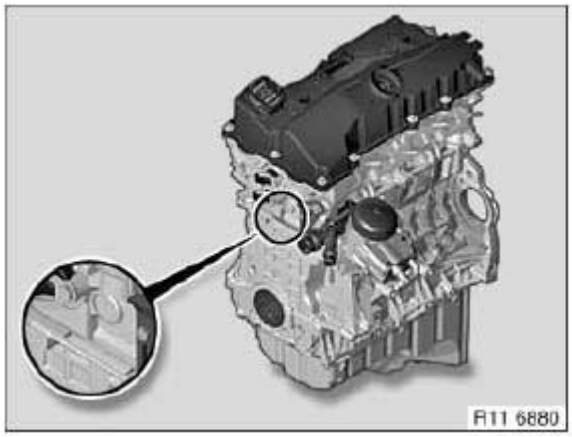



**Fig. 36: Identifying Engine Number Location (N42/N46/N46T)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

N51/N52/N52K/N53/N54

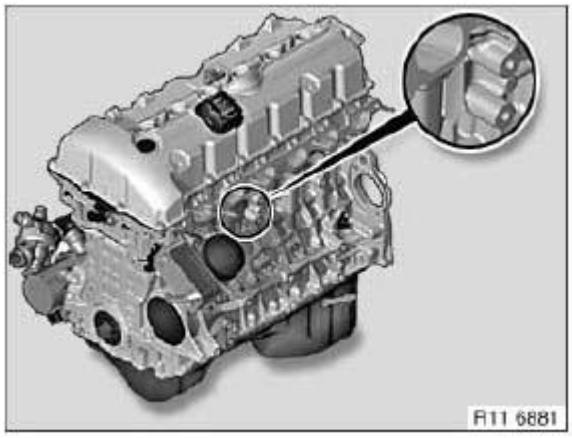



**Fig. 37: Identifying Engine Number Location (N51/N52/N52K/N53/N54)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

N62

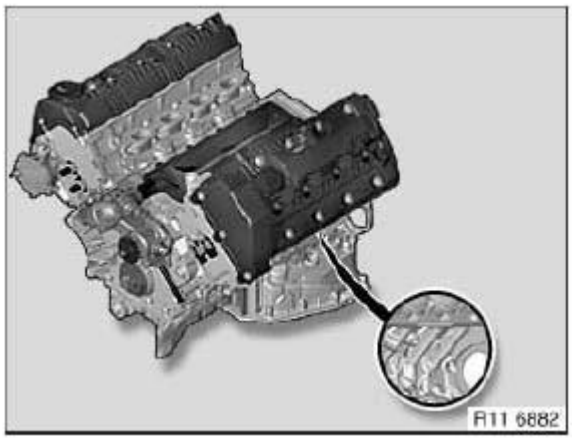



**Fig. 38: Identifying Engine Number Location (N62)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

N73

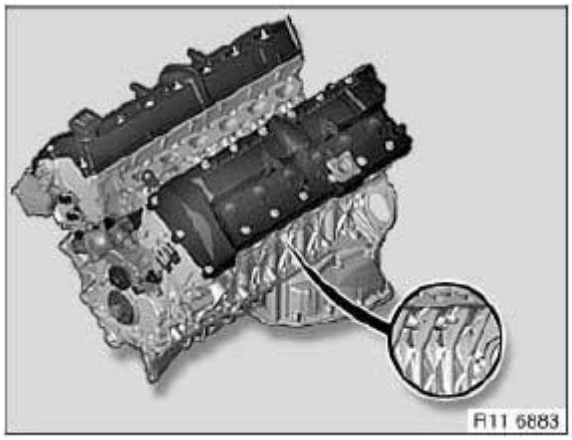



**Fig. 39: Identifying Engine Number Location (N73)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

S54

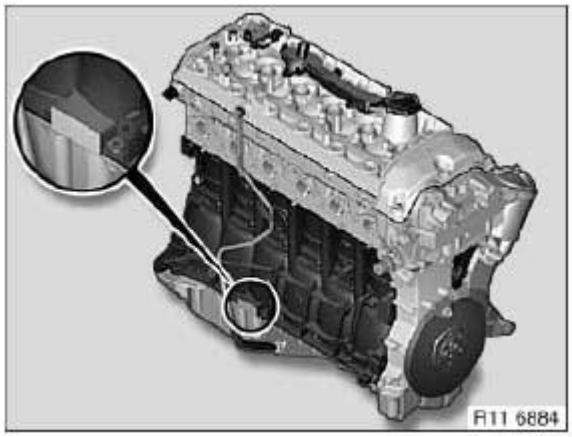



**Fig. 40: Identifying Engine Number Location (S54)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

S85/S65

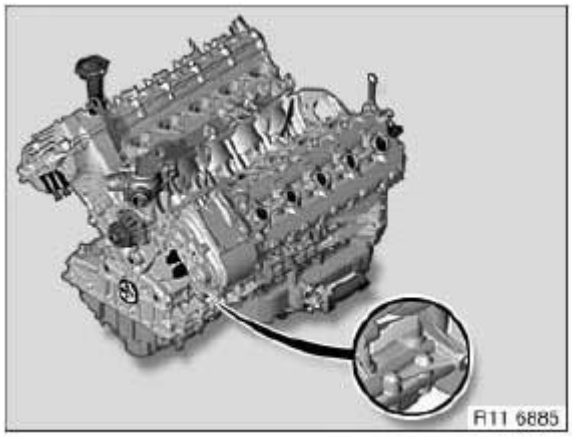



**Fig. 41: Identifying Engine Number Location (S85/S65)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

W10/W11

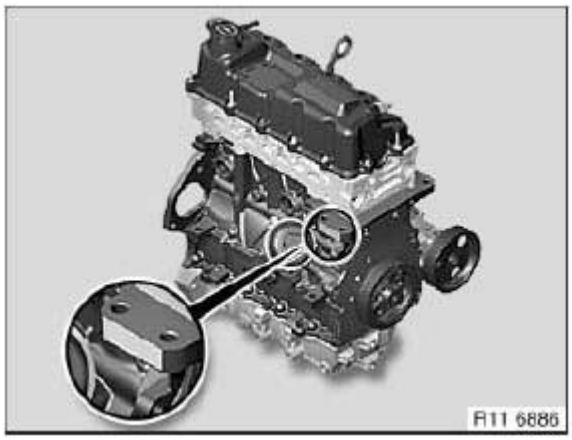



**Fig. 42: Identifying Engine Number Location (W10/W11)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

W17

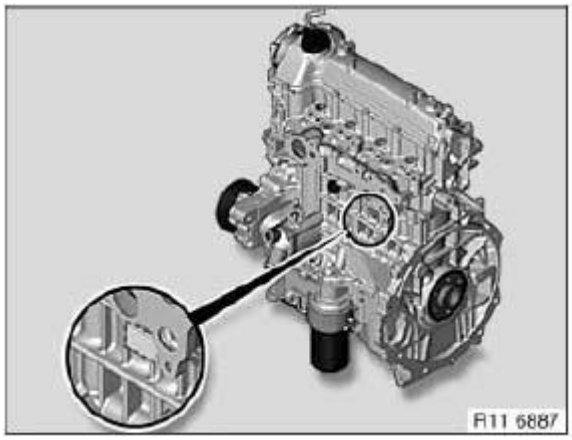



**Fig. 43: Identifying Engine Number Location (W17)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

## CYLINDER HEAD WITH COVER

### 11 12 000 REMOVING AND INSTALLING/SEALING CYLINDER HEAD COVER (N54)

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 8 620

*Necessary preliminary tasks:*

- Disconnect battery negative lead
- Remove **rod-type ignition coils** . See **12 13 511 REPLACING IGNITION COILS (N54, N53, N43)** .
- Unclip injector **wiring harness** . See **12 51 100 REPLACING WIRING HARNESS SECTION FOR IGNITION COIL (N54)** .
- Remove **INJECTORS** .
- Remove **tension strut** . See **51 71 371 REMOVING AND INSTALLING/REPLACING TENSION STRUT ON LEFT OR RIGHT SPRING STRUT DOME (CONVERTIBLE)** or **51 71 371 REMOVING AND INSTALLING/REPLACING TENSION STRUT ON LEFT OR RIGHT SPRING STRUT DOME (COUPE)** .
- Remove **fresh air duct** . See **51 71 371 REMOVING AND INSTALLING/REPLACING TENSION STRUT ON LEFT OR RIGHT SPRING STRUT DOME (CONVERTIBLE)** or **51 71 371 REMOVING AND INSTALLING/REPLACING TENSION STRUT ON LEFT OR RIGHT SPRING STRUT DOME (COUPE)** .

Disconnect vacuum lines (2) from vacuum lines (1). Unclip vacuum lines (1).

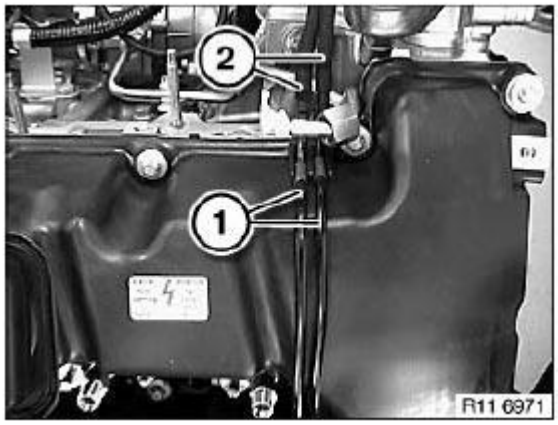



**Fig. 44: Identifying Vacuum Lines**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Disconnect vacuum lines (1) from vacuum lines (2).

Unclip vacuum line (2) and lay to one side.

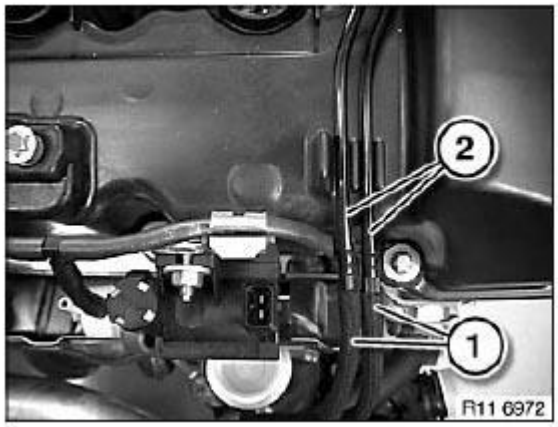



**Fig. 45: Identifying Vacuum Lines**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screw (1) with special tool 11 8 620.

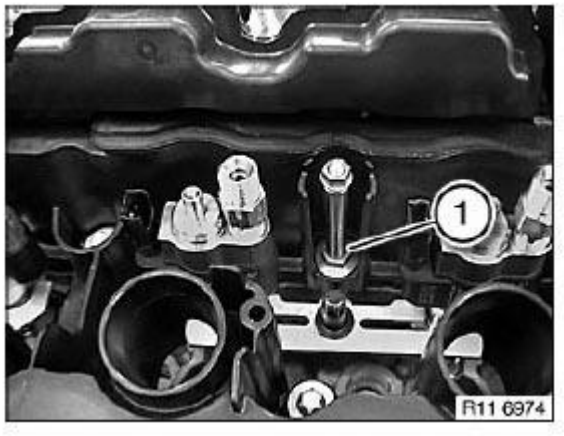



**Fig. 46: Identifying Screw**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screws (1) on cylinder head cover.


**Fig. 47: Identifying Screws On Cylinder Head Cover**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screws (1 and 2) along lines.

Tightening torque. See 11 12 4AZ in **CYLINDER HEAD WITH COVER** .

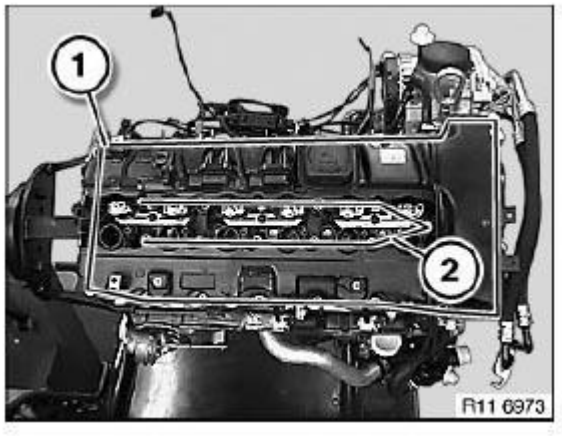



**Fig. 48: Identifying Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation:*

**Replace seal (1)** .

Press gasket (1) into cylinder head cover.

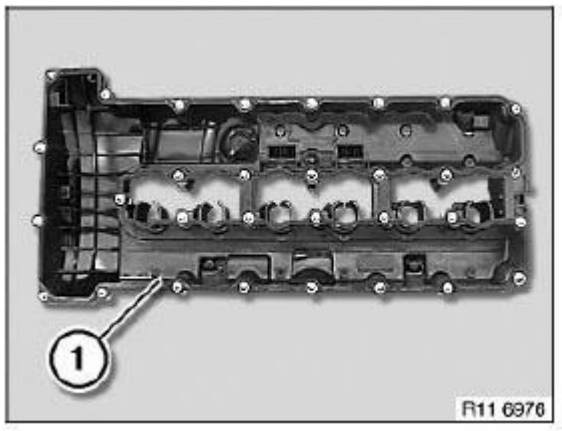



**Fig. 49: Identifying Cylinder Head Cover Gasket**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

**11 12 100 REMOVING AND INSTALLING CYLINDER HEAD (N54)**

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 0 320
- 11 4 420

- 11 4 430
- 11 4 471
- 11 4 472
- 11 8 580

**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** . See **11 00 050 REMOVING AND INSTALLING ENGINE (N54)**.
- Remove **inlet and exhaust adjustment unit** . See **11 36 046 REMOVING AND INSTALLING/REPLACING INLET AND EXHAUST ADJUSTMENT UNITS (N54)**.

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 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.

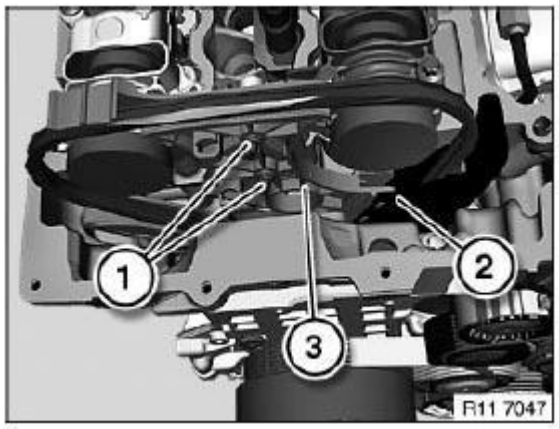



**Fig. 50: Identifying Timing Chain Module At Junction**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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. See 11 12 3AZ in **CYLINDER HEAD WITH COVER** .

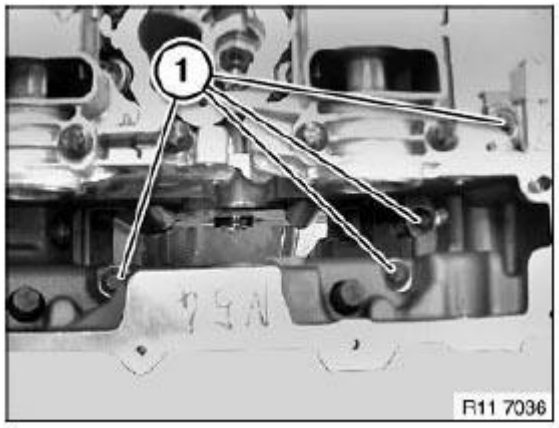



**Fig. 51: Identifying Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT: Observe different bolt heads.**

Release M9 cylinder head bolts (1) with special tool 11 4 420.

Tightening torque. See 11 12 2AZ in **CYLINDER HEAD WITH COVER** .

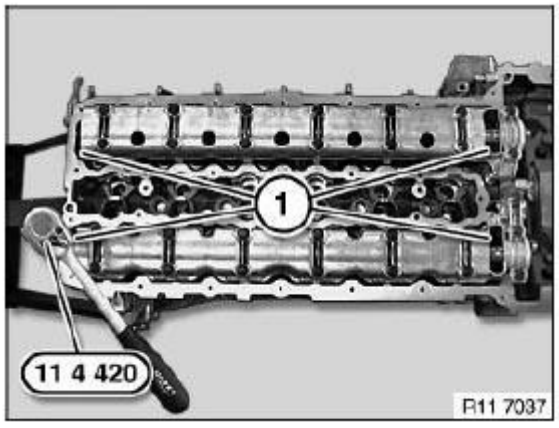



**Fig. 52: Identifying M9 Cylinder Head Bolts With Special Tool 11 4 420**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release M10 cylinder head bolts (1) with special tool 11 8 580 from outside inwards.

Tightening torque. See 11 12 1AZ in **CYLINDER HEAD WITH COVER** .

**IMPORTANT: All cylinder head bolts must be replaced.**
***Risk of damage!***
**Joining torque and angle of rotation must be observed without fail.**

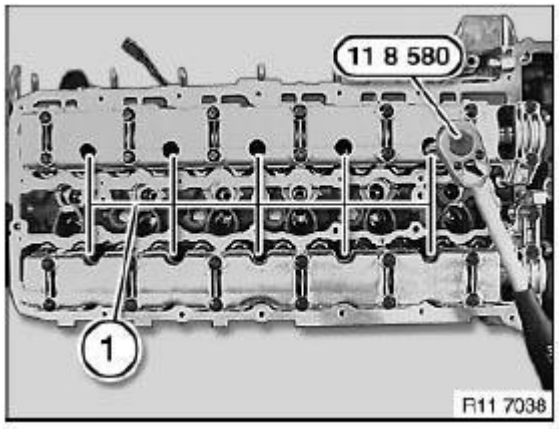



**Fig. 53: Identifying M10 Cylinder Head Bolts With Special Tool 11 8 580**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Shims (1) of cylinder head bolts can only be removed with a magnet (2) between cylinder head and bearing strip.

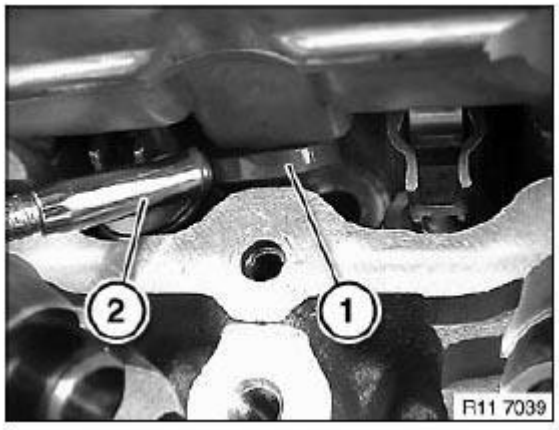



**Fig. 54: Identifying Shims And Magnet**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Secure special tool 11 0 320 with existing cylinder head cover bolts (1).

Tightening torque. See 11 12 4AZ in **CYLINDER HEAD WITH COVER** .

**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.**

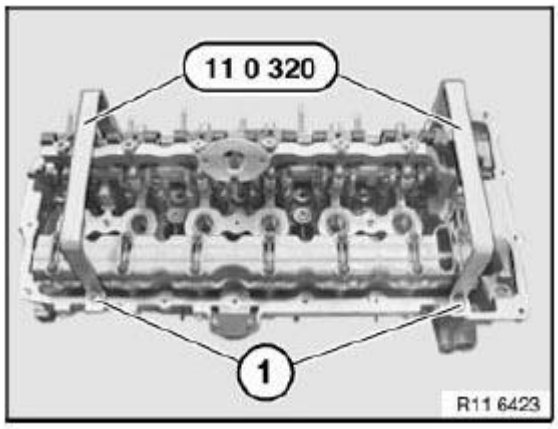



**Fig. 55: Identifying Cylinder Head Cover Bolts With Special Tool 11 0 320**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT: Set down cylinder head with inlet and exhaust camshafts on side only, *risk of damage* to valves (1).**

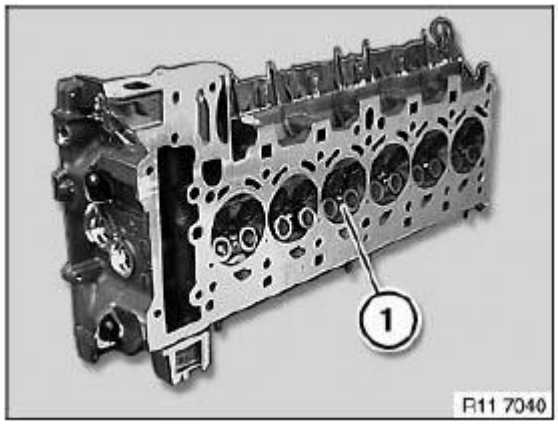



**Fig. 56: Identifying Valves**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Insert special tool 11 4 430 into bores.

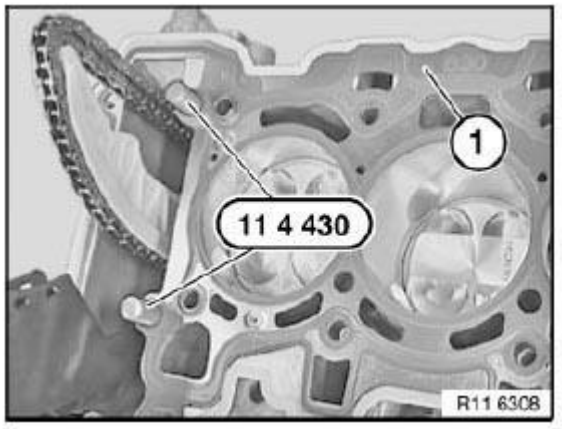



**Fig. 57: Identifying Special Tool 11 4 430**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Remove coarse residues on sealing faces with special tool 11 4 471 from cylinder head and crankcase.

**IMPORTANT: Do not use any metal-cutting tools.**

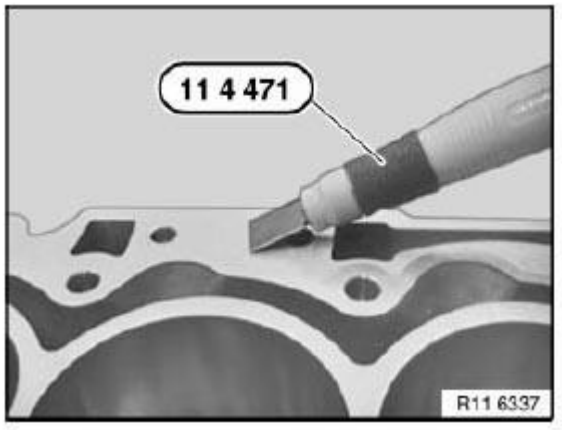



**Fig. 58: Removing Coarse Residues On Sealing Faces Using Special Tool 11 4 471**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Remove fine residues on sealing faces with special tool 11 4 472 from cylinder head and crankcase.

**IMPORTANT: Do not use any metal-cutting tools.**
**There must be no coolant, water or engine oil in the pocket holes.**
***Risk of corrosion and cracking!***

Clean all pocket holes.

*Installation:*

**Replace cylinder head gasket** . See **11 12 101 REPLACING CYLINDER HEAD GASKET (N54)**.

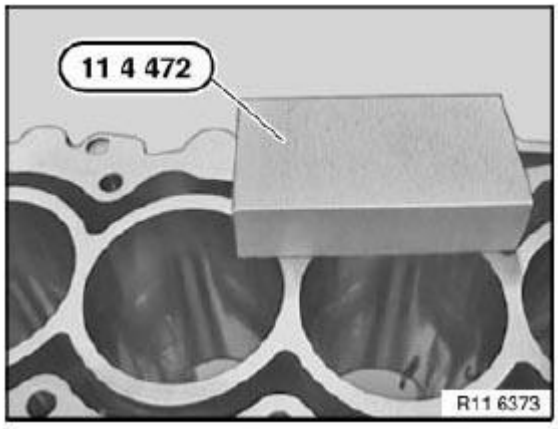



**Fig. 59: Identifying Special Tool 11 4 472 For Removing Fine Residues On Sealing Faces**
**Courtesy of BMW OF NORTH AMERICA, INC.**

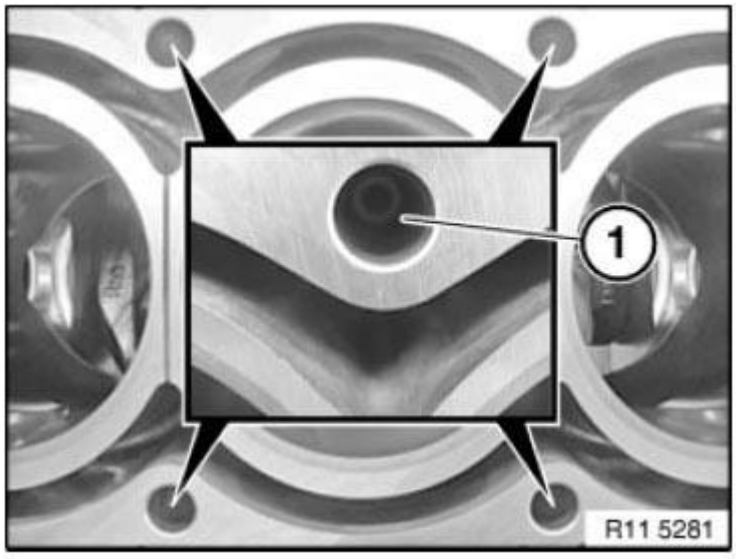



**Fig. 60: Ensure There Is No Coolant, Water Or Engine Oil In Threaded Hole**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT: Observe sequence for tightening cylinder head bolts without fail.**

*Installation:*

**Fit new cylinder head screws** .

Insert cylinder head bolts (1 to 10) with special tool 11 8 580.

Tightening torque. See 11 12 1AZ in **CYLINDER HEAD WITH COVER** .

Insert cylinder head bolts (11 to 14) with special tool 11 4 420.

Tightening torque. See 11 12 2AZ in **CYLINDER HEAD WITH COVER** .

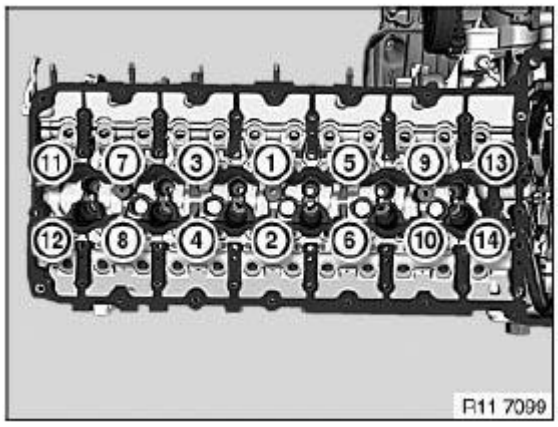



**Fig. 61: Tightening Sequence Of Cylinder Head Bolts**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**NOTE: Graphic shows inlet and exhaust camshafts removed.**

**Observe sequence for tightening cylinder head bolts without fail** .

**IMPORTANT: The 2nd torsion angle relates only to cylinder head bolts 1 to 10.**

*Installation:*

- **Tightening 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:*

**Replace screws (1)** .

Tightening torque. See 11 12 3AZ in **CYLINDER HEAD WITH COVER** .

**IMPORTANT: Secure the lowest screw with a gripper against falling down.**

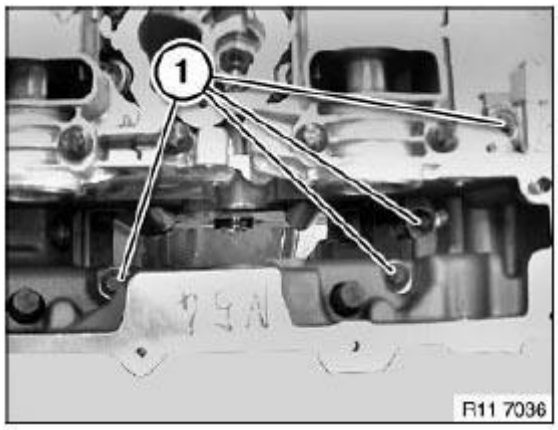



**Fig. 62: Identifying Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

**11 12 101 REPLACING CYLINDER HEAD GASKET (N54)**

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 4 430
- 11 4 470

*Necessary preliminary tasks:*

- Remove **cylinder head** .

Insert special tool 11 4 430 into bores.

Remove head gasket.

**IMPORTANT: Check identification (1) on cylinder head gasket (N54).**

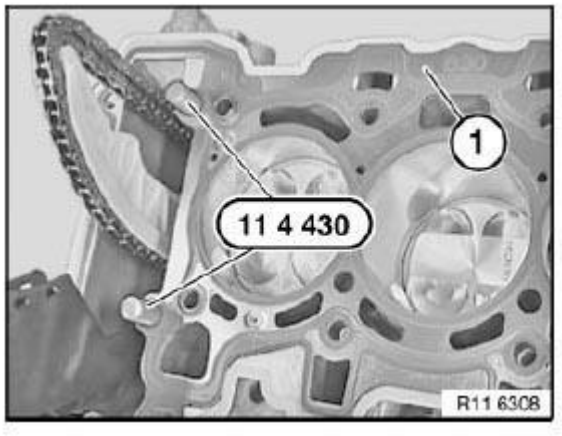



**Fig. 63: Identifying Cylinder Head Gasket Identification Mark**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Remove remnants of oil and dirt from pocket holes (1).

**IMPORTANT: Work on sealing face on engine block and on cylinder head with special tool 11 4 470 only.**
**Do not use any metal-cutting tools.**

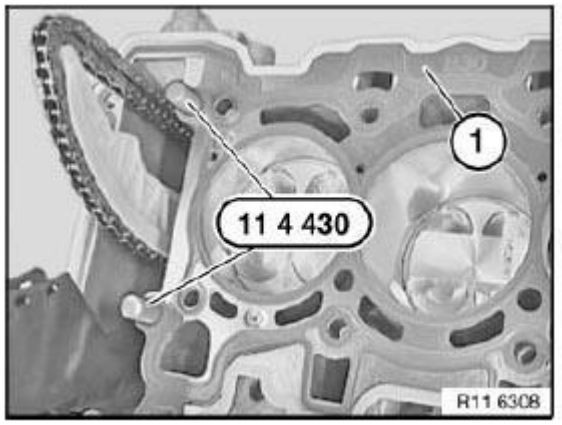



**Fig. 64: Identifying Pocket Holes**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Identification (1) of head gasket (N54).

Gasket (3) is a sheet-metal gasket with rubber coating.

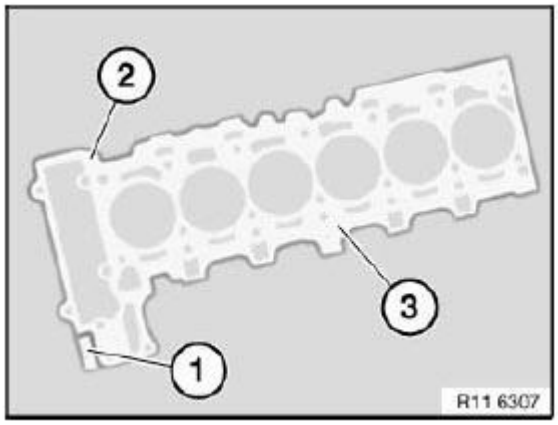



**Fig. 65: Identifying Head Gasket Identification Mark**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Check adapter sleeves (1) for damage and firm seating.

Place head gasket (2) in direction of arrow on engine block.

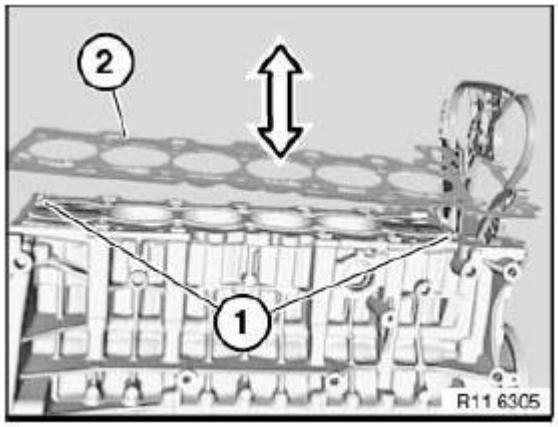



**Fig. 66: Direction Of Placing Head Gasket**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**NOTE: Check cylinder head for deviation from flatness . See 11 12 719 RESURFACING CYLINDER HEAD SEALING FACE (N54). Check cylinder head for water leaks . See 11 12 729 CHECK CYLINDER HEAD FOR WATER LEAKS (N54).**

Assemble engine.

**11 12 719 RESURFACING CYLINDER HEAD SEALING FACE (N54)**

**IMPORTANT: Reconditioning on cylinder head max. 0.3 mm**

*Necessary preliminary tasks:*

- Remove **cylinder head** . See **11 12 100 REMOVING AND INSTALLING CYLINDER HEAD (N54)**.
- Remove **exhaust camshaft** . See **11 31 028 REMOVING AND INSTALLING OR REPLACING EXHAUST CAMSHAFT (N54)**.
- Remove **inlet camshaft** . See **11 31 025 REMOVING AND INSTALLING OR REPLACING INLET CAMSHAFT (N54)**.
- Remove **roller cam followers** . See **11 33 050 REMOVING AND INSTALLING/REPLACING ALL CAM FOLLOWERS (N54)**.
- Remove all **valves** . See **11 34 552 REMOVING AND INSTALLING OR REPLACING ALL VALVES (N54)**.

Check evenness of cylinder head sealing faces with a standard straight-edge (1).

**NOTE: Max. deviation from level (longitudinal) 0.10 mm**

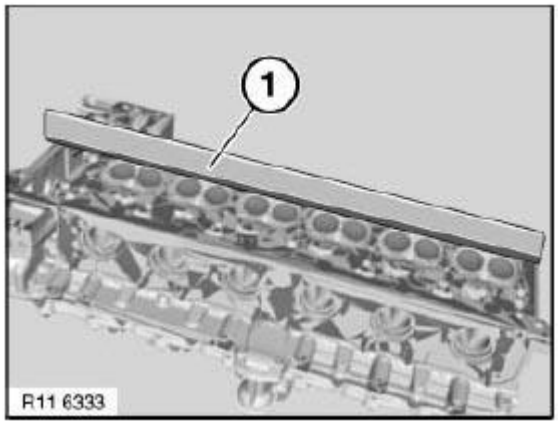



**Fig. 67: Checking Evenness Of Cylinder Head Sealing Faces Using Standard Straight-Edge**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Check evenness of cylinder head sealing faces with a standard straight-edge (1).

**NOTE: Max. deviation from level (transversal) 0.05 mm**

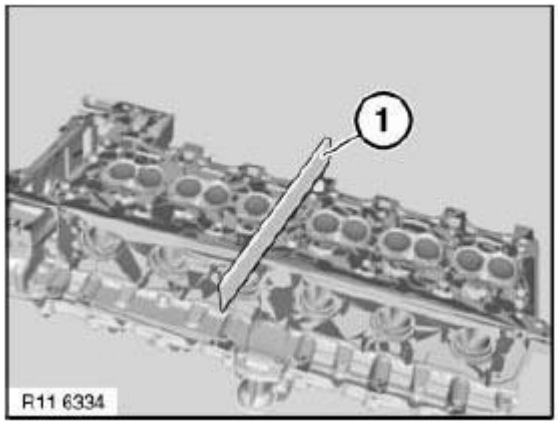



**Fig. 68: Checking Evenness Of Cylinder Head Sealing Faces Using Standard Straight-Edge**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Check cylinder head for **water leaks** . See **11 12 729 CHECK CYLINDER HEAD FOR WATER LEAKS (N54)**.

Assemble engine.

**11 12 729 CHECK CYLINDER HEAD FOR WATER LEAKS (N54)**

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 4 341
- 11 4 342
- 11 4 344
- 11 4 345

**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** . See **11 12 100 REMOVING AND INSTALLING CYLINDER HEAD (N54)**.
- Disassemble **cylinder head** . See **11 34 552 REMOVING AND INSTALLING OR REPLACING ALL VALVES (N54)**.

**NOTE: Observe mounting of special tool 11 4 341 on 1 cylinder.**

Secure special tool 11 4 341 with bolts 11 4 345 to **25 Nm** .

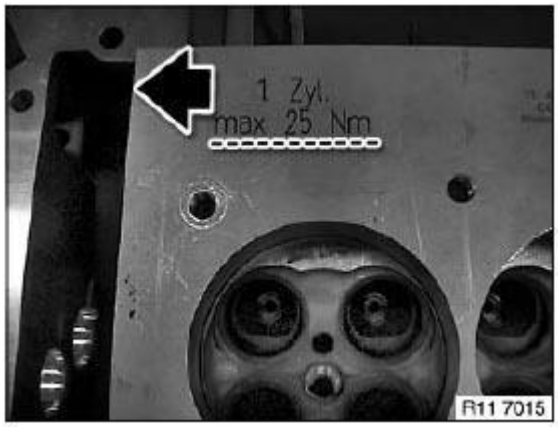



**Fig. 69: Securing Special Tool 11 4 341 With Bolts 11 4 345**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Install special tool 11 4 341 with special tool 11 4 345.

*Installation:*

1 cyl is marked.

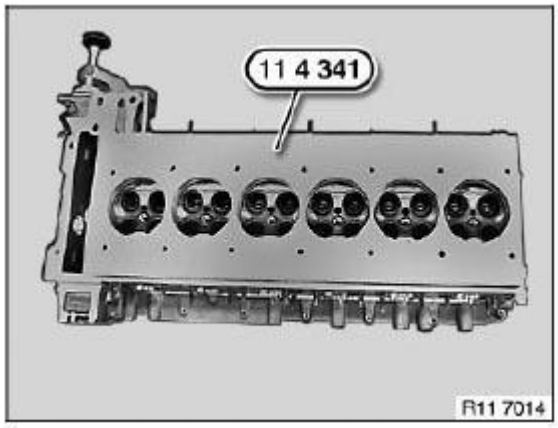



**Fig. 70: Identifying Special Tool 11 4 341**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Fit special tool 11 4 342 with bolts (1), insert knurled screw in direction of arrow.

Sealing flange must rest flat.

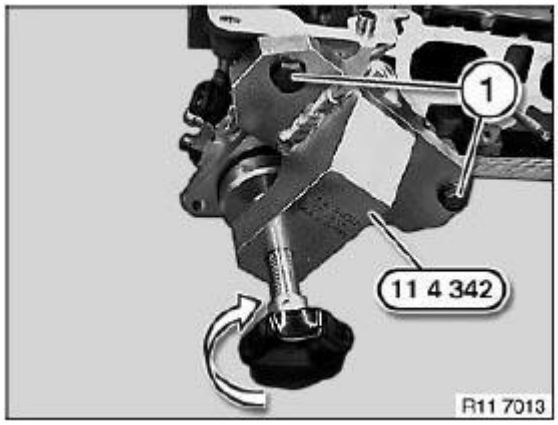



**Fig. 71: Identifying Special Tool 11 4 342 With Bolts**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Secure special tool 11 4 344 with bolts (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.**

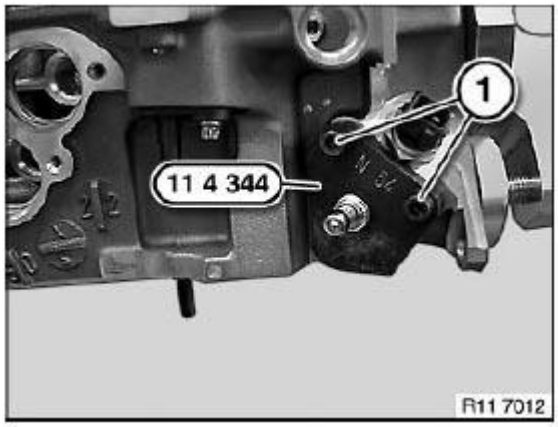



**Fig. 72: Identifying Special Tool 11 4 344 With Bolts**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

## 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**.
- Lower Front Axle.**31 11 506 LOWERING/RAISING FRONT AXLE CARRIER (SPECIAL TOOL SWZ00-2040)** .
- **Observe tightening specifications without fail during installation.**
- Release power steering pump and place to one side. See **32 41 060 REMOVING AND INSTALLING/REPLACING VANE PUMP FOR POWER STEERING** .
- 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.**

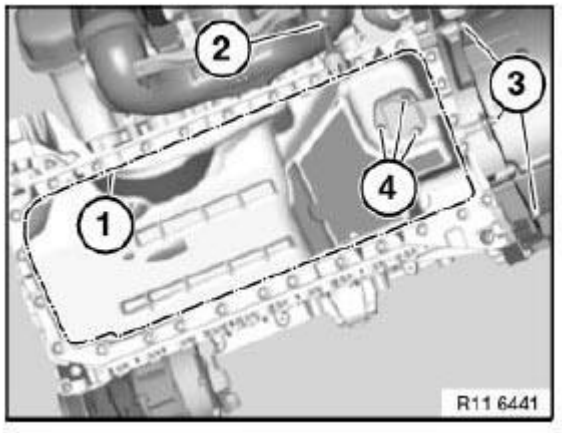



**Fig. 73: Identifying Return Hose With Bolts And Nuts**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.

## HOUSING COVER

### 11 14 005 REPLACING FRONT CRANKSHAFT RADIAL SEAL (N54)

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 0 371
- 11 0 372
- 11 4 370
- 11 9 221
- 11 9 222
- 11 9 224
- 11 9 231
- 11 9 232
- 11 9 233
- 11 9 234

*Necessary preliminary tasks:*

- Remove **vibration damper** . See **11 23 010 REMOVING AND INSTALLING/REPLACING VIBRATION DAMPER (N54)**.

**IMPORTANT: Do not release central bolt.**
***Risk of damage!***
**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. The camshafts may turn in relation to the crankshaft.**
**The timing must be adjusted again. See 11 31 505 ADJUSTING CAMSHAFT TIMING (N54).**

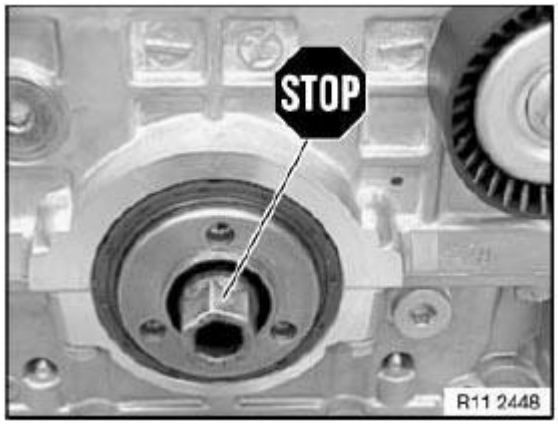



**Fig. 74: Identifying Central Bolt**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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 radial 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.

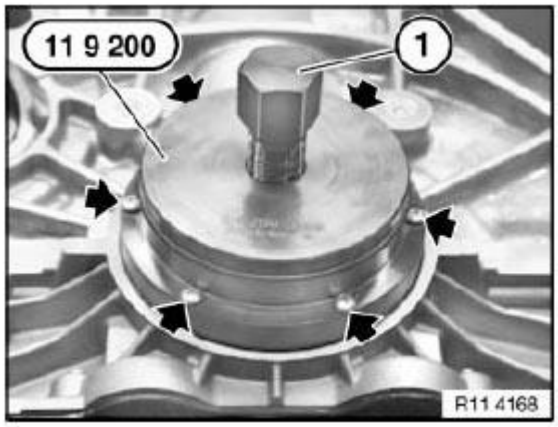



**Fig. 75: Identifying Special Tools 11 9 221, 11 9 222 And 11 9 224**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Screw special tool 11 0 371 to 80 Nm into crankshaft radial seal.

Screw in spindle 11 0 372.

Release crankshaft radial seal from crankcase.

**NOTE: Repeat this operation several times if necessary.**

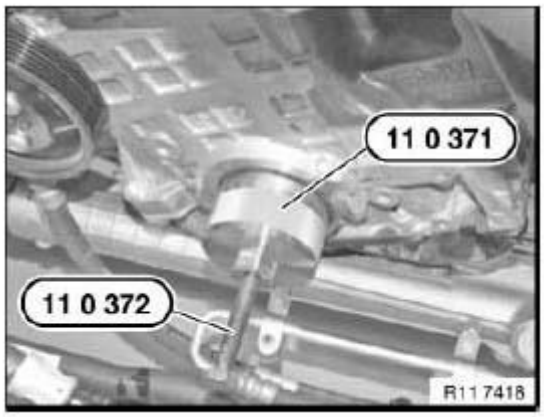



**Fig. 76: Identifying Special Tool 11 0 371 And 11 0 372**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Carefully saw open crankshaft radial seal (1) at cutting line (2).

Remove crankshaft radial seal (1) from special tool 11 0 371.

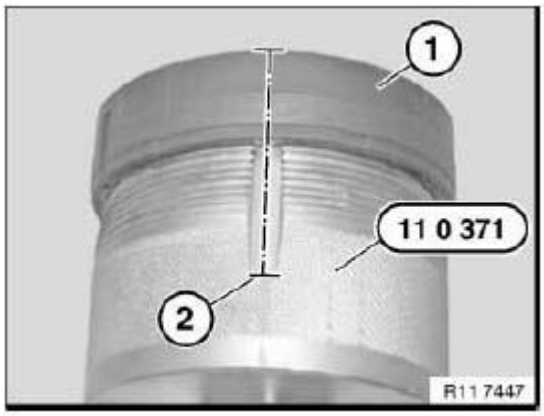



**Fig. 77: Identifying Crankshaft Radial Seal And Cutting Line**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT: The following text describes installation and sealing between the engine block and crankshaft 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.**

*Installation:*

Clean sealing surface (1) and degrease thoroughly in area of crankcase partition.

Apply a light coat of oil to running surface (2) for crankshaft radial seal.

**NOTE: Graphic shows an N42 engine by way of example.**

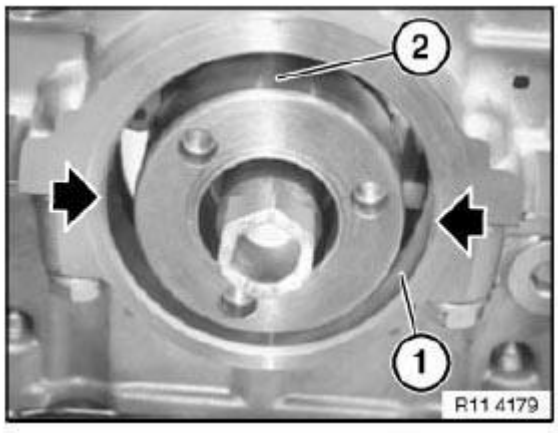



**Fig. 78: Identifying Sealing Surface And Running Surface For Crankshaft Radial Seal**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Screw special tool 11 9 232 with screws (special tool 11 9 234) to crankshaft hub.

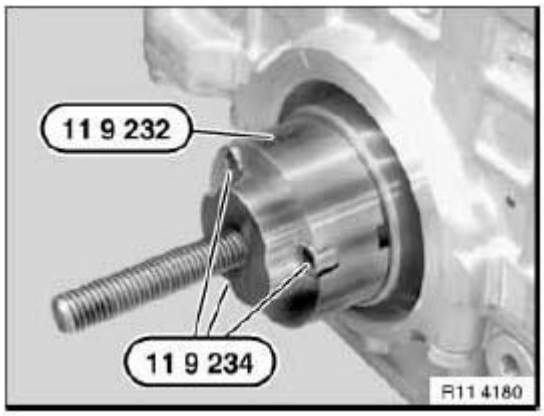



**Fig. 79: Identifying Special Tool 11 9 232 And 11 9 234**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**NOTE: Support bushing (1) is contained in scope of delivery of crankshaft radial seal (2).**
**When crankshaft radial seal (2) is installed, only support bushing (1) may be used as a slip bushing.**
**Crankshaft radial seal (2) has a groove on both left and right sides.**

**IMPORTANT: After installation, the grooves must be filled with sealing compound.**

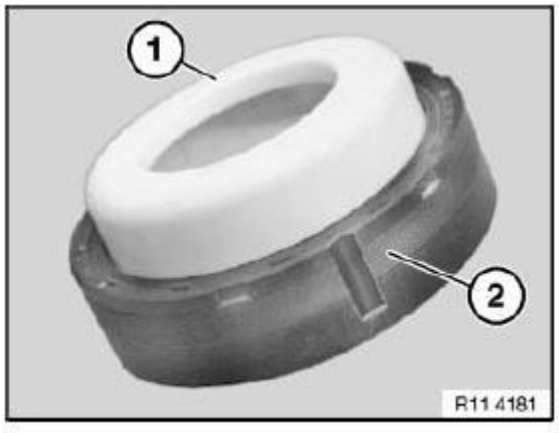



**Fig. 80: Identifying Support Bushing And Crankshaft Radial Seal**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**NOTE: The required parts are available from the BMW Parts Service (Electronic Parts Catalogue ETK).**

Remove screw caps (1) from injector (2).

Screw on metering needle.

Insert piston for pressing out or use special tool 11 4 370.

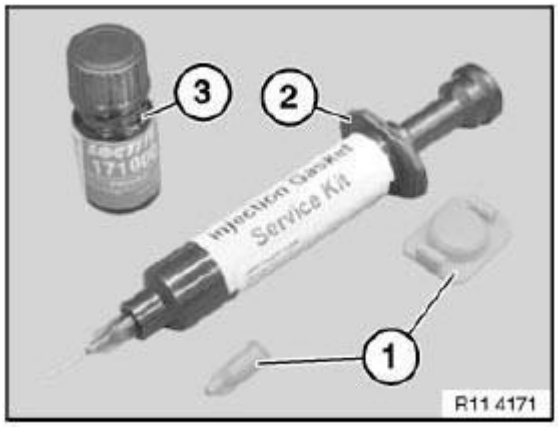



**Fig. 81: Identifying Screw Caps And Injector**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Push support bushing (1) with crankshaft radial seal (2) onto special tool 11 9 232.

**IMPORTANT: Support bushing (1) remains on special tool 11 9 232 until crankshaft radial seal is drawn in.**

Align groove (3) centrally to crankcase partition (4).

Coat both grooves (3) on crankshaft radial seal (2) with Loctite primer, manufacturer's number 171000, and expose to air for approx. one minute.

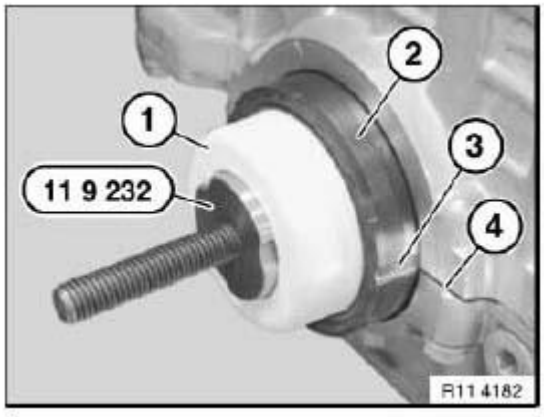



**Fig. 82: Identifying Support Bushing, Crankshaft Radial Seal With Special Tool 11 9 232**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Draw crankshaft radial seal with special tool 11 9 231 in conjunction with special tool 11 9 233 until flush.

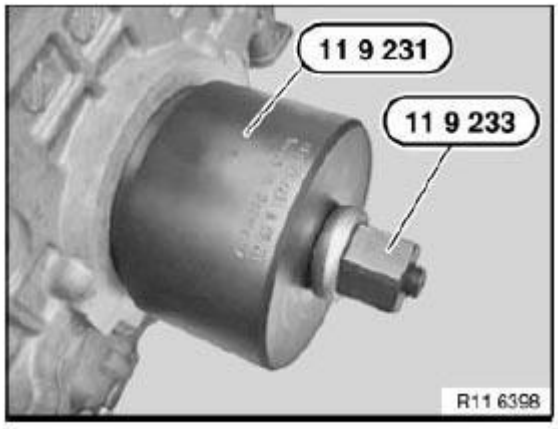



**Fig. 83: Identifying Special Tool (11 9 231) And (11 9 233)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**Before filling with sealing compound:**

Insert brush with Loctite primer, manufacturer's number 171000, as far as possible into grooves (1) on crankshaft radial seal and coat crankcase partition on engine block.

**NOTE: Graphic shows an N42 engine by way of example.**

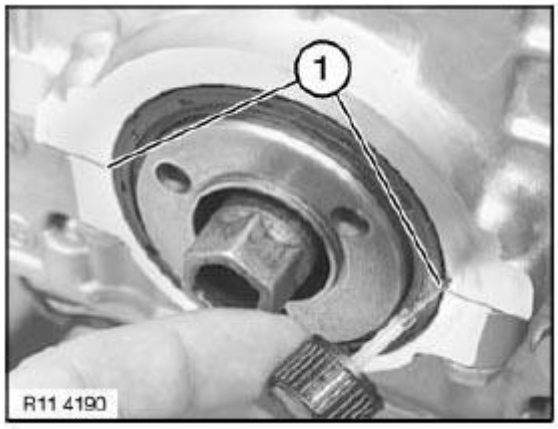



**Fig. 84: Inserting Brush Into Grooves On Crankshaft Radial Seal**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Using injector/syringe (2), fill both grooves (3) flush with sealant.

**NOTE: Graphic shows an N42 engine by way of example.**

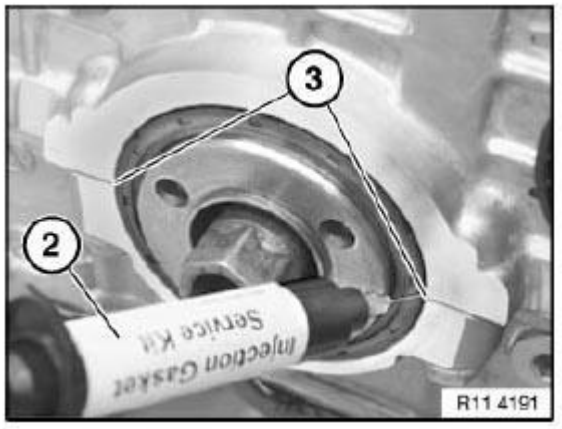



**Fig. 85: Filling Grooves Flush With Sealant Using Injector/Syringe**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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.**

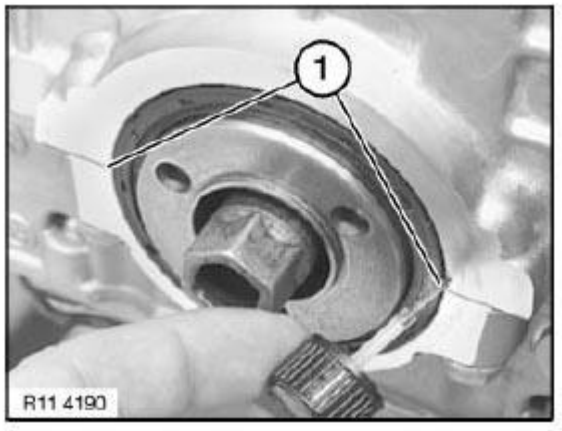



**Fig. 86: Identifying Grooves**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

**11 14 010 REPLACING SEALING COVER FOR VACUUM PUMP (N54)**

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 8 531
- 11 8 532
- 11 8 533
- 11 8 534
- 11 8 535
- 11 8 537

*Necessary preliminary tasks:*

- Remove **fan cowl** . See **17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N54)** .
- Remove alternator **drive belt** . See **11 28 010 REPLACING ALTERNATOR DRIVE BELT (N54)**.
- Remove both drive belt **tensioners** . See **11 28 020 REPLACE ALTERNATOR DRIVE BELT TENSIONER (N54)**.

**NOTE: For purposes of clarity, illustrations show alternator and power steering pump removed.**

Secure special tool 11 8 535 with special tools 11 8 531 and 11 8 537.

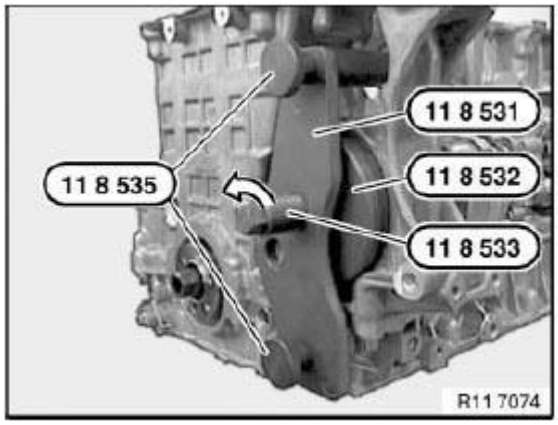



**Fig. 87: Identifying Special Tools 11 8 535, 11 8 531 And 11 8 537**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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**

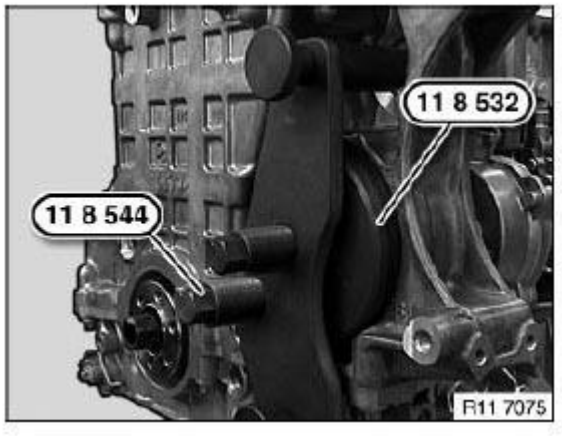



**Fig. 88: Identifying Special Tools 11 8 537 And 11 8 534**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Screw in new sealing cover (1) with special tools 11 8 532 and 11 8 533 until flush with crankcase upper section.

