

ENGINE**Engine****ENGINE, GENERAL****00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN****Danger of poisoning!**

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

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

Protective measures/rules of conduct

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

First aid measures

- Do not induce vomiting.

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

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

ENGINE IDENTIFICATION

Engine number at the marked surface.

Replacement drives are already assigned a number containing the identification and engine number at the factory.

The old drive number must be imprinted for replacement crankcases.

Magnesium crank cases feature a label, the engine number does not need to be embossed.

M47/M47TU/M47T2

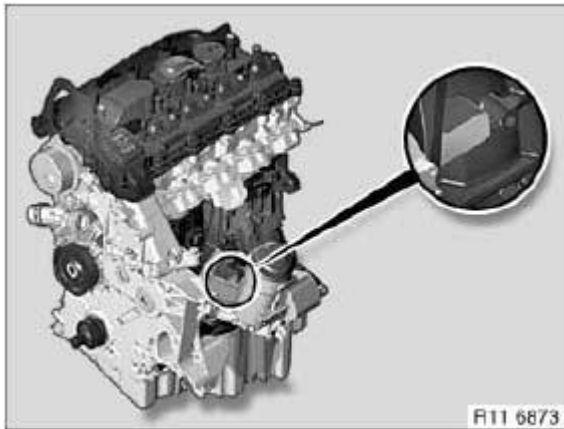


Fig. 1: Identifying Engine Identification Label (M47/M47TU/M47T2)
Courtesy of BMW OF NORTH AMERICA, INC.

M57/M57TU/M57T2

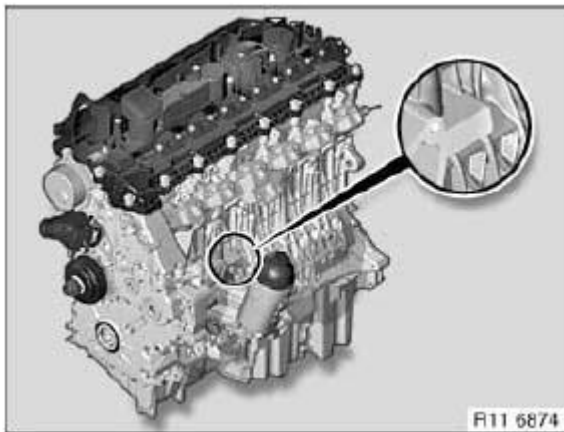


Fig. 2: Identifying Engine Identification Label (M57/M57TU/M57T2)
Courtesy of BMW OF NORTH AMERICA, INC.

M67/M67TU

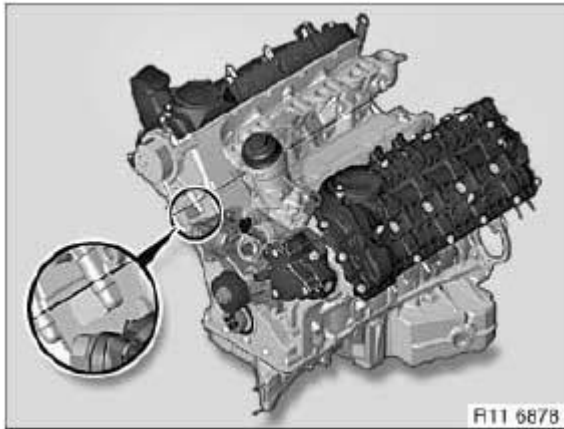


Fig. 3: Identifying Engine Identification Label (M67/M67TU)
Courtesy of BMW OF NORTH AMERICA, INC.

N47/N47S/N47C/N47T/N57/N57S/N57T

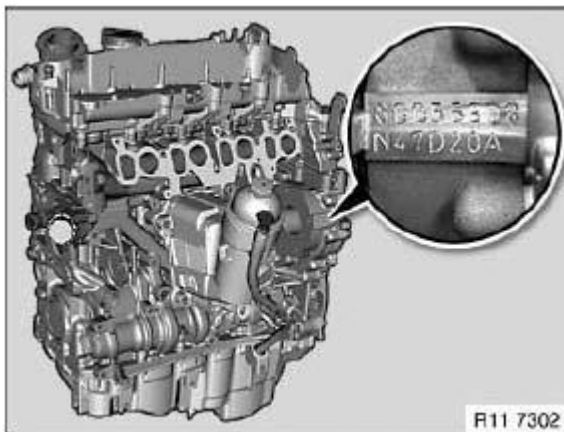


Fig. 4: Identifying Engine Identification Label (N47/N47S/N47C/N47T/N57/N57S/N57T)
Courtesy of BMW OF NORTH AMERICA, INC.

M52/M52TU

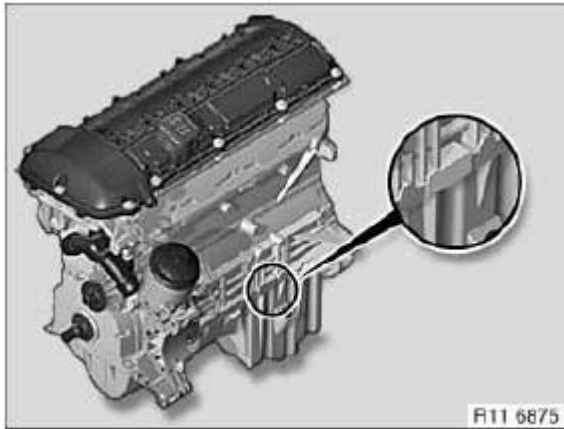


Fig. 5: Identifying Engine Identification Label (M52/M52TU)
Courtesy of BMW OF NORTH AMERICA, INC.

M54

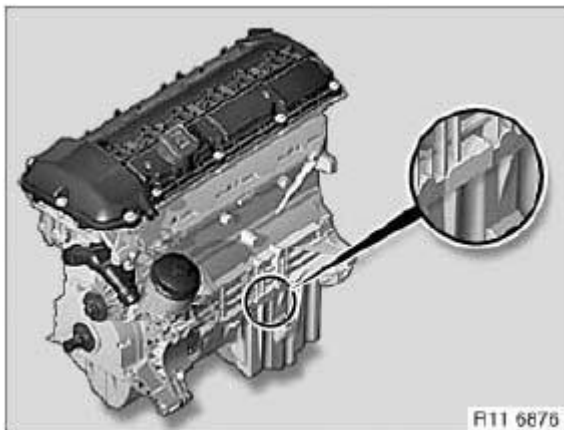


Fig. 6: Identifying Engine Identification Label (M54)
Courtesy of BMW OF NORTH AMERICA, INC.

M56

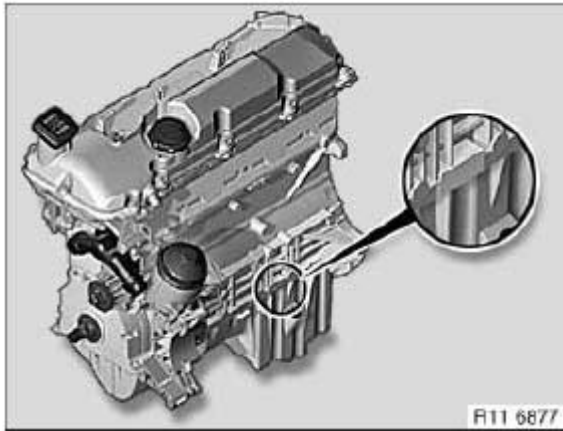


Fig. 7: Identifying Engine Identification Label (M56)
Courtesy of BMW OF NORTH AMERICA, INC.

N20/N26

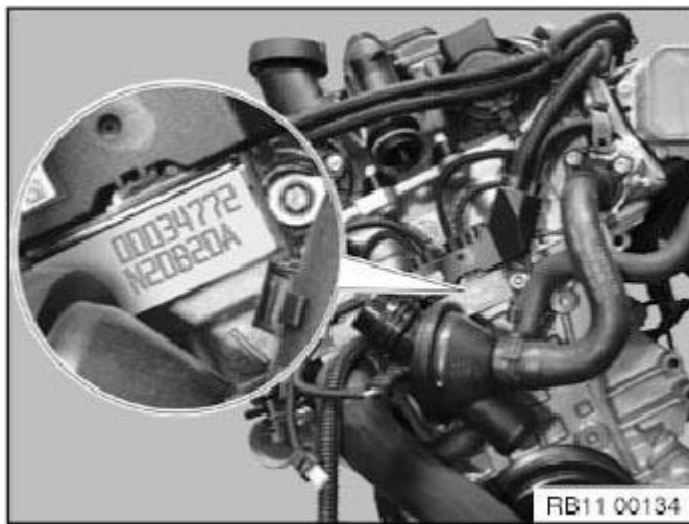


Fig. 8: Identifying Engine Identification Label (N20/N26)
Courtesy of BMW OF NORTH AMERICA, INC.

N40/N45/N45T/N43

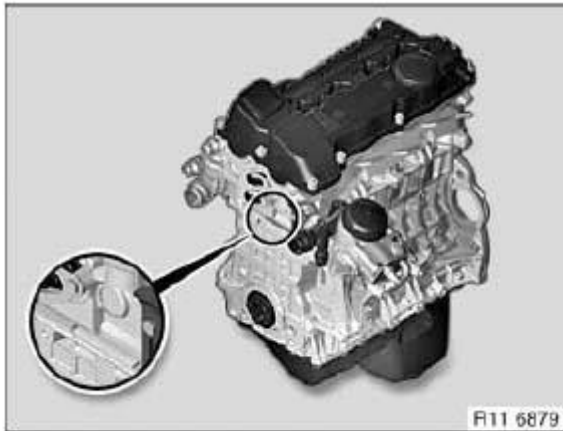


Fig. 9: Identifying Engine Identification Label (N40/N45/N45T/N43)
Courtesy of BMW OF NORTH AMERICA, INC.

N42/N46/N46T

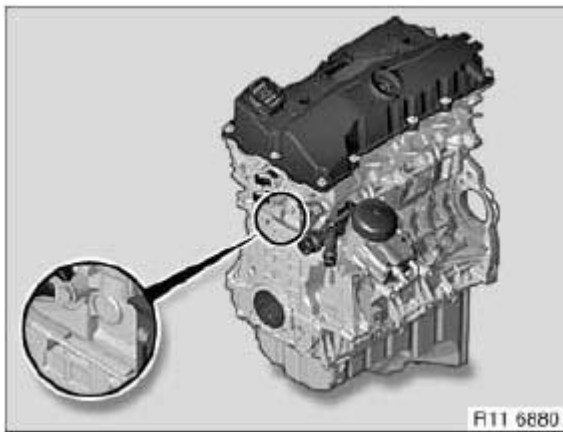


Fig. 10: Identifying Engine Identification Label (N42/N46/N46T)
Courtesy of BMW OF NORTH AMERICA, INC.

N51/N52/N52K/N52T/N53/N54/N55

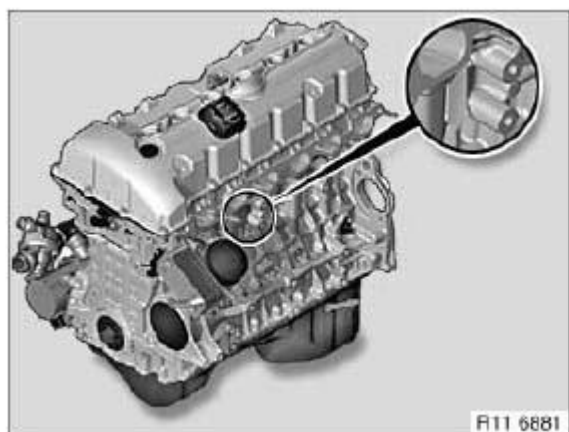


Fig. 11: Identifying Engine Identification Label (N51/N52/N52K/N52T/N53/N54/N55)
Courtesy of BMW OF NORTH AMERICA, INC.

N62/N62TU

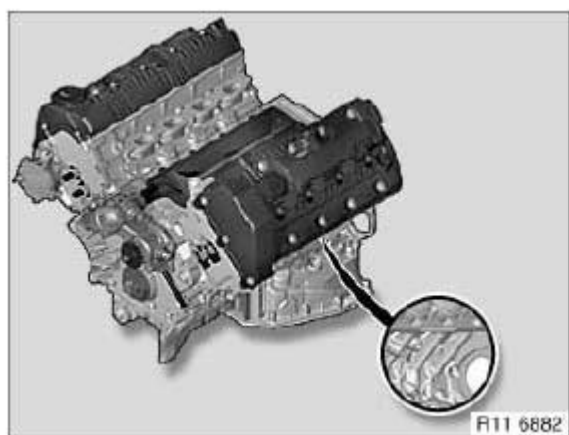


Fig. 12: Identifying Engine Identification Label (N62/N62TU)
Courtesy of BMW OF NORTH AMERICA, INC.

Position (1) engine number.

Position (2) engine code letters.

N63, N63TU.

S63

N74

S63T0 to engine number 2001 0052 on right side cyl. 1-4.

S63T0 from engine number 2001 0053 on left side cyl. 5-8.

E72 Vehicles must be imprinted on the left side cyl. 5-8.

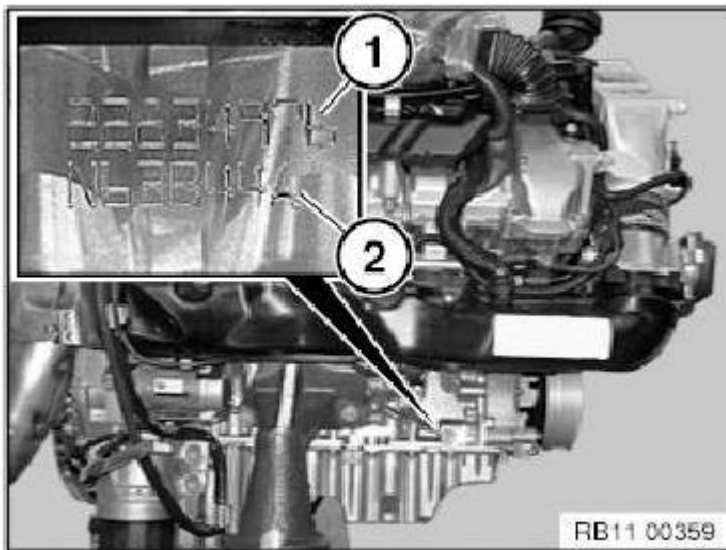


Fig. 13: Identifying Engine Number And Code Letters
Courtesy of BMW OF NORTH AMERICA, INC.

N73

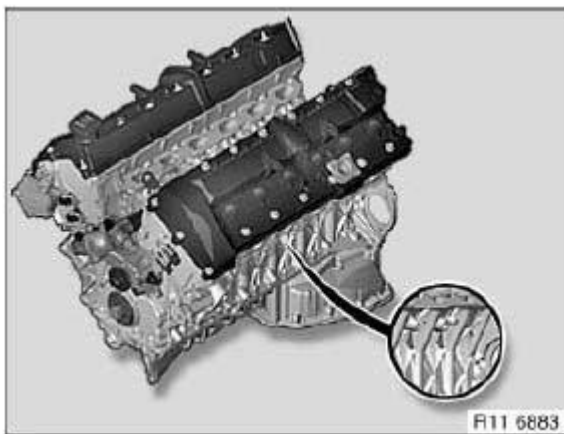


Fig. 14: Identifying Engine Identification Label (N73)
Courtesy of BMW OF NORTH AMERICA, INC.

S54

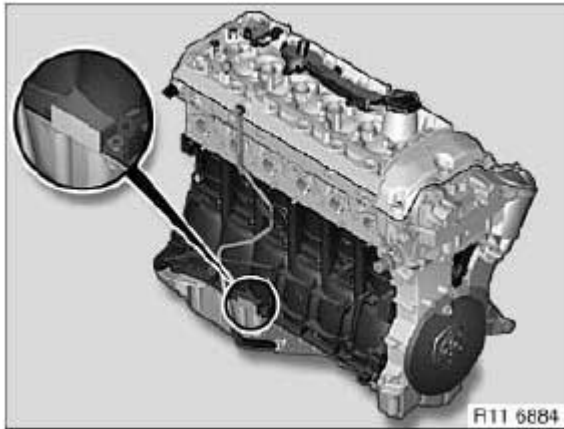


Fig. 15: Identifying Engine Identification Label (S54)
Courtesy of BMW OF NORTH AMERICA, INC.

S85/S65

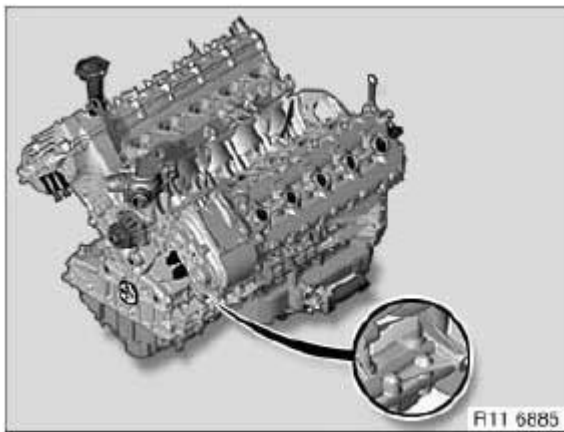


Fig. 16: Identifying Engine Identification Label (S85/S65)
Courtesy of BMW OF NORTH AMERICA, INC.

W10/W11

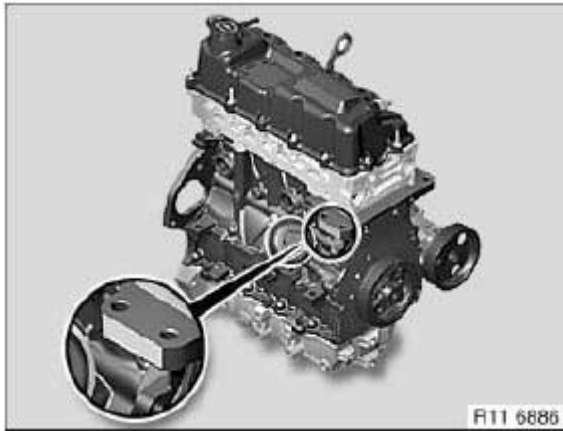


Fig. 17: Identifying Engine Identification Label (W10/W11)
 Courtesy of BMW OF NORTH AMERICA, INC.

N12/N13/N14/N16/N18/W16



Fig. 18: Identifying Engine Identification Label (N12/N13/N14/N16/N18/W16)
 Courtesy of BMW OF NORTH AMERICA, INC.

W17

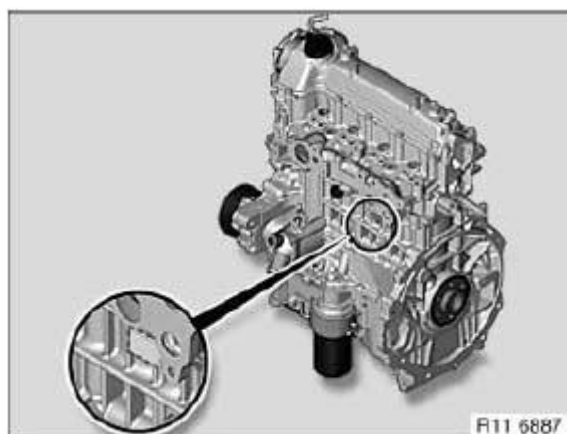


Fig. 19: Identifying Engine Identification Label (W17)
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 00... OVERVIEW OF CONSUMABLES (ELECTRONIC PARTS CATALOGUE)

1.0 Sealing compound for **injection** .

	Repair instructions (engine)	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
1.1	N40, N42, N45, N46, N43, N45N, N46N	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 128357 sealing compound
1.2	N40, N42, N45, N46, N43, N45N, N46N	Loctite 128357 liquid gasket	83 19 7 536 051	Sealing between crankcase upper and lower halves
1.3	N51, N52, N53, N54, N52N, N55	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 193140 sealing compound
1.4	N51, N52, N53, N54, N52N, N55	Loctite 193140 liquid gasket	83 19 0 439 030	Sealing between crankcase upper and lower halves
1.5	S65, S85	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 193140 sealing compound
1.6	S65, S85	Loctite 193140 liquid gasket	83 19 0 439 030	Sealing between crankcase upper and lower halves

2.0 Sealing compound for **application** .

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application example
2.1	M41, M47, M47TU, M47T2, M50, M51, M52,	Drei Bond 1209 liquid gasket	07 58 9 062 376	For sealing junction points on crankcase

	M52TU, M54, M57, M57TU, M57T2, M60, M62 N12, N14, N16, N18 N20, N26 N40, N42, N45, N45N, N46, N46N, N43, N47, N47 top, N47C N47D1 N51, N52, N52N, N53, N54, N55, N57, N57T, N62, N62TU, N63, N73, N73H, N74 S14, S38, S50, S52, S54, S62, S65, S85			
2.2	N12, N13, N14, N16, N18, N20, N26 W16,	Loctite 5970 liquid gasket	83 19 0 404 517	Sealing between crankcase upper and lower sections.
2.2	N47top, N47D1, N47C1 N57D1 N57S1, B37, B38	Loctite 5970 liquid gasket	83 19 0 404 517	Sealing of gear case cover, oil sump, coolant pump, component carrier.
2.3	N12, N14, N16, N18 W16	Loctite 648 liquid gasket	07 58 9 067 732	Sealing between cover sleeve and crankcase
2.4	N12, N13, N14, N16, N18 W16	Loctite 121078 liquid gasket	83 19 2 223 765	Sealing between cover sleeve and crankcase

3.0 Cleaning agent .

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
3.1	N12, N13, N14, N18, N20, N26, N45, N46, N45T, N46T, N43, N51, N52, N52Kp, N52TU, N53, N55, N63, N63S, N63Hybrid, N73, N74 B37, B38	Cold cleaner (chlorine free)	83 19 0 026 956	Cleaning assemblies, washing engine

4.0 Lubricant for application .

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
4.1	N12, N13, N18, N20, N26, N42, N46, N46TU, N51, N52, N52KP, N52TU, N55, N62, N62TU, N63O1, N73 S63T0	Lubricating grease Longtime PD1	83 19 2 160 340	For greasing the splined shaft on actuator drive/gearing of intermediate shaft.
4.2	M47, M47TU, M47T2, M57, M57TU, M57T2,	High temperature paste	83 19 2 152 323	For greasing the thread on the exhaust turbocharger.
4.3	N12, N13, N14, N16, N18 N20, N26, N40, N42, N45, N45TU N46, N46TU, N43. N51, N52, N52Kp, N52TU, N53, N54, N55. N62, N62TU, N63O0, N63O1, N73, N73H, N74. S63T1, S65, S85.	High temperature paste (NEVER-SEEZ compound)	83 19 2 158 851	For greasing the threads on the oxygen sensors.
4.4	N47, N47O1 N47C1, N47T N47D1 N57 N57D1 N63O0, N63O1, S63, S63T0	Copper paste	81 22 9 400 794	For greasing the double hex head bolt on the exhaust turbocharger. For greasing the central bolt on the VANOS transmission.
4.5	M47, M47TU, M47T2 M57, M57TU, M57T2 N47, N47O1 N47C1, N47T N47D1 N57 N57D1	High-temperature grease (UrethynE2).	83 23 0 441 070	For greasing the injectors or injector shafts. Magnet and piezo injectors.
4.6	N47T0, N47T1 N57T0, N57T1, N57S1	Assembly paste, ATE grease	83 19 9 407 854	For lubricating the O-rings of the pressure pipes Multistage turbocharging assembly.

5.0 Lubricants to loosen locked **screw connections** .

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
5.1	M47, M47TU, M47TU2, M57, M57TU, M57TU2. N47, N47C, N47D1, N57, N57D1, N57S1 W16, W17,	Brunox lubricating grease	83 23 0 445 529	For releasing the glow elements
5.2	E89	Brunox lubricating	83 23 0 445 529	For releasing and fixing the

F10, F11.	grease	screw connection of the rubber mounts
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6.0 Leak search Spray

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
6.1	Gasoline: N13, N20, N26, N54, N55 Diesel fuel: M47, M47TU, M47TU2, M57, M57TU, M57TU2. N47, N47C, N47D1, N57, N57D1,	Leak Spray	83 19 9 407 861	Check turbocharging path for leak tightness. Example: leakage on charge air hose or charge air cooler.

11 00 598 REMOVING AND INSTALLING ENGINE ON FRONT AXLE (N74)

Necessary preliminary tasks:

- Remove front axle with engine and transmission.

Disconnect plug connection (2) of exhaust gas oxygen sensor (1).

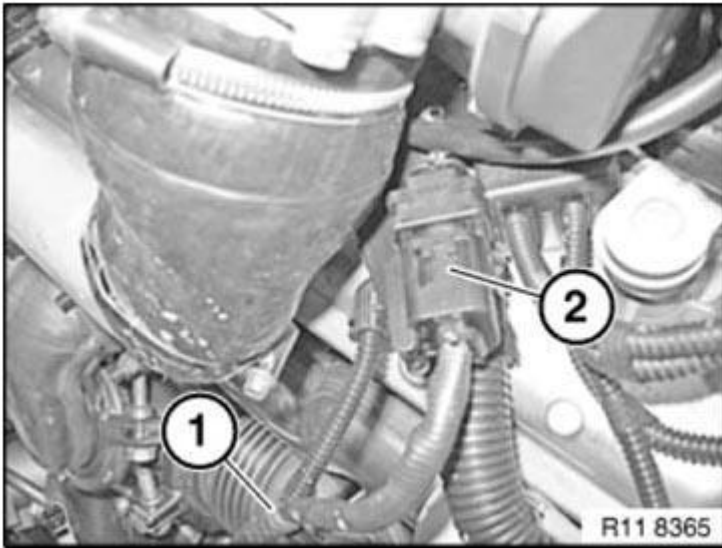


Fig. 20: Identifying Plug Connection And Exhaust Gas Oxygen Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Release V-band clamp (1).

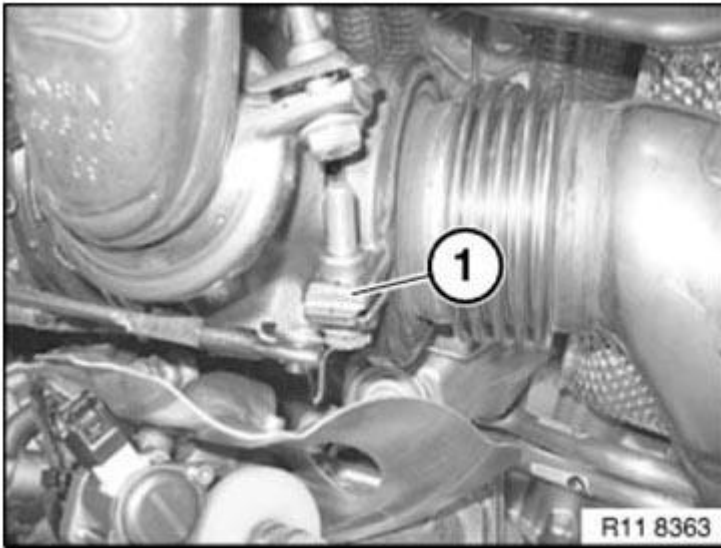


Fig. 21: Identifying V-Band Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove seal (2).

Installation note:

Replace seals.

Take off holder (3).

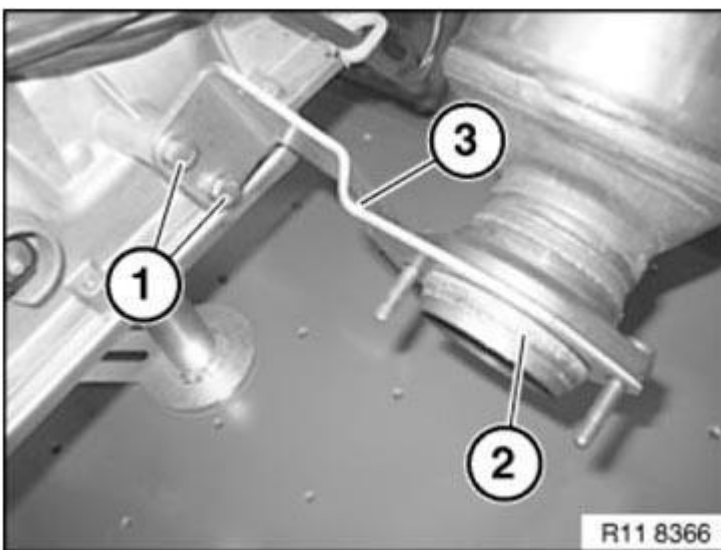


Fig. 22: Identifying Take Off Holder, Seal And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Remove catalytic converter 1-6 and 7-12.

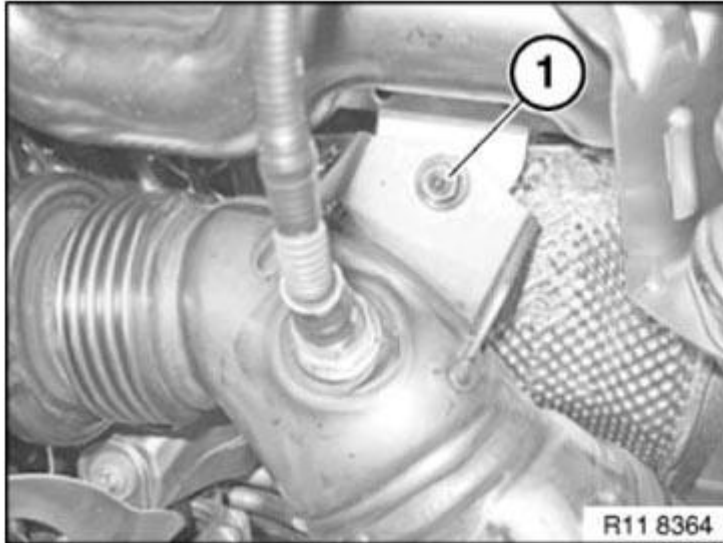


Fig. 23: Identifying Catalytic Converter Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cover on transmission.

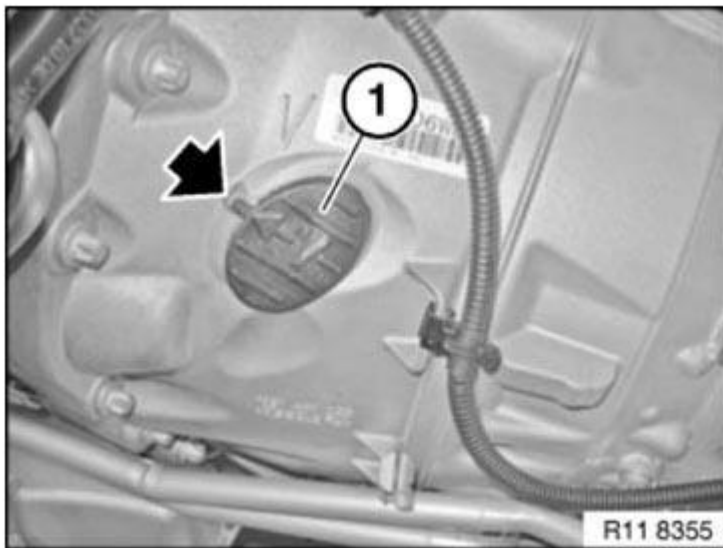


Fig. 24: Locating Transmission Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release all screws (1) on the converter.

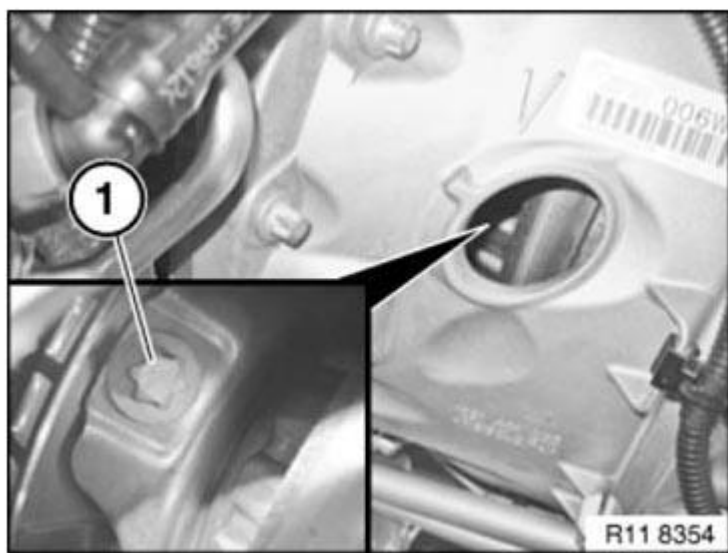


Fig. 25: Identifying Converter Screw
Courtesy of BMW OF NORTH AMERICA, INC.

The converter must be secured for removal.

Insert special tools **24 4 131** and **24 4 138** into the recess on the transmission housing.

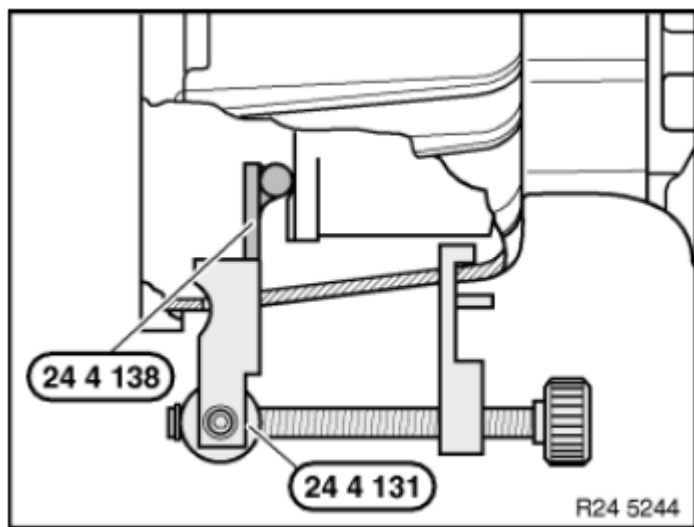


Fig. 26: Inserting Special Tools 24 4 131 And 24 4 138 Into Recess On Transmission Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off the engine wiring harness (4).

Unclip the oxygen sensor cable from the mounting (3).

Unclip and disconnect the oxygen sensor connector (5).

Undo the bolt (1) of the transmission oil line.

Take off the transmission oil line (2).

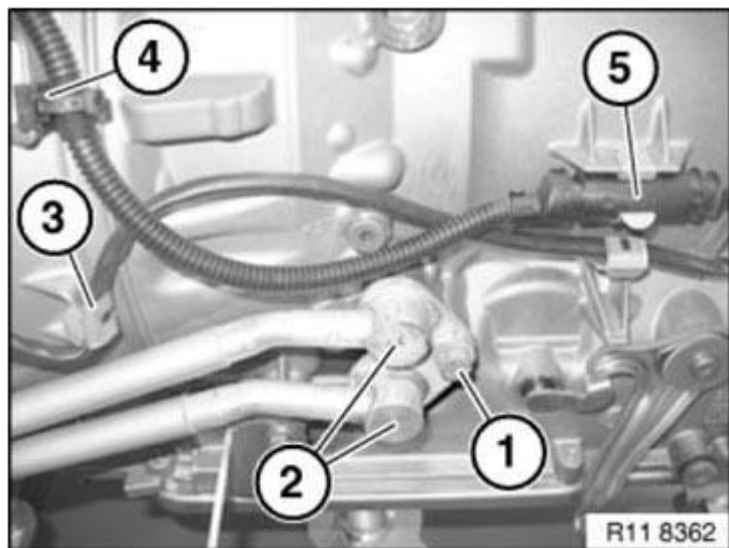


Fig. 27: Identifying Oxygen Sensor Connector, Transmission Oil Line, Engine Wiring Harness And Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Undo the transmission bolts (1).

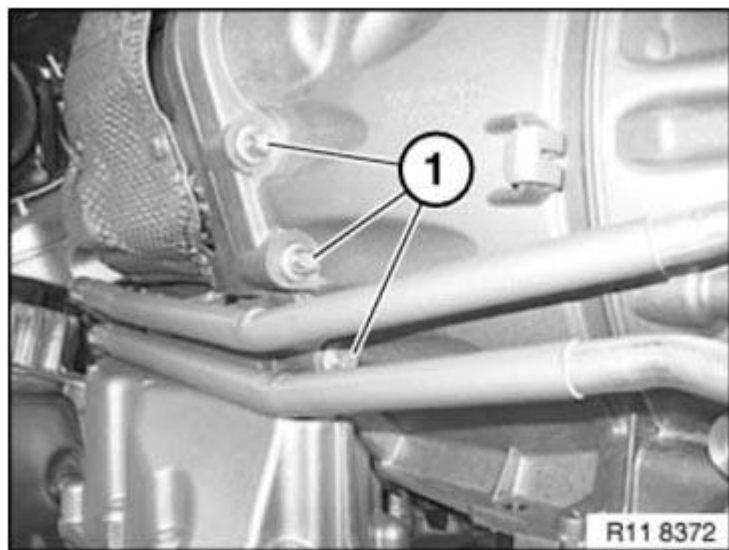


Fig. 28: Identifying Transmission Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Take off the transmission connector (1).

Unclip the transmission wiring harness from holders (2).

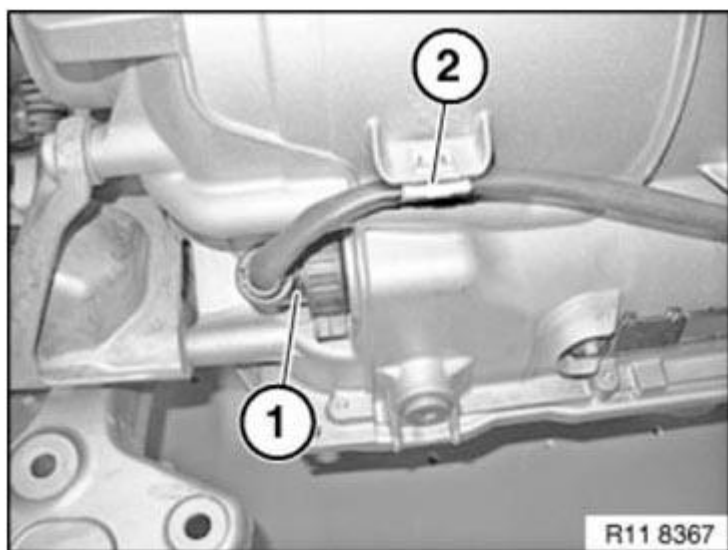


Fig. 29: Identifying Transmission Connector And Wiring Harness Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip the transmission wiring harness from its holders (2 3 4 and 5).

Pull off the transmission wiring harness from the transmission at the holder (1).

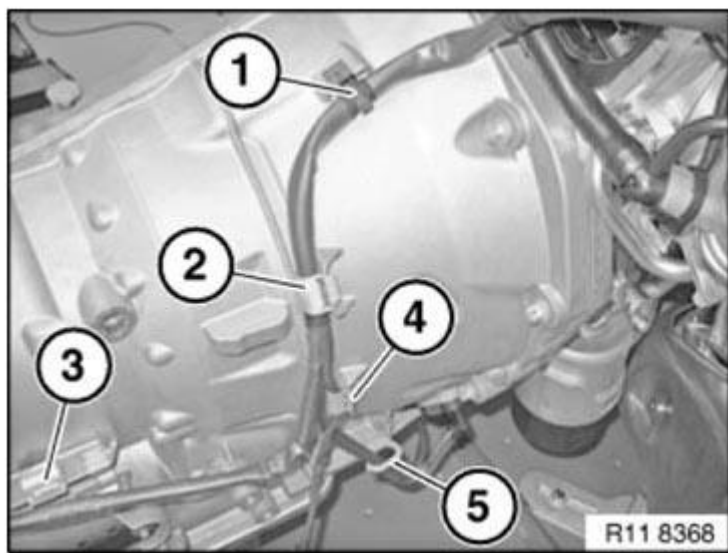


Fig. 30: Identifying Transmission Wiring Harness Holders
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on oil level sensor.

Unclip the transmission wiring harness from holders (2).

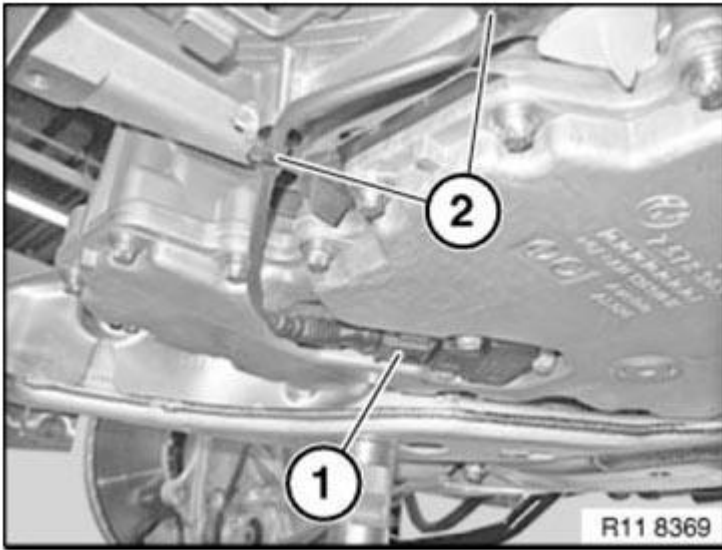


Fig. 31: Identifying Transmission Wiring Harness Holder And Oil Level Sensor Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Undo the transmission bolts (1).

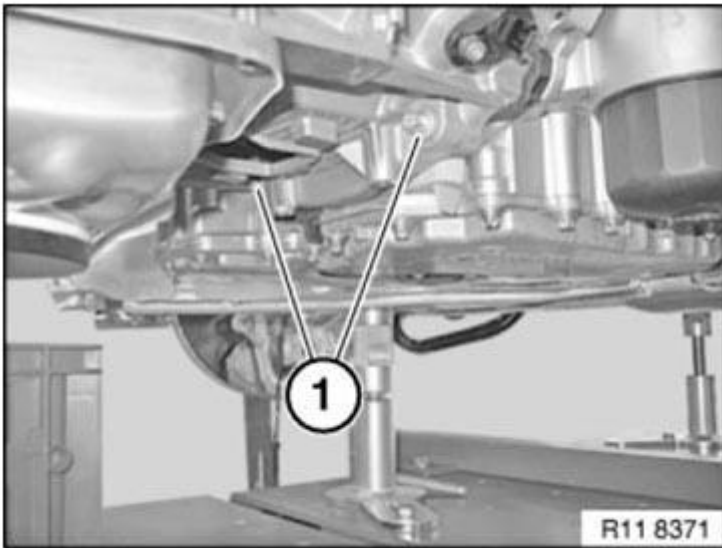


Fig. 32: Identifying Transmission Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Undo the transmission bolts (1 and 2).

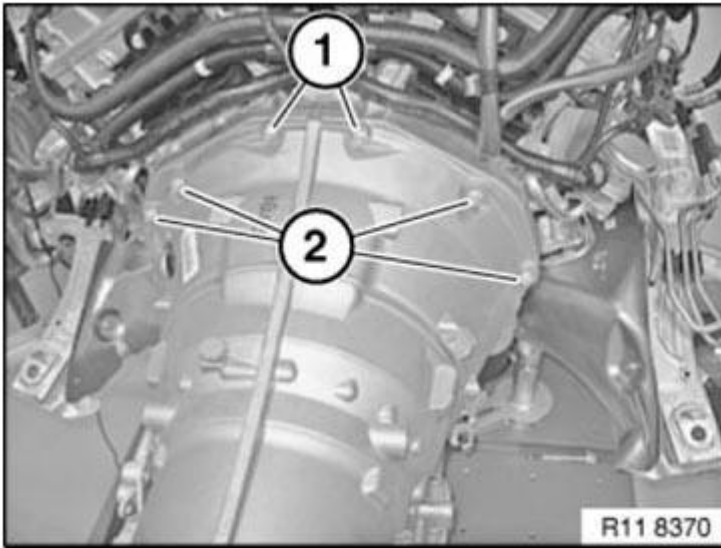


Fig. 33: Identifying Transmission Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Attach the engine using the engine crane and special tool 11 0 020.

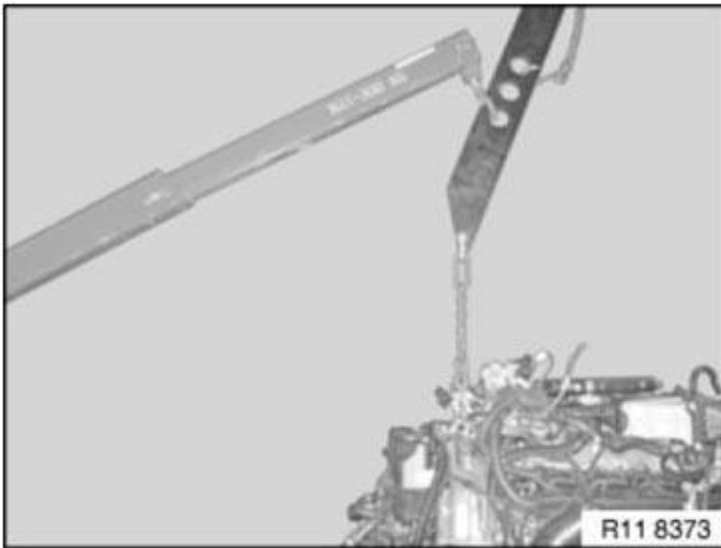


Fig. 34: Attaching Engine Using Engine Crane And Special Tool 11 0 020
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect transmission (2) from engine in the direction of the arrow.

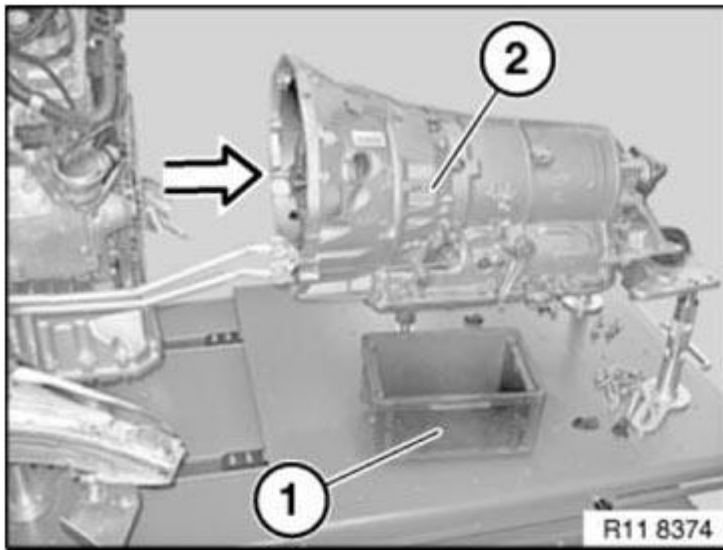


Fig. 35: Identifying Air Intake Manifold Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove the heat shield.

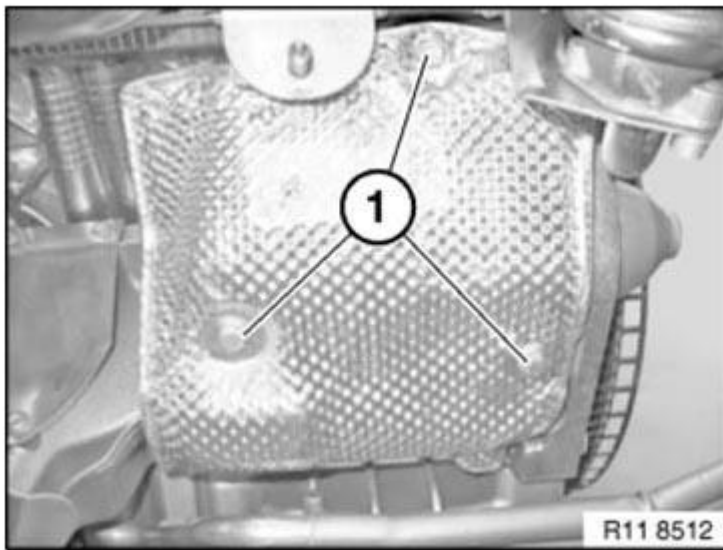


Fig. 36: Vacuum Activation - Connection Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

Release holder for hydraulic lines (1).

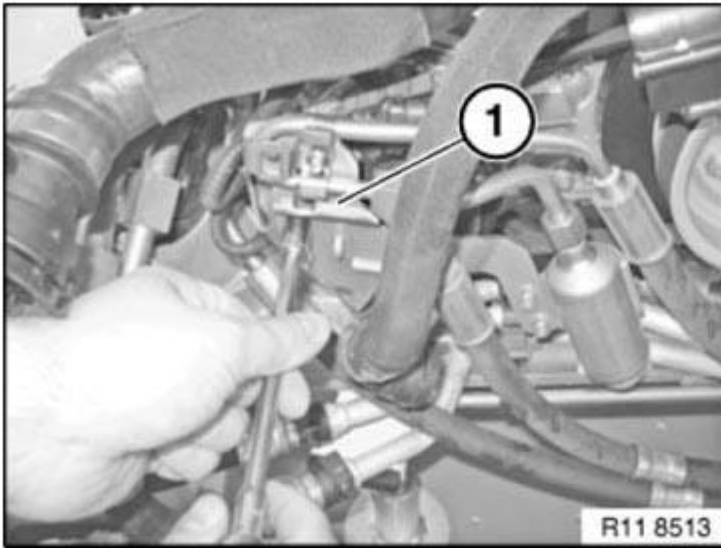


Fig. 37: Identifying Intake Plenum Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Release pressure hose of power steering pump with holder.

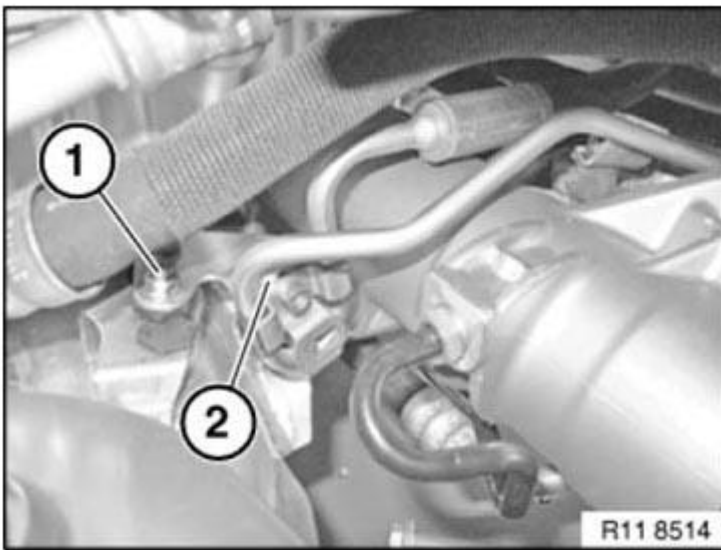


Fig. 38: Identifying Electric Changeover Valve Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Release screw (2).

Release pressure hose with holder (3).

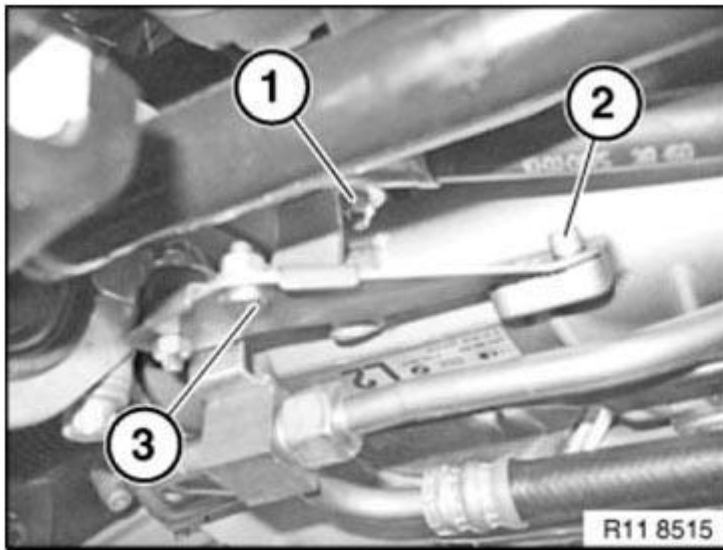


Fig. 39: Identifying Exhaust Turbocharger Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release central bolt (1).

Pull off pressure lines (2 and 3).

Installation note:

Replace all O-rings.

Open cable clips (4).

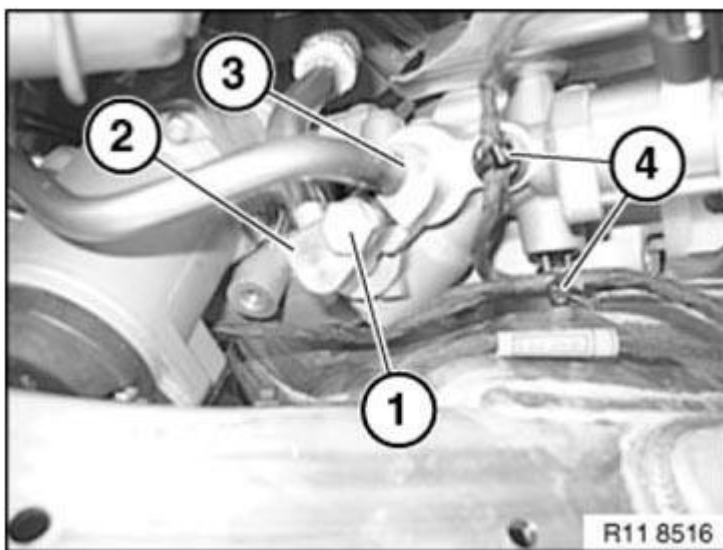


Fig. 40: Identifying Pressure Sensors And Cable Strap Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect the plug connections (1 and 2) on the steering box and front axle support.

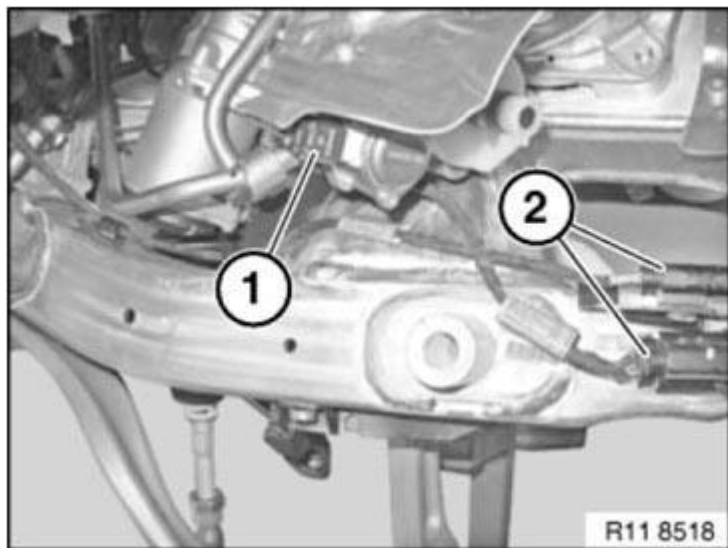


Fig. 41: Identifying Vacuum Pump Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Pull off the expansion hose (4).

Installation note:

Replace O-rings.

Release screws (3).

Pull off the expansion hose (2).

Installation note:

Replace O-rings.

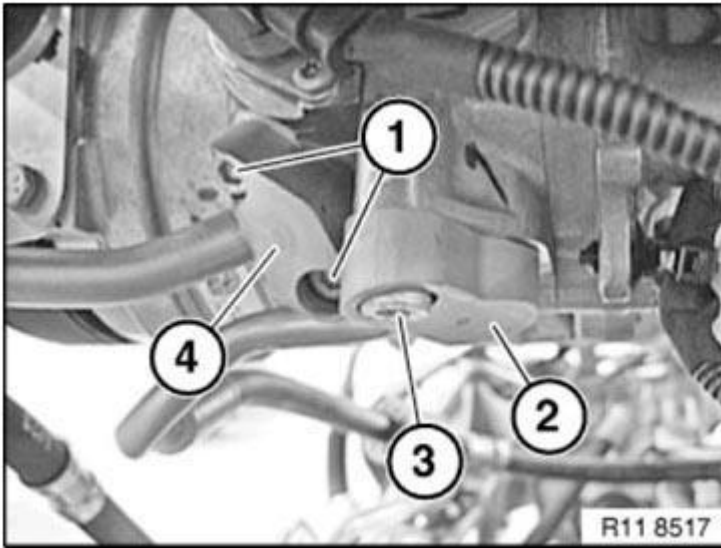


Fig. 42: Identifying Expansion Hose And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Undo the **BOLT** (1) on the left-hand engine mount.

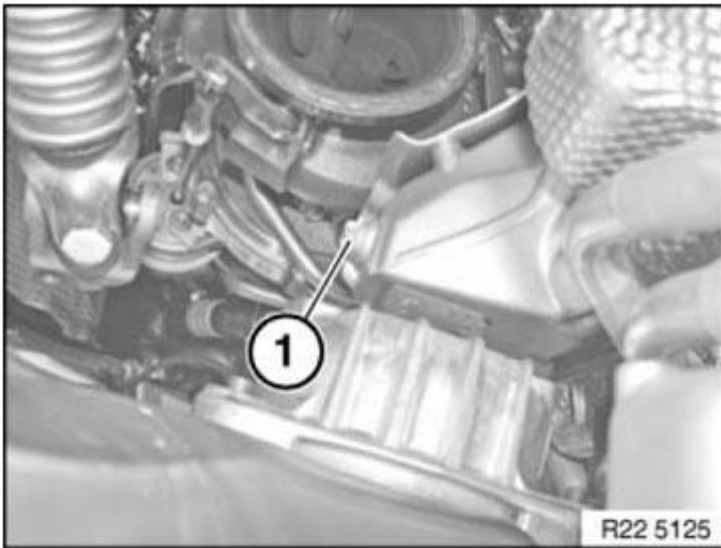


Fig. 43: Identifying Left-Hand Engine Mount Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Undo the **BOLT** (1) on the right-hand engine mount.

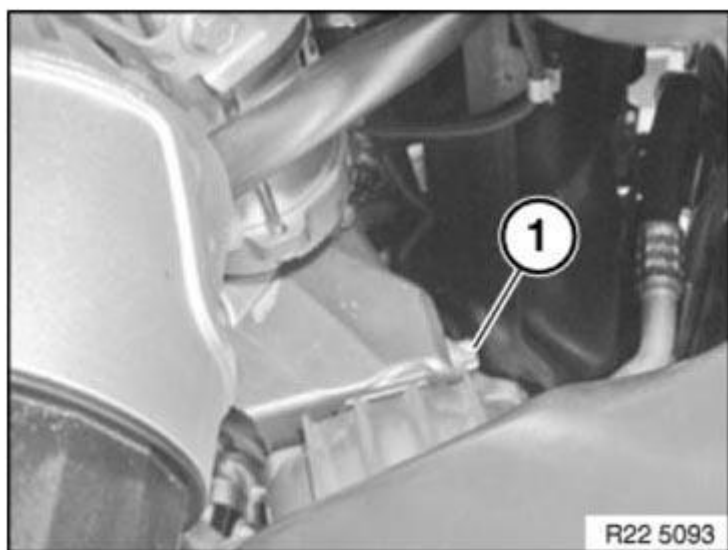


Fig. 44: Identifying Right-Hand Engine Mount Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Lift the engine (1) with the engine crane (2) and special tool 11 0 020 from the front axle.

Mount engine on assembly stand.

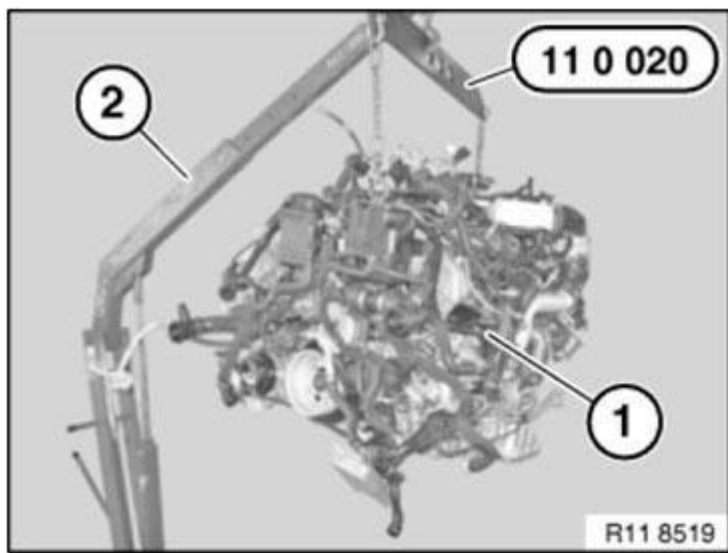


Fig. 45: Lifting Engine Using Engine Crane And Special Tool 11 0 020
Courtesy of BMW OF NORTH AMERICA, INC.

11 00 REMOVING AND INSTALLING/REPLACING ACOUSTIC COVER (N74)

Pull acoustic cover (1) up and out of the rubber mount and remove.

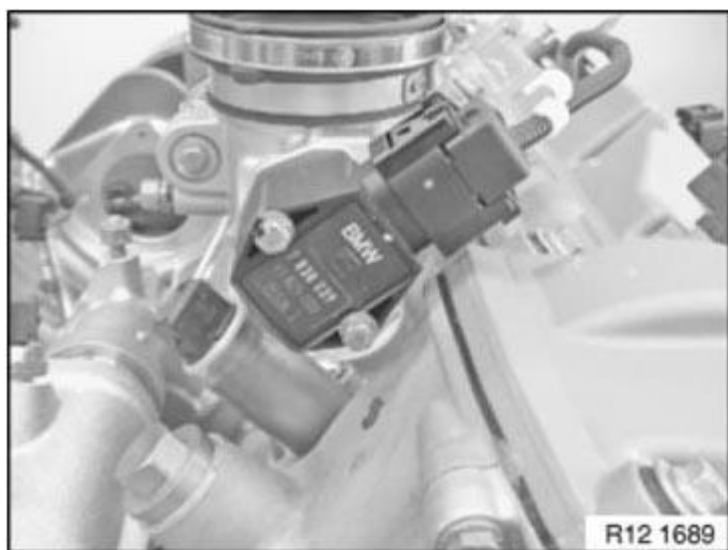


Fig. 46: Pulling Acoustic Cover Up
Courtesy of BMW OF NORTH AMERICA, INC.

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

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

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

Protective measures/rules of conduct

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

First aid measures

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

NOTE: Do not use solvents/thinners.

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

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

Observe safety precautions when working on MSA vehicles

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

MSA function is deactivated by

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

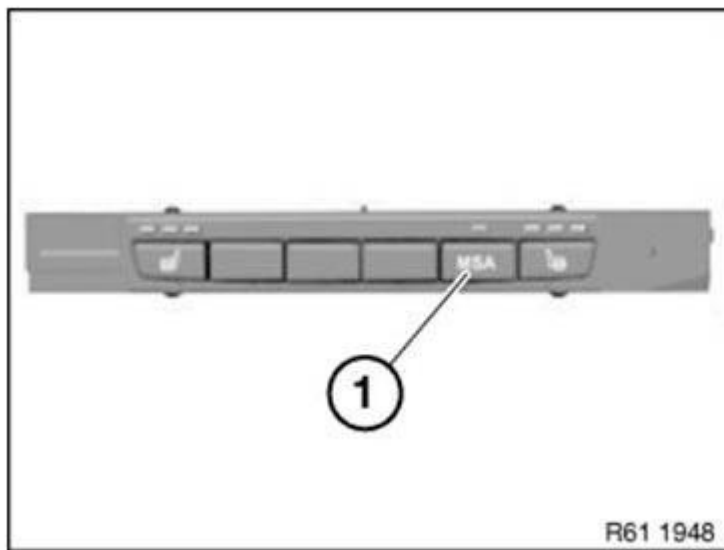


Fig. 47: Identifying MSA Button

Courtesy of BMW OF NORTH AMERICA, INC.

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

A = 10 mm

- Basic setting (engine hood/bonnet open)

B = 7 mm

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

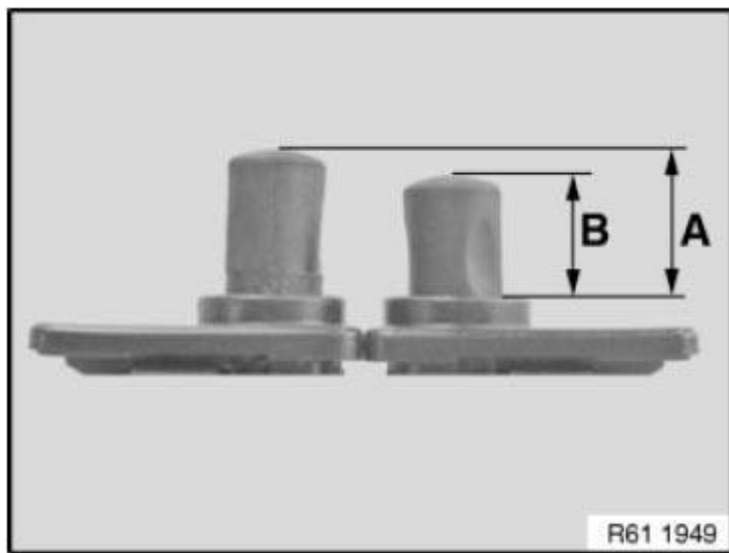


Fig. 48: Identifying Engine Bonnet/Hood Positions (Workshop Mode And Basic Setting)
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

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

Recycling

Observe country-specific waste disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:**

Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.

- **Environmental protection measures:**

Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.

- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

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

11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N74)

WARNING: Risk of injury!

Observe following instructions relating to special tool:

1. Prior to each use, check the special tools for defects, modifications and operational reliability.
2. Damaged/modified special tools must not be used!
3. No changes or modifications may be made to the special tools!
4. Keep special tools dry, clean and free of grease.

NOTE: • Numbering system for special tools has been re-encoded.

IMPORTANT: Special tool 00 6 000 must not be fitted when transverse member (1) is installed!

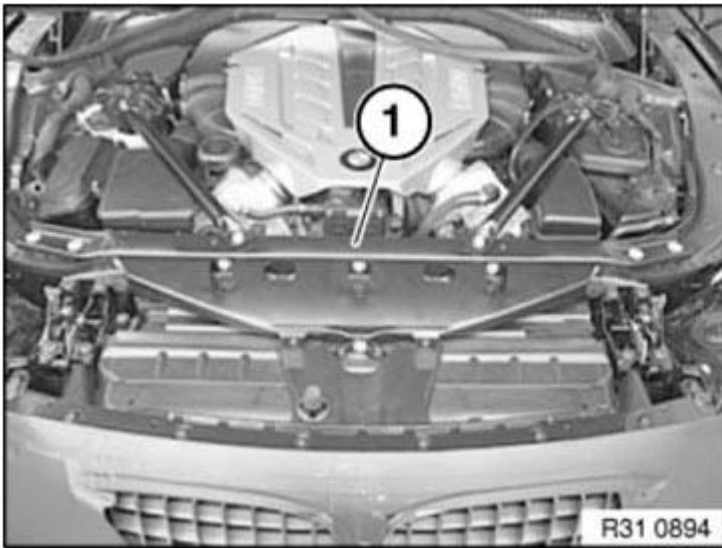


Fig. 49: Identifying Transverse Member
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Secure engine compartment lid in service position. See **SERVICE POSITION (ACTIVE UP TO**

09/2011) or **SERVICE POSITION (ACTIVE FROM 09/2011)** .

- Remove **PANEL** for engine compartment lid at side
- Remove acoustic cover
- Remove front **UNDERBODY PROTECTION**

Assemble transverse member **00 6 000** with special tools **00 6 002 00 6 004** , 00 6 010, **00 6 050** .

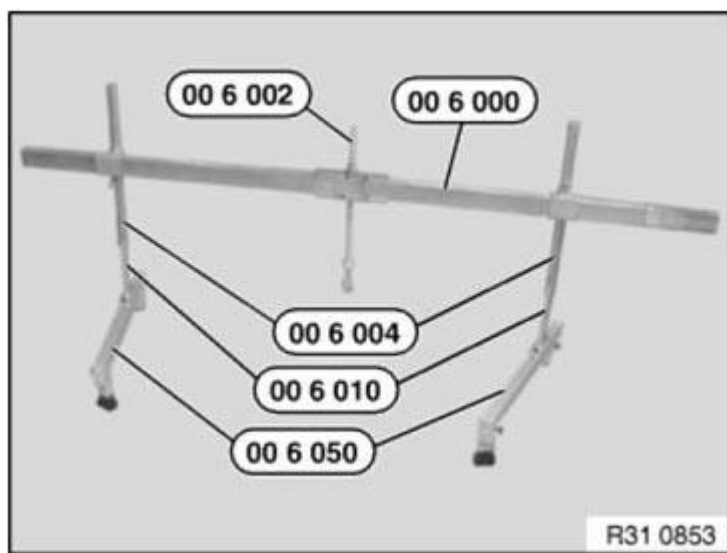


Fig. 50: Assembling Transverse Member 00 6 000 Using Special Tools 00 6 002 00 6 004, 00 6 010, 00 6 050

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Contact points (1) for special tool **00 6 050** are pictured.

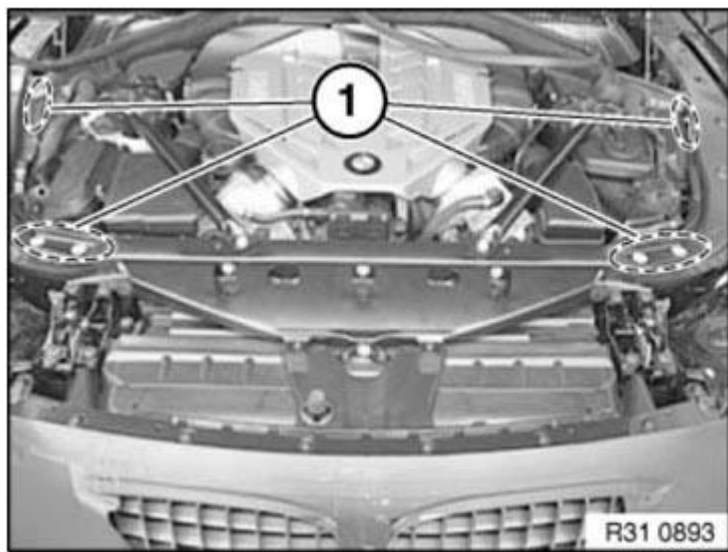


Fig. 51: Identifying Contact Points

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Position transverse member 00 6 000 with a 2nd person helping on contact points ().

Secure suitable chain (1) on the spindle 00 6 002 .

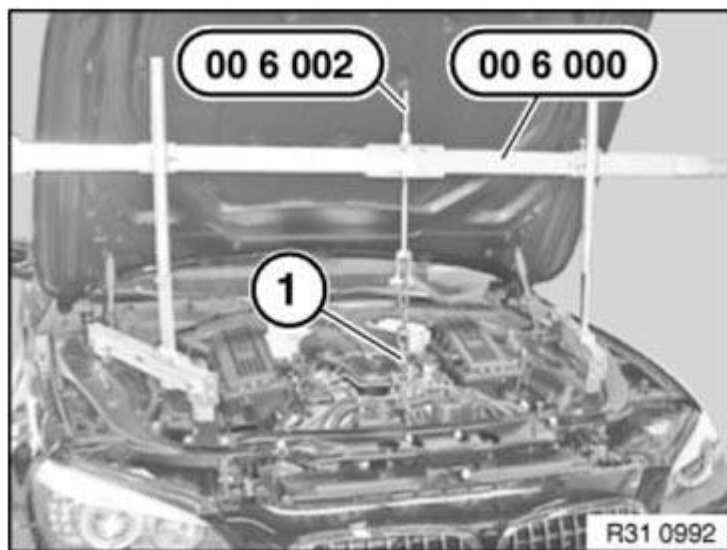


Fig. 52: Securing Suitable Chain On Spindle 00 6 002
Courtesy of BMW OF NORTH AMERICA, INC.

Suspend chain on the front suspension lug (1) of the engine.

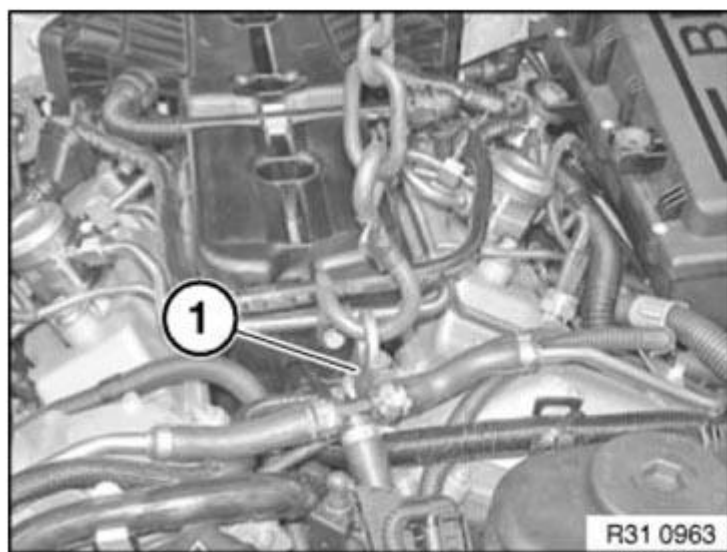


Fig. 53: Identifying Front Suspension Lug

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Avoid a change of engine position in the transverse or longitudinal direction.

Always make sure there is sufficient clearance between the engine (or its attachment parts) and the body.

WARNING: Risk of injury!

Tighten down all screws and nuts on transverse member 00 6 000 .

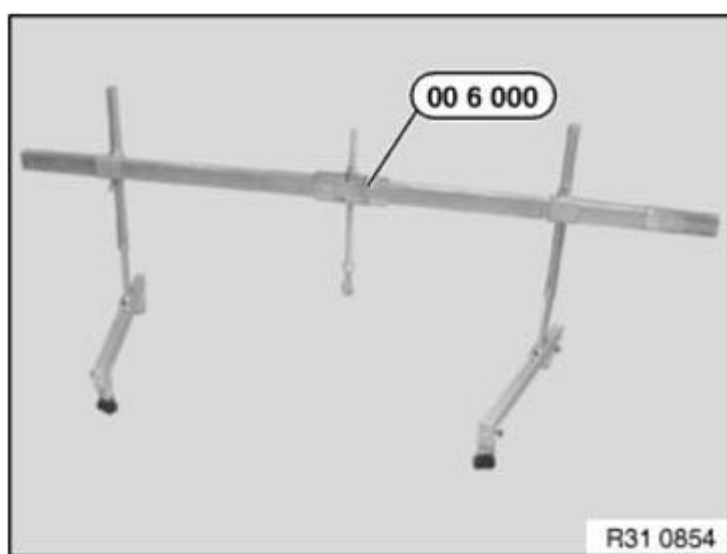


Fig. 54: Identifying Transverse Member 00 6 000
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: see 1AZ in 22 11 ENGINE MOUNTING

Raise engine approx. 10 mm with transverse member.

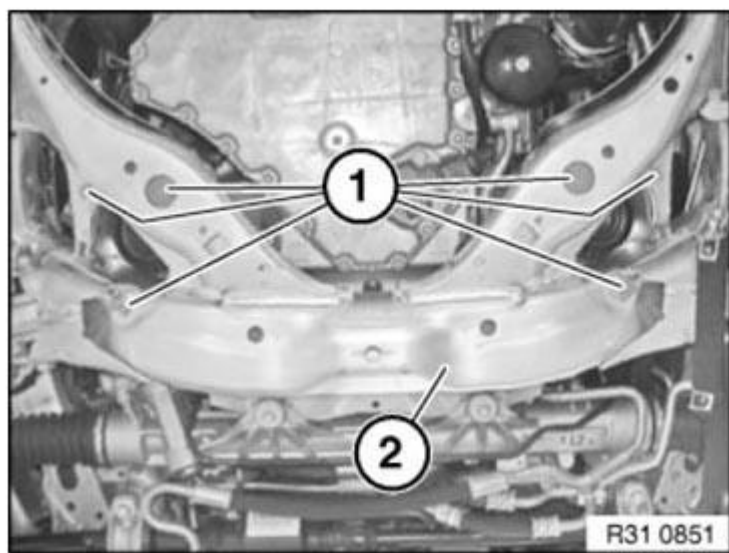


Fig. 55: Identifying Transverse Member Screws
Courtesy of BMW OF NORTH AMERICA, INC.

11 00... SERVICE - ENGINE OIL (N74)

WARNING: Risk of scalding!

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

IMPORTANT: Carry out the engine oil service only when the engine is at operating temperature.

Observe the exact engine oil filling capacity.

Overfilling the engine with engine oil will result in **engine damage**.

Checking and drip-off times (at least 15 minutes) must be observed.

Recycling:

Catch and dispose of drained engine oil in a suitable collecting vessel.

Observe country-specific waste disposal regulations.

Necessary preliminary tasks:

- Open the cover on the under trim panel.

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

Release screw plug (2) on oil filter cover.

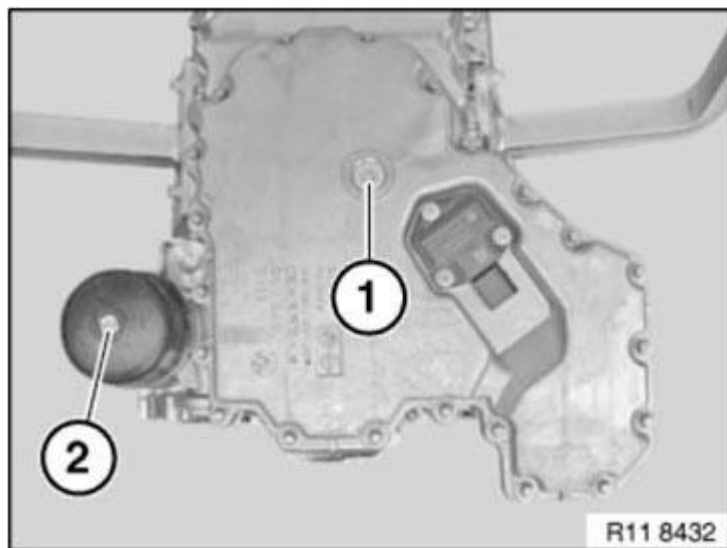


Fig. 56: Identifying Oil Filter Cover And Sump Screw Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release oil filter cover (1) with special tool 11 9 240 .

Tightening torque: see 1AZ in 11 42 OIL FILTER AND LINES

NOTE: **Graphic shows N63.**

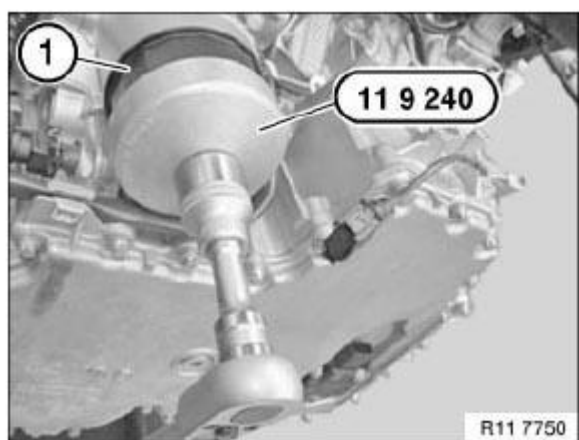


Fig. 57: Releasing Oil Filter Cover Using Special Tool 11 9 240
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Renew sealing ring (2) and wet with oil.

Check sealing ring (1) and renew, if installed.

Renew oil filter element (3) and slide into the oil filter cover.

Oil filter element (3) must snap audibly into place.

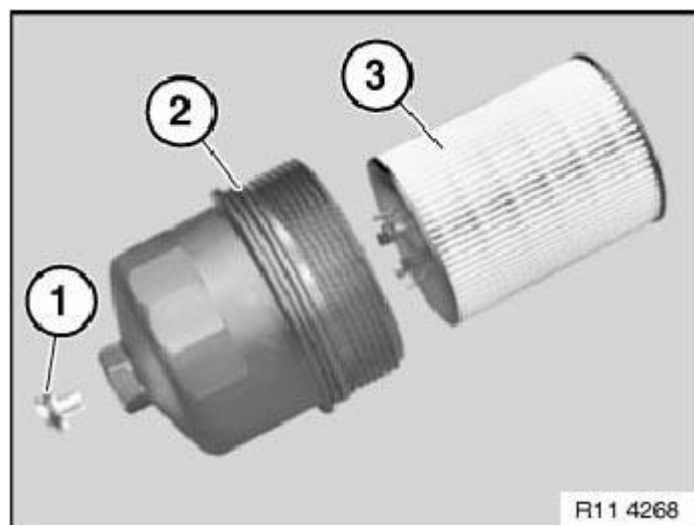


Fig. 58: Identifying Oil Filter Element And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Insert oil filter element (3) into oil filter cover.

Installation note

Oil filter element (3) must snap audibly into place.

Installation note:

Replace sealing rings .

Insert screw plug (1) for oil sump and tighten down.

Tightening torque: see 1AZ in **11 13 OIL SUMP**

Insert screw plug (2) for oil filter cover and tighten down.

Tightening torque: see 2AZ in **11 42 OIL FILTER AND LINES**

NOTE: Illustration with engine removed.

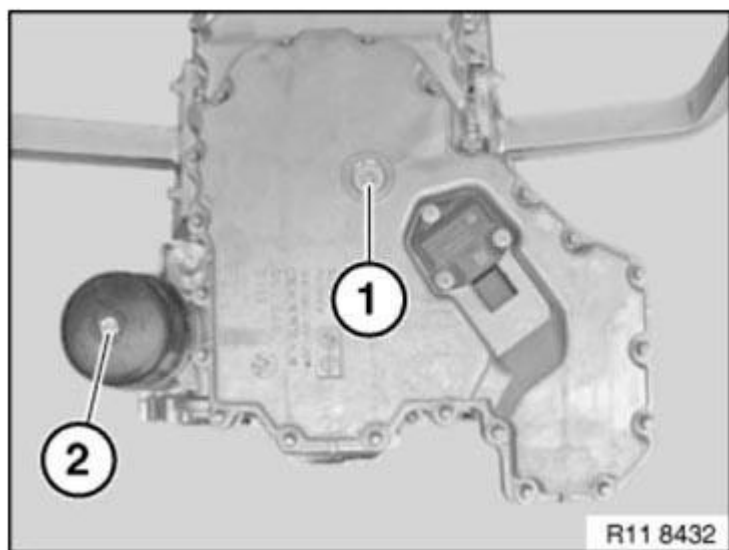


Fig. 59: Identifying Oil Filter Cover And Sump Screw Plug
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Engine overfill can only be detected with diagnosis tester.

NOTE: Pour in ENGINE OIL .

Start engine and run at idle speed.

Check oil filter cover and screw plugs for leak-tightness.

Assemble engine.

Checking engine oil level

- Park vehicle on a horizontal surface
 - Test engine oil level via diagnosis test.
1. Vehicle check.
 2. Control unit harness.
 3. Call up control unit function.
 4. Diagnosis request.
 5. Engine performance data.
 6. Query engine oil level.
 - Top up engine oil if necessary.
 - Difference between minimum and maximum is 1.5 liters.

CYLINDER HEAD WITH COVER

11 12 729 CHECKING CYLINDER HEAD FOR WATER LEAKS (N74)**Necessary preliminary tasks:**

- Remove LEFT CYLINDER HEAD.
- Remove RIGHT CYLINDER HEAD.
- Remove ALL VALVES.

NOTE: Set of special tools 11 6 221 can be used for cylinder bank 1 to 6 and cylinder bank 7 to 12.

Position special tool 11 6 221 on cylinder head.

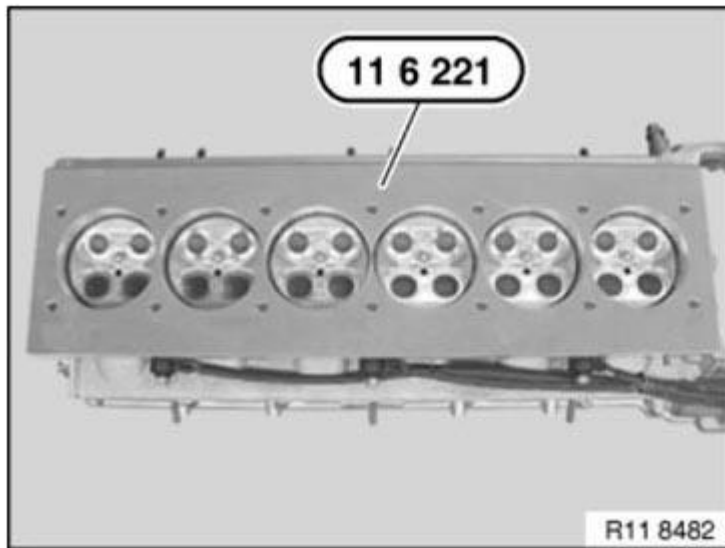


Fig. 60: Positioning Special Tool 11 6 221 On Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

Special tool 11 6 222 allows the original cylinder head bolts (1) to be used to secure the pressure plate 11 6 221 .

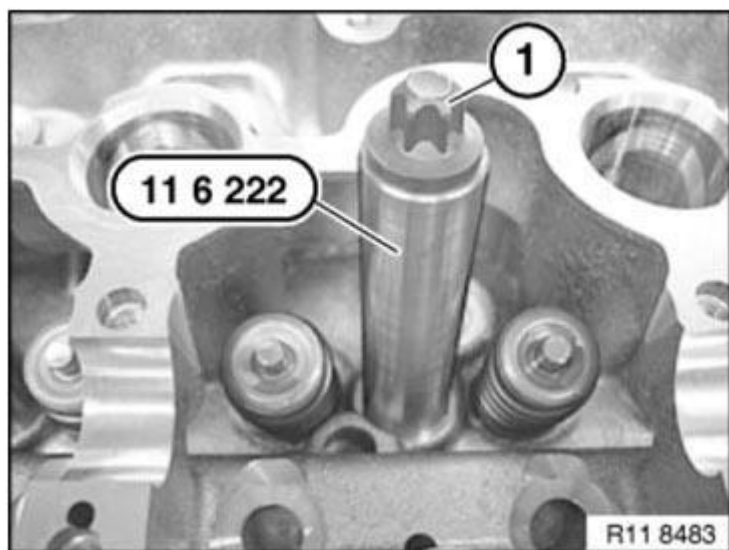


Fig. 61: Securing Cylinder Head Bolts To Pressure Plate Using Special Tool 11 6 222
Courtesy of BMW OF NORTH AMERICA, INC.

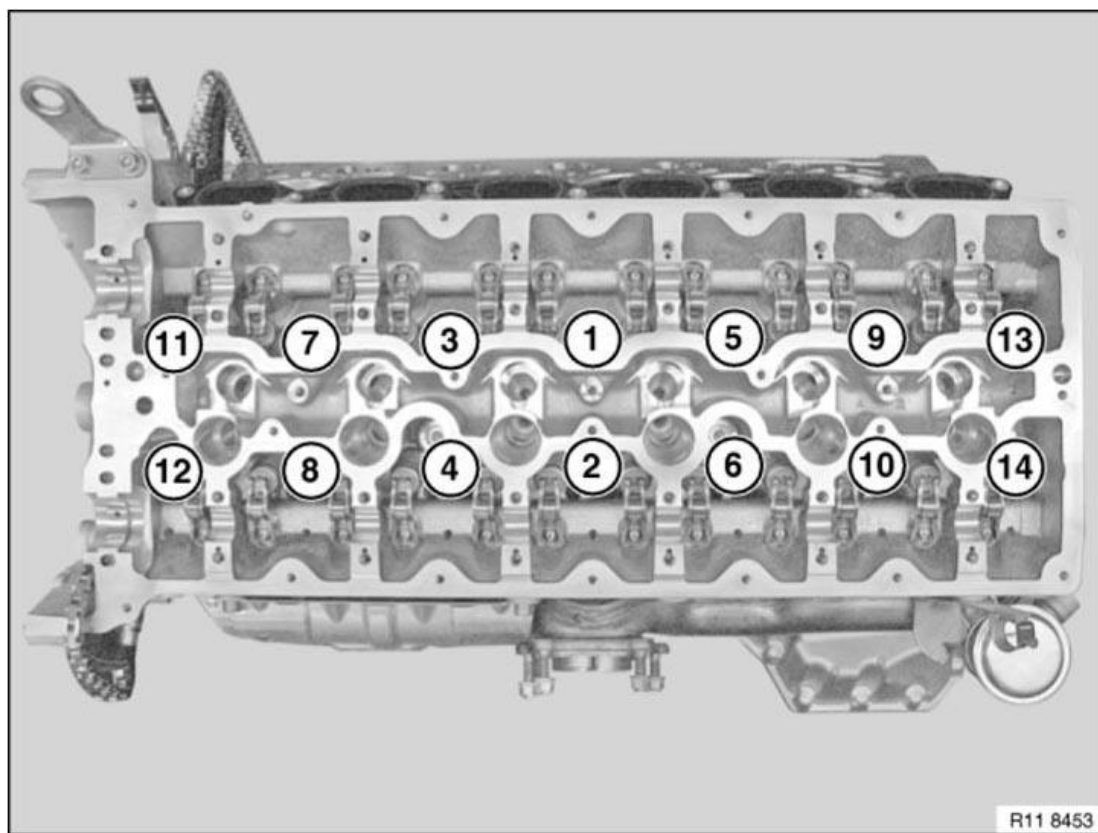


Fig. 62: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 11 8 083 and tighten in sequence (1 to 14) in several steps.

Tightening torque: **15 Nm**

Remove bleeder screw (1).

Tightening torque: see 8AZ in **11 12 CYLINDER HEAD WITH CYLINDER HEAD COVER**

Installation:

Replace sealing ring.

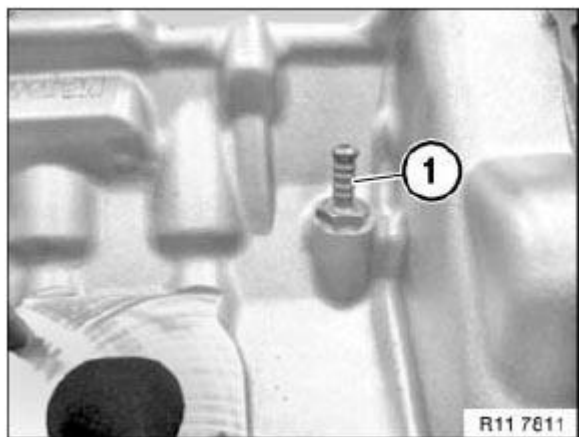


Fig. 63: Identifying Bleeder Screw

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Max: 0.8 Nm.

Screw in special tool 11 8 082 with suitable tool and special tool to 0.8 Nm.

Connect compressed air hose with pressure gauge.

Immerse cylinder head in a water bath. Test pressure: 3.0 bar.

Check cylinder head for escaping air (cracks).

NOTE: **Illustration shows N63.**

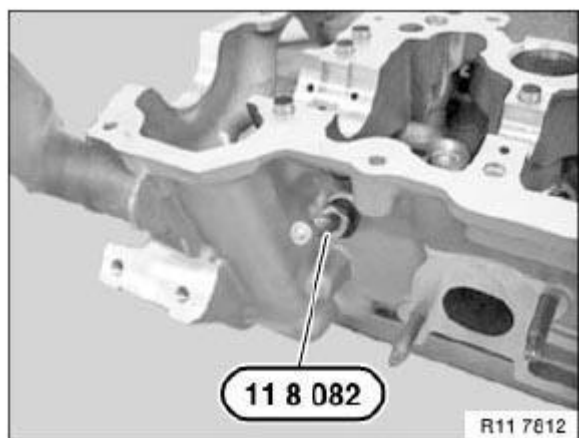


Fig. 64: Screwing Special Tool 11 8 082

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If necessary, add cleaning agent to water bath.

Assemble engine.

11 12 105 REMOVING AND INSTALLING LEFT CYLINDER HEAD (N74)

Necessary preliminary tasks:

- Check **TIMING**
- Remove left **INTAKE AND EXHAUST CAMSHAFT ADJUSTER**

Release bolt (1) on top guide rail.

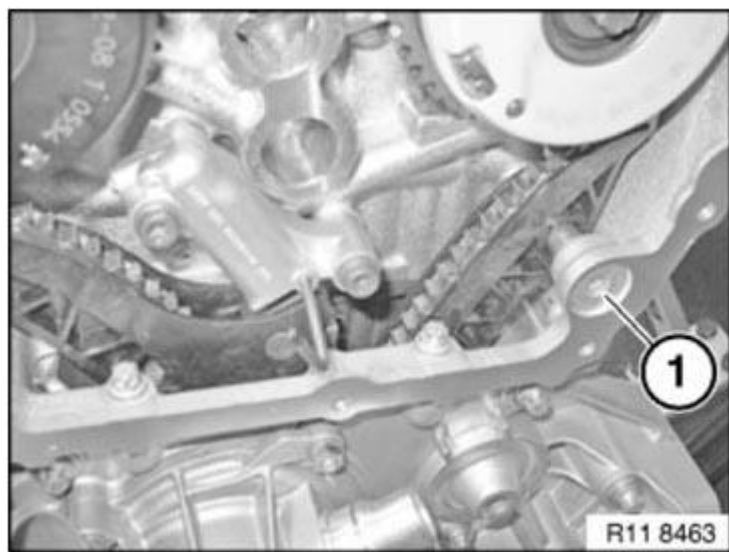


Fig. 65: Identifying Top Guide Rail Bolt

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Chain tensioner is pre-tensioned and may only be removed with secured special tool 11 4 120 .

