ENGINE

Engine - Repair Instructions - 528i, 528xi

00 ENGINE, GENERAL

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

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

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

Protective measures/rules of conduct:

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

First aid measures:

- Do not induce vomiting.

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

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

00 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... ENGINE OIL SERVICE (N52K)

Notes

WARNING: Danger of scalding!

Carry out work on the vehicle only when wearing oil- and heat-resistant protective gloves incl. forearm protection, face guard and protective apron.

IMPORTANT: Carry out the engine oil service only when the engine is at normal operating temperature.
Observe the exact engine oil filling capacity.
Overfilling the engine with engine oil will result in engine damage.
Checking and drop-off times (at least 10 minutes) must be observed.

IMPORTANT: Risk of damage!

Protect belt drive against dirt.

Cover with suitable materials.

Recycling

Catch and dispose of drained engine oil in a suitable container.

Observe country-specific waste-disposal regulations.

Release oil filter cap with special tool **11 9 240** .

Tightening torque **11 42 1AZ.** .

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

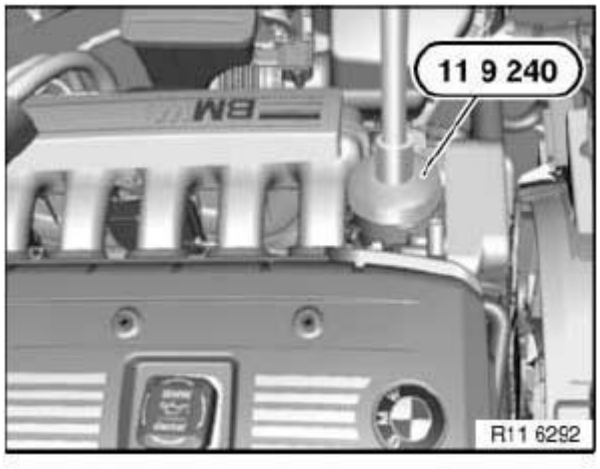


Fig. 1: Removing Oil Filter Cap With Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Presentation: without UNDERBODY PROTECTION .

Unclip service opening on underbody protection.

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

Tightening torque **11 13 1AZ.**

Installation:

Replace sealing ring

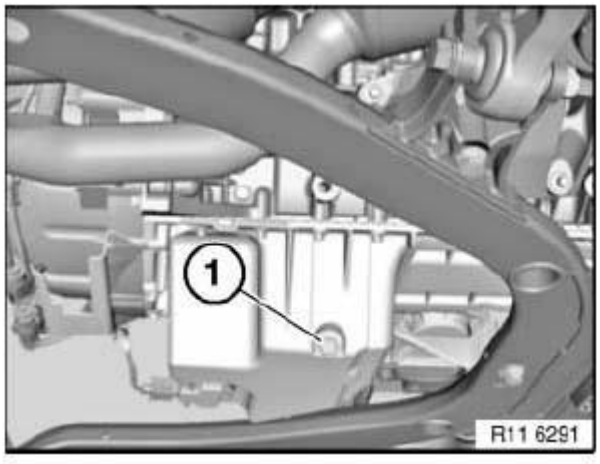


Fig. 2: Identifying Screw Plug On Oil Sump
Courtesy of BMW OF NORTH AMERICA, INC.

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

Installation:

Replace oil filter element (1) and sealing rings (2)

NOTE: Moisten sealing rings (2) with engine oil.

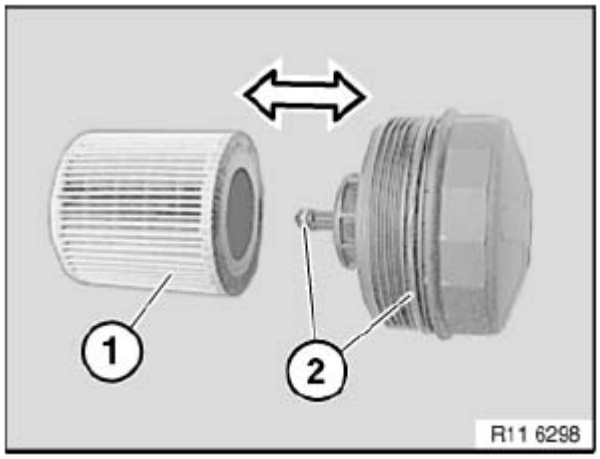


Fig. 3: Identifying Oil Filter Element And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Release oil filter cap with special tool **11 9 240** .

Tightening torque 11 42 1AZ.

NOTE: Pour in ENGINE OIL .

Start engine and run at idle until oil pressure warning lamp goes out.

Turn off engine

Check oil filter cap and screw plug on oil sump for leaks.

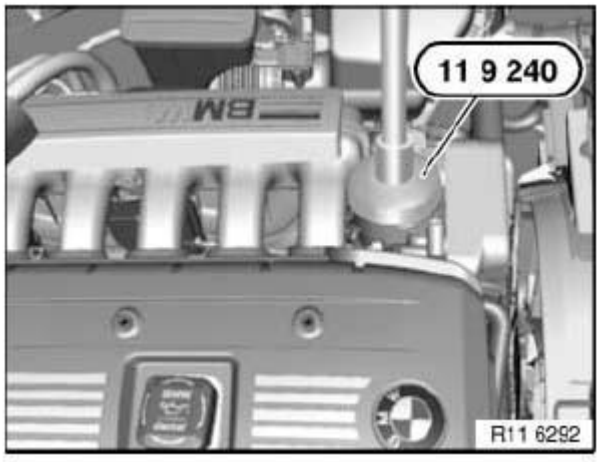


Fig. 4: Removing Oil Filter Cap With Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

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 REMOVING AND INSTALLING/REPLACING ACOUSTIC COVER (N52/N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released.
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage).

Unfasten screws (1 and 3).

If necessary, release oil cap (2) in direction of arrow.

Lift off acoustic cover (4)

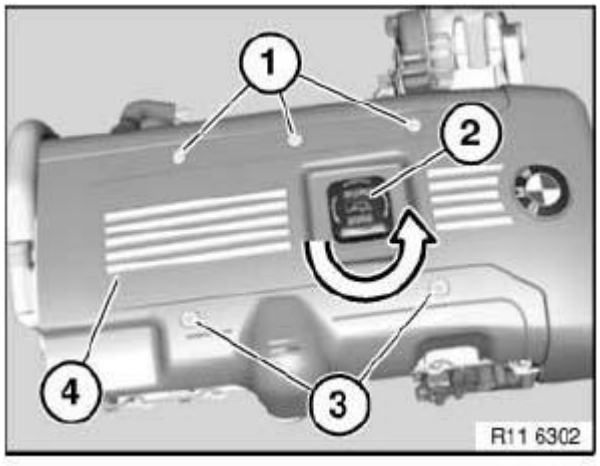


Fig. 5: Identifying Acoustic Cover, Oil Cap And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Remove microfilter housing

- Remove **TENSION STRUT**

Release screws. Tightening torque **11 12 7AZ** .

Remove acoustic cover.

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

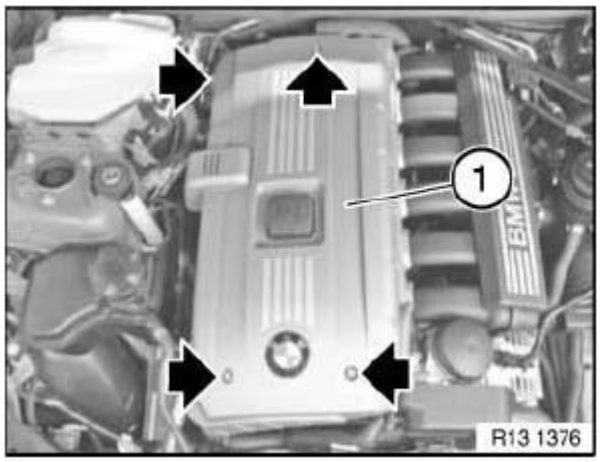


Fig. 6: Locating Acoustic Cover
Courtesy of BMW OF NORTH AMERICA, INC.

11 00 050 REMOVING AND INSTALLING ENGINE (N52K)

Notes

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are **released.**

Aluminum screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic.**

Jointing torque and angle of rotation must be observed without fail **(risk of damage).**

Necessary preliminary tasks:

- Move engine bonnet into **SERVICE POSITION**
- Remove **EXHAUST SYSTEM, COMPLETE**
- Remove **AUTOMATIC TRANSMISSION** or **MANUAL TRANSMISSION**
- Remove front output shafts (AWD only)
- Drain off **engine oil**.
- Clamp off **BATTERY NEGATIVE LEAD**
- Remove **INTAKE FILTER HOUSING**
- Remove **FAN COWL** with electric fan
- Remove **RADIATOR**
- Remove **water pump**
- Remove **coolant thermostat**
- Detach all coolant hoses from engine
- Remove **MICROFILTER FOR INTERIOR VENTILATION**
- Remove **air intake manifold**
- Detach vacuum line from brake booster.
- Unfasten **IGNITION COIL** wiring harness and lay to one side
- Unfasten **ENGINE WIRING HARNESS** and lay to one side
- Remove **INJECTION PIPE** and place to one side

Release **A/C SYSTEM COMPRESSOR** (1) and set down on front axle carrier.

NOTE: E60/E61 only.

IMPORTANT: A/C lines are pressurized.
Do not disconnect A/C lines.
Do not disconnect coolant pipe from crankcase.

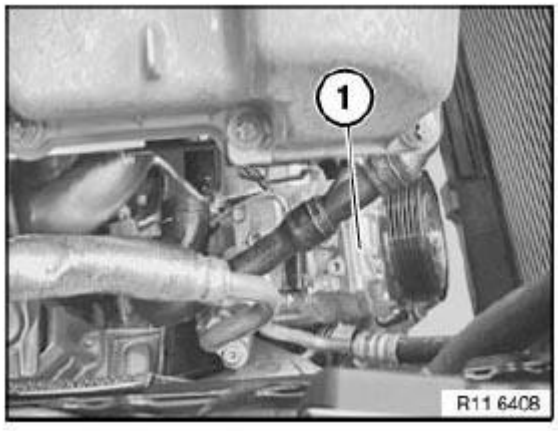


Fig. 7: Identifying Coolant Pipe

Courtesy of BMW OF NORTH AMERICA, INC.

Release power steering pump (1) and set down on front axle carrier.

NOTE: Do not disconnect hydraulic lines.

NOTE: For vehicles with optional equipment SA229 (Dynamic Drive), bracket must be released.

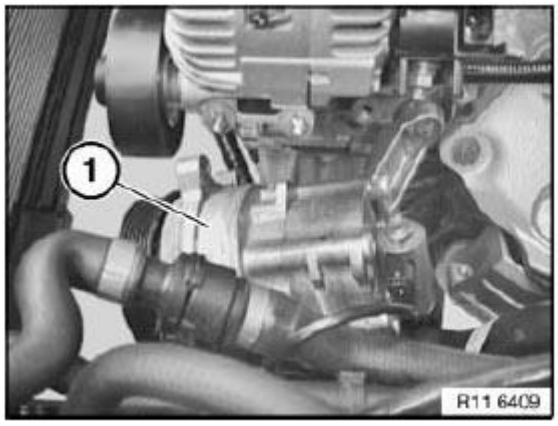


Fig. 8: Identifying Power Steering Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Screw towing eye (1) into cylinder head.

Tightening torque **11 12 9AZ.**

Attach special tool **11 0 020** to engine crane.

Suspend special tool **11 0 020** from the designated mounting eyelets (2) only.

Lift engine out with engine crane.

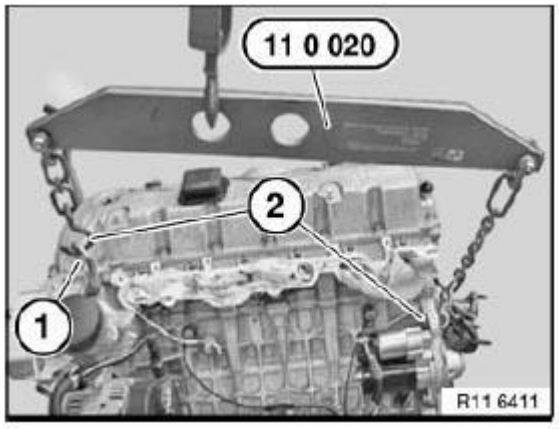


Fig. 9: Lift Engine Out Using Engine Crane
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For vehicles with optional equipment SA205 (automatic transmission), engine must be raised approx. 10 cm.

Release screws (1).

Remove lines (2) with oil-water heat exchanger in direction of arrow.

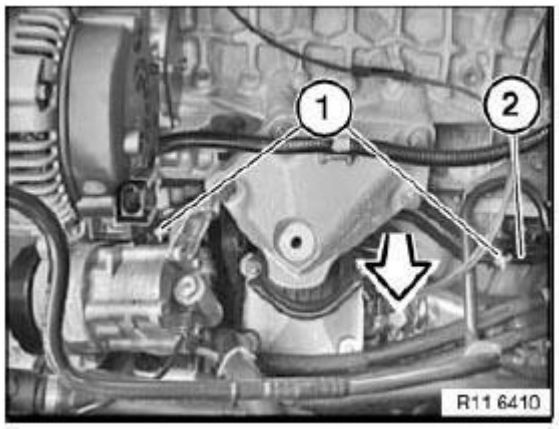


Fig. 10: Removing Oil-Water Heat Exchanger With Hydraulic Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N52, N53)

Special tools required:

- **00 6 000**
- **00 6 001**
- **00 6 002**
- **00 6 051**
- **00 6 052**
- **00 6 060**
- **00 6 080**

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.**

IMPORTANT: Before lifting the engine, check the lifting lugs for damage (cracks) and to ensure they are seated securely.

IMPORTANT: To safely support the cross-member, make sure that the lock carrier (front end - side frame connection) is installed.

Necessary preliminary tasks:

- Secure **ENGINE BONNET/HOOD IN SERVICE POSITION**
- Remove **INTAKE FILTER HOUSING**

Assemble cross member **00 6 000** with special tools **00 6 051** , **00 6 060** , **00 6 052** .

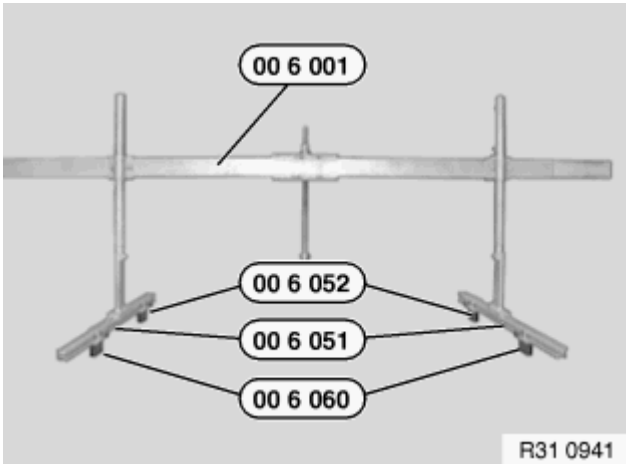


Fig. 11: Identifying Cross Member Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

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

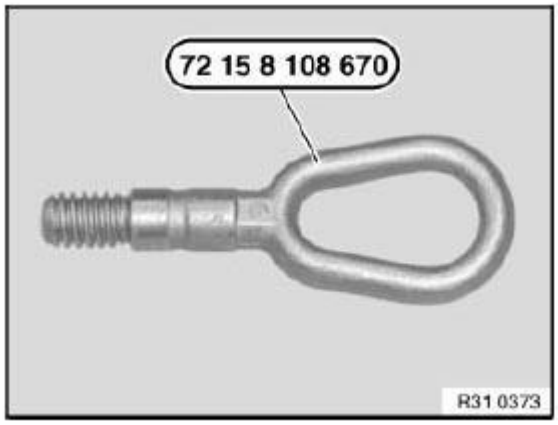


Fig. 12: Identifying Towing Hook (72 15 8 108 670)
Courtesy of BMW OF NORTH AMERICA, INC.

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.

Release front screws (1) on acoustic cover (2). Tightening torque for N52K: **11 12 6AZ** .

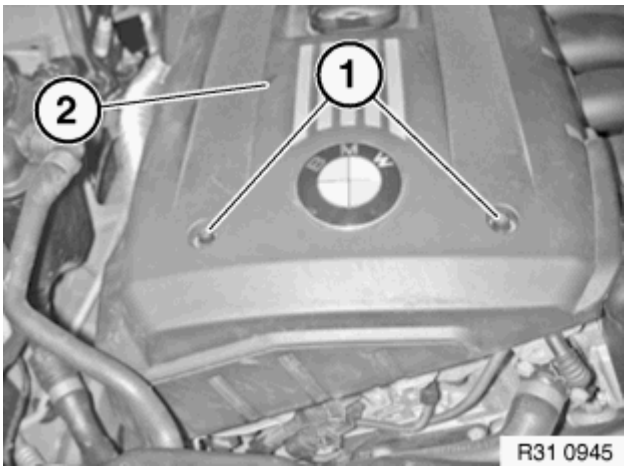


Fig. 13: Identifying Acoustic Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Raise acoustic cover (1) slightly. Screw in towing hook (2) and tighten down to approx. 30 Nm.

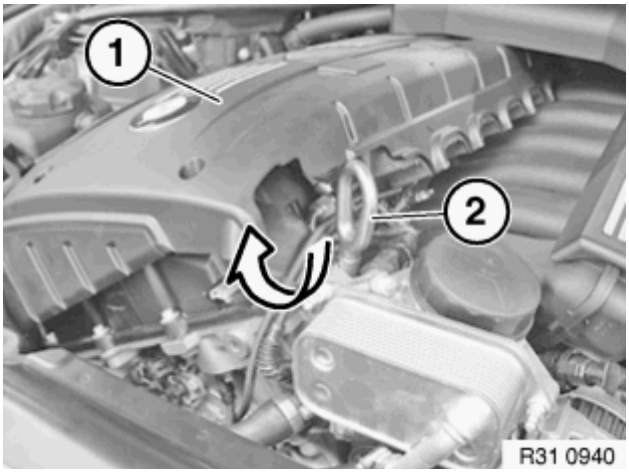


Fig. 14: Installing Towing Hook
Courtesy of BMW OF NORTH AMERICA, INC.

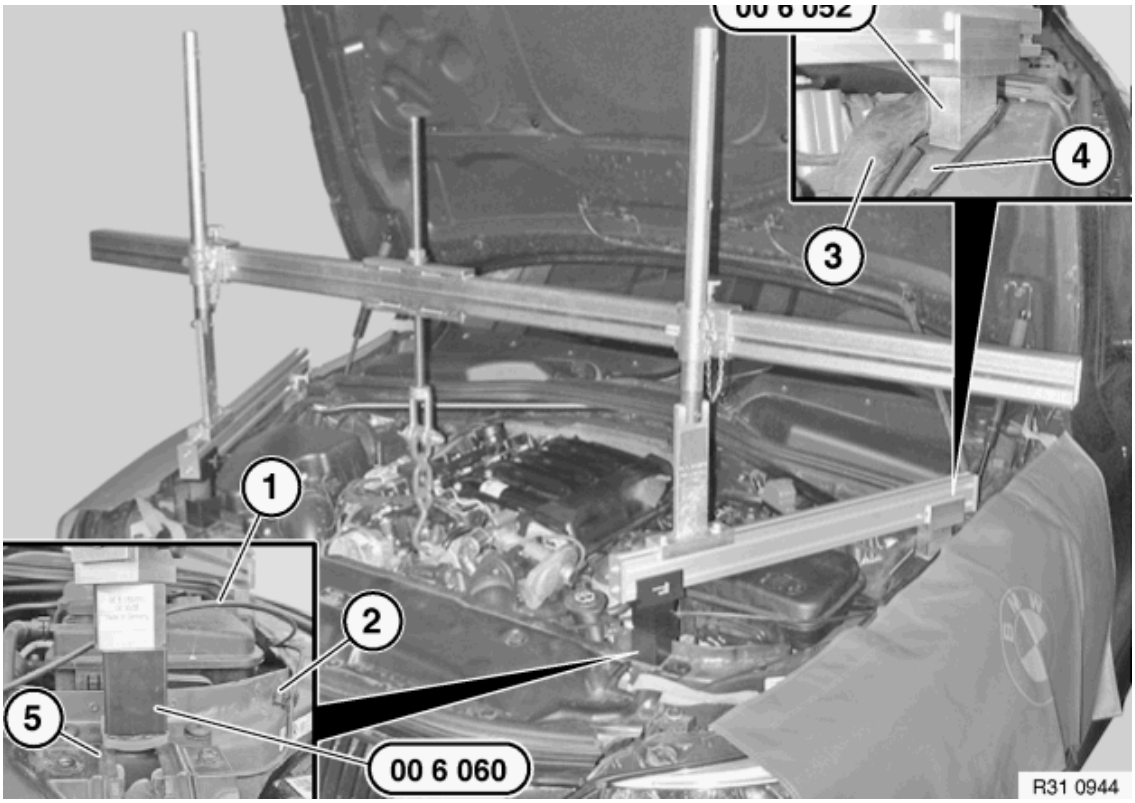


Fig. 15: Pulling Bowden Cable Out Of Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage! Carefully pull Bowden cable (1) on driver's side out of bracket (2) and do not kink. Carefully press wiring harness (3) to one side.

IMPORTANT: Risk of damage! Fit cross-member 00 6 000 with a 2nd person helping. Fit supports at rear on spring strut dome (4) and at front in area of lock (5). Screw

connections of cross-member 00 6 001 must point to windscreen.

Adapt bevel of special tool 00 6 052 to inclination of spring strut dome. Secure chain with coat hook 00 6 080 to spindle 00 6 002 and align centrally over towing hook. Attach special tool to towing hook.

WARNING: Danger of injury! Tighten down all adjusting screws and nuts on cross-member 00 6 000.

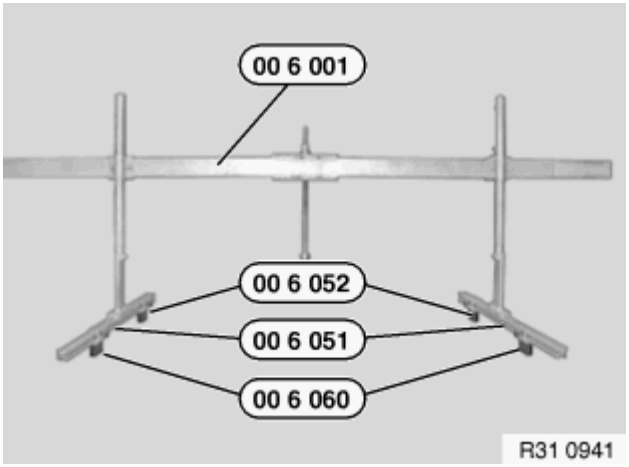


Fig. 16: Identifying Cross Member Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw on left and nut on right (1) and discard. Raise engine approx. 10 mm with cross member.

Installation note: Replace microencapsulated screw. Replace self-locking nut.

Tightening torque **22 11 2AZ** .

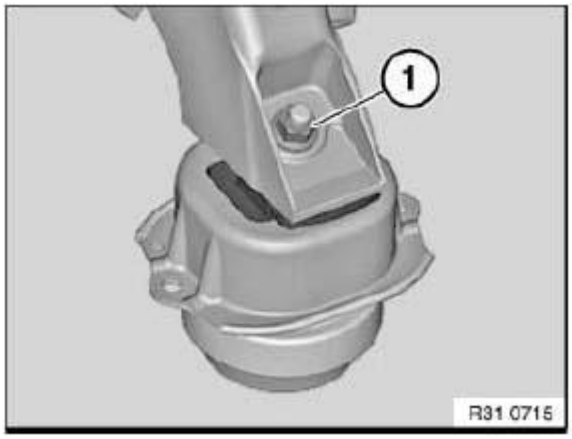


Fig. 17: Identifying Nut
Courtesy of BMW OF NORTH AMERICA, INC.

ENGINE IDENTIFICATION

Drive in engine numbers at marked surface with impact tool.

M47 / M47TU / M47T2

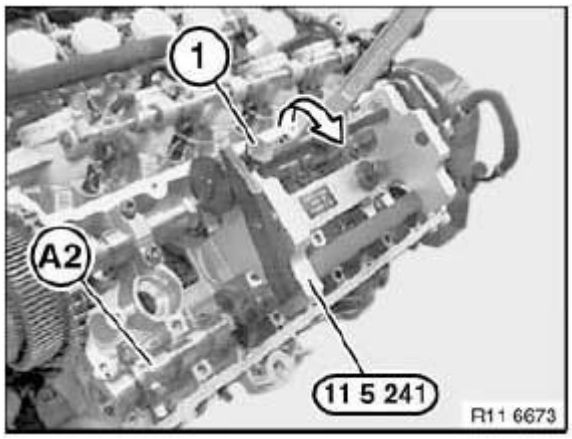


Fig. 18: Identifying Engine Identification - M47 / M47TU / M47T2
Courtesy of BMW OF NORTH AMERICA, INC.

M57 / M57TU / M57T2

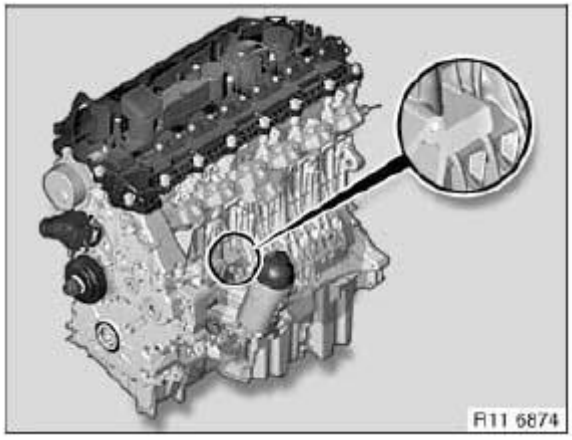


Fig. 19: Identifying Engine Identification - M57 / M57TU / M57T2
Courtesy of BMW OF NORTH AMERICA, INC.

M67 / M67TU

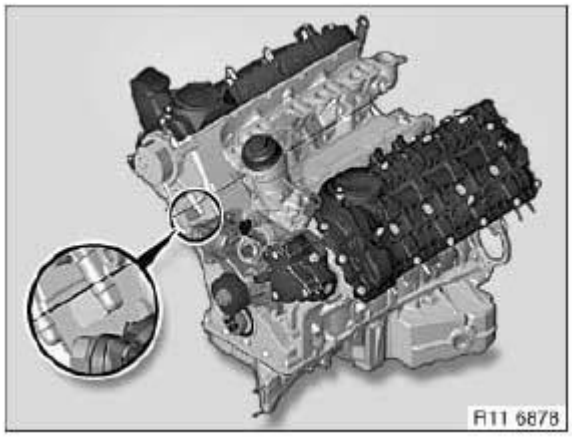


Fig. 20: Identifying Engine Identification - M67 / M67TU
Courtesy of BMW OF NORTH AMERICA, INC.

N47 / N47S

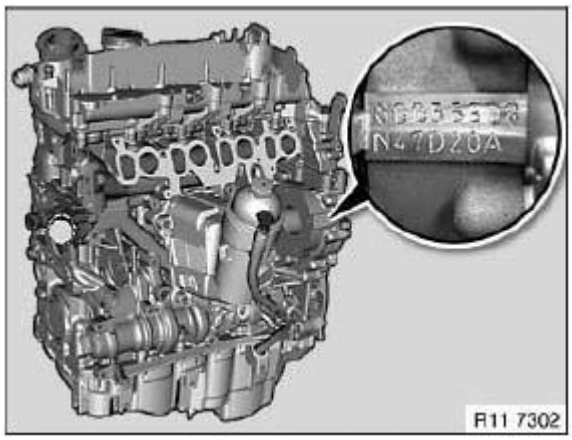


Fig. 21: Identifying Engine Identification - N47 / N47S
Courtesy of BMW OF NORTH AMERICA, INC.

M52 / M52TU

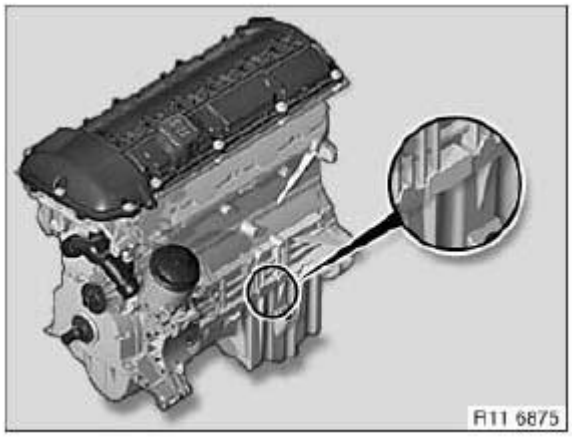


Fig. 22: Identifying Engine Identification - M52 / M52TU
Courtesy of BMW OF NORTH AMERICA, INC.

M54

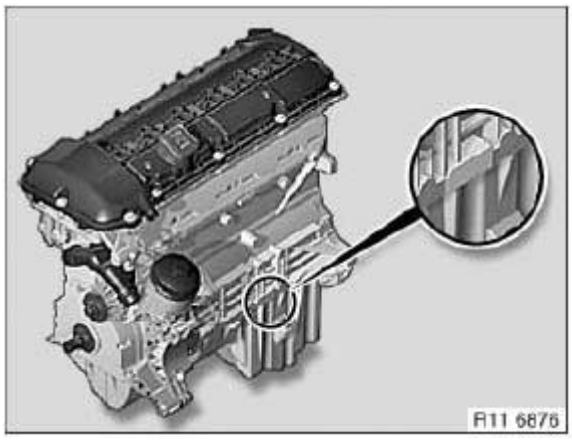


Fig. 23: Identifying Engine Identification - M54
Courtesy of BMW OF NORTH AMERICA, INC.

M56

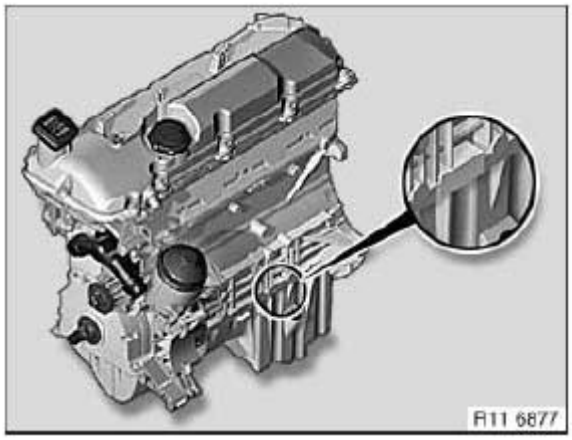


Fig. 24: Identifying Engine Identification - M56
Courtesy of BMW OF NORTH AMERICA, INC.

N40 / N45 / N45T / N43

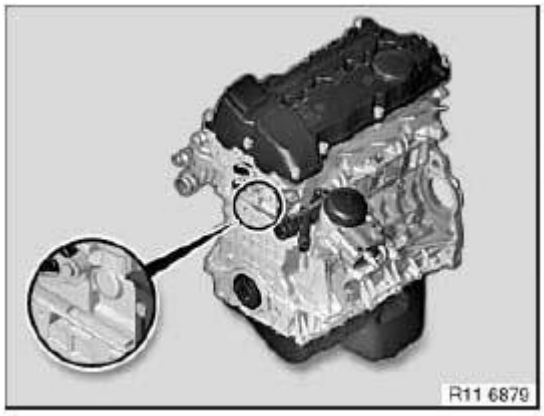


Fig. 25: Identifying Engine Identification - N40 / N45 / N45T / N43
Courtesy of BMW OF NORTH AMERICA, INC.

N42 / N46 / N46T

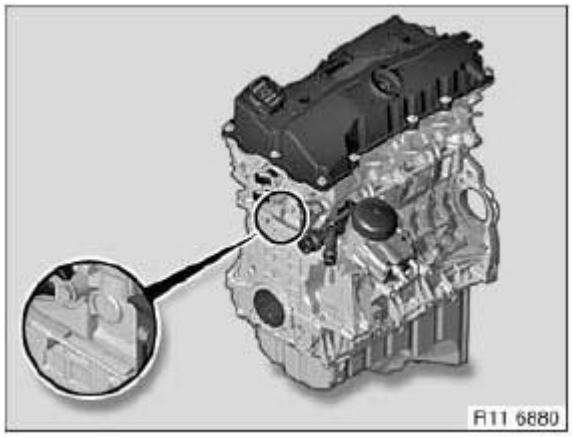


Fig. 26: Identifying Engine Identification - N42 / N46 / N46T
Courtesy of BMW OF NORTH AMERICA, INC.

N51 / N52 / N52K / N53 / N54

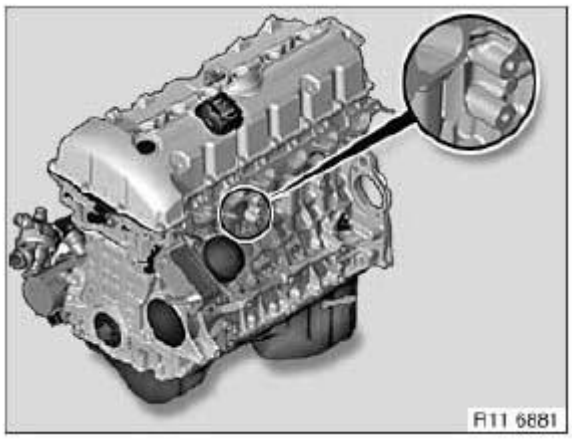


Fig. 27: Identifying Engine Identification - N51 / N52 / N52K / N53 / N54
Courtesy of BMW OF NORTH AMERICA, INC.

N62

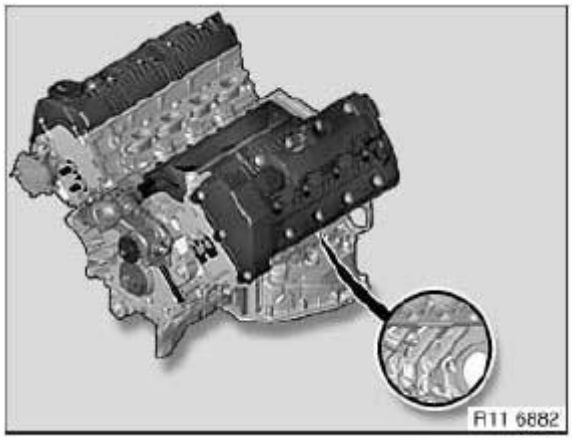


Fig. 28: Identifying Engine Identification - N62
Courtesy of BMW OF NORTH AMERICA, INC.

N73

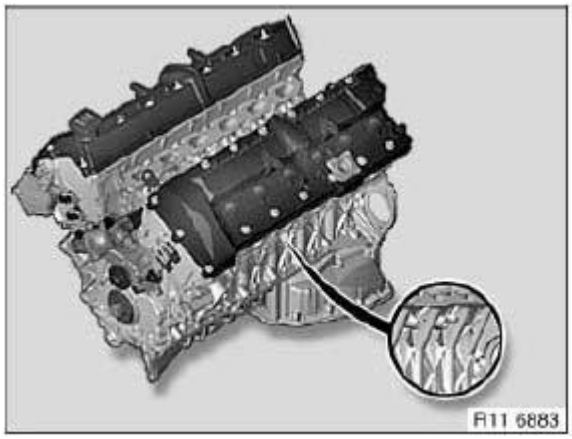


Fig. 29: Identifying Engine Identification - N73
Courtesy of BMW OF NORTH AMERICA, INC.

S54

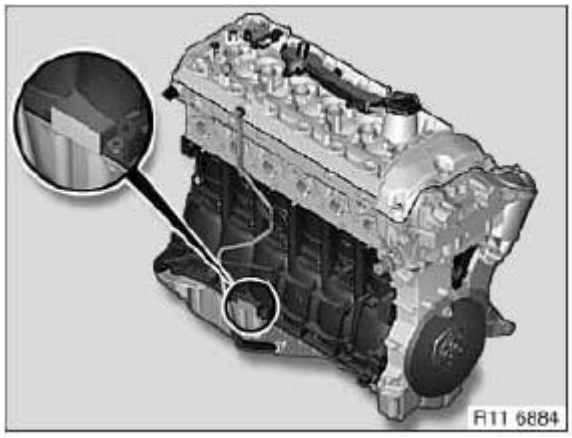


Fig. 30: Identifying Engine Identification - S54
Courtesy of BMW OF NORTH AMERICA, INC.

S85 / S65

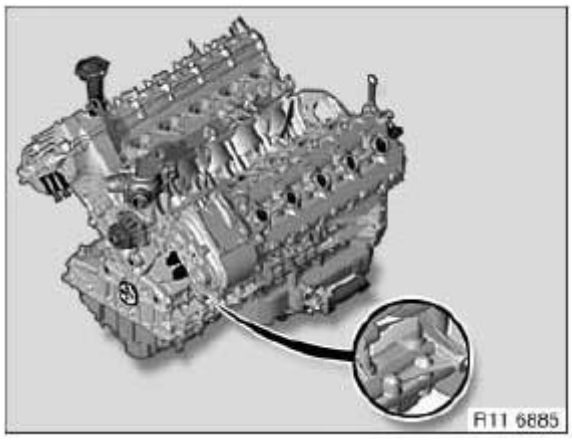


Fig. 31: Identifying Engine Identification - S85 / S65
Courtesy of BMW OF NORTH AMERICA, INC.

W10/W11

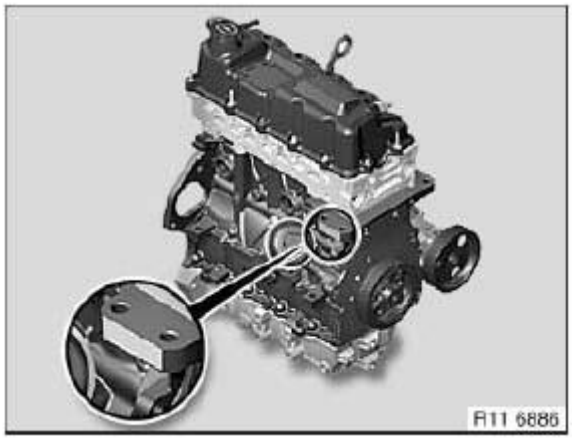


Fig. 32: Identifying Engine Identification - W10/W11
Courtesy of BMW OF NORTH AMERICA, INC.

W17

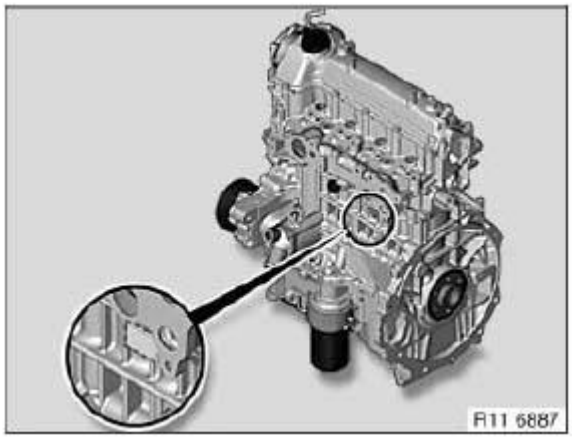


Fig. 33: Identifying Engine Identification - W17
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

MOUNTING ENGINE ON ASSEMBLY STAND (N52K)

Special tools required:

- **00 1 450**
- **11 3 370**
- **11 4 440**
- **11 9 261**
- **11 9 265**

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.
The end faces of aluminum screws/bolts are painted blue for the purposes of reliable identification.
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove engine

Bolt engine or engine block with steel bolts (1) and aluminum bolts (2) to special tool **11 4 440** .

To release central bolt, bolt on special tools **11 9 261** and **11 9 265** as well.

Mount engine with special tool 11 3 370 to special tool **00 1 450** .

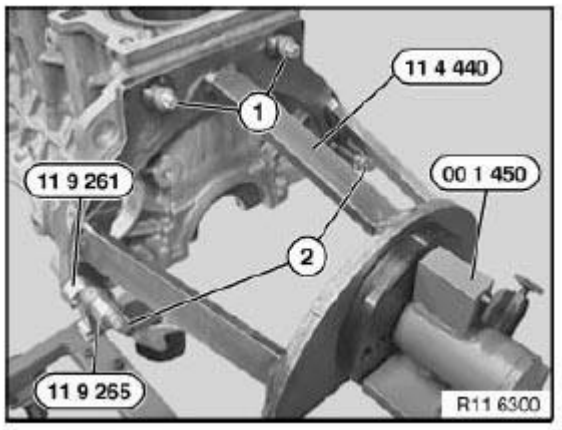


Fig. 34: Mounting Engine With Special Tool 11 3 370
Courtesy of BMW OF NORTH AMERICA, INC.

12 CYLINDER HEAD WITH COVER

11 12 000 REMOVING AND INSTALLING/SEALING CYLINDER HEAD COVER (N52K)

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are **released.**

Aluminum screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic.**

Jointing torque and angle of rotation must be observed without fail **(risk of damage).**

Necessary preliminary tasks

- Remove **IGNITION COILS**
- Release **WIRING HARNESS SECTION FOR IGNITION COIL** in cylinder head cover area
- Remove **TENSION STRUT**

Unlock and detach vent hose (1).

If necessary, pull off metal bracket (2) in direction of arrow.

Release screws (3) on electric servomotor.

Tightening torque **11 37 3AZ** .

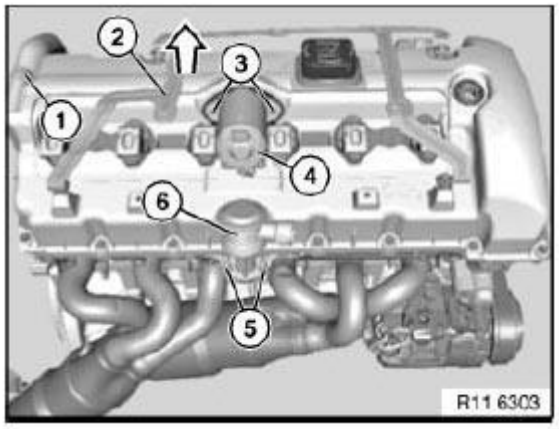


Fig. 35: Removing Metal Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: A further screw, which cannot be seen in the picture, must be released under the electric servomotor (4).

Release screw on electric servomotor.

Tightening torque **11 37 3AZ** .

Remove servomotor (4) in direction of arrow.

If necessary, release nuts (5).

Tightening torque **11 72 1AZ** .

If necessary, remove secondary air valve (6).

IMPORTANT: Observe different screw lengths.
Installation location of screws (1 and 2) is specified by the different bushing shapes.

Release screws in area (1).

Tightening torque **11 12 5AZ** .

Installation:

Replace aluminum screws

Release threaded pin (2).

Tightening torque **11 12 5AZ** .

Installation

Replace aluminum screws.

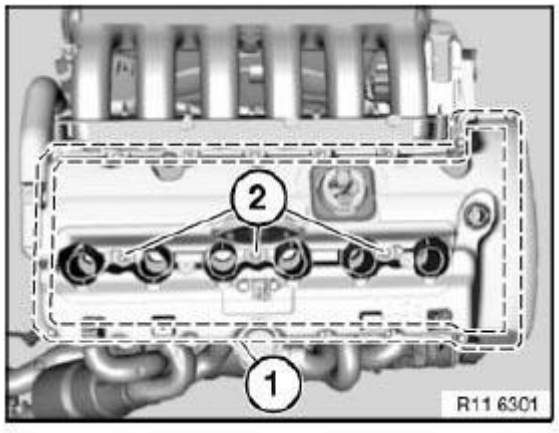


Fig. 36: Identifying Threaded Pins And Screw Mounting Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Slotted sleeves (2) for guiding ignition coils in cylinder head cover (1) must be replaced.

Remove slotted sleeves (2).

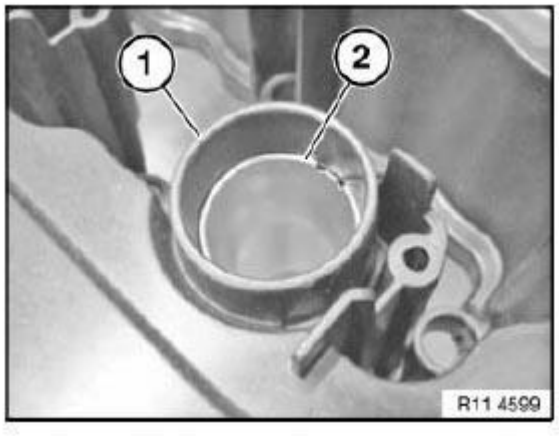


Fig. 37: Identifying Cylinder Head Cover And Slotted Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Clean all sealing faces (1 and 2).

IMPORTANT: Do not use any metal-cutting tools.

Installation:

Replace gaskets (1 and 2)

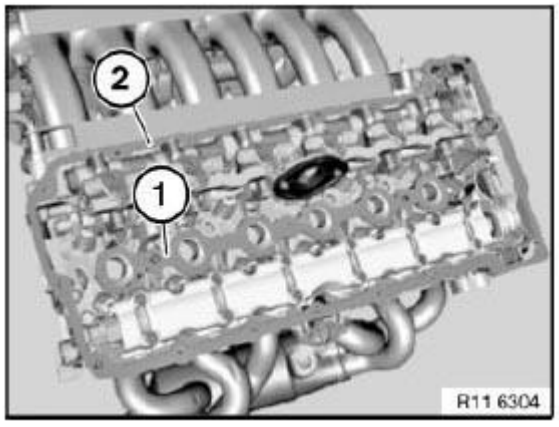


Fig. 38: Identifying Sealing Faces
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 100 REMOVING AND INSTALLING CYLINDER HEAD (N52K)

Special tools required:

- **11 0 320**
- **11 4 420**
- **11 4 430**
- **11 4 471**
- **11 4 472**
- **11 8 580**

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released.
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **EXHAUST SYSTEM** .
- Drain **COOLANT**
- Drain off **ENGINE OIL**
- Remove both **EXHAUST MANIFOLDS**
- Remove intake air manifold
- Detach coolant hoses from cylinder head
- Remove inlet and exhaust adjustment unit

IMPORTANT: Fit new cylinder head screws.
Do not wash off bolt coating.
There must be no coolant, water or engine oil in the pocket holes.
Risk of corrosion and cracking!

Release screws (1).

Unclip timing chain module (2) at junction (3) and remove towards top.

Set down timing chain.

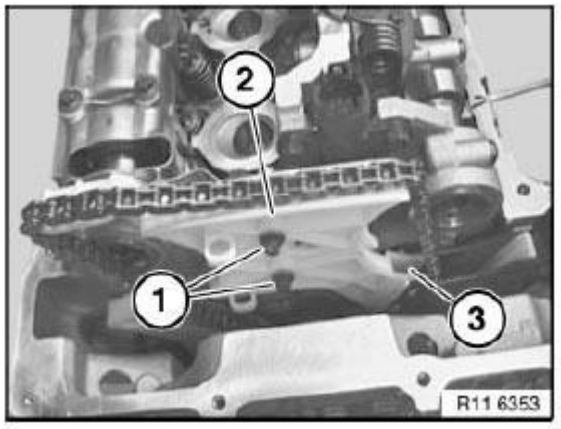


Fig. 39: Identifying Timing Chain Module, Junction And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

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.

Release bolts (2) for eccentric shaft sensor (1).

Remove eccentric shaft sensor (1) towards front.

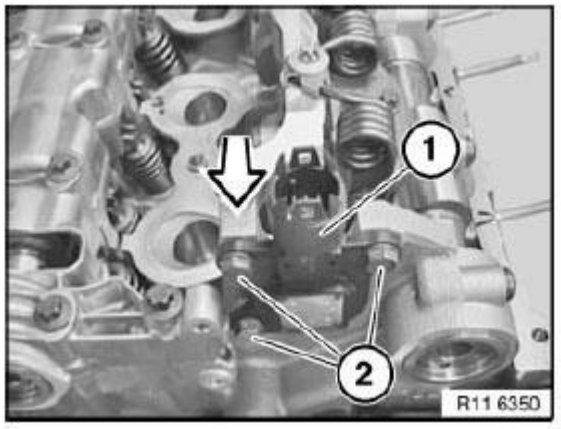


Fig. 40: Identifying Bolts And Eccentric Shaft Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Screw (1) is not magnetic and must be secured against falling down.

Release screw (1).

Remove magnet wheel (2) towards front.

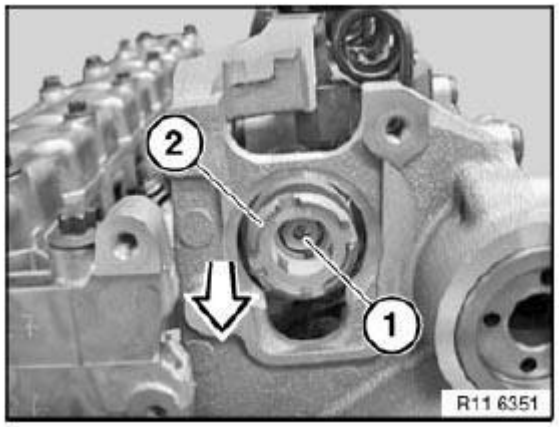


Fig. 41: Identifying Magnet Wheel And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Magnet wheel (1) is highly magnetic and must be protected against metal filings/borings.

After removing, place magnet wheel (1) in a plastic bag (2) with a seal.

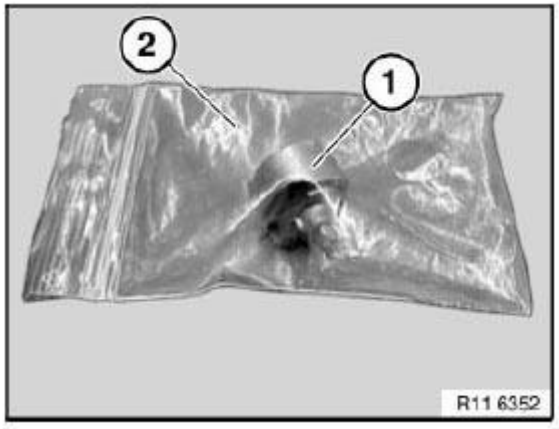


Fig. 42: Identifying Magnet Wheel And Plastic Bag
Courtesy of BMW OF NORTH AMERICA, INC.

Preload eccentric shaft (1) upwards in direction of arrow.

Remove stop screw between 1st and 2nd cylinders.

Tightening torque **11 37 5AZ** .

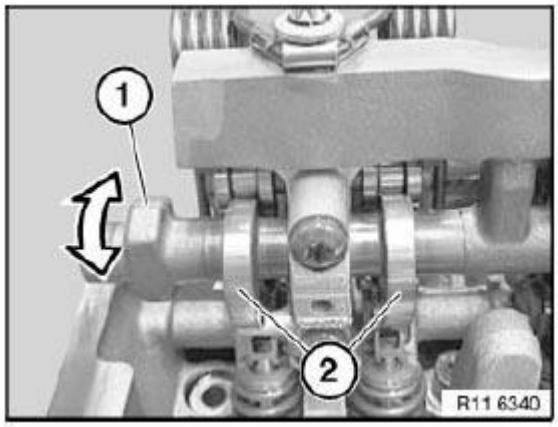


Fig. 43: Preloading Eccentric Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Bolt (2) can only be released when the timing chain module is pressed forward slightly.

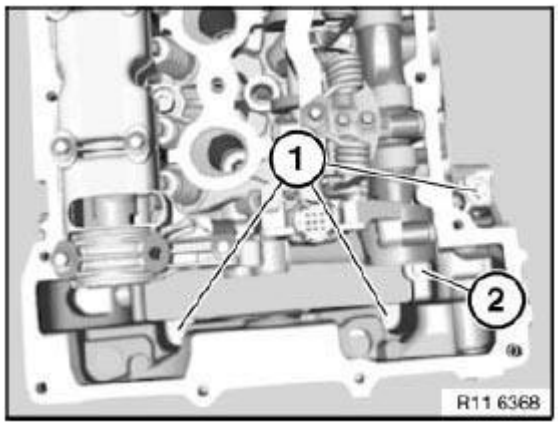


Fig. 44: Identifying Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Secure bolt (2) with a gripper against falling down.

Release screw (2).

Tightening torque **11 12 3AZ** .

Release screws (1).

Tightening torque **11 12 4AZ** .

Installation:

Replace aluminum screws.

IMPORTANT: Observe different bolt heads.

Release M10 cylinder head bolts (1) with special tool **11 8 580** .

Release M9 cylinder head bolts (2) with special tool **11 4 420** .

NOTE: Picture shows inlet and exhaust camshafts removed.

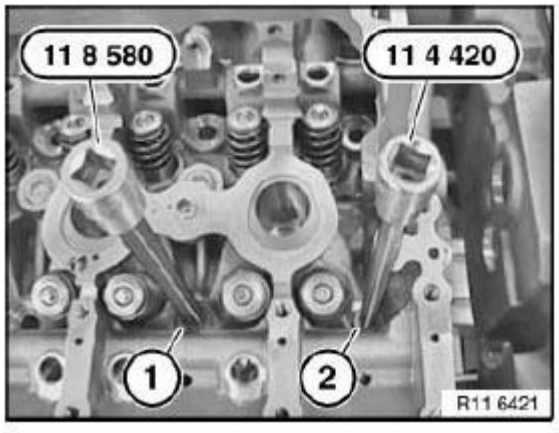


Fig. 45: Identifying Cylinder Head Bolts And Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe different M9 bolt lengths (1 and 3).

Release M9 cylinder head bolts (1 and 3) with special tool **11 4 420** .

Tightening torque **11 12 2AZ** .

Release M10 cylinder head bolts (2) with special tool **11 8 580** from outside inwards.

Tightening torque **11 12 1AZ** .

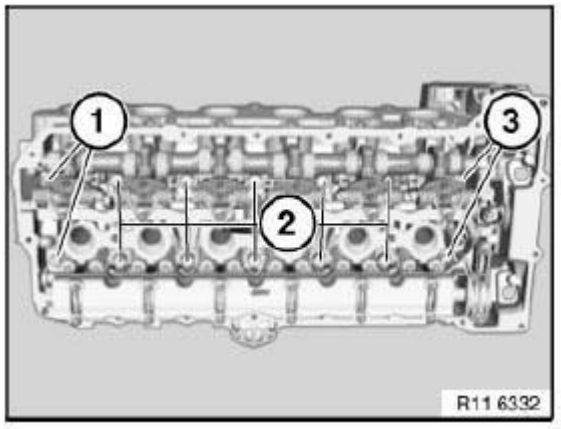


Fig. 46: Identifying Cylinder Head Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: All cylinder head bolts (1, 2 and 3) must be replaced.
Jointing torque and angle of rotation must be observed without fail.

Risk of damage!

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

Tightening torque **11 12 5AZ** .

IMPORTANT: Removing and install cylinder head with a second person helping.
Weight of cylinder head with add-on parts is approx. 40 kg.
Do not rest cylinder head on sealing surface. Risk of damage to valves!

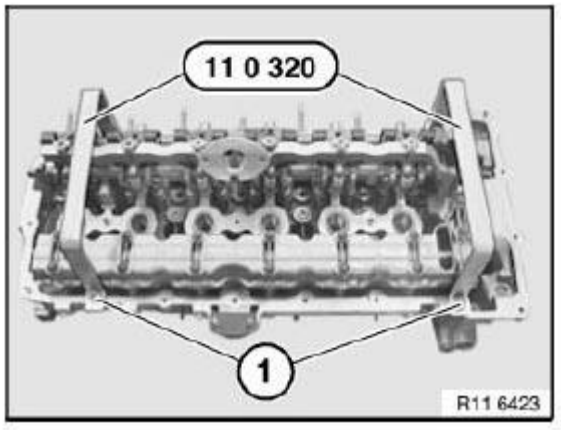


Fig. 47: Securing Special Tool With Existing Cylinder Head Cover Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool **11 4 430** into bores.

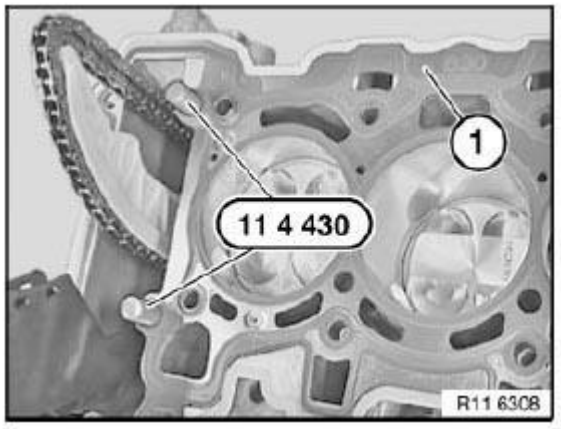


Fig. 48: Inserting Special Tool 11 4 430 Into Bores
Courtesy of BMW OF NORTH AMERICA, INC.

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.

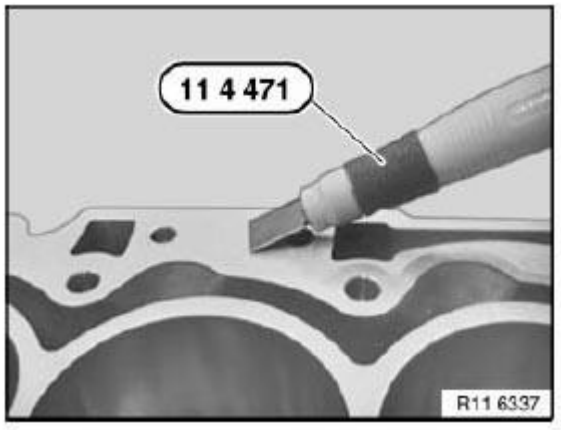


Fig. 49: Removing Coarse Residues On Sealing Faces With Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

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 threaded holes.

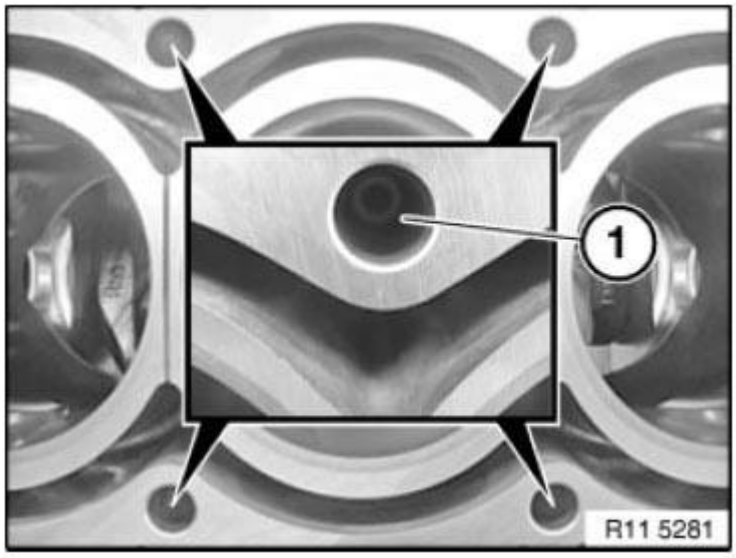


Fig. 50: Identifying Threaded Hole
Courtesy of BMW OF NORTH AMERICA, INC.