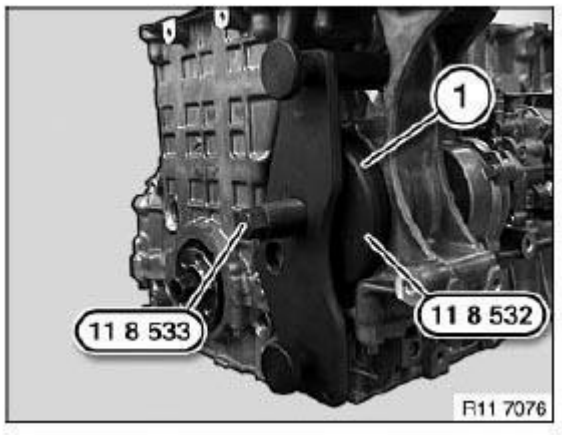



**Fig. 89: Identifying Sealing Cover With Special Tools 11 8 532 And 11 8 533**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

**11 14 151 REPLACING CRANKSHAFT RADIAL SEAL (N54) UP TO 12-31-08**

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 9 181
- 11 9 182
- 11 9 183
- 11 9 184

- 11 9 200

*Necessary preliminary tasks:*

- Remove **transmission** . See **24 00 030 REMOVING AND INSTALLING AUTOMATIC TRANSMISSION (GA6HP19Z) N54** or **23 00 018 REMOVING AND INSTALLING TRANSMISSION (GS6-53BZ) N54** .
- Remove **flywheel** . See **11 22 500 REMOVING AND INSTALLING/REPLACING FLYWHEEL (N54)**.

**NOTE: Radial seal has six removal openings for removal with special tool 11 9 200.**

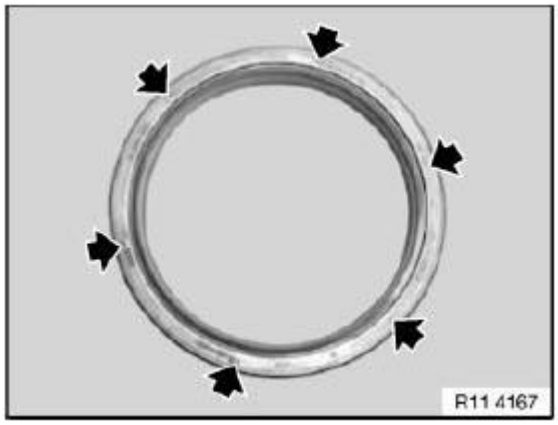



**Fig. 90: Locating Radial Seal Openings**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**NOTE: If necessary, remove rubber coating (1) on top side of radial seal and expose a removal opening (2) (see Fig. 91).**

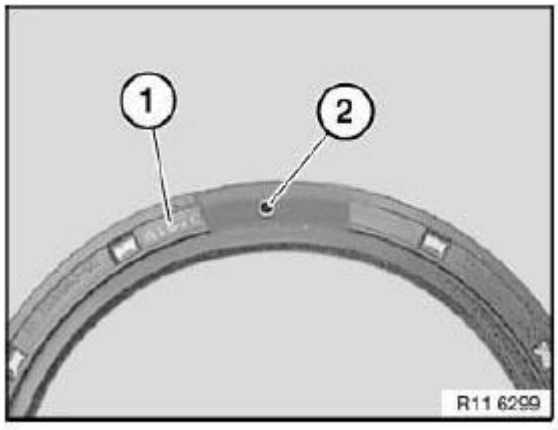



**Fig. 91: Identifying Rubber Coating And Removal Opening**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Fit special tool 11 9 200. Insert metal screws into removal opening of radial seal and initially tighten without play (do **not** overtighten metal screws).

Screw in spindle (1) slowly and carefully and detach radial seal.

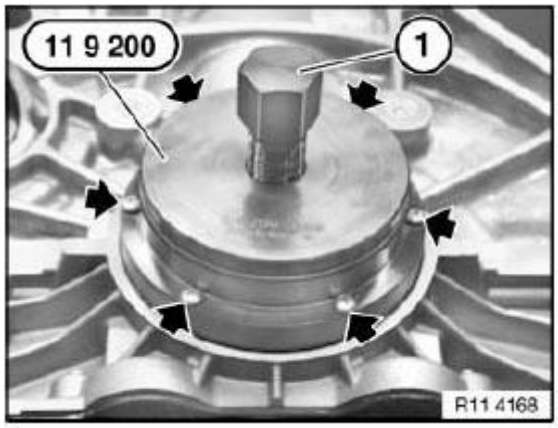



**Fig. 92: Identifying Special Tool 11 9 200 And Spindle**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*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 shaft seal.

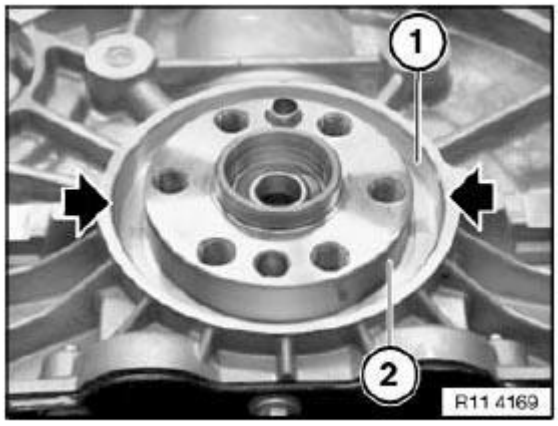



**Fig. 93: Identifying Sealing Surface And Running Surface Of Radial Shaft Seal**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**NOTE: Support sleeve (4) is supplied with radial shaft seal (1).**
**When radial shaft seal (1) is installed, only support sleeve (4) may be used as a slip sleeve.**
**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.**

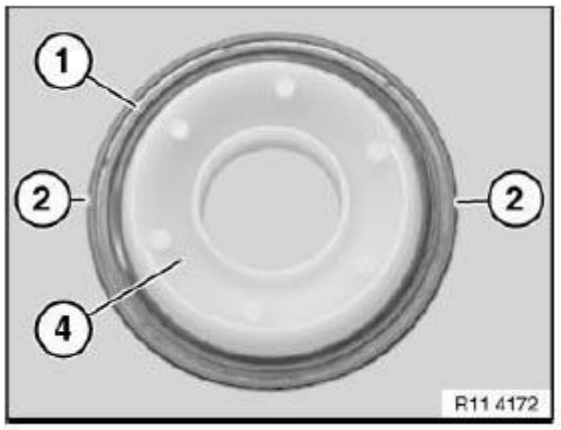



**Fig. 94: Identifying Radial Shaft Seal, Support Sleeve And Grooves**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT: The seal between the engine block and radial seal is described below. The engine block will not be leakproof at the outside of the 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 Service (ETK).**

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.

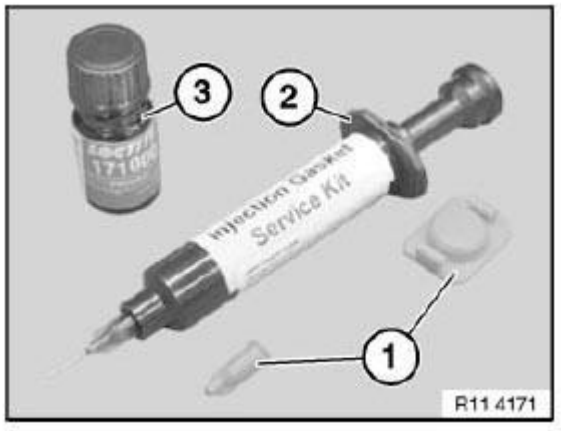


**Fig. 95: Identifying Screw Caps And Injector**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation:*

Fit support sleeve (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 sleeve (4).

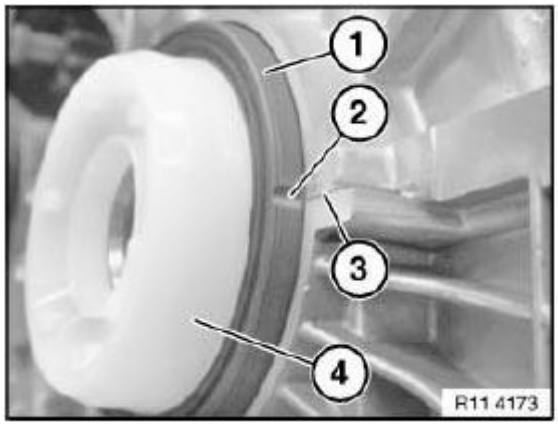



**Fig. 96: Identifying Support Sleeve, Radial Shaft Seal And Grooves**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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 pre-assembled radial shaft seal.

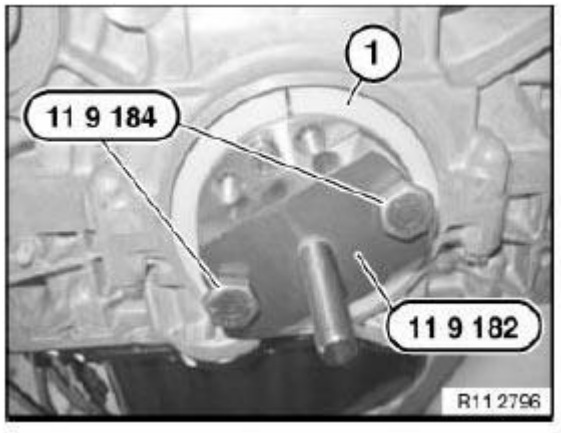



**Fig. 97: Identifying Special Tools 11 9 182 And 11 9 184**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.

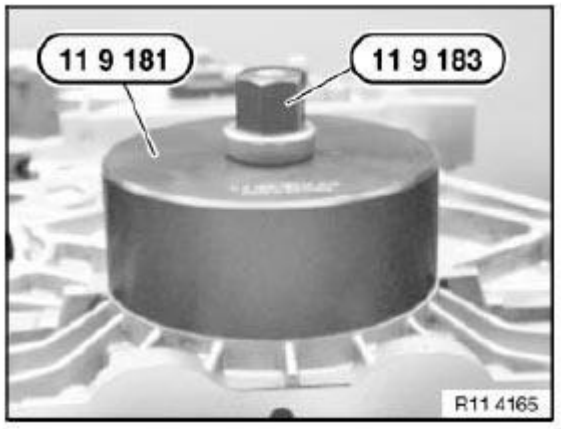



**Fig. 98: Identifying Special Tools 11 9 181 And 11 9 183**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.

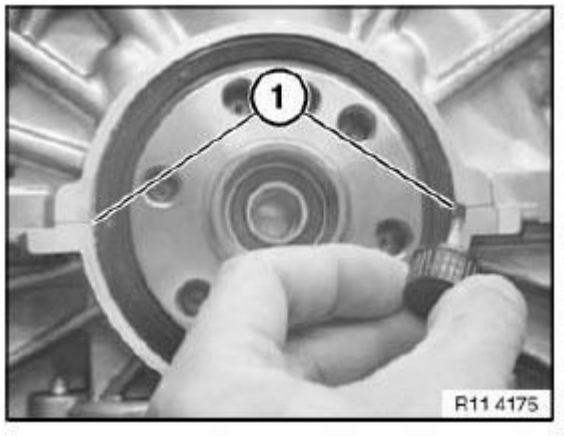



**Fig. 99: Inserting Brush With Loctite Primer Into Grooves On Radial Shaft Seal**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Fill both grooves (1) flush with Loctite sealing compound, manufacturer's number 193140.

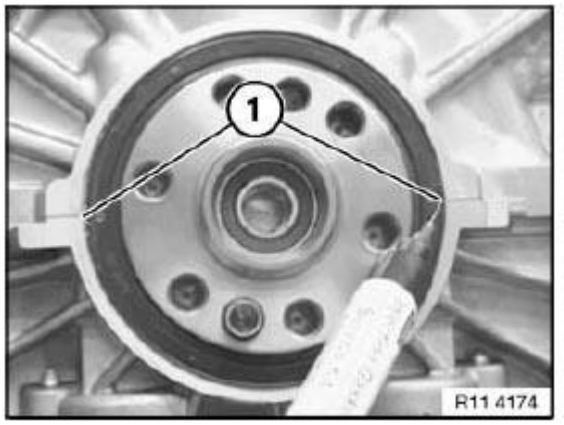



**Fig. 100: Filling Both Grooves Flush With Loctite Sealing Compound**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.**

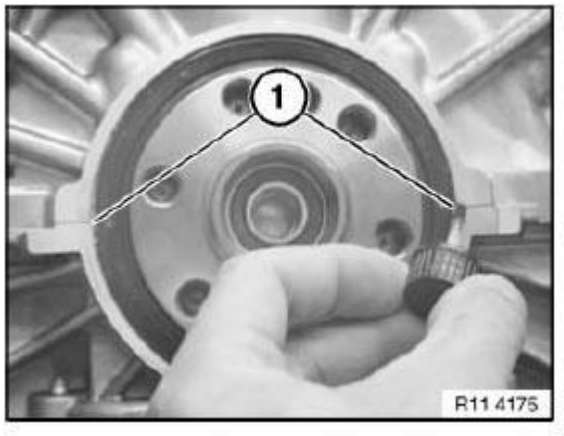



**Fig. 101: Coating Surface Of Sealing Compound In Both Grooves Using Loctite Primer**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

**11 14 151 REPLACING RADIAL CRANKSHAFT SEAL ON TRANSMISSION SIDE FROM 01-01-09**

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 9 181
- 11 9 182
- 11 9 183
- 11 9 184
- 11 9 200
- 11 8 220

*Necessary preliminary tasks:*

- Remove **FLYWHEEL**.

**IMPORTANT: Magnet wheel (1) is magnetic.**

**Keep magnet wheel (1) in a plastic bag away from metallic debris.**

Remove magnet wheel (1) from crankshaft.

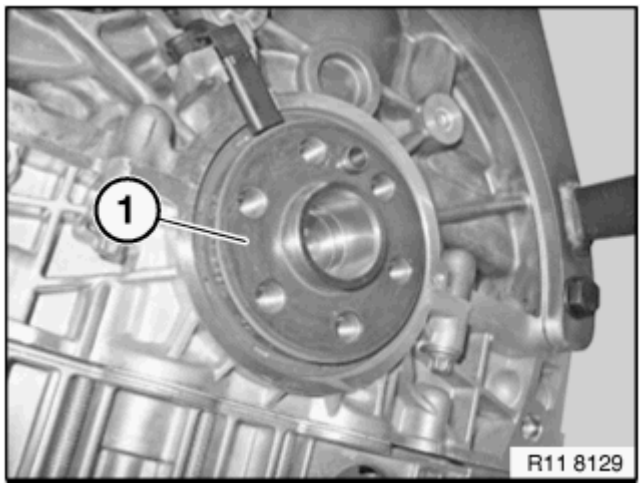



**Fig. 102: Identifying Magnet Wheel**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screw on pulse sensor (1).

Slide PULSE SENSOR (2) upwards.

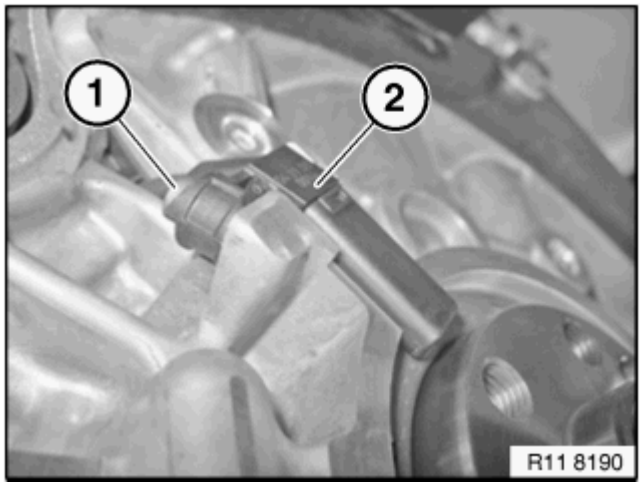



**Fig. 103: Identifying Pulse Sensor And Screw**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT: Drill size maximum 2.5 millimeters.**

**Remove shavings immediately.**

Drill a hole with a drill (1) in the radial shaft seal (see arrow).

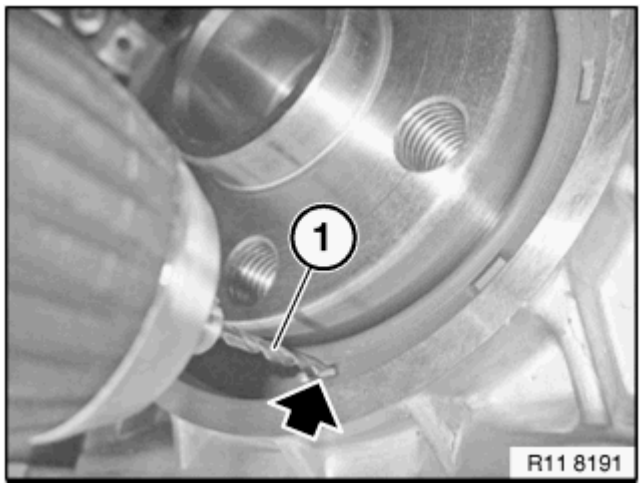



**Fig. 104: Drilling Hole In Radial Shaft Seal Using Drill**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Immediately carefully remove shavings on the radial shaft seal (1).

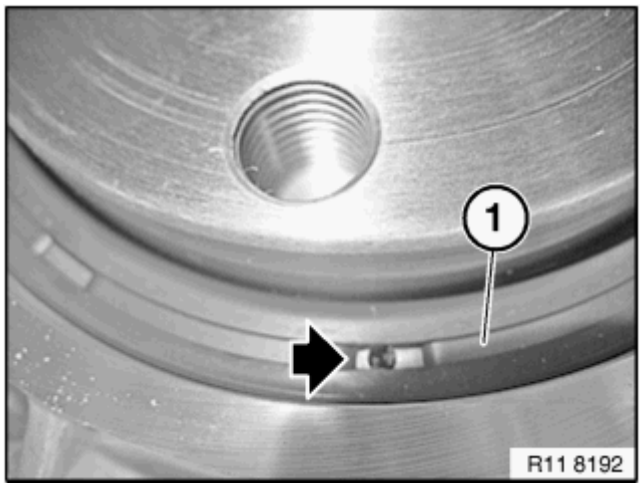



**Fig. 105: Identifying Radial Shaft Seal**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Screw in special tool 23 0 490 in direction of arrow.

Drive out radial shaft seal with impact weight in direction of arrow.

**IMPORTANT: Immediately carefully remove residual shavings.**

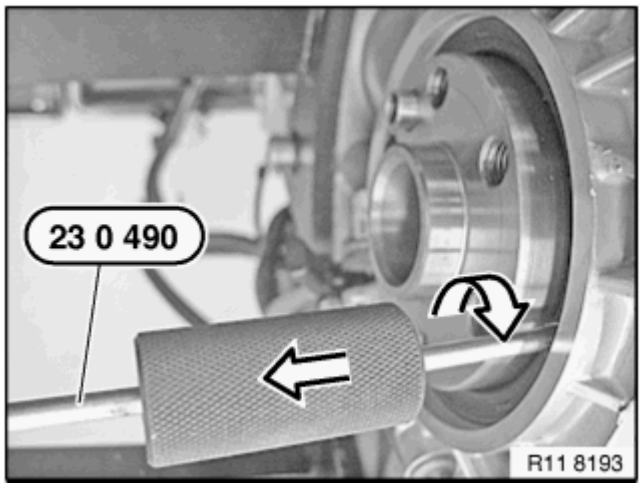



**Fig. 106: Screwing In Special Tool 23 0 490 In Clockwise Direction**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Prepare radial shaft seal (1) on special tool 11 8 220.

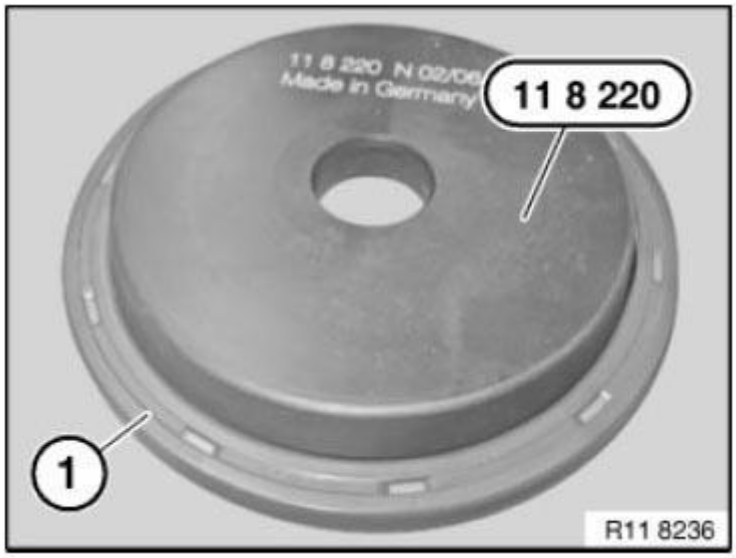



**Fig. 107: Identifying Radial Shaft Seal On Special Tool 11 8 220**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Position the radial shaft seal (1) with special tool 11 8 220 on the crankshaft.

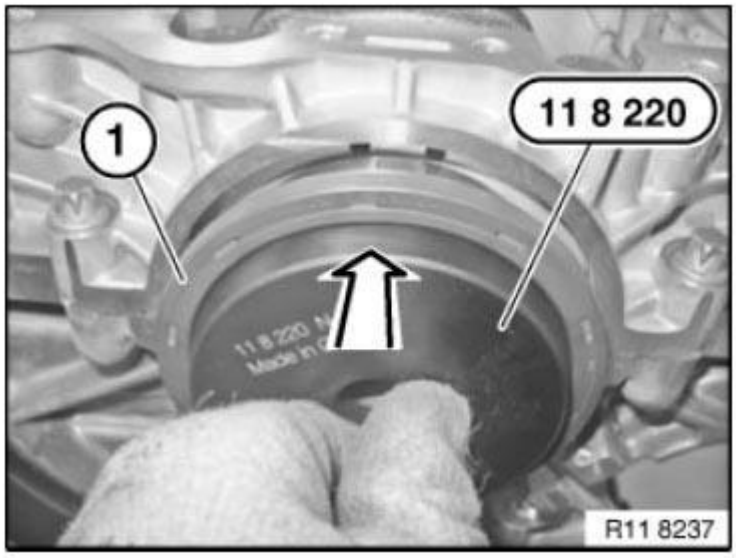



**Fig. 108: Positioning Radial Shaft Seal Using Special Tool 11 8 220 On Crankshaft**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Brush radial shaft seal (1) over the special tool 11 8 220.

Move radial shaft seal (1) parallel up against the crankcase.

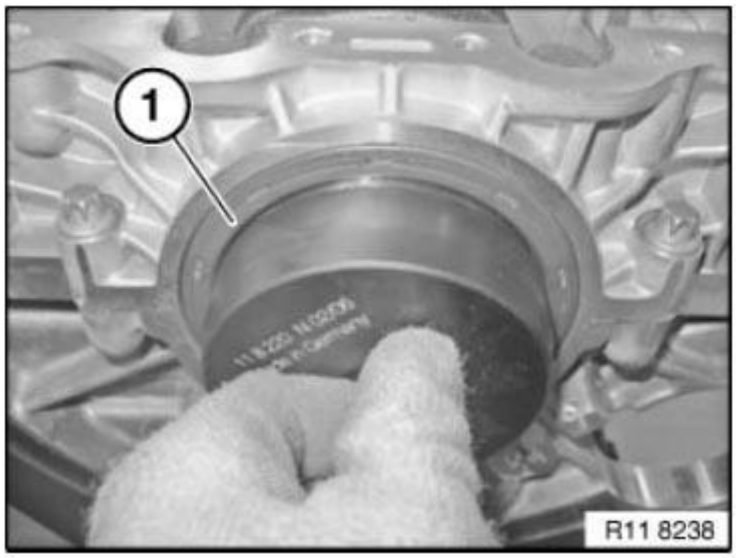



**Fig. 109: Moving Radial Shaft Seal Parallel Up Against Crankcase**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Fasten special tool 11 9 182 (synchronizing key) with special tool 11 9 184 (screw) on the crankshaft.

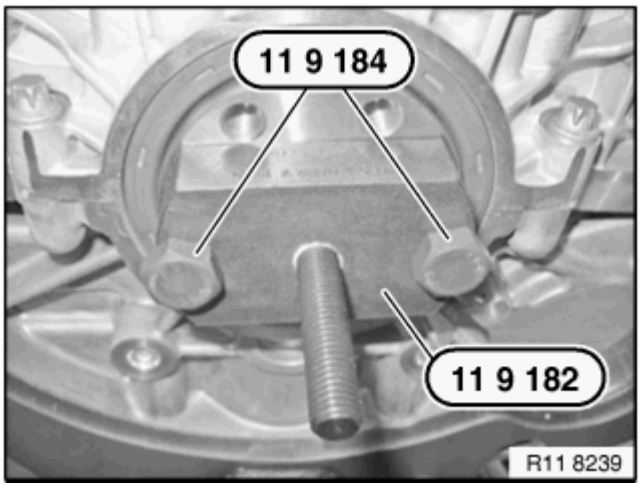



**Fig. 110: Fastening Special Tool 11 9 182 With Special Tool 11 9 184 On Crankshaft**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation note:*

Prepare special tool 11 9 181 (bush) for installation.

Connect special tool 11 9 185 (ring) onto special tool 11 9 181 (bush).

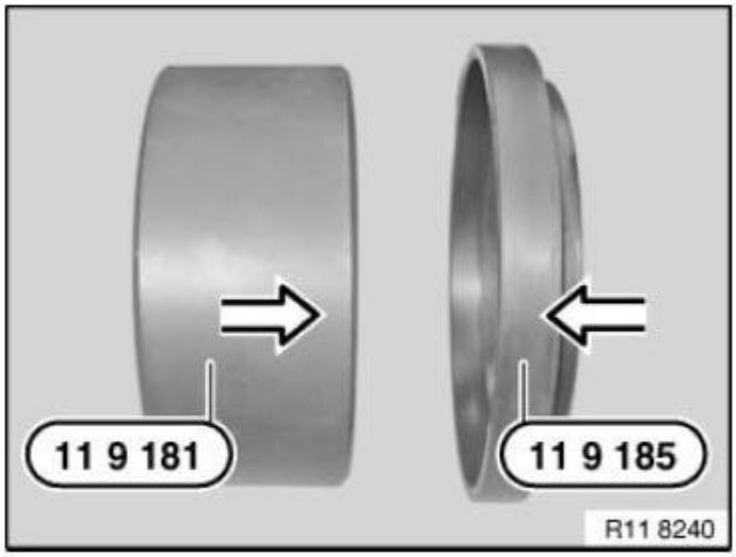



**Fig. 111: Connecting Special Tool 11 9 185 Onto Special Tool 11 8 181**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Pull on radial shaft seal with special tools 11 9 181 (bush) and 11 9 185 (ring) in combination with special tool 11 9 183 (nut).

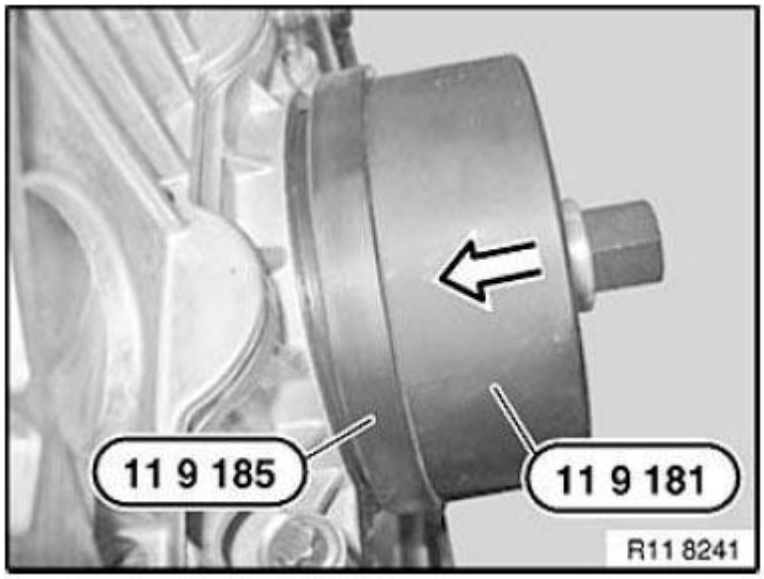



**Fig. 112: Installing Rear Crankshaft Seal Using Tool 119 180/181**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Screw on radial shaft seal with special tool 11 9 183 (nut) to limit position.

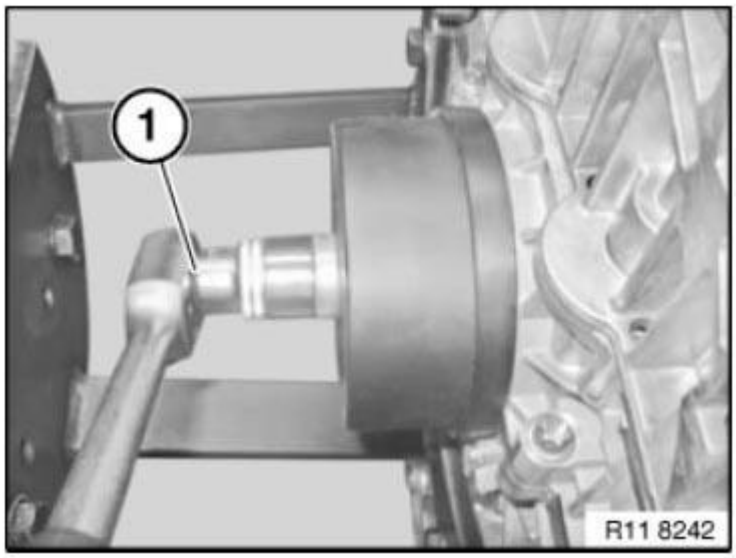



**Fig. 113: Screwing On Radial Shaft Seal Using Special Tool 11 9 183**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Remove all special tools.

Assemble engine.

## CRANKSHAFT WITH BEARINGS

**11 21 500 REPLACING CRANKSHAFT (N54)**

**Special tools required:**

For the following special tools, refer to **MAINTENANCE AND GENERAL INFORMATION - SPECIAL TOOLS** .

- 00 2 510
- 00 9 120
- 11 4 370
- 11 4 440
- 11 9 360

**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** . See **11 00 050 REMOVING AND INSTALLING ENGINE (N54)**.
- Mount engine on **assembly stand** . See **11 00 MOUNTING ENGINE ON ASSEMBLY STAND (N54)**.
- Remove **vibration damper** . See **11 23 010 REMOVING AND INSTALLING/REPLACING VIBRATION DAMPER (N54)**.
- Remove **oil sump**.
- Remove **oil pump** . See **11 41 000 REMOVING AND INSTALLING OIL PUMP (N54)**.
- Remove **triangular drive** for oil pump. See **11 41 010 REMOVING AND INSTALLING/REPLACING CHAIN MODULE FOR OIL PUMP/VACUUM PUMP (N54)**.
- Remove **timing chain module** . See **11 31 051 REPLACING TIMING CHAIN (N54)**.
- Remove **cylinder head** . See **11 12 100 REMOVING AND INSTALLING CYLINDER HEAD (N54)**.
- Remove **flywheel** . See **11 22 500 REMOVING AND INSTALLING/REPLACING FLYWHEEL (N54)**.
- Removing all **pistons** . See **11 25 530 REMOVING AND INSTALLING/REPLACING ALL PISTONS (N54)**.

Release screws (1).

Tightening torque. See 11 13 5AZ in **OIL PUMP** .

*Installation:*

**Replace aluminum screws** .

Remove oil deflector (2).

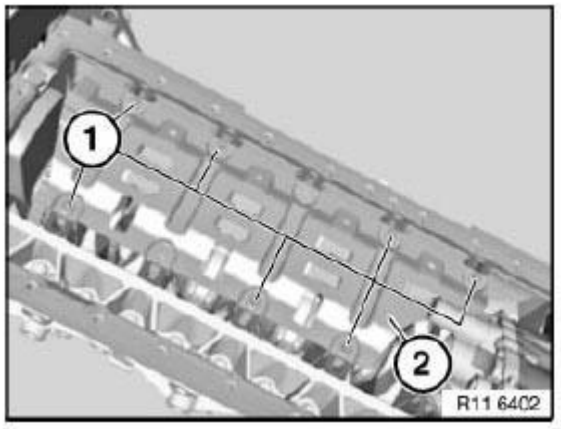



**Fig. 114: Identifying Screws And Oil Deflector**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screws (1).

Tightening torque. See 11 11 2AZ in **11 11 ENGINE BLOCK** .

Unfasten screws (2).

Tightening torque. See 11 11 3AZ in **11 11 ENGINE BLOCK** .

*Installation:*

**Replace aluminum screws** .

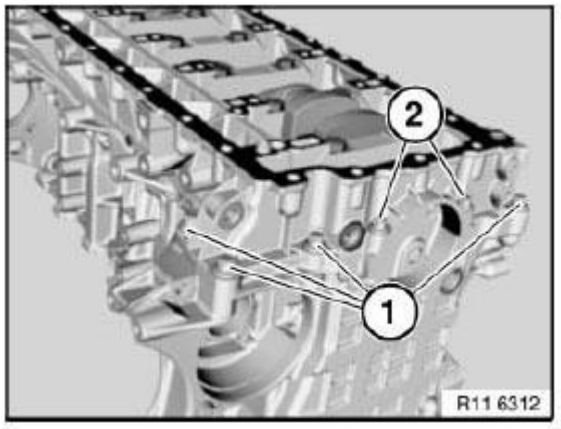



**Fig. 115: Identifying Aluminum Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screws (1).

Tightening torque. See 11 11 4AZ in **11 11 ENGINE BLOCK** .

Unfasten screws (2).

Tightening torque. See 11 11 2AZ in **11 11 ENGINE BLOCK** .

*Installation:*

**Replace aluminum screws** .

Release steel screws (1 to 14) from outside inwards.

Tightening torque. See 11 11 2AZ in **11 11 ENGINE BLOCK** .

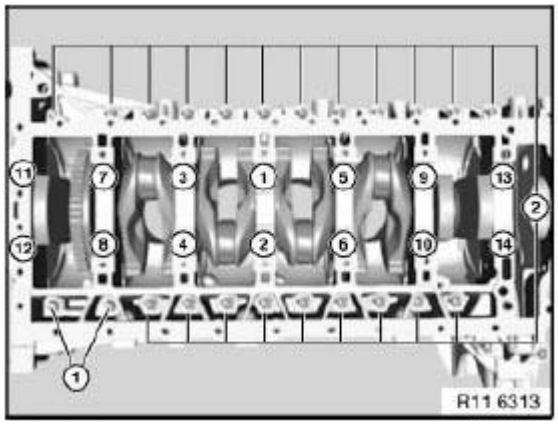



**Fig. 116: Steel Screws Releasing Sequence**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screws (1).

Tightening torque. See 11 11 3AZ in **11 11 ENGINE BLOCK** .

*Installation:*

**Replace aluminum screws** .

Remove crankshaft lower section in upward direction.

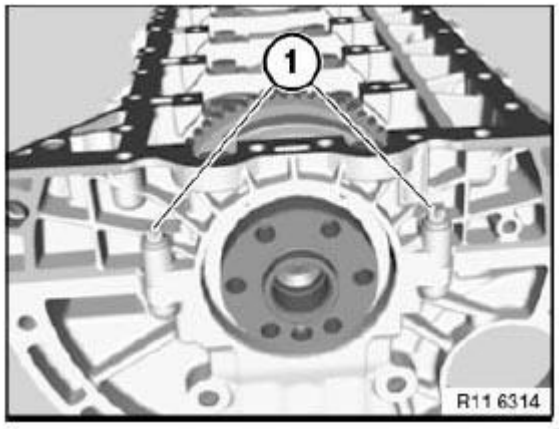



**Fig. 117: Identifying Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Remove both crankshaft radial seals (1).

**NOTE: Illustrations show N46.**

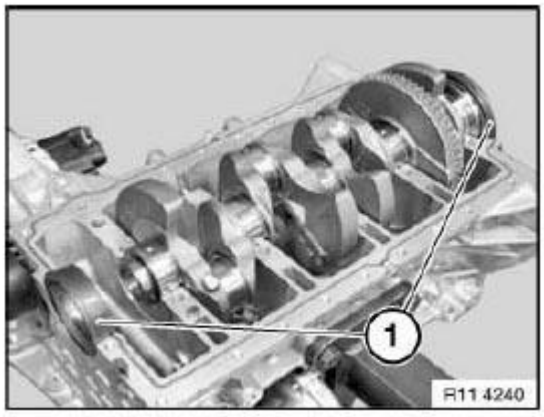



**Fig. 118: Identifying Crankshaft Radial Seals**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.**

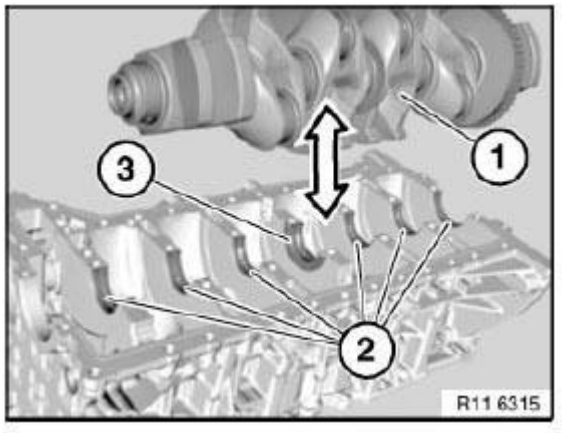



**Fig. 119: Removing And Installing Crankshaft**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Check guide sleeves (1) for damage and correct seating.

Reinstall crankshaft.

*Installation:*

Lubricate all bearing points with engine oil.

Clean all sealing surfaces.

**NOTE: Illustrations show N46.**

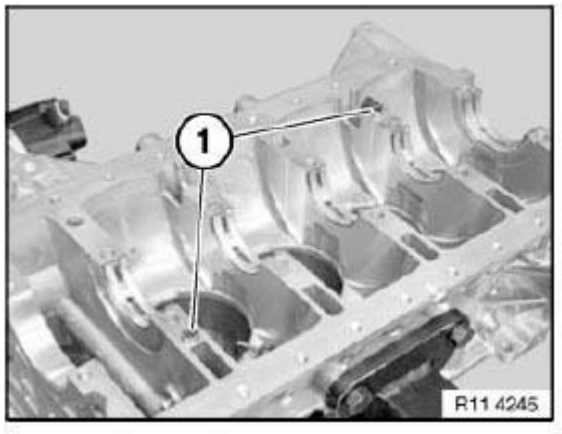



**Fig. 120: Identifying Guide Sleeves**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Tighten steel screws (1 to 14) from inside outwards.

Tightening torque. See 11 11 1AZ in **11 11 ENGINE BLOCK** .

Tighten screws (2) from inside outwards.

Tightening torque. See 11 11 2AZ in **11 11 ENGINE BLOCK** .

Tighten screws (1).

Tightening torque. See 11 11 4AZ in **11 11 ENGINE BLOCK** .

*Installation:*

**Replace aluminum screws** .

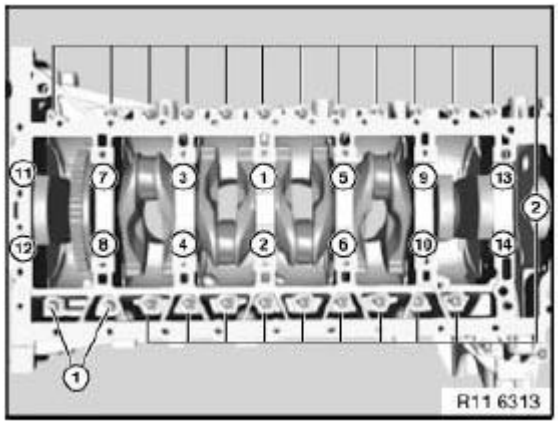



**Fig. 121: Steel Screws Tightening Sequence**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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. 122: Tightening Aluminum Screws Using 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** .

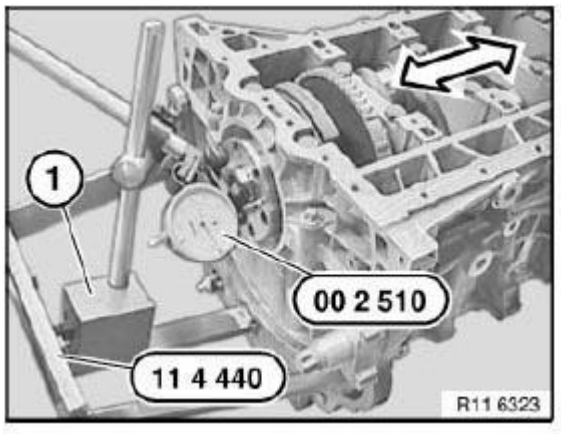



**Fig. 123: Direction Of Moving Crankshaft**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation:*

**Always replace nozzles (1)** .

Drive in both nozzles (1) with special tool 11 9 360 on left and right into crankcase.

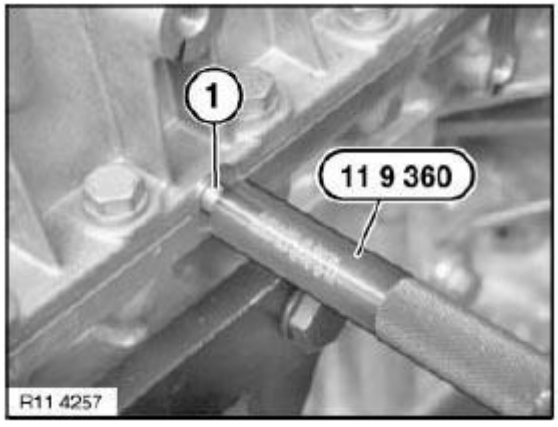



**Fig. 124: Drive In Nozzles Using Special Tool 11 9 360**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation:*

Replace **crankshaft radial seal at front** .

Replace **crankshaft radial seal at rear** .

*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.

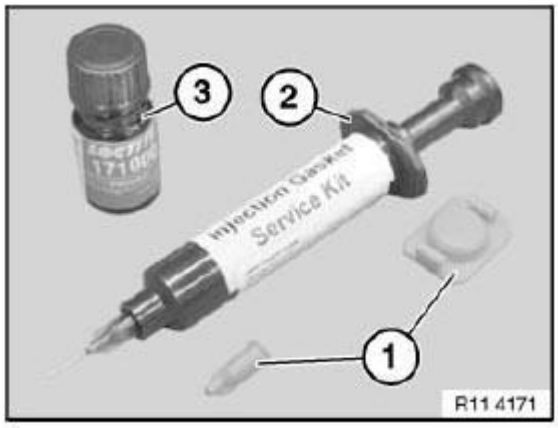



**Fig. 125: Identifying Screw Caps And Injector**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Slowly insert liquid gasket (1) with special tool 11 4 370 in direction of arrow.

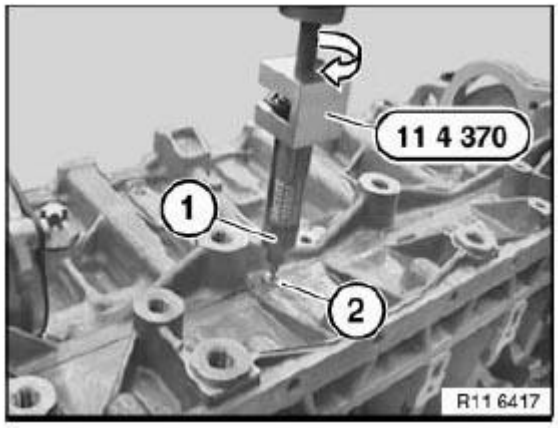



**Fig. 126: Inserting Liquid Gasket Using Special Tool 11 4 370**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Stop (seal off) escaping liquid gasket with primer 1.3. (Picture shows N40).

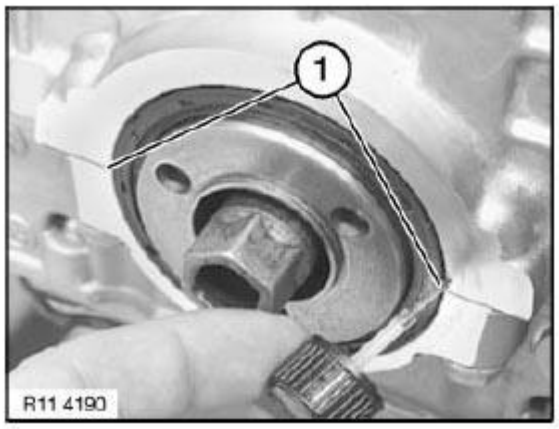



**Fig. 127: Escaping Liquid Gasket With Primer**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

**11 21 531 REPLACING ALL CRANKSHAFT MAIN BEARINGS (N54)**

**Special tools required:**

For the following special tools, refer to **MAINTENANCE AND GENERAL INFORMATION - SPECIAL TOOLS** .

- 00 2 590

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 4 470
- 11 8 510

**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** . See **11 21 500 REPLACING CRANKSHAFT (N54)**.

**Check setting of oil spray nozzles, adjusting if necessary:**

Attach special tool 11 8 510 to bolt connection on main bearing and secure with bolt (1).

*Installation:*

Oil nozzle must be located precisely in groove of special tool 11 8 510.

If necessary, adjust oil nozzle.

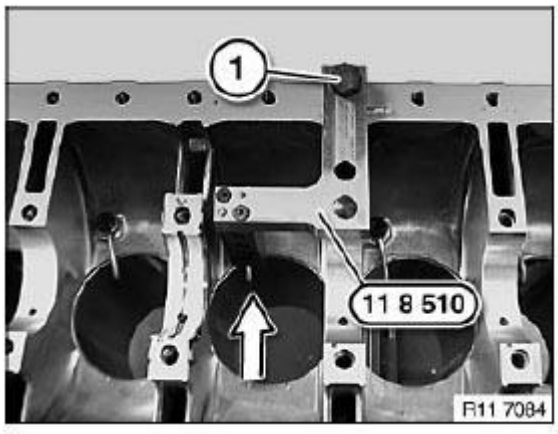



**Fig. 128: Locating Oil Nozzle In Groove Of Special Tool 11 8 510**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Adjust oil nozzle.

Release screw (1).

Tightening torque. See 11 11 5AZ in **11 11 ENGINE BLOCK** .

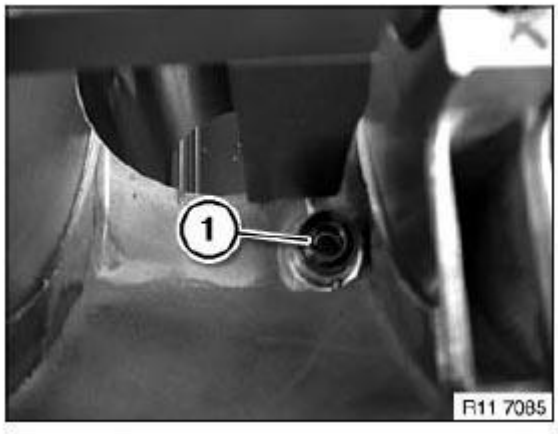



**Fig. 129: Identifying Screw**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Remove bearing shells (2) and (3).

**NOTE: Guide bearing shell (3) is a thrust bearing.**

**Observe bearing classification .**

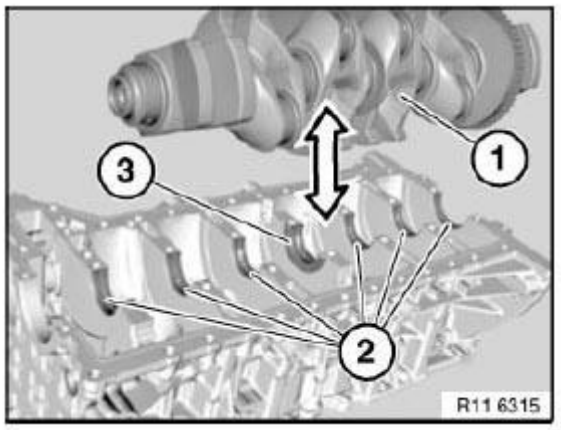



**Fig. 130: Identifying Bearing Shells**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation:*

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.**

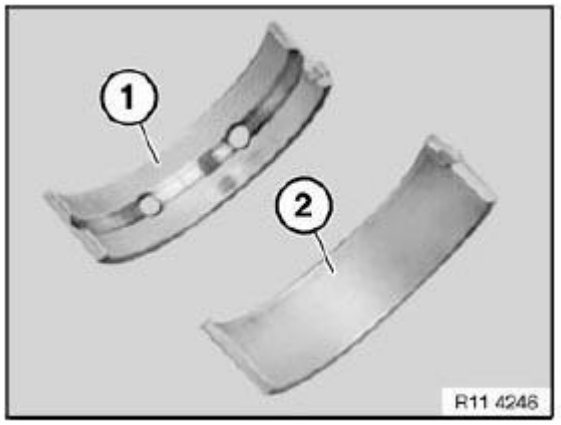



**Fig. 131: Identifying Bearing Shells**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**Main bearing classification** (1) for crankcase lower half (bedplate), code numbers 1 2 3, see table.

Observe **bearing classification** . See **ENGINE - TECHNICAL DATA** .

Bearing classification (2) of **connecting rods** code letters b and r. See **11 24 571 REPLACING ALL CONNECTING ROD BEARINGS (N54)**.

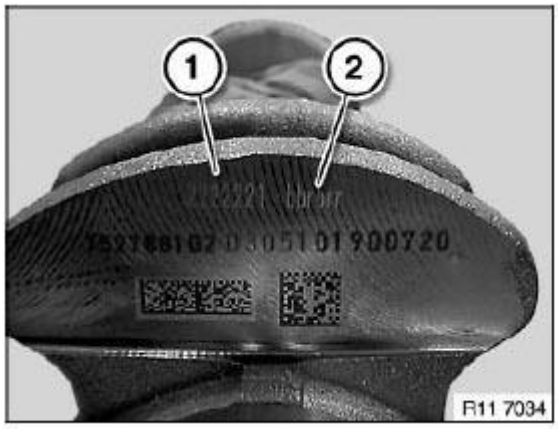



**Fig. 132: Identifying Main Bearing Classification Number On Crankcase Lower Half (Bedplate)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.

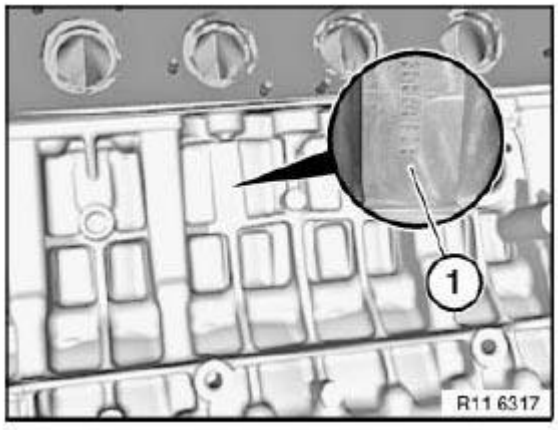



**Fig. 133: Identifying Main Bearing Classification In Crankcase**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*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.**

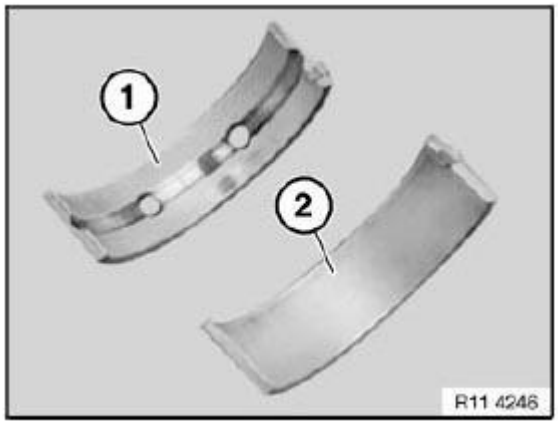



**Fig. 134: Identifying Bearing Shell**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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.

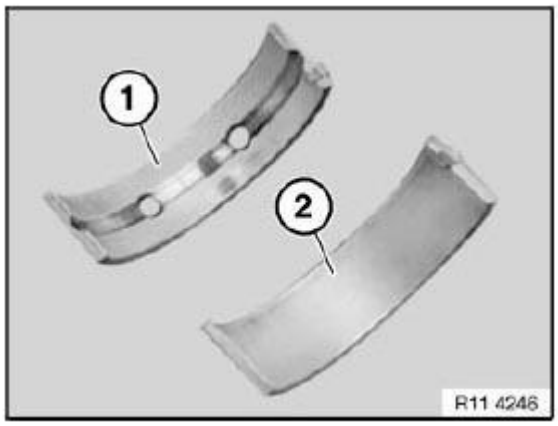



**Fig. 135: Identifying Bearing Shell**
**Courtesy of BMW OF NORTH AMERICA, INC.**

The color combination **Yellow and Red** must not be fitted.

*Installation:*

Possible color combinations for mounting the crankshaft in the crankcase.

**COLOR COMBINATIONS FOR MOUNTING CRANKSHAFT IN CRANKCASE**

| | | |
|---|---|---|
| **(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** |

Insert all bearing shells (2 and 3).

**IMPORTANT: Clean sealing surfaces.**
**Do *not* clean sealing faces with a metal-cutting tool.**

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 free from oil and grease.

Use used screws to determine bearing play.

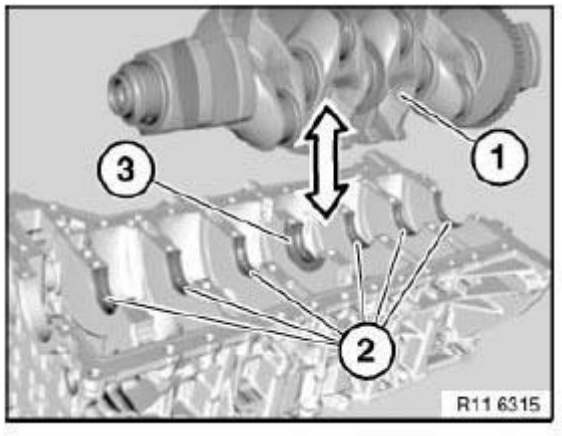



**Fig. 136: Identifying Bearing Shells**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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 clearance radial.

*Installation:*

Remove plastic thread.

Apply a light coat of oil to bearing shells and crankshaft.

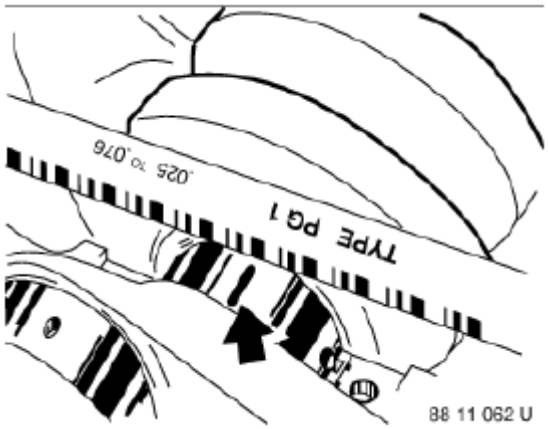



**Fig. 137: Checking Bearing Play**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Install crankcase lower section (bedplate).

Assemble engine.

**11 22 500 REMOVING AND INSTALLING/REPLACING FLYWHEEL (N54)**

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 4 180
- 11 9 260

*Necessary preliminary tasks:*

- Remove **transmission** . See **24 00 030 REMOVING AND INSTALLING AUTOMATIC TRANSMISSION (GA6HP19Z) N54** or **23 00 018 REMOVING AND INSTALLING TRANSMISSION (GS6-53BZ) N54** .
- Remove **clutch** . See **21 21 500 REMOVING AND INSTALLING/REPLACING CLUTCH (SAC 240)** .

Enlarge special tool 11 9 260 with slot.

Enlarge slot on special tool 11 9 260 to 8 mm.


**Fig. 138: Identifying Enlarge Dimension Of Slot On Special Tool 11 9 260**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**For vehicles with manual transmissions**

Secure flywheel with special tool 11 9 260.

Release flywheel screws with special tool 11 4 180.

Tightening torque. See 11 22 1AZ in **11 22 FLYWHEEL** .

*Installation:*

The flywheel is secured with a dowel pin.

**Fit new flywheel screws** .

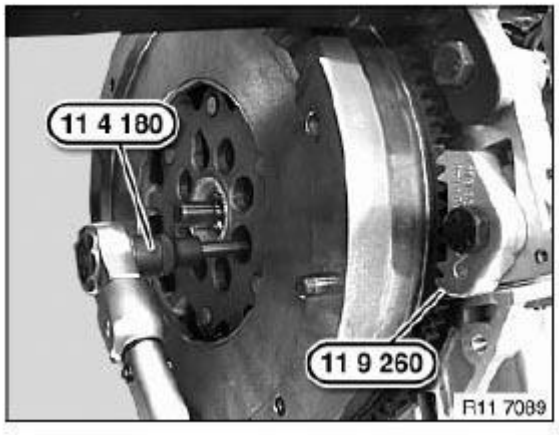



**Fig. 139: Releasing Flywheel Screws Using Special Tool 11 4 180**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**For vehicles with automatic transmissions**

Secure flywheel with special tool 11 9 260.

Release flywheel screws with a suitable tool (1).

Tightening torque. See 11 22 1AZ in **11 22 FLYWHEEL** .

*Installation:*

The flywheel is secured with a dowel pin.

**Fit new flywheel screws** .

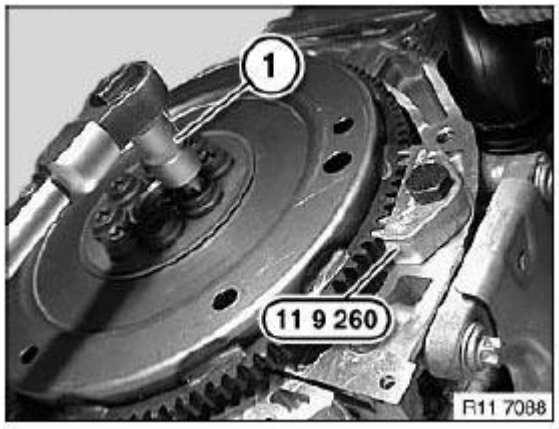



**Fig. 140: Securing Flywheel Using Special Tool 11 9 260**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

**11 21 505 SEALING CRANKCASE LOWER SECTION (N54, N54T)**

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 00 9 120
- 11 0 300
- 11 4 180
- 11 4 370
- 11 4 470
- 11 8 181
- 11 8 220
- 11 8 640
- 11 9 181

- 11 9 182
- 11 9 183
- 11 9 184
- 11 9 185
- 11 9 231
- 11 9 233
- 11 9 234
- 11 9 235
- 11 9 260
- 11 9 360

**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. See **21 21 500 REMOVING AND INSTALLING/REPLACING CLUTCH (SAC 240)** (if fitted).
- Remove left and right engine support arm. See **22 11 100 REPLACING RIGHT ENGINE SUPPORT ARM (N54)** or **22 11 110 REPLACING LEFT ENGINE SUPPORT ARM (N54)** .
- Remove **OIL SUMP**.