Release screws (1) and remove chain tensioner (2).

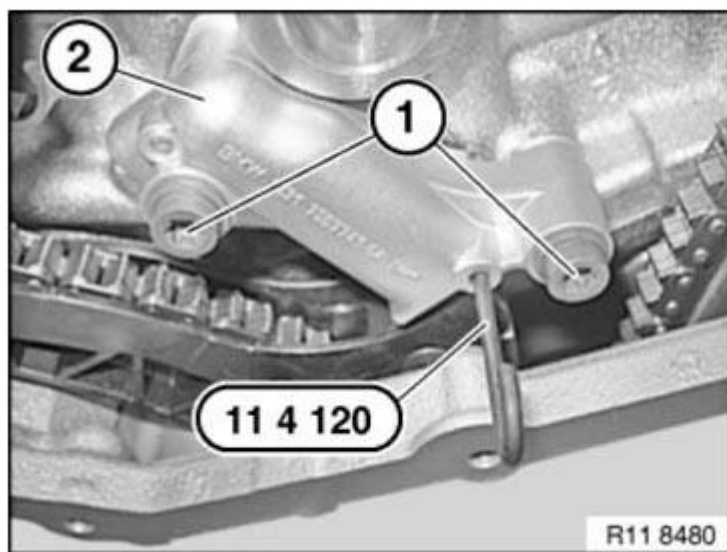


Fig. 66: Removing Chain Tensioner

Courtesy of BMW OF NORTH AMERICA, INC.

Release cylinder head screws at front of cylinder head.

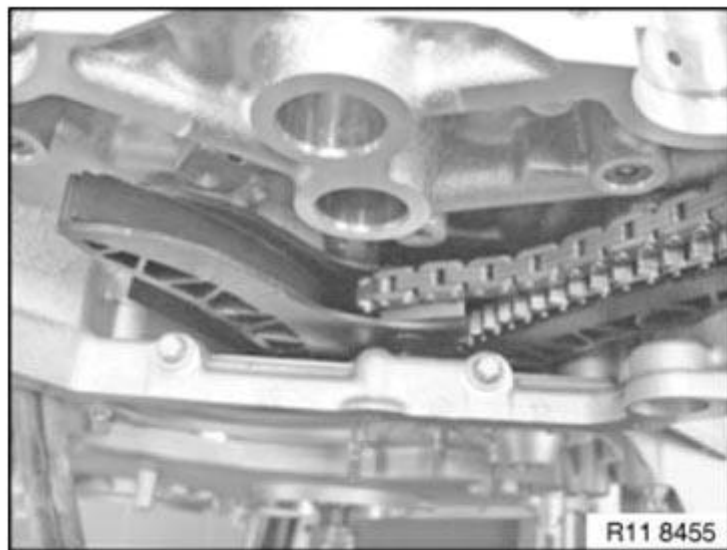


Fig. 67: Identifying Chain Tensioner Arm

Courtesy of BMW OF NORTH AMERICA, INC.

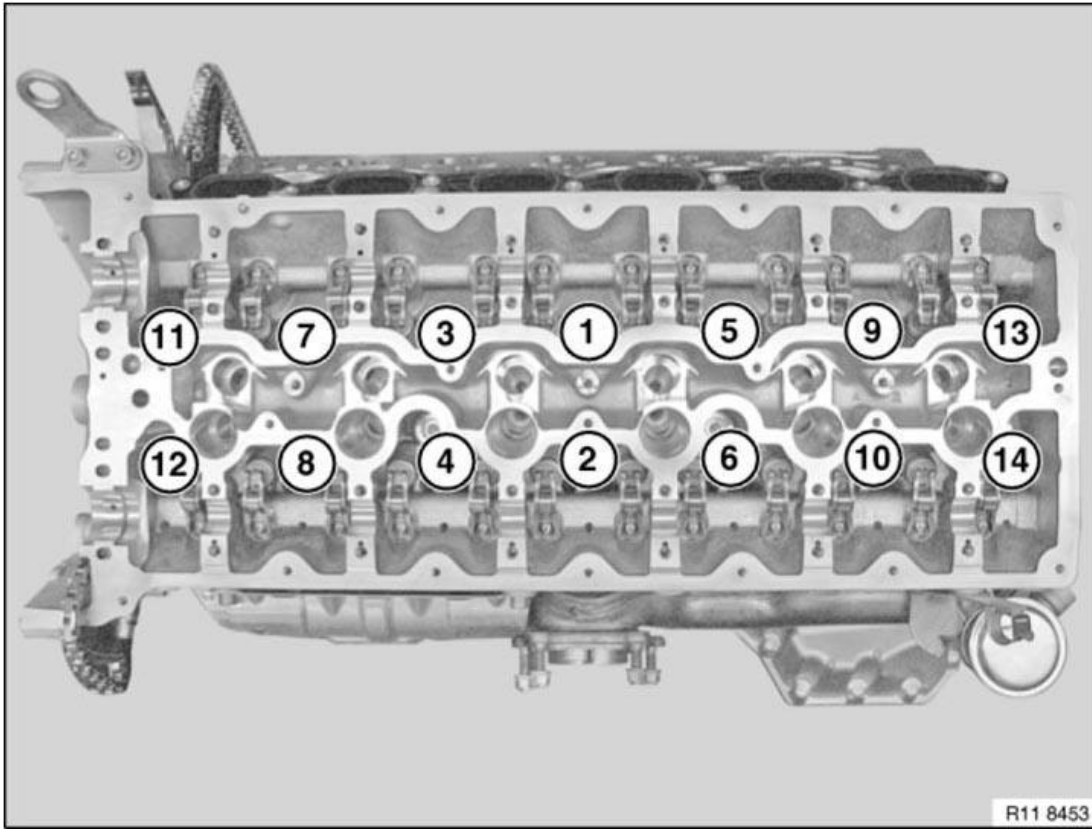


Fig. 68: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release cylinder head bolts in sequence (14 to 1).

Remove all cylinder head bolts with washers.

Remove cylinder head with assistance of a second person (weight approx. 30 kg).

NOTE: Detach ventilation line at separation point.

Remove ventilation line with cylinder head.

NOTE: For purposes of clarity, the graphic shows the camshafts removed.

Clean sealing faces of cylinder head and engine block; if necessary, remove gasket debris compound with special tool **11 4 470**. Make sure no gasket remnants drop into oil and cooling channels.

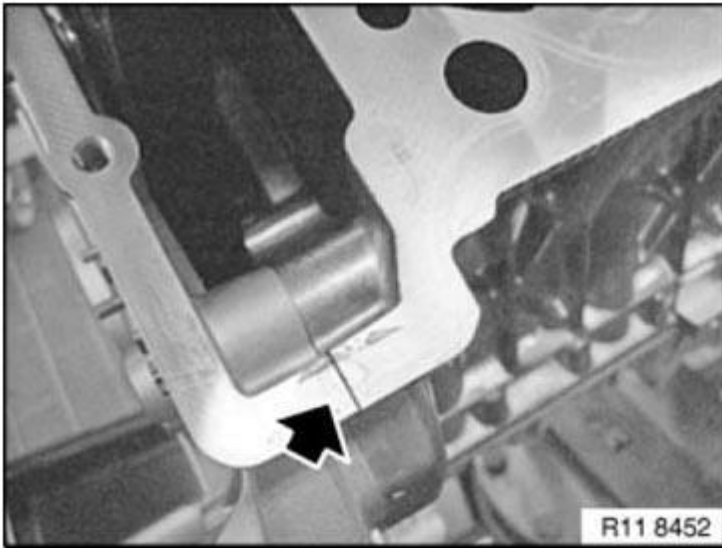


Fig. 69: Locating Sealing Face Of Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of cracking!

Threaded bores in engine block must be free of dirt and oil

Check CYLINDER HEAD for leaks.

Check CYLINDER HEAD SEALING FACE for surface evenness.

Coat joint between engine block and timing case cover with Drei Bond 1209 (refer to BMW Parts Service).

NOTE: Graphic shows an N62 engine by way of example.

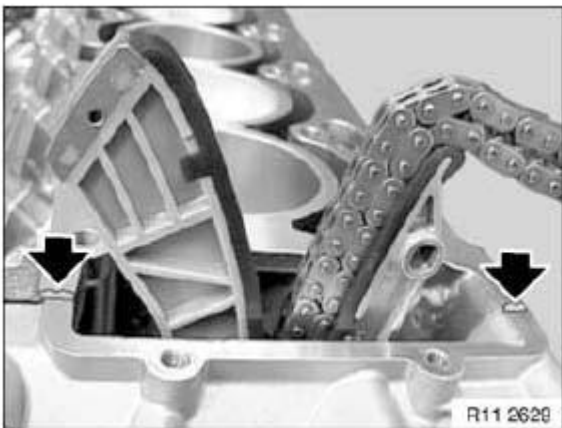


Fig. 70: Locating Drei Bond Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

Check dowel sleeves (1) for damage and correct installation position.

Installation:

Replace cylinder head gasket .

Fit new cylinder-head seal.

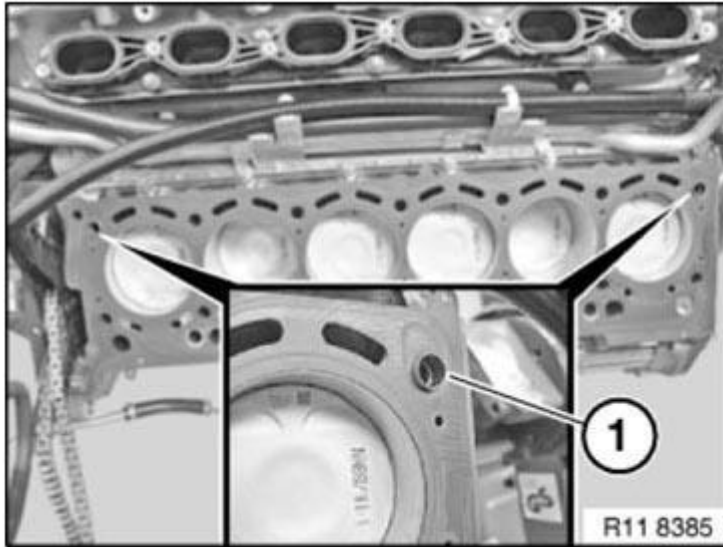


Fig. 71: Identifying Dowel Sleeves

Courtesy of BMW OF NORTH AMERICA, INC.

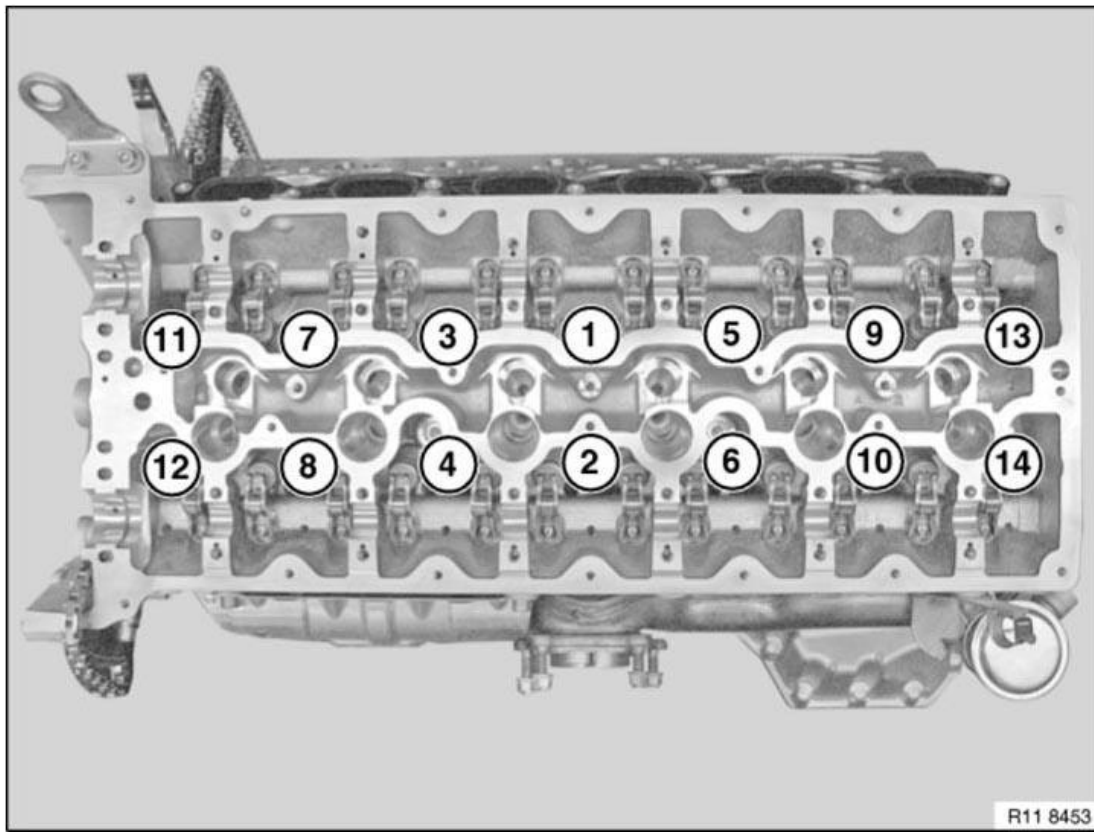


Fig. 72: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Join tensioner rails together using appropriate tool and insert timing chain.

Fit cylinder head with ventilation line.

Do not wash off bolt coating.

Fit new cylinder head screws .

Insert new cylinder head bolts and initially tighten so that they are free of play.

Tighten down cylinder head bolts in sequence 1 - 14.

Tightening torque: see 1AZ in **11 12 CYLINDER HEAD WITH CYLINDER HEAD COVER**

NOTE: For purposes of clarity, the graphic shows the camshafts removed.

To make it easier to check angle tightening, mark all collar bolts M11 using an oil-proof marker pen (see illustration).

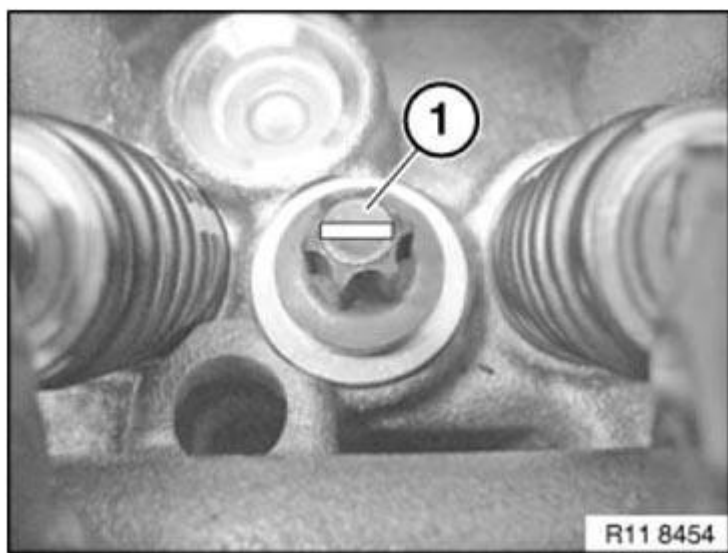


Fig. 73: Identifying Mark On Collar Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Insert and tighten down screws between cylinder head and timing case cover.

Tightening torque: see 2AZ in **11 12 CYLINDER HEAD WITH CYLINDER HEAD COVER**

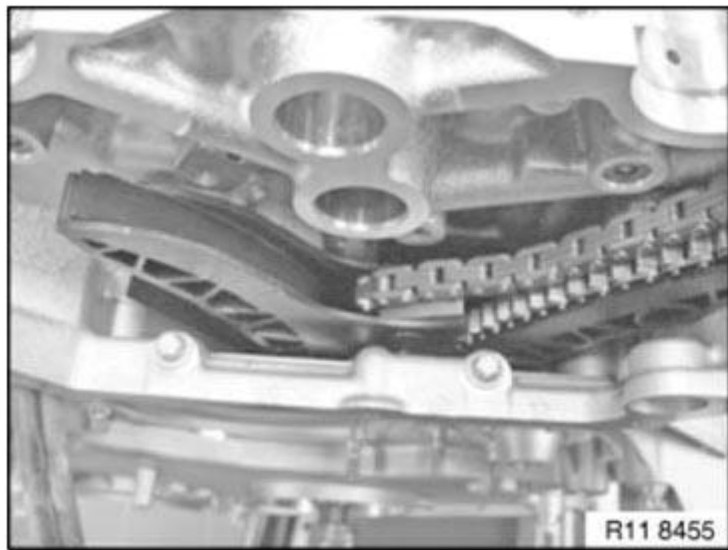


Fig. 74: Identifying Chain Tensioner Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screw (1) of guide rail and tighten down.

Tightening torque: see 5AZ in **11 31 CAMSHAFT**

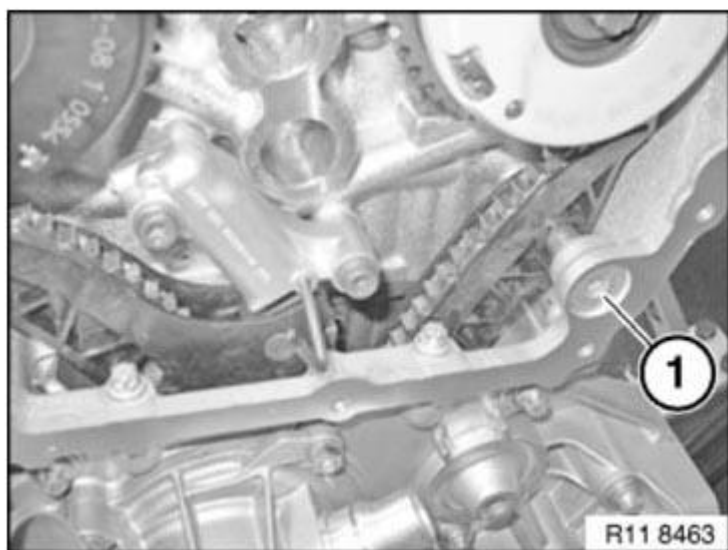


Fig. 75: Identifying Top Guide Rail Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, install camshafts. See **LEFT INTAKE CAMSHAFT** and **LEFT EXHAUST CAMSHAFT**.

Install left **INTAKE AND EXHAUST ADJUSTMENT UNITS**.

Assemble engine.

11 12 106 REMOVING AND INSTALLING RIGHT CYLINDER HEAD (N74)

Necessary preliminary tasks:

- Check **TIMING**.
- Remove **INTAKE AND EXHAUST ADJUSTMENT UNIT ON RIGHT SIDE**.
- Remove **COOLANT THERMOSTAT**

Release bolt (1) on top guide rail.

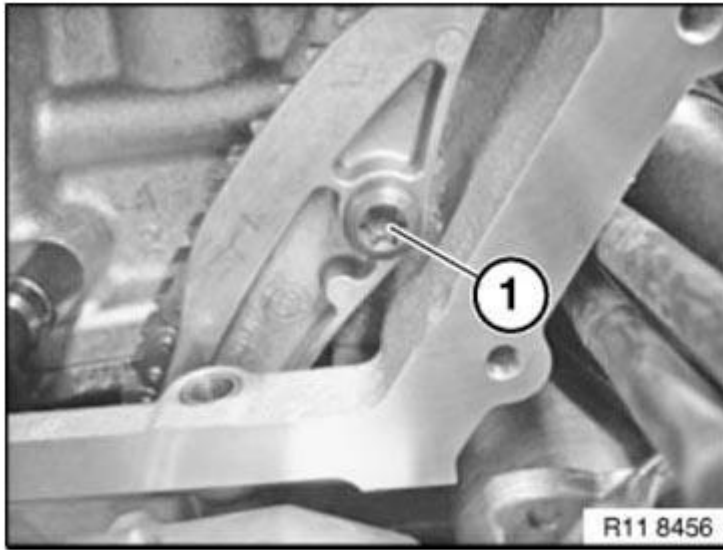


Fig. 76: Identifying Top Guide Rail Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1) on bottom guide rail.

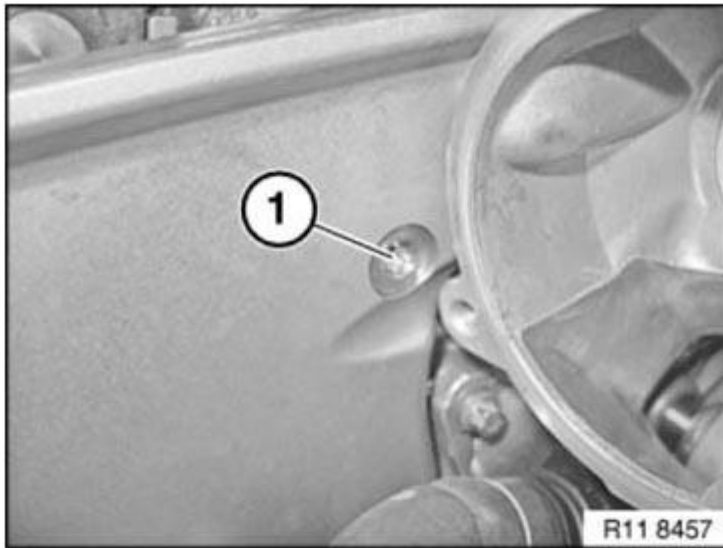


Fig. 77: Identifying Bottom Guide Rail Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Chain tensioner is pre-tensioned and may only be removed with secured special tool 11 4 120 .

Release screws (1) and remove chain tensioner (2).

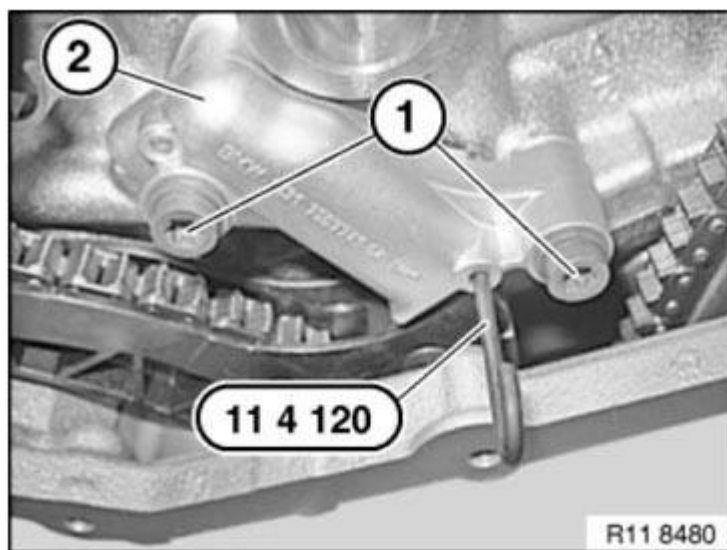


Fig. 78: Removing Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Release cylinder head screws at front of cylinder head.

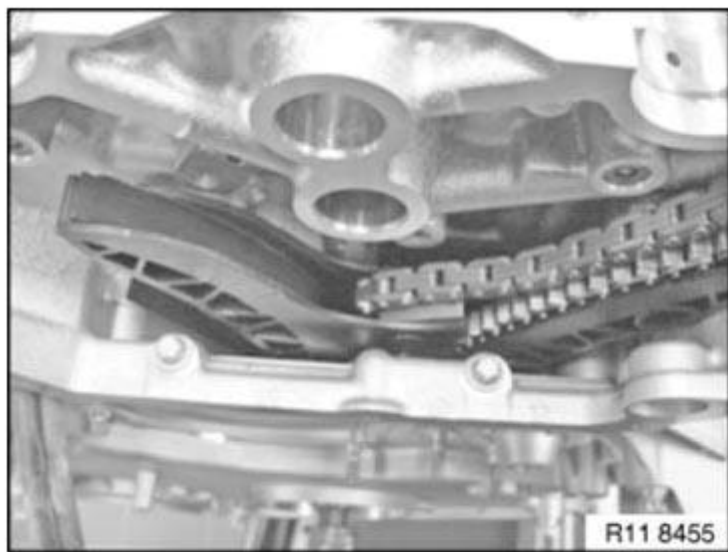


Fig. 79: Identifying Chain Tensioner Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Release cylinder head bolts in sequence (14 to 1).

Remove all cylinder head bolts with washers.

Remove cylinder head with assistance of a second person (weight approx. 30 kg).

NOTE: Detach ventilation line at separation point.

Remove ventilation line with cylinder head.

NOTE: For purposes of clarity, the graphic shows the camshafts removed.

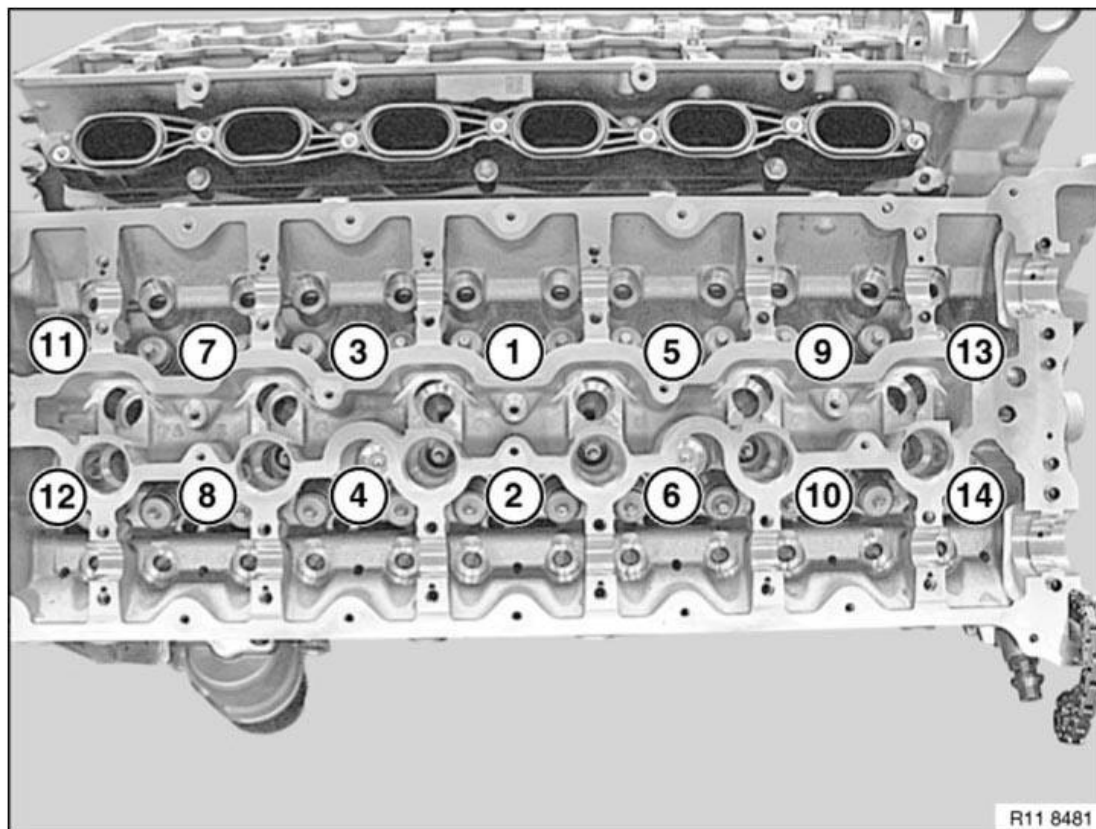


Fig. 80: Identifying Cylinder Head Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Clean sealing faces of cylinder head and engine block; if necessary, remove gasket debris compound with special tool **11 4 470**. Make sure no gasket remnants drop into oil and cooling channels.

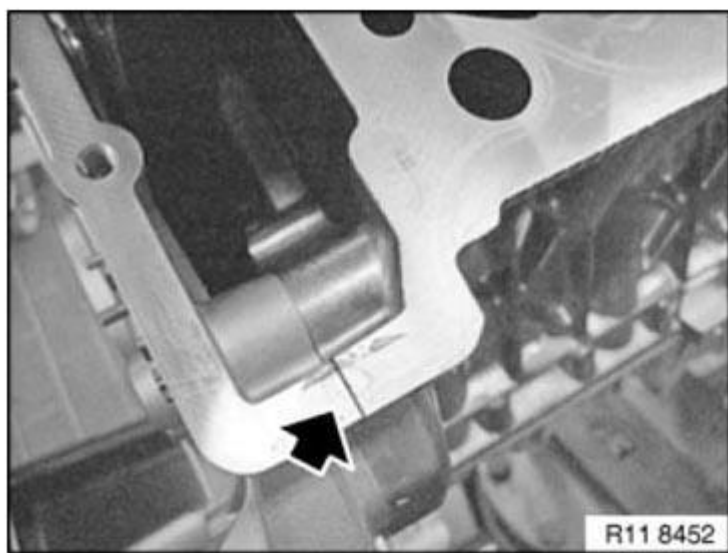


Fig. 81: Locating Sealing Face Of Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of cracking!

Threaded bores in engine block must be free of dirt and oil

Check CYLINDER HEAD FOR LEAKS.

Check CYLINDER HEAD SEALING FACE for surface evenness.

Coat joint between engine block and timing case cover with Drei Bond 1209 (refer to BMW Parts Service).

NOTE: **Graphic shows an N62 engine by way of example.**

Coat joint between engine block and timing case cover with Drei Bond 1209 (refer to BMW Parts Service).

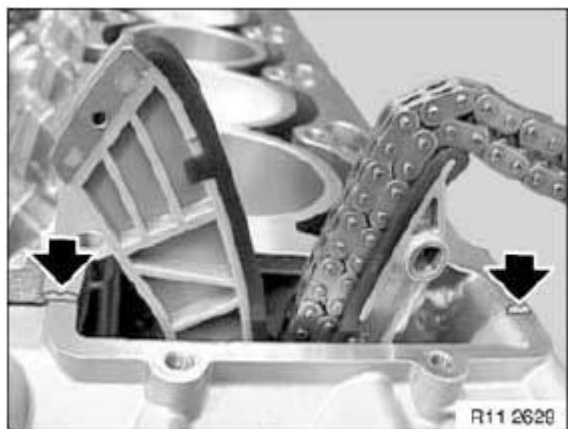


Fig. 82: Locating Drei Bond Applying Area

Courtesy of BMW OF NORTH AMERICA, INC.

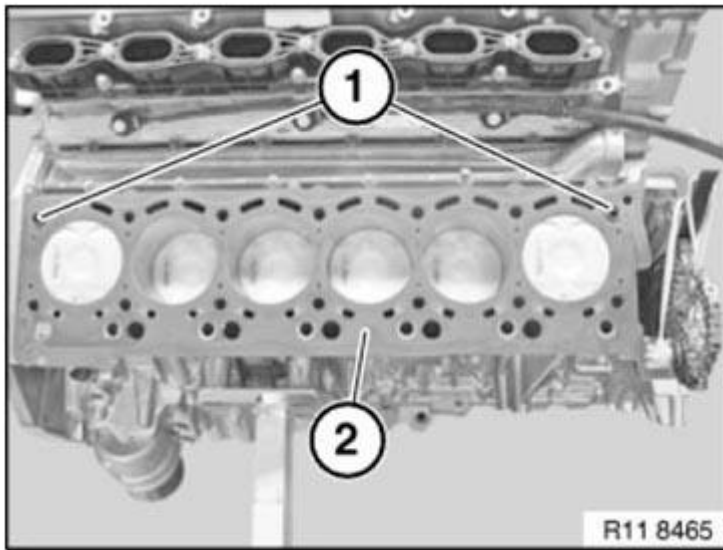
NOTE: Illustrations show N62.

Check dowel sleeves (1) for damage and correct installation position.

Installation:

Replace cylinder head gasket .

Fit new cylinder head gasket (2).

**Fig. 83: Identifying Cylinder Head Gasket And Dowel Sleeves**

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Join tensioner rails together using appropriate tool and insert timing chain.

Fit cylinder head with ventilation line.

Do not wash off bolt coating.

Fit new cylinder head screws .

Insert new cylinder head bolts and initially tighten so that they are free of play.

Tighten down cylinder head bolts in sequence 1 - 14.

Tightening torque: see 1AZ in **11 12 CYLINDER HEAD WITH CYLINDER HEAD COVER**

NOTE: For purposes of clarity, the graphic shows the camshafts removed.

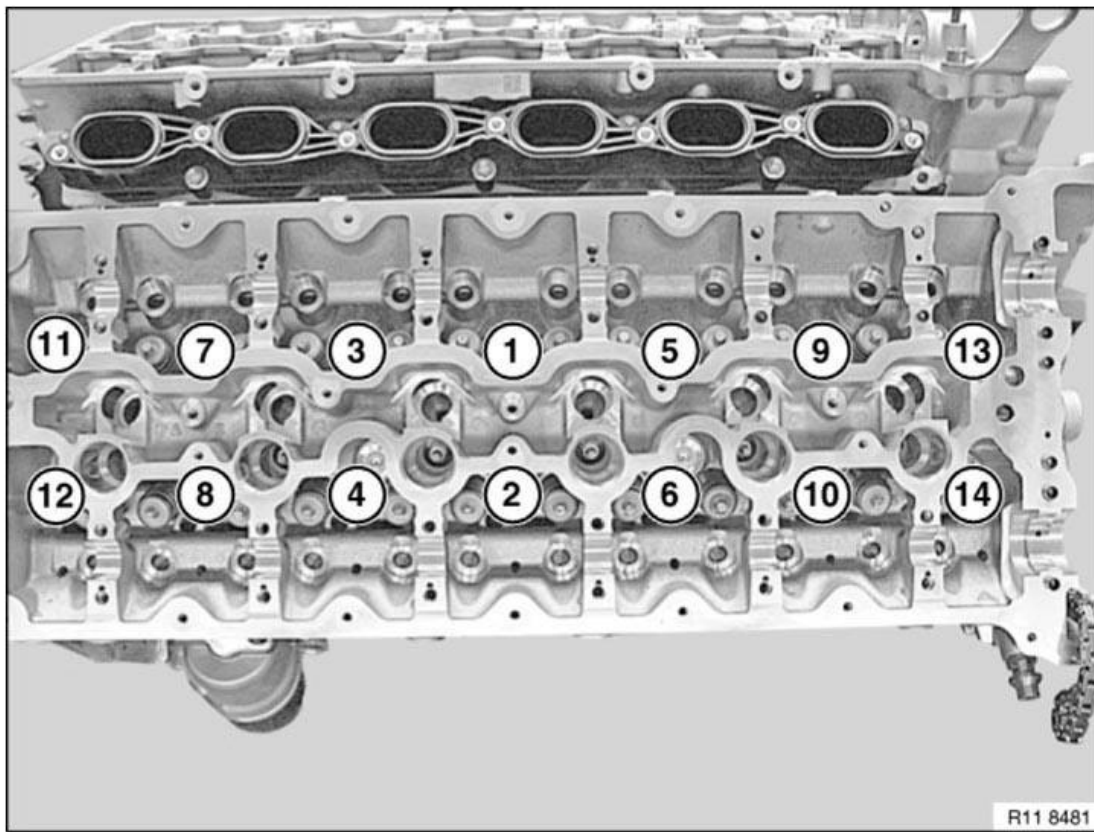


Fig. 84: Identifying Cylinder Head Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

To make it easier to check angle tightening, mark all collar bolts M11 using an oil-proof marker pen (see illustration).

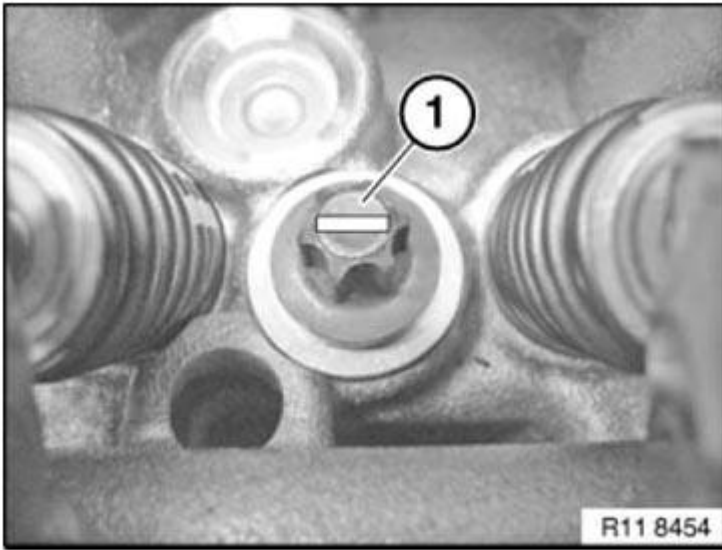


Fig. 85: Identifying Mark On Collar Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Insert and tighten down screws between cylinder head and timing case cover.

Tightening torque: see 2AZ in **11 12 CYLINDER HEAD WITH CYLINDER HEAD COVER**

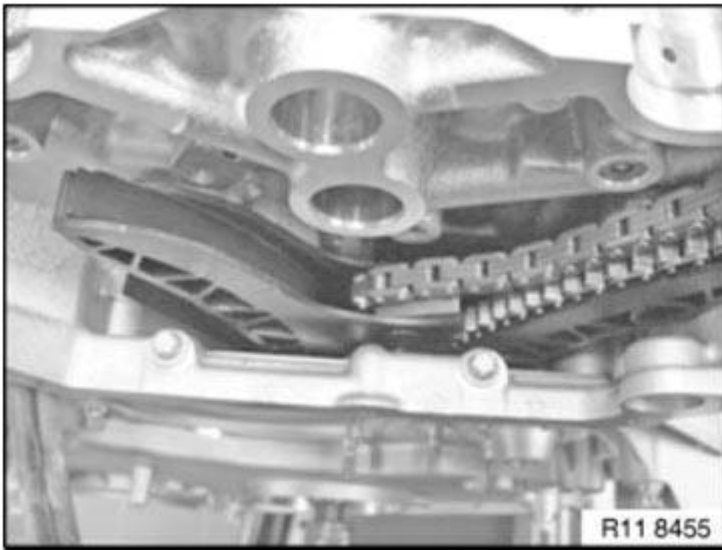


Fig. 86: Identifying Chain Tensioner Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1) on top guide rail.

Tightening torque: see 4AZ in **11 31 CAMSHAFT**

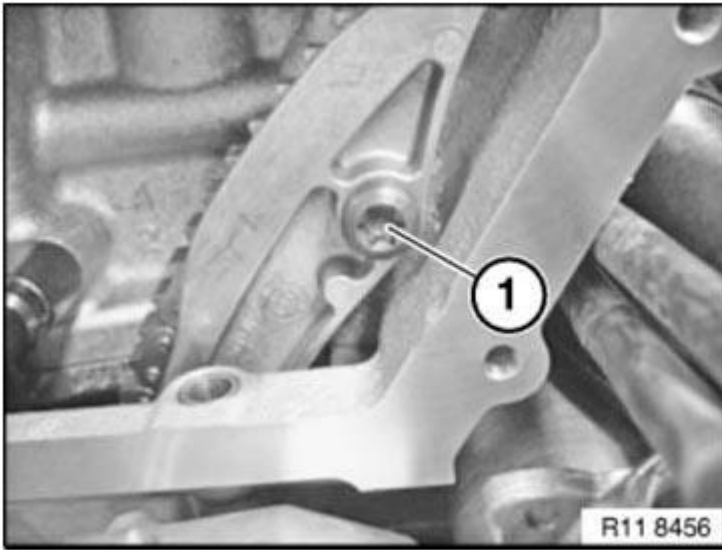


Fig. 87: Identifying Top Guide Rail Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1) on bottom guide rail.

Installation:

Replace O-ring.

Tightening torque: see 1AZ in **11 31 CAMSHAFT**

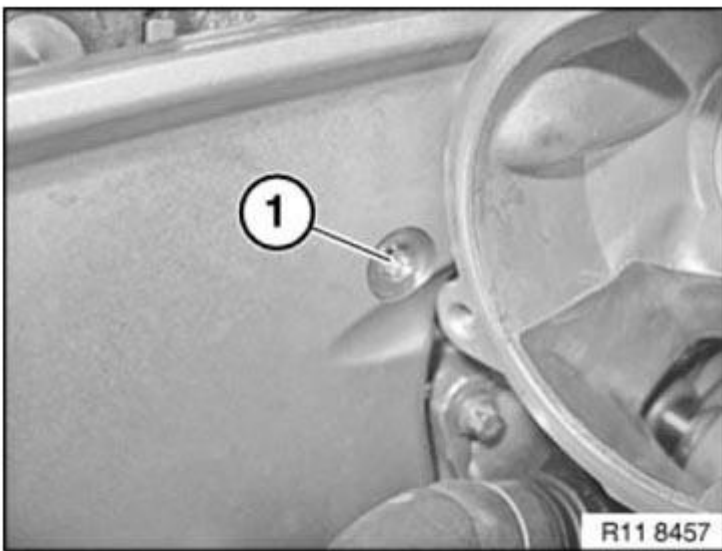


Fig. 88: Identifying Bottom Guide Rail Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, install camshafts. See **RIGHT INTAKE CAMSHAFT** and **RIGHT EXHAUST CAMSHAFT**.

Install INTAKE AND EXHAUST ADJUSTMENT UNIT ON LEFT SIDE.

Assemble engine.

11 12 005 REMOVING AND INSTALLING/SEALING LEFT CYLINDER HEAD COVER (N74)

Necessary preliminary tasks:

- Remove ACOUSTIC COVER
- Clamp off battery NEGATIVE TERMINAL
- Remove left INTERCOOLER
- Remove INTAKE AIR MANIFOLD
- REMOVE IGNITION COILS on right
- Remove FUEL RAIL
- Detach wiring harness for injectors and lay to one side
- Remove H.P. PUMP .

Release bolts in sequence (24 to 1).

Remove cylinder head cover.

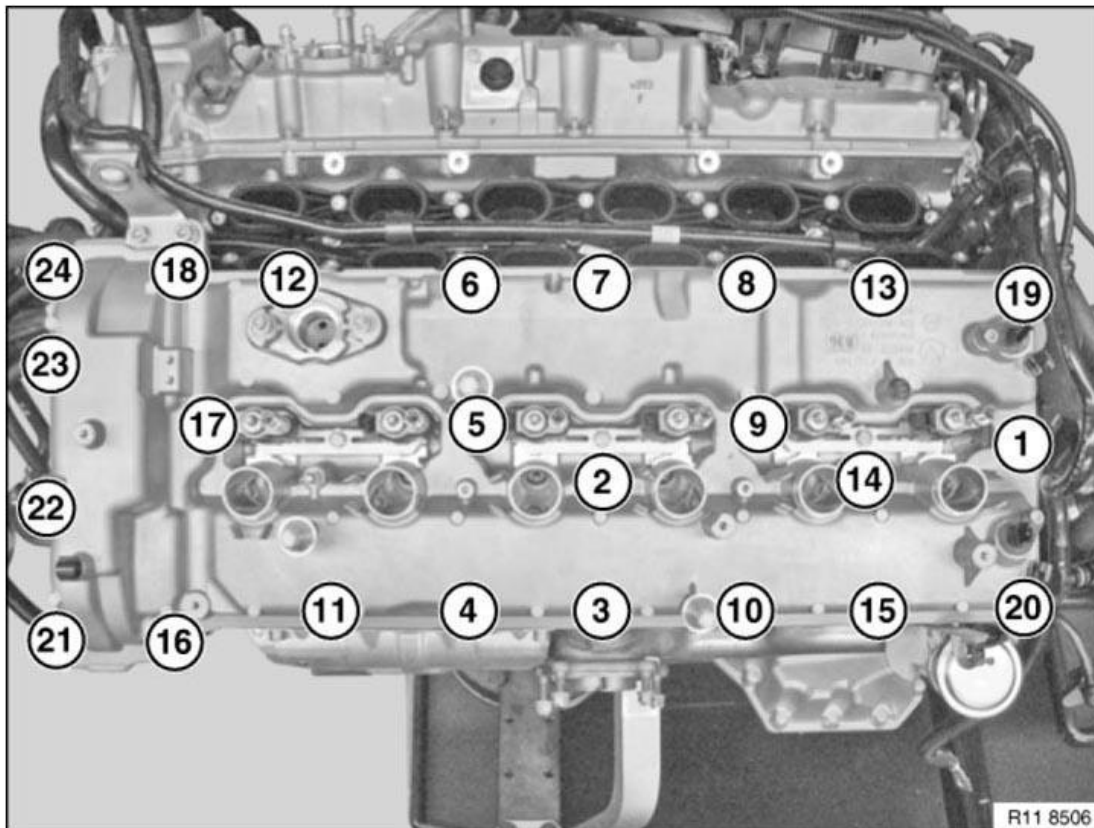


Fig. 89: Identifying Cylinder Head Cover Bolts Releasing Sequence

Courtesy of BMW OF NORTH AMERICA, INC.

Clean sealing surface (1) with special tool 11 4 470 .

Installation:

Replace seal (2) .

NOTE: Graphics show N63.

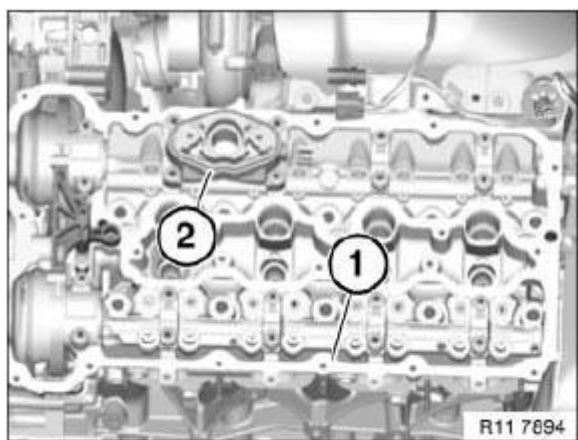


Fig. 90: Identifying Cylinder Head Cover Sealing Surface And Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Apply thin coating of DREI BOND 1209 sealing on left and right contact points on gear case cover.

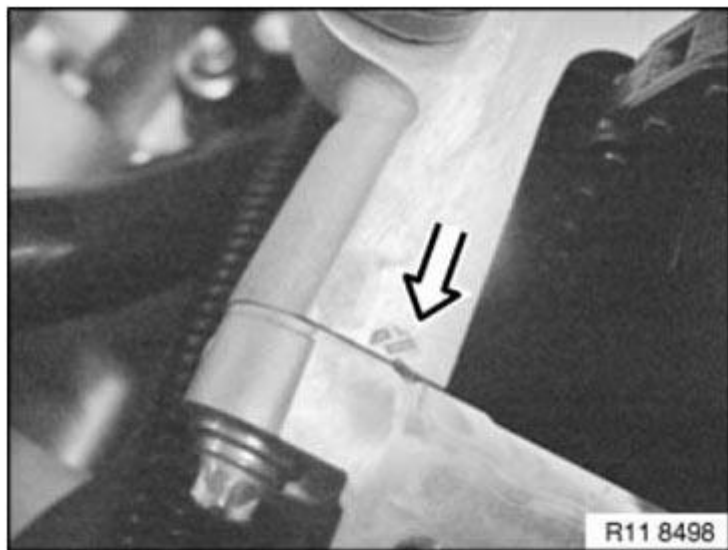


Fig. 91: Locating Drei Bond Applying Location
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace profile seal (1) on cylinder head cover .

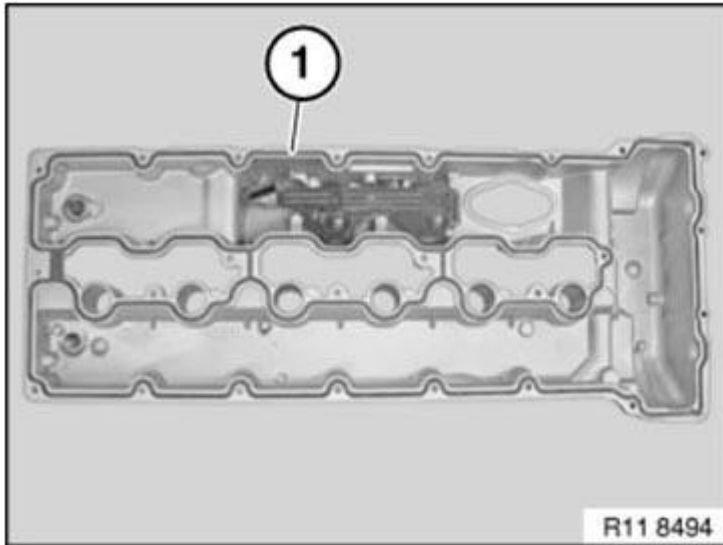


Fig. 92: Identifying Cylinder Head Cover Profile Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

It is important to join screw (1) for exact positioning of the camshaft sensors.

Fit cylinder head cover.

Position screw (1).

Release screw (1) by 90°.

NOTE: **Graphics show N63.**

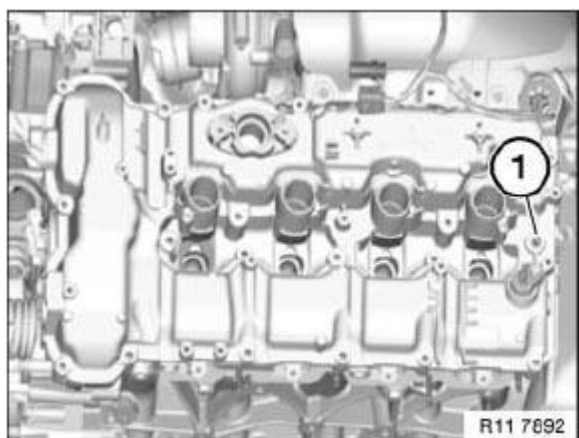


Fig. 93: Identifying Cylinder Head Cover Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Secure cylinder head cover in sequence (1 to 24) in two work steps.

Tightening torque: see 3AZ in **11 12 CYLINDER HEAD WITH CYLINDER HEAD COVER**

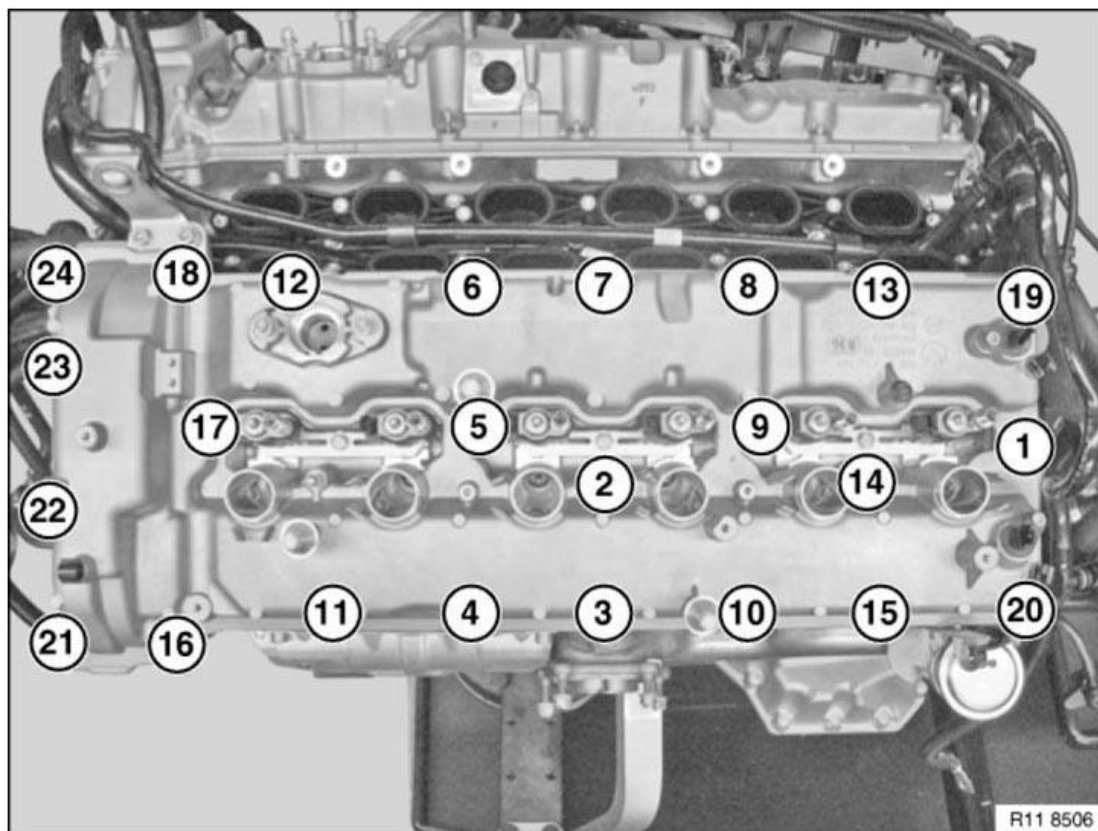


Fig. 94: Identifying Cylinder Head Cover Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Installation:

Change over all sensors when replacing cylinder head cover.

11 12 006 REMOVING AND INSTALLING/SEALING RIGHT CYLINDER HEAD COVER (N74)

Necessary preliminary tasks:

- Remove ACOUSTIC COVER
- Clamp off battery NEGATIVE TERMINAL
- Remove INTERCOOLER .
- Remove INTAKE AIR MANIFOLD
- Remove IGNITION COILS on right
- Remove FUEL RAIL
- Detach wiring harness for injectors and lay to one side
- Remove H.P. PUMP.

Release bolts in sequence (25 to 1).

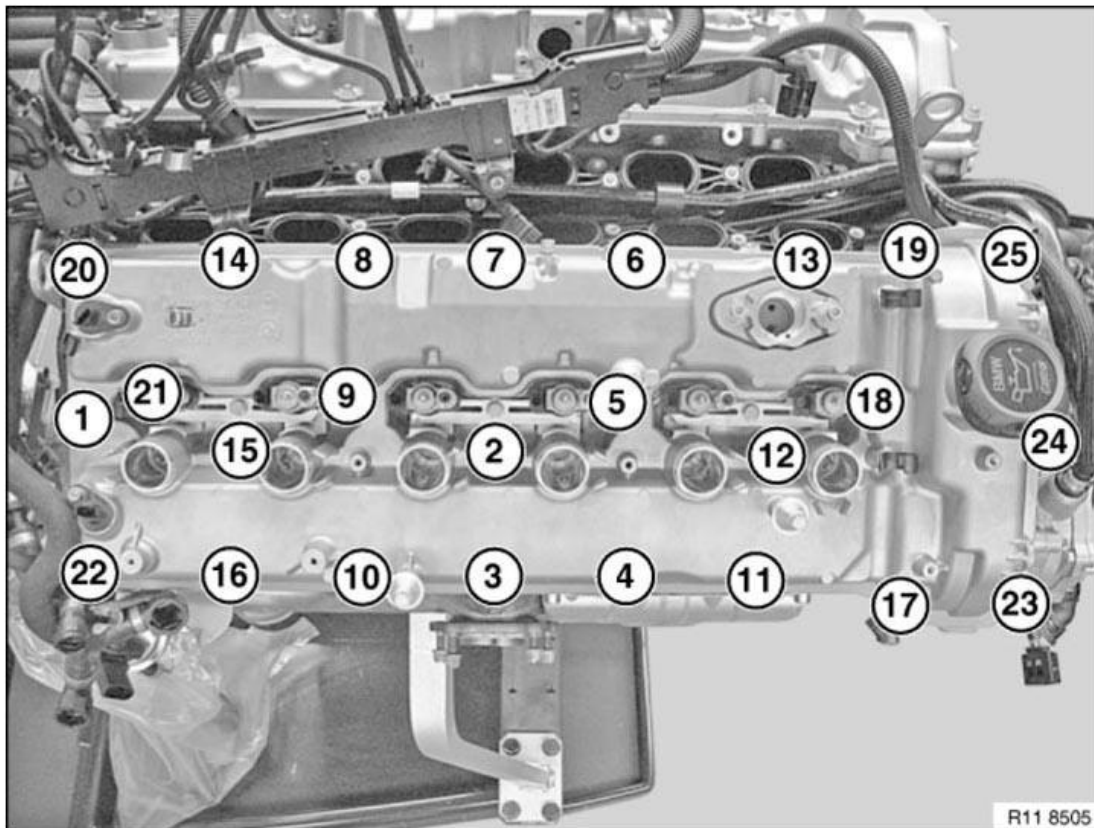


Fig. 95: Identifying Cylinder Head Cover Bolts Releasing Sequence

Courtesy of BMW OF NORTH AMERICA, INC.

Remove cylinder head cover.

Clean sealing surface (1) with special tool 11 4 470 .

Installation:

Replace seal (2) .

NOTE: Graphics show N63.

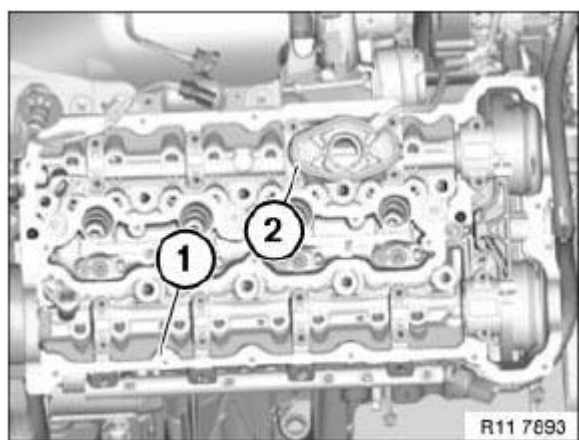


Fig. 96: Identifying Cylinder Head Cover Sealing Surface And Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Apply thin coating of DREI BOND 1209 sealing compound on left and right contact points on gear case cover.

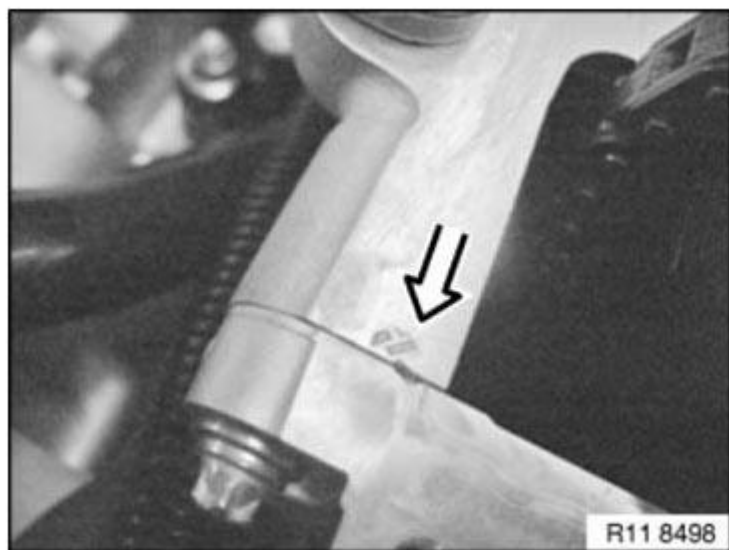


Fig. 97: Identifying Drei Bond Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace **profile seal (1)** on cylinder head cover .

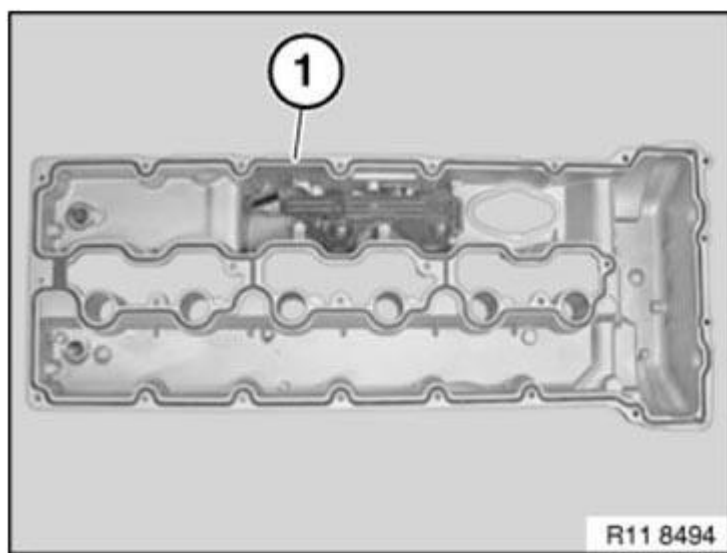


Fig. 98: Identifying Cylinder Head Cover Profile Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

It is important to join screw (1) for exact positioning of the camshaft sensors.

Fit cylinder head cover.

Position screw (1).

Release screw (1) by 90°.

NOTE: **Graphics show N63.**

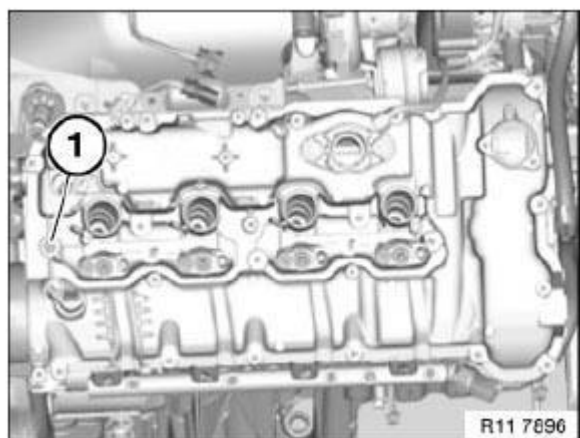


Fig. 99: Identifying Cylinder Head Cover Screw
 Courtesy of BMW OF NORTH AMERICA, INC.

Secure cylinder head cover in sequence (1 to 25) in two work steps.

Tightening torque: see 3AZ in **11 12 CYLINDER HEAD WITH CYLINDER HEAD COVER**

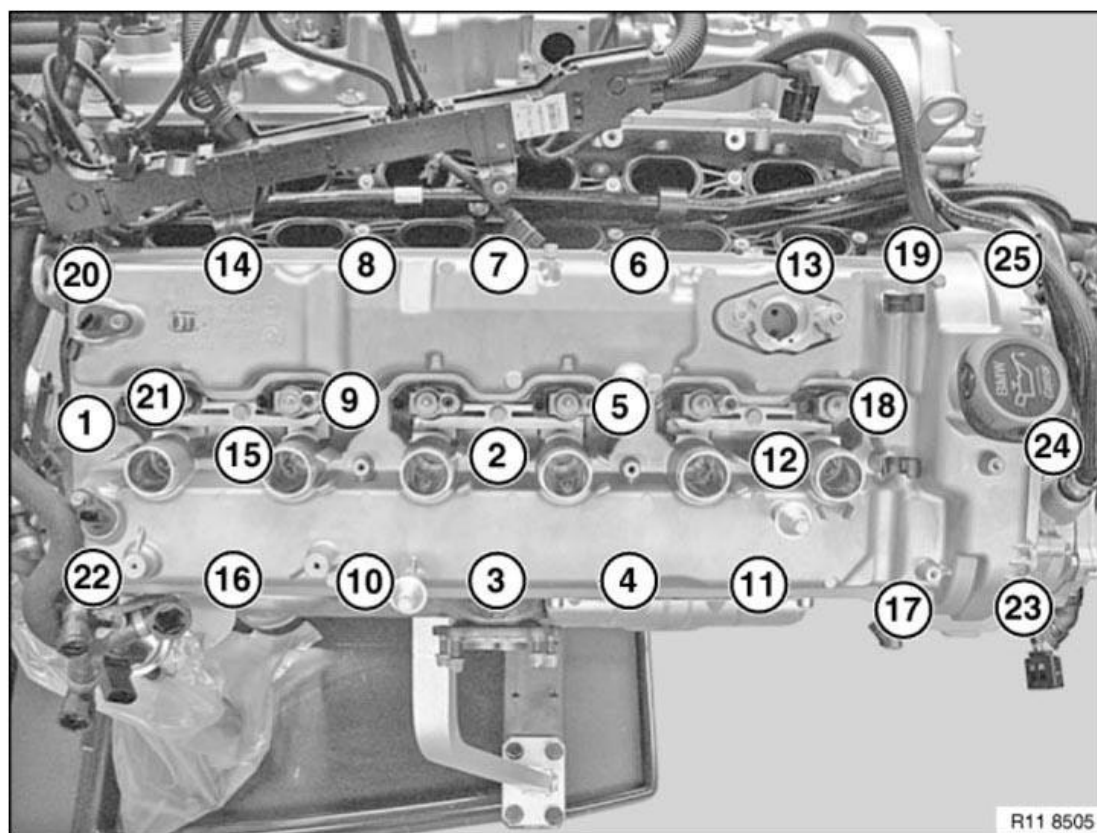


Fig. 100: Identifying Cylinder Head Cover Bolts Tightening Sequence
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Installation:

Change over all sensors when replacing cylinder head cover.

11 12 112 REPLACING BOTH CYLINDER HEAD GASKETS (N74)

Necessary preliminary tasks:

- Remove left **CYLINDER HEAD**
- Remove right **CYLINDER HEAD**

Installation:

The cylinder head gaskets for cylinders 1 - 6 and 7 - 12 are identical.

There is no marking (TOP).

Cylinder head gasket must be correctly positioned on the timing chain case depending on its styling.

Pay attention to fitting sleeves (1).

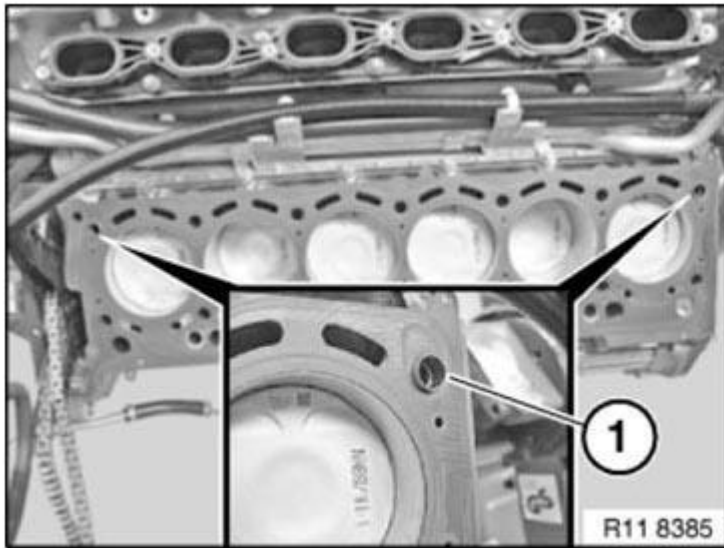


Fig. 101: Identifying Sleeves

Courtesy of BMW OF NORTH AMERICA, INC.

Repair gasket (+REP) is 0.3 mm thicker.

Check cylinder head for surface evenness. See **VALVE SEAT TECHNICAL DATA** , **HEAD/VALVES/GUIDES/BEARINGS TECHNICAL DATA** , and **RESURFACING CYLINDER HEAD SEALING FACE**.

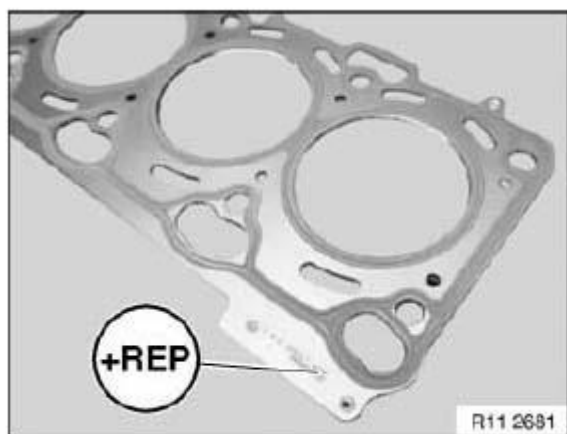


Fig. 102: Identifying Gasket (+REP)

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 719 RESURFACING CYLINDER HEAD SEALING FACE (N74)

Necessary preliminary tasks:

- Remove cylinder head. See LEFT CYLINDER HEAD or RIGHT CYLINDER HEAD.

Cylinder head disassembled

Check evenness of cylinder head sealing face with a standard straightedge (1).

NOTE: Maximum plane deviation: longitudinal 0.10 mm.

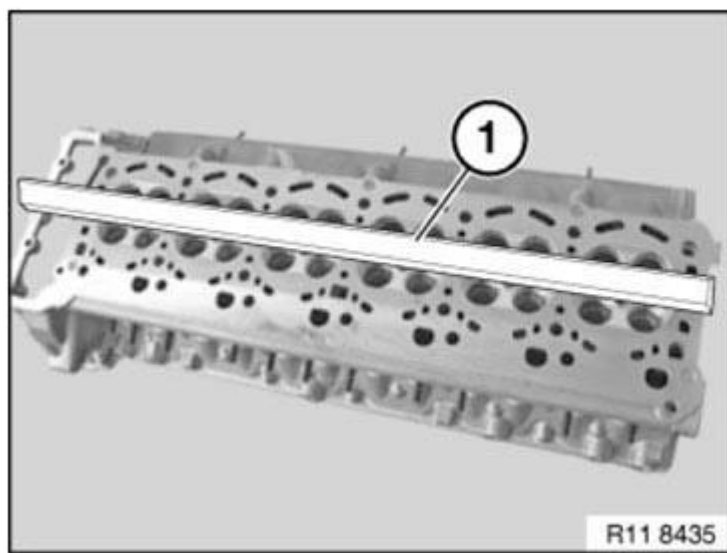


Fig. 103: Checking Cylinder Head Sealing Face Evenness Using Standard Straightedge

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Maximum plane deviation: transversal 0.05 mm.

- Machining limit: see HEAD/VALVES/GUIDES/BEARINGS TECHNICAL DATA and VALVE SEAT TECHNICAL DATA .

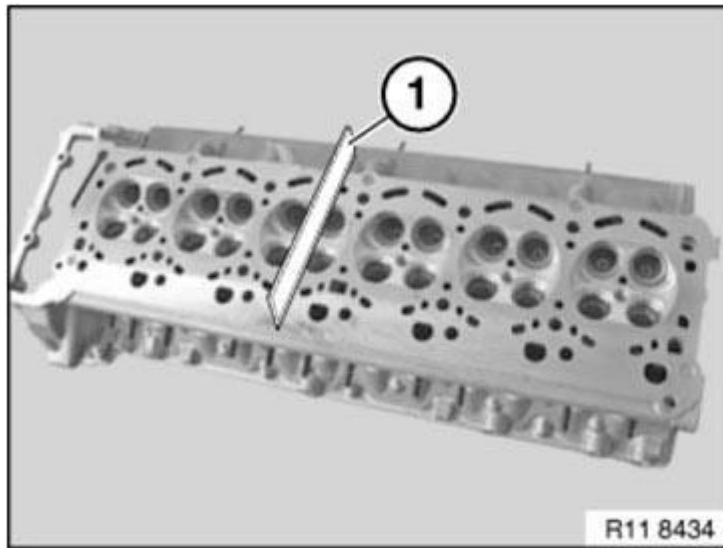


Fig. 104: Checking Cylinder Head Maximum Plane Deviation Using Standard Straightedge

Courtesy of BMW OF NORTH AMERICA, INC.

A cylinder head gasket (+REP) 0.3 mm thicker than usual can be obtained for machined (resurfaced) cylinder heads.

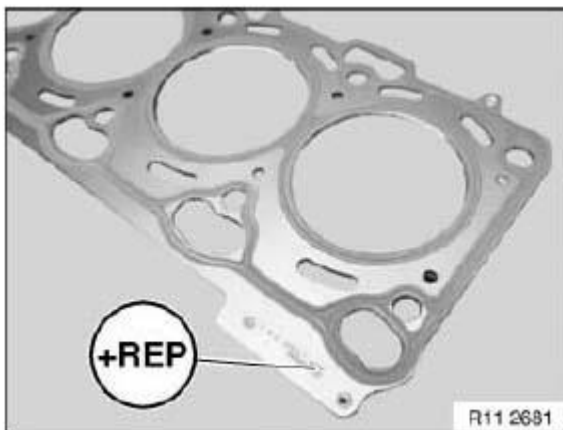


Fig. 105: Identifying Gasket (+REP)

Courtesy of BMW OF NORTH AMERICA, INC.

OIL SUMP

11 13 020 REMOVING AND INSTALLING/REPLACING LOWER OIL SUMP SECTION

Necessary preliminary tasks:

- Remove STIFFENING PLATE
- Drain ENGINE OIL

Disconnect plug connection on level sensor.

Release all screws along line (1).

Installation:

Replace seal.

Tightening torque: see 3AZ in 11 13 OIL SUMP

Assemble engine.

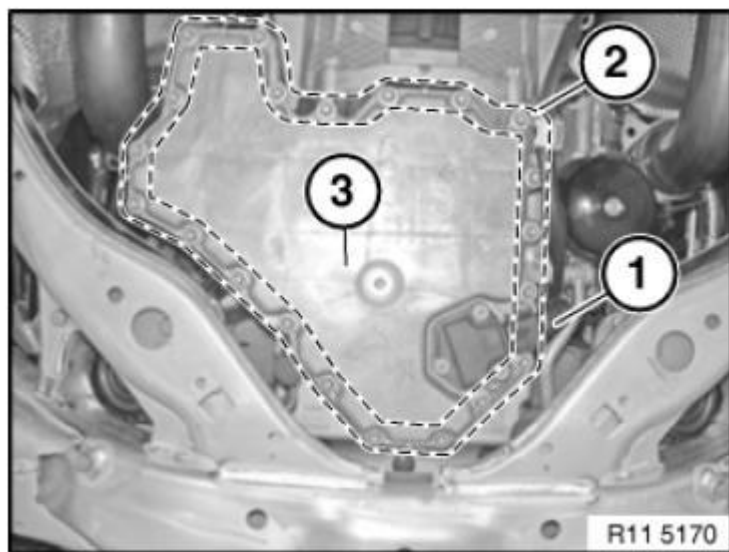


Fig. 106: Locating Screws

Courtesy of BMW OF NORTH AMERICA, INC.

11 13 010 REMOVING AND INSTALLING/REPLACING UPPER OIL SUMP SECTION (N74)

Necessary preliminary tasks:

- Drain off ENGINE OIL
- Secure engine in INSTALLATION POSITION

- **LOWER FRONT AXLE**
- Remove **LOWER** oil sump section
- Release **SUPPLY AND RETURN LINES** on oil filter
- Unclip wiring harness on oil sump

Unfasten screws (2).

Tightening torque: see 1AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

NOTE: Illustrations show N63.

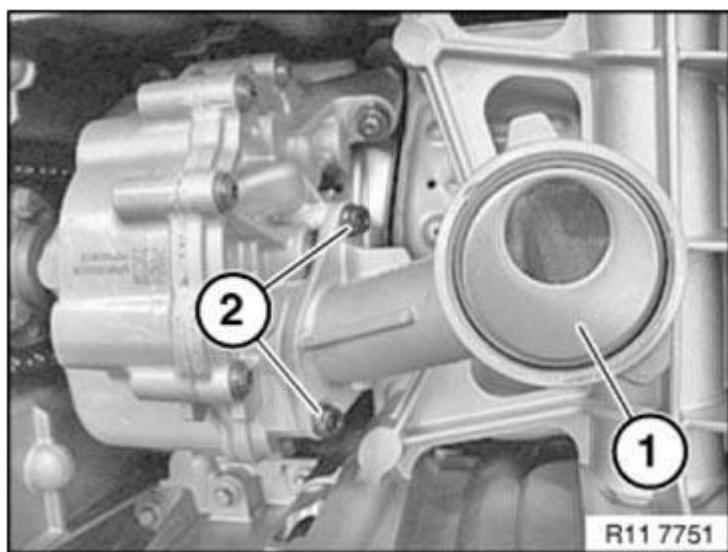


Fig. 107: Identifying Thermostat And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release thermostat (2).

Tightening torque: see 8AZ in **11 42 OIL FILTER AND LINES**

Open oil drain plug on oil filter cap.

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

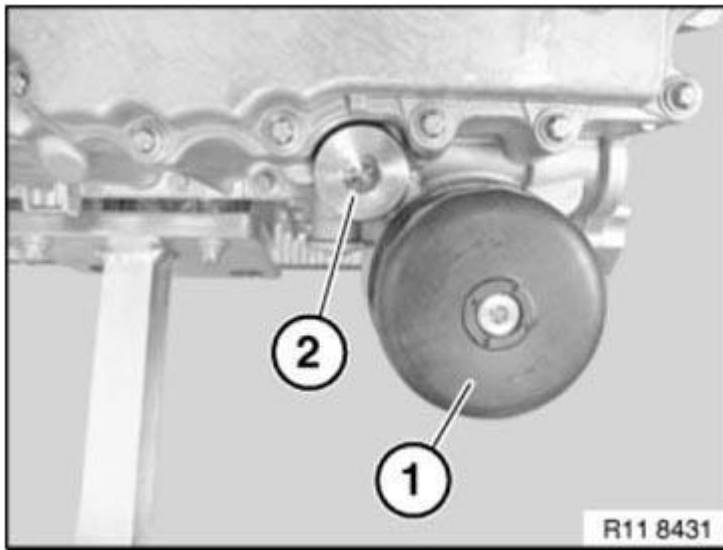


Fig. 108: Identifying Oil Filter And Thermostat
Courtesy of BMW OF NORTH AMERICA, INC.

Remove oil filter cover with oil filter (1) with special tool **11 9 240** .

Tightening torque: see 1AZ in **11 42 OIL FILTER AND LINES**

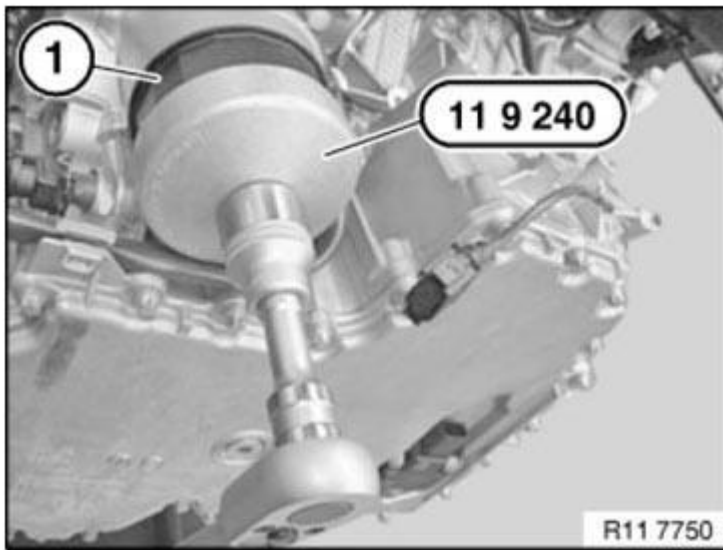


Fig. 109: Removing Oil Filter Cover Using Special Tool 11 9 240
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Unfasten screws (2).

Tightening torque: see 2AZ in **11 13 OIL SUMP**

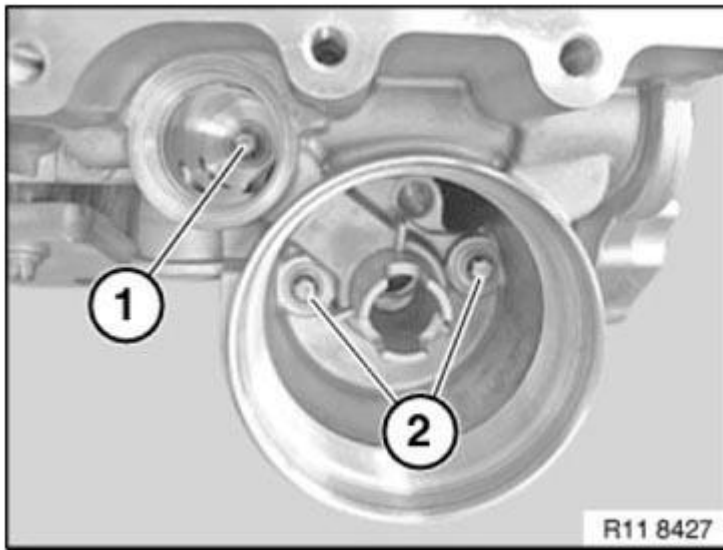


Fig. 110: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts in area of line (1).

Tightening torque: see 2AZ in **11 13 OIL SUMP**

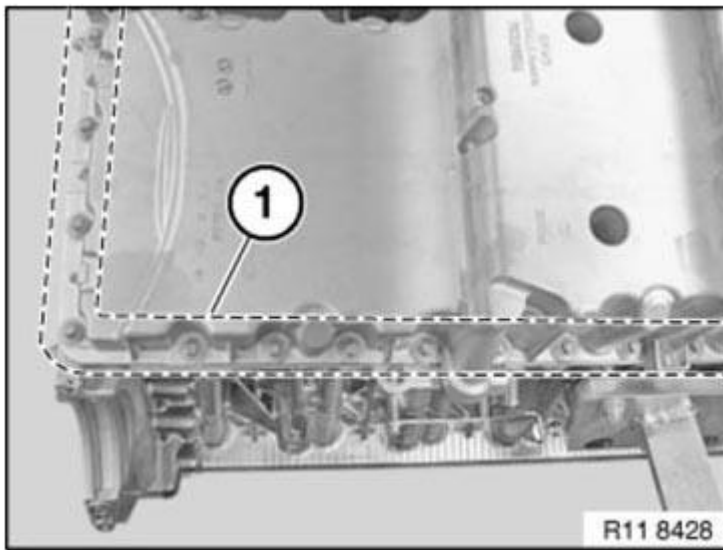


Fig. 111: Releasing Bolts In Area Of Line

Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts in area of line (1).

Tightening torque: see 2AZ in **11 13 OIL SUMP**

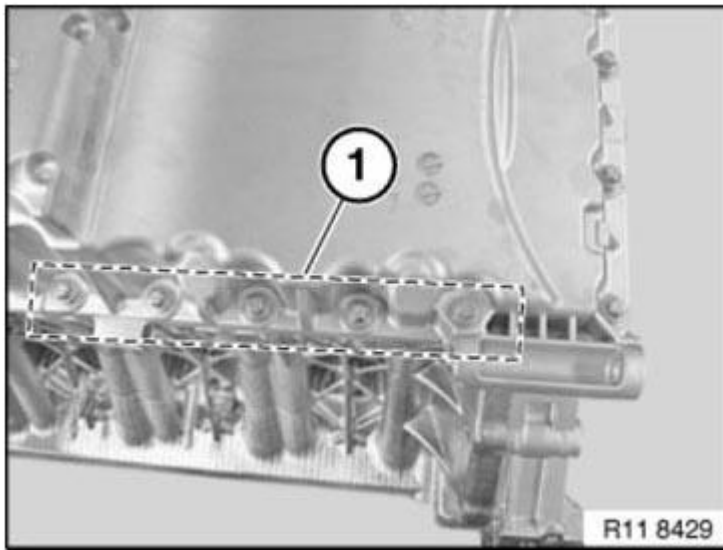


Fig. 112: Releasing Bolts In Area Of Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: see 2AZ in **11 13 OIL SUMP**

Release 4 bolts on transmission side.

Tightening torque: see 1AZ in **24 00 TRANSMISSION IN GENERAL**

Remove upper oil sump section (1).

Installation:

Free sealing faces of seal debris and clean.

Replace gasket.

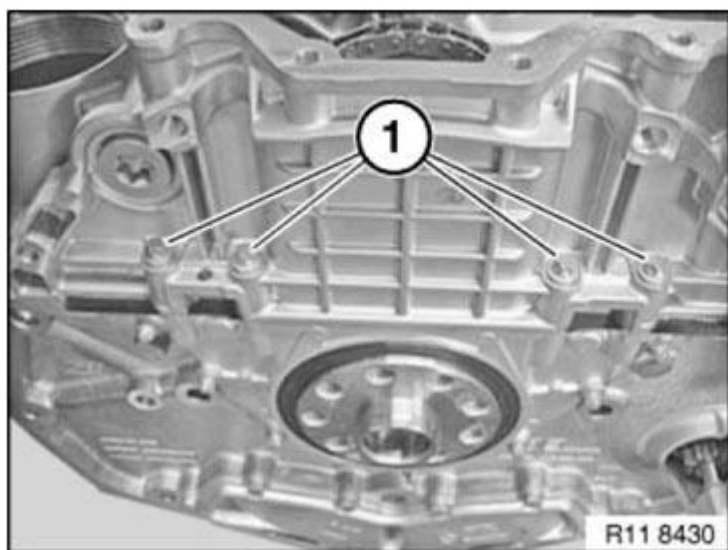


Fig. 113: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Special tool 11 8 780 is only necessary if transmission is removed.

Position special tool 11 8 780 with transmission bolts (1) so that engine oil sump is flush with engine block. Fasten upper oil sump section.

NOTE: Illustrations show N57.

Assemble engine.

HOUSING COVER

11 14 080 REMOVING AND INSTALLING GEAR CASE COVER, TOP LEFT (N74)

Gear case cover, cylinders 7-12

Necessary preliminary tasks:

- Remove ALTERNATOR .
- Remove LEFT CYLINDER HEAD COVER.
- Remove both SOLENOID VALVES on left side

Release screw (3).

Release screw (2).

Release screws (1).

Tightening torque: see 4AZ in **11 14 CASE COVERS**

Remove gear case cover.

Installation:

Screw (3) is an ISA-screw (internal Torx drive).

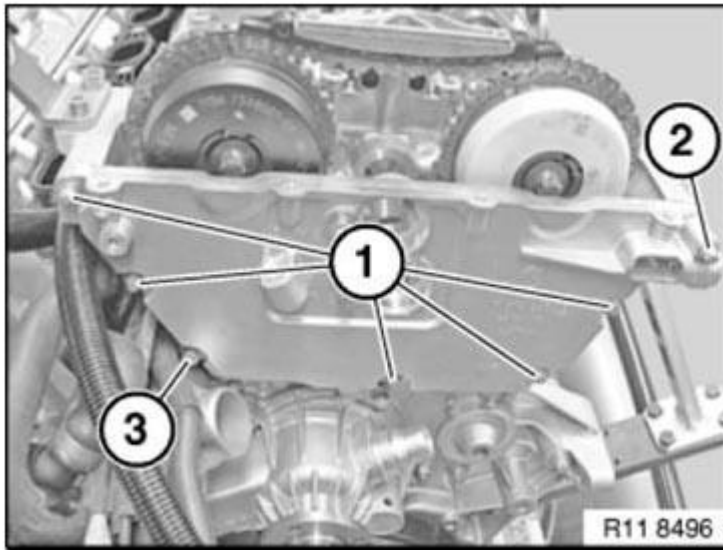


Fig. 114: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Check fitting bushes (1) for tight fit and damage.

Installation:

Replace seal (2) .

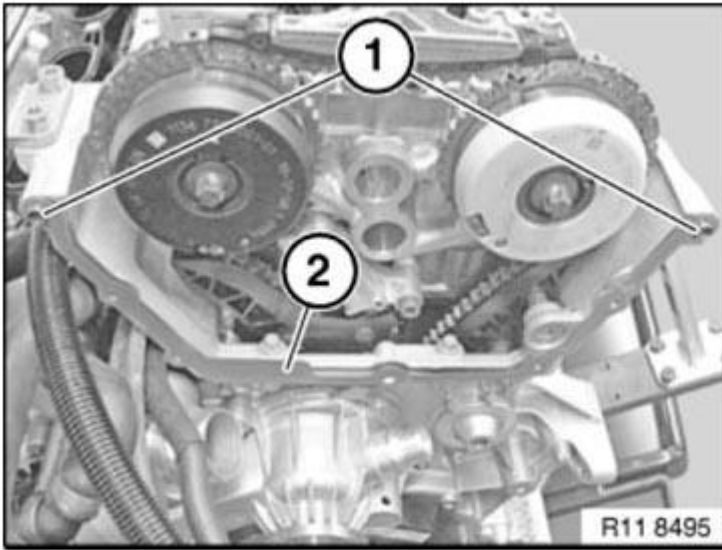


Fig. 115: Identifying Fitting Bushes And Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 14 110 REMOVING AND INSTALLING LOWER TIMING CASE COVER (N74)

Necessary preliminary tasks:

- Remove **ENGINE**
- Remove both cylinder heads. See **LEFT CYLINDER HEAD** and **RIGHT CYLINDER HEAD**.
- Remove **LOWER** oil sump section
- Remove **UPPER OIL SUMP SECTION**
- Remove alternator **BELT TENSIONER**
- Remove **VIBRATION DAMPER**
- Remove **COOLANT PUMP**
- Remove **ALTERNATOR**
- Remove **A/C COMPRESSOR**
- Remove hub for **VIBRATION DAMPER**

Undo bolts in sequence (14 to 1).

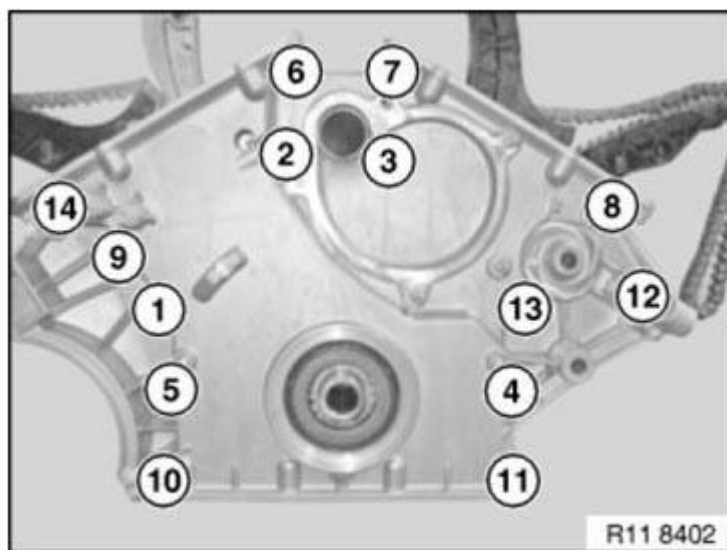


Fig. 116: Identifying Bolt Removal And Installation Sequence
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove gear case cover (1) in forward direction if necessary using a plastic hammer (2).

Clean sealing surfaces with special tool 11 4 470 .

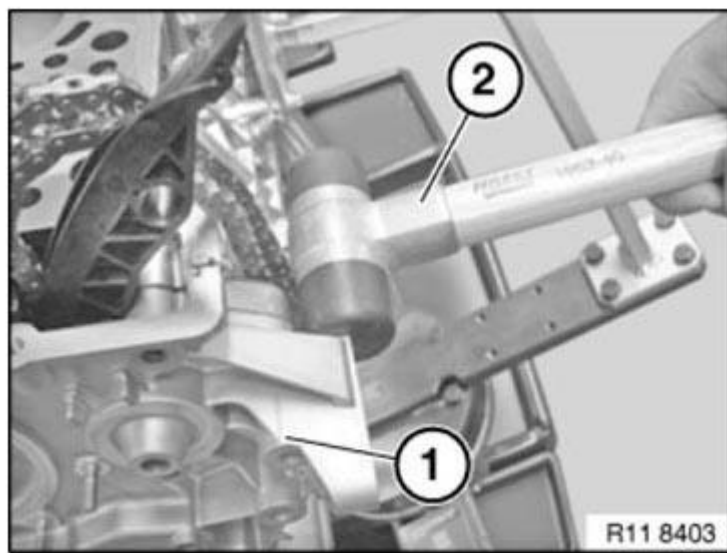


Fig. 117: Removing Gear Case Cover Using Plastic Hammer
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check jump guard for damage.

Release screw (1).

Tightening torque: see 1AZ in **11 14 CASE COVERS**

Remove jump guard (2).

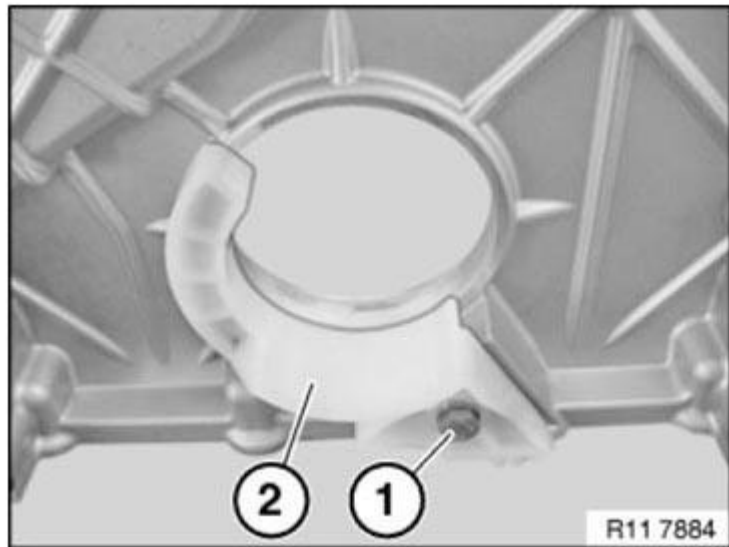


Fig. 118: Identifying Jump Guard And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove beaded metal gaskets (1, 2 and 3).

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

Installation:

Replace beaded metal gaskets (1, 2 and 3) .