Replace **CYLINDER HEAD GASKET**.

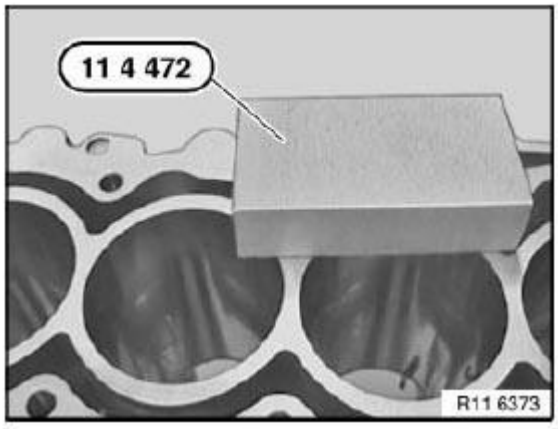


Fig. 51: Removing Fine Residues On Sealing Faces With Special Tool 11 4 472
Courtesy of BMW OF NORTH AMERICA, INC.

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

Fit new cylinder head screws.

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

Tightening torque **11 12 1AZ** .

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

Tightening torque **11 12 2AZ** .

NOTE: Picture shows inlet and exhaust camshafts removed.

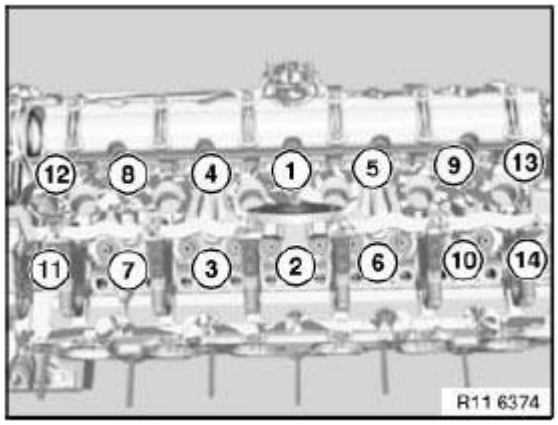


Fig. 52: Identifying Cylinder Head Bolts In Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Observe sequence for tightening cylinder head bolts without fail.

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

Installation:

- 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°

Insert bolts (1).

Tightening torque **11 12 4AZ** .

IMPORTANT: Secure bolt (2) with a gripper against falling down.

Insert bolt (2).

Tightening torque **11 12 3AZ** .

Installation:

Replace aluminum screws.

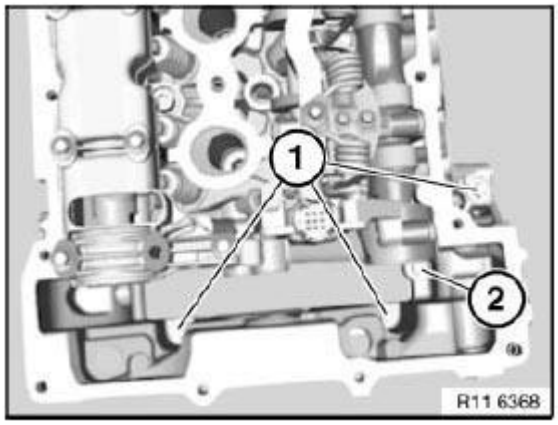


Fig. 53: Identifying Bolt Locations
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 101 REPLACING CYLINDER HEAD GASKET (N52K)

Special tools required:

- **11 4 430**
- **11 4 470**

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released.
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **CYLINDER HEAD**.

Insert special tool **11 4 430** into bores.

Remove cylinder head seal.

IMPORTANT: Check marking (1) on cylinder head gasket (B25 or B30).

- B = petrol/gasoline engine
- 30= displacement (3 litres)

Do not mix them up as this will cause **engine damage** .

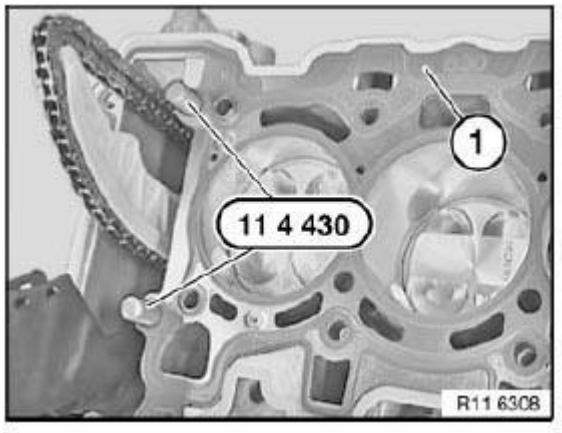


Fig. 54: Identifying Marking On Cylinder Head Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

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.

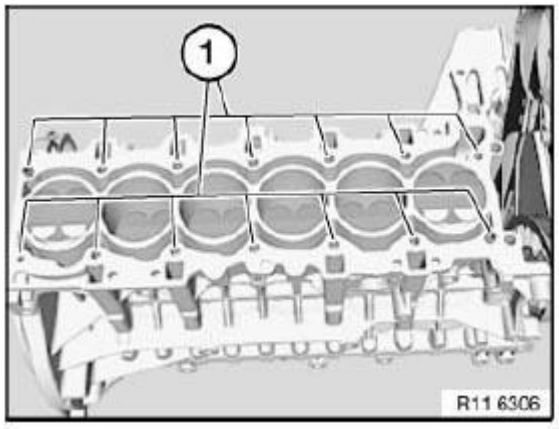


Fig. 55: Identifying Pocket Holes
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rubber coating (2) on cylinder head gasket (3) must not under any circumstances be damaged (electrochemical corrosion).

Cylinder head gasket (3) is a sheet-metal gasket.

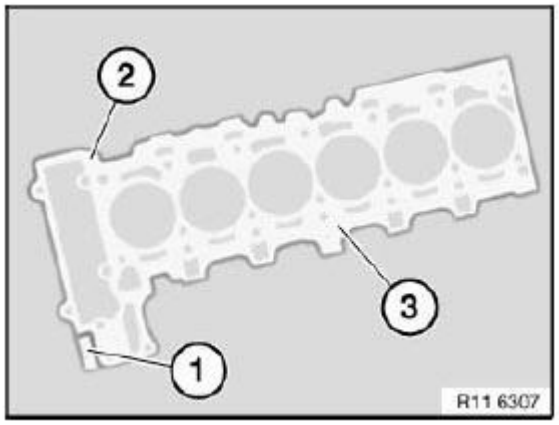


Fig. 56: Identifying Rubber Coating And Cylinder Head Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

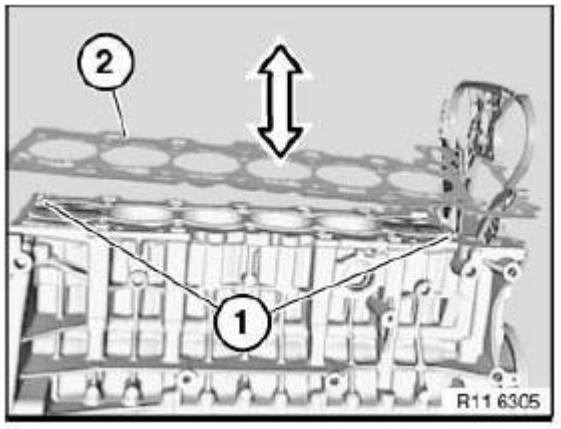


Fig. 57: Checking Adapter Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check cylinder head for DEVIATION FROM FLATNESS.
Check cylinder head for WATER LEAKS.

Assemble engine.

11 12 719 RESURFACING CYLINDER HEAD SEALING FACE (N52K)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD**
- Remove **EXHAUST CAMSHAFT**.
- Remove **INTERMEDIATE LEVER** on inlet side

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

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

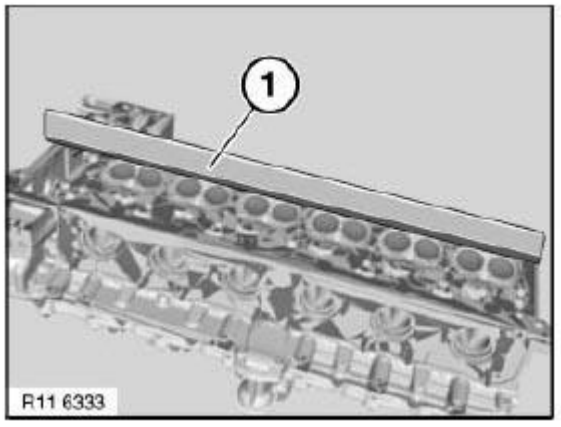


Fig. 58: Checking Evenness Of Cylinder Head Sealing Faces With Standard Straight-Edge

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

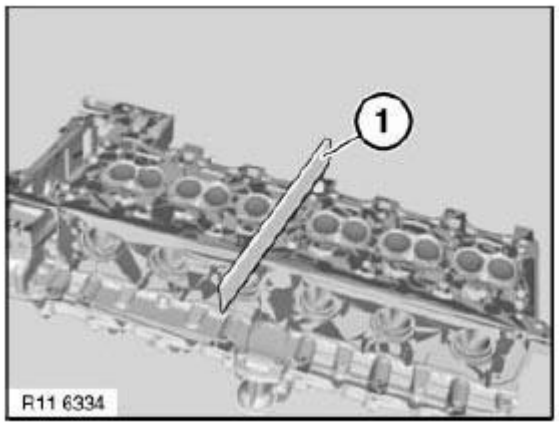


Fig. 59: Checking Evenness Of Cylinder Head Sealing Faces With Standard Straight-Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Check cylinder head for **WATER LEAKS**.

Assemble engine.

11 12 729 CHECKING CYLINDER HEAD FOR WATER LEAKS (N52K)

Special tools required:

- **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**
- Disassemble **CYLINDER HEAD**

NOTE: Observe mounting of special tool 11 4 341 on cylinder.
Secure special tool 11 4 341 with bolts 11 4 345 to 25 Nm.

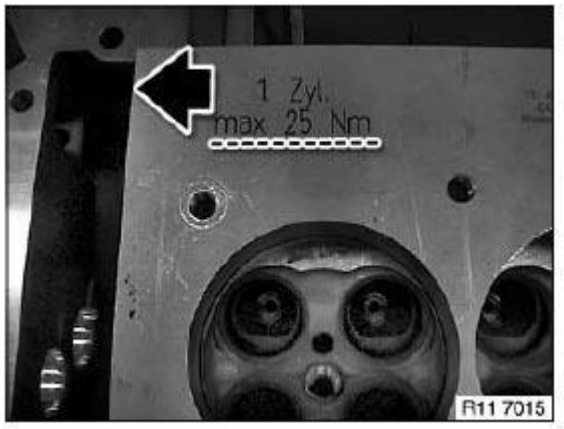


Fig. 60: Identifying Cylinder Block Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool **11 4 341** with special tool **114345** .

Installation:

Cylinder no. 1 is marked.

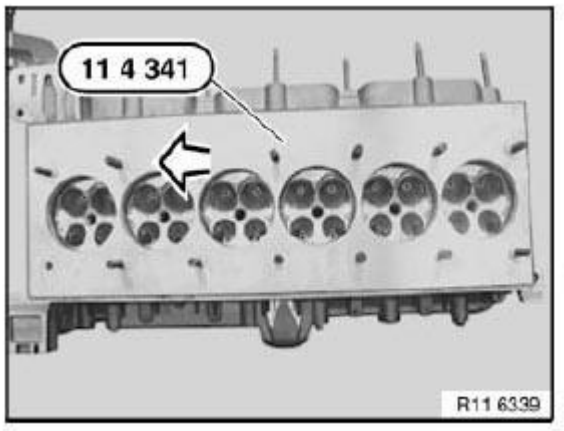


Fig. 61: Identifying Special Tool 11 4 341
Courtesy of BMW OF NORTH AMERICA, INC.

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

Sealing flange must rest flat.

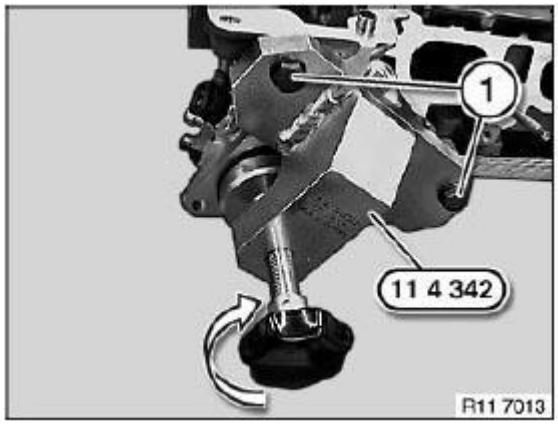


Fig. 62: Identifying Special Tool 11 4 342 With Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **11 4 344** with bolts (1).

NOTE: Compressed air at valve max. 3 bar.
Heat cylinder head to 60 °.
Check for bubble formation in a water bath.

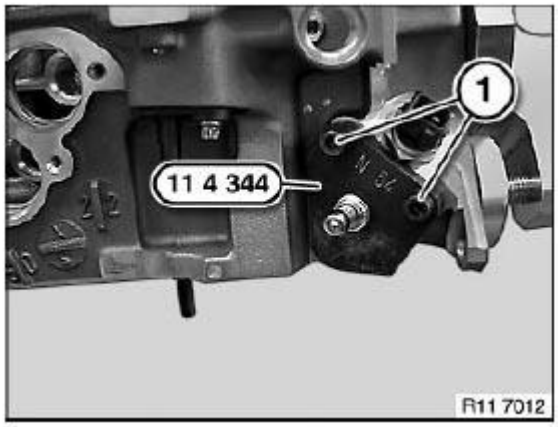


Fig. 63: Securing Special Tool 11 4 344 With Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

OIL SUMP

11 13 000 REMOVING AND INSTALLING, SEALING OR REPLACING OIL SUMP (N52K)

NOTE: Procedure shown is for 328.

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are released .

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are not magnetic .

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Lower **FRONT AXLE CARRIER**

NOTE: **The lines must be detached from the oil sump on vehicles with optional extra SA205 (automatic transmission); if necessary, detach oil pump and place to one side.**

Unclip electric leads (2) of oxygen monitor sensors from holder (3).

Disconnect plug connections (1) of oxygen monitor sensors and lay to one side.

Release bolts (5) on transmission.

For tightening torque refer to 11 13 7AZ in **13 OIL SUMP.** .

Disconnect plug connection (4) on oil level sensor.

Lay holder (3) to one side.

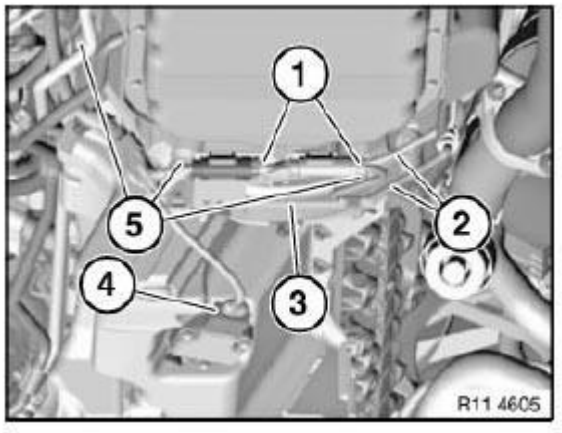


Fig. 64: Oxygen Monitor Sensors, Electric Leads, Holder, Plug Connection And Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Detach return hose (2).

IMPORTANT: For vehicles with optional extra SA205 (automatic transmission), bolts of different lengths are installed for mounting the oil sump.

Observe different tightening torques.

Release screws along line (1).

For tightening torque refer to 11 13 2AZ in **13 OIL SUMP.** .

For tightening torque refer to 11 13 3AZ in **13 OIL SUMP.** .

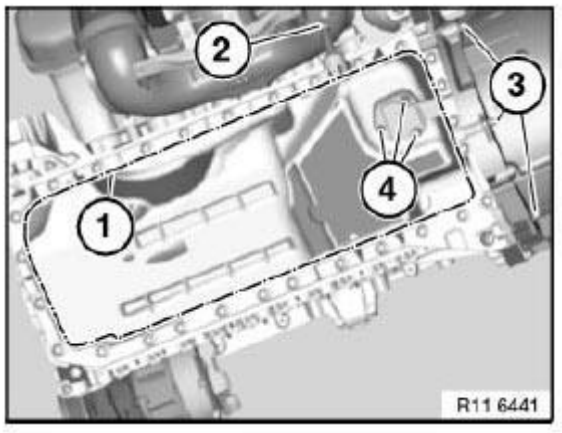


Fig. 65: Screw And Return Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace aluminum screws.

If necessary, unfasten screws (4). Remove oil level sensor.

IMPORTANT: There must be no adhesive residues in the oil sump retaining threads.

Clean retaining threads.

Installation:

Replace all seals.

Assemble engine.

14 HOUSING COVER

11 14 005 REPLACING FRONT CRANKSHAFT SEAL (N52K)

Special tools required:

- **11 0 371**
- **11 0 372**
- **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**

IMPORTANT: Do not release central bolt.
If the central bolt is released, the sprocket wheels of the timing chain and the oil pump will no longer be non-positively connected to the crankshaft. Inlet and exhaust camshafts can turn in relation to crankshaft.
Risk of damage!

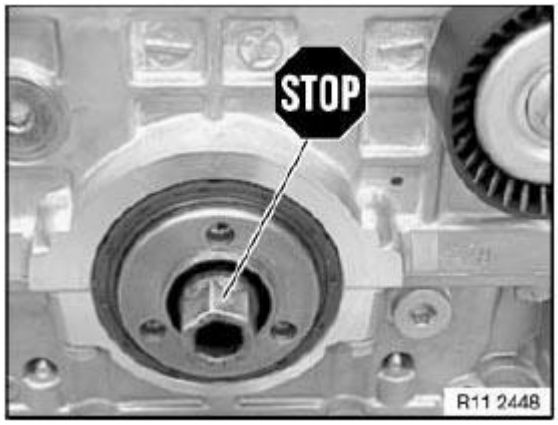


Fig. 66: Precaution For Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Turn back special tool **11 9 222** .

Push special tool **11 9 221** onto crankshaft.

IMPORTANT: When screws are tightened down (special tool 11 9 224), crankshaft seal is pressed inwards approx. 1 mm and thus slackened for subsequent removal.

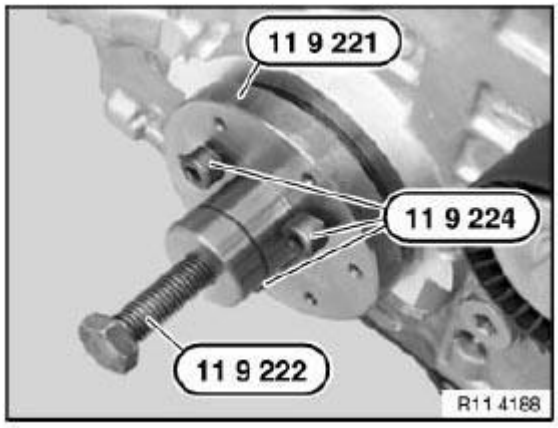


Fig. 67: Pushing Special Tool Onto Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screws (special tool **11 9 224**) and tighten down to approx. 20 Nm.

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

Screw in spindle **11 0 372** .

Release crankshaft seal from housing.

Repeat the operation several times if necessary.

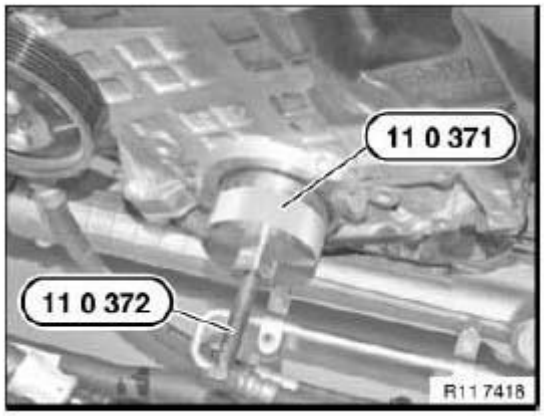


Fig. 68: Identifying Special Tool 11 0 371 Into Crankshaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

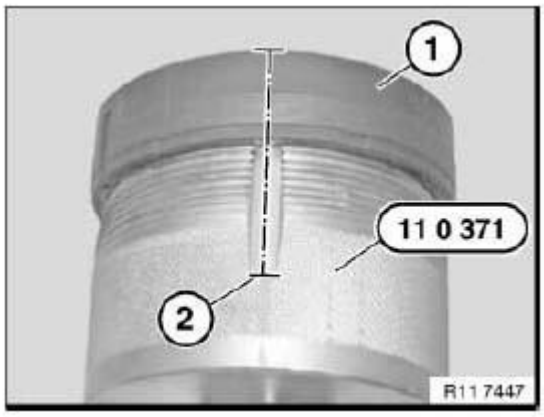


Fig. 69: Identifying Crankshaft Seal And Cutting Line
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The following text describes installation and sealing between the engine block and crankshaft seal.
The engine block will not be leakproof at the outside of the crankshaft seal if you fail to comply with the individual work steps and the work sequence.

Installation:

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

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

Illustration N42.

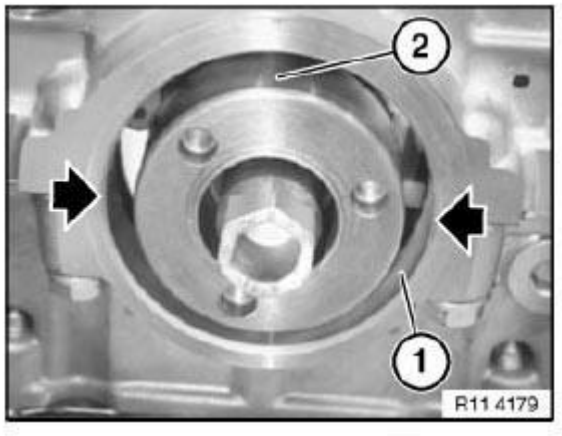


Fig. 70: Identifying Sealing Surface And Running Surface
Courtesy of BMW OF NORTH AMERICA, INC.

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

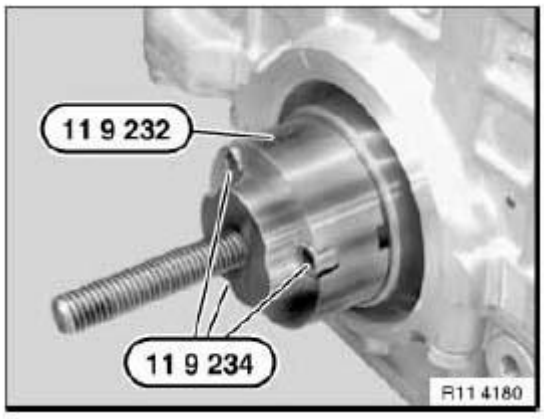


Fig. 71: Screwing Special Tool To Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Support sleeve (1) is supplied with crankshaft seal (2).
When crankshaft seal (2) is installed, only support sleeve (1) may be used as a slip sleeve.
Crankshaft seal (2) has a groove on both left and right sides.

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

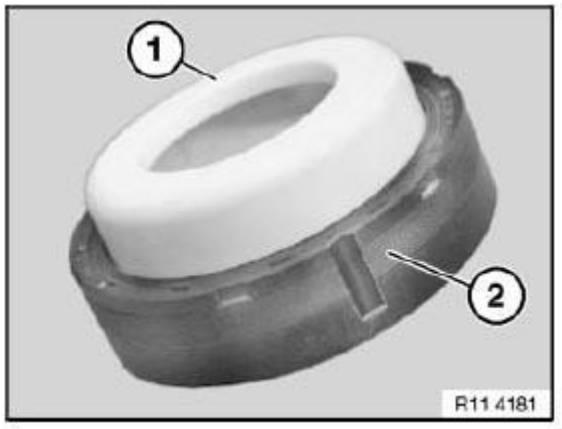


Fig. 72: Identifying Sleeve And Crankshaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Remove screw caps (1) from injector (2).
Screw on metering needle.
Insert piston for pressing out.
Injector (2) contains the sealing compound Loctite, manufacturer's number 128357.
Bottle (3) contains the primer Loctite, manufacturer's number 171000.

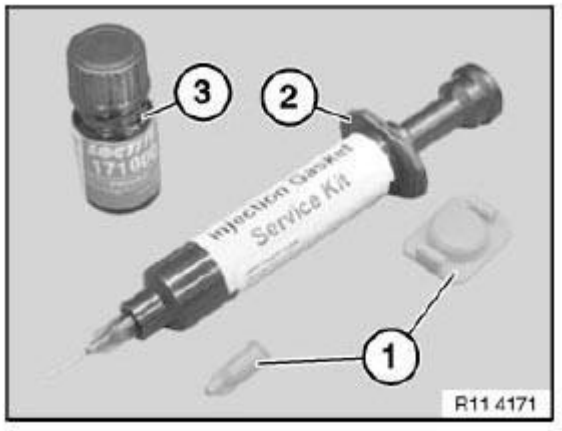


Fig. 73: Identifying Bottle, Screw Caps And Injector
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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

Coat both grooves (3) on crankshaft seal (2) with Loctite primer, manufacturer's number 171000, and expose to

air for approx. one minute.

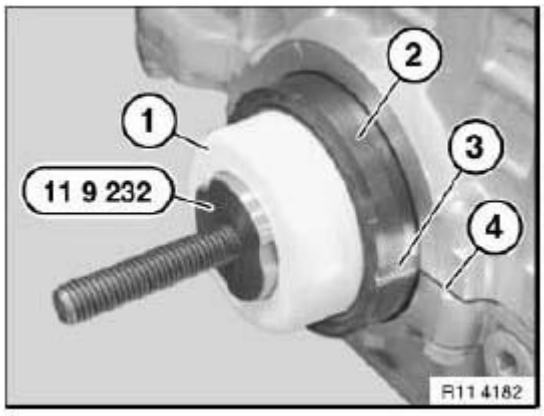


Fig. 74: Aligning Groove To Housing Partition
Courtesy of BMW OF NORTH AMERICA, INC.

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

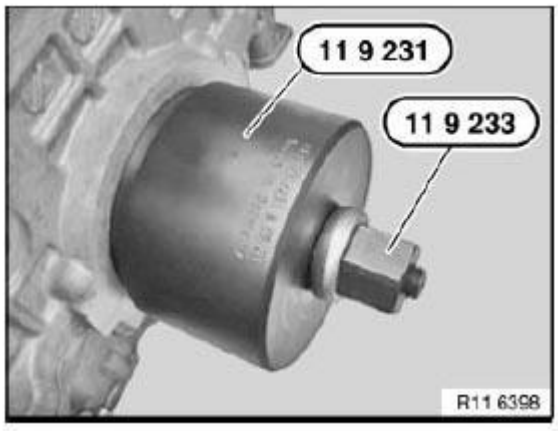


Fig. 75: Identifying Crankshaft Seal With Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Before filling with sealing compound:

Moisten brush with Loctite primer, manufacturer's number 171000. Insert brush as far as possible into grooves (1) on crankshaft seal in order to coat housing partition on engine block.

Illustration N42.

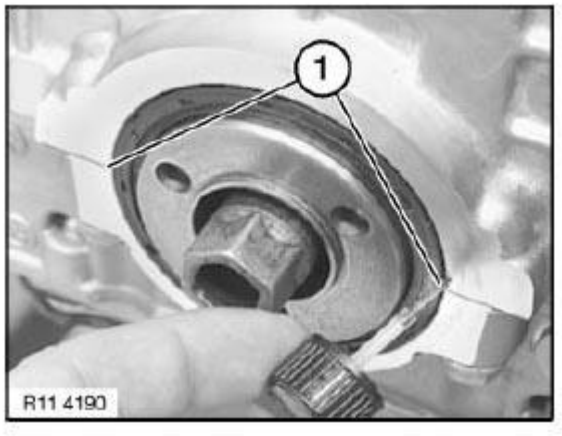


Fig. 76: Inserting Brush Into Grooves On Crankshaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Using injector (2), fill both grooves (3) flush with Loctite sealing compound, manufacturer's number 128357.

Illustration N42.

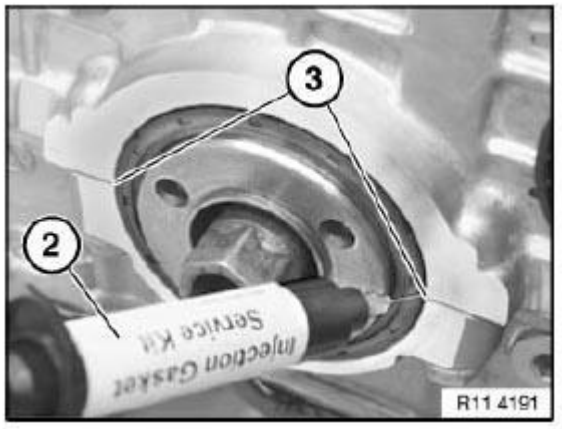


Fig. 77: Identifying Injector And Grooves
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Loctite primer, manufacturer's number 171000, binds the Loctite sealing compound, manufacturer's number 128357, and prevents leakage.

Coat surface of sealing compound in both grooves (1) with Loctite primer, manufacturer's number 171000.

Illustration N42.

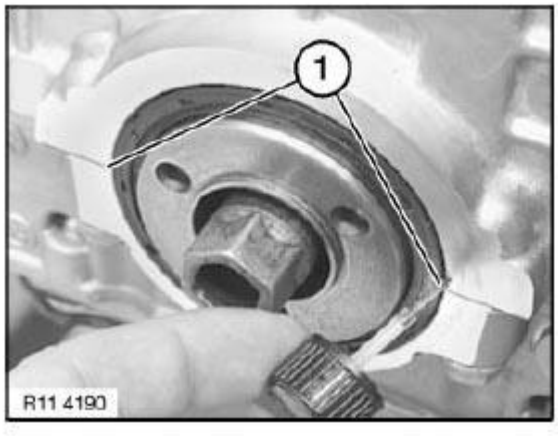


Fig. 78: Inserting Brush Into Grooves On Crankshaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 14 010 REPLACING SEALING COVER FOR VACUUM PUMP (N52K)

Special tools required:

- **11 4 361**
- **11 4 362**
- **11 4 363**
- **11 4 364**
- **11 9 200**

Necessary preliminary tasks:

- Remove fan cowl with electric fan
- Remove alternator drive belt
- Remove drive belt tensioner

NOTE: The procedure is the same as for the crankshaft radial seal. Expose removal openings on sealing cover.

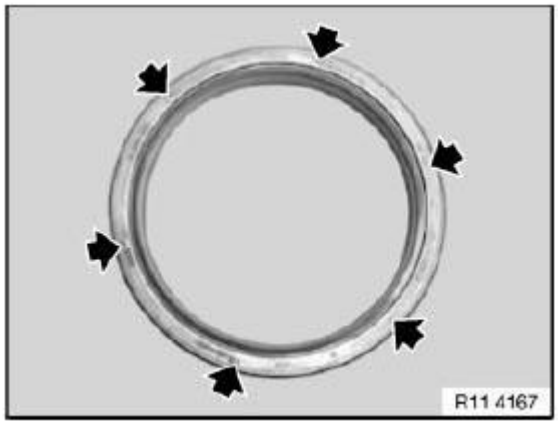


Fig. 79: Locating Crankshaft Radial Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Convert special tool **11 9 200** (see illustration).

Screw special tool **11 9 200** onto sealing cover.

NOTE: Insert screws until flush only with special tool 11 9 200 .

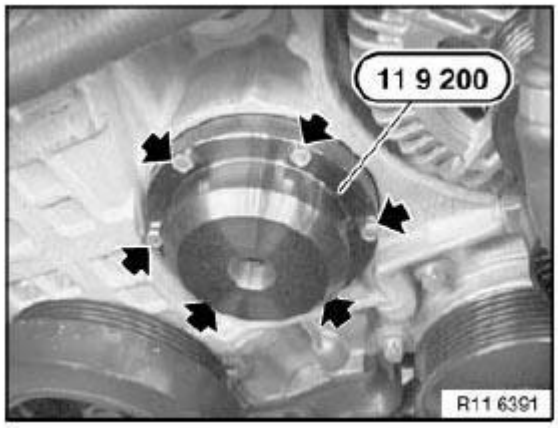


Fig. 80: Identifying Special Tool 11 9 200 Onto Sealing Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool **11 4 362** .

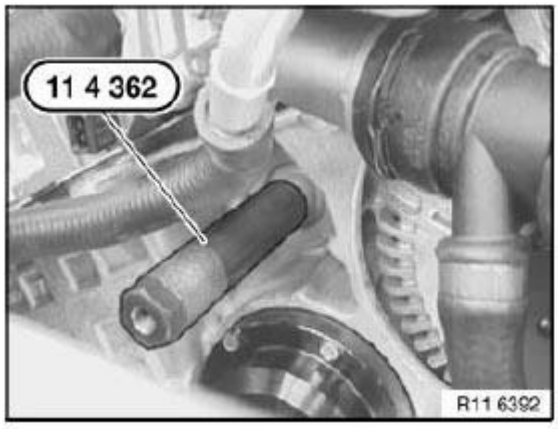


Fig. 81: Identifying Special Tool 11 4 362
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool **11 4 361** to bedplate construction screw connection (see arrow).

Secure with knurled screw (1).

Screw special tool **11 4 364** into special tool **119200** and screw out in direction of arrow.

NOTE: For purposes of clarity, the picture shows the alternator and power steering pump removed.

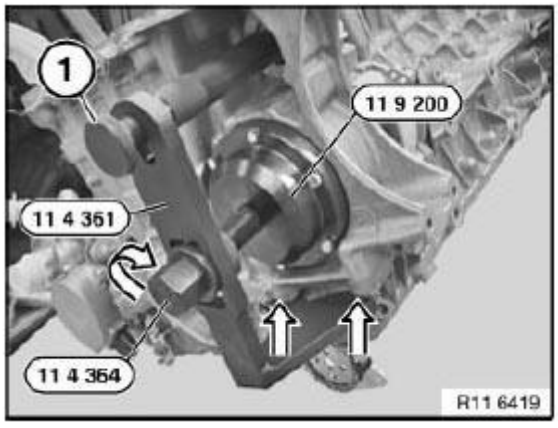


Fig. 82: Identifying Knurled Screw And Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare new sealing cover (1) with special tool **11 9 200 without** screws.

Screw in sealing cover with special tool **11 4 363** until it is flush.

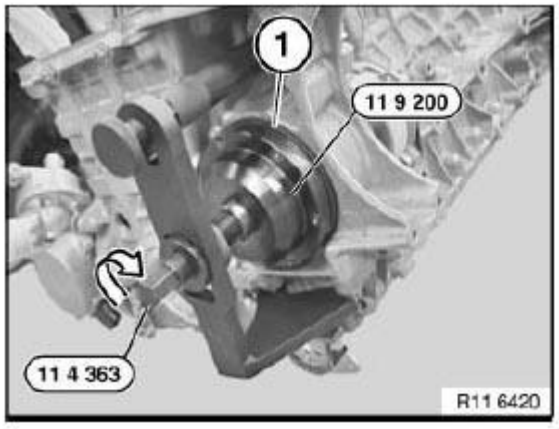


Fig. 83: Identifying Sealing Cover With Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 14 151 REPLACING CRANKSHAFT SEAL (N52K) (TO 12/1/08)

Special tools required:

- **11 9 181**
- **11 9 182**
- **11 9 183**
- **11 9 184**
- **11 9 200**

Necessary preliminary tasks:

- Remove **TRANSMISSION**
- Remove **FLYWHEEL**

NOTE: Crankshaft radial seal has six removal openings for removal with special tool 11 9 200 .

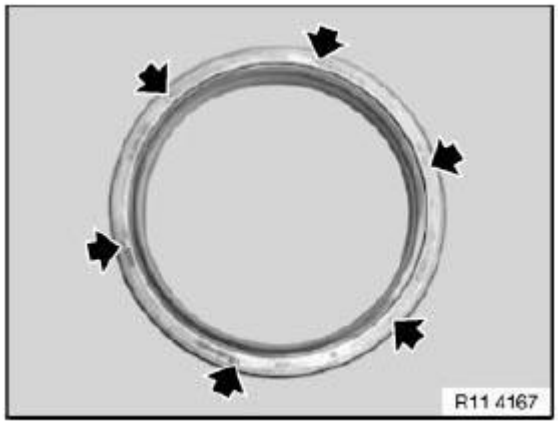


Fig. 84: Locating Crankshaft Radial Seal
Courtesy of BMW OF NORTH AMERICA, INC.

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

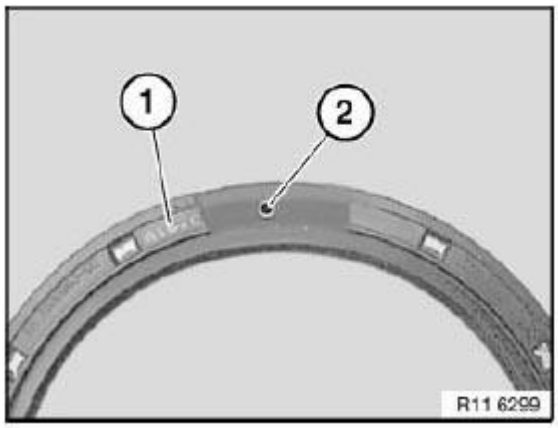


Fig. 85: Identifying Rubber Coating And Opening
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

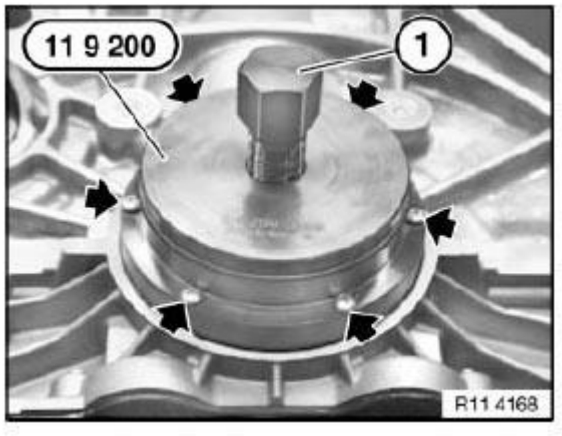


Fig. 86: Identifying Spindle And Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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

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

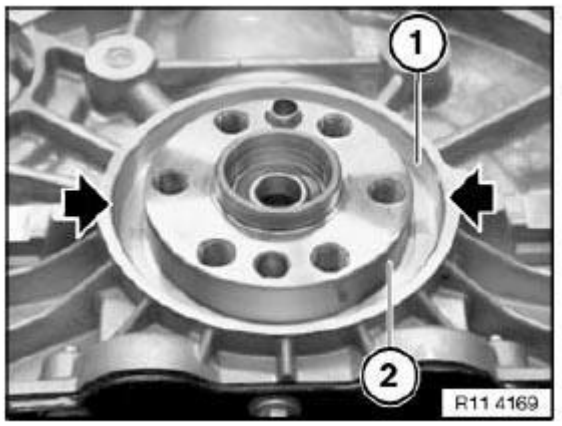


Fig. 87: Identifying Sealing Surface And Running Surface Of Crankshaft Radial Seal
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Support bushing (4) is contained in scope of delivery of crankshaft radial seal (1).
When crankshaft radial seal (1) is installed, only support bushing (4) may be used as a slip bushing.
Crankshaft radial seal (1) has a groove (2) on both left and right sides.

IMPORTANT: After installation, grooves (2) must be filled with sealing compound.

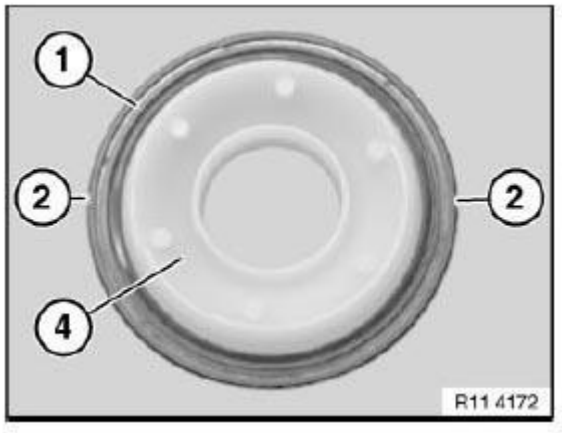


Fig. 88: Identifying Crankshaft Radial Seal, Groove And Bushing
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The following text describes installation and sealing between the engine block and crankshaft radial seal.
The engine block will not be leakproof at the outside of the crankshaft radial seal if you fail to comply with the individual work steps and the work sequence.

NOTE: The required parts are available from the BMW Parts 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 128357.

Bottle (3) contains the primer Loctite, manufacturer's number 171000.

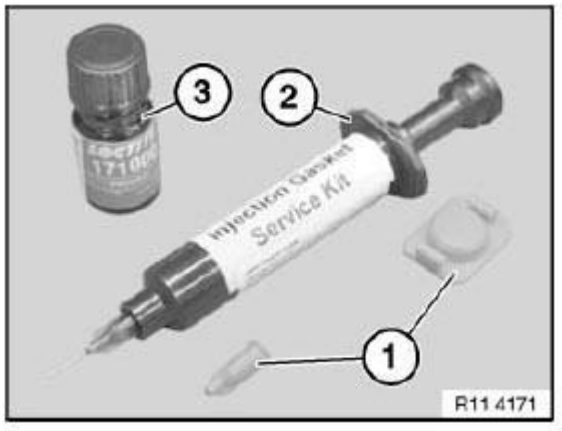


Fig. 89: Identifying Bottle, Screw Caps And Injector

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit support bushing (4) with crankshaft radial seal (1) on crankshaft.

Align groove (2) centrally to housing partition (3).

Coat both grooves (2) on crankshaft radial seal (1) with Loctite primer, manufacturer's number 171000, and expose to air for approx. one minute.

Push crankshaft radial seal (1) by hand as far as possible onto running surface.

Carefully remove support sleeve (4).

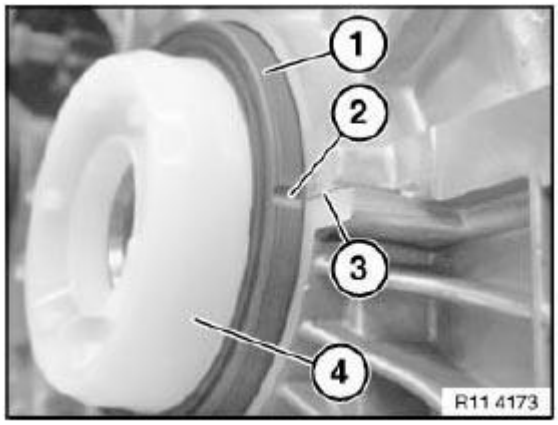


Fig. 90: Identifying Crankshaft Radial Seal, Support Sleeve And Grooves
Courtesy of BMW OF NORTH AMERICA, INC.

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 preassembled radial shaft seal.

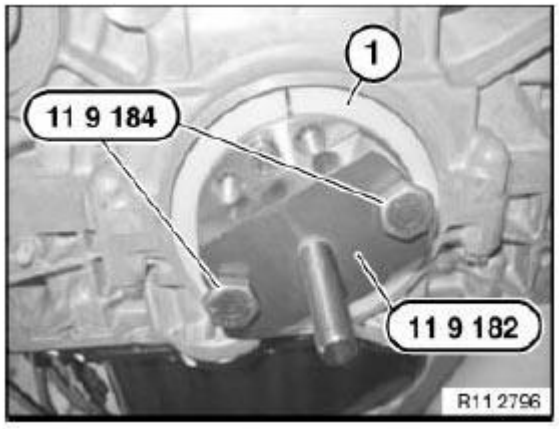


Fig. 91: Identifying Spacer Ring And Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

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.

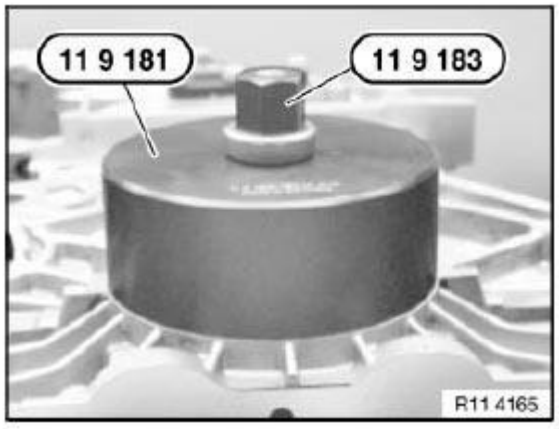


Fig. 92: Identifying Special Tool 11 9 181 And 11 9 183
Courtesy of BMW OF NORTH AMERICA, INC.

Before filling with sealing compound:

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

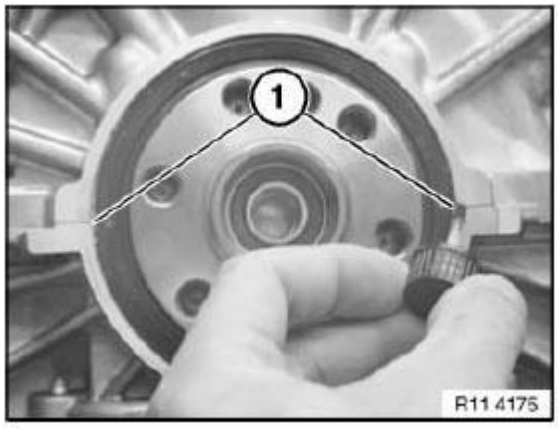


Fig. 93: Inserting Brush Into Grooves On Crankshaft Radial Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Using injector, fill both grooves (1) flush with Loctite sealing compound, manufacturer's number 128357.

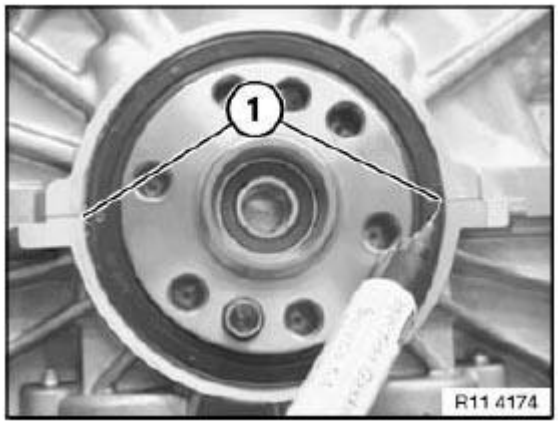


Fig. 94: Filling Grooves Flush With Loctite Sealing Compound
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Loctite primer, manufacturer's number 171000, binds the Loctite sealing compound, manufacturer's number 128357, and prevents leakage. Coat surface of sealing compound in both grooves (1) with Loctite primer, manufacturer's number 171000.

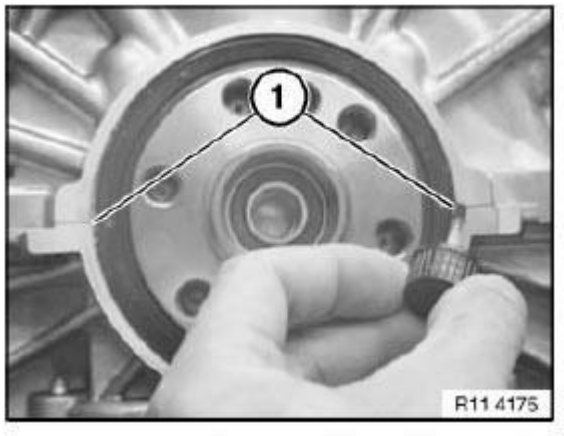


Fig. 95: Inserting Brush Into Grooves On Crankshaft Radial Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 14 151 REPLACING CRANKSHAFT SEAL (N52K) ON TRANSMISSION SIDE (FROM 1/1/09)

Special tools required:

- 11 8 220
- 11 9 181
- 11 9 182
- 11 9 183
- 11 9 184
- 11 9 185
- 23 0 490

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.

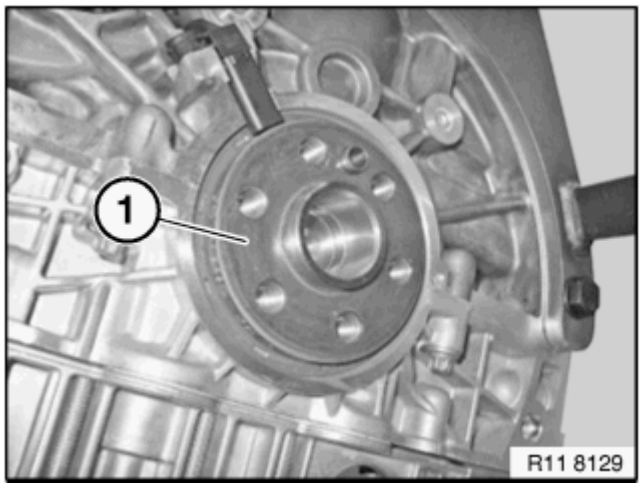


Fig. 96: Identifying Magnet Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw on pulse sensor (1).

Slide **PULSE SENSOR** (2) upwards.

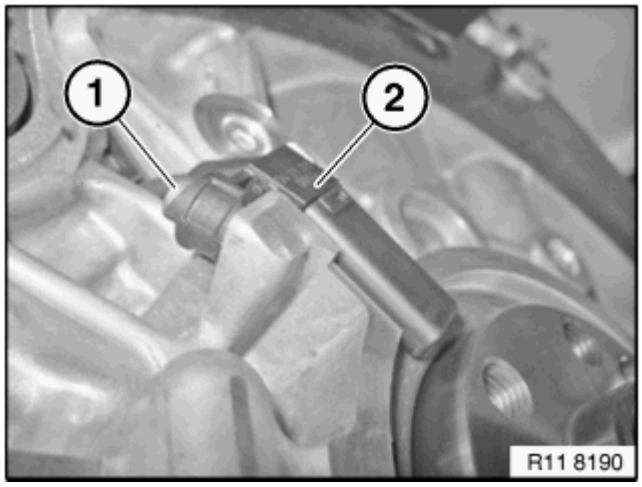


Fig. 97: Identifying Pulse Sensor And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Drill size maximum 2.5 millimeters.

Remove shavings immediately.

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

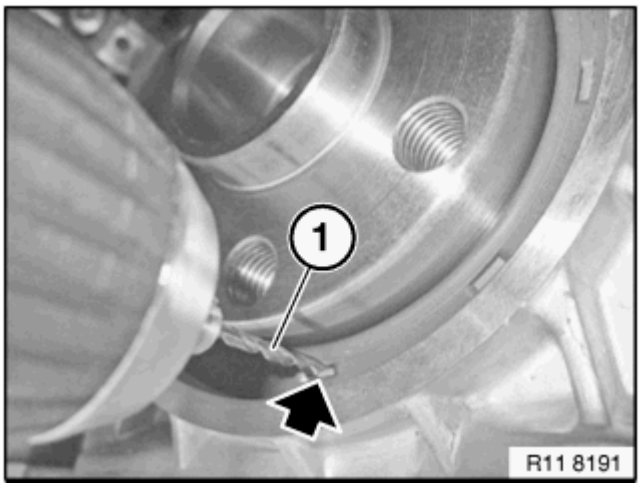


Fig. 98: Drilling Hole In Radial Shaft Seal Using Drill
Courtesy of BMW OF NORTH AMERICA, INC.

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

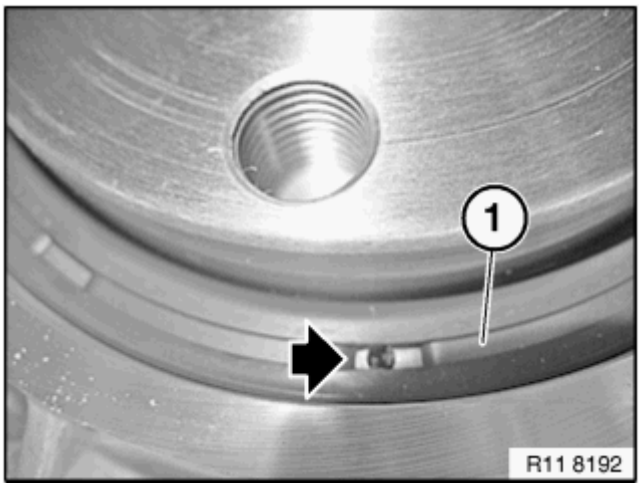


Fig. 99: Identifying Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

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.

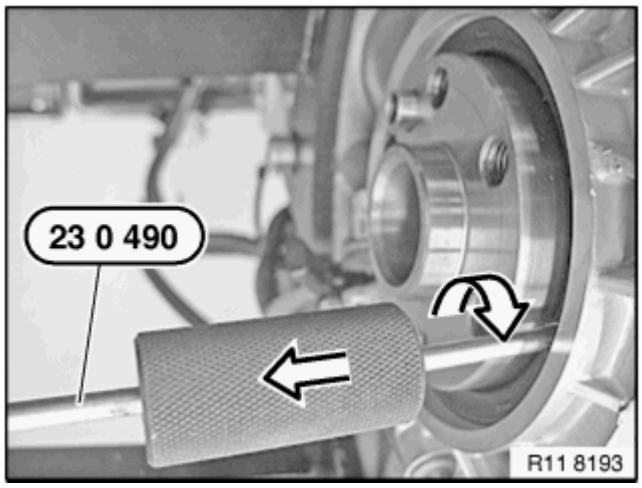


Fig. 100: Screwing In Special Tool 23 0 490 In Clockwise Direction
Courtesy of BMW OF NORTH AMERICA, INC.

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

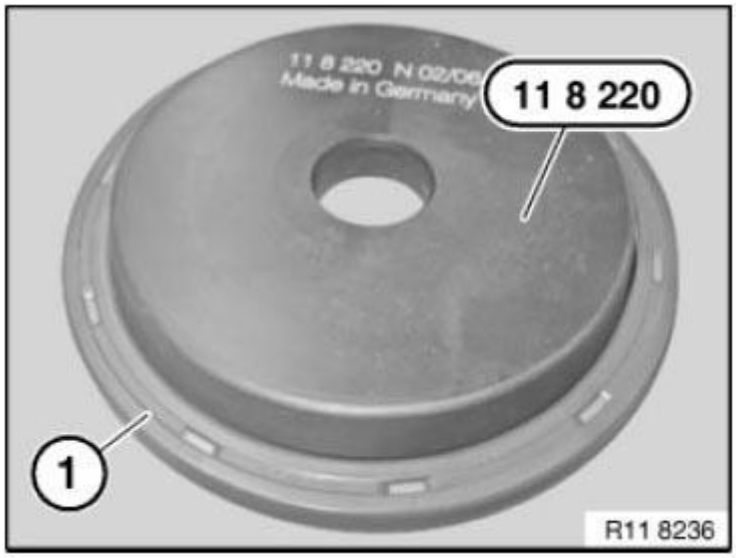


Fig. 101: Identifying Radial Shaft Seal On Special Tool 11 8 220
Courtesy of BMW OF NORTH AMERICA, INC.

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

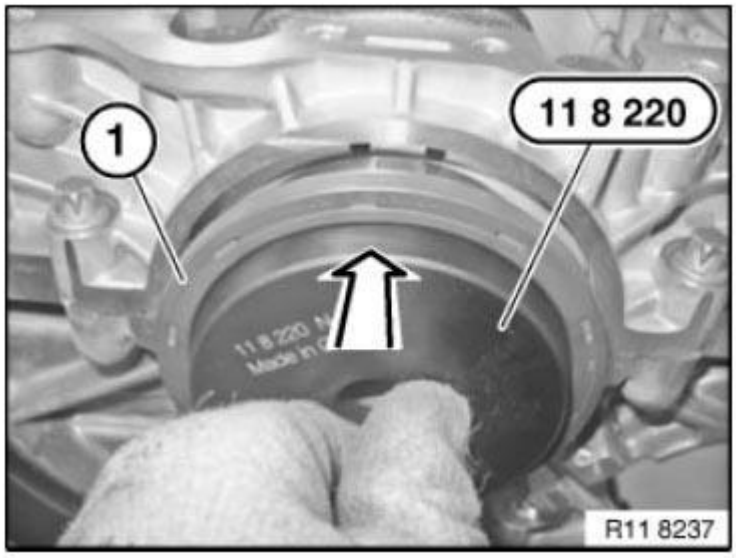


Fig. 102: Positioning Radial Shaft Seal Using Special Tool 11 8 220 On Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

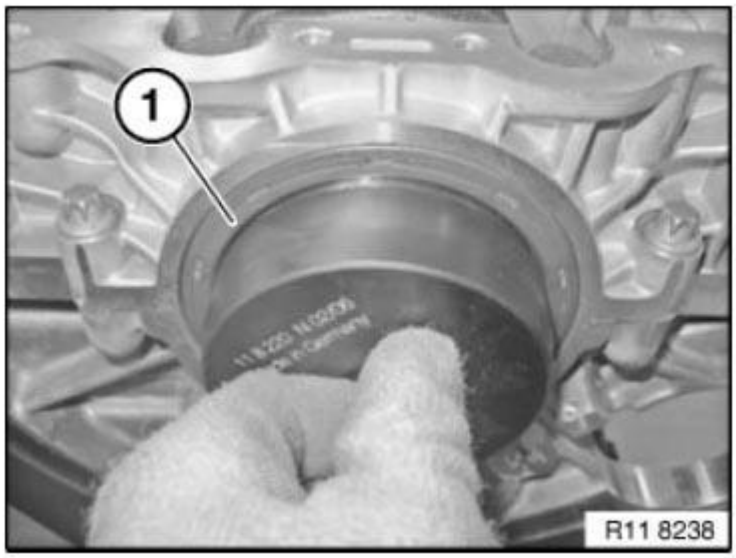


Fig. 103: Moving Radial Shaft Seal Parallel Up Against Crankcase
Courtesy of BMW OF NORTH AMERICA, INC.

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

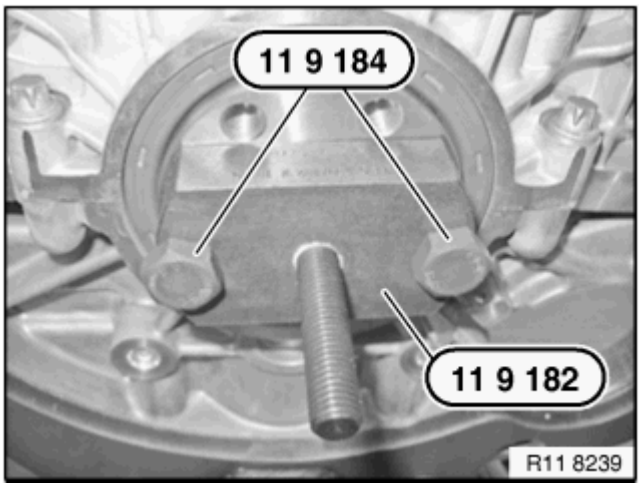


Fig. 104: Fastening Special Tool 11 9 182 With Special Tool 11 9 184 On Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

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).