Release screws (1).

Pull out oil pump intake pipe (2).

Tightening torque: **11 13 5AZ**

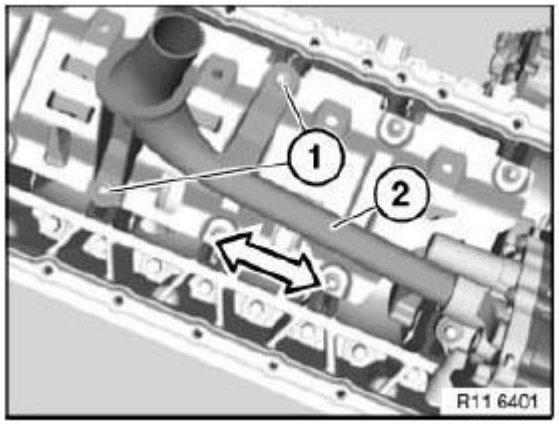



**Fig. 141: Removing Pump Intake Pipe**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screws (1).

Tightening torque: **11 13 5AZ** .

*Installation note:*

**Replace aluminum screws.**

Remove oil deflector (2).

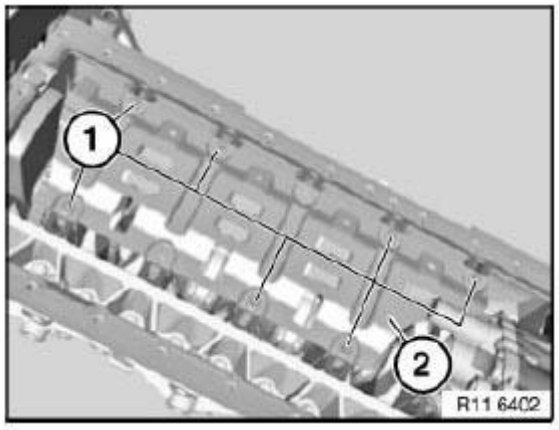



**Fig. 142: Identifying Oil Deflector And Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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** .

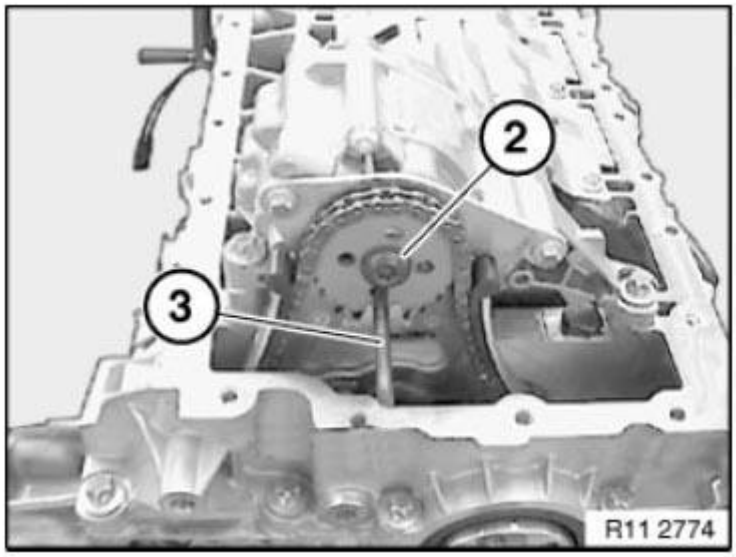



**Fig. 143: Identifying Oil Pump Drive Gear And Steel Pin**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Unfasten screws (2).

Tightening torque: **11 41 3AZ** .

*Installation note:*

**Replace aluminum screws.**

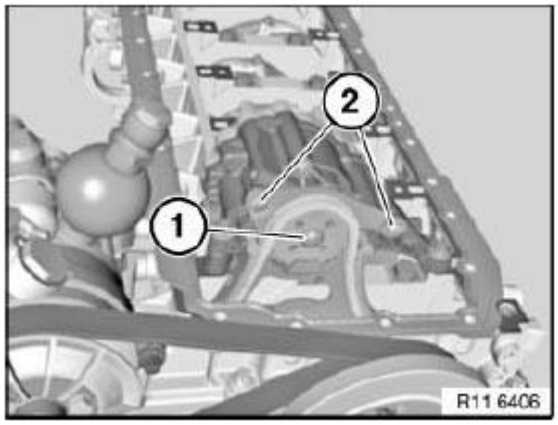



**Fig. 144: Identifying Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Remove screw plug (1) from crankcase at front.

**NOTE: Replace gasket.**

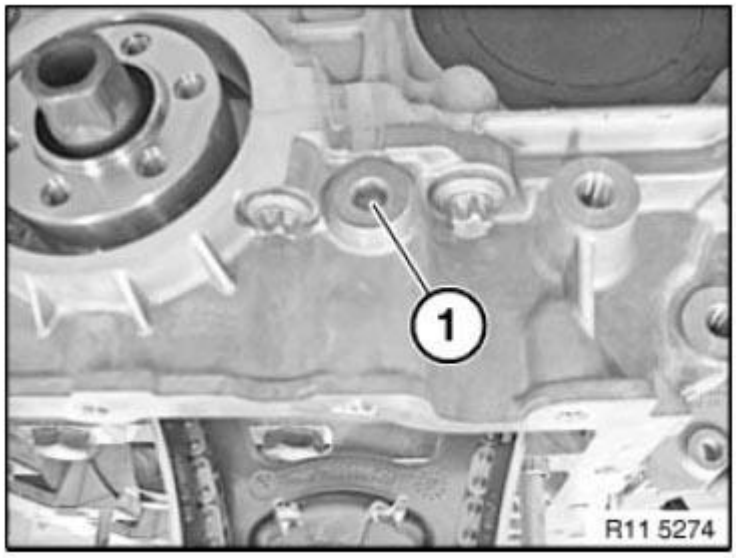



**Fig. 145: Identifying Screw Plug**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screw (1) for oil pump triangular drive with special tool **11 8 640** .

**NOTE: It is not necessary to remove the triangular drive.**

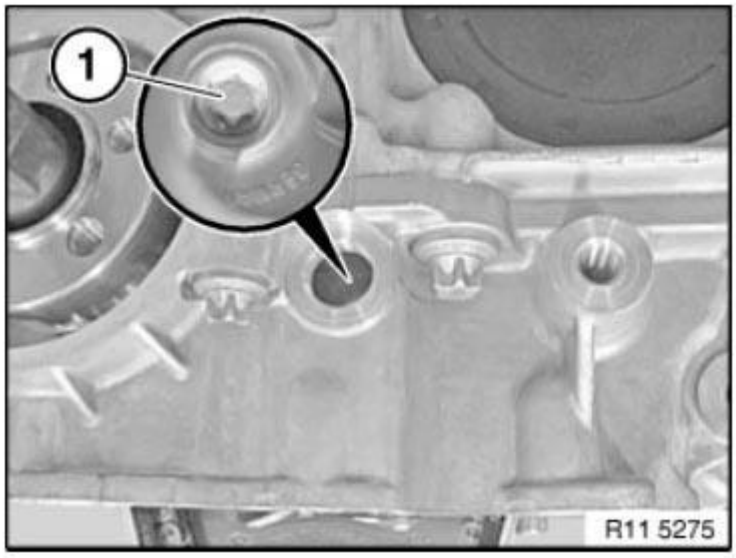



**Fig. 146: Identifying Oil Pump Triangular Drive Mounting Screw**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**Version 1**

**IMPORTANT: Observe different screw lengths.**

**Release screws (1).**

**Tightening torque 11 41 2AZ .**

*Installation note:*

**Replace aluminum screws.**

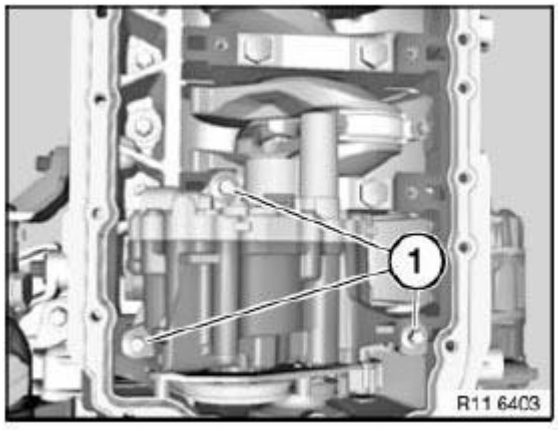



**Fig. 147: Identifying Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**Version 2**

**IMPORTANT: Observe different screw lengths.**

**Release oil pump screws (1).**

**Tightening torque: 11 41 2AZ .**

*Installation note:*

**Replace aluminum screws.**

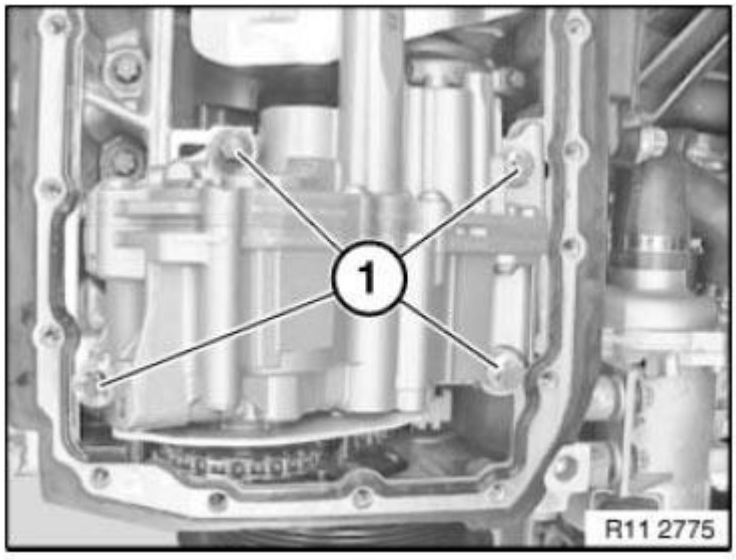



**Fig. 148: Identifying Oil Pump Mounting Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.

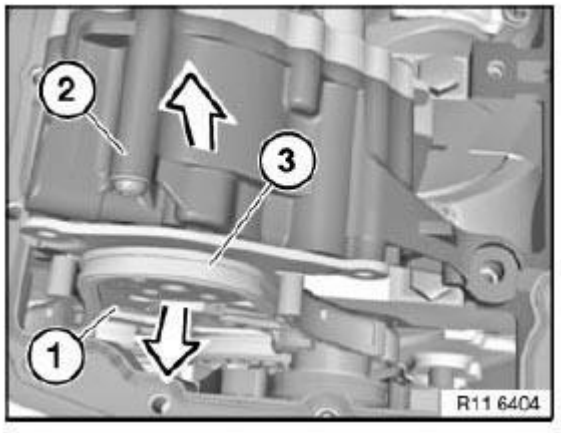



**Fig. 149: Removing Sprocket**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*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).

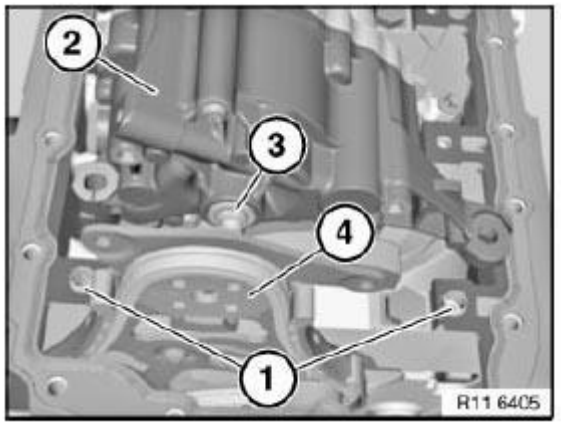



**Fig. 150: Identifying Spacer Bushings And Oil Pump**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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** .

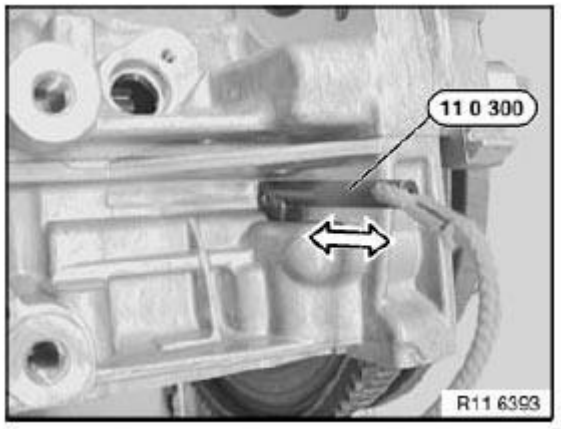



**Fig. 151: Securing Flywheel In Position Using Special Tool 11 0 300**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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)**

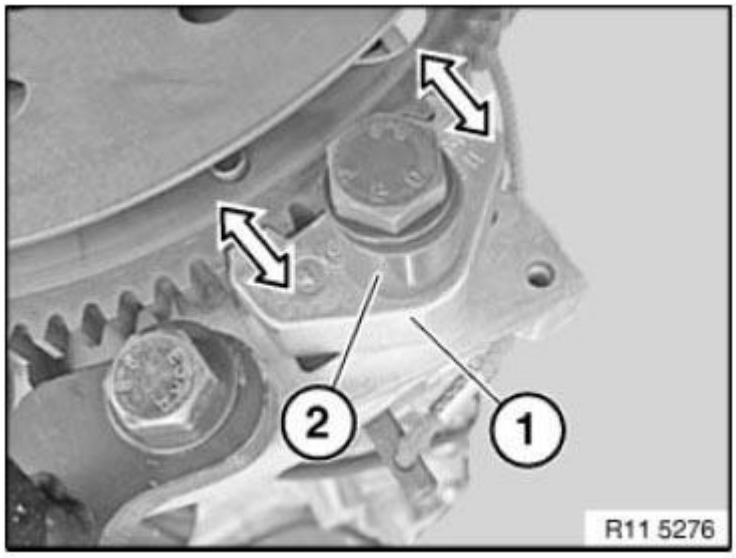



**Fig. 152: Securing Flywheel Using Special Tool 11 9 260 And Special Tool 11 9 266**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**Automatic transmission**

Release flywheel bolts (1).

Release special tool (2).

Remove flywheel (3).

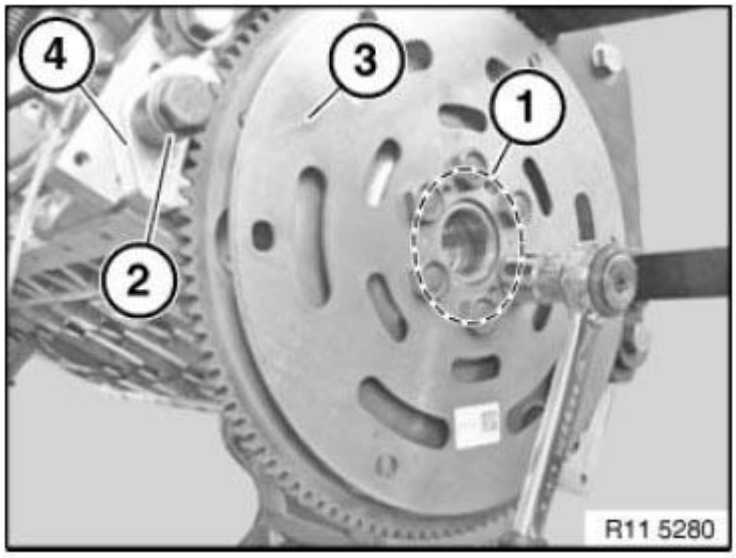



**Fig. 153: Identifying Flywheel With Mounting Bolts**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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** /

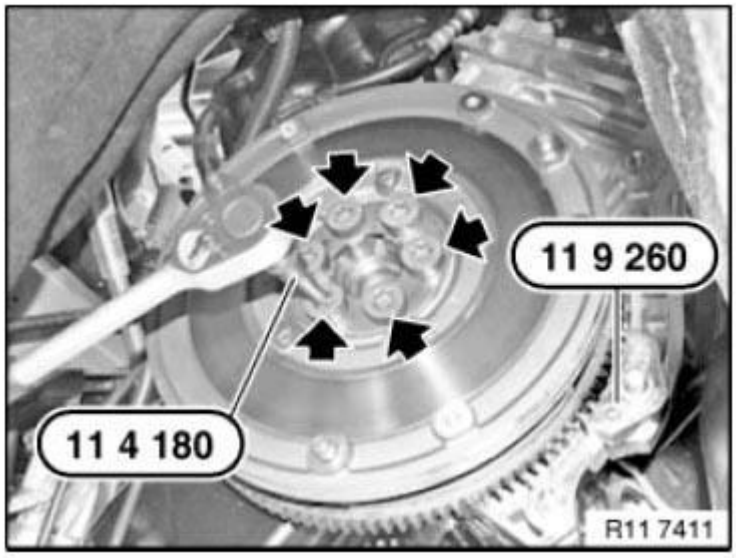



**Fig. 154: Removing Flywheel Bolts Using Special Tool 11 4 180**
**Courtesy of BMW OF NORTH AMERICA, INC.**

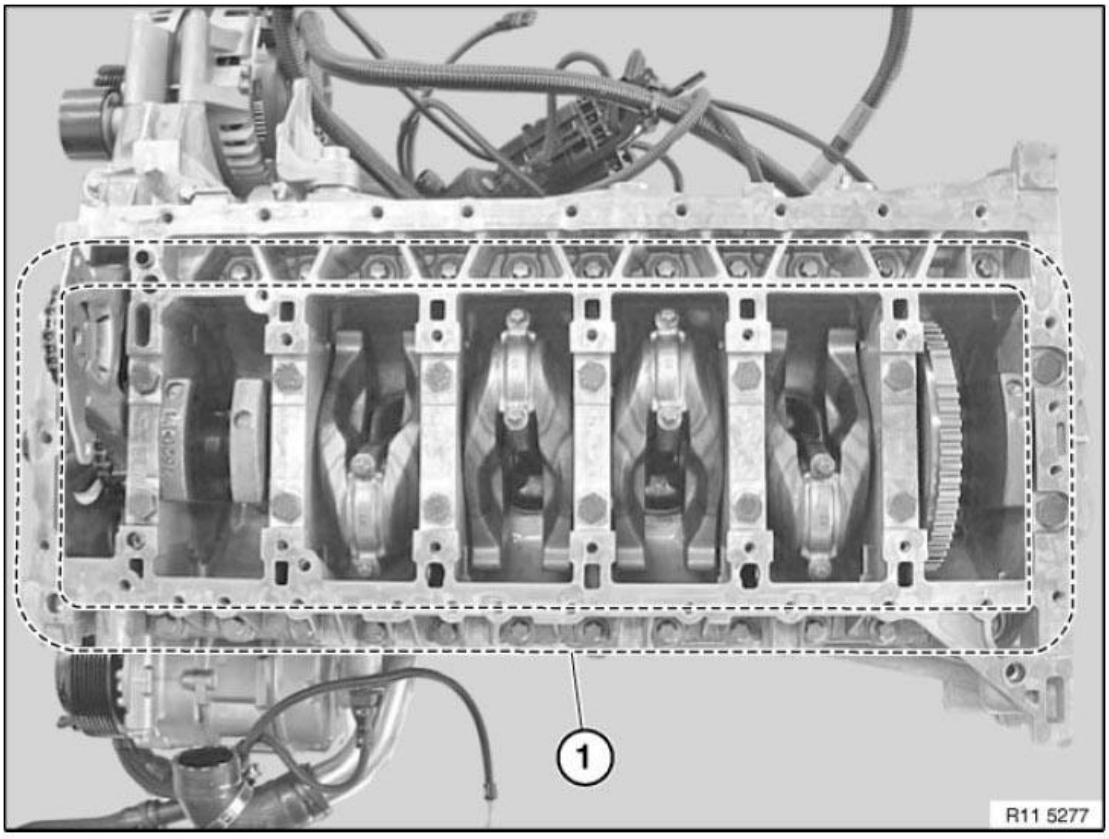



**Fig. 155: Identifying Crankcase Bolts**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release all crankcase bolts (1) along line (2).

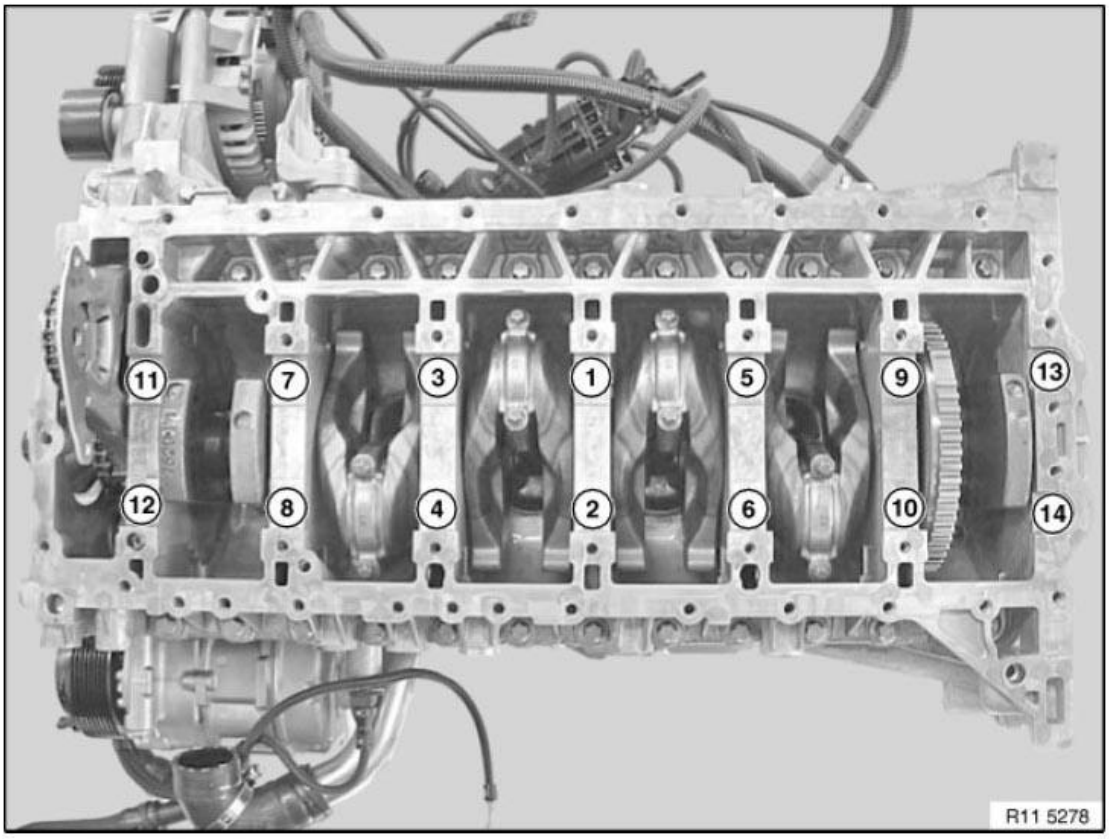



**Fig. 156: Identifying Crankcase Bolt Tightening Sequence**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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).**

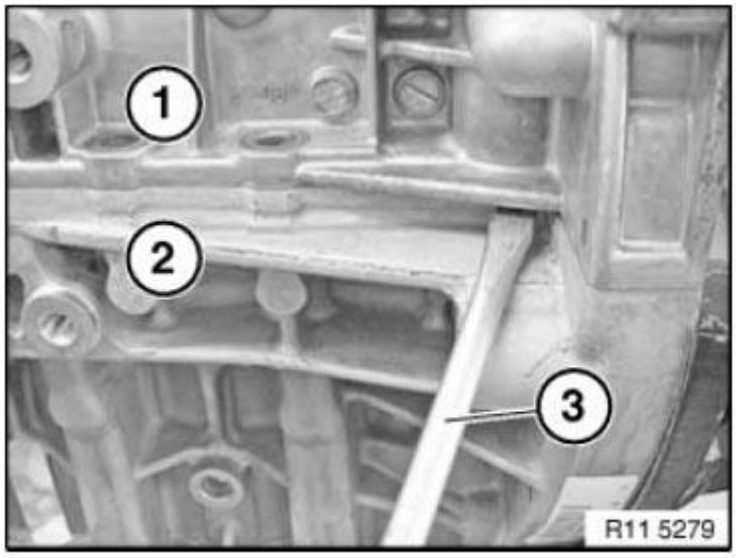



**Fig. 157: Removing Crankcase Lower Section From Upper Section Using Tool**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT: Timing chain is preloaded.**

**Do not raise crankshaft.**

Carefully remove radial shaft seal (1).

Catch escaping engine oil with a cloth (2).

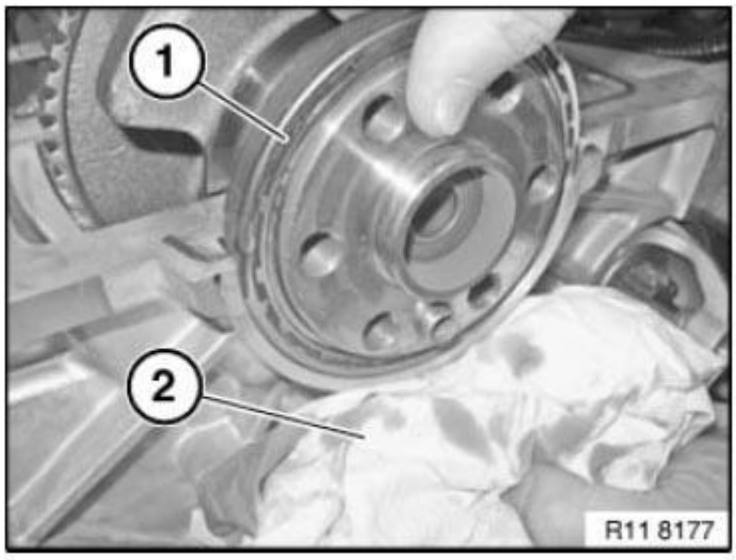



**Fig. 158: Removing Radial Shaft Seal**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Carefully remove radial shaft seal (1) towards front.

Catch escaping engine oil with a cloth (2).

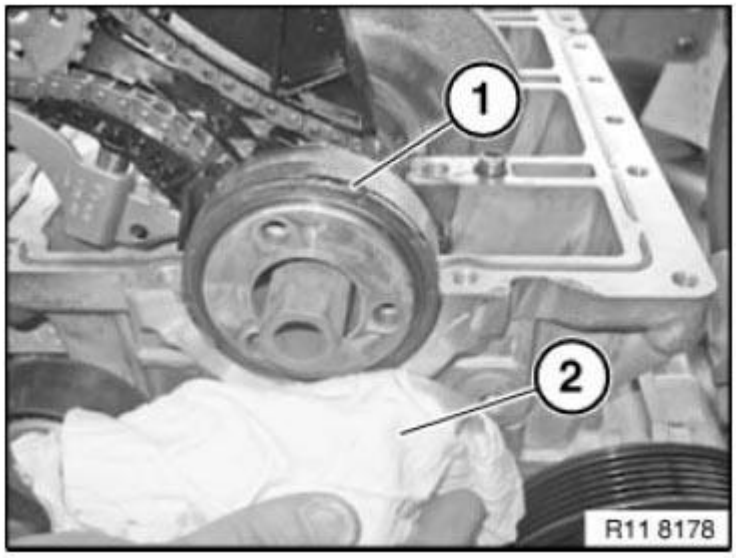



**Fig. 159: Catching Escaping Engine Oil Using Cloth**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT: Protect crankcase against sealant residues with a cloth (1).**

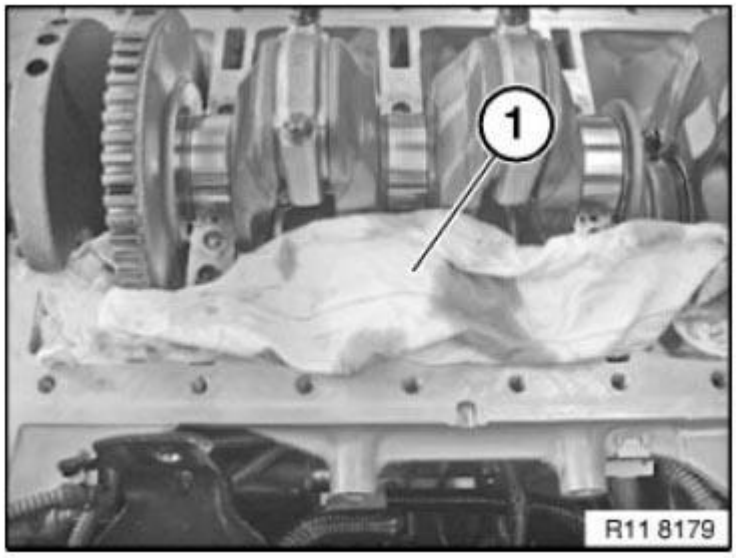



**Fig. 160: Protecting Crankcase Against Sealant Residues Using Cloth**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.

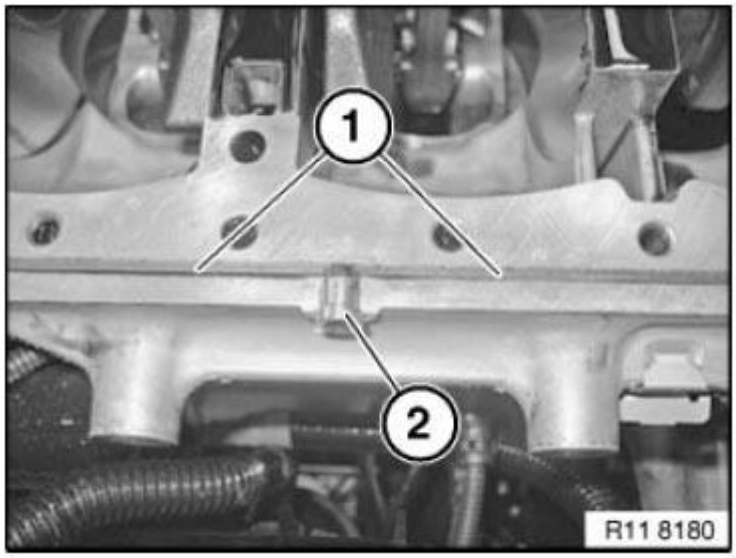



**Fig. 161: Identifying Injector Nozzle And Sealing Compound Residue**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.

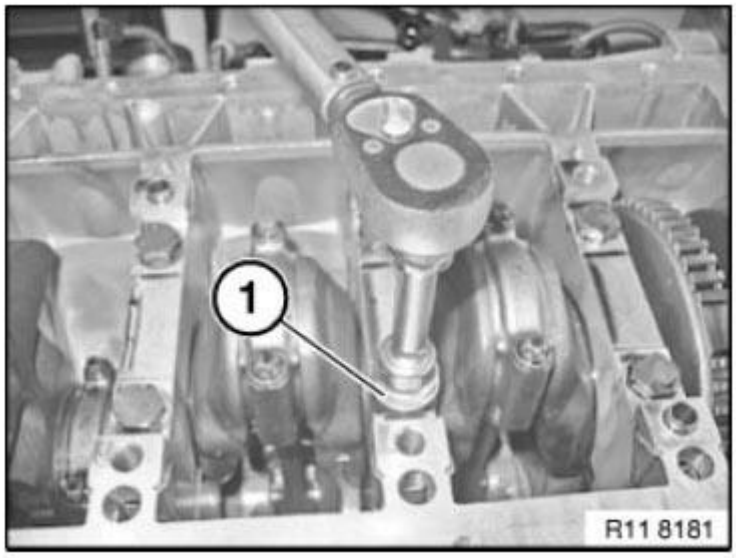



**Fig. 162: Positioning Crankcase Lower Section On Crankcase Upper Section**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Identify all M10 crankcase bolts with a colored marking (1) for checking.

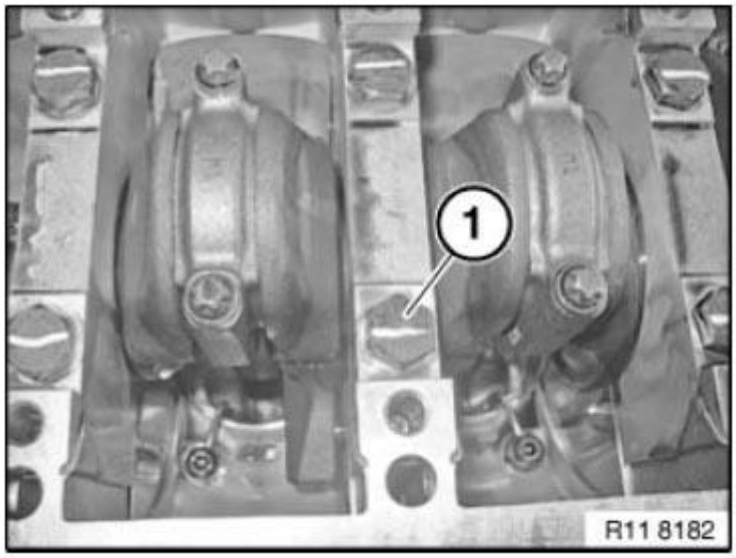



**Fig. 163: Identifying M10 Crankcase Bolts With Colored Marking**
**Courtesy of BMW OF NORTH AMERICA, INC.**

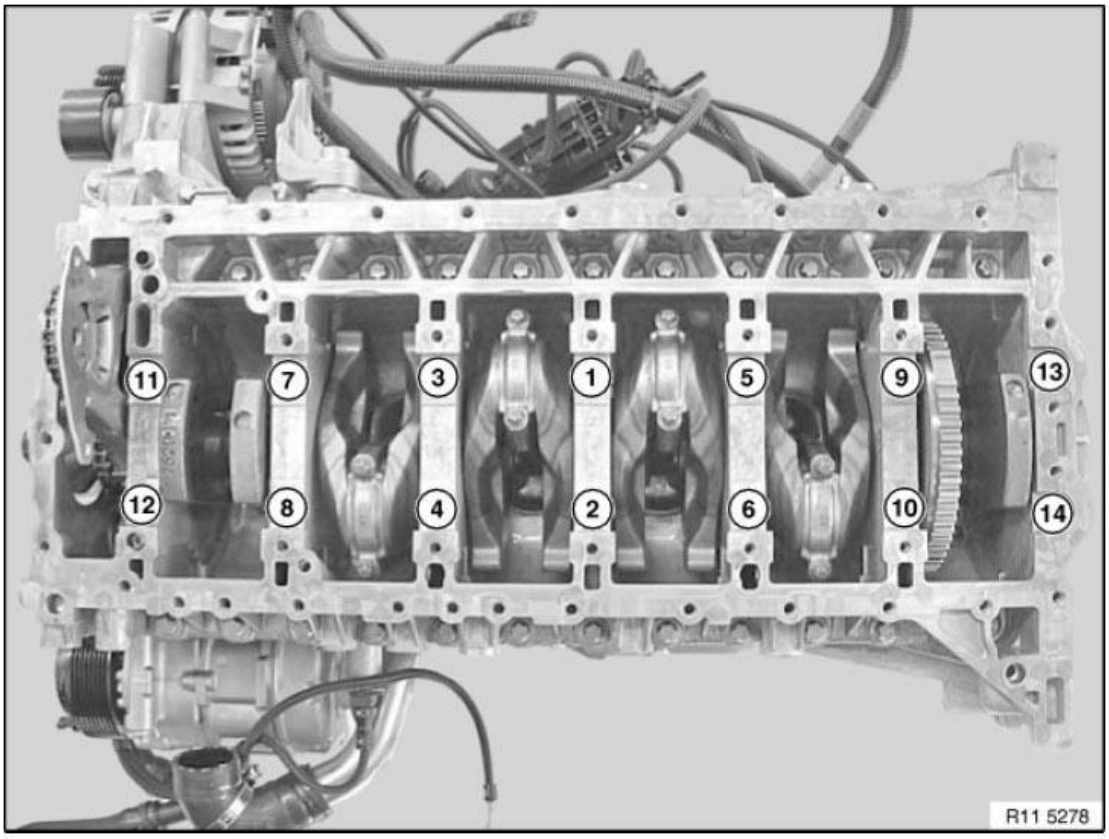



**Fig. 164: Identifying M10 Crankcase Bolts Tightening Sequence**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Secure crankcase bolts M10 in sequence 1 to 14 with special tool **00 9 120** .

Tightening torque: **11 11 1AZ.**

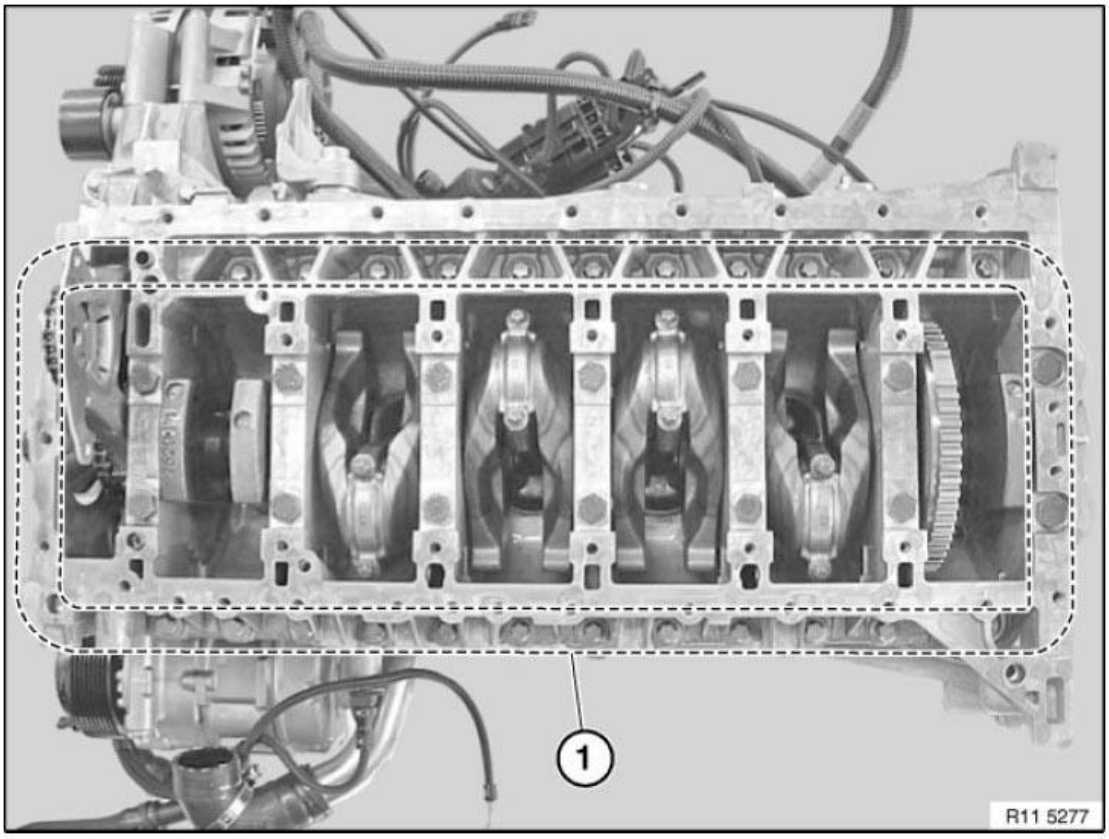



**Fig. 165: Identifying Crankcase Bolts**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Insert all crankcase bolts (1).

**IMPORTANT: Observe different lengths and sizes of the bolts.**

Tightening torque: **11 11 1AZ.**

Tighten screw (1) for oil pump triangular drive with special tool **11 8 640** .

**NOTE: Replace screw.**

Tightening torque: **11 41 4 AZ** .

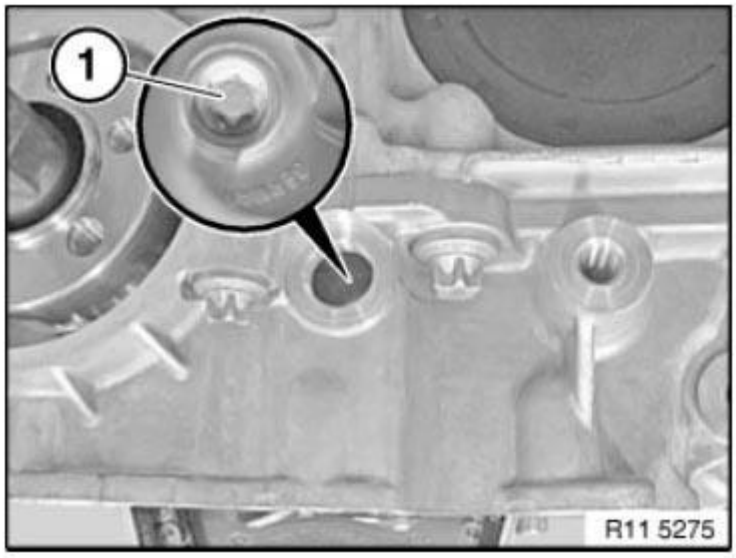



**Fig. 166: Identifying Oil Pump Triangular Drive Mounting Screw**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Tighten screw plug on front of crankcase.

*Installation note:*

Replace sealing ring.

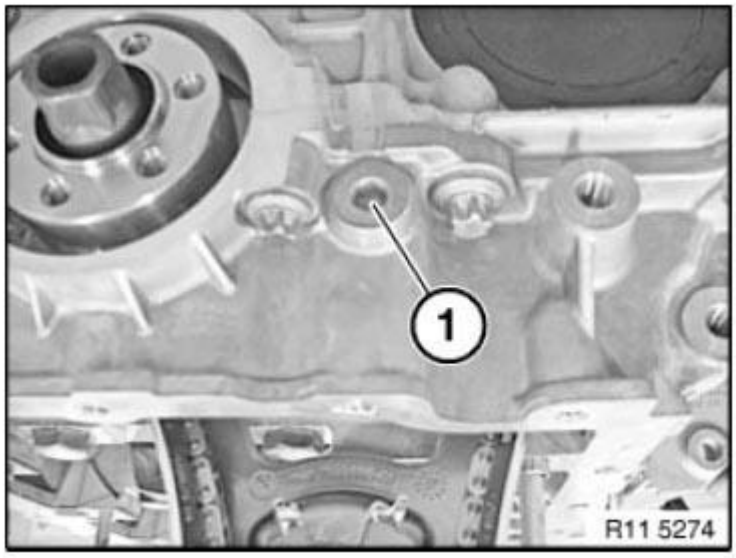



**Fig. 167: Identifying Screw Plug On Front Of Crankcase**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Prepare radial shaft seal (1) on special tool 11 8 220.

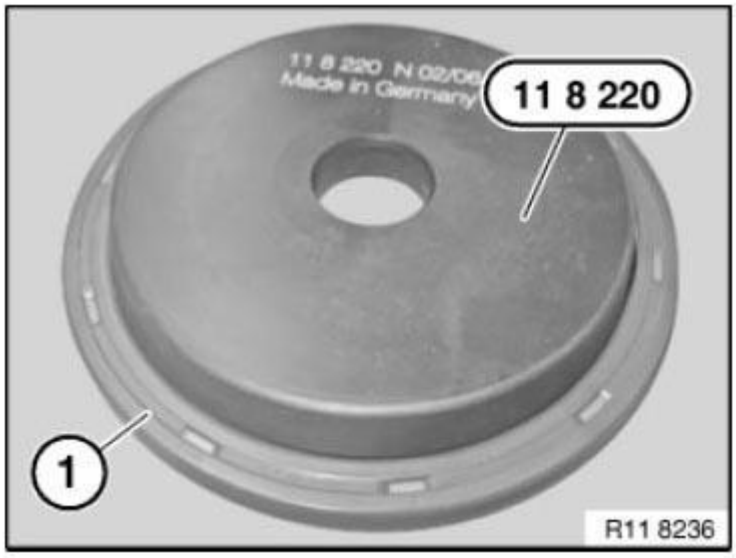



**Fig. 168: Identifying Radial Shaft Seal On Special Tool 11 8 220**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Position radial shaft seal (1) with special tool 11 8 220 on crankshaft.

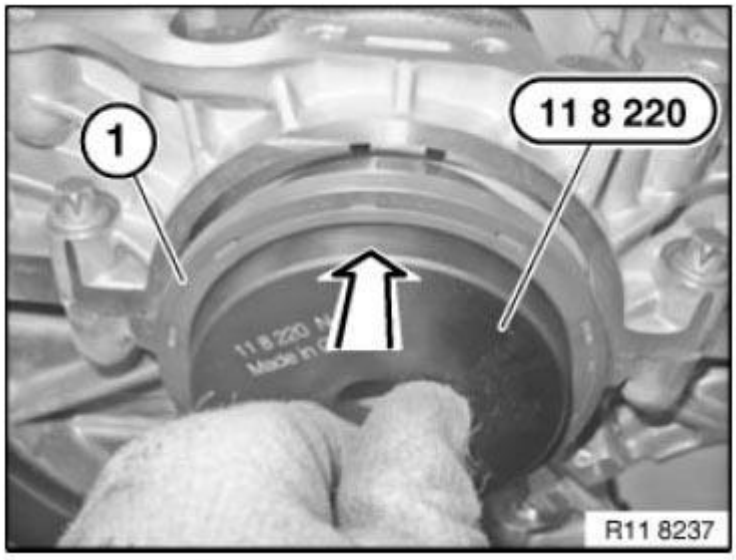



**Fig. 169: Positioning Radial Shaft Seal On Crankshaft Using Special Tool 11 8 220**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Brush radial shaft seal (1) over special tool 11 8 220.

Move radial shaft seal (1) parallel up against the crankcase.

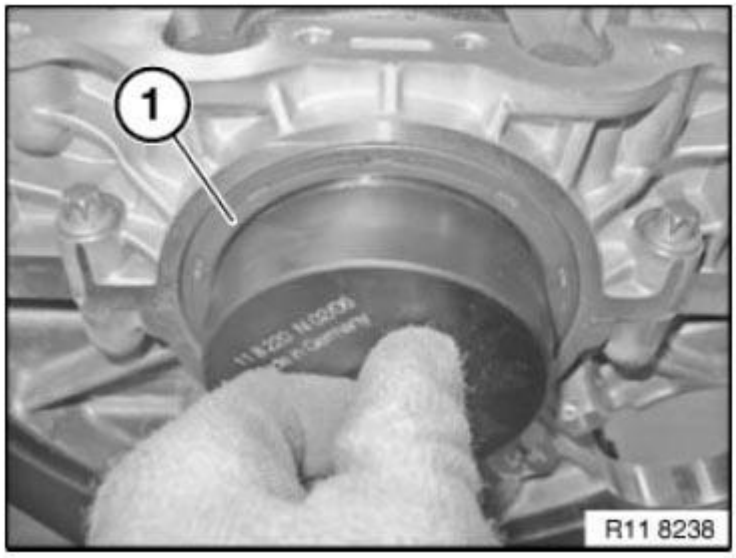



**Fig. 170: Moving Radial Shaft Seal Parallel Up Against Crankcase**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Screw special tool 11 9 182 with screws (special tool 11 9 184) to crankshaft.

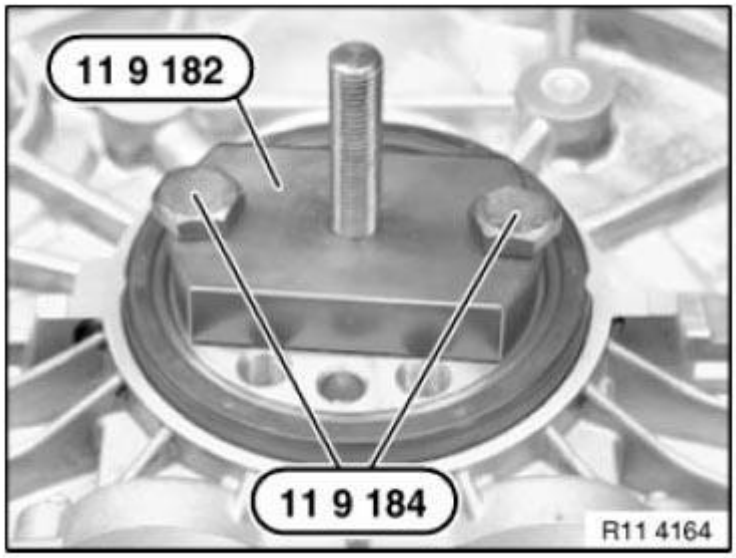



**Fig. 171: Mounting Special Tool 11 9 182 Over Crankshaft Using Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation note:*

Prepare special tool 11 9 181 for installation. Connect special tool 11 9 185 onto special tool 11 8 181.

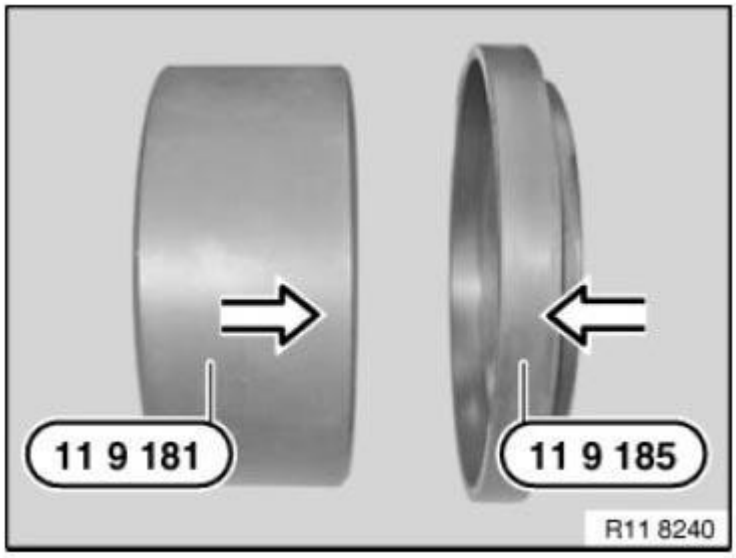



**Fig. 172: Connecting Special Tool 11 9 185 To Special Tool 11 8 181**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Pull on radial shaft seal with special tool 11 9 181 and 11 9 185 in combination with special tool 11 9 183.

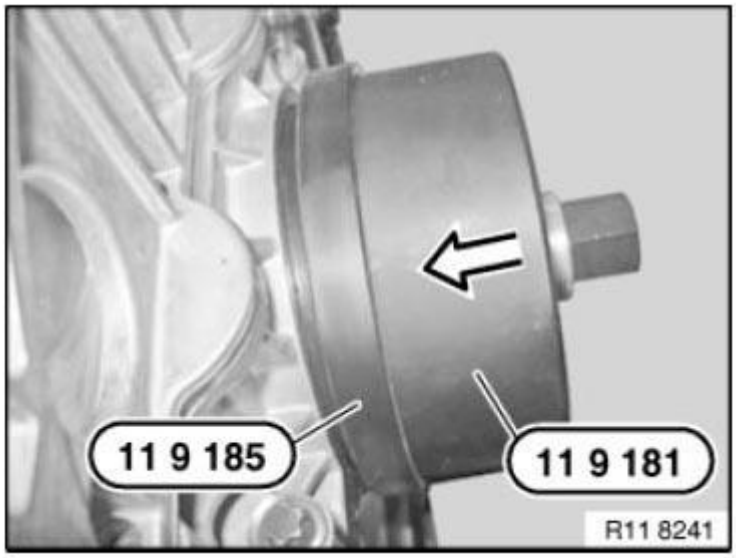



**Fig. 173: Pulling Radial Shaft Seal Using Special Tool 11 9 181/11 9 185/11 9 183**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Screw on radial shaft seal with special tool 11 9 183 to limit position.

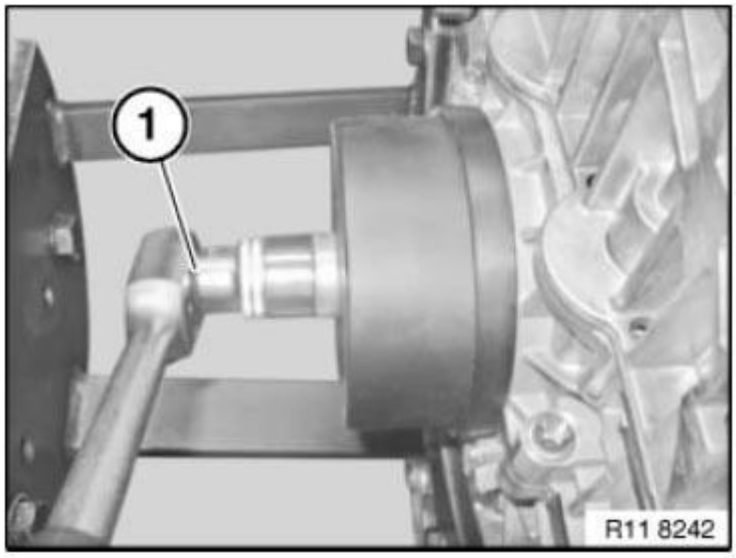



**Fig. 174: Installing Radial Shaft Seal Using Special Tool 119 183**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*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.**

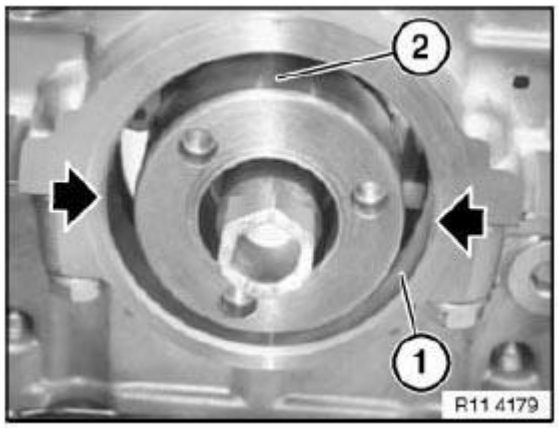



**Fig. 175: Identifying Sealing Surface And Running Surface For Crankshaft Radial Seal**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Push radial shaft seal (1) 11 9 235carefully in direction of arrow on the special tool.

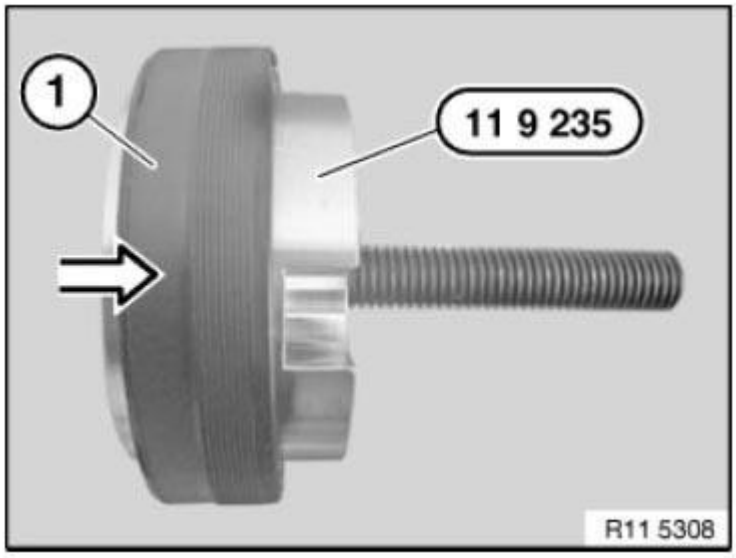



**Fig. 176: Pushing Radial Shaft Seal 11 9 235 Carefully On Special Tool**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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.

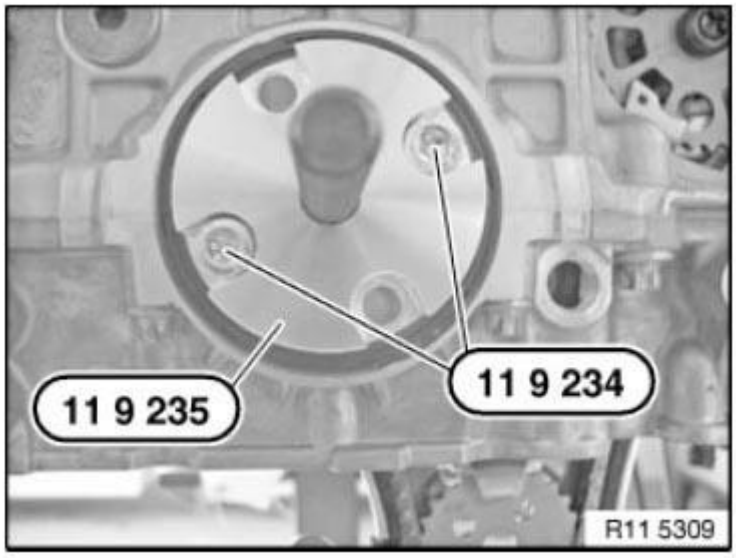



**Fig. 177: Identifying Special Tools On Crankshaft**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.**

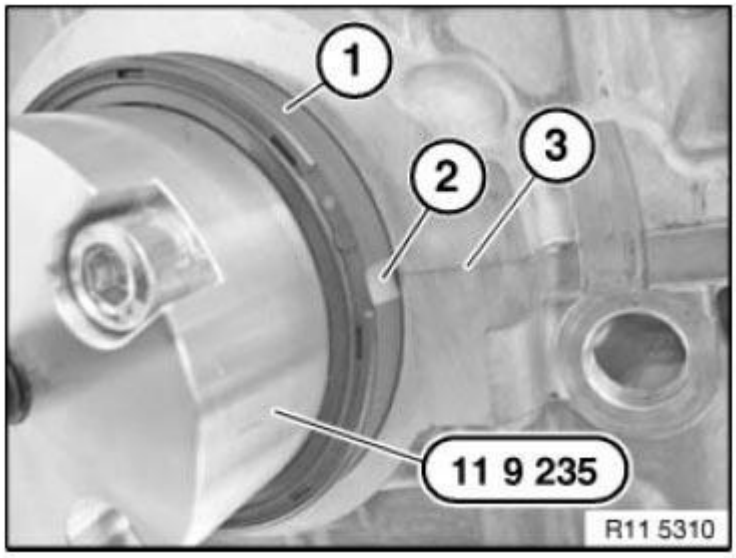



**Fig. 178: Identifying Radial Shaft Seal Groove**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Draw in radial shaft seal with special tool 11 9 231 in conjunction with special tool 11 9 233 until flush.