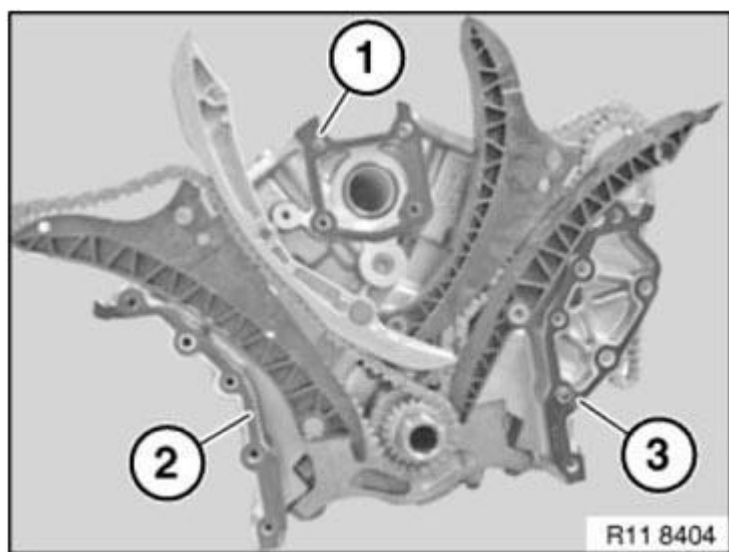


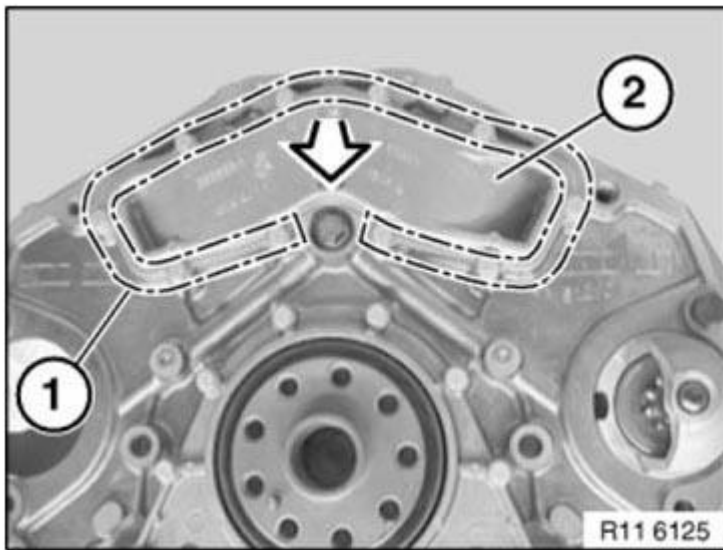
Fig. 119: Identifying Beaded Metal Gaskets

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws along lines (1).

Remove coolant cap (2).

NOTE: Graphics show N63.

**Fig. 120: Identifying Coolant Cap And Screws**

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace seal (1).

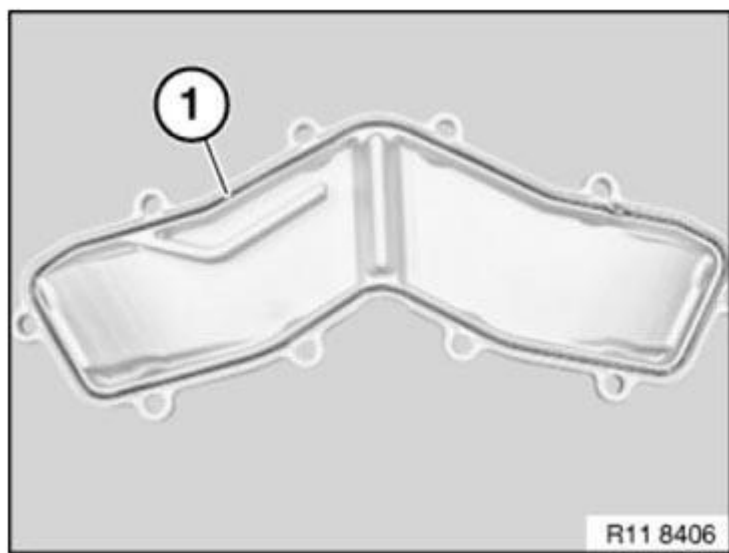


Fig. 121: Identifying Seal

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

For safety reasons, the coolant supply pipe (1) must be replaced during the scope of gear case cover work (internal leakage).

Drive out coolant pipe (1) in direction of arrow with special tool 23 1 040.

NOTE: Picture shown without end cover for V-chamber.

The end cover does not have to be removed.

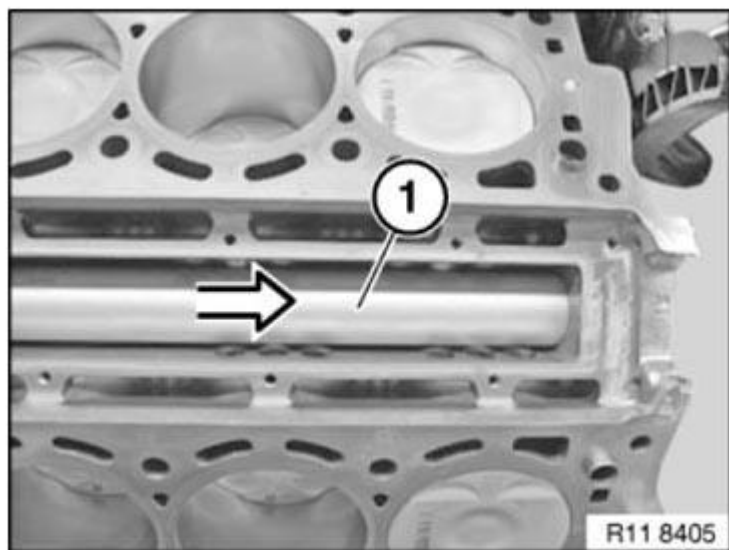


Fig. 122: Driving Out Coolant Pipe

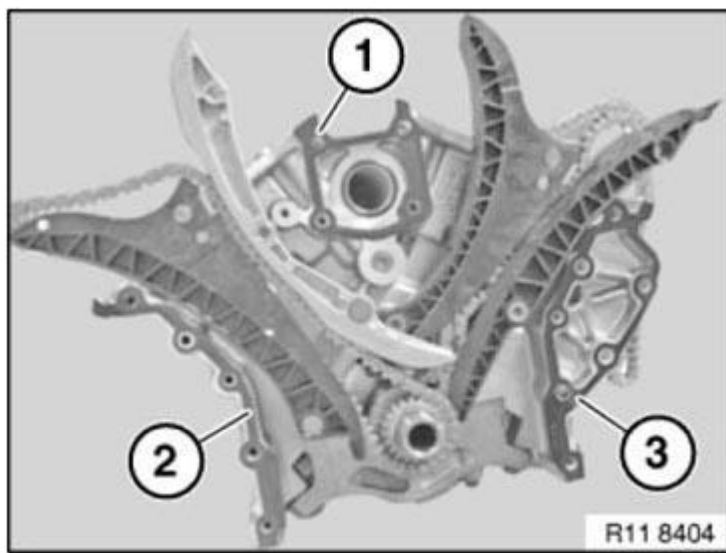
Courtesy of BMW OF NORTH AMERICA, INC.

Fit beaded metal gaskets (1, 2 and 3).

Coat coolant pipe with lubricant (Circo Light) and move up to limit position.

Installation:

Replace beaded metal gaskets (1, 2 and 3) .

**Fig. 123: Identifying Beaded Metal Gaskets**

Courtesy of BMW OF NORTH AMERICA, INC.

Fit timing-chain cover.

Insert all screws in sequence (1 to 14) and initially tighten to approx. 5 Nm.

Tighten all bolts in sequence (1 to 14).

Tightening torque: see 2AZ in **11 14 CASE COVERS**

Installation:

Wait for PU material to emerge at sealing joints.

Carefully wipe off protruding PU material.

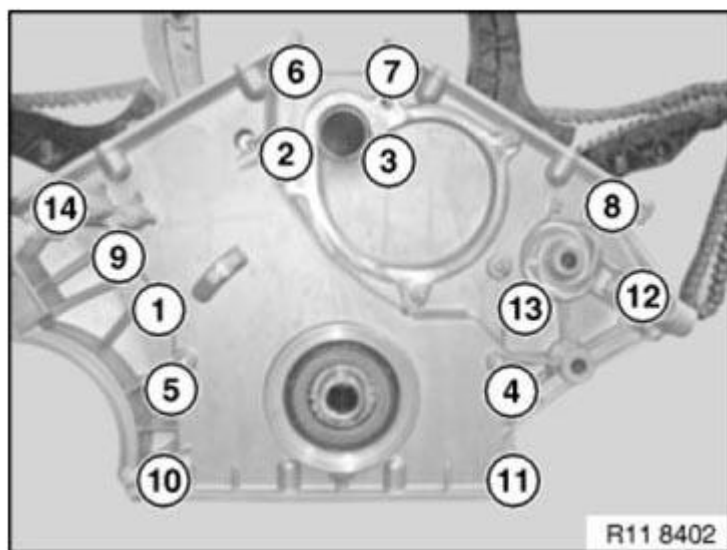


Fig. 124: Identifying Bolt Removal And Installation Sequence
 Courtesy of BMW OF NORTH AMERICA, INC.

Replace RADIAL SHAFT SEAL in gear case cover at bottom .

Assemble engine.

11 14 085 REMOVING AND INSTALLING TIMING CASE COVER, TOP RIGHT (N74)

Gear case cover, cylinders 1-6

Necessary preliminary tasks:

- Remove SECONDARY-AIR PUMP.
- Remove right CYLINDER HEAD COVER.
- Remove FAN COWL WITH ELECTRIC FAN.
- Remove VACUUM PUMP.

Disconnect plug connection (2 and 4) at solenoid valve.

Unfasten screws (1 and 3).

Release cable duct and lay to one side.

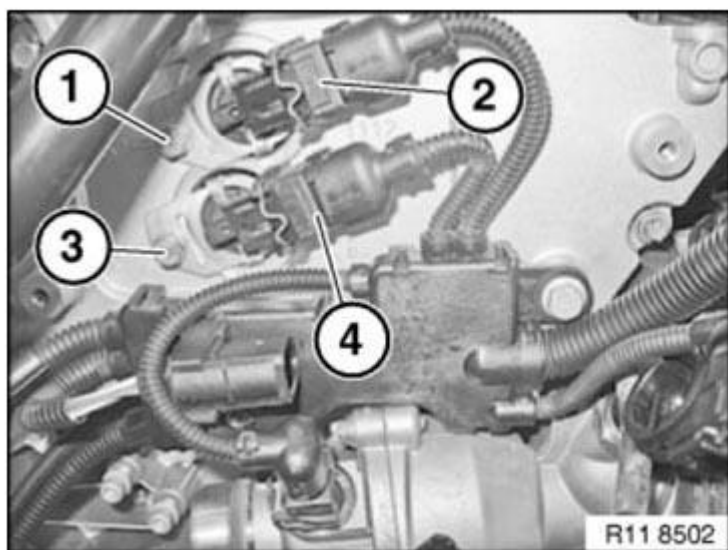


Fig. 125: Identifying Connectors And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove both solenoid valves (1 and 2).

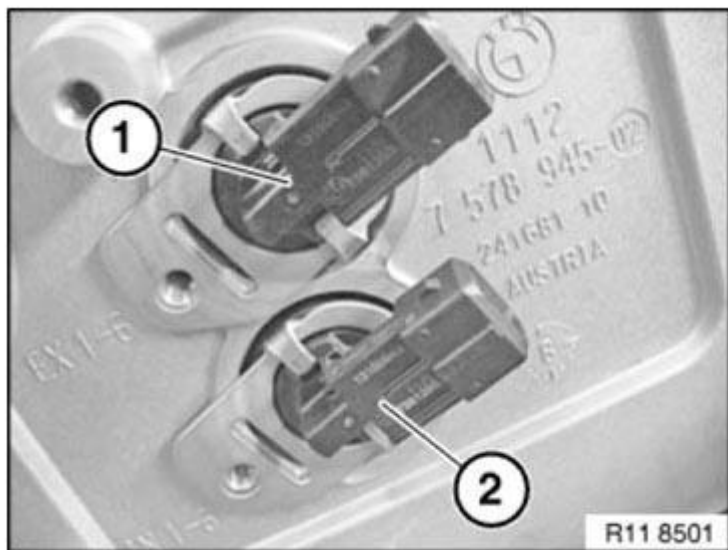


Fig. 126: Identifying Solenoid Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Release screw (2).

Tightening torque: see 4AZ in **11 14 CASE COVERS**

Remove timing case cover (2).

Installation:

Screw (2) required to secure cable duct.

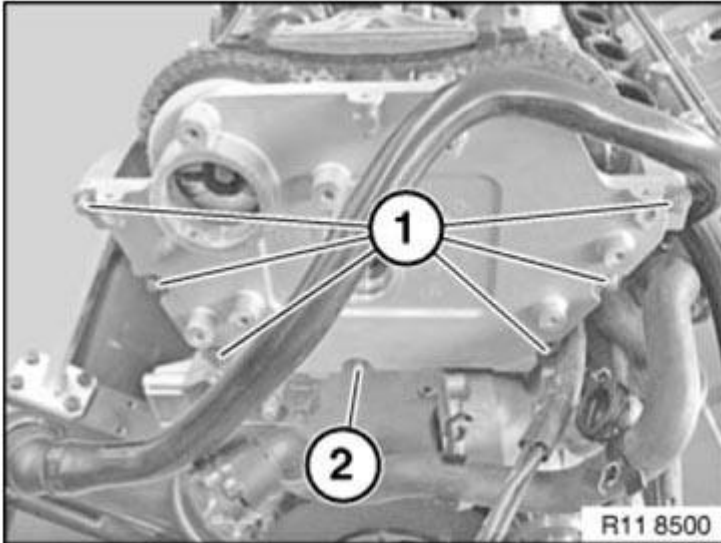


Fig. 127: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

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

Installation:

Replace seal (2) .

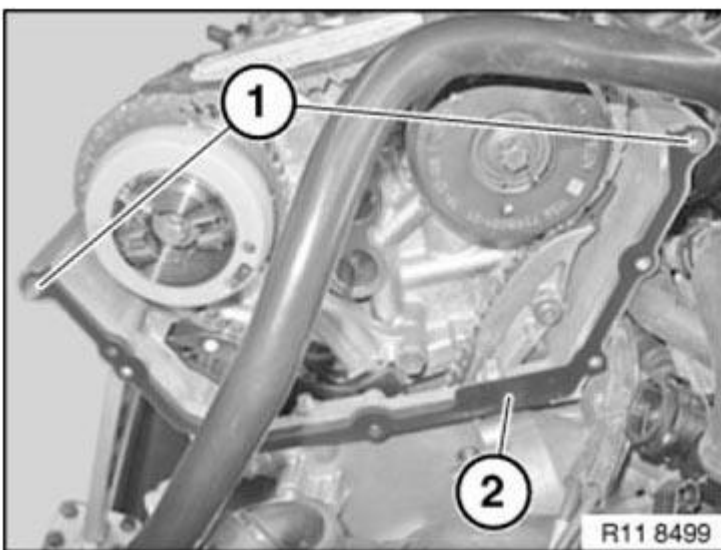


Fig. 128: Identifying Guide Sleeves And Seal

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 14 250 REMOVING AND INSTALLING/SEALING REAR COOLANT END COVER (N74)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

Recycling:

Catch and dispose of drained coolant in a suitable container.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks:

- Remove flywheel
- Drain coolant

Release all screws in area (1).

Tightening torque: see 5AZ in **11 14 CASE COVERS**

Remove end cover (2).

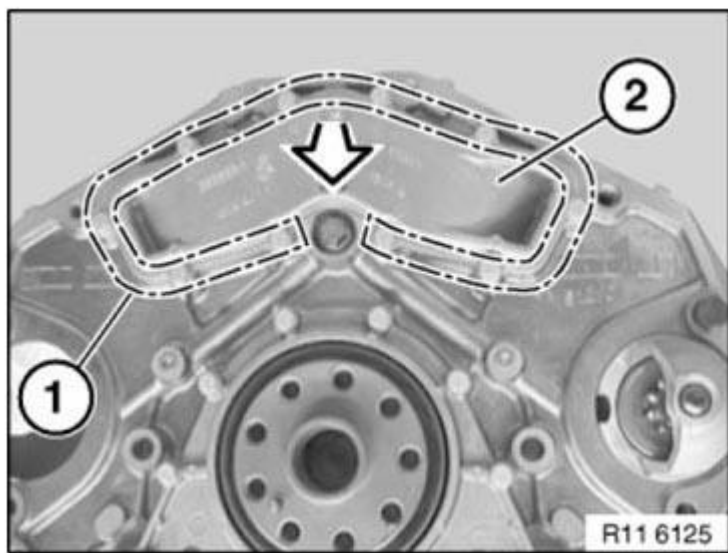


Fig. 129: Identifying Screws And End Cover
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Clean sealing surfaces with special tool **11 4 470** .

Installation:

Replace profile seal (1) .

Assemble engine.

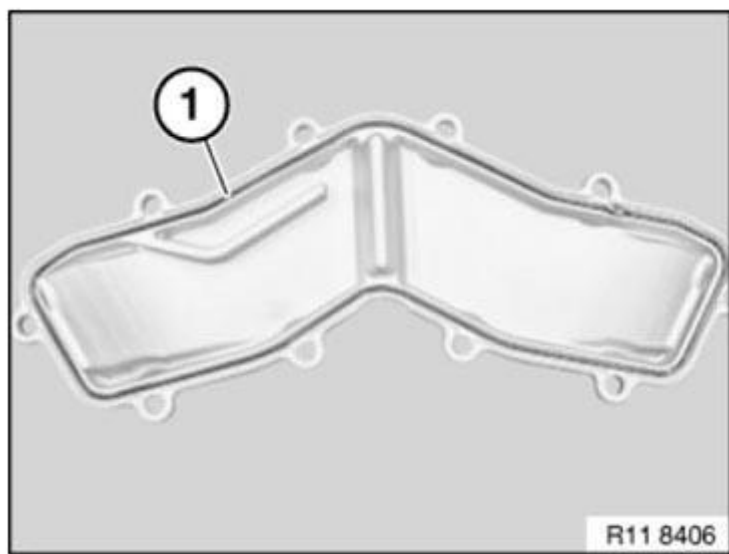


Fig. 130: Identifying Profile Seal

Courtesy of BMW OF NORTH AMERICA, INC.

11 14 151 REPLACING CRANKSHAFT RADIAL SEAL ON TRANSMISSION SIDE (N74)

IMPORTANT: The crankshaft radial seal can only be replaced completely with the end cover. The crankshaft radial seal is an integral part of the end cover and can not be replaced individually.

Necessary preliminary tasks:

- Drain off **ENGINE OIL**
- Remove **FLYWHEEL**

Release screws (1).

Unfasten screws (2).

Carefully remove end cover with crankshaft radial seal.

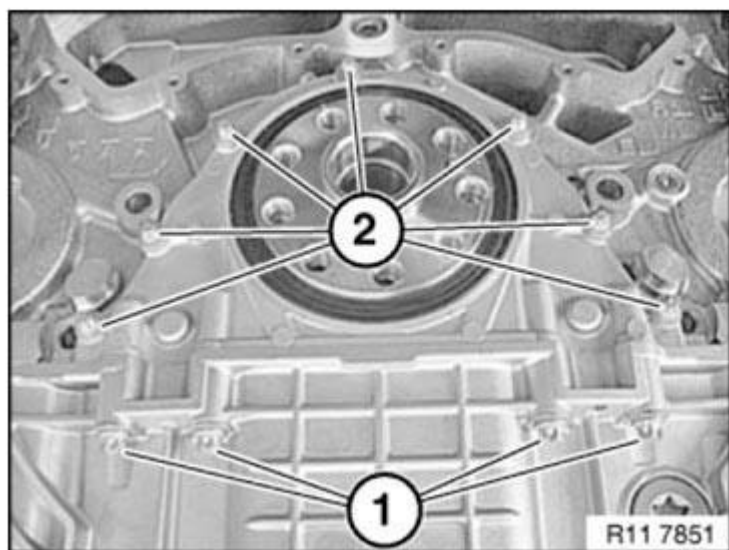


Fig. 131: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Support sleeve (2) is included in scope of delivery.

If the crankshaft radial seal (1) is stored for more than six months without the support sleeve (2), its operational reliability will no longer be guaranteed.

Crankshaft radial seal (1) must not be reused in this eventuality!

Support sleeve (2) remains in the crankshaft radial seal (1) and is used as a slip sleeve during subsequently described installation.

IMPORTANT: The sealing lip of the crankshaft radial seal (1) is highly sensitive and must not be kinked.
Do not touch the sealing lip with your fingers.

IMPORTANT: Special tool 11 2 390 must not be used.

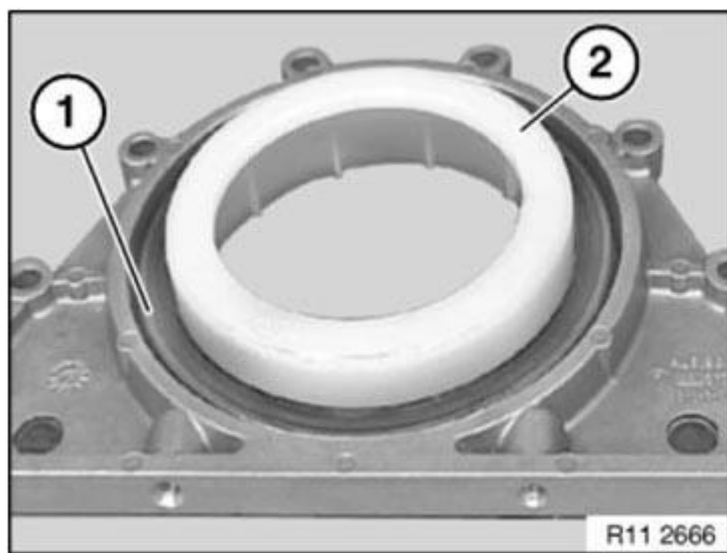


Fig. 132: Identifying Support Sleeve And Radial Seal
Courtesy of BMW OF NORTH AMERICA, INC.

When the crankshaft radial seal is installed, only the support sleeve included in the scope of delivery may be used as a slip sleeve.

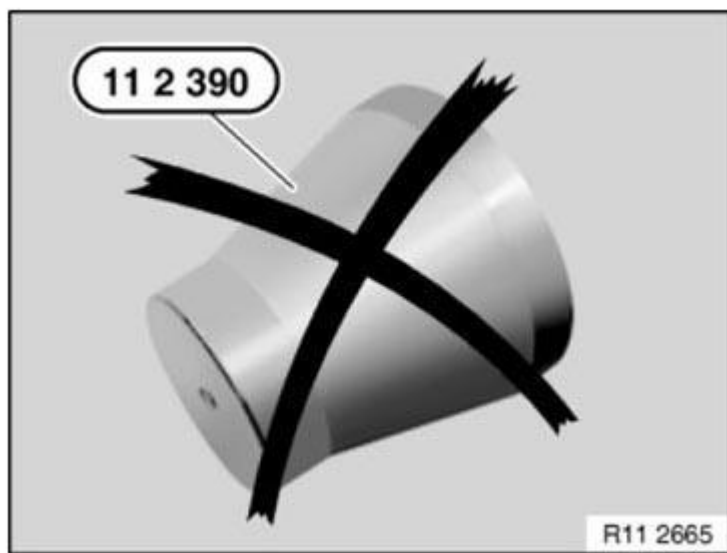


Fig. 133: Do Not Use Special Tool 11 2 390 On Sealing Lip Of Crankshaft Radial Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check dowel sleeves (1) for damage and correct installation position.

Clean sealing face (2) so that it is free from oil and grease.

Coat contact edges on joint along oil sump (see arrows in illustration) with **DREI BOND 1209**.

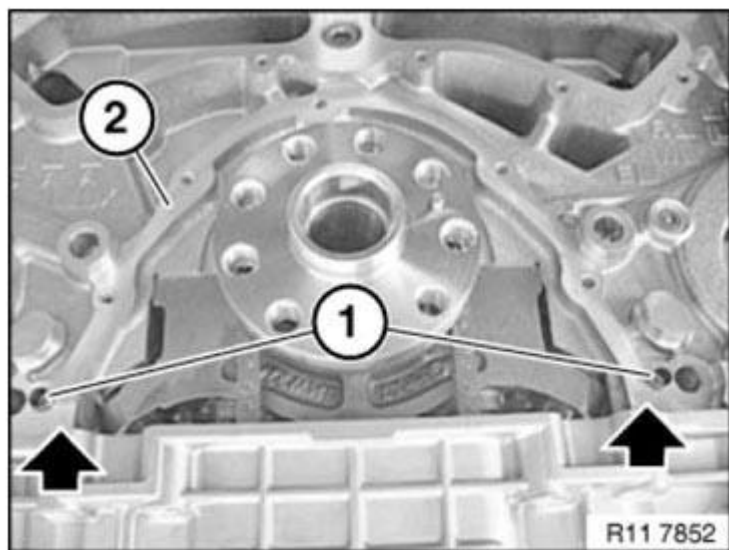


Fig. 134: Identifying Dowel Sleeves, Sealing Face, And Drie Bond 1209 Application Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Lightly oil running surface of crankshaft.

Fit end cover (1) with support sleeve (2) on crankshaft and push on carefully.

NOTE: Picture shows (N62TU).

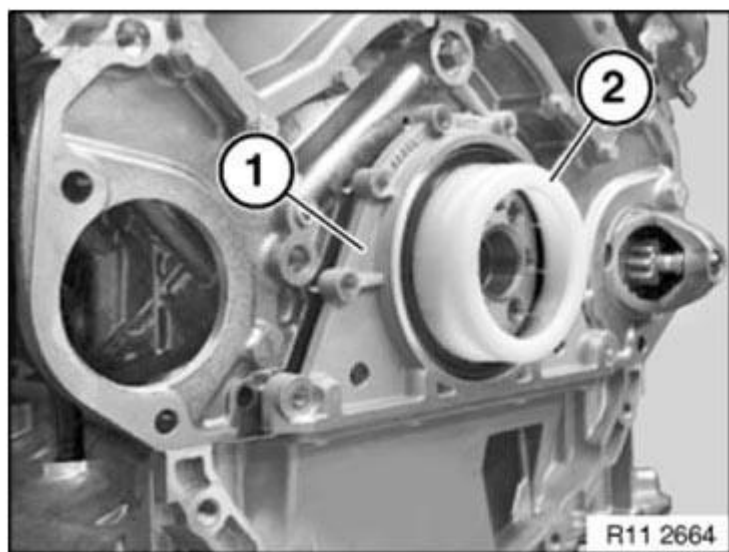


Fig. 135: Identifying End Cover And Support Sleeve

Courtesy of BMW OF NORTH AMERICA, INC.

Insert screws (2) and initially tighten without play.

Insert screws (1) and initially tighten without play.

Tighten down bolts (2) from inside outwards.

Tighten down screws (1) from inside outwards.

Tightening torque: see 7AZ in **11 14 CASE COVERS**

Assemble engine.

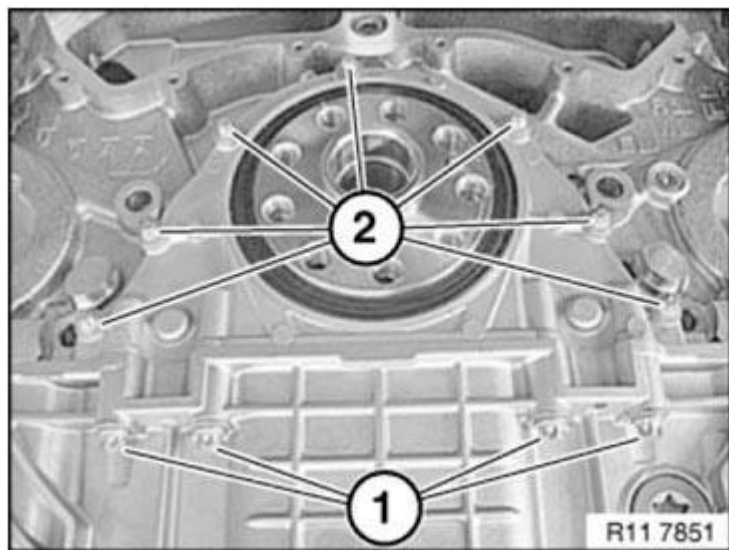


Fig. 136: Identifying Bolts And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

11 14 141 REPLACING RADIAL SHAFT SEAL IN LOWER TIMING CASE COVER (N74)

Necessary preliminary tasks:

- Removing **VIBRATION DAMPER**

Position all levers (2) horizontally to pull off radial shaft seal (1).

Turn back spindle of special tool **11 9 410** until all levers (2) can be positioned on sealing lip.

NOTE: **Illustrations show N62.**

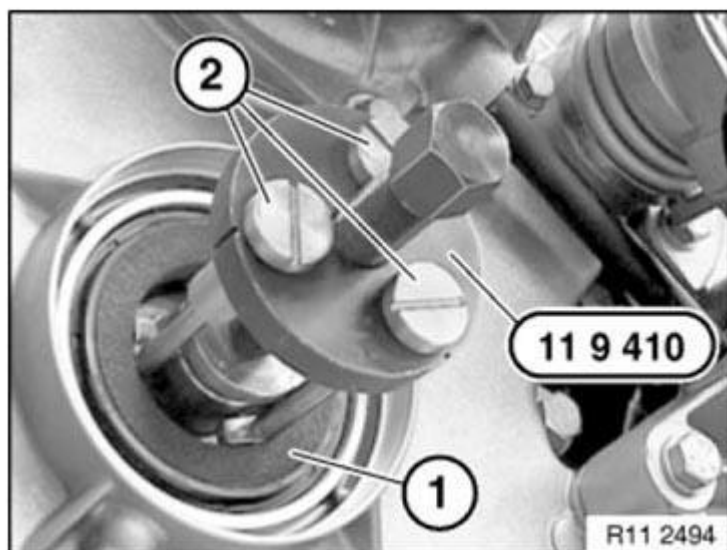


Fig. 137: Positioning Levers Horizontally
Courtesy of BMW OF NORTH AMERICA, INC.

Turn all levers (2) so that they grip behind radial shaft seal (1).

Turn spindle (3) on special tool **11 9 410** to remove radial shaft seal.

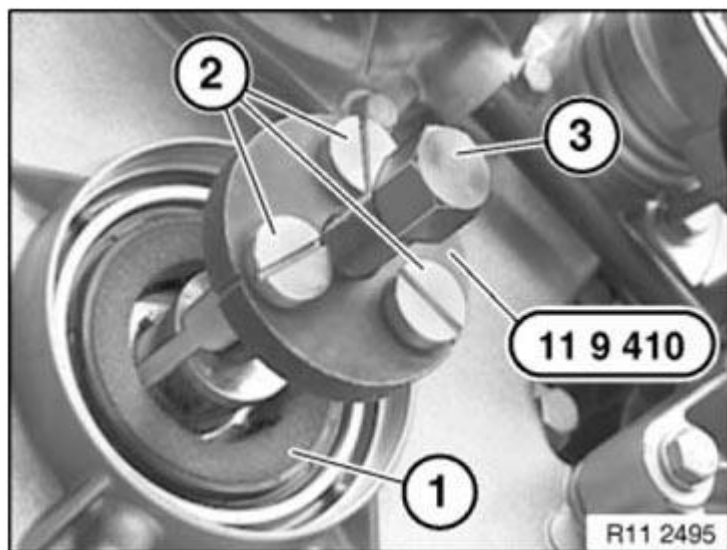


Fig. 138: Identifying Radial Shaft Seal Levers And Spindle Of Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Radial shaft seal (1) may only be supported with "support sleeve" (2).

If the radial shaft seal (1) is stored for more than six months without the support sleeve (2), its operational reliability will no longer be guaranteed.

Radial shaft seal (1) must not be reused in this case!

IMPORTANT: The sealing lip of the radial shaft seal (1) is highly sensitive and must not be kinked under any circumstances.

Do not touch the sealing lip with your fingers.

Remove support sleeve (2) from radial shaft seal (1).

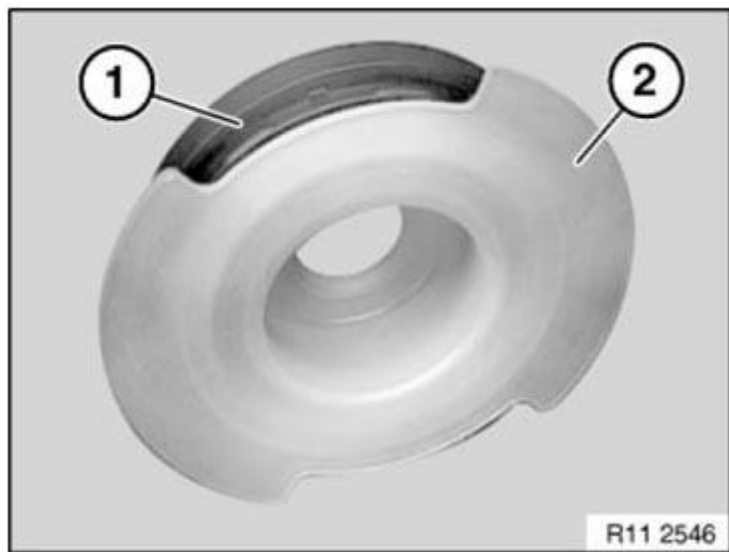


Fig. 139: Identifying Radial Shaft Seal And Support Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Fit radial shaft seal (1) on lower gear case cover.

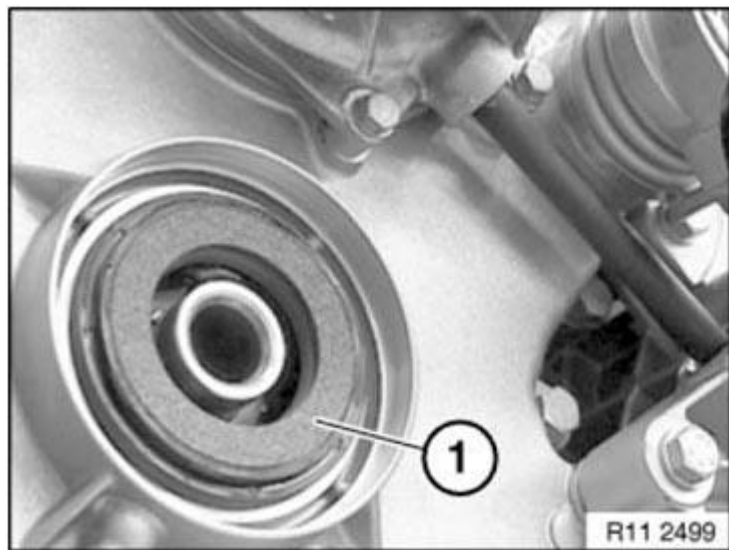


Fig. 140: Identifying Radial Shaft Seal On Lower Gear Case Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Using special tool 11 9 420 and central bolt (3), screw radial shaft seal into lower gear case cover until flush.

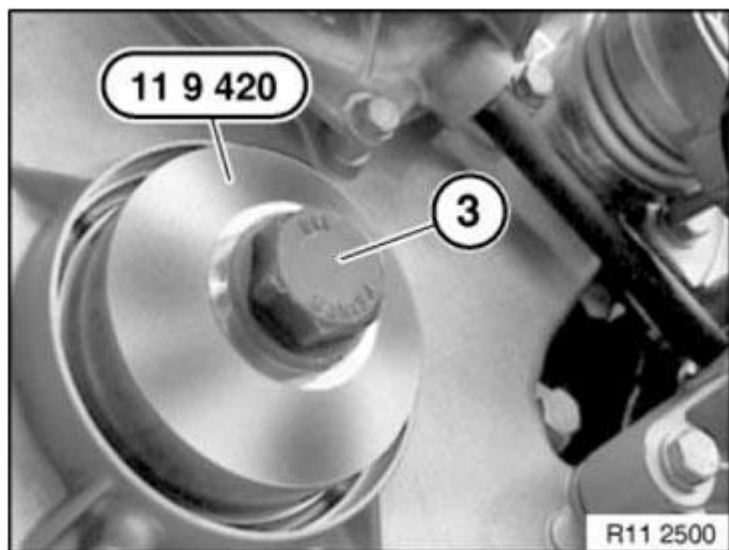


Fig. 141: Identifying Special Tool 11 9 420 And Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

CRANKSHAFT WITH BEARING

11 21 531 REPLACING ALL MAIN CRANKSHAFT BEARING SHELLS (N74)

IMPORTANT: Risk of injury from sharp crankcase edges.

Necessary preliminary tasks:

- Remove **CRANKSHAFT**

NOTE: Main bearing caps 1 to 5 are marked with punched numbers.

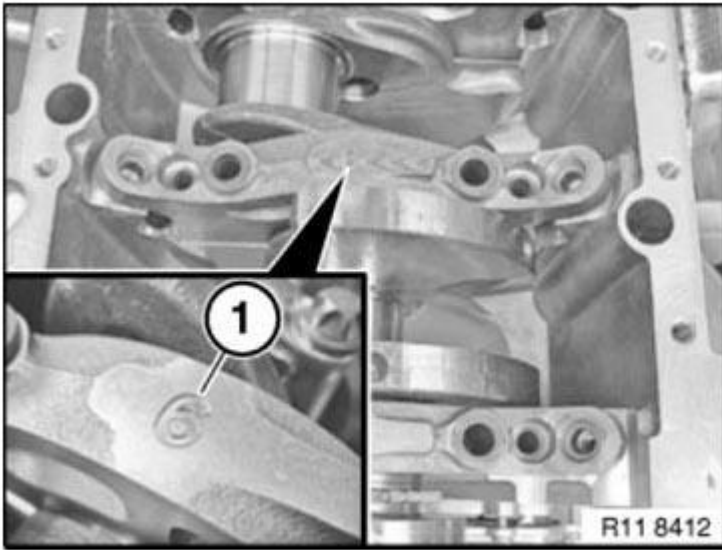


Fig. 142: Identifying Main Bearing Cap Punched Number
Courtesy of BMW OF NORTH AMERICA, INC.

The letters denote the bearing shell classification for the relevant bearing position from 1 to 7 (**main bearing cap**) .

The first letter on the left applies to the first bearing position at the front on the timing chain drive.

Color coding on crankshaft 1 to 57

Y= yellow

G= green

V= violet



Fig. 143: Identifying Bearing Shell Classification For Relevant Bearing Position From 1 To 7 (Main Bearing Cap)

Courtesy of BMW OF NORTH AMERICA, INC.

The letters denote the bearing shell classification for the relevant bearing position from 1 to 7 **crankcase** .

The letters are located on the transmission end in the V-chamber.

The first letter on the left applies to the first bearing position at the front on the timing chain drive.

Color assignment in crankcase 1 to 7.

Y= yellow

G= green

V= violet

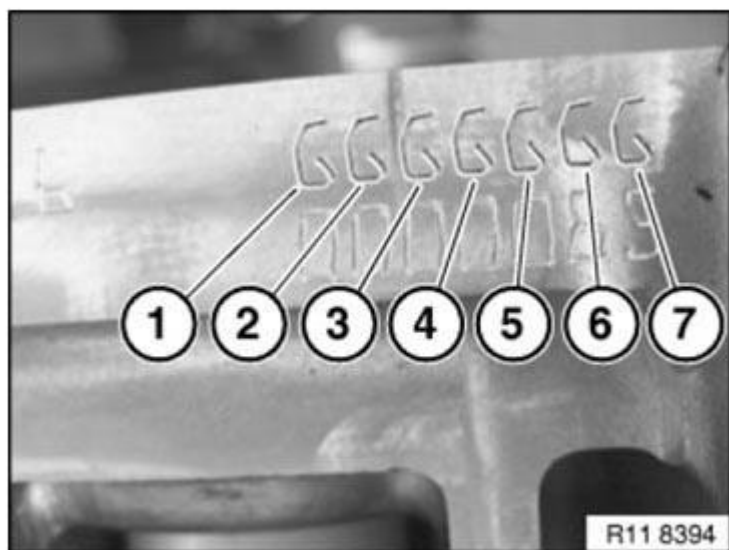


Fig. 144: Identifying Bearing Shell Classification For Relevant Bearing Position From 1 To 7 (Crankcase)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Install main bearing shells (1) with lubrication groove in crankcase.

Install main bearing shells (2) without lubrication groove in the main bearing caps.

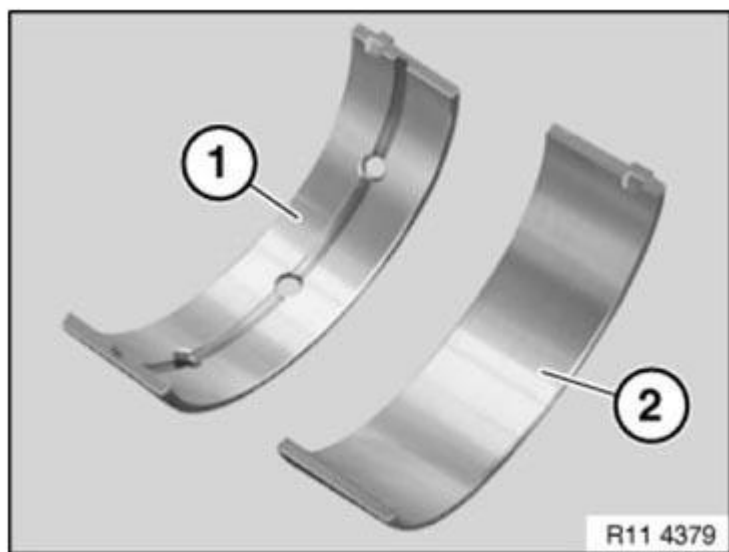


Fig. 145: Identifying Main Bearing Shells With Lubrication Groove And Main Bearing Shells Without Lubrication Groove
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Main bearing cap number 4 can be identified by the surfaces (1) for the thrust

washers discs of the thrust bearing.

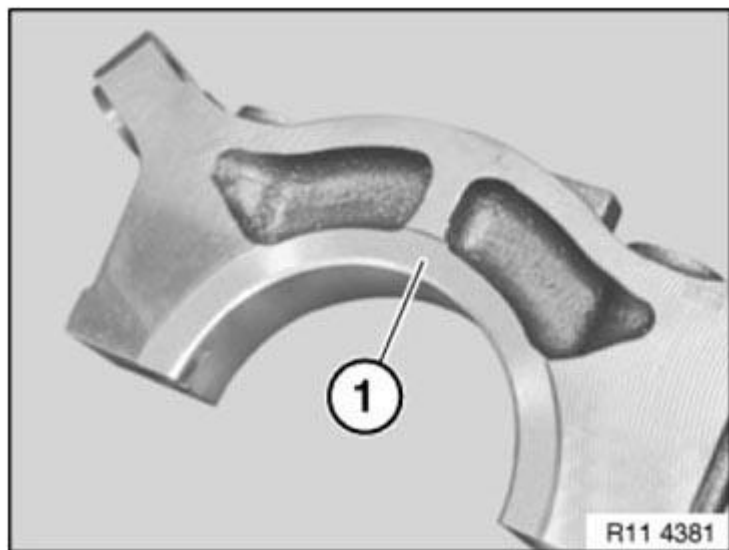


Fig. 146: Identifying Thrust Washers Discs Surface On Main Bearing Cap Number 4
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew thread support bushings in main bearing caps.

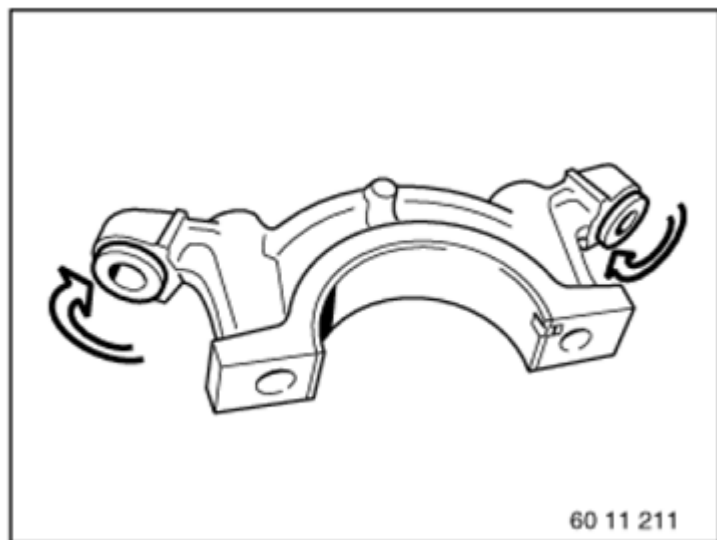


Fig. 147: Unscrewing Thread Support Bushings In Main Bearing Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Checking main bearing clearance

To check crankshaft bearing clearance, use the existing main bearing screws.

IMPORTANT: Risk of cracking!

No oil is permitted in the blind bores.

Do not twist crankshaft.

Place special tool **00 2 590** (Plastigage type PG 1) on oil-free crankshaft (see arrow in illustration).

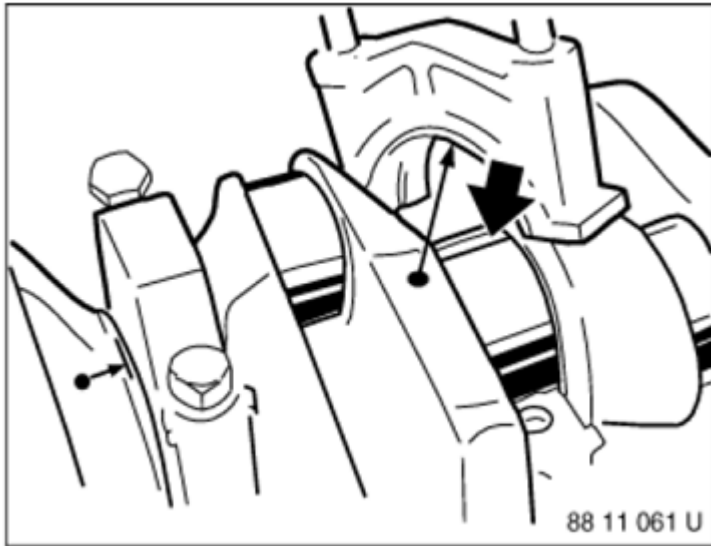


Fig. 148: Checking Main Bearing Clearance
Courtesy of BMW OF NORTH AMERICA, INC.

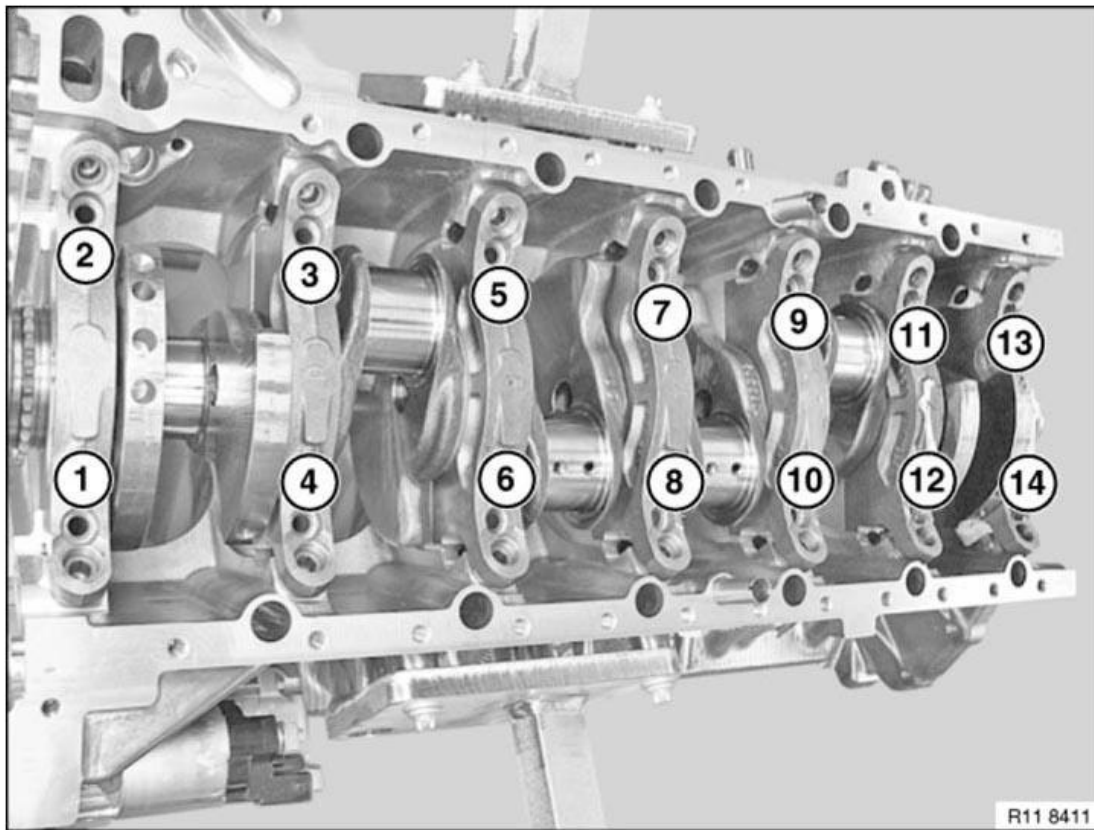


Fig. 149: Identifying Main Bearing Caps Collar Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down all collar bolts (M11) of main bearing caps in sequence 1 to 7 to jointing torque.

Tightening torque: see 1AZ in **11 11 ENGINE BLOCK**

Tighten down all collar bolts (M11) of main bearing caps with special tool **00 9 120** with angle of rotation.

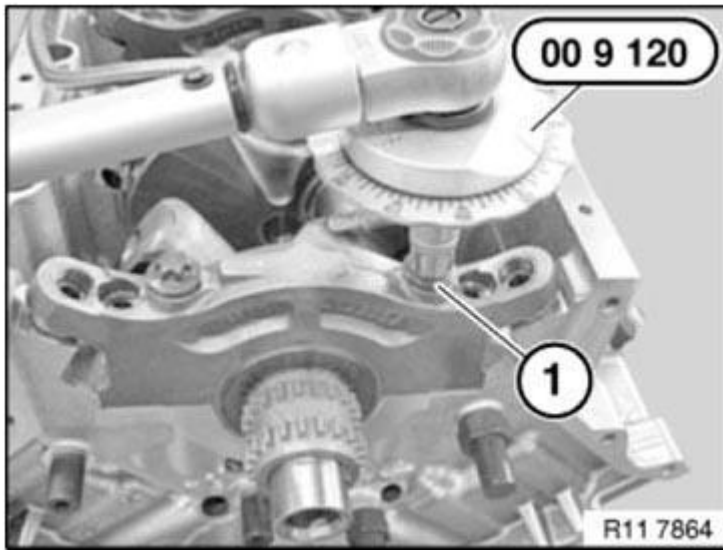


Fig. 150: Tightening Main Bearing Caps Collar Bolts Using Special Tool 00 9 120
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove main bearing cap.

Read off main bearing play at width of flattened plastic thread with assistance of measurement scale.

Main bearing play: see **RADIAL CONROD BEARING PLAY** , **CRANKSHAFT AXIAL PLAY** , **BEARING JOURNAL 1** , and **BEARING JOURNALS 2-7** .

- Remove plastic thread
- Apply a coat of oil to new bearing shells and crankshaft



Fig. 151: Measuring Main Bearing Play Using Measurement Scale

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Always replace bolts in main bearing caps with new bolts.

Do not wash off bolt coating.

IMPORTANT: Risk of cracking!

No oil is permitted in the blind bores.

Install **CRANKSHAFT**.

Carefully strike back and front of crankshaft (1) with a plastic hammer to center guide bearing (do not damage crankshaft).

Secure special tool **11 6 252** with magnetic foot on crankcase.

Position special tool **11 6 251**.

Tightening specifications for main bearing:

Check guide bearing shell of crankshaft and crankcase.

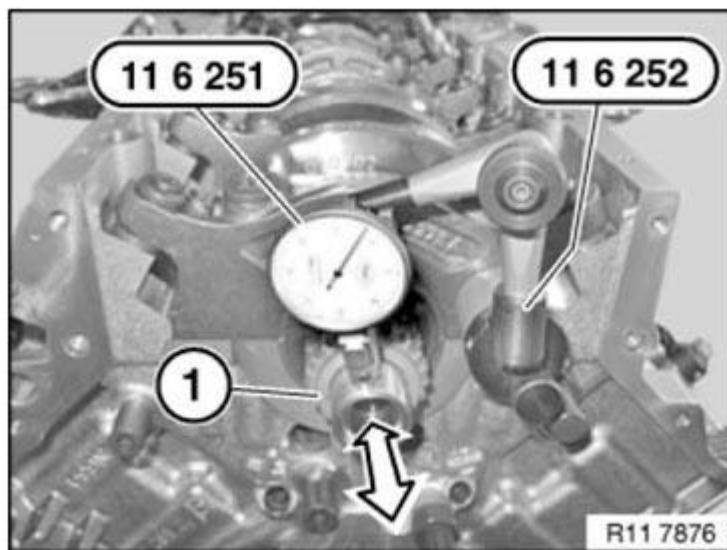


Fig. 152: Checking Crankshaft Axial Play
Courtesy of BMW OF NORTH AMERICA, INC.

Check **AXIAL PLAY**.

Assemble engine.

11 21 500 REPLACING CRANKSHAFT (N74)

IMPORTANT: Weight of crankshaft is approx. 25 kg.

Risk of injury from sharp crankcase edges.

Necessary preliminary tasks:

- Remove **ENGINE**
- Mount engine on assembly stand
- Remove cylinder head. See **LEFT CYLINDER HEAD/RIGHT CYLINDER HEAD**.
- Remove **HUB FOR VIBRATION DAMPER**
- Removing lower timing case cover
- **REMOVING OIL PAN**
- Remove **OIL PUMP**
- Removing **PISTON**
- Remove **FLYWHEEL**
- Remove radial shaft seals. See **RADIAL SEAL ON TRANSMISSION SIDE** and **RADIAL SHAFT SEAL IN LOWER TIMING CASE COVER**.
- Remove **TIMING CHAINS**

Installation:

Arrangement of main bearing caps 1 to 7.

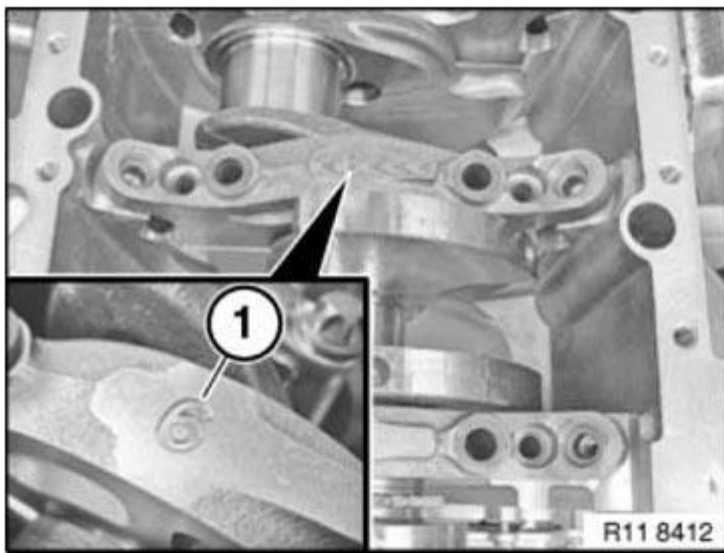


Fig. 153: Identifying Main Bearing Cap Number
Courtesy of BMW OF NORTH AMERICA, INC.

All numbers must be read from the cylinder bank (7 to 12) (see arrows in illustration).

Installation:

All bearing caps are numbered 1 to 6.

The bearing cap on bearing seat 7 has no number.

Main bearing caps 1 to 7 on the output end on the timing chain drive.

Release oil pump spacer bolts (1) with special tool **13 5 020** .

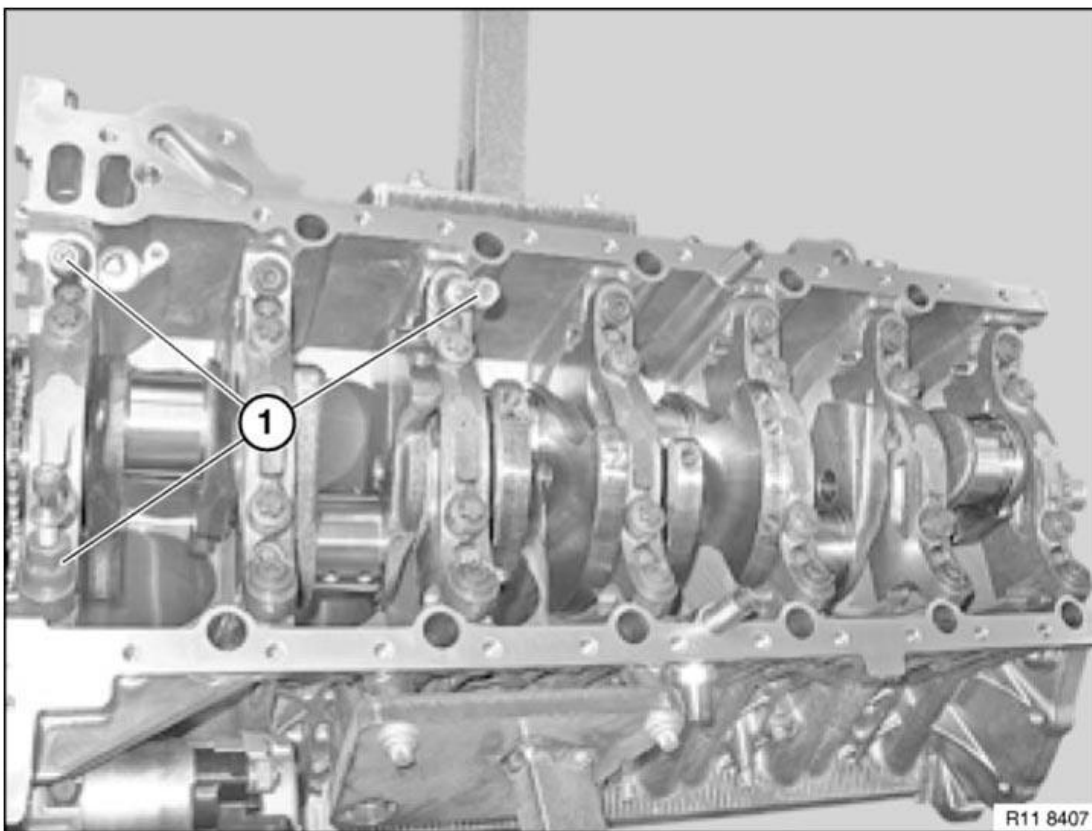


Fig. 154: Identifying Oil Pump Spacer Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

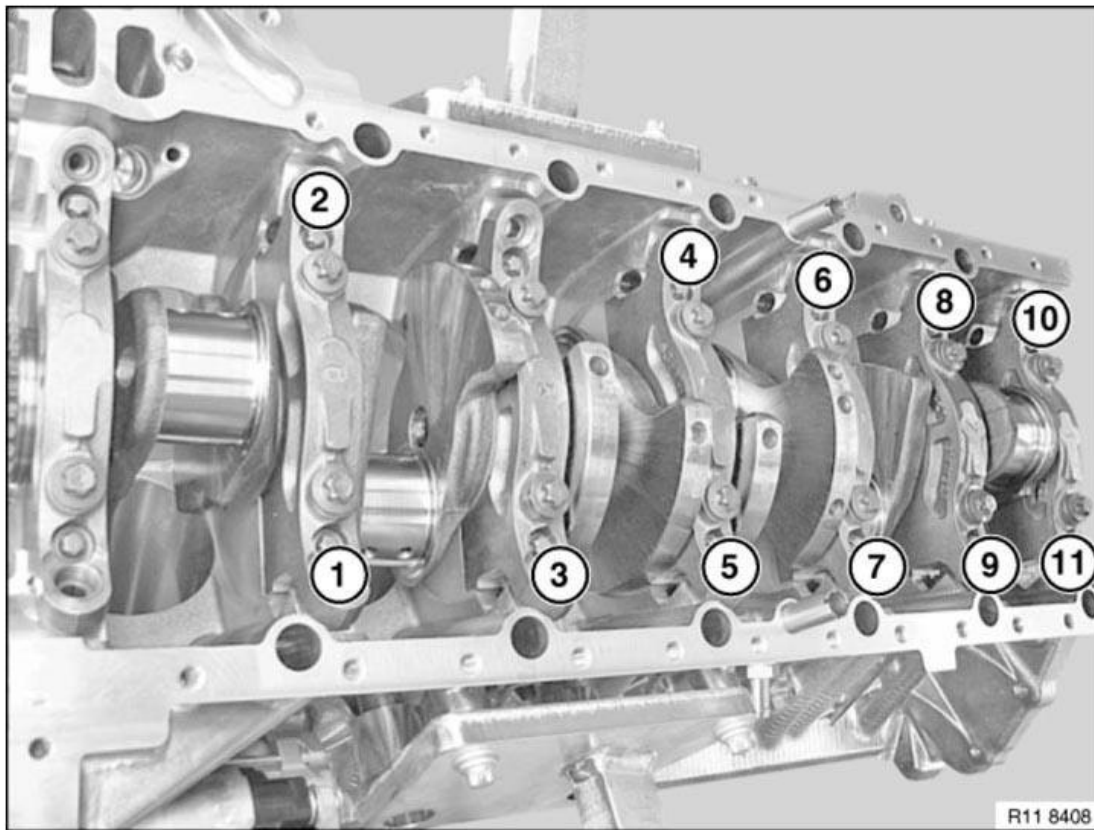


Fig. 155: Identifying Main Bearing Taper Screw Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release main bearing taper screw mounting from 1 to 11.

Release all thread support bushings (1).

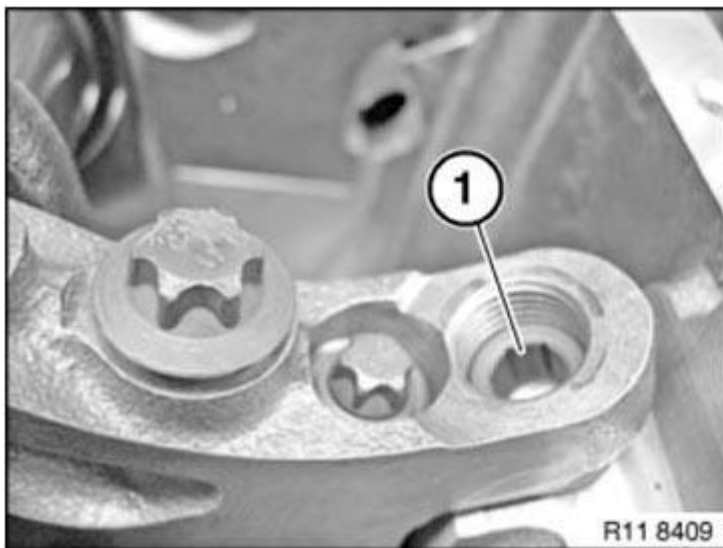


Fig. 156: Identifying Thread Support Bushings
Courtesy of BMW OF NORTH AMERICA, INC.

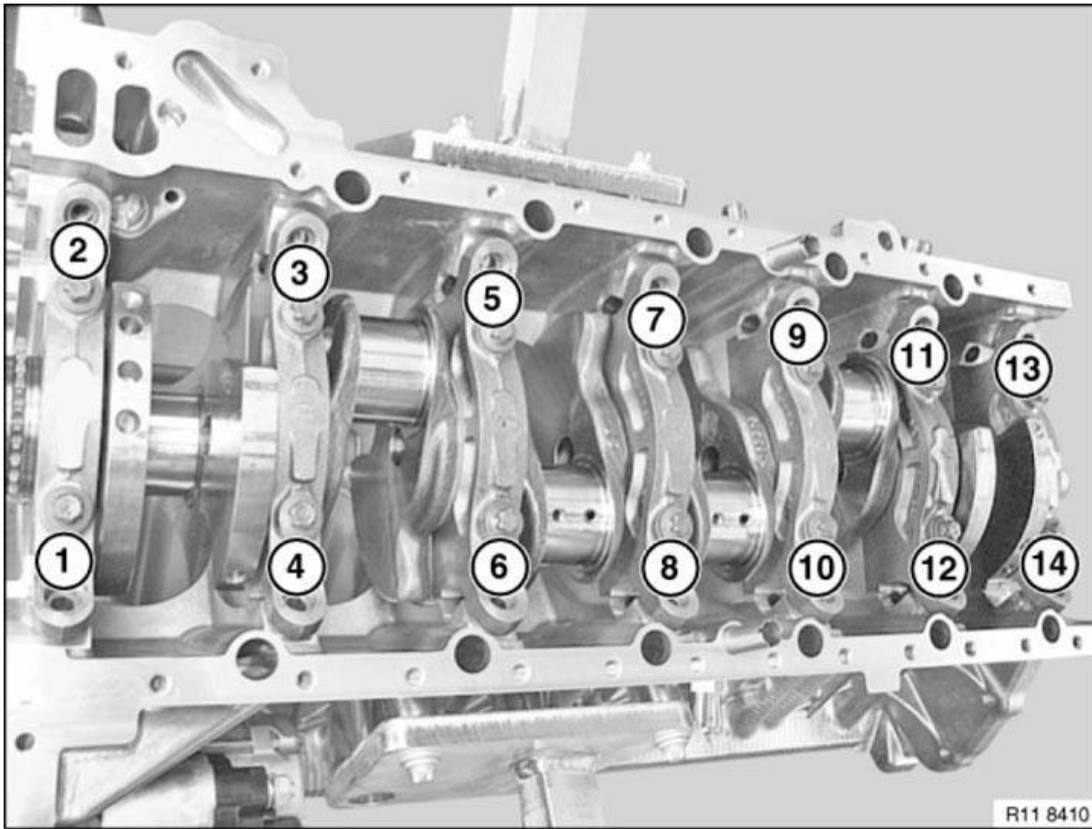


Fig. 157: Identifying Main Bearing Caps Collar Bolts (M8) Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release collar bolts (M8) in sequence 1 to 14.

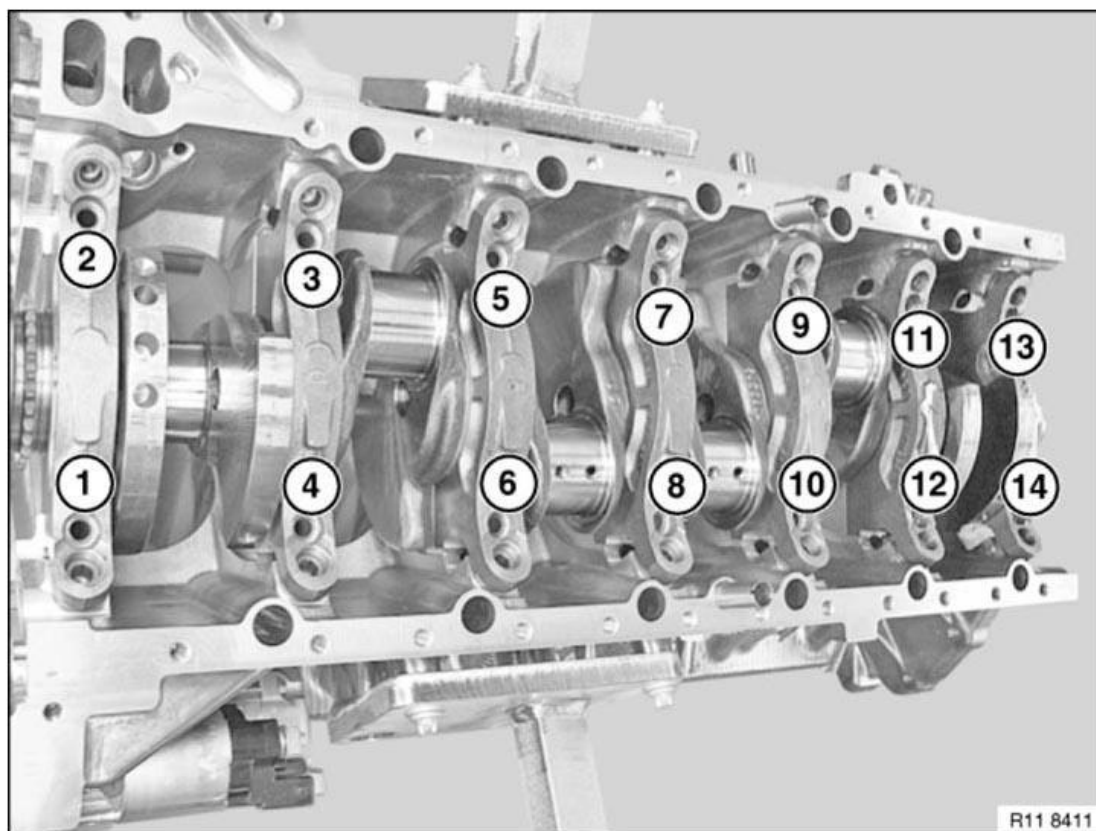


Fig. 158: Identifying Main Bearing Caps Collar Bolts (M11) Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release collar bolts (M11) in sequence 11 to 14.

Remove main bearing caps 1 to 7.

IMPORTANT: Remove crankshaft with a 2nd person, weight approx. 25 kg.

Lift out crankshaft and set down safely (secure against turning).

Release screw for oil nozzle (1).

Tightening torque: see 7AZ in **11 11 ENGINE BLOCK**

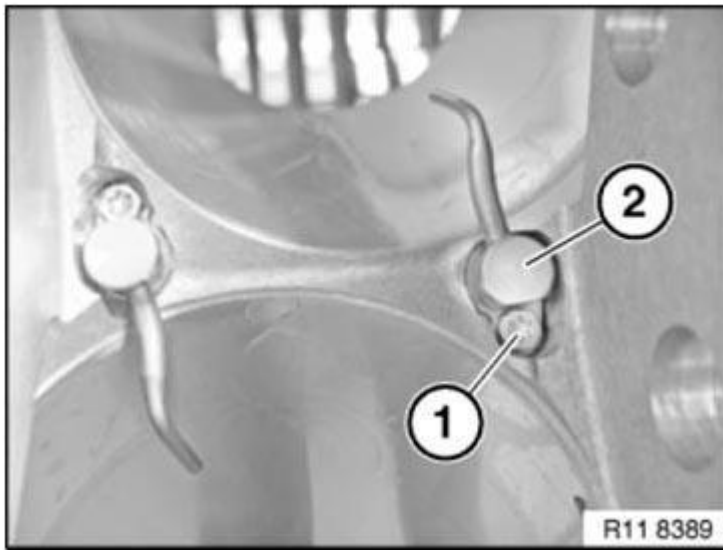


Fig. 159: Identifying Oil Nozzle With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check oil nozzle for clear passage with compressed air.

Observe fastening on oil nozzle.

Replace all O-rings.

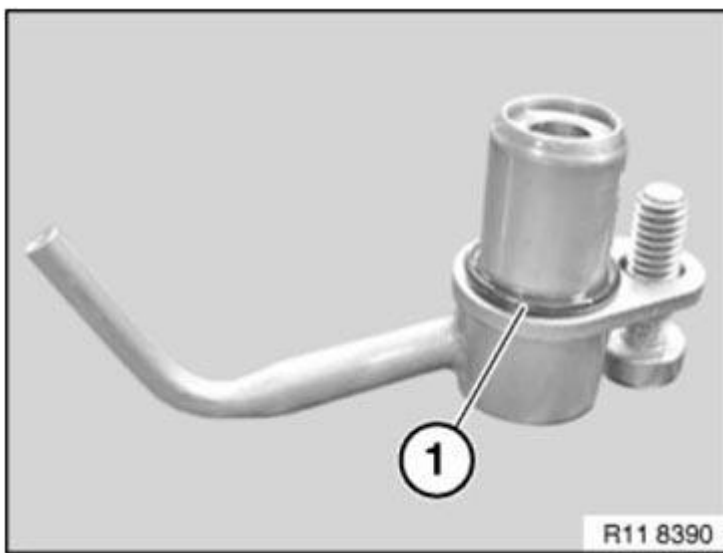


Fig. 160: Identifying Oil Nozzle O-Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Replace **MAIN CRANKSHAFT BEARING SHELLS**.

IMPORTANT: Install crankshaft with a 2nd person, weight approx. 25 kg.

Install crankshaft.

Installation:

Observe arrangement of main bearing caps (1).

All numbers must be read from the cylinder bank (7 to 12) (see arrows in illustration).

Turn back all thread support bushings hand-tight.

The main bearing cap number 1 is on the timing chain drive.

Installation:

Coat all main bearing points with engine oil.

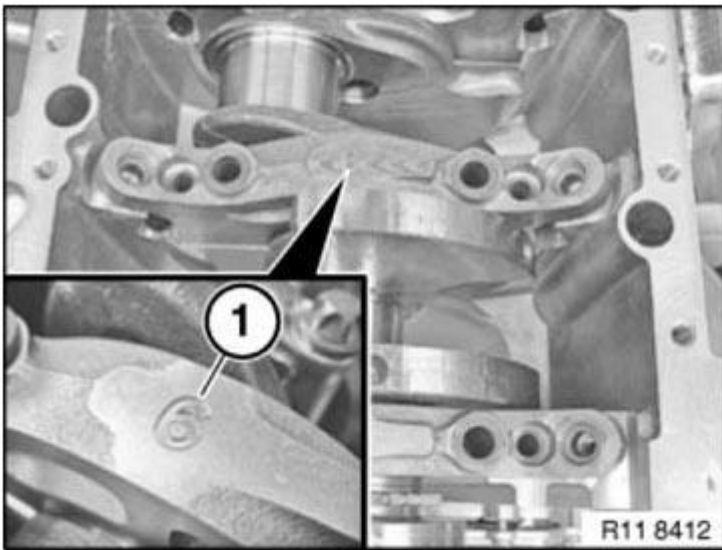


Fig. 161: Identifying Main Bearing Cap Number
Courtesy of BMW OF NORTH AMERICA, INC.

Fit main bearing caps (1 to 7).

Installation:

For a better overview of the screw connection quality, mark the head of all collar bolts after joining with a line (1) using an oil-proof marker pen.

For more accurately checking entire angle adjustment.

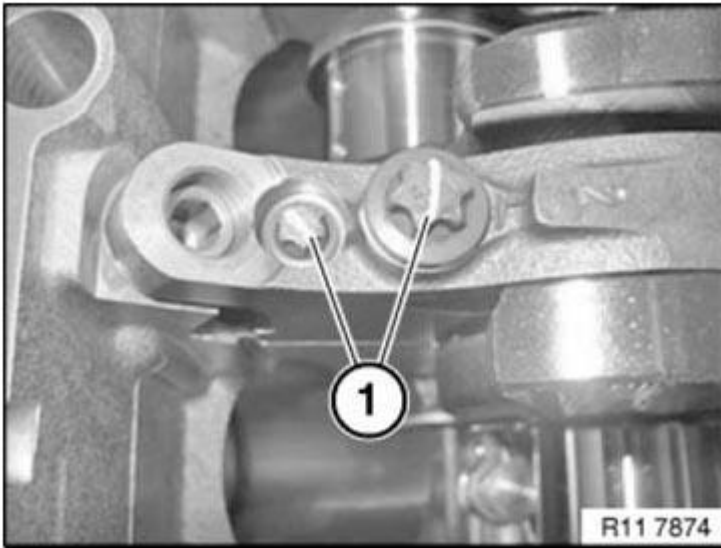


Fig. 162: Identifying Mark On Head Of Collar Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

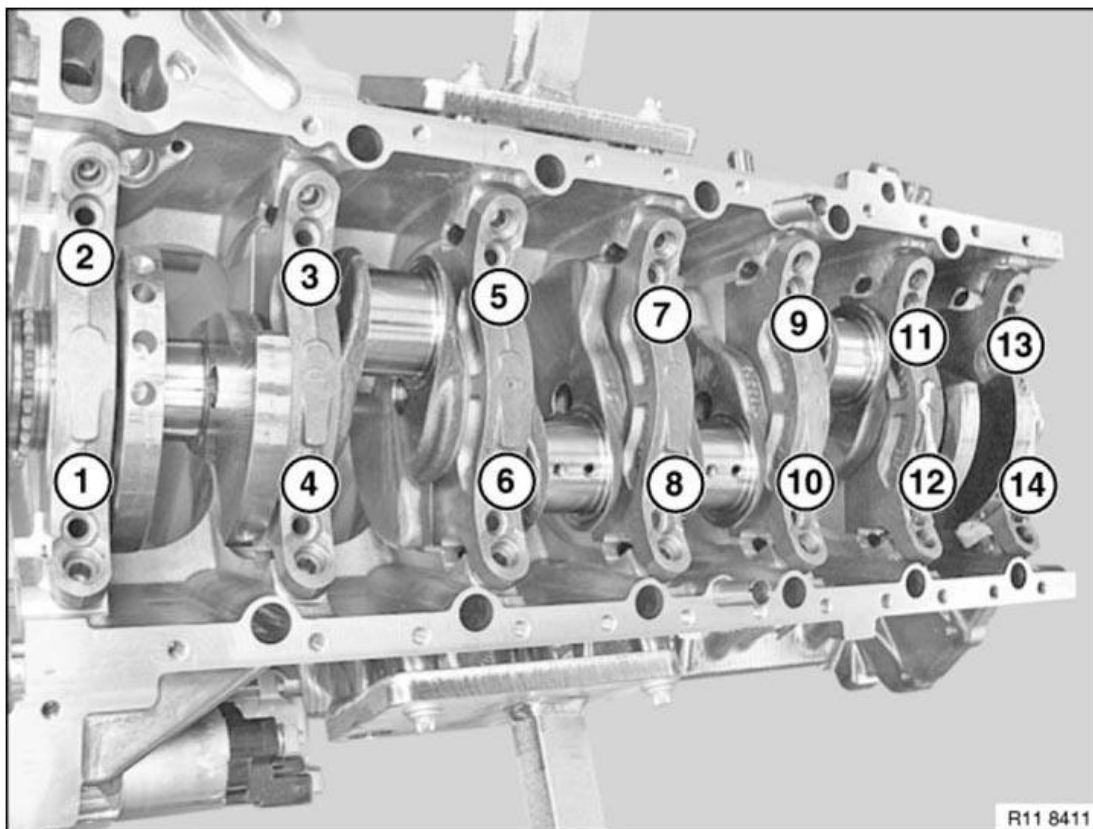


Fig. 163: Identifying Collar Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Insert collar bolts (M11) hand-tight in sequence (1 to 14).

(M11) Connect collar bolts in sequence (1-14) with 20 Nm torque.

To better check the total angular adjustment, mark all collar bolts M 11 with an oil-proof marker.

Secure collar bolts (M11) in sequence (1 to 14).

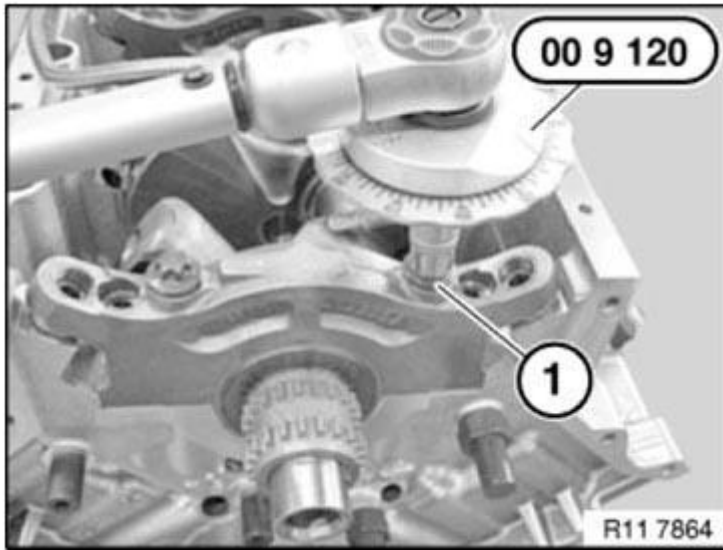


Fig. 164: Tightening Main Bearing Caps Collar Bolts Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Secure collar bolt (1) with special tool 00 9 120 .

Tightening torque: see 1AZ in 11 11 ENGINE BLOCK

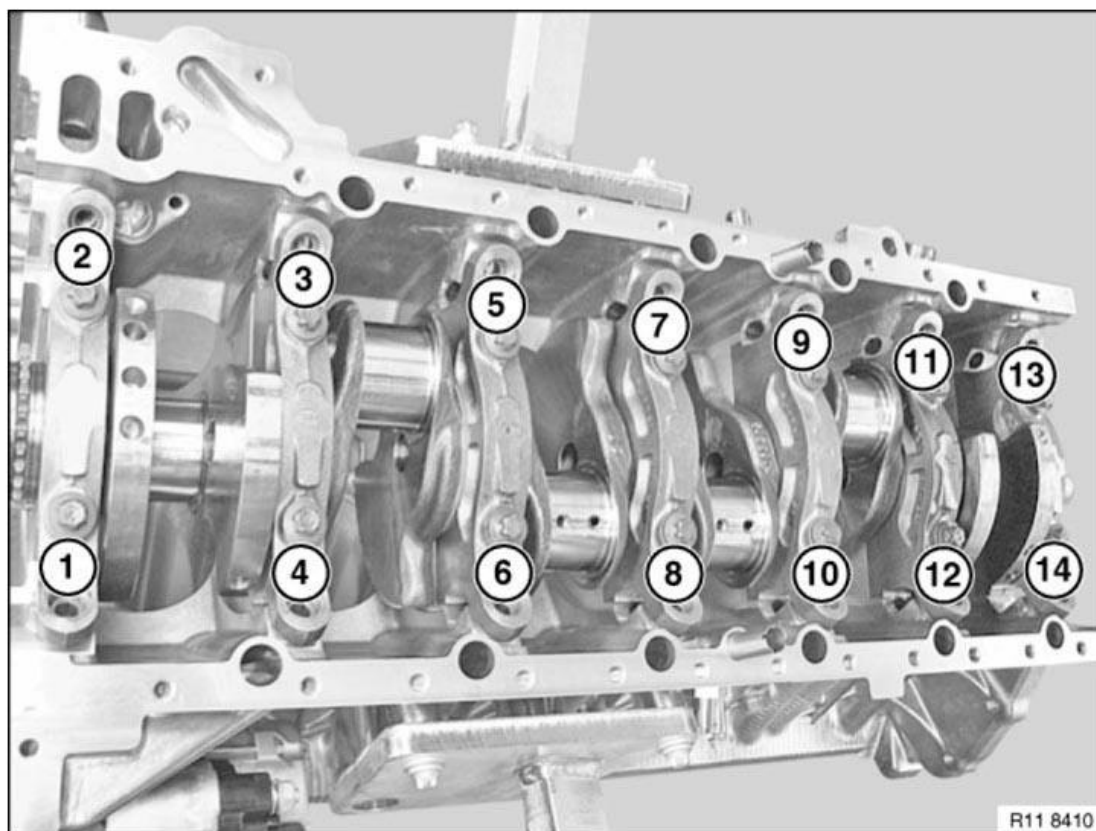


Fig. 165: Identifying Collar Bolts Inserting Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Insert collar bolts (1 to M8) hand-tight in sequence.

(M8) Connect collar bolts in sequence (1-14) with 10 Nm torque.

To better check the total angular adjustment, mark all collar bolts with a line using an oil-proof marker. M8

Secure collar bolts (M8) in sequence (1 to 14).

Secure collar bolt (1) with special tool **00 9 120** .

Tightening torque: see 2AZ in **11 11 ENGINE BLOCK**

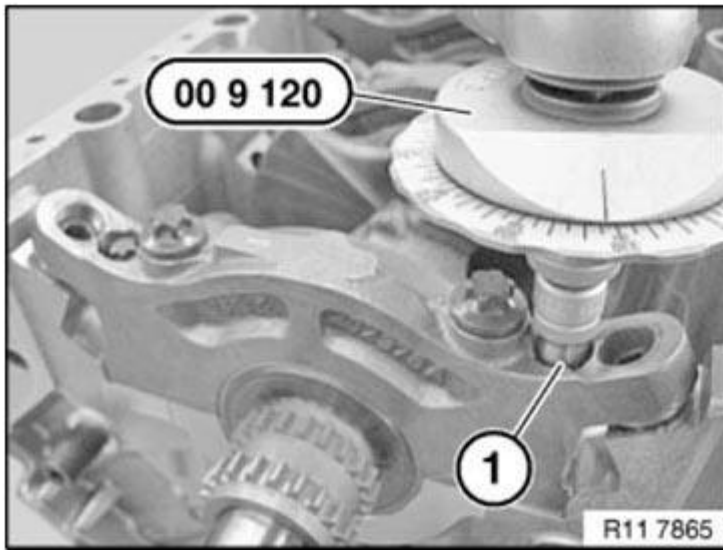


Fig. 166: Securing Collar Bolt Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Secure all threaded support sleeves (1) with special tool **11 4 350** .

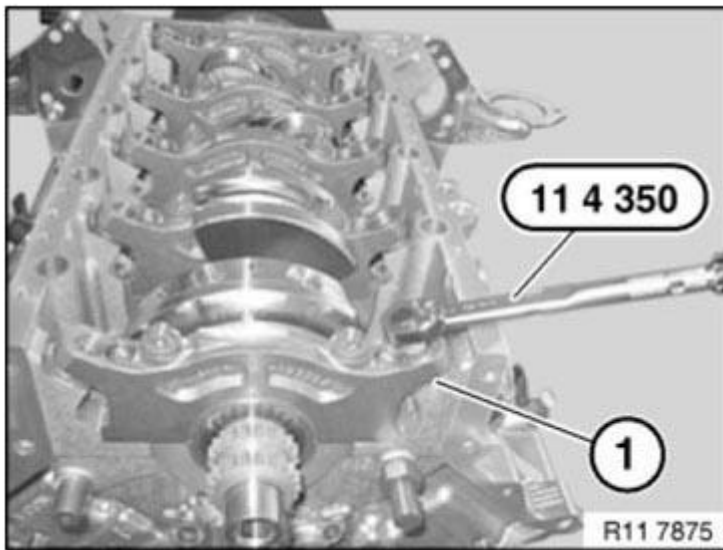


Fig. 167: Securing Threaded Support Sleeves Using Special Tool 11 4 350
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque: see 3AZ in **11 11 ENGINE BLOCK**

Tighten down main bearing taper screw mounting from 1 to 11.

Tightening torque: see 4AZ in **11 11 ENGINE BLOCK**

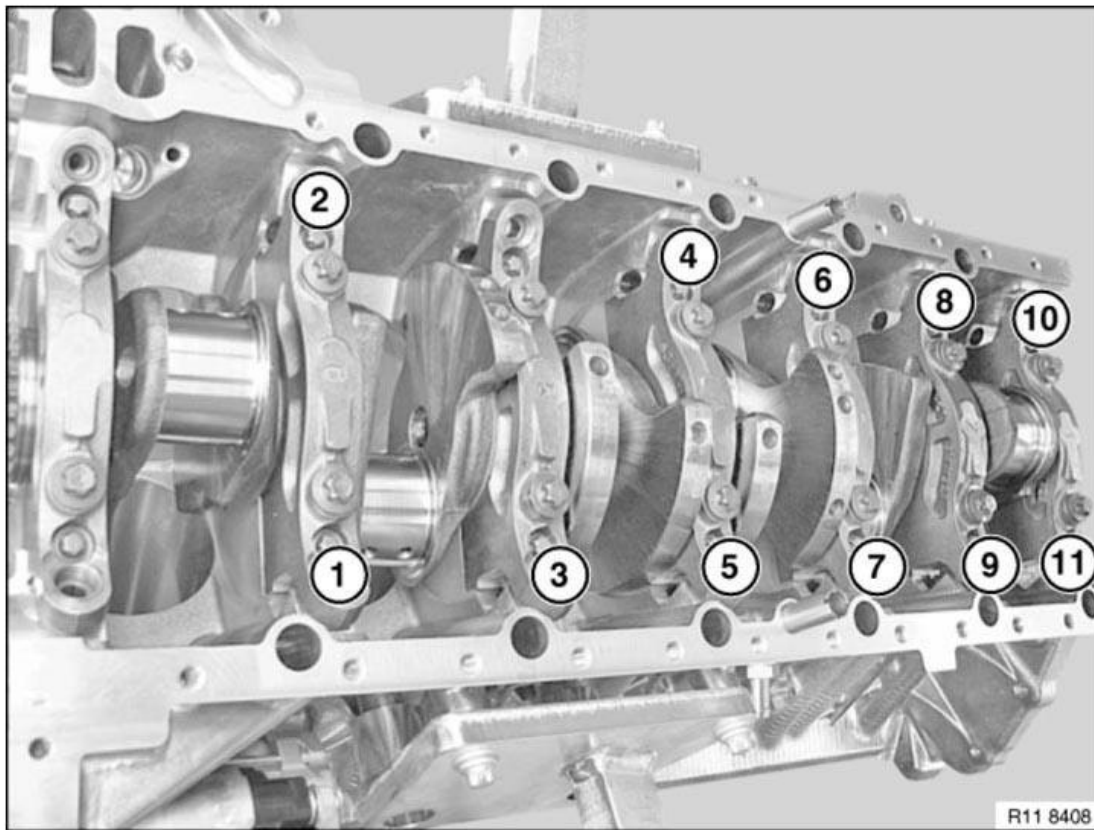


Fig. 168: Identifying Main Bearing Taper Screw Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down oil pump spacer bolts (1) with special tool **13 5 020** .

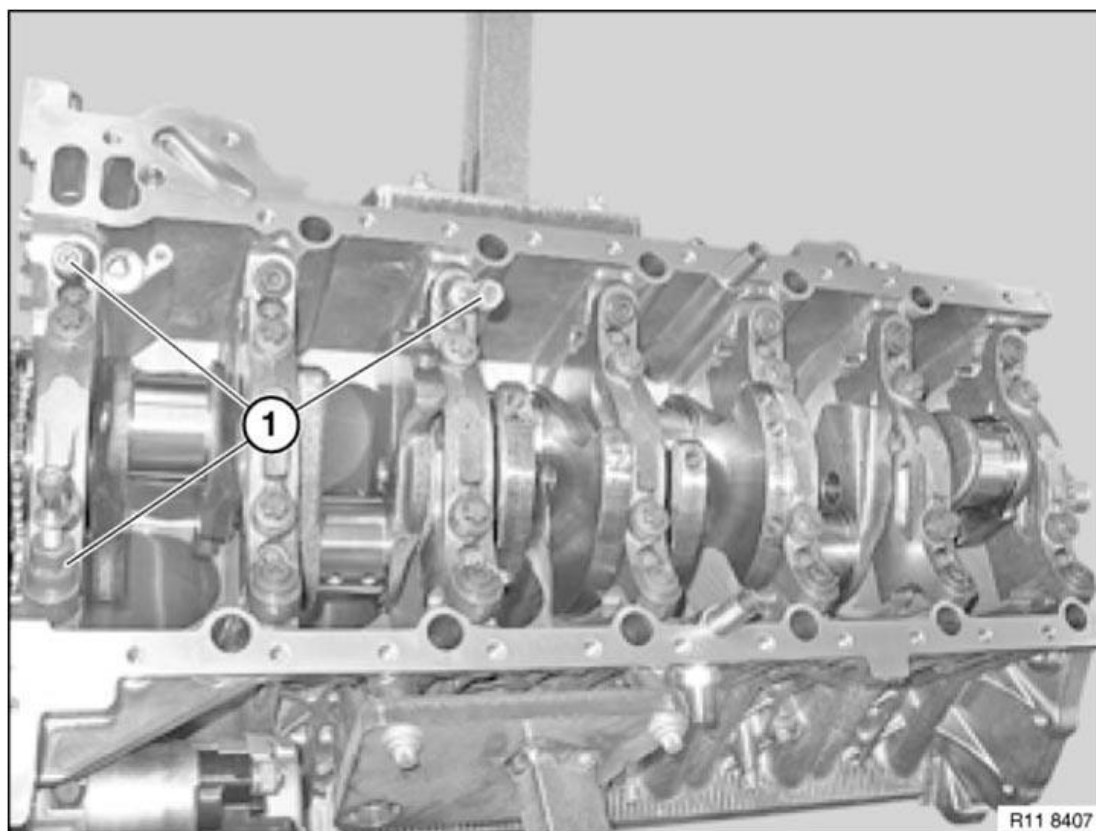


Fig. 169: Identifying Oil Pump Spacer Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque: see 5AZ in **11 11 ENGINE BLOCK**

Check crankshaft **COEFFICIENT OF FRICTION** .

Determine crankshaft **breakaway torque** with special tool **00 2 010** .

Rotate crankshaft at central bolt using special tool **00 2 010** .

If the breakaway torque is too high, it will be necessary to correct the **BEARING CLEARANCE** .