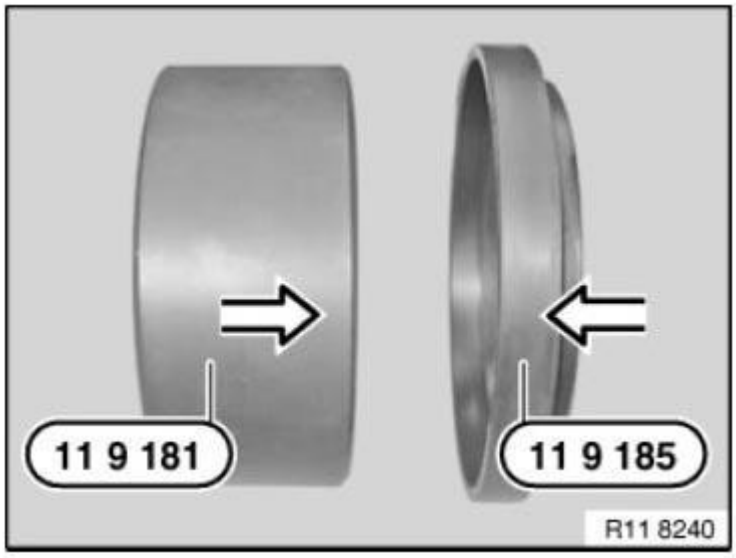


Fig. 105: Connecting Special Tool 11 9 185 Onto Special Tool 11 8 181
Courtesy of BMW OF NORTH AMERICA, INC.

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).

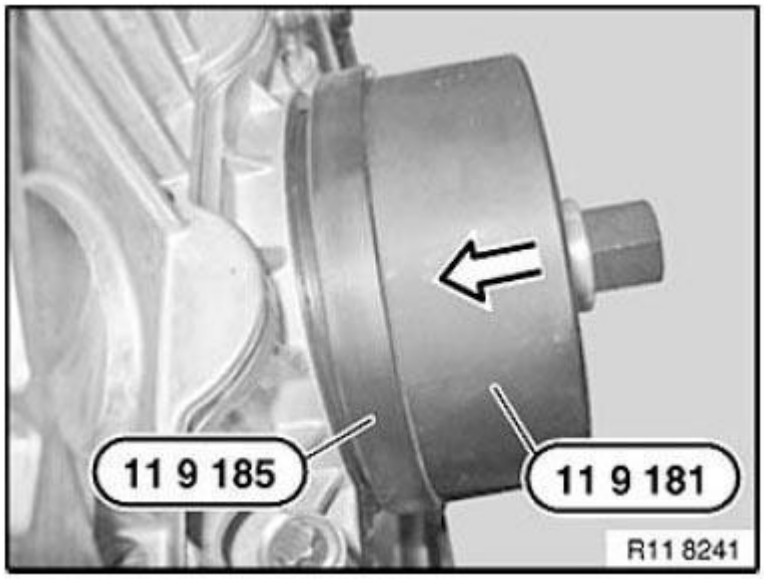


Fig. 106: Installing Rear Crankshaft Seal Using Tool 119 180/181
Courtesy of BMW OF NORTH AMERICA, INC.

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

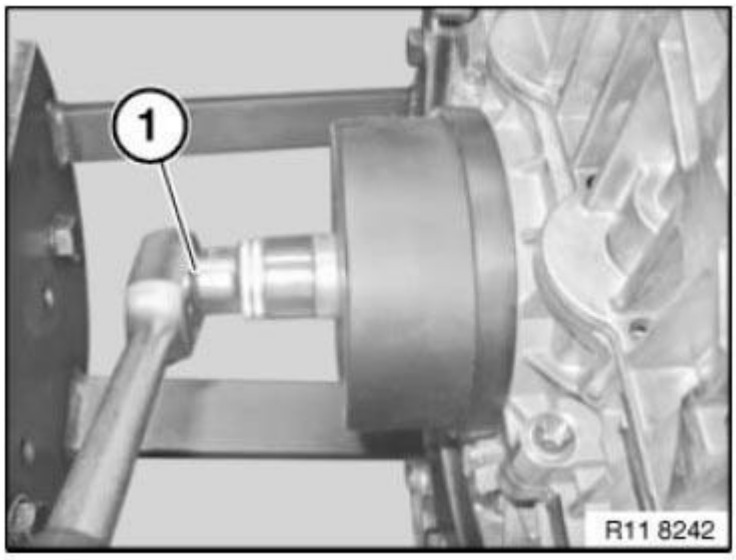


Fig. 107: Screwing On Radial Shaft Seal Using Special Tool 11 9 183
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

21 CRANKSHAFT WITH BEARING

11 21 500 REPLACING CRANKSHAFT (N52K)

Special tools required:

- **00 2 510**
- **00 9 120**
- **11 4 370**
- **11 4 440**
- **11 4 470**
- **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 .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove engine
- Mount engine on **ASSEMBLY STAND**
- Remove **VIBRATION DAMPER**
- Remove oil sump
- Remove **OIL PUMP**
- Remove oil pump/vacuum pump **CHAIN MODULE**
- Remove timing **CHAIN MODULE**
- Remove **CYLINDER HEAD**
- Remove **FLYWHEEL**
- Removing all **PISTONS**

Release bolts (1).

Tightening torque **11 13 6AZ** .

Installation:

Replace aluminum screws.

Remove oil deflector (2).

NOTE: Graphic shows the screw connection of the oil deflector (2) for vehicles with optional extra SA203 (all-wheel drive).

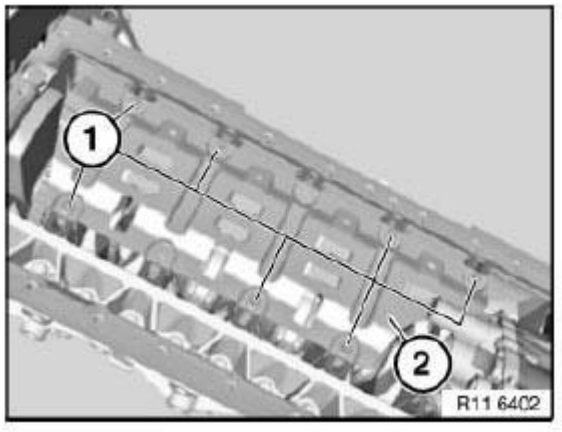


Fig. 108: Identifying Bolts And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1).

Tightening torque **11 11 2AZ** .

Release screws (2).

Tightening torque **11 11 3AZ** .

Installation:

Replace aluminum screws.

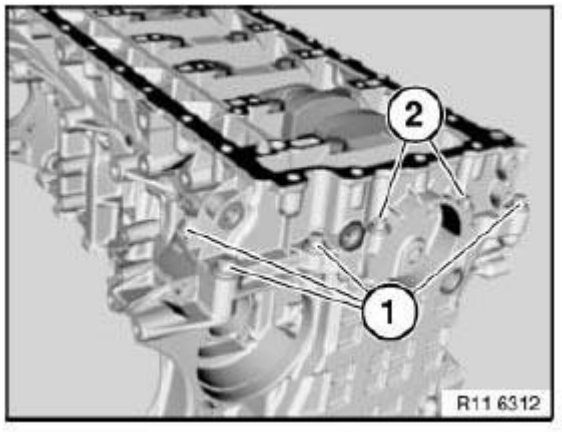


Fig. 109: Identifying Bolts And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1).

Tightening torque **11 11 4AZ** .

Release screws (2).

Tightening torque **11 11 2AZ** .

Installation:

Replace aluminum screws.

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

Tightening torque **11 11 1AZ** .

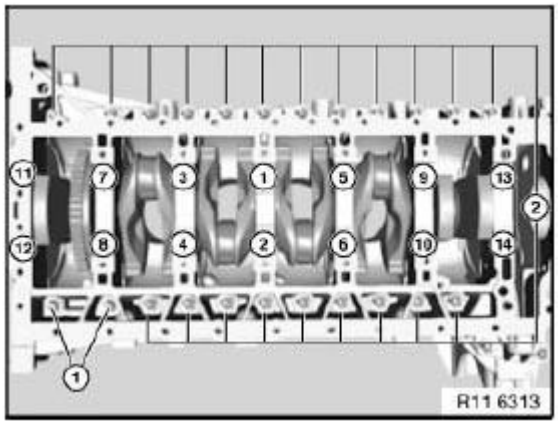


Fig. 110: Identifying Screws In Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1).

Tightening torque **11 11 3AZ** .

Installation:

Replace aluminum screws.

Lift out bedplate.

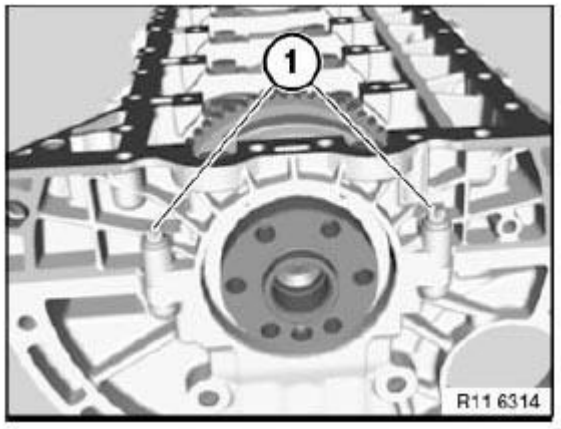


Fig. 111: Identifying Bolts Location
Courtesy of BMW OF NORTH AMERICA, INC.

Remove crankshaft (1) in direction of arrow.

IMPORTANT: Remove crankshaft with aid of a second person.
Weight of crankshaft approx. 25 kg.

Remove **BEARING SHELLS** (2) and guide bearing shell (3), replace if necessary.

Clean all sealing faces with special tool **11 4 470** .

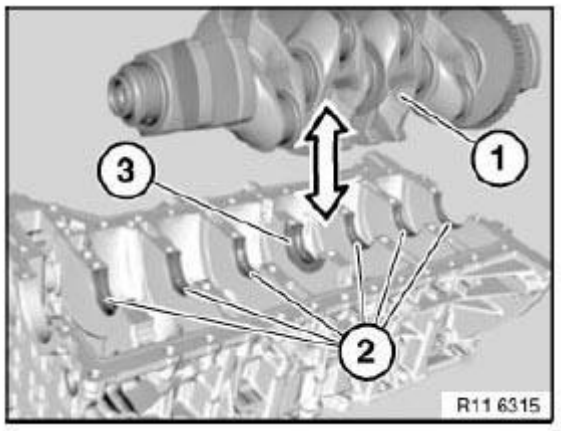


Fig. 112: Identifying Bearing Shell And Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Check adapter sleeves (1) for damage and secure seating; replace if necessary.

Install all **BEARING SHELLS**.

Installation:

Lubricate all bearing points with engine oil.

NOTE: Graphic shows N46.

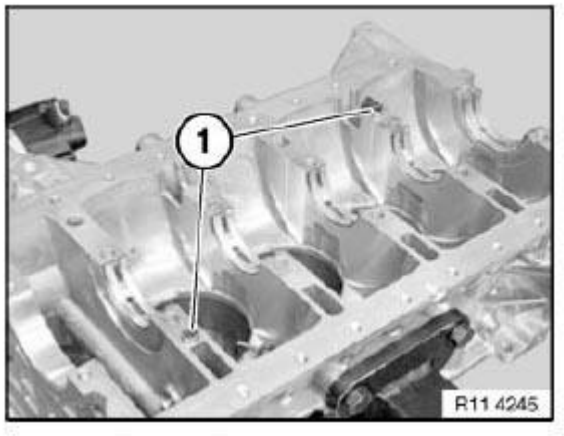


Fig. 113: Identifying Adapter Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Insert crankshaft (1).

IMPORTANT: Install crankshaft with aid of a second person.
Weight of crankshaft approx. 25 kg.

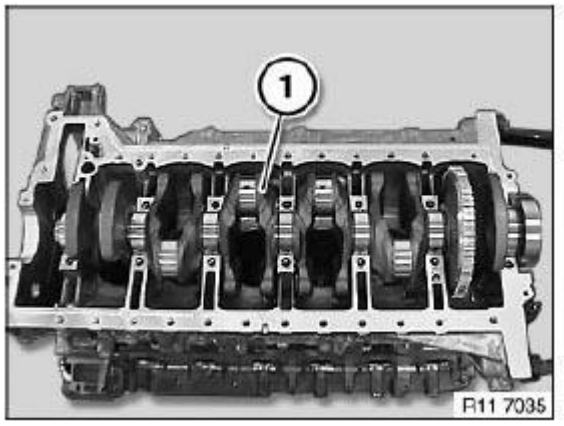


Fig. 114: Identifying Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

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

Tightening torque **11 11 1AZ** .

Tighten screws (2) from inside outwards.

Tightening torque **11 11 2AZ** .

Tighten screws (1).

Tightening torque **11 11 4AZ** .

Installation:

Replace aluminum screws.

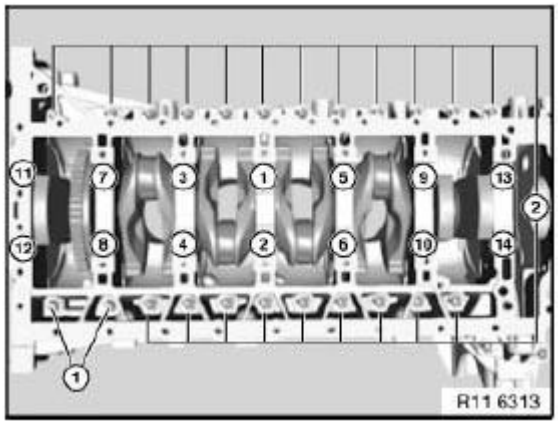


Fig. 115: Identifying Screws In Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

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.

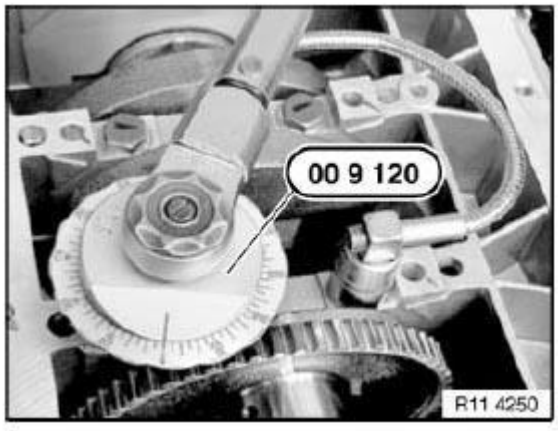


Fig. 116: Identifying Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Set up stand with magnetic foot (1) on special tool **11 4 440** .

Set up special tool **00 2 510** on stand.

Position special tool **00 2 510** on crankshaft.

Move crankshaft in direction of arrow.

Determine **BEARING PLAY** .

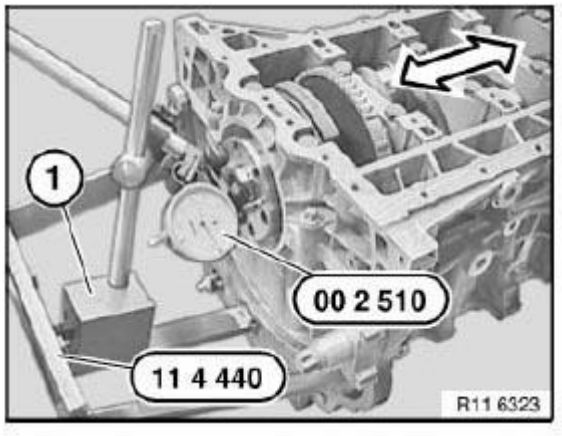


Fig. 117: Setting Up Stand With Magnetic Foot On Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

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

Installation:

Always replace nozzles (1).

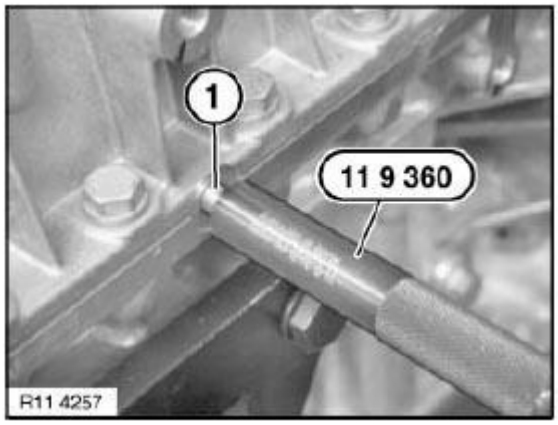


Fig. 118: Identifying Nozzles With Special Tool 11 9 360
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Prepare sealing compound (1) in special tool **11 4 370** .

Screw on nozzle (2) for injecting sealing compound.

Slowly insert sealing compound (1) with special tool **11 4 370** in direction of arrow.

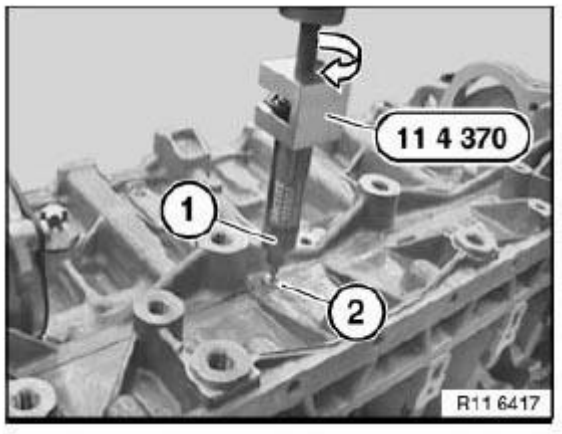


Fig. 119: Inserting Sealing Compound With Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Replace **CRANKSHAFT RADIAL SEAL** at front.

Replace **CRANKSHAFT RADIAL SEAL** (transmission side).

Assemble engine.

11 21 531 REPLACING ALL MAIN CRANKSHAFT BEARING SHELLS (N52K)

Special tools required:

- **00 2 590**
- **11 4 251**
- **11 4 252**
- **11 4 470**

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released.
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of

damage) .

Necessary preliminary tasks:

- Remove **CRANKSHAFT**

Checking position of oil spray nozzles:

Insert special tool **11 4 251** in screw connection of main bearing.

NOTE: Special tool 11 4 252 must be pre-installed at the seventh main bearing.

Check position of oil spray nozzle (2) according to position (1) on special tool **11 4 251** .

If necessary, adjust and secure oil spray nozzle (2).

Tightening torque **11 11 5AZ** .

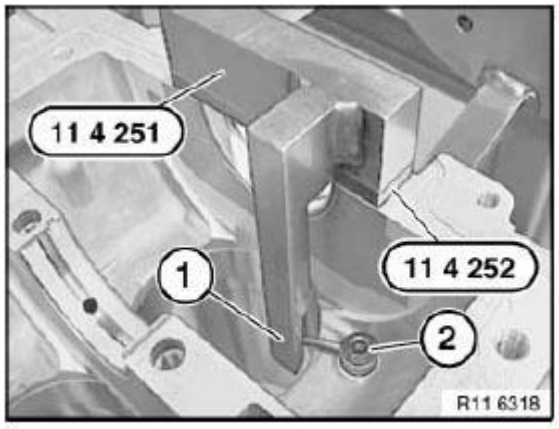


Fig. 120: Identifying Oil Spray Nozzle And Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bearing shells (2) and guide bearing shell (3).

NOTE: Guide bearing shell (3) is a thrust bearing.
Observe bearing classification. See ENGINE BLOCK and CRANKSHAFT WITH BEARING .

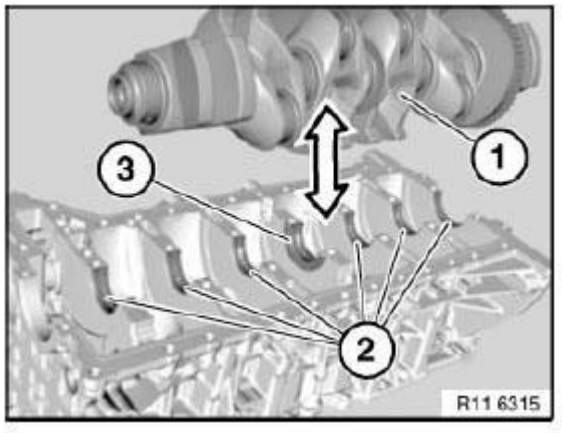


Fig. 121: Identifying Bearing Shell And Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Bearing shell (1) with lubricant groove must be fitted in crankcase.

Bearing shell (2) without lubricant groove must be fitted in bedplate.

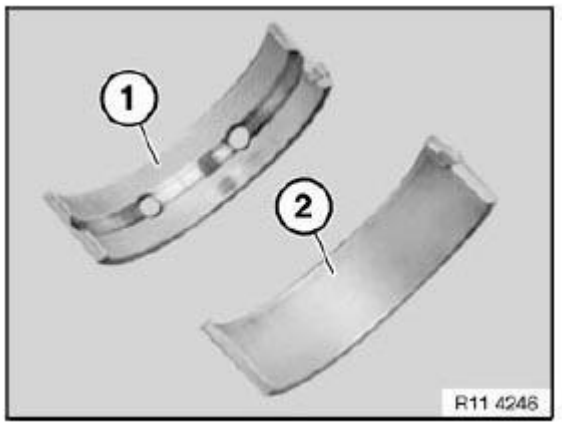


Fig. 122: Identifying Bearing Shell
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Allocation of bearing points: Bearing point 1 is at the front on the timing chain drive in the direction of travel.

Surface (1) for identification on crankshaft web 1.

Seven-digit part number (2).

Bearing classification (3) on bedplate.

NOTE: Code letters (4 and 5) are exclusively required for a machined crankshaft. Code letter (4) as per table, main bearing. B= build date 1 (B 1 2 3 -0.25 mm). B= build date 2 (C 1 2 3 -0.50 mm). Code letter (5) as per table, lift bearing. B= construction stage 1 (-0.25mm). C = construction stage 2 (-0.50 mm)

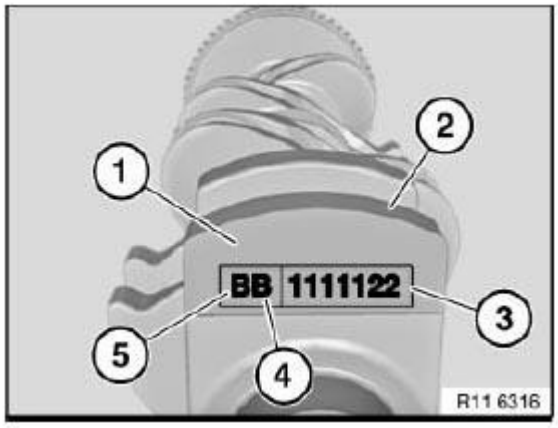


Fig. 123: Identifying Seven-Digit Part Number And Bearing Classification
Courtesy of BMW OF NORTH AMERICA, INC.

Bearing classification (1) on crankcase.

Installation:

When all the letters and number code have been determined, the color of the bearing shells must be allocated (see table).

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.

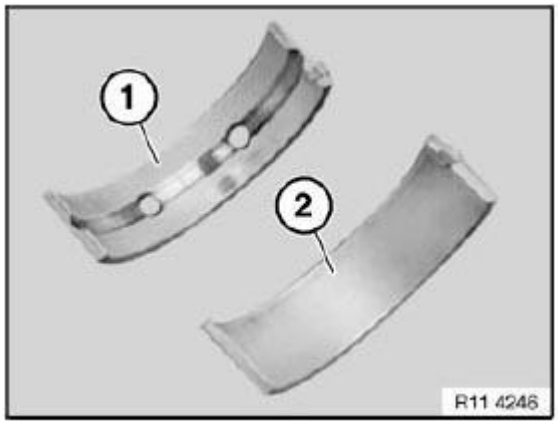


Fig. 124: Identifying Bearing Shell
Courtesy of BMW OF NORTH AMERICA, INC.

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.

Installation example:

For bearing 1 with code letter **A** on the **crankcase** and code number **1** on the **crankshaft** bearing shell (1) with the color **Yellow** is required for the **crankcase** and bearing shell (2) with the color **Yellow** for the **crankcase lower half** (bedplate).

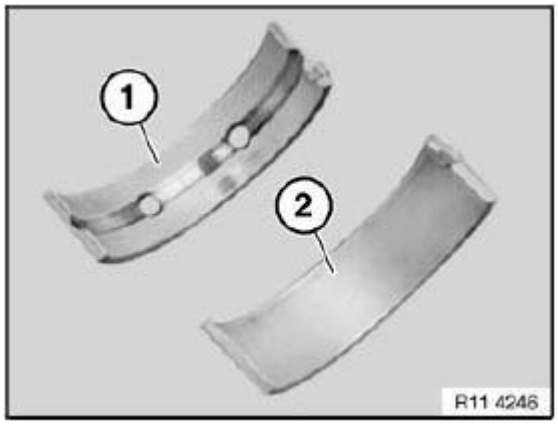


Fig. 125: Identifying Bearing Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Bearing 2: **A** and **2** colors Yellow and Green.

Bearing 3: **B** and **2** colors Green and Green.

Bearing 4: **C** and **2** colors Red and Green.

Bearing 5: **B** and **1** colors Green and Yellow.

Bearing 6: **C** and **3** colors Red and Red.

Bearing 7: **C** and **1** colors Green and Green.

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

IMPORTANT: Excessively small bearing play will result in engine damage. The color combination Yellow and Red must not be fitted. Possible color combinations (see table).

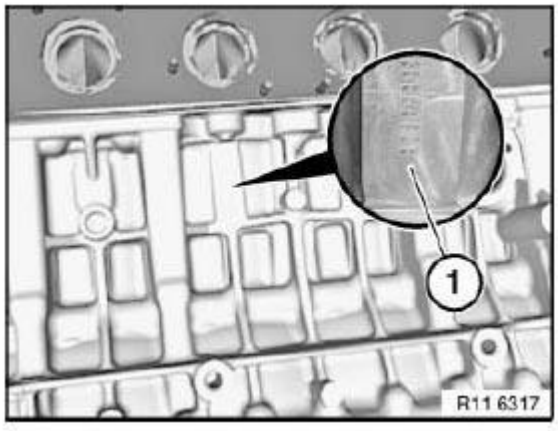


Fig. 126: Identifying Bearing Classification
Courtesy of BMW OF NORTH AMERICA, INC.

CRANKCASE INSTALLATION COLOR REFERENCE CHART

(A 1) Crankcase/Yellow	**(B 1) Crankcase/Green**	**(C 1) Crankcase/Green**
(A 1) Crankcase lower half/**Yellow**	**(B 1)** Crankcase lower half/**Yellow**	**(C 1)** Crankcase lower half/**Green**
(A 2) Crankcase/**Yellow**	**(B 2)** Crankcase/**Green**	**(C 2)** Crankcase/**Red**
(A 2) Crankcase lower half/**Green**	**(B 2)** Crankcase lower half/**Green**	**(C 2)** Crankcase lower half/**Green**
(A 3) Crankcase/**Green**	**(B 3)** Crankcase/**Green**	**(C 3)** Crankcase/**Red**
(A 3) Crankcase lower half/**Green**	**(B 3)** Crankcase lower half/**Red**	**(C 3)** Crankcase lower half/**Red**

Install bearing shells (2) and guide bearing shell (3).

Installation:

Clean all sealing surfaces.

IMPORTANT: Do not use any metal-cutting tools.

Clean sealing faces with special tool **11 4 470** only.

Determine bearing play with special tool **00 2 590** .

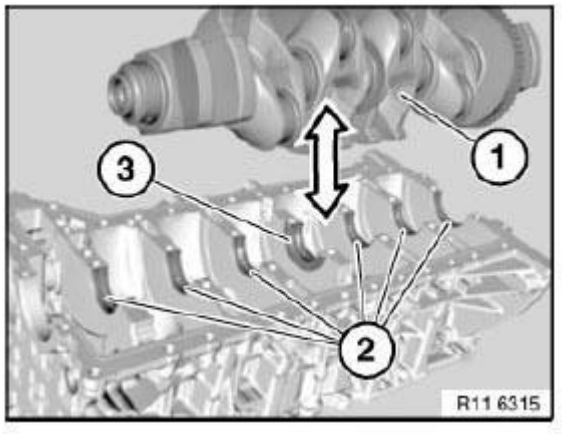


Fig. 127: Identifying Bearing Shell And Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

All measuring points must be clean and free from oil and grease. If necessary, clean all measuring points.

Use the existing screws to determine the bearing play. Set up **BEDPLATE** with bearing shells.

Remove bedplate.

Read off bearing play at width of flattened plastic thread and measurement scale.

Installation:

Remove plastic thread.

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

Fig. 128: Checking Bearing Play Using Plastic Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

Install **BEDPLATE**.

Assemble engine.

11 21 571 REPLACING ROLLER BALL BEARING IN CRANKSHAFT (N52K)

Necessary preliminary tasks

- Remove **CLUTCH** .

Remove guide bearing with special tool 11 2 340.

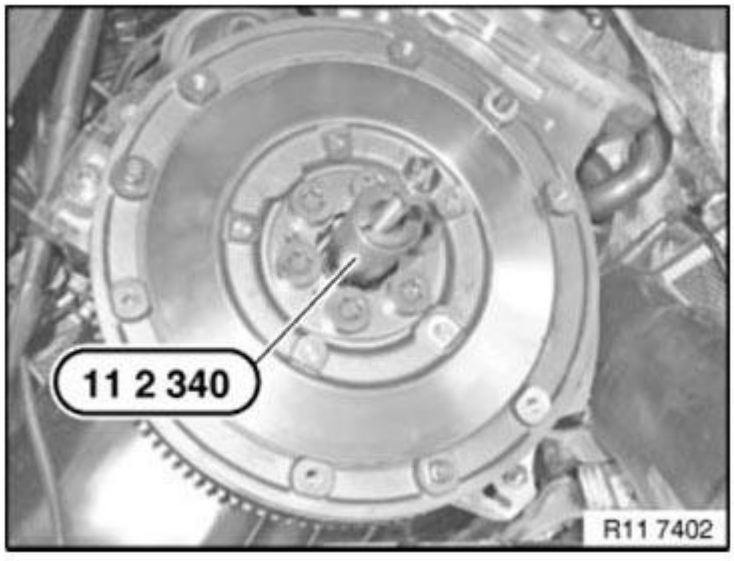


Fig. 129: Removing Guide Bearing Using Special Tool 11 2 340
Courtesy of BMW OF NORTH AMERICA, INC.

Install new thrust bearing and drive firmly home with special tool 11 2 350 in conjunction with special tool **00 5**

500 .

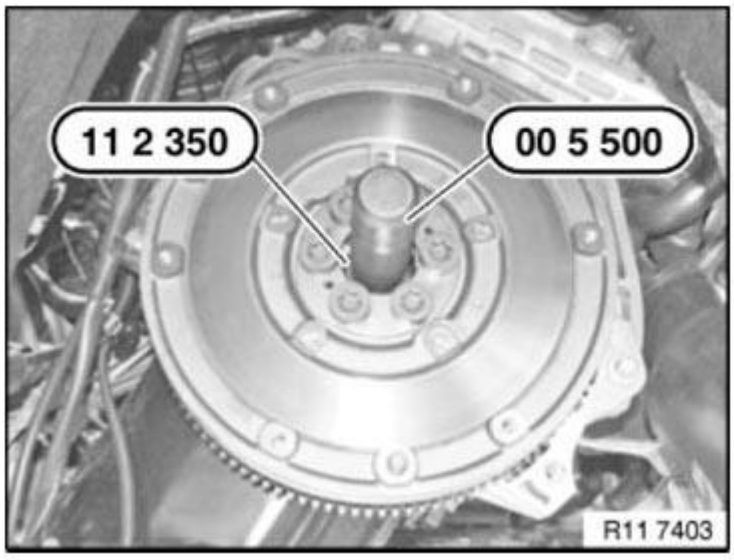


Fig. 130: Installing New Thrust Bearing Using Special Tool 11 2 350 And 00 5 500
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 21 505 SEALING THE CRANKCASE'S LOWER PART (N52K)

Notes

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are **released.**

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic.**

Risk of damage!

Joining torque and angle of rotation must be observed without fail.

IMPORTANT: Changed procedure.

It is not necessary to remove the cylinder head and the crankshaft.

Necessary preliminary tasks

- Remove **ENGINE**.
- Mount engine on **ASSEMBLY STAND**.
- Remove **CLUTCH** (if fitted).
- Remove left and right engine support arm
- Remove oil sump.

Release screws (1).

Pull out oil pump intake pipe (2).

Tightening torque, see: **13 OIL SUMP.**

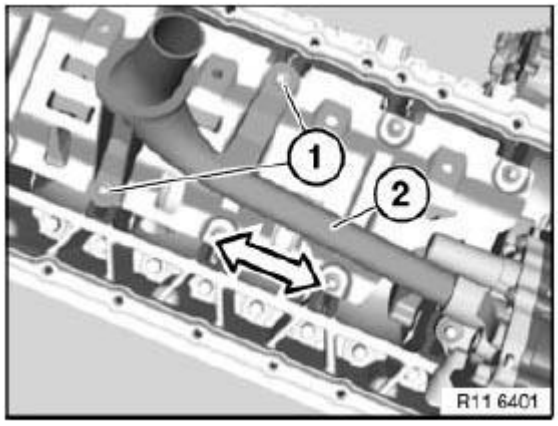


Fig. 131: Removing Intake Pipe
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: **11 13 6AZ** .

Installation:

Replace aluminum screws

Remove oil deflector (2).

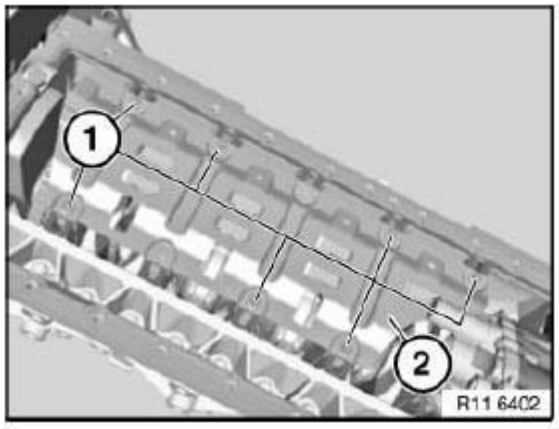


Fig. 132: Identifying Screws And Oil Deflector
Courtesy of BMW OF NORTH AMERICA, INC.

Secure oil pump sprocket with steel pin 6.0 mm (3) to oil pump.

IMPORTANT: Release central bolt (2) only together with steel pin 6.0 mm (3). Do not remove sprocket.

Release central bolt (2).

Tightening torque: **11 41 6AZ** .

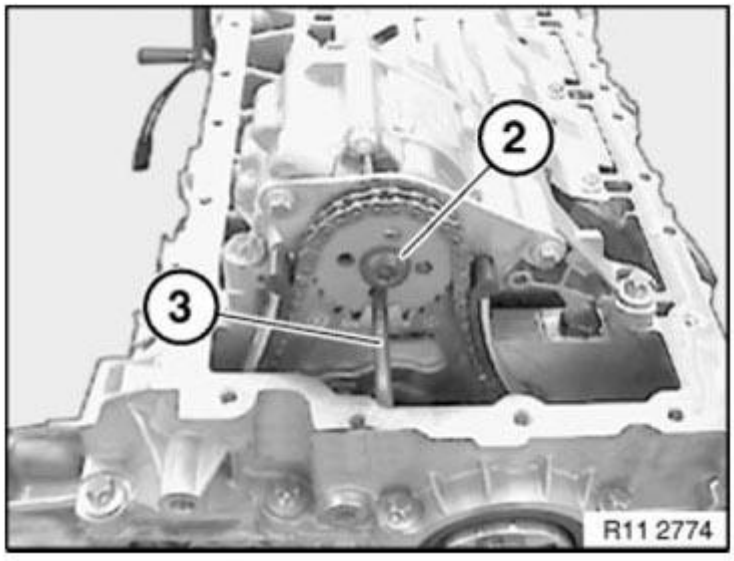


Fig. 133: Identifying Oil Deflector And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (2).

Tightening torque: **11 41 6AZ** .

Installation:

Replace aluminum screws

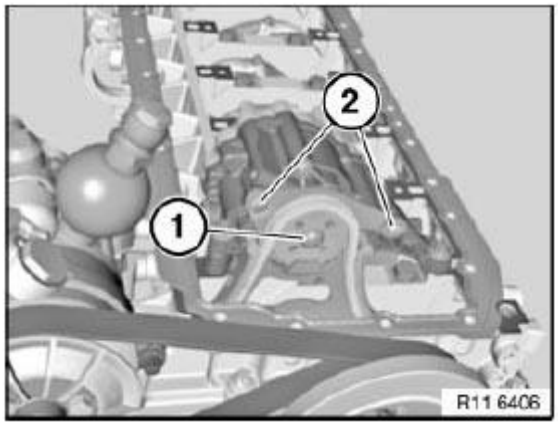


Fig. 134: Identifying Bolt And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove screw plug (1) from crankcase at front.

NOTE: Replace gasket.

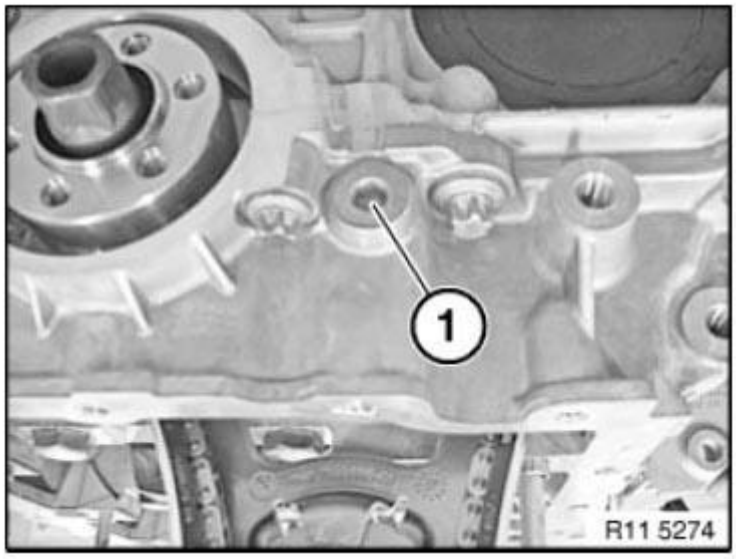


Fig. 135: Identifying Screw Plug
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

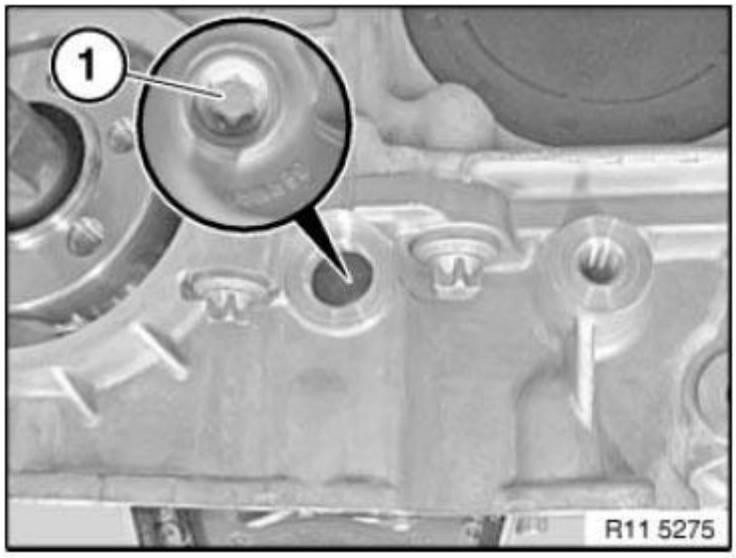


Fig. 136: Identifying Oil Pump Triangular Drive Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Version 1

IMPORTANT: Observe different screw lengths.

Release screws (1).

Tightening torque **11 41 2AZ** .

Tightening torque **11 41 3AZ** .

Installation:

Replace aluminum screws

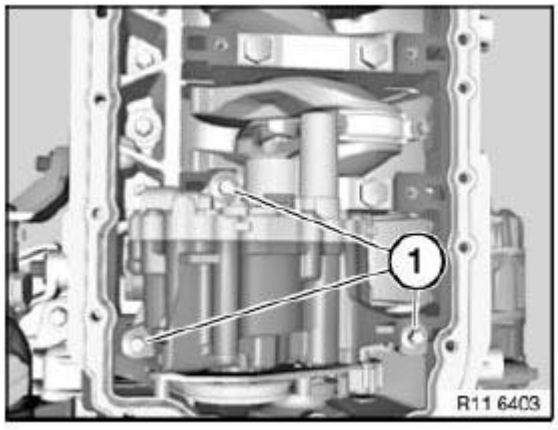


Fig. 137: Identifying Screws

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:

Replace aluminum screws

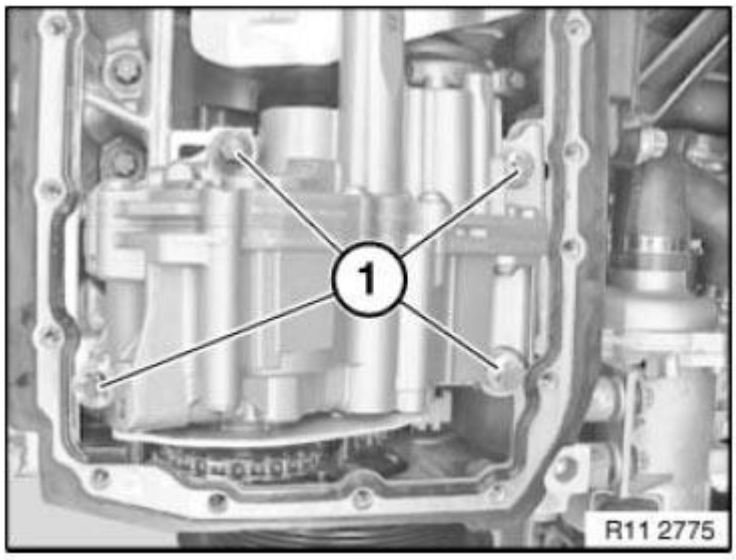


Fig. 138: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

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.

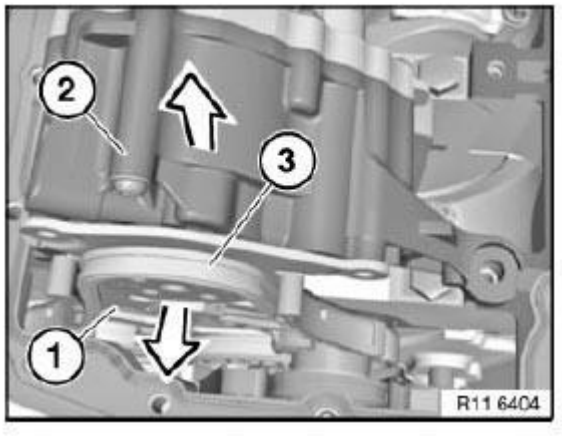


Fig. 139: Pulling Drive Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check spacer bushings (1) for secure seating and damage; replace if necessary.

Align twin surface (3) on oil pump (2) to sprocket wheel.

Install oil pump (2).

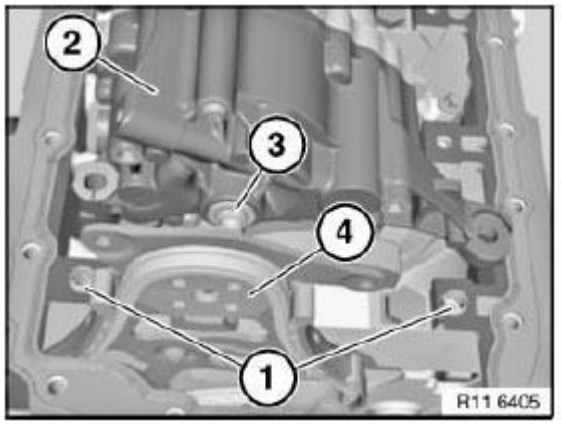


Fig. 140: Identifying Spacer Bushings And Oil Pump
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The special tool bore for the TDC position is located on the inlet side underneath the starter motor.

Rotate engine at central bolt and secure flywheel in position with special tool **11 0 300** .

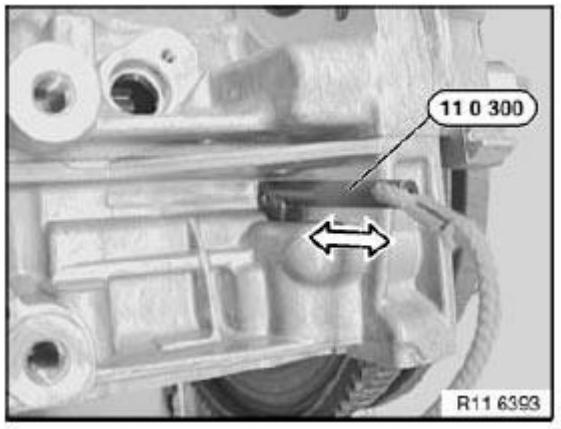


Fig. 141: Securing Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

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)

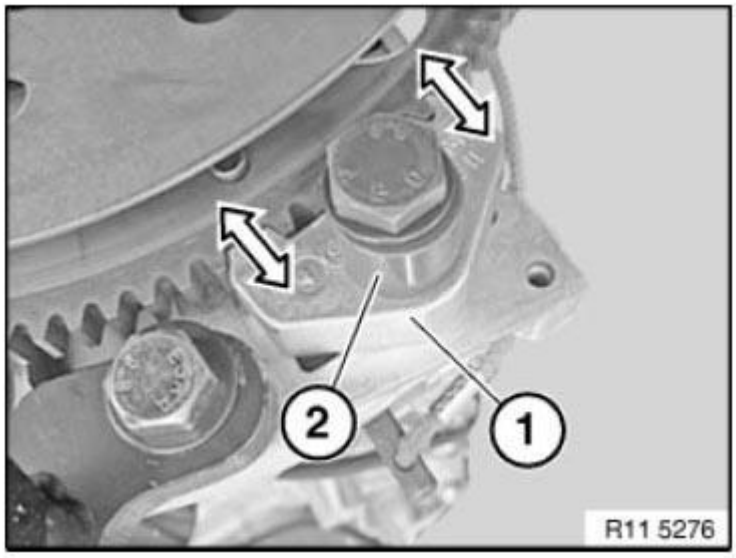


Fig. 142: Securing Flywheel Using Special Tool 11 9 260/11 9 266
Courtesy of BMW OF NORTH AMERICA, INC.

Automatic transmission

Release flywheel bolts (1).

Release special tool (2).

Remove flywheel (3).

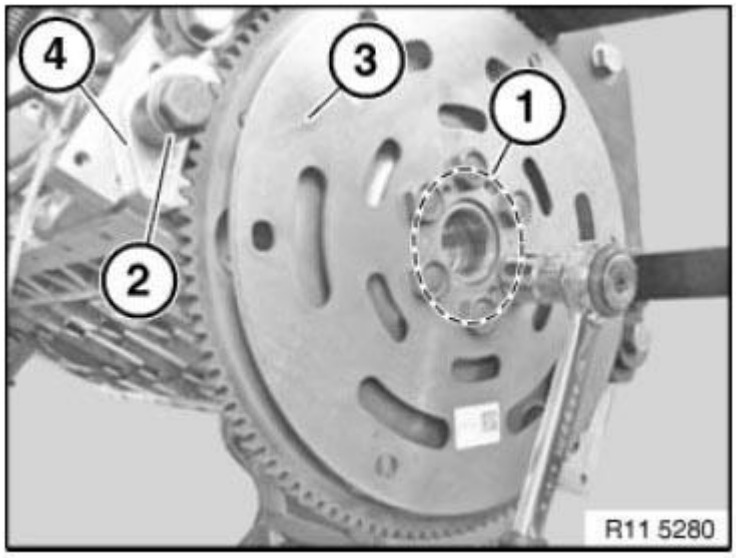


Fig. 143: Identifying Flywheel With Bolts And Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Manual gearbox

IMPORTANT: Position crankshaft at TDC.

Remove dual-mass flywheel.

Secure flywheel with special tool 11 9 260 .

Remove VIBRATION DAMPER .

Release flywheel bolts with special tool 11 4 180 .

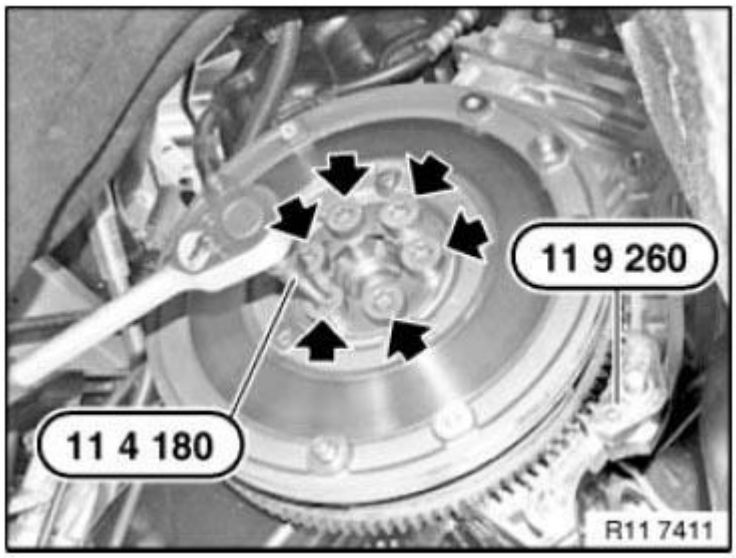


Fig. 144: Removing Flywheel Bolts Using Special Tool 11 4 180
Courtesy of BMW OF NORTH AMERICA, INC.

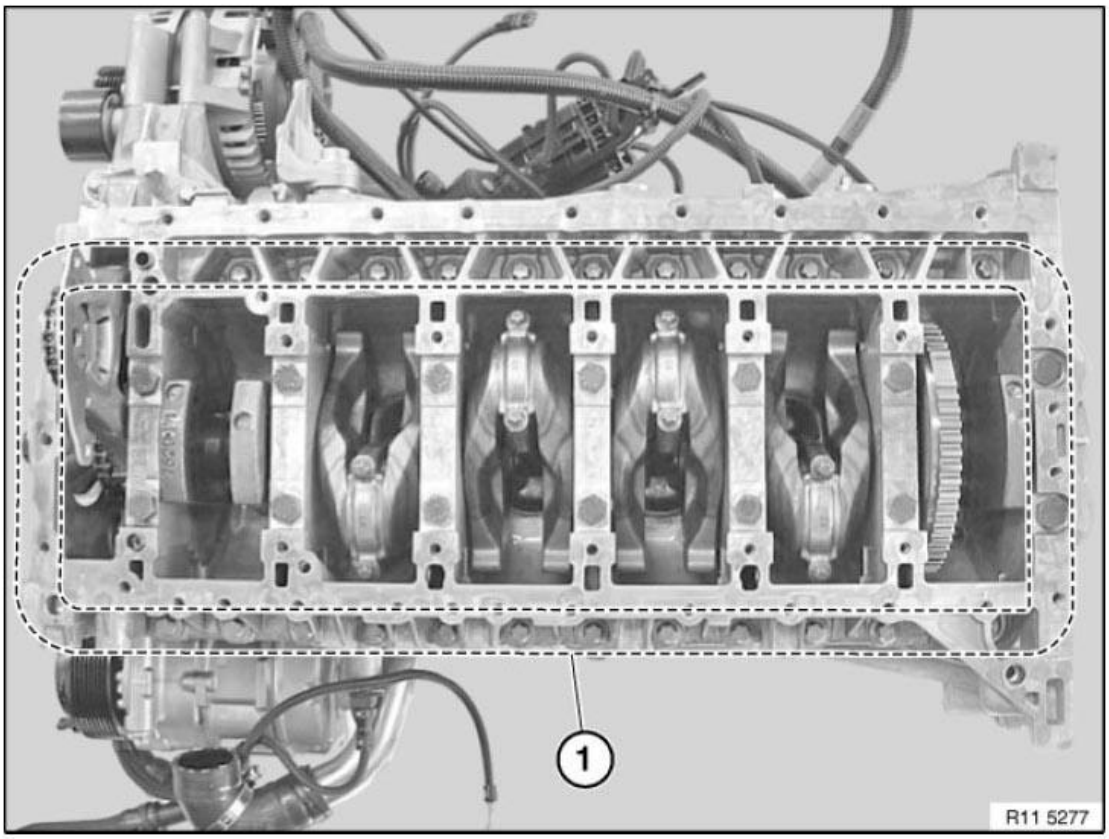


Fig. 145: Identifying Crankshaft Bolt Mounting Area
Courtesy of BMW OF NORTH AMERICA, INC.

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

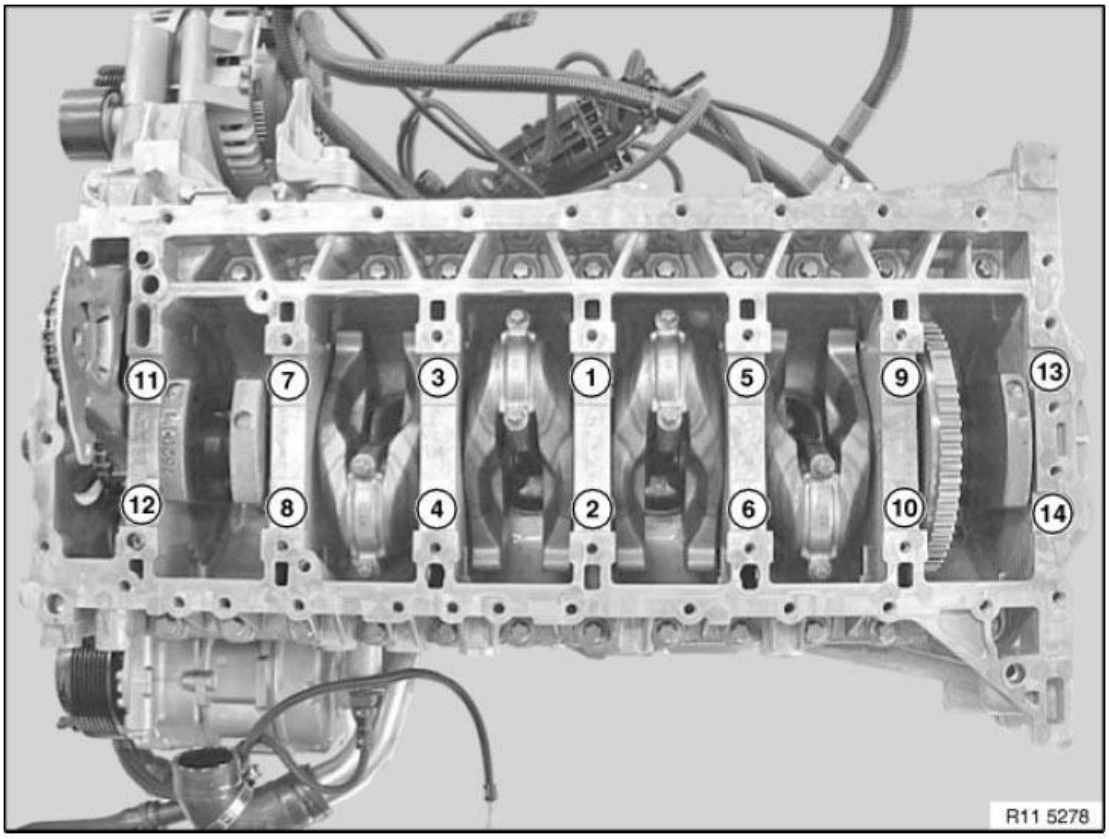


Fig. 146: Identifying Crankshaft Bolt Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

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).

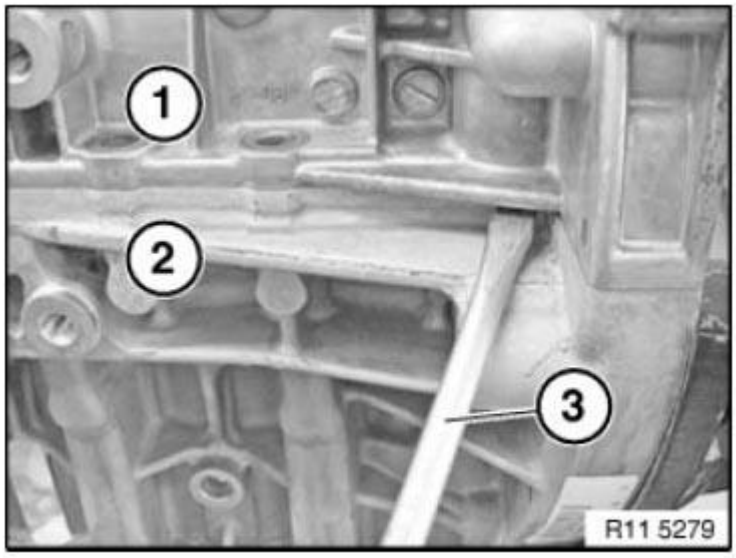


Fig. 147: Removing Crankshaft (Lower Section And Upper Section) Using Tool
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Timing chain is pre-tensioned.
Do not raise crankshaft.

Carefully remove radial shaft seal (1).

Catch escaping engine oil with a cloth (2).

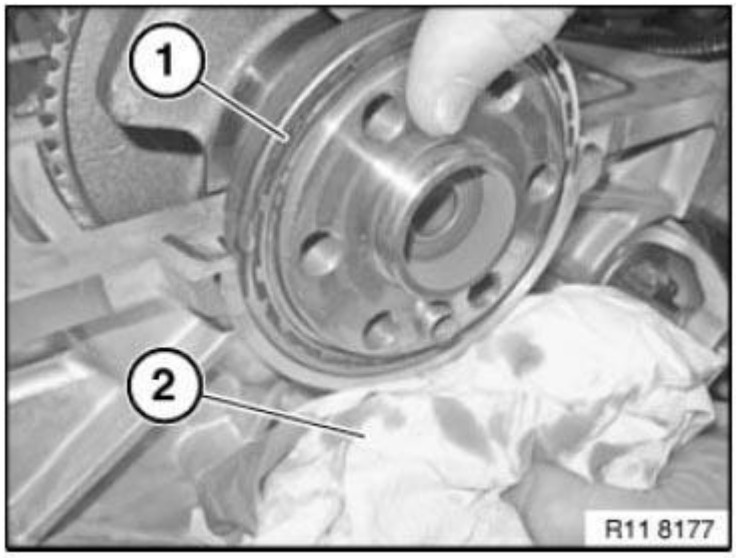


Fig. 148: Removing Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully remove radial shaft seal (1) towards front.

Catch escaping engine oil with a cloth (2).