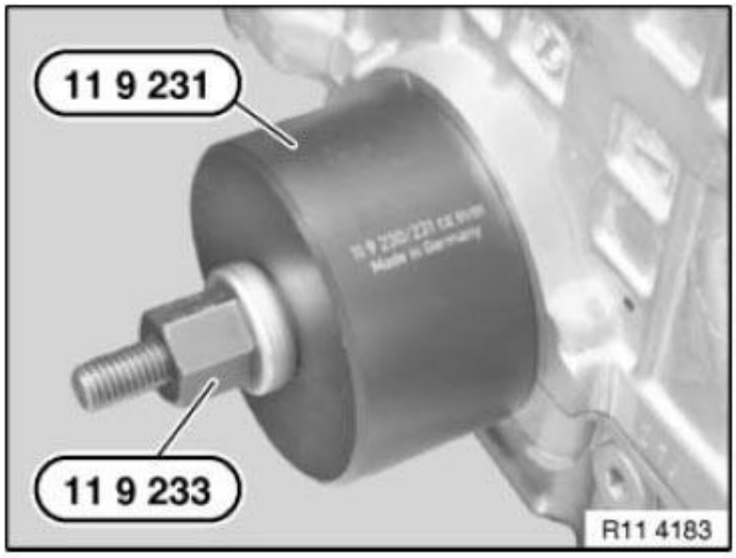



**Fig. 179: Identifying Special Tools 119 231 And 11 9 233**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Drive both injector nozzles (1) on left and right with special tool **11 9 360** into crankcase up to stop.

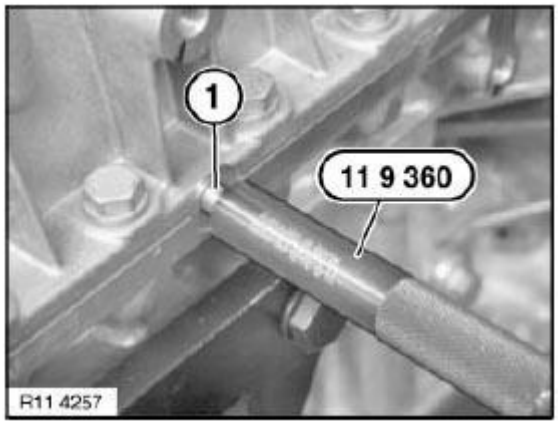



**Fig. 180: Installing Nozzles Using Special Tool 11 9 360**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.**

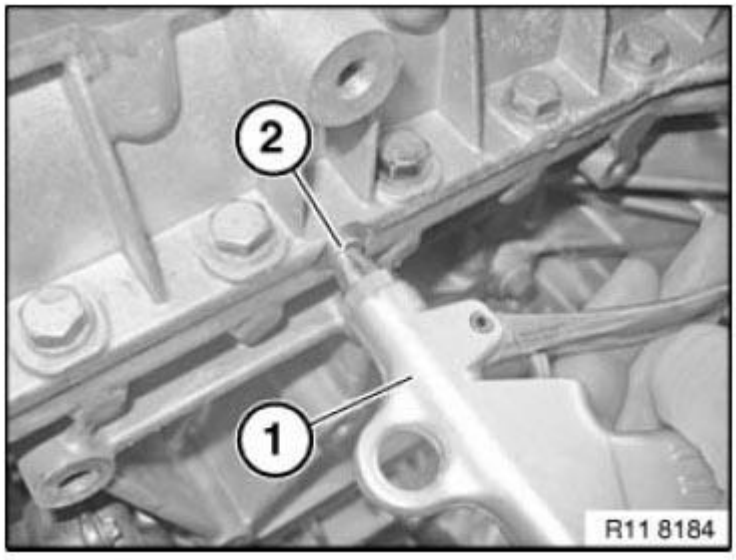



**Fig. 181: Blowing Compressed Air Into Injector Nozzle**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*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.

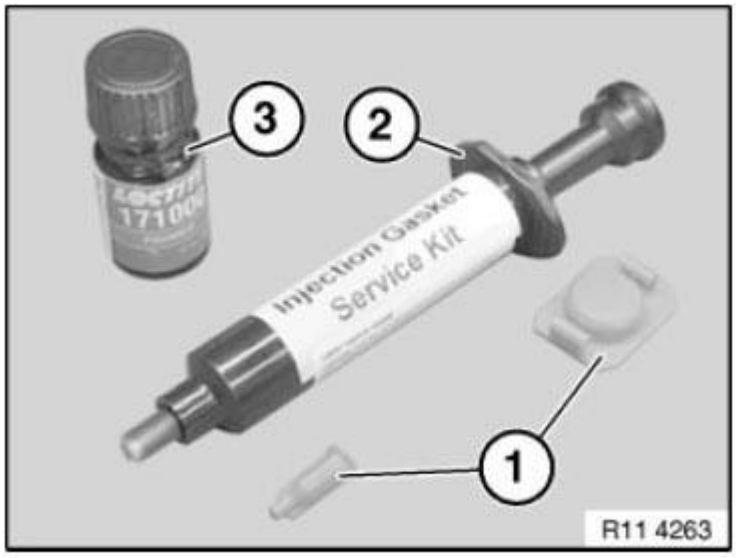



**Fig. 182: Identifying Liquid Sealing Compound, Injector Nozzles And Primer Bottle**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.

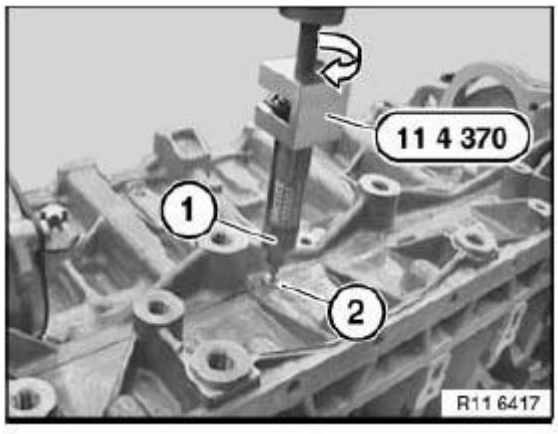



**Fig. 183: Inserting Liquid Sealing Compound Using Special Tool 11 4 370**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Stop (seal off) escaping liquid sealing compound with primer 1.3.

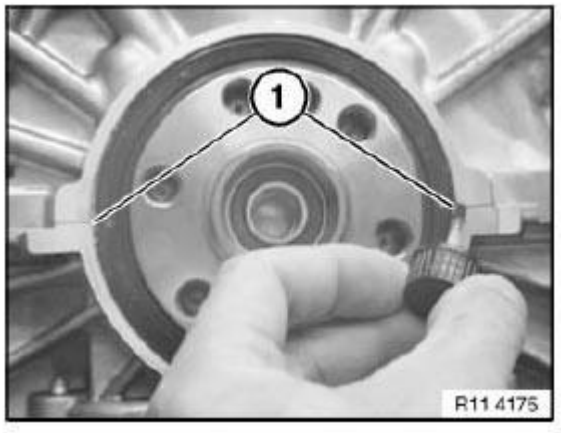



**Fig. 184: Stopping Escaping Liquid Sealing Compound With Primer**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Stop (seal off) escaping liquid sealing compound with primer 1.3.

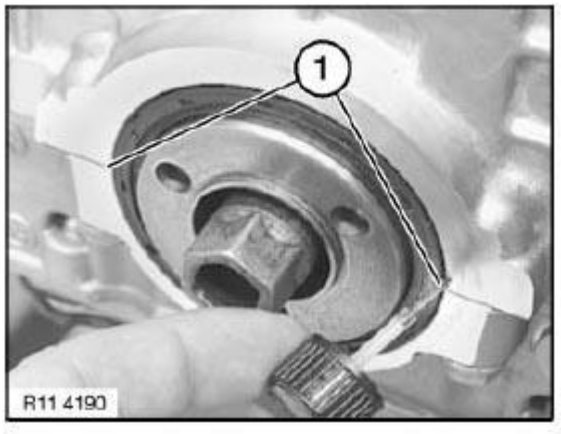



**Fig. 185: Stopping Escaping Liquid Sealing Compound With Primer**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

# FLYWHEEL

### 11 22 500 REMOVING AND INSTALLING/REPLACING FLYWHEEL (N54)

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 4 180
- 11 9 260

*Necessary preliminary tasks:*

- Remove **transmission** . See **24 00 030 REMOVING AND INSTALLING AUTOMATIC TRANSMISSION (GA6HP19Z) N54** or **23 00 018 REMOVING AND INSTALLING TRANSMISSION (GS6-53BZ) N54** .
- Remove **clutch** . See **21 21 500 REMOVING AND INSTALLING/REPLACING CLUTCH (SAC 240)** .

Enlarge special tool 11 9 260 with slot.

Enlarge slot on special tool 11 9 260 to **8 mm** .


**Fig. 186: Identifying Dimension Of Slot On Special Tool 11 9 260**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**For vehicles with manual transmissions**

Secure flywheel with special tool 11 9 260.

Release flywheel screws with special tool 11 4 180.

Tightening torque. See 11 22 1AZ in **11 22 FLYWHEEL** .

*Installation:*

The flywheel is secured with a dowel pin.

**Fit new flywheel screws** .

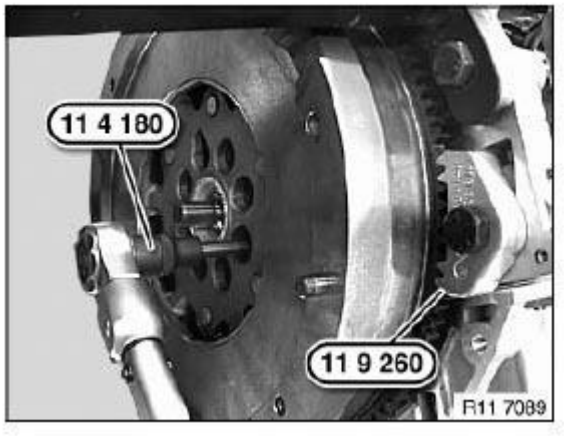



**Fig. 187: Releasing Flywheel Screws Using Special Tool 11 4 180**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**For vehicles with automatic transmissions**

Secure flywheel with special tool 11 9 260.

Release flywheel screws with a suitable tool (1).

Tightening torque. See 11 22 1AZ in **11 22 FLYWHEEL** .

*Installation:*

The flywheel is secured with a dowel pin.

**Fit new flywheel screws** .

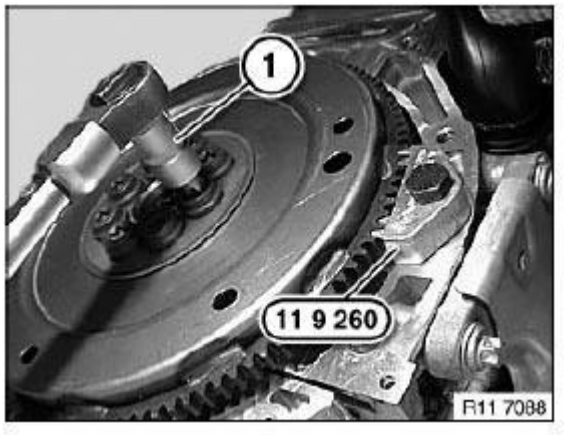



**Fig. 188: Securing Flywheel Using Special Tool 11 9 260**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

## 11 22 513 REPLACING ROLLER BEARING FOR DUAL-MASS FLYWHEEL

**Special tools required:**

For the following special tools, refer to **MANUAL TRANSMISSION - SPECIAL TOOLS** .

- 23 4 031
- 23 4 033
- 23 4 035
- 23 4 036
- 23 4 040

*Necessary preliminary tasks:*

- **Transmission** removed. See **24 00 030 REMOVING AND INSTALLING AUTOMATIC TRANSMISSION (GA6HP19Z) N54** or **23 00 018 REMOVING AND INSTALLING TRANSMISSION (GS6-53BZ) N54** .
- Remove **clutch release bearing** . See **21 51 500 REMOVING AND INSTALLING OR REPLACING CLUTCH RELEASE BEARING/LEVER** .

**Pressing out roller bearing**

Install special tool 23 4 031in 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.

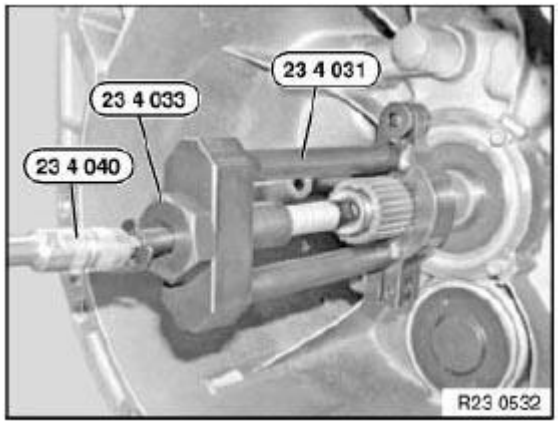



**Fig. 189: Identifying Special Tools 23 4 033, 23 4 031 And 23 4 040**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Remove special tool 23 4 031.

Remove pressed-in grease (1) from drive shaft completely.

Then reinstall special tool.

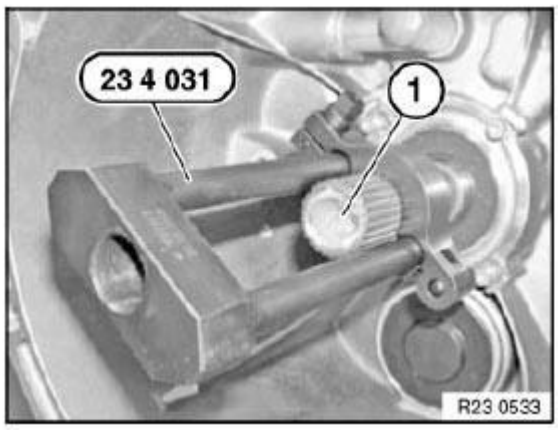



**Fig. 190: Identifying Pressed-In Grease On Drive Shaft**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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.

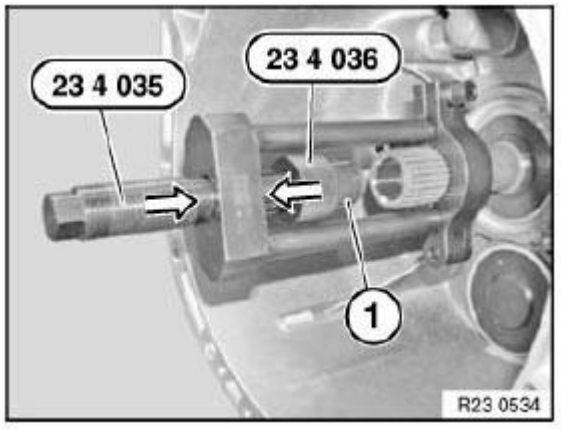



**Fig. 191: Pushing Roller Bearing**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Screw in pressure spindle (1) until roller bearing is fully pressed in.

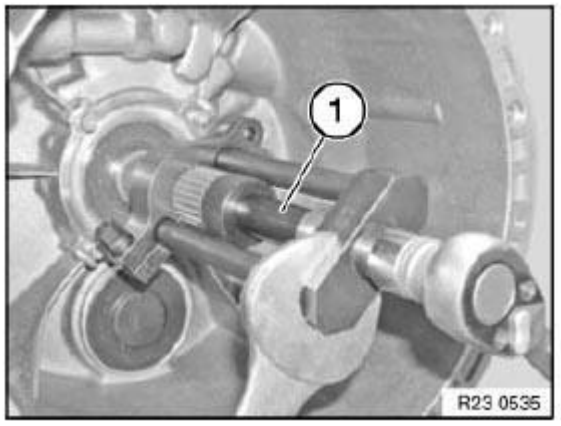



**Fig. 192: Screwing In Pressure Spindle**
**Courtesy of BMW OF NORTH AMERICA, INC.**

## VIBRATION DAMPER

### 11 23 010 REMOVING AND INSTALLING/REPLACING VIBRATION DAMPER (N54)

*Necessary preliminary tasks:*

- Remove front **underbody protection** . See **51 47 490 REMOVING AND INSTALLING/REPLACING FRONT UNDERBODY PROTECTION** .
- Remove **drive belt** . See **11 28 010 REPLACING ALTERNATOR DRIVE BELT (N54)**.

Release screws (1).

Tightening torque. See 11 23 1AZ in **VIBRATION DAMPER** .

Remove vibration damper (2).

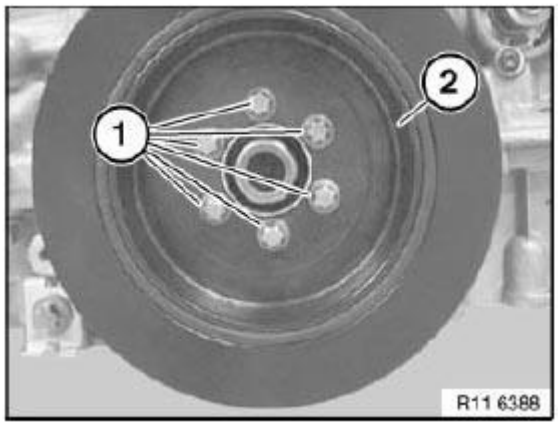



**Fig. 193: Identifying Vibration Damper With Mounting Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

## CONNECTING ROD WITH BEARINGS

### 11 24 571 REPLACING ALL CONNECTING ROD BEARINGS (N54)

**Special tools required:**

For the following special tools, refer to **MAINTENANCE AND GENERAL INFORMATION - SPECIAL TOOLS** .

- 00 2 590
- 00 9 120

**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 connecting rod and in 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.

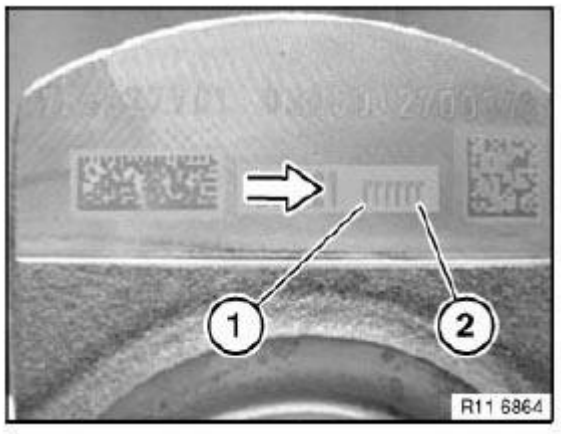



**Fig. 194: Direction Of Fitting Color In Connecting Rod And Connecting Rod Bearing Cap**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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:

Cyl. 1: Classification **r=** rod side Yellow bearing cap side Red.

Cyl. 2: Classification **b=** rod side Violet bearing cap side Blue.

Cyl. 3: Classification **b=** rod side Violet bearing cap side Blue.

Cyl. 4: Classification **r=** rod side Yellow bearing cap side Red.

Cyl. 5: Classification **r=** rod side Yellow bearing cap side Red.

Cyl. 6: Classification **b=** rod side Violet bearing cap side Blue.

Install new conrod bearing shells.

In each case insert only one color of bearing shell (1 and 2) for each conrod.

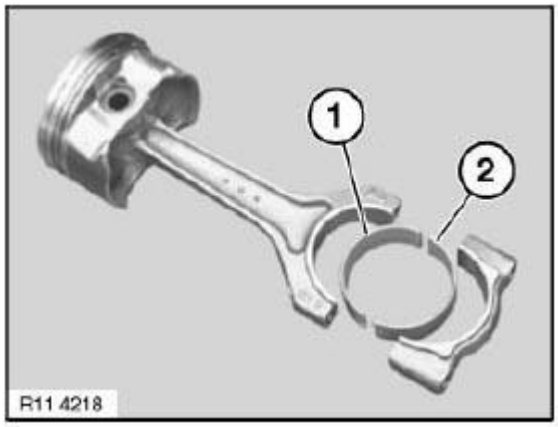



**Fig. 195: Identifying Bearing Shell Colors**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Check conrod 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.

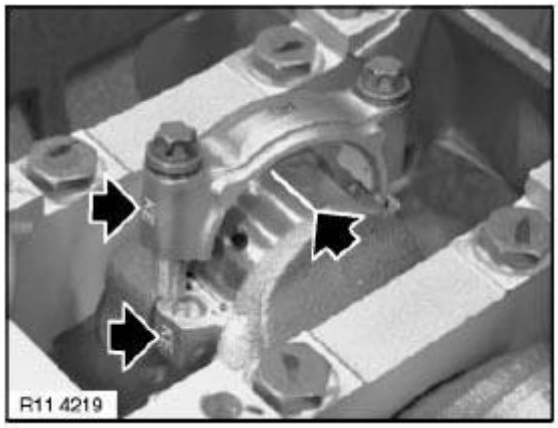



**Fig. 196: Locating Bearing Cap Pairing Letters**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT: Do not distort conrods or crankshaft.**

Use the old conrod bolts to check conrod clearance.

Tighten down conrod bolts with special tool 00 9 120.

Tightening torque. See 11 24 1AZ in **11 24 CONNECTING RODS AND BEARINGS** .

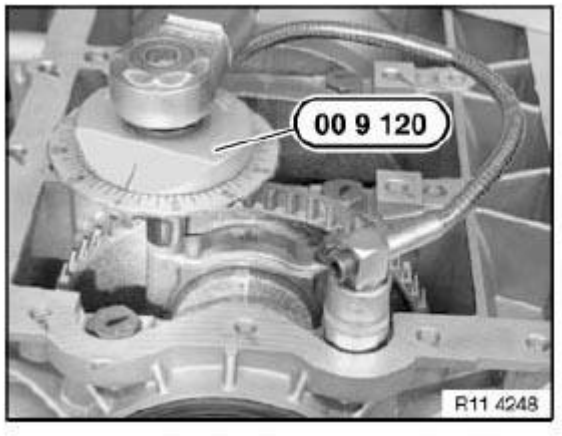



**Fig. 197: Tightening Conrod Bolts Using Special Tool 00 9 120**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Remove bearing cap. Read off bearing clearance at width of crushed plastic thread with aid of measuring scale.

**Conrod bearing clearance** .

- Remove plastic thread.
- Coat crankshaft and bearing shells with oil.
- Install new conrod bolts and tighten down with special tool 00 9 120.

Tightening torque. See 11 24 1AZ in **11 24 CONNECTING RODS AND BEARINGS** .

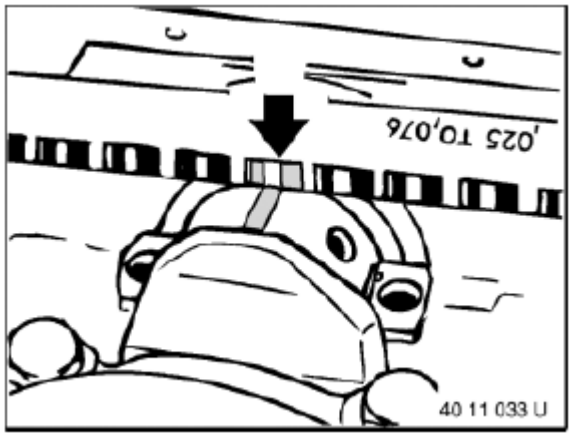



**Fig. 198: Checking Bearing Clearance**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

## PISTON WITH RINGS AND PIN

### 11 25 530 REMOVING AND INSTALLING/REPLACING ALL PISTONS (N54)

**Special tools required:**

For the following special tools, refer to **MAINTENANCE AND GENERAL INFORMATION - SPECIAL TOOLS** .

- 00 9 120

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 5 464
- 11 8 141
- 11 8 560
- 11 8 561
- 11 8 562
- 11 8 563
- 11 8 59

**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 according to weight categories.**
**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** . See **11 00 050 REMOVING AND INSTALLING ENGINE (N54)**.
- Mount engine on **assembly stand** . See **11 00 MOUNTING ENGINE ON ASSEMBLY STAND (N54)**.
- Remove intake air **manifold** . See **11 61 050 REMOVING AND INSTALLING INTAKE AIR MANIFOLD (N54)**.
- Remove **cylinder head** . See **11 12 100 REMOVING AND INSTALLING CYLINDER HEAD (N54)**.
- Remove **oil sump**.
- Remove **oil pump** . See **11 41 000 REMOVING AND INSTALLING OIL PUMP (N54)**.

**NOTE: In event of heavy oil carbon residue:**

Carefully remove oil carbon residue from cylinder wall.

**NOTE: Illustrations show N46.**

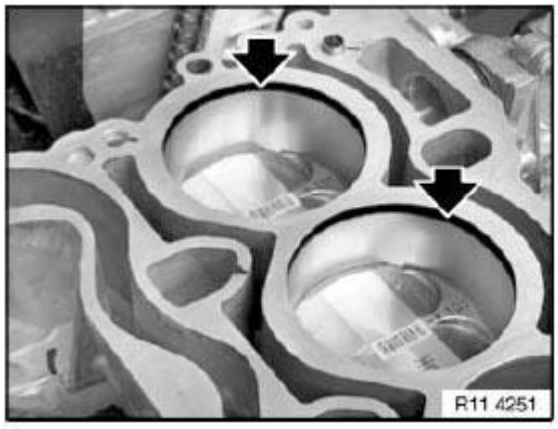



**Fig. 199: Locating Oil Carbon Residue On Cylinder Wall**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Do **not** release screw (1).

**Oil spray nozzle** (2) must not be maladjusted or bent. See **11 21 531 REPLACING ALL CRANKSHAFT MAIN BEARINGS (N54)**.

If necessary, readjust **(risk of damage)** .

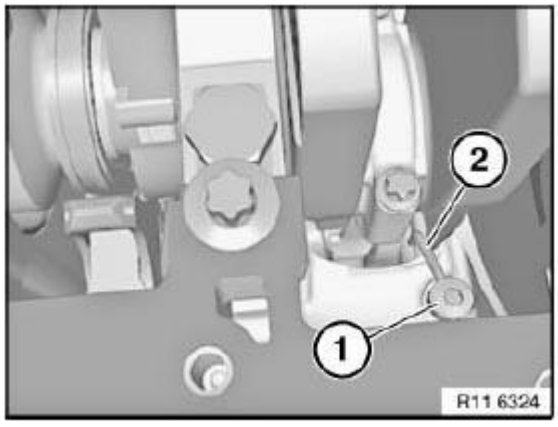



**Fig. 200: Identifying Screw And Oil Spray Nozzle**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release connecting rod bolts (1).

Tightening torque. See 11 24 1AZ in **11 24 CONNECTING RODS AND BEARINGS** .

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.**

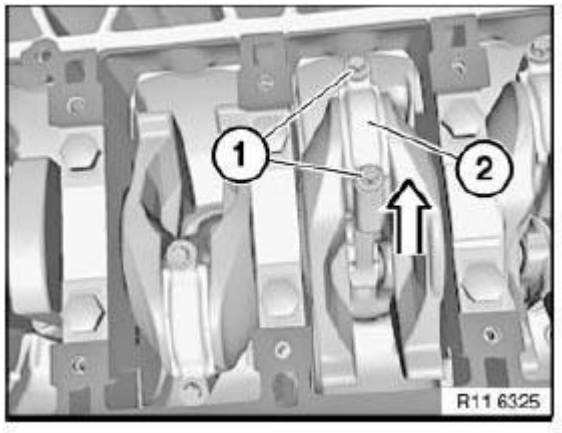



**Fig. 201: Removing Connecting Rod Bearing Cap**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Screw special tool 11 8 590 into base of connecting rod.

Press out connecting rod and piston to cylinder head side.

**IMPORTANT: Risk of damage to oil spray nozzle.**

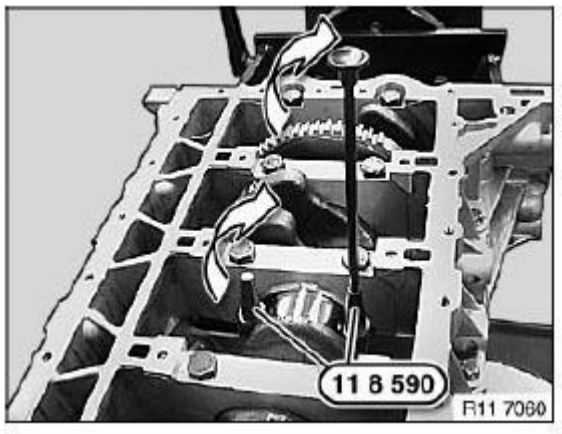



**Fig. 202: Screwing Special Tool 11 8 590**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Preliminary work:*

Clamp special tool 11 8 561 in a vice.

Secure piston (1) with connecting rod to special tool 11 8 561.

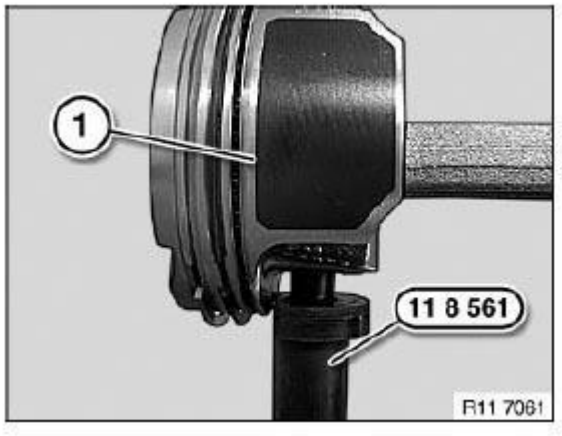



**Fig. 203: Securing Piston Using Special Tool 11 8 561**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**WARNING: Protective goggles must be worn for the next work step.**

**WARNING: Protective goggles must be worn.**

To lever out piston circlip (1), support special tool 11 5 464 on piston (2).

Lever out piston circlip (1) with special tool 11 5 464 in direction of arrow.

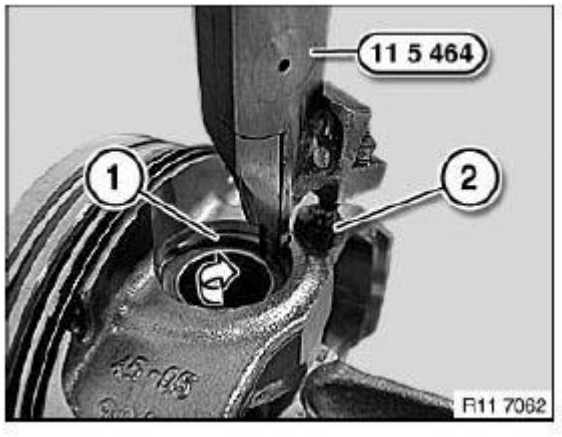



**Fig. 204: Removing Piston Circlip Using Special Tool 11 5 464**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation:*

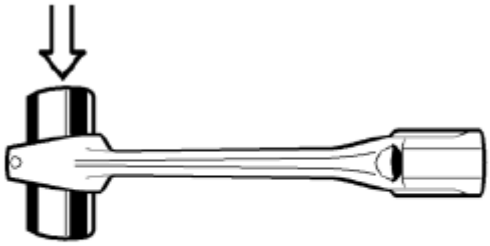
**If necessary, replace connecting rods** .

**IMPORTANT: Connecting rods are divided into weight categories and are only available as a set.**
**Old and new connecting rods must not be installed in mixed combinations.**

*Installation:*

The gudgeon pin must be able to be pressed through the liner by hand with little force and must not display any significant play.



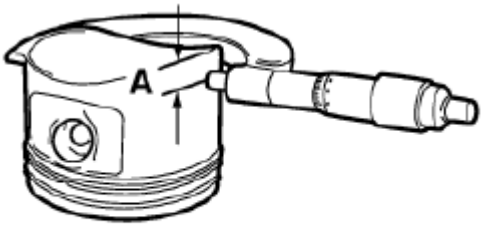
R11 4212

**Fig. 205: 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. 206: Measuring Piston Diameter Using Micrometer At Measuring Point A**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Adjust micrometer to cylinder bore of engine block. Set internal caliper on micrometer to zero. Measure bottom, center and top of cylinder bore in direction of travel and direction of engine rotation.

Diameter of cylinder bore.

Piston installation clearance.

**Total permissible wear tolerance** .

*Installation:*

**If necessary, replace piston** .

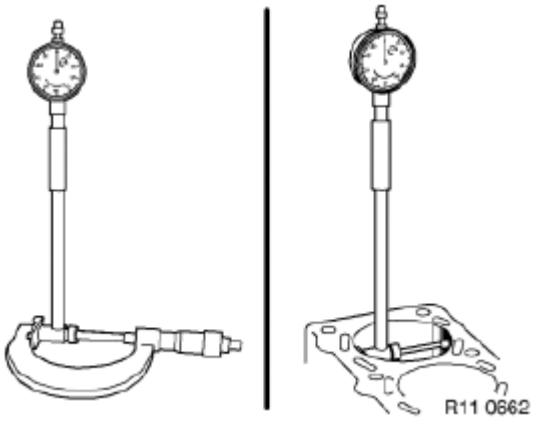



**Fig. 207: Measuring Cylinder Bore Diameter**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**WARNING: Protective goggles must be worn.**

**IMPORTANT: The opening of the piston pin circlip must be installed in the *6 o'clock position* on the piston.**
***Risk of damage!***

Insert piston circlip (2) into groove of special tool 11 8 562.

Bring piston circlip (2) into assembly position (1).

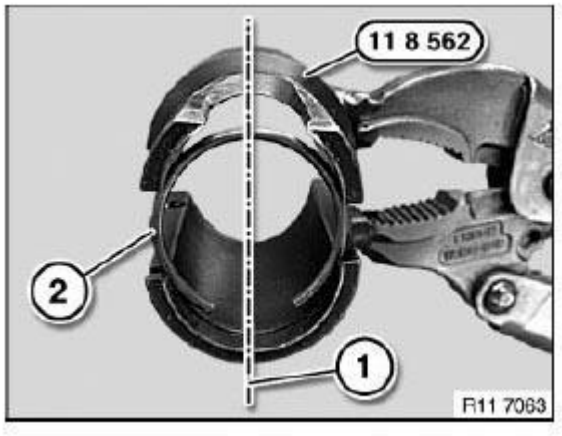



**Fig. 208: Inserting Piston Circlip Into Groove Of Special Tool 11 8 562**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**WARNING: Protective goggles must be worn.**

Slide special tool 11 8 563 up to piston pin circlip (2)

Special tools 11 8 562 and 11 8 563 are prepared.

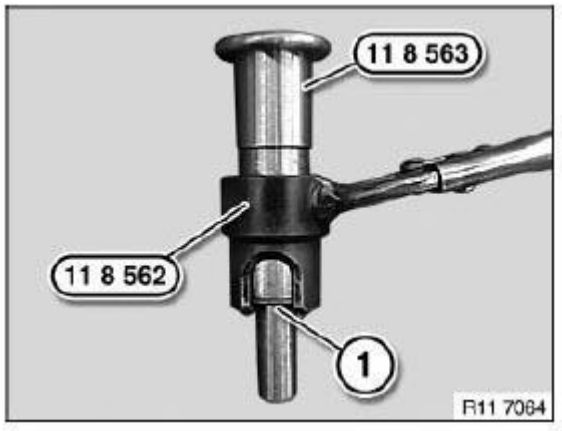



**Fig. 209: Identifying Special Tools 11 8 562 And 11 8 563**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**WARNING: Protective goggles must be worn.**

Cutout on special tool 11 8 562 must point to piston crown; only then can special tool 11 8 563 be correctly fitted.

When special tools 11 8 562 and 11 8 563 are correctly positioned, the piston pin circlip must be driven in with

a plastic hammer in the direction of the arrow.

**NOTE: See Fig. 210.**

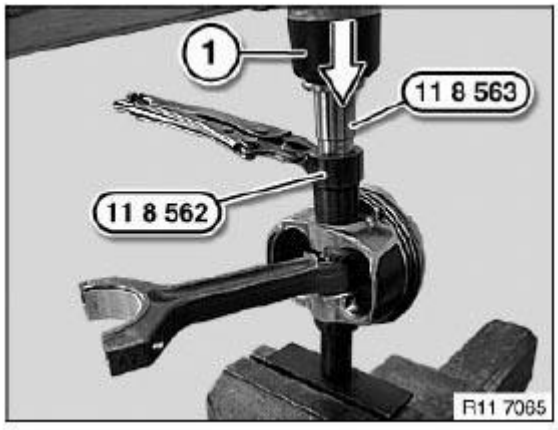



**Fig. 210: Drive In Piston Pin Circlip**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Piston pin circlip is correctly installed when opening (1) points downwards.

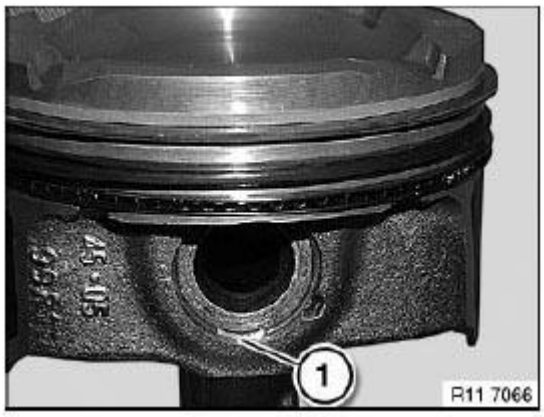



**Fig. 211: Position Of Installing Piston Pin Circlip**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**NOTE: B 30.**

Install all **piston rings** . See **PISTON WITH RINGS AND PIN** .

Install all **bearing shells** . See **CONNECTING ROD WITH BEARING** .

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:*

Check protective lugs (1) on special tool 11 8 590 for correct position and damage.

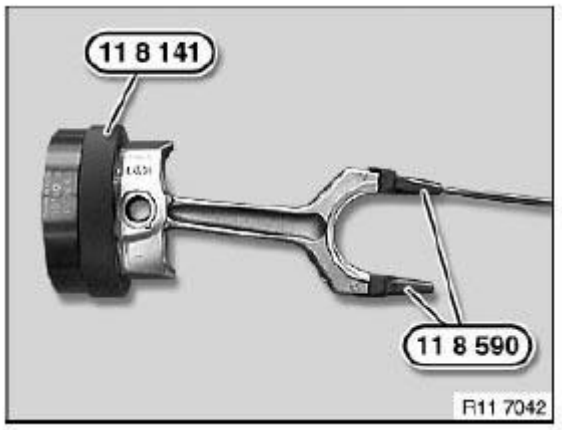



**Fig. 212: Identifying Special Tools 11 8 590 And 11 8 141**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Insert piston with connecting rod in cylinder.

**IMPORTANT: Risk of damage to oil spray nozzle.**
**Danger of piston ring failure.**
**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.

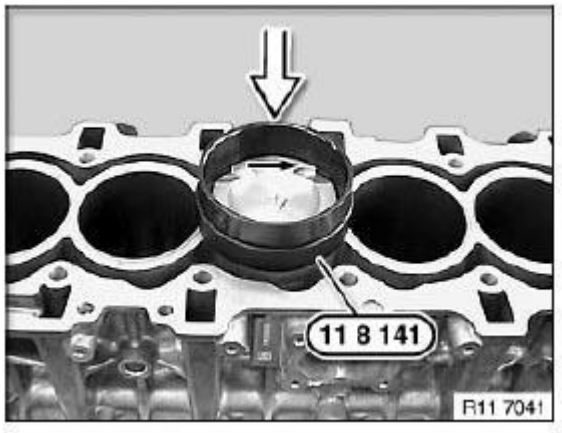



**Fig. 213: Direction Of Pressing Piston**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT: Connecting rod and connecting rod bearing cap are marked with pairing letters (1) and must not be mixed up.**
**Mixing them up or incorrectly fitting the connecting rod bearing cap on the big end will result in *engine damage* .**

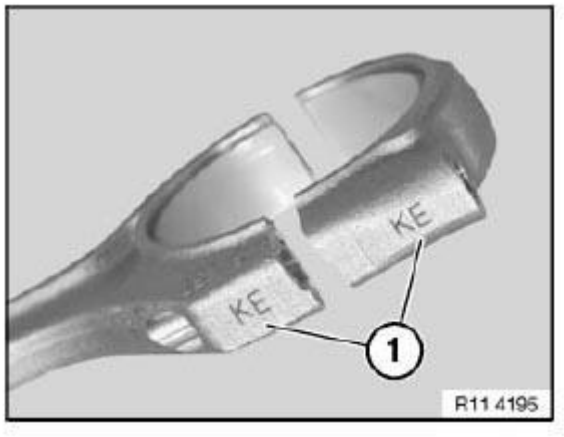



**Fig. 214: Identifying Bearing Cap Marked With Pairing Letters**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Apply a light coat of oil to crank pin.

Assemble connecting rod and crank pin.

Screw off special tool 11 8 560 in counterclockwise direction.

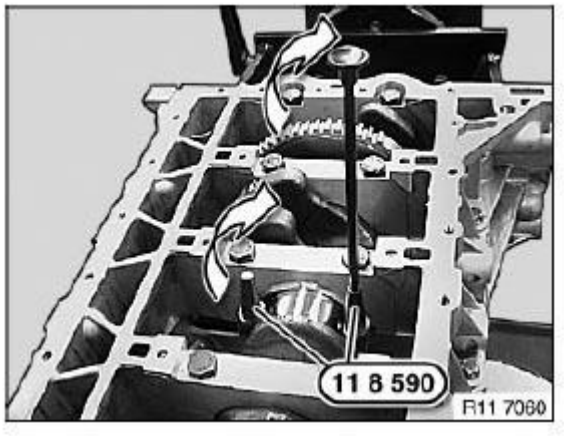



**Fig. 215: Screwing Off Special Tool In Counterclockwise Direction**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Fit bearing caps (2) so that pairing letters match up.

Install new connecting rod bolts (1).

Tightening torque. See 11 24 1AZ in **11 24 CONNECTING RODS AND BEARINGS** .

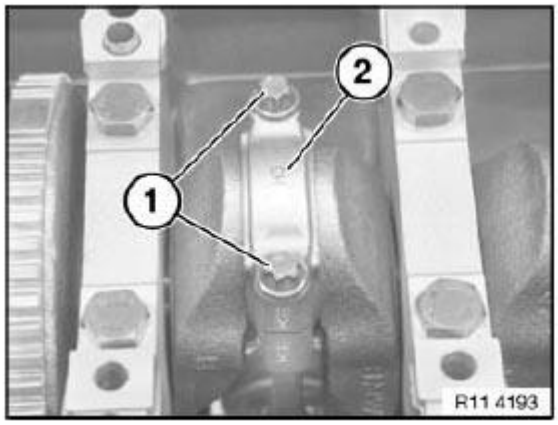



**Fig. 216: Identifying Bearing Caps And Connecting Rod Bolts**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Adjust torsion angle of conrod with special tool 00 9 120 (see **Fig. 217**).

Tightening torque. See 11 24 1AZ in **11 24 CONNECTING RODS AND BEARINGS** .

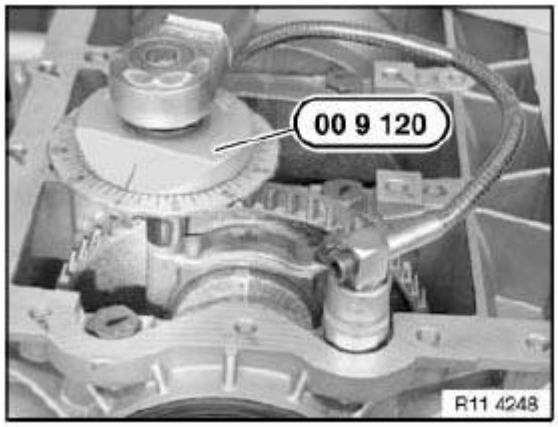



**Fig. 217: Adjusting Torsion Angle Of Conrod Using Special Tool 00 9 120**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

**11 25 671 REPLACING PISTON RINGS ON ALL PISTONS (N54)**

*Necessary preliminary tasks:*

- Remove all **PISTONS**.

Measuring axial clearance of piston rings in piston ring groove.

See **ENGINE - TECHNICAL DATA** .

**NOTE: It is not possible to measure the axial clearance of the oil scraper rings.**

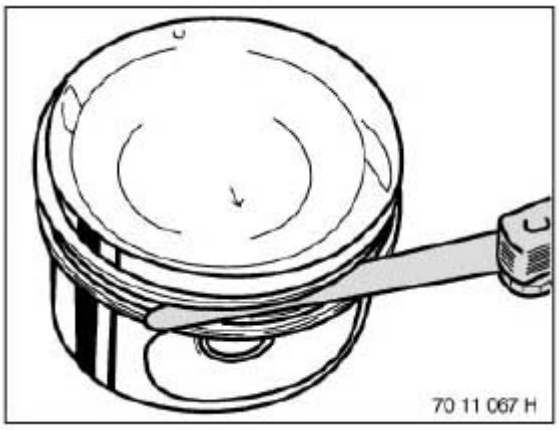



**Fig. 218: Measuring Axial Clearance Of Piston Rings In Piston Ring Groove**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.**

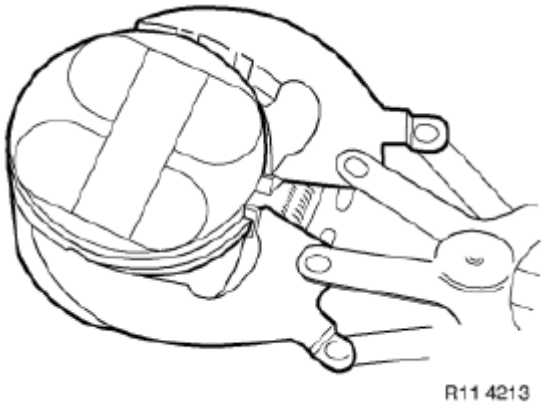



**Fig. 219: Removing Compression Ring**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation:*

New pistons may only be installed together with new piston rings.

Determine **gap** with a feeler gauge. See **ENGINE - TECHNICAL DATA** .

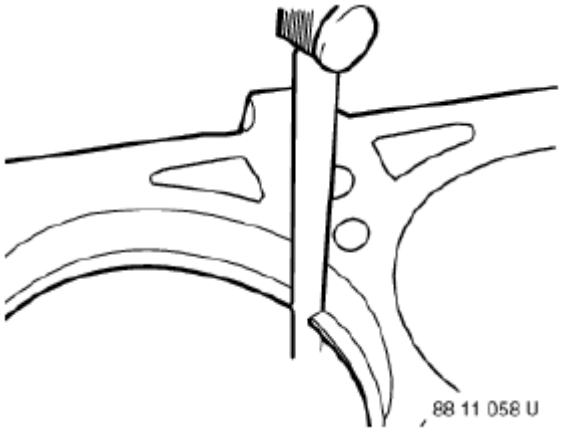



**Fig. 220: Measuring Piston Gap Using Feeler Gauge**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**NOTE: Schematic representation of piston rings.**

*Installation:*

Piston rings with "TOP" identification must point to piston crown.

1. Plain compression ring
2. Stepped compression ring "Top"
3. Two-part oil scraper ring

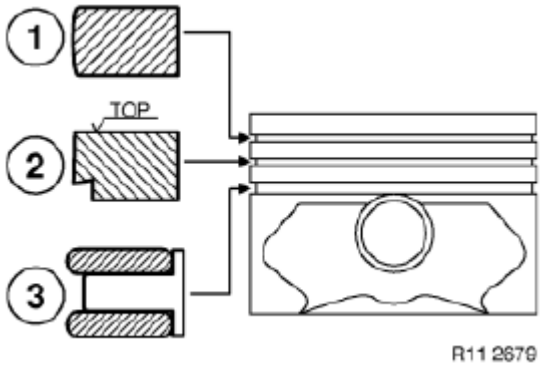



**Fig. 221: Identifying Piston Rings**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**NOTE: Oil control ring comprises two steel band rings (1) and a support spring (2).**

*Installation:*

Insert support spring (2) into piston ring groove and then fit steel band rings (1) so that contact points are offset by approx. 120°.

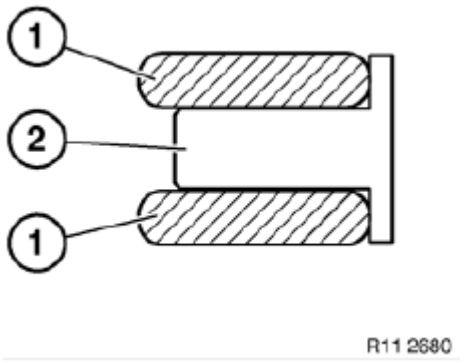



**Fig. 222: Identifying Steel Band Rings And Support Spring**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Offset the contact points (1) of the piston rings by approx. 120° to each other but do not position above the piston pin boss.

**NOTE: See Fig. 223 N52.**

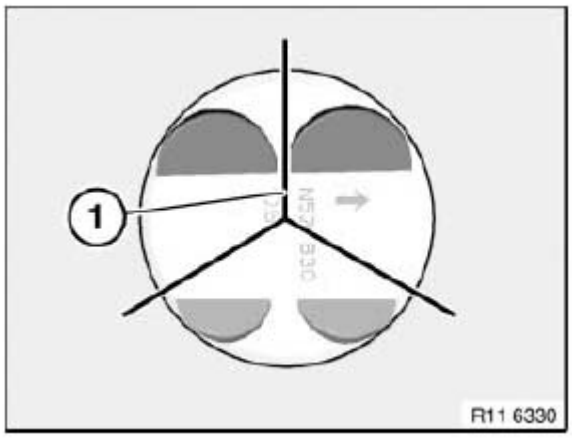



**Fig. 223: Off Setting Of Piston Rings Contact Points**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

# V-RIBBED BELT WITH TENSIONER/DEFLECT ELEMENT

### 11 28 010 REPLACING ALTERNATOR DRIVE BELT (N54)

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 3 340

**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** . See **17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N54)** .

Unfasten hose clip (1).

Release quick-connect fastener (3) 90° on boost pressure pipe in direction of arrow.

Pull off air hose (2).

*Installation:*

Bring lock (3) back 90° into installation position.

Recirculated air hose must audibly snap into place.

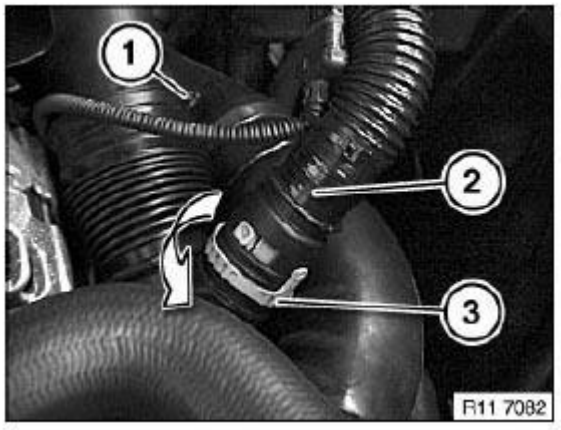



**Fig. 224: Releasing Quick-Connect Fastener**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Unclip line (1) from holder (2) in direction of arrow.

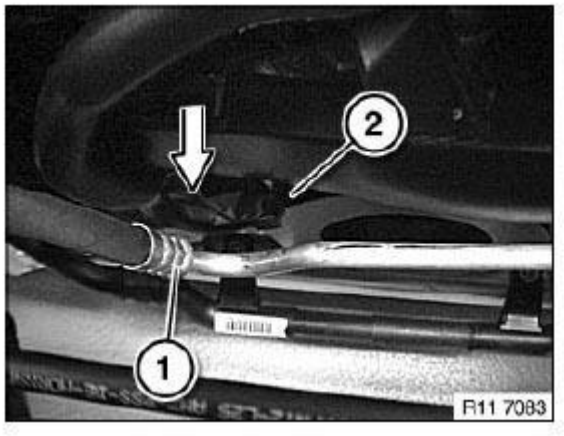



**Fig. 225: Uncoupling Line From Holder**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release coolant hose (1) from holder (2).

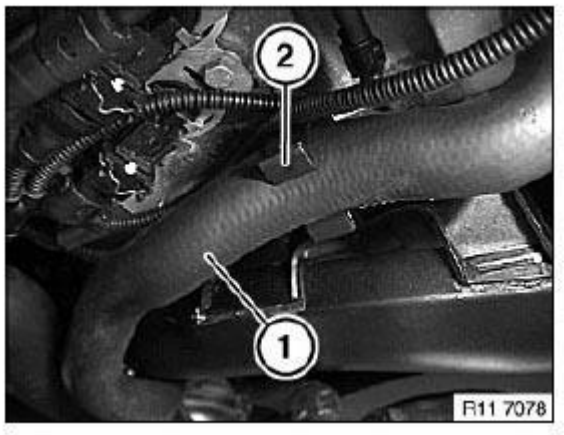



**Fig. 226: Identifying Coolant Hose And Holder**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screw (1).

Fold air duct (2) down.

**NOTE: Do not remove air duct (2).**

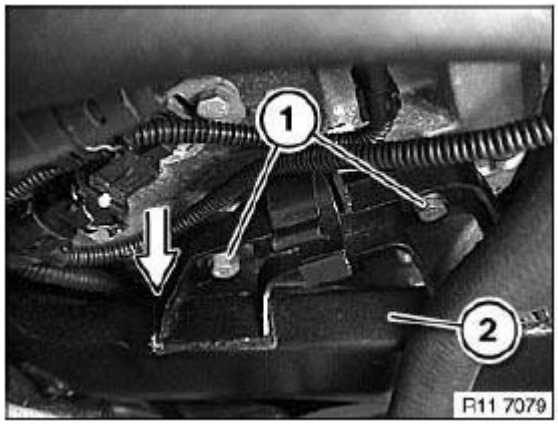



**Fig. 227: Folding Air Duct Down**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.

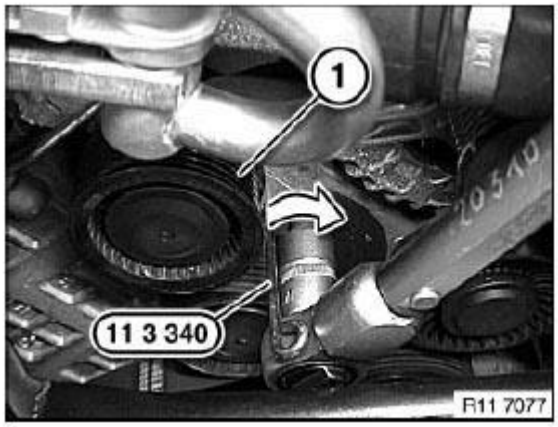



**Fig. 228: Turning Belt Tensioner**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Remove drive belt (1).

*Installation:*

Mark the direction of rotation of the drive belt if it is to be reused.

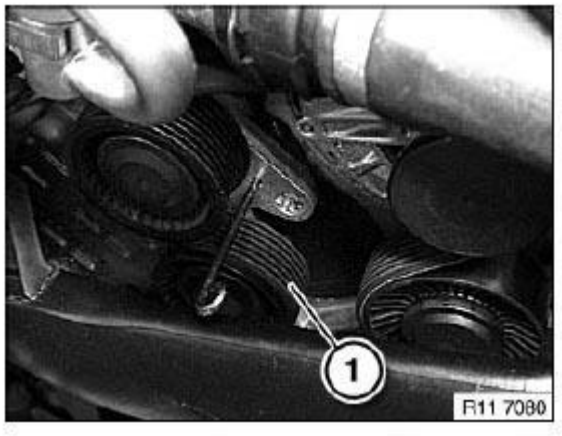



**Fig. 229: Identifying Drive Belt**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Pretension tensioning pulley (1) in direction of arrow.

Remove special tool 11 3 340.

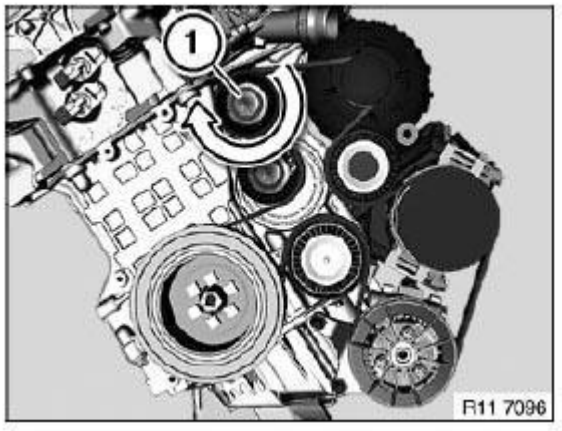



**Fig. 230: Pretensioning Tensioning Pulley**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation:*

Note arrangement of drive belt

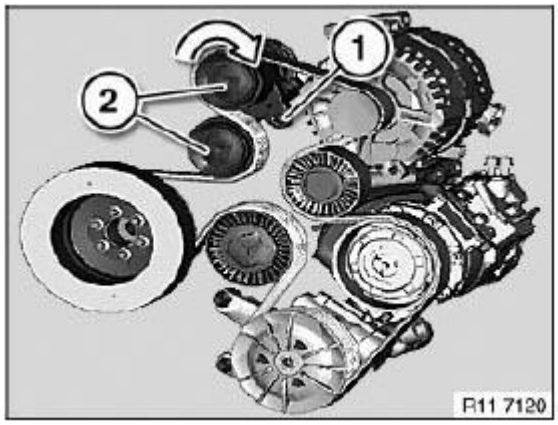



**Fig. 231: Drive Belt Routing Diagram**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

*Installation:*

**Risk of damage!**

Check that drive belt is in correct installation position.

**11 28 020 REPLACE ALTERNATOR DRIVE BELT TENSIONER (N54)**

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 3 340

*Necessary preliminary tasks:*

- Remove **drive belt** . See **11 28 010 REPLACING ALTERNATOR DRIVE BELT (N54)**.

Remove special tool 11 3 340.

Release screw on belt tensioner.

Tightening torque. See 11 28 1AZ in **11 28 V-RIBBED BELT WITH TENSION AND DEFLECTION ELEMENT** .