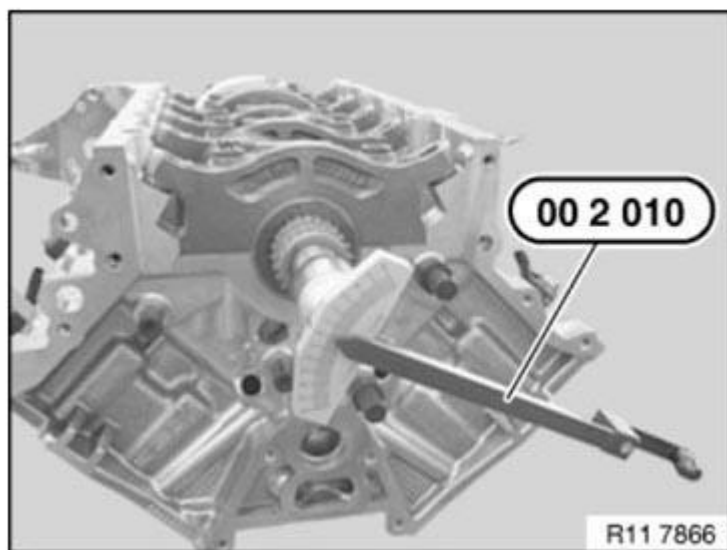


Fig. 170: Rotating Crankshaft Using Special Tool 00 2 010
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 6 252 to crankcase with magnetic base.

Slide crankshaft in direction of arrow forwards as far as it will go.

Set special tool 11 6 251 to zero.

Slide crankshaft (1) in direction of arrow towards rear and determine value.

Check AXIAL PLAY .

Assemble engine.

FLYWHEEL

11 22 510 REMOVING AND INSTALLING/REPLACING FLYWHEEL (TRANSMISSION REMOVED - N74)

Necessary preliminary tasks:

- Remove TRANSMISSION .

Secure flywheel (1) with special tool 11 9 260 , 11 9 263 and 11 9 264 .

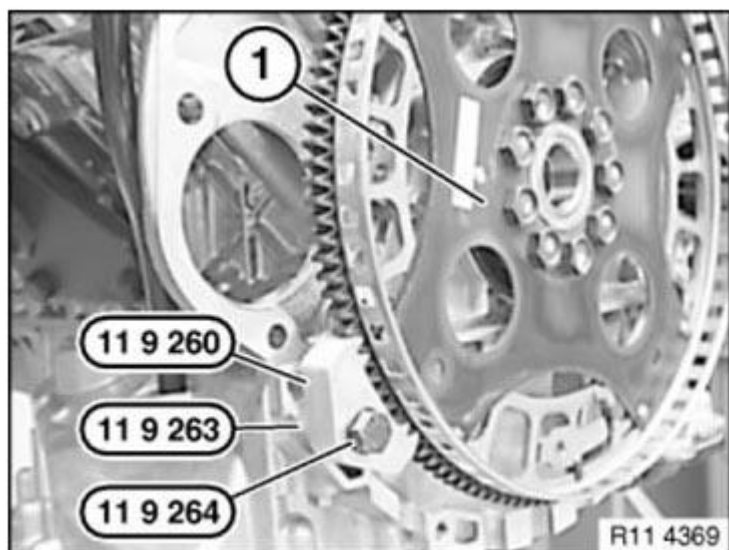


Fig. 171: Securing Flywheel Using Special Tool 11 9 260, 11 9 263 And 11 9 264
Courtesy of BMW OF NORTH AMERICA, INC.

Release flywheel screws in area (1).

Remove flywheel (2).

Installation:

Clean threads on flywheel screws in crankshaft.

Flywheel (2) is secured with an alignment pin.

Fit flywheel (2).

Fit new flywheel screws .

Tightening torque: see 1AZ in **11 22 FLYWHEEL**

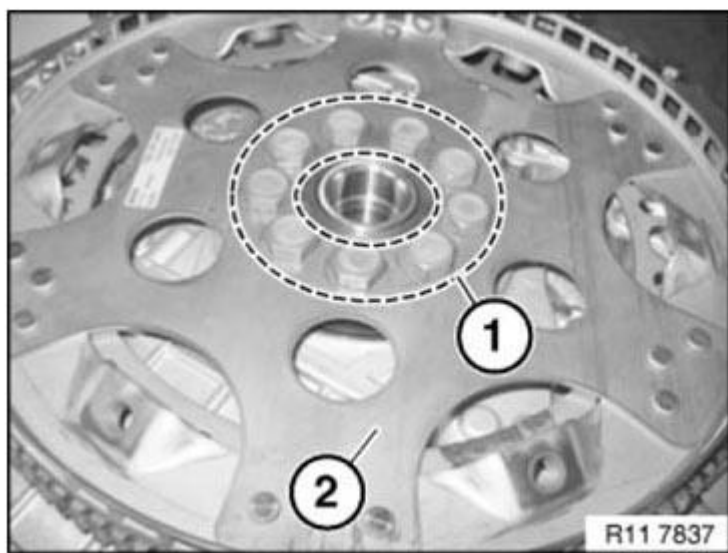


Fig. 172: Identifying Flywheel And Screws Area
Courtesy of BMW OF NORTH AMERICA, INC.

VIBRATION DAMPER

11 23 010 REMOVING AND INSTALLING/REPLACING VIBRATION DAMPER (N74)

Necessary preliminary tasks:

- Remove **FAN COWL**
- Remove alternator **DRIVE BELT**
- Remove A/C compressor **DRIVE BELT**
- Remove belt pulley for A/C system

Release screw (1).

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

Remove belt tensioner with idler pulley (2).

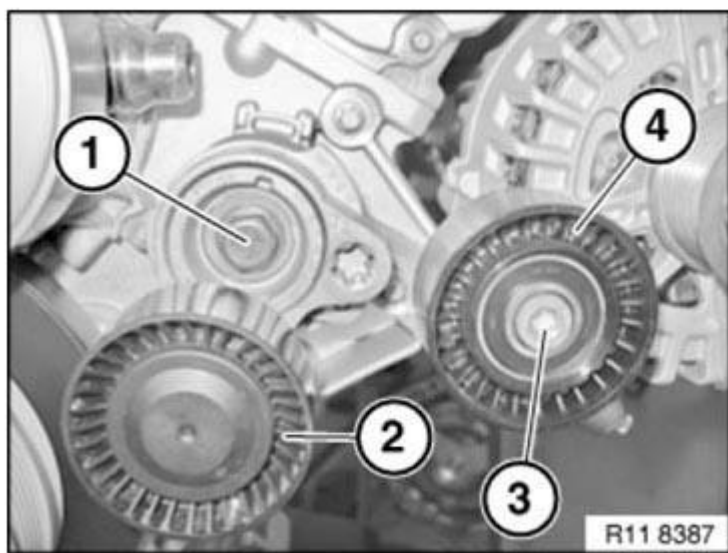


Fig. 173: Identifying Idler Pulley With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Observe fixture on belt tensioner (1) (risk of damage!) .

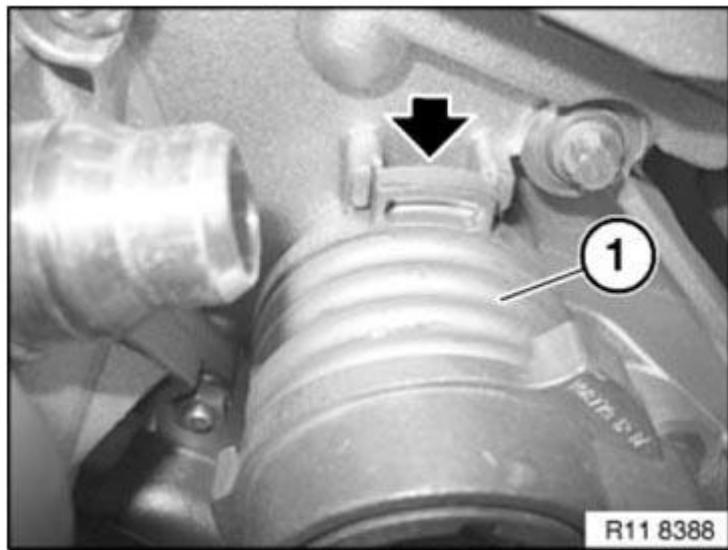


Fig. 174: Identifying Belt Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **11 8 090** with three screws (1) to vibration damper.

Secure special tool **11 8 090** with belt tensioner bolt (2) to timing case cover.

Tightening torque: see 3AZ in **11 28 V-RIBBED BELT WITH TENSION AND DEFLECTION**

ELEMENT

NOTE: A 3/4 inch tool is needed to release the central bolt.

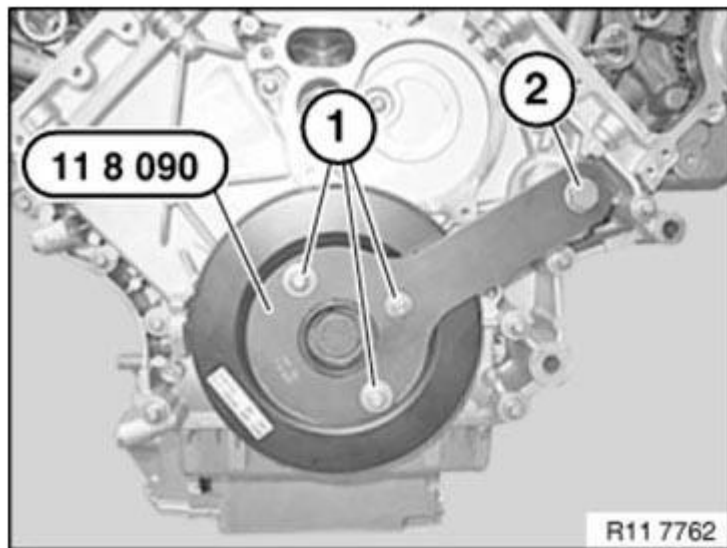


Fig. 175: Securing Special Tool 11 8 090 With Belt Tensioner Bolt And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release central bolt on vibration damper.

Secure central bolt with special tool 00 9 140 or 11 3 460 .

Position special tool 11 3 460 on special tool 11 8 090 .

Adjust special tool 11 9 453 on special tool 11 9 454 using clamping screw to 0° on scale.

Tightening torque: see 1AZ in 11 23 VIBRATION DAMPER

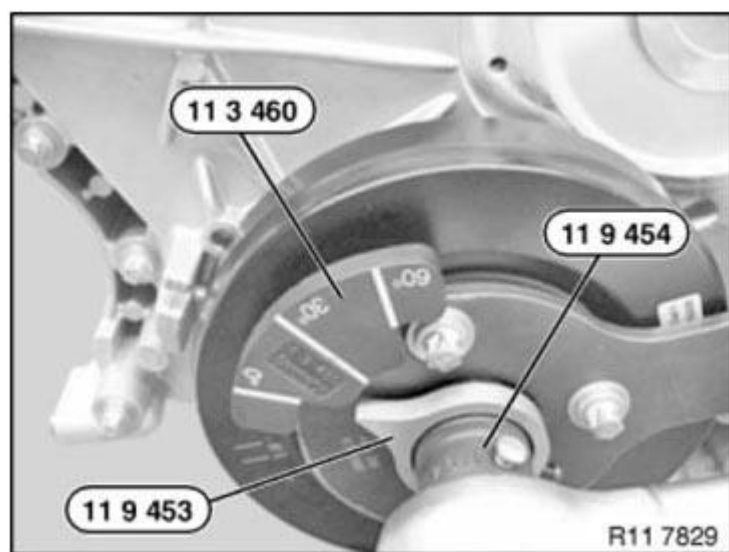


Fig. 176: Adjusting Special Tool 11 9 453 On Special Tool 11 9 454 Using Clamping Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

CONNECTING ROD WITH BEARING

11 24 571 REPLACE ALL BIG-END BEARINGS (N74)

IMPORTANT: Note grinding stages on crankshaft. See CONROD BEARING JOURNALS , CRANKSHAFT GUIDE BEARING , MAIN BEARING JOURNALS (1) , and MAIN BEARING JOURNALS (2-7) .

Necessary preliminary tasks:

- Remove all PISTONS.

Install new connecting rod bearing shells.

Install one blue bearing shell (1) and one red bearing shell (2) in each conrod.

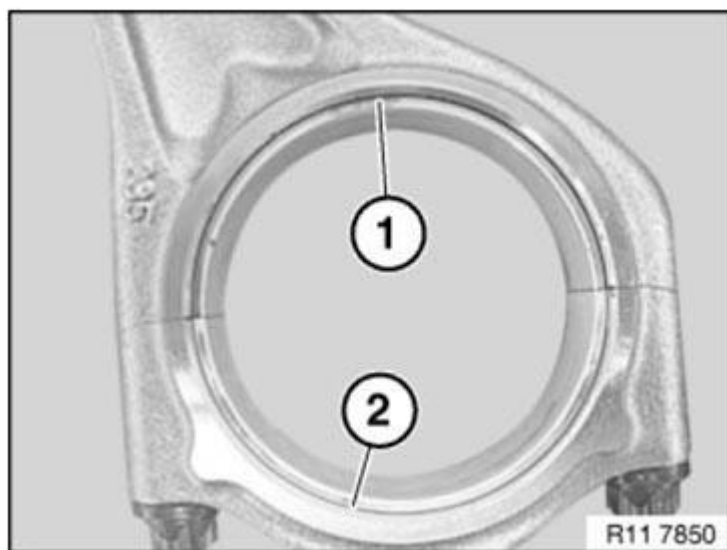


Fig. 177: Identifying Blue And Red Bearing Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Install **PISTON**.

Installation:

The bearing shells on the conrod are coded.

Conrod bearing cap (1): the red bearing shell is fitted and the fastening notches are on the left and right sides of the bearing shell (see arrows in illustration).

Conrod (2): the blue bearing shell is fitted and the fastening notches are one side of the bearing shell (see arrows in illustration).

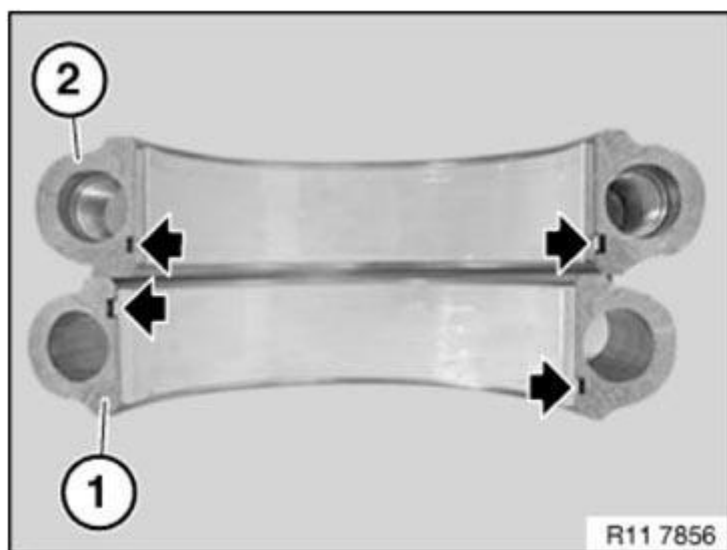


Fig. 178: Identifying Conrod And Conrod Bearing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Check connecting rod bearing clearance .

Piston in BDC position.

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

Fit bearing caps so that pair numbers match up.

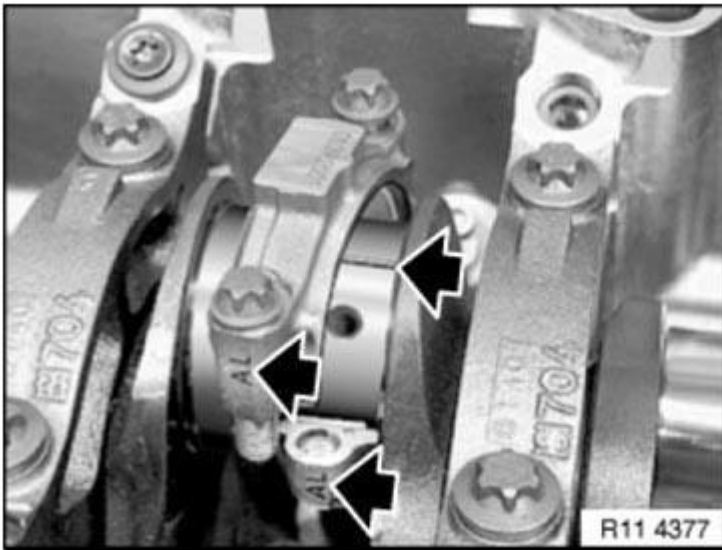


Fig. 179: Locating Bearing Caps Pair Numbers
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not distort connecting rods or crankshaft.

Use conrod bolts to check conrod bearing clearance.

Connecting rod bolts with special tool **00 9 120** .

Tightening torque: see 1AZ in **11 24 CONNECTING RODS AND BEARINGS**

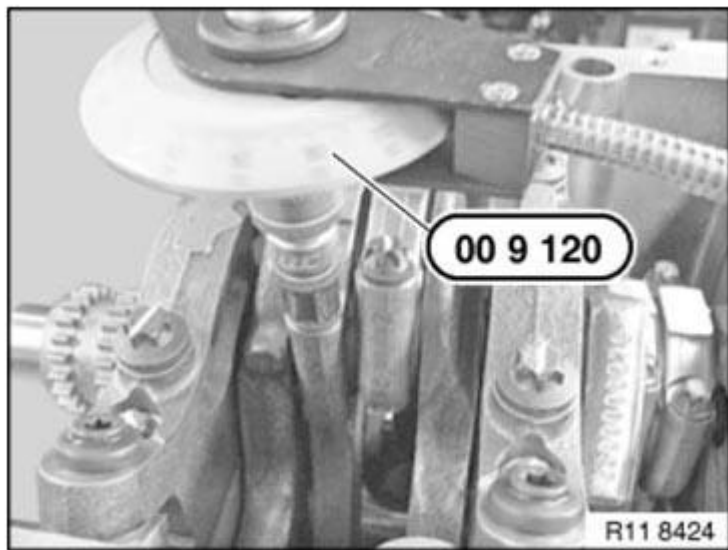


Fig. 180: Tightening Connecting Rod Bolts Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bearing cap and read off bearing play at width of flattened plastic thread with assistance of measurement scale.

CONROD BEARING CLEARANCE .

- Remove plastic thread.
- Lubricate crankshaft and bearing shells.
- Install new conrod bolts.

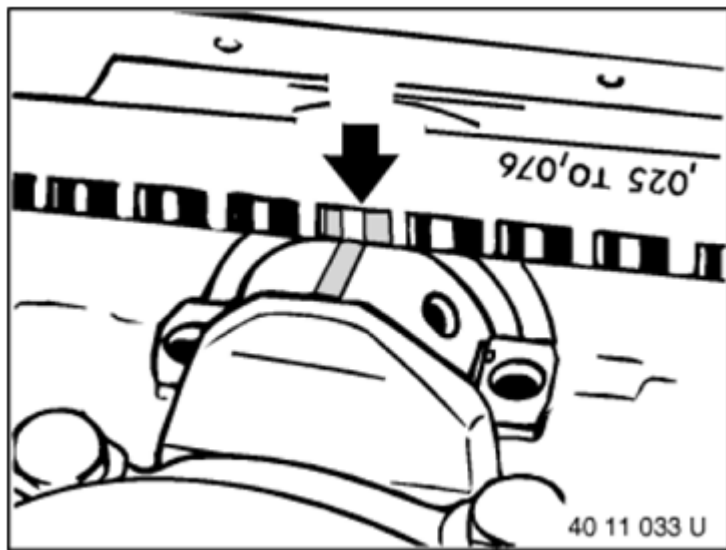


Fig. 181: Measuring Conrod Bearing Clearance Using Measurement Scale
Courtesy of BMW OF NORTH AMERICA, INC.

Join connecting rod bolt (1).

Tightening torque: see 1AZ in **11 24 CONNECTING RODS AND BEARINGS**

Installation:

Check entire angle adjustment.

For better overview of screw connection quality.

After joining, use an oil-resistant marker to apply a stroke (1) on the bolt head (see illustration).

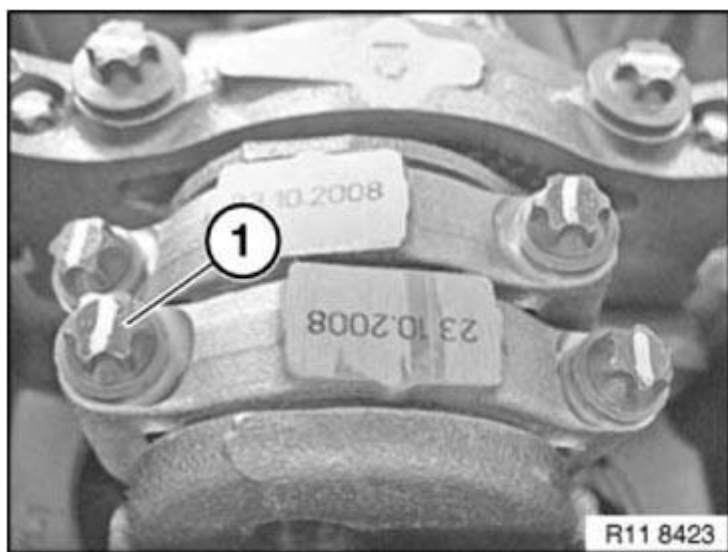


Fig. 182: Identifying Oil-Resistant Marker Stroke On Bolt Head
Courtesy of BMW OF NORTH AMERICA, INC.

Secure connecting rod bolts with special tool **00 9 120** .

Tightening torque: see 1AZ in **11 24 CONNECTING RODS AND BEARINGS**

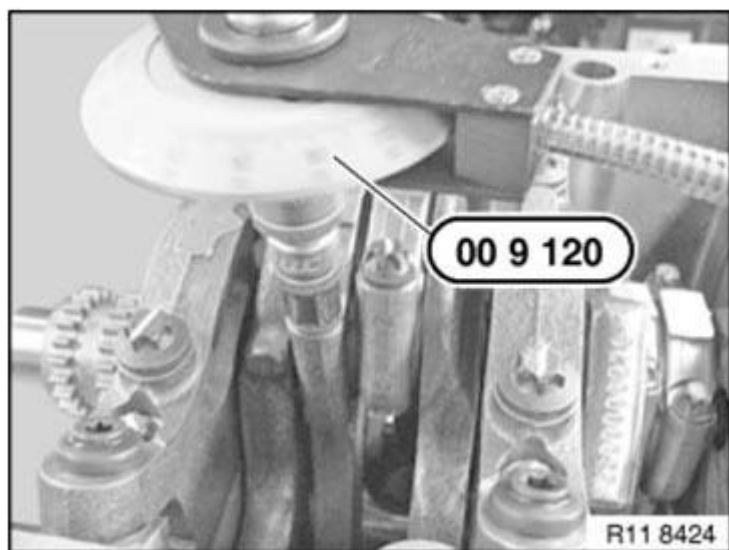


Fig. 183: Tightening Connecting Rod Bolts Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

PISTON WITH RINGS AND PIN

11 25 530 REMOVING AND INSTALLING/REPLACING ALL PISTONS (N74)

WARNING: Protective goggles must be worn when working on the gudgeon pin circlip.

IMPORTANT: If pistons and connecting rods are reused, they must be reinstalled in the same places.

Piston and piston pin are matched to each other and can only be replaced as a pair.

Conrod and conrod bearing cap are cracked.

Identification is effected by means of identical pairing letters on the connecting rod big end.

Mixing up the components will result in engine damage.

Conrod bearings must always be replaced.

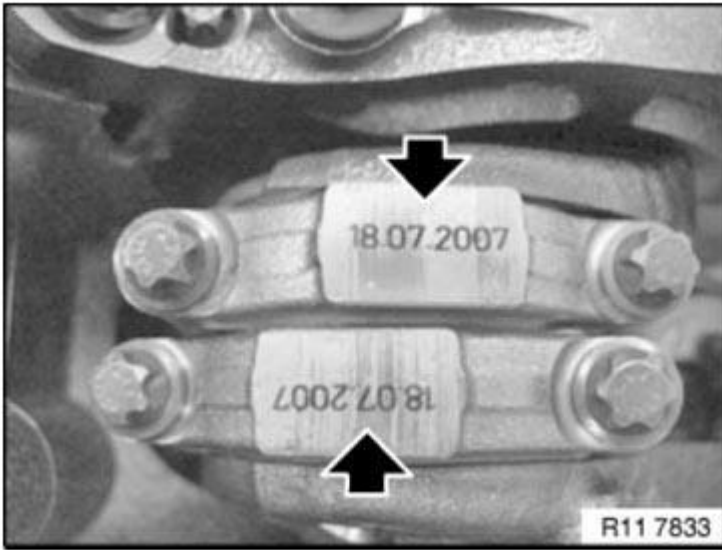


Fig. 184: Locating Stamped Dates On Connecting Rod Bearing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Remove engine
- Mount engine on assembly stand.
- Remove both cylinder heads.
- Remove oil sump.
- Remove oil pump.

Unscrew connecting rod bearing cap.

NOTE: Connecting rods and connecting rod bearing caps are denoted with the same pairing letters.

The stamped dates are always arranged in opposite directions.

Set down conrod bearing caps in order.

NOTE: To install and remove the conrods, it is essential for the crankshaft to be exactly in alignment with the cylinder bore (see dashed line in illustration).

Position crankshaft at central bolt.

Insert special tool **11 8 152** into conrod.

Screw special tool **11 5 440** into conrod with bolt (1).

Remove conrod with piston from cylinder head side.

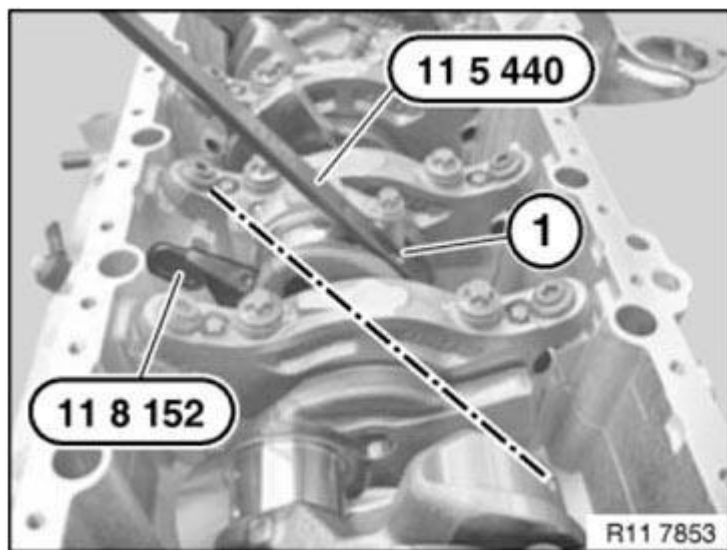


Fig. 185: Removing Conrod Using Special Tool 11 5 440 And 11 8 152
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Piston and piston bolts are paired and must not be fitted individually.

Lift out retaining ring and press out piston pin.

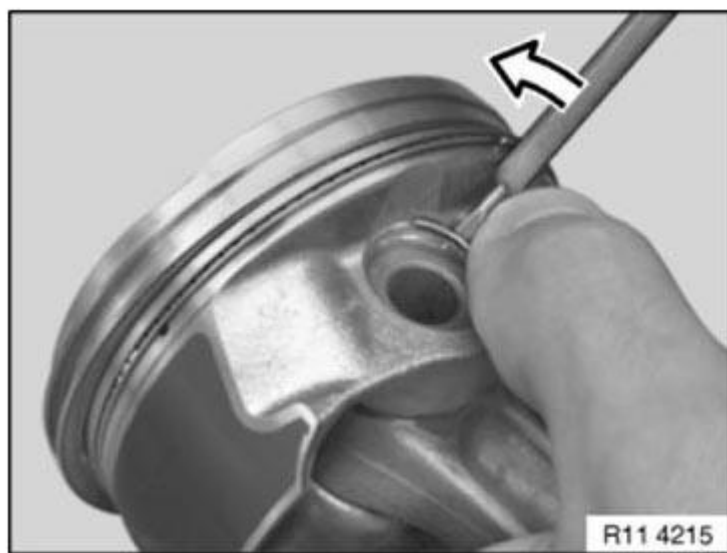


Fig. 186: Lifting Out Retaining Ring
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace connecting rods.

NOTE: The conrods can also be replaced individually.

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

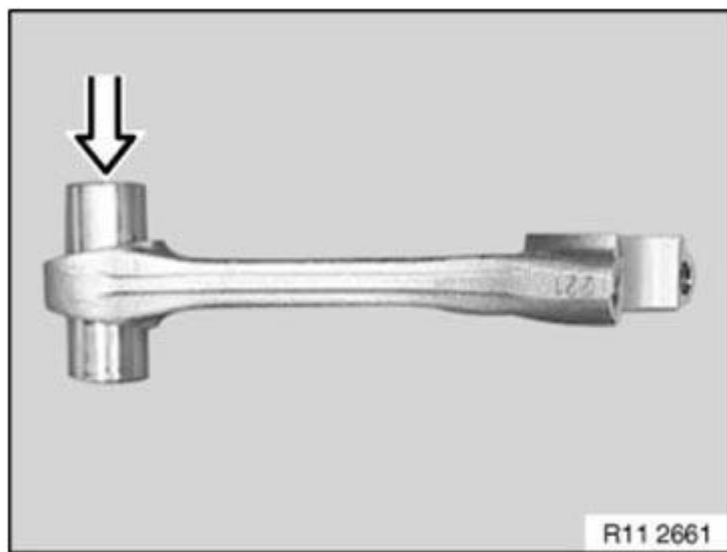


Fig. 187: Pressing Gudgeon Pin

Courtesy of BMW OF NORTH AMERICA, INC.

Prior to installation, measure piston installation clearance: Measure piston diameter with micrometer at measuring point A from lower edge of piston and offset by 90° to piston pin axis.

Measuring point A.

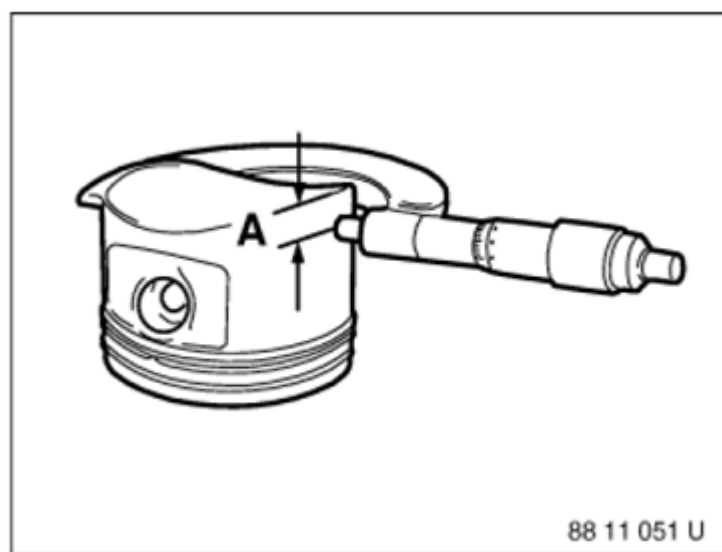


Fig. 188: Measuring Piston Diameter Using Micrometer At Measuring Point A

Courtesy of BMW OF NORTH AMERICA, INC.

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

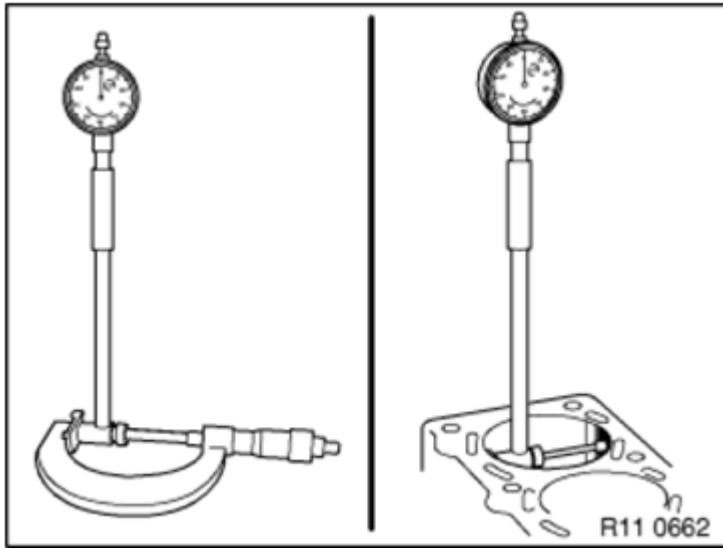


Fig. 189: Measuring Piston Installation Clearance Using Micrometer

Courtesy of BMW OF NORTH AMERICA, INC.

Diameter of cylinder bore.

Piston installation clearance.

Total permissible wear tolerance.

IMPORTANT: The conrods of cylinder banks 1 to 4 and 5 to 8 are mounted to the pistons differently.

NOTE: The pistons and connecting rods of cylinders 1 to 12 are identical.

Arrow on piston crown (cyl. 1 to 6) points upwards, screw connection on connecting rod points at an angle to right.

Arrow on piston crown (cyl. 7 to 12) points upwards, screw connection on connecting rod points at an angle to left.

NOTE: For purposes of clarity, pistons are shown removed.

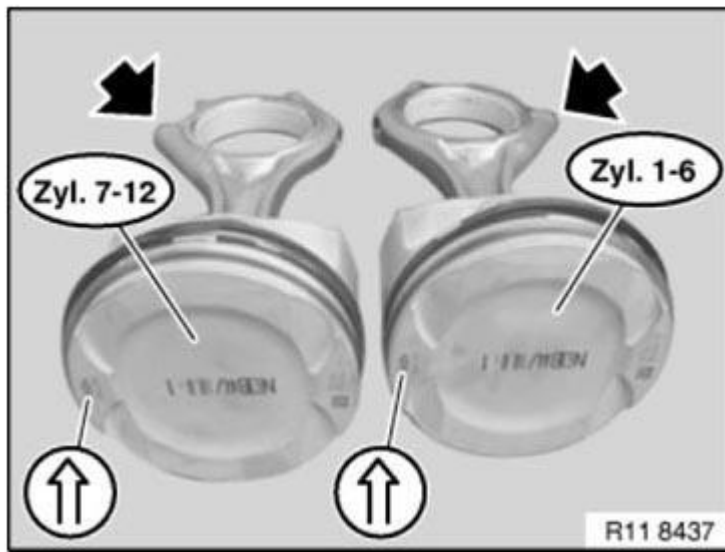


Fig. 190: Identifying Piston Crown And Connecting Rods
 Courtesy of BMW OF NORTH AMERICA, INC.

The conrods are correctly mounted on the piston when the bolt connections on the conrods are parallel to each other (see arrow in illustration).

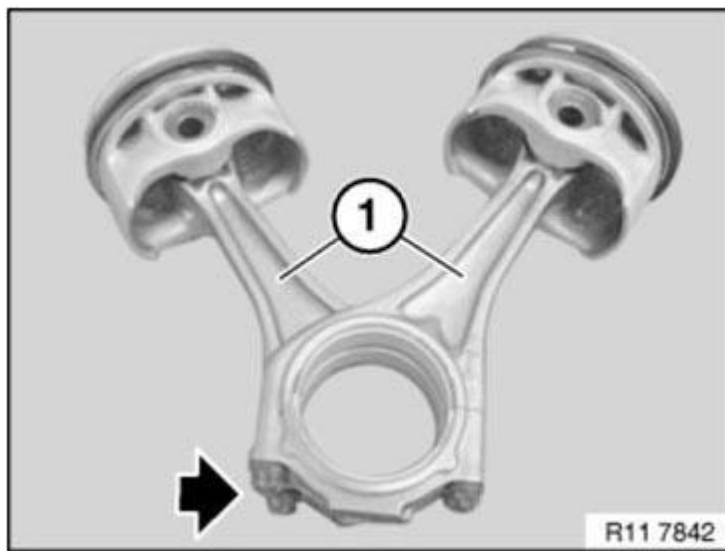


Fig. 191: Identifying Connecting Rods
 Courtesy of BMW OF NORTH AMERICA, INC.

Install retaining ring.



Fig. 192: Installing Retaining Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Piston circlip (1) is correctly installed when the opening points upwards.

See illustration.

It must still be possible for the piston pin to moved easily.

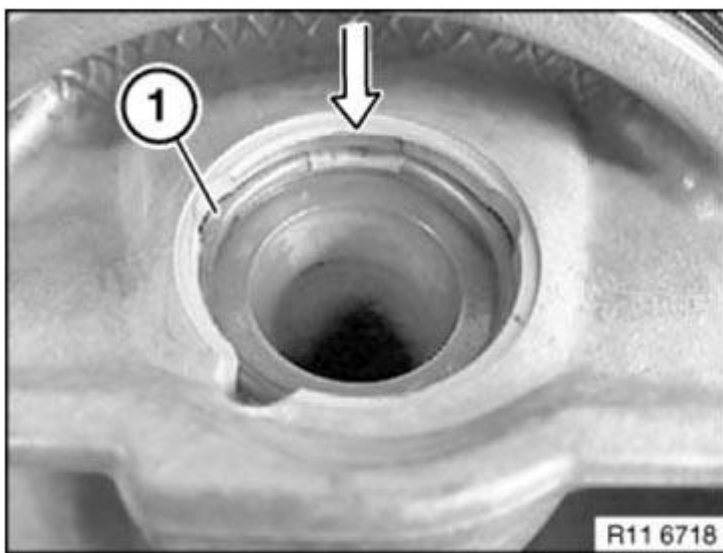


Fig. 193: Identifying Piston Circlip
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tools 11 4 440 and **11 8 152** into connecting rods.

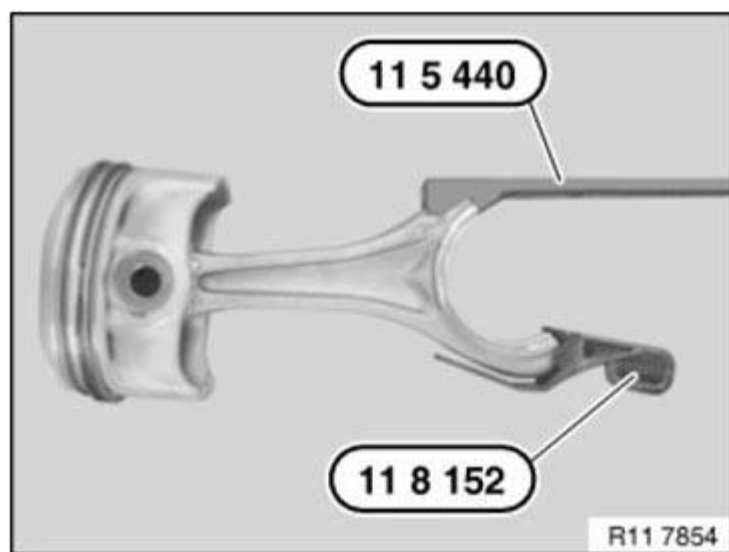


Fig. 194: Inserting Special Tools 11 4 440 And 11 8 152 Into Connecting Rods
 Courtesy of BMW OF NORTH AMERICA, INC.

Install connecting rod bearing.

Lightly coat pistons and piston rings with oil.

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

NOTE: Picture shows S85.

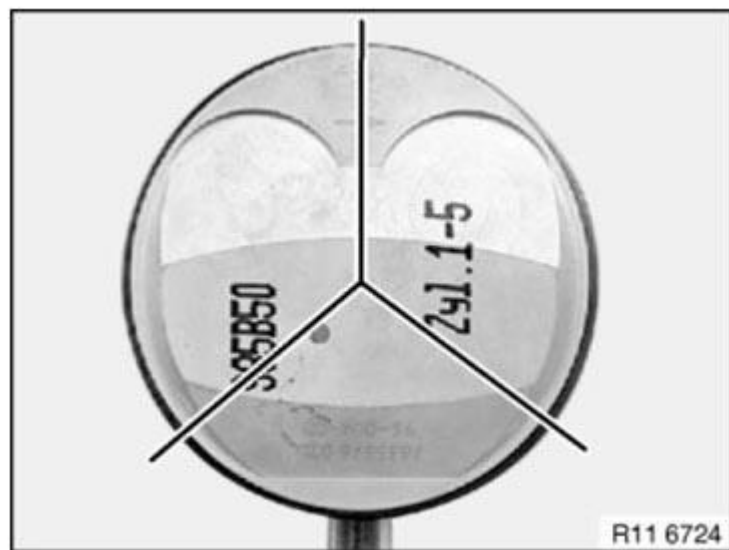


Fig. 195: Identifying Piston Rings Contact Points Offset Angle
 Courtesy of BMW OF NORTH AMERICA, INC.

Keep piston rods compressed with special tool **11 7 280** .

Install piston so that arrow points to camshaft drive.

IMPORTANT: Danger of piston ring failure.

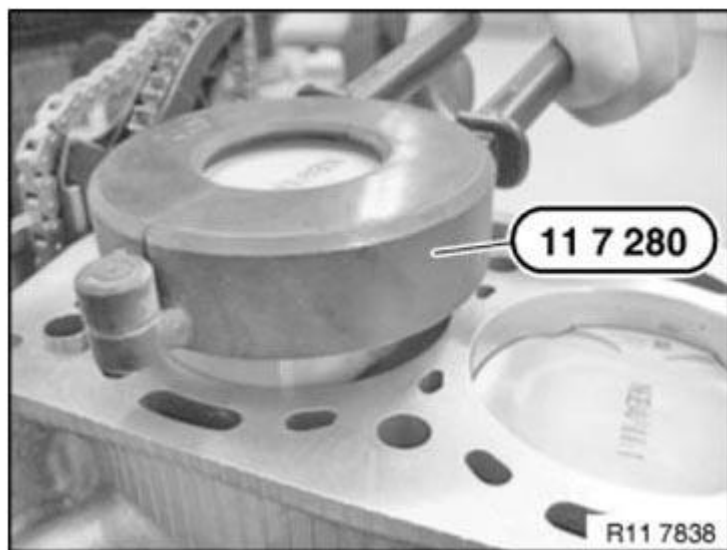


Fig. 196: Compressing Piston Rods Using Special Tool 11 7 280
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of piston ring failure.

Press in piston (1) only with finger force (do not knock in!).

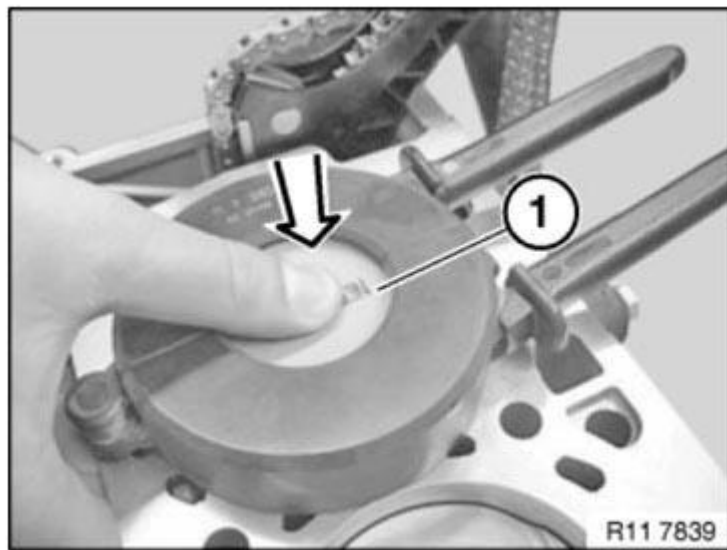


Fig. 197: Pressing Piston With Finger Force

Courtesy of BMW OF NORTH AMERICA, INC.

The direction arrow on the piston crown must point to the camshaft drive (direction of travel towards front).

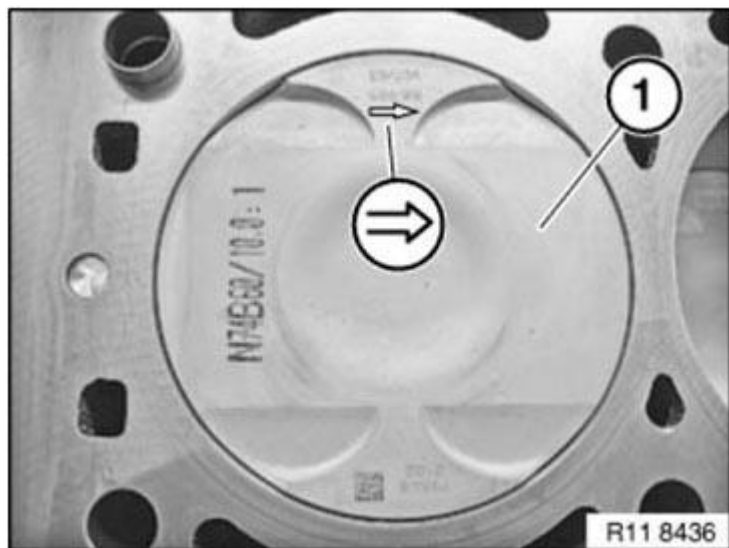


Fig. 198: Identifying Direction Arrow On Piston Crown
Courtesy of BMW OF NORTH AMERICA, INC.

Attach crankshaft journal to connecting rod. Remove special tools 11 5 440 and 11 8 152.

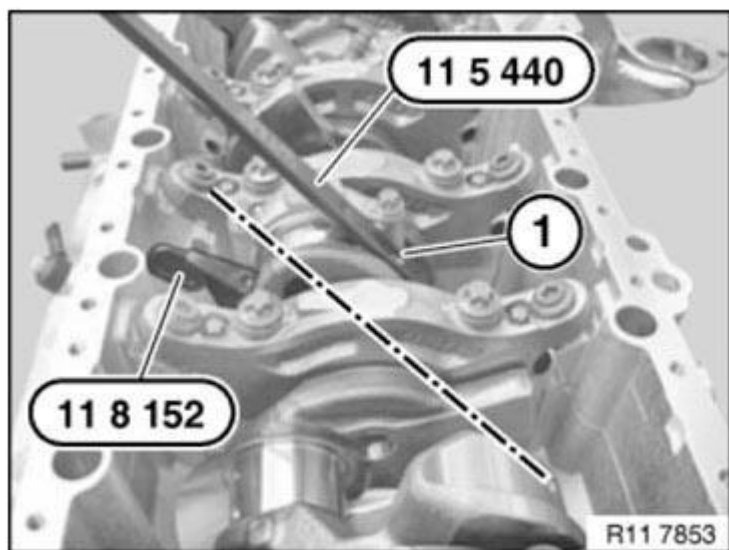


Fig. 199: Removing Special Tool 11 5 440 And 11 8 152
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purposes of clarity, the pairing letters (1) are shown on the removed conrod.

IMPORTANT: Conrods and conrod bearing caps are denoted with the same pairing letters (1), do not mix them up.

Fit bearing cap so that pairing letters match up.

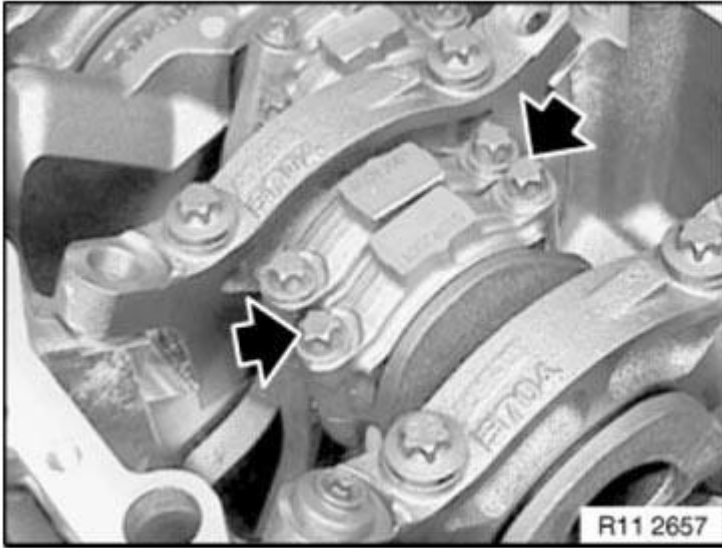


Fig. 200: Locating Conrod Bolts

Courtesy of BMW OF NORTH AMERICA, INC.

Apply light coat of oil to connecting-rod bearing shells.

Fit bearing cap so that pairing letters match up.

Install new conrod bolts.

Join connecting rod bolt (1).

Tightening torque: see 1AZ in **11 24 CONNECTING RODS AND BEARINGS**

Installation:

Check entire angle adjustment.

For better overview of screw connection quality.

After joining, use an oil-resistant marker to apply a stroke (1) on the bolt head (see illustration).

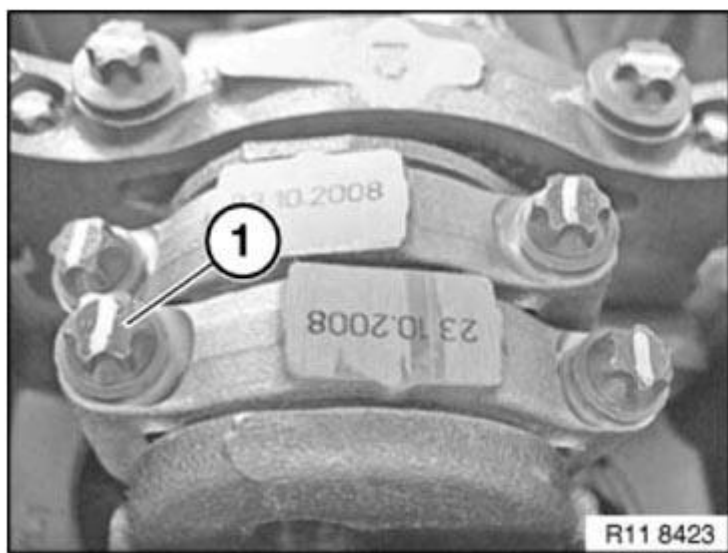


Fig. 201: Identifying Oil-Resistant Marker Stroke On Bolt Head
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten connecting rod bolts (1) with special tool **00 9 120** .

Tightening torque: see 1AZ in **11 24 CONNECTING RODS AND BEARINGS**

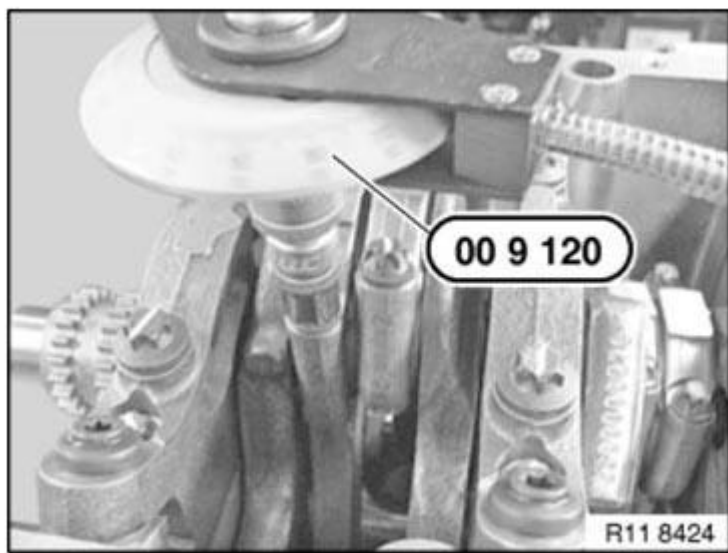


Fig. 202: Tightening Connecting Rod Bolts Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

V-RIBBED BELT WITH TENSIONER

11 28 010 REPLACE ALTERNATOR DRIVE BELT (N74)

**IMPORTANT: If contaminated with hydraulic fluid: Replace drive belt.
Belt tensioner is under high initial spring tension.**

Installation:

If the drive belt is to be reused, mark direction of travel and reinstall drive belt in same direction of rotation.

Necessary preliminary tasks:

- Remove FAN COWL

Slowly and carefully preload belt tensioner (1) with a Torx socket T60 (2) in direction of arrow up to limit position.

Secure special tool **11 0 390** in dowel hole.

Belt tensioner (1) is in installation position.

Remove drive belt (3).

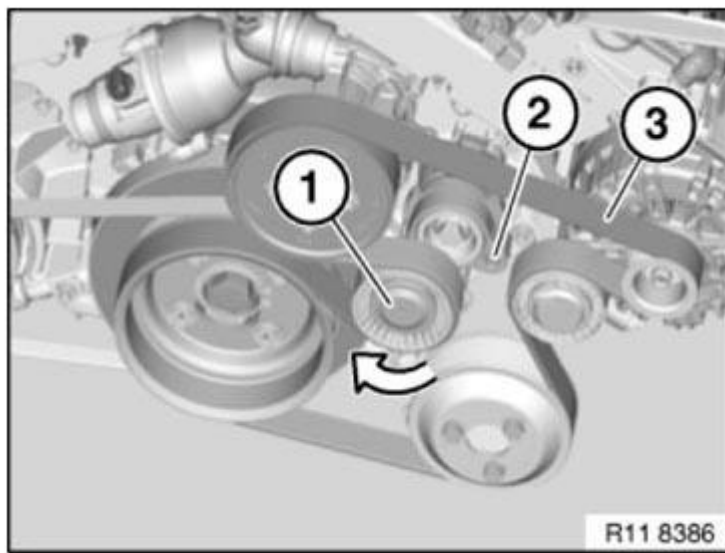


Fig. 203: Identifying Drive Belt, Belt Tensioner And Torx Socket T60
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 28 025 REPLACE TENSIONING DEVICE PULLEY FOR ALTERNATOR DRIVE BELT (N74)**Necessary preliminary tasks:**

- Remove alternator **DRIVE BELT**

Remove pulley (2) protective cap.

Release screw (3).

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

Remove idler pulley (4).

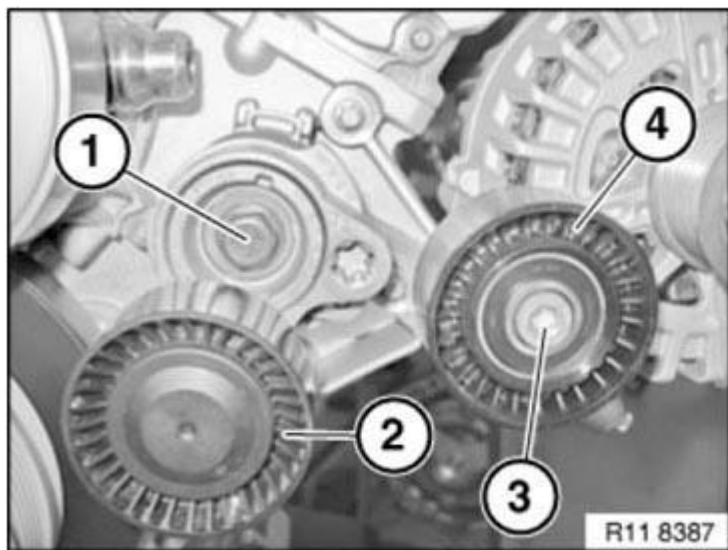


Fig. 204: Identifying Idler Pulley With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 28 050 REPLACING A/C COMPRESSOR DRIVE BELT WITH BELT TENSIONER (N74)

IMPORTANT: Risk of damage!

Release screws (1) on vibration damper only if removal position is adjusted.

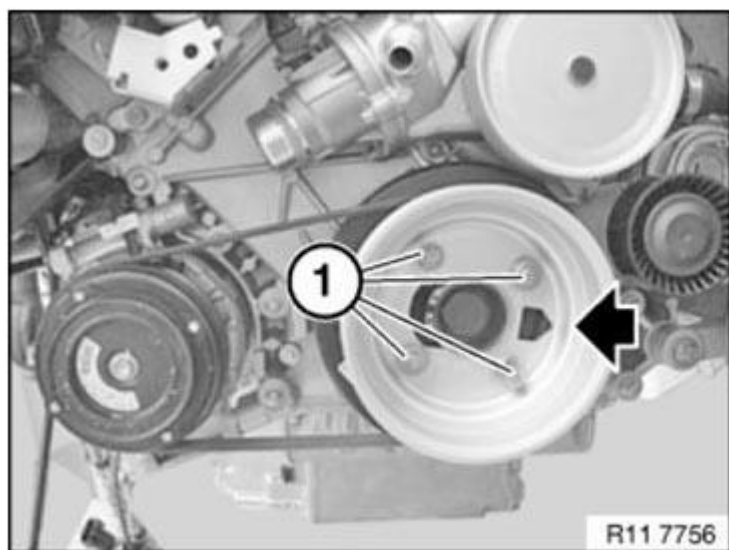


Fig. 205: Identifying Screws On Vibration Damper
Courtesy of BMW OF NORTH AMERICA, INC.

If contaminated with hydraulic fluid: **Replace** drive belt.

Crank engine at central bolt in direction of engine rotation.

Installation:

If the drive belt is to be reused, mark direction of travel and reinstall drive belt in same direction of rotation.

Necessary preliminary tasks:

- Remove alternator **DRIVE BELT**

NOTE: **Observe direction of engine rotation.**

Crank engine at central bolt until marking (see arrow in illustration) is reached on vibration damper.

Release screws (1).

Tightening torque: see 3AZ in **11 28 V-RIBBED BELT WITH TENSION AND DEFLECTION ELEMENT**

IMPORTANT: Belt pulley is pretensioned.

Belt pulley tension is relieved abruptly during the cranking process!

NOTE: **Observe direction of engine rotation.**

Crank engine at central bolt until marking (see arrow in illustration) is reached on vibration damper.

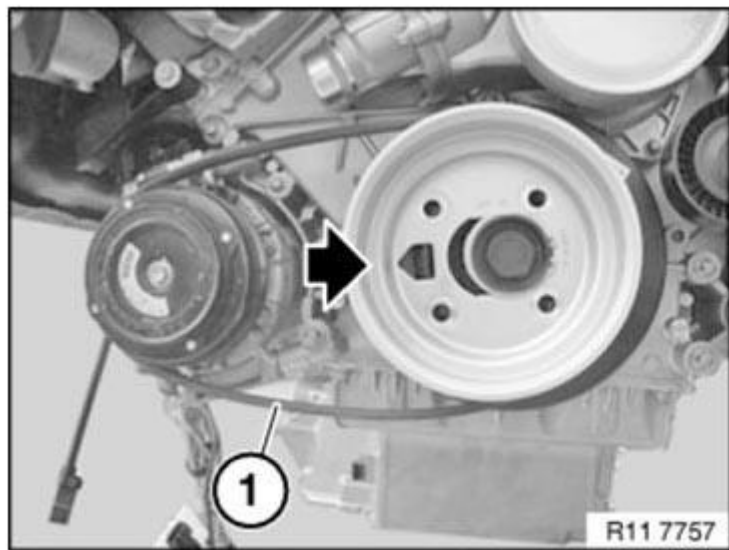


Fig. 206: Removing Elasto-Belt

Courtesy of BMW OF NORTH AMERICA, INC.

Remove elasto-belt.

Assemble engine.

11 28 020 REPLACING TENSIONING DEVICE FOR ALTERNATOR DRIVE BELT (N74)

Necessary preliminary tasks:

- Remove alternator **DRIVE BELT**

If necessary, remove special tool **11 0 390** .

Release screw (1).

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

Remove belt tensioner with idler pulley (2).

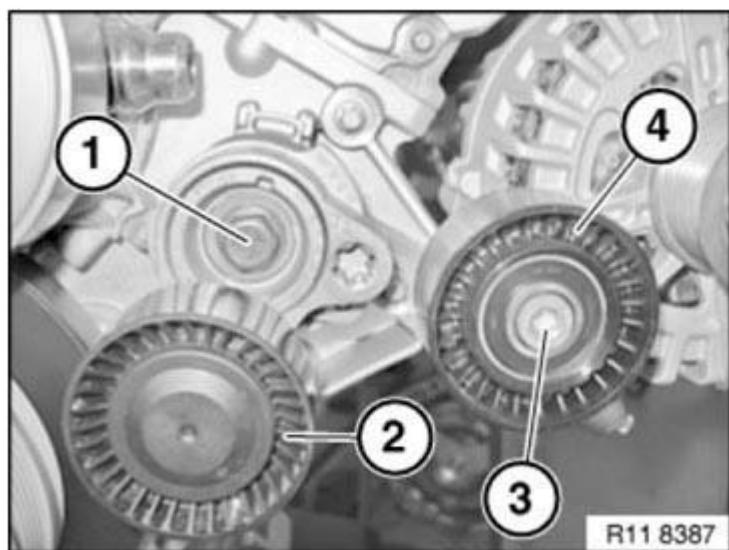


Fig. 207: Identifying Screw And Belt Tensioner With Idler Pulley
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

CAMSHAFT

11 31 573 ADJUSTING CAMSHAFT TIMING ON LEFT SIDE (N74)

IMPORTANT: Release central bolts on adjustment unit only with special tool 11 9 890 .

Risk of damage to timing drive.

If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

(cylinder bank 7 to 12)

Necessary preliminary tasks:

- Remove LEFT TIMING CASE COVER
- CHECK CAMSHAFT TIMING ON LEFT SIDE

Get special tool 11 9 890 ready for securing camshafts.

NOTE: Special tool 11 9 891 Knurled screw.

Special tool 11 9 892 Press-down bar.

Special tool 11 9 893 Gap gauge for inlet and exhaust camshafts.

Special tool 11 9 895 spacer.

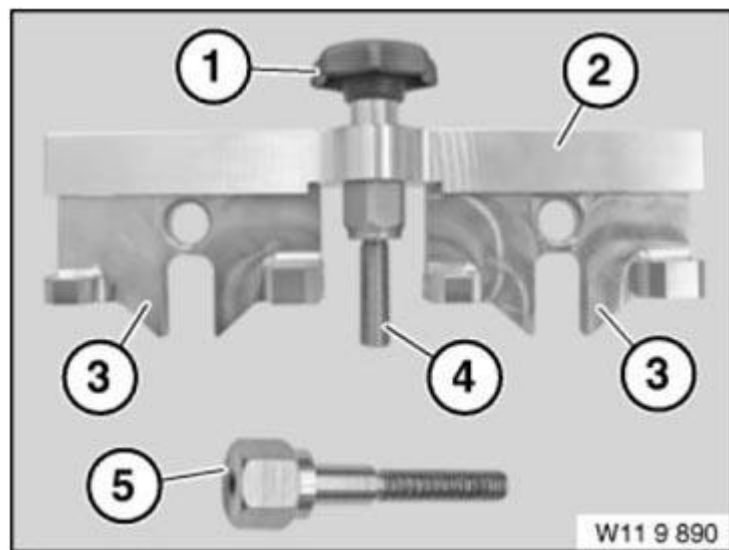


Fig. 208: Identifying Special Tools (11 9 890, 11 9 891, 11 9 892, 11 9 893, 11 9 895)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

Release central bolts (1 and 2) of inlet and exhaust adjustment units.

Installation:

Replace central bolts after releasing.

Illustrations show cylinders 1 to 6.

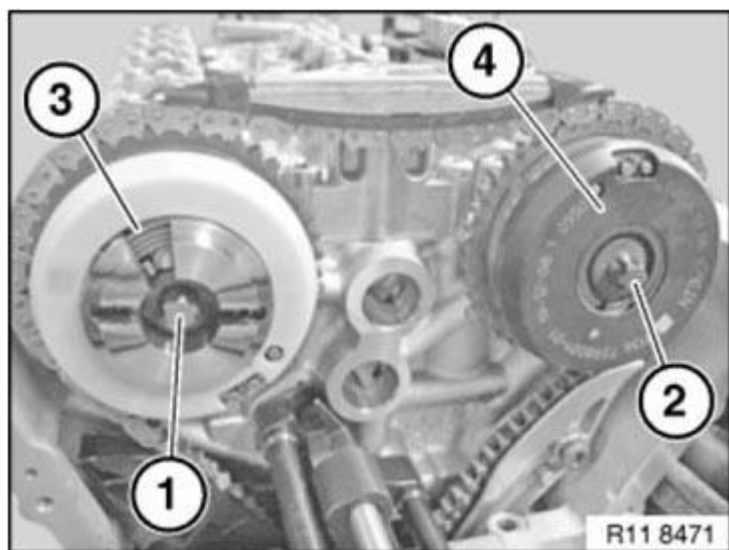


Fig. 209: Identifying Inlet And Exhaust Adjustment Units Central Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat contact face of new central bolt (1) with copper paste.

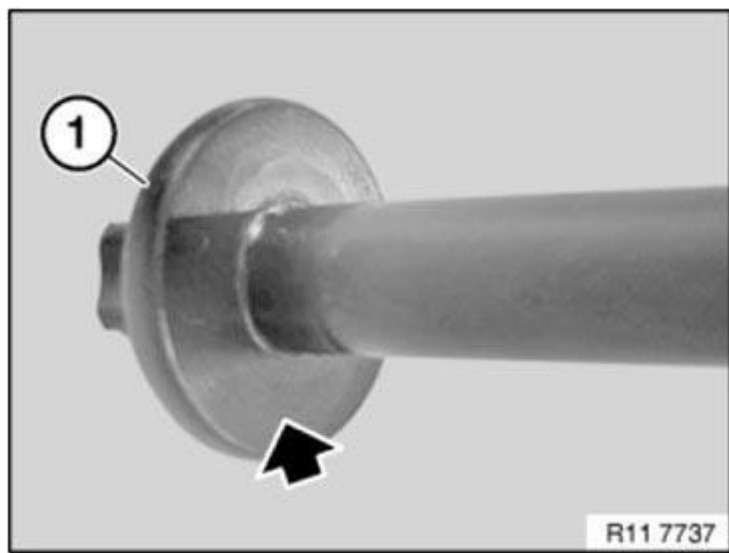


Fig. 210: Locating Central Bolt Coating Contact Face
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Solenoid valves for VANOS adjustment units must be removed.

Screw special tool 11 9 895 into cylinder head.

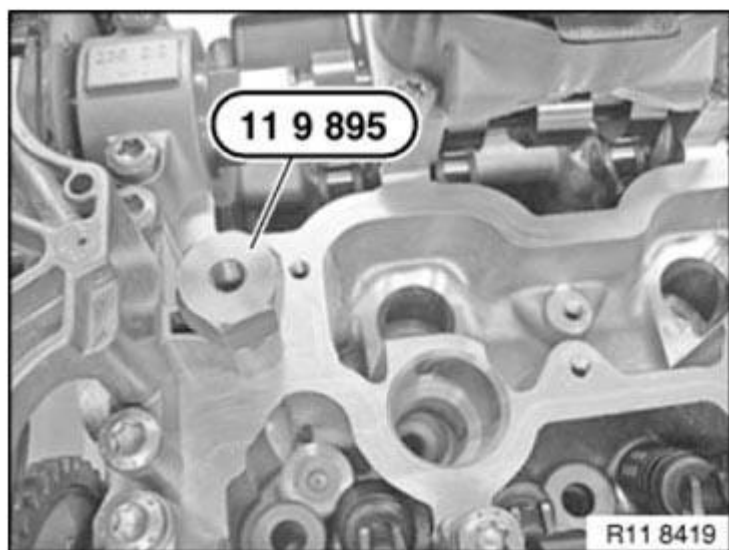


Fig. 211: Screwing Special Tool 11 9 895 Into Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 893 on inlet and exhaust camshafts.

The special tool 11 9 893 must rest **without a gap** on cylinder head; if necessary, adjust camshaft at hexagon heads.

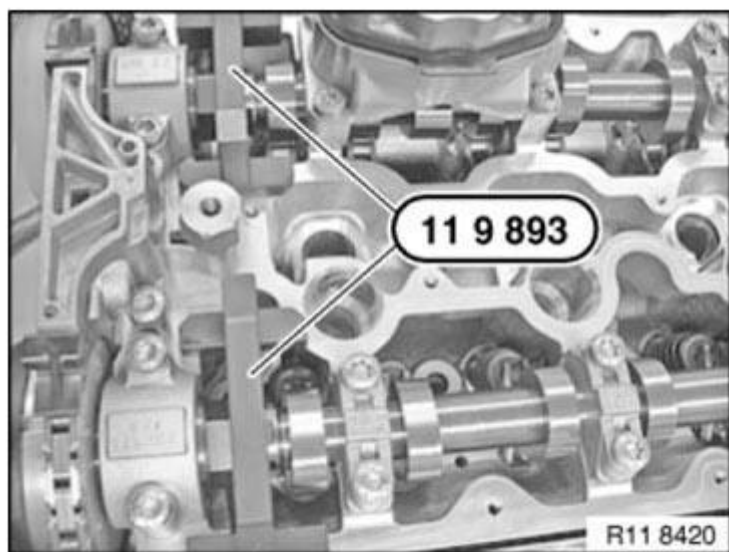


Fig. 212: Positioning Special Tool 11 9 893 On Inlet And Exhaust Camshafts
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 892 on special tool 11 9 893.

Both special tools 11 9 891 are secured with special tool 11 9 893.

NOTE: Tighten down special tool 11 9 891 by hand.

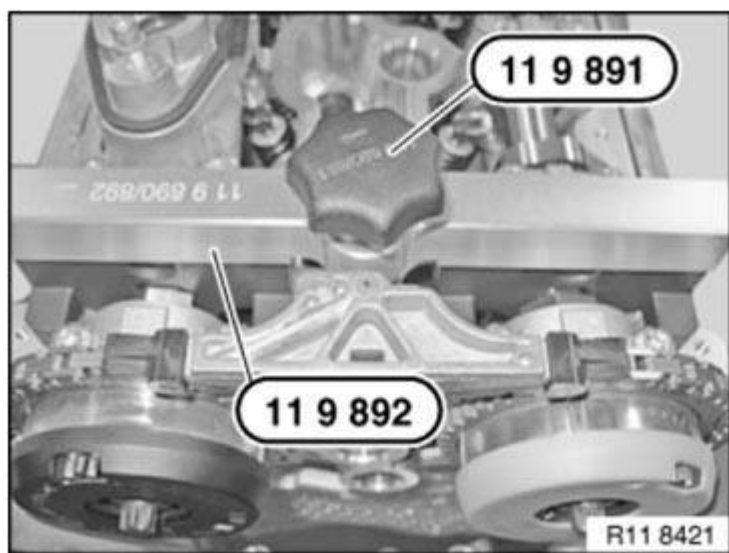


Fig. 213: Identifying Special Tools (11 9 891, 11 9 892)
Courtesy of BMW OF NORTH AMERICA, INC.

Join central bolt (1) of intake adjustment unit (2).

Tightening torque: see 1AZ in 11 36 VARIABLE CAMSHAFT CONTROL

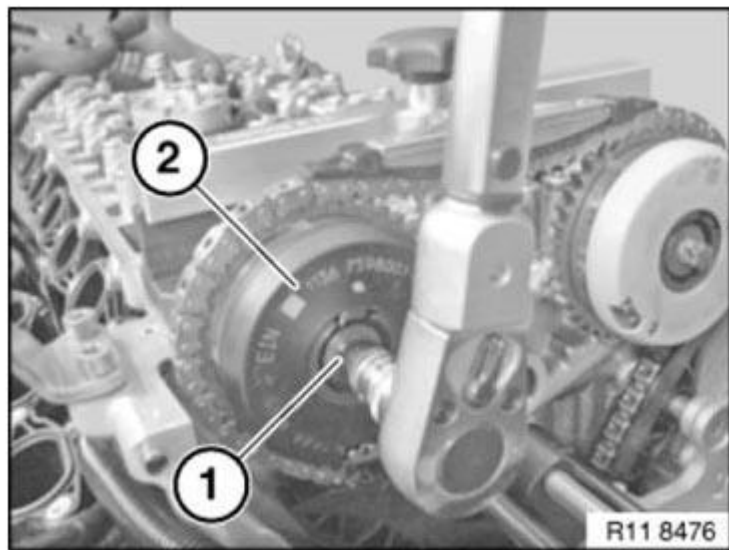


Fig. 214: Tightening Central Bolt Of Intake Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Join central bolt (1) of exhaust adjustment unit (2).

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

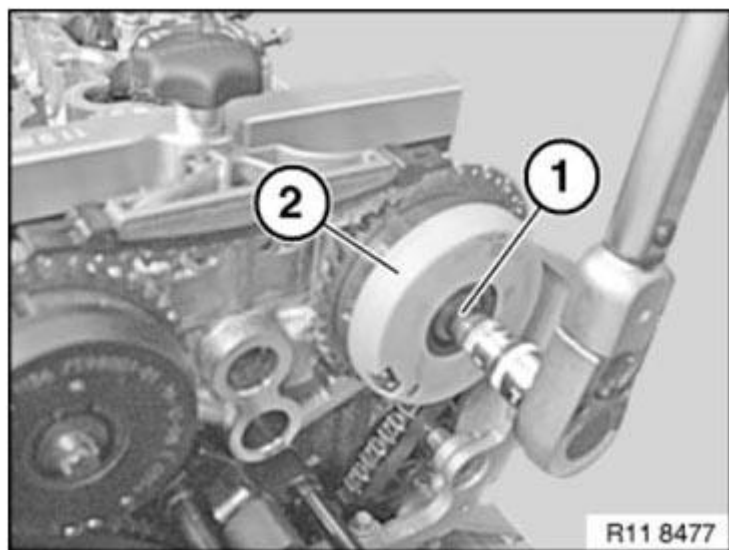


Fig. 215: Tightening Central Bolt Of Exhaust Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of intake adjustment unit (2) with special tool **00 9 120** .

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

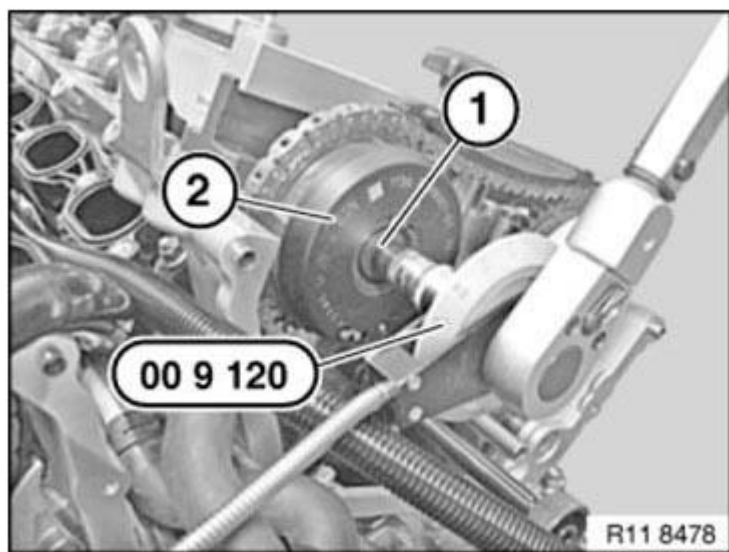


Fig. 216: Securing Intake Adjustment Unit Central Bolt Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of exhaust adjustment unit (2) with special tool **00 9 120** .

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

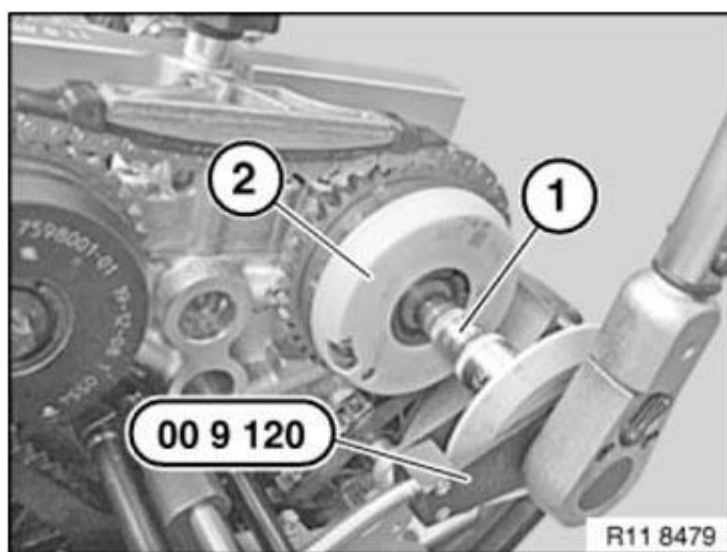


Fig. 217: Securing Exhaust Adjustment Unit Central Bolt Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 890 .

Remove special tools 11 9 190 and 11 8 570 .

Crank engine at central bolt twice in direction of engine rotation until engine returns to **TDC firing position for cylinder 1** .

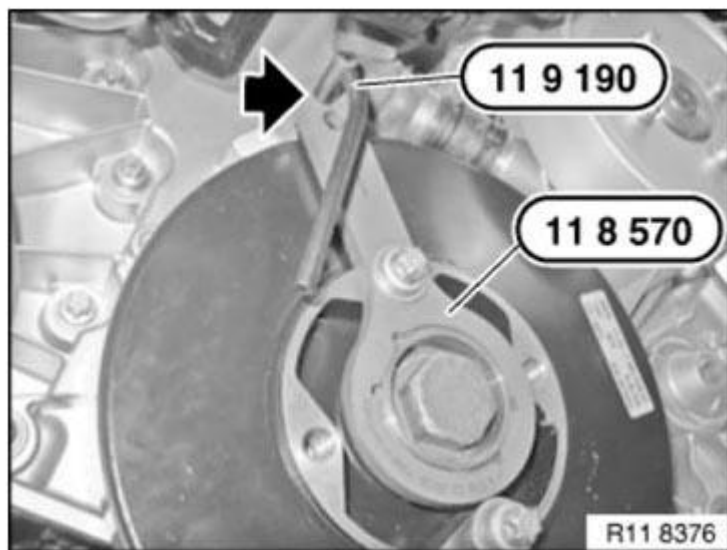


Fig. 218: Identifying Special Tools 11 9 190 And 11 8 570
Courtesy of BMW OF NORTH AMERICA, INC.

Secure vibration damper with special tool 11 9 190 at **TDC firing position for cylinder 1** .

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

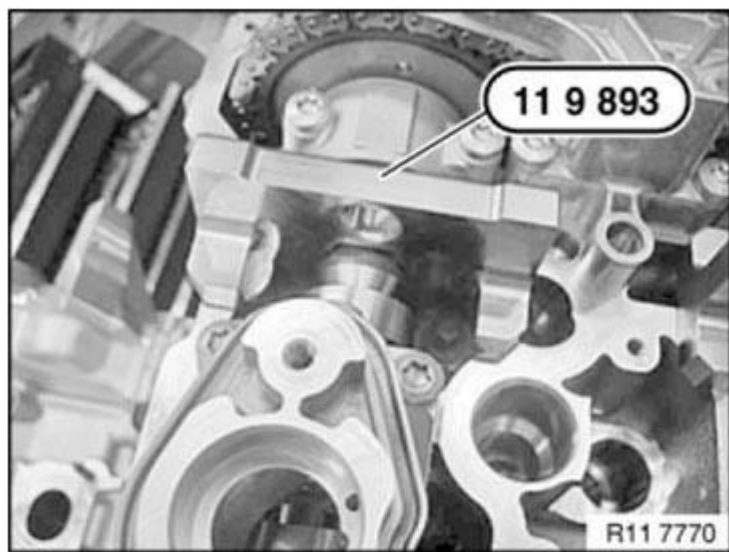


Fig. 219: Fitting Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

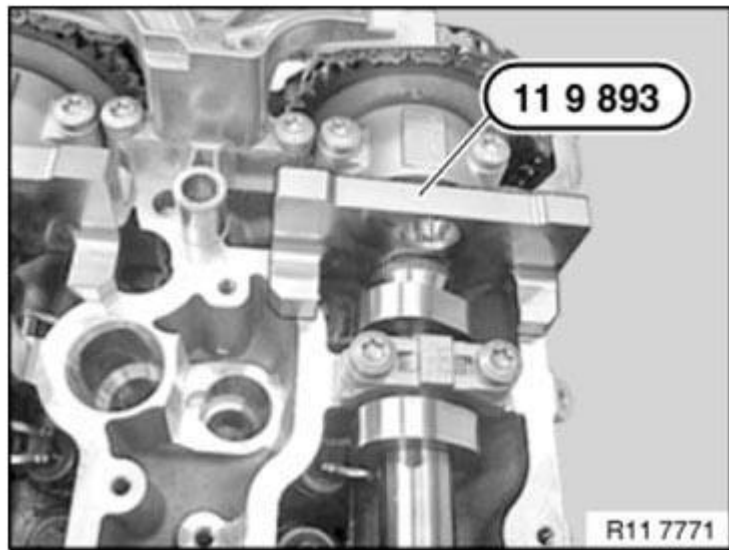


Fig. 220: Fitting Special Tool 11 9 893 On Intake Camshaft

Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

11 31 574 ADJUSTING CAMSHAFT TIMING ON RIGHT SIDE (N74)

IMPORTANT: Release central bolts on adjustment unit only with special tool 11 9 890 .

Risk of damage to timing drive.

If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

(cylinder bank 1 to 6)

Necessary preliminary tasks:

- Remove RIGHT TIMING CASE COVER
- CHECK CAMSHAFT TIMING ON RIGHT SIDE.

Get special tool 11 9 890 ready for securing camshafts.

NOTE: Special tool 11 9 891 Knurled screw.

Special tool 11 9 892 Press-down bar.

Special tool 11 9 893 Gap gauge for inlet and exhaust camshafts.

Special tool 11 9 895 spacer.

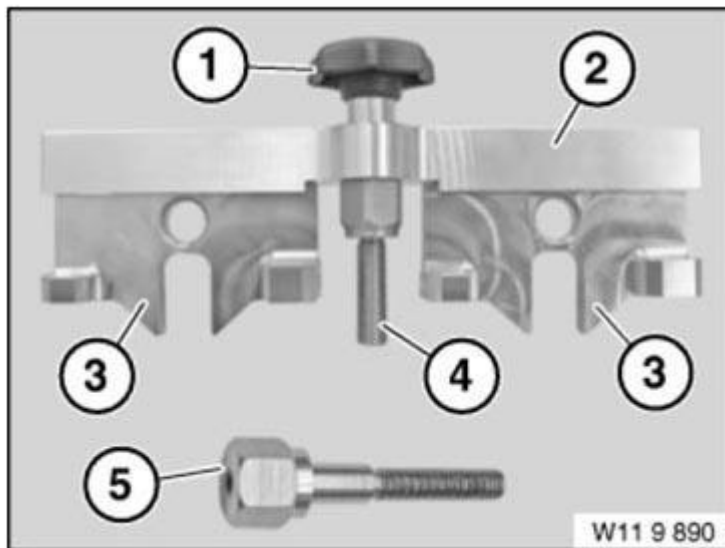


Fig. 221: Identifying Special Tools (11 9 890, 11 9 891, 11 9 892, 11 9 893, 11 9 895)

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshaft.

Release central bolts (1 and 2) of inlet and exhaust camshaft adjusters.

Installation:

Replace central bolts after releasing.

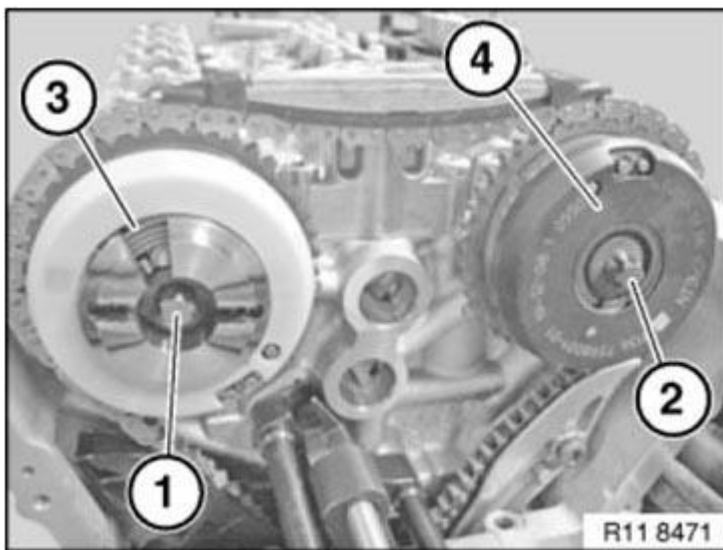


Fig. 222: Identifying Inlet And Exhaust Adjustment Units Central Bolts

Courtesy of BMW OF NORTH AMERICA, INC.

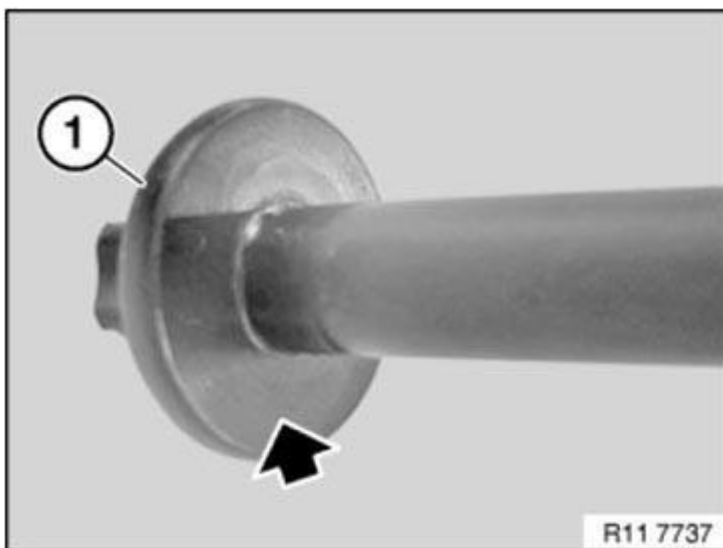


Fig. 223: Locating Central Bolt Coating Contact Face
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat contact face of new central bolt (1) with copper paste.

IMPORTANT: SOLENOID VALVES for Vanos units must be removed.

Screw special tool **11 9 895** into cylinder head.

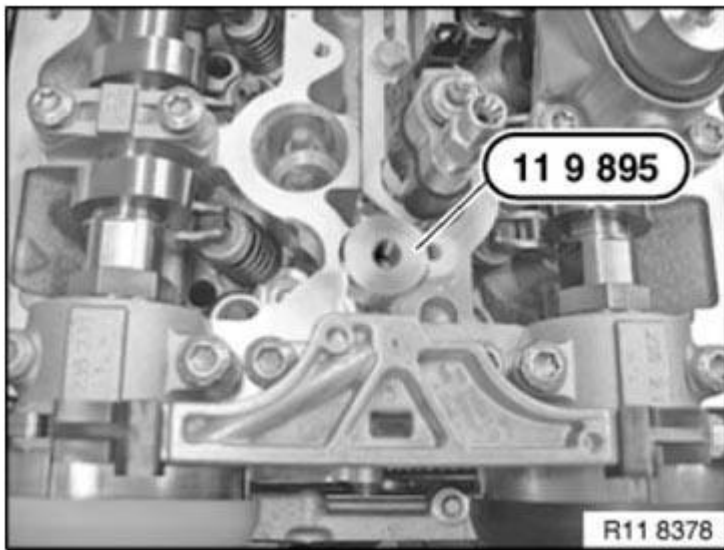


Fig. 224: Screwing Special Tool 11 9 895 Into Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 893 at the angle between the inlet and exhaust cam shafts.

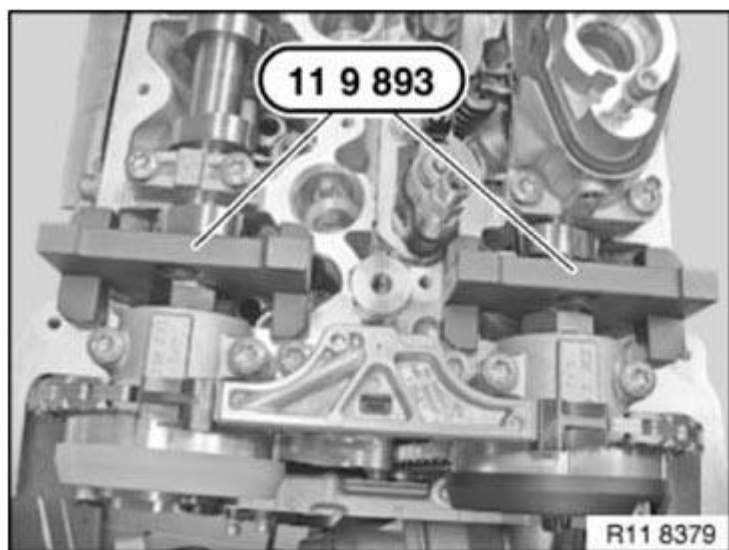


Fig. 225: Positioning Special Tool 11 9 893 At Angle Between Inlet And Exhaust Cam Shafts
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 892 on special tool 11 9 893.

Both special tools 11 9 891 are secured with special tool 11 9 893.

NOTE: Tighten down special tool 11 9 891 by hand.

Connect inlet camshaft adjuster (2) central screw (1).

Tightening torque: see 1AZ in 11 36 VARIABLE CAMSHAFT CONTROL

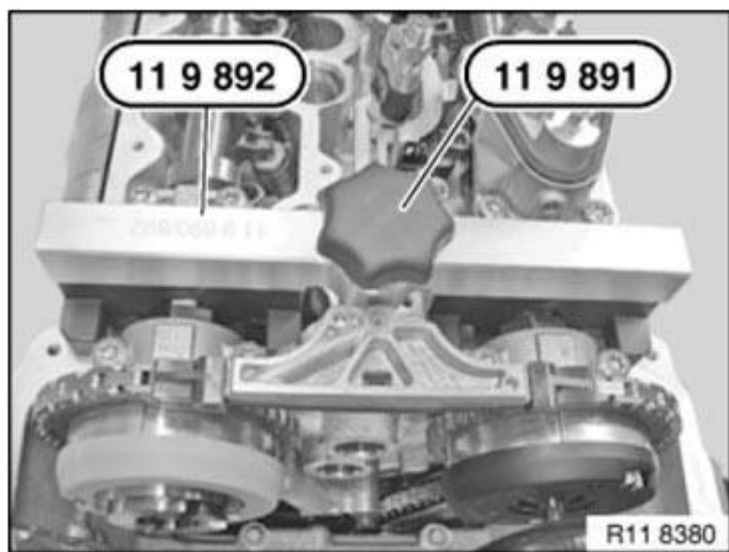


Fig. 226: Identifying Special Tool 11 9 891 And Special Tool 11 9 893

Courtesy of BMW OF NORTH AMERICA, INC.

Connect exhaust camshaft adjuster (2) central screw (1).

Tightening torque: see 1AZ in 11 36 VARIABLE CAMSHAFT CONTROL

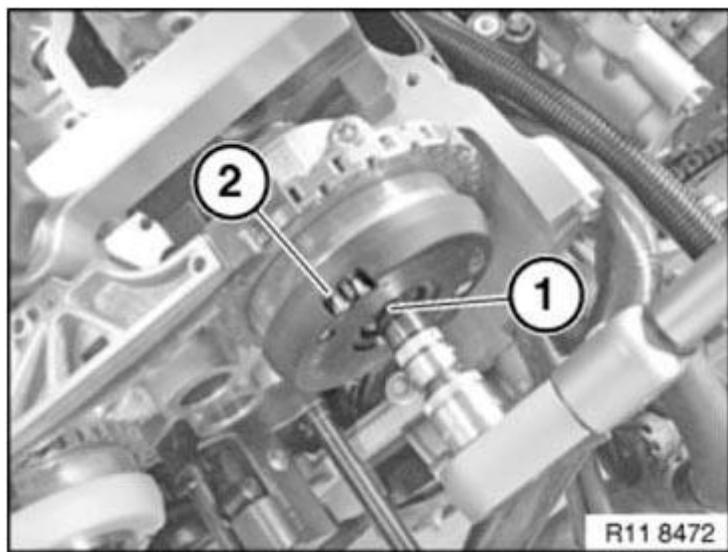


Fig. 227: Tightening Inlet Camshaft Adjuster Central Screw
Courtesy of BMW OF NORTH AMERICA, INC.

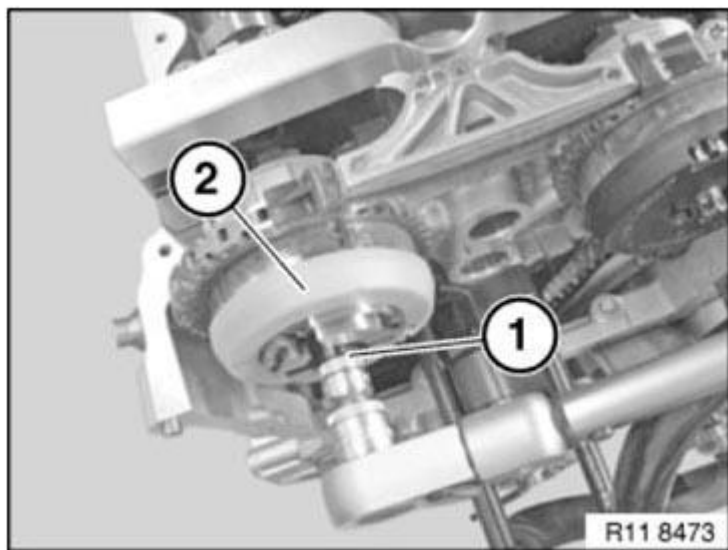


Fig. 228: Tightening Exhaust Camshaft Adjuster Central Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of exhaust camshaft adjuster (2) with special tool 00 9 120 .