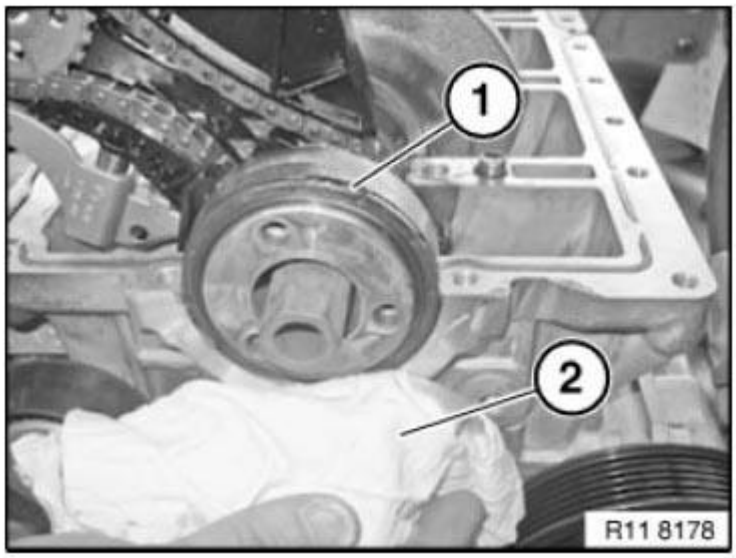


Fig. 149: Catching Escaping Engine Oil Using Cloth
Courtesy of BMW OF NORTH AMERICA, INC.

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

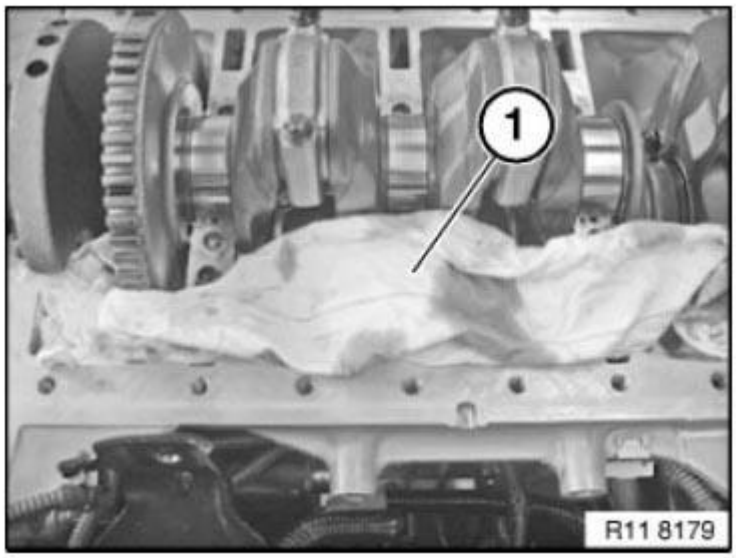


Fig. 150: Protecting Crankcase Against Sealant Residues Using Cloth
Courtesy of BMW OF NORTH AMERICA, INC.

Remove sealant residues (1) with special tool **11 4 470** .

Remove injector nozzles (2) for liquid sealing compound on left and right.

Installation:

Replace injector nozzles (2).

Clean all threads with compressed air.

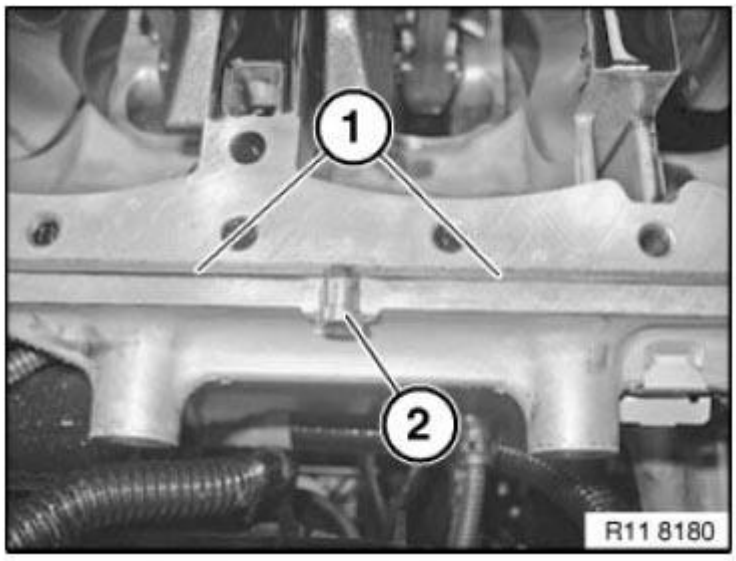


Fig. 151: Identifying Injector Nozzle And Sealant Residue
Courtesy of BMW OF NORTH AMERICA, INC.

Position crankcase lower section (1) on crankcase upper section.

Screw in all M10 crankcase bolts.

Joint all M10 crankcase bolts (1) from inside outwards.

Tightening torque: 20 Nm

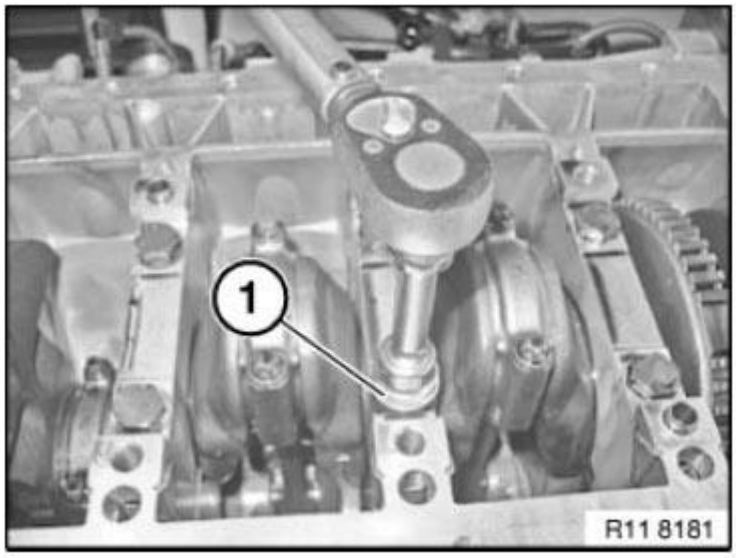


Fig. 152: Screwing In All M10 Crankcase Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

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

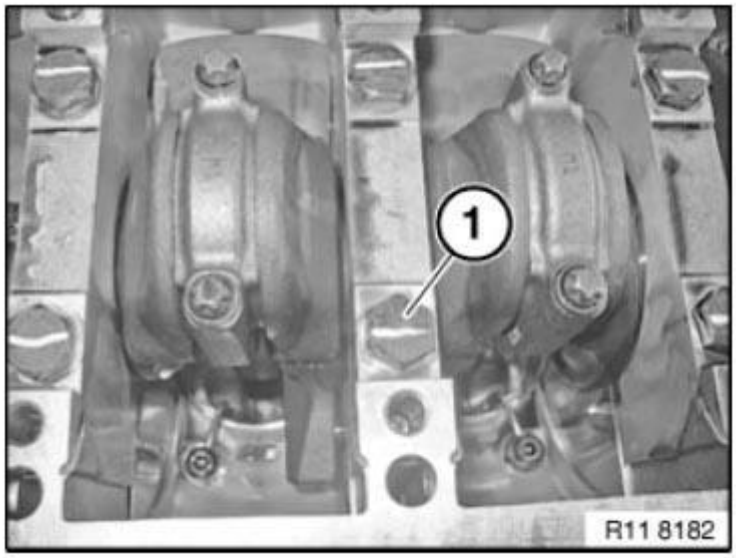


Fig. 153: Identify M10 Crankcase Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

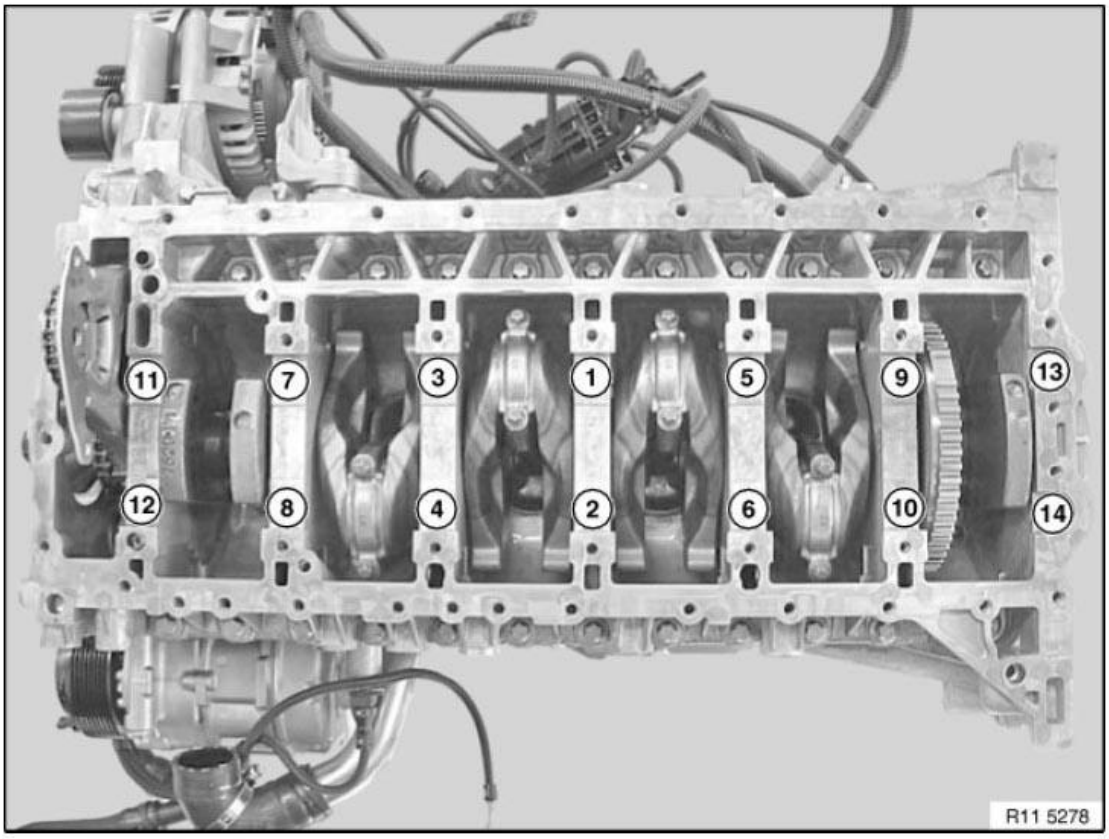


Fig. 154: Identifying Crankcase Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

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

Tightening torque: **11 11 1AZ**

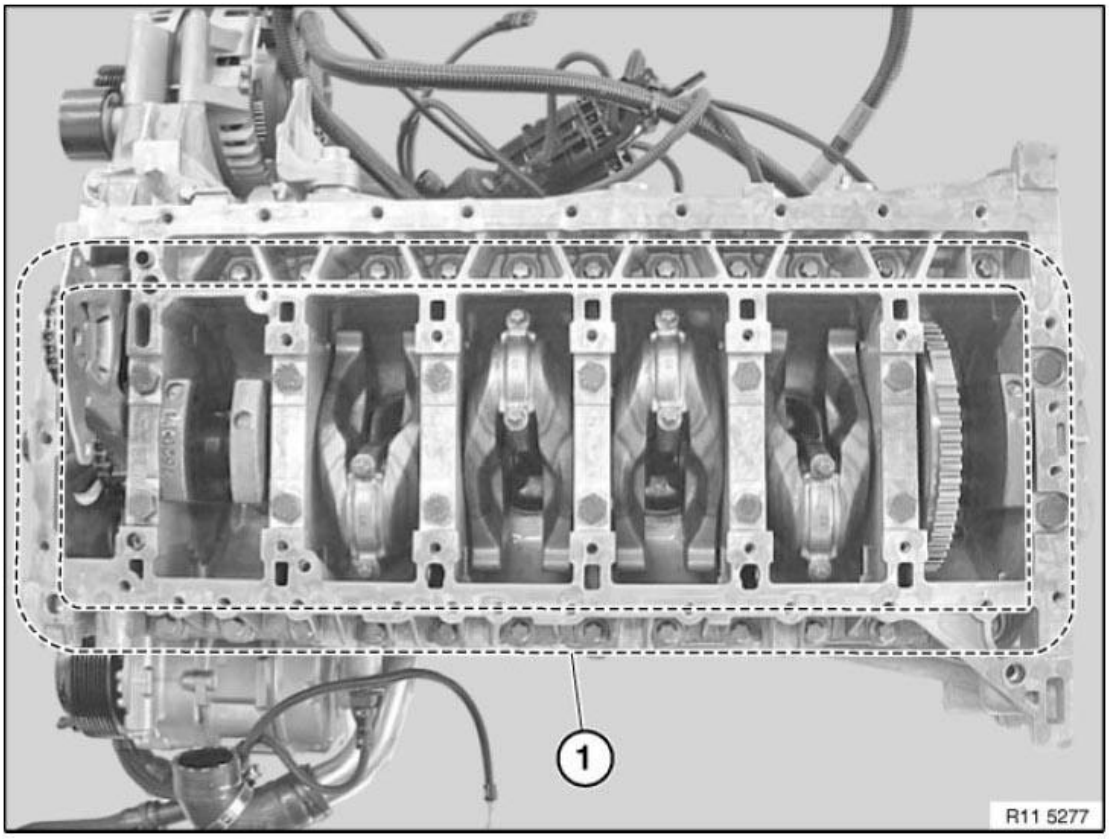


Fig. 155: Identifying Crankcase Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Insert all crankcase bolts (1).

IMPORTANT: Observe different lengths and sizes of the bolts.

Tightening torque: **11 11 2AZ / 3AZ / 4AZ**

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

NOTE: Replace screw.

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

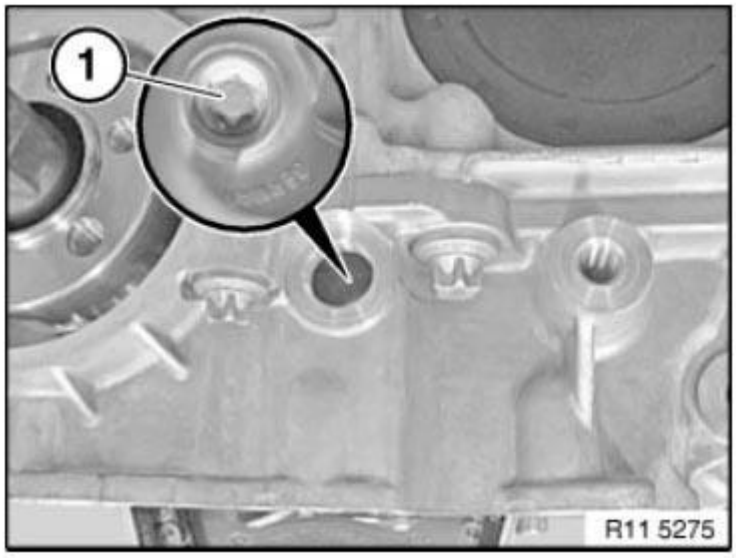


Fig. 156: Identifying Oil Pump Triangular Drive Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten screw plug on front of crankcase.

Tightening torque: **11 11 8AZ**

Installation:

Replace sealing ring.

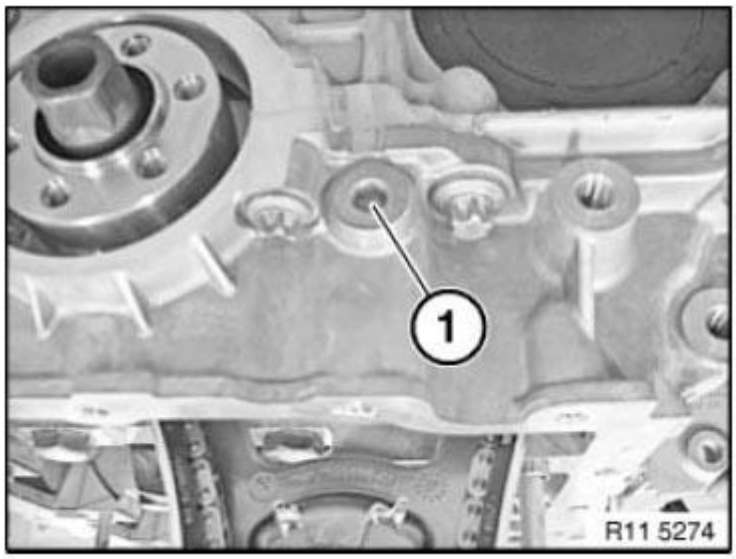


Fig. 157: Identifying Screw Plug On Crankcase
Courtesy of BMW OF NORTH AMERICA, INC.

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

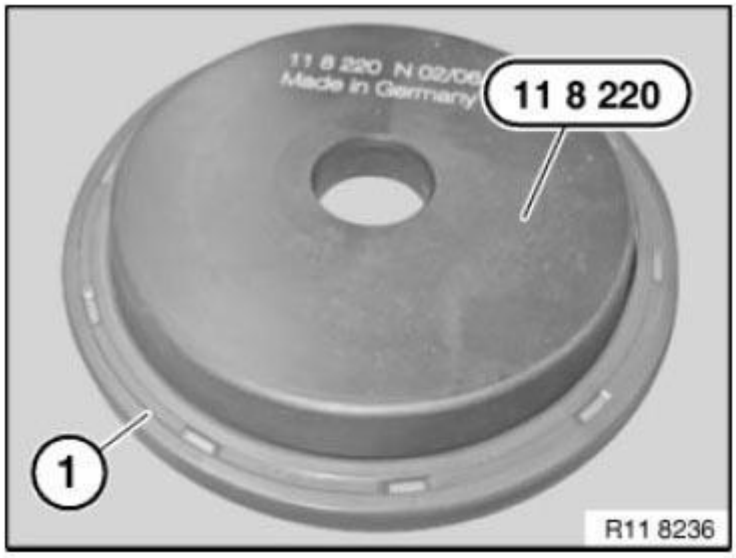


Fig. 158: Identifying Radial Shaft Seal On Special Tool 11 8 220
Courtesy of BMW OF NORTH AMERICA, INC.

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

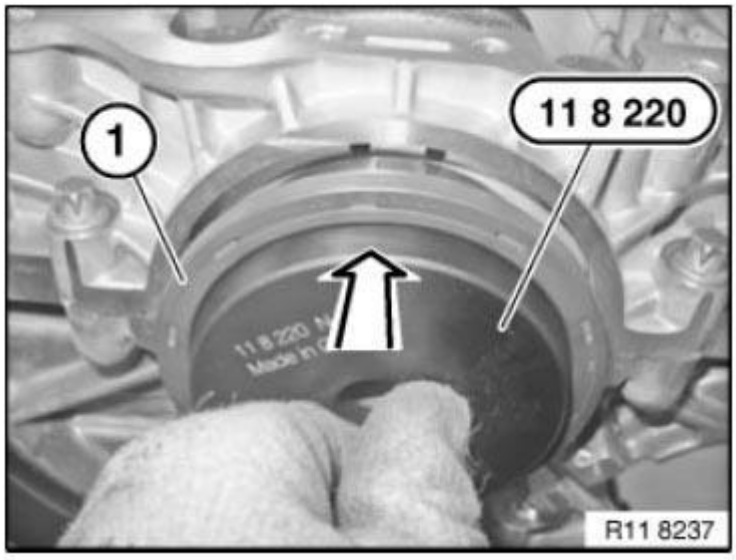


Fig. 159: Positioning Radial Shaft Seal Using Special Tool 11 8 220 On Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

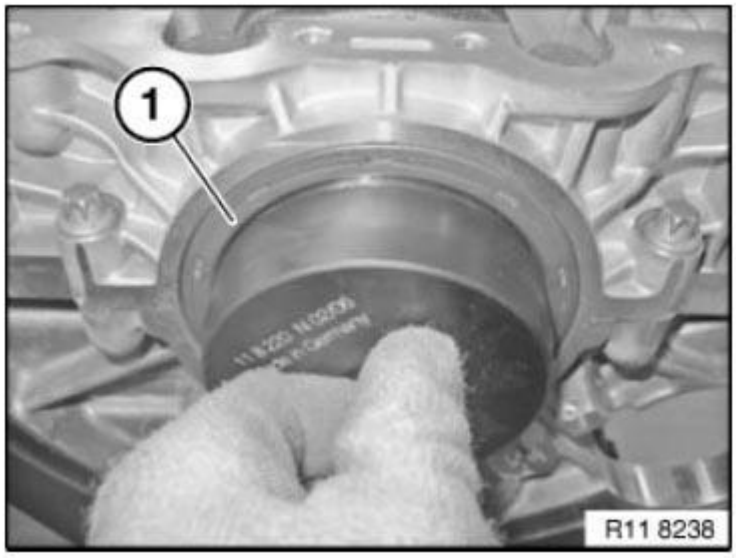


Fig. 160: Moving Radial Shaft Seal Parallel Up Against Crankcase
Courtesy of BMW OF NORTH AMERICA, INC.

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

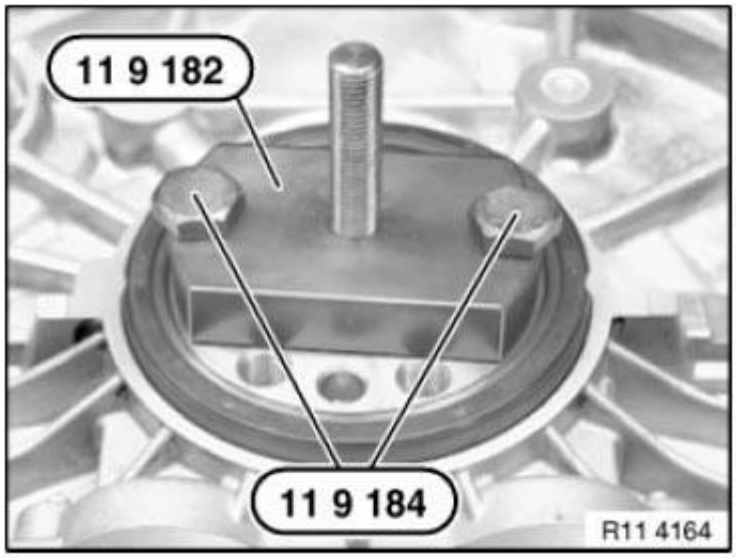


Fig. 161: Screwing Special Tool 11 9 182 With Screws (Special Tool 11 9 184) To Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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

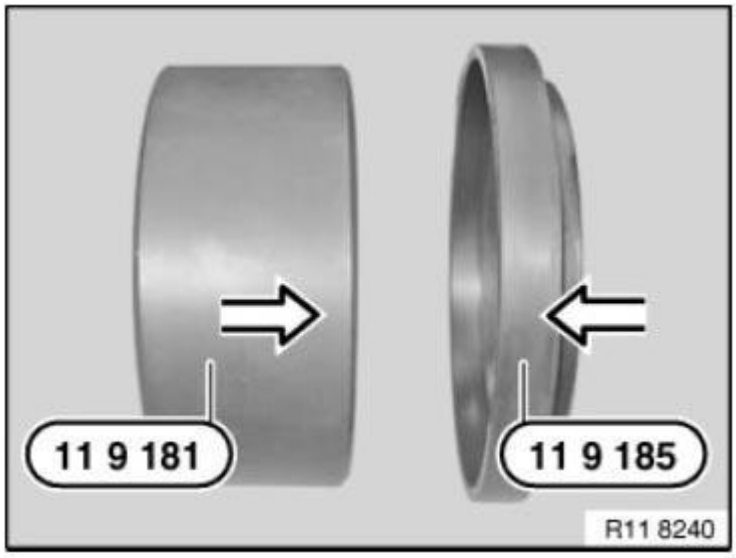


Fig. 162: Connecting Special Tool 11 9 185 Onto Special Tool 11 8 181
Courtesy of BMW OF NORTH AMERICA, INC.

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

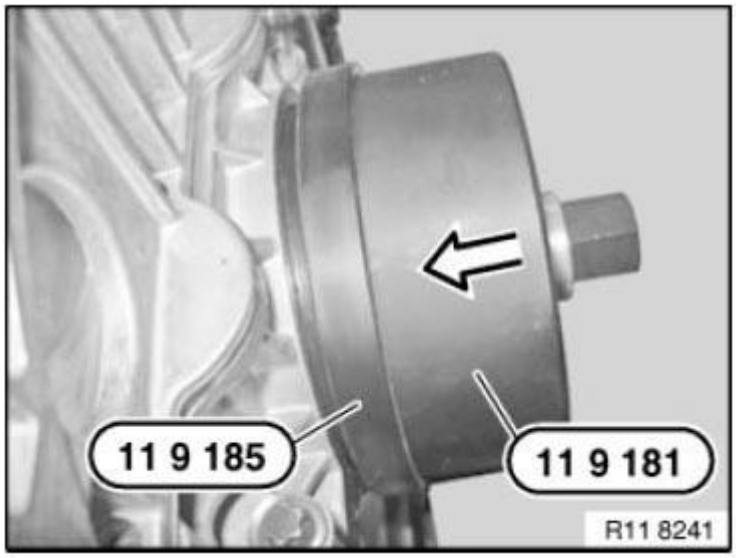


Fig. 163: Pulling Radial Shaft Seal Using Special Tool 11 9 181/11 9 185/11 9 183
Courtesy of BMW OF NORTH AMERICA, INC.

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

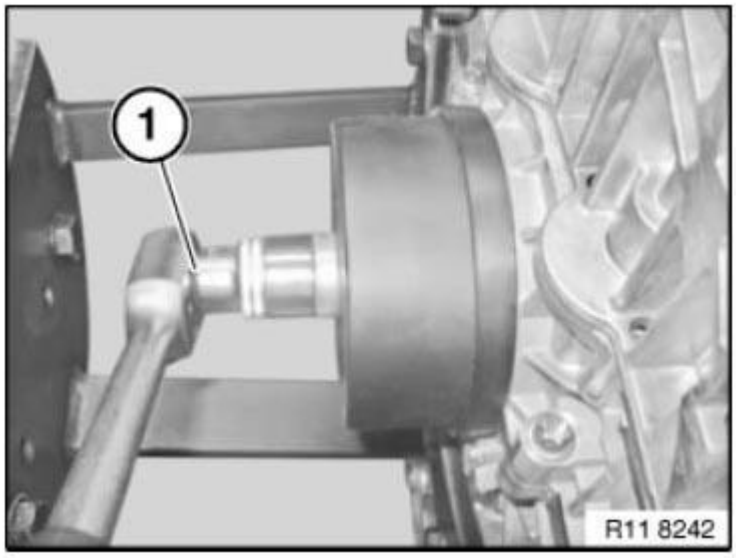


Fig. 164: Screwing On Radial Shaft Seal Using Special Tool 11 9 183
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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

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

NOTE: Graphic N42.

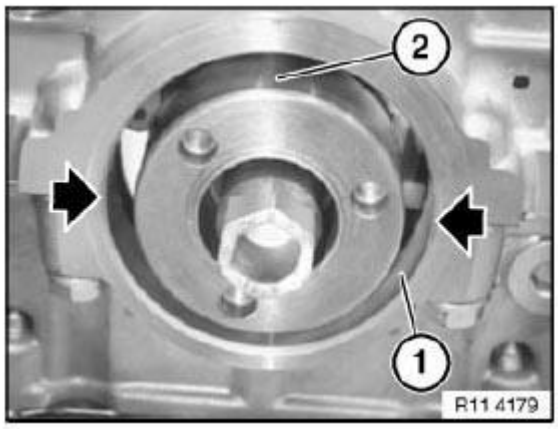


Fig. 165: Identifying Sealing Surface And Running Surface For Crankshaft Radial Seal
Courtesy of BMW OF NORTH AMERICA, INC.

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

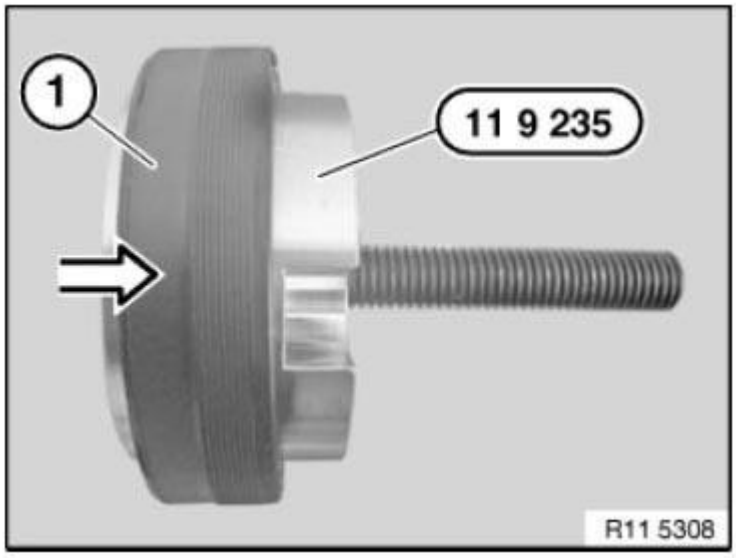


Fig. 166: Pushing Radial Shaft Seal (11 9 235) On Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: 11 9 235Special tool can only be fastened with 2 opposite bolts.
Determine hole pattern on special tool.

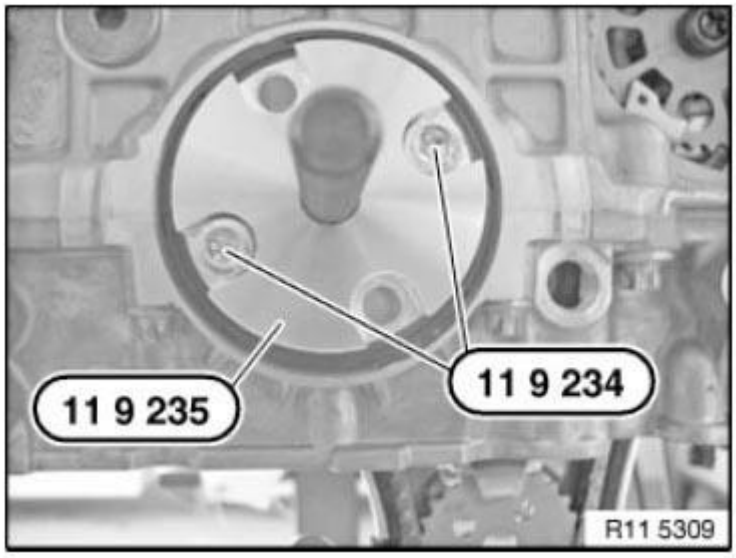


Fig. 167: Mounting Special Tool 11 9 235 With Special Tool 11 9 234 On Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 9 235 with special tool 11 9 234 on crankshaft.

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.

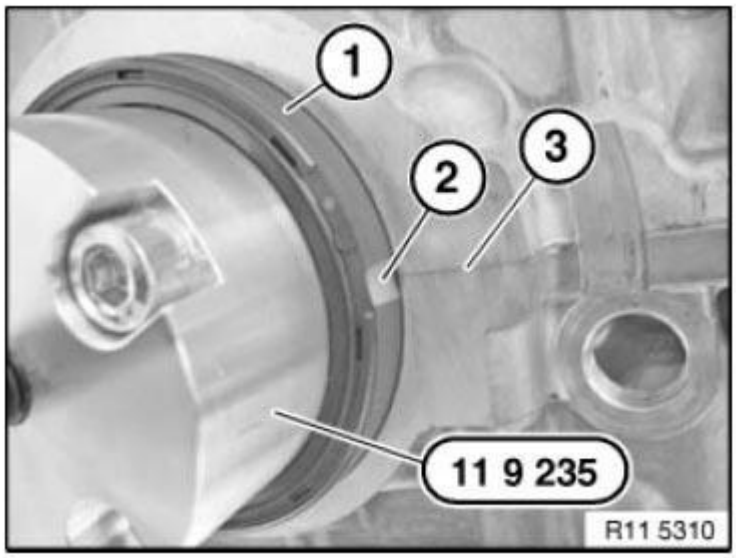


Fig. 168: Identifying Radial Shaft Seal, Housing Partition And Groove
Courtesy of BMW OF NORTH AMERICA, INC.

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

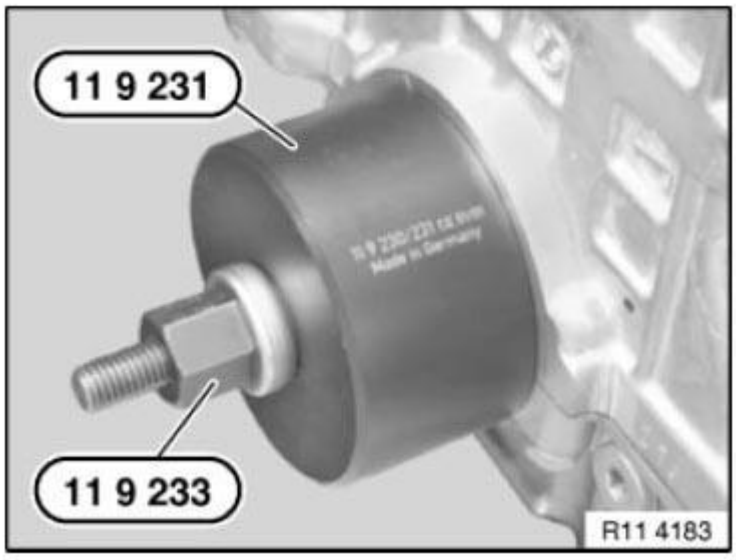


Fig. 169: Inserting Radial Seal With Special Tool 11 9 231 And 11 9 233
Courtesy of BMW OF NORTH AMERICA, INC.

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

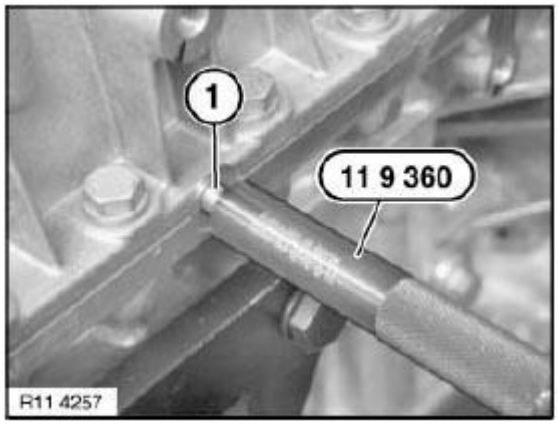


Fig. 170: Inserting Nozzles Using Special Tool 11 9 360
Courtesy of BMW OF NORTH AMERICA, INC.

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.

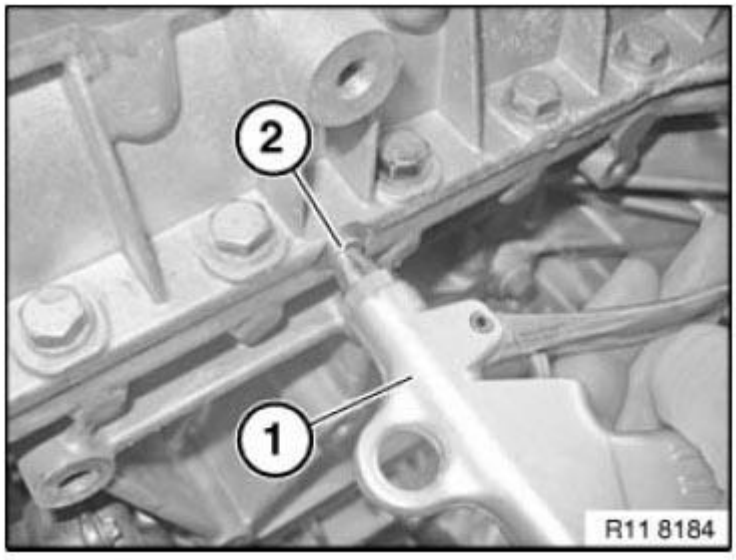


Fig. 171: Blowing Compressed Air Into Injector Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Use PRIMER 1.3 AND LIQUID SEAL 1.4.

Prepare liquid sealing compound (1) in special tool **11 4 370** .

Injector nozzles for injecting sealing compound are not required.

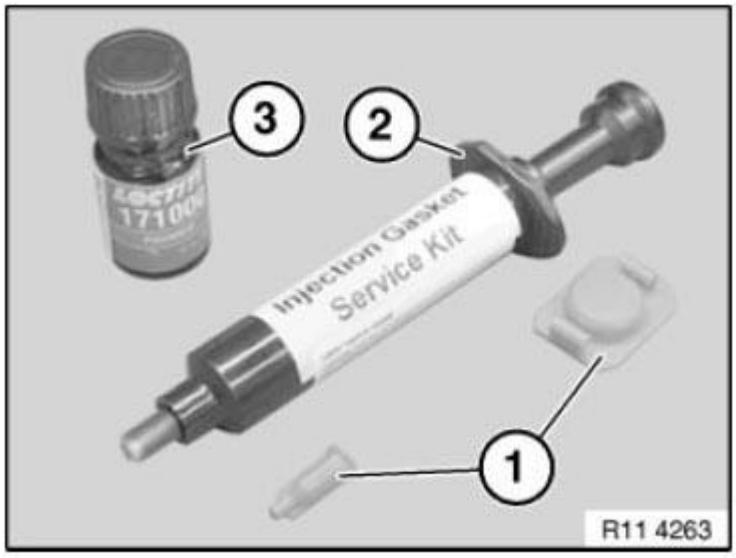


Fig. 172: Identifying Injector With Primer Bottle
Courtesy of BMW OF NORTH AMERICA, INC.

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

Liquid sealing compound must emerge at radial shaft seals at front and rear.

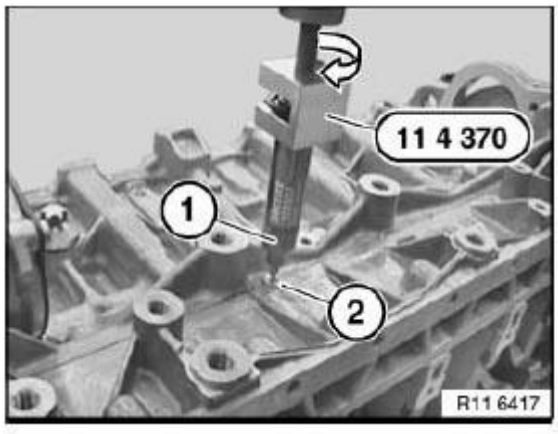


Fig. 173: Inserting Liquid Sealing Compound Using Special Tool 11 4 370
Courtesy of BMW OF NORTH AMERICA, INC.

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

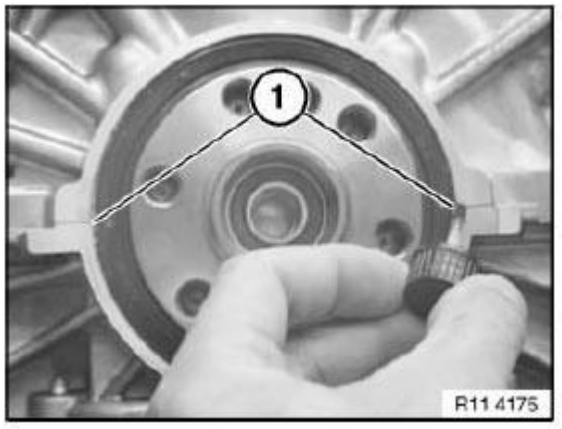


Fig. 174: Coating Surface Of Sealing Compound In Both Grooves Using Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

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

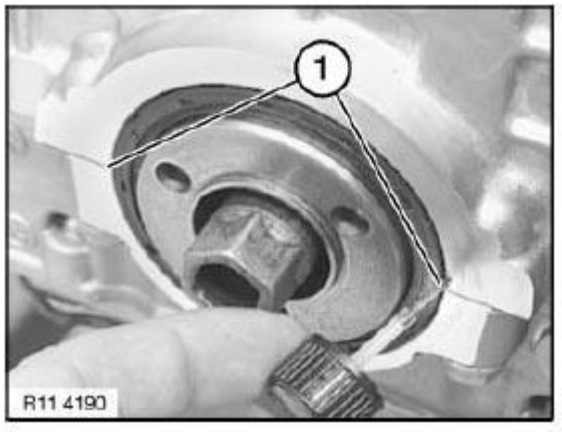


Fig. 175: Sealing Escaping Liquid Gasket With Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

22 FLYWHEEL

11 22 500 REMOVING AND INSTALLING/REPLACING FLYWHEEL (N52K)

Special tools required:

- **11 4 180**
- **11 9 260**
- **11 9 265**

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released.
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **TRANSMISSION**
- Remove **CLUTCH**

For vehicles with optional extra SA205 (automatic transmission):

Secure flywheel (1) with existing transmission bolt (2) and special tool **11 9 260** .

Installation:

Replace aluminum screws.

Unfasten flywheel screws.

Tightening torque **11 22 1AZ** .

Installation:

Flywheel (1) is secured with an alignment pin.

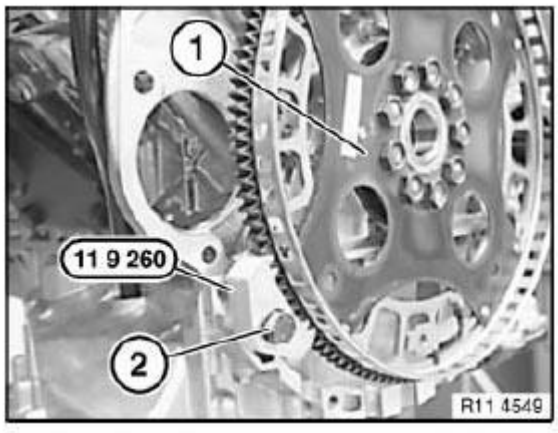


Fig. 176: Identifying Flywheel And Transmission Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Fit new flywheel screws.

Clean all threads for flywheel screws in crankshaft.

For vehicles without optional extra SA205 (automatic transmission):

Secure flywheel with existing transmission bolt (1) and special tools **11 9 260** and **11 9 265** .

Installation:

Replace aluminum screws.

Release flywheel screws with special tool **11 4 180** .

Tightening torque **11 22 2AZ** .

Installation:

Flywheel is secured with a dowel pin.

Fit new flywheel screws.

Clean all threads for flywheel screws in crankshaft.

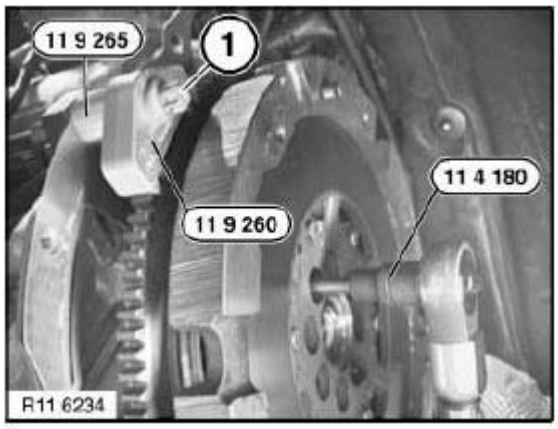


Fig. 177: Identifying Transmission Bolt And Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

23 VIBRATION DAMPER

11 23 010 REMOVING AND INSTALLING/REPLACING VIBRATION DAMPER (N52K)

Necessary preliminary tasks:

- Remove **UNDERBODY PROTECTION** .
- Remove drive belt

Release screws (1).

Tightening torque **11 23 1AZ** .

Remove vibration damper (2).

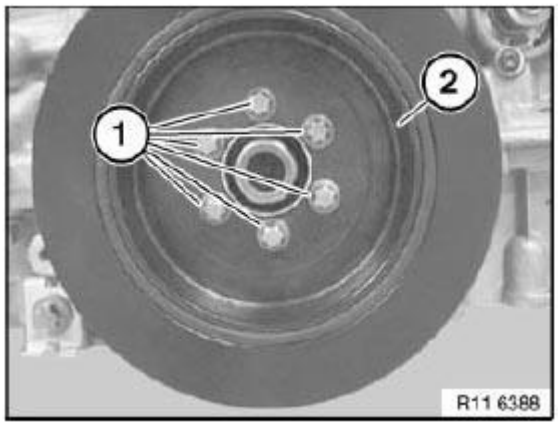


Fig. 178: Identifying Vibration Damper And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

24 CONNECTING ROD WITH BEARING

11 24 571 REPLACING ALL CONNECTING ROD BEARING SHELLS (N52K)

Special tools required:

- **00 2 590**
- **00 9 120**

IMPORTANT: All crank pins are connected with the crankshaft.
Modified procedure: The colours of the connecting rod bearing shells are the same at the top and bottom.
The Blue / Red connecting rod bearing shell colours are no longer fitted in combination.

Necessary preliminary tasks:

- Remove oil sump

IMPORTANT: All crankshaft crank pins are classified.

Possible classifications per connecting rod at top and bottom:

r: Red
b: Blue

Only **one** color may be fitted per big end bearing cap and connecting rod.

In direction of arrow from (1 to 2) crank pin (1 to 6).

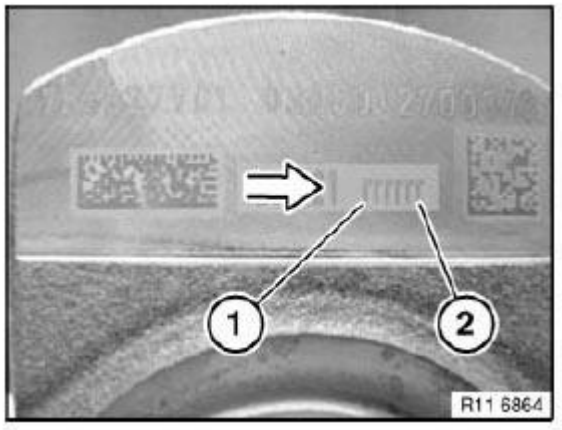


Fig. 179: Identifying Crank Pin And Arrow
Courtesy of BMW OF NORTH AMERICA, INC.

Example:

Possible classification: rbbrrb

Cylinder Classification Red / Red

1:

Cylinder Classification Blue / Blue

2:

Cylinder Classification Blue / Blue

3:

Cylinder Classification Red / Red

4:

Cylinder Classification Red / Red

5:

Cylinder Classification Blue / Blue

6:

Release conrod bolts (1).

Remove connecting rod bearing cap (2).

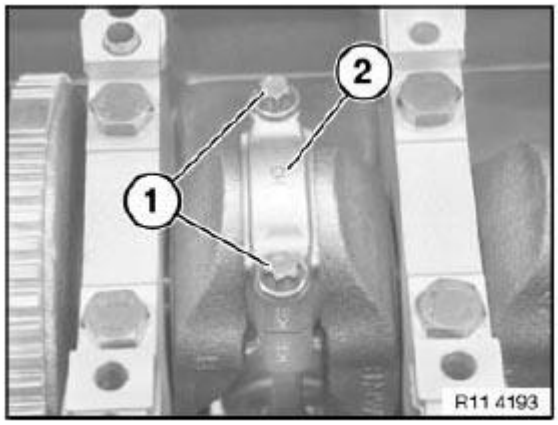


Fig. 180: Identifying Connecting Rod Bearing Cap And Conrod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage to cylinder wall and to crankshaft.

Gently release connecting rod from crankshaft.

Remove connecting rod bearing shells (1 and 2).

Install new conrod bearing shells.

Installation:

Pay attention to guide lugs during installation.

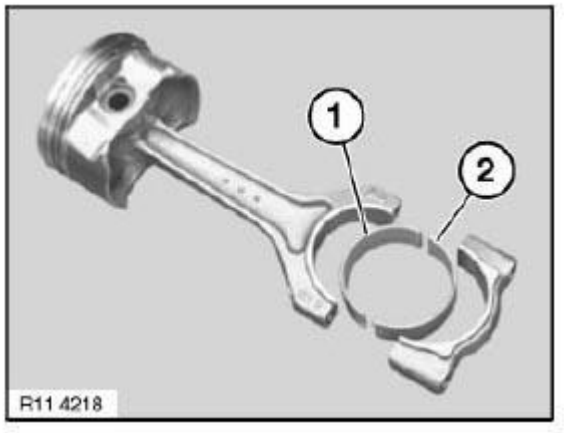


Fig. 181: Identifying Connecting Rod Bearing Shells
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: All crankshaft crank pins are classified.

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

Check conrod bearing clearance.

Piston in BDC position.

To determine the connecting rod bearing play, make sure that the bearing points are clean and free from oil and grease.

Fit special tool **00 2 590** (Plastigage Type PG 1) to the oil-free crankshaft.

Fit conrod bearing cap so that pairing letters match up.

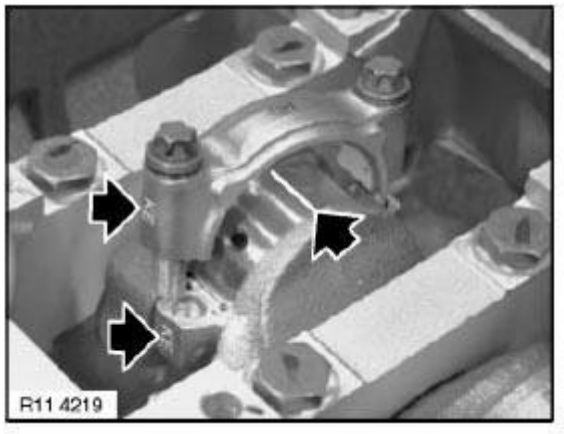


Fig. 182: Identifying Connecting Rod Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

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 **11 24 1AZ** .

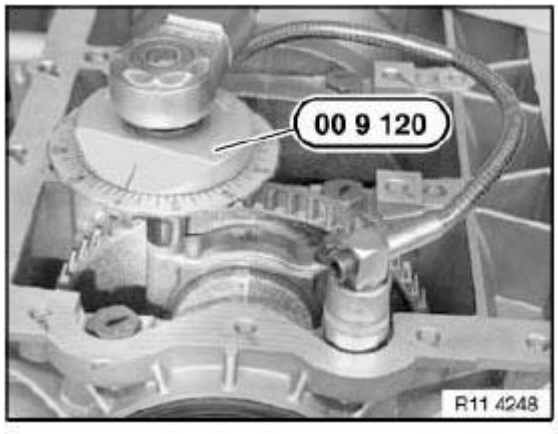


Fig. 183: Identifying Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew conrod bearing cover. Read off conrod bearing play at width of flattened plastic thread on measurement scale.

CONROD BEARING CLEARANCE .

- Remove Plastigage
- Coat crankshaft and connecting rod bearing shells with oil
- Install new conrod bolts and tighten down with special tool **00 9 120** .

Tightening torque **11 24 1AZ** .

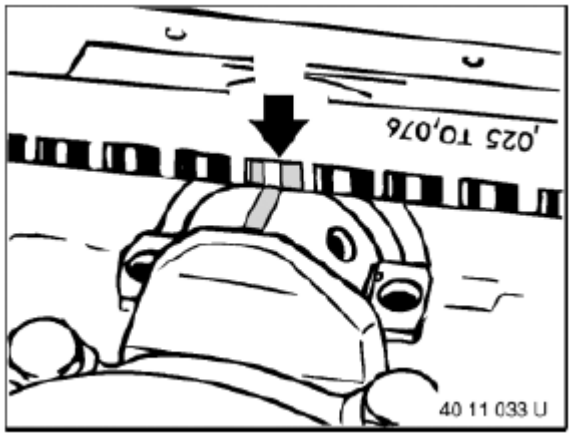


Fig. 184: Checking Conrod Bearing Play
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

25 PISTON WITH RINGS AND PIN

11 25 530 REMOVING AND INSTALLING/REPLACING ALL PISTONS (N52K)

Special tools required:

- **00 9 120**
- **11 4 491**
- **11 4 492**
- **11 4 493**
- **11 4 494**
- **11 6 241**
- **11 6 261**
- **11 8 330**

WARNING: Danger of injury!
Carry out work on piston pin circlip wearing protective goggles only.

IMPORTANT: If piston, connecting rod, big end bearing cap and connecting rod bearing shell are to be reused, they must be installed in the same position.
Individual replacement of a connecting rod is not permitted. Connecting rods are classified by weight categories and are only available as a set for all cylinders.
Connecting rod and big end bearing cap are marked with identical pairing letters and must not be mixed up.
Danger of engine damage!

Piston and piston pins are paired and must not be fitted individually.

Necessary preliminary tasks:

- Remove engine
- Mount engine on **ASSEMBLY STAND**
- Remove intake air manifold
- Remove **CYLINDER HEAD**.
- Remove oil sump
- Remove **OIL PUMP**

NOTE: Carefully remove heavy oil carbon residues from the cylinder wall (arrow).

IMPORTANT: Do not use any metal-cutting tools.

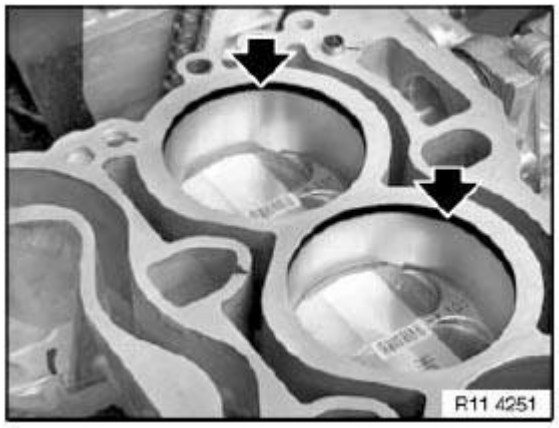


Fig. 185: Locating Heavy Oil Carbon
Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Oil spray nozzle (2) must not be maladjusted or bent.
Risk of damage!**

Do not release screw (1) of oil spray nozzle (2).

If necessary, readjust **OIL SPRAY NOZZLE** (2).

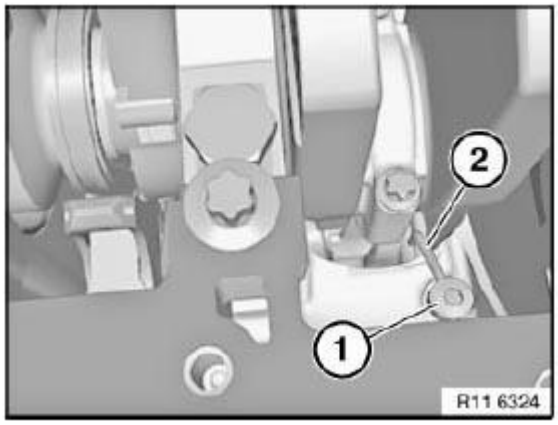


Fig. 186: Identifying Screw And Oil Spray Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Release conrod bolts (1).

Tightening torque **11 24 1AZ** .

Installation:

Replace screws.

Remove conrod bearing cap (2) in direction of arrow.

IMPORTANT: Connecting rod and big end bearing cap (2) are marked with identical pairing letters and must not be mixed up.
Danger of engine damage!

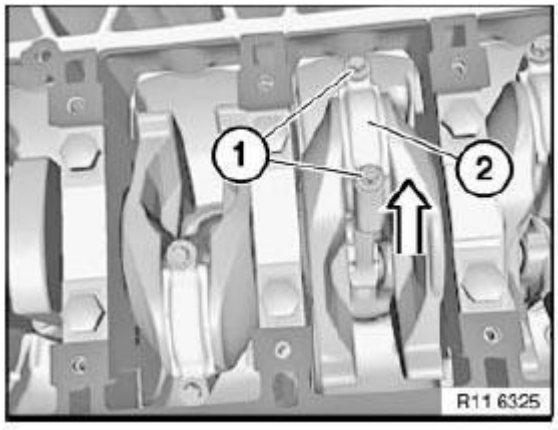


Fig. 187: Identifying Conrod Bearing Cap And Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool **11 8 330** to connecting rod.

Press out connecting rod and piston with special tool **11 8 330** to cylinder head side.

NOTE: Special tool 11 8 330 simultaneously serves to prevent connecting rod and piston from falling down.

IMPORTANT: Do not touch the oil spray nozzle when removing the components. Risk of damage!

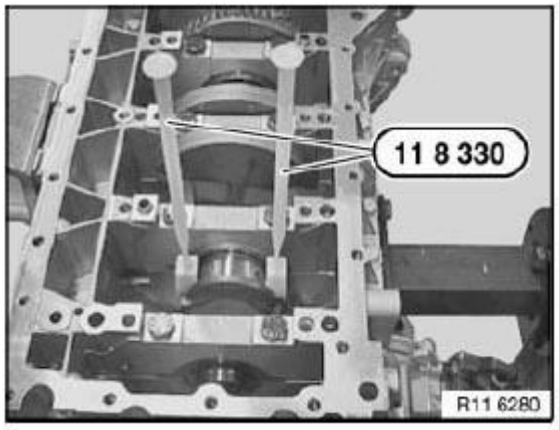


Fig. 188: Identifying Special Tool 11 8 330
Courtesy of BMW OF NORTH AMERICA, INC.

Preliminary work:

Clamp special tool **11 4 491** in vice.

Secure piston (1) with connecting rod to special tool **11 4 491** .

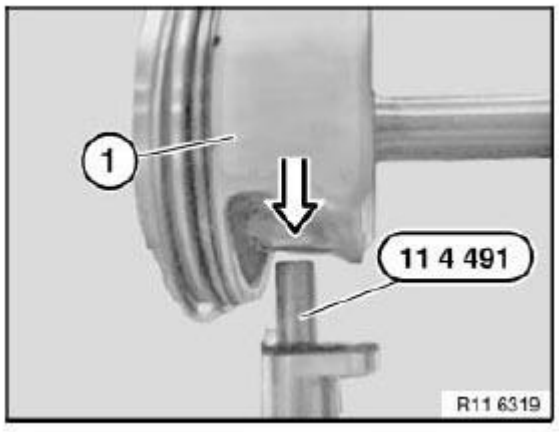


Fig. 189: Securing Piston With Connecting Rod To Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Danger of injury!

Carry out work on piston pin circlip wearing protective goggles only.

WARNING: Protective goggles must be worn.

Lever out piston pin circlip with special tool **11 4 492** in direction of arrow.

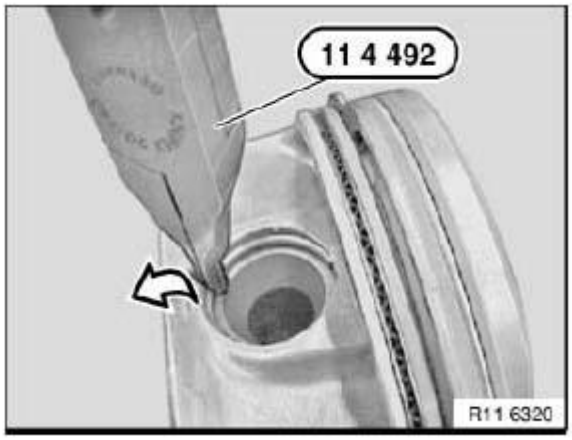


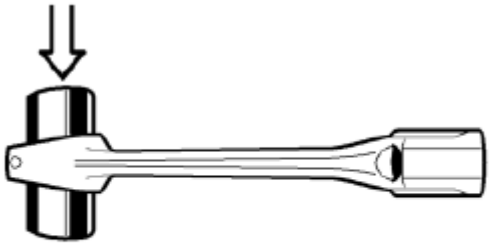
Fig. 190: Removing Piston Pin Circlip With Special Tool 11 4 492
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace connecting rods.