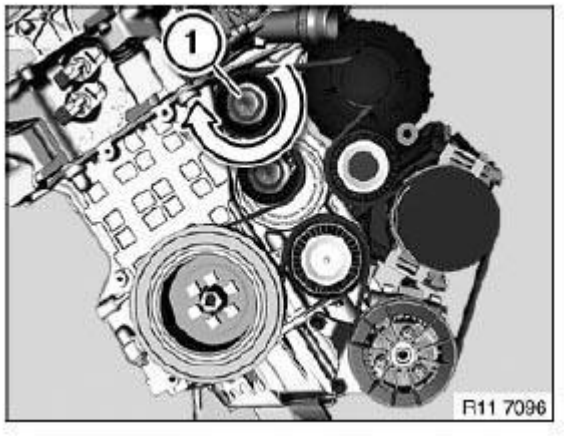



**Fig. 232: Releasing Screw On Belt Tensioner**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

## CAMSHAFT

**11 31 005 CHECKING CAMSHAFT TIMING (N54)**

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 0 300
- 11 4 281
- 11 4 283

*Necessary preliminary tasks:*

- Remove **cylinder head cover** . See **11 12 000 REMOVING AND INSTALLING/SEALING CYLINDER HEAD COVER (N54)**.
- Remove front **underbody protection** . See **51 47 490 REMOVING AND INSTALLING/REPLACING FRONT UNDERBODY PROTECTION** .

Remove fastener (1) in direction of arrow.

*Installation:*

Install fastener (1) with bore facing outwards.

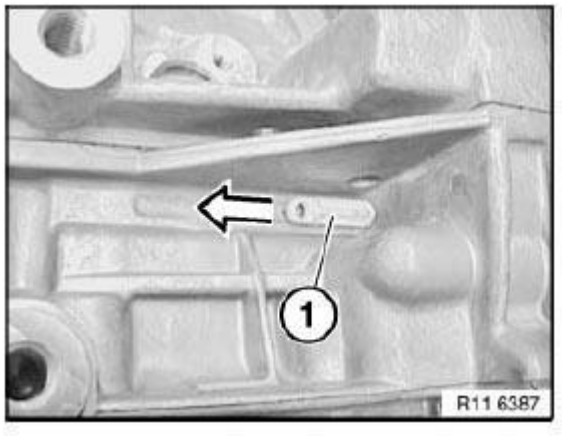



**Fig. 233: Removing Fastener**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Rotate crankshaft at central bolt into TDC position.

Slide in special tool 11 0 300 in direction of arrow and secure 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.**

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.

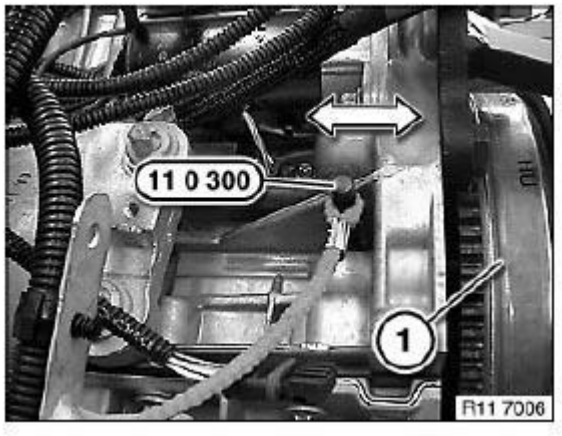



**Fig. 234: Sliding In Special Tool 11 0 300**
**Courtesy of BMW OF NORTH AMERICA, INC.**

With 1st cylinder in firing TDC position, cams of inlet camshaft (1) at 6th cylinder point downwards at an angle.

With 1st cylinder in firing 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.**

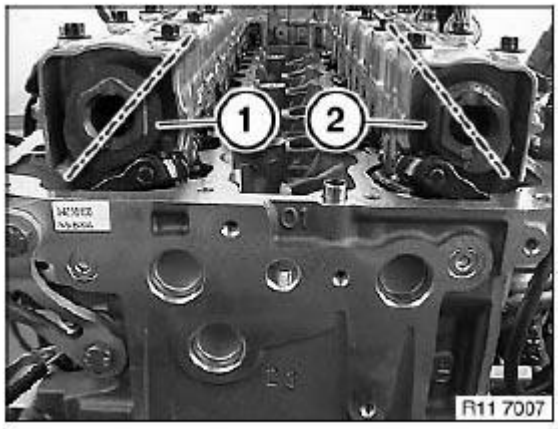



**Fig. 235: Identifying Cams Of Inlet And Exhaust Camshaft**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Secure special tool 11 4 283 on cylinder head with screws (1).

Mount special tool 11 4 281 on intake and exhaust camshafts.

If special tools 11 4 281 cannot be attached, the **timing** must be adjusted. See **11 31 505 ADJUSTING CAMSHAFT TIMING (N54)**.

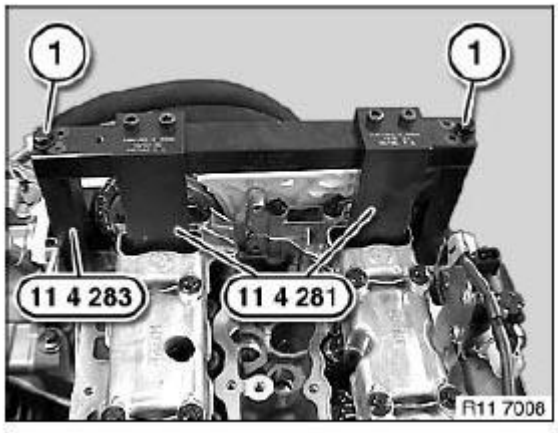



**Fig. 236: Identifying Special Tools 11 4 283, 11 4 281 With Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Remove all special tools.

Assemble engine.

## 11 31 025 REMOVING AND INSTALLING OR REPLACING INLET CAMSHAFT (N54)

**Special tools required:**

For the following special tools, refer to **MAINTENANCE AND GENERAL INFORMATION - SPECIAL TOOLS** .

- 00 9 120

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 4 350
- 11 8 550
- 11 8 551
- 11 8 552
- 11 8 553
- 11 9 000

**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 banks must be tensioned with a total of six special tools 11 8 553.**
**Special tool 11 8 550 can be used for inlet and exhaust sides.**

*Necessary preliminary tasks:*

- Remove **cylinder head cover**.
- Remove **inlet adjustment unit** of inlet camshaft.

Release bearing cap screw connections from outside inwards.

Lift out lower and upper bearing banks (1) with camshaft.

**NOTE: Illustration shows N52.**

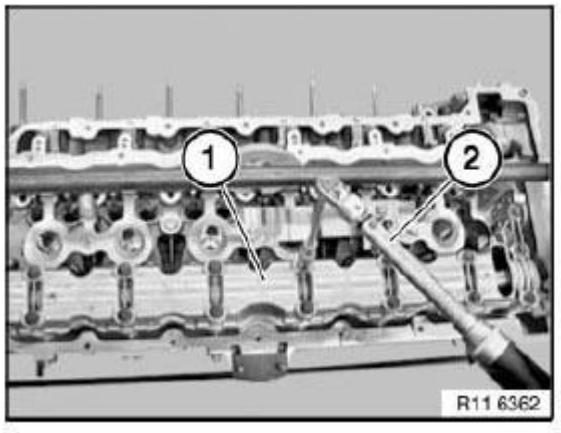



**Fig. 237: Releasing Bearing Cap Screw Connections**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Remove upper bearing shell.

Remove inlet camshaft (1) marked with (E).

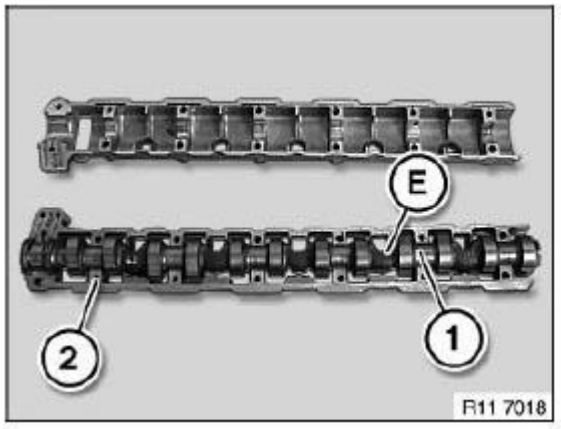



**Fig. 238: Identifying Inlet Camshaft Marked**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT: Both camshafts have different markings.**
**Mixing up the two camshafts will result in *engine damage* .**

A Exhaust camshaft

E Inlet camshaft

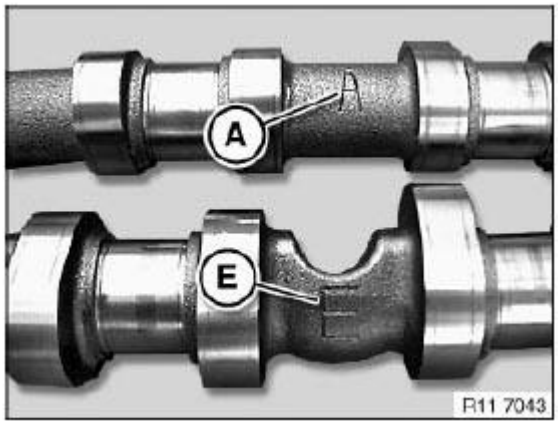



**Fig. 239: Identifying Exhaust And Inlet Camshaft**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Check plain compression rings (1) for damage and replace if necessary.

Plain compression rings (1) are engaged at joint.

Press plain compression rings (1) apart upwards and downwards and removed towards front.

**IMPORTANT: Plain compression rings (1) can easily break.**

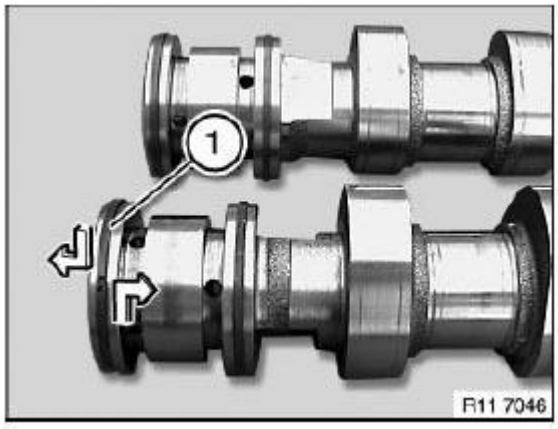



**Fig. 240: Pressing Plain Compression Rings**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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 profile insert.**

**Installing camshaft bearing bank**

Pre-install special tool 11 8 551on cylinder nos. 2 and 3.

Insert special tool 11 8 552 in screw connection of cylinder head cover.

Special tool 11 8 551is marked with letters E and A.

E = Inlet side

A = Exhaust side

Press down roller cam follower on cylinder no. 3 with spindle nut (2) of special tool 11 8 551.

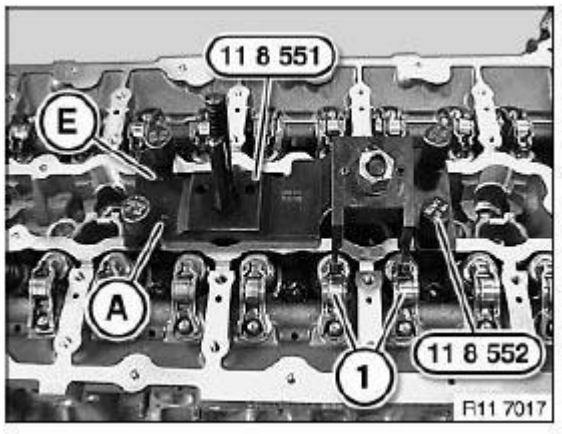



**Fig. 241: Identifying Special Tools 11 8 551 And 11 8 552**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation:*

Before installing inlet camshaft, make sure roller cam follower is correctly seated on HVCA element and valve.

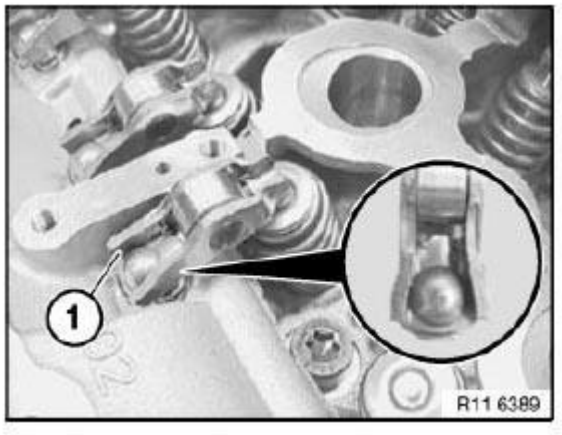



**Fig. 242: Identifying Roller Cam Follower Installation Position**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation:*

Pre-install bearing strip of inlet camshaft.

Lubricate all bearing points in lower bearing strip with engine oil.

*Installation:*

Lay inlet camshaft (1) in bearing strip.

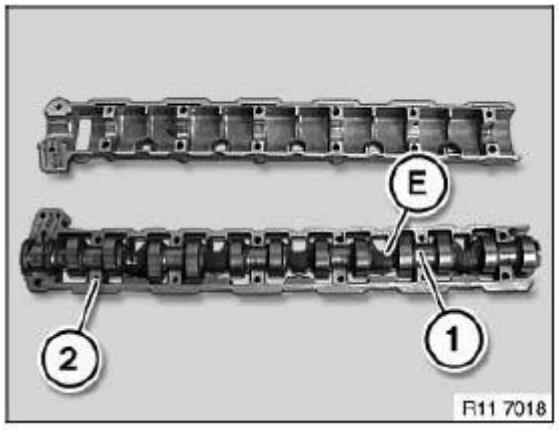



**Fig. 243: Identifying Inlet Camshaft Marked**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Rotate inlet camshaft (1) at cylinder no. 1 into position (2).

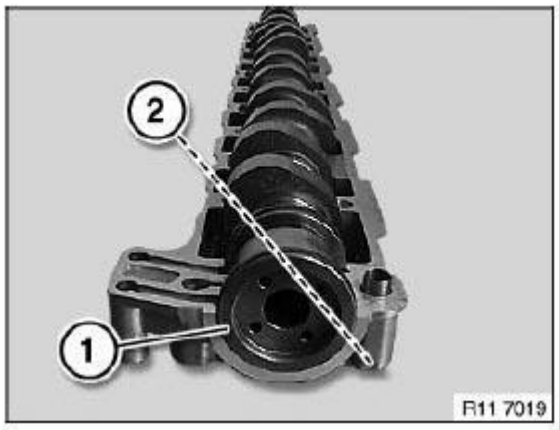



**Fig. 244: Identifying Inlet Camshaft With Position**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation:*

Lower and upper bearing banks must be aligned to each other at ground surfaces (1 and 2).

Bring thrust piece and legs of special tool 11 8 553 into contact at milled surfaces.

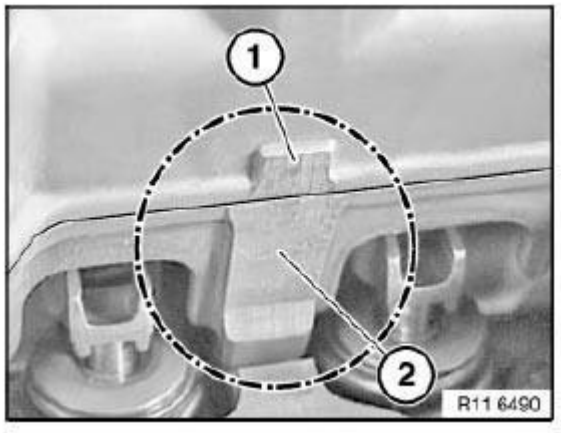



**Fig. 245: Identifying Lower And Upper Bearing Banks Alignment Position**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**NOTE: Schematic depiction of special tool 11 8 553 at lower bearing bank (1) and upper bearing bank (2).**

**IMPORTANT: Tighten screw (3) on thrust piece to 2 Nm.**

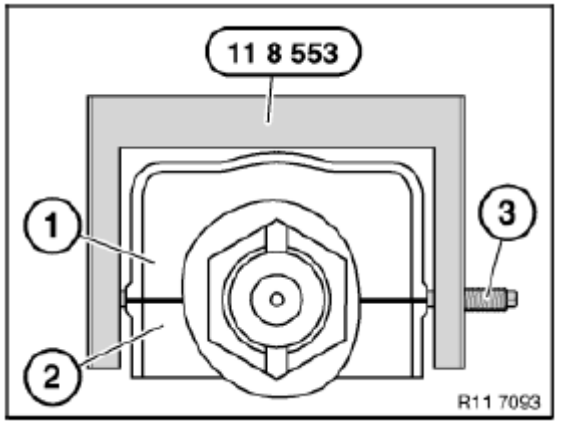



**Fig. 246: Schematic Depiction Of Special Tool 11 8 553 On Lower Bearing Bank And Upper Bearing Bank**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Position special tool 11 8 553 over screw connection of bearing banks.

Make sure that legs come into exact contact on ground

surfaces, lower bearing bank (1) and upper bearing bank (2).

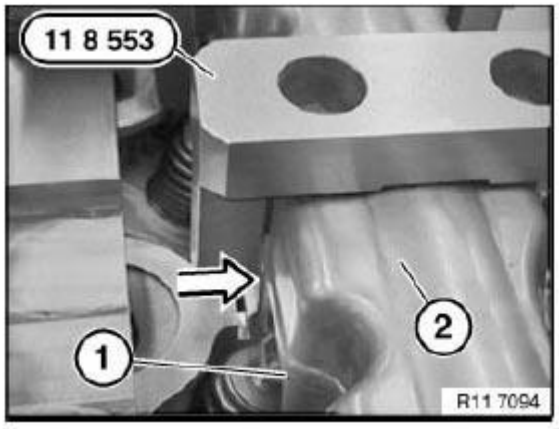



**Fig. 247: Positioning Special Tool 11 8 553 Over Screw Connection Of Bearing Banks**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Initially tighten screw of special tool 11 8 553 to ground surfaces of lower bearing bank (1) and upper bearing bank (2).

**IMPORTANT: Tighten screws on thrust piece to 2 Nm.**

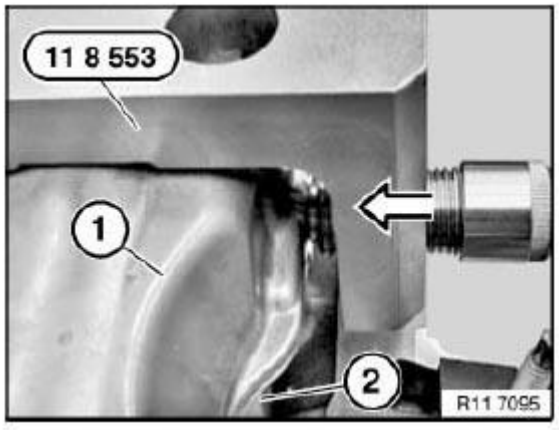



**Fig. 248: Tightening Screw Of Special Tool 11 8 553**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT: Set special tool 11 4 350 *to 2 Nm.* Pretension all special tools 11 8 553 with special tool 11 4 350 only.**

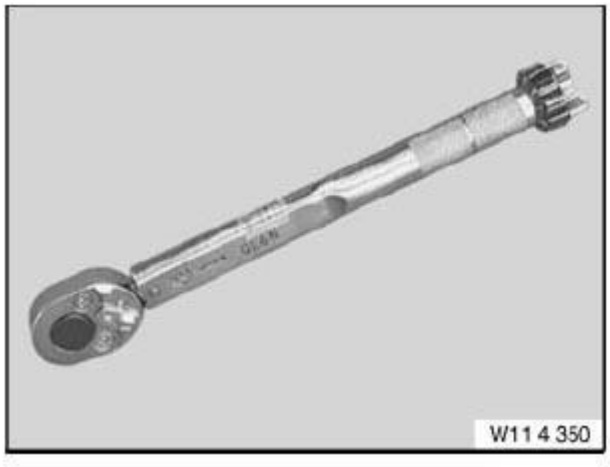



**Fig. 249: Identifying Special Tools 11 8 553 With Special Tool 11 4 350**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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* .**

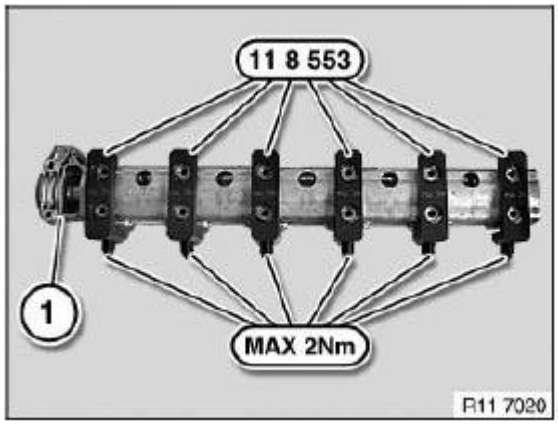



**Fig. 250: Identifying Upper And Lower Bearing Strips With Special Tools 11 8 553**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Install inlet camshaft with bearing banks (1) on cylinder head.

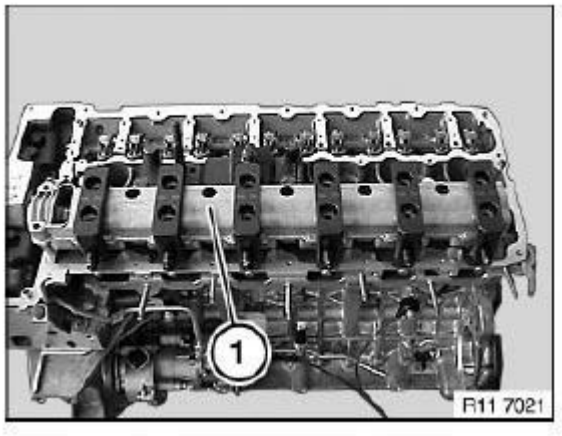



**Fig. 251: Identifying Bearing Banks On Cylinder Head**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Check position of intake camshaft (1) at cylinder no. 6.

Roller cam follower (2) is not actuated.

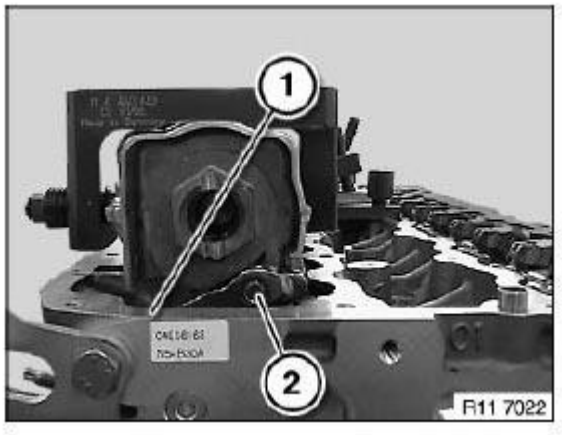



**Fig. 252: Position Of Intake Camshaft And Roller Cam Follower**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Tighten lower and upper bearing banks with special tool 00 9 120.

Tightening torque. See 11 31 1AZ in **11 31 CAMSHAFT** .

**IMPORTANT: Remove special tool 11 8 553 only when camshaft screw connection is completed .**

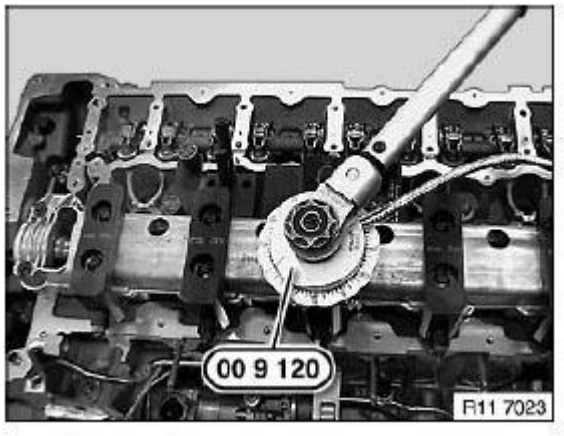



**Fig. 253: Tightening Lower And Upper Bearing Banks Using Special Tool 00 9 120**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Adjust valve timing.

Assemble engine.

**11 31 028 REMOVING AND INSTALLING OR REPLACING EXHAUST CAMSHAFT (N54)**

**Special tools required:**

For the following special tools, refer to **MAINTENANCE AND GENERAL INFORMATION - SPECIAL TOOLS** .

- 9 120

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 4 350
- 11 8 551
- 11 8 552
- 11 8 553
- 11 9 000

**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 banks must be tensioned 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 banks (1) with camshaft.

**NOTE: Illustration shows N52.**

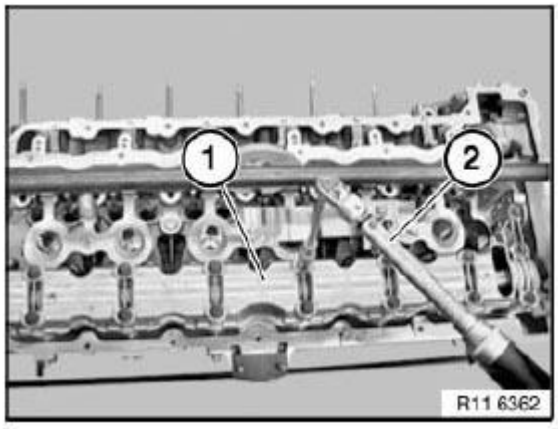



**Fig. 254: Identifying Lower And Upper Bearing Banks In Camshaft**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT: Both camshafts have different markings.**
**Mixing up the two camshafts will result in *engine damage* .**

A Exhaust camshaft.

E Inlet camshaft

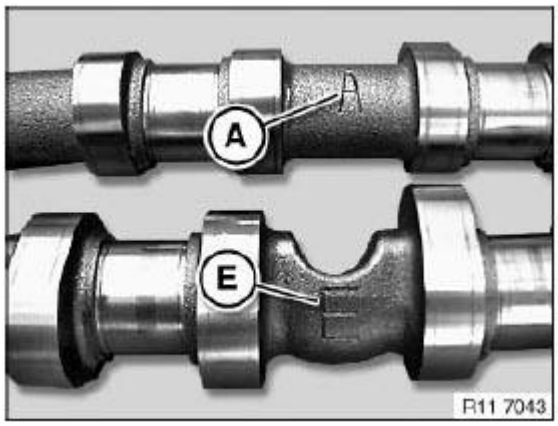



**Fig. 255: Identifying Inlet And Exhaust Camshaft**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Check plain compression rings (1) for damage and replace if necessary.

Plain compression rings (1) are engaged at joint.

Press plain compression rings (1) apart upwards and downwards and removed towards front.

**IMPORTANT: Plain compression rings (1) can easily break.**

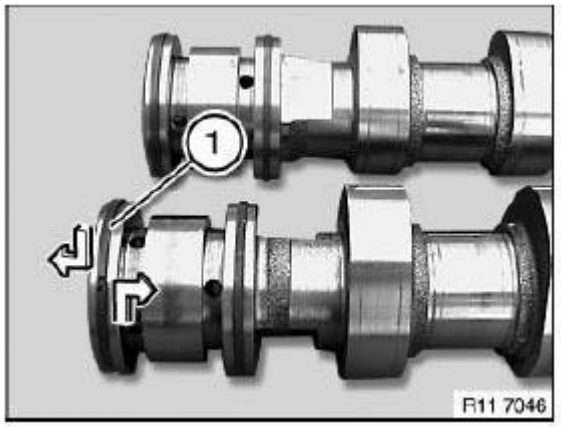



**Fig. 256: Pressing Plain Compression Rings**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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 profile insert.**

*Installation:*

Before installing exhaust camshaft, make sure roller cam follower is correctly seated on HVCA element and valve.

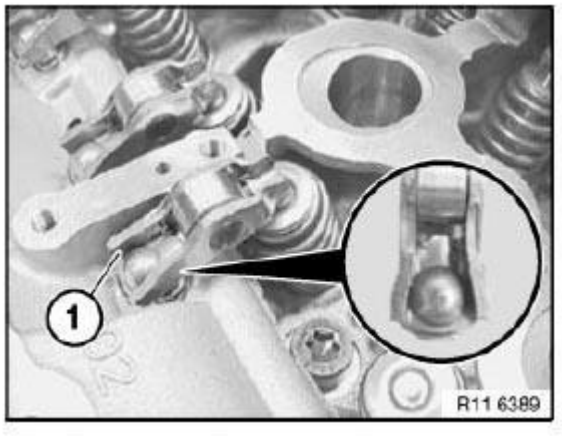



**Fig. 257: Identifying Roller Cam Follower Installation Position**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**Installing camshaft bearing bank**

Pre-install special tool 11 8 551 on cylinder no. 2.

Observe markings E and A

E: Inlet 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.

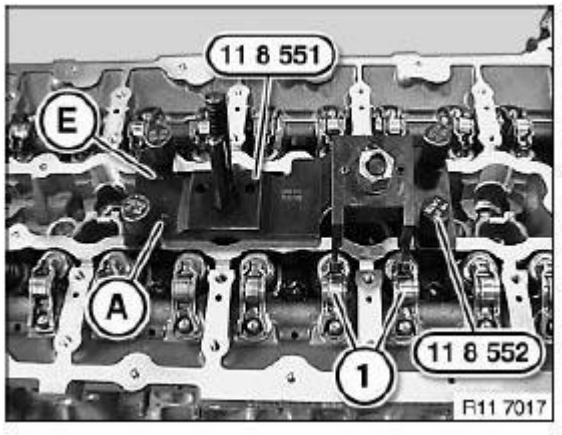



**Fig. 258: Identifying Special Tools 11 8 551 And 11 8 552**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Lay lower bearing strip (1) on cylinder head.

*Installation:*

Lubricate all bearing points with engine oil.

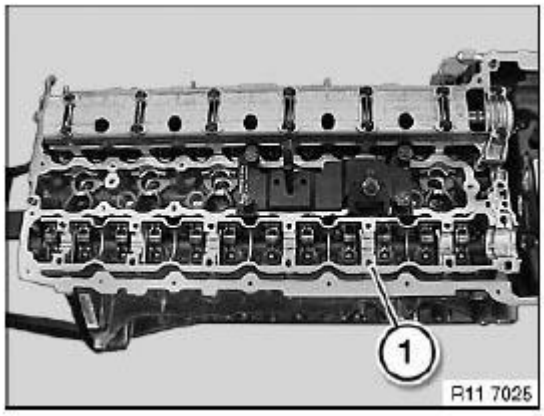



**Fig. 259: Identifying Lower Bearing Strip On Cylinder Head**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Insert exhaust camshaft (1) in lower bearing bank.

*Installation:*

Lubricate all bearing positions and cams with engine oil.

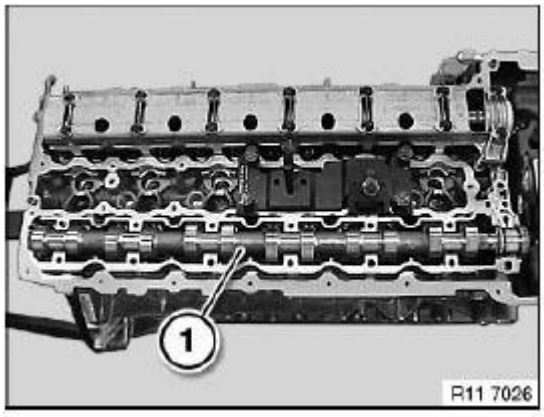



**Fig. 260: Identifying Exhaust Camshaft In Lower Bearing Bank**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Installation position (1) of exhaust camshaft (2) at cylinder no. 1.

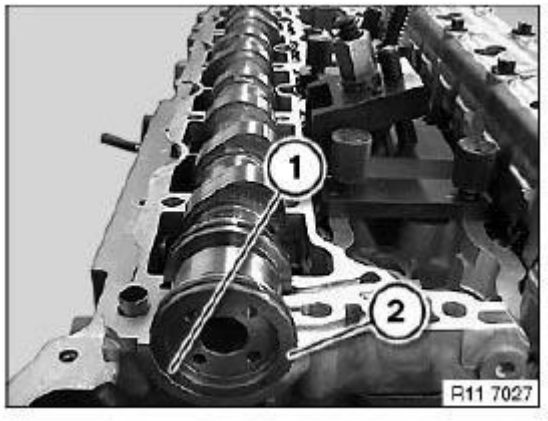



**Fig. 261: Identifying Installation Position Of Exhaust Camshaft At Cylinder No. 1**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Join exhaust camshaft to lower and upper bearing strips with torque wrench from inside outwards to **8 Nm** .

**Release** all screws of bearing bank (1) from outside inwards by 90°.

Check position of exhaust camshaft (2) at cylinder no. 6.

Roller cam follower (1) is not actuated.

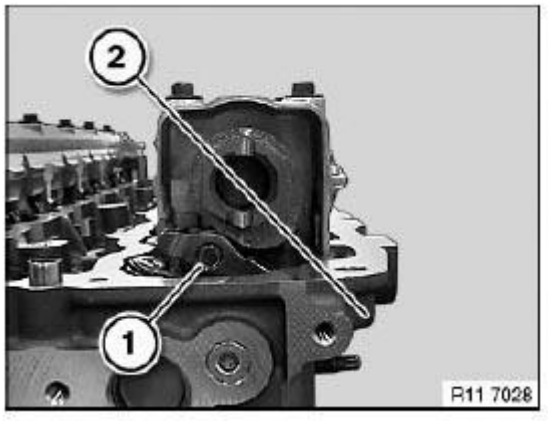



**Fig. 262: Identifying Exhaust Camshaft Position And Cam Follower**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation:*

Lower and upper bearing banks must be aligned to each other at ground surfaces (1 and 2).

Bring thrust piece and legs of special tool 11 8 553 into contact at milled surfaces.

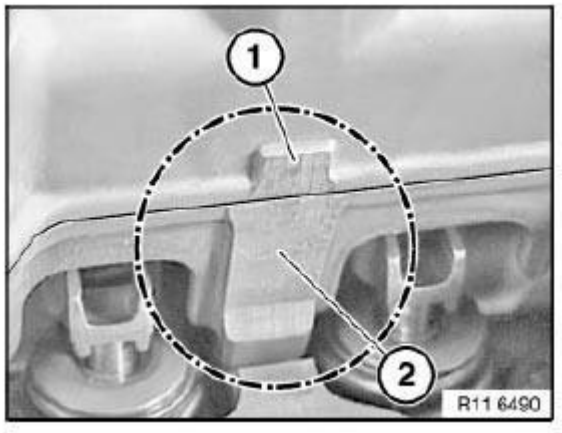



**Fig. 263: Identifying Lower And Upper Bearing Banks Alignment Position**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**NOTE: Schematic depiction of special tool 11 8 553 at upper bearing bank (1) and lower bearing bank (2).**

**IMPORTANT: Tighten screw (3) on thrust piece to 2 Nm.**

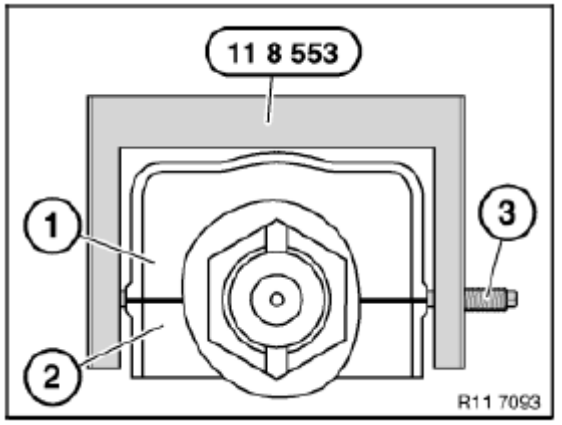



**Fig. 264: Schematic Depiction Of Special Tool 11 8 553 On Lower And Upper Bearing Bank**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Position special tool 11 8 553 over screw connection of bearing banks.

**NOTE: Make sure that legs come into exact contact on ground surfaces, lower bearing bank (1) and upper bearing bank (2).**

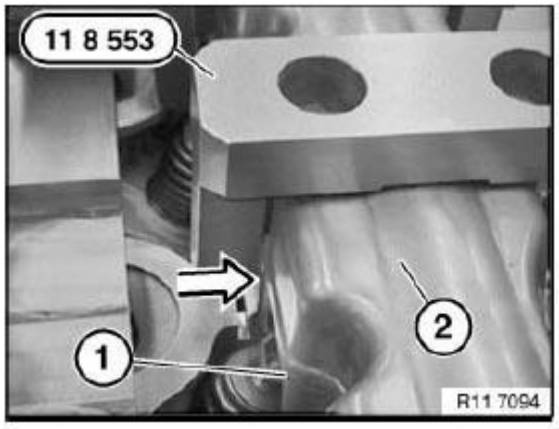



**Fig. 265: Positioning Special Tool 11 8 553 Over Screw Connection Of Bearing Banks**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Initially tighten screw of special tool 11 8 553 to ground surfaces of lower bearing bank (2) and upper bearing bank (1).

**IMPORTANT: Tighten screws on thrust piece to 2 Nm.**

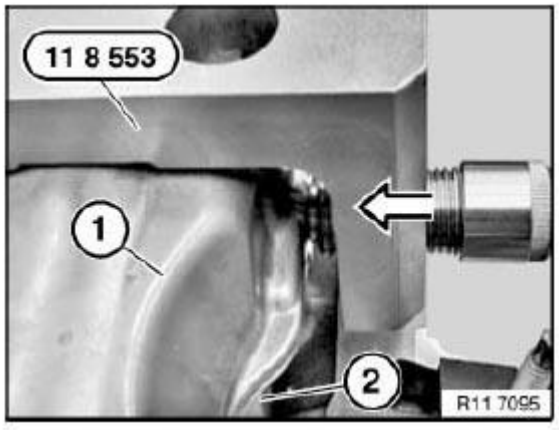



**Fig. 266: Tightening Screw Of Special Tool 11 8 553**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT: Set special tool 11 4 350 *to 2 Nm.***
**Pretension all special tools 11 8 553 with special tool 11 4 350 only.**

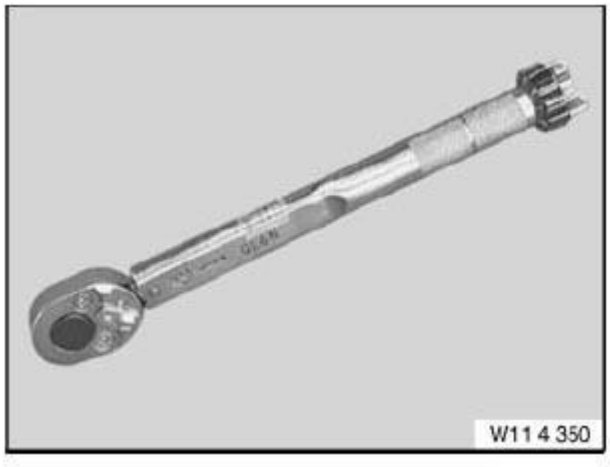



**Fig. 267: Identifying Special Tools 11 8 553 With Special Tool 11 4 350**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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 bank are easily accessible.

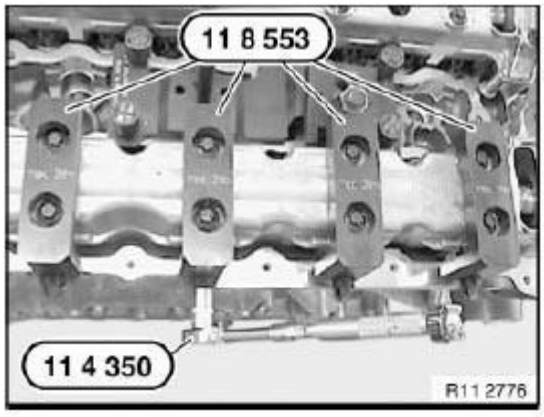



**Fig. 268: Identifying Special Tools 11 8 553 And Special Tool 11 4 350**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Tighten lower and upper bearing banks with special tool 00 9 120.

Position special tool 11 8 553 over screw connection of bearing banks.

Tightening torque. See 11 31 1AZ in **11 31 CAMSHAFT** .

**IMPORTANT: Remove special tool 11 8 553 only when camshaft screw connection is completed .**

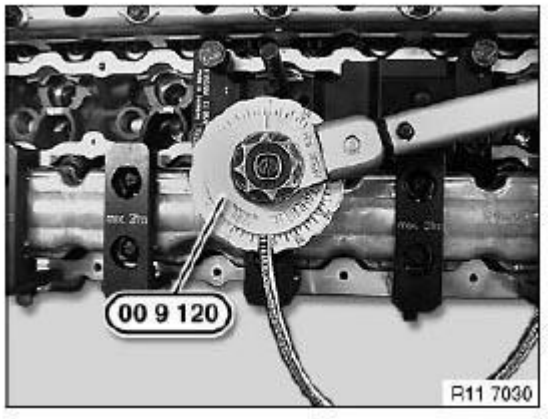



**Fig. 269: Tightening Banks Using Special Tool 00 9 120**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

**11 31 051 REPLACING TIMING CHAIN (N54)**

**Special tools required:**

For the following special tools, refer to **MAINTENANCE AND GENERAL INFORMATION - SPECIAL TOOLS** .

- 00 9 140

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 0 300
- 11 4 280
- 11 8 180
- 11 8 660
- 11 9 260

*Necessary preliminary tasks:*

- Remove **fan cowl** . See **17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N54)** .
- Remove **cylinder head cover** . See **11 12 000 REMOVING AND INSTALLING/SEALING CYLINDER HEAD COVER (N54)**.
- Remove all spark plugs.
- Remove **chain tensioner** . See **11 31 090 INSTALLING AND REMOVING/REPLACING CHAIN TENSIONER PISTON (N54)**.
- Remove **crankshaft radial seal** at front. See **11 14 005 REPLACING FRONT CRANKSHAFT RADIAL SEAL (N54)**.

- Remove **belt tensioner** . See **11 28 020 REPLACE ALTERNATOR DRIVE BELT TENSIONER (N54)**.
- Remove **vibration damper** . See **11 23 010 REMOVING AND INSTALLING/REPLACING VIBRATION DAMPER (N54)**.
- Remove **inlet and exhaust adjustment units** . See **11 36 046 REMOVING AND INSTALLING/REPLACING INLET AND EXHAUST ADJUSTMENT UNITS (N54)**.

Remove fastener (1) in direction of arrow.

*Installation:*

Install fastener (1) with bore facing outwards.

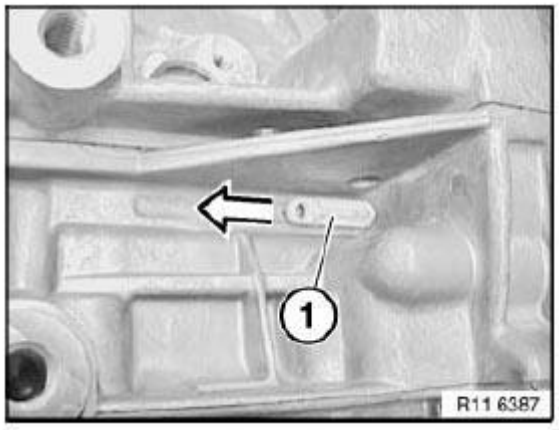



**Fig. 270: Removing Fastener**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Secure engine in firing TDC position of cylinder no. 1 with special tool 11 0 300.

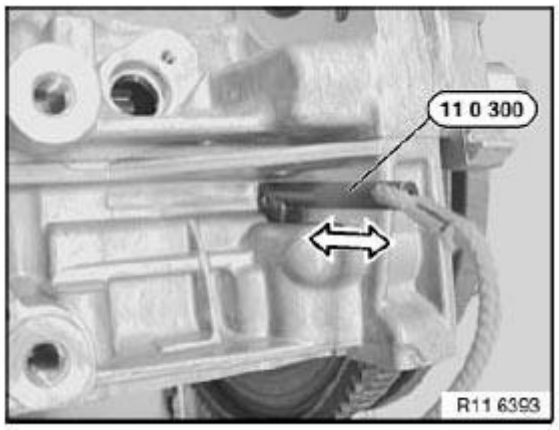



**Fig. 271: Securing Engine In Firing TDC Position Of Cylinder No. 1 Using Special Tool 11 0 300**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Mark flywheel and transmission housing with a line (1).

**NOTE: Picture shows automatic transmission.**

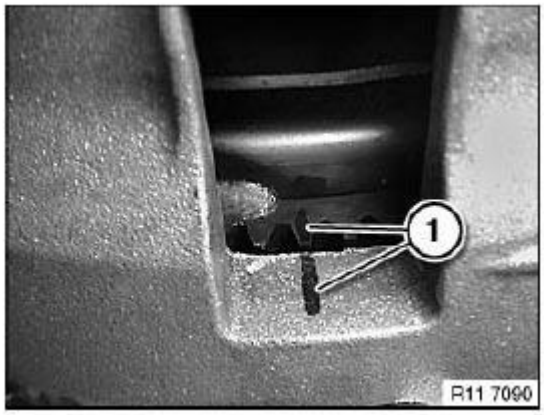



**Fig. 272: Identifying Line On Flywheel And Transmission Housing**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Do **not** remove special tool 11 4 280.

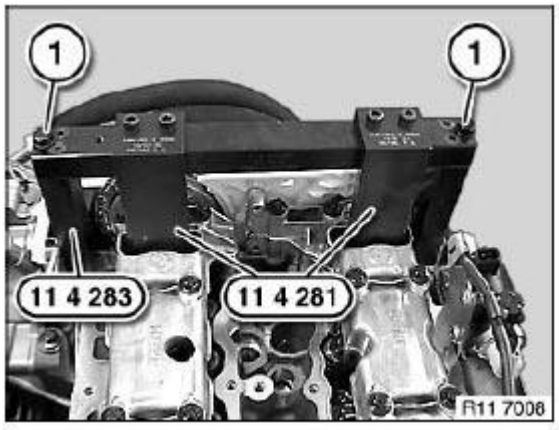



**Fig. 273: Identifying Special Tool 11 4 280**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**Procedure, transmission removed** .

Secure flywheel (crankshaft) with special tool 11 9 260.

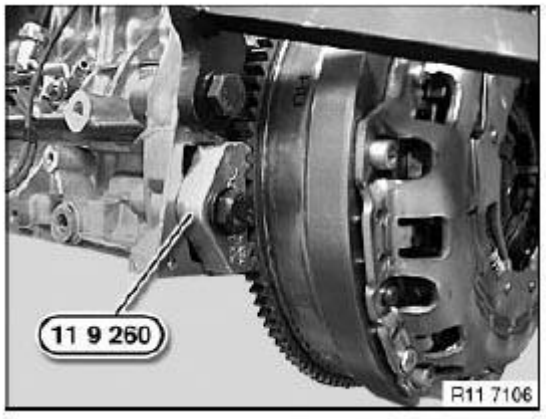



**Fig. 274: Securing Flywheel (Crankshaft) Using Special Tool 11 9 260**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Secure flywheel (crankshaft) with special tool 11 8 660 to transmission.

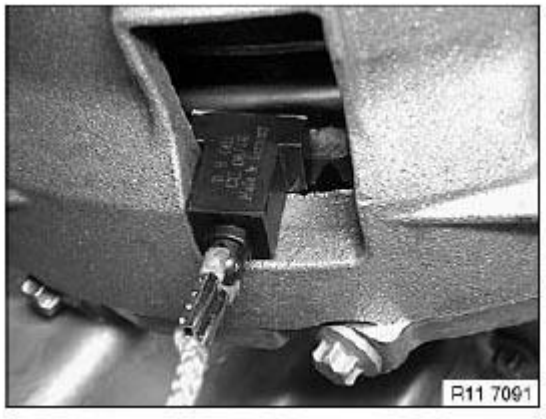



**Fig. 275: Securing Flywheel (Crankshaft) Using Special Tool 11 8 660**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Mount special tool 11 8 180 on manual transmission with bolts (1).

Secure flywheel in direction of arrow.

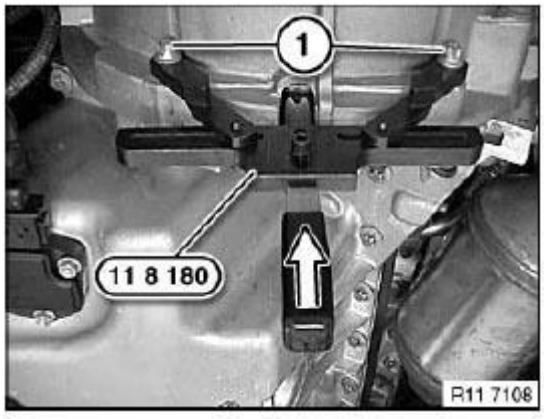



**Fig. 276: Securing Flywheel**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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. See 11 21 1AZ in **11 21 CRANKSHAFT AND BEARINGS** or **11 21 CRANKSHAFT AND BEARINGS** .

Remove central bolt with hub towards front.

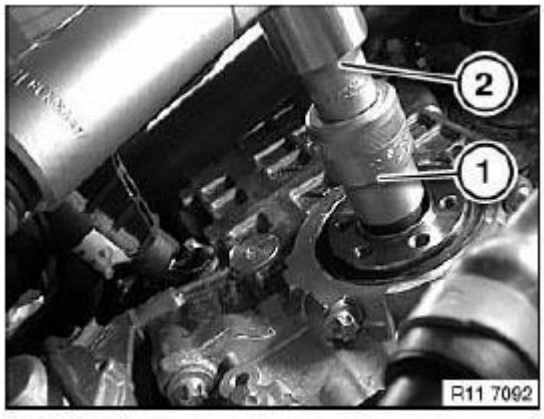



**Fig. 277: Releasing Central Bolt Using 3/4" Socket**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Open plug (1).

Tightening torque. See 11 31 6AZ in **11 31 CAMSHAFT** .

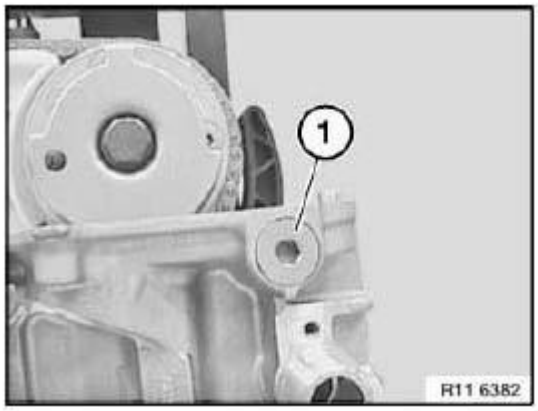



**Fig. 278: Identifying Plug**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Open plug (1).

Tightening torque. See 11 31 6AZ in **11 31 CAMSHAFT** .

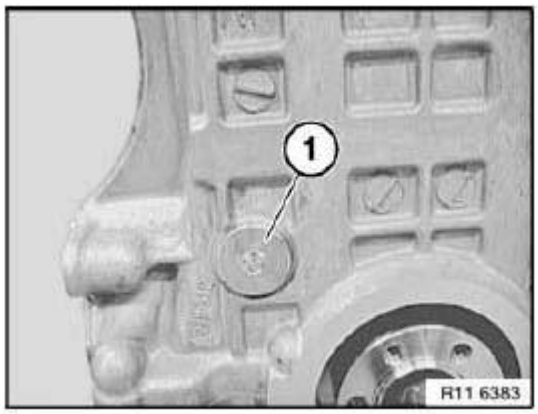



**Fig. 279: Identifying Plug**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screw (1) on chain drive at top.

Tightening torque. See 11 31 2AZ in **11 31 CAMSHAFT** .

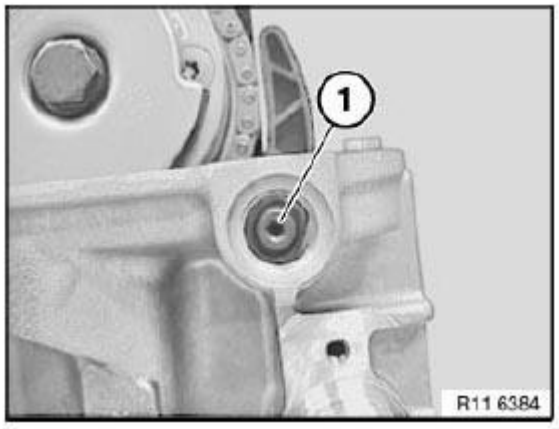



**Fig. 280: Identifying Screw On Chain Drive Top**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screw (1) on chain drive at bottom.

Tightening torque. See 11 31 3AZ in **11 31 CAMSHAFT** .

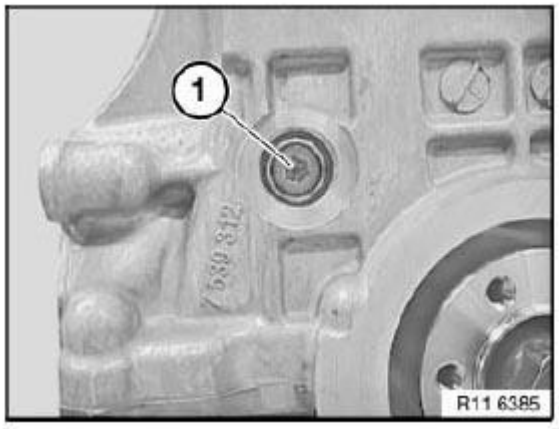



**Fig. 281: Identifying Screw On Chain Drive Bottom**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screws (1).

Tightening torque. See 11 31 2AZ **11 31 CAMSHAFT** .

Remove timing chain module with timing chain and sprocket wheel upwards in direction of arrow.

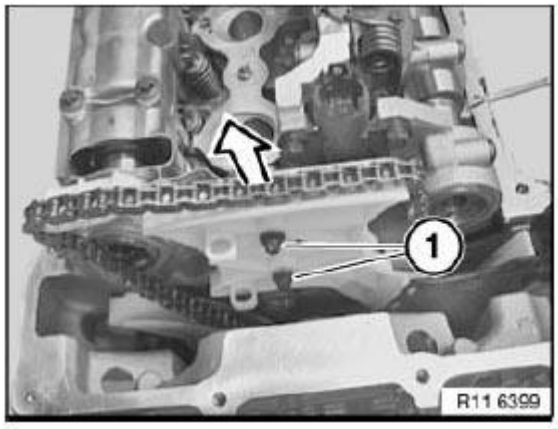



**Fig. 282: Removing Timing Chain Module With Timing Chain And Sprocket Wheel**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT: Note installation direction of sprocket wheel (2).**
**Collar (see arrow) on sprocket wheel (2) points to crankshaft .**
**Incorrect assembly will result in engine damage .**

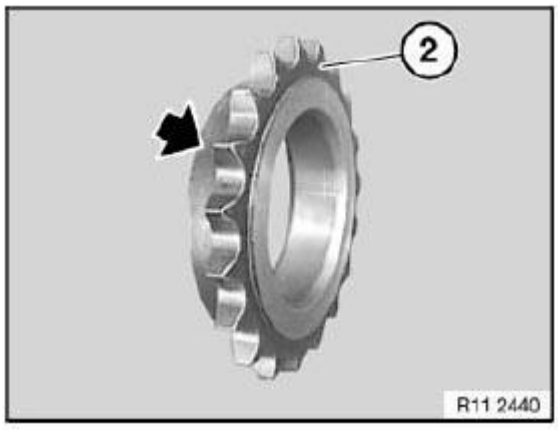



**Fig. 283: Position Of Installing Sprocket Wheel**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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 under tension.

Timing chain (1) may jam on chain module (3).

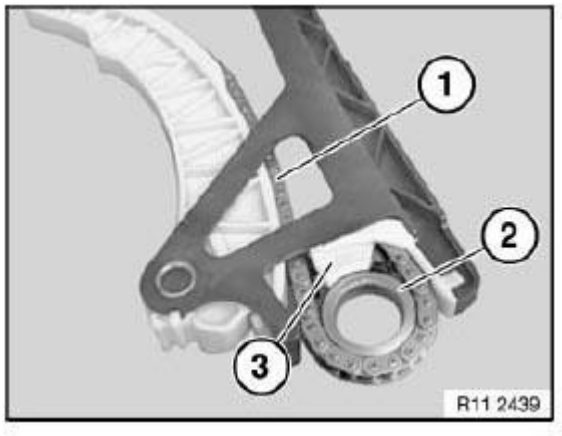



**Fig. 284: Identifying Timing Chain And Chain Module**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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.**

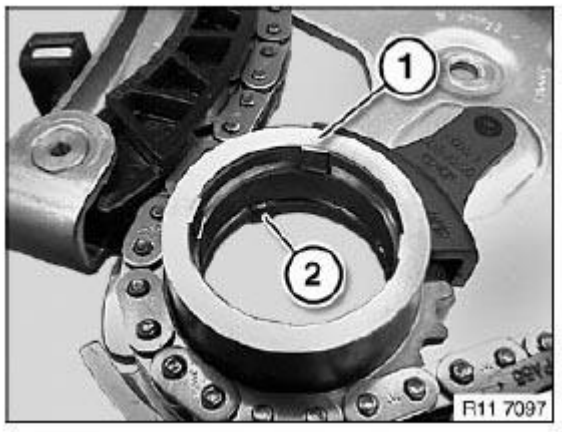



**Fig. 285: Identifying Friction Plates**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Make sure friction plate (3) is in correct installation position.