Tightening torque: see 1AZ in 11 36 VARIABLE CAMSHAFT CONTROL

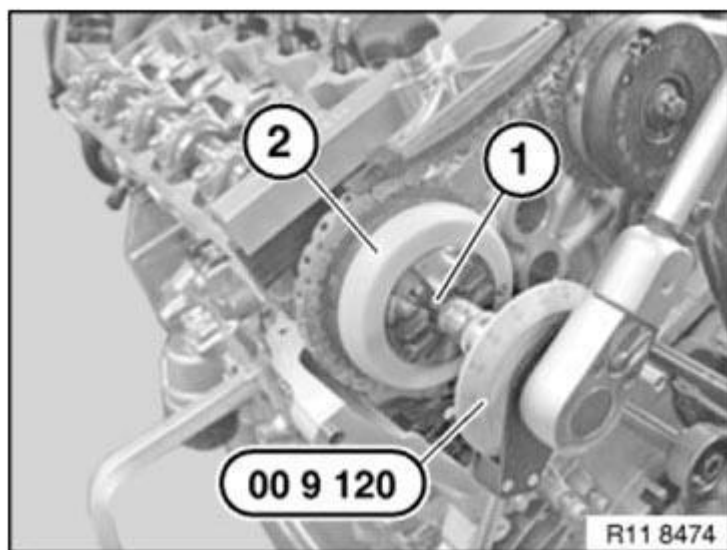


Fig. 229: Tightening Central Bolt Of Exhaust Camshaft Adjuster With Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of inlet camshaft adjuster (2) with special tool 00 9 120 .

Tightening torque: see 1AZ in 11 36 VARIABLE CAMSHAFT CONTROL

Remove special tool 11 9 890 .

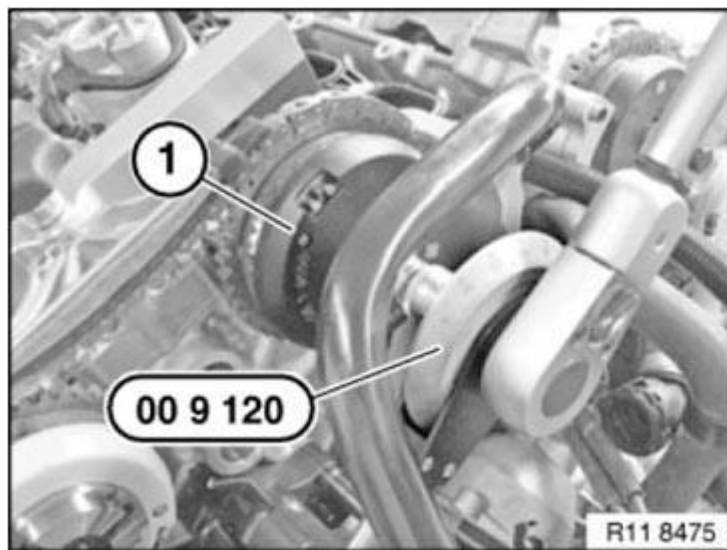


Fig. 230: Securing Central Bolt Of Inlet Camshaft Adjuster With Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tools 11 9 190 and 11 8 570 .

Crank engine at central bolt twice in direction of engine rotation until engine returns to **cylinder no. 1 TDC**

firing position .

Secure vibration damper with special tool **11 9 190** in the **firing TDC position of cylinder 1** .

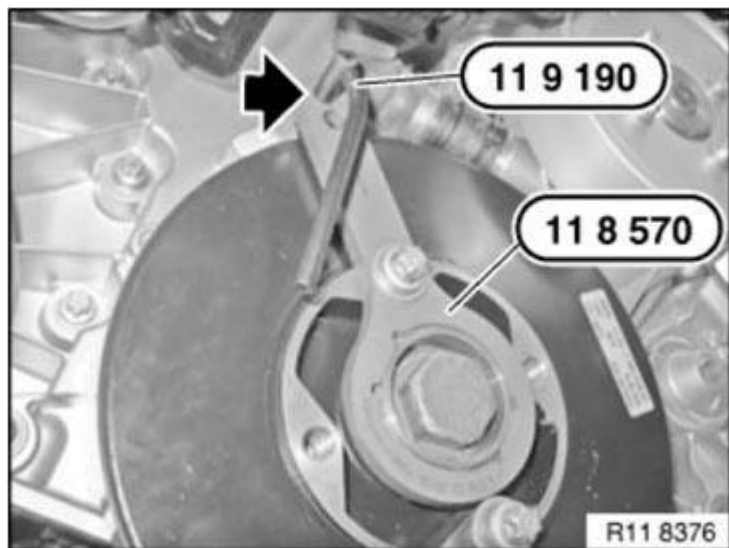


Fig. 231: Identifying Special Tools 11 9 190 And 11 8 570
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

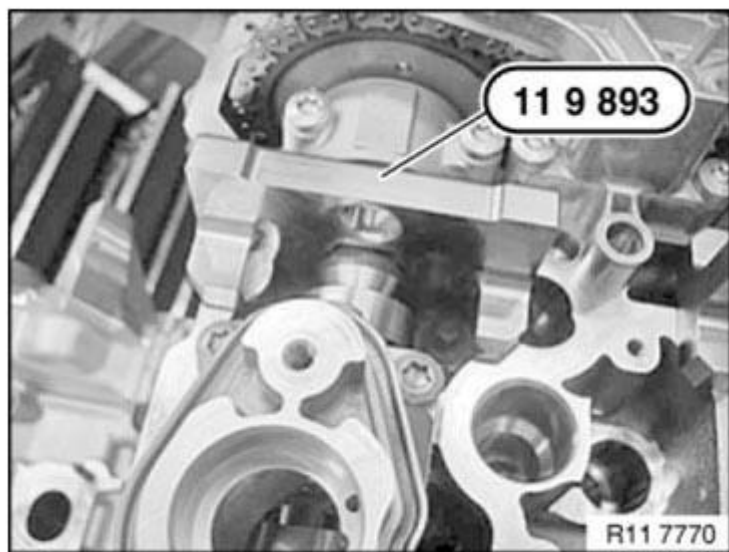


Fig. 232: Fitting Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on exhaust camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

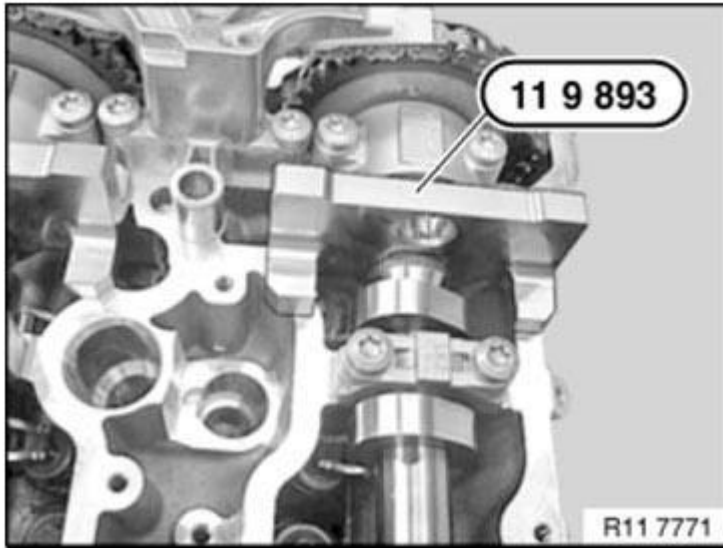


Fig. 233: Fitting Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

11 31 070 CHECKING CAMSHAFT TIMING ON LEFT SIDE (N74)

IMPORTANT: The timing can only be checked with special tool 11 9 900 .
The timing may be misinterpreted if it is checked without special tool 11 9 900 .

Cylinders 7 - 12

Necessary preliminary tasks:

- Remove left CYLINDER HEAD COVER
- Remove FAN COWL with electric fan
- Remove BELT PULLEY for air conditioning system
- Remove left CHAIN TENSIONER

Mount special tool 11 9 900 at position of chain tensioner.

Preload hexagon socket screw with special tool 00 9 250 to **0.6 Nm** .

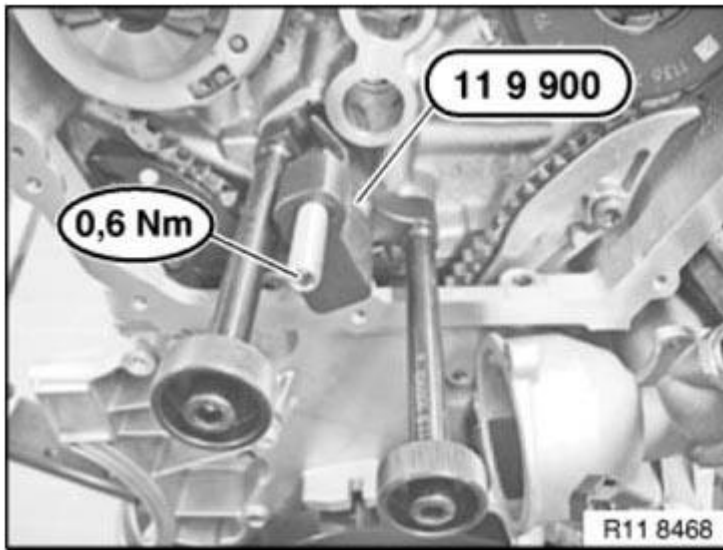


Fig. 234: Mounting Special Tool 11 9 900 At Position Of Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When the engine is shut down, the inlet and exhaust camshaft adjuster is normally locked in its initial position.

The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the adjuster.

In order to avoid incorrect timing adjustment, it is essential to check the locking of the adjuster and if necessary perform locking by rotating the camshafts.

Checking locking of inlet and exhaust adjustment units in initial position:

Gripping hexagon head (2) of camshafts with a fork wrench (1), carefully try to rotate camshafts against direction of rotation.

The inlet and exhaust adjustment units are locked in the initial position when the camshafts are non-positively connected to the adjustment units.

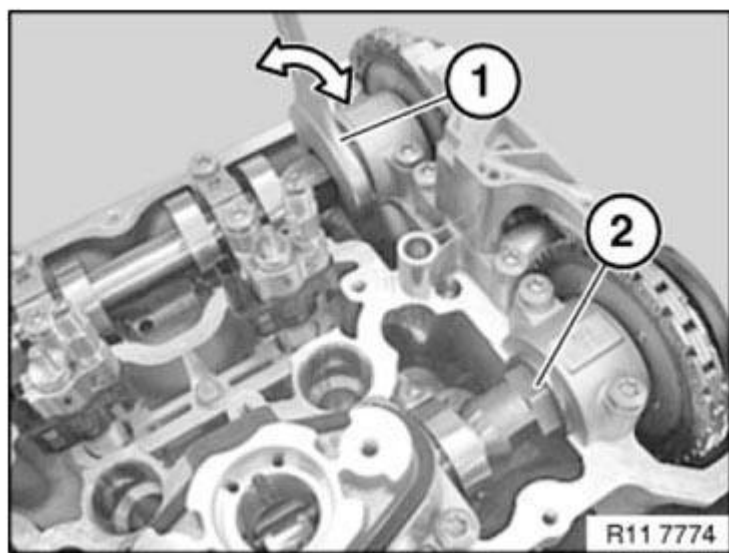


Fig. 235: Rotating Camshafts Using Fork Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If the inlet or exhaust camshaft adjuster of the camshafts "can not" be locked as described, the adjuster is faulty and must be replaced.

NOTE: If the camshafts are at the TDC firing position for cylinder 1, the labelling on the exhaust camshaft (1 and 2) can be read from above.

A = exhaust camshaft.

712 = cylinder 7 to 12.

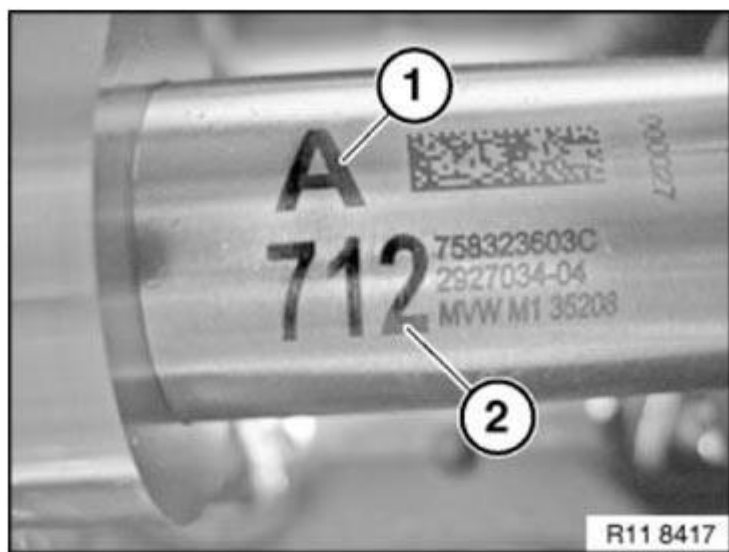


Fig. 236: Identifying Exhaust Camshaft Labelling

Courtesy of BMW OF NORTH AMERICA, INC.

With 1st cylinder in firing TDC position, cams of exhaust camshaft (1) of the 1st cylinder point inward at an angle (see arrow in illustration).

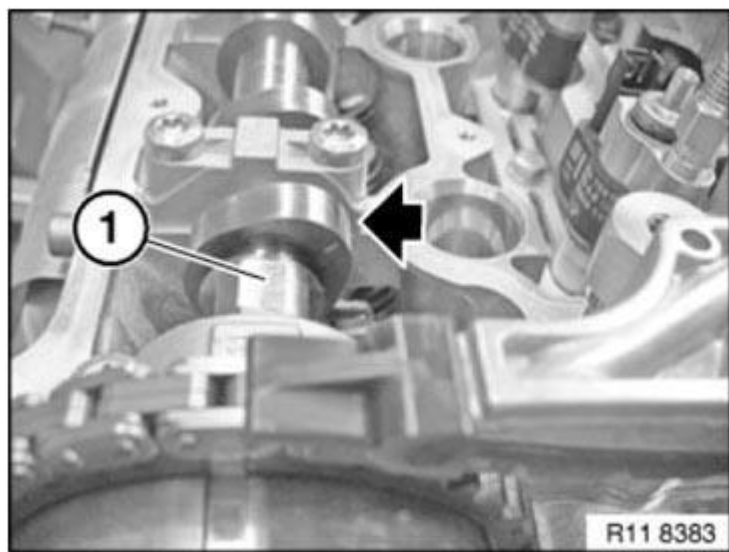


Fig. 237: Identifying Cams Of Exhaust Camshaft Of 1st Cylinder Point Inward At An Angle
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the camshafts are at the TDC firing position for cylinder 1, the labelling on the intake camshaft (1 and 2) can be read from above.

E= intake camshaft.

712 = cylinder 7 to 12.

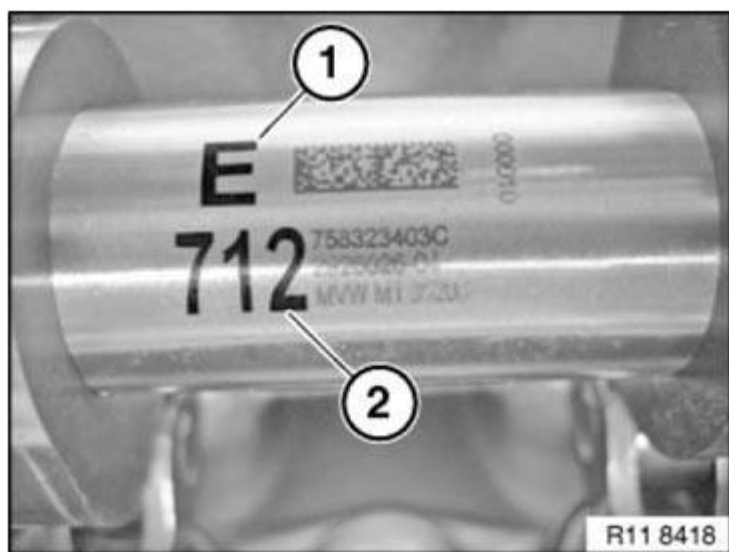


Fig. 238: Identifying Intake Camshaft Labelling
Courtesy of BMW OF NORTH AMERICA, INC.

With 1st cylinder in firing TDC position, cams of intake camshaft (1) of the 1st cylinder point inward at an angle (see arrow in illustration).

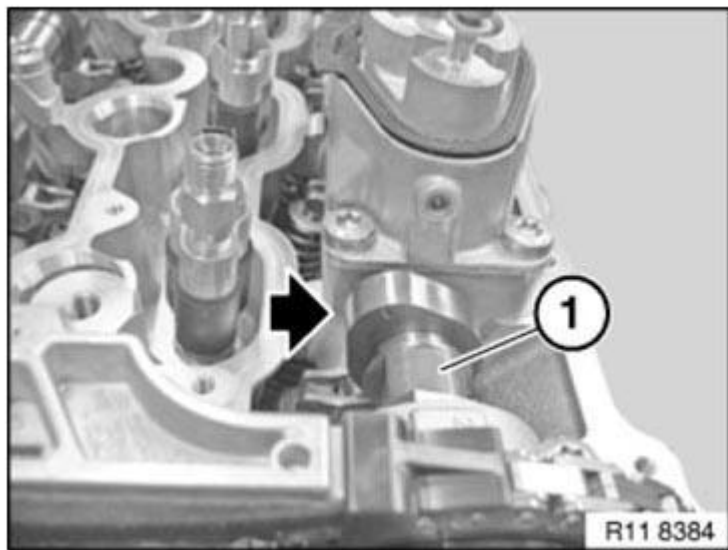


Fig. 239: Identifying Cams Of Intake Camshaft Of 1st Cylinder Point Inward At An Angle
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Lay auxiliary water pump holder to one side.

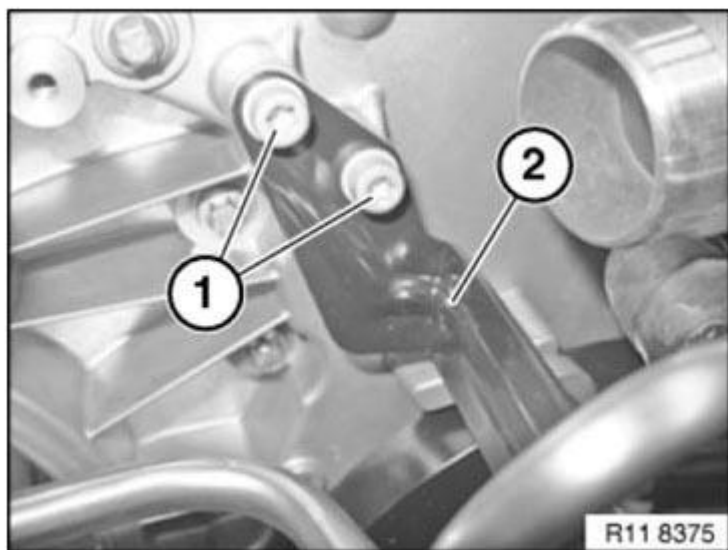


Fig. 240: Identifying Auxiliary Water Pump Holder With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **11 8 570** with the mounting flats on the vibration damper at the TDC mark.

Secure special tool **11 8 570** with a screw (1).

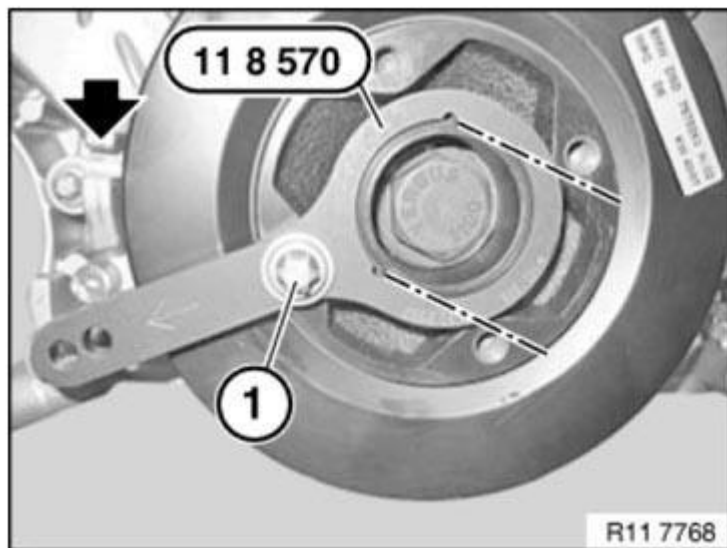


Fig. 241: Securing Special Tool 11 8 570 With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine at the central bolt in direction of engine rotation.

Use special tools **11 8 570** and **11 9 190** to insert the vibration damper in the upper bore hole.

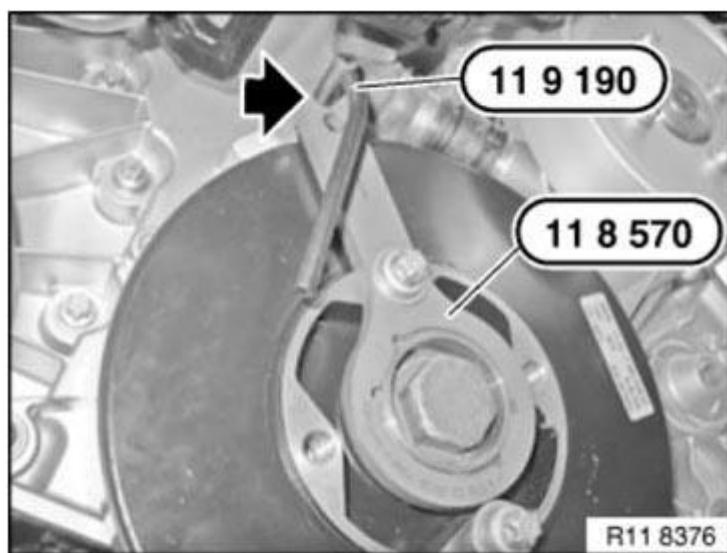


Fig. 242: Identifying Special Tools 11 9 190 And 11 8 570
Courtesy of BMW OF NORTH AMERICA, INC.

The crankshaft is correctly positioned when the special tool **11 8 570** is locked with **11 9 190** in the groove (see

arrow in illustration).

The crankshaft is locked in the **Cylinder 1 firing TDC position** .

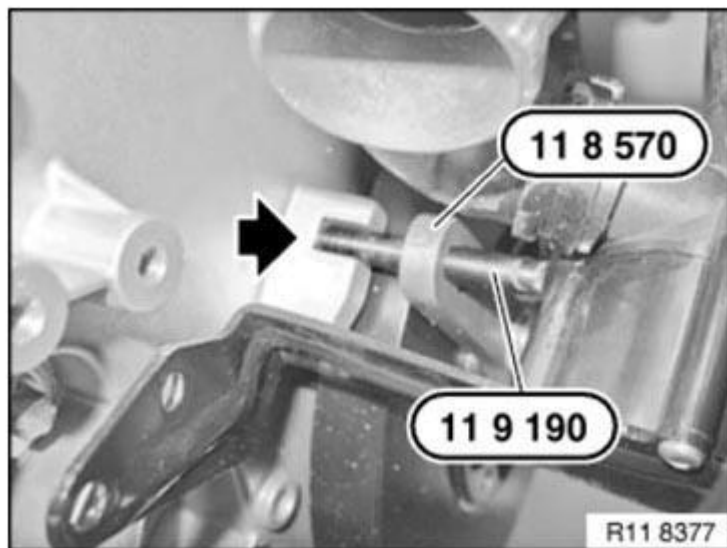


Fig. 243: Locking Crankshaft In Correct Position Using Special Tool 11 8 570 And 11 9 190
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

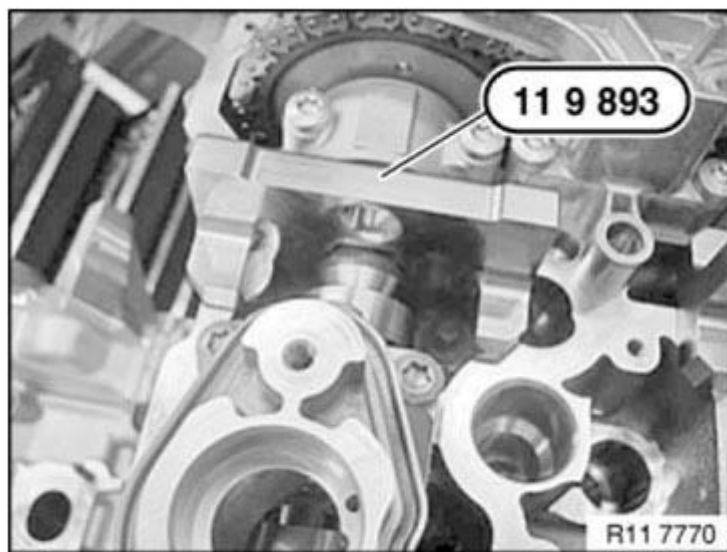


Fig. 244: Fitting Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 893 on the exhaust camshaft and test timing adjustment.

NOTE: Timing is correctly adjusted if special tool 11 9 893 rests on the cylinder head without any gaps.

If necessary, adjust camshaft TIMING on left side.

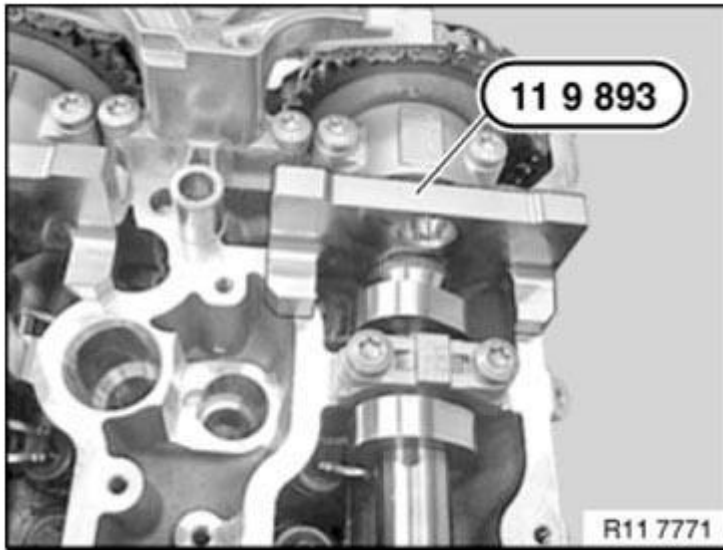


Fig. 245: Fitting Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

11 31 071 CHECKING CAMSHAFT TIMING ON RIGHT SIDE (N74)

IMPORTANT: The timing can only be checked with special tool 11 9 900 .
The timing may be misinterpreted if it is checked without special tool 11 9 900 .

Cylinders 1 - -6

Necessary preliminary tasks:

- Remove right CYLINDER HEAD COVER
- Remove FAN COWL with electric fan
- Remove BELT PULLEY for air conditioning system
- Remove right CHAIN TENSIONER

Mount special tool 11 9 900 at position of chain tensioner.

Preload hexagon socket screw with special tool 00 9 250 to **0.6 Nm** .

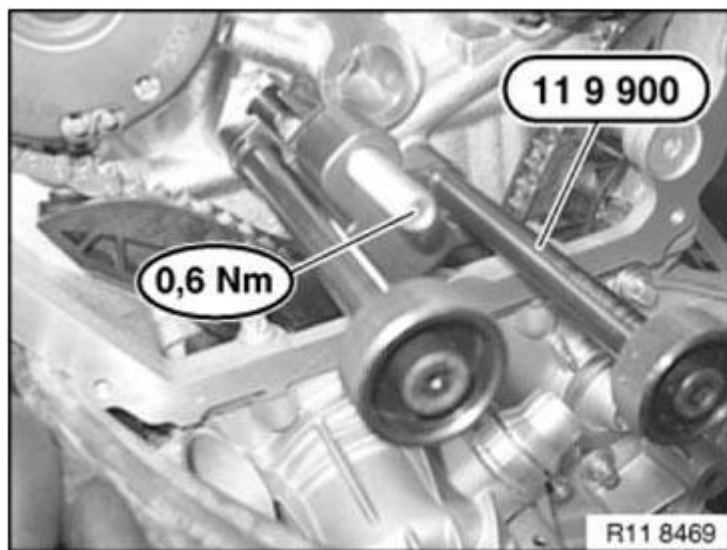


Fig. 246: Mounting Special Tool 11 9 900 At Position Of Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When the engine is shut down, the inlet and exhaust camshaft adjuster is normally locked in its initial position.

The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the adjuster.

In order to avoid incorrect timing adjustment, it is essential to check the locking of the adjuster and if necessary perform locking by rotating the camshafts.

Checking locking of inlet and exhaust camshaft adjusters in initial position:

Gripping hexagon head (2) of camshafts with a fork wrench (1), carefully try to rotate camshafts against direction of rotation.

The inlet and exhaust adjustment units are locked in the initial position when the camshafts are non-positively connected to the adjusters.

NOTE: Graphic corresponds to cylinders 7-12.

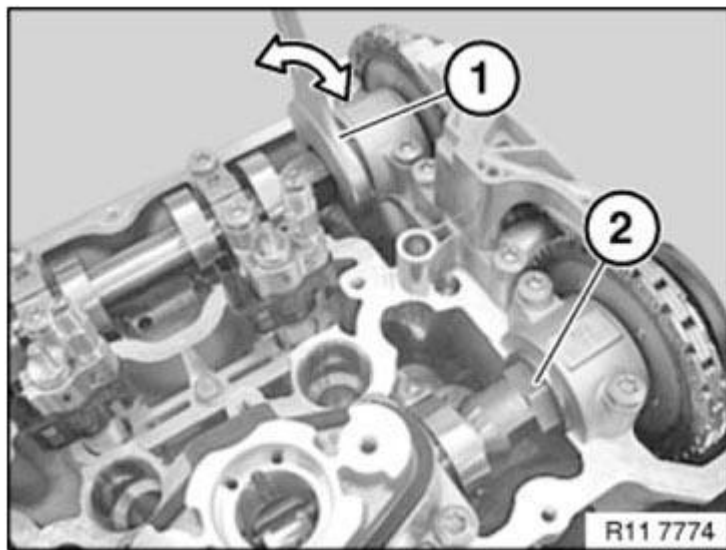


Fig. 247: Rotating Camshafts Using Fork Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If the inlet or exhaust camshaft adjuster of the camshafts "cannot" be locked as described, the adjuster is faulty and must be replaced.

NOTE: If the camshafts are at the TDC firing position for cylinder 1, the labelling on the exhaust camshaft (1 and 2) can be read from above.

A = exhaust camshaft.

16 = cylinder 1 to 6.

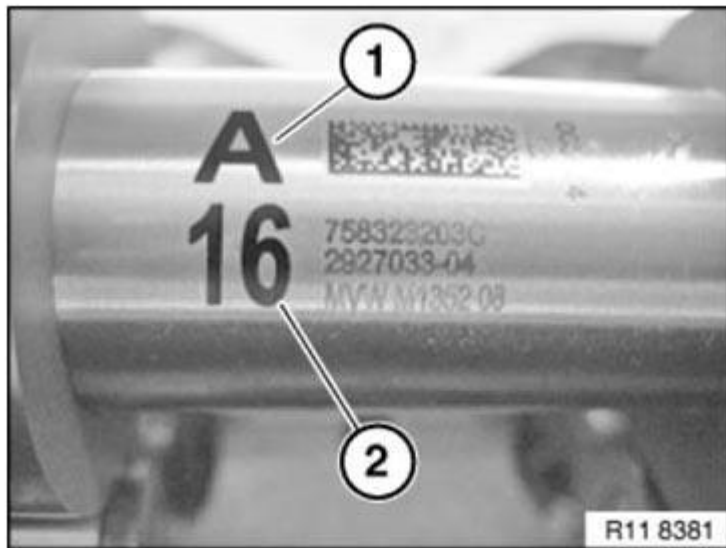


Fig. 248: Identifying Exhaust Camshaft Labelling

Courtesy of BMW OF NORTH AMERICA, INC.

With 1st cylinder in firing TDC position, cams of exhaust camshaft (1) of the 1st cylinder point inward at an angle (see arrow in illustration).

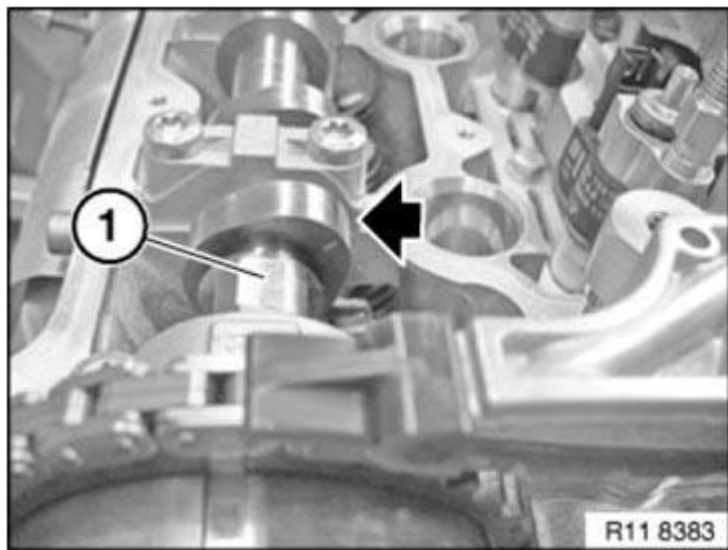


Fig. 249: Locating Cams Of Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the camshafts are at the TDC firing position for cylinder 1, the labelling on the intake camshaft (1 and 2) can be read from above.

E= intake camshaft.

16 = cylinder 1 to 6.

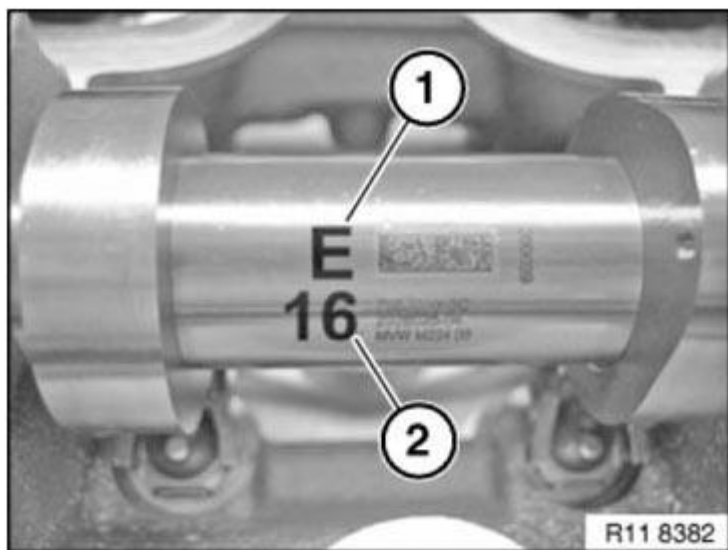


Fig. 250: Identifying Intake Camshaft Labelling
Courtesy of BMW OF NORTH AMERICA, INC.

With 1st cylinder in firing TDC position, cams of intake camshaft (1) of the 1st cylinder point inward at an angle (see arrow in illustration).

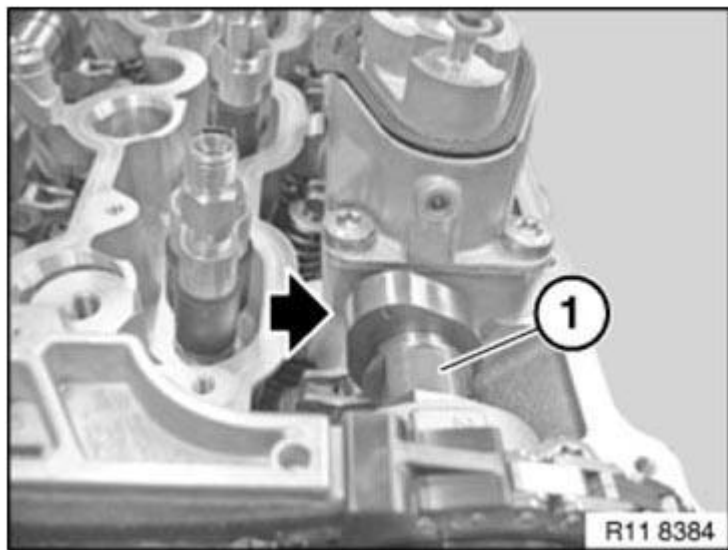


Fig. 251: Identifying Cams Of Intake Camshaft Of 1st Cylinder Point Inward At An Angle
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Lay auxiliary water pump holder to one side.

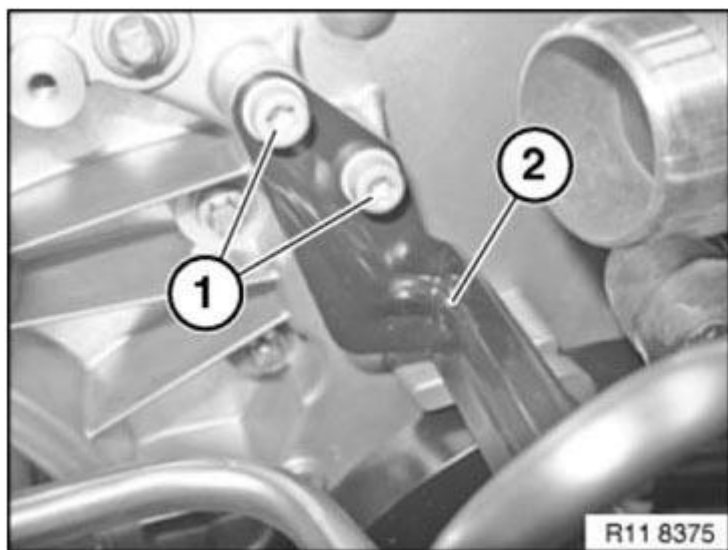


Fig. 252: Identifying Auxiliary Water Pump Holder With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **11 8 570** with the mounting flats on the vibration damper at the TDC mark.

Secure special tool **11 8 570** with a screw (1).

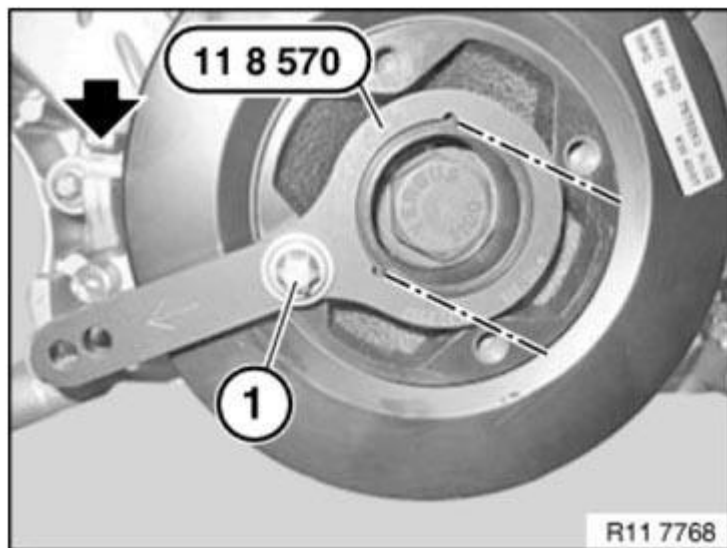


Fig. 253: Securing Special Tool 11 8 570 With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine at the central bolt in direction of engine rotation.

Use special tools **11 8 570** and **11 9 190** to insert the vibration damper in the upper bore hole.

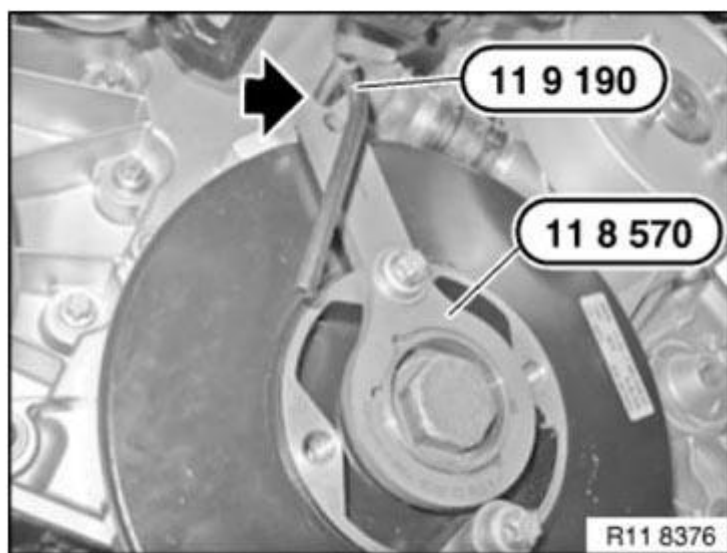


Fig. 254: Identifying Special Tools 11 9 190 And 11 8 570
Courtesy of BMW OF NORTH AMERICA, INC.

The crankshaft is correctly positioned when the special tool **11 8 570** is locked with **11 9 190** in the groove (see

arrow in illustration).

The crankshaft is locked in the **Cylinder 1 firing TDC position** .

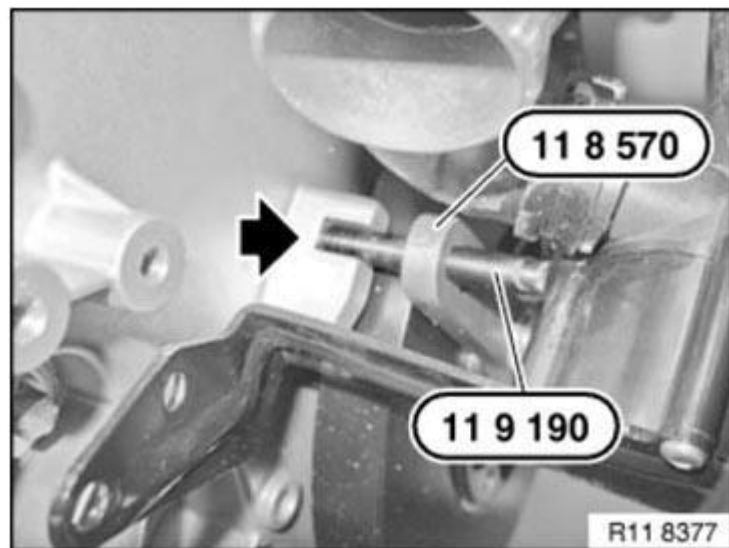


Fig. 255: Locking Crankshaft In Correct Position Using Special Tool 11 8 570 And 11 9 190
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft and check timing adjustment.

NOTE: Timing is correctly adjusted when special tool 11 9 893 rests without a gap on cylinder head.

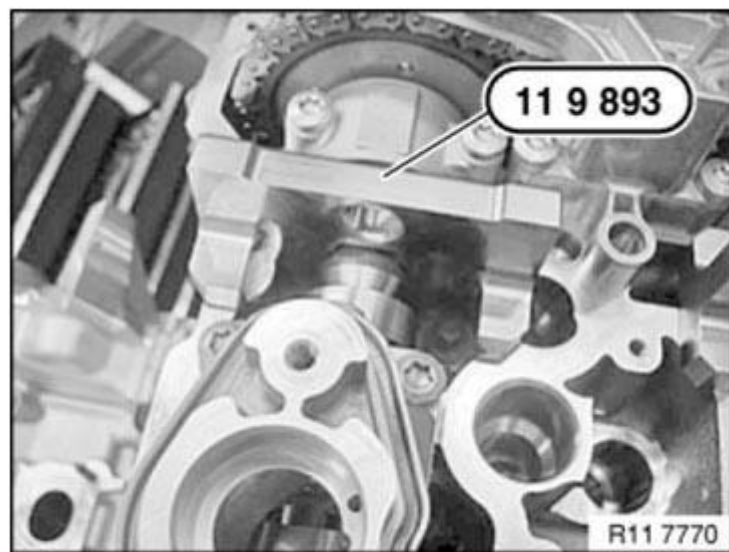


Fig. 256: Fitting Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 893 on the exhaust camshaft and test timing adjustment.

NOTE: Timing is correctly adjusted if special tool 11 9 893 rests on the cylinder head without any gaps.

If necessary, adjust camshaft TIMING on right side.

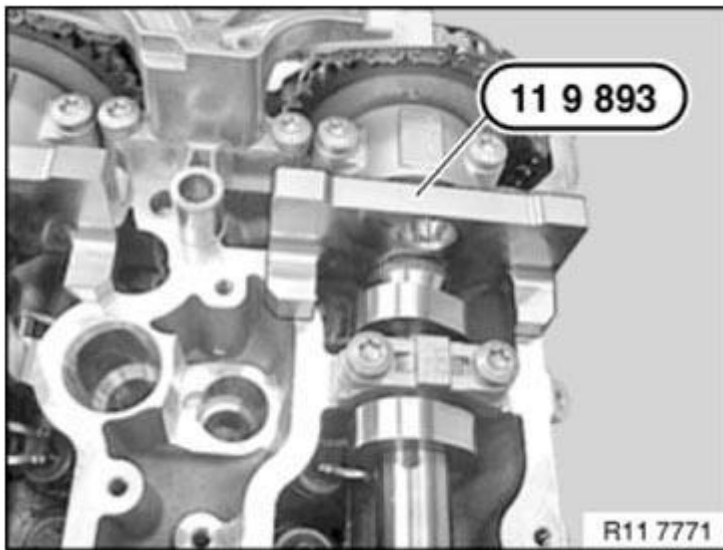


Fig. 257: Fitting Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

11 31 032 REMOVE AND INSTALL/REPLACE LEFT INTAKE CAMSHAFT (N74)

Necessary preliminary tasks:

- Remove LEFT CYLINDER HEAD COVER.
- Check TIMING.
- Remove LEFT INTAKE ADJUSTMENT UNIT.

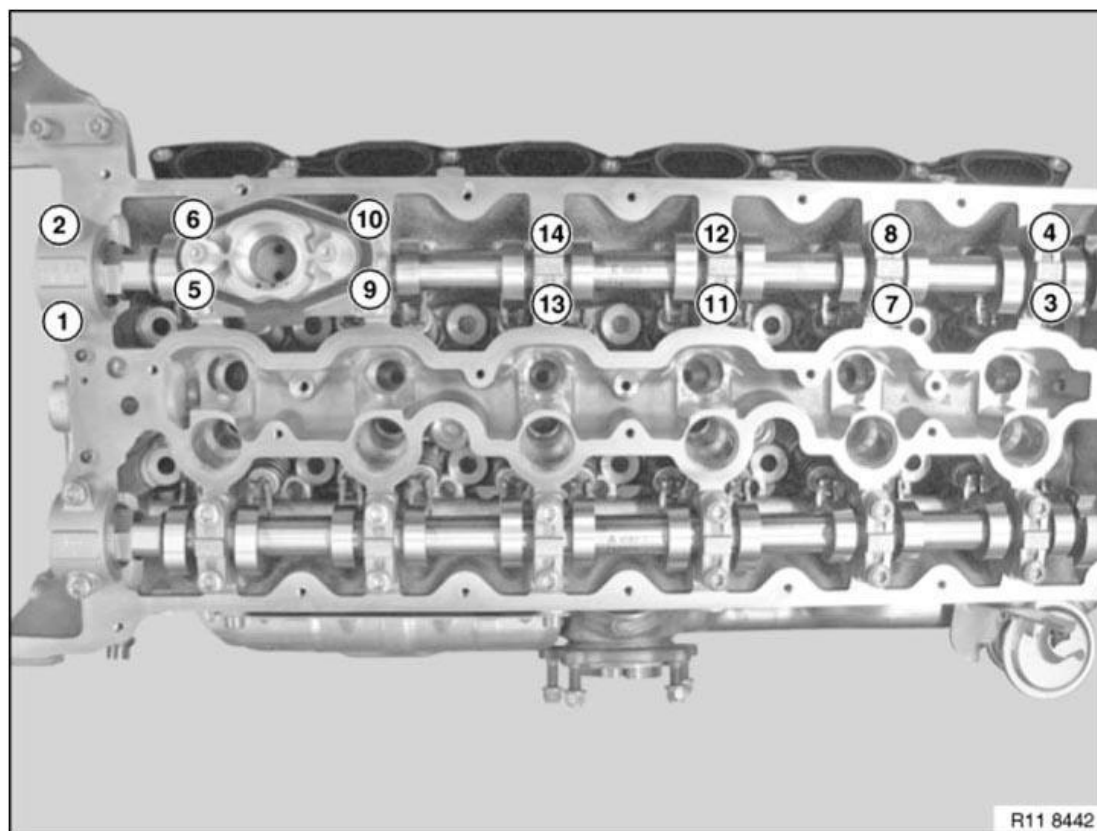


Fig. 258: Identifying Camshaft Bearings Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts of camshaft bearings in sequence (1 to 14) in 1/2 turns .

Set down all bearing caps in a tidy and orderly fashion on special tool 11 4 480 .

Remove intake camshaft in upward direction .

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

NOTE: Rocker arms (1) are freely accessible after inlet camshaft has been removed.

Do "not" remove rocker arm (1) on intake side.

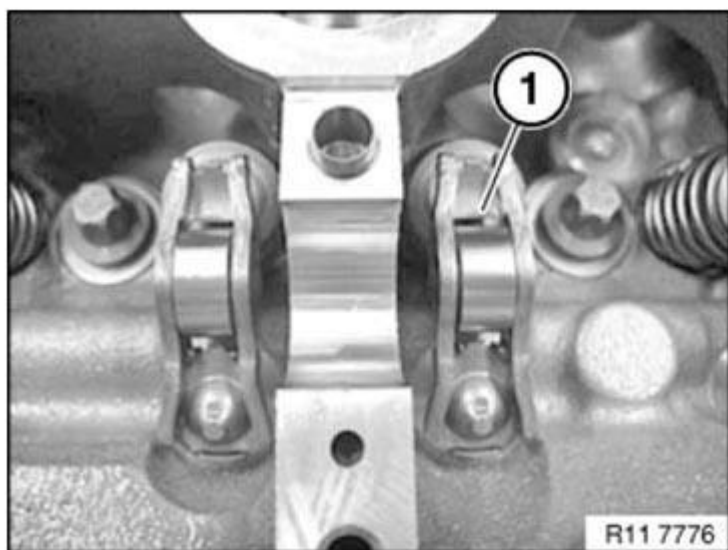


Fig. 259: Identifying Rocker Arms

Courtesy of BMW OF NORTH AMERICA, INC.

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

Press plain rectangular compression ring (1) on one side into groove, pull up on other side and remove latch mechanism.

Carefully pull plain rectangular compression ring (1) apart and remove towards front.

Ends of plain rectangular compression rings (1) point upwards.

Make sure plain rectangular compression rings (1) are engaged at ends.

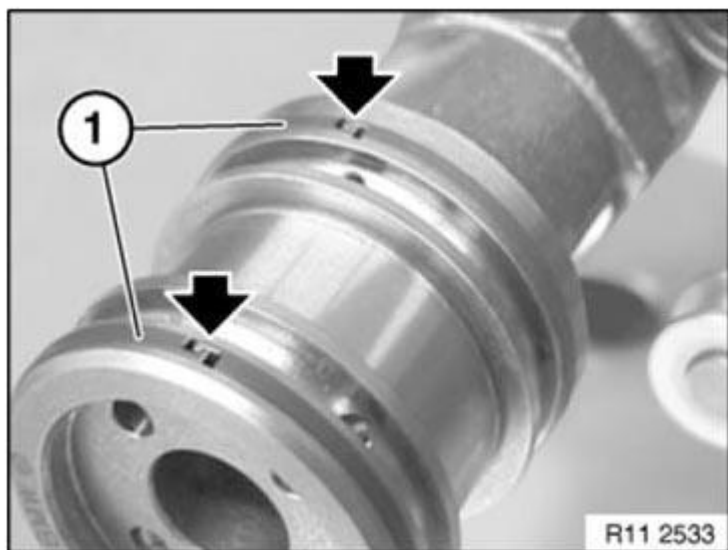


Fig. 260: Identifying Plain Rectangular Compression Ring
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The intake camshaft of cylinder bank 7 to 12 is marked with "E and 712".

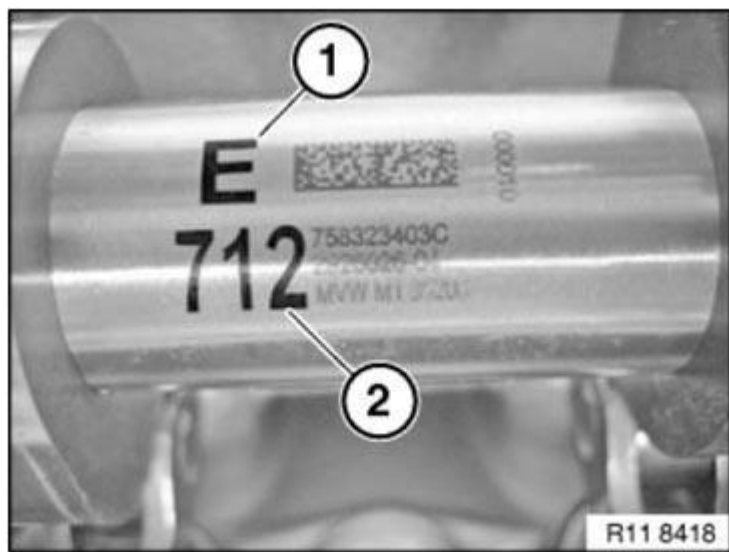


Fig. 261: Identifying Intake Camshaft Labelling
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) slip slightly when inlet camshaft is fitted.

Make sure rocker arms (1) are secured as illustrated on hydraulic valve clearance compensating elements and on valves.

Align all rocker arms (1) straight.

Installation note:

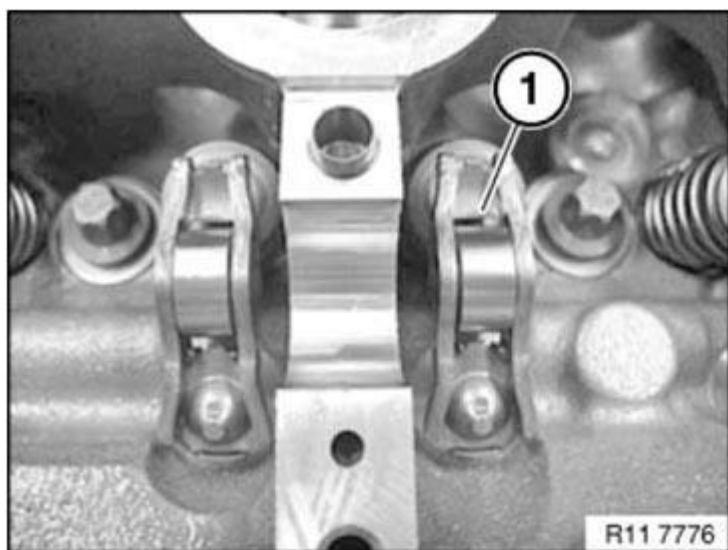


Fig. 262: Identifying Rocker Arm

Courtesy of BMW OF NORTH AMERICA, INC.

Coat all bearing positions with engine oil.

Insert inlet camshaft without strain.

Insert inlet camshaft so that cams point to side at cylinder 7 as shown in picture.

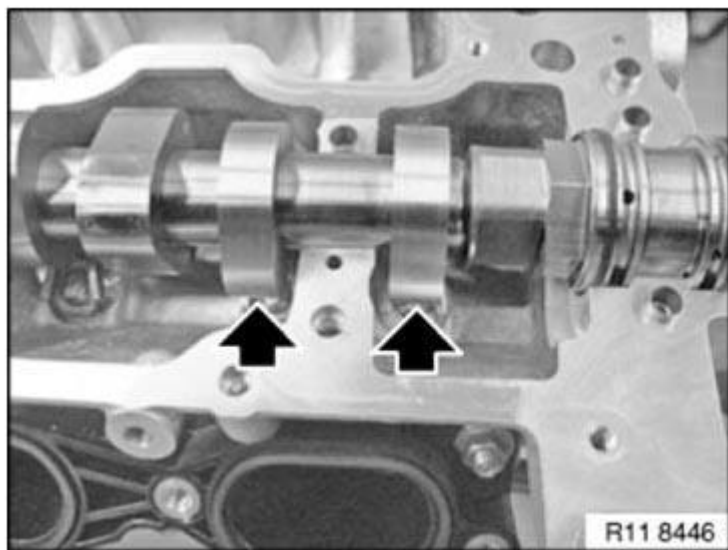


Fig. 263: Locating Inlet Camshaft Cams

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Ends of compression rings point upwards or downwards.

Make sure plain rectangular compression rings are engaged at ends.

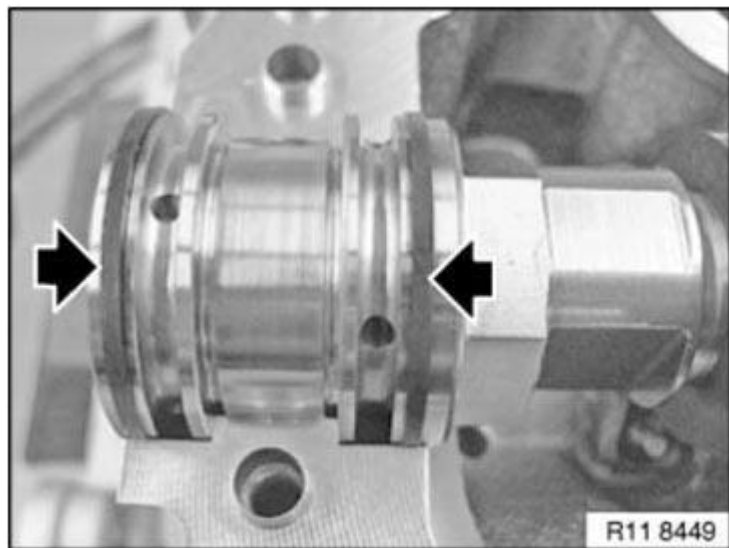


Fig. 264: Locating Plain Rectangular Compression Rings
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not mix up the bearing caps of cylinders 1 to 6 and 7 to 12.
All bearing caps are coded and must be installed in the same position.

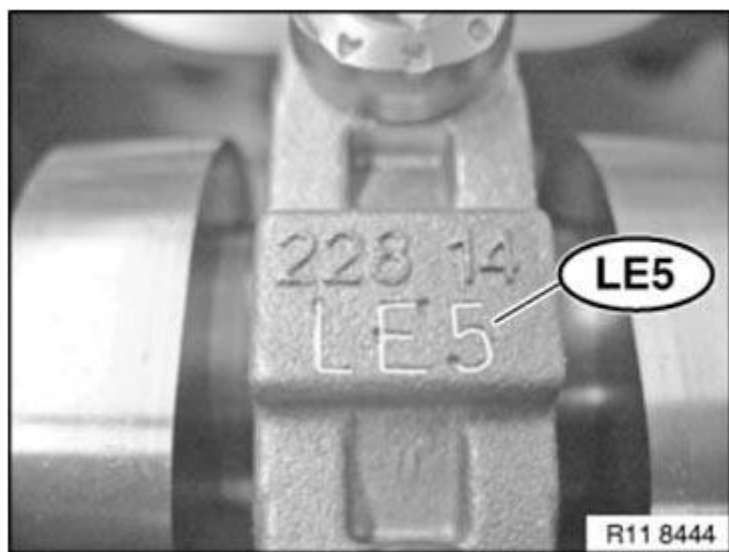


Fig. 265: Identifying Bearing Cap Codes
Courtesy of BMW OF NORTH AMERICA, INC.

All bearing caps are marked:

If both cylinder heads are removed at the same time, the respective bearing caps for each cylinder bank must be

marked.

E = Intake side

A = Exhaust side

1 = Designation from 1 to 7

Check roller (1) of bucket tappet for ease of movement.

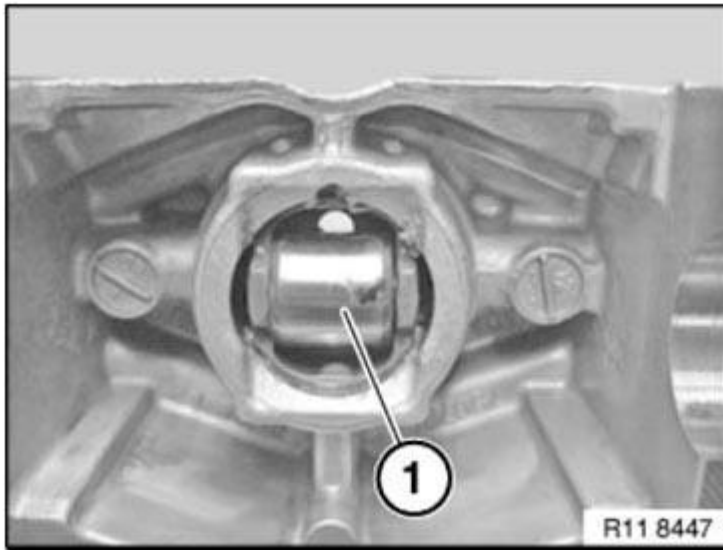


Fig. 266: Identifying Bucket Tappet Roller
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Observe installation lugs of high-pressure carrier and bucket tappet.

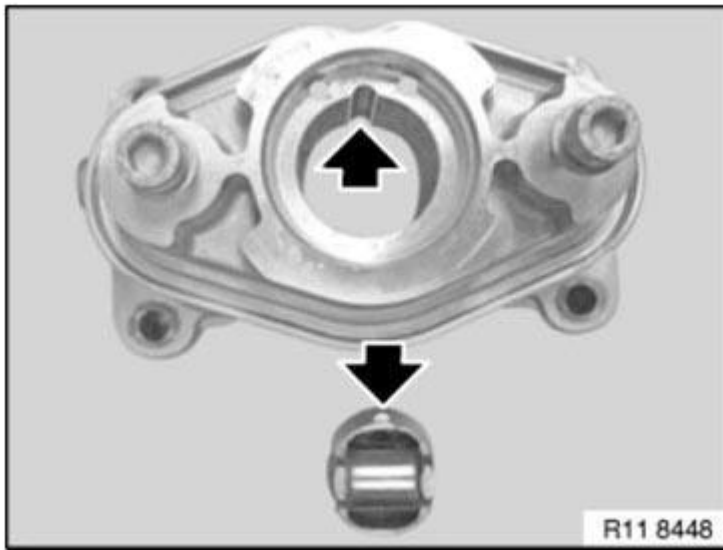


Fig. 267: Locating Lugs Of High-Pressure Carrier And Bucket Tappet
 Courtesy of BMW OF NORTH AMERICA, INC.

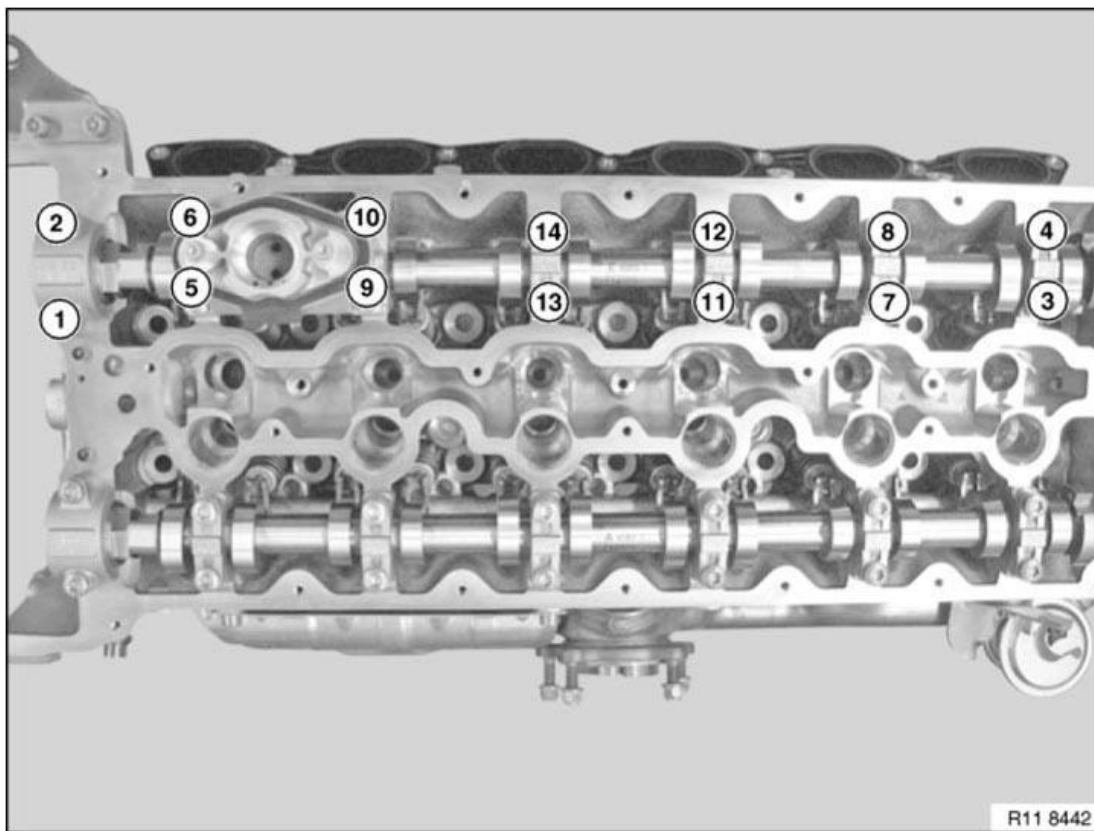


Fig. 268: Identifying Camshaft Bearings Bolts Releasing Sequence
 Courtesy of BMW OF NORTH AMERICA, INC.

Fit all bearing covers .

Insert all bolts .

Tighten down bolts in sequence (14 to 1) in 1/2 turns .

Tightening torque: see 1AZ in 11 31 CAMSHAFT

Preload intake camshaft with a open-end spanner (2) towards right.

NOTE: **Graphic of exhaust camshaft.**

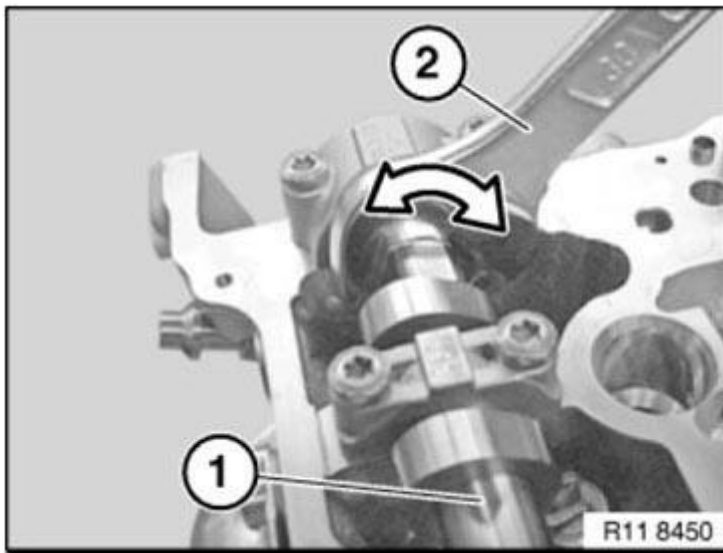


Fig. 269: Preloading Intake Camshaft With Open-End Spanner Towards Right
Courtesy of BMW OF NORTH AMERICA, INC.

Block intake camshaft with special tool 11 9 893.

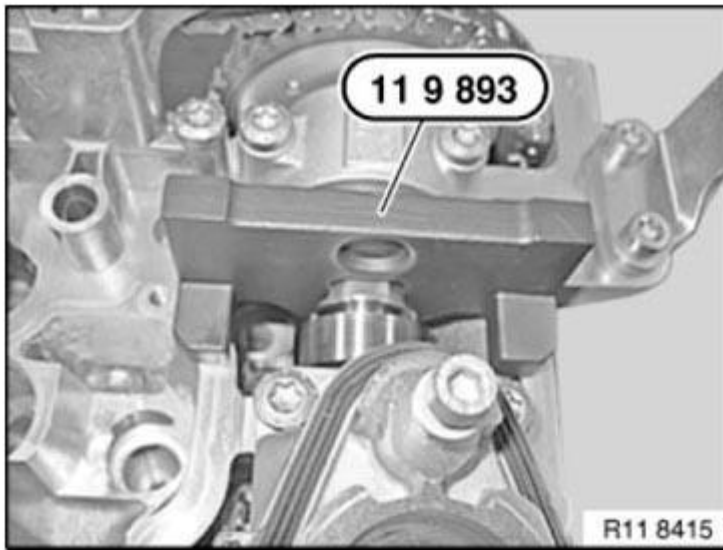


Fig. 270: Blocking Intake Camshaft Using Special Tool 11 9 893
Courtesy of BMW OF NORTH AMERICA, INC.

Install INTAKE ADJUSTMENT UNITS.

Adjust VALVE TIMING.

Assemble engine.

11 31 038 REMOVING AND INSTALLING/RENEWING RIGHT EXHAUST CAMSHAFT (N74)

IMPORTANT: (cylinder bank 7 to 12)

With cylinder 1 in TDC firing position, the pistons are at the top in cylinders 1 and 6 Risk of damage!

For safety reasons, crank engine at central bolt back 30°.

Necessary preliminary tasks:

- Remove LEFT CYLINDER HEAD COVER.
- Check TIMING.
- Remove LEFT INTAKE ADJUSTMENT UNIT.

IMPORTANT: For safety reasons, crank engine at central bolt back 30°.

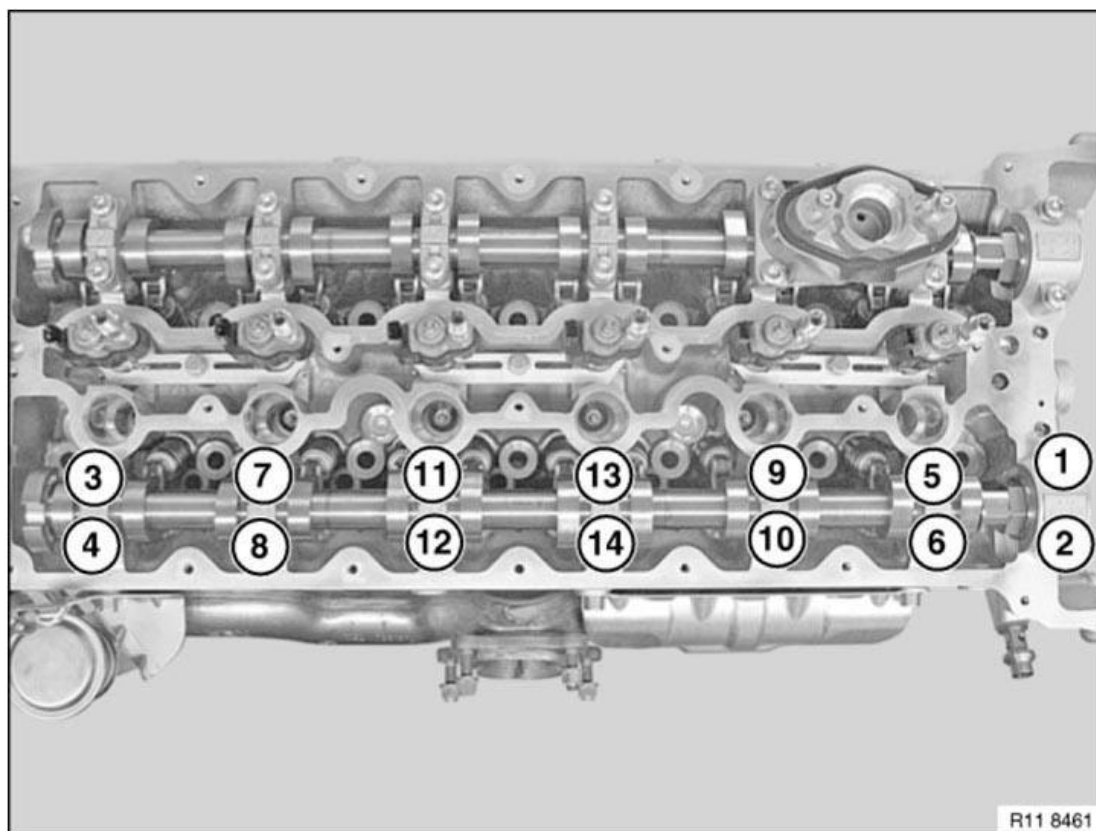


Fig. 271: Identifying Camshaft Bearings Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts of camshaft bearings in sequence (1 to 14) in 1/2 turns .

Set down all bearing caps in a tidy and orderly fashion on special tool 11 4 480 .

Remove exhaust camshaft in upward direction .

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

NOTE: Rocker arms (1) are freely accessible after exhaust camshaft has been removed.

Do "not" remove rocker arms (1) on exhaust side.

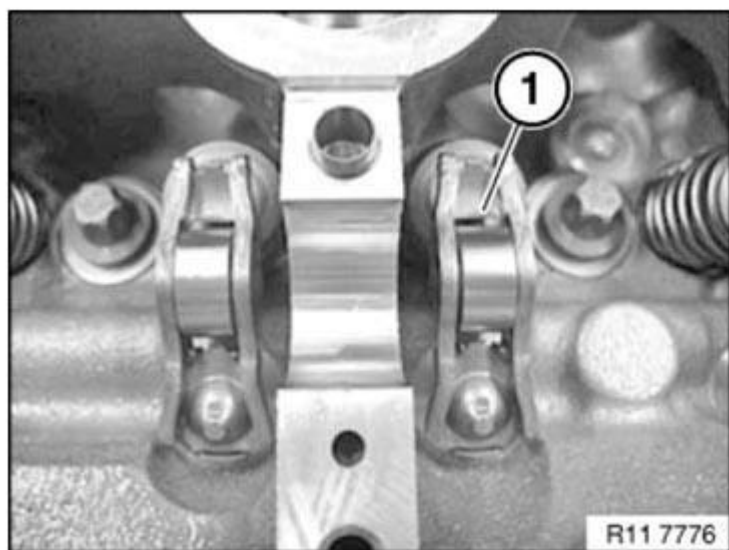


Fig. 272: Identifying Rocker Arm

Courtesy of BMW OF NORTH AMERICA, INC.

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

Modify plain rectangular compression ring on new camshaft.

Press plain rectangular compression ring (1) on one side into groove, pull up on other side and remove latch mechanism.

Carefully pull plain rectangular compression ring (1) apart and remove towards front.

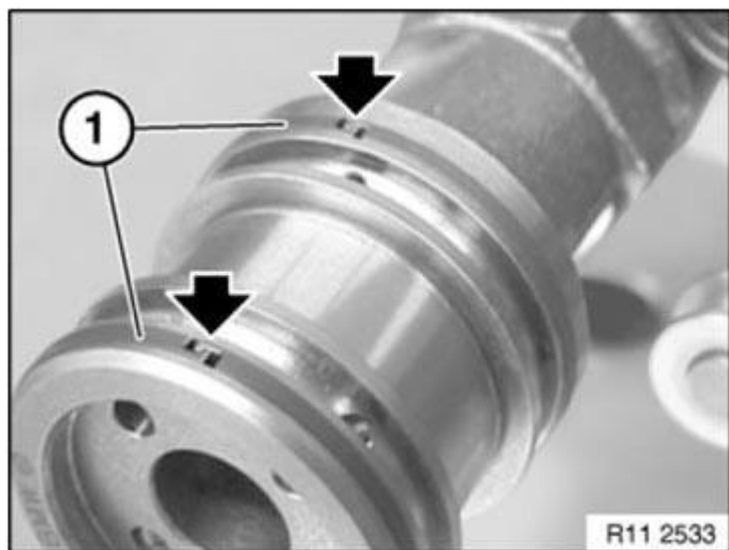


Fig. 273: Identifying Plain Rectangular Compression Ring

Courtesy of BMW OF NORTH AMERICA, INC.

Ends of plain rectangular compression rings (1) point upwards.

Make sure plain rectangular compression rings (1) are engaged at ends.

NOTE: Exhaust camshaft (1) of cylinder bank 1 to 6 is marked with "A and 16".

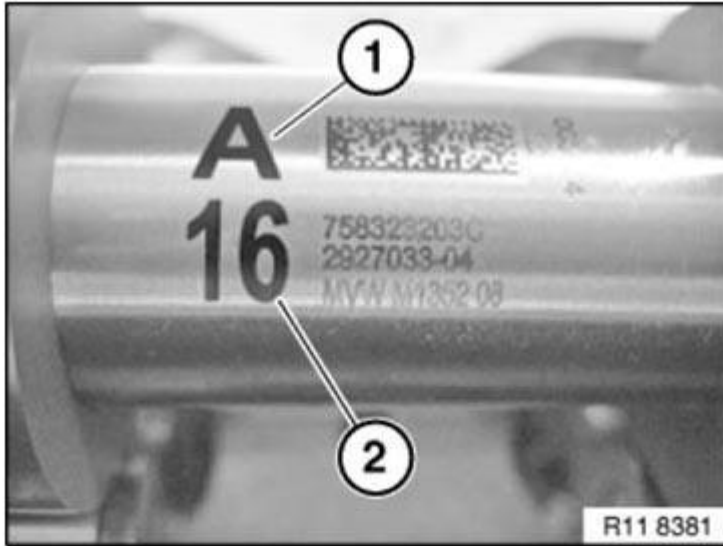


Fig. 274: Identifying Exhaust Camshaft Labelling
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) slip slightly when exhaust camshaft is fitted.

Make sure rocker arms (1) are secured as illustrated on hydraulic valve clearance compensating elements and on valves.

Align all rocker arms (1) straight.

Coat all bearing positions with engine oil. Insert exhaust camshaft.

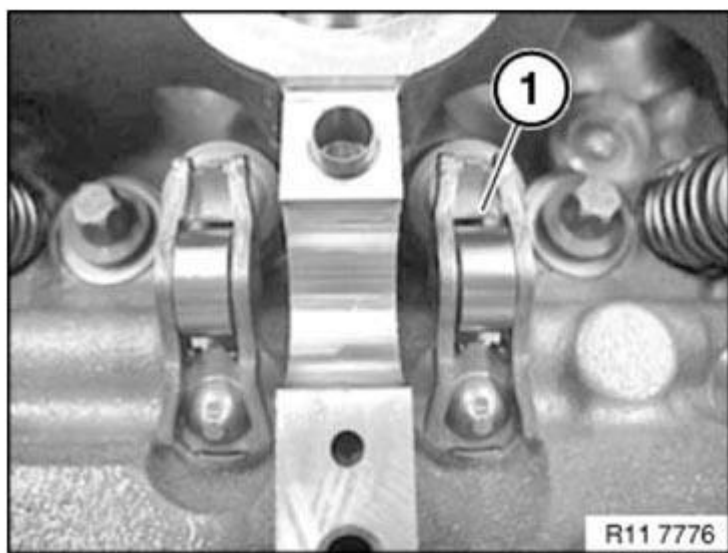


Fig. 275: Identifying Rocker Arm

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Coat all bearing positions with engine oil.

Do not mix up the bearing caps of cylinders 1 to 6 and 7 to 12.

All bearing caps are coded and can only be installed in one position.

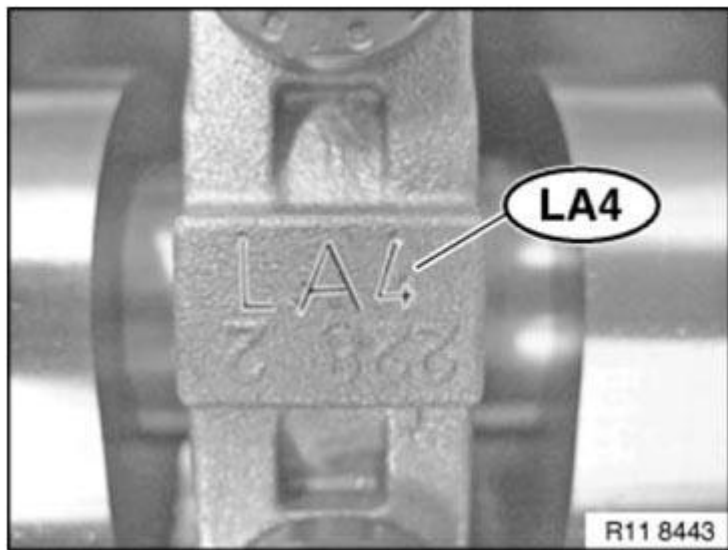


Fig. 276: Identifying Bearing Cap Code

Courtesy of BMW OF NORTH AMERICA, INC.

If both cylinder heads are removed at the same time, the respective bearing caps for each cylinder bank must be marked.

E = Intake side

A = Exhaust side

1 = Designation from 1 to 7

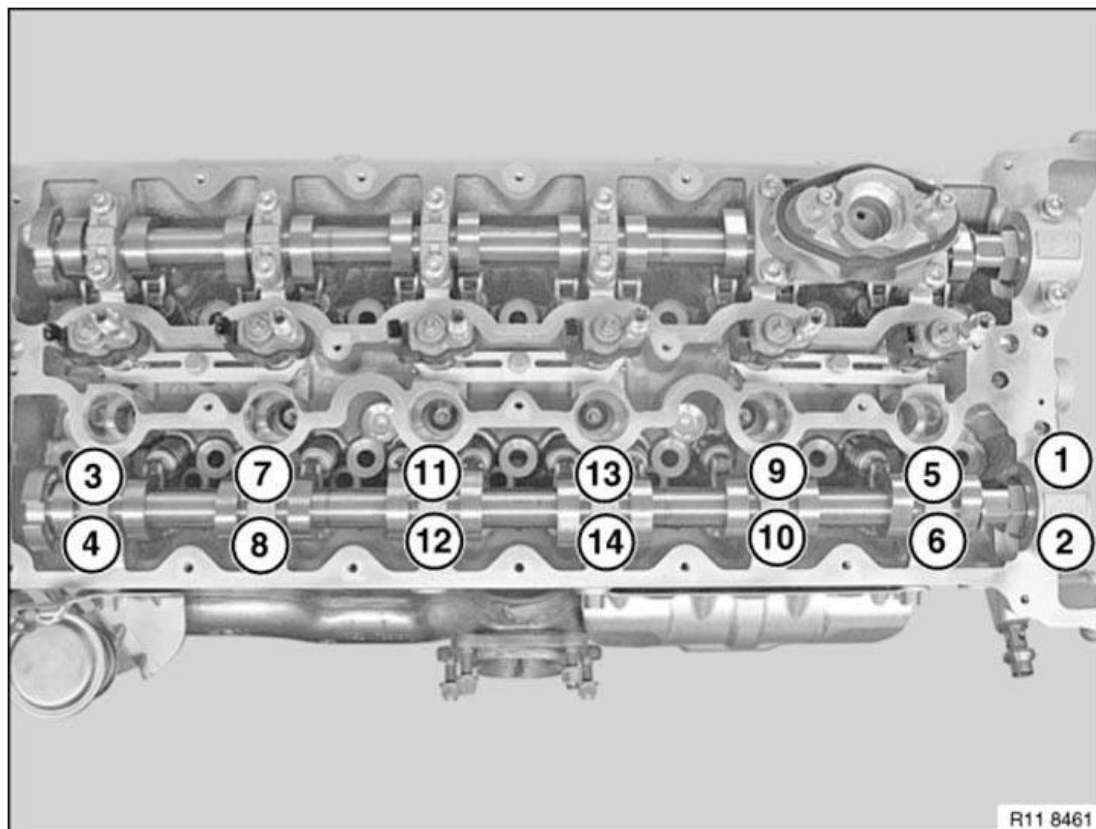


Fig. 277: Identifying Camshaft Bearings Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Fit all bearing covers .

Insert all bolts .

Tighten down bolts in sequence (14 to 1) in 1/2 turns .

Tightening torque: see 1AZ in **11 31 CAMSHAFT**

Preload exhaust camshaft (1) with an open-end spanner (2) towards left.

NOTE: Graphic of cylinders 7 to 12.

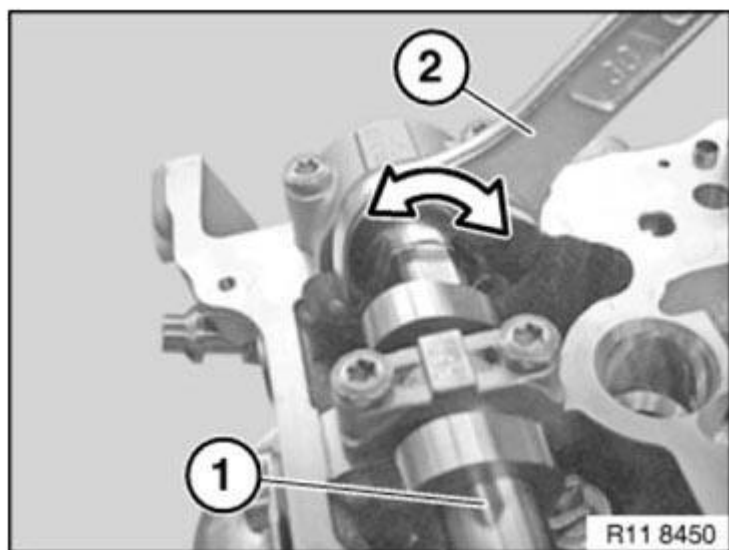


Fig. 278: Preloading Exhaust Camshaft With Open-End Spanner Towards Left
Courtesy of BMW OF NORTH AMERICA, INC.

Block exhaust camshaft with special tool 11 9 893.

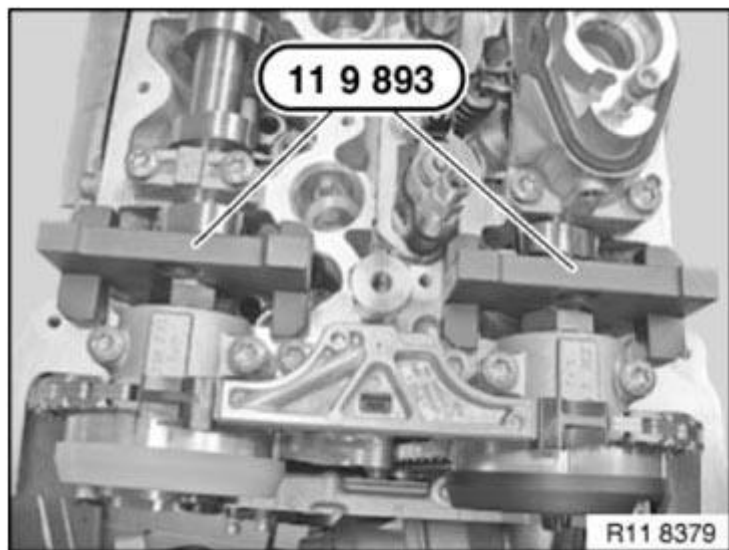


Fig. 279: Blocking Exhaust Camshaft Using Special Tool 11 9 893
Courtesy of BMW OF NORTH AMERICA, INC.

Install **INTAKE ADJUSTMENT UNITS**.

Adjust **VALVE TIMING**.

Assemble engine.

11 33 052 REMOVING AND INSTALLING/REPLACING ALL ROCKER ARMS ON LEFT SIDE

(N74)

(cylinder bank 7 to 12)

Necessary preliminary tasks:

- Remove LEFT INTAKE CAMSHAFT.
- Remove left EXHAUST CAMSHAFT.

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

Tolerance classes are not required.

Remove rocker arm (1) and set down in a tidy and orderly fashion in special tool 11 4 480.

Install rocker arm (1).

Align all rocker arms (1) straight.

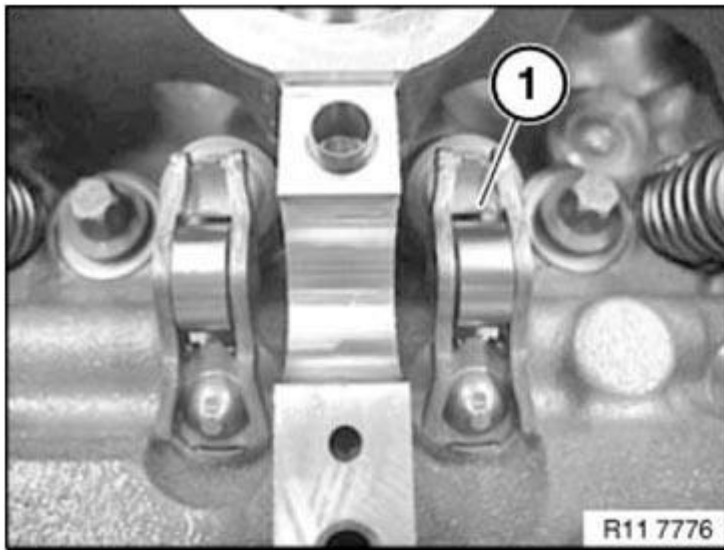


Fig. 280: Identifying Rocker Arm

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 036 REMOVING AND INSTALLING/REPLACING LEFT EXHAUST CAMSHAFT (N74)

(cylinder bank 7 to 12)

Necessary preliminary tasks:

- Remove LEFT CYLINDER HEAD COVER.
- Check TIMING.
- Remove LEFT INTAKE ADJUSTMENT UNIT.

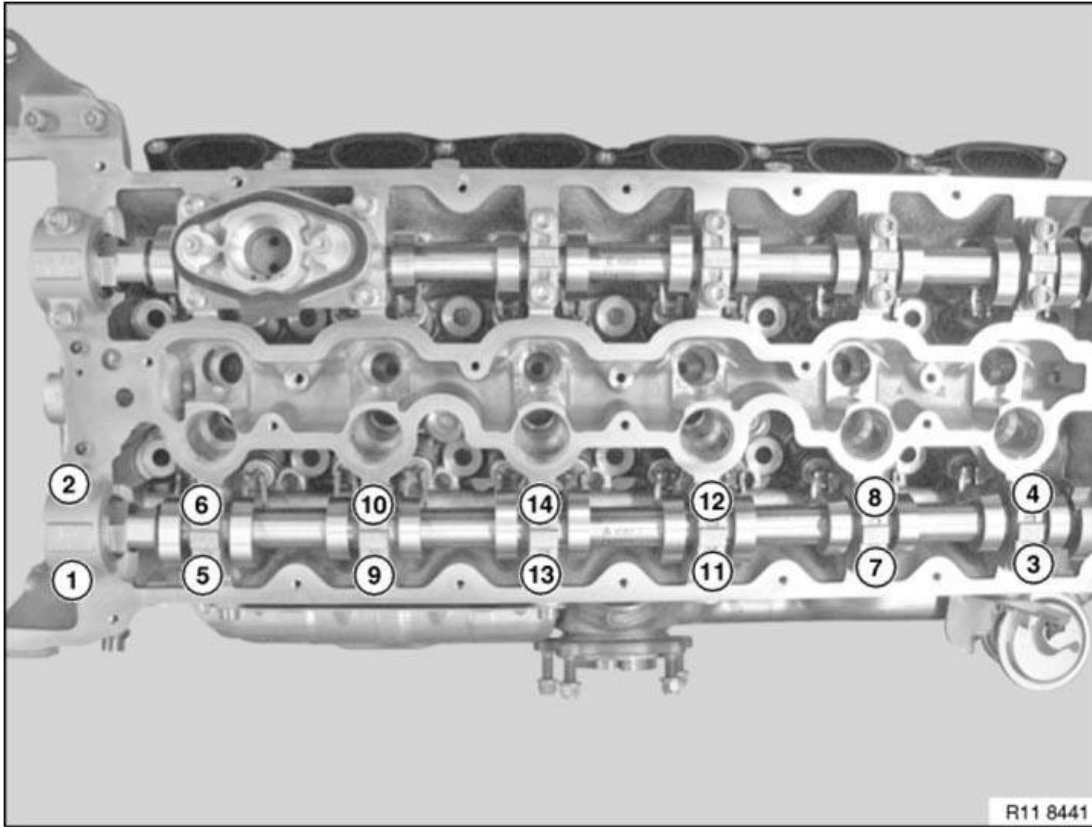


Fig. 281: Identifying Camshaft Bearings Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts of camshaft bearings in sequence (1 to 14) in 1/2 turns .

Set down all bearing caps in a tidy and orderly fashion on special tool 11 4 480 .

Remove exhaust camshaft in upward direction .

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

NOTE: Rocker arms (1) are freely accessible after exhaust camshaft has been removed.

Do "not" remove rocker arms (1) on exhaust side.

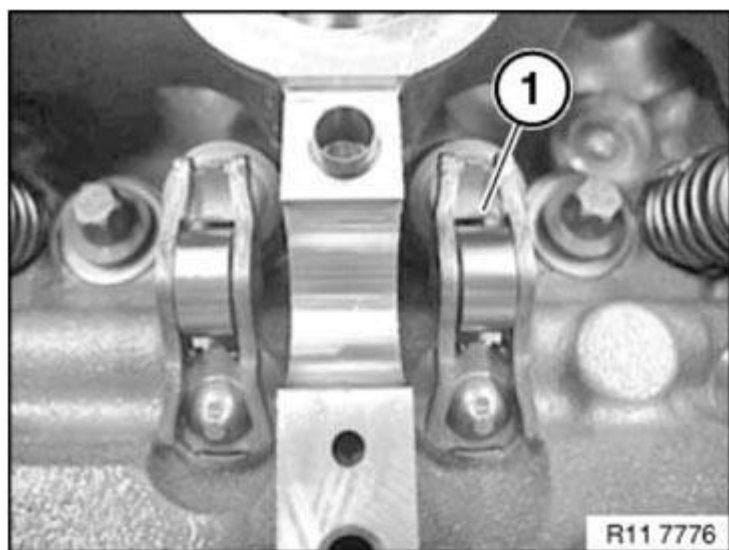


Fig. 282: Identifying Rocker Arm

Courtesy of BMW OF NORTH AMERICA, INC.