IMPORTANT: Individual replacement of a connecting rod is not permitted. Connecting rods are classified by weight categories and are only available as a set for all cylinders.
Existing and new connecting rods must not be installed in mixed combinations.

Installation:

It must be possible for the piston pin to be pressed with minimal force by hand through the small end bushing. There must be no noticeable play.



R11 4212

Fig. 191: Pressing Piston Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Measure piston installation clearance:

Measure piston diameter with micrometer at measuring point "A" from lower edge of piston and offset by 90° to piston pin axis.

PISTON DIAMETER at measuring point "A".

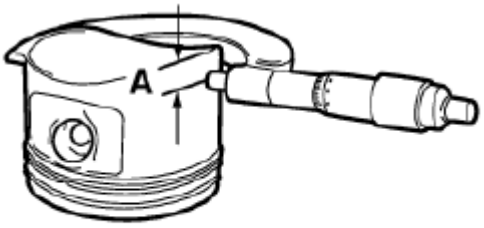


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Fig. 192: Measuring Piston Diameter With Micrometer
Courtesy of BMW OF NORTH AMERICA, INC.

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

Diameter of cylinder bore.

Piston installation clearance.

Total permissible wear tolerance. See **ENGINE, GENERAL** , **ENGINE BLOCK** and **PISTON WITH RINGS** .

If necessary, replace piston.

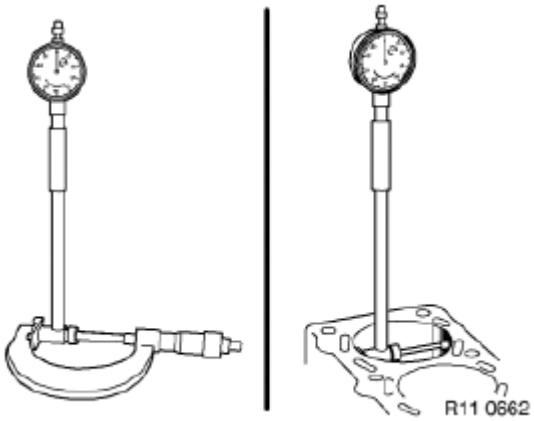

Fig. 193: Measuring Cylinder Bore
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Protective goggles must be worn.

Insert piston pin circlip (2) into groove (1) of special tool **11 4 493** .

Move piston pin circlip (2) into installation position.

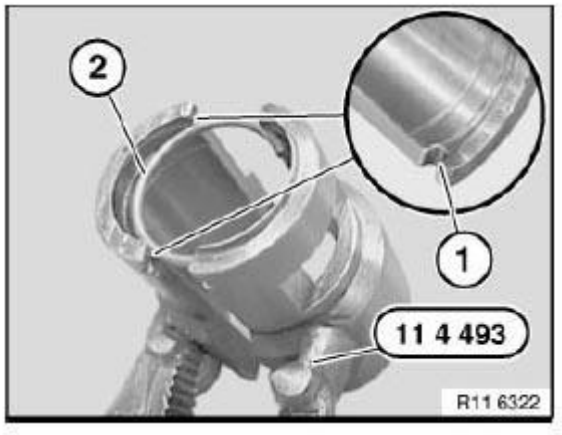

Fig. 194: Inserting Piston Pin Circlip Into Groove Of Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Protective goggles must be worn.

Guide lug and cutout on special tool **11 4 493** must point to piston crown. Only then can special tool **11 4 494** be correctly fitted.

When special tools **11 4 493** and **11 4 494** are correctly positioned, the piston pin circlip must be driven in with a plastic hammer in the direction of the arrow.

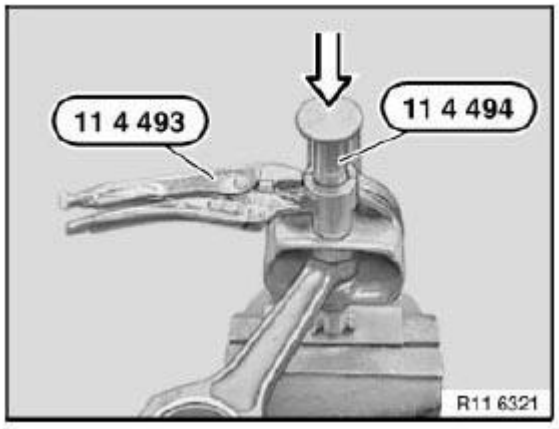

Fig. 195: Identifying Special Tool 11 4 493 And 11 4 494
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For vehicles with B30 engines.

Install all **PISTON RINGS**.

Install all **CONNECTING ROD BEARING SHELLS**.

Coat piston (2) and piston rings with oil.

Pre-install piston (2) in special tool **11 6 261** .

Attach special tool **11 8 330** to connecting rod (1).

Installation:

Check protective lugs on special tool **11 8 330** for correct position and damage.

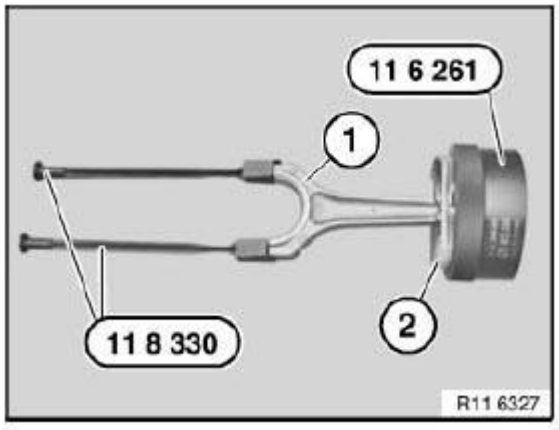

Fig. 196: Identifying Piston And Connecting Rod
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For vehicles with B25 engines.

Install all **PISTON RINGS**.

Install all **CONNECTING ROD BEARING SHELLS**.

Coat piston (2) and piston rings with oil.

Pre-install piston (2) in special tool **11 6 241** .

Attach special tool **11 8 330** to connecting rod (1).

Installation:

Check protective lugs on special tool **11 8 330** for correct position and damage.

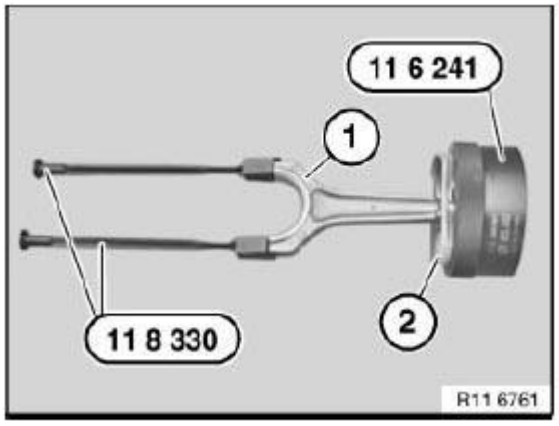

Fig. 197: Attaching Special Tool 11 8 330 To Connecting Rod
Courtesy of BMW OF NORTH AMERICA, INC.

Insert piston (1) with connecting rod in cylinder.

IMPORTANT: Do not touch the oil spray nozzle when installing the components.
Risk of damage!
Danger of piston ring failure.

Press in piston (1) at marked points (see arrows) with finger pressure only, do not drive in.

Insert piston (1) so that arrow (2) on piston crown points to camshaft drive.

Press in piston (1) with special tools **116 261** /**11 6 241** .

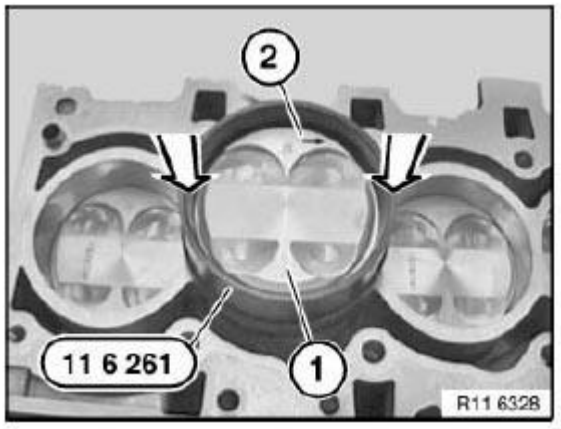

Fig. 198: Identifying Piston And Arrow Mark
Courtesy of BMW OF NORTH AMERICA, INC.

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

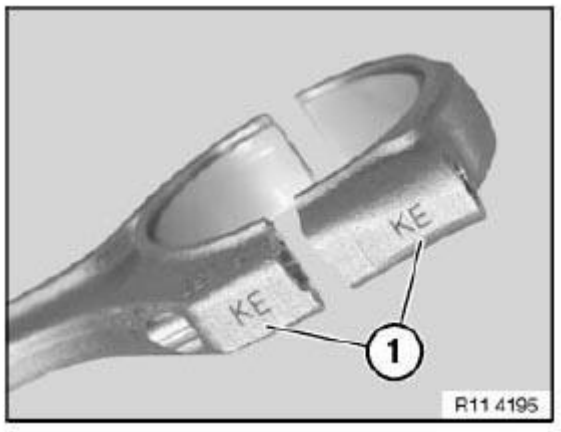

Fig. 199: Identifying Marked With Identical Pairing Letters
Courtesy of BMW OF NORTH AMERICA, INC.

Apply a light coat of oil to connecting rod bearing journal. Join connecting rod and connecting rod bearing journal.

Detach special tool **11 8 330** .

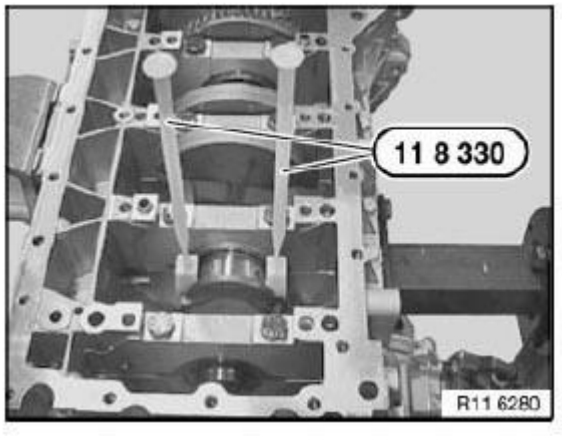

Fig. 200: Identifying Special Tool 11 8 330
Courtesy of BMW OF NORTH AMERICA, INC.

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

Installation:

Replace screws.

Install new conrod bolts (1).

IMPORTANT: Jointing torque and angle of rotation must be observed without fail. Risk of damage!

Tightening torque **11 24 1AZ** .

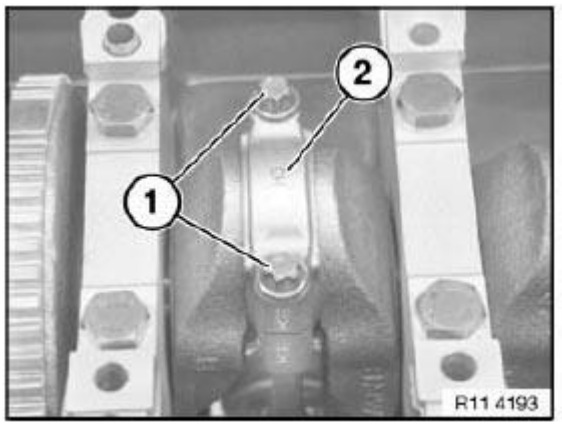

Fig. 201: Identifying Conrod Bearing Caps And Conrod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, tighten connecting rod bolts to torsion angle with special tool **00 9 120** .

Tightening torque **11 24 1AZ** .

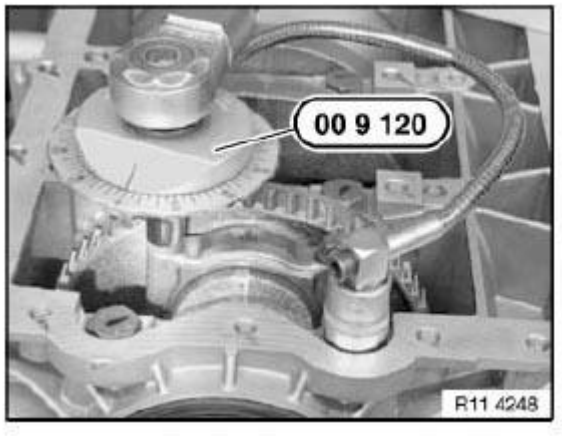

Fig. 202: Identifying Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 25 671 REPLACING PISTON RINGS ON ALL PISTONS (N52K)

Necessary preliminary tasks:

- Removing all **PISTONS**

Measuring axial clearance of piston rings in piston ring groove.

See **TECHNICAL DATA** .

NOTE: It is not possible to measure the axial clearance of the U-flex rings.

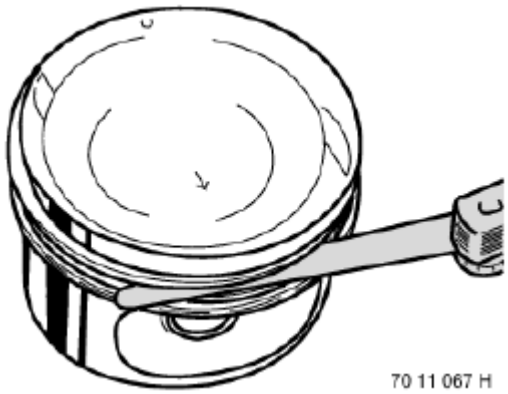

Fig. 203: Measuring Axial Clearance Of Piston Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Remove plain compression ring and stepped ring upwards with piston ring pliers.

The U-flex ring comprises two steel band rings and a support spring.

NOTE: The U-flex ring cannot be removed with piston ring pliers.

Put aside all piston rings in correct sequence and installation position.

It might not be possible to find the identification on used piston rings.

Installation:

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

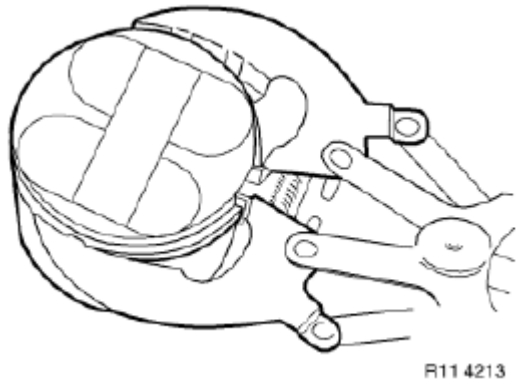

Fig. 204: Removing Compression Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Determine **END CLEARANCE** with a feeler gauge.

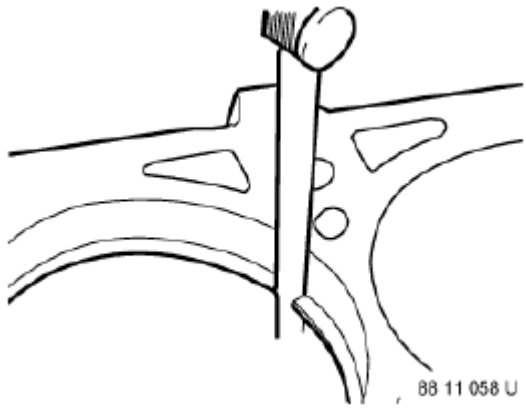

Fig. 205: Checking Piston Gap Using Feeler Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Schematic diagram of piston rings.

Installation:

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

1. Plain compression ring
2. Stepped ring "TOP"
3. U-flex ring

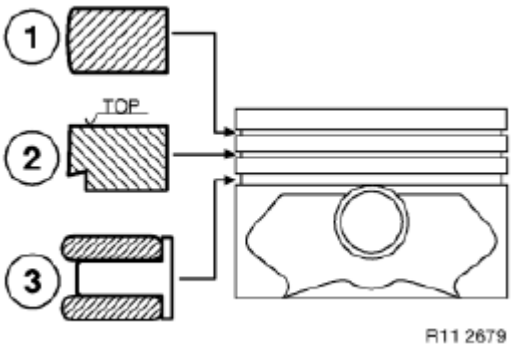

Fig. 206: Identifying Piston Rings Installation Positions
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The U-flex ring comprises two steel band rings (1) and a support spring (2).

Installation:

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

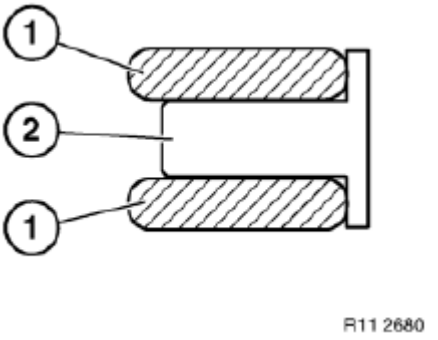

Fig. 207: Identifying Steel Band Rings And Support Spring
Courtesy of BMW OF NORTH AMERICA, INC.

The contact points (1) of the piston rings must be arranged offset by approx. 120°. However, the contact points (1) must not be arranged over the piston pin boss.

NOTE: Picture shows N52.

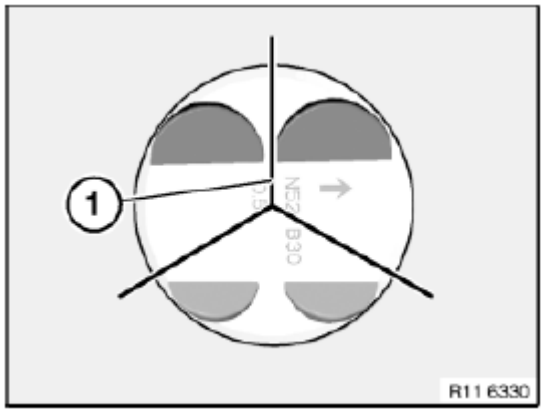

Fig. 208: Identifying Contact Points Of Piston Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

V-RIBBED BELT WITH TENSION/DEFLECTION ELEMENT

11 41 115 REMOVING AND INSTALLING/REPLACING HYDRAULIC VALVE (N52K)

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are **released.**

Aluminum screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic.**

Jointing torque and angle of rotation must be observed without fail **(risk of damage).**

Necessary preliminary tasks

- Remove front **UNDERBODY PROTECTION**
- Have a cleaning cloth ready to catch escaping oil

Detach plug (1) from hydraulic valve (2).

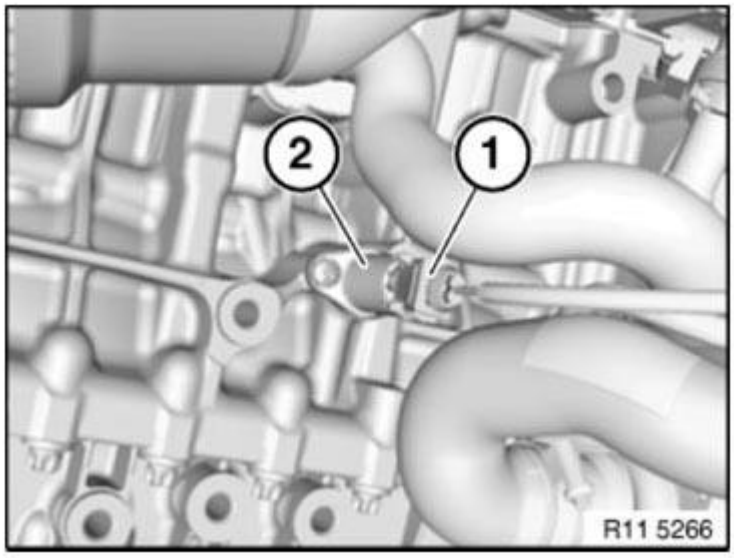

Fig. 209: Identifying Hydraulic Valve With Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove hydraulic valve (2). Tightening torque **11 41 7AZ**

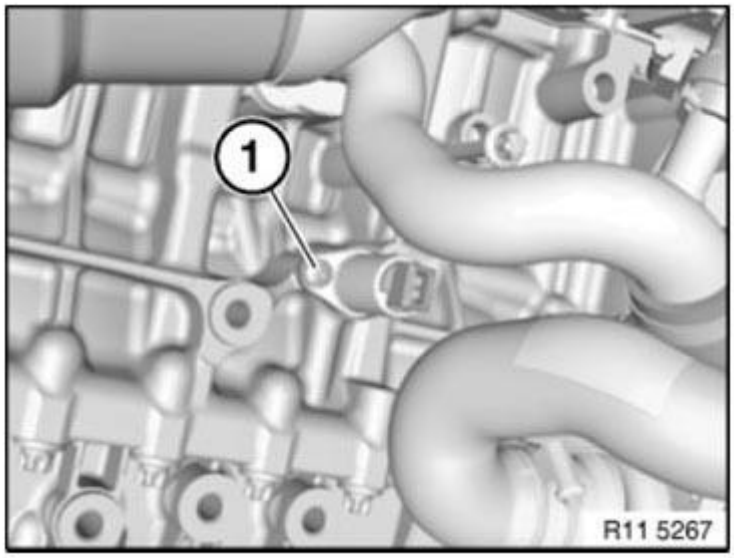

Fig. 210: Identifying Hydraulic Valve Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Replace O-ring (1).

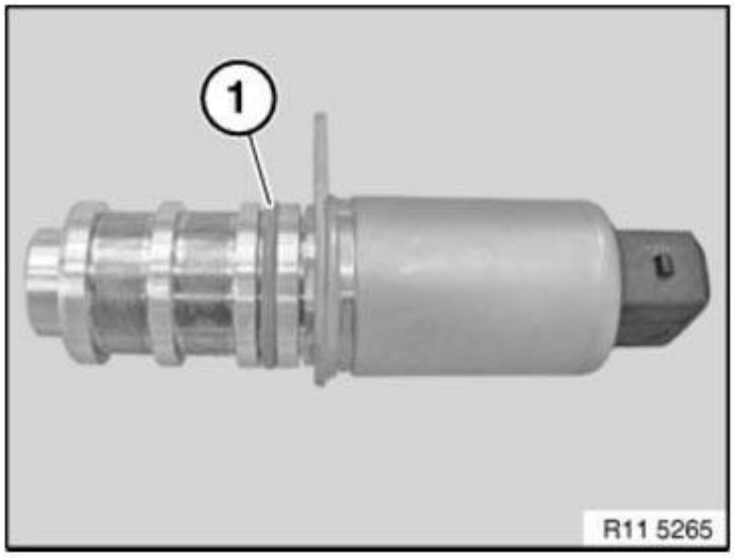

Fig. 211: Identifying O-Ring
Courtesy of BMW OF NORTH AMERICA, INC.

11 28 010 REPLACING ALTERNATOR DRIVE BELT (N52K)

Notes

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are **released.**

Aluminum screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic.**

Jointing torque and angle of rotation must be observed without fail **(risk of damage).**

Necessary preliminary tasks:

- Remove **FAN COWL** with electric fan

Course of drive belt E6x, E9x, E8x

NOTE: Mark the direction of travel of the drive belt if it is to be reused.

Turn belt tensioner (3) in direction of arrow until bore (4) is flush on housing.

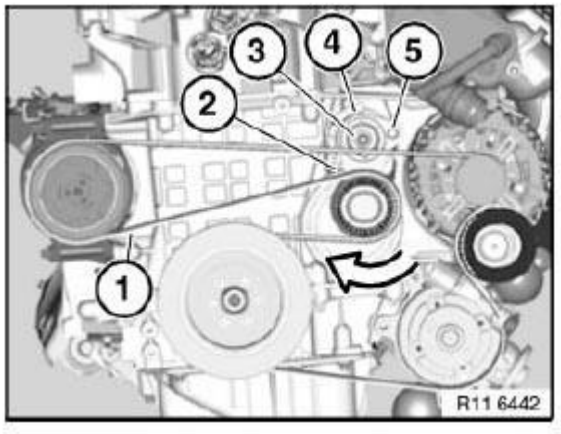

Fig. 212: Identifying Belt Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Hold belt tensioner (3) under tension.

Secure belt tensioner (3) in place with special tool **11 3 340** .

Load is removed from tensioning pulley (2).

Remove drive belt (1)

Installation

Check drive belt for correct installation position and, if reusing, observe direction of travel. **Risk of damage.**

11 28 020 REPLACING TENSIONING DEVICE FOR ALTERNATOR DRIVE BELT (N52K)

Notes

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are **released.**

Aluminum screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic.**

Jointing torque and angle of rotation must be observed without fail **(risk of damage).**

Necessary preliminary tasks

- Remove **DRIVE BELT**

E9x only

Remove special tool **11 3 340** .

Release screw (3) on belt tensioner (4).

Tightening torque **11 28 1AZ** .

Installation:

Replace aluminum screws

Remove belt tensioner (4).

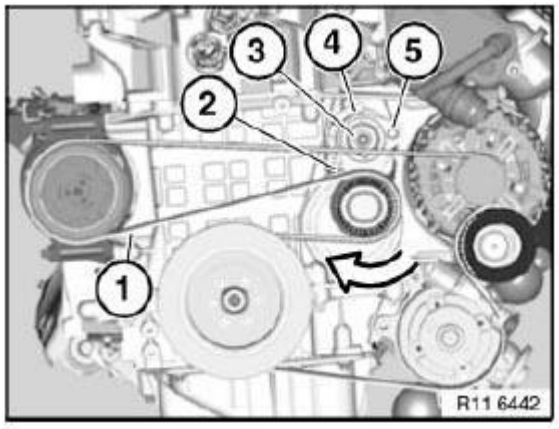

Fig. 213: Identifying Belt Tensioner With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

31 CAMSHAFT

11 31 005 CHECKING TIMING OF CAMSHAFT(S) (N52K)

Special tools required:

- **11 0 300**

- **11 4 281**
- **11 4 282**
- **11 4 283**

Necessary preliminary tasks:

- Remove **cylinder head cover**
- Remove **UNDERBODY PROTECTION** .

Remove fastener (1) in direction of arrow.

Installation:

Install fastener (1) with bore facing outwards.

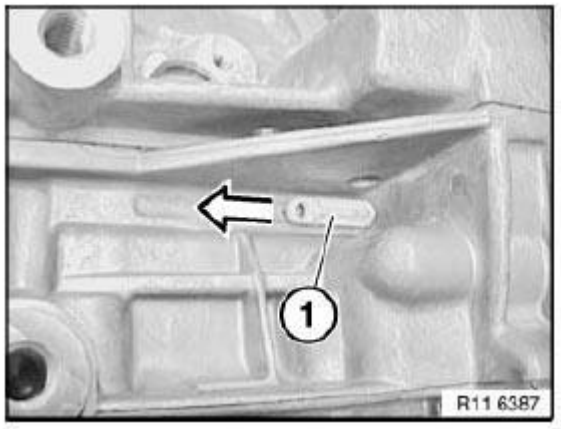

Fig. 214: Identifying Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate crankshaft at central bolt into TDC position.

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

IMPORTANT: On vehicles with optional extra SA205 (automatic transmission), there is a large bore for the TDC position shortly before the special tool bore. This bore can be confused with the special tool bore.

If the flywheel is secured in the correct special tool bore with special tool **11 0 300** , the engine can no longer be moved at the central bolt.

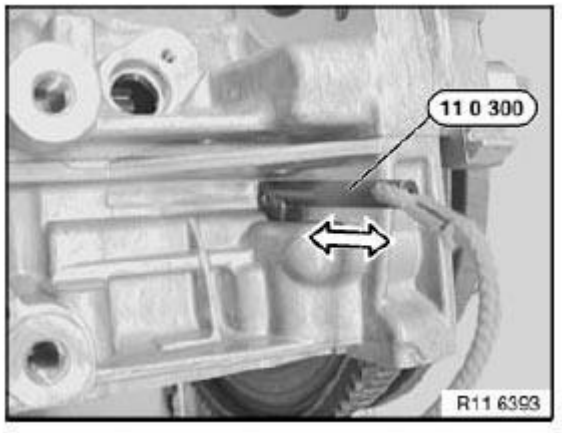

Fig. 215: Identifying Special Tool 11 0 300
Courtesy of BMW OF NORTH AMERICA, INC.

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

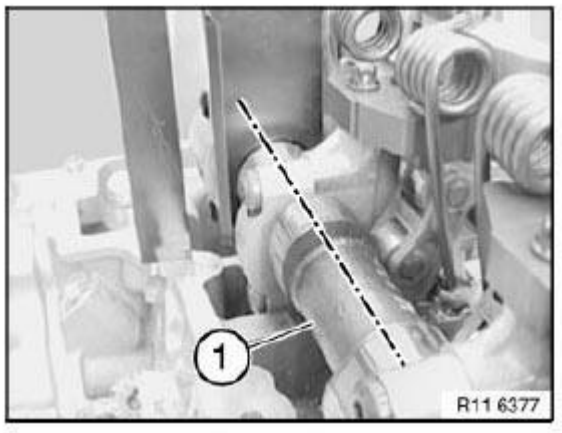

Fig. 216: Identifying Inlet Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

The timings are correct when the part numbers (2) on the inlet and exhaust camshafts (1) point upwards.

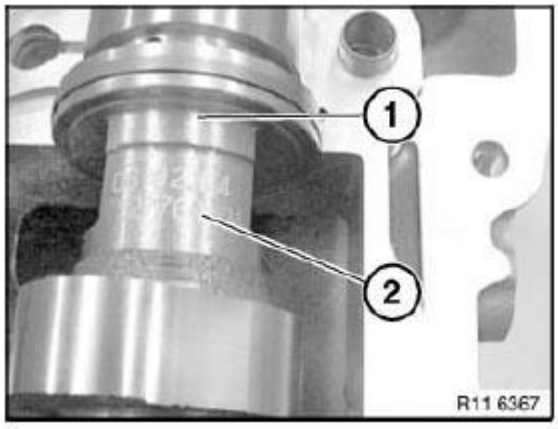

Fig. 217: Identifying Part Numbers And Exhaust Camshafts
Courtesy of BMW OF NORTH AMERICA, INC.

With 1st cylinder in firing TDC position, cams of exhaust camshaft (3) at 6th cylinder point downwards at an angle.

Cam follower (1) is not actuated.

NOTE: When the engine is installed, the position of the exhaust camshaft (3) for the timing can only be checked with a mirror.

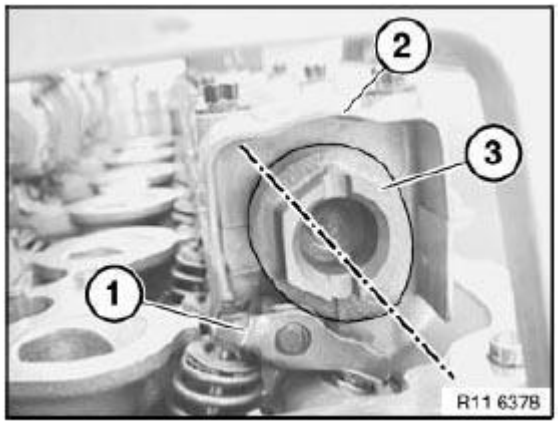

Fig. 218: Identifying Cam Follower And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **11 4 283** to cylinder head with bolts (1).

NOTE: Fit special tool 114282 underneath on side of inlet camshaft.

Mount special tool **n 4281** on inlet and exhaust camshafts.

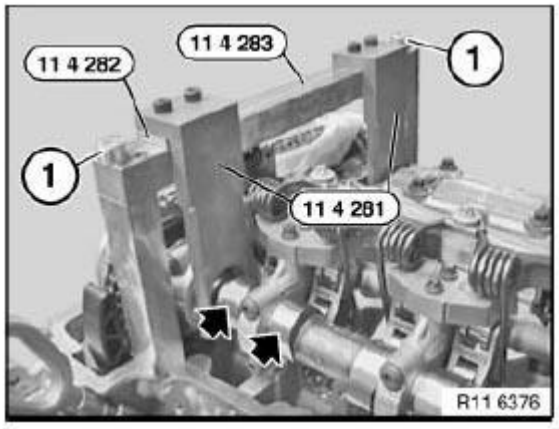

Fig. 219: Securing Special Tool 11 4 283 To Cylinder Head With Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, adjust **VALVE TIMING.**

Assemble engine.

11 31 025 REMOVING AND INSTALLING/REPLACING INLET CAMSHAFT (N52K)

Special tools required:

- **11 4 281**
- **11 4 481**

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released.
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **cylinder head cover**
- Remove inlet adjustment unit
- Remove **INTERMEDIATE LEVER**
- Adjust **VALVE TIMING**

NOTE: All bearing caps (1 and 2) are marked with numbers from 1 to 6.

Bearing cap (1) is a thrust bearing.

Release screws on bearing caps 1 to 6 (1 and 2).

Tightening torque **11 31 2AZ** .

Set all bearing caps down in special tool **11 4 481** in a tidy and orderly fashion.

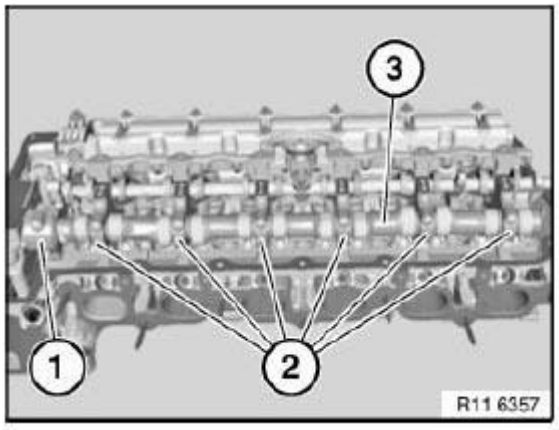

Fig. 220: Identifying Bearing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Remove inlet camshaft (2) towards top.

Installation:

Clean all bearing points and lubricate with oil.

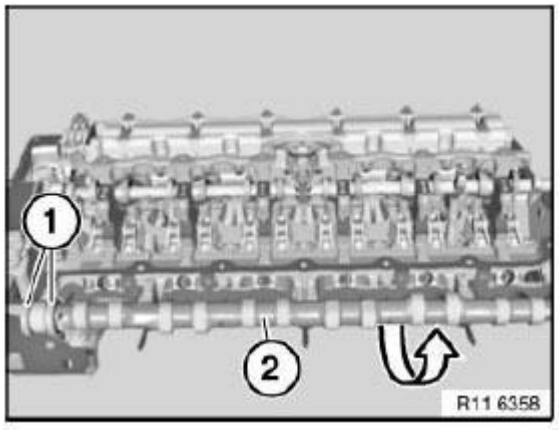

Fig. 221: Identifying Inlet Camshaft And Compression Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Metal plain rectangular compression ring:

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

Only replace plain rectangular compression rings (1) when they are broken. The plain rectangular compression rings have catches at the joint. Press plain rectangular compression rings (1) apart upwards and downwards and removed towards front. Make sure plain rectangular compression rings (1) can move freely.

Installation note: When intake camshafts are inserted, no joint must point to a separating joint.

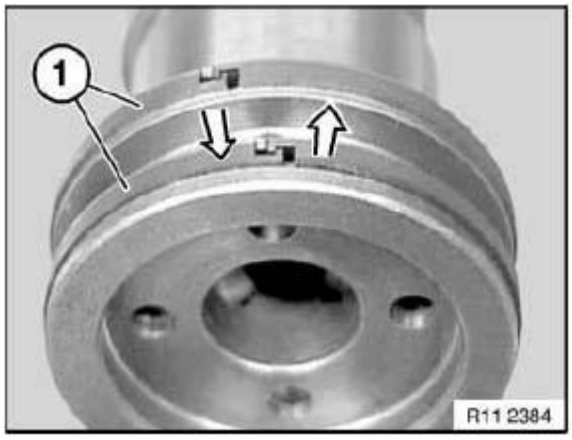

Fig. 222: Identifying Compression Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Plastic plain rectangular compression ring:

Installation note: The plastic plain rectangular compression ring is maintenance free and does not have to be replaced.

Insert plastic plain rectangular compression ring (1) into groove of intake camshaft (2) (see arrow). Lightly oil plastic plain rectangular compression ring (1) and rotate in direction of arrow until plastic plain rectangular compression ring (1) is positioned on the intake camshaft.

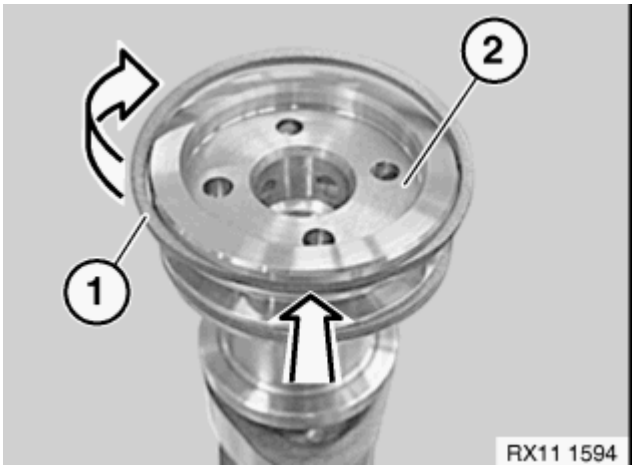

Fig. 223: Installing Plastic Plain Rectangular Compression Ring

Courtesy of BMW OF NORTH AMERICA, INC.

Check plastic plain rectangular compression ring (1 and 2) for freedom of movement.

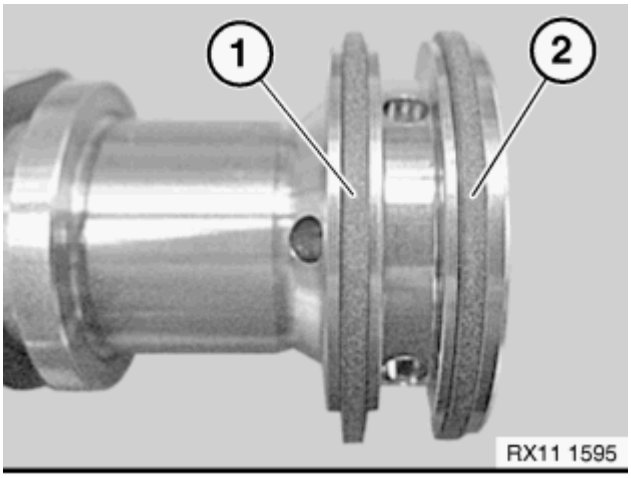

Fig. 224: Checking Ring For Freedom Of Movement
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Markings of inlet and exhaust camshafts are different.
Mixing up the inlet and exhaust camshaft will result in engine damage.
A = Exhaust camshaft.
E = Inlet camshaft

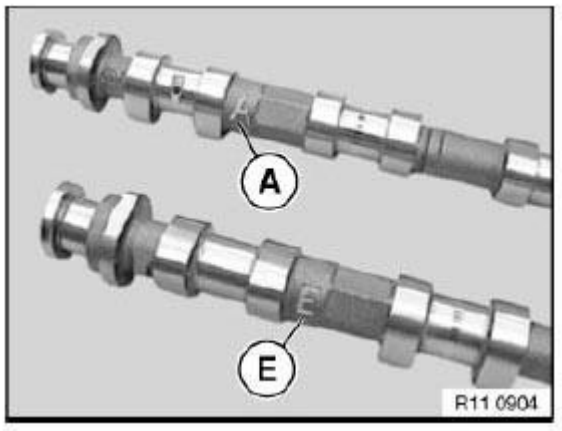

Fig. 225: Identifying Exhaust Camshaft And Inlet Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Insert inlet camshaft (1) so that part number on twin surface points upwards.

Position inlet camshaft (1) so that cams point upwards at an angle.

Attach special tool **11 4 281** to twin surface.

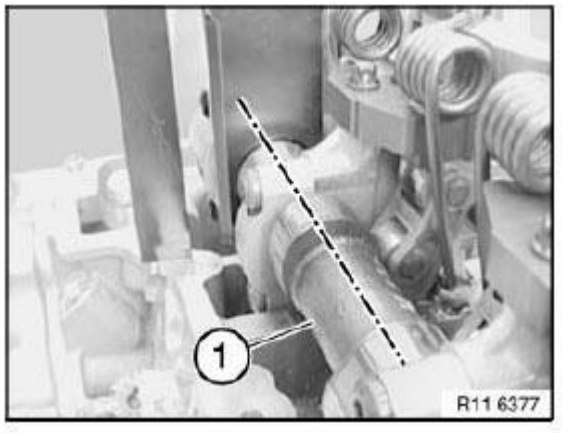

Fig. 226: Identifying Inlet Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 028 REMOVING AND INSTALLING/REPLACING EXHAUST CAMSHAFT (N52K)

Special tools required:

- 11 4 460
- 11 9 000
- 11 4 350
- 00 9 120

IMPORTANT: It is absolutely essential to follow an exact procedure for removing and installing the exhaust camshaft.
Risk of damage!
The upper and lower bearing banks must be tensioned with a total of six special tools 11 4 461 .

Necessary preliminary tasks:

- Remove **cylinder head cover**
- Remove exhaust adjustment unit
- Adjust **VALVE TIMING**

The screw connection of the bearing banks must be released from the outside inwards.

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

Remove upper bearing bank (1).

Remove exhaust camshaft from lower bearing bank.

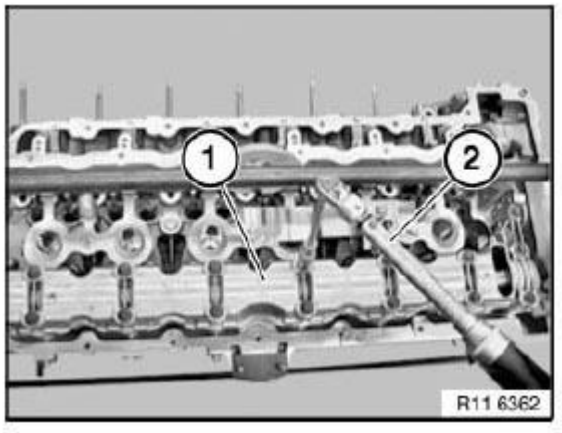

Fig. 227: Identifying Upper And Lower Bearing Banks
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Markings of inlet and exhaust camshafts are different.
Mixing up the inlet and exhaust camshaft will result in engine damage .
A - Exhaust camshaft.
E- Inlet camshaft

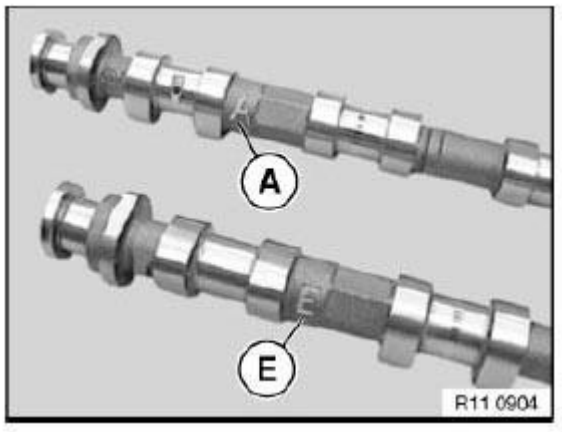

Fig. 228: Identifying Exhaust Camshaft And Inlet Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Metal plain rectangular compression ring:

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

Only replace plain rectangular compression rings (1) when they are broken. The plain rectangular compression rings have catches at the joint. Press plain rectangular compression rings (1) apart upwards and downwards and removed towards front. Make sure plain rectangular compression rings (1) can move freely.

Installation note: When exhaust camshafts are inserted, no joint must point to a separating joint.

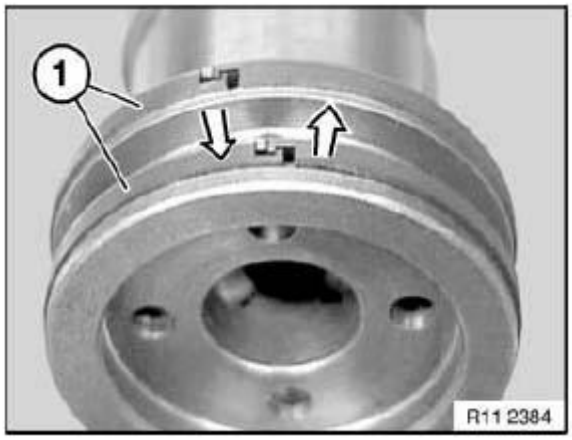

Fig. 229: Identifying Compression Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Plastic plain rectangular compression ring:

Installation note: The plastic plain rectangular compression ring is maintenance free and does not have to be replaced.

Insert plastic rectangular compression ring (1) into groove of exhaust camshaft (2) (see arrow). Lightly oil plastic rectangular compression ring (1) and rotate in direction of arrow until compression ring (1) is positioned on the exhaust camshaft.

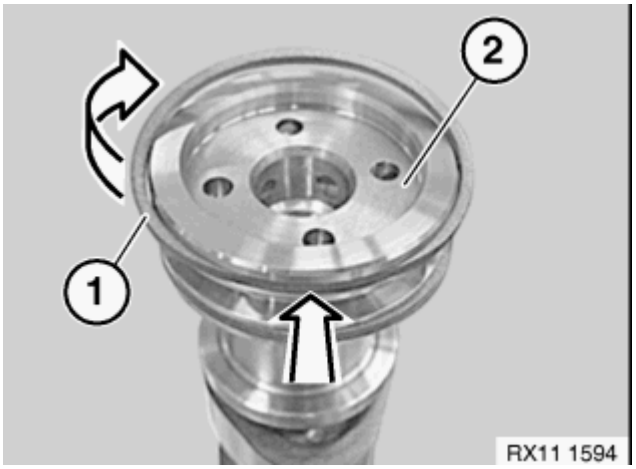

Fig. 230: Installing Plastic Plain Rectangular Compression Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Check plastic plain rectangular compression ring (1 and 2) for freedom of movement.

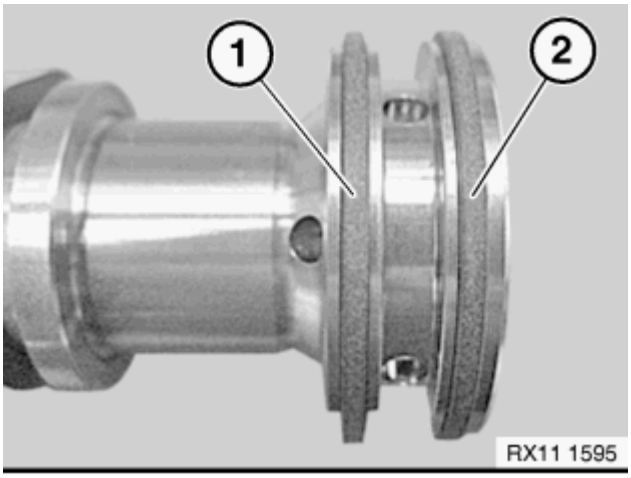

Fig. 231: Checking Ring For Freedom Of Movement
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Removal on engine: Set engine to ignition TDC at cylinder No. 1. Removed cylinder head: When using special tool 11 9 000, it will be necessary to remove the aluminum strip.

Installation bearing strip:

Pre-install special tool **11 4 462** on cylinder no. 2.

Insert special tool **11 4 463** in screw connection of cylinder head cover.

IMPORTANT: Special tool 11 4 463 is a special screw.

Press down cam followers (3) on cylinder no. 2 with spindle nut (2) of special tool **11 4 462** .

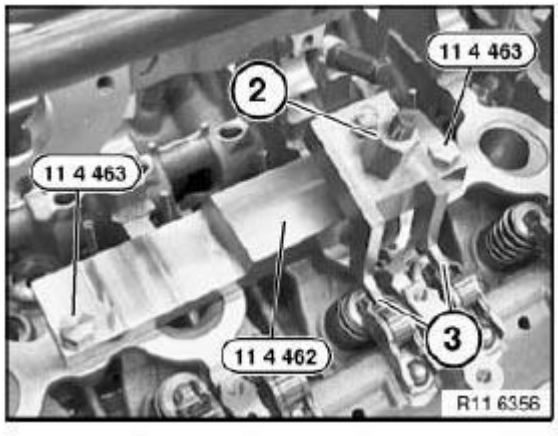

Fig. 232: Identifying Cam Followers And Cylinder No. 2 With Spindle Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Before mounting the exhaust camshaft on the correct cam follower seat (1), pay attention to the hydraulic valve clearance adjustment element and the valve.

Refer to **REMOVING AND INSTALLING/REPLACING ALL CAM FOLLOWERS**.

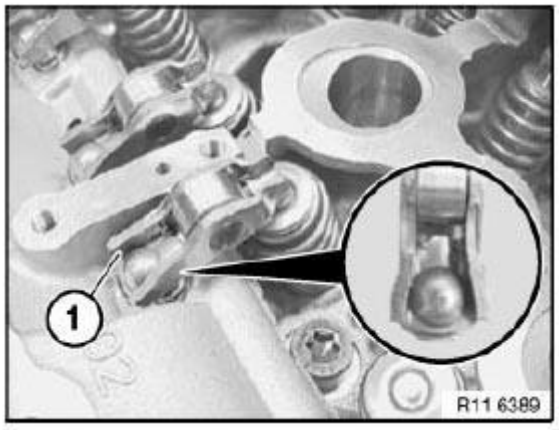

Fig. 233: Identifying Cam Followers
Courtesy of BMW OF NORTH AMERICA, INC.

Position lower bearing bank (1) with exhaust camshaft (2) cam followers.

Align exhaust camshaft (2).

Cylinder nos. 2 and 4 are at valve overlap.

Cams (3) on cylinder no. 1 point upwards at an angle.

Part number (4) on twin surface of exhaust camshaft (2) points upwards.

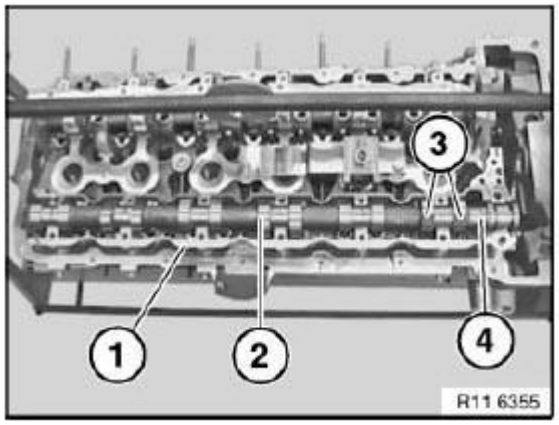

Fig. 234: Identifying Lower Bearing Bank, Exhaust Camshaft And Cams
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: There must be no adhesive residues in the cylinder head tapped holes.

Clean tapped holes.

Fit upper bearing bank (1).

Insert bolts dry.

Tension down upper bearing bank (1) with exhaust camshaft at bearing points 3 and 5 through a 1/2 bolt turn.

Join exhaust camshaft to upper and lower bearing banks (1) with torque wrench (2) from inside outwards to **8 Nm.**

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

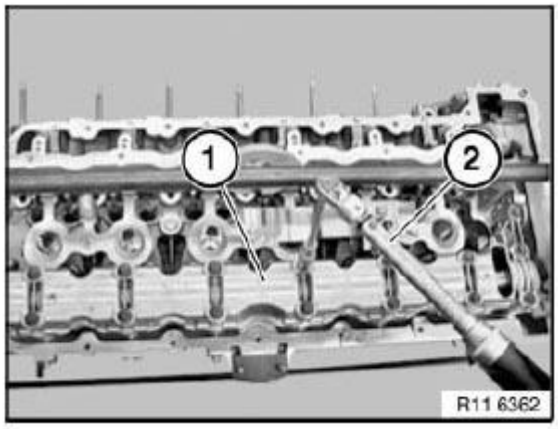

Fig. 235: Identifying Upper And Lower Bearing Banks
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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

Make sure that the thrust piece and the legs of special tools **11 4 461** rest on the milled surfaces.

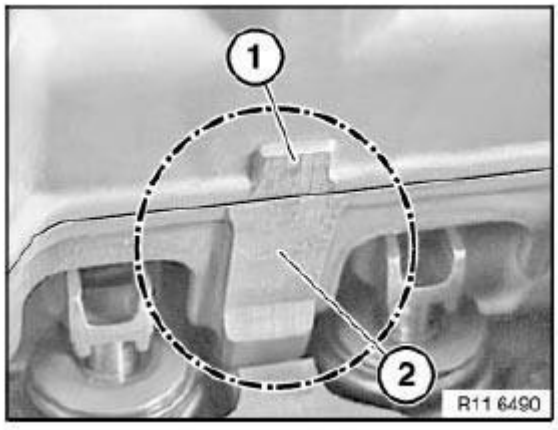

Fig. 236: Identifying Ground Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Schematic depiction of special tool 11 4 461 at upper bearing bank (1) and lower bearing bank (2).
Pretension all special tools 11 4 461 with special tool 11 4 350 only.

IMPORTANT: Tighten screw (3) on thrust piece to 2 Nm. Risk of damage!

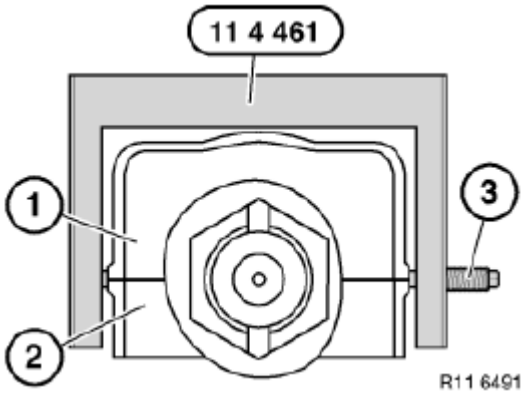

Fig. 237: Identifying Upper Bearing Bank And Lower Bearing Bank
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **114 461** over screw connection of bearing banks.

Make sure that the legs rest exactly on the ground surfaces of the upper bearing bank (2) and lower bearing bank (1).

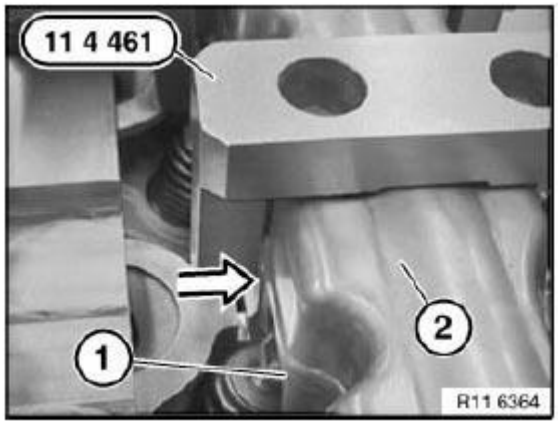

Fig. 238: Identifying Upper Bearing Bank And Lower Bearing Bank
Courtesy of BMW OF NORTH AMERICA, INC.

Initially tighten screw of special tool **11 4 461** to ground surfaces of upper bearing bank (1) and lower bearing bank (2).

IMPORTANT: Tighten screws on thrust piece to 2 Nm. Risk of damage!

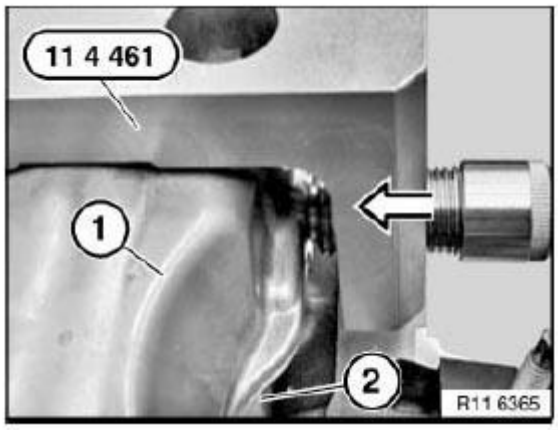

Fig. 239: Identifying Upper Bearing Bank And Lower Bearing Bank
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Set special tool 11 4 350 to 2 Nm.
Pretension all special tools 11 4 461 with special tool 11 4 350 only.

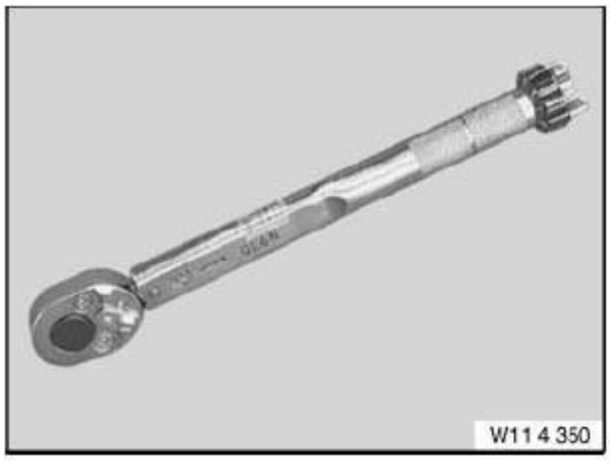

Fig. 240: Identifying Set Special Tool 11 4 350
Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tools **11 4 461** with screw (1) to inside of cylinder head.

Mount special tool **11 4 461** with screw facing outwards on cylinder no. 2.

Position special tools **11 4 461** so that screw connections (2) of bearing bank are easily accessible.

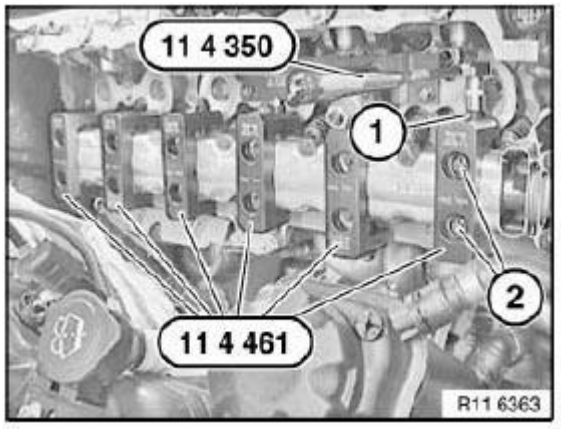

Fig. 241: Identifying Screw Connections And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

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

Tightening torque **11 31 1AZ** .

IMPORTANT: Remove special tool 11 4 461 only when exhaust camshaft screw connection is completed .

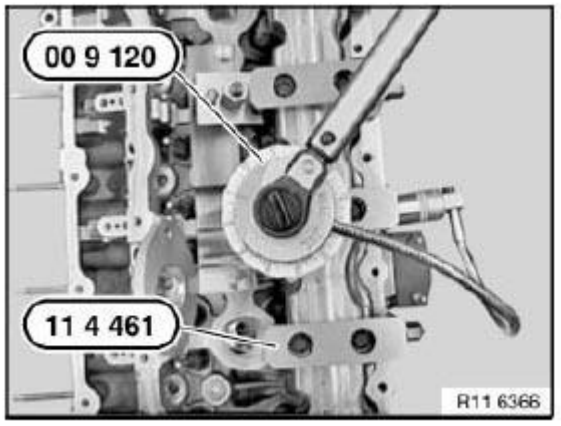

Fig. 242: Identifying Special Tool 11 4 461 And 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 051 REPLACING TIMING CHAIN (N52K)

Special tools required:

- **00 9 140**
- **11 0 300**

- **11 4 280**
- **11 4 281**
- **11 4 282**
- **11 4 283**
- **11 4 360**
- **11 4 362**
- **11 5 200**
- **11 9 280**

Necessary preliminary tasks:

- Remove **cylinder head cover**
- Remove all **SPARK PLUGS**
- Remove **CHAIN TENSIONER**.
- Remove **CRANKSHAFT RADIAL SEAL** at front
- Remove **drive belt tensioner**
- Remove **VIBRATION DAMPER**

Remove fastener (1) in direction of arrow.