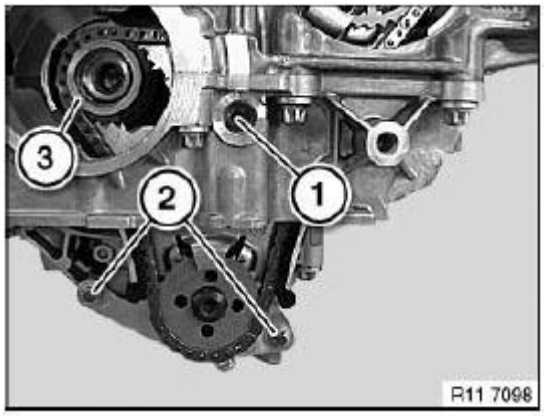



**Fig. 286: Identifying Friction Plate Installation Position**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.**

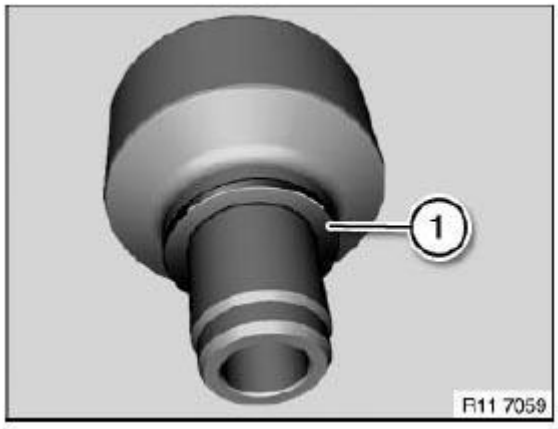



**Fig. 287: Identifying Friction Plate Without Retainers**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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. See 11 21 1AZ in **11 21 CRANKSHAFT AND BEARINGS** or **11 21 CRANKSHAFT AND BEARINGS** .

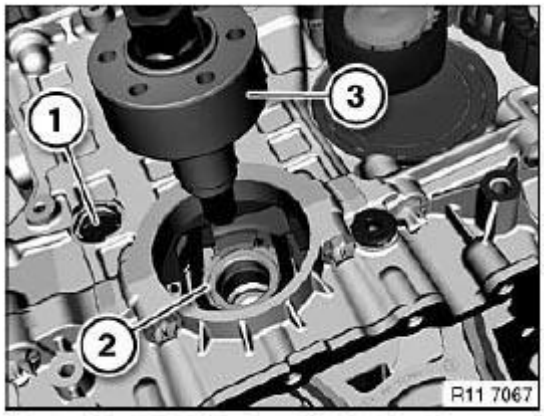



**Fig. 288: Identifying Gear Wheels Installation Position**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Secure special tool 00 9 140 with magnet to engine carrier (1).

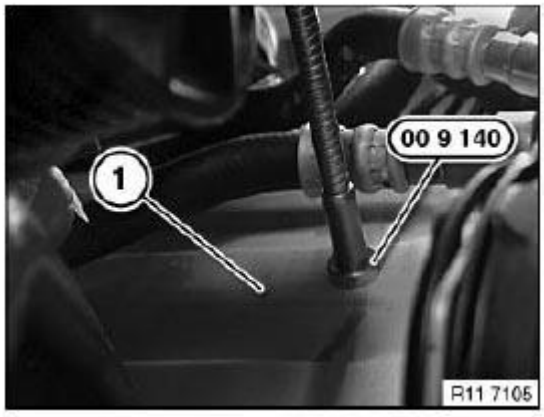



**Fig. 289: Securing Special Tool 00 9 140 With Magnet To Engine Carrier**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Secure central bolt with special tool 00 9 140.

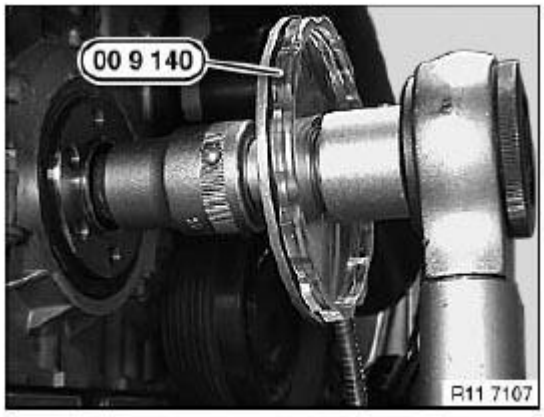


**Fig. 290: Securing Central Bolt Using Special Tool 00 9 140**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Remove **crankshaft radial seal** at front. See **11 14 005 REPLACING FRONT CRANKSHAFT RADIAL SEAL (N54)**.

Install **inlet and exhaust adjustment units** . See **11 36 046 REMOVING AND INSTALLING/REPLACING INLET AND EXHAUST ADJUSTMENT UNITS (N54)**.

Install **chain tensioner** . See **11 31 090 INSTALLING AND REMOVING/REPLACING CHAIN TENSIONER PISTON (N54)**.

Crank engine twice.

Check **timing** . See **11 31 005 CHECKING CAMSHAFT TIMING (N54)**.

Assemble engine.

**11 31 090 INSTALLING AND REMOVING/REPLACING CHAIN TENSIONER PISTON (N54)**

*Necessary preliminary tasks:*

Release chain tensioner (1).

Tightening torque. See 11 31 5AZ in **11 31 CAMSHAFT** .

**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.**

*Installation:*

No sealing ring is fitted during series-production assembly.

A sealing ring must be fitted by service personnel when the chain tensioner is fitted.

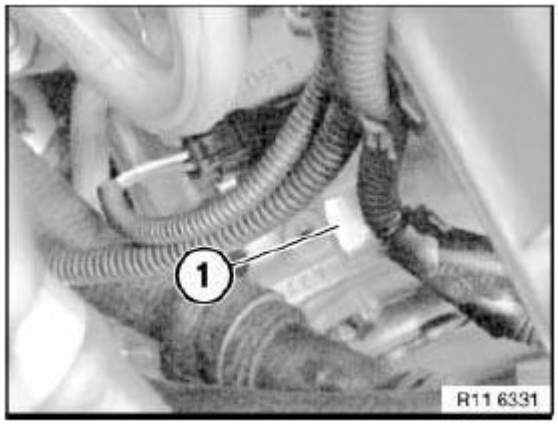



**Fig. 291: Identifying Chain Tensioner**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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. 292: Compressing Chain Tensioner**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

**11 31 505 ADJUSTING CAMSHAFT TIMING (N54)**

**Special tools required:**

For the following special tools, refer to **MAINTENANCE AND GENERAL INFORMATION - SPECIAL TOOLS** .

- 00 9 120
- 00 9 250

- 11 0 300
- 11 4 281
- 11 4 283
- 11 8 520
- 11 9 340

**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** . See **11 12 000 REMOVING AND INSTALLING/SEALING CYLINDER HEAD COVER (N54)**.

Remove fastener (1) in direction of arrow.

*Installation:*

Install fastener (1) with bore facing outwards.

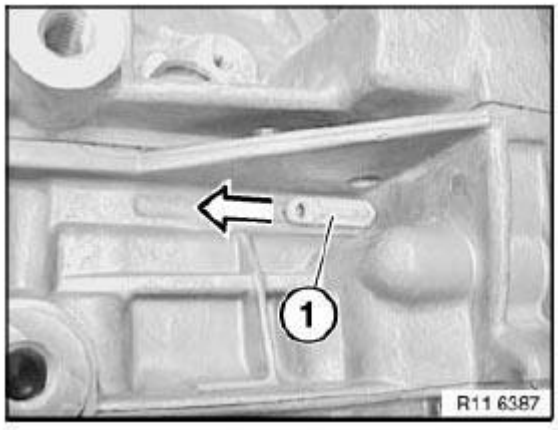



**Fig. 293: Installing Fastener**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Rotate crankshaft at central bolt into TDC position.

Slide in special tool 11 0 300 in direction of arrow and secure 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.**

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.

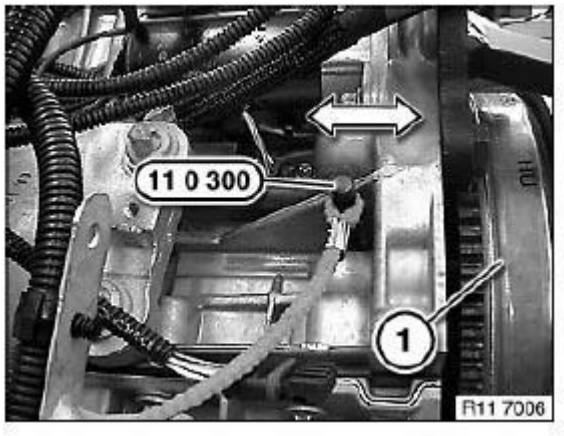



**Fig. 294: Sliding In Special Tool 11 0 300**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Fit special tool 11 4 283 with screws (1).

Fit special tool 11 4 281 on special tool 11 4 283.

**IMPORTANT: If the special tool 11 4 281 cannot be installed, the camshaft must be rotated at the hexagon head at the rear.**

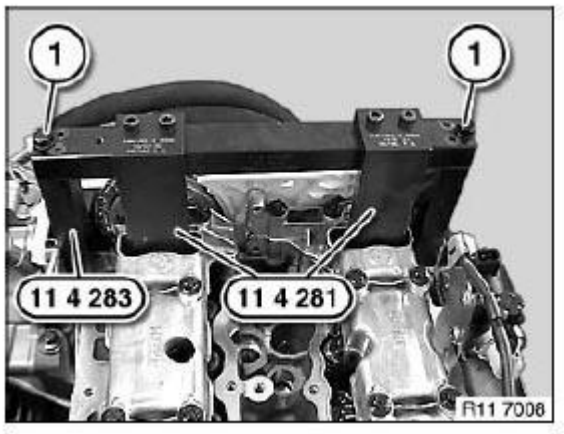



**Fig. 295: Identifying Special Tools 11 4 283 And 11 4 281**
**Courtesy of BMW OF NORTH AMERICA, INC.**

With cylinder no. 1 in firing TDC position, cams of exhaust camshaft (2) and inlet camshaft (1) at cylinder no. 6 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.**

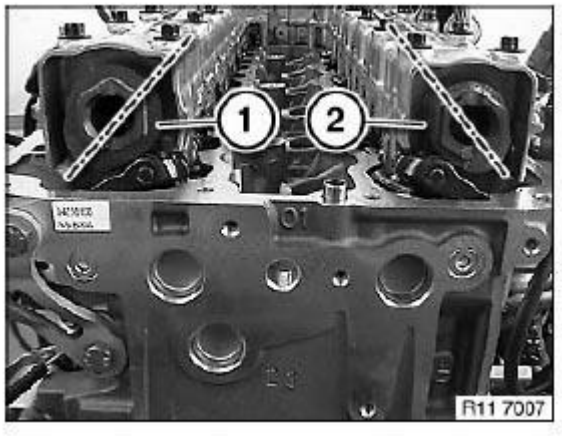



**Fig. 296: Identifying Cams Of Inlet And Exhaust Camshaft**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release central bolt (1) of exhaust camshaft.

*Installation:*

**Replace screw (1)** .

Tightening torque. See 11 36 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL** .

Release central bolt (2) of inlet camshaft.

*Installation:*

**Replace screw (2)** .

Tightening torque. See 11 36 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL** .

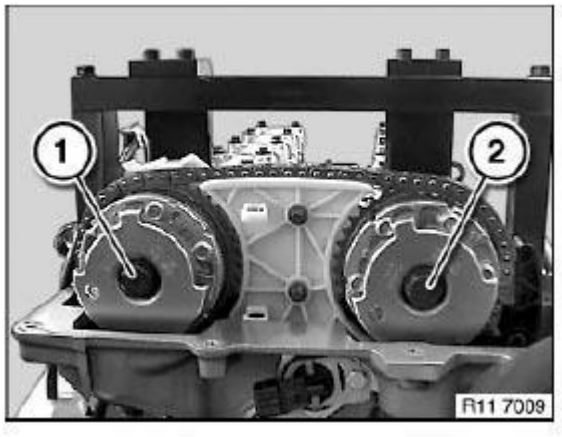



**Fig. 297: Identifying Central Bolt Of Inlet And Exhaust Camshaft**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Rotate sensor gears until locating pins on special tool 11 8 520 match up.

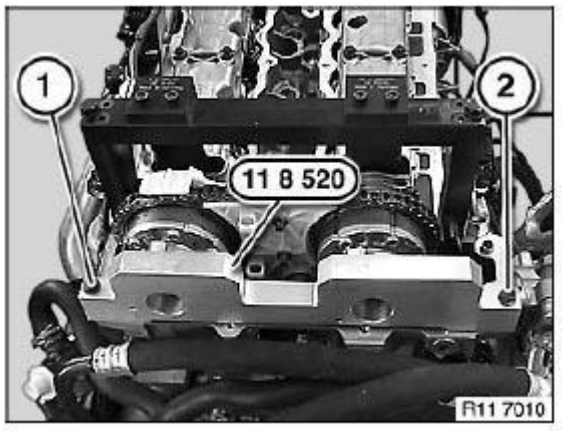



**Fig. 298: Identifying Special Tool 11 8 520**
**Courtesy of BMW OF NORTH AMERICA, INC.**

## ROCKER ARM WITH BEARING MOUNT

**11 33 050 REMOVING AND INSTALLING/REPLACING ALL CAM FOLLOWERS (N54)**

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 4 480

**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** . See **11 12 000 REMOVING AND INSTALLING/SEALING CYLINDER HEAD COVER (N54)**.
- Remove **inlet camshaft** . See **11 31 025 REMOVING AND INSTALLING OR REPLACING INLET CAMSHAFT (N54)**.
- Remove **exhaust camshaft** . See **11 31 028 REMOVING AND INSTALLING OR REPLACING EXHAUST CAMSHAFT (N54)**.

Detach roller cam followers (1) from HVCA element and remove.

Set down roller cam followers in tidy and orderly fashion; if necessary, set down in special tool 11 4 480.

*Installation:*

Before installing exhaust and inlet camshafts, make sure roller cam followers are correctly seated.

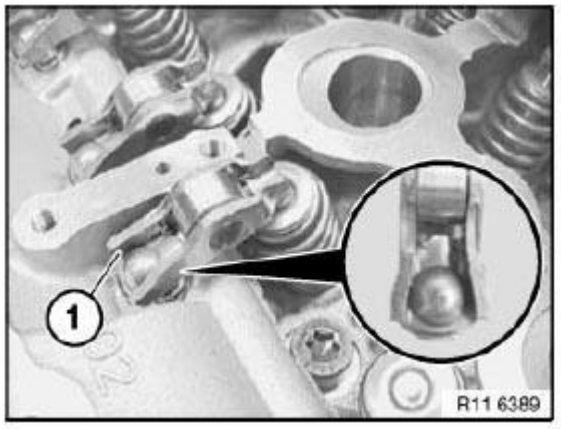



**Fig. 299: Identifying Roller Cam Follower Installation Position**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Remove HVCA element in direction of arrow.

*Installation:*

If the HVCA elements are reused, they must be placed together with the cam followers in neat order if necessary in special tool 11 4 480.

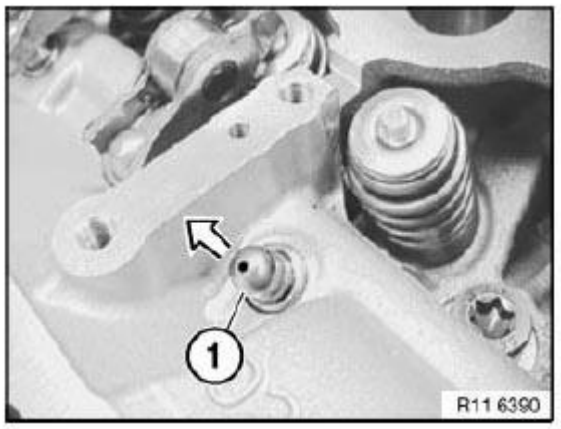



**Fig. 300: Removing HVCA Element**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

## VALVES WITH SPRINGS

### 11 34 552 REMOVING AND INSTALLING OR REPLACING ALL VALVES (N54)

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 4 480

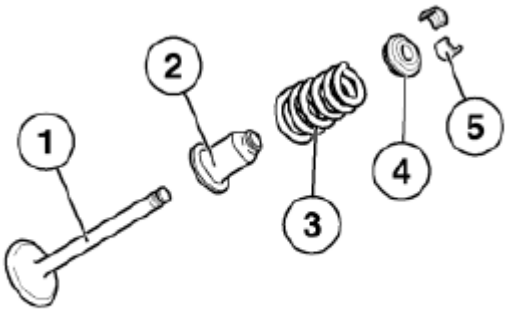
*Necessary preliminary tasks:*

- Remove **cylinder head** . See **11 12 100 REMOVING AND INSTALLING CYLINDER HEAD (N54)**.
- Remove **inlet camshaft** . See **11 31 025 REMOVING AND INSTALLING OR REPLACING INLET CAMSHAFT (N54)**.
- Remove **exhaust camshaft** . See **11 31 028 REMOVING AND INSTALLING OR REPLACING EXHAUST CAMSHAFT (N54)**.
- Remove **roller cam follower** . See **11 33 050 REMOVING AND INSTALLING/REPLACING ALL CAM FOLLOWERS (N54)**.
- Remove **valve springs** . See **11 34 715 REPLACING ALL VALVE SPRINGS (N54)**.
- Remove **valve stem seals** . See **11 34 560 REPLACING ALL VALVE STEM SEALS (N54)**.

Arrangement:

1. Valve
2. Valve stem seal with spring plate, bottom
3. Valve spring
4. Top plate spring
5. Valve tapers

If the valves are to be reused, set then down in special tool 11 4 480 in a tidy and orderly fashion.




R11 4170

**Fig. 301: Identifying Valve Arrangement**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

Check function of DME.

## 11 34 560 REPLACING ALL VALVE STEM SEALS (N54)

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 1 480
- 11 6 380

*Necessary preliminary tasks:*

- Remove **cylinder head** . See **11 12 100 REMOVING AND INSTALLING CYLINDER HEAD (N54)**.
- Remove **inlet camshaft** . See **11 31 025 REMOVING AND INSTALLING OR REPLACING INLET CAMSHAFT (N54)**.
- Remove **exhaust camshaft** . See **11 31 028 REMOVING AND INSTALLING OR REPLACING EXHAUST CAMSHAFT (N54)**.
- Remove **roller cam follower** . See **11 33 050 REMOVING AND INSTALLING/REPLACING ALL CAM FOLLOWERS (N54)**.
- Remove all **valve springs** . See **11 34 715 REPLACING ALL VALVE SPRINGS (N54)**.

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** . See **11 34 552 REMOVING AND INSTALLING OR REPLACING ALL VALVES (N54)**.

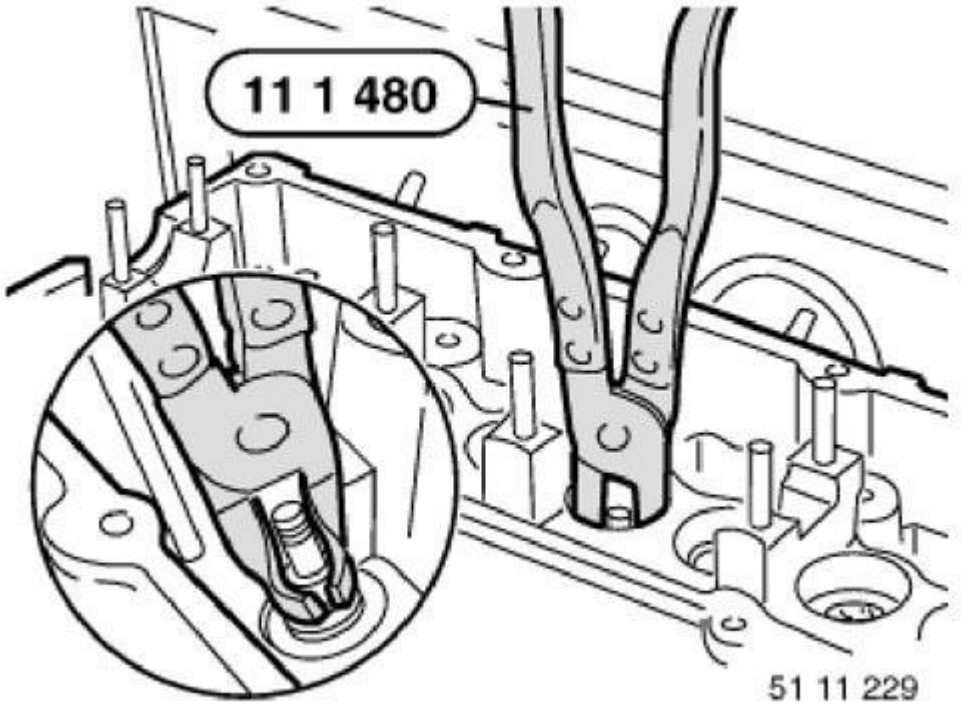



**Fig. 302: Pressing Special Tool 11 1 480 Onto Valve Stem Seals**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**NOTE: For use on the N54 engine, special tool 11 6 380 must be remachined according to the sketch with a 10mm dia. drill bit to a depth of B = approx. 23 mm. This modification has already been taken into account for reordering.**

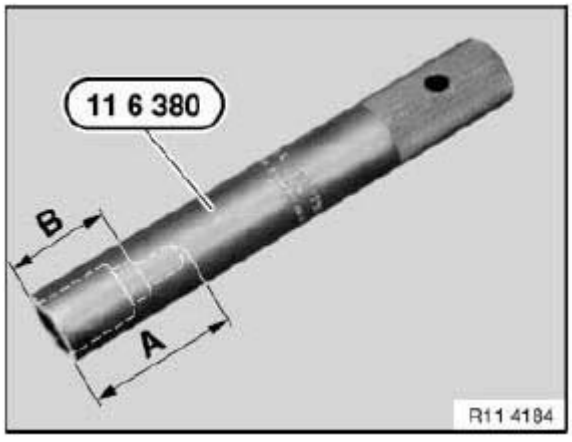



**Fig. 303: Identifying Special Tool 11 6 380 With Depth**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT: Different diameters at valve stem.
All valve stem seals are color-coded.**

Valve dia. 5 mm: valve stem seal is red or brown.

Valve dia. 6 mm: valve stem seal is green or light green.

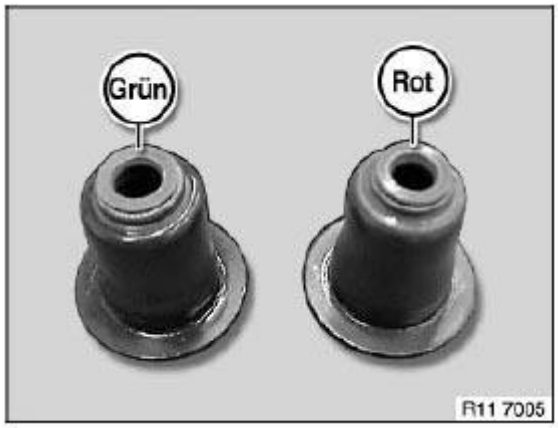



**Fig. 304: Identifying Valve Stem Seals**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation:*

Fit the mounting sleeves (plastic sleeves) supplied in the spare part 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.

**NOTE: Illustrations show N46.**

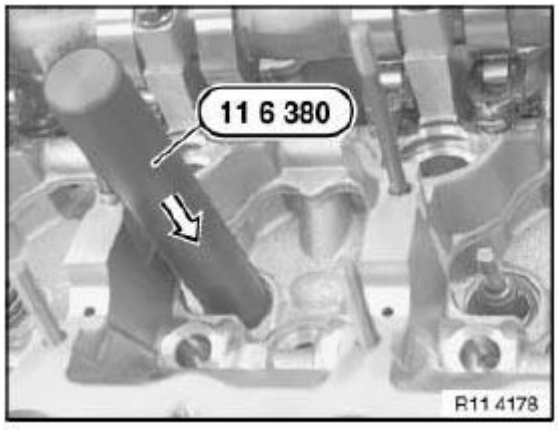



**Fig. 305: Pressing Valve Stem Seal Using Special Tool 11 6 380**

**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

**11 34 715 REPLACING ALL VALVE SPRINGS (N54)**

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 0 009
- 11 0 346
- 11 4 480
- 11 9 000
- 11 9 017

**IMPORTANT: Different valve stem diameters.**
***Mixing up the valve springs will result in damage to the engine .***

*Necessary preliminary tasks:*

- Remove **cylinder head cover** . See **11 12 000 REMOVING AND INSTALLING/SEALING CYLINDER HEAD COVER (N54)**.
- Remove **cylinder head** .
- Remove **exhaust camshaft** . See **11 31 028 REMOVING AND INSTALLING OR REPLACING EXHAUST CAMSHAFT (N54)**.
- Remove **inlet camshaft** . See **11 31 025 REMOVING AND INSTALLING OR REPLACING INLET CAMSHAFT (N54)**.
- Remove **roller cam followers** . See **11 33 050 REMOVING AND INSTALLING/REPLACING ALL CAM FOLLOWERS (N54)**.

**Intake valves**

Place cylinder head on special tool 11 9 000.

Press valve spring down on spring retainer with special tools 11 0 009 and 11 9 017.

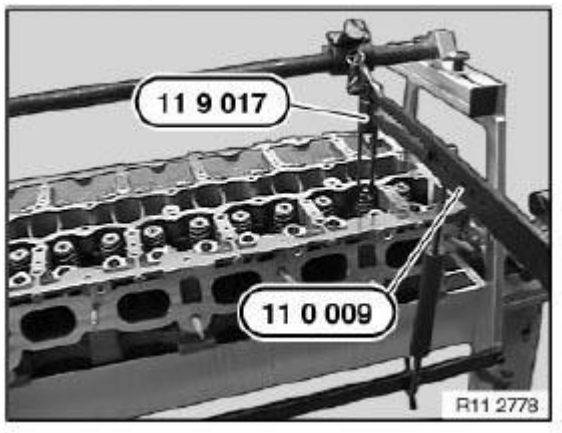



**Fig. 306: Pressing Valve Spring Down On Spring Retainer Using Special Tools 11 0 009 And 11 9 017**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**Exhaust valves**

Place cylinder head on special tool 11 9 000.

Press valve spring down on spring retainer with special tools 11 0 009 and 11 0 346.

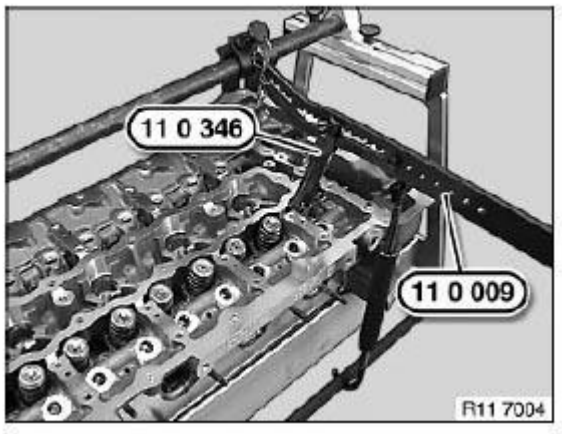



**Fig. 307: Pressing Valve Spring Down On Spring Retainer Using Special Tools 11 0 009 And 11 0 346**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.

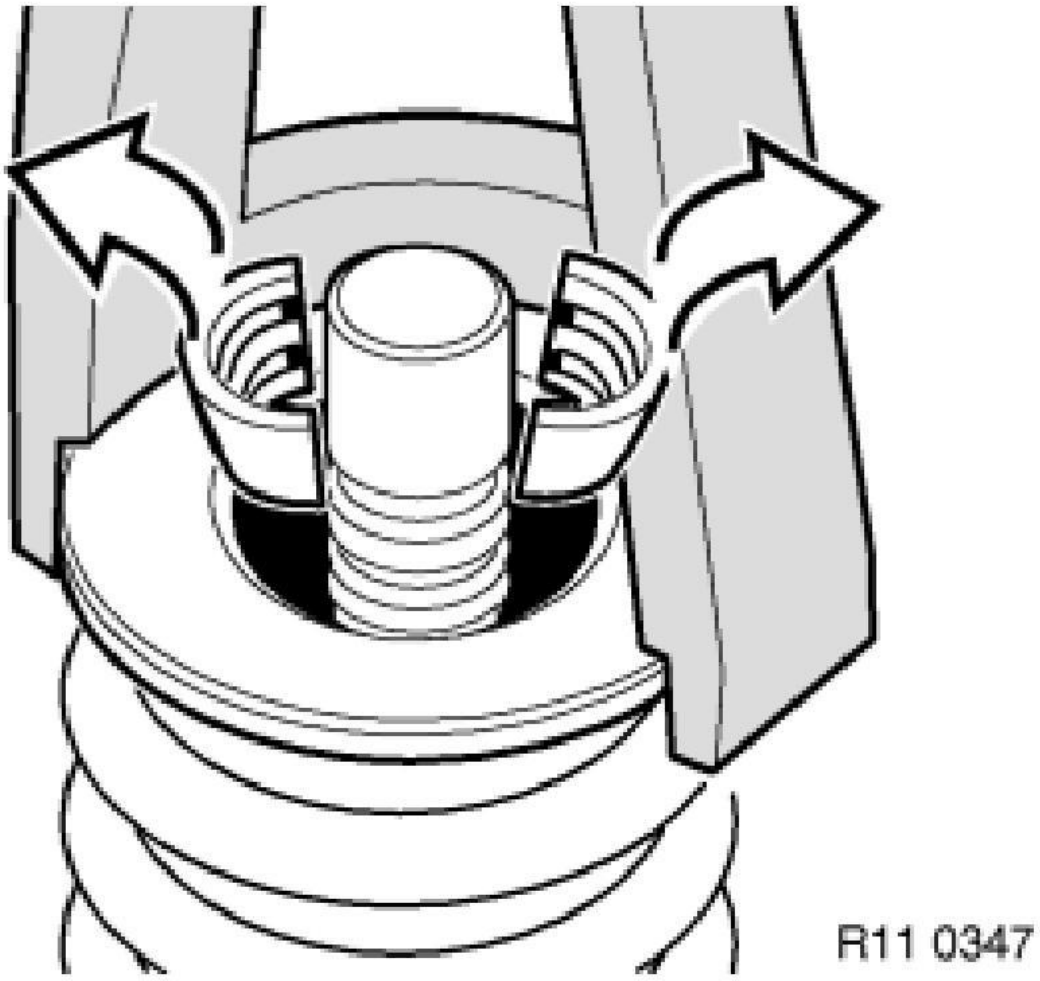



**Fig. 308: Removing Spring And Spring Retainer**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT: Incorrect installation possible.**
***Incorrect installation will result in valve spring breakage!***

Color marking (1) is normally on lower end of valve spring.

*Installation:*

Intake Violet/green or violet/yellow valve:

Exhaust White/green or white/yellow valve:

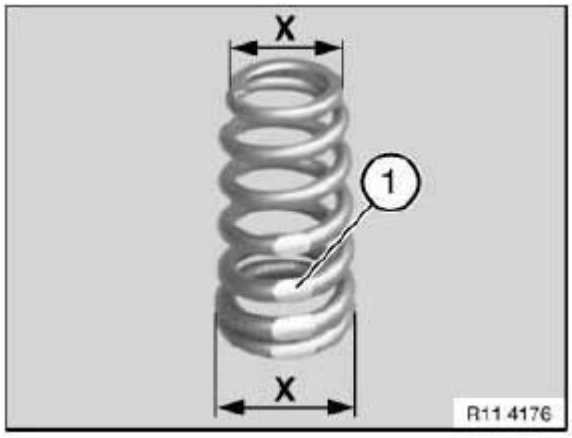



**Fig. 309: Identifying Color Marking On Lower End Of Valve Spring**
**Courtesy of BMW OF NORTH AMERICA, INC.**

If the colors on the valve springs can no longer be identified, these must be replaced for safety reasons.

Arrangement:

1. Valve
2. Valve stem seal with spring plate, bottom
3. Valve spring
4. Top plate spring
5. Valve cotters

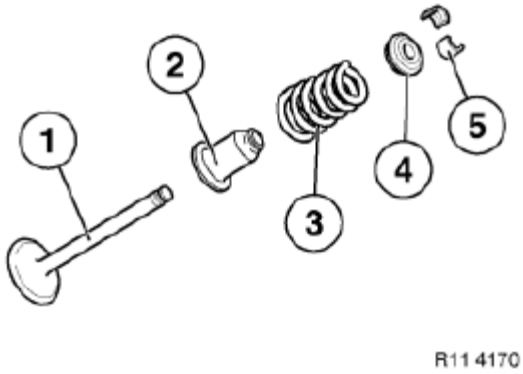



**Fig. 310: Identifying Valve Arrangement**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

Check function of DME control unit.

## VARIABLE CAMSHAFT TIMING

**11 36 046 REMOVING AND INSTALLING/REPLACING INLET AND EXHAUST ADJUSTMENT UNITS (N54)**

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 0 300
- 11 4 280
- 11 4 281
- 11 4 283

**IMPORTANT: To open central bolts, release at inlet and exhaust adjustment units with special tool 11 4 280 only.**

*Necessary preliminary tasks:*

- Remove **cylinder head cover** . See **11 12 000 REMOVING AND INSTALLING/SEALING CYLINDER HEAD COVER (N54)**.

Remove fastener (1) in direction of arrow.

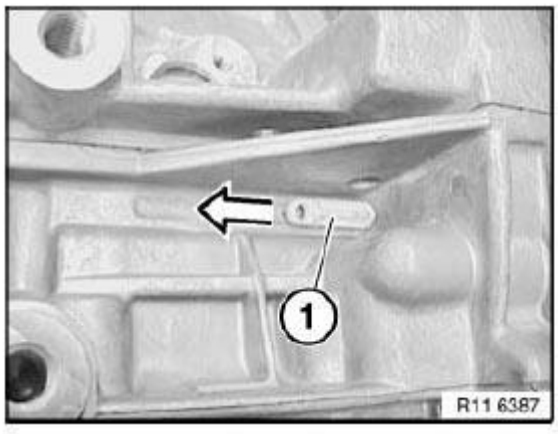



**Fig. 311: Removing Fastener**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.**

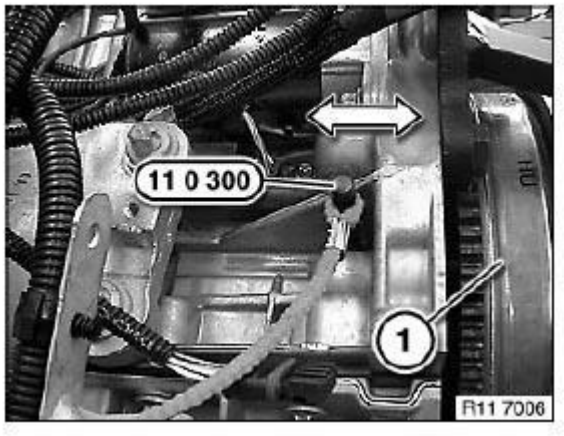



**Fig. 312: Sliding In Special Tool 11 0 300**
**Courtesy of BMW OF NORTH AMERICA, INC.**

With cylinder no. 1 in firing TDC position, inlet camshaft (1) at cylinder no. 6 points downwards at an angle to the left.

With cylinder no. 1 in firing TDC position, exhaust camshaft (2) at cylinder no. 6 points downwards at an angle to the right.

*Installation:*

If the timing is checked while the engine is installed, this is only possible with a mirror.

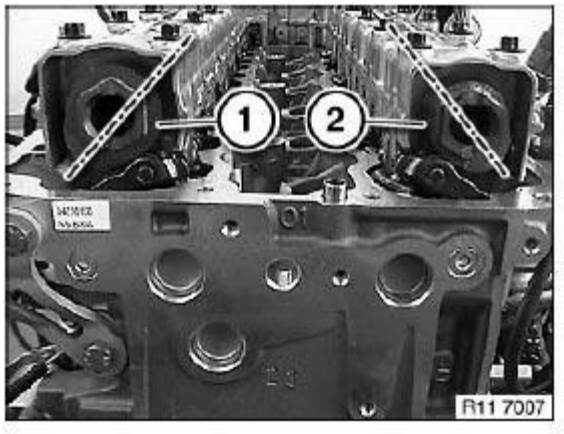



**Fig. 313: Identifying Cams Of Inlet And Exhaust Camshaft**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Fit special tool 11 4 283 with screws (1).

Fit special tool 11 4 281 on special tool 11 4 283.

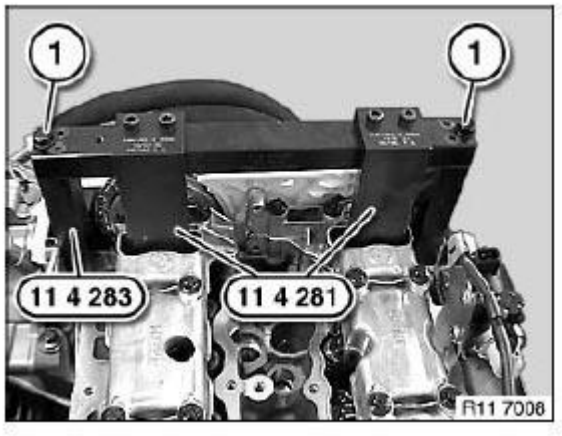



**Fig. 314: Identifying Special Tools 11 4 283 And 11 4 281**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release central bolt of exhaust adjustment unit (1).

Release central bolt of inlet adjustment unit (2).

Tightening torque. See 11 36 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL** .

Release **chain tensioner** . See **11 31 090 INSTALLING AND REMOVING/REPLACING CHAIN TENSIONER PISTON (N54)**.

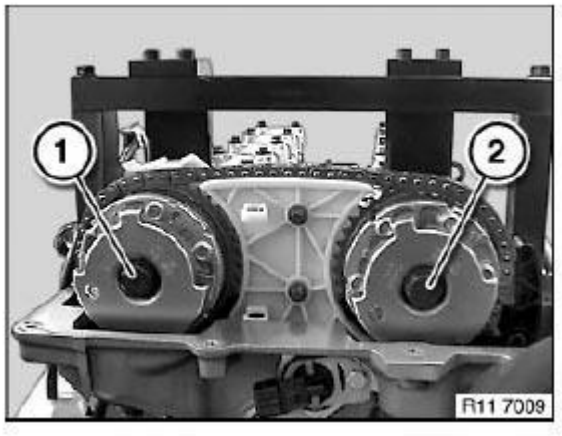



**Fig. 315: Identifying Central Bolt Of Inlet And Exhaust Camshaft**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Detach exhaust adjustment unit (1) from exhaust camshaft.

Detach 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.

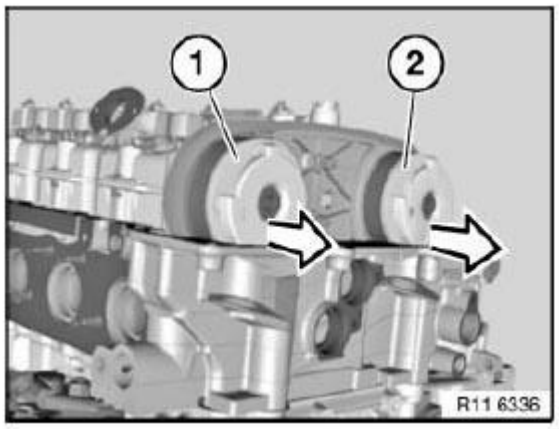



**Fig. 316: Turning Sensor Gears**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT:**

- **Risk of mixing up the inlet and exhaust adjustment units .**
- **Mixing up the inlet and exhaust adjustment units will cause damage to the engine.**

The inlet and exhaust adjustment units are different.

VANOS is marked with AUS and EX for the exhaust camshaft.

VANOS is marked with EIN and IN for the inlet camshaft.

Sensor gears can be fitted alternatively.

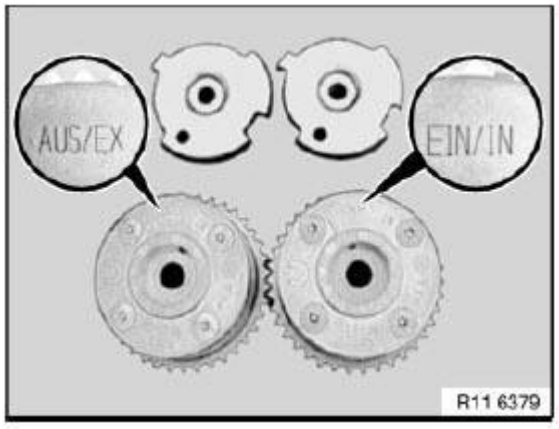



**Fig. 317: Identifying VANOS Mark**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Position inlet and exhaust adjustment units on camshafts.

Installation position of inlet and exhaust adjustment units can be freely selected.

*Installation:*

Replace screws (1 and 2).

Insert screws (1 and 2).

Adjust **valve timing** . See **11 31 005 CHECKING CAMSHAFT TIMING (N54)**.

Fit **chain tensioner** . See **11 31 090 INSTALLING AND REMOVING/REPLACING CHAIN TENSIONER PISTON (N54)**.

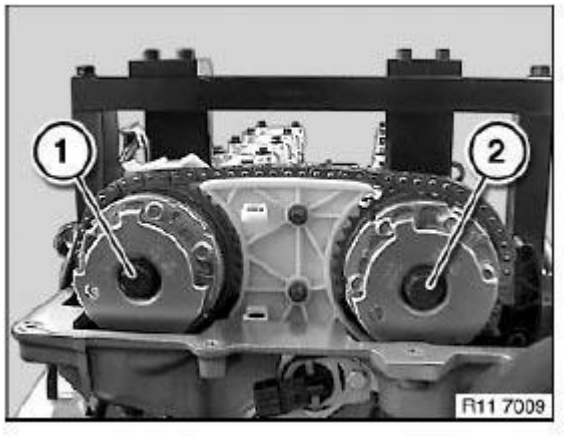



**Fig. 318: Identifying Central Bolt Of Inlet And Exhaust Camshaft**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT: Incorrect installation possible.**

Make sure that timing chain is guided in tensioning rail (1).

**NOTE: Schematic representation on removed chain drive.**

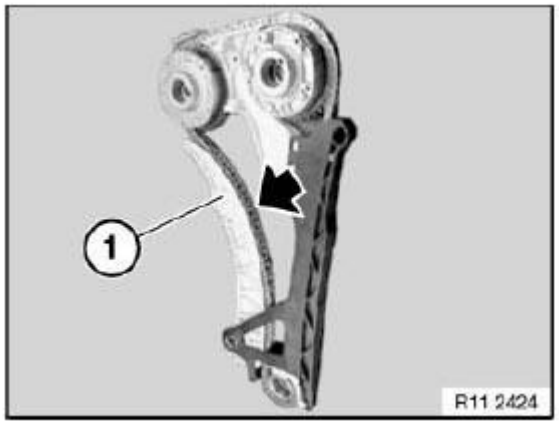



**Fig. 319: Identifying Tensioning Rail**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Remove all special tools.

Assemble engine.

**11 36 655 REMOVING AND INSTALLING/REPLACING BOTH SOLENOID VALVES (N54)**

**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** . See **17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N54)** .

**NOTE: Carefully press coolant hose and pressure line (not shown) to one side.**

**NOTE: Solenoid valve (2) controls the inlet adjustment unit.**
**Solenoid valve (3) controls the exhaust adjustment unit.**

Remove plug connections (1 and 4).

*Installation:*

Do not mix up plug connections (1 and 4) of solenoid valves.

Plug connections (1 and 4) must snap audibly into place!

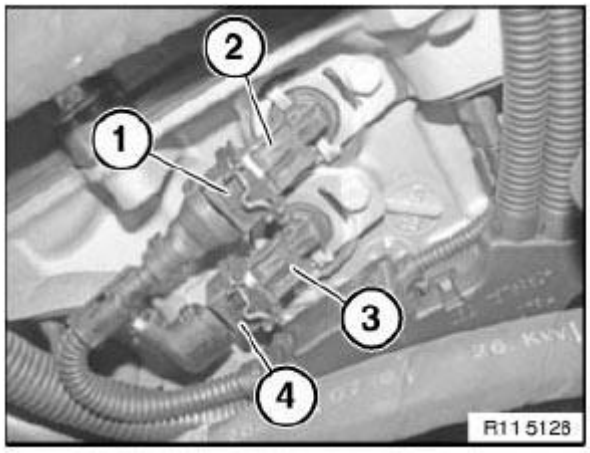



**Fig. 320: Identifying Plug Connections Of Solenoid Valves**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Unfasten screws (3 and 4).

Tightening torque. See 11 36 3AZ in **11 36 VARIABLE CAMSHAFT CONTROL** .

Carefully pull out solenoid valves (1 and 2).

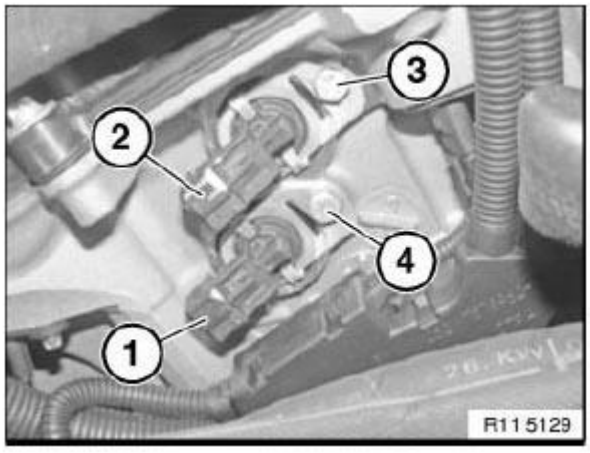



**Fig. 321: Identifying Solenoid Valves**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation:*

**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).

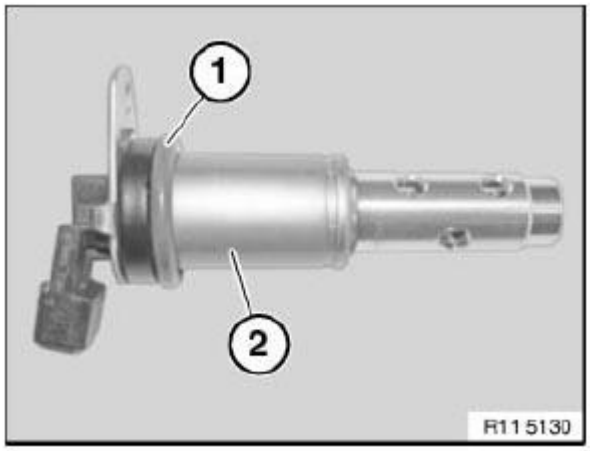



**Fig. 322: Identifying Sealing Ring On Solenoid Valve**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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. See 11 36 3AZ in **11 36 VARIABLE CAMSHAFT CONTROL** .

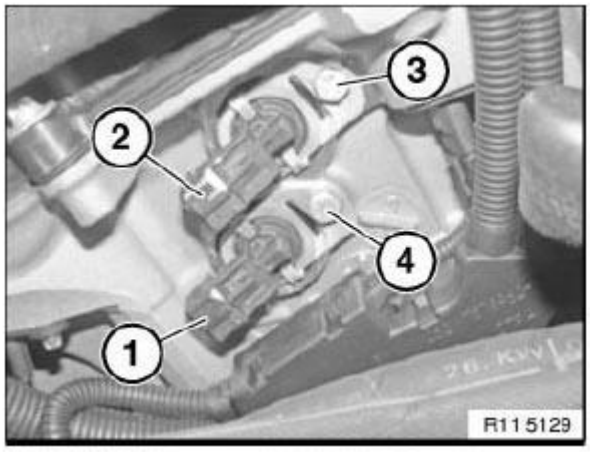



**Fig. 323: Identifying Solenoid Valves**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

Now clear the fault memory.

Check function of DME control unit.

## OIL SUPPLY

**11 40 000 CHECKING ENGINE OIL PRESSURE (N54)**

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 4 050

For the following special tools, refer to **FUEL SYSTEM - SPECIAL TOOLS -- 135I** .

- 13 3 061
- 13 3 063
- 13 6 051
- 13 6 054

*Necessary preliminary tasks:*

- Remove front **ignition coil cover** . See **11 00 REMOVING AND INSTALLING/REPLACING IGNITION COIL COVER (N54)**.

Disconnect plug connection (1) on oil pressure switch.

*Installation:*

Plug connection (1) must snap audibly into place!

Remove oil pressure switch (2).

Tightening torque. See 12 61 1AZ in **OIL PRESSURE, OIL TEMPERATURE GAUGE** .

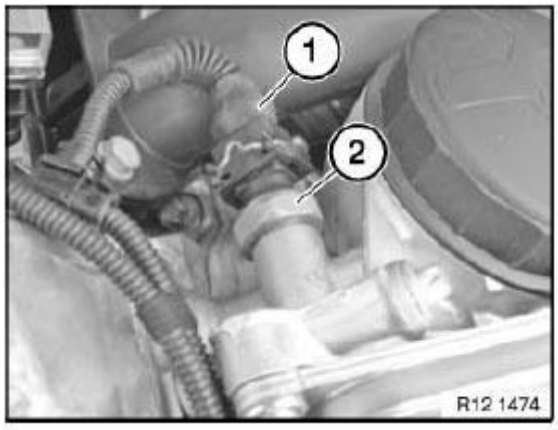



**Fig. 324: Identifying Plug Connection On Oil Pressure Switch**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Screw in special tool 11 4 050 with sealing ring (1).

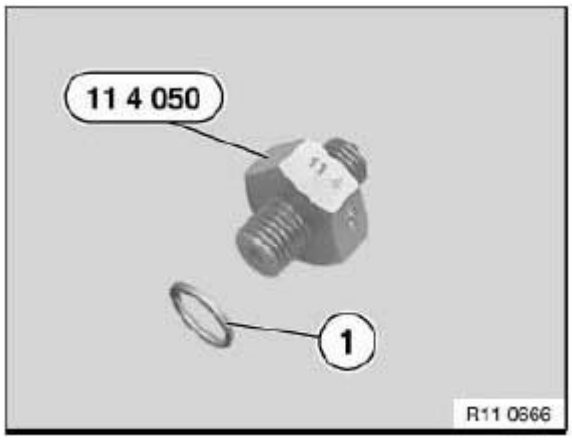



**Fig. 325: Identifying Special Tool And Sealing Ring**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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** . See **ENGINE - TECHNICAL DATA** .

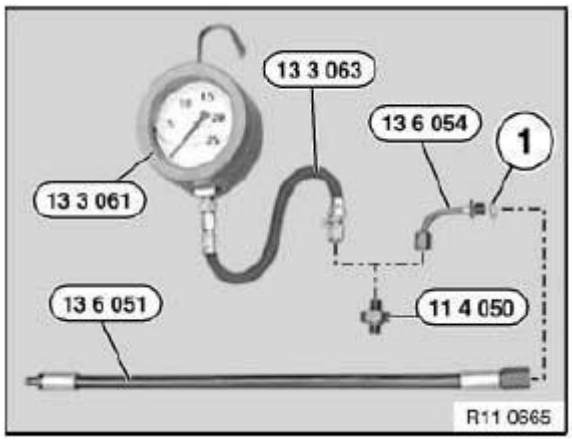



**Fig. 326: Checking Engine Oil Pressure Using Pressure Gauge**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

## OIL PUMP WITH FILTER AND DRIVE

### 11 41 000 REMOVING AND INSTALLING OIL PUMP (N54)

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 0 300

*Necessary preliminary tasks:*

- Remove **oil sump**

Release screws (1).

Tightening torque. See 11 41 1AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE** .

*Installation:*

**Replace aluminum screws** .

Remove intake pipe (2) in direction of arrow.

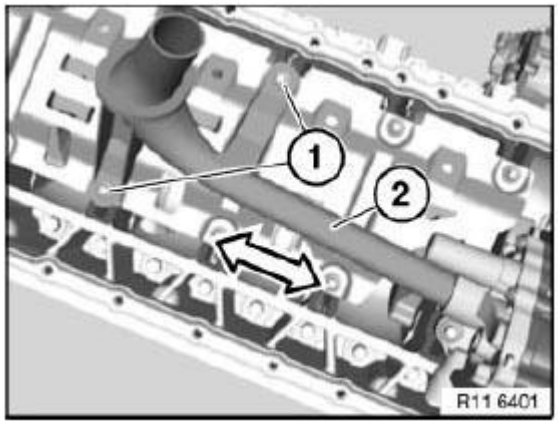



**Fig. 327: Removing Intake Pipe**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Secure oil pump drive gear with special tool 11 0 300 to oil pump.

**IMPORTANT: Release central bolt (2) with special tool 11 0 300 only.**

Tightening torque. See 11 41 4AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE** .

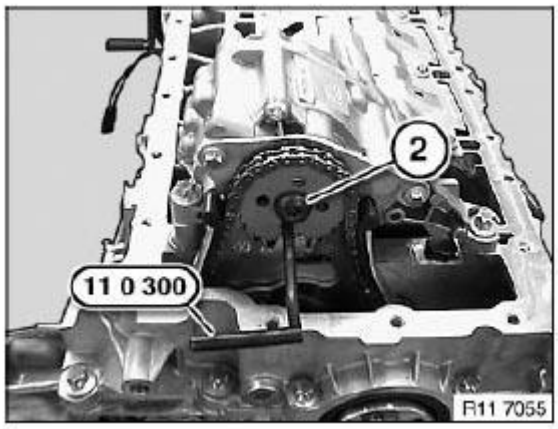



**Fig. 328: Securing Oil Pump Drive Gear Using Special Tool 11 0 300**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screws (2).

Tightening torque. See 11 41 3AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE** .

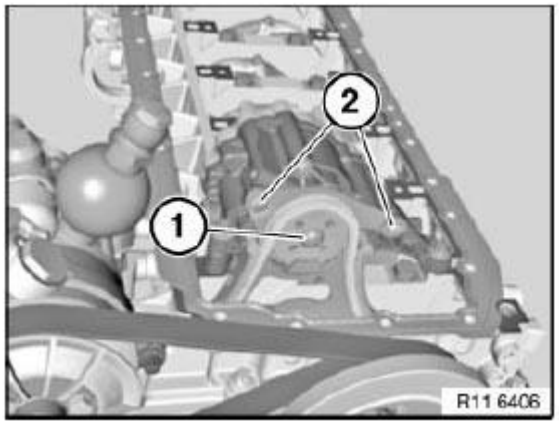



**Fig. 329: Identifying Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screws (1).

Tightening torque. See 11 41 2AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE** .

*Installation:*

**Replace aluminum screws** .

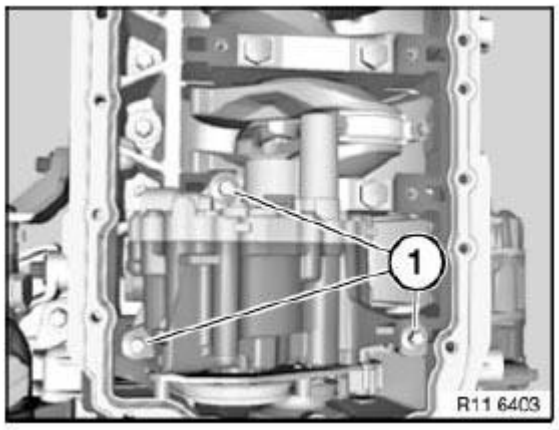



**Fig. 330: Identifying Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Pull of drive gear (1) in direction of arrow.

**NOTE: Timing chain (3) of triangular drive is pressed upwards by chain tensioner. Do not remove drive gear.**

Remove oil pump (2) in direction of arrow.

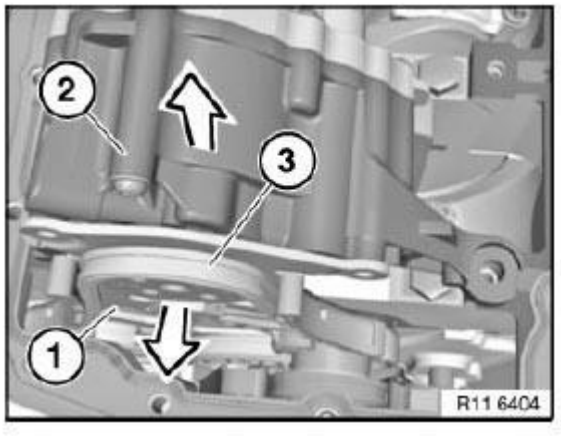



**Fig. 331: Pulling Drive Gear**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation:*

Check spacers (1) for damage and firm seating.

**Replace spacers (1) if necessary** .

Align twin surface (3) on oil pump (2) to drive gear. Install oil pump (2).

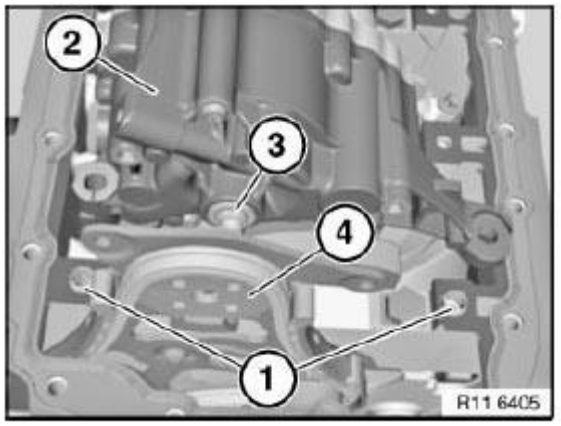



**Fig. 332: Identifying Spacers With Twin Surface On Oil Pump**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

**11 41 010 REMOVING AND INSTALLING/REPLACING CHAIN MODULE FOR OIL PUMP/VACUUM PUMP (N54)**

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 0 290
- 11 0 300
- 11 4 120
- 11 4 280
- 11 5 20
- 11 8 640
- 11 8 650
- 11 9 190
- 11 9 280

**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** . See **11 12 000 REMOVING AND INSTALLING/SEALING CYLINDER HEAD COVER (N54)**.
- Remove **oil sump**.
- Remove **drive belt** . See **11 28 010 REPLACING ALTERNATOR DRIVE BELT (N54)**.
- Remove drive belt **tensioner** . See **11 28 020 REPLACE ALTERNATOR DRIVE BELT TENSIONER (N54)**.
- Remove **vibration damper** . See **11 23 010 REMOVING AND INSTALLING/REPLACING VIBRATION DAMPER (N54)**.
- Remove **sealing cover** for vacuum pump. See **11 14 010 Replacing Sealing Cover For Vacuum Pump (N54)**.
- Remove **chain tensioner** . See **11 31 090 INSTALLING AND REMOVING/REPLACING CHAIN TENSIONER PISTON (N54)**.

Turn sprocket wheel (3) at central bolt (crankshaft) into position.

Screw special tool 11 8 650 into crankcase.

Position special tool 11 0 290 on sprocket wheel and on special tool 11 8 650.

Release screw (1).

Tightening torque. See 11 66 2AZ in **11 66 VACUUM PUMP** .