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

Press plain rectangular compression ring (1) on one side into groove, pull up on other side and remove latch mechanism.

Carefully pull plain rectangular compression ring (1) apart and remove towards front.

Modify plain rectangular compression ring on new camshaft.

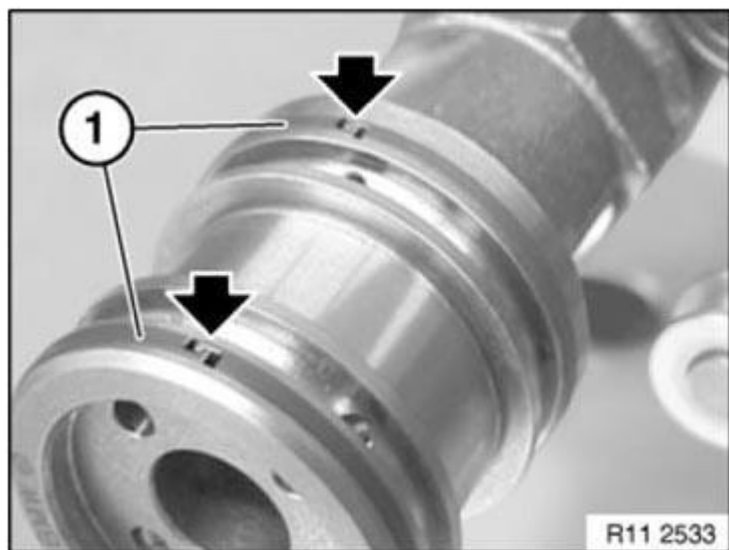


Fig. 283: Identifying Plain Rectangular Compression Ring

Courtesy of BMW OF NORTH AMERICA, INC.

Ends of plain rectangular compression rings (1) point upwards.

Make sure plain rectangular compression rings (1) are engaged at ends.

NOTE: The exhaust camshaft (1) of cylinder bank 7 to 12 is marked with "A and 712".

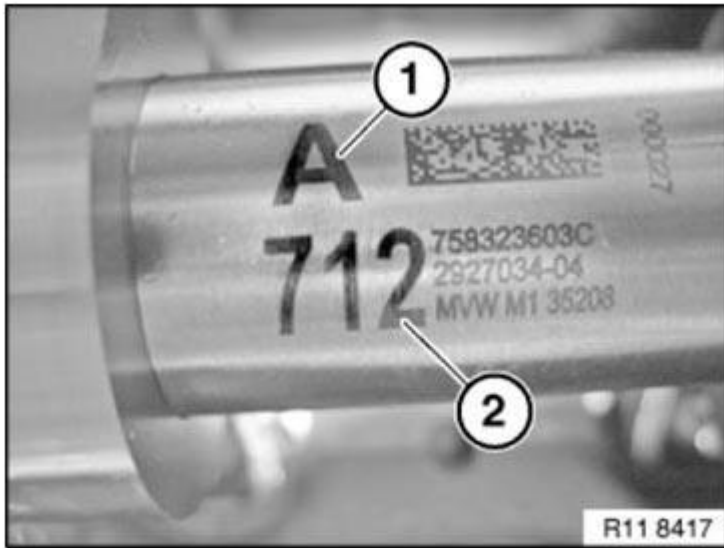


Fig. 284: Identifying Exhaust Camshaft Labelling
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) slip slightly when exhaust camshaft is fitted.

Make sure rocker arms (1) are secured as illustrated on hydraulic valve clearance compensating elements and on valves.

Align all rocker arms (1) straight.

Coat all bearing positions with engine oil.

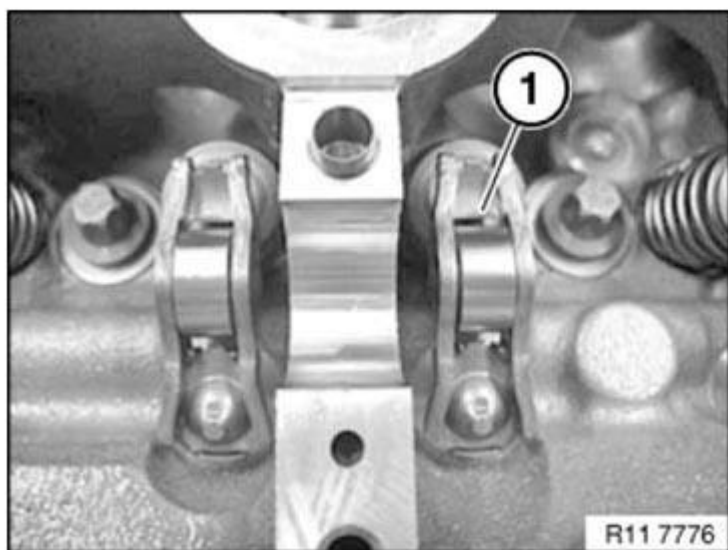


Fig. 285: Identifying Rocker Arm

Courtesy of BMW OF NORTH AMERICA, INC.

Install exhaust camshaft (1).

Insert exhaust camshaft (1) so that cams point to side at cylinder 5 as shown in picture.

Coat all bearing positions with engine oil.

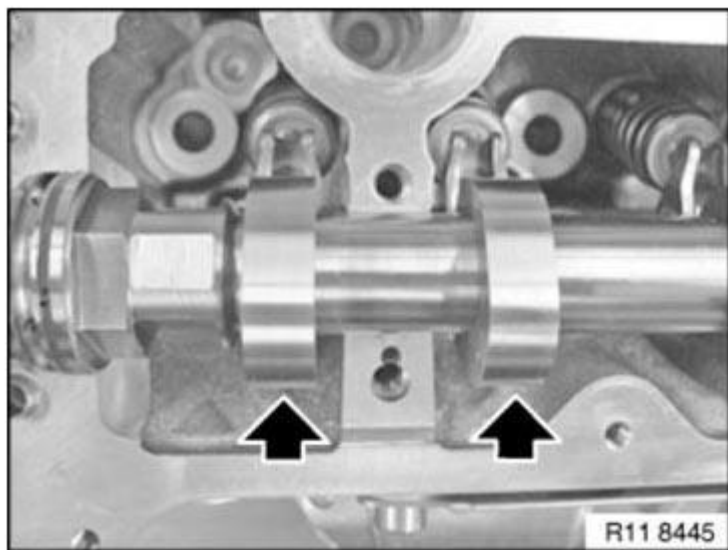


Fig. 286: Locating Exhaust Camshaft Cams

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not mix up the bearing caps of cylinders 1 to 6 and 7 to 12.
All bearing caps are coded and can only be installed in one position.

All bearing caps are marked:

If both cylinder heads are removed at the same time, the respective bearing caps for each cylinder bank must be marked.

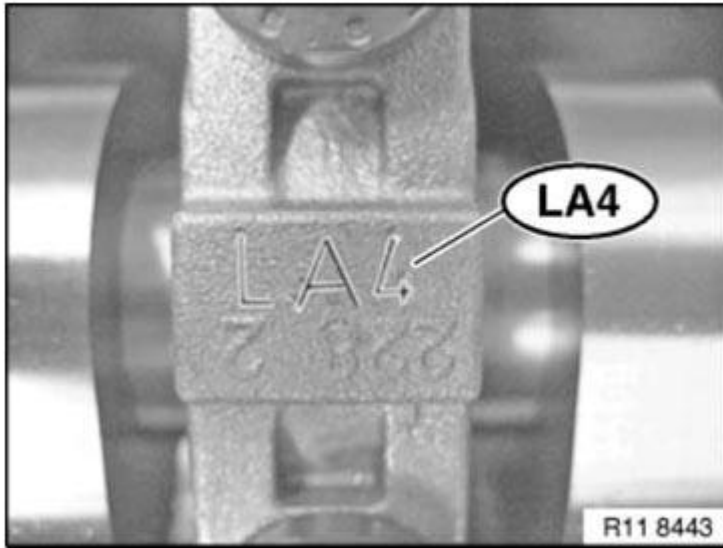


Fig. 287: Identifying Bearing Cap Code
Courtesy of BMW OF NORTH AMERICA, INC.

E = Intake side

A = Exhaust side

1 = Designation from 1 to 7

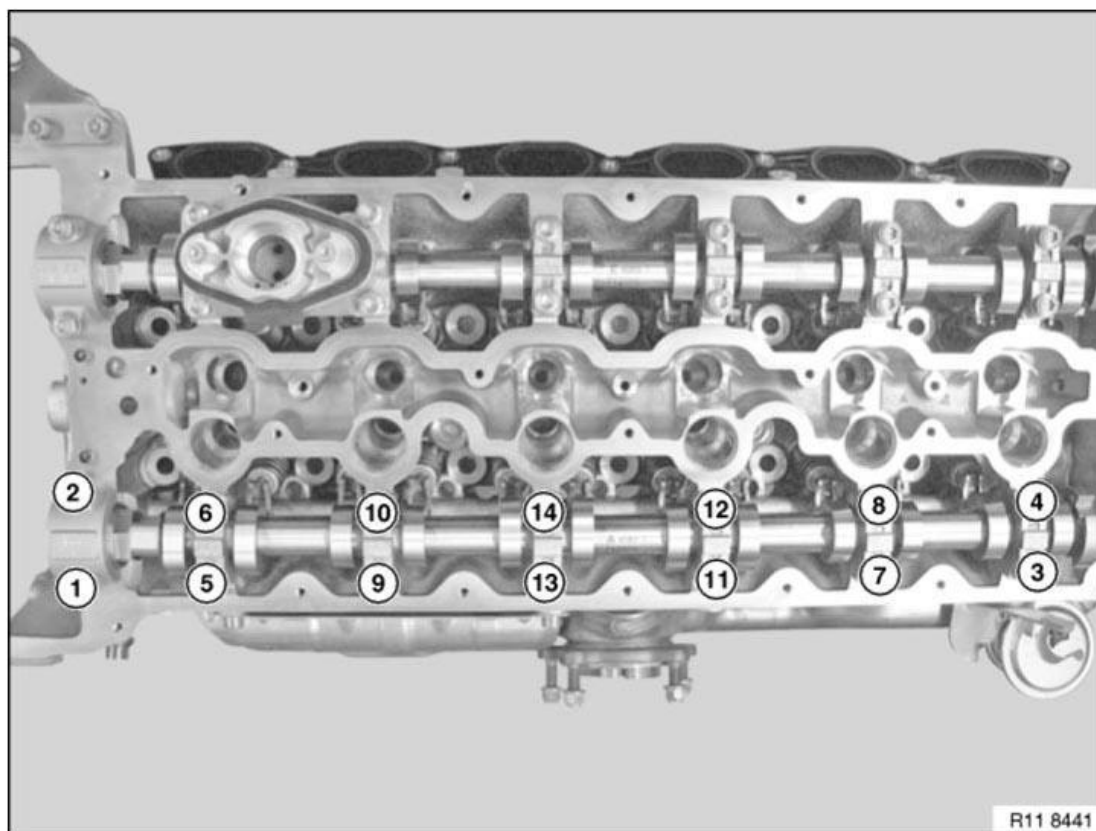


Fig. 288: Identifying Camshaft Bearings Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Coat all bearing positions with engine oil .

Insert all bolts .

Tighten down bolts in sequence (14 to 1) in 1/2 turns .

Tightening torque: see 1AZ in **11 31 CAMSHAFT**

Preload exhaust camshaft (1) with an open-end spanner (2) towards left.

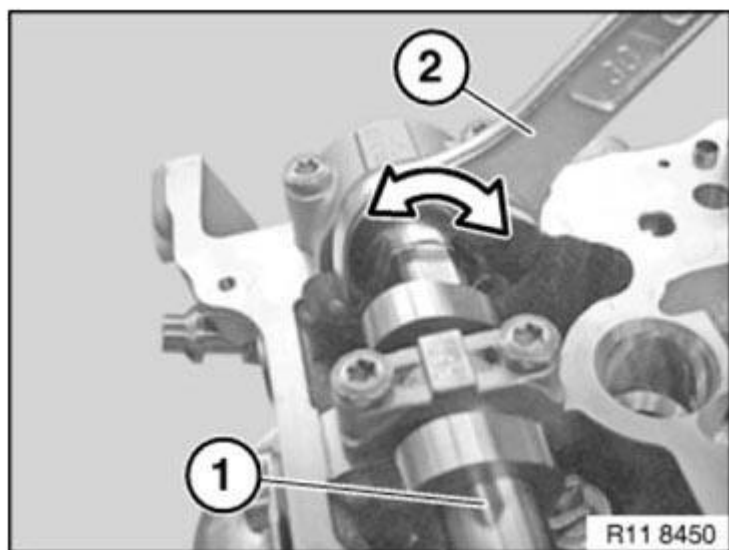


Fig. 289: Preloading Exhaust Camshaft With Open-End Spanner Towards Left
Courtesy of BMW OF NORTH AMERICA, INC.

Block exhaust camshaft with special tool 11 9 893.

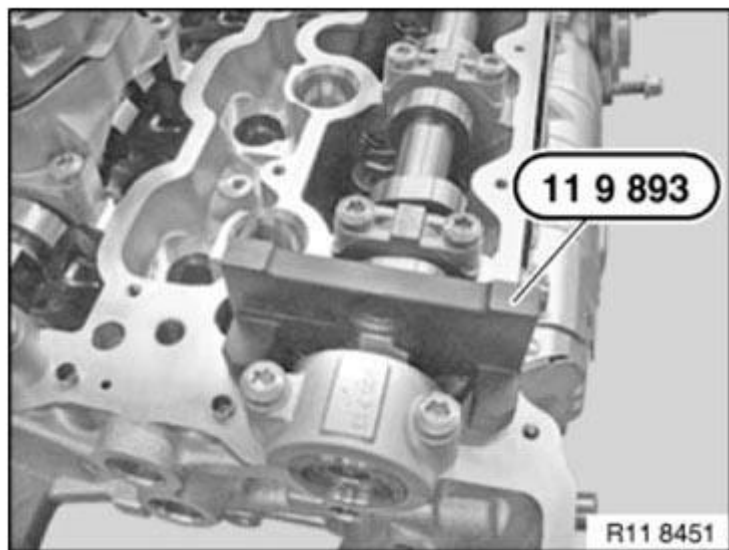


Fig. 290: Blocking Exhaust Camshaft Using Special Tool 11 9 893
Courtesy of BMW OF NORTH AMERICA, INC.

Install INTAKE ADJUSTMENT UNITS.

Adjust VALVE TIMING.

Assemble engine.

11 31 034 REMOVING AND INSTALLING/REPLACING RIGHT INLET CAMSHAFT (N74)

(cylinder bank 7 to 12)

IMPORTANT: With cylinder 1 in TDC firing position, the pistons are at the top in cylinders 1 and 6 Risk of damage!

For safety reasons, crank engine at central bolt back 30°.

Necessary preliminary tasks:

- Remove LEFT CYLINDER HEAD COVER.
- Check TIMING.
- Remove LEFT INTAKE ADJUSTMENT UNIT.

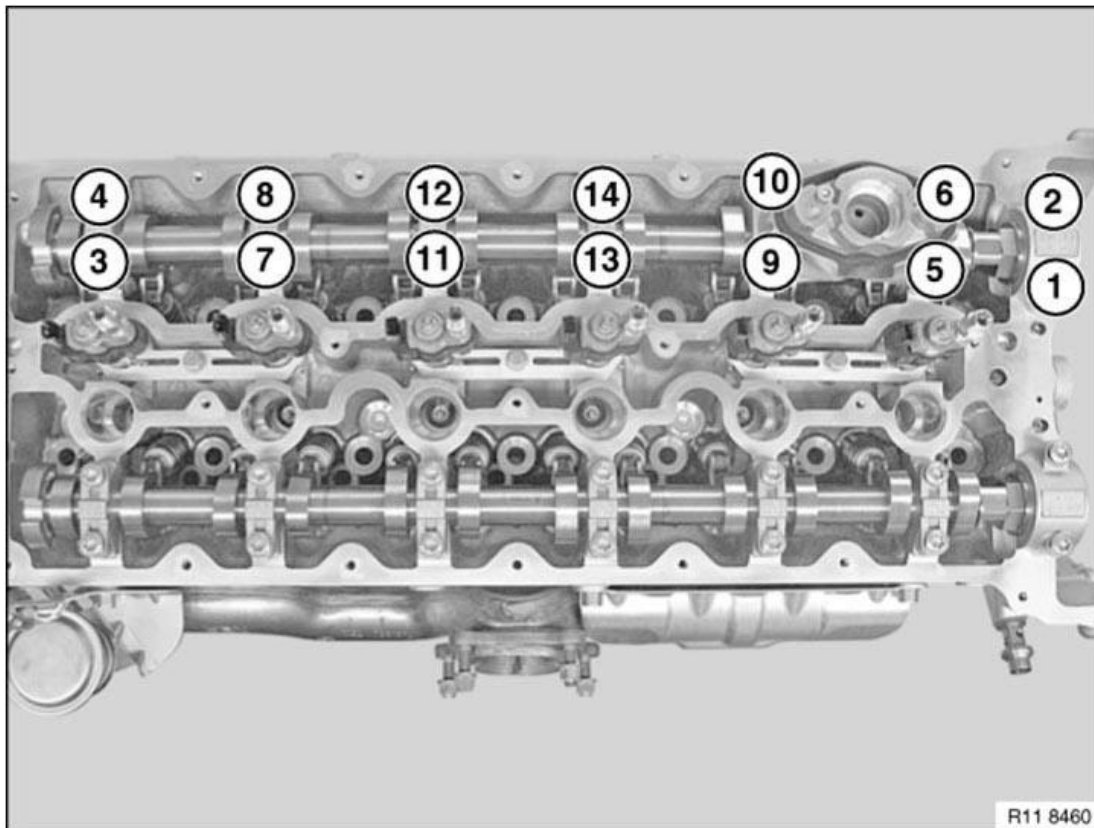


Fig. 291: Identifying Camshaft Bearing Bolts Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts of camshaft bearings in sequence (1 to 14) in 1/2 turns .

Set down all bearing caps in a tidy and orderly fashion on special tool 11 4 480 .

Remove intake camshaft in upward direction .

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

NOTE: Rocker arms (1) are freely accessible after inlet camshaft has been removed.

Do "not" remove rocker arm (1) on intake side.

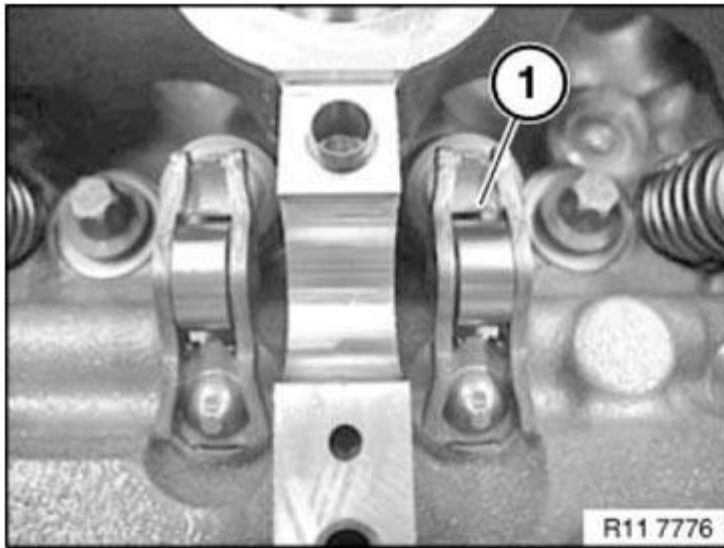


Fig. 292: Identifying Rocker Arm

Courtesy of BMW OF NORTH AMERICA, INC.

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

Press plain rectangular compression ring (1) on one side into groove, pull up on other side and remove latch mechanism.

Carefully pull plain rectangular compression ring (1) apart and remove towards front. Ends of plain rectangular compression rings (1) point upwards.

Make sure plain rectangular compression rings (1) are engaged at ends.

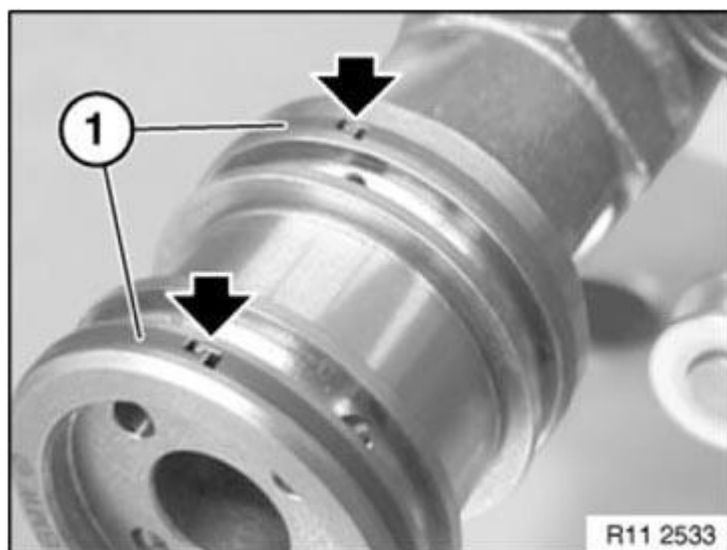


Fig. 293: Identifying Plain Rectangular Compression Ring
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Intake camshaft of cylinder bank 1 to 6 is marked with "E and 16".

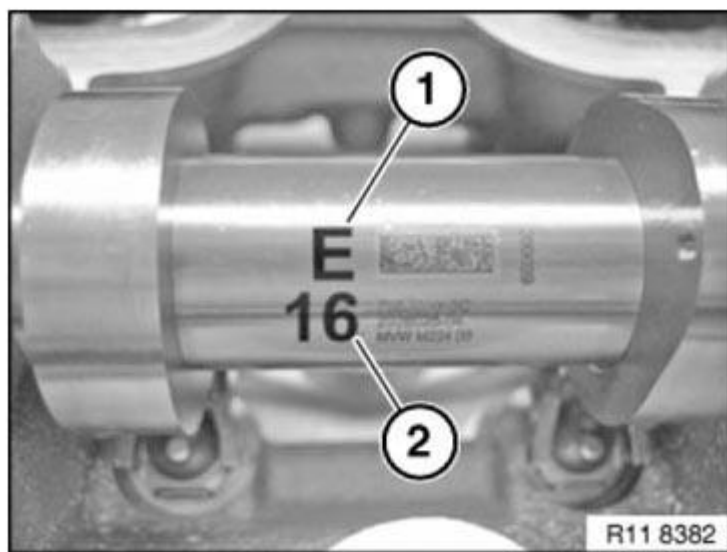


Fig. 294: Identifying Intake Camshaft Labelling
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) slip slightly when inlet camshaft is fitted.

Make sure rocker arms (1) are secured as illustrated on hydraulic valve clearance compensating elements and on valves.

Align all rocker arms (1) straight.

Installation note:

Coat all bearing positions with engine oil.

Insert inlet camshaft without strain.

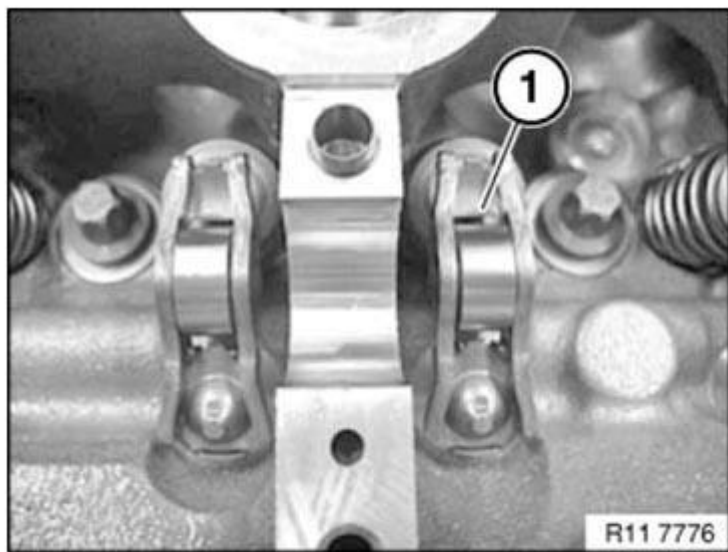


Fig. 295: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Ends of compression rings point upwards or downwards.

Make sure plain rectangular compression rings are engaged at ends.

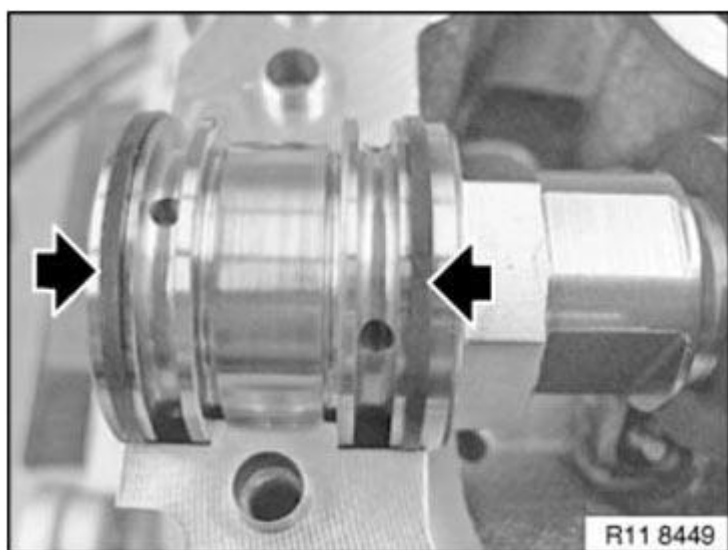


Fig. 296: Locating Plain Rectangular Compression Rings
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not mix up the bearing caps of cylinders 1 to 6 and 7 to 12.

All bearing caps are coded and must be installed in the same position.

All bearing caps are marked:

If both cylinder heads are removed at the same time, the respective bearing caps for each cylinder bank must be marked.

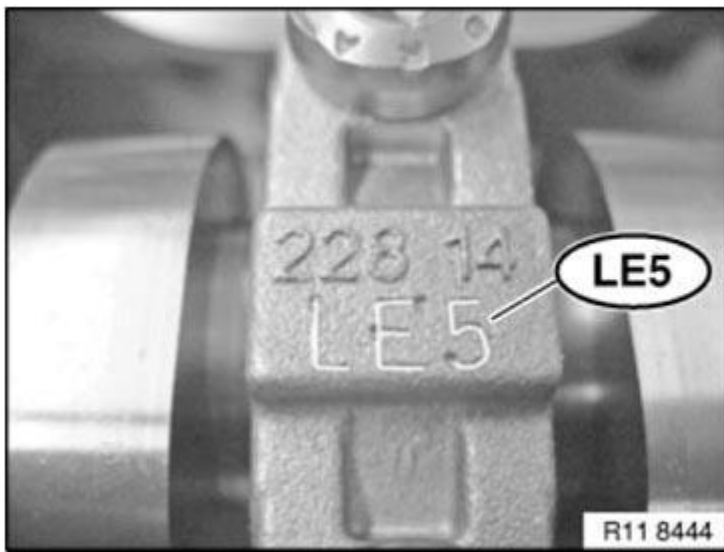


Fig. 297: Identifying Bearing Cap Codes
Courtesy of BMW OF NORTH AMERICA, INC.

E = Intake side

A = Exhaust side

1 = Designation from 1 to 7

Check roller (1) of bucket tappet for ease of movement.

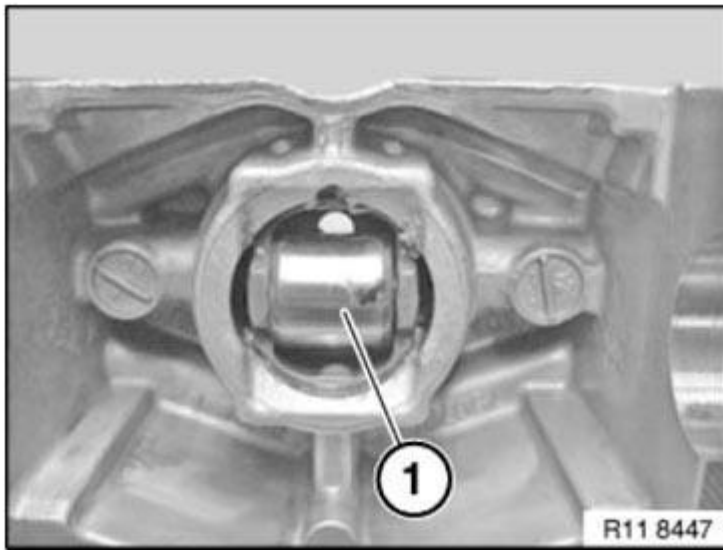


Fig. 298: Identifying Bucket Tappet Roller
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Observe installation lugs of high-pressure carrier and bucket tappet.

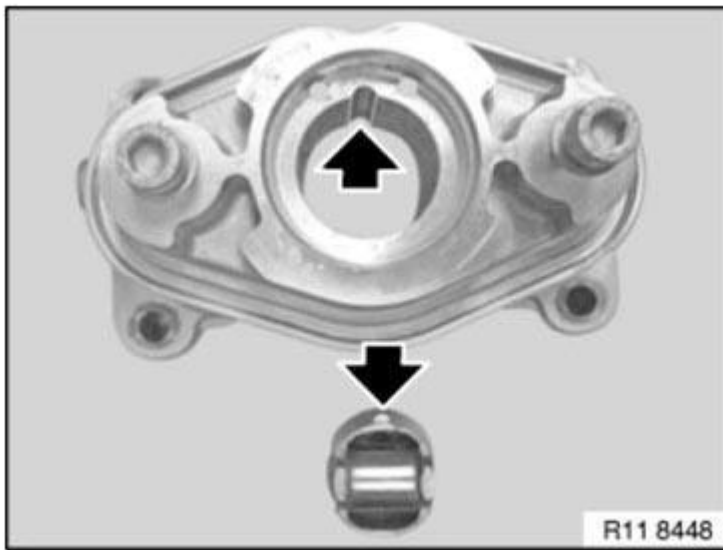


Fig. 299: Locating Lugs Of High-Pressure Carrier And Bucket Tappet
Courtesy of BMW OF NORTH AMERICA, INC.

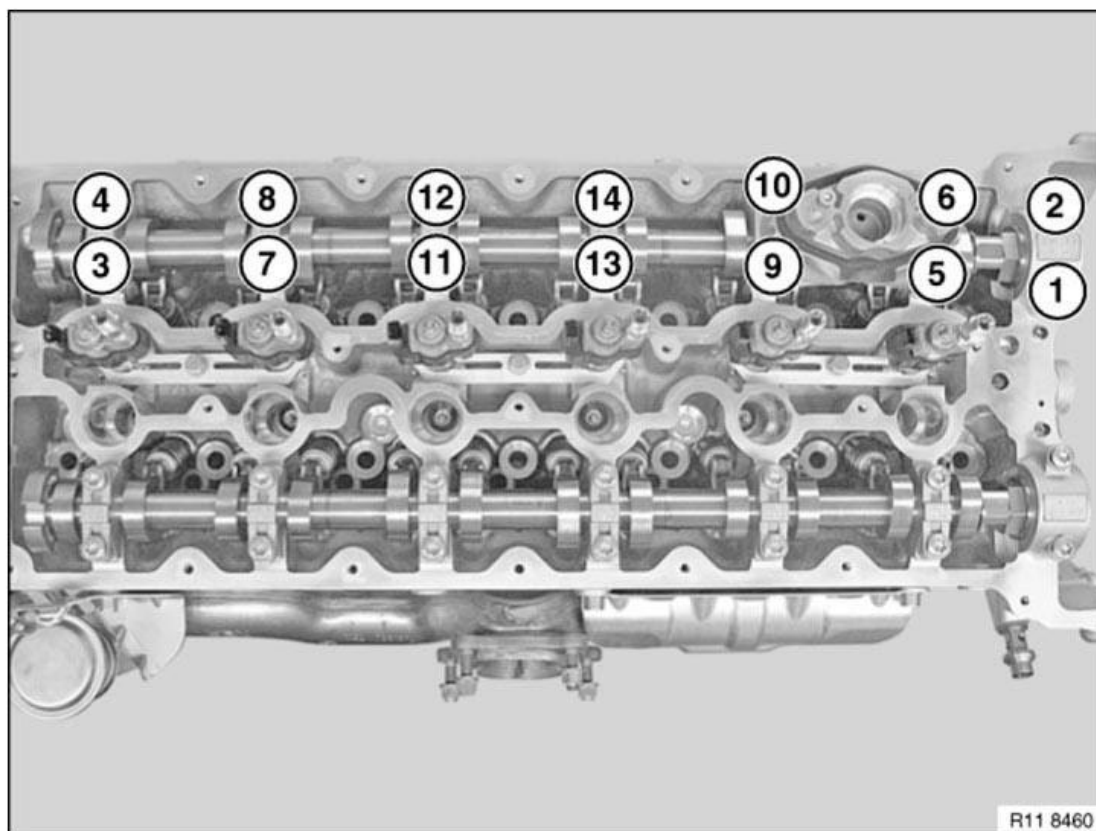


Fig. 300: Identifying Camshaft Bearing Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Fit all bearing covers .

Insert all bolts .

Tighten down bolts in sequence (14 to 1) in 1/2 turns .

Tightening torque: see 1AZ in **11 31 CAMSHAFT**

Preload intake camshaft with a open-end spanner (2) towards right.

NOTE: Image of exhaust camshaft.

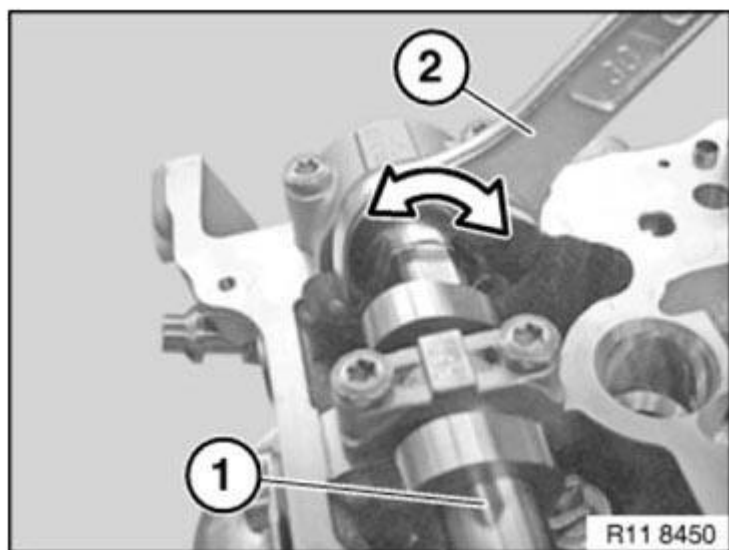


Fig. 301: Preloading Intake Camshaft With Open-End Spanner Towards Right
Courtesy of BMW OF NORTH AMERICA, INC.

Block intake camshaft with special tool 11 9 893.

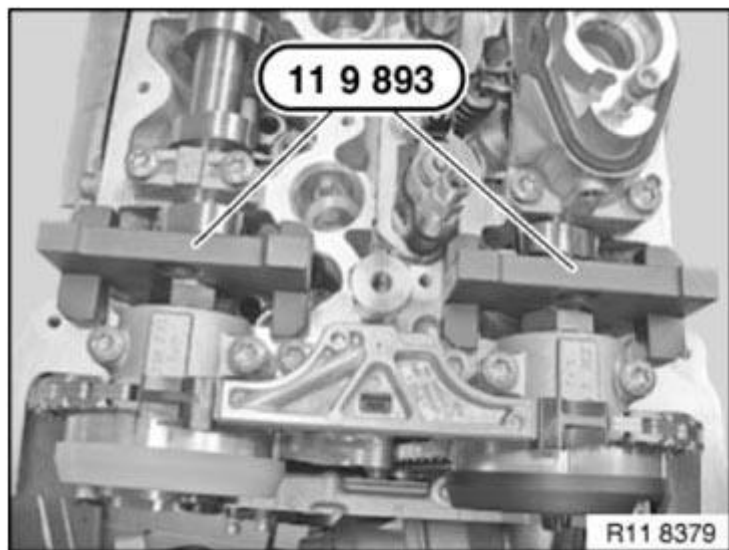


Fig. 302: Blocking Intake Camshaft Using Special Tool 11 9 893
Courtesy of BMW OF NORTH AMERICA, INC.

Install **INTAKE ADJUSTMENT UNITS**.

Adjust **VALVE TIMING**.

Assemble engine.

11 33 054 REMOVING AND INSTALLING/REPLACING ROCKER ARMS ON RIGHT SIDE (N74)

(cylinder bank 1 to 6)

Necessary preliminary tasks:

- Remove right INTAKE CAMSHAFT.
- Remove right EXHAUST CAMSHAFT.

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

Tolerance classes are not required.

Remove rocker arm (1) and set down in a tidy and orderly fashion in special tool 11 4 480.

Install rocker arm (1).

Align all rocker arms (1) straight.

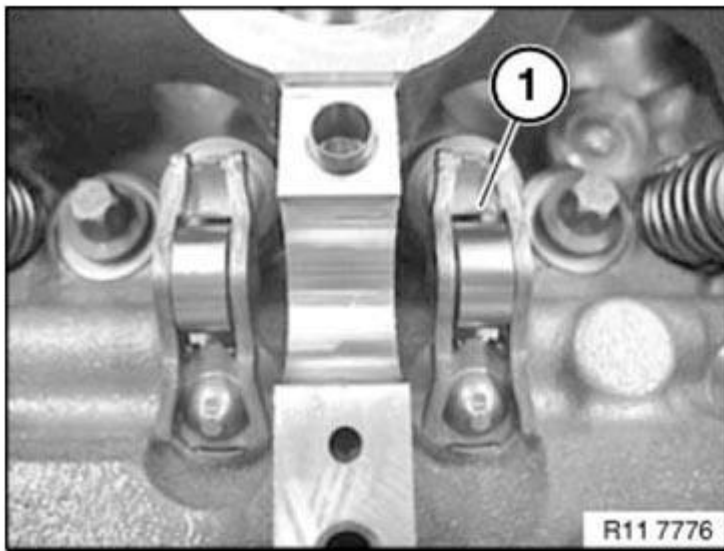


Fig. 303: Identifying Rocker Arm

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 094 REMOVING HYDRAULIC CHAIN TENSIONER FOR TIMING CHAINS ON LEFT SIDE (N74)

WARNING: Chain tensioner is pre-tensioned.
Release lock pin only in installed state.

Risk of injury!

IMPORTANT: Risk of damage!

The engine must not be cranked when the chain tensioner is removed.

The timing chain may jump.

Necessary preliminary tasks:

- Remove **TIMING CASE COVER** at top left

Crank engine back at central bolt (1) against direction of engine rotation by approx. 90°.

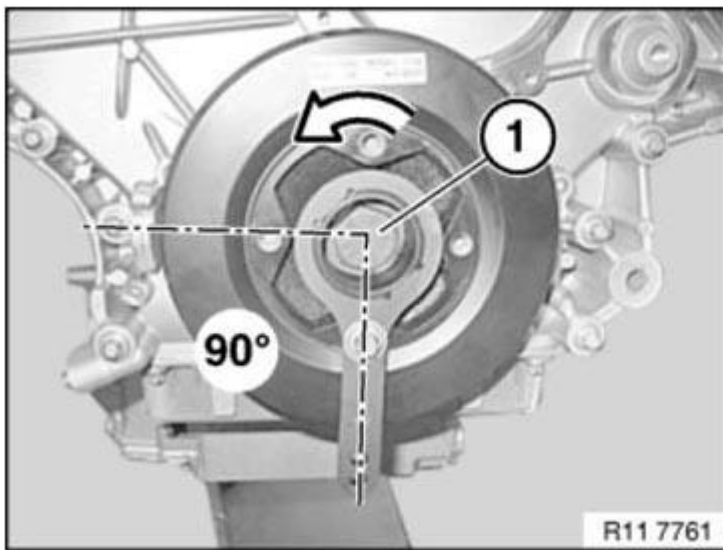


Fig. 304: Turning Central Bolt Approx. 90° Against Direction Of Engine Rotation
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The timing chain on the chain tensioner becomes the tight end on cranking back.

Do not crank engine without chain tensioner or special tool **11 9 900** .

Piston (1) of chain tensioner must be pressed in against oil pressure in housing (see arrow in illustration).

NOTE: Graphics show N63.

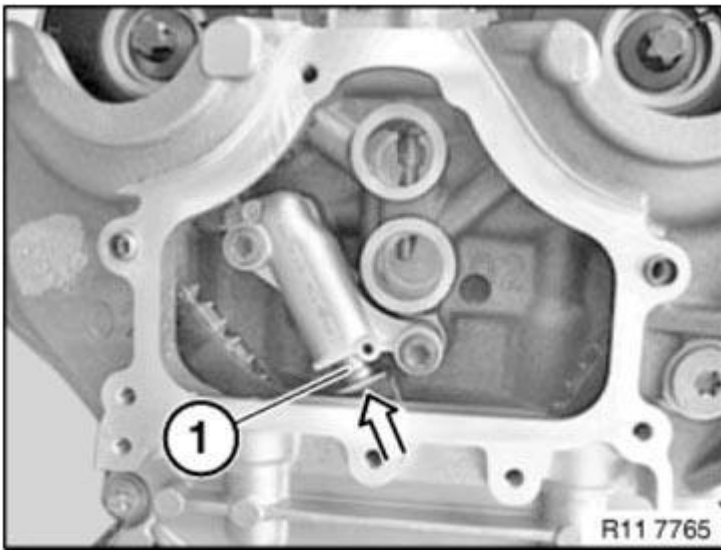


Fig. 305: Pressing Chain Tensioner Piston
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 4 120 or 3.5 mm drill in drill hole.

WARNING: Piston of chain tensioner is now secured.

Release screws (1).

Tightening torque: see 7AZ in 11 31 CAMSHAFT

Remove chain tensioner (2).

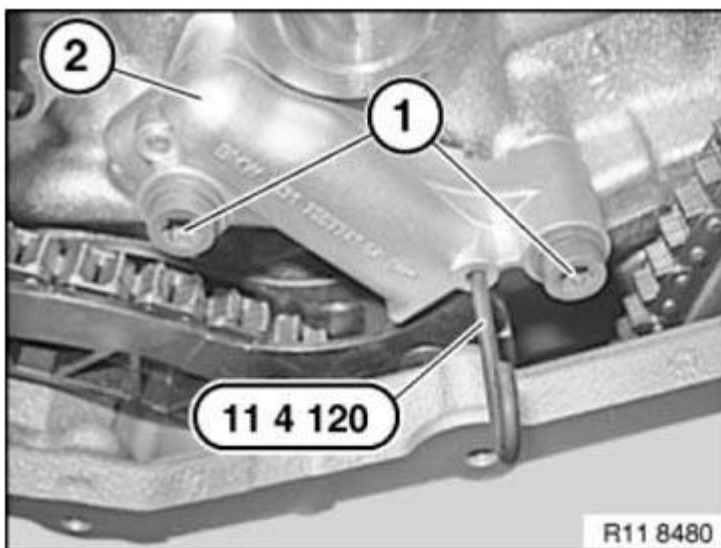


Fig. 306: Removing Chain Tensioner

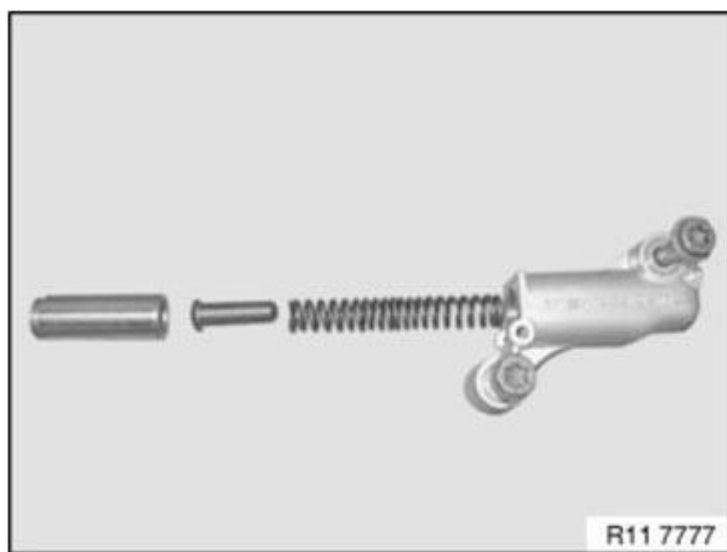
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of injury!

Chain tensioner is pre-tensioned.

Chain tensioner arrangement:

- Piston
- Expansion element
- Compression spring
- Housing

**Fig. 307: Identifying Chain Tensioner Components**

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace all gaskets and sealing rings .

Assemble engine.

11 31 095 REMOVING HYDRAULIC CHAIN TENSIONER FOR TIMING CHAINS ON RIGHT SIDE (N74)

**WARNING: Chain tensioner is pre-tensioned.
Release lock pin only in installed state.**

Risk of injury!**IMPORTANT: Risk of damage!**

The engine must not be cranked when the chain tensioner is removed.

The timing chain may jump.

Necessary preliminary tasks:

- Remove **TIMING CASE COVER** at top right

Crank engine back at central bolt (1) against direction of engine rotation by approx. 180°.

NOTE: Illustration shows N63.

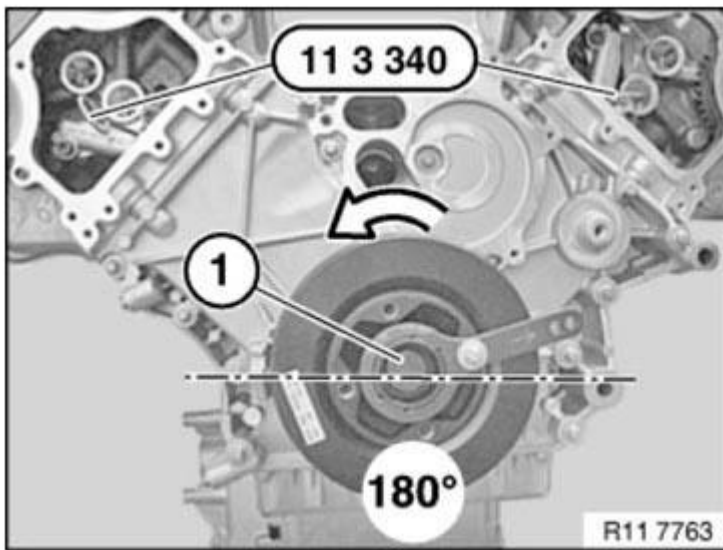


Fig. 308: Turning Central Bolt Against Direction Of Engine Rotation By Approx. 180°
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The timing chain on the chain tensioner becomes the tight end on cranking back.

Do not crank engine without chain tensioner or special tool **11 9 900** .

Piston (1) of chain tensioner must be pressed in against oil pressure in housing (see arrow in illustration).

NOTE: Illustration shows N63.

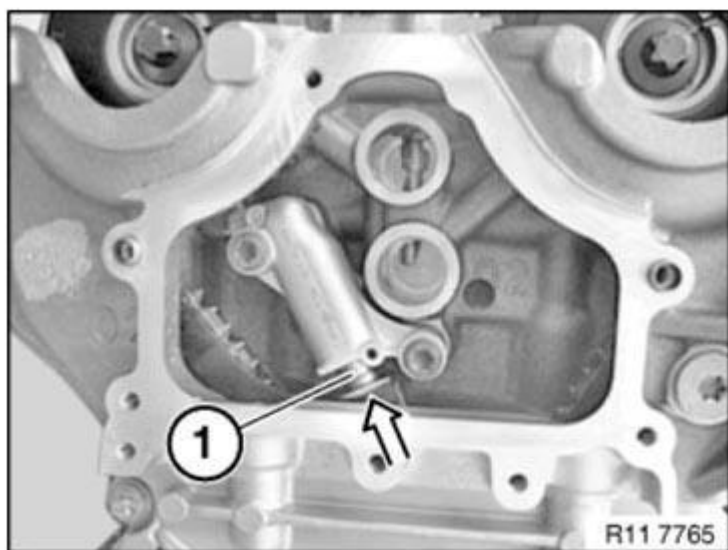


Fig. 309: Pressing Chain Tensioner Piston
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 11 4 120 into bore hole.

Release screws (1).

Tightening torque: see 7AZ in 11 31 CAMSHAFT

Remove chain tensioner (2).

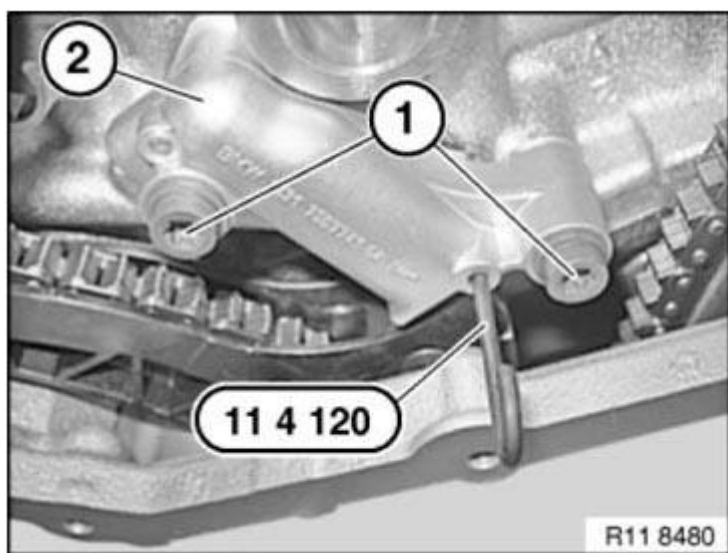


Fig. 310: Removing Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of injury!

Chain tensioner is under high preload force.

Chain tensioner arrangement:

- Piston
- Expansion element
- Compression spring
- Housing

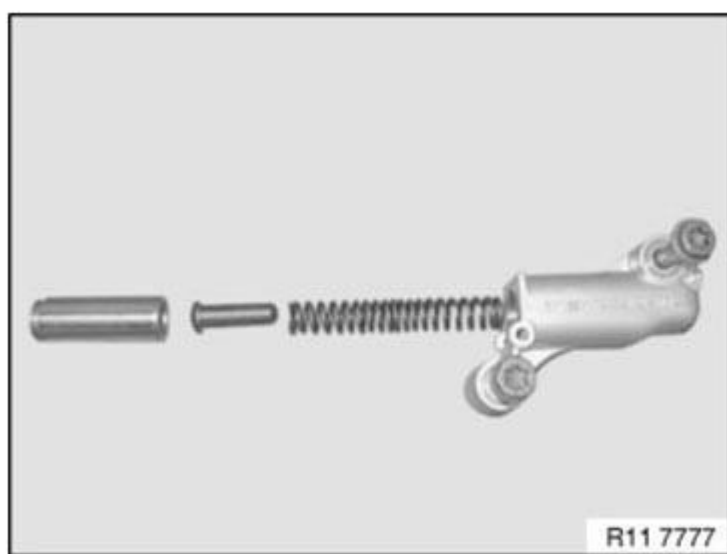


Fig. 311: Identifying Chain Tensioner Components
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace all gaskets and sealing rings .

Assemble engine.

11 31 052 REPLACING BOTH TIMING CHAINS (N74)

WARNING: Burning hazard! Wear gloves.

Necessary preliminary tasks:

- Remove lower **TIMING CASE COVER**
- To facilitate removal and installation of timing chains, turn engine over with special tool **00 2 300**

Timing drive, cylinders 1 to 6 .

Remove guide rail (5) from bearing bolt.

Remove timing chain (3) with tensioning rail (4) from bearing bolt.

Timing drive, cylinders 7 to 12 .

Remove guide rail (1) from bearing bolt.

Remove timing chain (2) with tensioning rail (6) from bearing bolt.

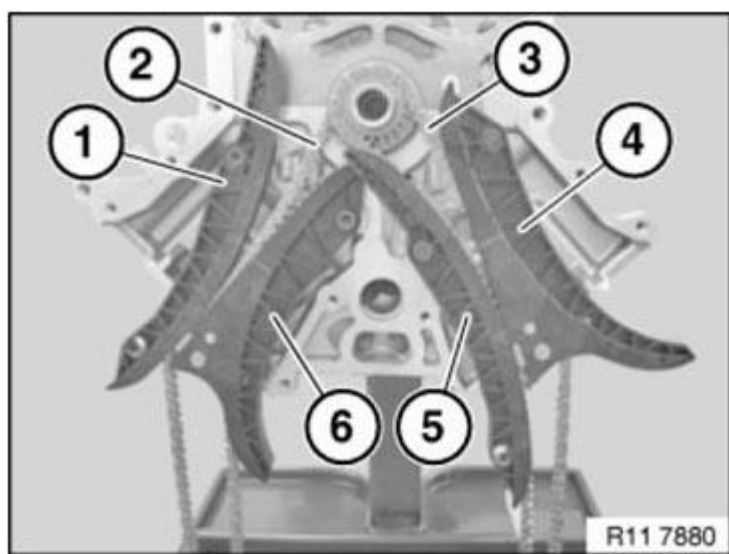


Fig. 312: Identifying Timing Chain, Guide And Tensioning Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Timing drive, cylinders 1 to 6 .

Release bearing bolts (2) with a suitable tool.

Tightening torque: see 1AZ in **11 31 CAMSHAFT**

Timing drive, cylinders 7 to 12 .

Release bearing bolts (1).

Tightening torque: see 2AZ in **11 31 CAMSHAFT**

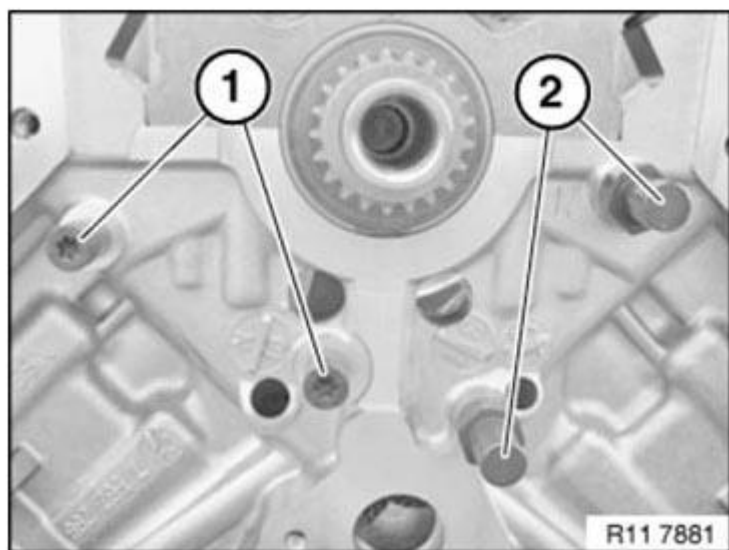


Fig. 313: Identifying Bearing Bolts

Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tools **11 2 001** and **11 2 002** to the crankshaft.

Insert special tool **11 2 007** and remove sprocket wheel with special tool **11 2 003**.

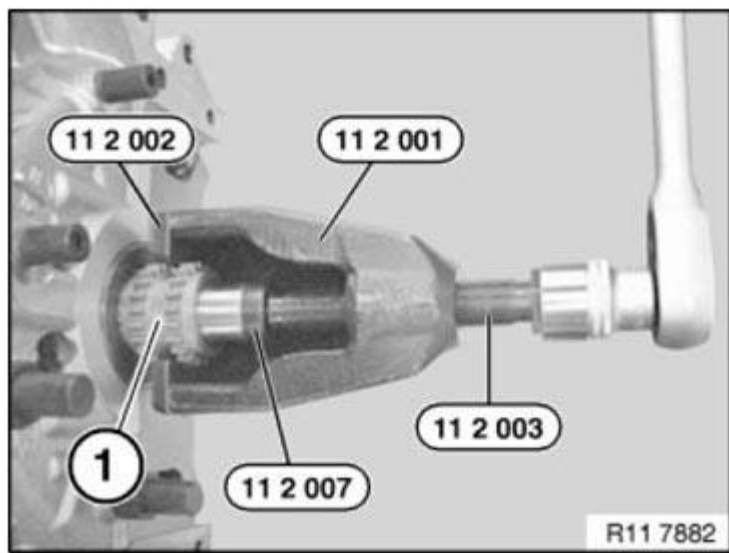


Fig. 314: Removing Sprocket Wheel Using Special Tool 11 2 003

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure Woodruff key (1) is installed in correct position in crankshaft (2).

Installation:

Check sprocket wheels for wear, replace if necessary.

Heat sprocket wheel to 60 °C .

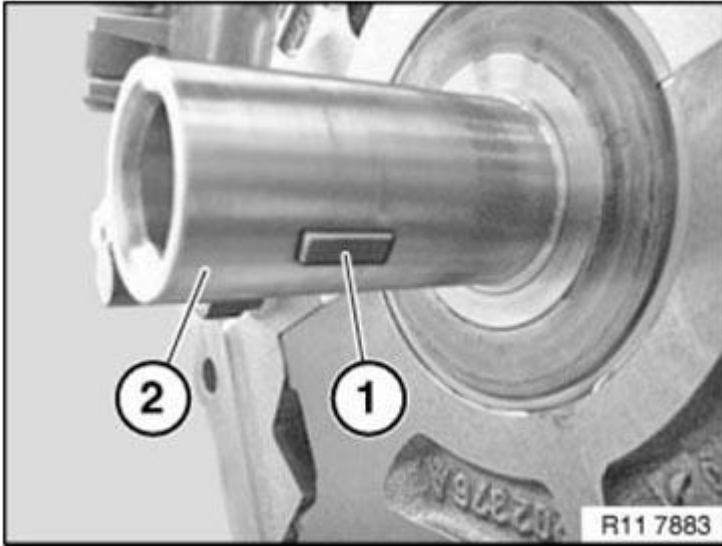


Fig. 315: Identifying Woodruff Key And Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Scalding hazard!
Wear gloves.

Installation:

Maintain tension of timing chains when installing timing case cover.

Observe sparking protection on timing case cover.

Make sure timing chain (1) is correctly installed when placing it in guide rail (3).

Assemble engine.

ROCKER ARM WITH BEARING MOUNT

11 33 062 REMOVING AND INSTALLING/REPLACING ALL HYDRAULIC VALVE CLEARANCE COMPENSATING ELEMENTS (HVC) (N74)

Necessary preliminary tasks:

- Remove all **ROCKER ARMS**.

Remove hydraulic valve clearance compensating elements (1) in direction of arrow.

If the compensating elements are to be reused, set then down in neat order in special tool 11 4 480.

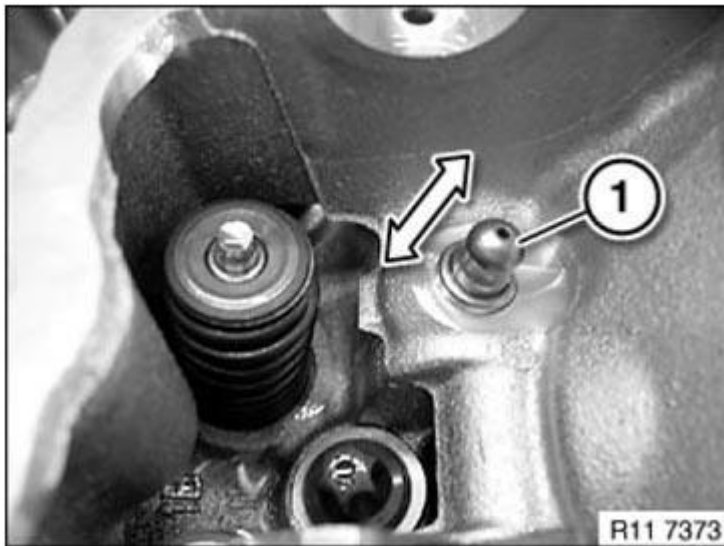


Fig. 316: Identifying Hydraulic Valve Clearance Compensating Elements Removing Direction
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 33 052 REMOVING AND INSTALLING/REPLACING ALL ROCKER ARMS ON LEFT SIDE (N74)

(cylinder bank 7 to 12)

Necessary preliminary tasks:

- Remove LEFT INTAKE CAMSHAFT.
- Remove left EXHAUST CAMSHAFT.

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

Tolerance classes are not required.

Remove rocker arm (1) and set down in a tidy and orderly fashion in special tool 11 4 480.

Install rocker arm (1).

Align all rocker arms (1) straight.

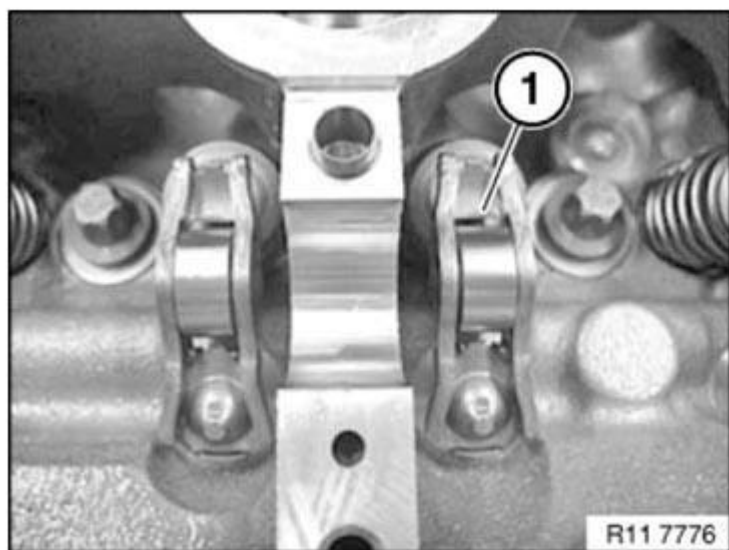


Fig. 317: Identifying Rocker Arm

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 33 054 REMOVING AND INSTALLING/REPLACING ROCKER ARMS ON RIGHT SIDE (N74)

(cylinder bank 1 to 6)

Binary tasks

- Remove right INTAKE CAMSHAFT.
- Remove right EXHAUST CAMSHAFT.

IMPORTANT: Used rocker arms (1) may only be reused in the same position.

Tolerance classes are not required.

Remove rocker arm (1) and set down in a tidy and orderly fashion in special tool 11 4 480.

Install rocker arm (1).

Align all rocker arms (1) straight.

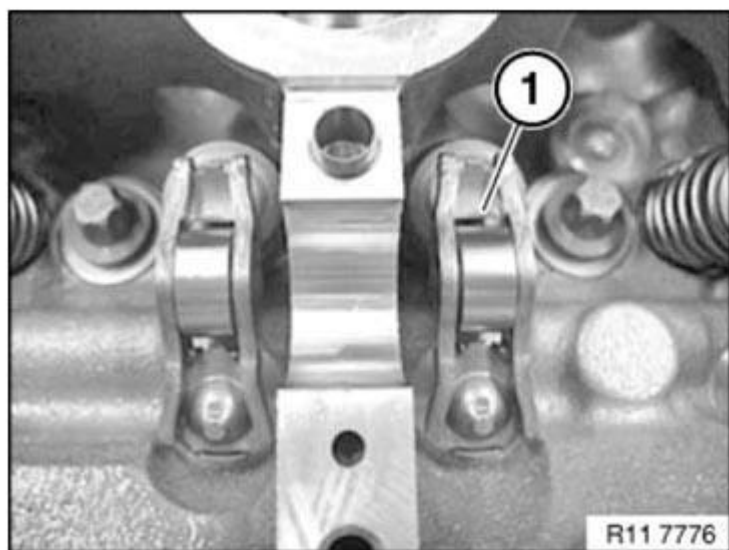


Fig. 318: Identifying Rocker Arm

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

VALVES WITH SPRINGS

11 34 552 REMOVING AND INSTALLING/REPLACING ALL VALVES (N74)

Necessary preliminary tasks:

- Remove LEFT CYLINDER HEAD.
- Remove RIGHT CYLINDER HEAD.
- Remove camshafts. See RIGHT INTAKE CAMSHAFT, RIGHT EXHAUST CAMSHAFT, LEFT INTAKE CAMSHAFT, and LEFT EXHAUST CAMSHAFT.

Release screws (1).

Remove cable duct.

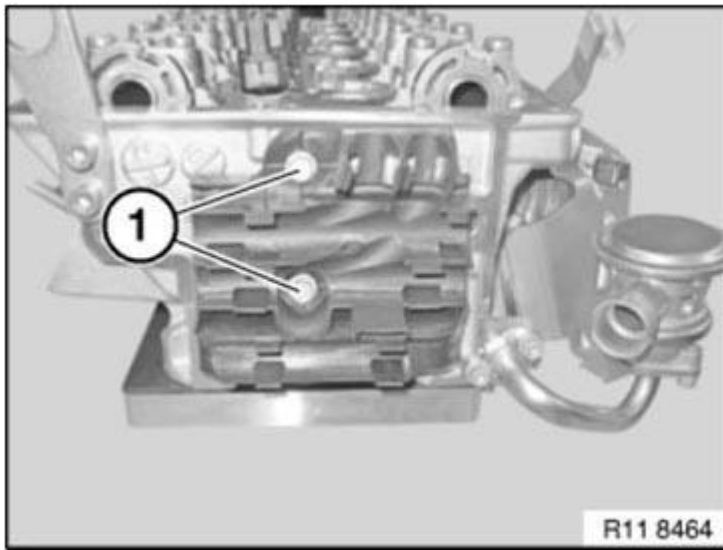


Fig. 319: Identifying Cable Duct Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Mount cylinder head (1) on special tool **11 9 000** .

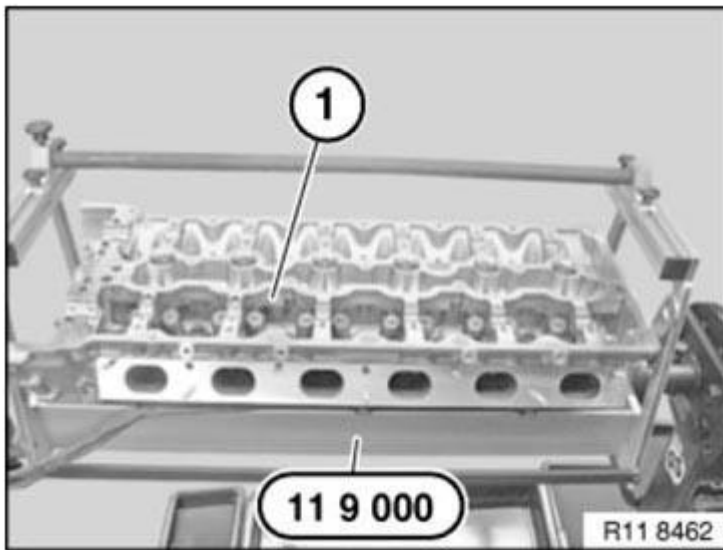


Fig. 320: Mounting Cylinder Head On Special Tool 11 9 000
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare special tool **11 9 008** on special tool **11 9 006** .

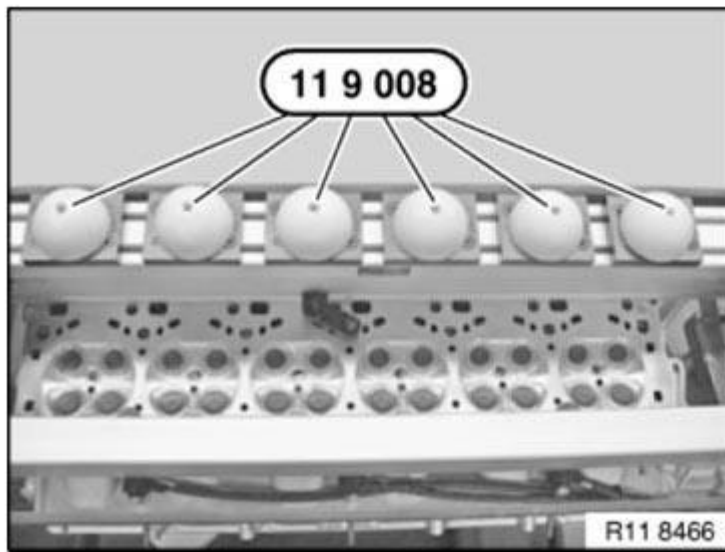


Fig. 321: Identifying Special Tool 11 9 008
 Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 9 006 with silicone cushion on cylinder head.

Slide locks (1) in direction of arrow and pretension with eccentric shaft.

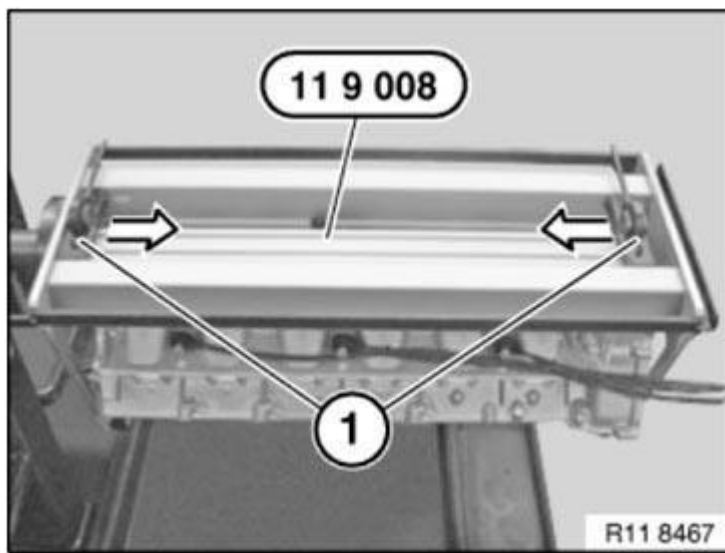


Fig. 322: Sliding Locks
 Courtesy of BMW OF NORTH AMERICA, INC.

Press down valve spring with special tool 11 8 840 .

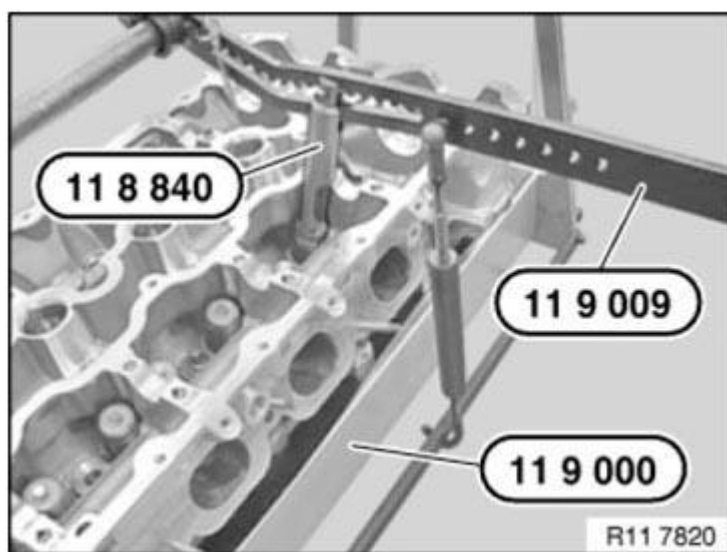


Fig. 323: Pressing Down Valve Spring Using Special Tool 11 8 840
Courtesy of BMW OF NORTH AMERICA, INC.

Remove valve cotters (1) with a magnet.

Place valve springs and valve keys on special tool 11 4 480 in an orderly manner.

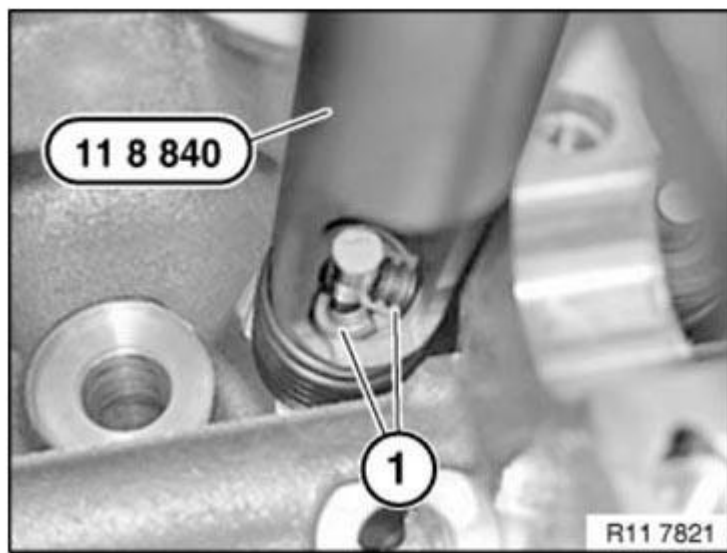


Fig. 324: Identifying Valve Cotters
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect installation possible.

Incorrect installation will result in valve spring breakage.

Color marking (1) is normally on lower end of valve spring.

Only the diameter is decisive for the correct installation of the valve springs.

Install valve spring so that larger diameter points to spring plate at bottom.

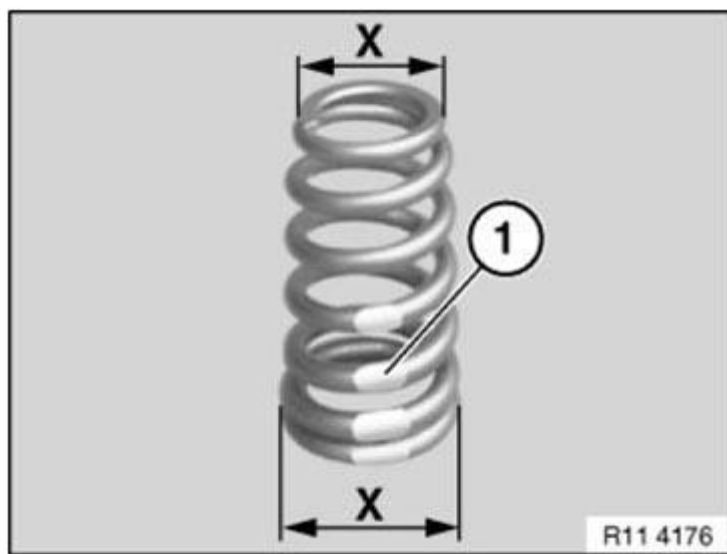


Fig. 325: Identifying Color Marking On Valve Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement

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

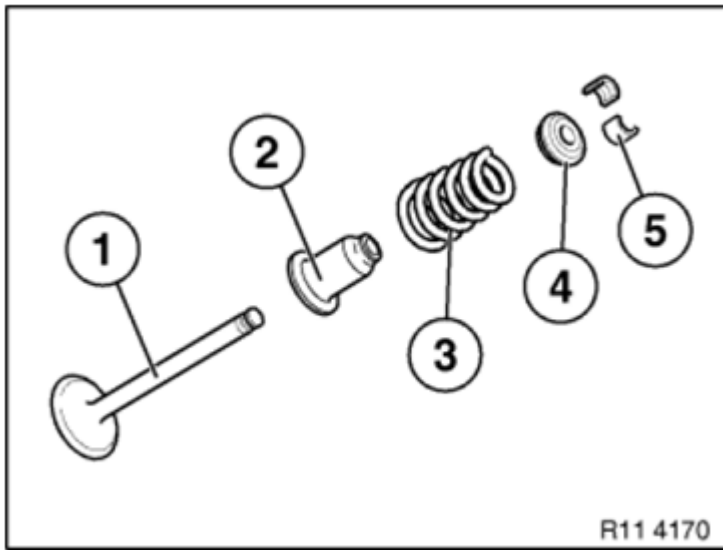


Fig. 326: Identifying Valve, Valve Stem Seal, Keys, Spring And Top Plate Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Release special tool **11 9 006** from cylinder head.

Remove all valves and place on special tool **11 4 480** in an orderly manner.

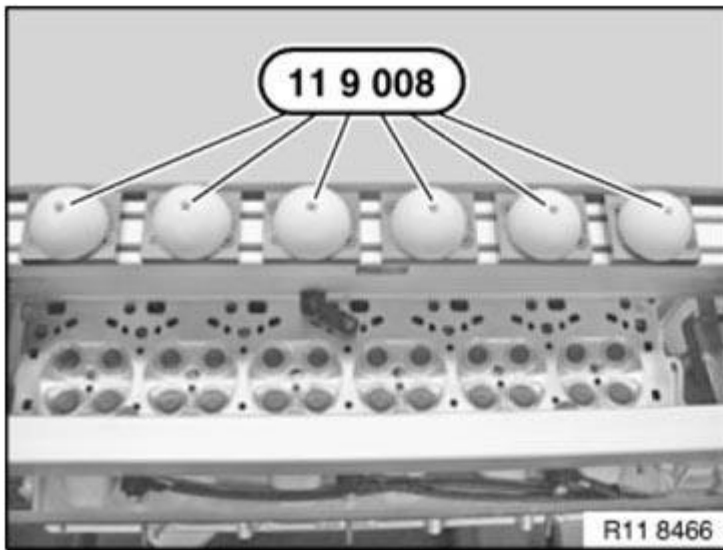


Fig. 327: Identifying Special Tool 11 9 008
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 34 715 REPLACING ALL VALVE SPRINGS (N74)

Necessary preliminary tasks:

- Remove LEFT CYLINDER HEAD.
- Remove RIGHT CYLINDER HEAD.
- Remove camshafts. See RIGHT INTAKE CAMSHAFT, RIGHT EXHAUST CAMSHAFT, LEFT INTAKE CAMSHAFT, and LEFT EXHAUST CAMSHAFT.

Release screws (1).

Remove cable duct.

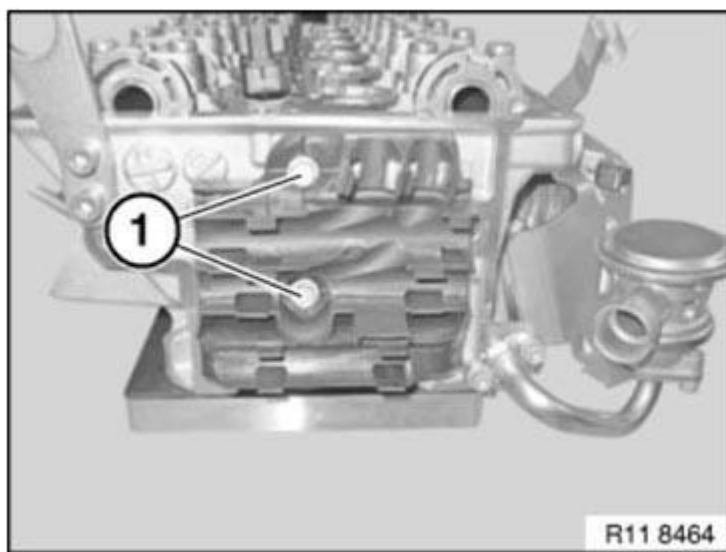


Fig. 328: Identifying Cable Duct Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Mount cylinder head (1) on special tool 11 9 000 .

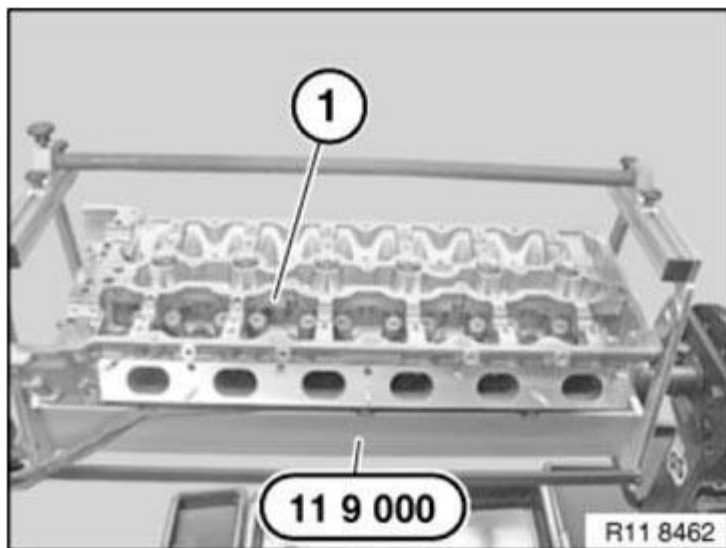


Fig. 329: Mounting Cylinder Head On Special Tool 11 9 000
 Courtesy of BMW OF NORTH AMERICA, INC.

Prepare special tool **11 9 008** on special tool **11 9 006**.

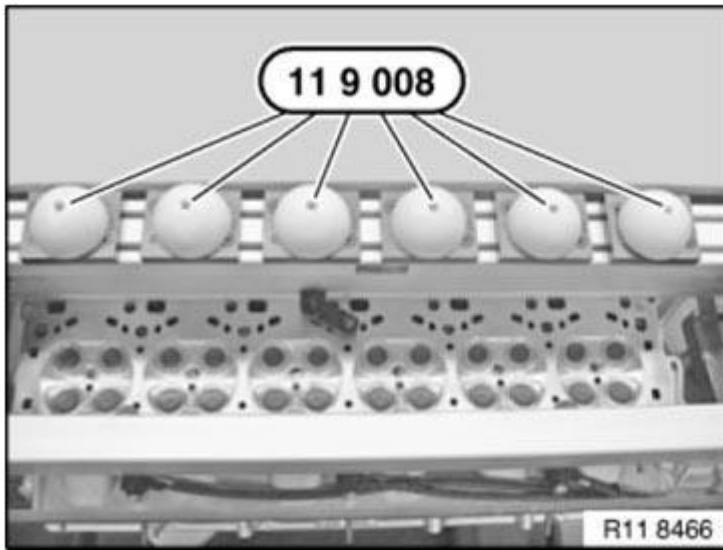


Fig. 330: Identifying Special Tool 11 9 008
 Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **11 9 006** with silicone cushion on cylinder head.

Slide locks (1) in direction of arrow and pretension with eccentric shaft.

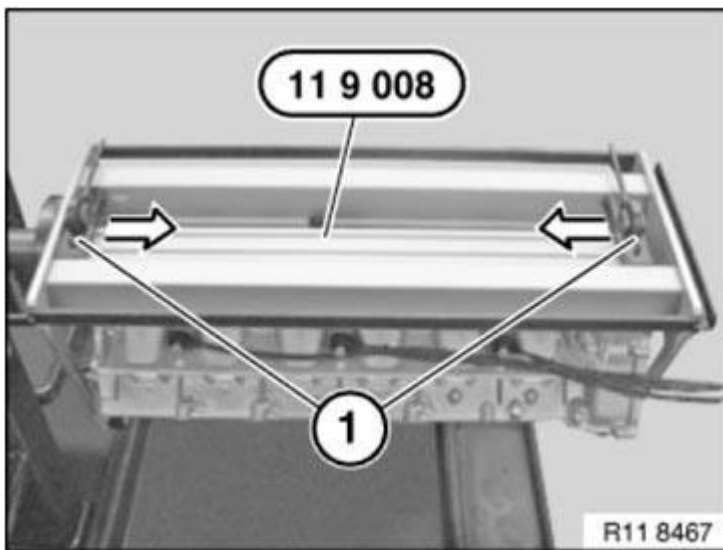


Fig. 331: Sliding Locks
 Courtesy of BMW OF NORTH AMERICA, INC.

Press down valve spring with special tool **11 8 840** .

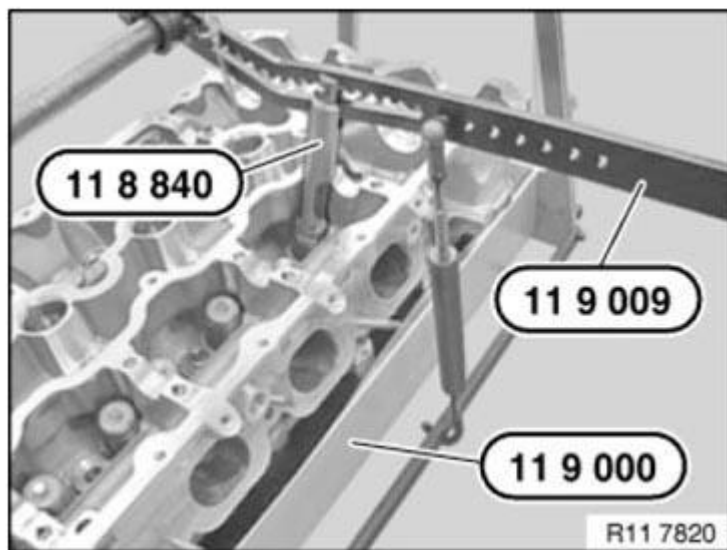


Fig. 332: Pressing Down Valve Spring Using Special Tool 11 8 840
Courtesy of BMW OF NORTH AMERICA, INC.

Remove valve cotters (1) with a magnet.

Place valve springs and valve keys on special tool 11 4 480 in an orderly manner.

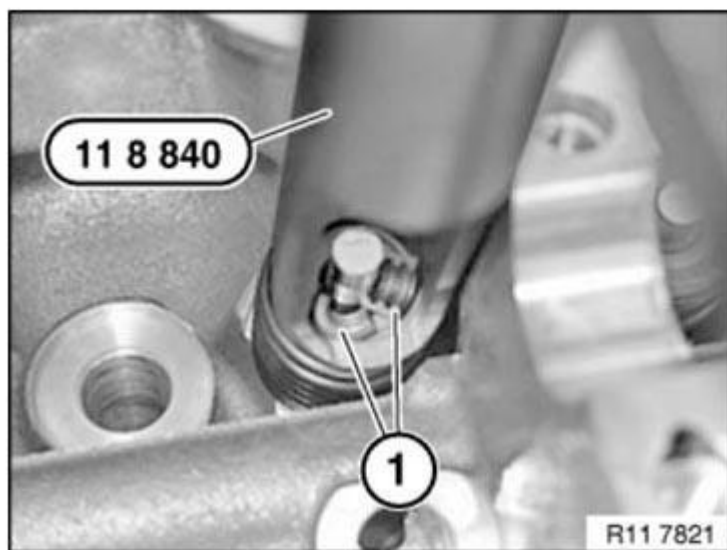


Fig. 333: Identifying Valve Cotters
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect installation possible.

Incorrect installation will result in valve spring breakage.

Color marking (1) is normally on lower end of valve spring.

Only the diameter is decisive for the correct installation of the valve springs.

Install valve spring so that larger diameter points to spring plate at bottom.

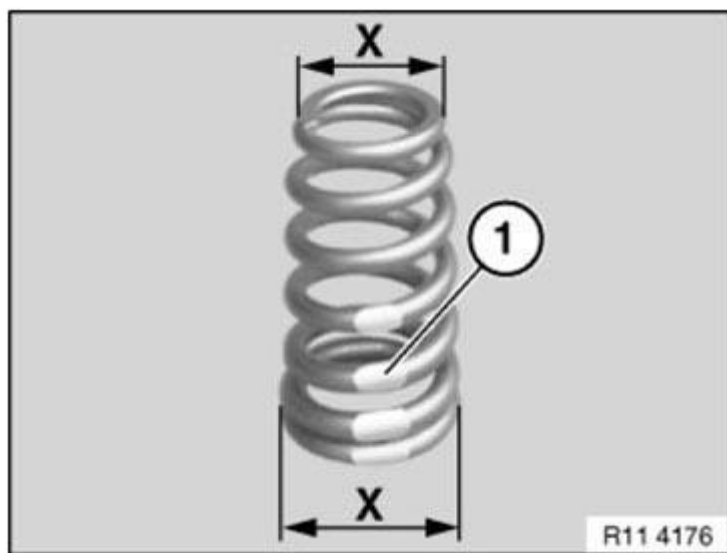


Fig. 334: Identifying Color Marking On Valve Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement

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

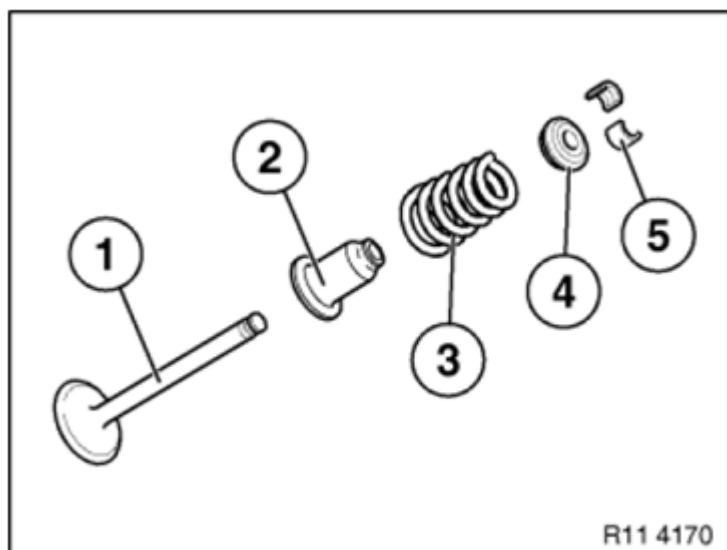


Fig. 335: Identifying Valve, Valve Stem Seal, Keys, Spring And Top Plate Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 34 560 REPLACING ALL VALVE STEM SEALS (N74)

IMPORTANT: Risk of damage to sealing lip on valve stem seal.
Fit new valve stem seals only when all valves have been installed.

Necessary preliminary tasks:

- Remove all **VALVE SPRINGS**.

Press special tool **11 6 370** onto the valve stem seal.

Withdraw valve stem seal by turning and simultaneously unscrewing special tool **11 6 370**.

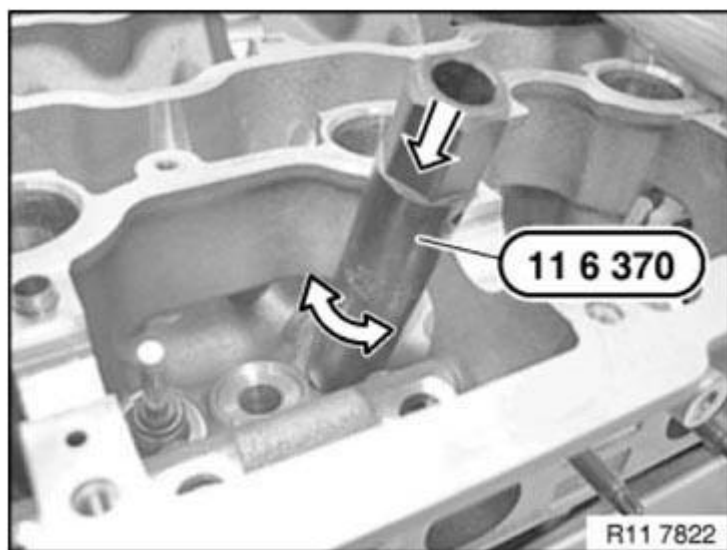


Fig. 336: Pressing Special Tool 11 6 370 Onto Valve Stem Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Lubricate valve stem with oil and insert valve.

Installation sleeve 11 1 380 is included in the delivery specification for the valve stem seals.

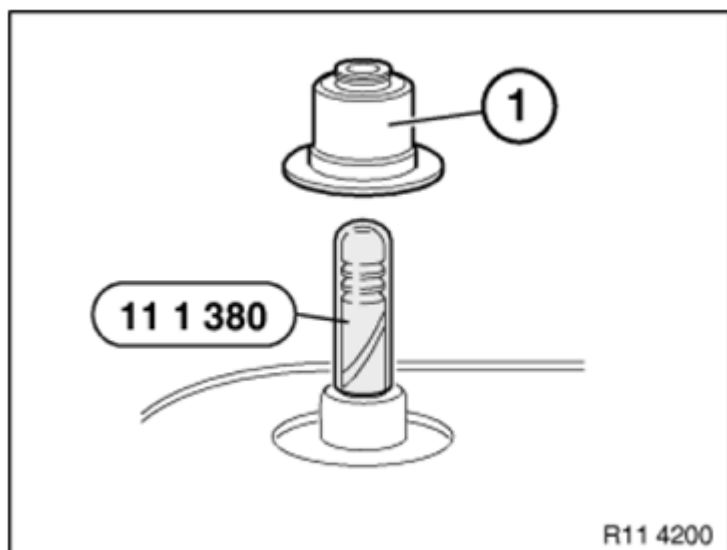


Fig. 337: Identifying Valve Stem Seal And Special Tool 11 1 380
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 1 380 .

Coat new valve stem seal (1) with oil and install.

NOTE: For use on the N74 engine, the special tool **11 6 380** must be remachined according to the sketch with a 6.2 mm drill bit dia. to a depth of A = approx. 45 mm.

This modification has already been taken into account for reordering.

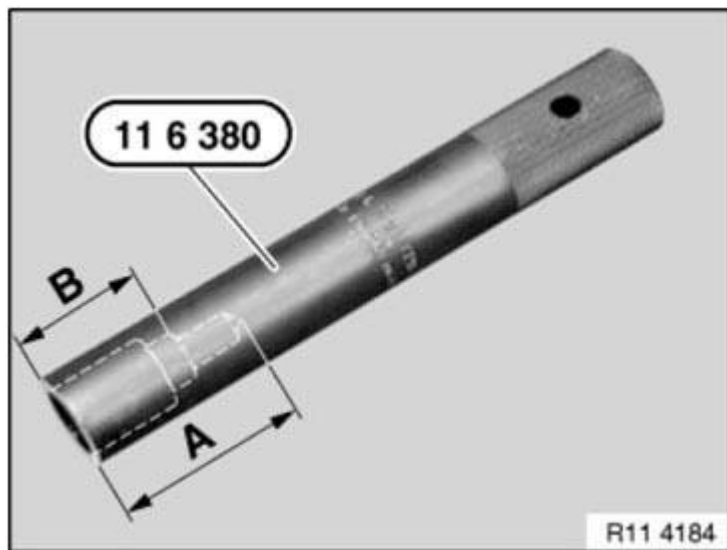


Fig. 338: Identifying Special Tool 11 6 380 Modification Dimensions
Courtesy of BMW OF NORTH AMERICA, INC.