Installation:

Install fastener (1) with bore facing outwards.

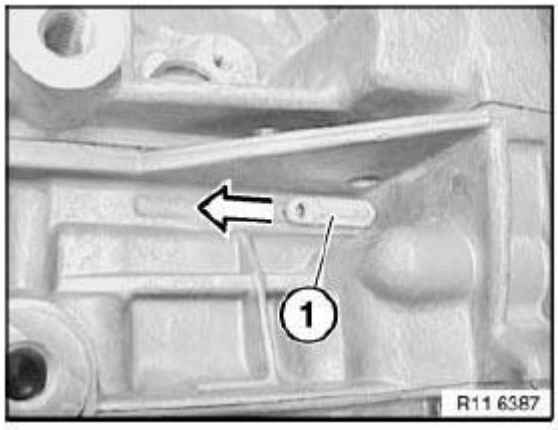

Fig. 243: Identifying Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate crankshaft at central bolt into TDC position.

Slide special tool **110300** in direction of arrow into special tool bore and secure crankshaft.

IMPORTANT: On vehicles with optional extra SA205 (automatic transmission), there is a large bore for the TDC position shortly before the special tool bore. This bore can be confused with the special tool bore.

If the flywheel is secured in the correct special tool bore with special tool **11 0 300** , the engine can no longer be moved at the central bolt.

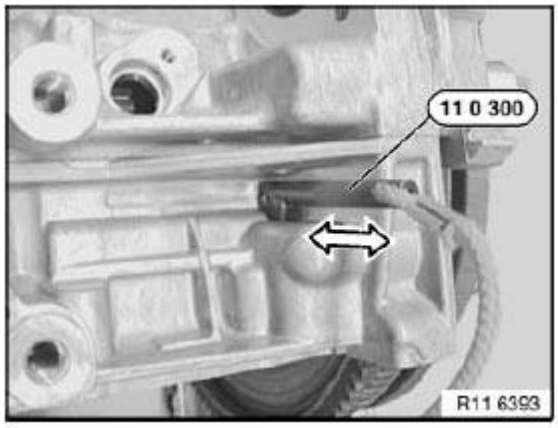

Fig. 244: Identifying Special Tool 11 0 300
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not remove special tool 110300 to release central bolt (1). Employ a second person for gripping when releasing central bolt (1).

Screw special tool **11 9 280** onto hub of vibration damper.

Release central bolt (1).

Tightening torque **11 21 1AZ** .

Remove hub towards front.

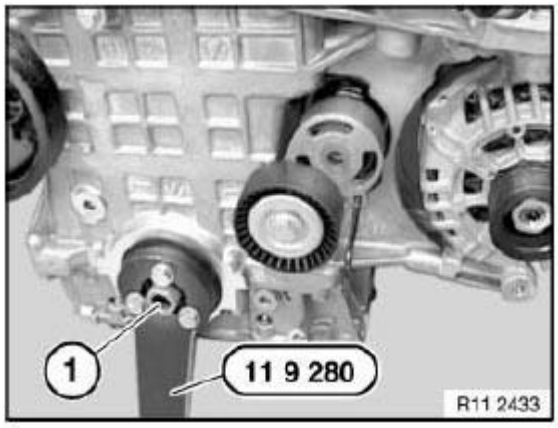

Fig. 245: Identifying Central Bolt And Special Tool 11 9 280
Courtesy of BMW OF NORTH AMERICA, INC.

Open plug (1).

Tightening torque **11 31 7AZ** .

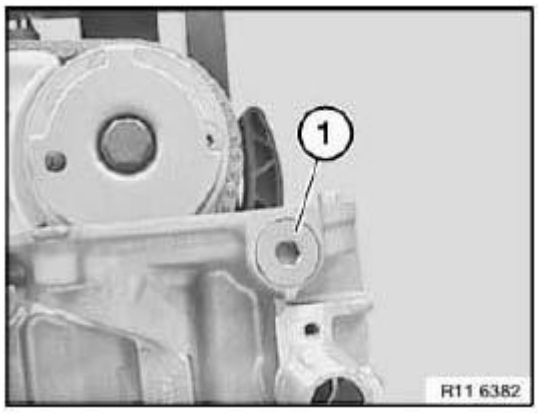

Fig. 246: Identifying Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Open plug (1).

Tightening torque **11 11 7AZ** .

Installation:

Replace aluminum screws.

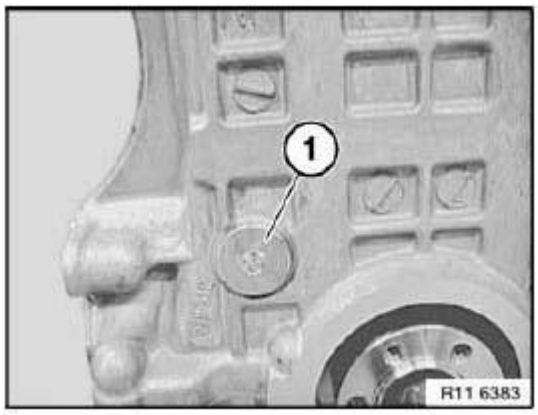

Fig. 247: Identifying Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release bearing pin (1) from timing chain module on cylinder head.

Tightening torque **11 31 5AZ** .

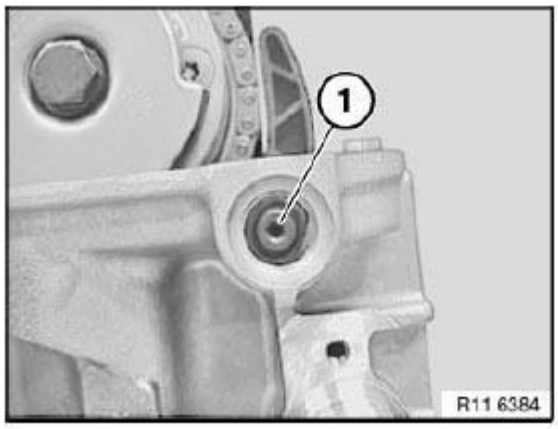

Fig. 248: Identifying Bearing Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Release bearing pin (1) from timing chain module on crankcase.

Tightening torque **11 31 4AZ** .

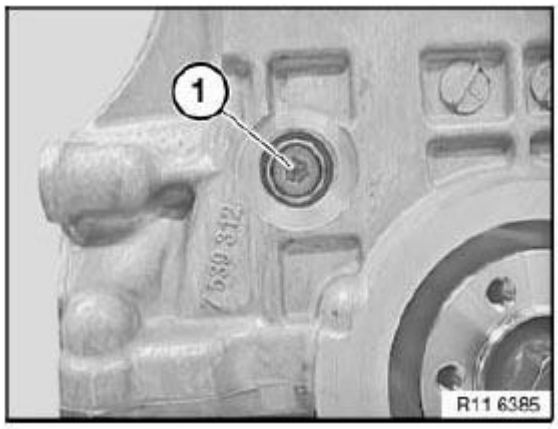

Fig. 249: Identifying Bearing Pin
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Install special tool 11 4 280 to release the central bolts on the inlet and exhaust adjustment units.

Secure special tool **11 4 283** to cylinder head with bolts (1).

NOTE: Fit special tool 11 4 282 underneath on side of inlet camshaft.

Mount special tool **11 4 281** on inlet and exhaust camshafts.

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

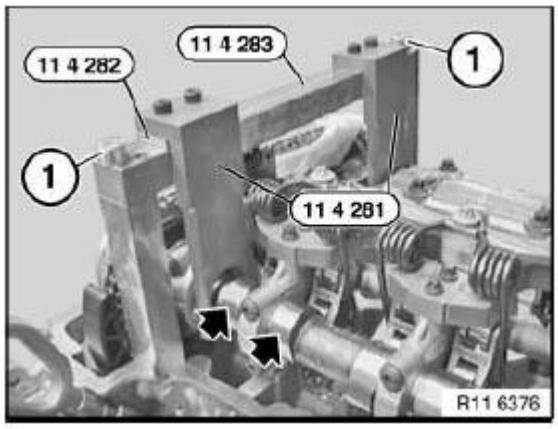

Fig. 250: Securing Special Tool 11 4 283 To Cylinder Head With Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Remove inlet and exhaust adjustment unit.

Release bolts (1) from timing chain module on cylinder head.

Tightening torque **11 31 3AZ** .

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

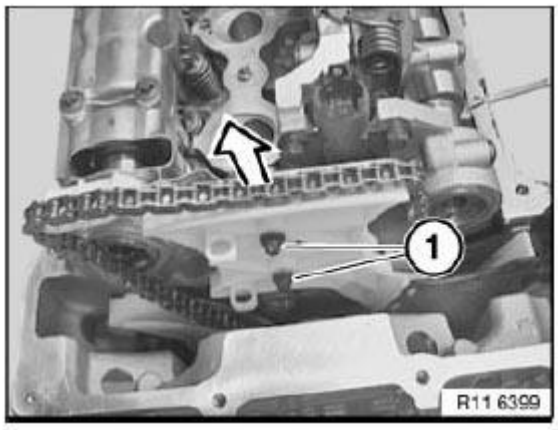

Fig. 251: Identifying Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Note installation direction of sprocket wheel (2).
Collar (see arrow) on sprocket wheel (2) points to engine.

Incorrect assembly will result in engine damage.

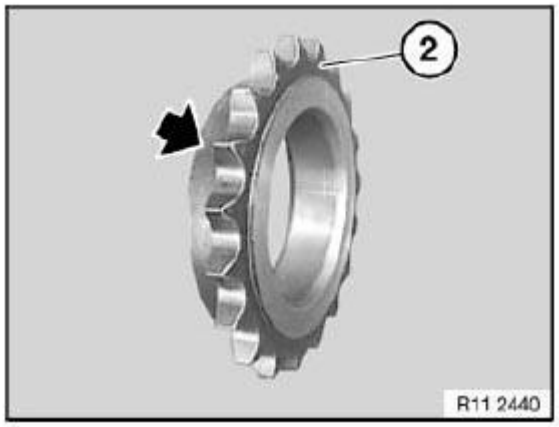

Fig. 252: Identifying Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Pull timing chain (1) upwards until sprocket wheel (2) engages chain guide (3).

Install timing chain (1) and sprocket wheel (2) in this position.

Installation:

Always hold timing chain (1) under tension. Timing chain (1) may jam on chain guide (3).

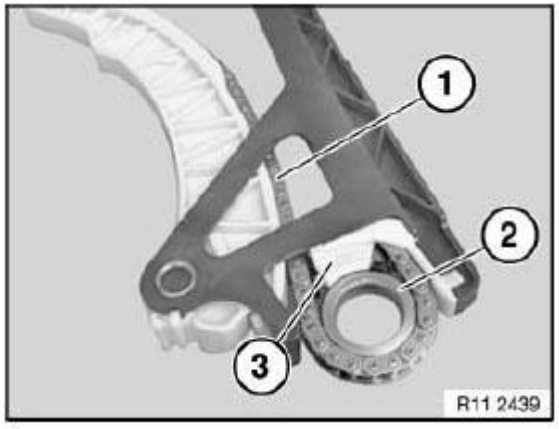

Fig. 253: Identifying Timing Chain, Chain Guide And Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Install hub with central bolt.

Tighten down special tool **11 5 200** with screws (1) to hub.

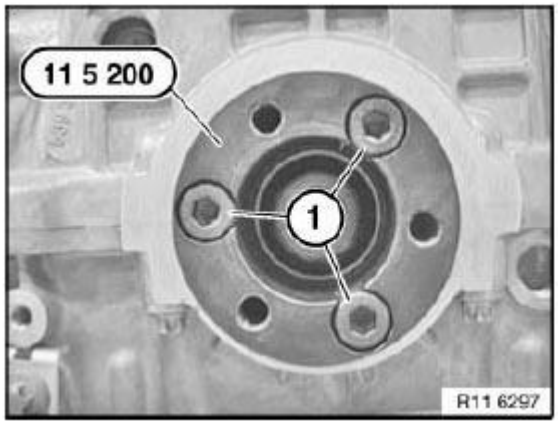

Fig. 254: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove tensioner for drive belt.

Screw in special tool **11 4 362** from special tool kit **11 4 360** .

Mount special tool **11 9 280** on **11 5 200** .

Support special tool **11 9 280** on special tool **11 4 362** .

Special tool **11 0 300** secures crankshaft.

Tighten central bolt to jointing torque.

Tightening torque **11 21 1AZ** .

Mark central bolt and hub with paint.

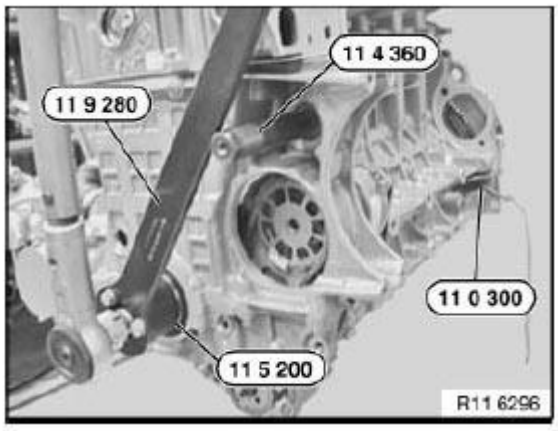

Fig. 255: Identifying Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Mark special tools with colored line (1).

See picture.

IMPORTANT: Do not remove the special tool while tightening the central bolt to torsion angle.
Risk of damage!

If necessary, tighten central bolt to torsion angle with special tool **00 9 140** .

Tightening torque **11 21 1AZ** .

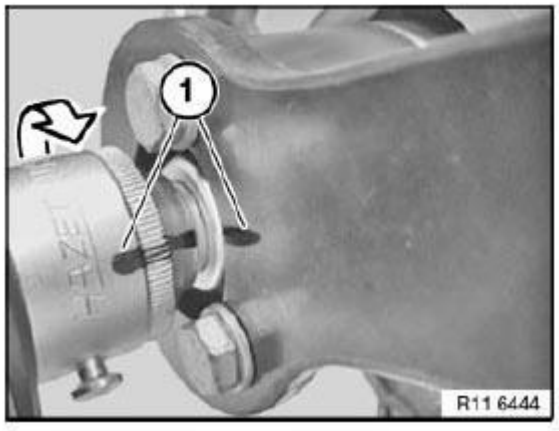

Fig. 256: Identifying Special Tools With Colored Line
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten central bolt with a second person helping.

Tightening torque **11 21 1AZ** .

Install inlet and exhaust adjustment units.

Install **CHAIN TENSIONER**.

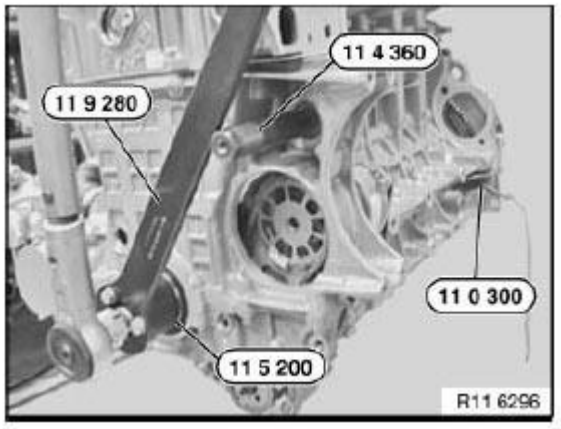

Fig. 257: Identifying Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine twice.

Check **TIMING**.

If necessary, adjust **VALVE TIMING**.

Assemble engine.

11 31 090 INSTALLING AND REMOVING/REPLACING CHAIN TENSIONER PISTON (N52K)

Release chain tensioner (1).

Tightening torque **11 31 6AZ** .

IMPORTANT: Have a cleaning cloth ready. A small quantity of engine oil will emerge after the screw connection has been released.
Make sure no engine oil runs onto belt drive.

Installation:

No sealing ring is fitted during series-production assembly.

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

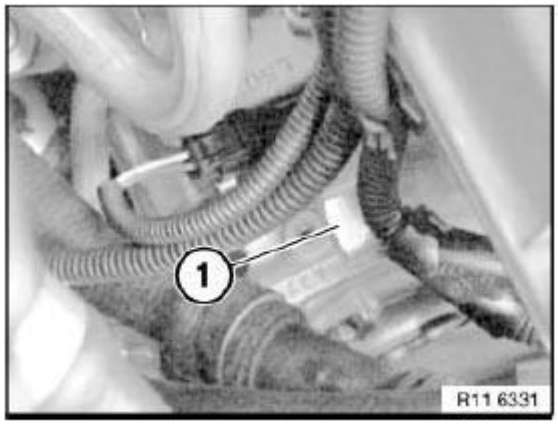

Fig. 258: Identifying Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

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. 259: Identifying Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 505 ADJUSTING TIMING OF CAMSHAFT(S) (N52K)

Special tools required:

- **00 9 120**
- **00 9 250**
- **11 0 300**
- **11 4 280**

- **11 4 281**
- **11 4 282**
- **11 4 283**
- **11 4 290**
- **11 9 340**

Necessary preliminary tasks:

- Remove **cylinder head cover**

Remove fastener (1) in direction of arrow.

Installation:

Install fastener (1) with bore facing outwards.

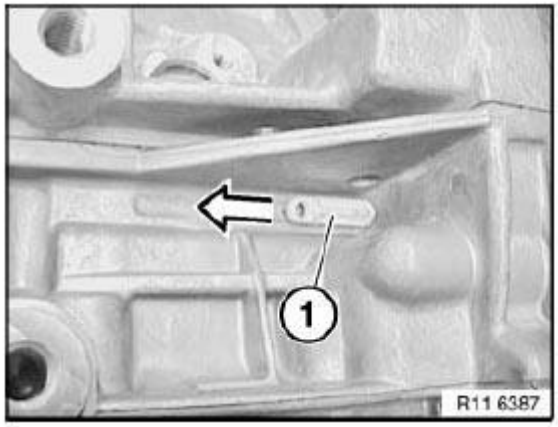

Fig. 260: Identifying Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate crankshaft at central bolt into TDC position.

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

IMPORTANT: On vehicles with optional extra SA205 (automatic transmission), there is a large bore for the TDC position shortly before the special tool bore. This bore can be confused with the special tool bore.

If the flywheel is secured in the correct special tool bore with special tool **11 0 300** , the engine can no longer be moved at the central bolt.

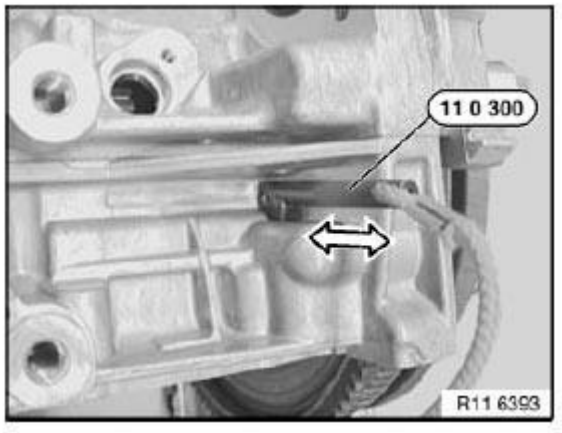

Fig. 261: Identifying Special Tool 11 0 300
Courtesy of BMW OF NORTH AMERICA, INC.

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

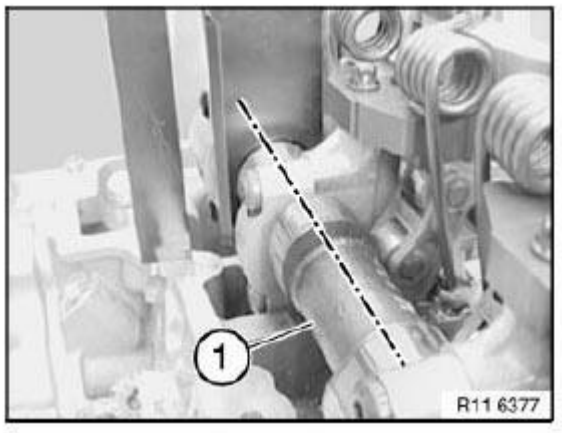

Fig. 262: Identifying Inlet Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Part numbers (2) on inlet and exhaust camshafts (1) point upwards.

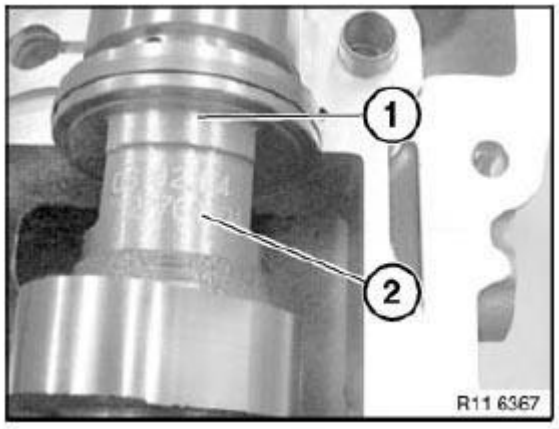

Fig. 263: Identifying Part Numbers And Exhaust Camshafts
Courtesy of BMW OF NORTH AMERICA, INC.

With 1st cylinder in firing TDC position, cams of exhaust camshaft (3) at 6th cylinder point downwards at an angle.

Cam follower (1) is not actuated.

NOTE: When the engine is installed, the position of the exhaust camshaft (3) for the timing can only be checked with a mirror.

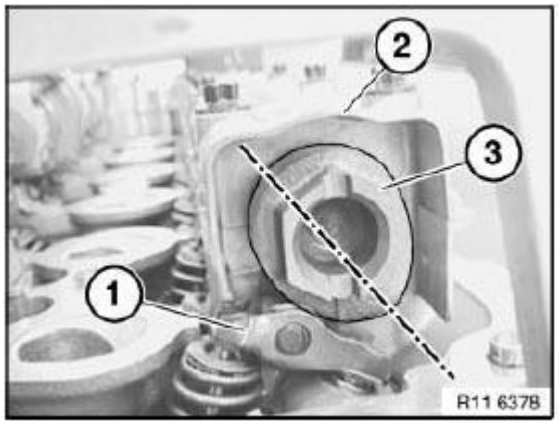

Fig. 264: Identifying Cam Follower And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **114 283** to cylinder head with bolts (1).

NOTE: Fit special tool 11 4 282 underneath on side of inlet camshaft.

Mount special tool **11 4 281** on inlet and exhaust camshafts.

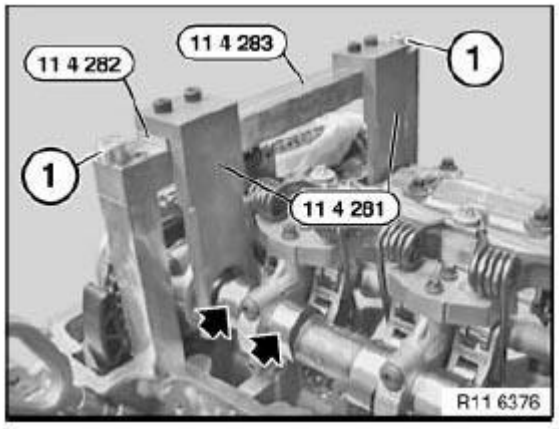

Fig. 265: Securing Special Tool 11 4 283 To Cylinder Head With Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Release central bolts (1).

Release central bolts (1) with special tool **11 4 280** only.

Release chain tensioner (2) (have a cleaning cloth ready).

NOTE: Picture in CAD and does not show special tools.

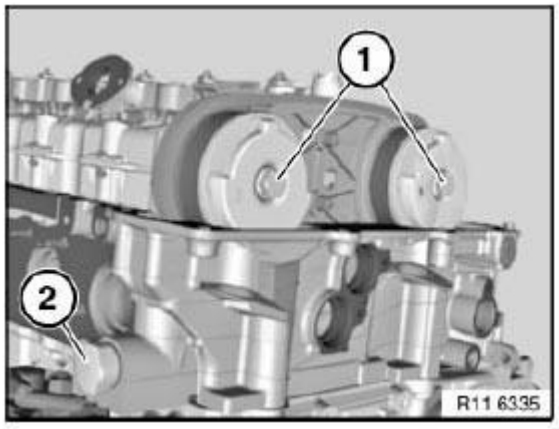

Fig. 266: Identifying Chain Tensioner And Central Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Turn sensor gears (2) in direction of arrow until locating pins (1) on special tool **11 4 290** match up.

Slide on special tool **11 4 290** in direction of arrow.

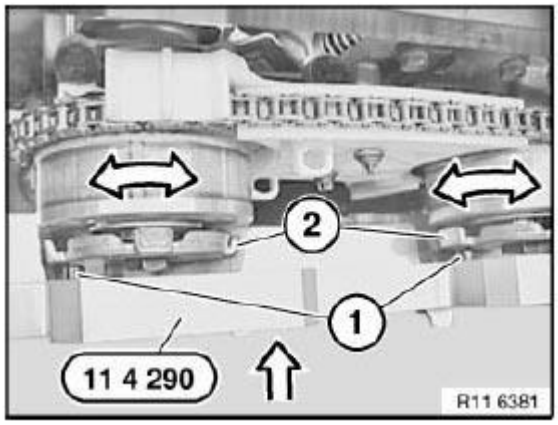

Fig. 267: Identifying Sensor Gears And Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **11 4 290** with bolts (1).

Screw special tool **11 9 340** into cylinder head.

Pretension timing chain with special tool **00 9 250** to **0.6 Nm** .

Secure both central bolts of inlet and exhaust adjustment units with special tool **00 9 120** to inlet and exhaust camshafts.

Tightening torque **11 36 1AZ** .

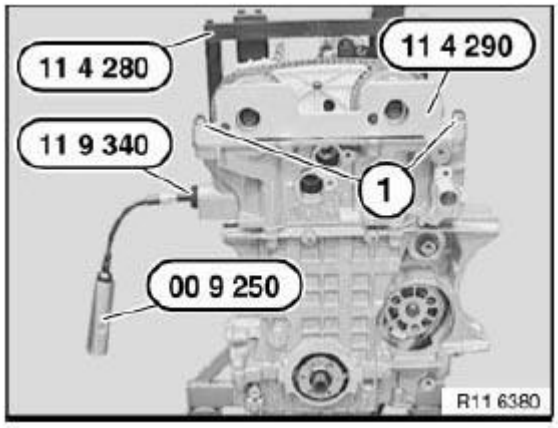

Fig. 268: Identifying Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

33 ROCKER ARM WITH BEARING MOUNT

11 33 050 REMOVING AND INSTALLING/REPLACING ALL ROCKER ARMS (N52K)

Special tools required:

- **11 4 480**

Necessary preliminary tasks:

- Remove **cylinder head cover**
- Remove **INTERMEDIATE LEVER**
- Remove **EXHAUST CAMSHAFT**.

IMPORTANT: Rocker arms (1) are divided into bearing categories.
The tolerance classes are marked according to the picture in numbers from 1 to 5.
Already used rocker arms (1) may only be reused in the same position.

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

Set down all cam followers (1) in neat order in special tool **11 4 480** .

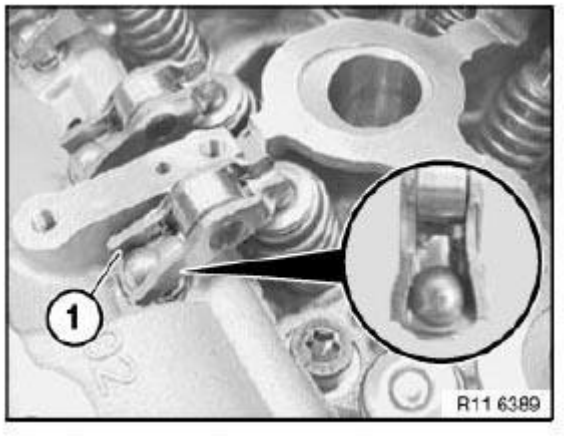

Fig. 269: Identifying Cam Followers
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Before installing exhaust camshaft or intermediate levers, make sure cam followers (1) are correctly seated.

Remove HVCA element (1) in direction of arrow.

Installation:

If the HVCA elements (1) are reused, they must be placed together with the cam followers in neat order in special tool **11 4 480** .

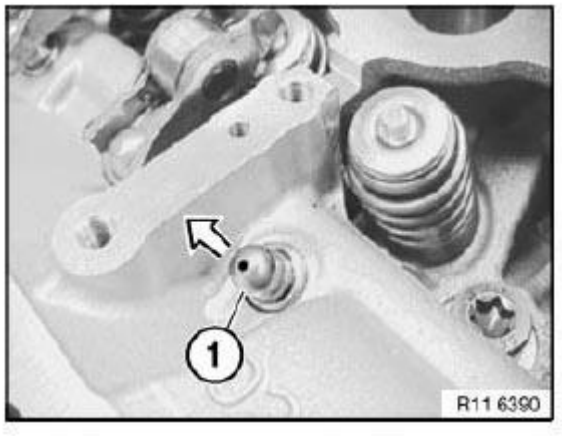

Fig. 270: Identifying HVCA Elements
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME; if necessary, readjust uniform mixture distribution.

34 VALVES WITH SPRINGS

11 34 552 REMOVING AND INSTALLING/REPLACING ALL VALVES (N52K)

Special tools required:

- **11 4 480**

Necessary preliminary tasks:

- Remove **CYLINDER HEAD**.
- Remove **INTERMEDIATE LEVER**
- Remove **ECCENTRIC SHAFT**
- Remove **INLET CAMSHAFT**
- Remove **EXHAUST CAMSHAFT**.
- Remove **CAM FOLLOWERS**
- Remove **VALVE SPRINGS**
- Remove **VALVE STEM SEALS**

Arrangement:

1. Valve
2. Valve stem seal with lower spring plate
3. Valve spring
4. Upper spring plate

5. Valve tapers

If the valves are to be reused, they must be placed in neat order in special tool **11 4 480** .

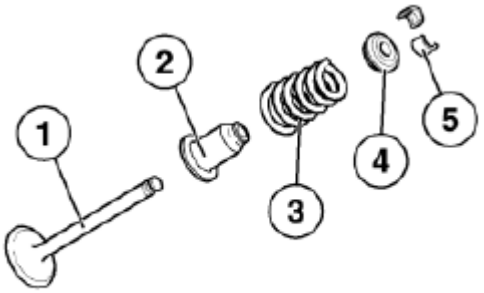

Fig. 271: Identifying Valve Components
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME; if necessary, readjust uniform mixture distribution.

11 34 560 REPLACING ALL VALVE STEM SEALS (N52K)

Special tools required:

- **11 1 480**
- **11 6 380**

Necessary preliminary tasks:

- Remove **CYLINDER HEAD**.
- Remove **INTERMEDIATE LEVER**
- Remove **ECCENTRIC SHAFT**
- Remove **INLET CAMSHAFT**
- Remove **EXHAUST CAMSHAFT**.
- Remove **CAM FOLLOWERS**

Firmly press special tool **11 1 480** onto old valve stem seals.

Detach valve stem seal from valve stem by turning and simultaneously pulling special tool **11 1 480** .

Installation:

Insert all **VALVES**.

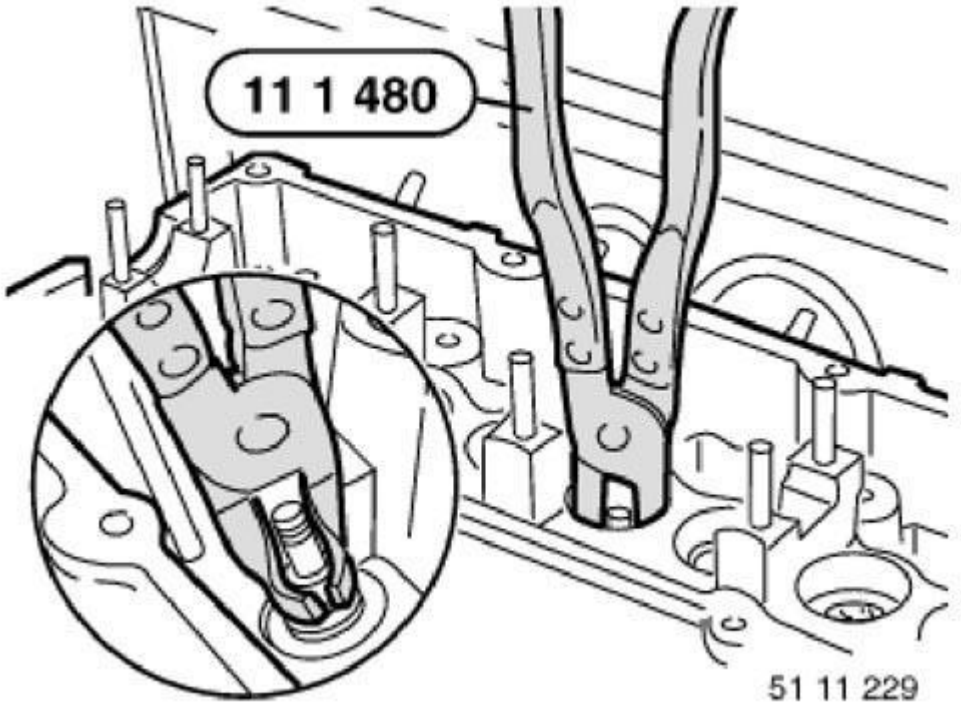

Fig. 272: Pressing Special Tool 11 1 480 Onto Old Valve Stem Seals
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For use on the N52K engine, special tool 11 6 380 must be remachined according to the picture with a 10 mm dia. drill bit to a depth of B = approx. 23 mm.
This modification has already been taken into account for reordering.

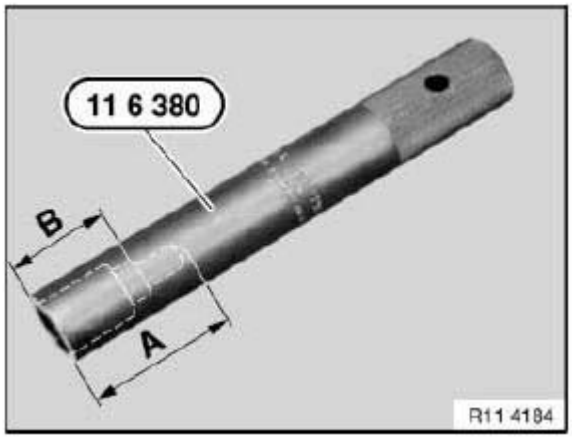

Fig. 273: Identifying Special Tool 11 6 380
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Different diameters at valve stem.
All valve stem seals are colour-coded.

For 5 mm dia. valves, the valve stem seal is marked red or brown.

For 6 mm dia. valves, the valve stem seal is marked green or light green.

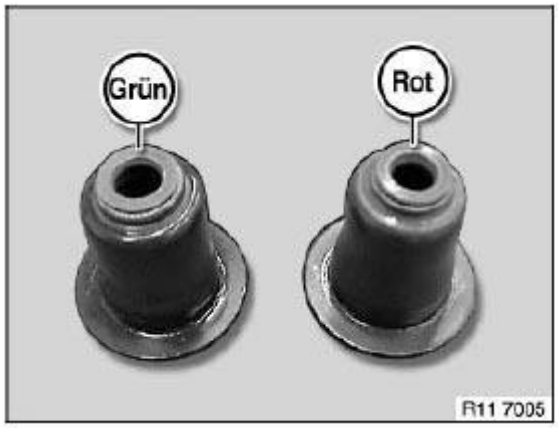

Fig. 274: Identifying Valve Stem Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit the mounting sleeves (plastic sleeves) contained in the delivery specification on the valve stem end.

Lubricate mounting sleeve.

Press on valve stem seal by hand with special tool **11 6 380** as far as it will go.

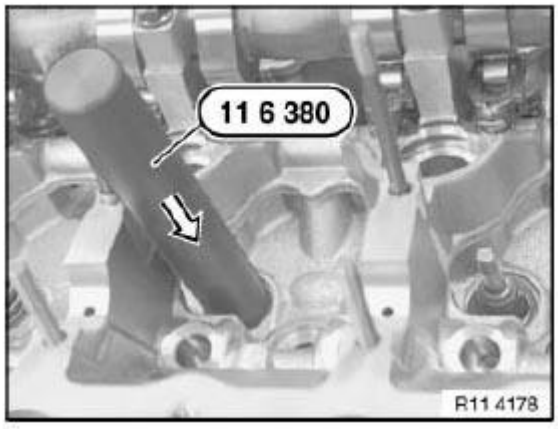

Fig. 275: Identifying Special Tool 11 6 380
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 34 715 REPLACING ALL VALVE SPRINGS (N52K)

Special tools required:

- **11 0 346**
- **11 4 480**
- **11 9 000**
- **11 9 017**

Necessary preliminary tasks:

- Remove **CYLINDER HEAD**.
- Remove **EXHAUST CAMSHAFT**.
- Remove **INTERMEDIATE LEVER**
- Remove **INLET CAMSHAFT**
- Remove **CAM FOLLOWERS**

Place cylinder head on special tool **11 9 000** .

Press down **inlet valves** with special tool **11 9 017** .

Press down **exhaust valves** with special tool **11 0 346** .

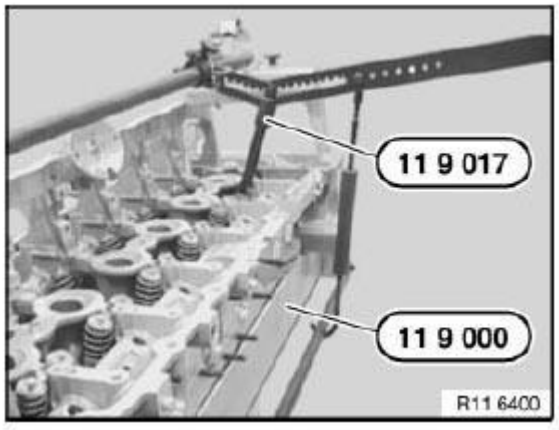

Fig. 276: Identifying Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Remove valve cotters with a magnet.

Remove valve spring with spring plates.

If the individual components are to be reused, they must be placed in neat order in special tool **11 4 480** .

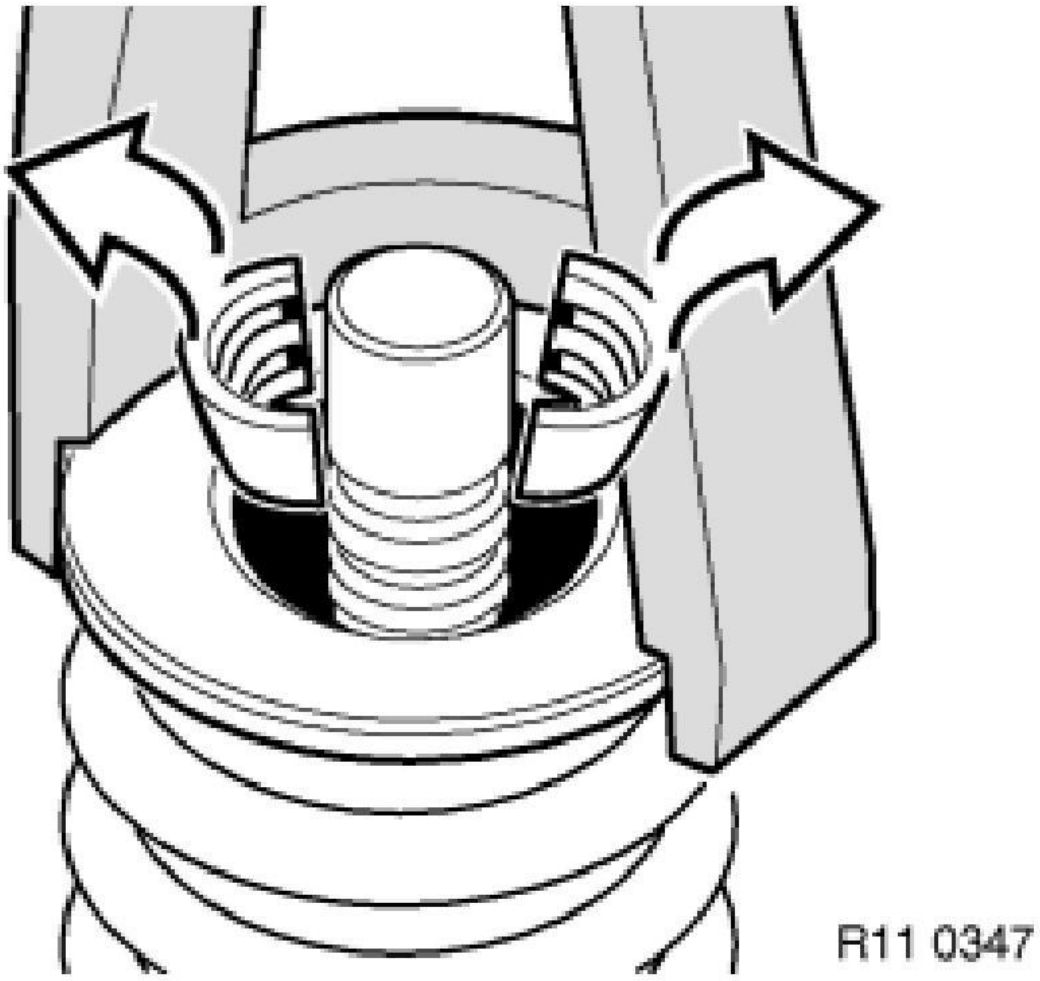

Fig. 277: Removing Valve Cotters With Magnet
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect installation possible.
Incorrect installation will result in valve spring breakage.
Risk of mixing up the valve springs for the inlet and exhaust valves.

The valve spring is colour-coded (1) at the lower end.

Install the valve spring so that the larger diameter points to the lower spring plate.

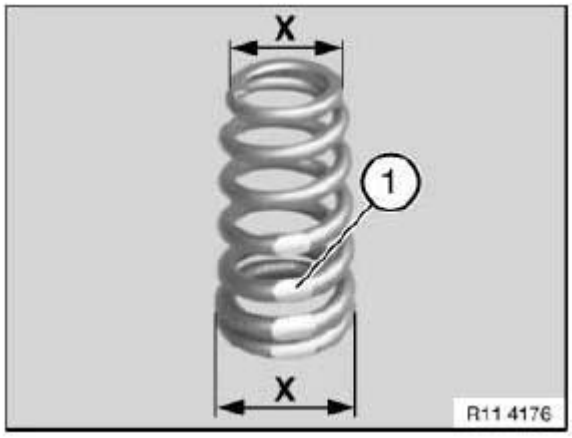

Fig. 278: Identifying Colour-Coded Of Valve Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement:

1. Valve
2. Valve stem seal with lower spring plate
3. Valve spring
4. Upper spring plate
5. Valve tapers

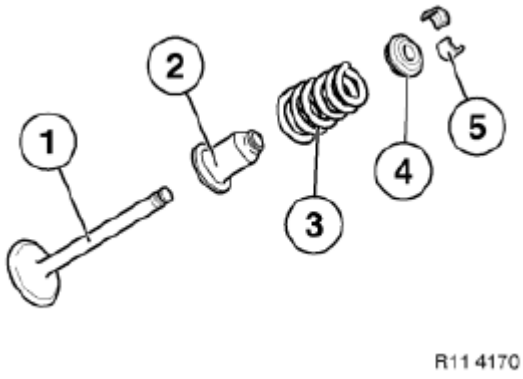

Fig. 279: Identifying Valve Components
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME; if necessary, readjust uniform mixture distribution.

37 VARIABLE VALVE GEAR

11 37 005 REMOVING AND INSTALLING/REPLACING ECCENTRIC SHAFT (N52K)

Special tools required:

- **11 4 481**

Necessary preliminary tasks:

- Remove **cylinder head cover**
- Remove **INTERMEDIATE LEVER**

If necessary, move eccentric shaft (1) on twin surface to minimum lift (2).

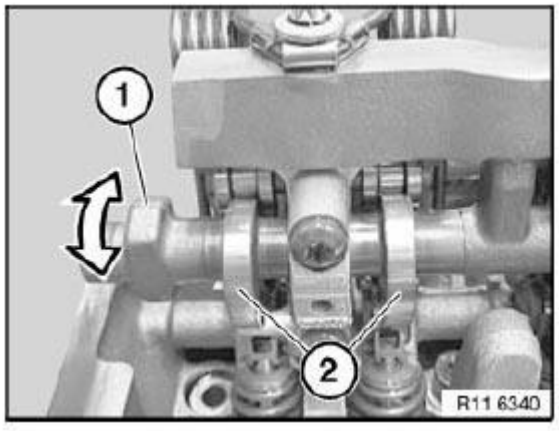

Fig. 280: Identifying Eccentric Shaft And Lift
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: All bearing caps (1 and 2) of eccentric shaft are marked with numbers from 1 to 6 (1 for 1st cylinder to 6 for 6th cylinder).
Bearing cap 6 (1) is provided with a stop.

Release screws on bearing cap 6 (1).

Release screws on bearing caps 1 to 5 (2).

Set all bearing caps down in special tool **11 4 481** in a tidy and orderly fashion.

Remove eccentric shaft with gentle tilting and turning movements.

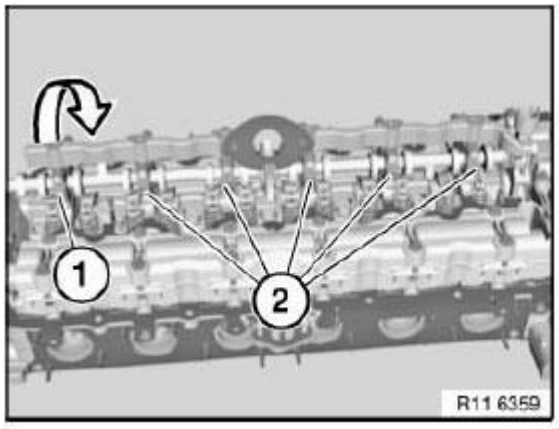

Fig. 281: Identifying Bearing Caps
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Screw is not magnetic and must be secured against falling down.

Release screw.

Remove magnet wheel (1).

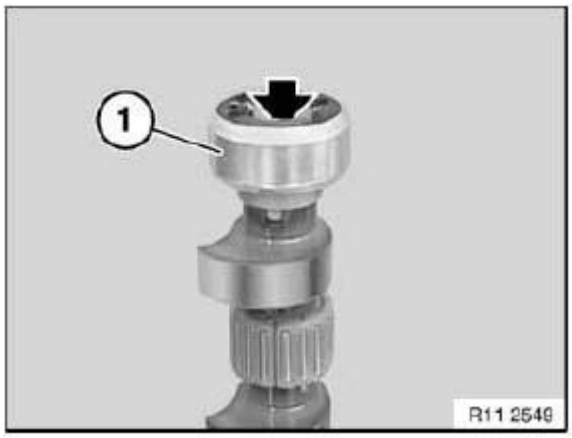

Fig. 282: Identifying Magnet Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Magnet wheel (1) is highly magnetic and must be protected against metal filings/borings.

After removing, place magnet wheel (1) in a plastic bag (2) with a seal.

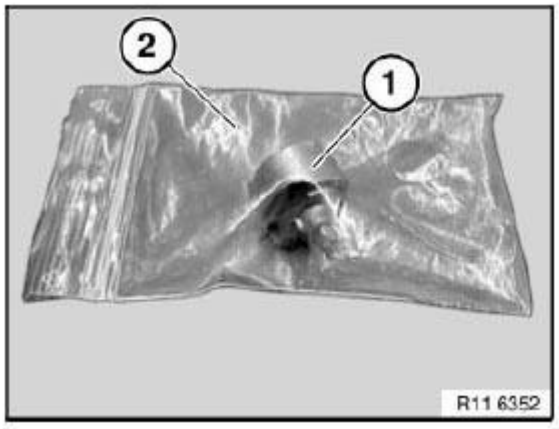

Fig. 283: Placing Magnet Wheel In Plastic Bag
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Needle bearing (1) can break very easily.

Carefully pull needle bearing (1) apart at point of separation.

Remove all needle bearings (1) from eccentric shaft.

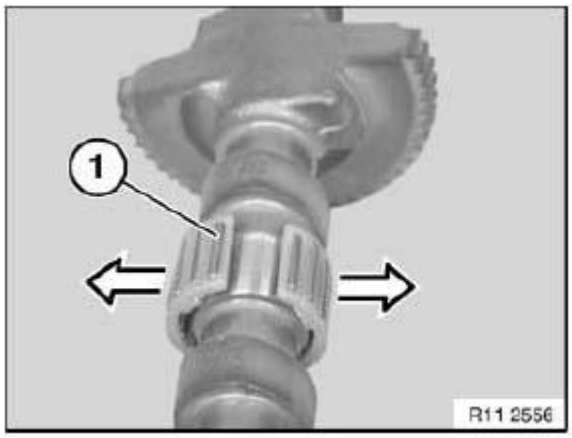

Fig. 284: Identifying Needle Bearings
Courtesy of BMW OF NORTH AMERICA, INC.

Install bearing shells (1) as pictured.

NOTE: Always replace bearing shells (1) and needle bearings together.

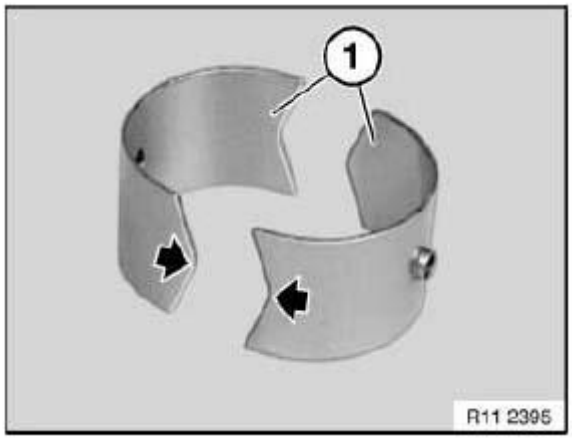

Fig. 285: Identifying Bearing Shells
Courtesy of BMW OF NORTH AMERICA, INC.

Install bearing shell (1) with tip facing down (see arrow) in cylinder head.

Install bearing shell (2) with tip facing up in bearing cap.

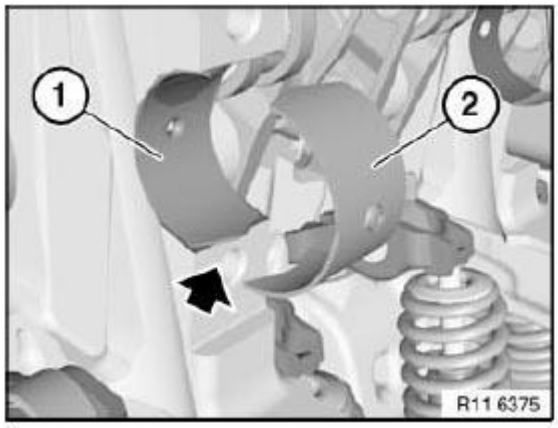

Fig. 286: Identifying Bearing Shells
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: All bearing caps (1 and 2) of eccentric shaft are marked with numbers from 1 to 6 (1 for 1st cylinder to 6 for 6th cylinder).
Bearing cap 6 (1) is provided with a stop.

Insert eccentric shaft.

Adjust eccentric shaft on dihedron to minimum stroke.

Fit all bearing caps (1 and 2).

Insert all screws.

Tightening torque **11 12 7AZ** .

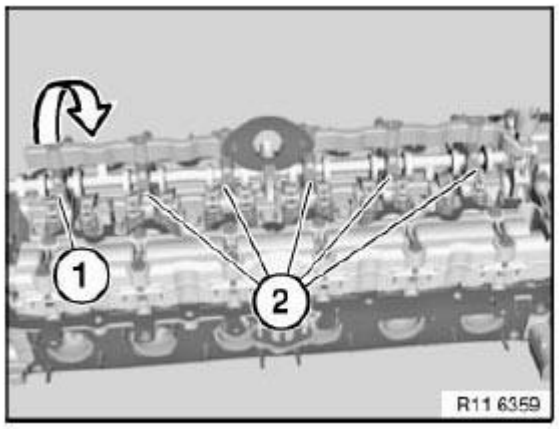

Fig. 287: Identifying Bearing Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 37 010 REMOVING AND INSTALLING/REPLACING INTERMEDIATE LEVERS (N52K)

Special tools required:

- **11 4 270**
- **11 4 450**
- **11 4 481**
- 11 7 110

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released.
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

NOTE: There are 2 different versions of the gate

IMPORTANT: Establish size of gates.

Version 1 Size 55.2 mm

Version 2 Size 58 mm

Version 1

Size (1) 55.2 mm

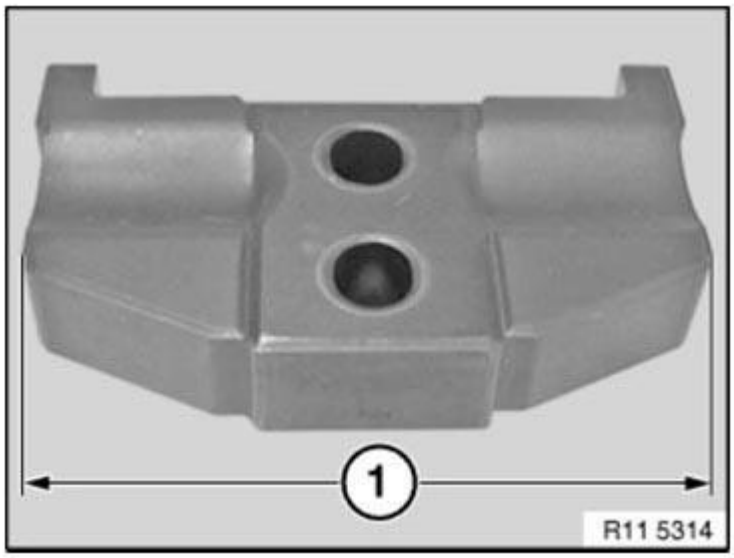

Fig. 288: Identifying Guide Block Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Remove cylinder head cover

If necessary, move eccentric shaft (1) on twin surface to minimum lift (2).

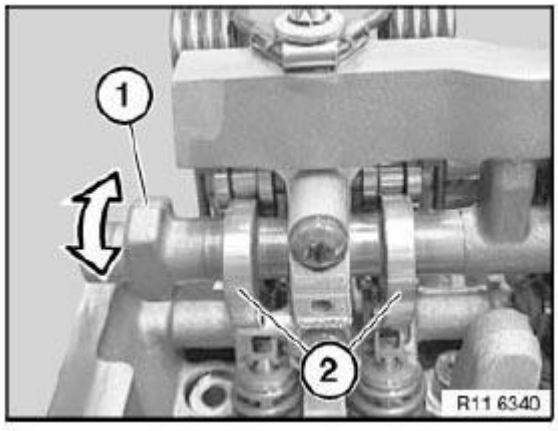

Fig. 289: Identifying Eccentric Shaft And Lift
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Oil spray nozzle must be removed from 3rd cylinder (make a note of installation position of oil spray nozzle).

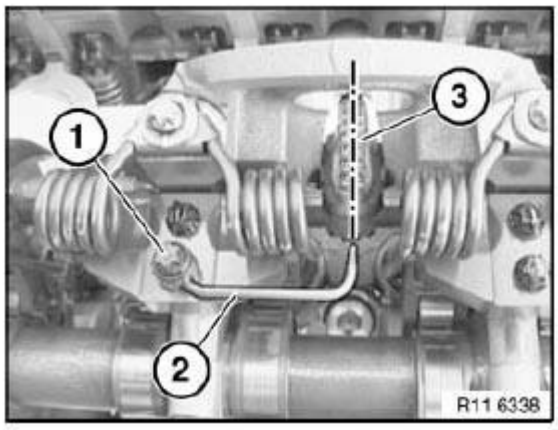

Fig. 290: Identifying Screw With Oil Spray Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **114270** with gripping pliers (3) to guide block (2).

IMPORTANT: Special tool 11 4 270 is only secured to guide block (2). Adjusting the gripping pliers (3) on special tool 11 4 270 is not permitted. Risk of damage!

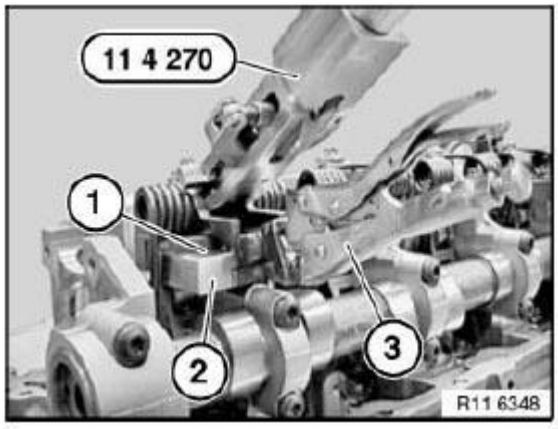

Fig. 291: Securing Special Tool 114270 With Gripping Pliers To Guide Block
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury in event of incorrect use.

IMPORTANT: Improper handling. Risk of damage!

Secure both bearing pins (2) in torsion springs with knurled screw (1) of special tool **11 4 270** .

Press special tool **11 4 270** in direction of arrow as far as it will go.

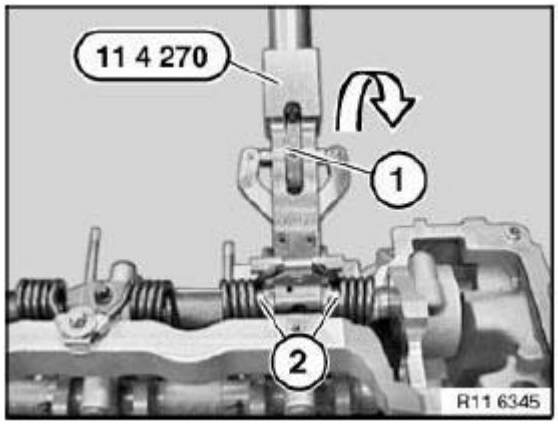

Fig. 292: Identifying Bearing Pins And Knurled Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (2) of torsion spring.

Tightening torque **11 37 2AZ** .

To avoid jamming of screw (2) with torsion spring, it is necessary when releasing screw (2) to relieve the pretension on special tool **11 4 270** uniformly.

IMPORTANT: Thread on cylinder head. Risk of damage!

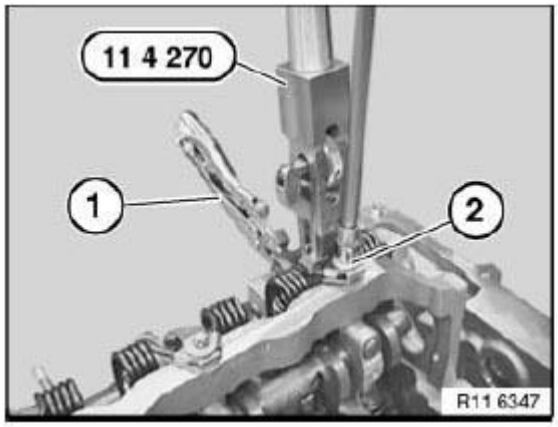

Fig. 293: Identifying Special Tool 11 4 270
Courtesy of BMW OF NORTH AMERICA, INC.