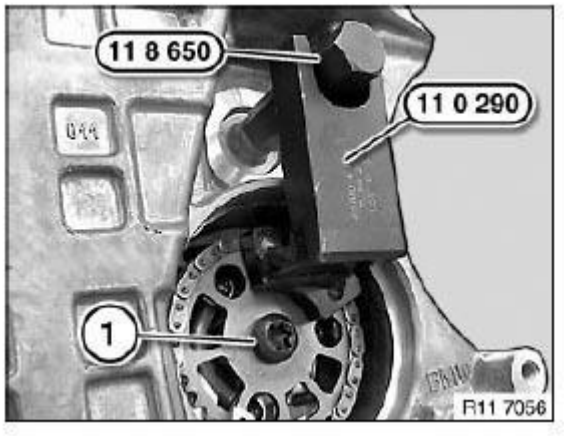



**Fig. 333: Positioning Special Tool 11 0 290 On Sprocket Wheel And On Special Tool 11 8 650**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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 wheel (3) at hexagon head of vacuum pump (4).

*Installation:*

A lock pin is pre-installed if the triangular drive is replaced.

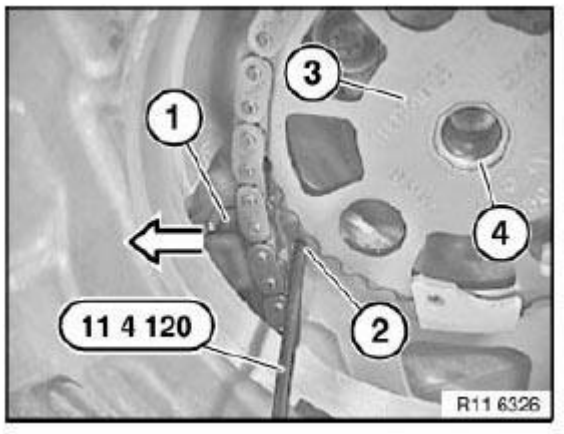



**Fig. 334: Pressing Timing Chain Using Chain Tensioner**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screws (2).

Tightening torque. See 11 41 3AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE** .

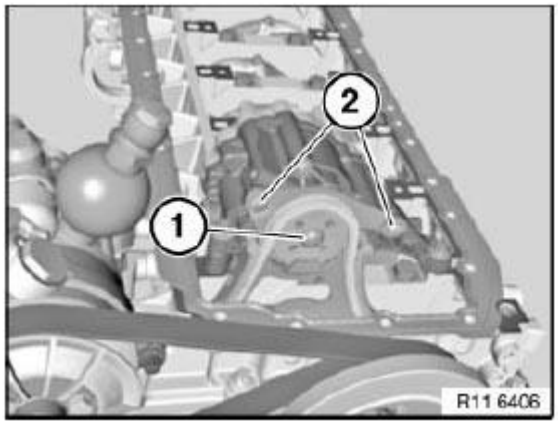



**Fig. 335: Identifying Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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 in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

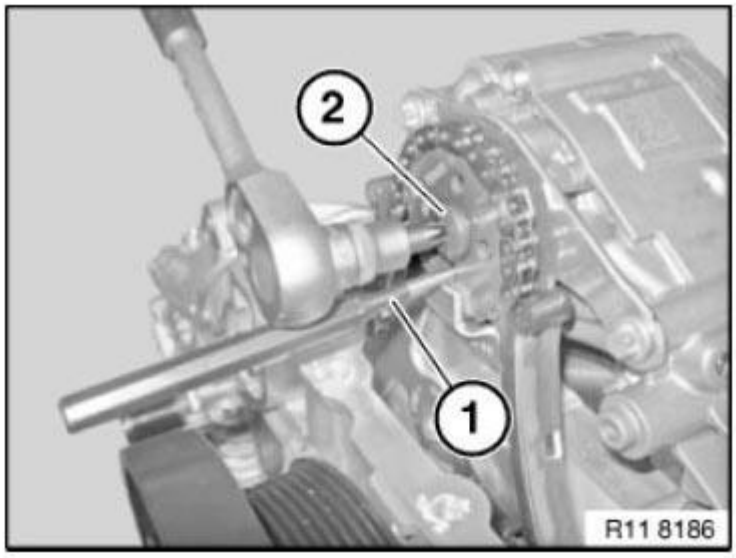



**Fig. 336: Identifying Central Bolt And Pin**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Secure **crankshaft and camshaft** .

Do **not** remove special tools 11 0 300 and 11 4 280.

Fit special tool 11 9 280.

Release central bolt (1).

**NOTE: A 3/4 inch tool is needed to release the central bolt. A second person is required.**

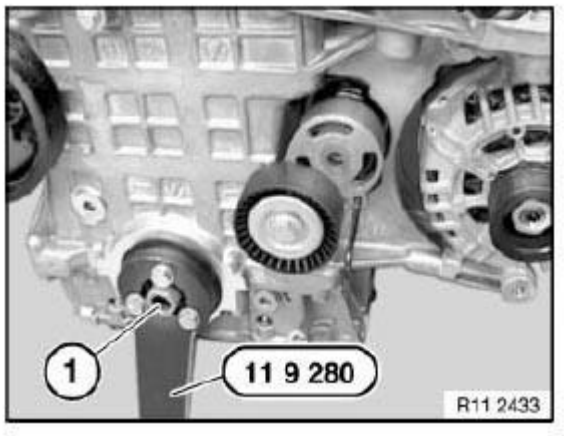



**Fig. 337: Identifying Central Bolt With Special Tool 11 9 280**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Remove hub (2) towards front.

*Installation:*

Replace **crankshaft radial seal** at front. See **11 14 005 REPLACING FRONT CRANKSHAFT RADIAL SEAL (N54)**.

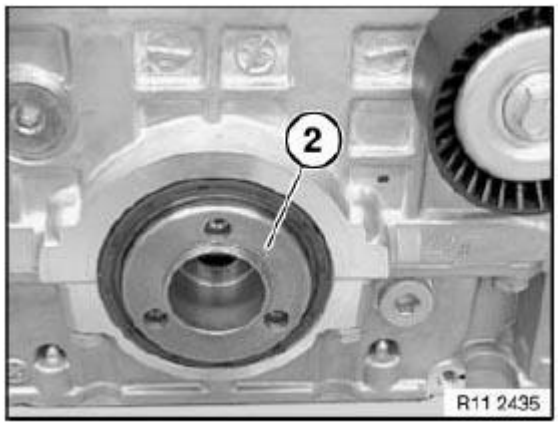



**Fig. 338: Identifying Hub**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Open screw plug on bedplate.

*Installation:*

**Replace seal** .

Release screw (1) with special tool 11 8 640 on triangular drive.

Tightening torque. See 11 41 3AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE** .

*Installation:*

**Replace aluminum screws** .

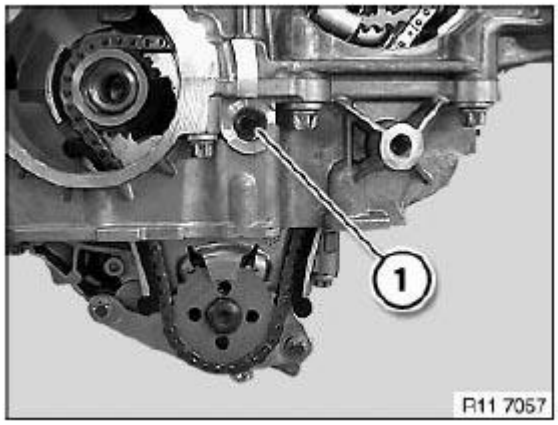



**Fig. 339: Identifying Screw**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Remove triangular drive (1) in direction of arrow.

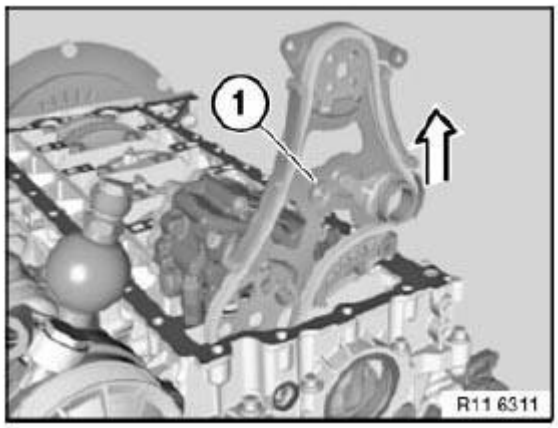



**Fig. 340: Removing Triangular Drive**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT: Note installation direction of sprocket wheel (2).**
**Collar on sprocket wheel (2) points to *timing chain drive* .**
**Incorrect assembly will result in *engine damage* .**

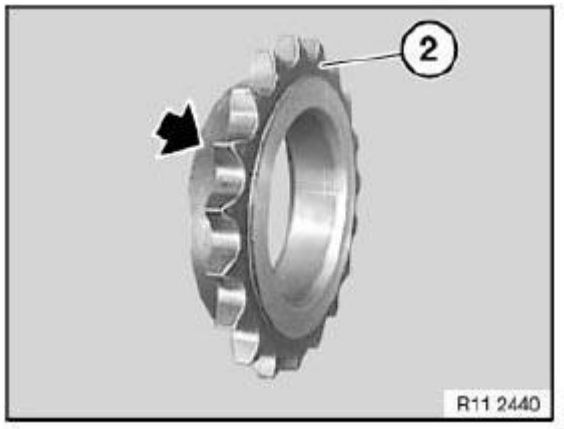



**Fig. 341: Position Of Installing Sprocket Wheel**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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 wheel.

The third friction plate is attached to the crankshaft hub.

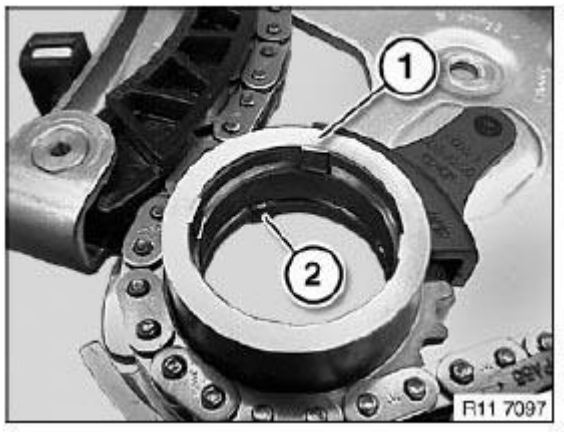



**Fig. 342: Identifying Friction Plates**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Feed in oil pump chain module.

Secure oil pump chain module with screws (2).

Tightening torque. See 11 41 3AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE** .

Secure screw (1) with special tool 11 8 640.

Tightening torque. See 11 41 3AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE** .

*Installation:*

Check both friction plates (3) with retainers for correct installation position.

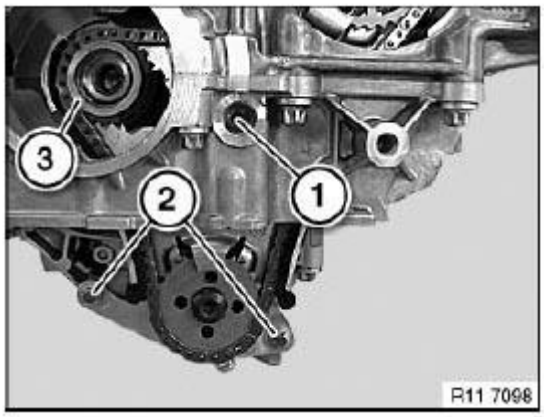



**Fig. 343: Identifying Friction Plate Installation Position**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.**

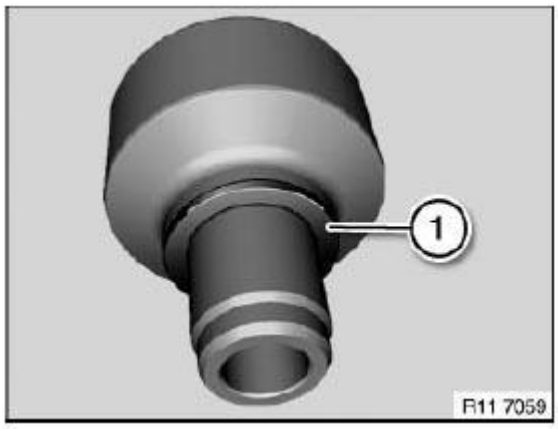



**Fig. 344: Identifying Friction Plate Without Retainers**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Fit central bolt (1).

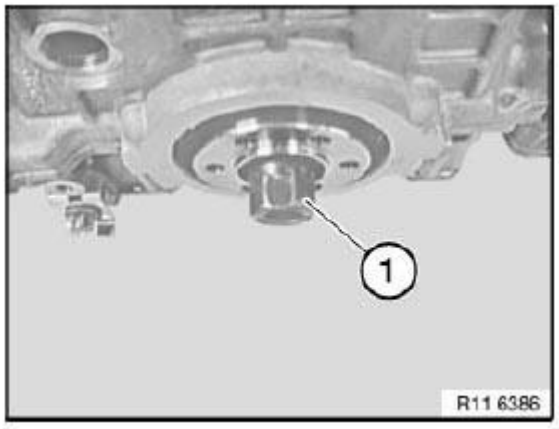



**Fig. 345: Identifying Central Bolt**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Insert special tools 11 8 650 and 11 0 290.

Tighten bolt (1).

Tightening torque. See 11 66 2AZ in **11 66 VACUUM PUMP** .

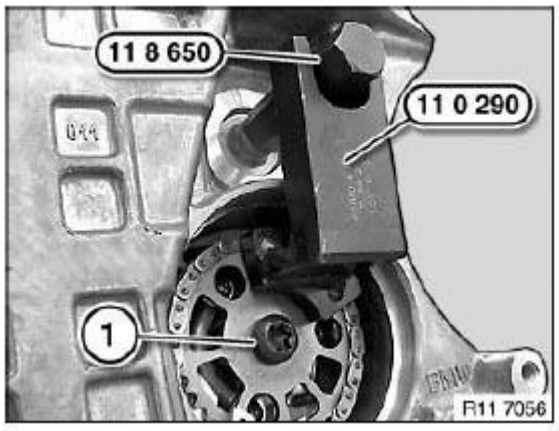



**Fig. 346: Positioning Special Tool 11 0 290 On Sprocket Wheel And On Special Tool 11 8 650**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Install special tool 11 0 300.

Tighten bolt (2).

Tightening torque. See 11 41 4AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE** .

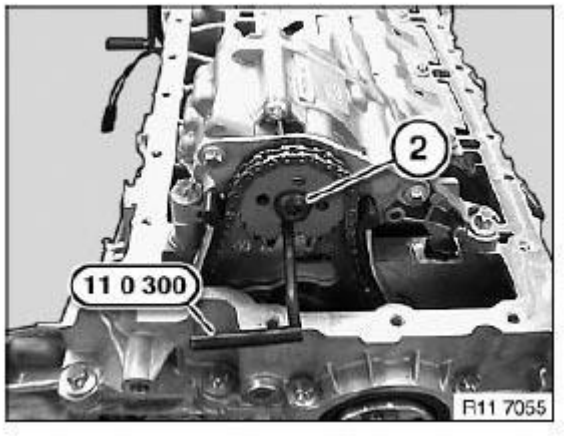



**Fig. 347: Securing Oil Pump Drive Gear Using Special Tool 11 0 300**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Tighten down special tool 11 5 200 with screws (1) to hub.

Do **not** remove special tools 11 0 300 and 11 4 280.

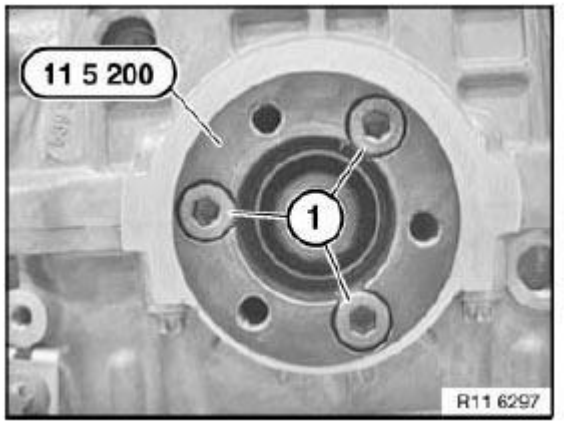



**Fig. 348: Identifying Special Tool 11 5 200**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Tighten central bolt to jointing torque.

Tightening torque. See 11 21 1AZ in **11 21 CRANKSHAFT AND BEARINGS** or **11 21 CRANKSHAFT AND BEARINGS** .

Mark torsion angle tightening on tool with stroke of paint (1).

See **Fig. 349**.

**IMPORTANT: Do *not* remove tool from central bolt during torsion angle tightening. *Risk of damage!***

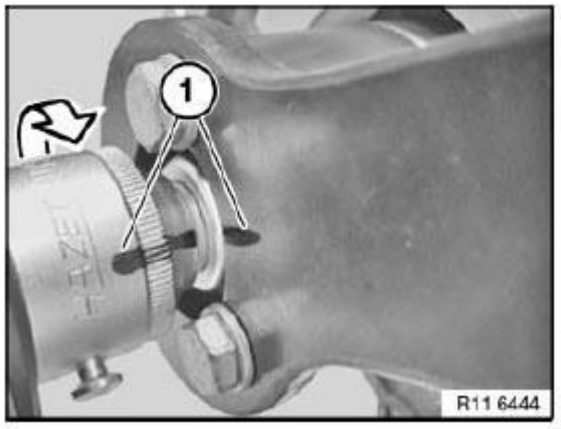



**Fig. 349: Tightening Torsion Angle**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation:*

Replace **crankshaft radial seal** at front. See **11 14 005 REPLACING FRONT CRANKSHAFT RADIAL SEAL (N54)**.

Assemble engine.

## OIL FILTER AND LINES

### 11 42 020 REMOVING AND INSTALLING/REPLACING FULLFLOW OIL FILTER (N54)

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 9 240

**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 air manifold** . See **11 61 050 REMOVING AND INSTALLING INTAKE AIR MANIFOLD (N54)**.
- Drain **coolant** . See **17 00 005 DRAINING AND ADDING COOLANT (N54)** .

- Unlock coolant hose and detach
- Remove **oil-water heat exchanger** . See **11 44 000 REMOVING AND INSTALLING/REPLACING OIL-COOLANT HEAT EXCHANGER (N54)**.

Release oil filter cap with special tool 11 9 240. Tightening torque. See 11 42 1AZ in **11 42 OIL FILTER AND PIPES** .

**NOTE: Engine oil flows out of the oil filter housing and back into the oil sump.**

*Installation:*

**Replace sealing rings on oil filter cap** .

Moisten sealing rings with engine oil.


**Fig. 350: 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. See 11 42 2AZ in **11 42 OIL FILTER AND PIPES** .

*Installation:*

Replace all seals.

If necessary, replace filter element.

Modify oil pressure switch when replacing.

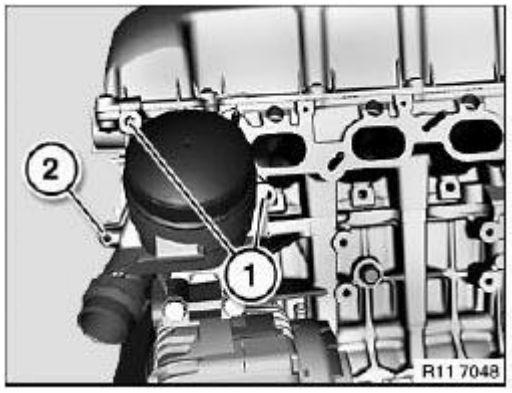



**Fig. 351: Identifying Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

**11 42 198 REMOVING AND INSTALLING OIL FEED LINE FOR EXHAUST TURBOCHARGER (N54)**

Remove exhaust turbocharger.

Release screw (2). Tightening torque **11 42 9AZ.**

**Important!** Where necessary, to release the oil feed line (3), do not place pliers on the pipe. Risk of damage!

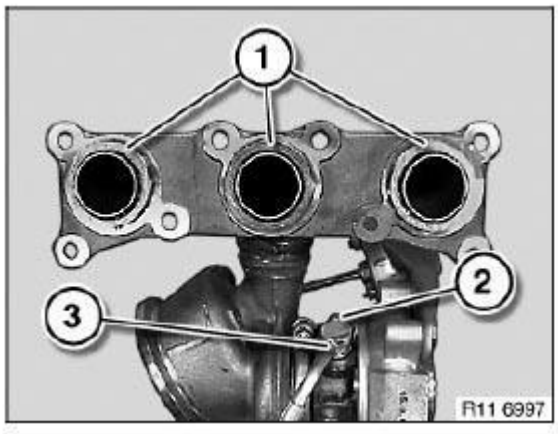



**Fig. 352: Identifying Turbocharger**
**Courtesy of BMW OF NORTH AMERICA, INC.**

If necessary, release oil feed line (3) with suitable pliers at connection and remove.

**Installation note:** Replace O-rings.

Assemble engine.

**11 42 250 REMOVING AND INSTALLING OIL RETURN LINE FOR EXHAUST TURBOCHARGER (N54)**

Remove both catalytic converters.

Remove right engine support arm.

Undo screws (1 and 2)

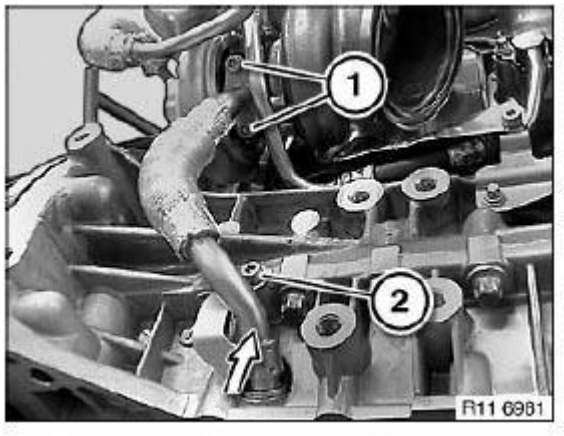



**Fig. 353: Removing Oil Return Pipe**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Tightening torque **11 42 7AZ.** .

Remove oil return line in direction of arrow.

**Installation note:** Renew O-rings and gaskets.

Assemble engine.

**11 42 248 REMOVING AND INSTALLING/RENEWING THE OIL RETURN LINE FOR EXHAUST TURBOCHARGER CYL. 1-3 (N54)**

**IMPORTANT: It is not necessary to carry out a chassis/wheel alignment check to release the steering tie rod.**

*Necessary preliminary tasks:*

- Partially release the track rod end on the right.
- Partially release the holder on the steering gear.
- Disconnect the plug connection at the coolant pump.
- Remove heat shield.
- Remove coolant hose from coolant pump.

Release screws (1 and 2).

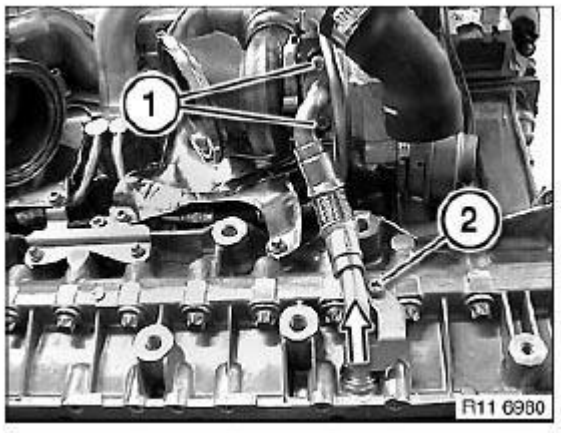



**Fig. 354: Locating Oil Return Pipe Screw**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Tightening torque: **11 42 7AZ.**

Remove oil return line in direction of arrow.

**Installation note:** Renew O-rings and gaskets.

Assemble engine.

**11 42 035 REMOVING AND INSTALLING/REPLACING THERMOSTAT HOUSING**

**WARNING: Warning! Risk of scalding! Only perform this repair work on an engine that has cooled down.**

**IMPORTANT: 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 auxiliary materials.**

*Necessary preliminary tasks:*

- Drain **COOLANT** .
- Remove **FAN COWL** .

Release screw (1). Tightening torque **11 42 3AZ.** . Pull engine oil pipe down off the thermostat housing.
**Installation note:** Replace O-rings.

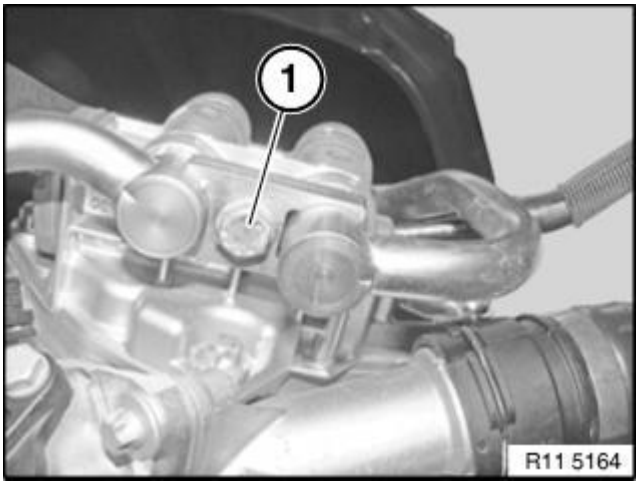



**Fig. 355: Identifying Screw**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screws (1) on thermostat housing. Remove oil-coolant heat exchanger towards front. Picture shows E9x
Installation note: Replace gasket.

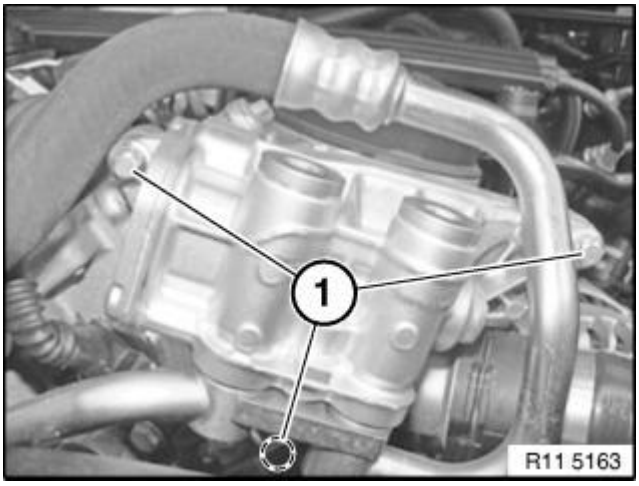



**Fig. 356: Identifying Bolts On Oil-Coolant Heat Exchanger**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Reassemble vehicle 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.

## OIL COOLER

### 11 44 000 REMOVING AND INSTALLING/REPLACING OIL-COOLANT HEAT EXCHANGER (N54)

**WARNING: Danger 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 coolant 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** . See **17 00 005 DRAINING AND ADDING COOLANT (N54)** .
- Remove **fan cowl** . See **17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N54)** .

Release screw (1).

Tightening torque. See 11 42 3AZ in **11 42 OIL FILTER AND PIPES** .

Do not detach oil lines from oil-coolant heat exchanger in downward direction.

*Installation:*

**Replace O-rings** .

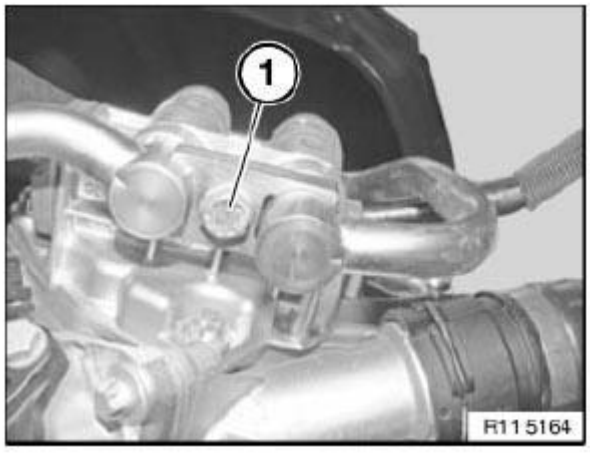



**Fig. 357: Identifying Screw**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release bolts (1) on oil-coolant heat exchanger.

Remove oil-coolant heat exchanger towards front.

*Installation:*

**Replace seal** .

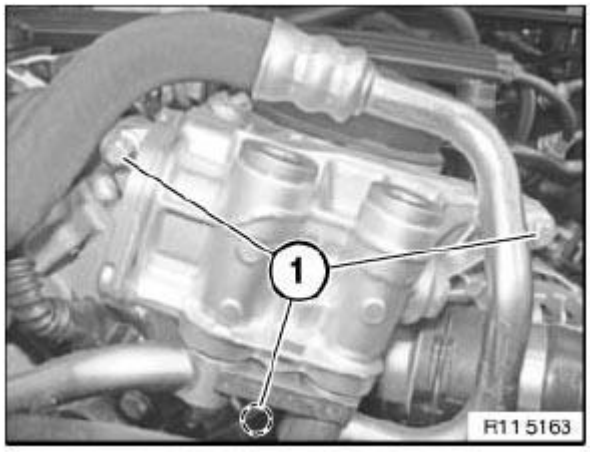



**Fig. 358: Identifying Oil-Coolant Heat Exchanger Bolt**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Reassemble car and set in horizontal position.

Vent **cooling system** and check for water leaks. See **17 00 039 VENTING COOLING SYSTEM AND CHECKING FOR WATER LEAKS (N54)** .

Start engine and run at idle until oil pressure warning lamp goes out.

Stop engine.

Wait approx. 5 minutes and check engine oil level.

Top up engine oil if necessary.

### 11 42 035 REMOVING AND INSTALLING/REPLACING THERMOSTAT HOUSING

See **11 42 035 Removing and installing/replacing thermostat housing**.

## WATER PUMP WITH DRIVE

### 11 51 000 REMOVING AND INSTALLING/REPLACING WATER PUMP (N54)

**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: 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:*

- Drain **COOLANT** .
- Remove **coolant thermostat** . See **11 53 000 REMOVING AND INSTALLING/REPLACING COOLANT THERMOSTAT (N54)**.

Release coolant hose (1).

Disconnect plug connection (4).

Release screws (5).

*Installation:*

**Replace aluminum screws** .

Tightening torque. See **11 51 COOLANT PUMP WITH DRIVE** .

*Installation:*

If a coolant pump is reused, it must be mechanically rotated once (breakaway torque at pump gears).

One coolant pump rotation will be sufficient.

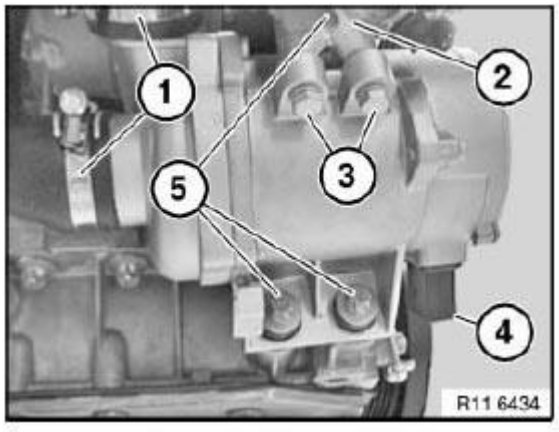



**Fig. 359: Identifying Coolant Hose, Plug Connection With Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

**Venting instructions** must be observed **without fail** . See **17 00 039 VENTING COOLING SYSTEM AND CHECKING FOR WATER LEAKS (N54)** .

# THERMOSTAT AND CONNECTIONS

## 11 53 000 REMOVING AND INSTALLING/REPLACING COOLANT THERMOSTAT (N54)

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

*Recycling:*

Catch and dispose of drained coolant in a suitable container.

Observe country-specific waste-disposal regulations.

*Necessary preliminary tasks:*

- Remove front **underbody protection** . See **51 47 490 REMOVING AND INSTALLING/REPLACING FRONT UNDERBODY PROTECTION** .
- Drain **coolant** . See **17 00 005 DRAINING AND ADDING COOLANT (N54)** .

**NOTE: Illustration shows coolant thermostat removed.**

Disconnect coolant hoses (arrows) on the thermostat (1) with clamping tongs.

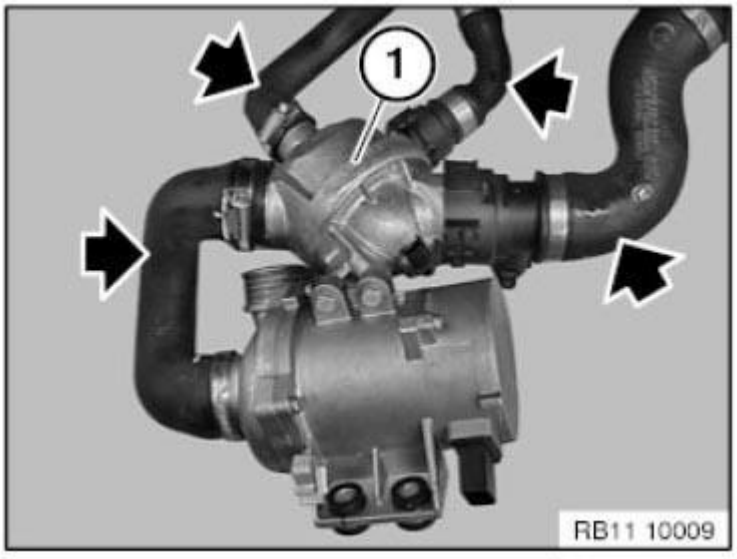



**Fig. 360: Locating Thermostat Coolant Hoses**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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. See 11 53 1AZ in **THERMOSTAT AND CONNECTIONS** .

Remove coolant thermostat (7).

**NOTE: Illustration shows coolant thermostat removed.**

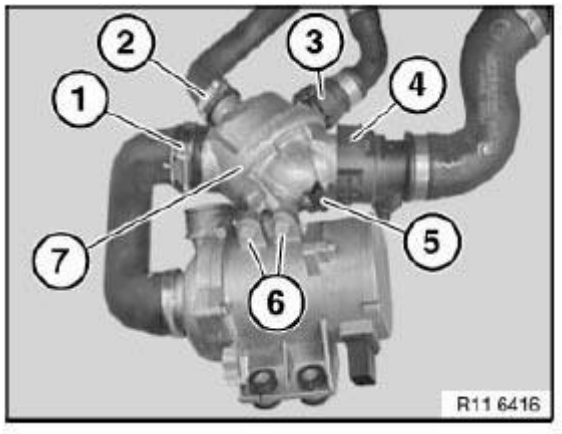



**Fig. 361: Identifying Hose Clamp And Coolant Hoses**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

**11 53 740 REMOVING AND INSTALLING/REPLACING FEED LINE (N54)**

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

*Recycling:*

Catch and dispose of drained coolant in a suitable container.

Observe country-specific waste-disposal regulations.

*Necessary preliminary tasks:*

- Drain **coolant** . See **17 00 005 DRAINING AND ADDING COOLANT (N54)** .
- Remove both **catalytic exhaust-gas converters** . See **18 32 050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 1-3 (N54)** or **18 32 060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 4-6 (N54)** .

Unfasten hose clip (1).

Tightening torque. See 11 51 4AZ in **11 51 COOLANT PUMP WITH DRIVE** .

Detach coolant hose of feed line in direction of arrow from coolant pump (2).

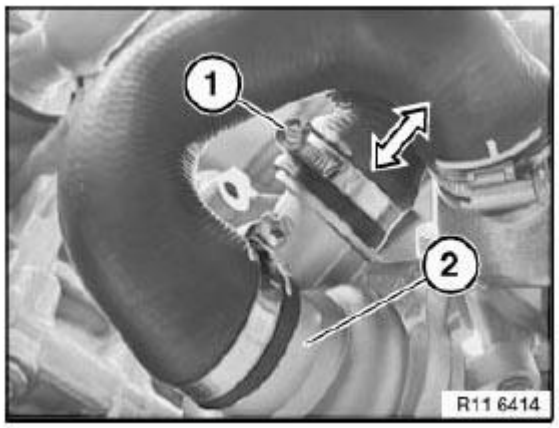



**Fig. 362: Detaching Coolant Hose Of Feed Line**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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. See 11 53 10AZ in **THERMOSTAT AND CONNECTIONS** .

If necessary, release coolant feed lines (3 and 4) with suitable pliers at connection.

*Installation:*

Replace O-rings.

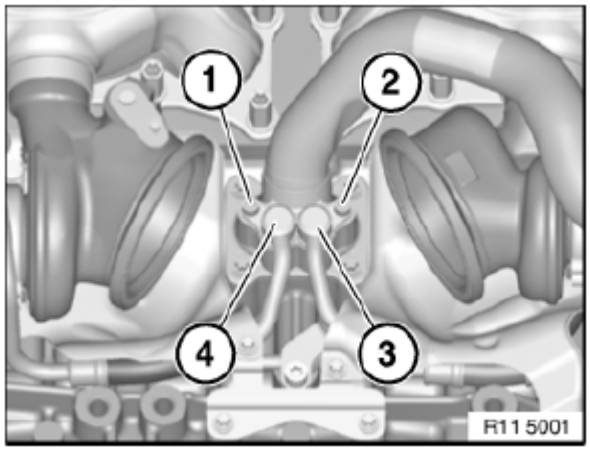



**Fig. 363: Identifying Coolant Feed Lines And Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**NOTE: For purposes of clarity, the graphic shows the released coolant feed lines removed.**

Release screws (1).

Tightening torque. See 11 53 3AZ in **THERMOSTAT AND CONNECTIONS** .

Remove feed line (2).

*Installation:*

**Replace seal** .

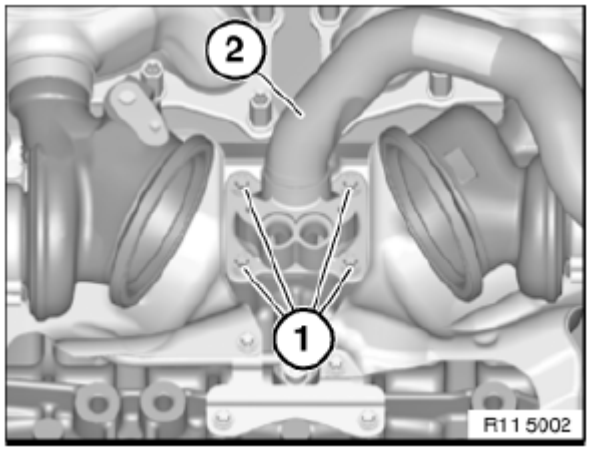



**Fig. 364: Identifying Feed Line With Mounting Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

Top up **coolant** . See **17 00 005 DRAINING AND ADDING COOLANT (N54)** .

**Venting instructions** must be observed **without fail** . See **17 00 039 VENTING COOLING SYSTEM AND CHECKING FOR WATER LEAKS (N54)** .

## INTAKE MANIFOLD

### 11 61 368 REMOVING AND INSTALLING/REPLACING REAR LEFT CHARGE-AIR DUCT (N54)

*Necessary preliminary tasks:*

- Switch off ignition
- Remove **intake filter housing** . See **13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING (N54)** .

**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!**

Loosen hose clamp.

Tightening torque. See 13 71 6AZ in **13 71 AIR INTAKE SILENCER** .

*Installation:*

Install charge-air hoses dry and free from grease.

Detach charge-air hose (1) from charge-air duct (2).

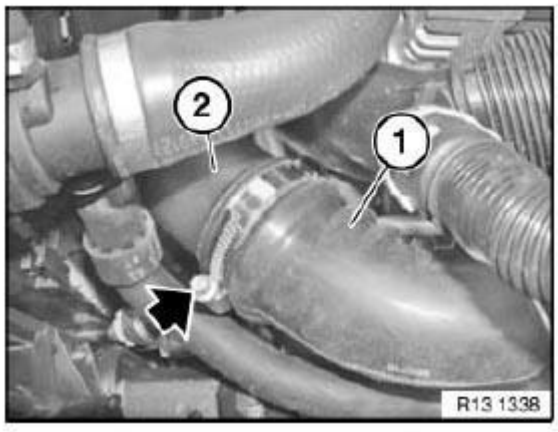



**Fig. 365: Identifying Charge-Air Hose And Charge-Air Duct**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release quick-connect couplings (1) by turning lock through 90°.

Detach recirculated-air hoses (2) and lay to one side.

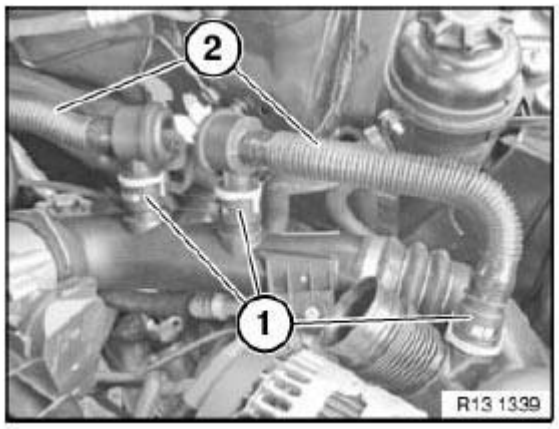



**Fig. 366: Identifying Quick-Connect Couplings And Recirculated-Air Hoses**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation:*

Bring lock (1) back 90° into installation position.

Pay attention to markings.

Recirculated-air hoses must snap audibly into place.

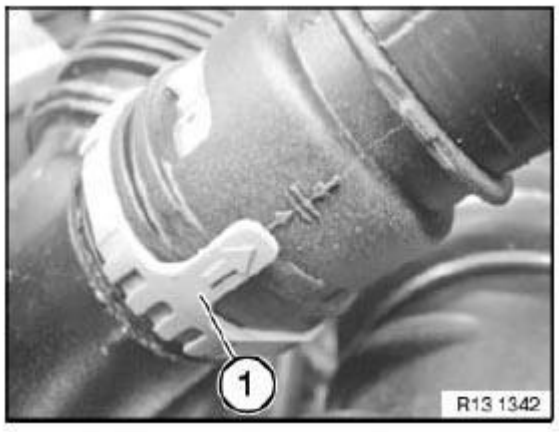



**Fig. 367: Identifying Lock Installation Position**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Unlock plug (1) and remove.

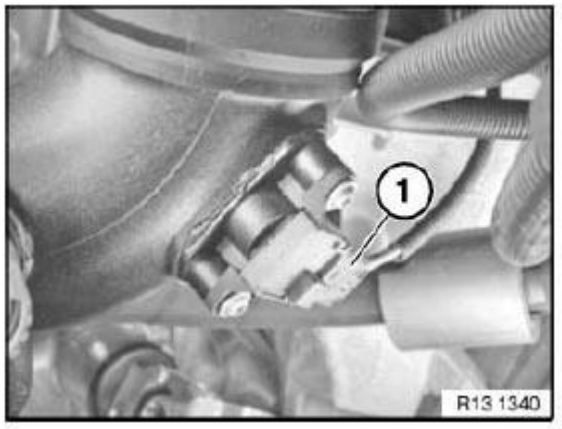



**Fig. 368: Identifying Plug**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**IMPORTANT: Coat sealing rings of quick-connect couplings with anti-seize agent. Pressure pipes cannot be fitted without anti-seize agent!**

Release screw.

Tightening torque. See 13 71 4AZ in **13 71 AIR INTAKE SILENCER** .

Unlock quick-connect coupling (1).

Detach charge-air duct (2) from throttle valve assembly and remove.

*Installation:*

Coat sealing ring of quick-connect coupling with anti-seize agent.

Charge-air duct (2) must snap audibly into place.

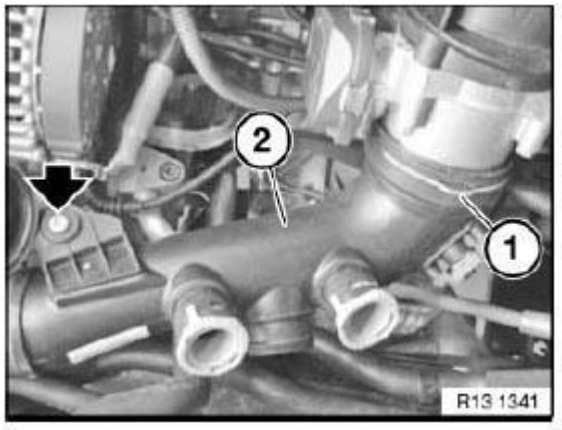



**Fig. 369: Identifying Quick-Connect Coupling And Charge-Air Duct**

**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

Read out fault memory of DME control unit

**11 61 365 REPLACING FRONT CHARGE-AIR DUCT (N54)**

See **11 61 365 REPLACING FRONT CHARGE-AIR DUCT (N54)** .

**11 61 362 REPLACING RIGHT CHARGE-AIR DUCT (N54)**

See **11 61 362 REPLACING RIGHT CHARGE-AIR DUCT (N54)** .

**11 61 050 REMOVING AND INSTALLING INTAKE AIR MANIFOLD (N54)**

*Necessary preliminary tasks:*

- Remove **intake filter housing** . See **13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING (N54)** .
- Remove **engine cover**.
- Remove **left charge air duct**.
- If necessary, remove **tension strut** (risk of damage to charge-air pressure sensor). See **51 71 371 REMOVING AND INSTALLING/REPLACING TENSION STRUT ON LEFT OR RIGHT SPRING STRUT DOME (CONVERTIBLE)** or **51 71 371 REMOVING AND INSTALLING/REPLACING TENSION STRUT ON LEFT OR RIGHT SPRING STRUT DOME (COUPE)** .

Detach crankcase breather (1) at cylinder head cover.

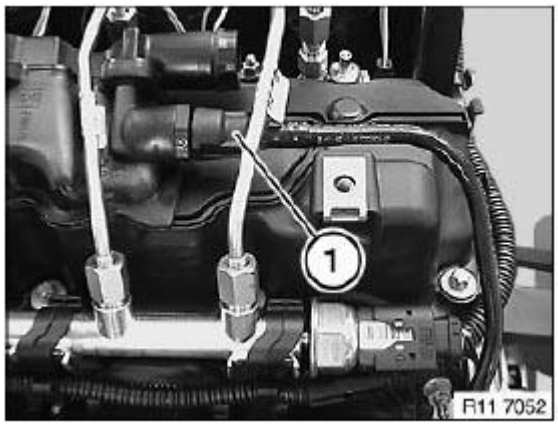



**Fig. 370: Identifying Crankcase Breather**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Pull off vacuum hose (1).

Detach tank vent valve (2) from mounting.

Release hose (3) and lay to one side.

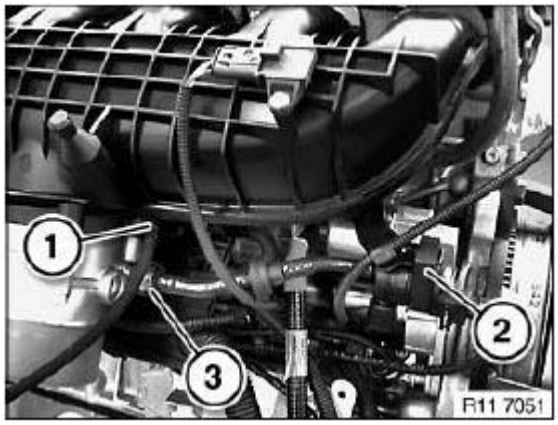



**Fig. 371: Identifying Vacuum Hoses And Tank Vent Valve**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Disconnect plug connection (1) on oil pressure switch (2).

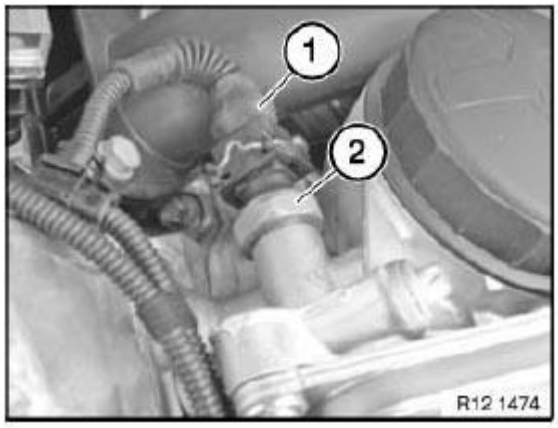



**Fig. 372: Identifying Plug Connection On Oil Pressure Switch**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release retainers (1) on fuel rail and place to one side.

Disconnect plug connection (2).

**NOTE: Do not detach fuel line.**

Unscrew nuts (3).

Release screw (4).

Tightening torque. See 11 61 1AZ in **INTAKE MANIFOLD** .

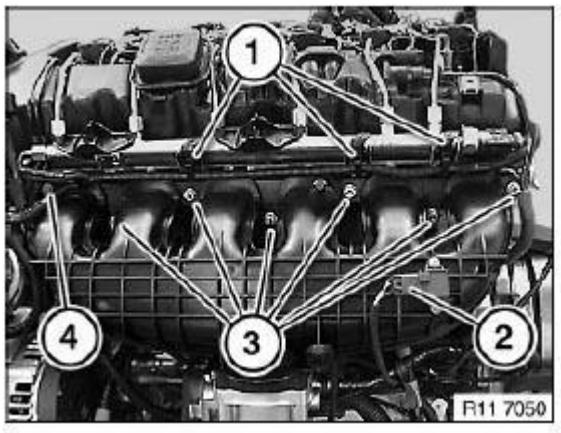



**Fig. 373: Identifying Retainers, Plug Connection With Screws And Nuts**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Raise intake air manifold.

Release screws (1).

Place cable duct (2) to one side.

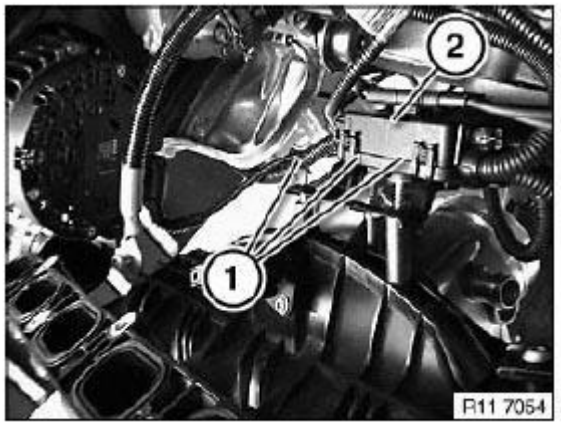



**Fig. 374: Identifying Cable Duct And Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Cut cable tie (1).

Disconnect plug connection (2).

*Installation:*

**Replace all seals (3)** .

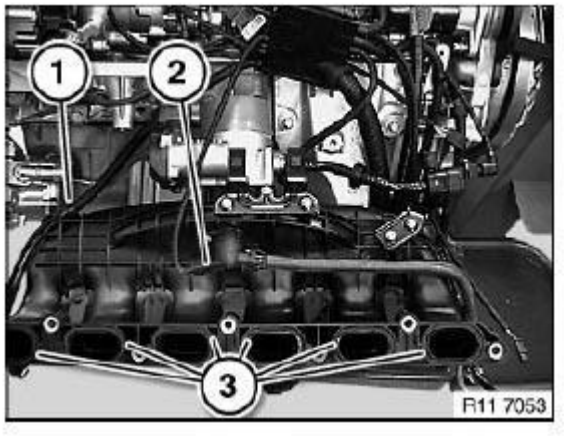



**Fig. 375: Identifying Cable Tie, Plug Connection And Seals**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation:*

**Replace all seals** .

Assemble engine.

**11 61 730 BMW LEAK TEST FOR INTAKE SYSTEM (N54)**

**IMPORTANT: Overpressure and vacuum lines are identified by the size of the seals and color-coded Red and Blue and must not be mixed up with each other.**
**Build up pressure with Blue color.**
**Generate vacuum pressure with Red color.**
**Mixing up the functions will result in damage to the engine.**

*Necessary preliminary tasks:*

- Release upper section of intake air filter.
- Prepare BMW diagnosis system.
- Start diagnosis program.
    1. Drive
    2. Engine electronics
    3. Air supply
    4. Boost pressure control

  or Perception

  Lack of power

Note on ordering:

- Workshop equipment.
- Workshop planning.
- Workshop equipment catalogue.
- Measuring and test equipment.
- No. 81 29 0 426 464

**Pressure measurement**

Prepare BMW diagnosis system on diagnosis unit.

1. Screw in pressure sensor.
2. Overpressure connection (Blue).
3. Connect stimuli cables (3) to positive and negative.
4. Connect 12V battery cables (4) to vehicle battery positive and negative.

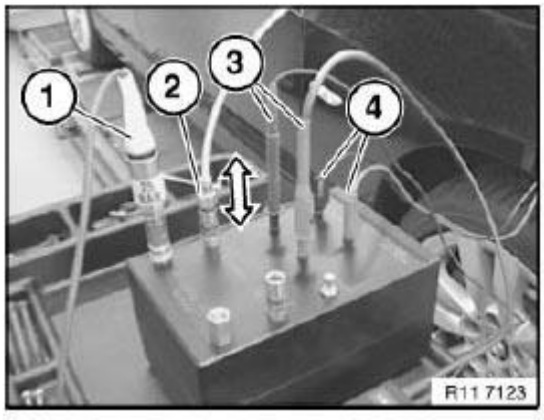



**Fig. 376: Measuring Pressure**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Secure seal plug (1) with union nut (2) in intake duct and seal.

**NOTE: Twin-Turbo: both intake ducts must be sealed.**

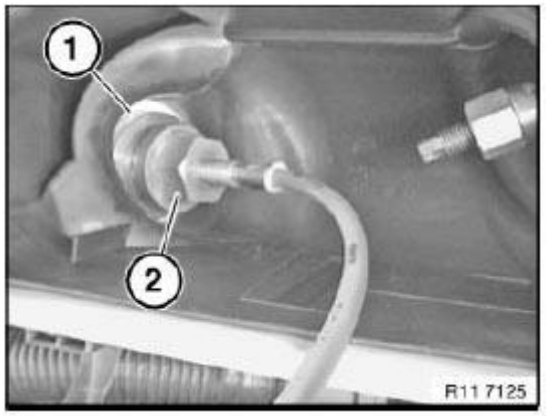



**Fig. 377: Identifying Seal Plug And Union Nut**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Insert Blue pneumatic hose (4) in pneumatic coupling (2) of sealing plug (1).

Seal plug (3) has no pneumatic coupling.

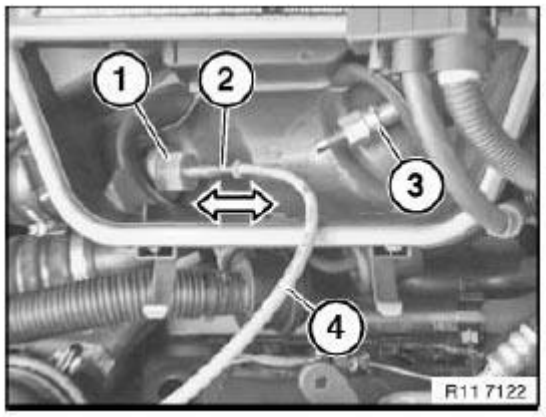



**Fig. 378: Inserting Blue Pneumatic Hose In Pneumatic Coupling Of Sealing Plug**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**Vacuum pressure measurement**

Prepare diagnosis tester on diagnosis unit.

1. Screw in pressure sensor.
2. Connect stimuli cables (2) to positive and negative.
3. Connect 12V battery cables (3) to vehicle battery positive and negative.
4. Controller for vacuum connection.
5. Vacuum connection (Red).

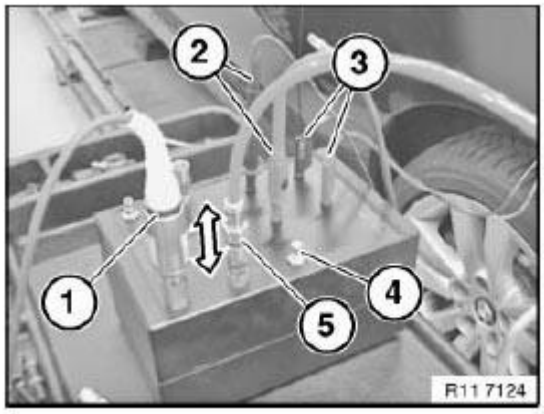



**Fig. 379: Measuring Vacuum Pressure**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**Calibration for vacuum pressure measurement**

Seal stop cock (2) in direction of arrow.

Release lock nut on controller (1).

Carry out pressure adjustment in accordance with BMW diagnosis instruction.

Secure controller (1) hand-tight against turning.

Open stop cock (2) again.

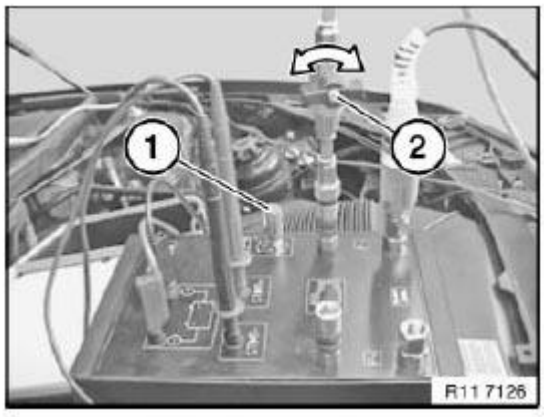



**Fig. 380: Sealing Stop Cock**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**Connections on EPPC**

1. Connection (VAC) to vacuum reservoir.
2. Connection (OUT) with ring to turbocharger.

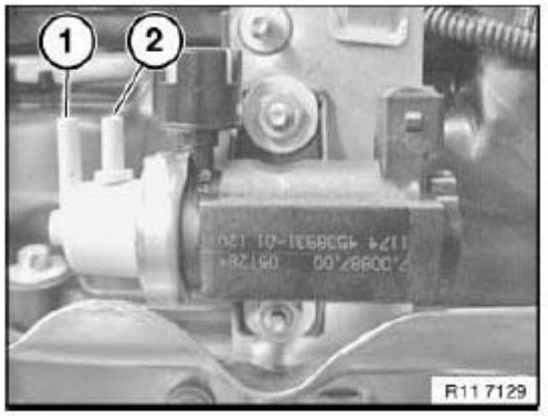



**Fig. 381: Identifying Connection VAC And OUT**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**Checking wastegate on cylinders 1-3**

Detach vacuum line from EPPC (2), cylinders 1-3 (OUT).

Clamp off connecting line with suitable tool (1).