Manually press on valve stem seal as far as it will go with special tool **11 6 380**.

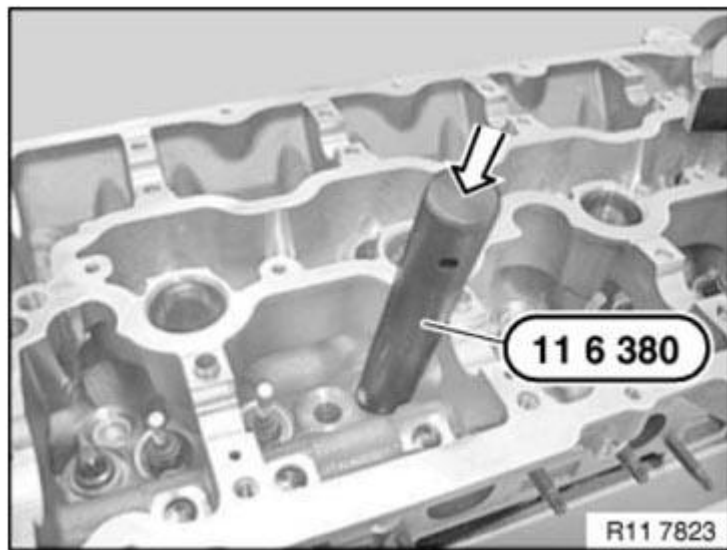


Fig. 339: Pressing Valve Stem Seal Using Special Tool 11 6 380
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

VARIABLE CAMSHAFT TIMING

11 36 720 REMOVING AND INSTALLING/RENEWING BOTH SOLENOID VALVES ON RIGHT SIDE (N74)

IMPORTANT: Always check that the solenoid valves are clean during removal and installation.

Possible malfunctions if valves are contaminated:

- Rough running
- OBD incorrect entry
- Poor exhaust gas values
- Low engine power

IMPORTANT: Risk of damage!

Do not clean solenoid valves with compressed air.

Solenoid valves, cylinders 1-6

Necessary preliminary tasks:

- Read out fault memory in DME control unit
- Switch off ignition.
- Remove **FAN COWL WITH ELECTRIC FAN** .
- Remove **VACUUM PUMP**.
- Loosen expansion tank and carefully press to the side.

NOTE: Top solenoid valve controls the exhaust adjustment unit.

Bottom solenoid valve controls the inlet adjustment unit.

Unlock plug connections of solenoid valves (2 and 4) and disconnect.

Installation:

Plug connections must snap audibly into place!

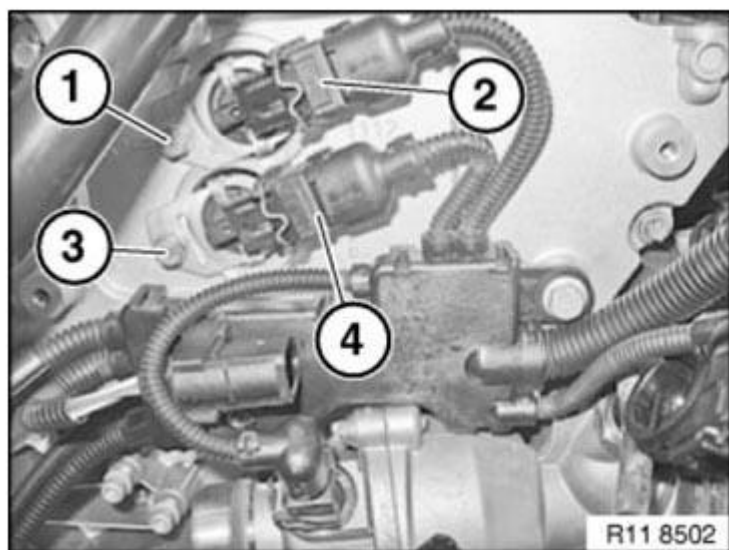


Fig. 340: Identifying Solenoid Valve Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (1 and 3).

Tightening torque: see 3AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

Pull out solenoid valves.

Installation:

Replace O-rings (1 and 2) on solenoid valve .

Installation:

To install solenoid valves, coat both O-rings with engine oil.

If the solenoid valve is to be reused, the filter strainer (see arrow in illustration) must be cleaned.

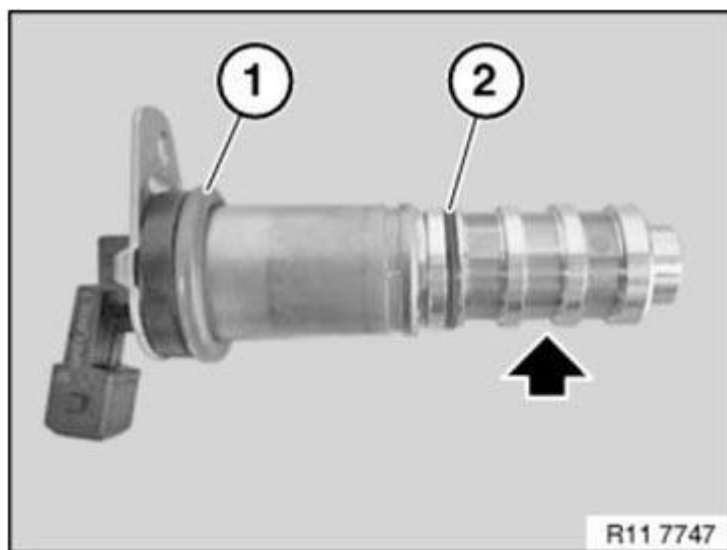


Fig. 341: Identifying Solenoid Valve O-Rings
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If a filter element is clogged with dirt, the filter element (filter strainer) may be removed.

Release filter elements (1) at contact edges.

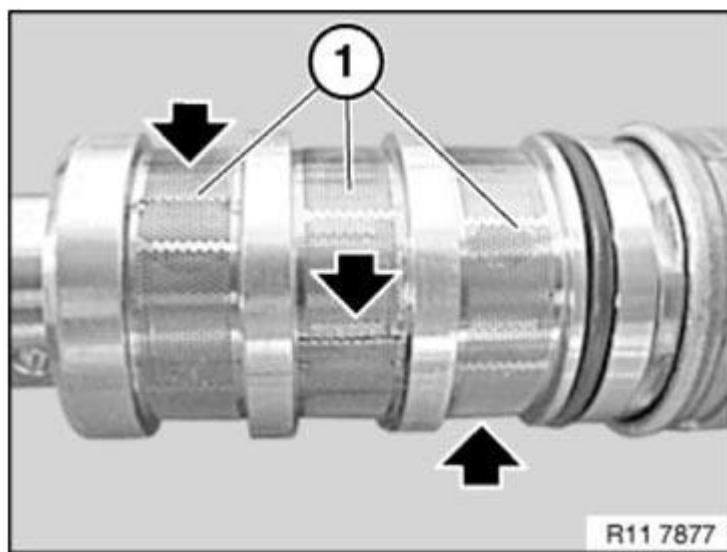


Fig. 342: Identifying Filter Elements
Courtesy of BMW OF NORTH AMERICA, INC.

Bend open welding spots on filter element (1) with a screwdriver (2) in direction of arrow until welding spots are opened.

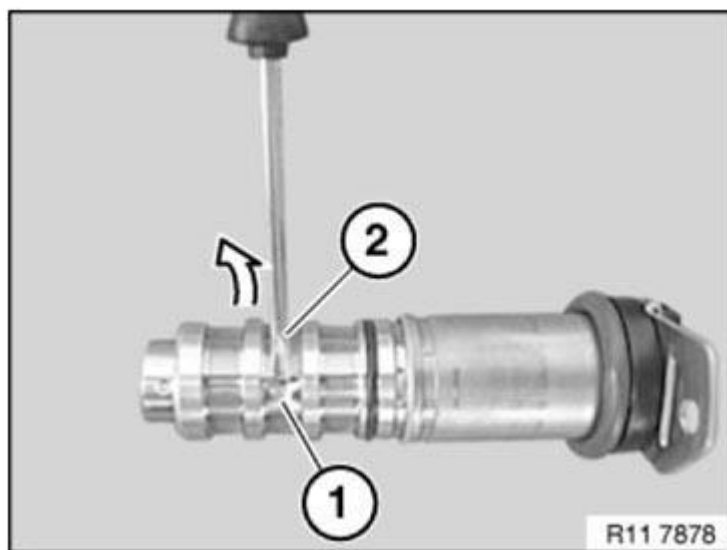


Fig. 343: Bending Open Welding Spots On Filter Element Using Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Avoid damaging, e.g. notches or scratches, the solenoid valve housing (see arrows in illustration).

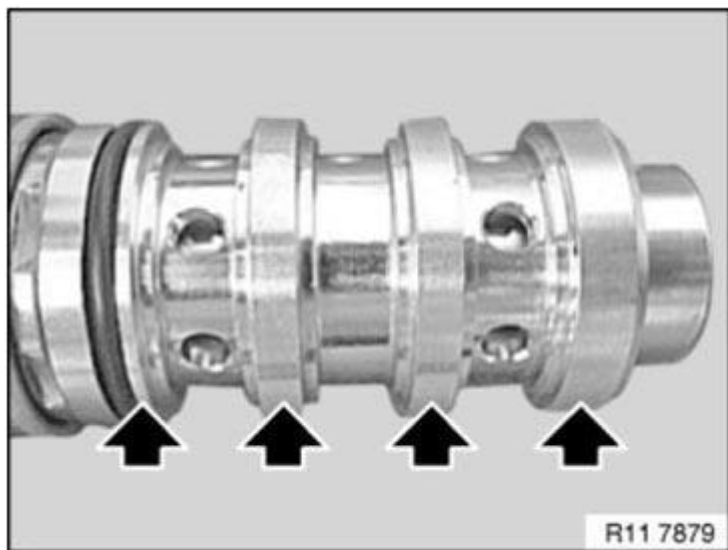


Fig. 344: Locating Solenoid Valve Housing Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully insert solenoid valves as far as they will go.

Ensure correct installation position.

Insert screws (1 and 3) and tighten down.

Tightening torque: see 3AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

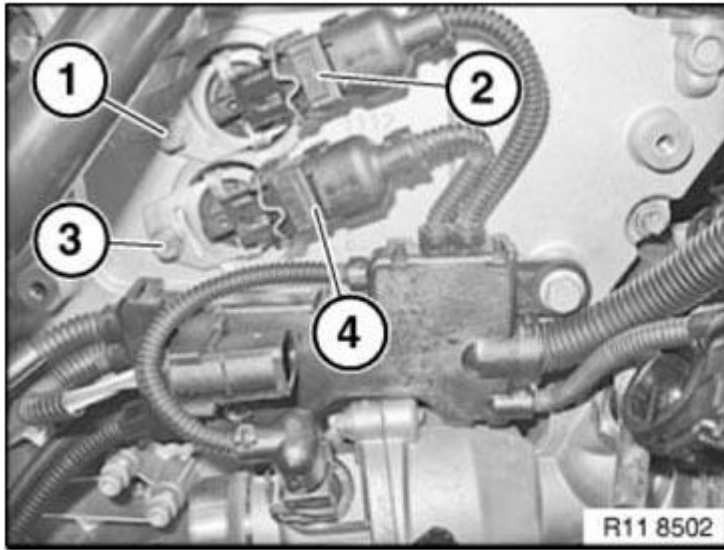


Fig. 345: Identifying Solenoid Valve Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Delete fault memory.

Check function of DME control unit.

11 36 047 REMOVING AND INSTALLING/RENEWING INLET AND EXHAUST CAMSHAFT ADJUSTERS ON LEFT SIDE (N74)

IMPORTANT: When the engine is shut down, the inlet and exhaust camshaft adjusters is normally locked in its initial position.

The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the camshaft adjuster.

(cylinder bank 7 to 12)

Necessary preliminary tasks:

- Read fault memory and make a documentary record
- Remove **LEFT CYLINDER HEAD COVER**
- Remove **LEFT TIMING CASE COVER**
- Check **TIMING**

To release central bolts, use special tool **11 9 890** or grip at hexagon head of camshaft.

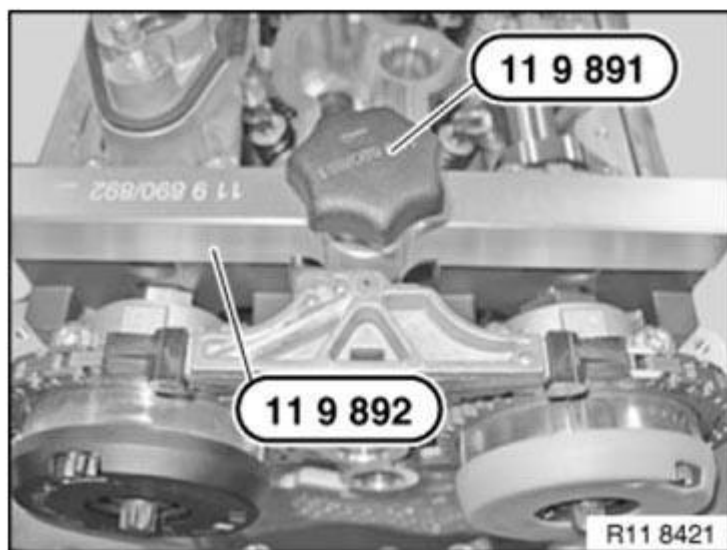


Fig. 346: Pressing Special Tool 11 9 892 Down With Special Tool 11 9 891
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If special tool 11 9 890 can not be fitted, it is necessary when releasing the central bolt to grip the hexagon head of the respective camshafts.

Release central bolts (1 and 2) of inlet and exhaust camshaft adjusters.

Installation:

Replace central bolts after releasing.

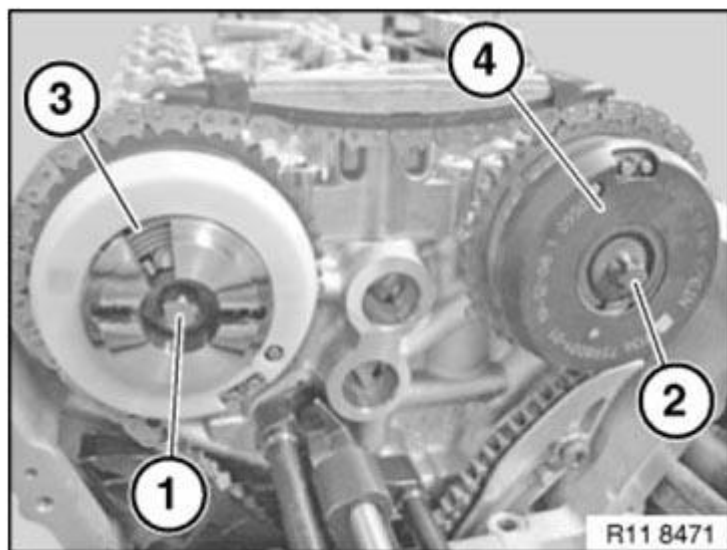


Fig. 347: Identifying Inlet And Exhaust Adjustment Units Central Bolts
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check whether head of central bolt (1) is greased (see arrow in illustration).

If no grease can be seen on the bolt head of central bolt (1), the VANOS gear must be replaced for safety reasons.

Installation:

Coat contact face of central bolt (1) with copper paste.

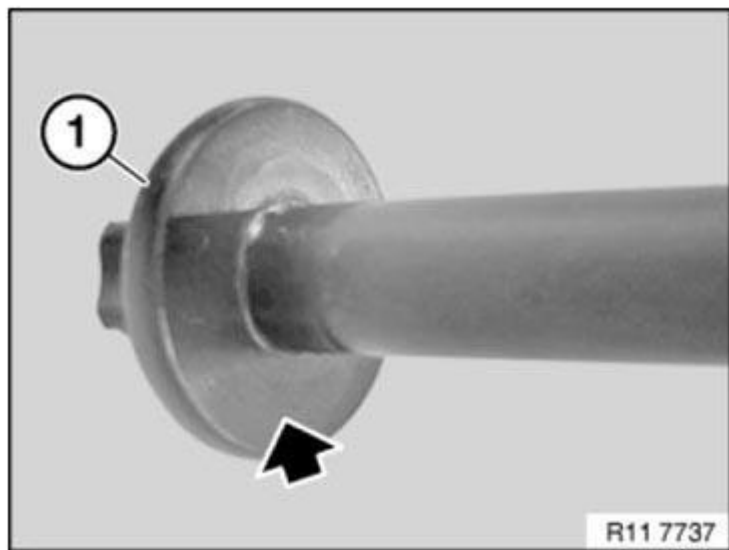


Fig. 348: Locating Central Bolt Coating Contact Face
Courtesy of BMW OF NORTH AMERICA, INC.

Release hexagon socket screw.

Release special tool **11 9 900** at knurled screws and remove.

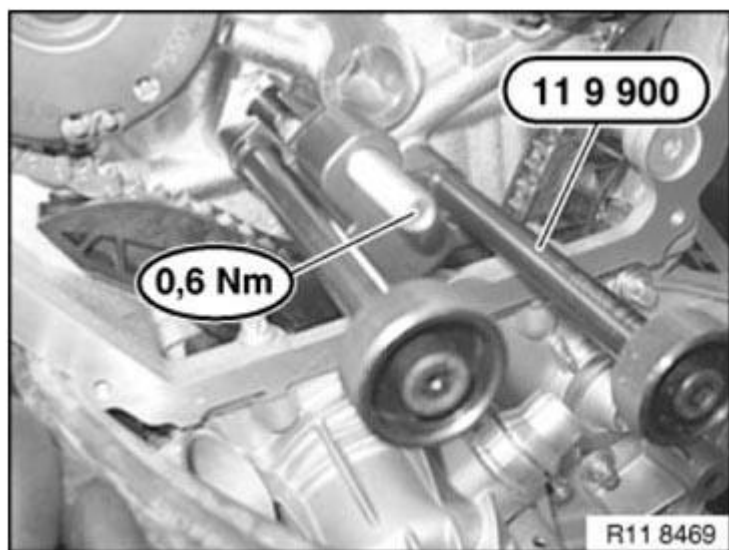


Fig. 349: Pretensioning Timing Chain Using Special Tool 11 9 900
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove upper tensioning rail (2).

Remove camshaft adjusters.

NOTE: Shown without special tools for purposes of clarity.

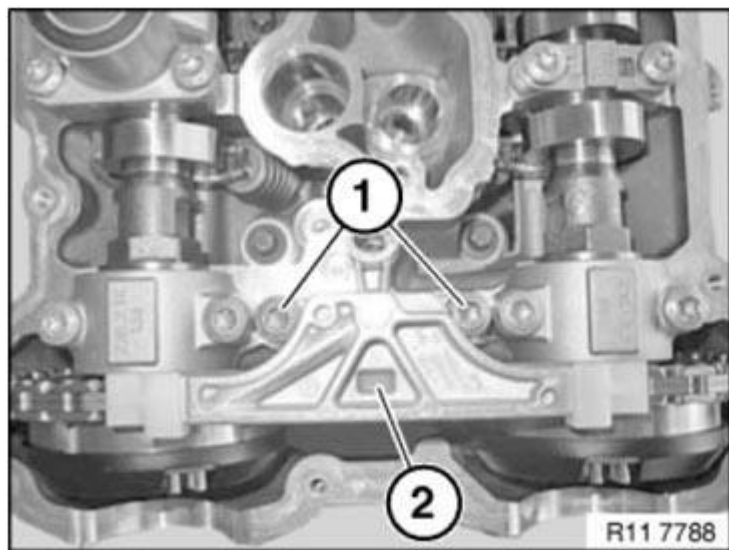


Fig. 350: Identifying Upper Tensioning Rail And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of mix-up:

Intake and exhaust camshaft adjusters are different.

Mixing up the inlet and exhaust camshaft adjusters will cause damage to the engine.

1. Inlet camshaft adjuster (1) is marked with **ON**
2. Exhaust (2) is marked with **OFF**

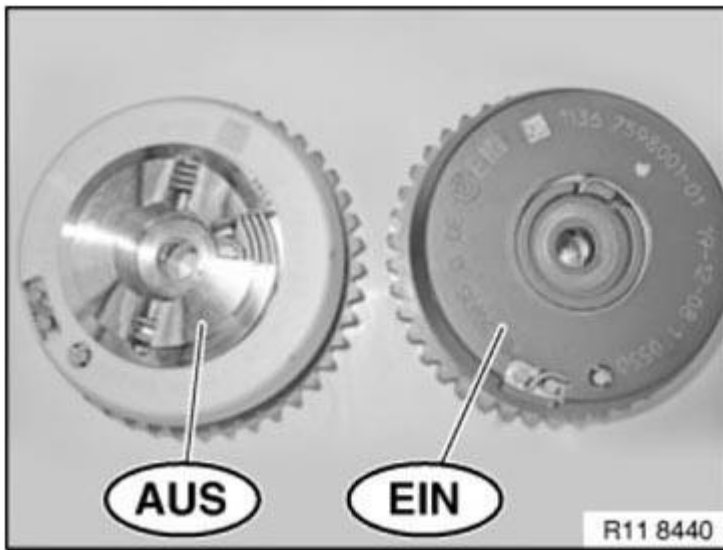


Fig. 351: Identifying Inlet And Exhaust Camshaft Adjusters Marking
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat contact face of central bolt (1) with copper paste.

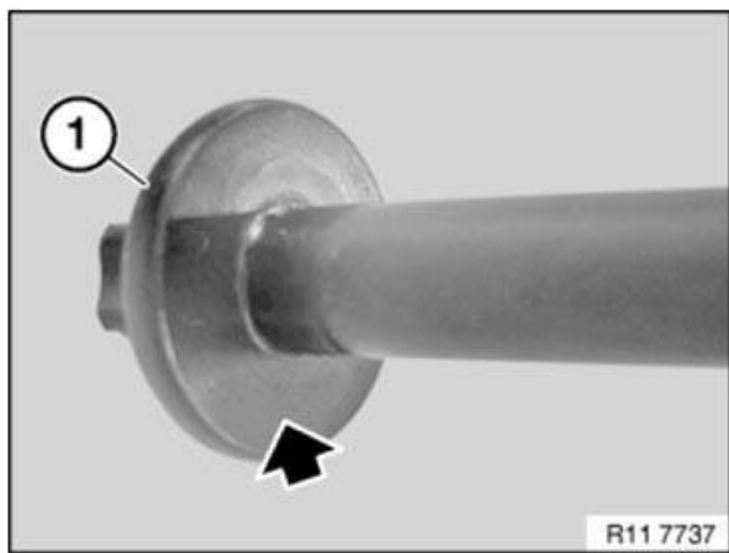


Fig. 352: Locating Central Bolt Coating Contact Face
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Position of camshaft adjusters (3 and 4) in relation to timing chain can be freely selected.

Feed camshaft adjuster into timing chain and position on camshafts.

Insert central bolts (1 and 2) on camshaft adjusters without gaps.

Release central bolts (1 and 2) by 90°.

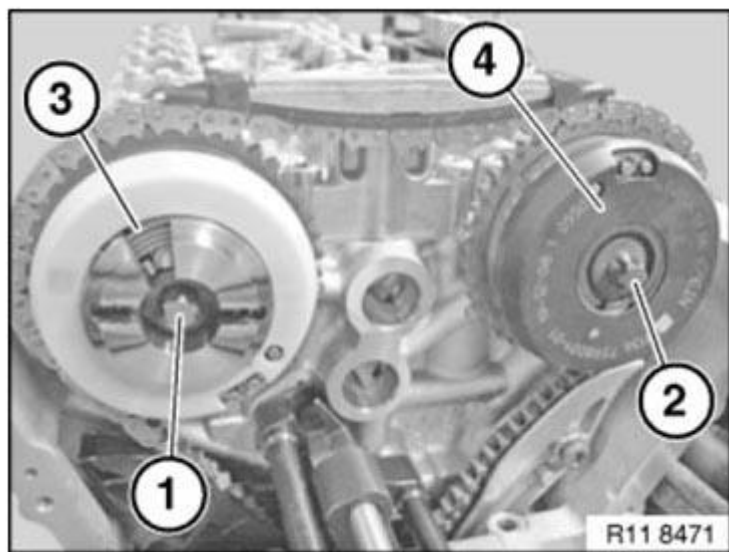


Fig. 353: Identifying Inlet And Exhaust Adjustment Units Central Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Fit sliding rail (2) and secure with screws (1).

Tightening torque: see 4AZ in **11 31 CAMSHAFT**

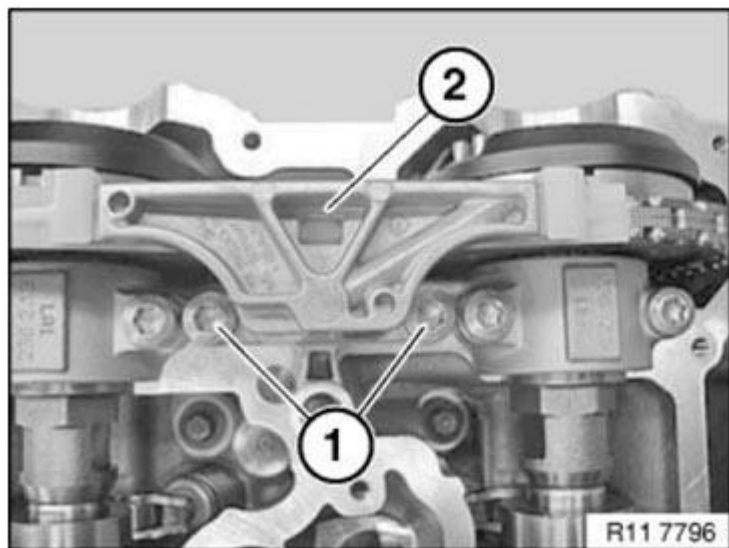


Fig. 354: Identifying Sliding Rail And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Get special tool **11 9 890** ready for securing camshafts.

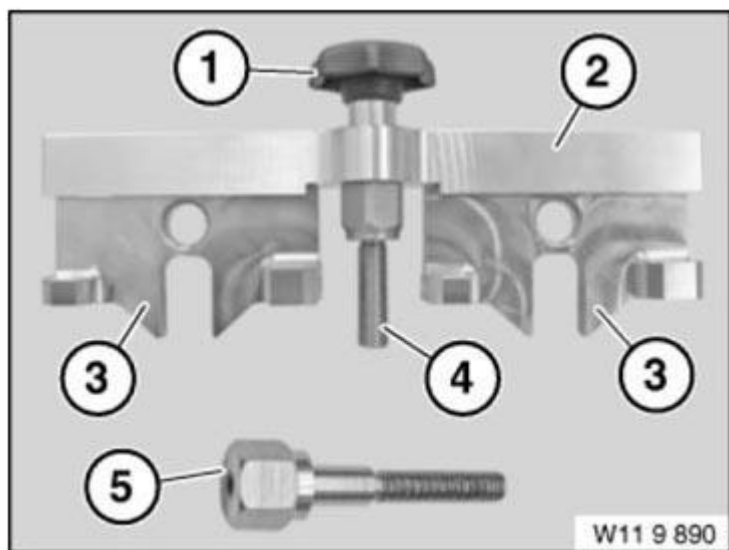


Fig. 355: Identifying Special Tools (11 9 890, 11 9 891, 11 9 892, 11 9 893, 11 9 895)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft.

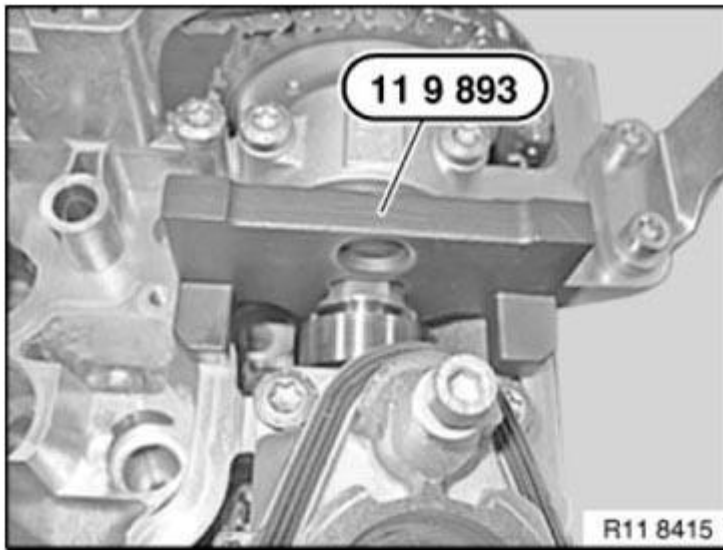


Fig. 356: Fitting Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 893 on exhaust camshaft.

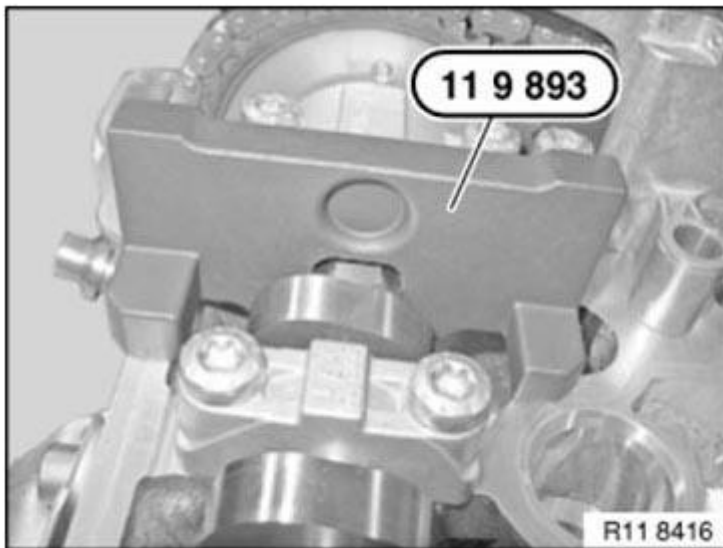


Fig. 357: Placing Special Tool 11 9 893 On Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 9 895 into cylinder head.

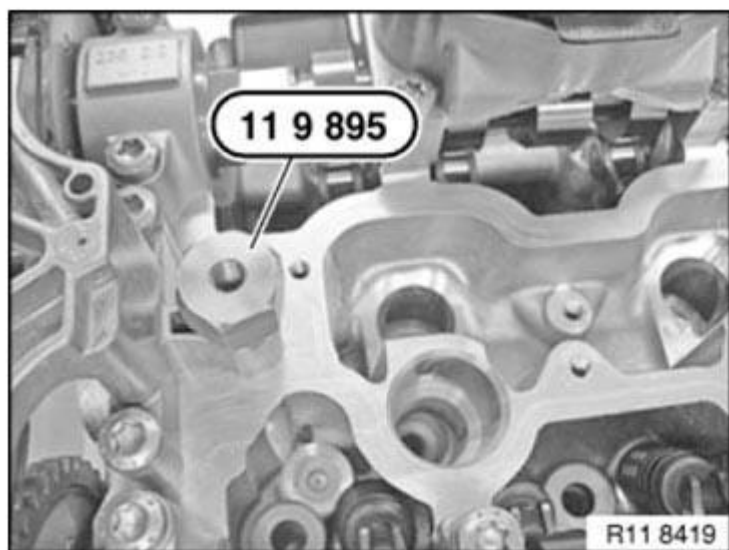


Fig. 358: Screwing Special Tool 11 9 895 Into Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Align exhaust and inlet camshafts in such a way that special tools 11 9 893 rest without a gap on the cylinder head.

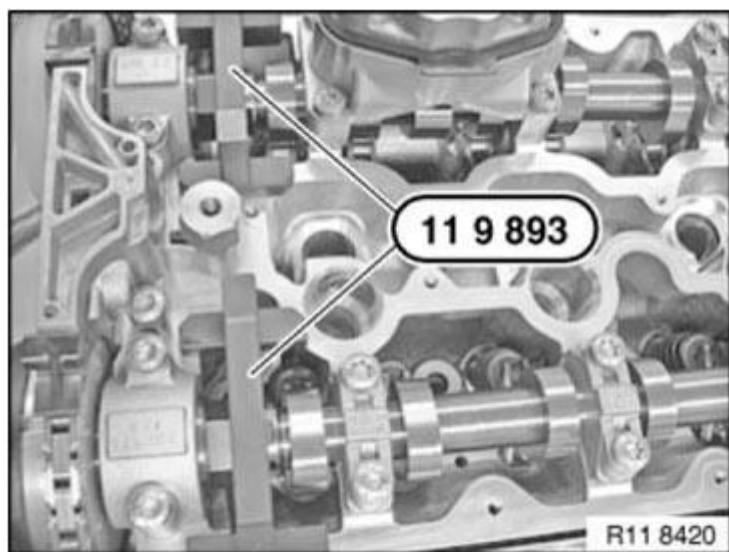


Fig. 359: Positioning Special Tool 11 9 893 On Inlet And Exhaust Camshafts
Courtesy of BMW OF NORTH AMERICA, INC.

Press special tool 11 9 892 down with special tool 11 9 891 .

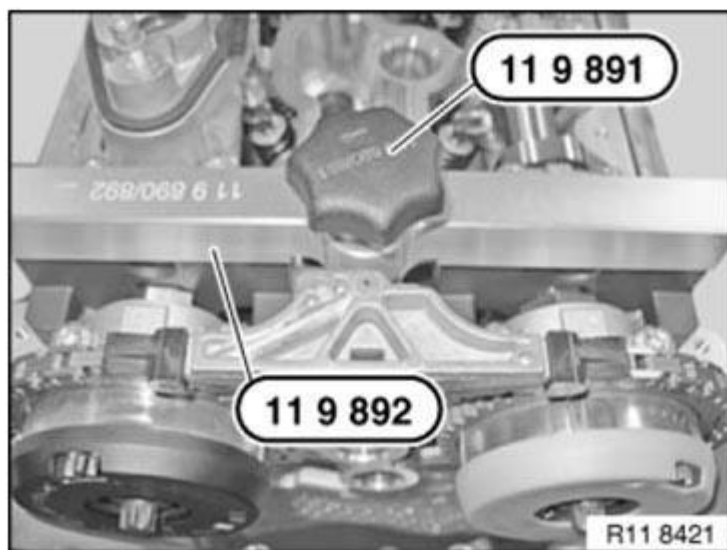


Fig. 360: Pressing Special Tool 11 9 892 Down With Special Tool 11 9 891
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 11 9 900 .

Pretension timing chain with special tool 11 9 900 .

Preload hexagon socket screw with special tool 00 9 250 to 0.6 Nm .

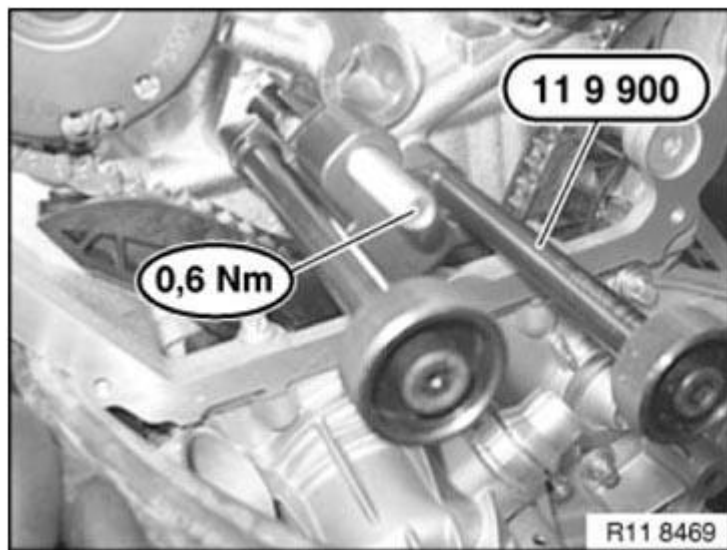


Fig. 361: Pretensioning Timing Chain Using Special Tool 11 9 900
Courtesy of BMW OF NORTH AMERICA, INC.

Check special tools 11 9 190 for correct seating.

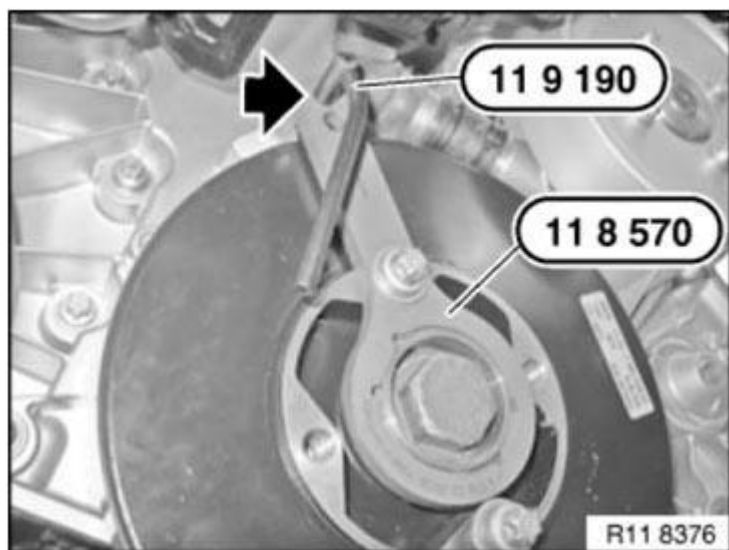


Fig. 362: Identifying Special Tools 11 9 190 And 11 8 570
Courtesy of BMW OF NORTH AMERICA, INC.

Connect intake camshaft adjuster (2) central screw (1).

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

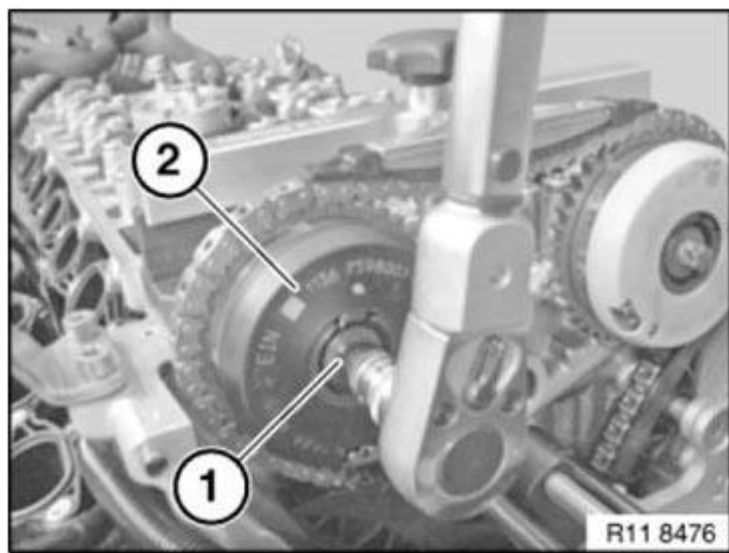


Fig. 363: Identifying Intake Camshaft Adjuster And Central Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Connect exhaust camshaft adjuster (2) central screw (1).

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

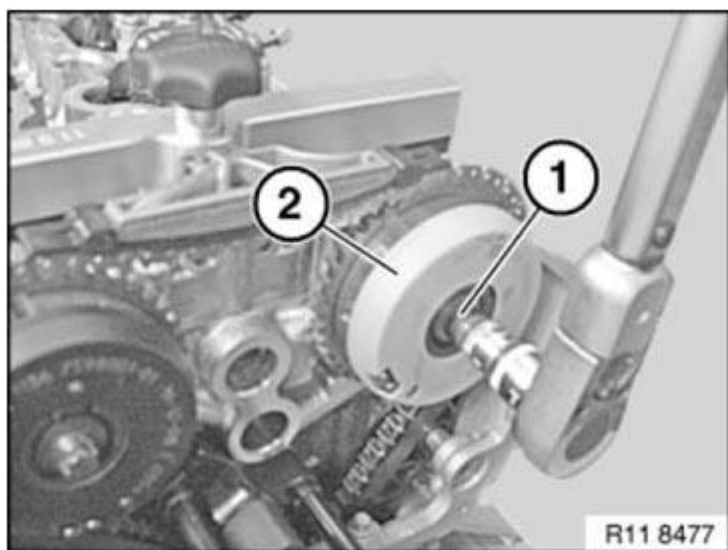


Fig. 364: Tightening Exhaust Camshaft Adjuster Central Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of inlet camshaft adjuster (2) with special tool 00 9 120 .

Tightening torque: see 1AZ in 11 36 VARIABLE CAMSHAFT CONTROL

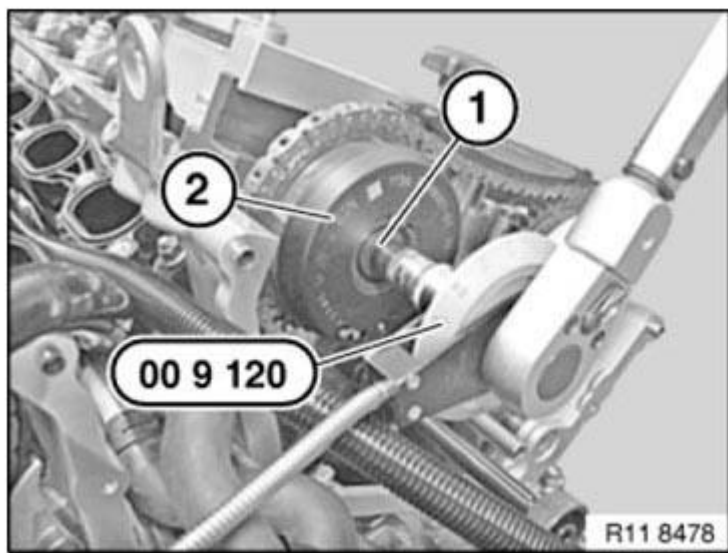


Fig. 365: Securing Intake Adjustment Central Bolt Unit Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of inlet camshaft adjuster (2) with special tool 00 9 120 .

Tightening torque: see 1AZ in 11 36 VARIABLE CAMSHAFT CONTROL

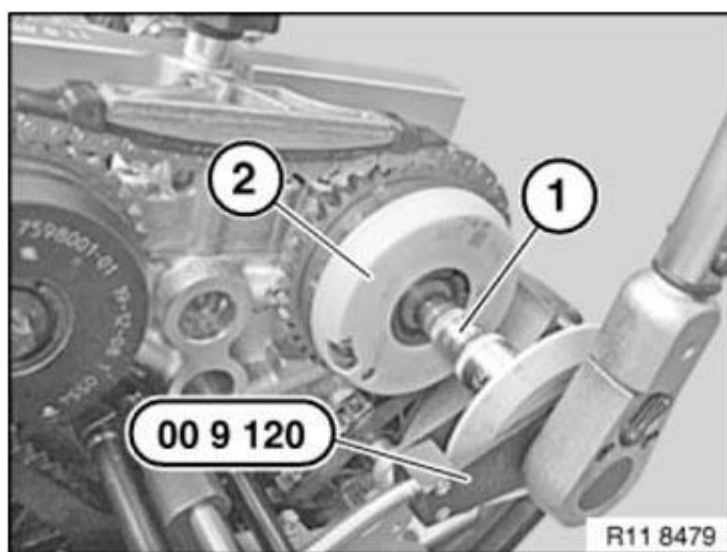


Fig. 366: Securing Inlet Camshaft Adjuster Central Bolt Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tools 11 9 190 and 11 8 570 .

Crank engine at central bolt twice in direction of rotation until engine is in the **firing TDC position cylinder 1** again.

Mount special tool 11 8 570 on vibration damper with a bolt.

Secure special tool 11 9 190 at cylinder no. 1 TDC firing position .

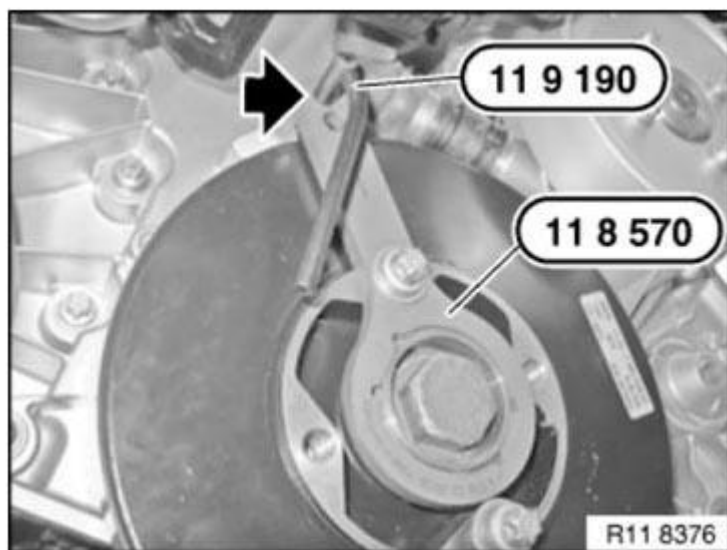


Fig. 367: Removing Special Tools 11 9 190 And 11 8 570
Courtesy of BMW OF NORTH AMERICA, INC.

Check **TIMING** again.

Remove all special tools.

11 36 715 REMOVING AND INSTALLING/REPLACING BOTH SOLENOID VALVES ON LEFT SIDE (N74)

IMPORTANT: Always check that the solenoid valves are clean during removal and installation.

Possible malfunctions if valves are contaminated:

- Rough running
- OBD incorrect entry
- Poor exhaust gas values
- Low engine power

IMPORTANT: Risk of damage!

Do not clean solenoid valves with compressed air.

Solenoid valves, cylinders 7-12

Necessary preliminary tasks:

- Read out fault memory in DME control unit
- Turn off ignition
- Remove **FAN COWL WITH ELECTRIC FAN**

NOTE: Top solenoid valve (4) controls the exhaust adjustment unit.

Bottom solenoid valve (2) controls the inlet adjustment unit.

Unlock plug connections of solenoid valves (2 and 4) and disconnect.

Installation:

Plug connections must snap audibly into place!

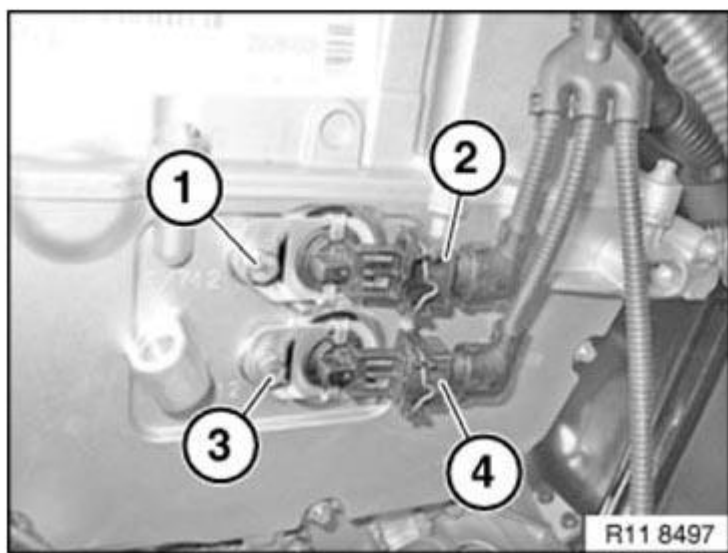


Fig. 368: Identifying Solenoid Valve With Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (1 and 3).

Tightening torque: see 3AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

Pull out solenoid valves.

Installation:

Replace O-rings (1 and 2) on solenoid valve .

Installation:

To install solenoid valves, coat both O-rings with engine oil.

If the solenoid valve is to be reused, the filter strainer (see arrow in illustration) must be cleaned.

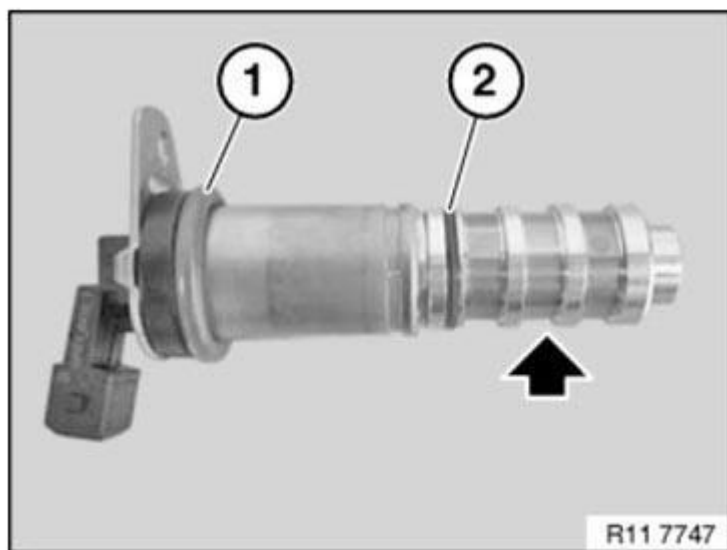


Fig. 369: Identifying Solenoid Valve O-Rings
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If a filter element is clogged with dirt, the filter element (filter strainer) may be removed.

Release filter elements (1) at contact edges.

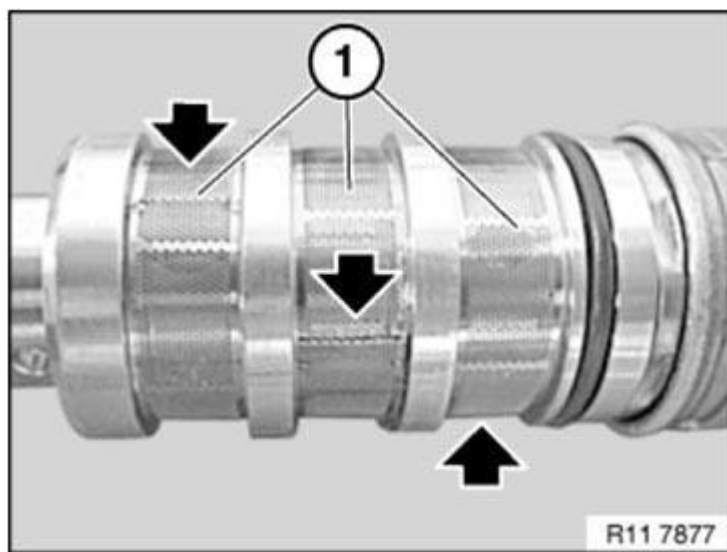


Fig. 370: Identifying Filter Elements
Courtesy of BMW OF NORTH AMERICA, INC.

Bend open welding spots on filter element (1) with a screwdriver (2) in direction of arrow until welding spots are opened.

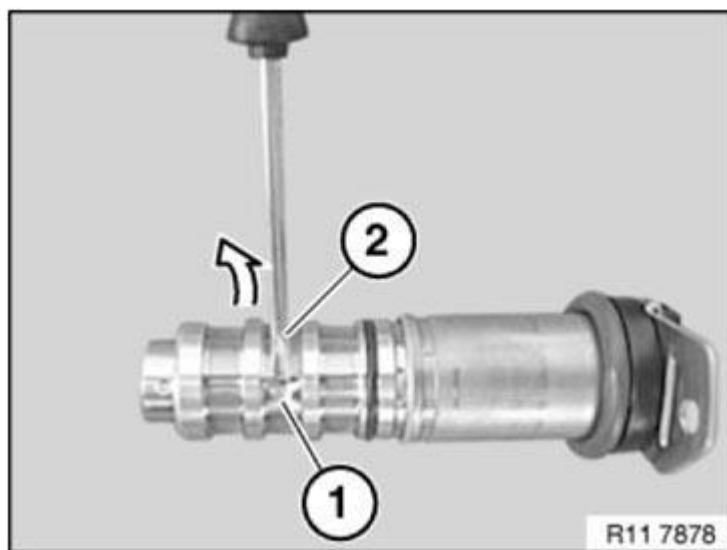


Fig. 371: Bending Open Welding Spots On Filter Element Using Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Avoid damaging, e.g. notches or scratches, the solenoid valve housing (see arrows in illustration).

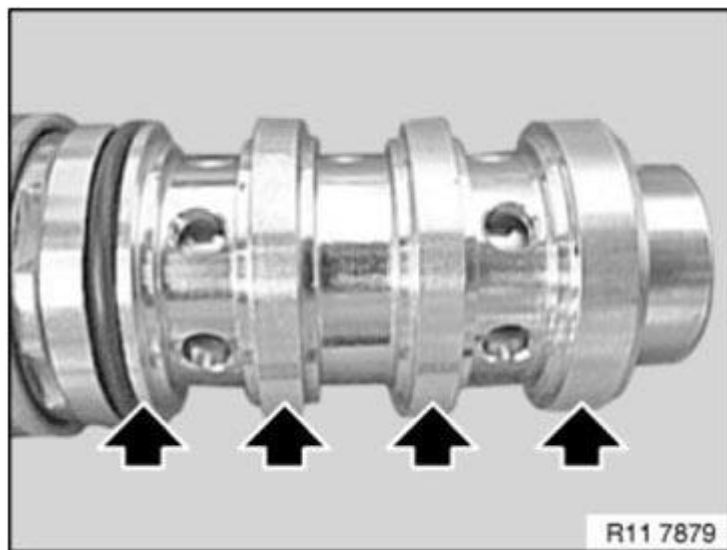


Fig. 372: Locating Solenoid Valve Housing Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Gently insert solenoid valves as far as stop.

Ensure correct installation position.

Insert screws (1 and 3) and tighten down.

Tightening torque: see 3AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

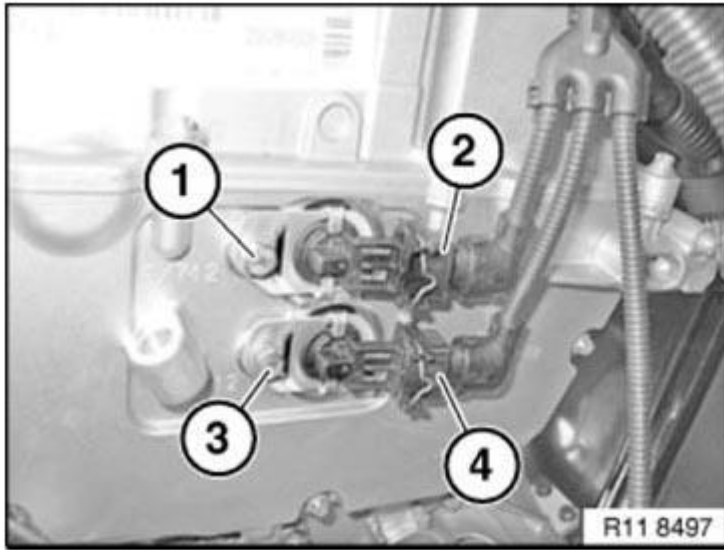


Fig. 373: Identifying Solenoid Valve With Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Delete fault memory.

Check function of DME control unit.

11 36 048 REMOVING AND INSTALLING/REPLACING INLET AND EXHAUST ADJUSTMENT UNITS ON RIGHT SIDE (N74)

IMPORTANT: When the engine is shut down, the inlet and exhaust camshaft adjuster is normally locked in its initial position.

The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the adjuster.

(cylinder bank 1 to 6)

Necessary preliminary tasks:

- Read fault memory and make a documentary record
- Remove **RIGHT CYLINDER HEAD COVER**
- Remove **RIGHT GEAR CASE COVER**
- Check **TIMING**.

To release central bolts, use special tool **11 9 890** or grip at hexagon head of camshaft.

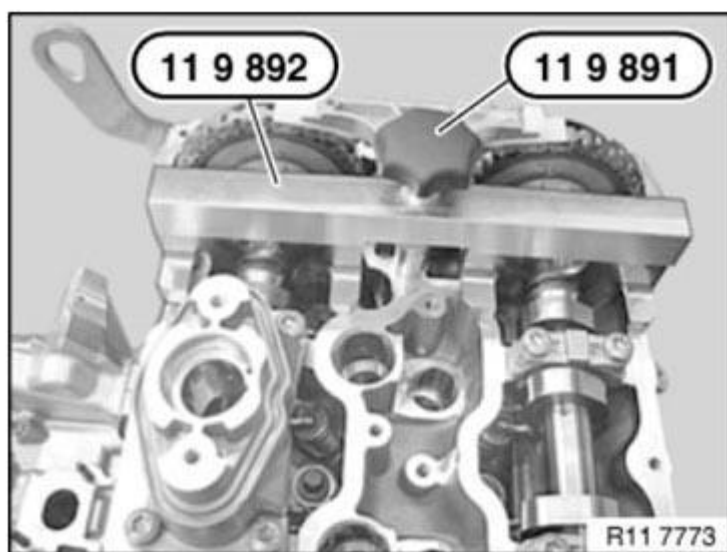


Fig. 374: Gripping Special Tools At Hexagon Head Of Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If special tool 11 9 890 can not be fitted, counter-hold at hexagon of the relevant camshafts when releasing central bolts.

Release central bolts (1 and 2) of inlet and exhaust adjustment units.

Installation:

Replace central bolts after releasing.

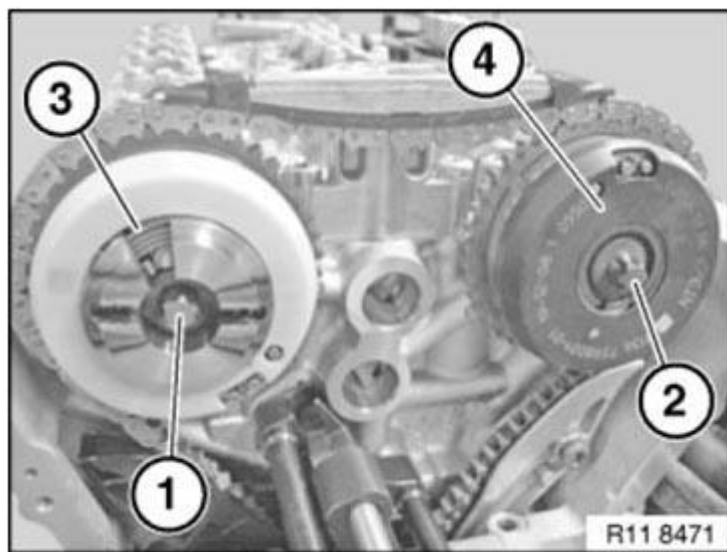


Fig. 375: Identifying Inlet And Exhaust Adjustment Units Central Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Release hexagon socket screw.

Release special tool **11 9 900** at knurled screws and remove.

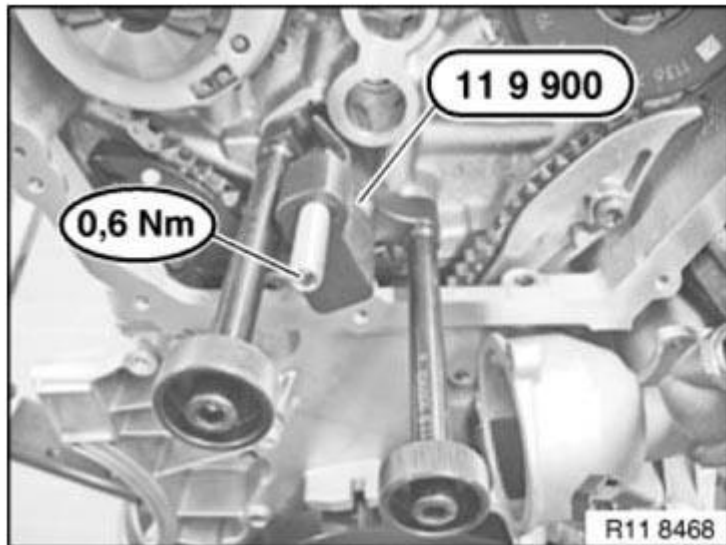


Fig. 376: Pretensioning Chain Using Special Tool 11 9 900
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove upper tensioning rail (2).

Remove adjustment units.

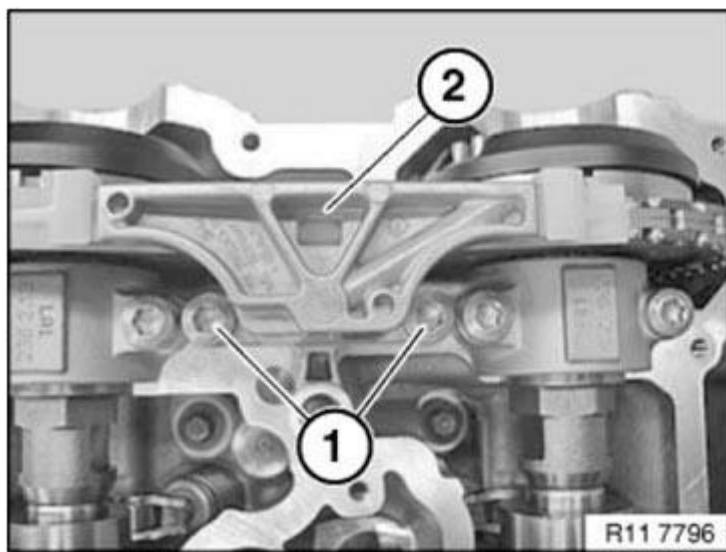


Fig. 377: Identifying Sliding Rail And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of mix-up:

Intake and exhaust adjustment units are different.

Mixing up the inlet and exhaust adjustment units will cause damage to the engine.

1. Intake adjuster (1) is marked with **ON** .
2. Exhaust camshaft adjuster (2) is marked with **OFF** .

The exhaust camshaft adjuster is equipped with the fixture for the vacuum pump on cylinder 1 to 6.

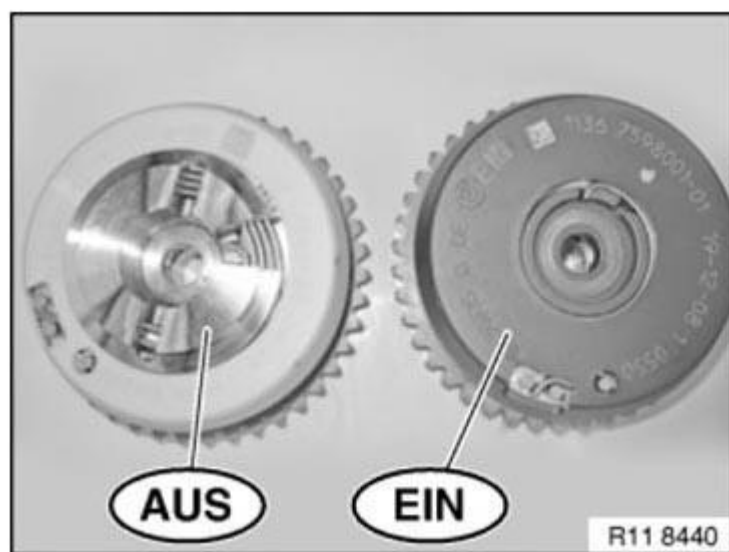


Fig. 378: Identifying Inlet And Exhaust Camshaft Adjusters Marking
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Apply copper paste to the central bolt (1) only on the contact surface for the intake adjuster.

It is not permitted to grease the contact surface for the exhaust camshaft adjuster.

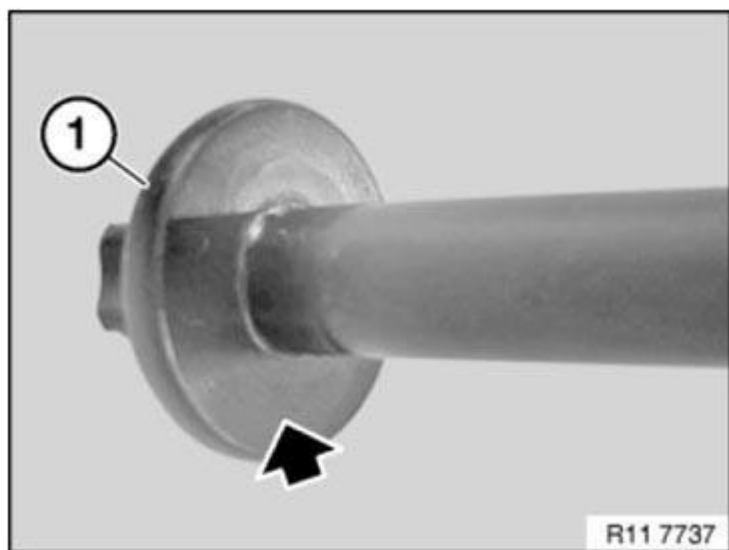


Fig. 379: Locating Central Bolt Coating Contact Face
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Position of adjustment units in relation to timing chain can be freely selected.

Feed adjuster into timing chain and position on camshafts.

Insert central bolts (1 and 2) on adjustment units without gaps.

Release central bolts (1 and 2) by 90°.

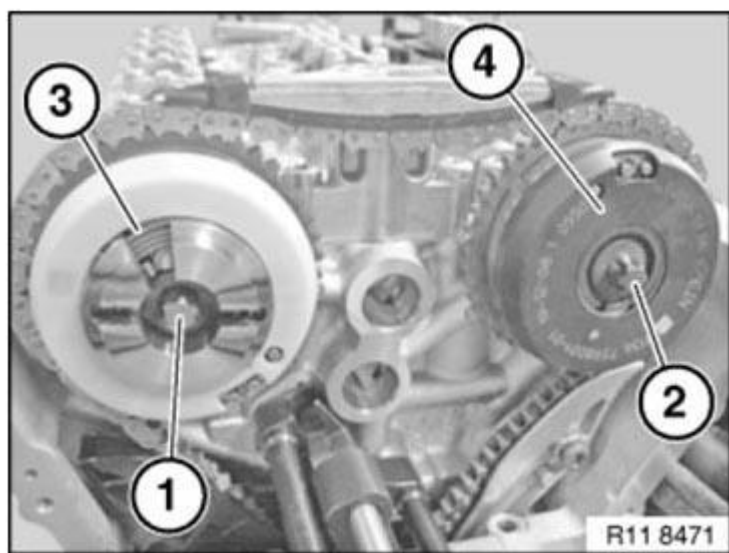


Fig. 380: Identifying Inlet And Exhaust Adjustment Units Central Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Fit sliding rail (2) and secure with screws (1).

Tightening torque: see 4AZ in **11 31 CAMSHAFT**

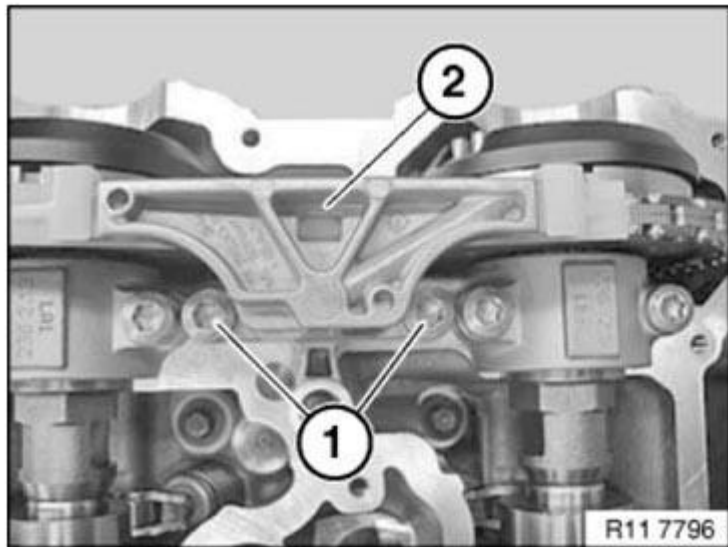


Fig. 381: Identifying Sliding Rail And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Get special tool **11 9 890** ready for securing camshafts.

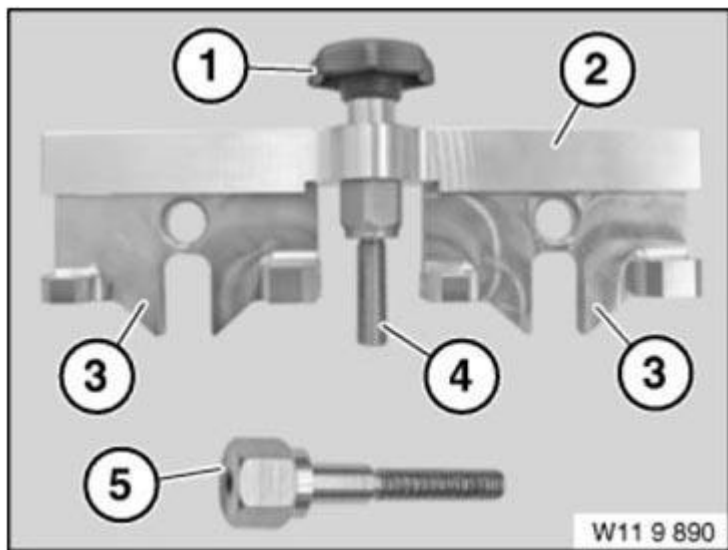


Fig. 382: Identifying Special Tools (11 9 890, 11 9 891, 11 9 892, 11 9 893, 11 9 895)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 893 on intake camshaft.

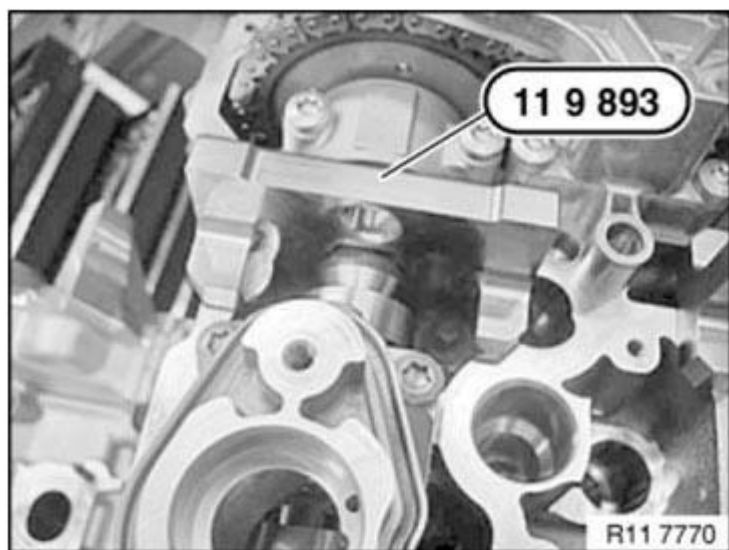


Fig. 383: Fitting Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 893 on exhaust camshaft.

Installation:

Align exhaust and intake camshafts in such a way that special tools 11 9 893 rest without a gap on the cylinder head.

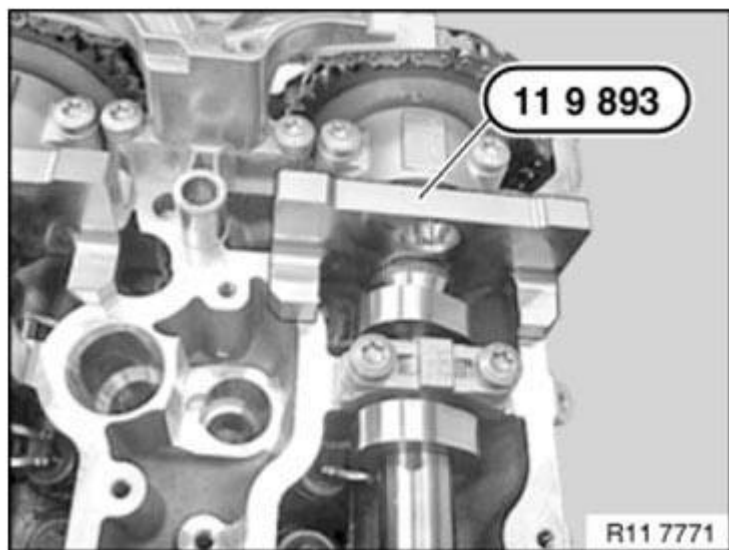


Fig. 384: Fitting Special Tool 11 9 893 On Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 9 894 into cylinder head.

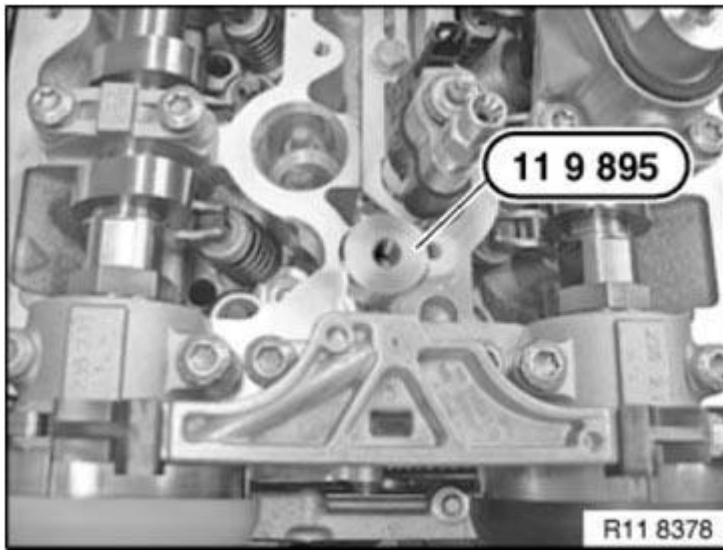


Fig. 385: Screwing Special Tool 11 9 895 Into Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Press special tool 11 9 892 down with special tool 11 9 891.

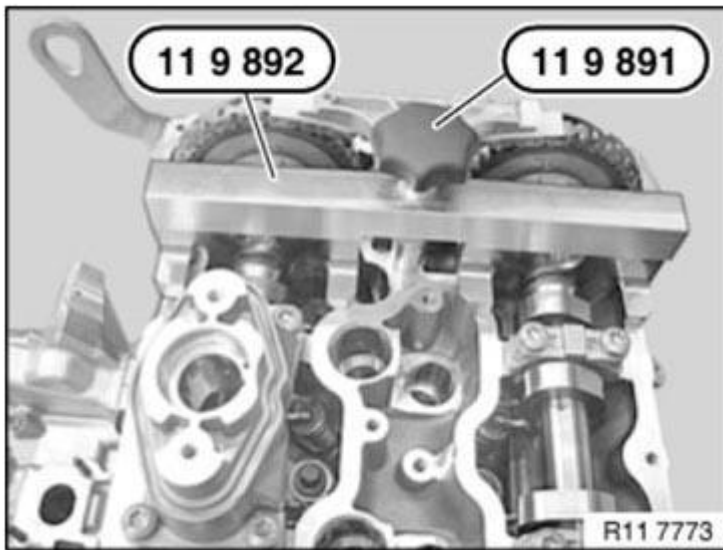


Fig. 386: Releasing Central Bolts Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 11 9 900.

Pretension timing chain with special tool 11 9 900.

Preload hexagon socket screw with special tool 00 9 250 to 0.6 Nm.

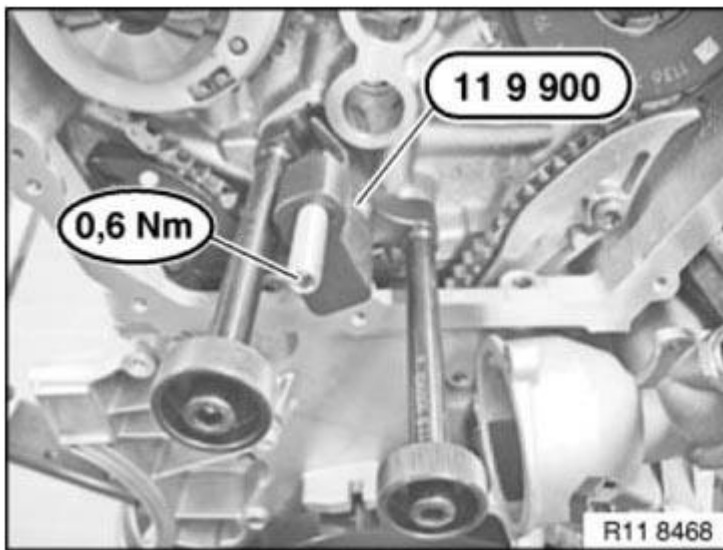


Fig. 387: Pretensioning Chain Using Special Tool 11 9 900
Courtesy of BMW OF NORTH AMERICA, INC.

Check special tools 11 9 190 for correct seating.

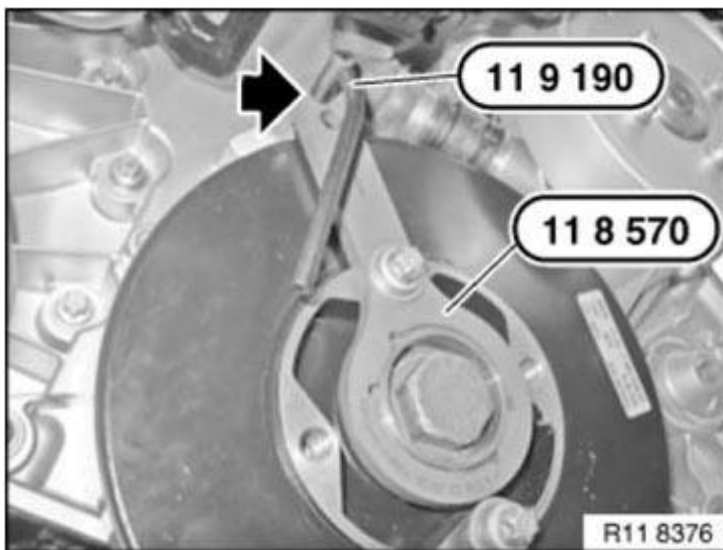


Fig. 388: Identifying Special Tools 11 9 190 And 11 8 570
Courtesy of BMW OF NORTH AMERICA, INC.

Join central bolt (1) of adjuster (2).

Tightening torque: see 1AZ in 11 36 VARIABLE CAMSHAFT CONTROL

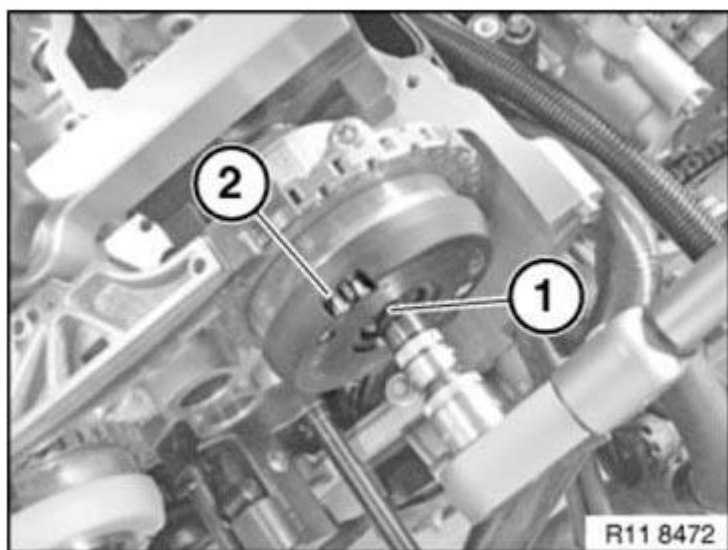


Fig. 389: Tightening Inlet Camshaft Adjuster Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Join central bolt (1) of adjuster (2).

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

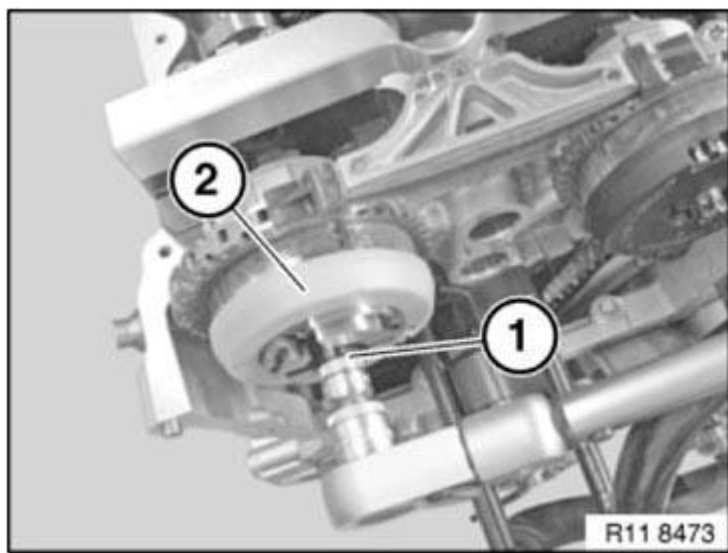


Fig. 390: Tightening Camshaft Adjuster Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of adjuster (2) with special tool **00 9 120** .

Tightening torque: see 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL**

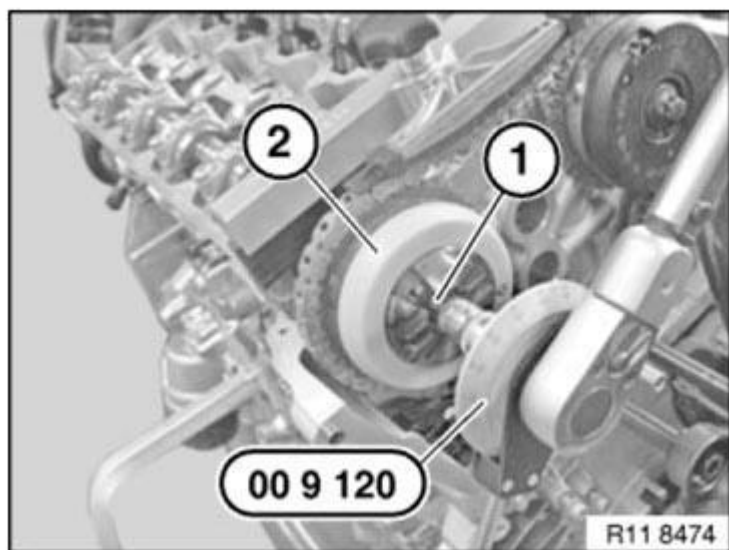


Fig. 391: Tightening Exhaust Camshaft Adjuster Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) of adjuster with special tool 00 9 120 .

Tightening torque: see 1AZ in 11 36 VARIABLE CAMSHAFT CONTROL

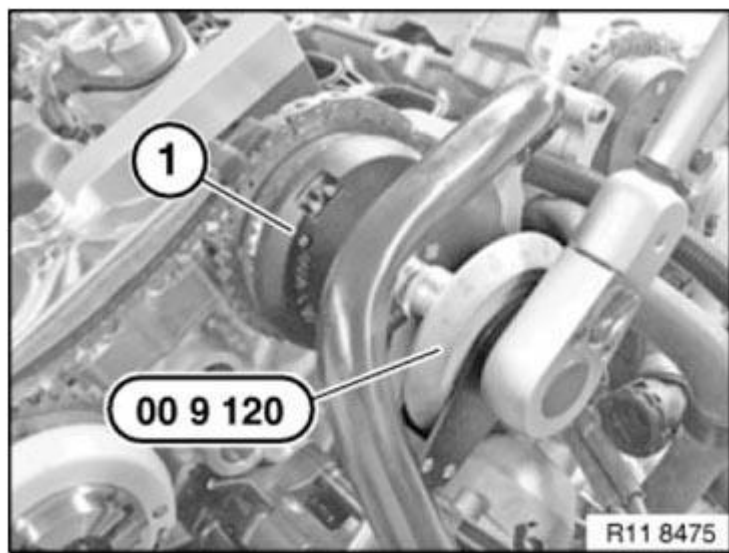


Fig. 392: Securing Central Bolt Of Inlet Camshaft Adjuster With Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tools 11 9 190 and 11 8 570 .

Crank engine at central bolt two times in direction of rotation.

Mount special tool 11 8 570 on vibration damper with a bolt.

Secure special tool **11 9 190** .

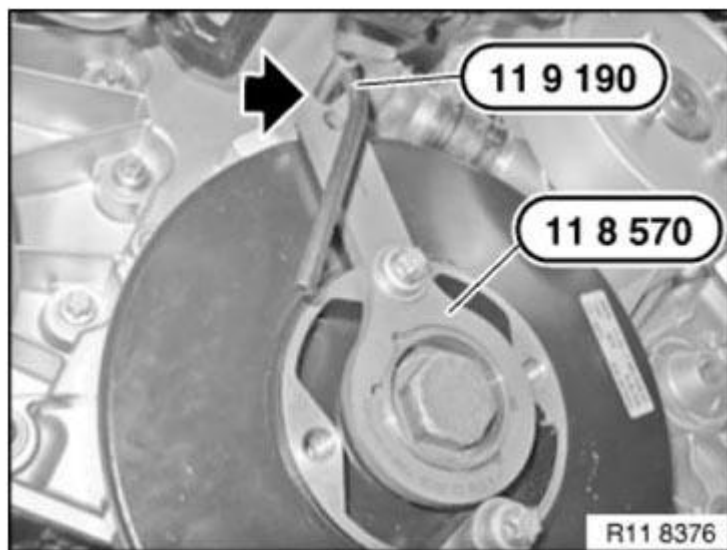


Fig. 393: Identifying Special Tools 11 9 190 And 11 8 570
Courtesy of BMW OF NORTH AMERICA, INC.

Check **TIMING** again.

Remove all special tools.

OIL SUPPLY

11 40 000 CHECKING ENGINE OIL PRESSURE (N74)

WARNING: Risk of scalding!

NOTE: Engine oil escapes on removal of the oil drain plug.

Keep a suitable collecting vessel on hand!

Necessary preliminary tasks:

- Remove service flap

Loosen oil filter oil drain plug (1).

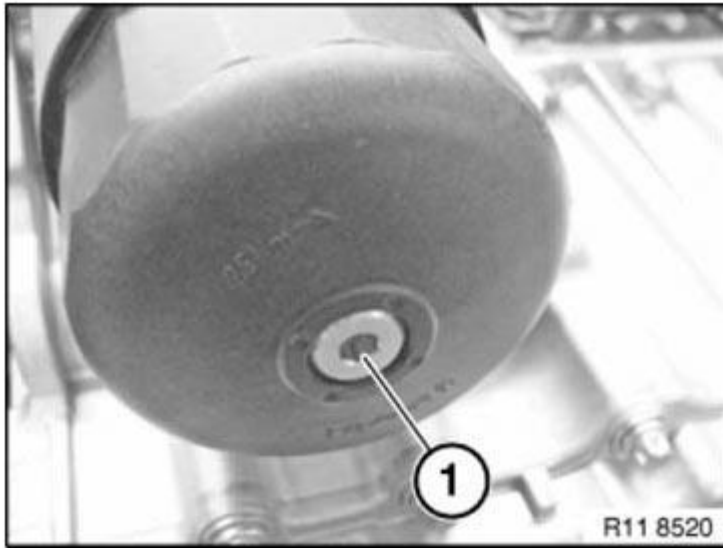


Fig. 394: Identifying Oil Filter Oil Drain Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Check O-ring (1) on special tool 11 7 430 .

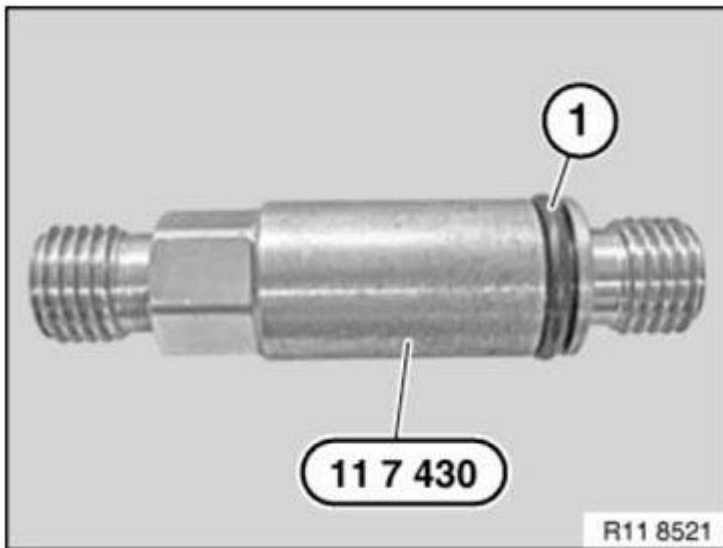


Fig. 395: Identifying O-Ring On Special Tool 11 7 430
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 7 430 into oil filter housing.

Tightening torque: **10 Nm**

Screw special tool 13 5 000 pressure gauge together with special tool 11 7 430 .

NOMINAL VALUE .

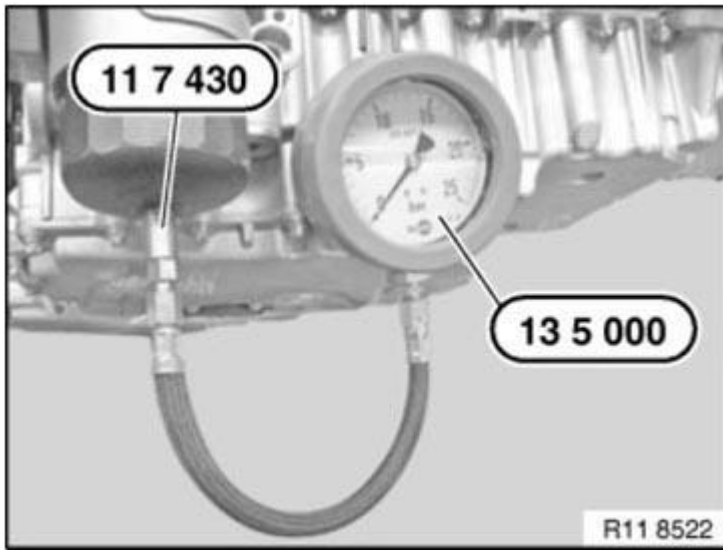


Fig. 396: Checking Engine Oil Pressure Using Pressure Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

Engine oil level check by means of diagnosis system (see SERVICE - ENGINE OIL).

Assemble engine.

OIL PUMP WITH FILTER AND DRIVE

11 41 000 REMOVING AND INSTALLING/REPLACING OIL PUMP (N74)

IMPORTANT: All the adjustment operations on the chain drive must be observed.

A timing chain which is tensioned too tautly can cause noises in the chain drive.

A timing chain that is too slack can cause the timing chain to jump.

Risk of damage in oil pump drive.

Necessary preliminary tasks:

- **DRAIN ENGINE OIL.**
- **REMOVE UPPER OIL SUMP SECTION.**

Unscrew nuts (2).

Tightening torque: see 1AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

Remove intake pipe (1).

Installation note:

Replace O-ring.

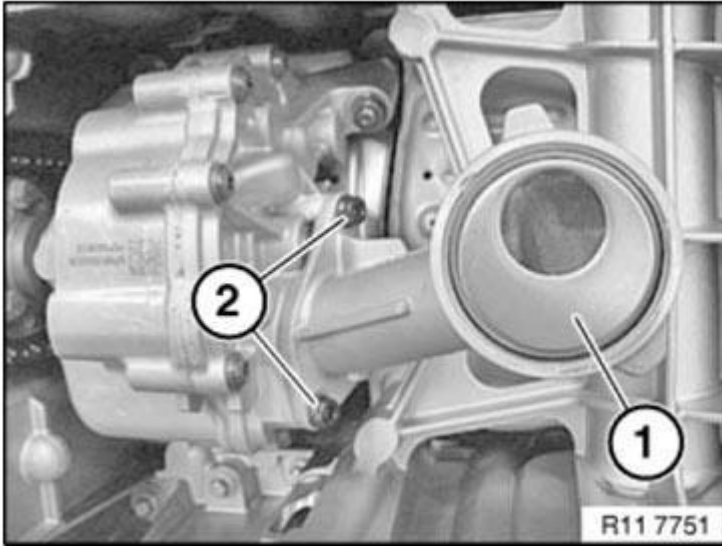


Fig. 397: Identifying Intake Pipe And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release all nuts (1) using special tool 11 7 201.

Tightening torque: see 7AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

Remove oil pump drive gear.

NOTE: Picture shows engine removed.