Relieve tension on torsion spring (1) with special tool **11 4 270** .

NOTE: Metal lug (2) cannot be disassembled and must not be removed.

Installation:

Replace torsion spring (1) if metal lug (2) is faulty.

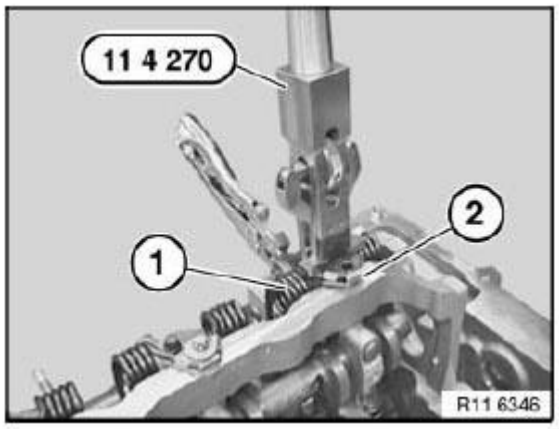

Fig. 294: Identifying Special Tool 11 4 270
Courtesy of BMW OF NORTH AMERICA, INC.

Press torsion spring apart at positions (1).

Remove torsion spring towards top.

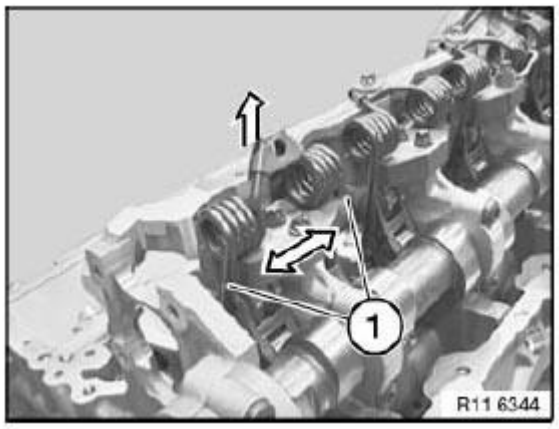

Fig. 295: Pressing Torsion Spring
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Uniform distribution must not be changed.
Place all components in clean and neat order in special tool 11 4 481 .

All components must be reinstalled in the same positions in an engine which has already been in use.

1. Eccentric shaft with bearing
2. Bearing caps of eccentric shaft (set out in order)
3. Inlet camshaft
4. Bearing caps of inlet camshaft (set out in order)
5. Inlet valves with valve springs
6. Valve plates and valve cotters
7. Cam followers with HVCA elements (set out in order)
8. Torsion springs
9. Guide blocks (set out in order)
10. Intermediate levers (set out in order)

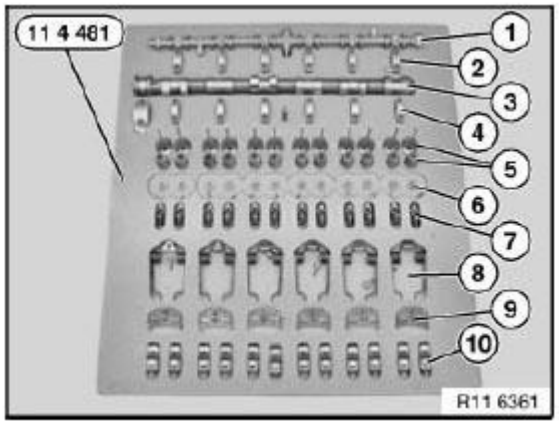

Fig. 296: Identifying Special Tool 11 4 481
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on guide block (2).

Tightening torque **11 37 1AZ** .

Place all guide blocks (2) in neat order in special tool **11 4 481** .

Installation:

Mixing up the guide blocks (2) will cause the engine to suffer idle-speed fluctuations.

This will result in maladjustment of uniform distribution .

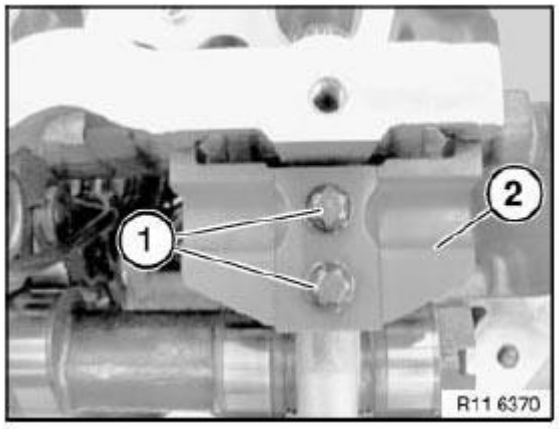

Fig. 297: Identifying Guide Blocks And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

All contact surfaces (1) of guide block must be clean and free from oil and grease. If necessary, clean contact surfaces (1).

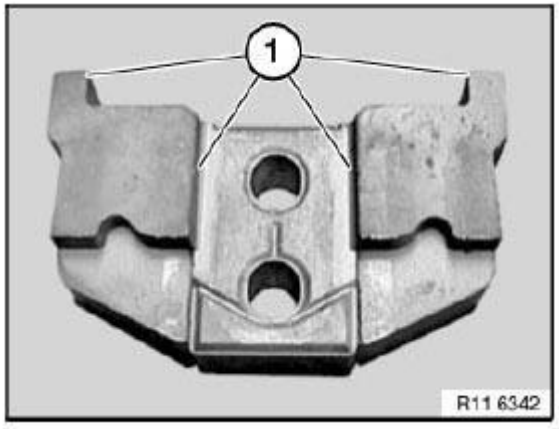

Fig. 298: Identifying Contact Surfaces Of Guide Block
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out intermediate levers (2).

Place all intermediate levers (2) in neat order in special tool **11 4 481** .

Installation:

Mixing up the intermediate levers (2) will cause the engine to suffer idle-speed fluctuations.

Installation:

All contact surfaces (1) must be clean and free from oil and grease. If necessary, clean contact surfaces (1).

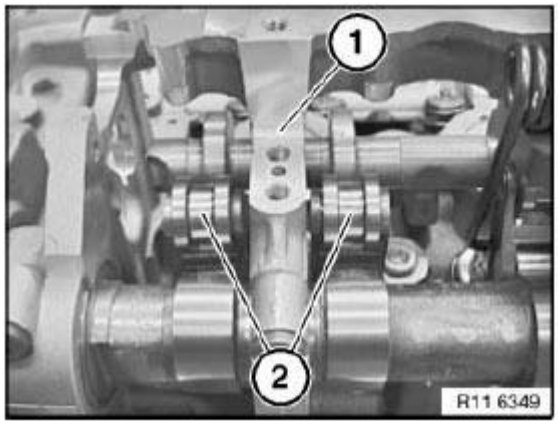

Fig. 299: Identifying Contact Surfaces And Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

All intermediate levers (1) are classified.

All intermediate levers (1) must be reinstalled in the same positions in an engine which has already been in use.

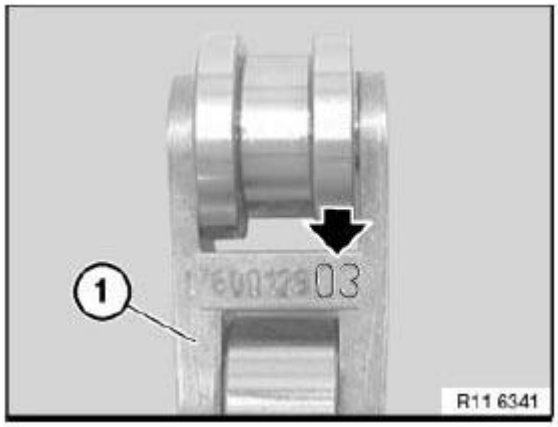

Fig. 300: Identifying Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Before installing intermediate levers (2), make sure cam followers are correctly positioned.
Risk of damage!

Install intermediate levers (2).

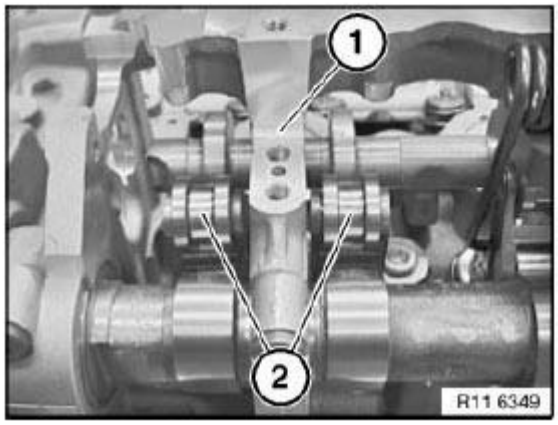

Fig. 301: Identifying Contact Surfaces And Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

Fit guide block (2) cleanly into opening.

Tighten screws (1) hand-tight.

Check that intermediate levers are in correct installation position.

Release screws (1) by a 1/4 turn.

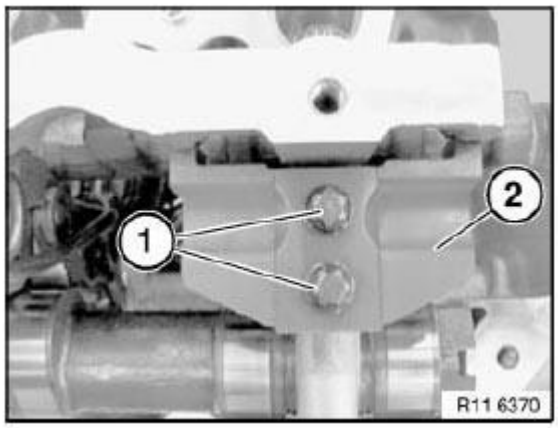

Fig. 302: Identifying Screws And Guide Block
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **11 4 450** to bolt connection (1) of eccentric shaft.

Turn eccentric lever (3) on special tool **11 4 450** in direction of arrow.

Guide block is now pretensioned.

Insert screws (2) of guide blocks.

Tightening torque **11 37 1AZ** .

Installation:

At cylinder no. 3, the guide block can be pre-installed with one screw (internal) only.

Oil spray nozzle is fitted only after torsion spring has been installed.

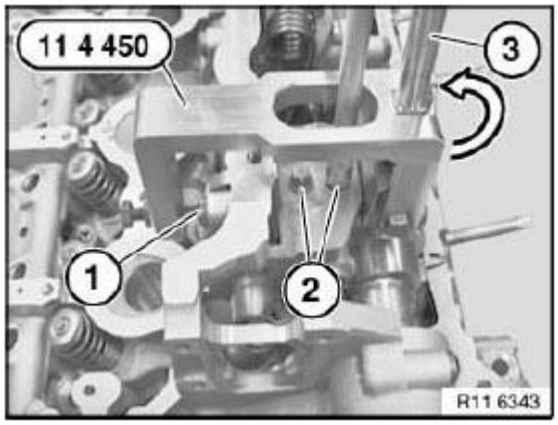

Fig. 303: Identifying Eccentric Lever, Screws And Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Install torsion spring (2) on guide block.

Installation:

Insert torsion spring (2) in intermediate lever (1) (see arrow).

Check that cam follower (3) is in correct installation position.

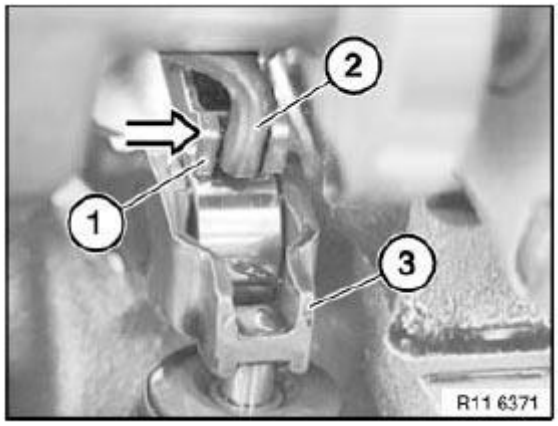

Fig. 304: Identifying Torsion Spring, Intermediate Lever And Cam Follower
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **11 4 270** with gripping pliers (3) to guide block (2).

IMPORTANT: Special tool 11 4 270 is only secured to guide block (2). Adjusting the gripping pliers (3) on special tool 11 4 270 is not permitted. Risk of damage!

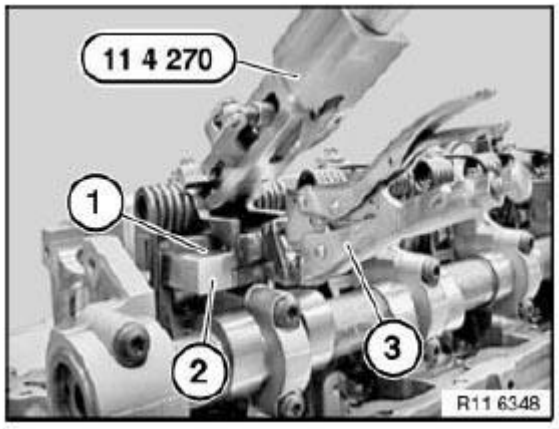

Fig. 305: Identifying Gripping Pliers, Guide Block And Special Tool 11 4 270
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury in event of incorrect use.

IMPORTANT: Improper handling. Risk of damage!

Secure both bearing pins (2) in torsion springs with knurled screw (1) of special tool **11 4 270** .

IMPORTANT: Check torsion spring on intermediate lever to ensure correct installation position.

Press special tool **11 4 270** in direction of arrow as far as it will go.

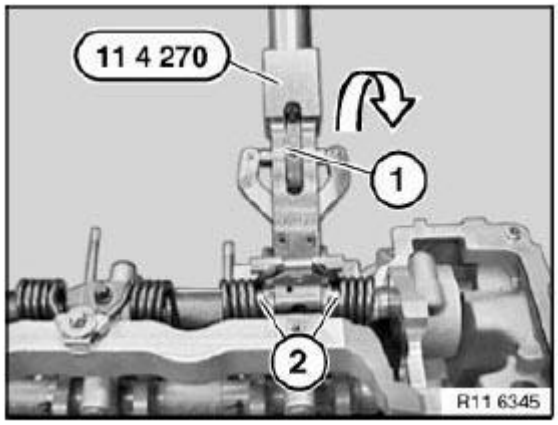

Fig. 306: Identifying Bearing Pins And Knurled Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screw (2) of torsion spring.

Tightening torque **11 37 2AZ** .

To avoid jamming of screw (2) with torsion spring, it is necessary when inserting screw (2) to increase pretension on special tool **11 4 270** uniformly.

IMPORTANT: Thread on cylinder head. Risk of damage!

Remove special tool **11 4 270** .

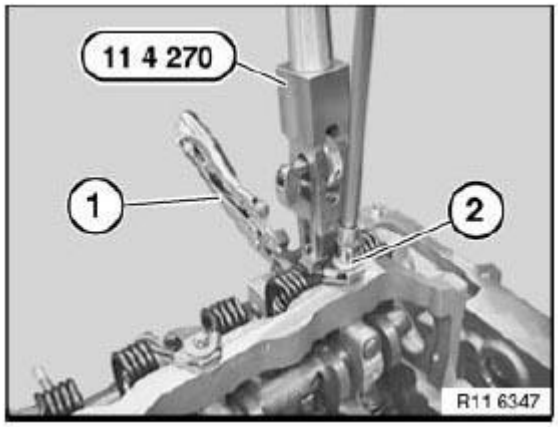

Fig. 307: Identifying Special Tool 11 4 270
Courtesy of BMW OF NORTH AMERICA, INC.

At cylinder no. 3, adjust oil spray nozzle (2) so that oil spray points precisely towards spline teeth (3).

Insert screw (1) with oil spray nozzle (2) (external).

Tightening torque **11 37 4AZ** .

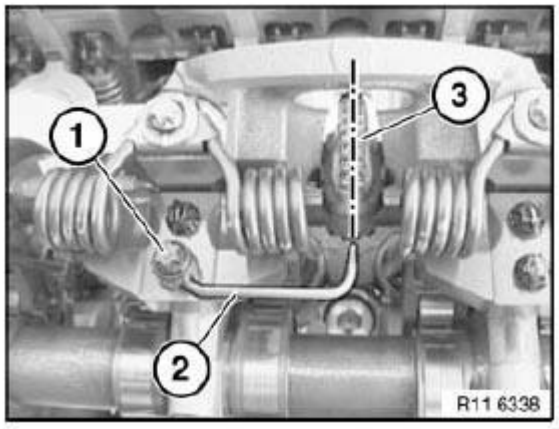

Fig. 308: Identifying Screw, Oil Spray Nozzle And Spline Teeth
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Version 2

Size (1) 58 mm

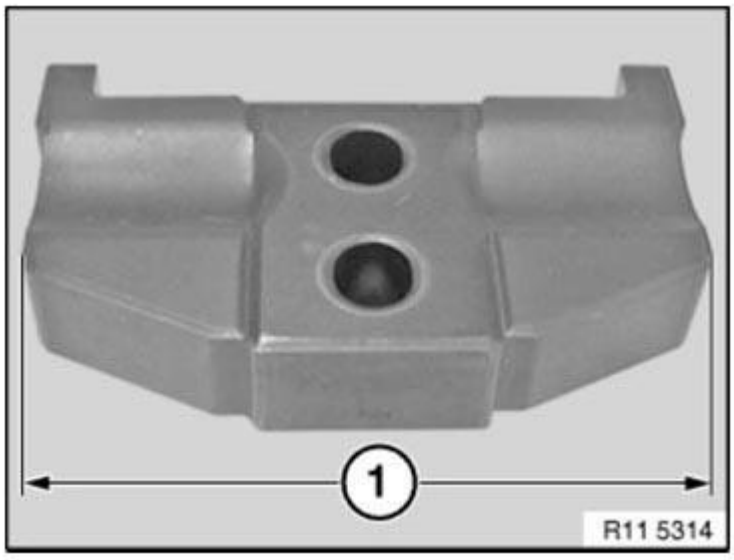

Fig. 309: Identifying Guide Block Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**

  For E81, E82, E87, E88, E90, E91, E92, E93: Remove cowl panel cover.

If necessary, move eccentric shaft (1) on twin surface to minimum lift (2).

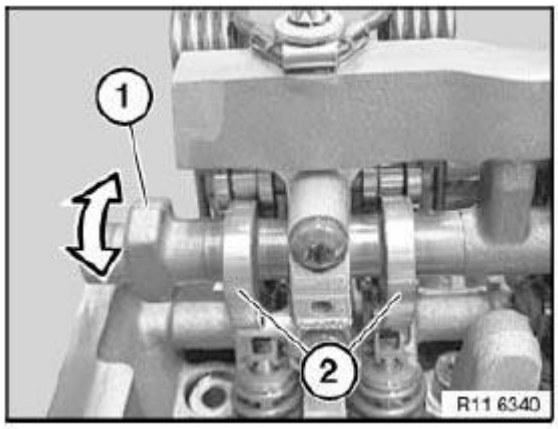

Fig. 310: Turning Eccentric Shaft To Minimum Lift
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Oil spray nozzle must be removed from 3rd cylinder (make a note of installation position of oil spray nozzle).

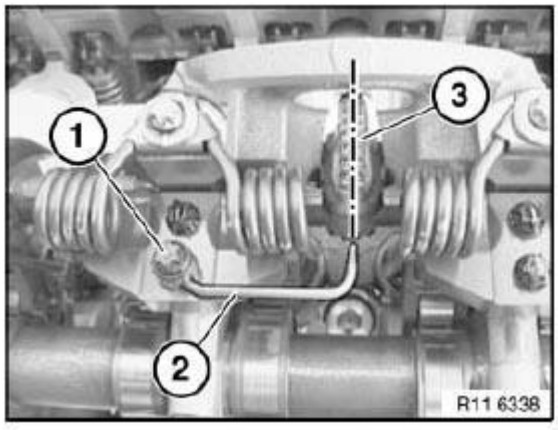

Fig. 311: Identifying Oil Spray Nozzle, Spline Teeth And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **11 7 110** on return spring (1) (see arrows).

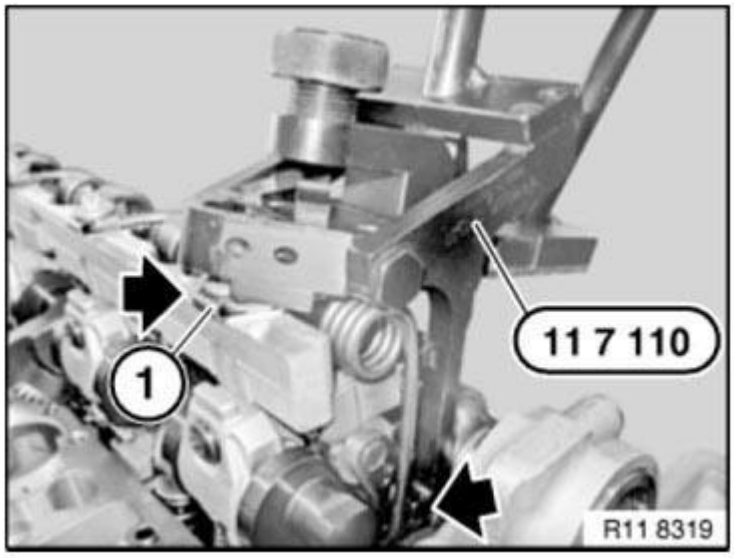

Fig. 312: Locating Special Tool (11 7 110) On Return Spring
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury in event of incorrect use.

IMPORTANT: Improper handling. Risk of damage!

Place special tool **11 7 110** flat on cylinder head.

Turn knurled screw (1) in direction of arrow until both clamping levers secure return spring in guide block.

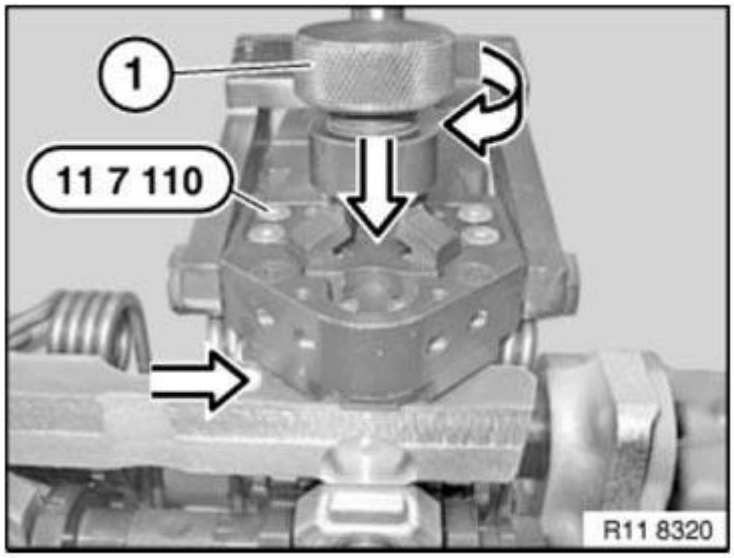

Fig. 313: Turning Knurled Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Return spring is correctly preloaded when both clamping levers are parallel to guide block.

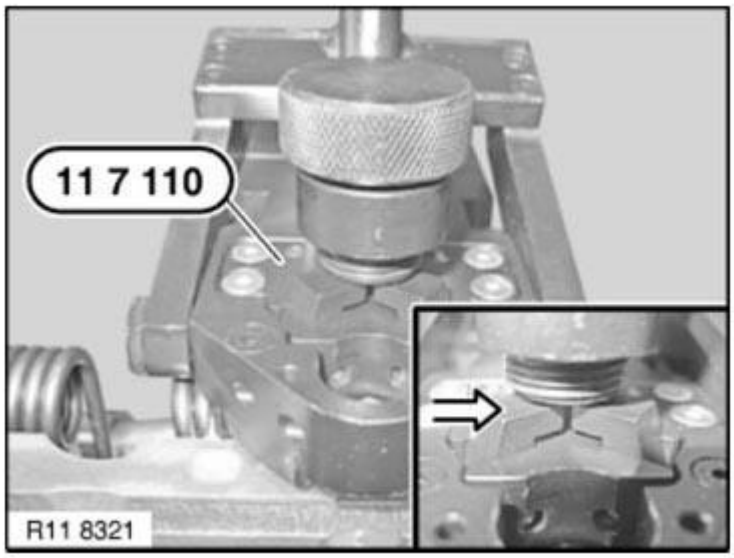

Fig. 314: Identifying Guide Block With Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Left and right return springs (1) must be positioned in lateral guide of special tool **11 7 110** .

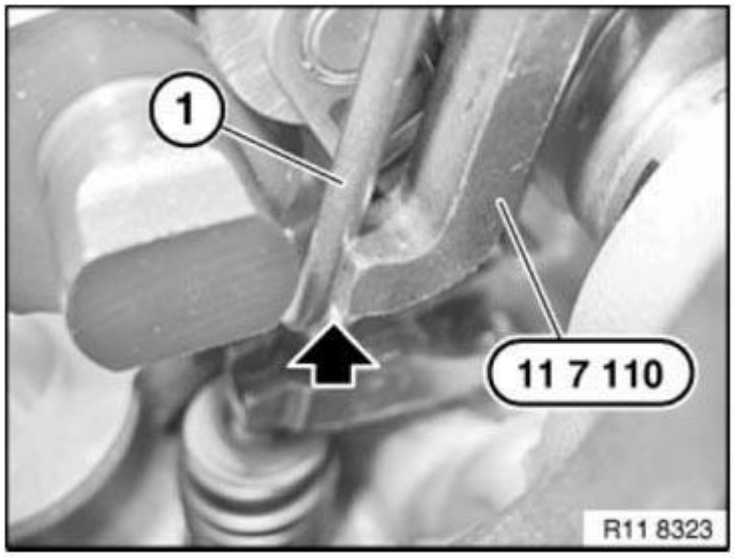

Fig. 315: Identifying Return Springs In Lateral Special Tool 11 7 110 Lateral Guide
Courtesy of BMW OF NORTH AMERICA, INC.

Preload return spring with lever (1) on special tool **11 7 110** in direction of arrow.

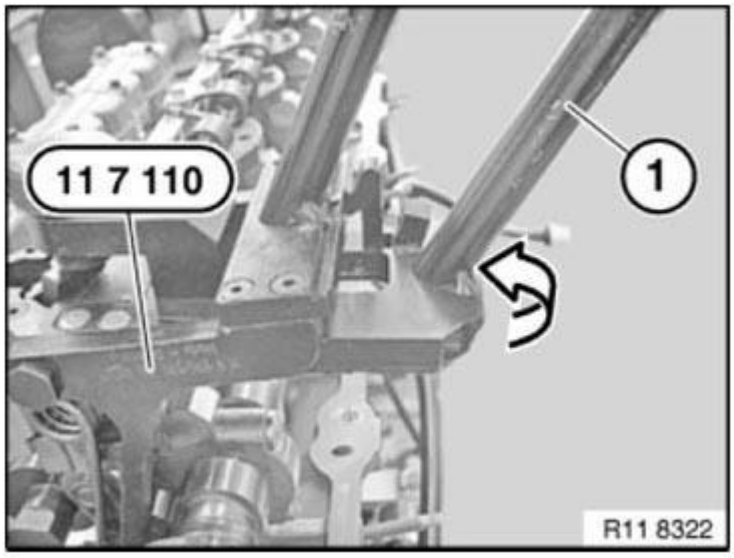

Fig. 316: Identifying Return Spring With Lever And Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

Lock special tool **11 7 110** with catch on lever (1).

IMPORTANT: Screw fixing on return spring can only be released with special tool 11 7 110 secured.

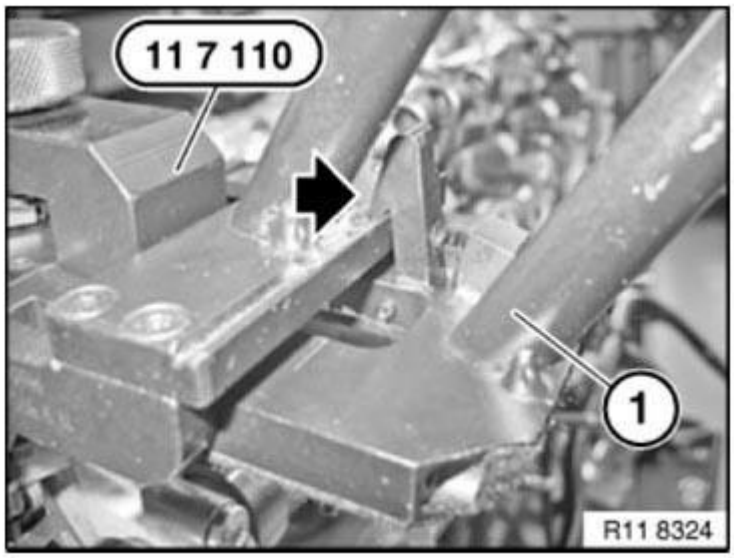

Fig. 317: Locking Special Tool 11 7 110 With Catch On Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

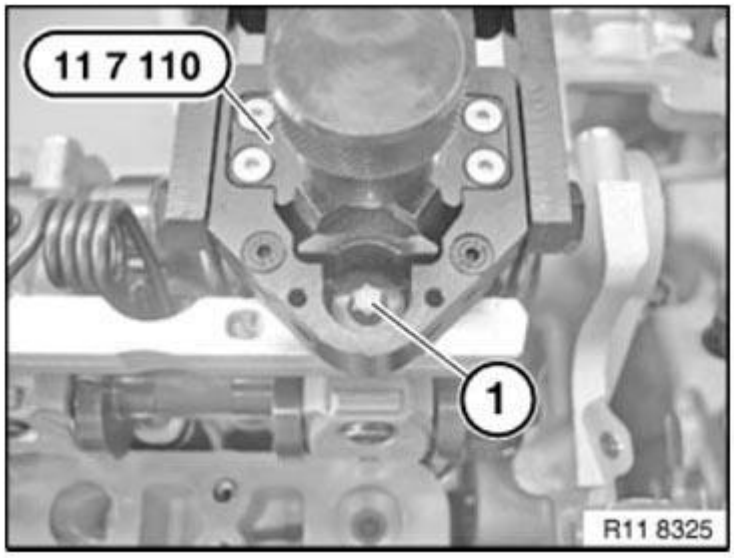

Fig. 318: Identifying Special Tool 11 7 110 And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury in event of incorrect use.

Lever (1) is under pre-tension.

IMPORTANT: Improper handling.

Risk of damage!

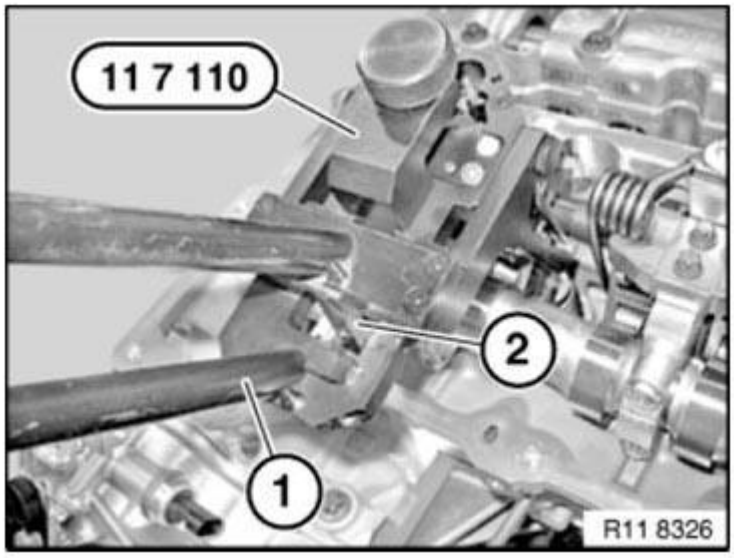

Fig. 319: Identifying Latching Hook, Lever With Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

Secure lever (1)

Press back latching hook (2).

Return spring tension can now be released.

Release knurled screw (1) on special tool **11 7 110** in direction of arrow.

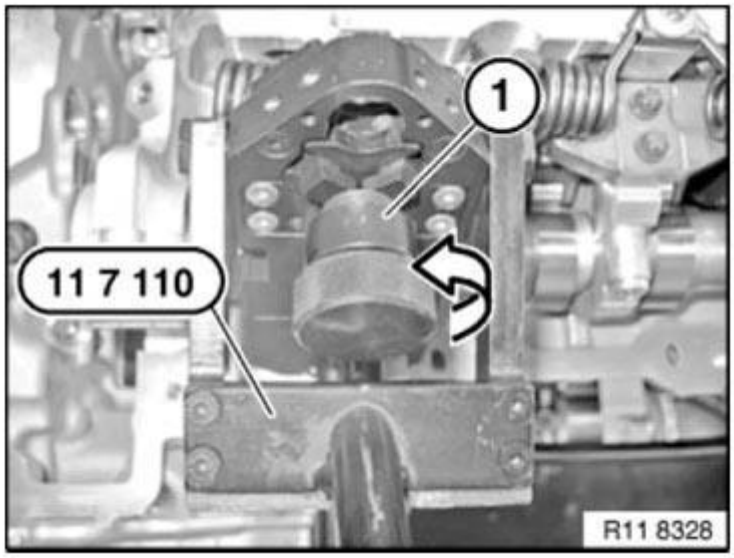

Fig. 320: Releasing Knurled Screw On Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

Release special tool **11 7 110** in direction of arrow from return spring (1).

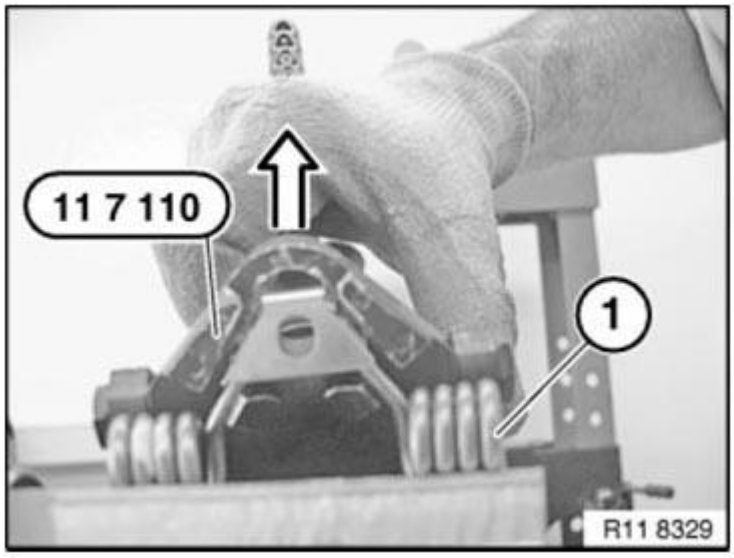

Fig. 321: Releasing Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

Press torsion spring apart at positions (1).

Remove torsion spring towards top.

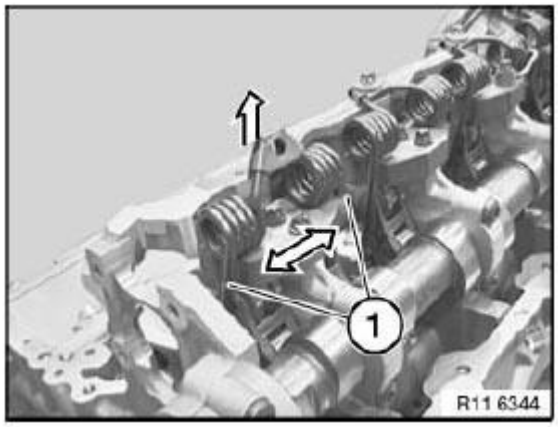

Fig. 322: Pressing Torsion Spring Apart
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Uniform distribution must not be changed.
Place all components in clean and orderly condition in special tool 11 4 481.

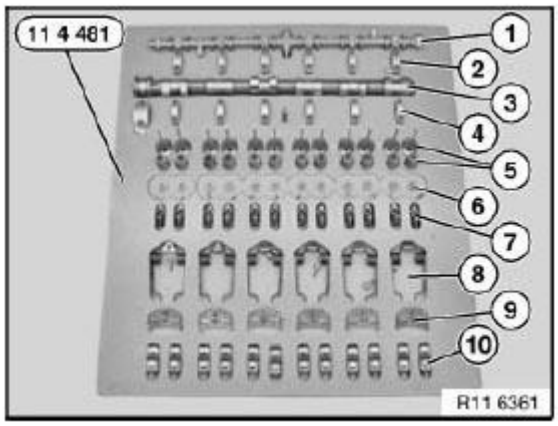

Fig. 323: Identifying Components With Special Tool (11 4 481)
Courtesy of BMW OF NORTH AMERICA, INC.

All components must be reinstalled in the same positions in an engine which has already been in use.

1. Eccentric shaft with bearing
2. Bearing caps of eccentric shaft (set out in order)
3. Intake camshaft
4. Bearing caps of inlet camshaft (set out in order)
5. Intake valves with valve springs

6. Valve plates and valve cotters
7. Cam followers with HVCA elements (set out in order)
8. Torsion springs
9. Guide blocks (set out in order)
10. Intermediate levers (set out in order)

Release screws (1) on guide block (2).

Tightening torque **11 37 1AZ** .

Place all guide blocks (2) in neat order in special tool 11 4 481.

Installation:

Mixing up the guide blocks (2) will cause the engine to suffer idle-speed fluctuations.

This will result in maladjustment of **uniform distribution.**

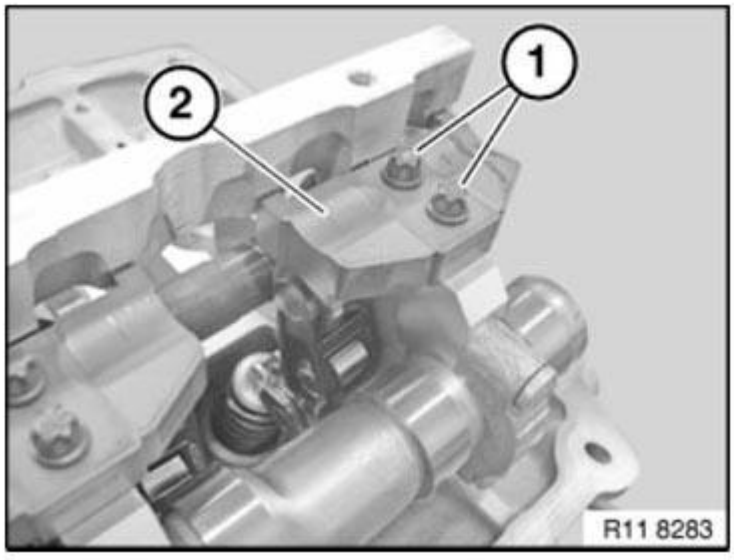

Fig. 324: Identifying Guide Block With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

All contact surfaces (1) of guide block must be clean and free from oil and grease. If necessary, clean contact surfaces (1).

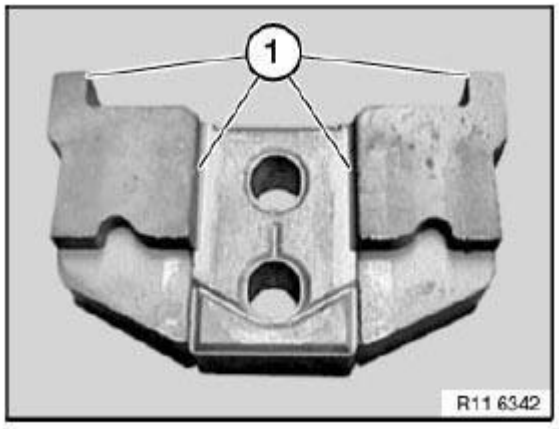

Fig. 325: Identifying Guide Block Contact Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out intermediate levers (2).

Place all intermediate levers (2) in neat order in special tool 11 4 481.

Installation:

Mixing up the intermediate levers (2) will cause the engine to suffer idle-speed fluctuations.

Installation:

All contact surfaces (1) must be clean and free from oil and grease. If necessary, clean contact surfaces (1).

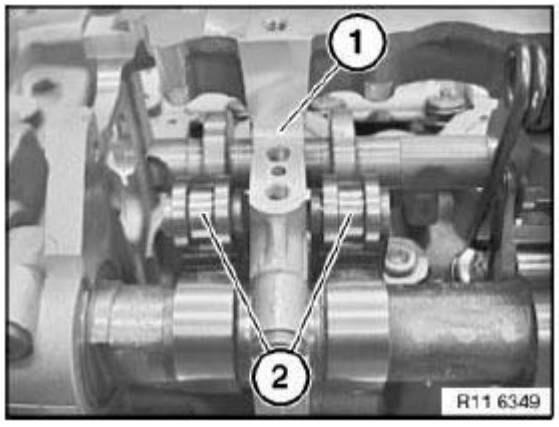

Fig. 326: Identifying Contact Surfaces And Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

All intermediate levers (1) are classified.

All intermediate levers (1) must be reinstalled in the same positions in an engine which has already been in use.

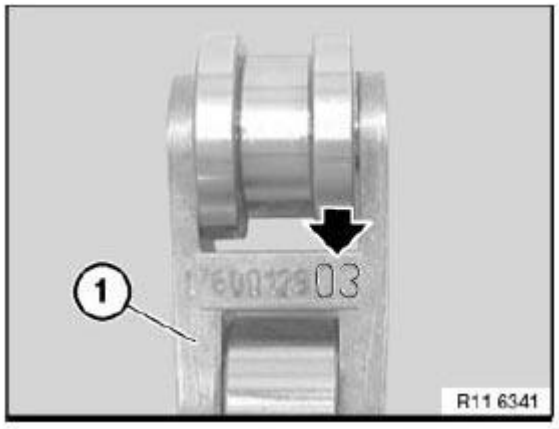

Fig. 327: Identifying Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Before installing intermediate levers (2), make sure cam followers are correctly positioned.

Risk of damage!

Install intermediate levers (2).

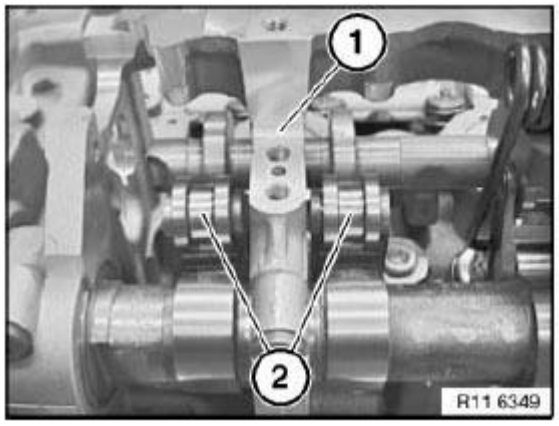

Fig. 328: Identifying Contact Surfaces And Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

Fit guide block (2) cleanly into opening.

Tighten screws (1) hand-tight.

Check that intermediate levers are in correct installation position.

Release screws (1) by a 1/4 turn.

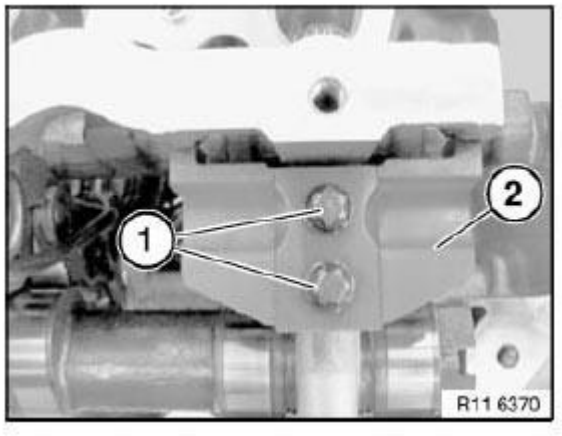

Fig. 329: Identifying Screws And Guide Block
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **11 4 450** to screw fixing (1) of eccentric shaft.

Move eccentric lever (3) on special tool **11 4 450** in direction of arrow.

Guide block is now pretensioned.

Insert screws (2) of guide blocks.

Tightening torque **11 37 1AZ** .

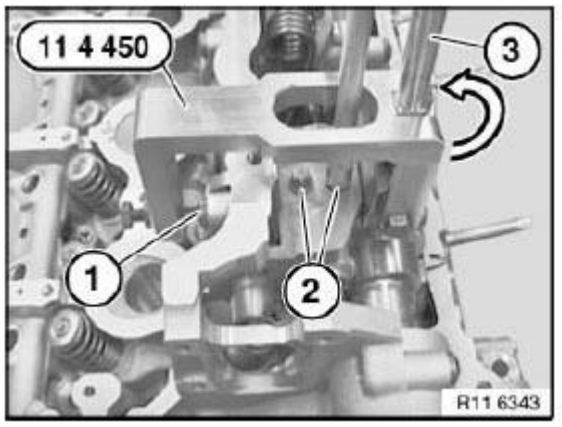

Fig. 330: Turning Eccentric Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

At cylinder no. 3, the guide block can be pre-installed with one screw (internal) only.

Oil spray nozzle is fitted only after torsion spring has been installed.

Install torsion spring (2) on guide block.

Insert torsion spring (2) in intermediate lever (1) (see arrow).

Check that cam follower (3) is in correct installation position.

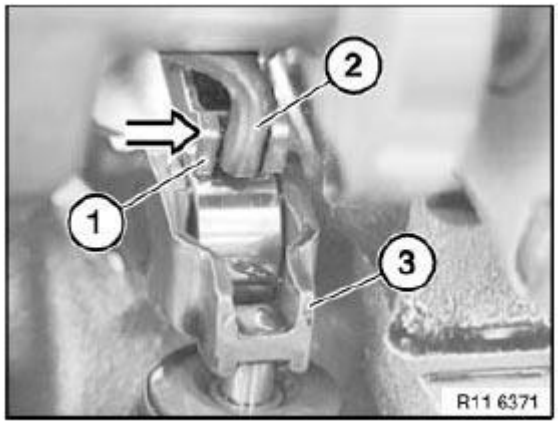

Fig. 331: Inserting Torsion Spring In Intermediate Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **11 7 110** on return spring.

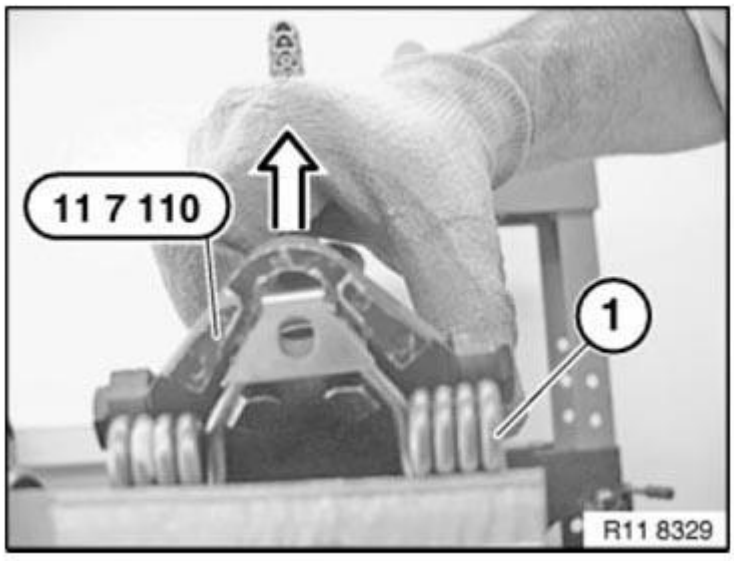

Fig. 332: Positioning Special Tool 11 7 110 On Return Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Clamp return spring with knurled screw (1) in direction of arrow.

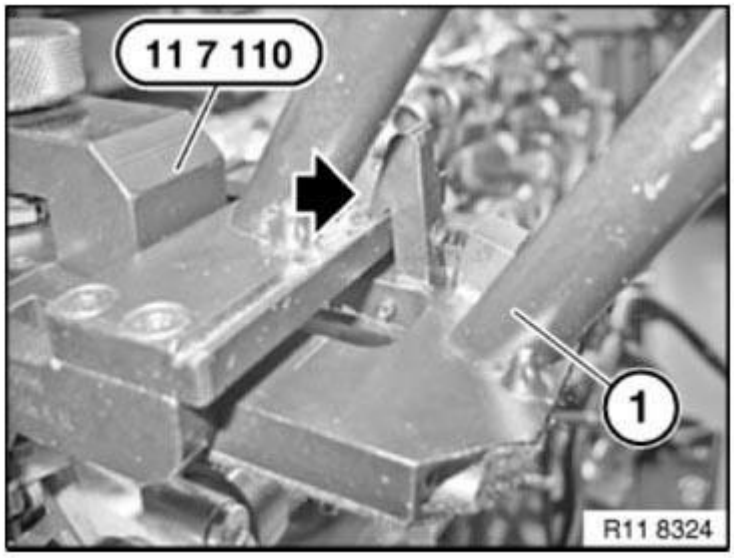

Fig. 333: Clamping Return Spring With Knurled Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Return spring (1) is positioned correctly when catches (see arrows) are surrounding return spring (1).

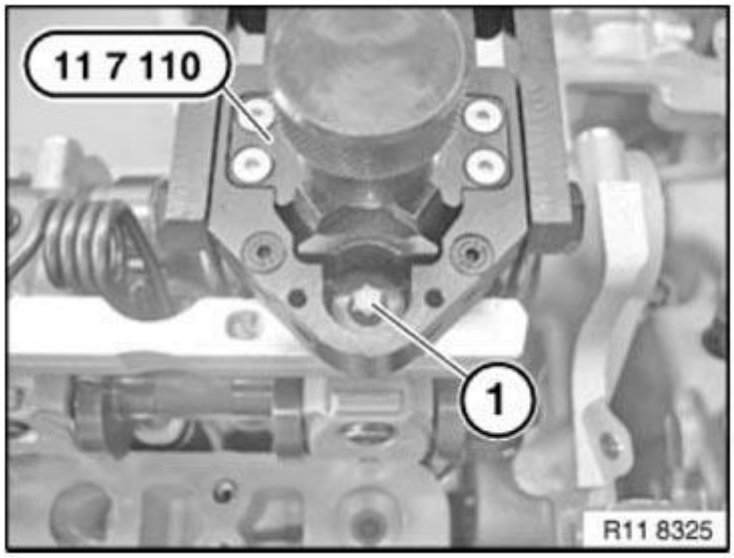

Fig. 334: Identifying Return Spring With Screws And Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury in event of incorrect use.

IMPORTANT: Improper handling.

Risk of damage!

Check return spring on intermediate lever to ensure correct installation position.

Press special tool **11 7 110** to stop in direction of arrow.

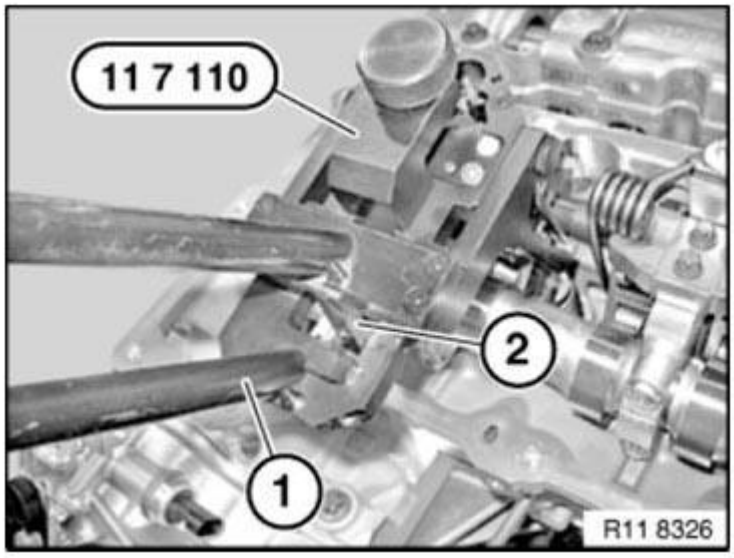

Fig. 335: Identifying Latching Hook, Lever With Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Pay attention to thread on cylinder head.

Risk of damage!

Tighten bolt (1).

Tightening torque **11 37 2AZ** .

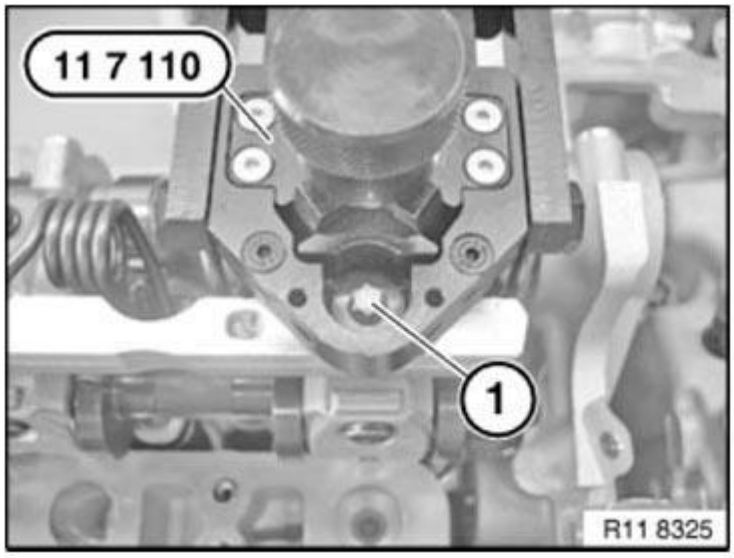

Fig. 336: Identifying Return Spring With Screws And Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

At cylinder no. 3, adjust oil spray nozzle (2) so that oil spray points precisely towards spline teeth (3).

Insert screw (1) with oil spray nozzle (2) (external).

Tightening torque **11 37 4AZ** .

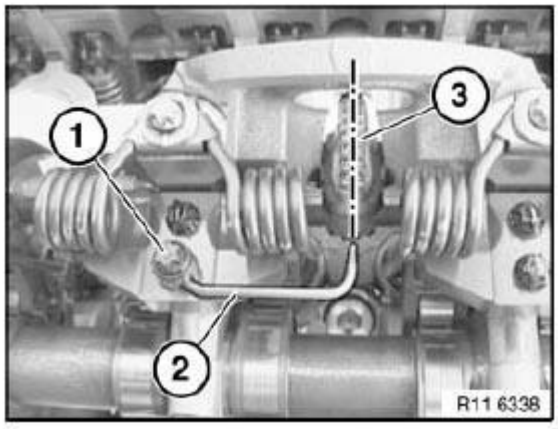

Fig. 337: Identifying Oil Spray Nozzle, Spline Teeth And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

OIL SUPPLY

11 40 000 CHECKING ENGINE OIL PRESSURE (WITH HYDRAULIC VALVE)

Notes

IMPORTANT: The regulated oil pump can only be checked and measured with the diagnosis system.

Vehicles with a regulated oil pump have a HYDRAULIC VALVE fitted.

Diagnosis path:

- **DME Motor Electronics**
- **Complete vehicle**
- **Drive**
- **Engine electronics**
- **Engine oil**
- **Oil-pressure control**

Special tool 11 9 250 must be converted for the N52k and N53.

Necessary preliminary tasks:

- Connect BMW diagnosis system to vehicle.
- Observe diagnosis instructions.
- Protect drive belt against dirt
- Have a cleaning cloth ready to catch escaping oil

Secure special tool 11 9 250 at hexagon head in a vice.

Release insert (2) using a screwdriver (1) in direction of arrow.

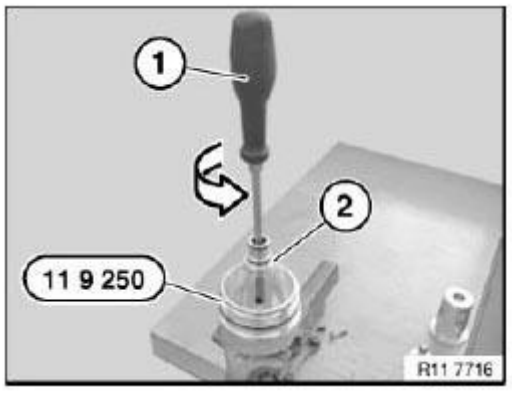

Fig. 338: Releasing Insert Using Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw piece (1) on special tool 11 6 410.

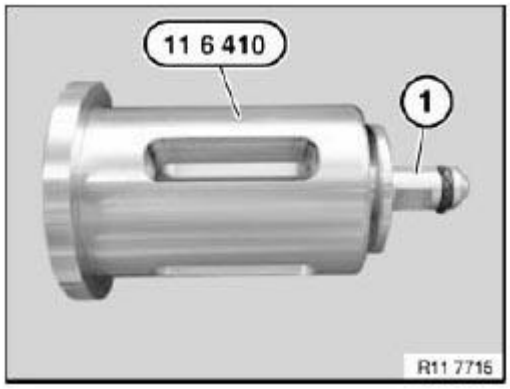

Fig. 339: Identifying Screw Piece With Special Tool (11 6 410)
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool 11 6 410 in special tool 11 9 250.

Insert central screw with a screwdriver (1) hand-tight.

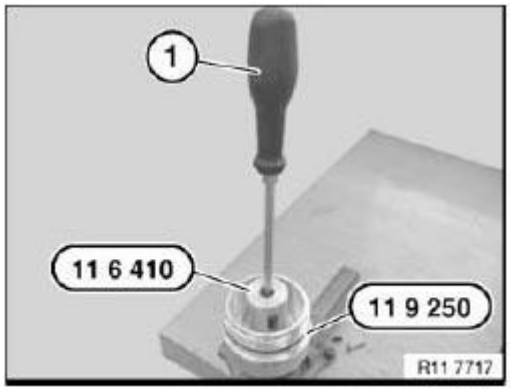

Fig. 340: Inserting Central Screw Using Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screw piece (1) hand-tight in direction of arrow on special tool 11 6 410.

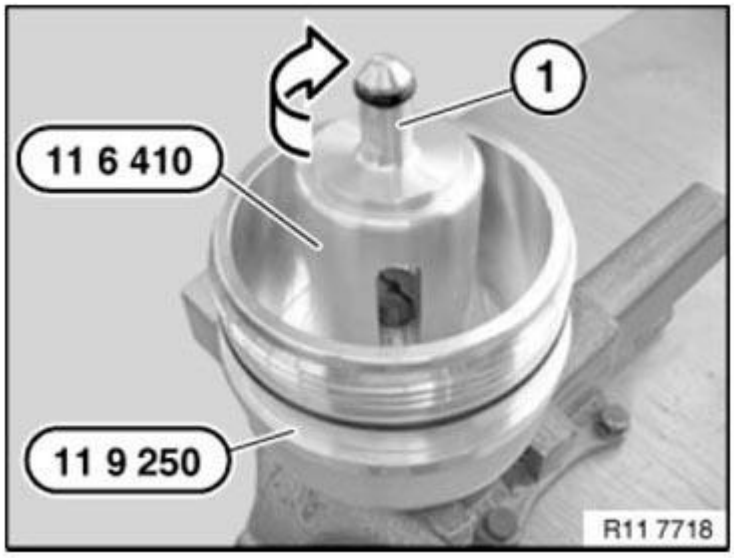

Fig. 341: Tightening Screw Piece
Courtesy of BMW OF NORTH AMERICA, INC.