Attach vacuum line to pneumatic coupling (3) with Red pneumatic hose in direction of arrow.

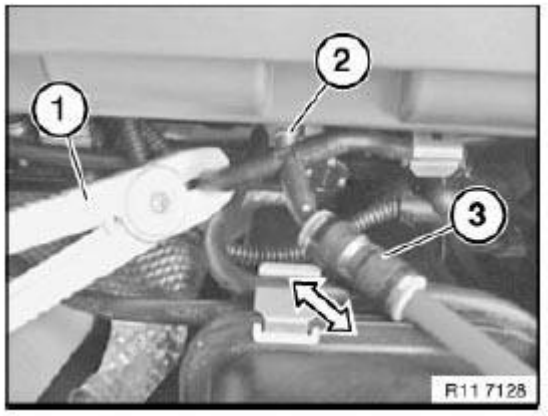



**Fig. 382: Detaching Vacuum Line From EPPC**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**Checking wastegate on cylinders 4-6**

Detach vacuum line from EPPC (2), cylinders 4-6 (OUT).

Clamp off connecting line with suitable tool (1).

Attach vacuum line to pneumatic coupling (3) with Red pneumatic hose in direction of arrow.

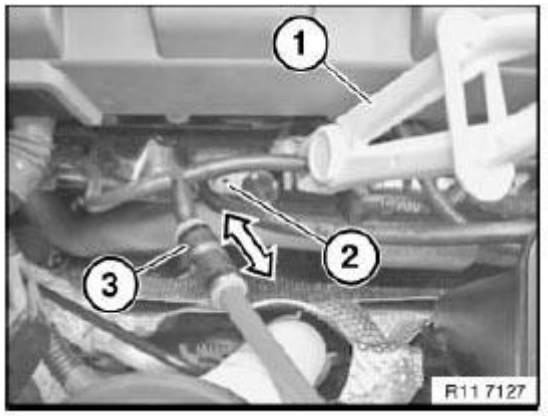



**Fig. 383: Detaching Vacuum Line From EPPC**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Initial position (1) of wastegate linkage depressurized.

Wastegate valve opened.

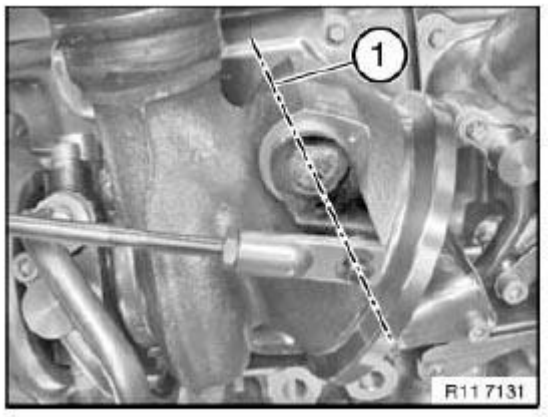



**Fig. 384: Identifying Initial Position Of Wastegate Linkage Depressurized**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Initial position (1) of wastegate linkage with vacuum pressure.

Wastegate valve closed.

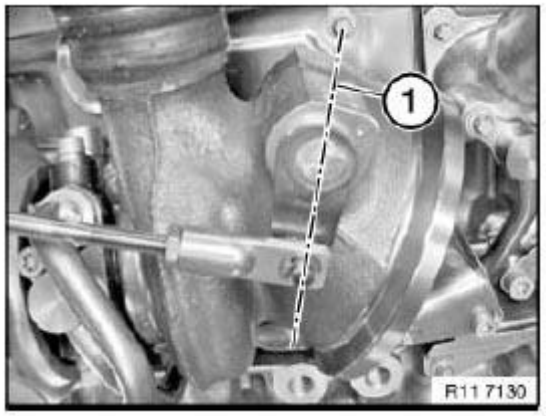



**Fig. 385: Identifying Initial Position Of Wastegate Linkage With Vacuum Pressure**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**Checking wastegate valve (1) with vacuum pressure**

Wastegate valve must be opened without vacuum pressure.

The wastegate valves must close if a vacuum pressure is applied at the wastegate sockets (see BMW diagnosis system).

Check shaft on turbine wheel for rotatability.

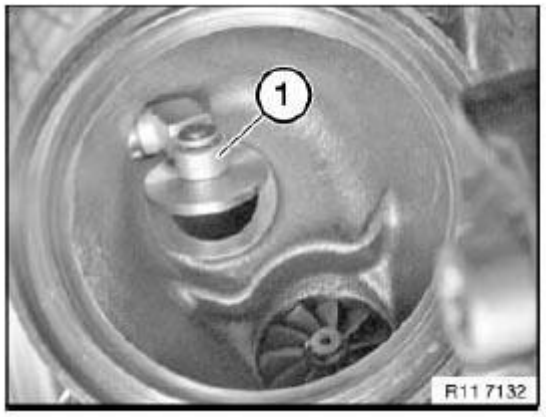



**Fig. 386: Identifying Wastegate Valve**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**Checking pop-off valves**

*Necessary preliminary tasks:*

- Remove both pop-off valves

**NOTE: To check the function of the pop-off valves (2), it is necessary to build up**

**vacuum pressure at the valves.**
**Establish vacuum pressure with the BMW auxiliary diagnosis unit - vacuum.**

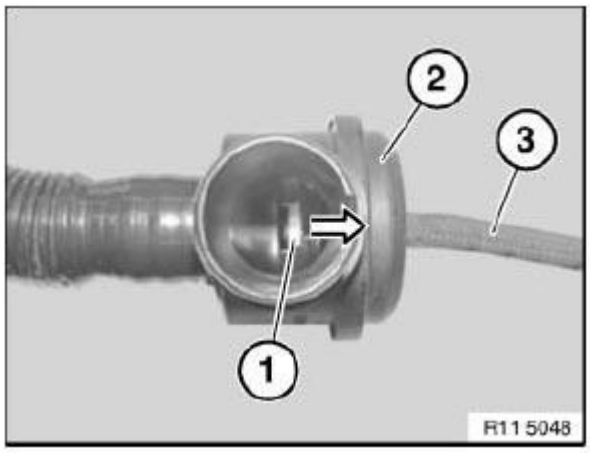



**Fig. 387: Releasing Plunger**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Connect vacuum hose (3).

Establish vacuum pressure at 500 mbar.

Plunger (1) must visibly release the opening in the direction of the arrow as far as it will go.

**IMPORTANT: Plunger (1) must maintain this position while vacuum pressure is being created.**
**If this is not the case, replace the pop-off valve (2).**

Assemble engine.

Observe BMW diagnosis instructions.

## SUPERCHARGER WITH CONTROL

### 11 65 CONNECTION DIAGRAM, VACUUM ACTIVATION (N54)

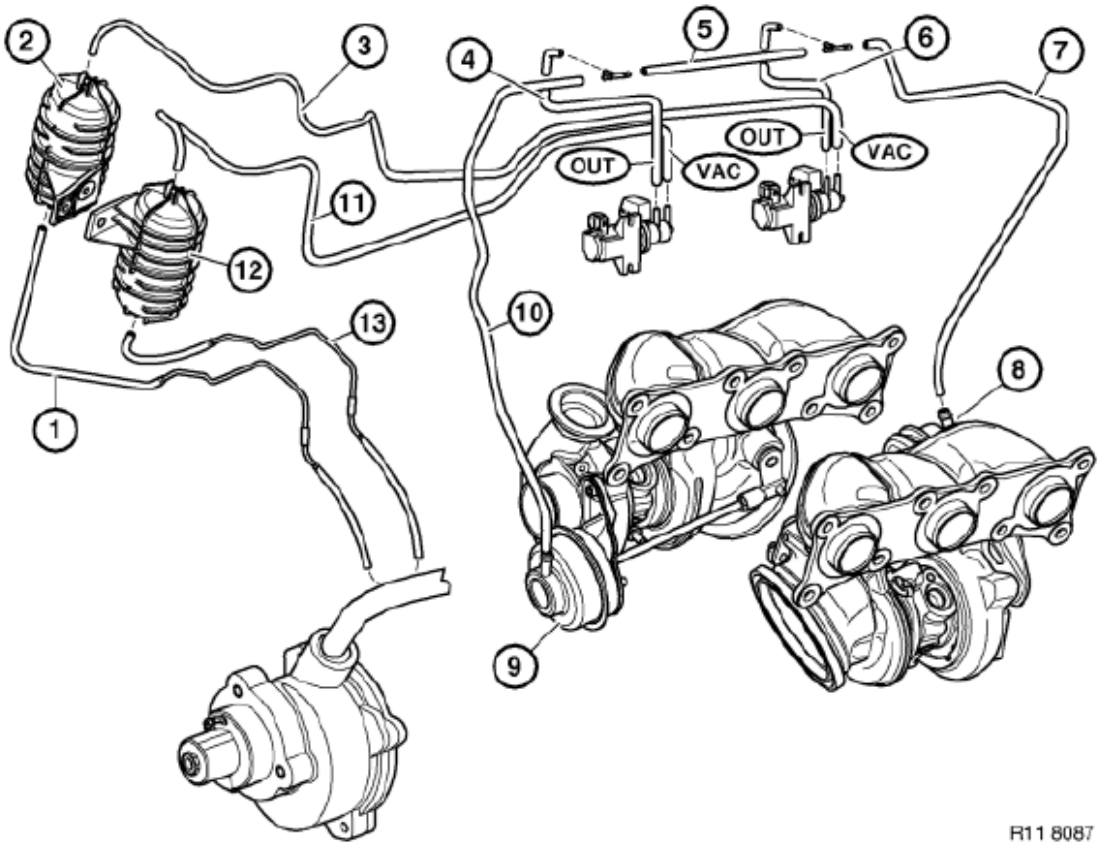



**Fig. 388: Vacuum Hose Connection Diagram**
**Courtesy of BMW OF NORTH AMERICA, INC.**

1. Vacuum hose connection vacuum pump to vacuum accumulator cylinders 4 to 6.
2. Vacuum accumulator, cylinders 4 to 6.
3. Vacuum hose connection VAC on EPPC (electropneumatic pressure converter) cylinders 4 to 6 to vacuum accumulator.
4. Vacuum hose connection OUT on EPPC (electropneumatic pressure converter) cylinders 1 to 3 to T-piece.
5. Vent line between connecting line 4 and 6 of wastegate units.
6. Vacuum hose connection OUT on EPPC (electropneumatic pressure converter) cylinders 4 to 6 to T-piece.
7. Vacuum line branch T-piece to vacuum unit (wastegate valve) cylinders 4 to 6.
8. Connection vacuum unit (wastegate valve) cylinders 4 to 6.
9. Connection vacuum unit (wastegate valve) cylinders 1 to 3.
10. Vacuum line branch T-piece to vacuum unit (wastegate valve) cylinders 1 to 3.
11. Vacuum hose connection VAC on EPPC (electropneumatic pressure converter) cylinders 1 to 3 to vacuum accumulator.
12. Vacuum accumulator cylinders 1 to 3.
13. Vacuum hose connection vacuum pump to vacuum accumulator cylinders 1 to 3.

## 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 catalytic converters. See **18 32 050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST GAS CONVERTER FOR CYLINDERS 1-3 (N54)** or **18 32 060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST GAS CONVERTER FOR CYLINDERS 4-6 (N54)** .
- Release **TRACK ROD** from steering gear.
- Remove **CHARGE AIR COOLER** .
- Drain **COOLANT** .
- Remove coolant **EXPANSION TANK** .
- Remove **Coolant Thermostat**.
- Remove **Water Pump**.
- Remove both vacuum reservoirs.
- Remove right **charge-air duct**.

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.

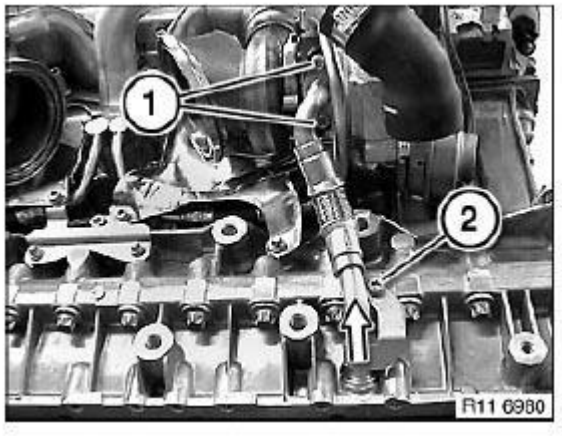



**Fig. 389: Identifying Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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!**

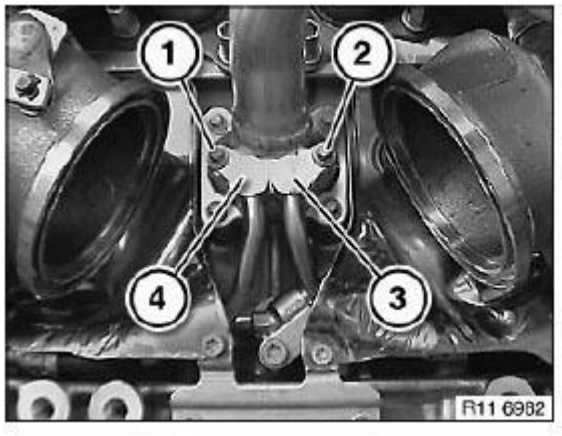



**Fig. 390: Identifying Coolant Feed Line With Mounting Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screws (1).

Tightening torque **11 53 3AZ** .

Remove feed line (2).

*Installation note:*

Replace O-ring.

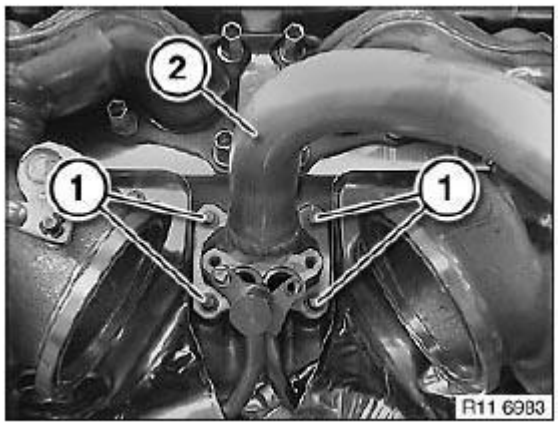



**Fig. 391: Identifying Feed Line With Mounting Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.

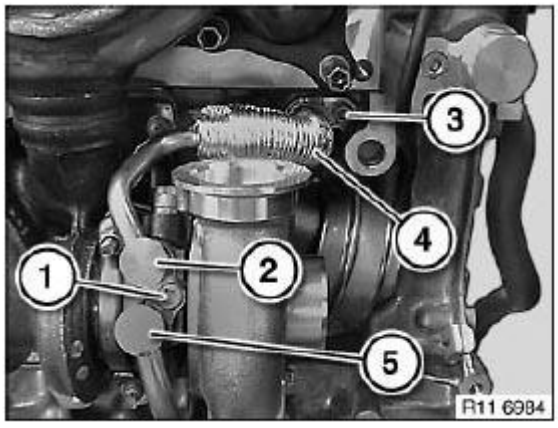



**Fig. 392: Identifying Pipe Connections And Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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** .

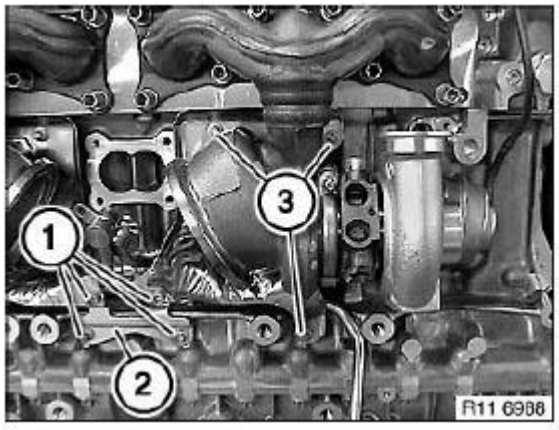



**Fig. 393: Identifying Retaining Plate And Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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).**

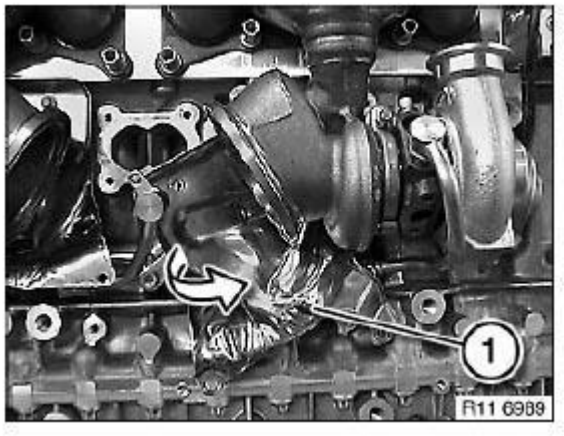



**Fig. 394: Identifying Heat Shield**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screws (1).

Tightening torque **11 65 3AZ** .

Set holder (2) down on cylinder head cover.

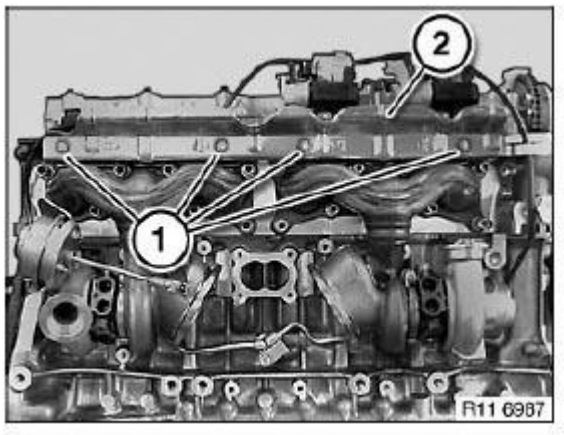



**Fig. 395: Identifying Holder And Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screw (1).

Tightening torque **11 42 4AZ** .

Detach oil feed line in direction of arrow.

*Installation note:*

Replace O-ring.

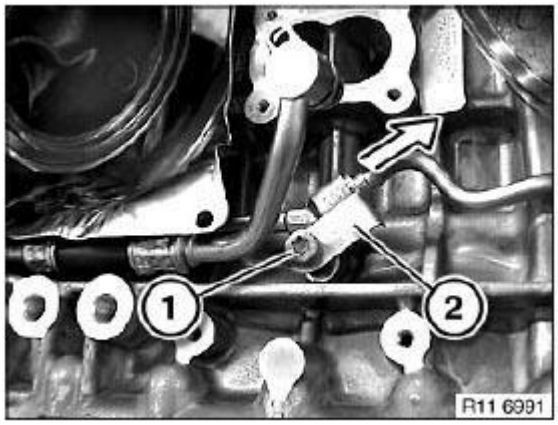



**Fig. 396: Disconnecting Oil Feed Line**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.

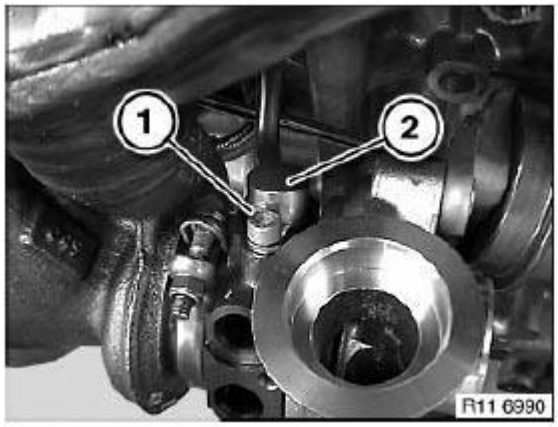



**Fig. 397: Identifying Oil Pressure Line**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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!**

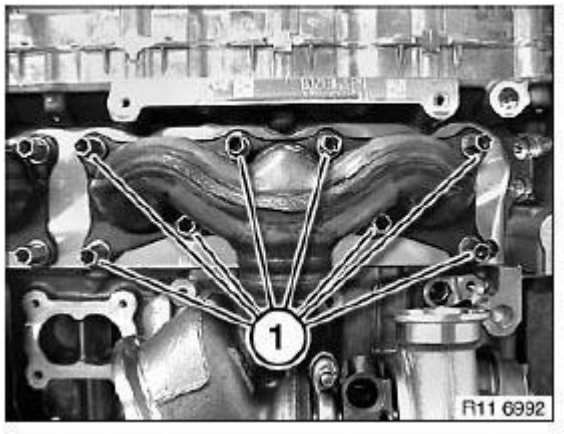



**Fig. 398: Identifying Nuts**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.

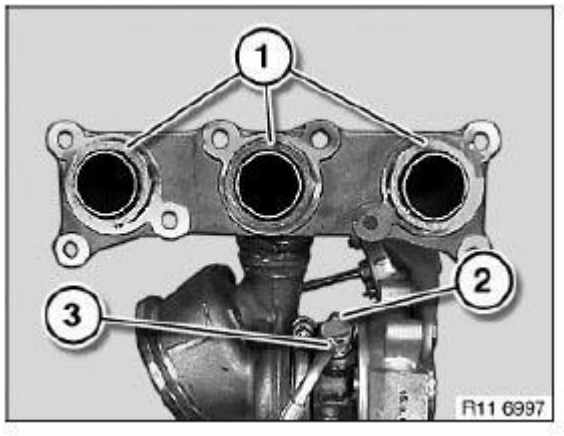



**Fig. 399: Identifying Oil Feed Line And Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*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**

*Necessary preliminary tasks:*

- Remove both catalytic converters. See **18 32 050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST GAS CONVERTER FOR CYLINDERS 1-3 (N54)** or **18 32 060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST GAS CONVERTER FOR CYLINDERS 4-6 (N54)** .
- Remove **CHARGE AIR COOLER** .
- Drain **COOLANT** .
- Remove coolant **EXPANSION TANK** .
- Remove both vacuum reservoirs.
- Remove right **charge-air duct**.
- 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.

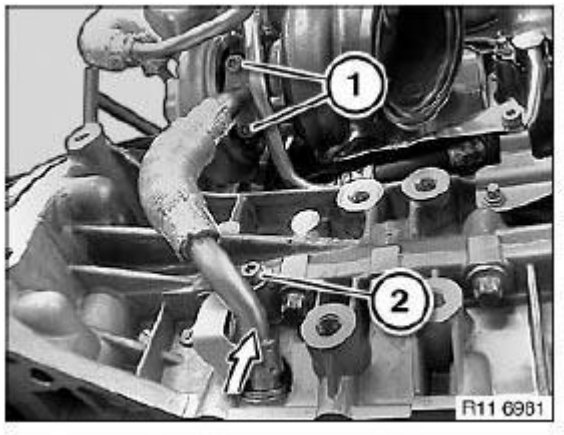



**Fig. 400: Identifying Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.

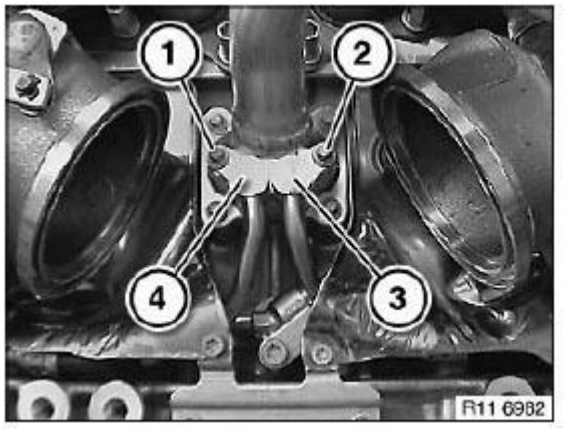



**Fig. 401: Identifying Coolant Feed Line With Mounting Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screws (1).

Tightening torque **11 53 3AZ** .

Remove feed line (2).

*Installation note:*

Replace O-ring.

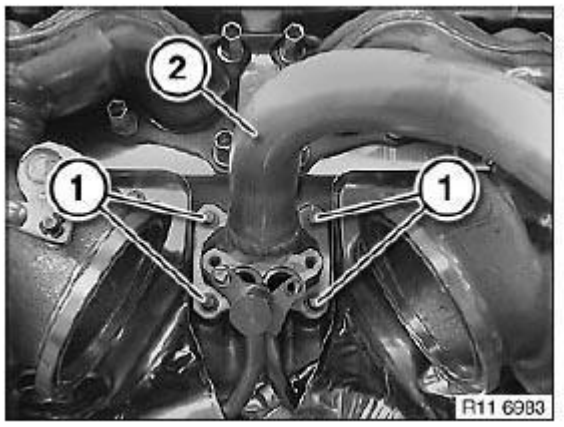



**Fig. 402: Identifying Feed Line And Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screw (1).

Tightening torque **11 53 9AZ** .

Release coolant return pipe if necessary with suitable pliers.

**IMPORTANT: Do not place pliers on pipes. Risk of damage!**

**Installation note:** Replace O-ring.

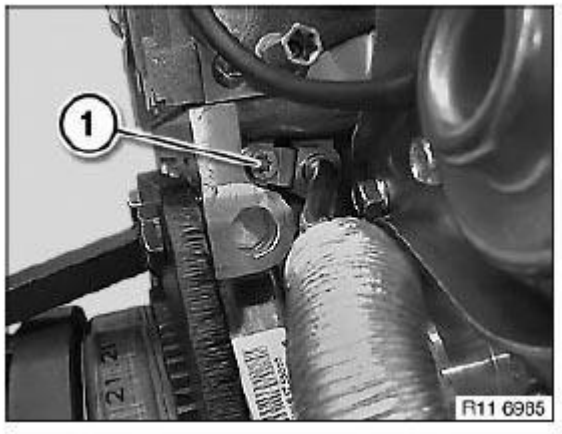



**Fig. 403: Identifying Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screw (1).

Tightening torque **11 53 8AZ** .

**IMPORTANT: When detach coolant feed pipe (3), pay attention to linkage of vacuum unit (wastegate valve). Risk of damage!**

Release coolant feed pipe (3) if necessary with suitable pliers.

Release coolant return pipe (2) if necessary with suitable pliers and remove.

**IMPORTANT: Do not place pliers on pipes. Risk of damage!**

**Installation note:** Replace O-ring.

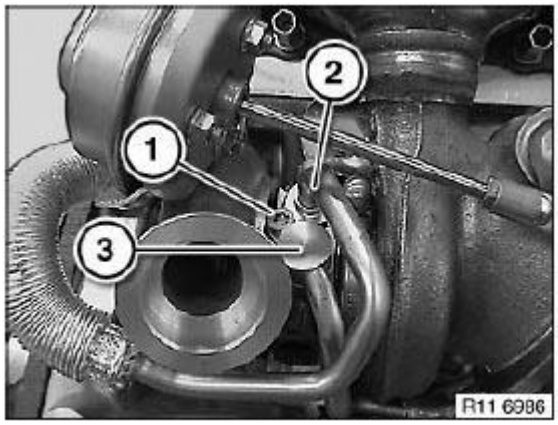



**Fig. 404: Identifying Coolant Return Pipe With Screw**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screws (1).

Tightening torque **11 65 2AZ** .

Remove retaining plate (2).

Unfasten screws (3 and 4).

Tightening torque **11 65 2AZ** .

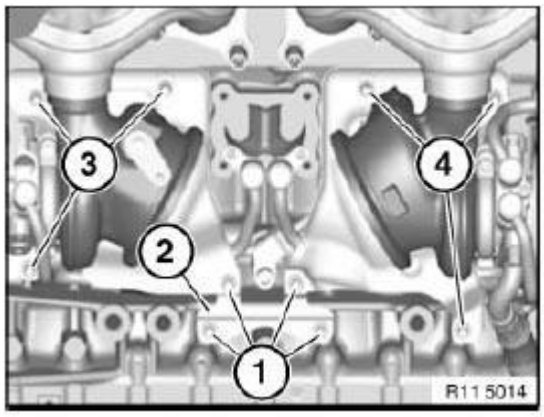



**Fig. 405: Identifying Retaining Plates And Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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).**

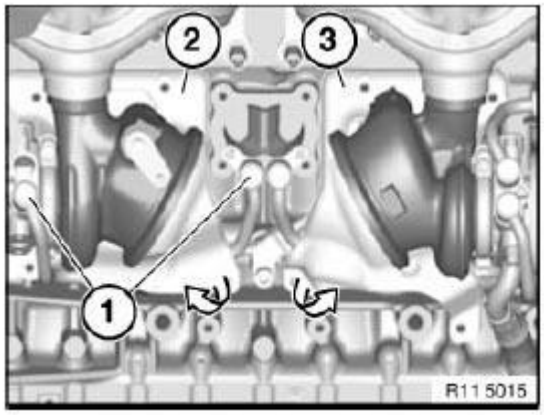



**Fig. 406: Removing Heat Shield**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screw (1).

Tightening torque **11 42 4AZ** .

Detach oil feed line in direction of arrow.

*Installation note:*

Replace O-ring.

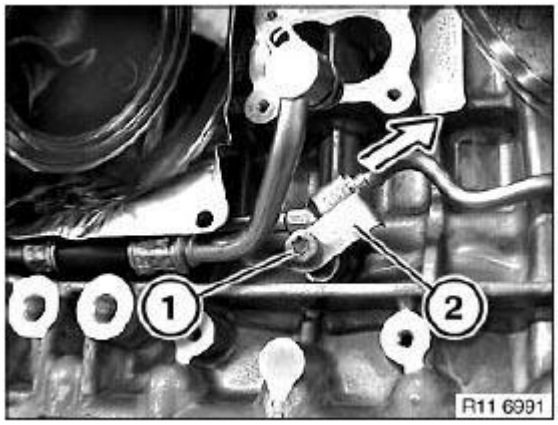



**Fig. 407: Removing Oil Feed**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screws (1).

Tightening torque **11 65 3AZ** .

Set holder (2) down on cylinder head cover.

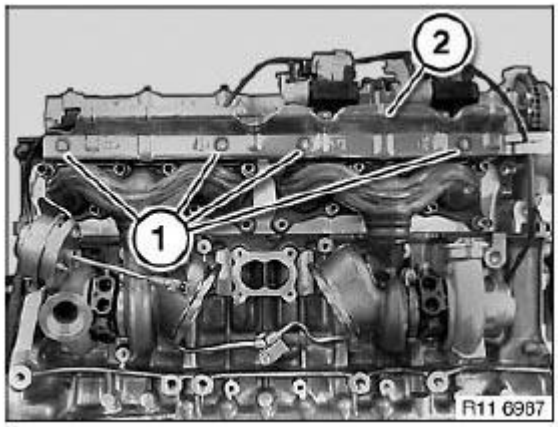



**Fig. 408: Identifying Holder And Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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!**

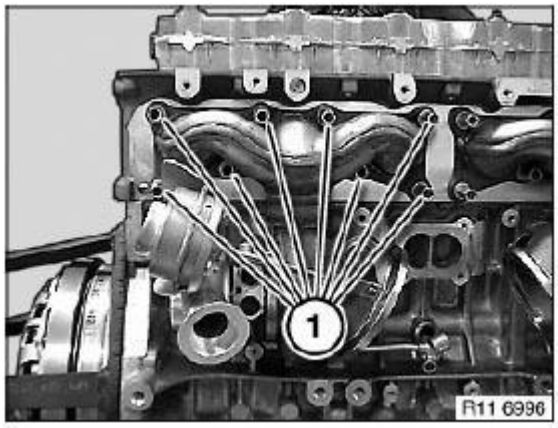



**Fig. 409: Identifying Nuts**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.

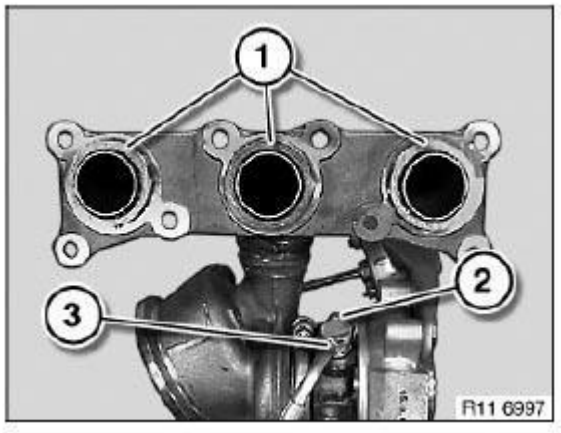



**Fig. 410: Identifying Oil Feed Line And Graphite Sealing Rings**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*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)**

**IMPORTANT: Overpressure and vacuum lines are identified by the size of the seals and color-coded Red and Blue and must not be mixed up with each other. Build up pressure with Blue color.**

**Generate vacuum pressure with Red color.**
**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

  Perception:

  1. Noises at turbocharger (clanking)

  or Fault memory entry:

  1. Drive
  2. Engine electronics
  3. Air supply
  4. Boost pressure control
- Remove both **exhaust turbochargers** .

Release locking clip (2).

Disengage linkage of vacuum unit (wastegate valve).

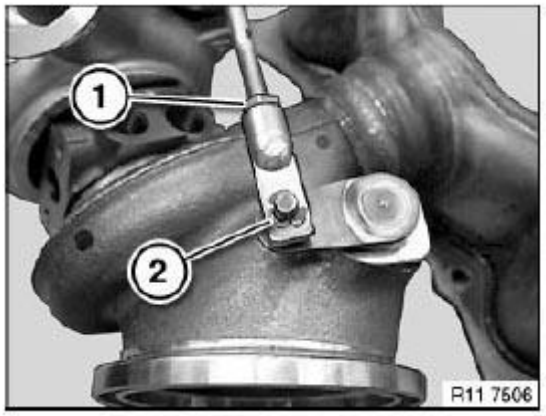



**Fig. 411: Identifying Locking Clip**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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.

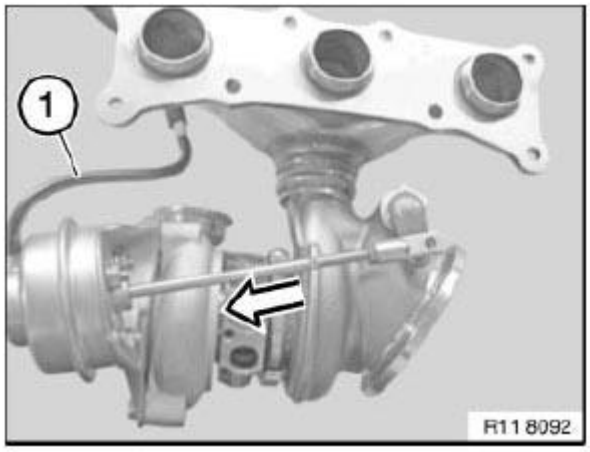



**Fig. 412: Identifying Vacuum Line**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.

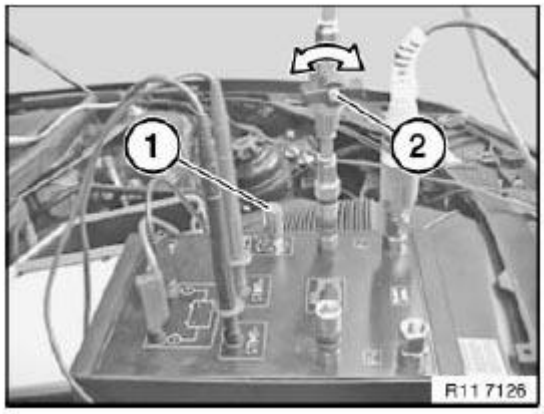



**Fig. 413: Sealing Stop Cock**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Determine gap dimension.

Gap dimension between turnbuckle and adjusting lever.

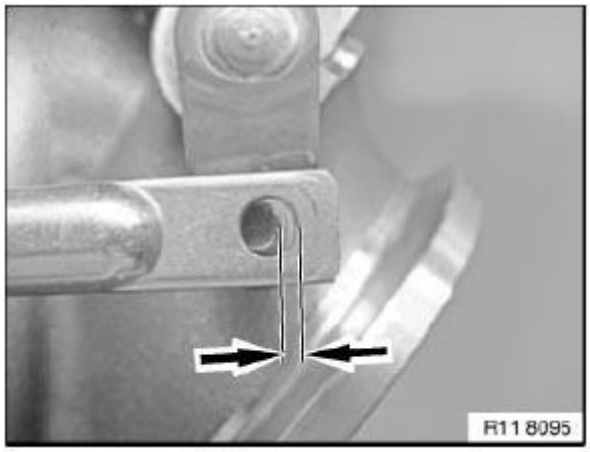



**Fig. 414: Identifying Gap Dimension Between Turnbuckle And Adjusting Lever**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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 > or = 1.5 mm.**

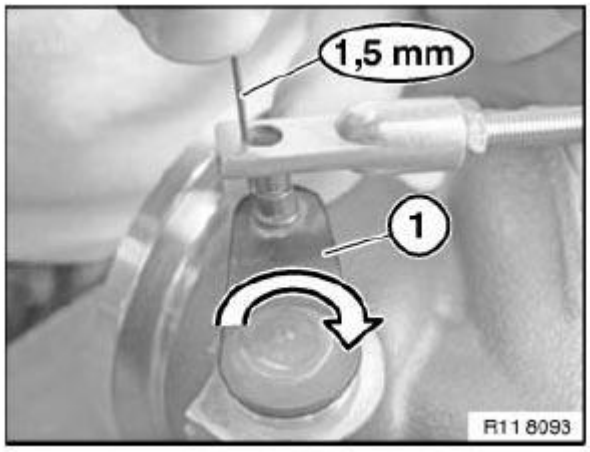



**Fig. 415: Sealing Off Wastegate Valve**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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 < 1.5 mm.**

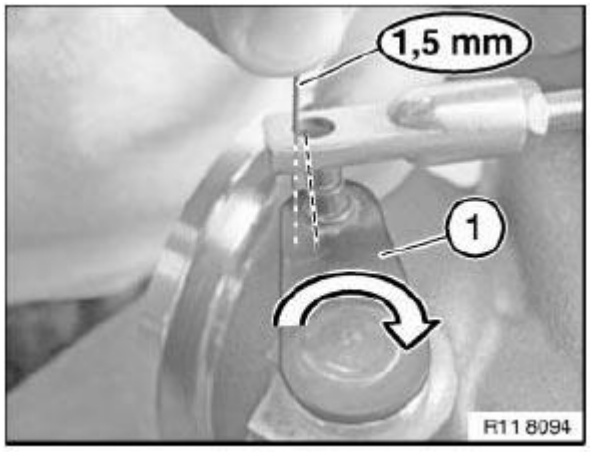



**Fig. 416: Identifying Drill Bit Dimension**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Unfasten screws (1 and 3).

Tightening torque. See 11 65 11AZ in **SUPERCHARGER WITH CONTROL** .

*Installation:*

**Replace vacuum unit 2 (wastegate valve)** .

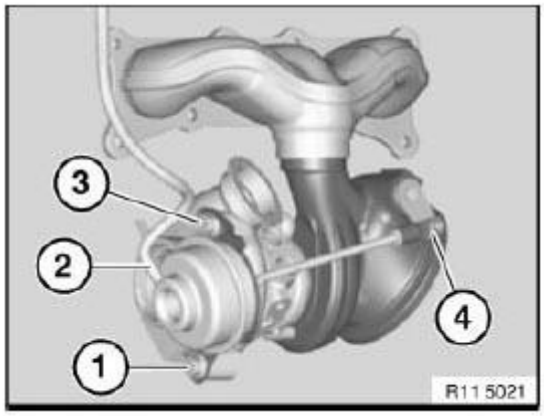



**Fig. 417: Identifying Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**Adjusting vacuum unit (wastegate valve) linkage**

Initial position of vacuum unit (wastegate valve) linkage depressurized.

Connect red vacuum line (1) to vacuum unit (wastegate valve).

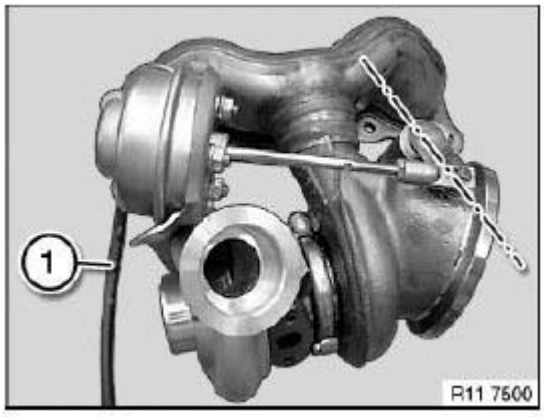



**Fig. 418: Identifying Red Vacuum Line**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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).

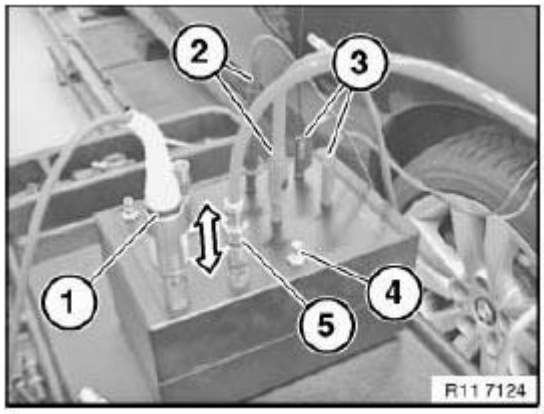



**Fig. 419: Measuring Vacuum Pressure**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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.

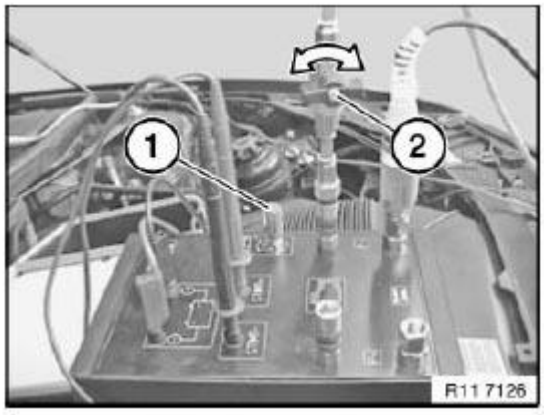



**Fig. 420: Sealing Stop Cock**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Initial position (1) of wastegate linkage with preset vacuum pressure.

Wastegate valve virtually closed.

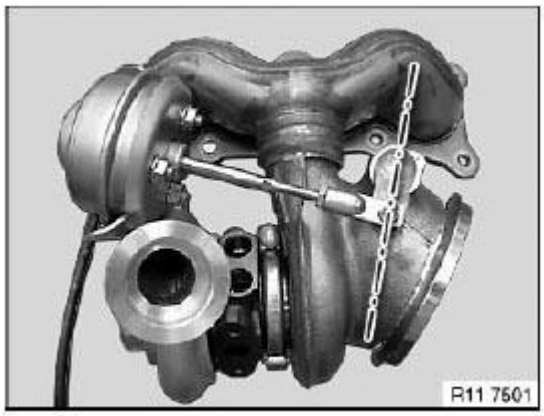



**Fig. 421: Identifying Initial Position Of Wastegate Linkage With Preset Vacuum Pressure**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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.

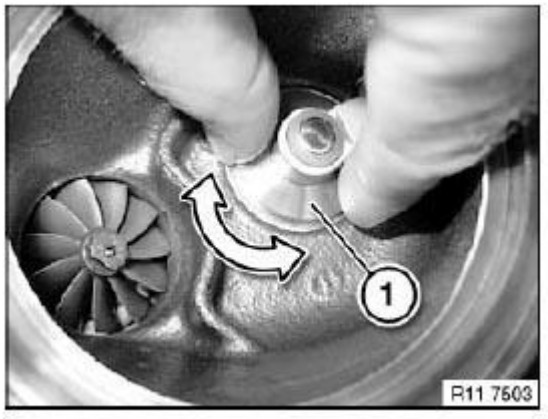



**Fig. 422: Checking Wastegate Valve Turnability**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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).**

Check turnability at wastegate valve again.

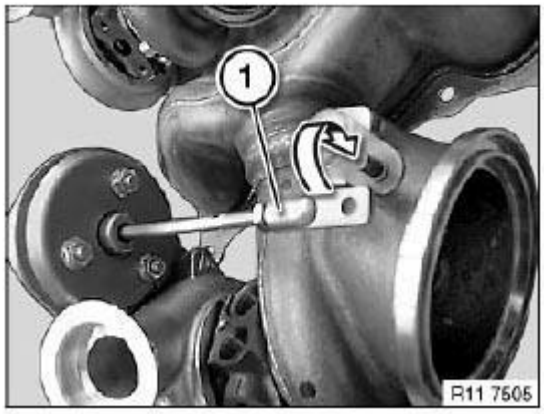



**Fig. 423: Engaging Turnbuckle On Adjusting Lever**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Secure lock nut (1); to do so, secure turnbuckle against turning with a suitable tool.

Tightening torque. See 11 65 10AZ in **SUPERCHARGER WITH CONTROL** .

Mount locking clip (2).

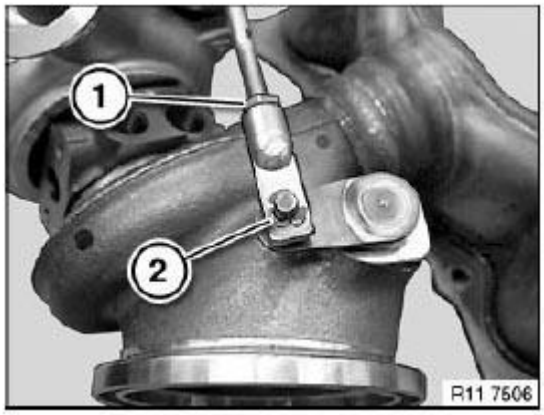



**Fig. 424: Identifying Lock Nut And Locking Clip**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

Observe diagnosis instructions.

Execute test module for boost pressure control.

# VACUUM PUMP

**11 66 000 REMOVING AND INSTALLING/REPLACING VACUUM PUMP (N54)**

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 0 290
- 11 4 120
- 11 8 650

*Necessary preliminary tasks:*

- Remove **drive belt** . See **11 28 010 REPLACING ALTERNATOR DRIVE BELT (N54)**.
- Remove **tensioner** for drive belt. See **11 28 020 REPLACE ALTERNATOR DRIVE BELT TENSIONER (N54)**.
- Remove **sealing cover** for vacuum pump. See **11 14 010 REPLACING SEALING COVER FOR VACUUM PUMP (N54)**.
- Remove **high-pressure pump** . See **13 51 017 REMOVING AND INSTALLING OR REPLACING HIGH-PRESSURE FUEL PUMP (N54, N53)** .

Rotate crankshaft at central bolt.

Turn sprocket wheel until drilled holes and screws of vacuum pump match up.

Screw in special tool 11 8 650.

Secure special tool 11 0 290 in sprocket wheel and to special tool 11 8 650.

Release screw (1).

Tightening torque. See 11 66 2AZ in **11 66 VACUUM PUMP** .

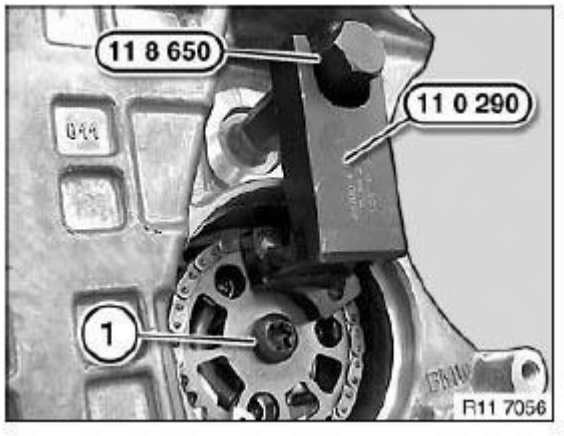



**Fig. 425: Positioning Special Tool 11 0 290 On Sprocket Wheel And On Special Tool 11 8 650**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Press chain tensioner (1) with chain in direction of arrow.

Install special tool 11 4 120.

Remove sprocket wheel (2) in direction of arrow.

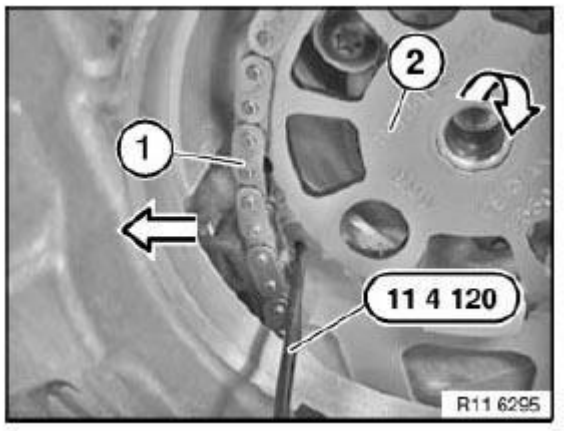



**Fig. 426: Removing Sprocket Wheel**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screws (1).

Tightening torque. See 11 66 1AZ in **11 66 VACUUM PUMP** .

Release screws (1).

Secure screws (1) against falling out.

Remove vacuum pump.

*Installation:*

Replace seal.

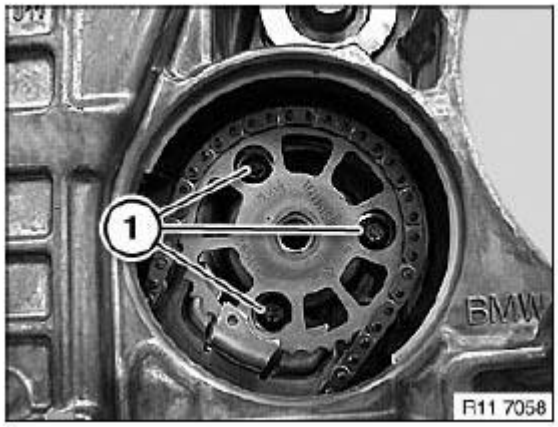



**Fig. 427: Identifying Vacuum Pump Screws**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

## EMISSION CONTROL OXYGEN SENSOR

**11 78 513 REPLACING BOTH LAMBDA OXYGEN CONTROL SENSORS (N54)**

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 7 030
- 11 9 150

**WARNING: Scalding hazard!**
**Work should only be carried out on an exhaust system that has cooled down.**

*Necessary preliminary tasks:*

- Remove **acoustic cover** . See **11 00 REMOVING AND INSTALLING/REPLACING IGNITION COIL COVER (N54)**.
- Remove **MICROFILTER HOUSING** .
- Remove front underbody protection (not M3).

**NOTE: It is not necessary to conduct a chassis/wheel alignment check when the tie rod is released.**

Release **EAR CLIP** (1). Pull off gaiter (2) from the track rod (3).

Pull off gaiter (2) from the track rod (3).

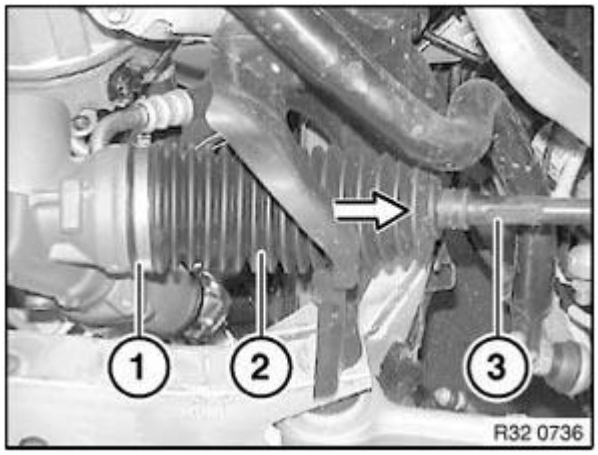



**Fig. 428: Detaching Gaiter From Tie Rod**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**NOTE: It is not necessary to conduct a chassis/wheel alignment check when the track rod is released.**

**IMPORTANT: To avoid damage to rack and to suspension mounting, move rack in as far as possible.**

Undo the joint (1) using special tools 32 3 160 at the steering box rack.

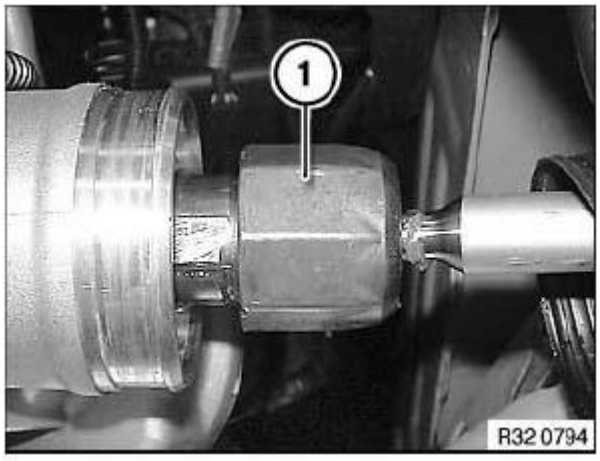



**Fig. 429: Identifying Steering Gear Rack Joint**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Tightening torque **32 21 1AZ** .

*Installation:*

If an oxygen sensor is to be 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.

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 reduced the prescribed tightening torque by 3 Nm.**

Tightening torque. See 11 78 1AZ in **EMISSION CONTROL OXYGEN SENSOR** .

*Installation:*

Cable color black, cylinders 1 to 3.

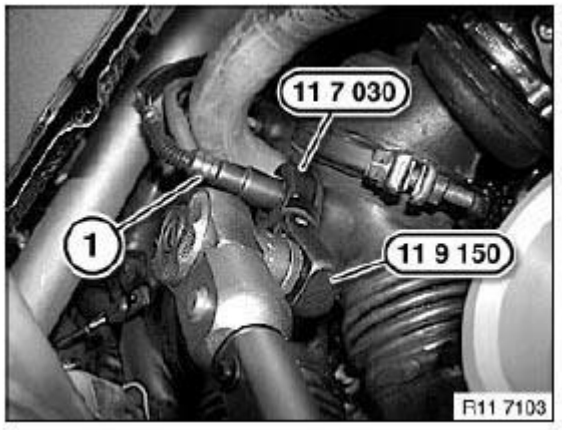



**Fig. 430: Identifying Special Tool 11 7 030 And 11 9 150**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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 reduced the prescribed tightening torque by 3 Nm.**

Tightening torque. See 11 78 1AZ in **EMISSION CONTROL OXYGEN SENSOR** .

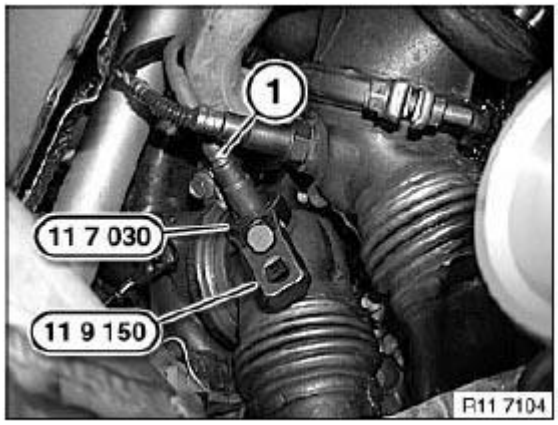



**Fig. 431: Releasing Oxygen Control Sensor Using Special Tools 11 7 030 And 11 9 150**
**Courtesy of BMW OF NORTH AMERICA, INC.**

*Installation:*

Cable color grey, cylinders 4 to 6.

Assemble engine.

Check function of DME control unit.

**11 78 545 REPLACING BOTH LAMBDA OXYGEN MONITOR SENSORS (N54)**

**Special tools required:**

For the following special tools, refer to **ENGINE- SPECIAL TOOLS** .

- 11 7 020
- 11 7 030
- 11 9 150

**WARNING: Scalding hazard!**
**Work should only be carried out on an exhaust system that has cooled down.**

*Necessary preliminary tasks:*

- Remove rear **underbody protection** . See **51 47 490 REMOVING AND INSTALLING/REPLACING FRONT UNDERBODY PROTECTION** .

*Installation:*

If an oxygen sensor is to be reused, only apply a thin and uniform coat of Never Seez Compound (refer to BMW Parts Service) to thread.

The part of the oxygen monitor 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 monitor sensor.

Release monitor 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 reduced the prescribed tightening torque by 3 Nm.**

Tightening torque. See 11 78 1AZ in **EMISSION CONTROL OXYGEN SENSOR** .

*Installation:*

Cable color black, cylinders 1 to 3.

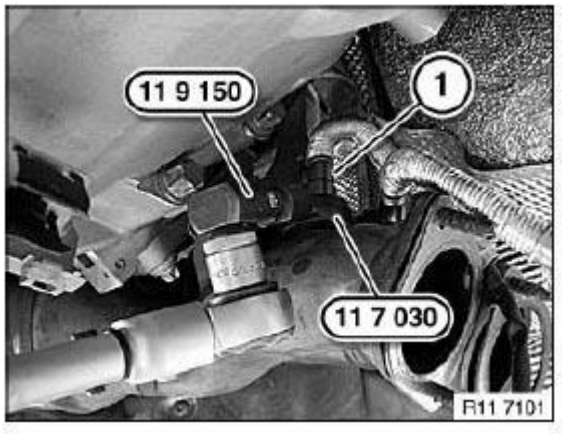



**Fig. 432: Releasing Monitor Sensor Using Special Tools 11 7 030 And 11 9 150**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**NOTE: Release insulation (2) in direction of arrow.**

Disconnect plug connection for oxygen monitor sensor.

Release monitor sensor (1) with special tool 11 7 020.

Tightening torque. See 11 78 1AZ in **EMISSION CONTROL OXYGEN SENSOR** .

*Installation:*

Cable color grey, cylinders 4 to 6.

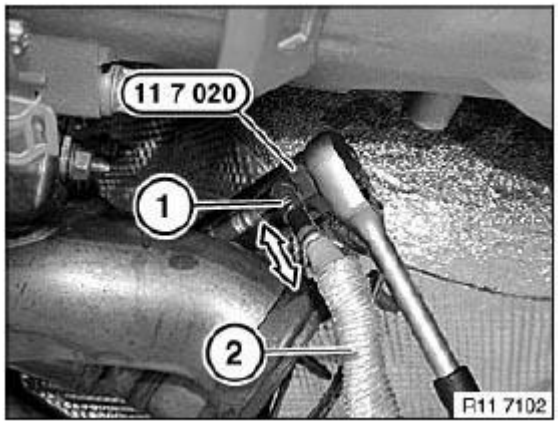



**Fig. 433: Releasing Insulation**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

Check function of DME control unit.