Release oil filter cap with special tool **11 9 240** .

Tightening torque: **11 42 1AZ**

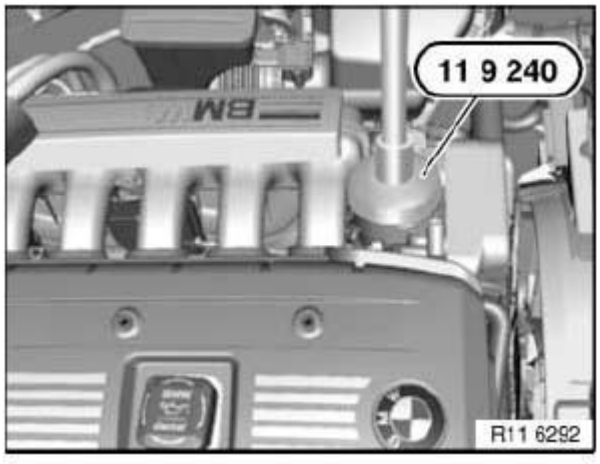

Fig. 342: Removing Oil Filter Cap Using Special Tool (11 9 240)
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully detach filter element.

Installation

Check all O-rings for damage, replace if necessary.

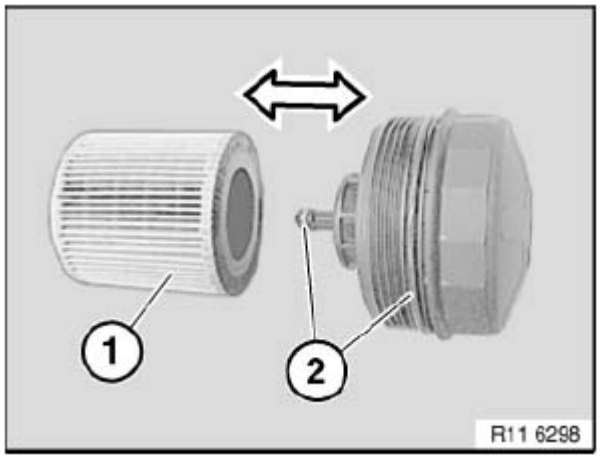

Fig. 343: Identifying Filter Element
Courtesy of BMW OF NORTH AMERICA, INC.

Install filter element (1) in special tool 11 9 250.

Installation:

Coat O-ring with engine oil.

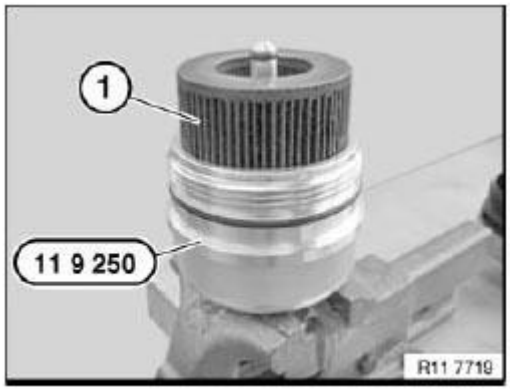

Fig. 344: Identifying Filter Element With Special Tool (11 9 250)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Engine oil pressure measurement is only possible with the diagnosis system.

Screw in special tool 11 9 250 with a filter element.

Secure special tool 13 6 051 with a sealing ring to special tool.

Start engine and check **ENGINE OIL PRESSURE** .

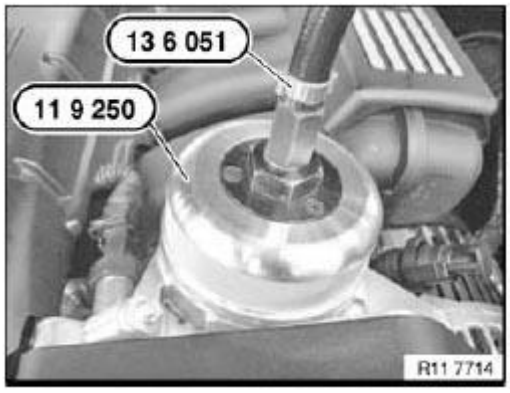

Fig. 345: Identifying Special Tool (13 6 051 And 11 9 250)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 40 000 CHECKING ENGINE OIL PRESSURE (WITHOUT HYDRAULIC VALVE)

Notes

Special tools required:

11 4 050

13 3 061

13 3 063

13 6 051

13 6 054

IMPORTANT: The regulated oil pump can only be checked and measured with the diagnosis system.
Vehicles with a regulated oil pump have a HYDRAULIC VALVE fitted.
If a hydraulic valve is fitted, proceed in accordance with CHECKING ENGINE OIL PRESSURE (WITH HYDRAULIC VALVE) .

Necessary preliminary tasks

- Remove **acoustic cover**
- Protect drive belt against dirt
- Have a cleaning cloth ready to catch escaping oil

Disconnect plug connection on oil pressure switch (3)

Remove oil pressure switch (3).

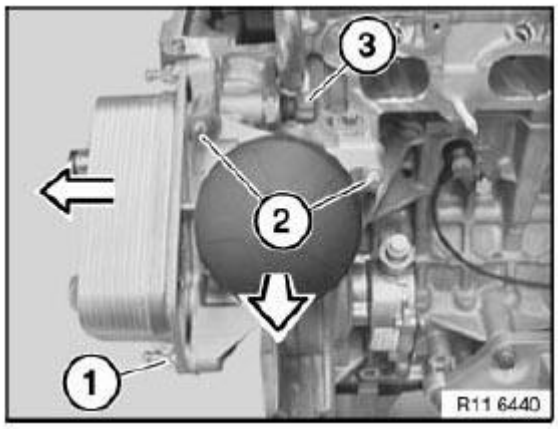

Fig. 346: Releasing Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool **11 4 050** with sealing ring.

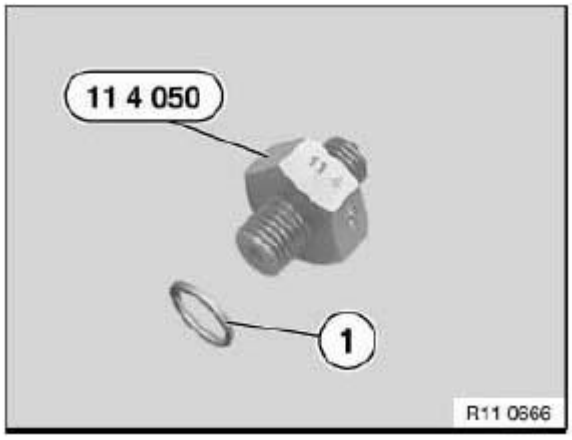

Fig. 347: Identifying Special Tool (11 4 050) And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Check engine oil pressure with diagnosis system

Connect special tools 13 6 054 and 13 6 051.

Check engine oil pressure with pressure gauge

Connect special tools 13 3 063 and 13 3 061.

Start engine and check **ENGINE OIL PRESSURE** .

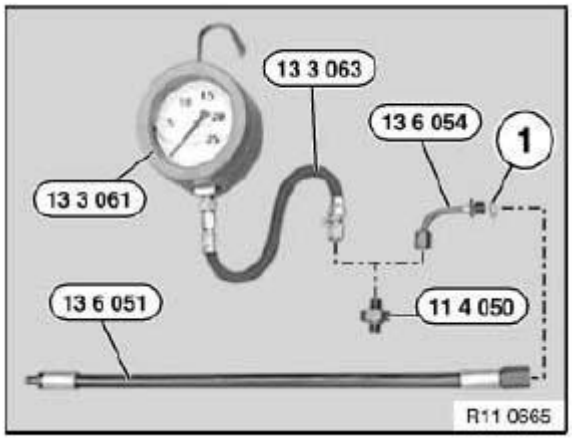

Fig. 348: Checking Engine Oil Pressure
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

41 OIL PUMP WITH FILTER AND DRIVE

11 41 115 REMOVING AND INSTALLING/REPLACING HYDRAULIC VALVE (N52K)

NOTE: See 11 41 115 Removing and installing/replacing hydraulic valve (N52K).

11 41 000 REMOVING AND INSTALLING/REPLACING OIL PUMP (N52K)

Necessary preliminary tasks:

- Remove oil sump

Release screws (1).

Tightening torque **11 41 1AZ** .

Installation:

Replace aluminum screws.

Remove intake pipe (2) in direction of arrow.

Installation:

Replace sealing ring.

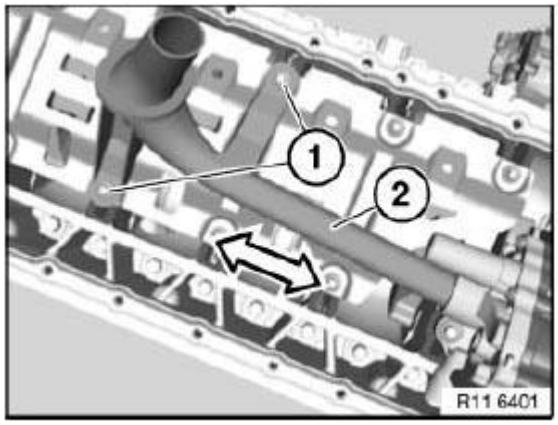

Fig. 349: Identifying Intake Pipe And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: To release bolt (1), insert a 6 mm drill bit between sprocket wheel and oil pump housing.

Release bolt (1).

Tightening torque **11 41 6AZ** .

Release screws (2).

Tightening torque **11 41 5AZ** .

Installation:

Replace aluminum screws.

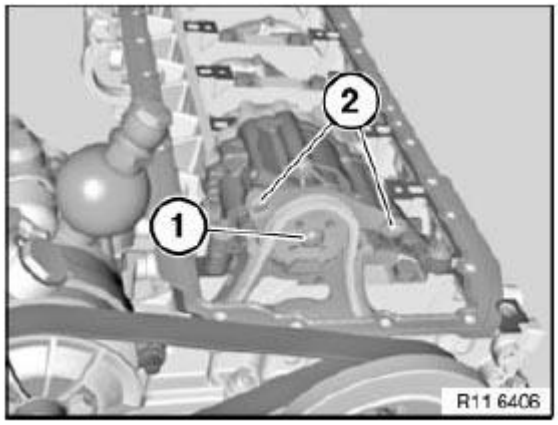

Fig. 350: Identifying Bolt And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe different screw lengths.

Release screws (1).

Tightening torque **11 41 2AZ** .

Tightening torque **11 41 3AZ** .

Installation:

Replace aluminum screws.

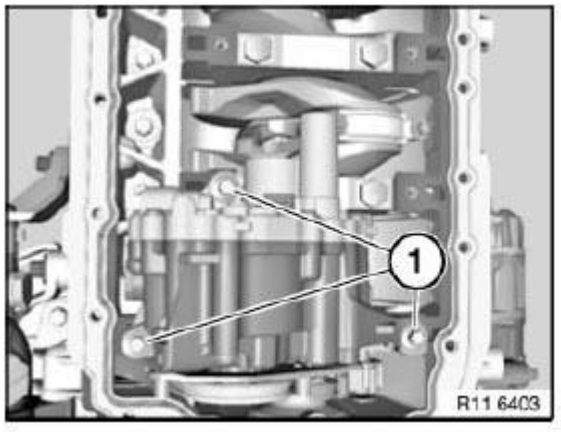

Fig. 351: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Detach sprocket wheel (1) in direction of arrow.

NOTE: Chain tensioner presses timing chain (3) upwards. Do not remove sprocket wheel (1).

Remove oil pump (2) in direction of arrow.

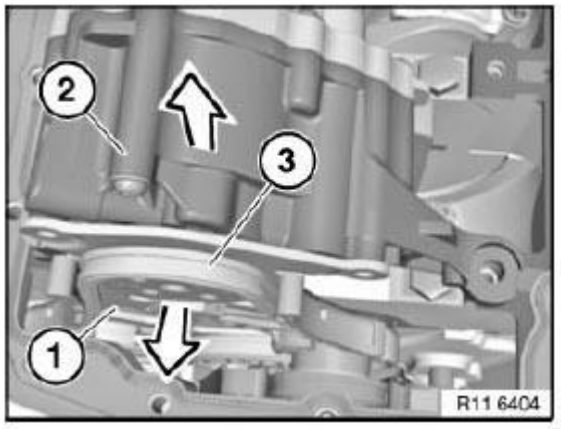

Fig. 352: Identifying Oil Pump, Timing Chain And Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check spacers (1) for secure seating and damage; replace if necessary.

Align twin surface (3) on oil pump (2) to sprocket wheel (4).

Install oil pump (2).

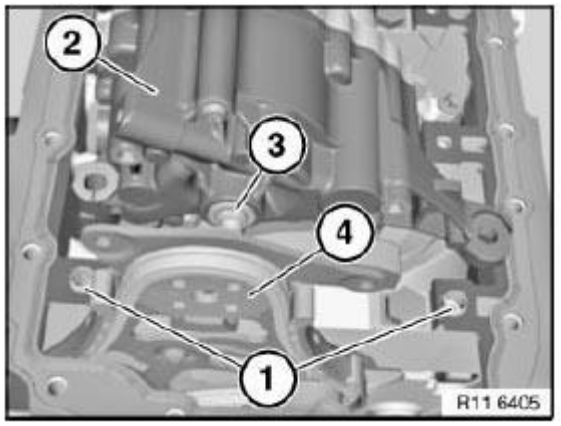

Fig. 353: Identifying Twin Surface, Oil Pump And Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 41 010 REMOVING AND INSTALLING/REPLACING CHAIN MODULE FOR OIL PUMP/VACUUM PUMP (N52K)

Special tools required:

- **00 9 140**

- **11 0 290**
- **11 0 300**
- **11 4 120**
- **11 4 280**
- **11 4 360**
- **11 4 362**
- **11 4 440**
- **11 5 200** **11 5 200**
- **11 9 280** **11 9 280**

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released.
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove cylinder head cover
- Remove oil sump
- Remove **drive belt**
- Remove drive belt **tensioner**
- Remove **VIBRATION DAMPER**
- Remove **SEALING COVER** for vacuum pump

Procedure on installed engine:

Turn sprocket wheel (3) with central bolt at crankshaft into position until special tool **11 0 290** can be secured.

Simultaneously secure special tool **11 0 290** to sprocket wheel (3) and special tool **11 4 362** .

Release screw (2) for sprocket wheel (3).

Tightening torque **11 66 2AZ** .

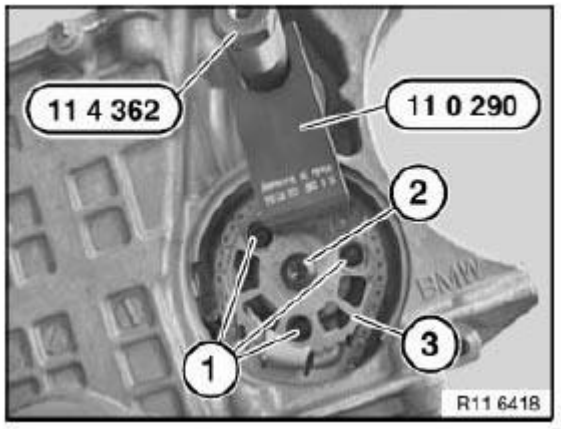

Fig. 354: Identifying Screw And Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Press timing chain with chain tensioner (1) in direction of arrow.

Disconnect timing chain with special tool **11 4 120** .

Feed out sprocket wheel (3) at hexagon head (4) of vacuum pump.

Installation:

If the chain module is replaced, a mounting bar (2) is already pre-installed.

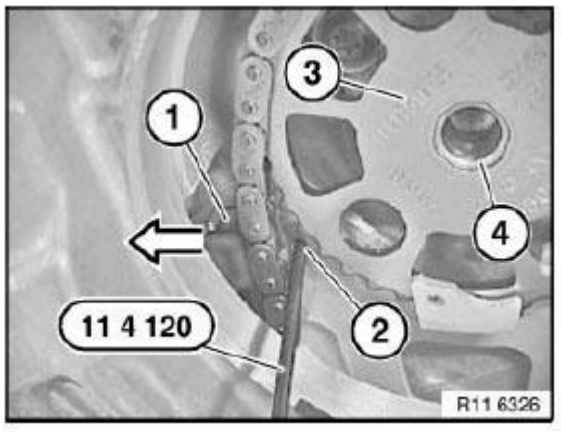

Fig. 355: Identifying Sprocket Wheel, Hexagon Head And Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: To release bolt (1), insert a 6 mm drill bit between sprocket wheel and oil pump housing.

Release screw (1) for sprocket wheel.

Tightening torque **11 41 6AZ** .

Release screws (2) for chain module.

Tightening torque **11 41 5AZ** .

Installation:

Replace aluminum screws.

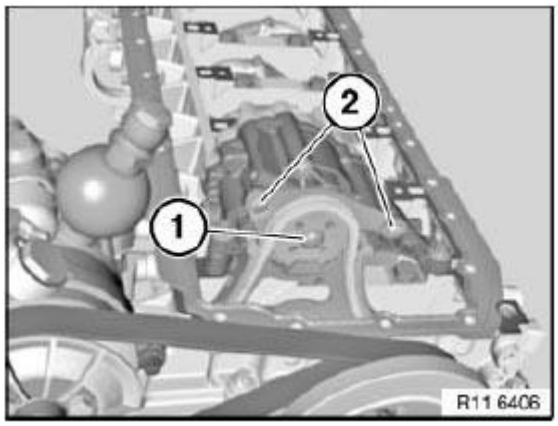

Fig. 356: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Secure crankshaft and camshaft with special tools **11 0 300** and **11 4 280** (refer to Checking **TIMING**).

IMPORTANT: Do not remove special tools 11 0 300 and 11 4 280 to release central bolt (1). Employ a second person for gripping when releasing central bolt (1).

Screw special tool **11 9 280** onto hub of vibration damper. Release central bolt (1).

Tightening torque **11 21 1AZ** .

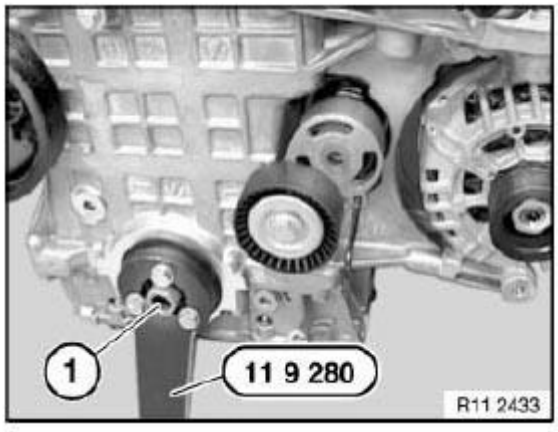

Fig. 357: Identifying Central Bolt And Special Tool 11 9 280
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace central bolt (1).

Remove hub (2) towards front.

Installation:

Replace **CRANKSHAFT RADIAL SEAL** at front.

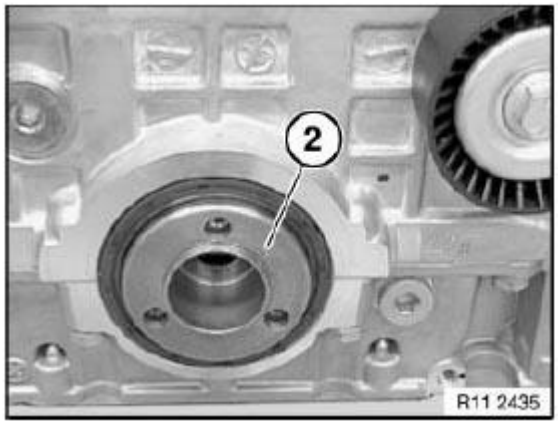

Fig. 358: Identifying Hub
Courtesy of BMW OF NORTH AMERICA, INC.

Open screw plug on bedplate.

Tightening torque **11 11 8AZ** .

Installation:

Replace aluminum screws.

Release screw for chain module (1).

11 41 4AZ .

Installation:

Replace aluminum screws.

Remove chain module (1) in direction of arrow.

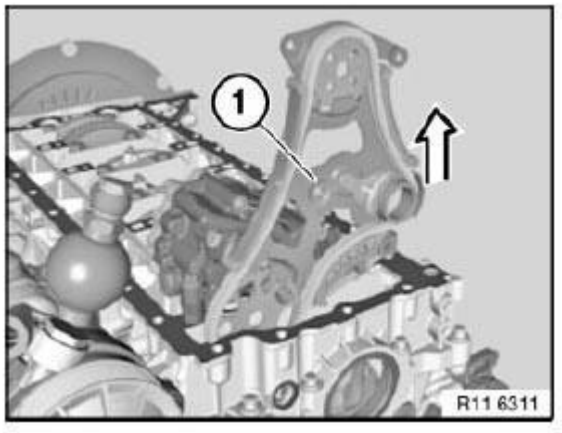

Fig. 359: Identifying Chain Module
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Note installation direction of sprocket wheel (2).
Collar (see arrow) on sprocket wheel (2) points to engine.

Incorrect assembly will result in engine damage.

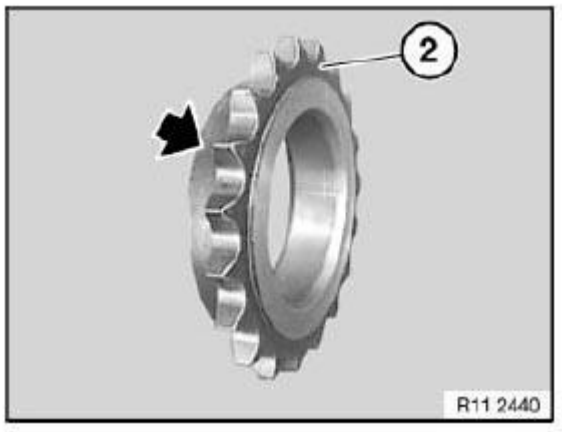

Fig. 360: Identifying Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Procedure on removed engine:

NOTE: Engine is mounted on special tool 11 4 440 .

Release screw (1) for sprocket wheel.

Tightening torque **11 66 2AZ** .

Release screw (2) for sprocket wheel.

Tightening torque **11 41 6AZ** .

Release central bolt (3).

Tightening torque **11 21 1AZ** .

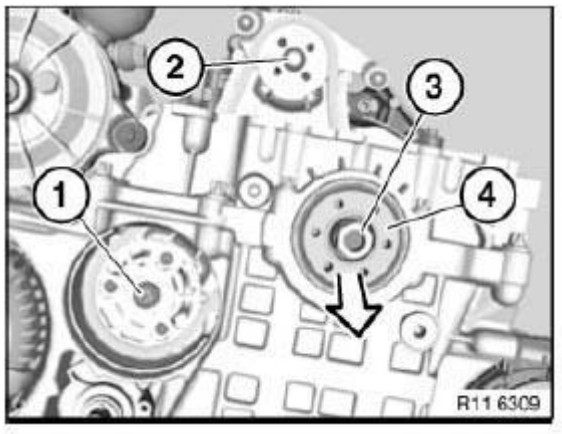

Fig. 361: Identifying Central Bolt And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Mark central bolt (3) with a colored dot.

Replace central bolt (3).

Remove hub (4) towards front.

All:

Install hub with new central bolt.

Tighten down special tool **11 5 200** with screws (1) to hub.

Do **not** remove special tools **11 0 300 and 11 4 280** .

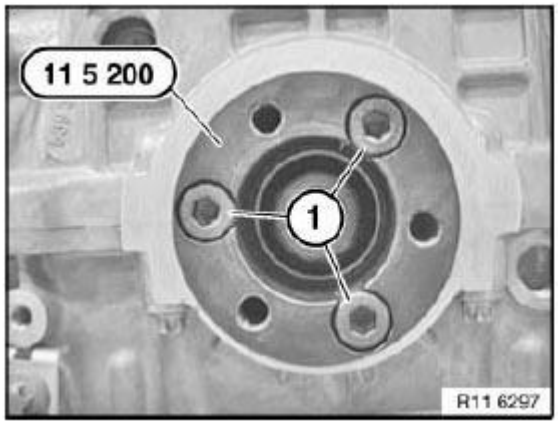

Fig. 362: Identifying Special Tool 11 5 200 And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove tensioner for drive belt.

Screw in special tool **11 4 362** from special tool kit **11 4 360** .

Mount special tool **11 9 280** on **11 5 200** .

Support special tool **11 9 280** on special tool **11 4 362** .

Special tool **11 0 300** secures crankshaft.

Tighten central bolt to jointing torque.

Tightening torque **11 21 1AZ** .

Mark central bolt and hub with paint.

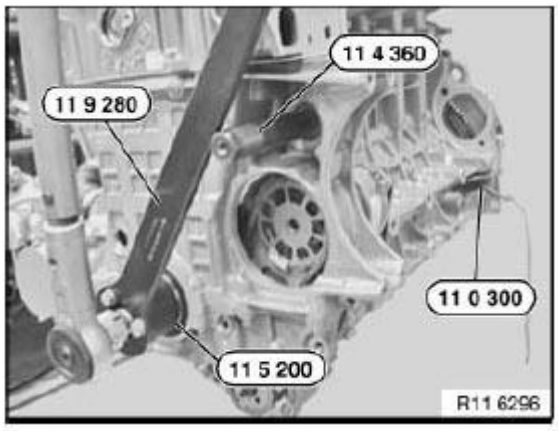

Fig. 363: Identifying Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Mark special tools with colored line (1).

See picture.

IMPORTANT: Do not remove the special tool while tightening the central bolt to torsion angle.
Risk of damage!

If necessary, tighten central bolt to torsion angle with special tool **00 9 140** .

Tightening torque **11 21 1AZ** .

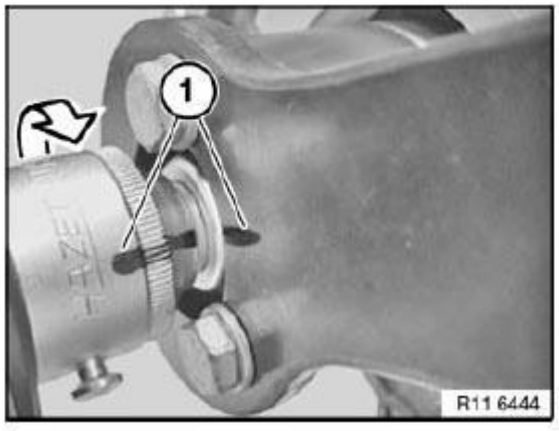

Fig. 364: Identifying Special Tools With Colored Line
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace **CRANKSHAFT RADIAL SEAL** at front.

Assemble engine.

42 OIL FILTER AND LINES

11 42 020 REMOVING AND INSTALLING/REPLACING FULLFLOW OIL FILTER (N52)

WARNING: Danger of scalding!

Only perform these tasks on an engine that has cooled down.

Recycling:

Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks:

- Drain **COOLANT** .
- Remove intake air **MANIFOLD**.
- Unfasten oil filter cover.
- Protect drive belt against dirt.

Release screw (1).

Tightening torque: **11 42 2AZ** .

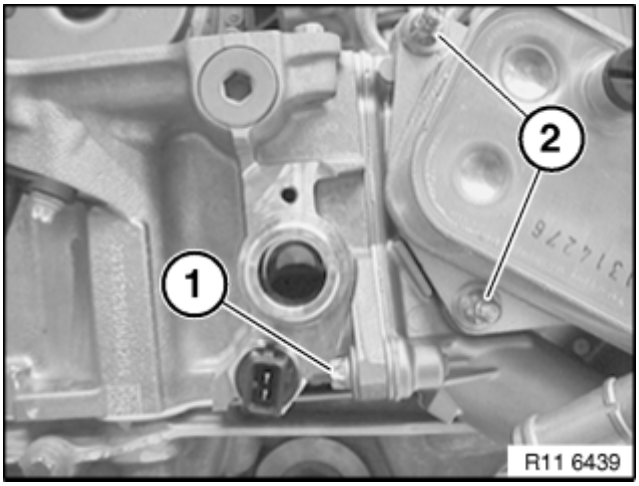

Fig. 365: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (2).

NOTE: Have cleaning cloth ready to catch residual oil.

Tightening torque: **11 42 2AZ** .

Installation:

Replace all seals.

If necessary, replace filter element.

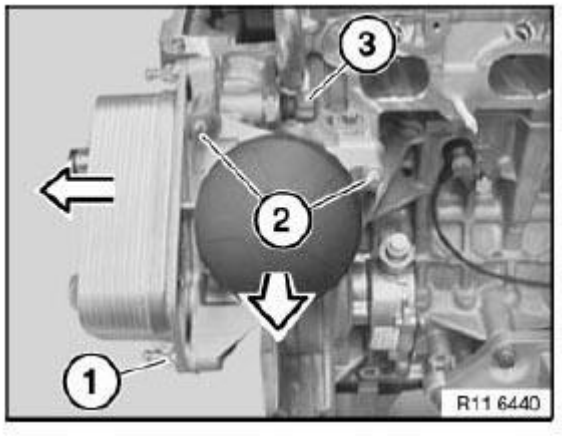

Fig. 366: Oil Pressure Switch And Removal Directions
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

NOTE: Protect drive belt against dirt.

Installation:

VENTING INSTRUCTIONS must be observed without fail.

51 WATER PUMP WITH DRIVE

11 51 000 REMOVING AND INSTALLING/REPLACING WATER PUMP (N52K)

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

Recycling:

Catch and dispose of drained coolant in a suitable container.

Observe country-specific waste-disposal regulations.

IMPORTANT: If a water pump that has already been operated is reused, it must be filled with coolant immediately after removal.
Mixture ratio, water: coolant = 1:1
Protect plug connections against coolant and contamination.
Cover plug connections with suitable materials.

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.

**A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released.
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .**

Installation note: All screws, nuts, bolts and hose clamps removed during the repair must be replaced. Retaining elements on chassis and suspension and steering parts must be replaced.

Necessary preliminary tasks:

- Drain coolant
- Remove **FRONT UNDERBODY PROTECTION**
- AWD only: Remove reinforcement plate

Disconnect plug connection (1). Disconnect coolant hose (2).

Tightening torque **11 53 5AZ** .

Undo screws (3).

Tightening torque **11 53 1AZ** .

Lay thermostat (4) to one side. Disconnect coolant hose (5).

Tightening torque **11 53 3AZ** .

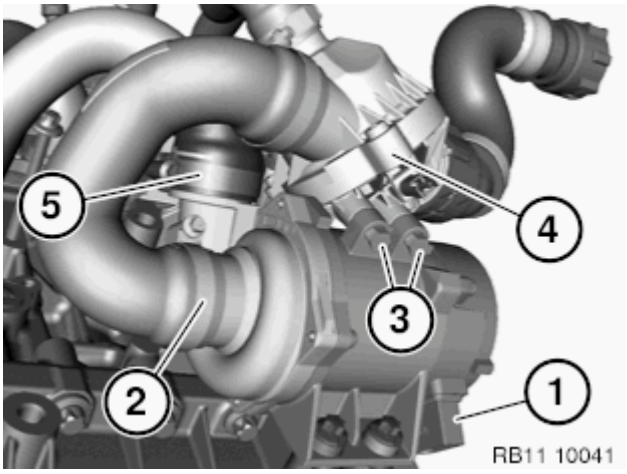

Fig. 367: Removing Thermostat And Water Pump Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 53 1AZ** .

Installation note: Replace aluminum screws.

Installation note: If the electrical water pump is used again, it must be turned by one rotation due to the breakaway torque at the blade wheels.

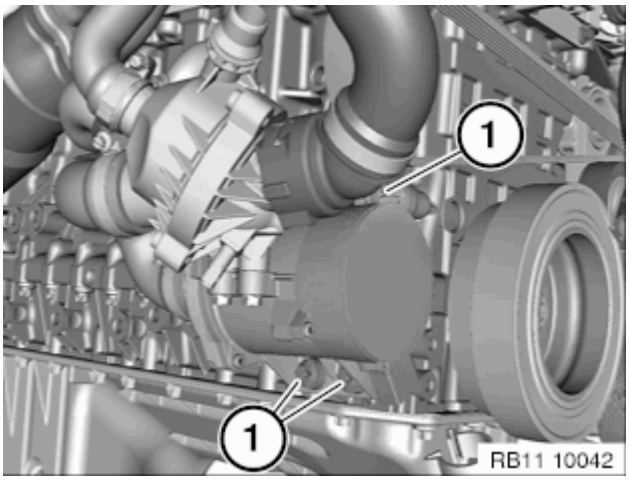

Fig. 368: Removing Water Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

VENTING INSTRUCTIONS must be observed without fail .

53 THERMOSTAT AND CONNECTIONS

11 53 000 REMOVING AND INSTALLING/REPLACING COOLANT THERMOSTAT (N52K)

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

Recycling

Catch and dispose of drained coolant in a suitable container.

Observe country-specific waste-disposal regulations.

IMPORTANT: Protect plug connections against coolant and contamination.
Cover plug connections with suitable materials.

Necessary preliminary tasks:

- Drain coolant

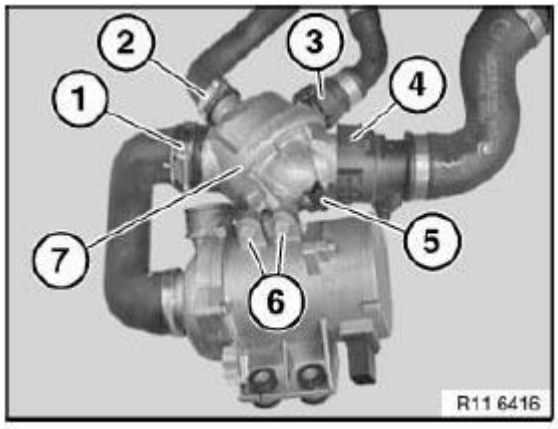

Fig. 369: Identifying Hose Clip, Coolant Hose And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purposes of clarity, the picture and text refer to the component when removed.

Unfasten hose clip (1).

Tightening torque **11 53 5AZ** .

Remove coolant hose.

Unfasten hose clip (2).

Tightening torque **11 53 6AZ** .

Remove coolant hose.

Unlock and detach coolant hose (3).

Unlock and detach coolant hose (4).

Disconnect plug connection (5).

Release screws (6).

Tightening torque **11 53 1AZ** .

Remove coolant thermostat (7).

Assemble engine.

61 INTAKE MANIFOLD

11 61 050 REMOVING AND INSTALLING AIR INTAKE MANIFOLD (N52K)

Necessary preliminary tasks:

- Remove **TENSION STRUT**
- Remove **INTAKE FILTER HOUSING**
- Remove **IGNITION COIL COVER**

Release vacuum line (5) from line holder (4).

Disconnect vacuum hose (1) from vacuum line (5).

Release connections (2 and 3) of vacuum line (5).

Lay vacuum line (5) to one side.

Installation:

Connections (2 and 3) must snap audibly into place!

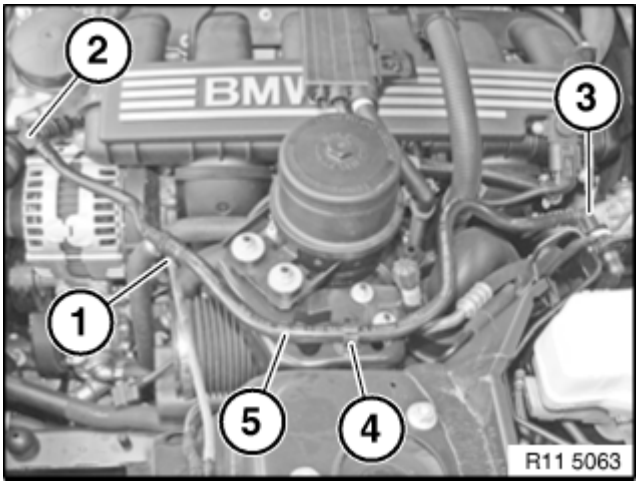

Fig. 370: Locating Vacuum Line And Line Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Installation:

Replace self-locking nut (1).

Place oil reservoir (2) in direction of arrow to one side.

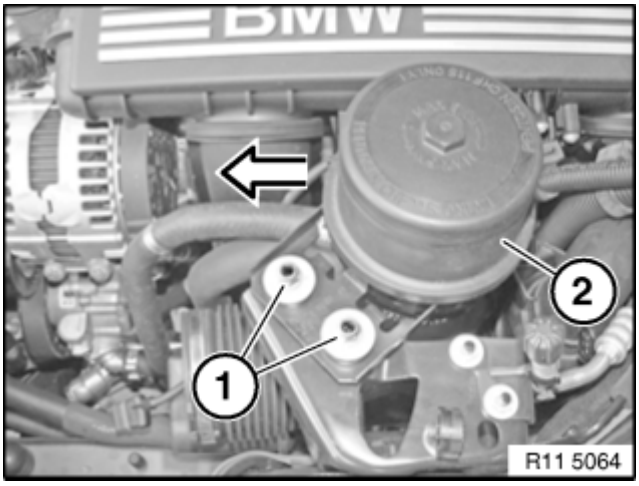

Fig. 371: Identifying Oil Reservoir And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release rubber holders (1 and 2) from guide.

Disconnect plug connection (3).

Installation:

Plug connection (3) must snap audibly into place!

Unclip line (4) from line holder.

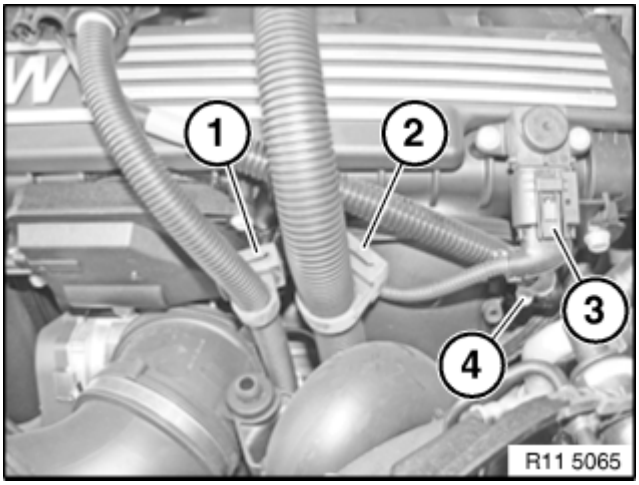

Fig. 372: Identifying Rubber Holders And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Open cable duct (4).

Expose lines (1 and 3).

Lay cable duct (4) (upper and lower sections) to one side.

NOTE: The lines (1 to 3) do not have to be detached in order to remove the air intake manifold!

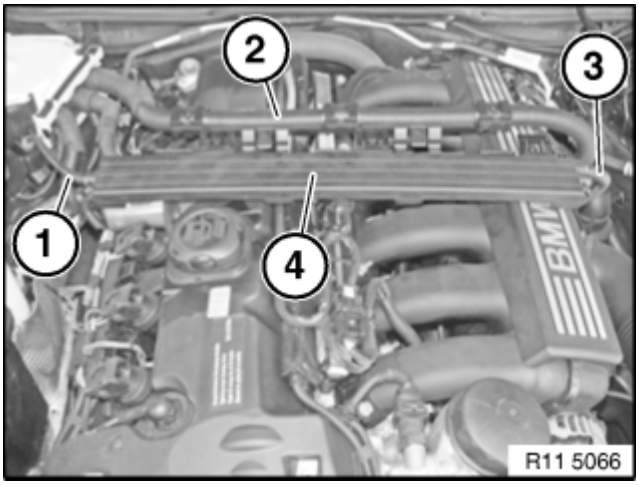

Fig. 373: Identifying Cable Duct And Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten hose clip (1).

Tightening torque **11 61 3AZ** .

Detach clean-air gaiter (3) at position (2) in direction of arrow and remove.

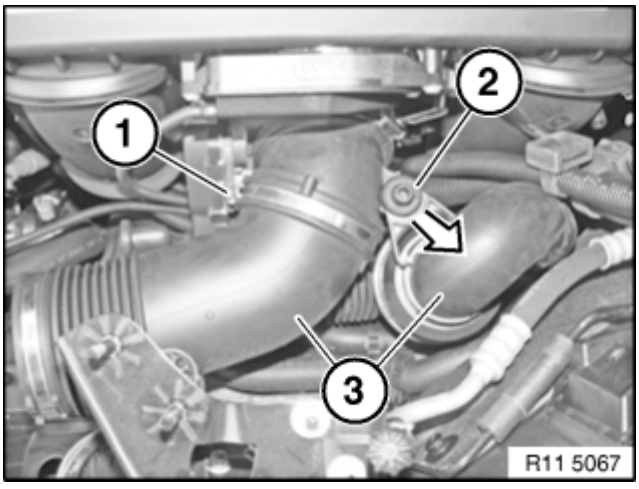

Fig. 374: Identifying Clean-Air Gaiter And Hose Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Installation:

Plug connections (1) must snap audibly into place!

IMPORTANT: Cover fitting (2) with suitable apparatus to prevent objects getting into it.

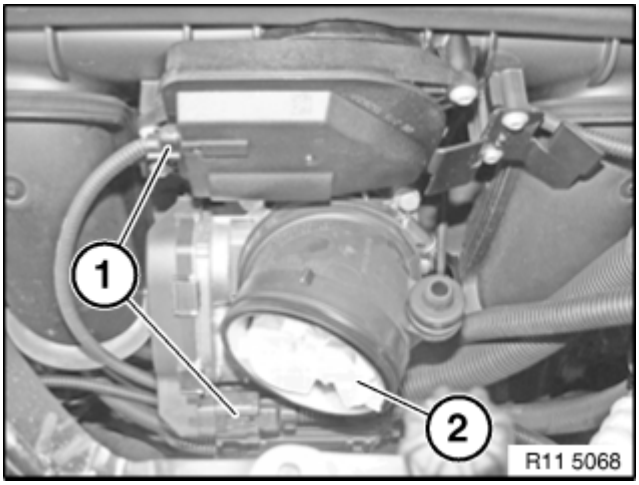

Fig. 375: Identifying Plug Connections And Fittings
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (2).

Tightening torque **11 61 4AZ** .

Unclip fuel line (1) at position (3) from holder (not shown).

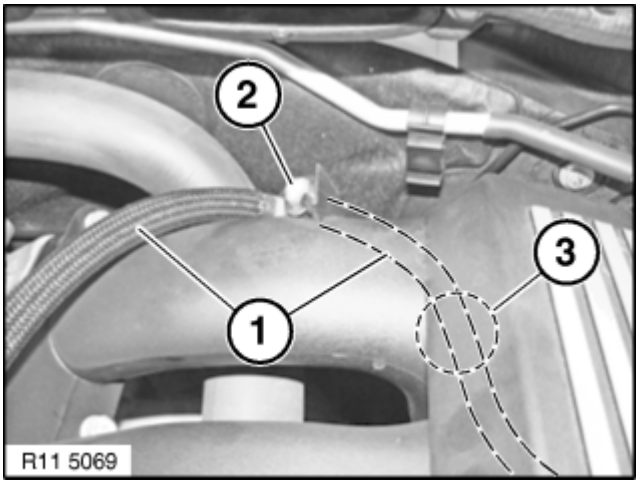

Fig. 376: Identifying Fuel Line And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) and lay to one side.

Unclip lines at positions (4).

Remove plug connections (2 and 3).

Installation:

Plug connections (1 to 3) must snap audibly into place!

Lay both lines (5) between intake ducts (direction of arrow) downwards.

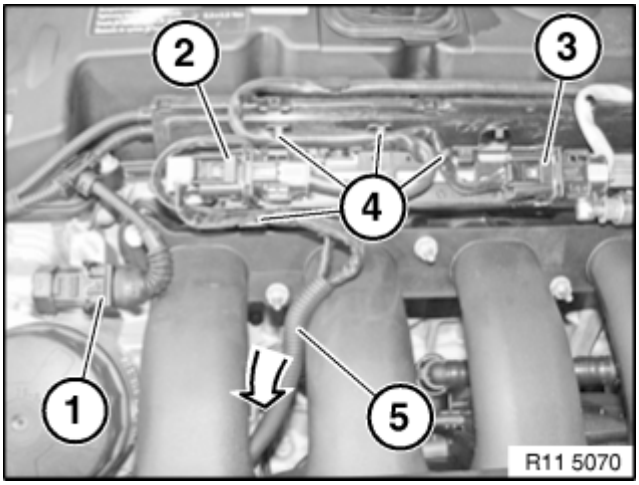

Fig. 377: Identifying Plug Connections And Lines
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purposes of clarity, the graphic shows the engine wiring harness removed.

Release screws (1).

Tightening torque **11 61 5AZ** .

Lay cable duct (2) with bracket (3) and engine wiring harness to one side.

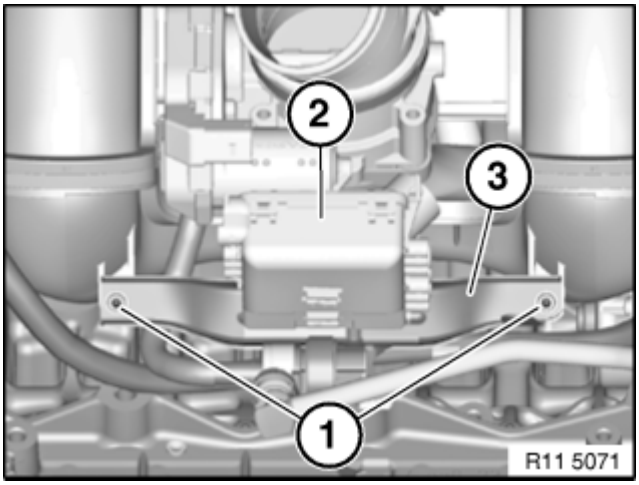

Fig. 378: Identifying Cable Duct, Bracket, And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (1 and 3).

Tightening torque **11 61 1AZ** .

Unscrew nuts (2).

Tightening torque **11 61 2AZ** .

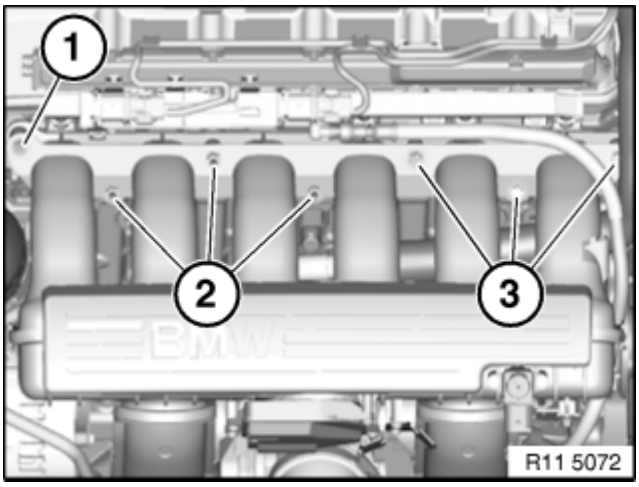

Fig. 379: Locating Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Expose air intake manifold (3) in following work steps:

1. Raise air intake manifold (3) approx. 5 - 10 cm (see arrow 1).
2. Turn air intake manifold (3) at front through 45° (see arrow 2).

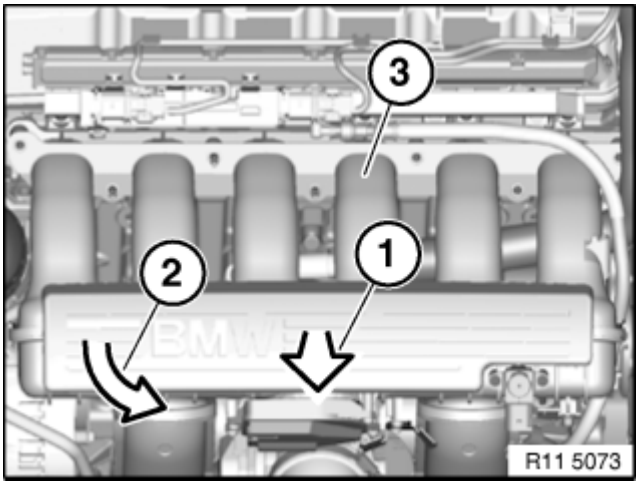

Fig. 380: Identifying Air Intake Manifold
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The following plug connections and connections are located below the intake ducts.

Disconnect plug connections (2).

Release engine ventilation connections (1).

Installation:

Engine ventilation connections (1) and plug connections (2) must snap audibly into place!

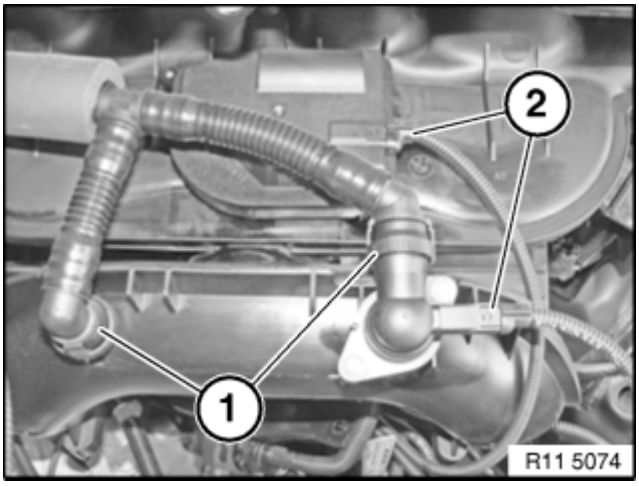

Fig. 381: Identifying Plug Connections and Engine Ventilation Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Release tank venting connection (2).

Installation:

Tank venting connection (2) must snap audibly into place!

Disconnect air intake manifold (1) in upward direction.

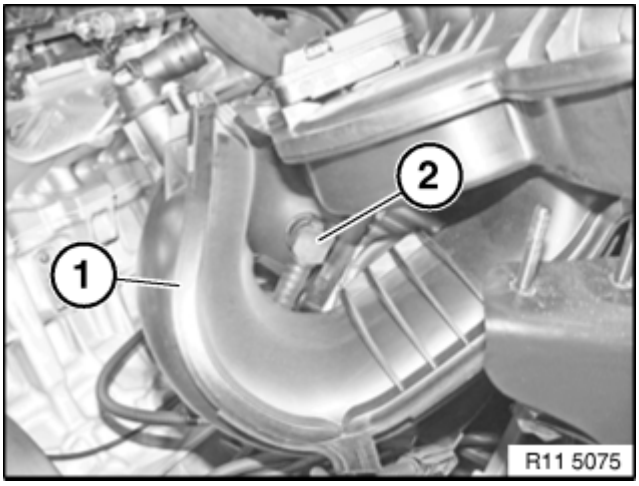

Fig. 382: Identifying Tank Venting Connection And Air Intake Manifold
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Cover intake entries (1) with suitable apparatus to prevent objects getting into them.

Installation:

Sealing faces must be free from oil and grease.

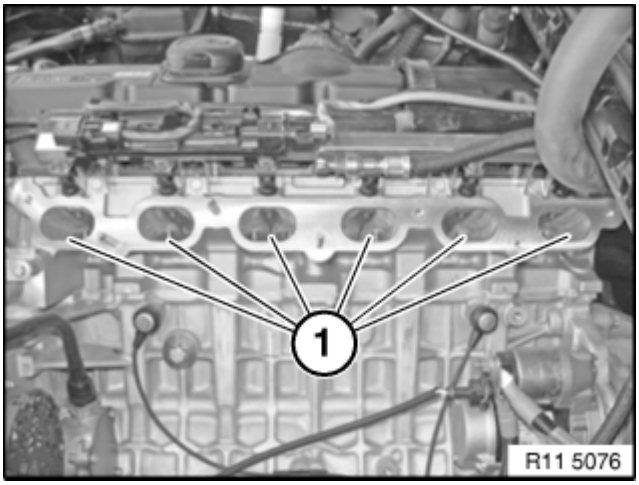

Fig. 383: Identifying Intake Entries
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace gaskets (1).

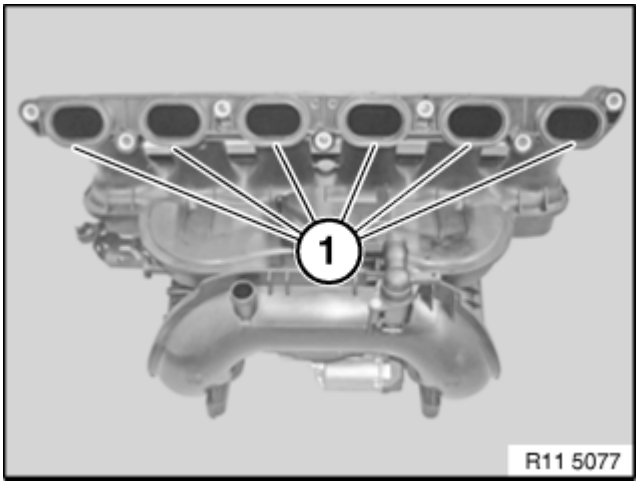

Fig. 384: Locating Air Intake Gaskets
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check air intake system for leaks.

78 EMISSION CONTROL, OXYGEN SENSOR

11 78 513 REPLACING BOTH LAMBDA OXYGEN CONTROL SENSORS (N52K)

Special tools required:

- **11 4 260**

WARNING: Scalding hazard!
Work should only be carried out on an exhaust system that has cooled down.

Installation:

The threads of new lambda control sensors are already coated with Never Seez Compound .

If a lambda control sensor is to be reused, apply a thin and even coating of Never Seez compound to the thread only.

The part of the lambda control sensor which projects into the exhaust system branch (sensor ceramics) must not be cleaned and not coated with lubricant.

Lambda control sensor, cylinder nos. 1 to 3:

NOTE: The lambda control sensor on the exhaust manifold of cylinder nos. 1 to 3 is accessible from above. The exhaust system does not have to be removed.

Lambda control sensor, cylinder nos. 4 to 6:

Necessary preliminary tasks:

- Remove **EXHAUST SYSTEM**

Disconnect plug connection on lambda control sensor (1).

Release lambda control sensor (1) on exhaust manifold of cylinder nos. 4 to 6 with special tool **11 4 260** .

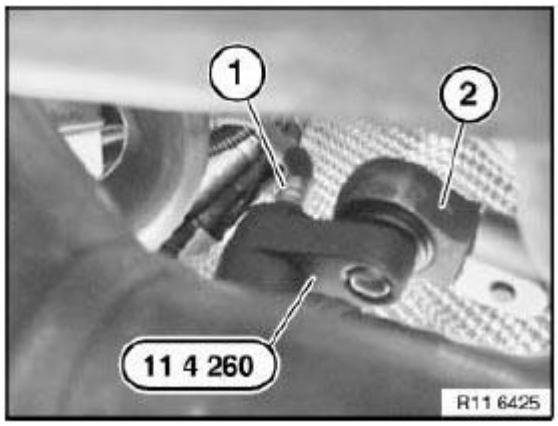

Fig. 385: Identifying Lambda Control Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

All:

Installation:

Cable color of lambda control sensor, cylinders nos. 1 to 3 = black.

Cable color of lambda control sensor, cylinders nos. 4 to 6 = grey.

Tightening torque **11 78 1AZ** .

Assemble engine.

Check function of DME.

11 78 545 REPLACING BOTH LAMBDA OXYGEN MONITORING SENSORS (N52K)

Notes

WARNING: Risk of burning!

Work should only be carried out on an exhaust system that has cooled down.

Necessary preliminary tasks:

- Remove **UNDERBODY PROTECTION** .

Installation note:

The threads of new lambda monitoring sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a lambda monitoring sensor is to be reused, apply a thin and even coating of Never Seez Compound to the thread only.

The part of the lambda monitoring sensor which projects into the exhaust system branch (sensor ceramics) must **not** be cleaned and **not** coated with lubricant.

Disconnect plug connection on lambda monitoring sensor (1).

Release lambda monitoring sensor (1) on exhaust manifold of cylinder nos. 1 to 3 with special tool **11 9 150** .

Tightening torque **11 78 1AZ** .

Installation note:

Cable color of lambda monitoring sensor (1), cylinders nos. 1 to 3 = black.

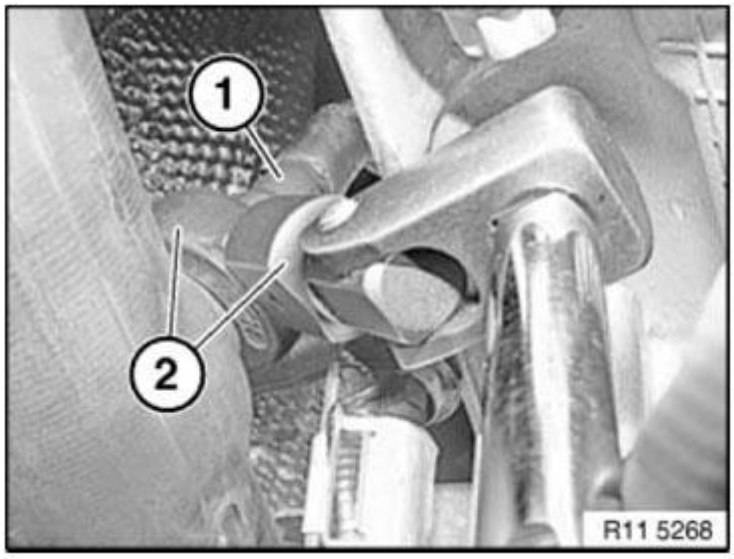

Fig. 386: Removing Lambda Monitoring Sensor Plug Connection Using Special Tool (11 9 150)
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection on lambda monitoring sensor (1).

Release lambda monitoring sensor (1) on exhaust manifold of cylinder nos. 4 to 6 with special tool **11 9 150** .

Tightening torque **11 78 1AZ** .

Installation note:

Cable color of lambda monitoring sensor (1), cylinders nos. 4 to 6 = grey.

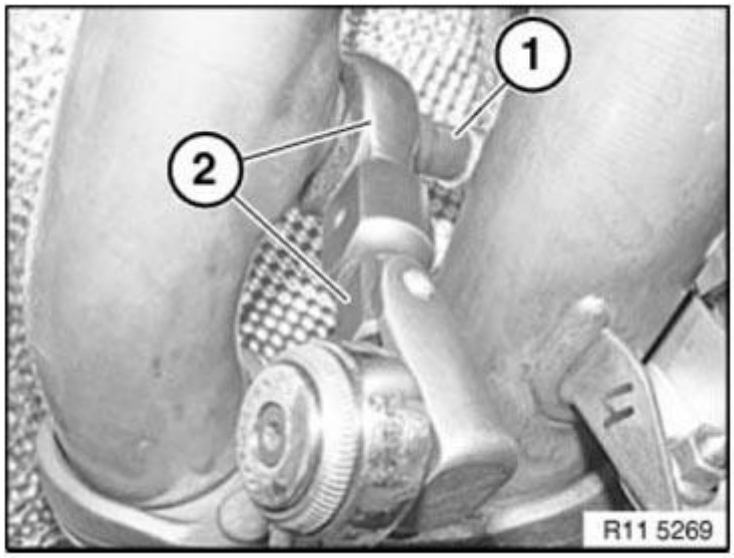

Fig. 387: Removing Lambda Monitoring Sensor Plug Connection Using Special Tool (11 9 150)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