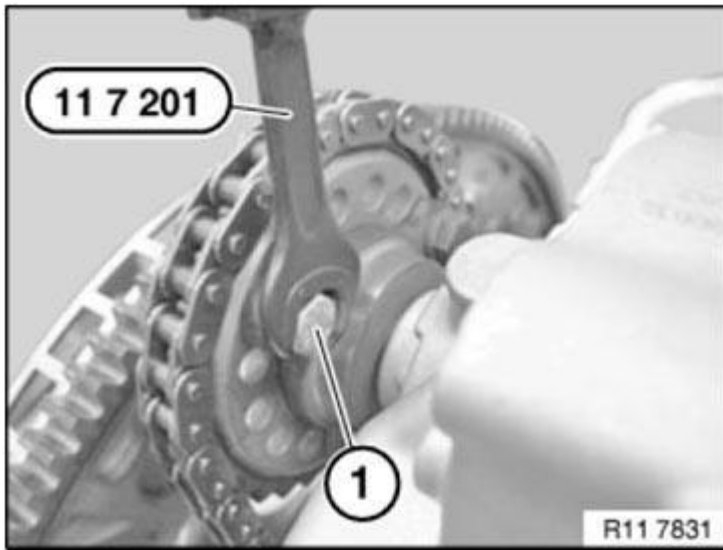


Fig. 398: Releasing All Nuts Using Special Tool 11 7 201
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque: see 4AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

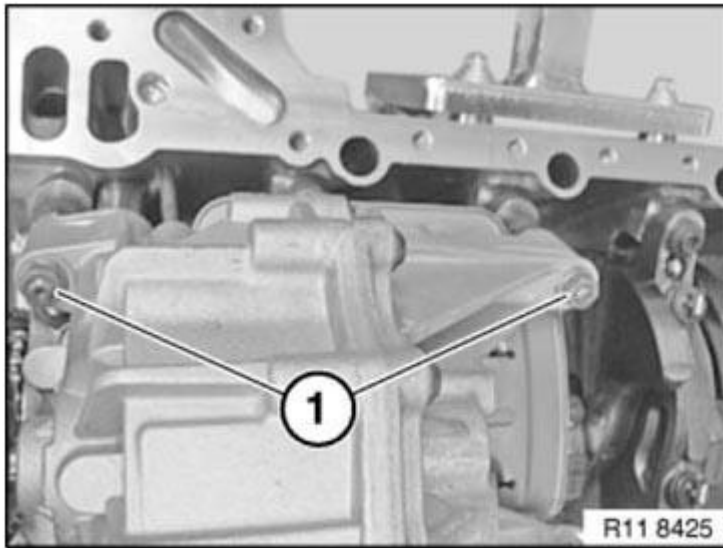


Fig. 399: Identifying Oil Pump Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque: see 4AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

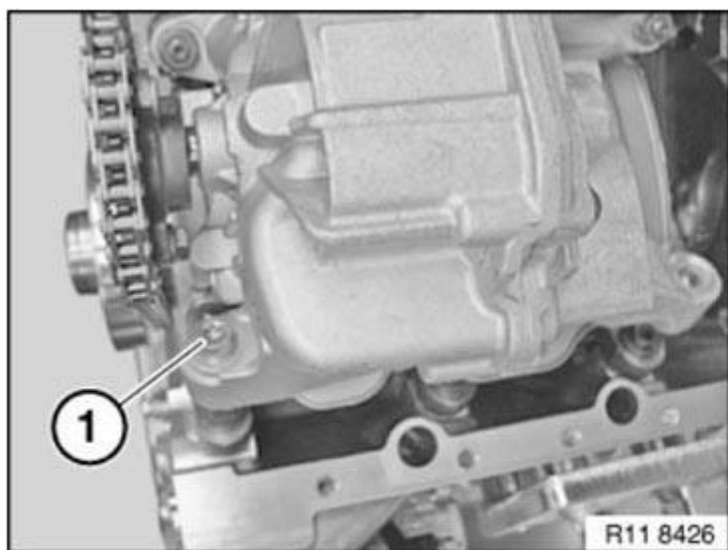


Fig. 400: Identifying Oil Pump Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Detach oil lines (1) upwards in direction of arrow.

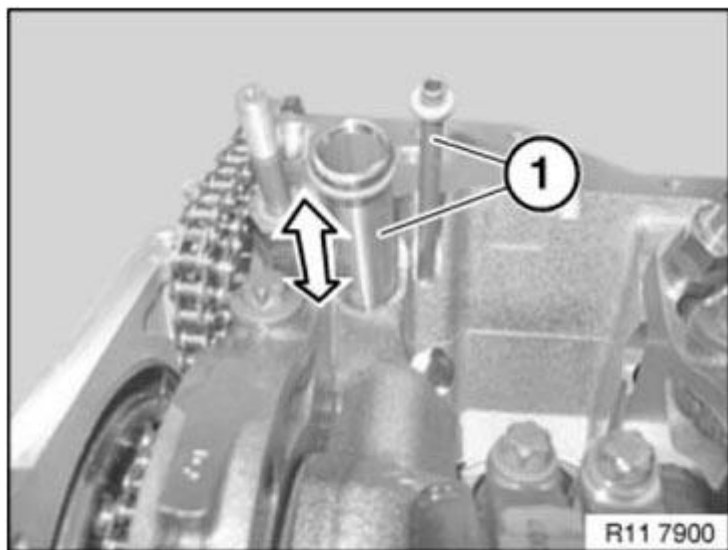


Fig. 401: Detaching Oil Lines In Upwards Direction
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace sealing rings (1).

Apply light coat of oil to sealing ring (1).

Coat sealing ring (2) with suitable lubricant.

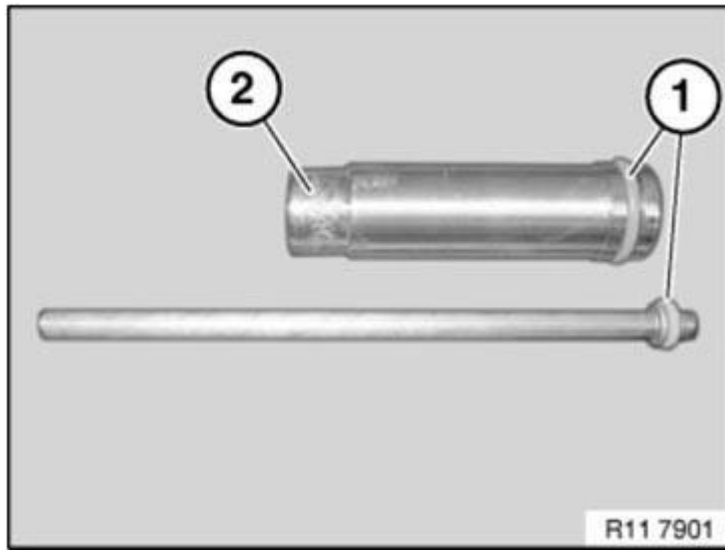


Fig. 402: Identifying Coating Applying Area On Sealing Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace O-ring (1) for oil feed line.

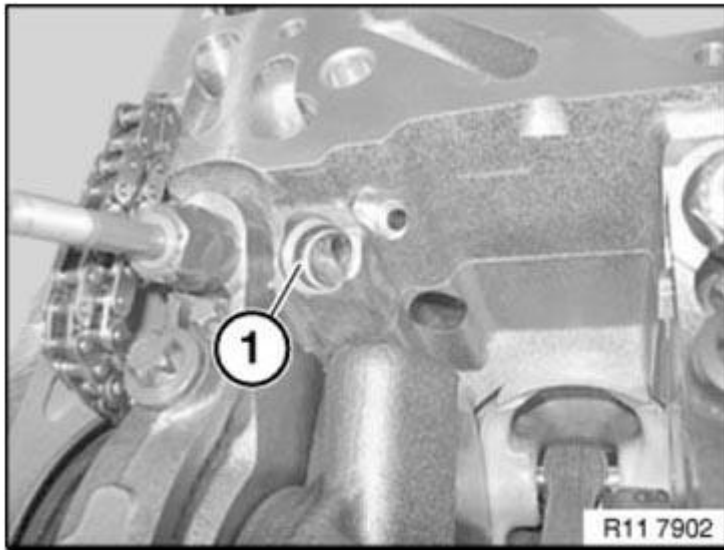


Fig. 403: Identifying Oil Feed Line O-Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Fit oil lines (1) in direction of arrow.

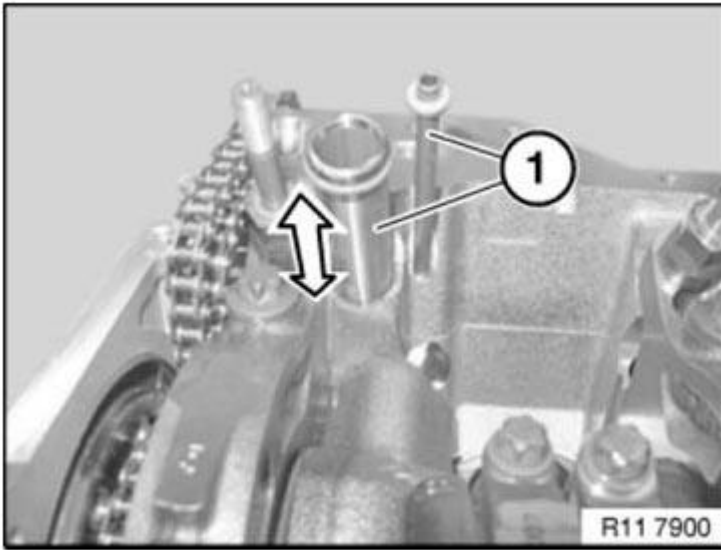


Fig. 404: Fitting Oil Lines

Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

If the oil pump is replaced, it will be necessary to modify the oil deflector.

Release screws (1).

Tightening torque: see 2AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

Modify oil deflector (2).

NOTE: **Graphic shows N63.**

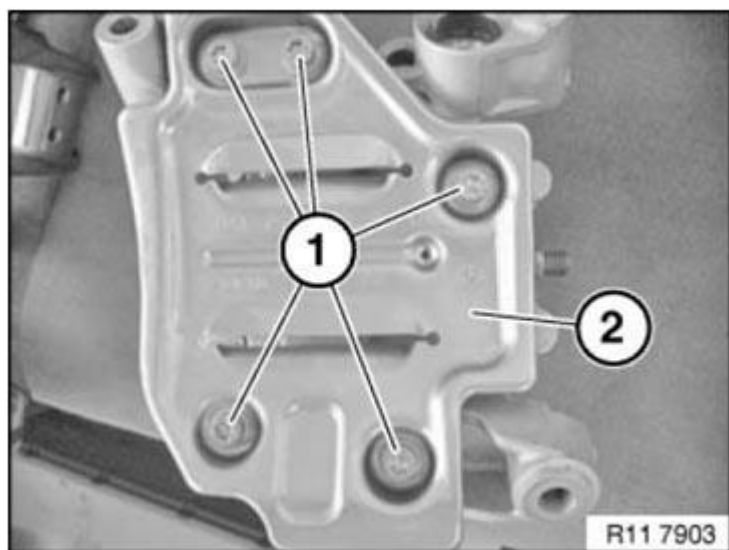


Fig. 405: Identifying Oil Deflector And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 8 920 on special tool 11 9 280 .

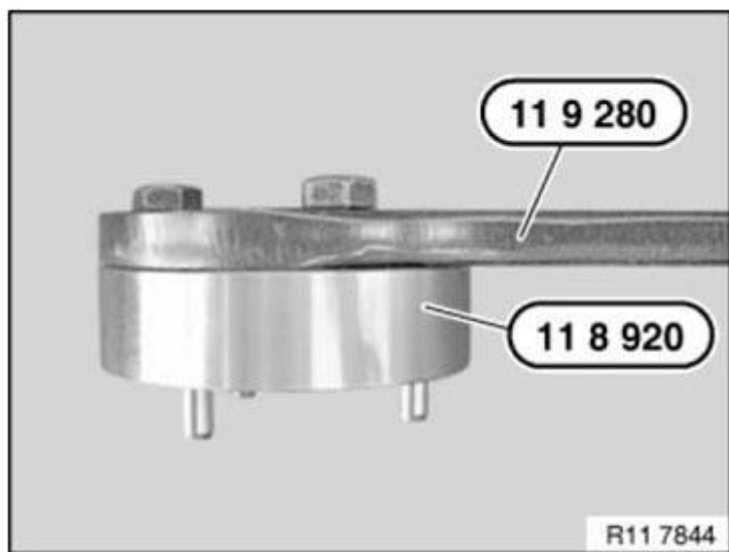


Fig. 406: Fitting Special Tool 11 8 920 On Special Tool 11 9 280
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Left-hand thread on oil pump screw connection.

Do not grip oil pump drive with a pair of pliers **risk of damage** .

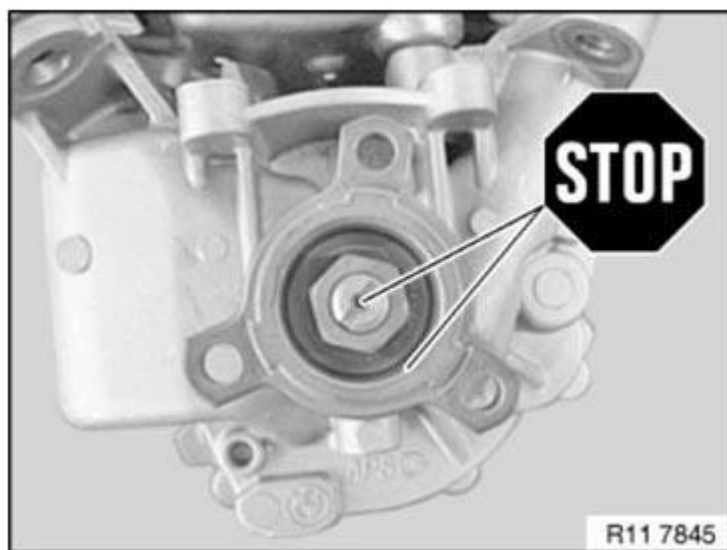


Fig. 407: Identifying Oil Pump Screw Connection Stopping Position
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Nut (1) has left-hand thread.

Position special tool **11 8 920** on sprocket.

Slacken nut (1).

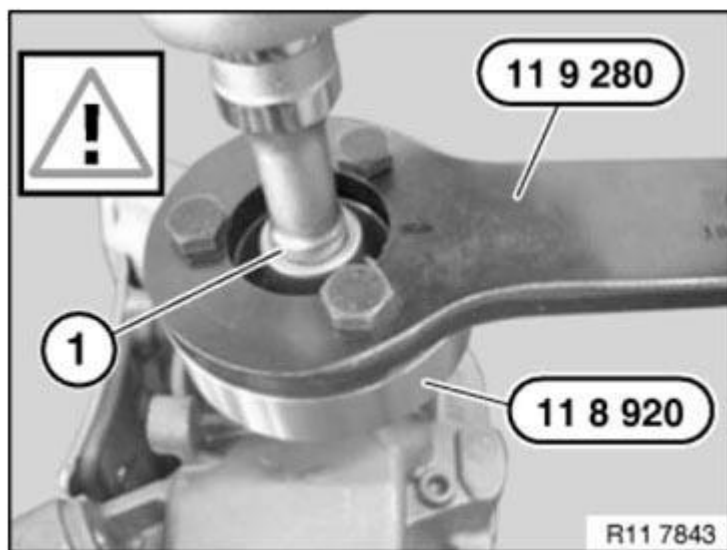


Fig. 408: Positioning Special Tool 11 8 920 On Sprocket
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check mounting flats on pump shaft (1) for damage.

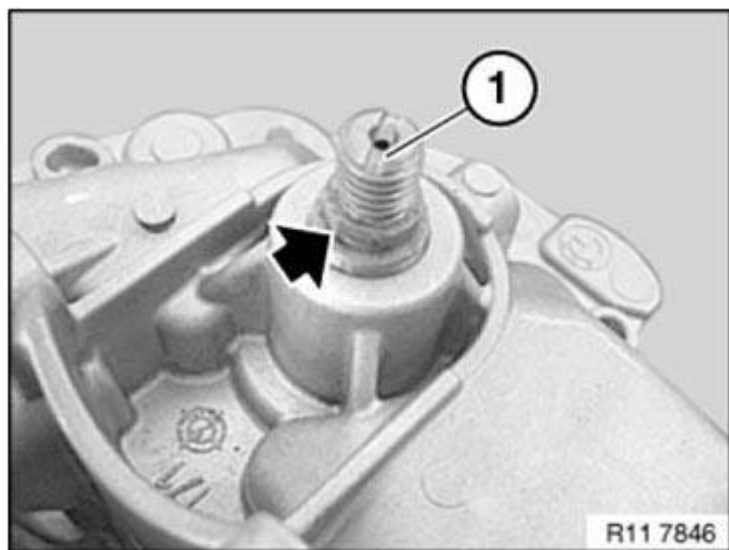


Fig. 409: Locating Mounting Flats On Pump Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Nut (1) has left-hand thread.

Grip pump with assistance of a second person.

Secure nut (1) with special tool **00 9 120**.

Tightening torque: see 6AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

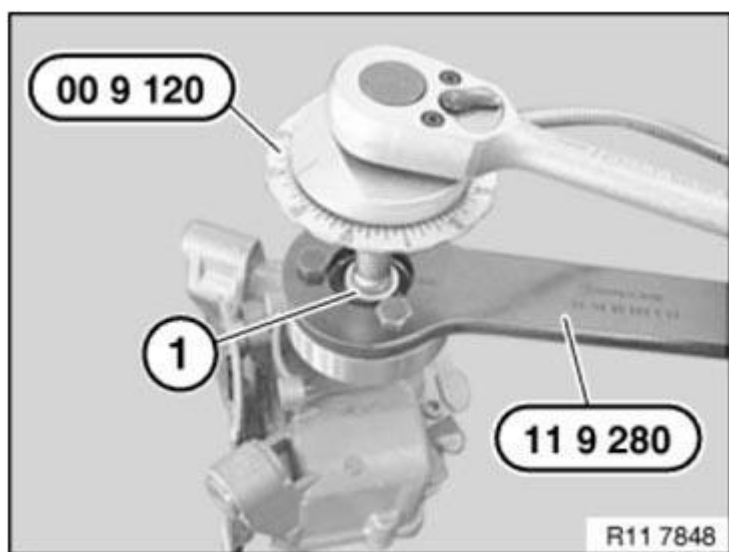


Fig. 410: Securing Nut Using Special Tool 00 9 120

Courtesy of BMW OF NORTH AMERICA, INC.

Join and secure nuts (1).

Tightening torque: see 4AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

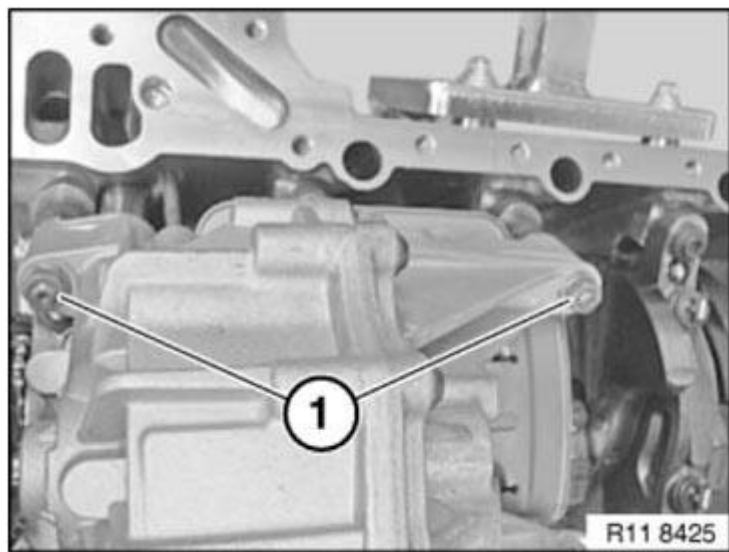


Fig. 411: Identifying Oil Pump Nuts

Courtesy of BMW OF NORTH AMERICA, INC.

Install oil pump drive gear.

Secure all nuts (1) with special tool 11 7 201.

Tightening torque: see 7AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

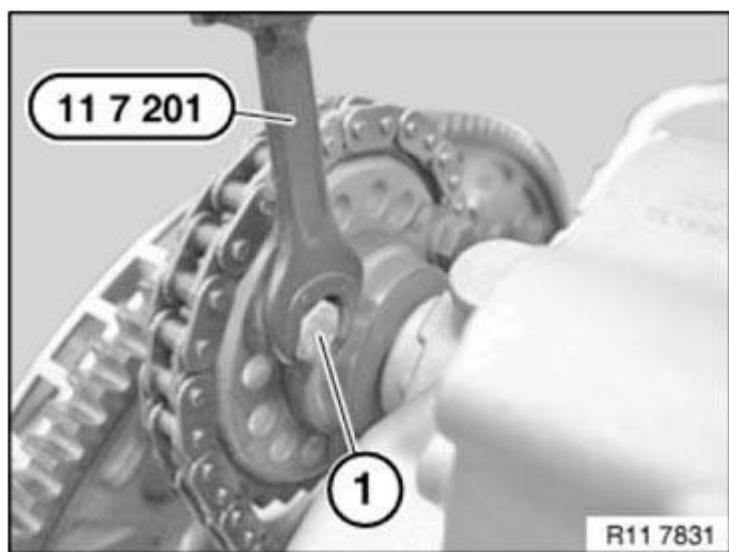


Fig. 412: Securing All Nuts Using Special Tool 11 7 201
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust oil pump timing chain .

Pretension oil pump adjusting sleeve (1) with a hexagon socket wrench.

Adjustment value 9 mm \pm 2 .

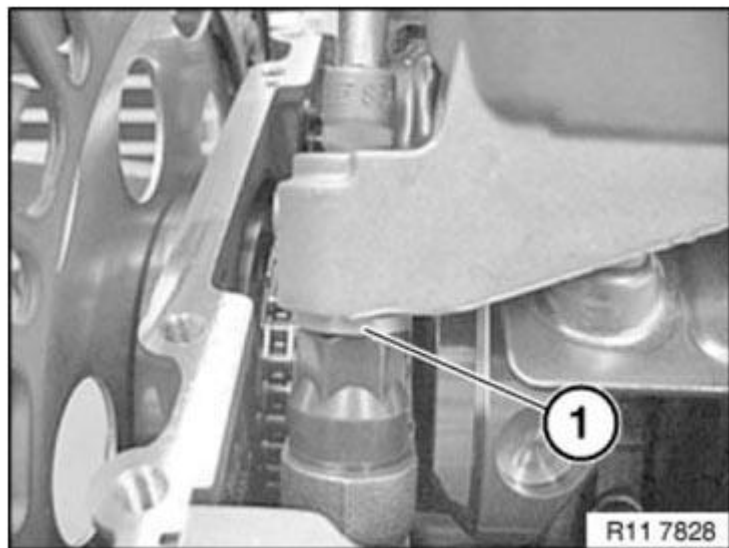


Fig. 413: Identifying Oil Pump Adjusting Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Procedure on removed engine:

Upper oil sump has been removed .

Minimally preload timing chain (1) with special tool **51 0 342** .

Read off measured value A on special tool **51 0 342** and note down.

IMPORTANT: Do not use force to preload timing chain (1).

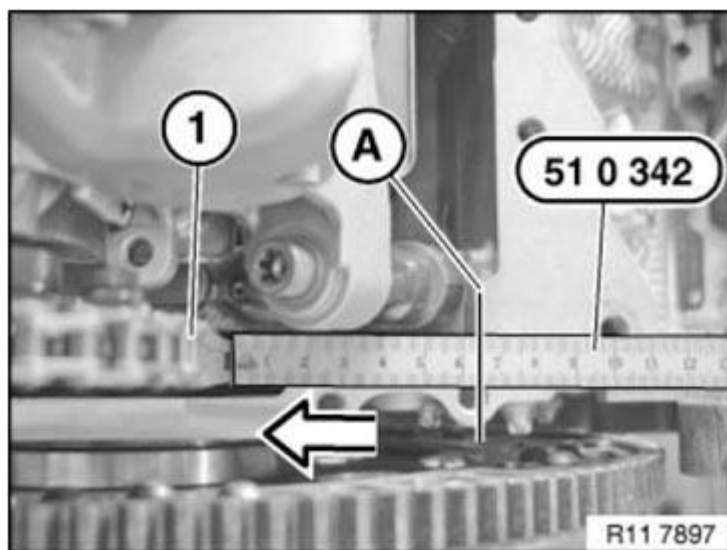


Fig. 414: Checking Measured Value A On Special Tool 51 0 342
Courtesy of BMW OF NORTH AMERICA, INC.

Using a screwdriver (1), preload timing chain to minimal extent in direction of arrow.

Read off measured value B on special tool 51 0 342 and note down.

IMPORTANT: Do not use force preload timing chain.

Measured value **A** minus measured value **B** results in the adjustment value.

Adjustment value **9 mm ±2**.

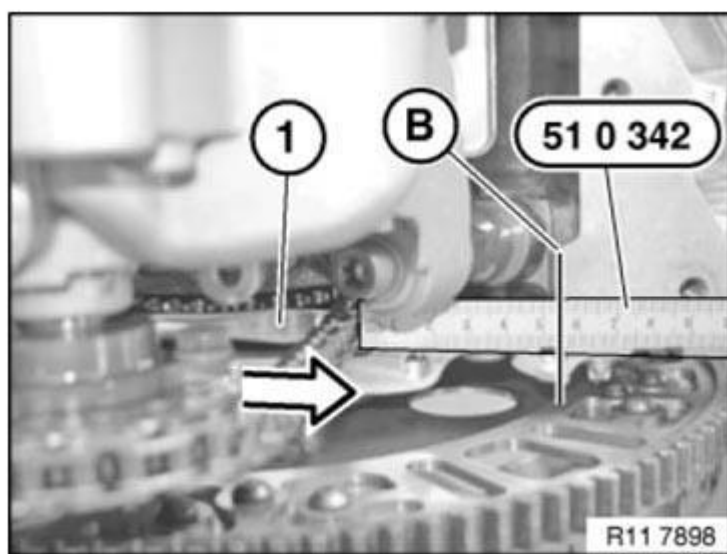


Fig. 415: Measuring Timing Chain Preloading Using Special Tool 51 0 342 (Preloading Using

Screwdriver)

Courtesy of BMW OF NORTH AMERICA, INC.

Procedure on installed engine

Upper oil sump has been installed .

Position drag pointer (1) of special tool **2 213 485** on oil pump chain.

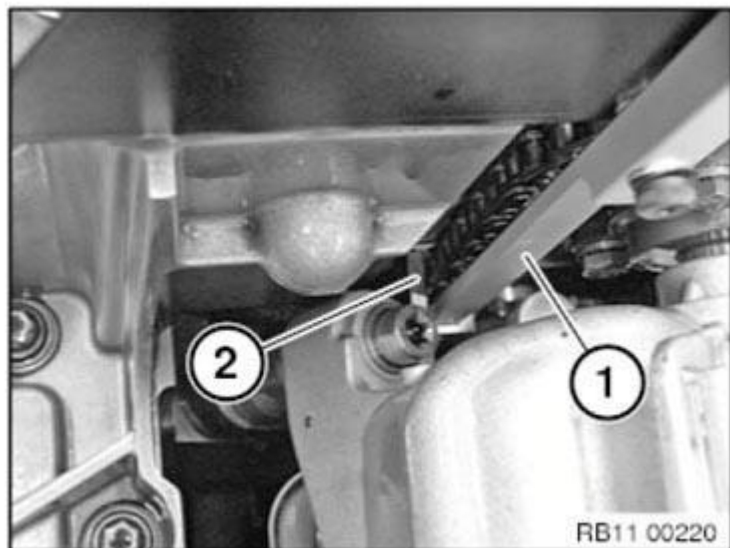


Fig. 416: Positioning Drag Pointer Of Special Tool 2 213 485 On Oil Pump Chain
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Attachment point (1) N63/S63.

Attachment point (2) N74.

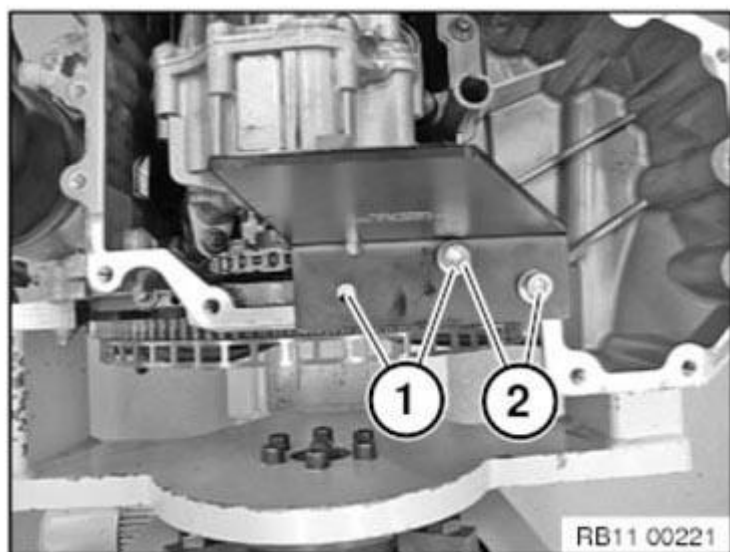


Fig. 417: Identifying Oil Pump Attachment Points
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not use force preload timing chain.

Push drag pointer (1) to the left and right until value has been determined.

Adjustment value **9 mm \pm 2** .

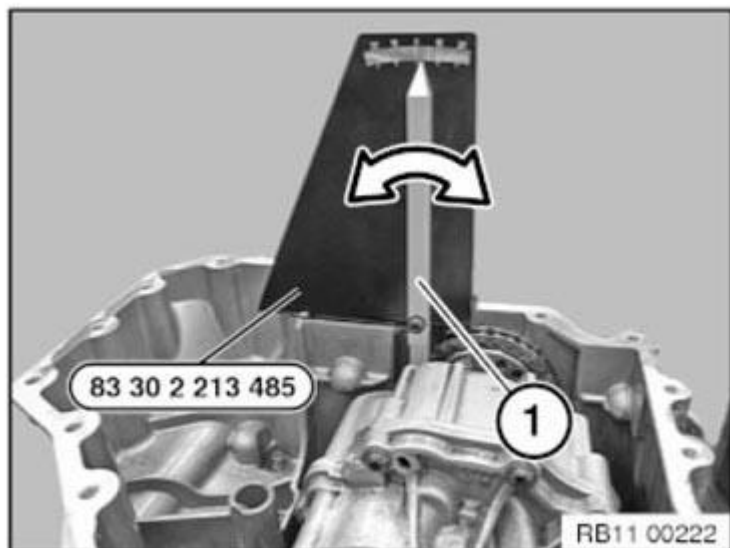


Fig. 418: Determining Timing Chain Preloading Using Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust oil pump timing chain .

Pretension oil pump adjusting sleeve (1) with a hexagon socket wrench.

Adjustment value **9 mm ±2** .

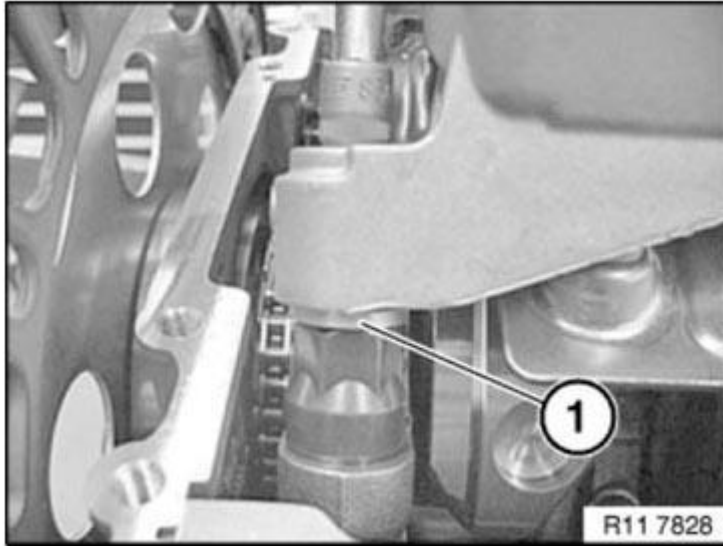


Fig. 419: Identifying Oil Pump Adjusting Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Join and secure screw (2).

Tightening torque: see 4AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

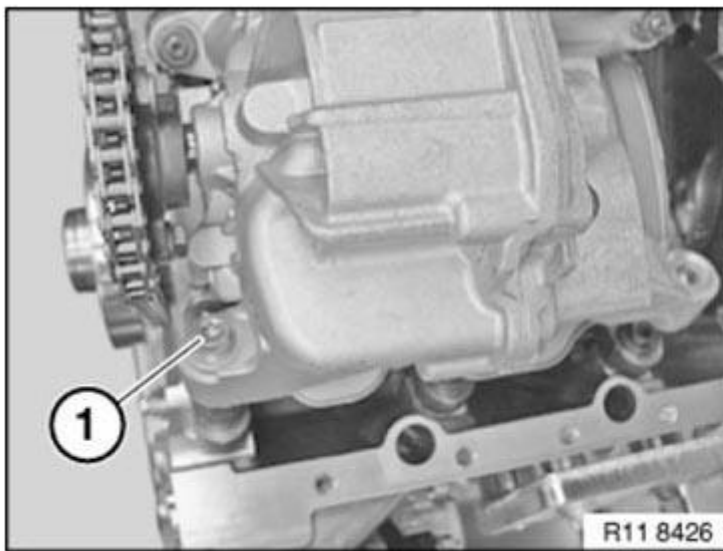


Fig. 420: Identifying Oil Pump Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

WATER PUMP WITH DRIVE

11 51 000 REMOVING AND INSTALLING/RENEWING COOLANT PUMP (N74)

WARNING: Risk of scalding!

Only perform this work after engine has cooled down.

IMPORTANT: Risk of damage!

Coolant emerges when the coolant hoses are detached from the coolant thermostat and coolant pump.

Cover surrounding components and plug connections with suitable apparatus

Recycling:

Catch and dispose of drained coolant in a suitable container.

Observe country-specific waste disposal regulations.

Installation note:

1. All screws, nuts, bolts and hose clamps removed during the repair must be replaced.
2. Retaining elements on chassis and suspension and steering parts must be replaced.

Necessary preliminary tasks:

- Drain **COOLANT**
- Remove **FAN COWL** with electric fan.
- Remove alternator **DRIVE BELT**
- Remove **COOLANT THERMOSTAT**.

Remove plug connections (2 and 3).

Installation note:

Plug connections (2 and 3) must snap audibly into place!

Unlock snap fastener on coolant hose (1).

Detach all coolant hoses and lay to one side.

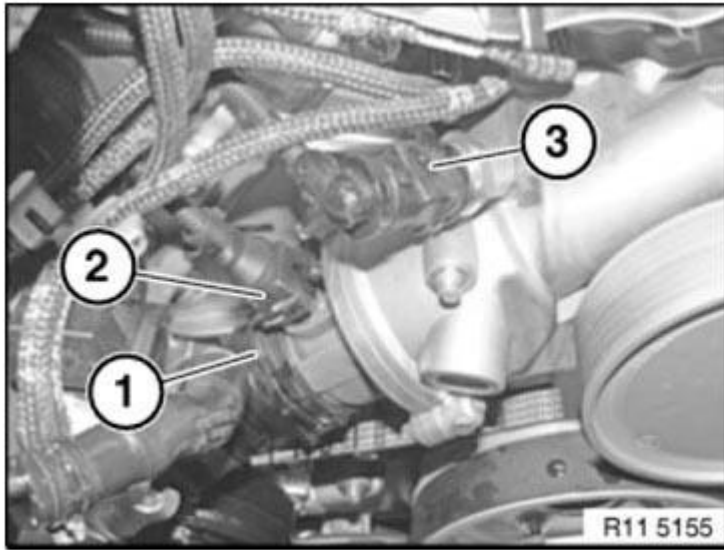


Fig. 421: Identifying Coolant Hose And Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque: see 2AZ in **11 51 COOLANT PUMP**

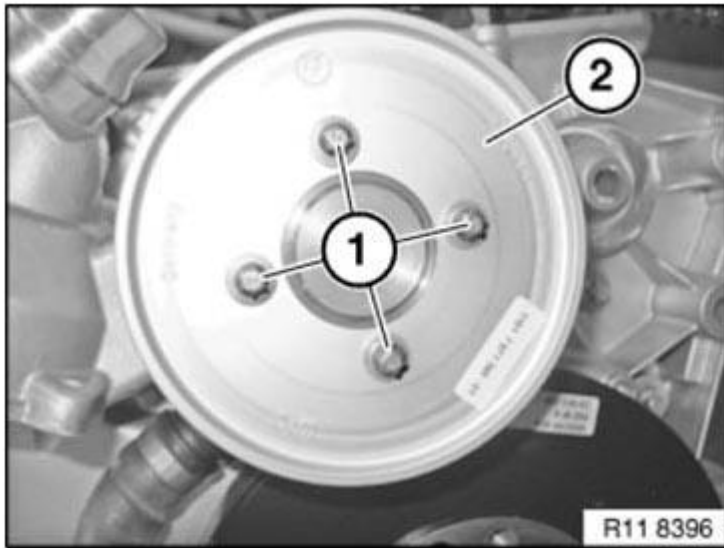


Fig. 422: Identifying Coolant Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **VIBRATION ABSORBER** (1).

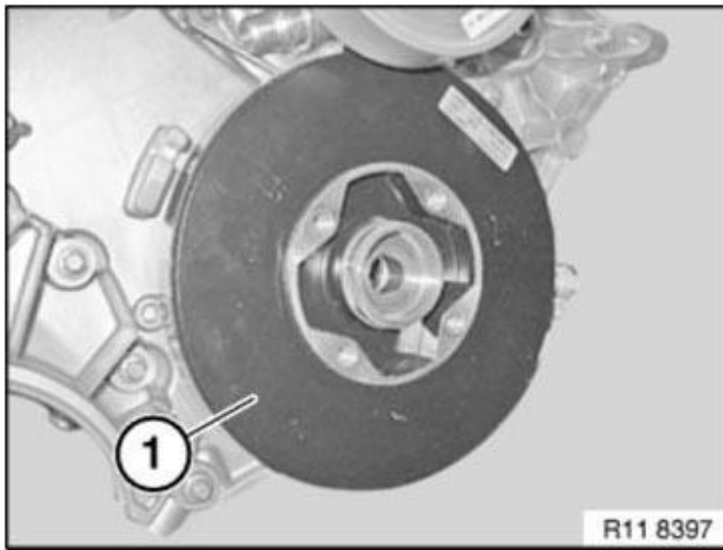


Fig. 423: Identifying Vibration Absorber
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque: see 1AZ in **11 51 COOLANT PUMP**

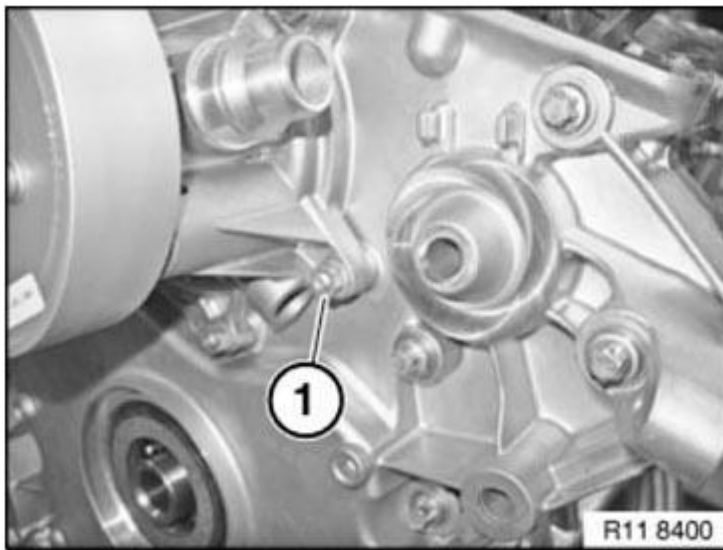


Fig. 424: Identifying Coolant Pump Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Slacken nut (2).

Tightening torque: see 1AZ in **11 51 COOLANT PUMP**

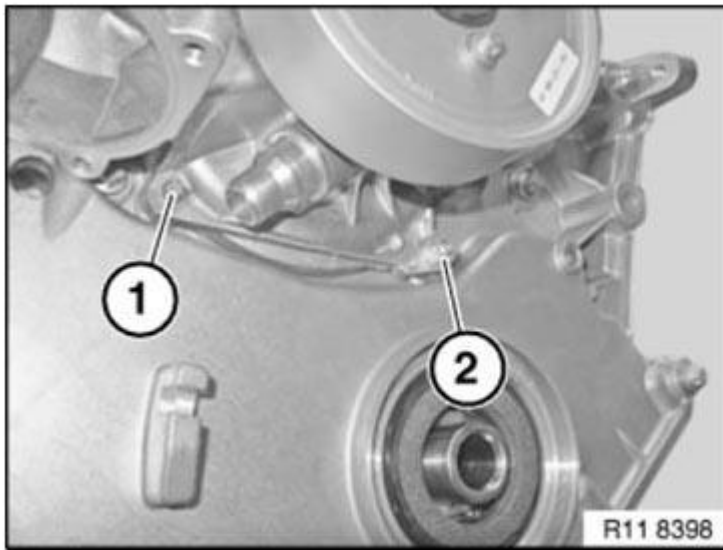


Fig. 425: Identifying Coolant Pump Slacken Nut And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Slacken nut (2).

Tightening torque: see 1AZ in **11 51 COOLANT PUMP**

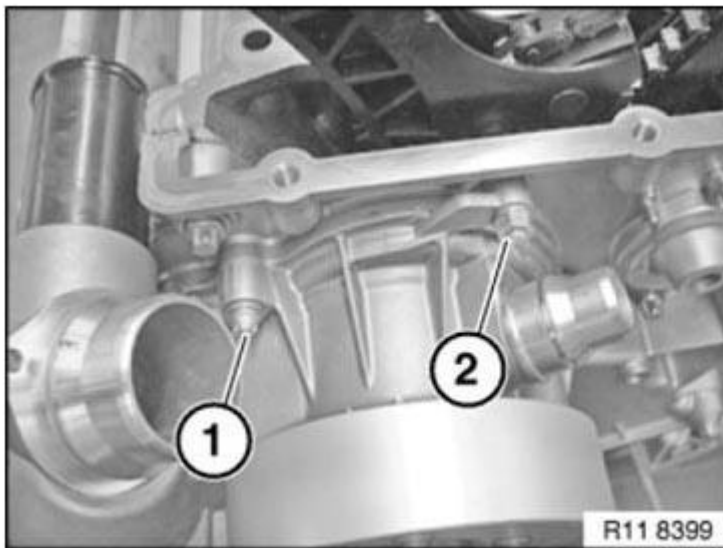


Fig. 426: Identifying Coolant Pump Slacken Nut And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace gasket (1).

Replace coolant pipe (2).

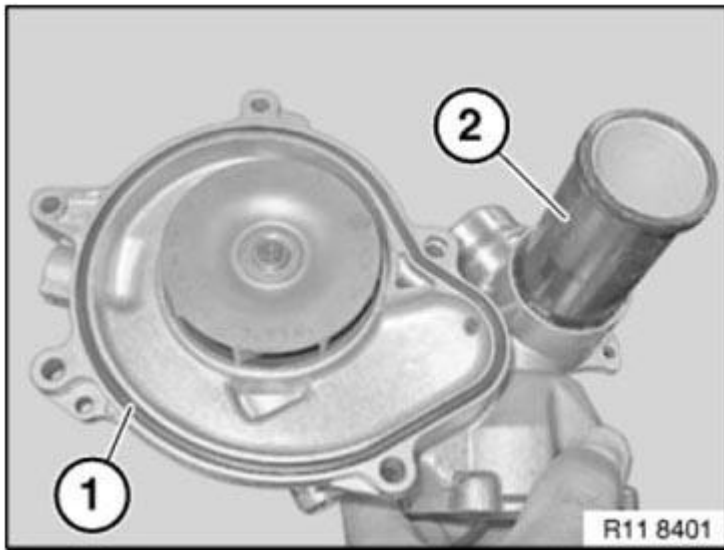


Fig. 427: Identifying Coolant Pipe And Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Top up COOLANT .

BLEEDING INSTRUCTIONS must be observed **without fail** .

THERMOSTAT AND CONNECTIONS

11 53 090 REMOVING AND INSTALLING/REPLACING AUXILIARY WATER PUMP FOR EXHAUST TURBOCHARGER (N74)

WARNING: Risk of scalding!

Only perform this work after engine has cooled down.

Recycling:

Catch and dispose of drained coolant in a suitable container.

Observe country-specific waste disposal regulations.

Necessary preliminary tasks:

- Remove FAN COWL .

- Remove **STIFFENING PLATE**
- Drain **COOLANT** .

Unfasten snap fastener (1), pull off coolant hose (2) and lay to one side

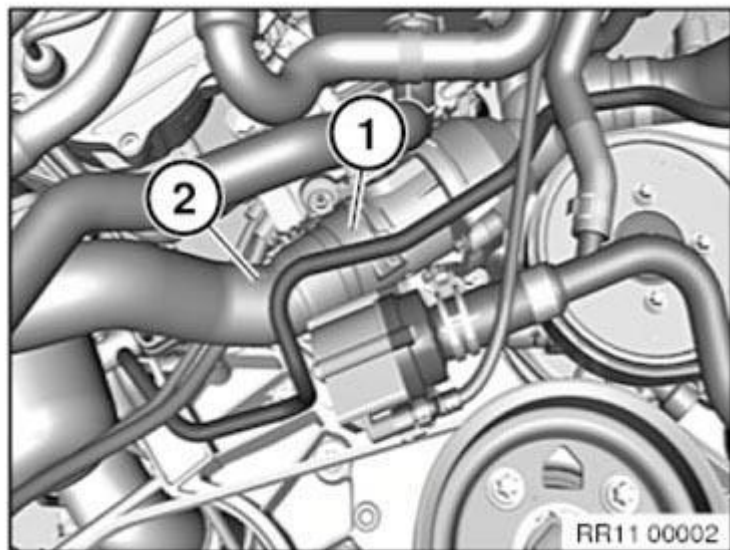


Fig. 428: Identifying Snap Fastener And Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Coolant emerges when the coolant hoses are detached from the auxiliary water pump.

Cover surrounding components and plug connections with suitable apparatus

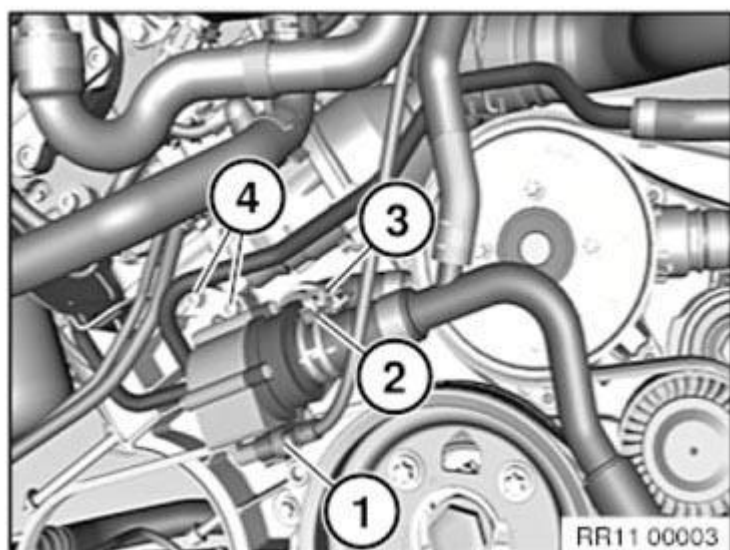


Fig. 429: Identifying Coolant Pump Plug Connection, Hose Clamps And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Release hose clamps (2, 3) with a suitable tool.

Pull off coolant hoses and lay to one side.

Release screws (4) and remove coolant pump.

Installation note:

plug connection (1) must snap audibly into place!

Modify holder if replacing auxiliary water pump.

Assemble engine.

Top up **COOLANT** .

VENTING INSTRUCTIONS must be observed **without fail** .

11 53 000 REMOVING AND INSTALLING/REPLACING COOLANT THERMOSTAT (N74)

WARNING: Risk of scalding!

Only perform this work after engine has cooled down.

Recycling:

Catch and dispose of drained coolant in a suitable container.

Observe country-specific waste disposal regulations.

Necessary preliminary tasks:

- Drain **COOLANT**
- **REMOVE FRONT UNDERBODY PROTECTION** .
- Remove **REAR UNDERBODY PROTECTION**
- Remove **STIFFENING PLATE**
- Remove **FAN COWL** with electric fan
- **REMOVE CHARGE AIR COOLER EXPANSION TANK** .

NOTE: For purposes of clarity, the graphic shows the auxiliary water pump removed.

Disconnect plug connection (3).

Installation note:

Plug connection (3) must snap audibly into place!

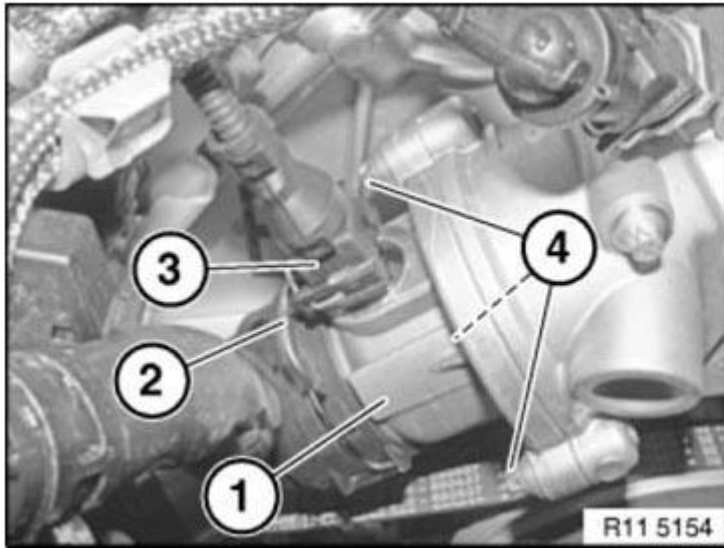


Fig. 430: Identifying Coolant Thermostat, Hose, Plug Connection And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock snap fastener on coolant hose (2).

Detach coolant hose (2) and lay to one side.

NOTE: One of the screws is not shown and is located at the rear under the coolant thermostat (1).

Release screws (4).

Tightening torque: see 1AZ in **11 53 THERMOSTAT AND CONNECTIONS**

Lift out coolant thermostat (1).

Clean sealing surface.

Installation note:

Replace sealing ring (1) .

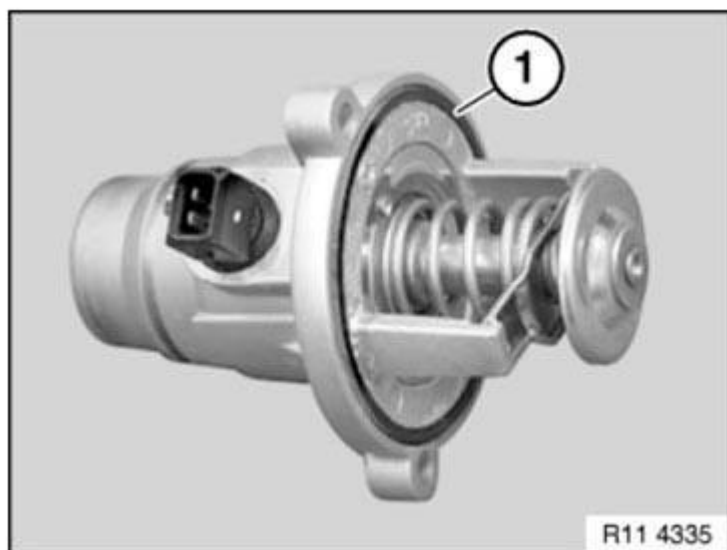


Fig. 431: Identifying Coolant Thermostat Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Top up COOLANT .

VENTING INSTRUCTIONS must be observed **without fail** .

INTAKE MANIFOLD

11 61 068 REMOVING AND INSTALLING/REPLACING AIR INTAKE MANIFOLD (N74)

Necessary preliminary tasks:

- Remove throttle. See LEFT THROTTLE VALVE ASSEMBLY and RIGHT THROTTLE BODY .
- Remove intercooler. See RIGHT INTERCOOLER and LEFT INTERCOOLER .
- Remove vacuum reservoir.

Disengage engine ventilation (3) at terminals (1 and 2).

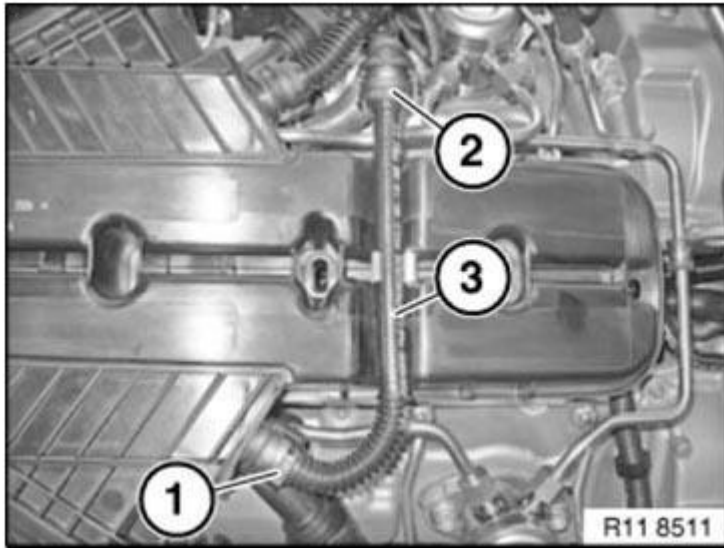


Fig. 432: Identifying Engine Ventilation At Terminals
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

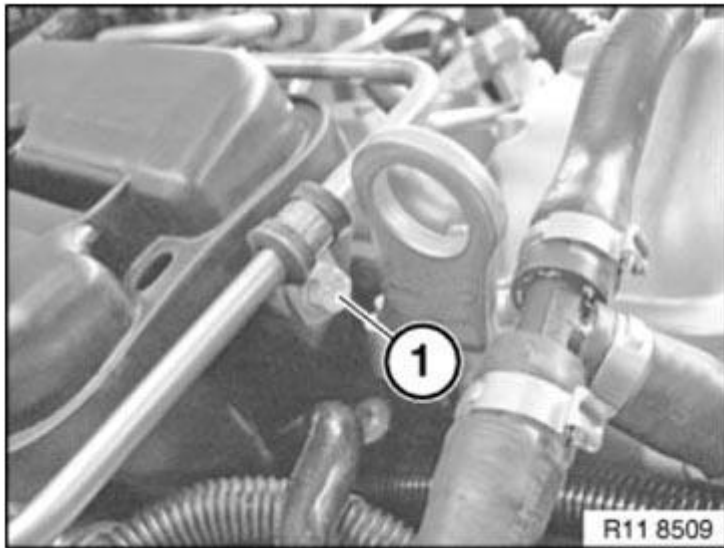


Fig. 433: Identifying Air Intake Manifold Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1) at rear of intake plenum.

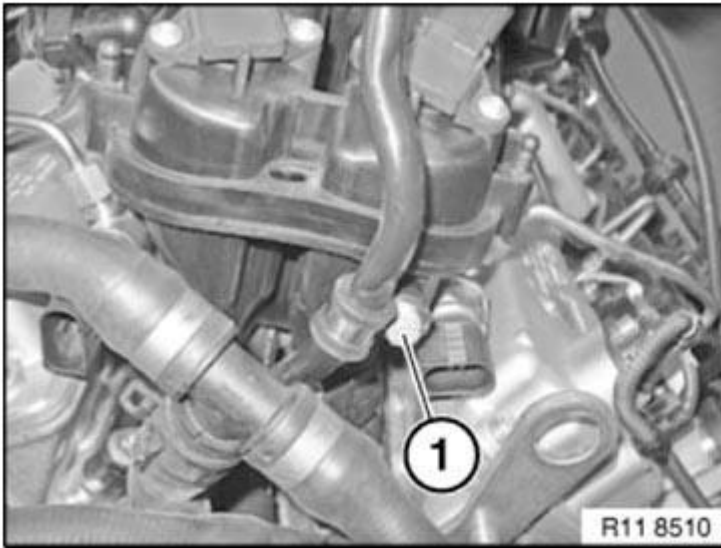


Fig. 434: Identifying Intake Plenum Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1 and 2) at charge-air pressure sensor.

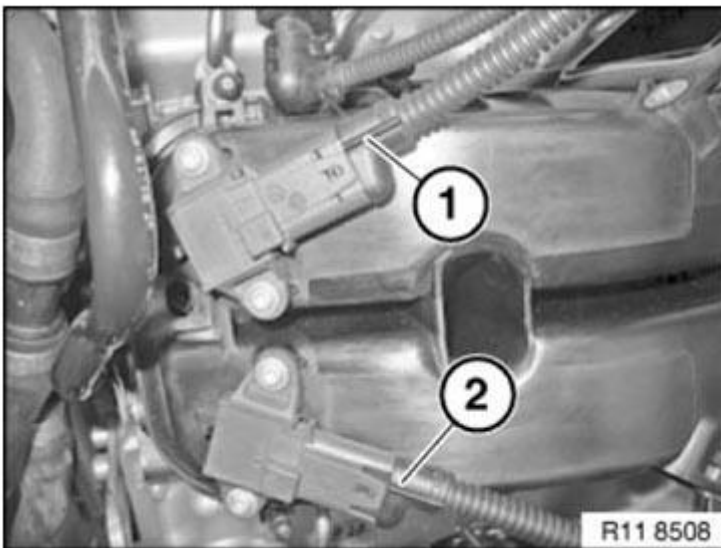


Fig. 435: Identifying Charge-Air Pressure Sensor Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release all bolts (1) on intake plenum using special tool 11 4 410 .

Tightening torque: see 2AZ in 11 61 INTAKE PLENUM

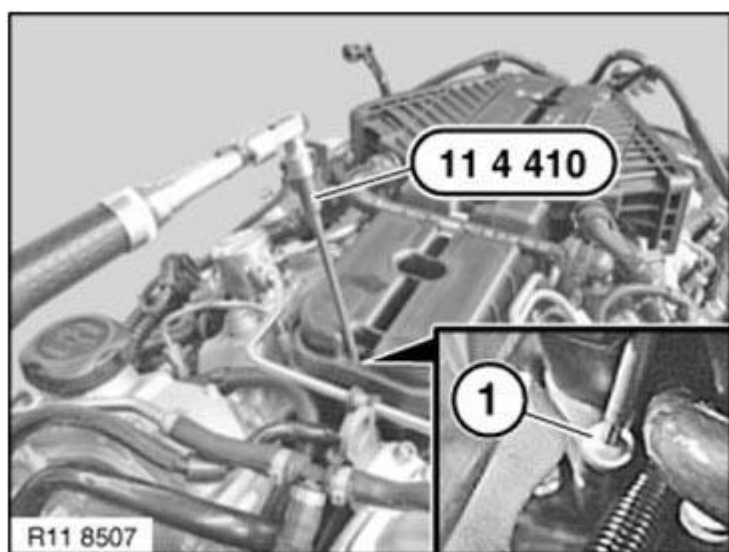


Fig. 436: Releasing Bolts On Intake Plenum Using Special Tool 11 4 410
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace all sealing rings (1) on intake lines.

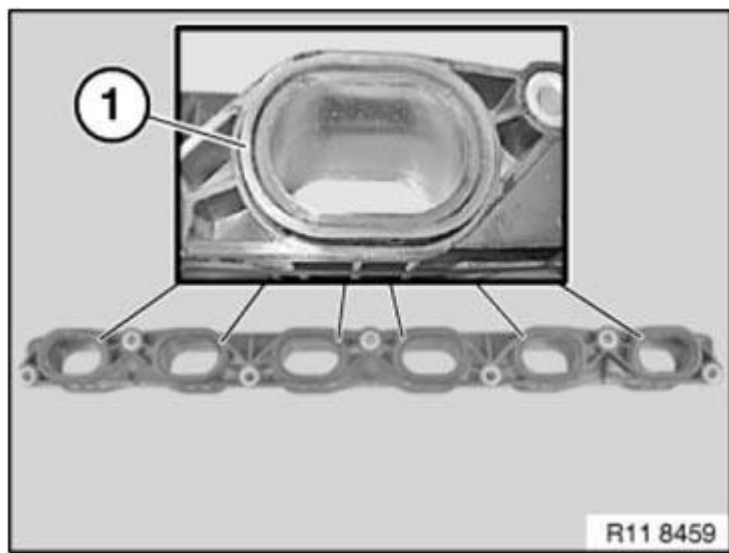


Fig. 437: Identifying Sealing Ring On Intake Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine and vehicle.

Check air intake system for leaks.

11 61 065 REMOVING AND INSTALLING/REPLACING BOTH INTAKE LINES (N74)

Necessary preliminary tasks:

- Remove intake **PLENUM**

Unscrew nuts (1).

Tightening torque: see 1AZ in **11 61 INTAKE PLENUM**

NOTE: Cylinders 7 to 12 are depicted here; procedure is identical for cylinder 1 to 6.

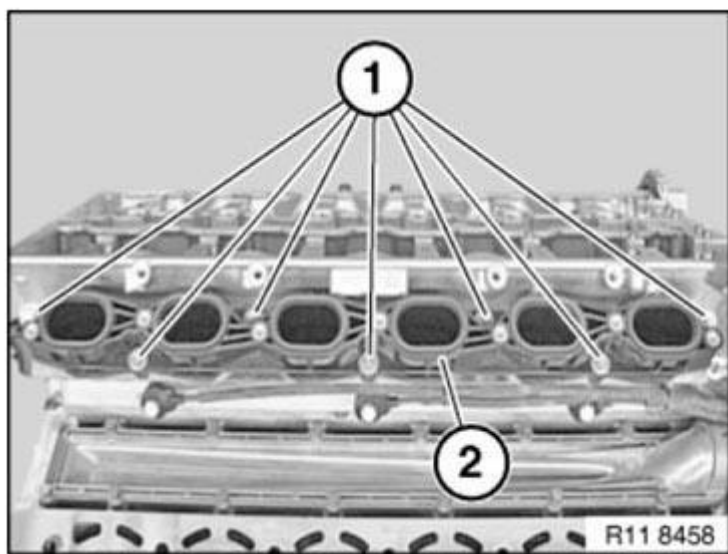


Fig. 438: Identifying Intake Lines Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace all sealing rings (1).

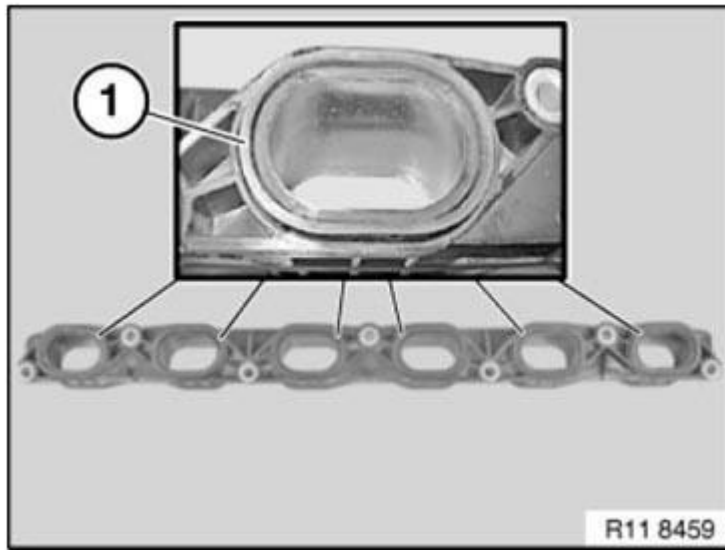


Fig. 439: Identifying Intake Lines Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine and vehicle.

Check intake system for leaks.

TURBOCHARGER WITH CONTROL

11 65 CONNECTION DIAGRAM, VACUUM ACTIVATION (N74)

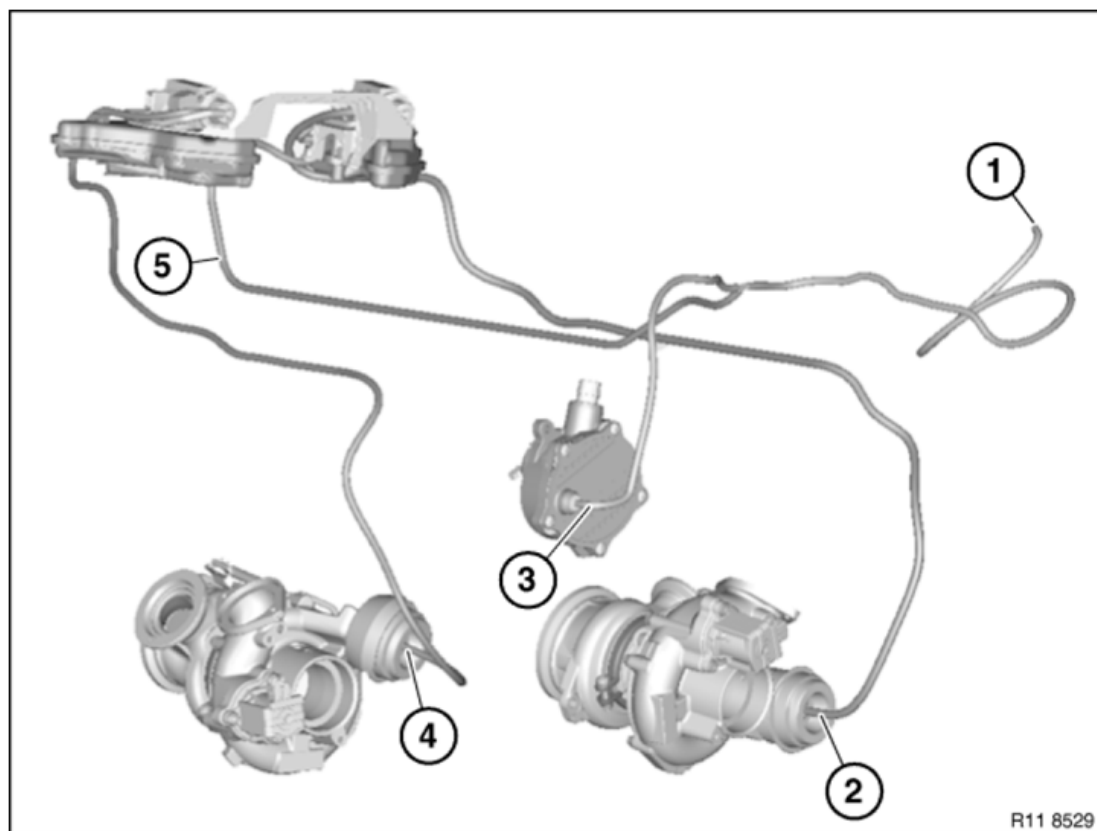


Fig. 440: Vacuum Activation - Connection Diagram
 Courtesy of BMW OF NORTH AMERICA, INC.

1. Connector **to the exhaust flaps** .
2. Connection, vacuum unit (wastegate valve), cylinder bank 2, cylinder pair 7 to 12.
3. Vacuum line **to vacuum pump** .
4. Connection, vacuum unit (wastegate valve), cylinder bank 1, cylinder pair 1 to 6.
5. Vacuum line, distributor to vacuum container.

T-piece (1) of vacuum line to the vacuum containers.

Connector (2) vacuum line to electro-pneumatic pressure converter (EPDW), cylinders 7 to 12, VAC connection.

Connector (3) vacuum line to electro-pneumatic pressure converter (EPDW), cylinders 1 to 6, VAC connection.

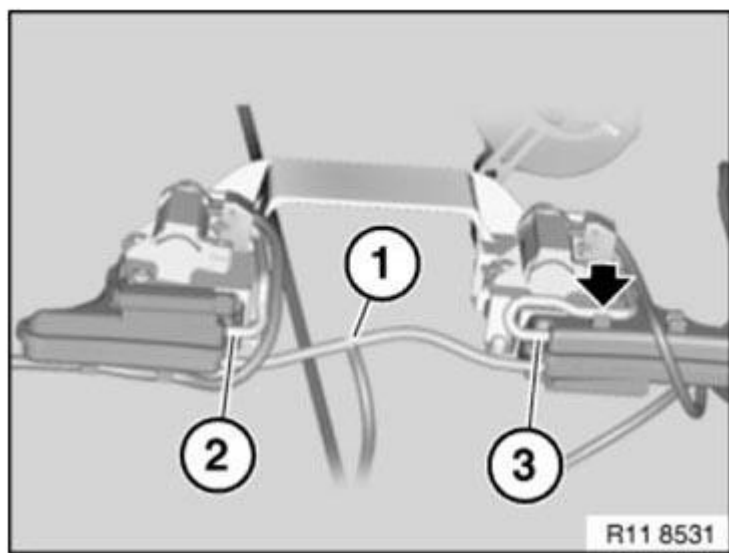


Fig. 441: Identifying Vacuum Line To Electropneumatic Pressure Converter Connector And T-Piece
Courtesy of BMW OF NORTH AMERICA, INC.

11 65 714 REMOVING AND INSTALLING/RENEWING THE ELECTRIC CHANGEOVER VALVE ON THE EXHAUST TURBOCHARGER AT RIGHT (N74)

Necessary preliminary tasks:

- Remove right **TURBOCHARGER**.

Release screws (1).

Remove electric changeover valve (2).

Installation note:

Replace O-ring.

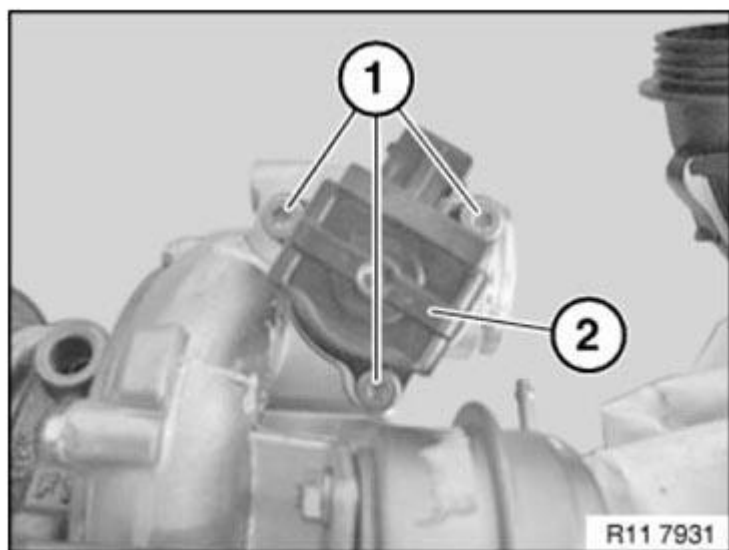


Fig. 442: Identifying Electric Changeover Valve And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Follow diagnosis instruction.

1. Complete vehicle
2. Powertrain
3. Engine electrical system
4. Air supply
5. Charging pressure control

11 65 712 REMOVING AND INSTALLING/REPLACING ELECTRIC CHANGEOVER VALVE ON EXHAUST TURBOCHARGER, LEFT (N74)

Necessary preliminary tasks:

- Remove left **TURBOCHARGER**.

Release screws (1).

Remove electric changeover valve.

Installation note:

Replace O-ring.

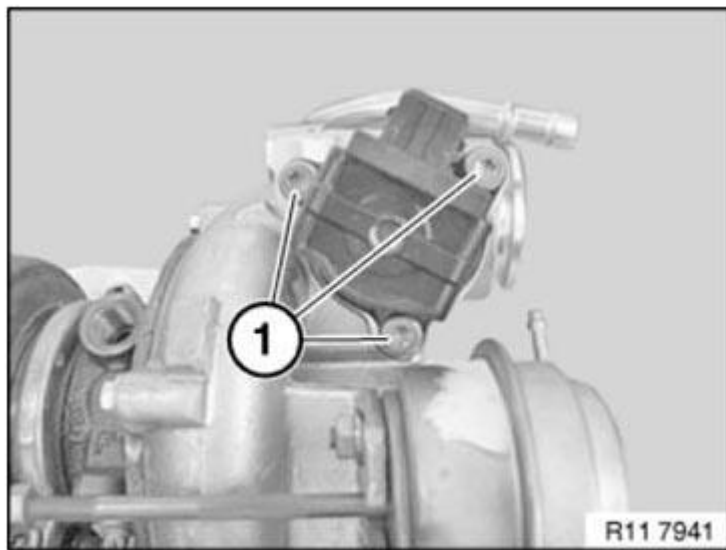


Fig. 443: Identifying Electric Changeover Valve Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Follow diagnosis instruction.

1. Complete vehicle
2. Powertrain
3. Engine electrical system
4. Air supply
5. Charging pressure control

11 65 030 REMOVING AND INSTALLING/REPLACING EXHAUST TURBOCHARGER, LEFT, CYLINDERS 7 - 12 (N74)

WARNING: Scalding hazard!

Only perform these tasks on an engine that has cooled down.

Necessary preliminary tasks:

- Remove **CATALYTIC CONVERTER** , cylinders 7 - 12
- Remove power steering gear. See **HYDRAULIC STEERING GEAR** or **ACTIVE FRONT STEERING HYDRAULIC STEERING GEAR** .
- Remove **CHARGE AIR PIPE**
- Remove **CLEAN AIR PIPE**

- Remove **INTERMEDIATE PIPE**

NOTE: Catch leaking engine oil and coolant with suitable auxiliary materials

Release banjo bolt (1).

Tightening torque: see 4AZ in **11 42 OIL FILTER AND LINES**

Replace seals.

Unfasten banjo bolt (2).

Replace seals.

Tightening torque: see 2AZ in **11 53 THERMOSTAT AND CONNECTIONS**

Disconnect vacuum hose (3) from vacuum unit.

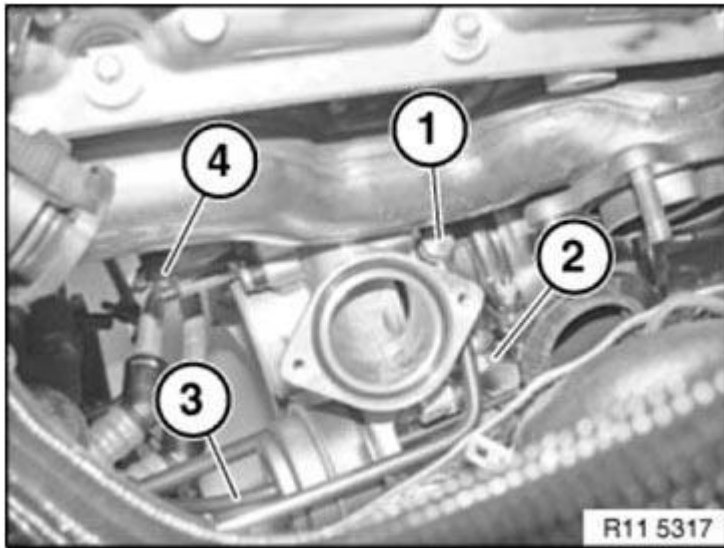


Fig. 444: Identifying Vacuum Hose, Plug Connection And Banjo Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (4).

Open hose clip (1).

Tightening torque: see 7AZ in **11 00 STANDARD SCREW CONNECTION**

Pull off coolant line (2).

Installation:

Replace hose clamp (1) .

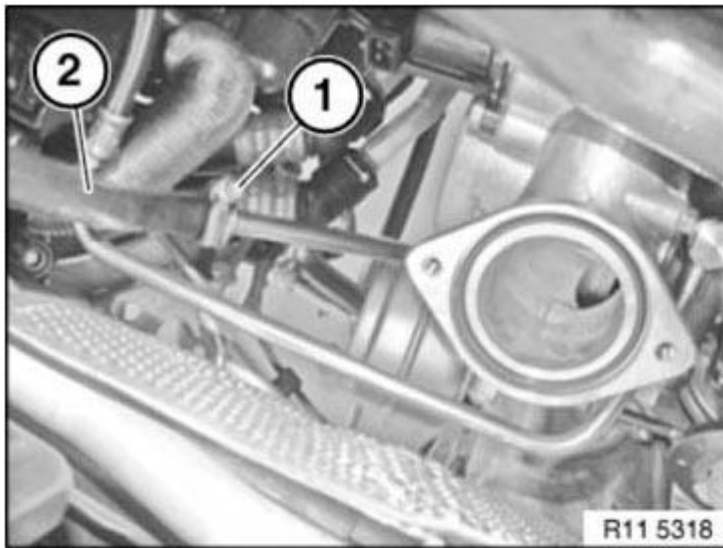


Fig. 445: Identifying Coolant Line And Hose Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: see 5AZ in **11 42 OIL FILTER AND LINES**

Lay oil line from turbocharger to side.

Installation:

Replace seal .

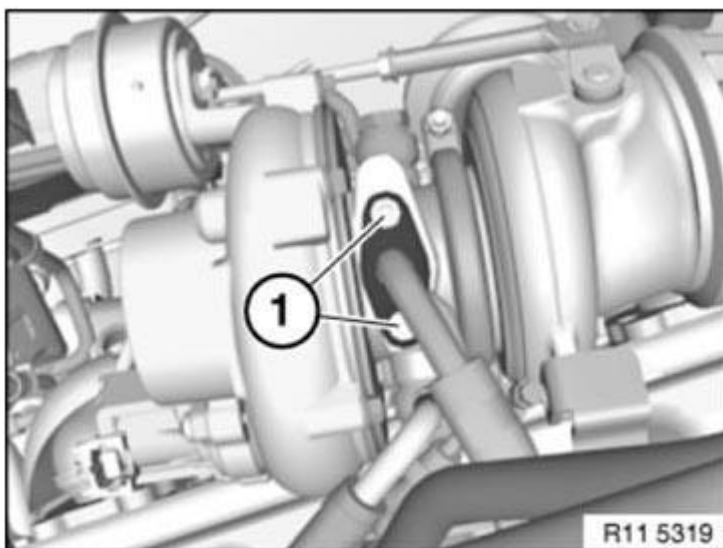


Fig. 446: Identifying Turbocharger Oil Line Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Remove heat shield from starter.

Tightening torque: see 2AZ in **12 41 STARTER MOTOR WITH MOUNTING**

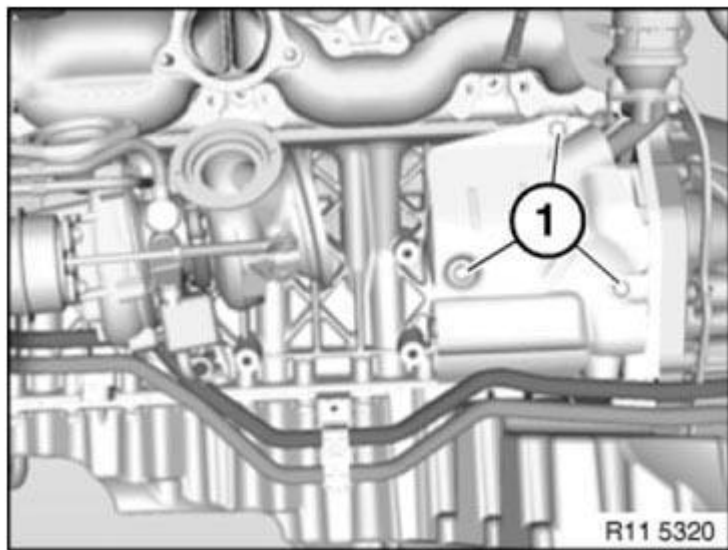


Fig. 447: Identifying Starter Heat Shield Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque: see 4AZ in **11 62 EXHAUST MANIFOLD**

IMPORTANT: Do not mechanically deform line remaining on exhaust turbocharger.

Remove exhaust turbocharger with coolant line forwards and downwards.

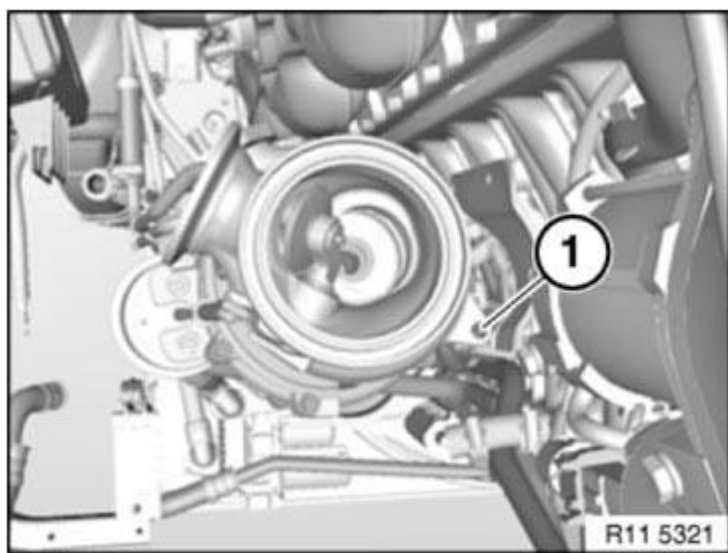


Fig. 448: Identifying Exhaust Turbocharger Screws
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, convert coolant feed line to new turbocharger.

Release banjo bolt (1).

Disconnect line (2).

Replace seals.

Tightening torque: see 3AZ in **11 53 THERMOSTAT AND CONNECTIONS**

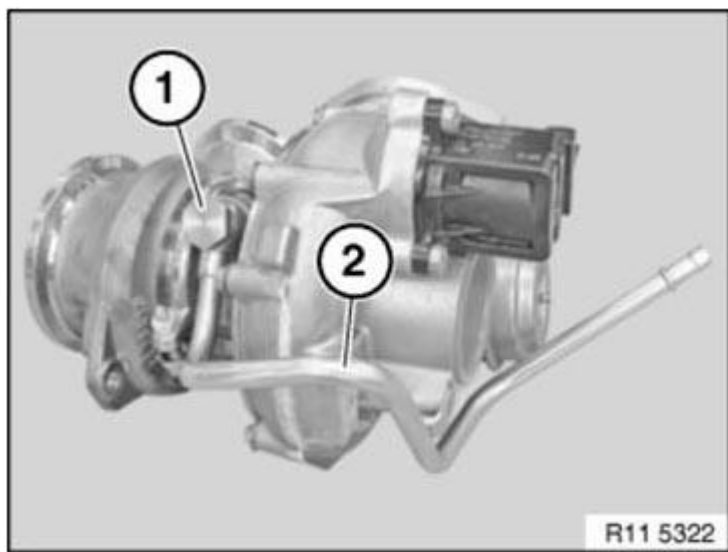


Fig. 449: Identifying Coolant Feed Line And Banjo Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Install intermediate tube (3).

Tighten self-locking nut (1).

Tightening torque: see 6AZ in **18 31 EXHAUST SYSTEM**

Position V-ribbon clips on turbocharger.

Tightening torque: see 7AZ in **18 31 EXHAUST SYSTEM**

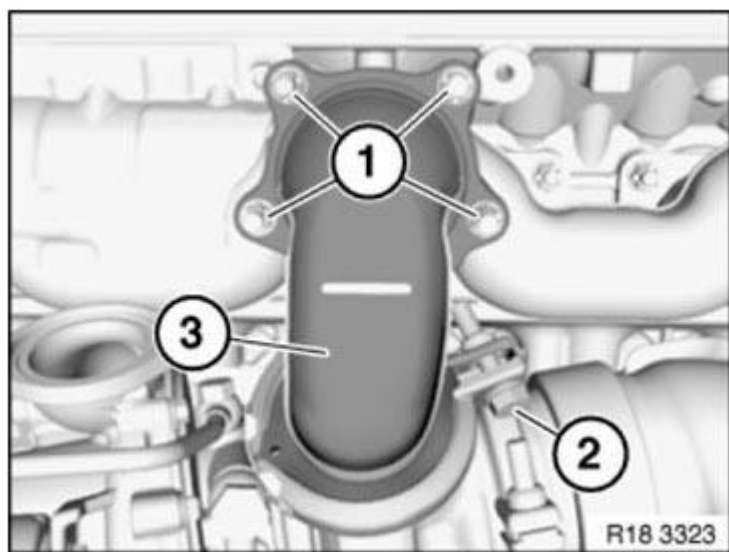


Fig. 450: Identifying Intermediate Tube, Self-Locking Nut And V-Band Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten bolt (1).

Tightening torque: see 4AZ in **11 62 EXHAUST MANIFOLD**

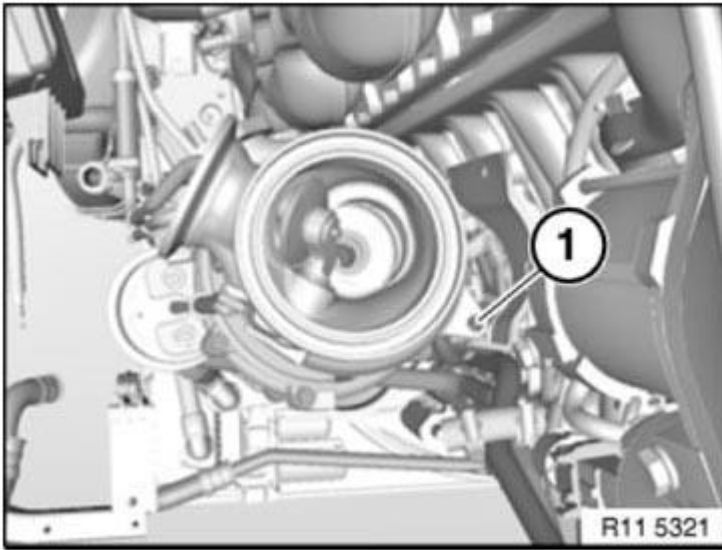


Fig. 451: Identifying Exhaust Turbocharger Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check vacuum connections.

Observe BMW diagnosis instructions.

1. Complete vehicle
2. Drive
3. Engine electrical system
4. Air supply
5. Boost pressure control

11 65 025 REMOVING AND INSTALLING/REPLACING EXHAUST TURBOCHARGER, RIGHT, CYLINDERS 1-6 (N74)

WARNING: Scalding hazard!

Only perform these tasks on an engine that has cooled down.

Necessary preliminary tasks:

- Remove CATALYTIC CONVERTER , cylinders 1-6
- Remove power steering gear. See HYDRAULIC STEERING GEAR or ACTIVE FRONT STEERING HYDRAULIC STEERING GEAR .
- Remove CHARGE AIR PIPE

- Remove CLEAN AIR PIPE
- Remove INTERMEDIATE PIPE
- Remove A/C COMPRESSOR

NOTE: Catch leaking engine oil and coolant with suitable auxiliary materials

Release banjo bolt (1).

Tightening torque: see 4AZ in 11 42 OIL FILTER AND LINES

Replace seals.

Unfasten banjo bolt (2).

Replace seals.

Tightening torque: see 2AZ in 11 53 THERMOSTAT AND CONNECTIONS

Disconnect vacuum hose (3) from vacuum unit.

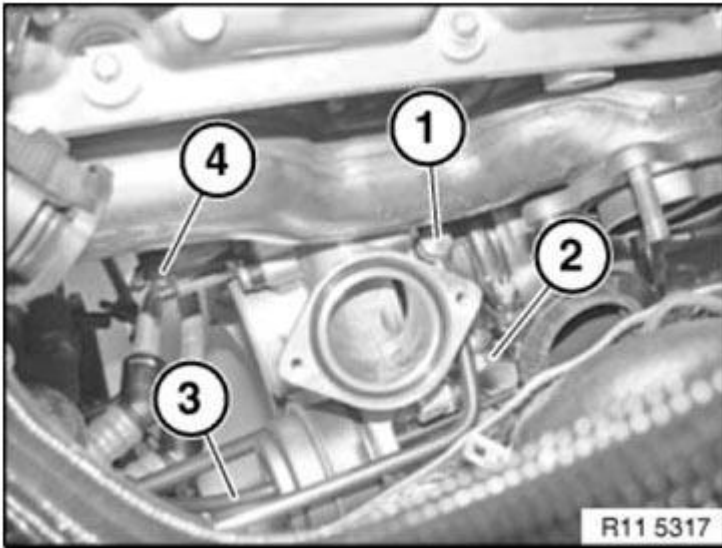


Fig. 452: Identifying Vacuum Hose, Plug Connection And Banjo Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (4).

Open hose clip (1).

Tightening torque: see 7AZ in 11 00 STANDARD SCREW CONNECTION

Pull off coolant line (2).

Installation:

Replace hose clamp (1) .

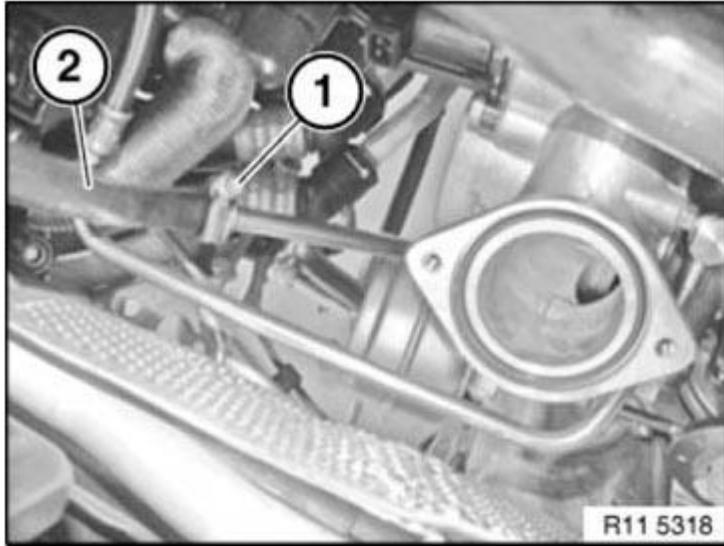


Fig. 453: Identifying Coolant Line And Hose Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: see 5AZ in **11 42 OIL FILTER AND LINES**

Lay oil line from turbocharger to side.

Installation:

Replace seal .

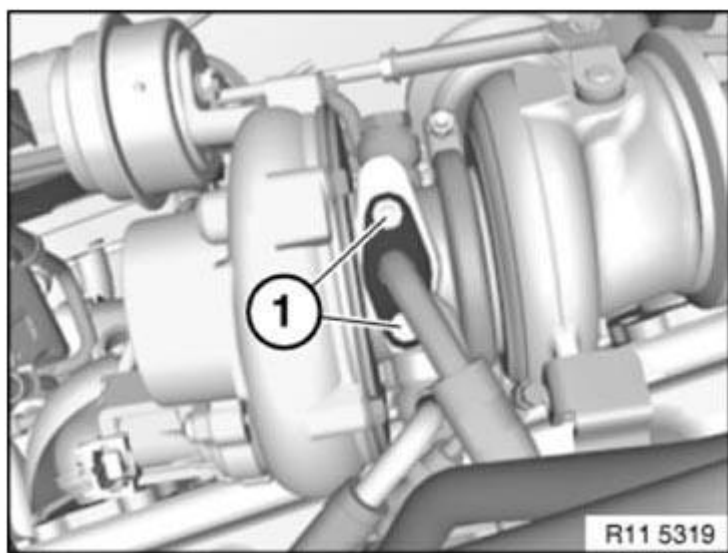


Fig. 454: Identifying Turbocharger Oil Line Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque: see 4AZ in **11 62 EXHAUST MANIFOLD**

IMPORTANT: Do not mechanically deform line remaining on exhaust turbocharger.

Remove exhaust turbocharger with coolant line forwards and downwards.

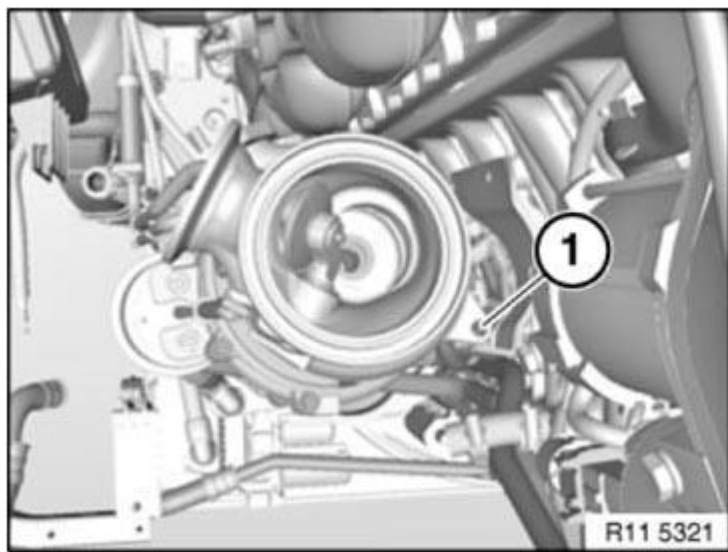


Fig. 455: Identifying Exhaust Turbocharger Screws
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, convert coolant feed line to new turbocharger.

Release banjo bolt (1).

Disconnect line (2).

Replace seals.

Tightening torque: see 3AZ in **11 53 THERMOSTAT AND CONNECTIONS**

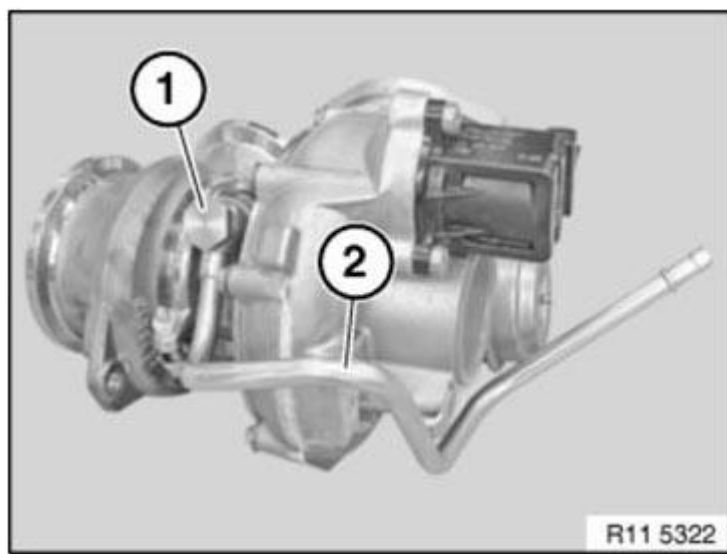


Fig. 456: Identifying Coolant Feed Line And Banjo Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Insert intermediate pipe (3).

Tighten self-locking nuts (1).

Tightening torque: see 6AZ in **18 31 EXHAUST SYSTEM**

Position V-band clamp (2) on turbocharger.

Tightening torque: see 7AZ in **18 31 EXHAUST SYSTEM**

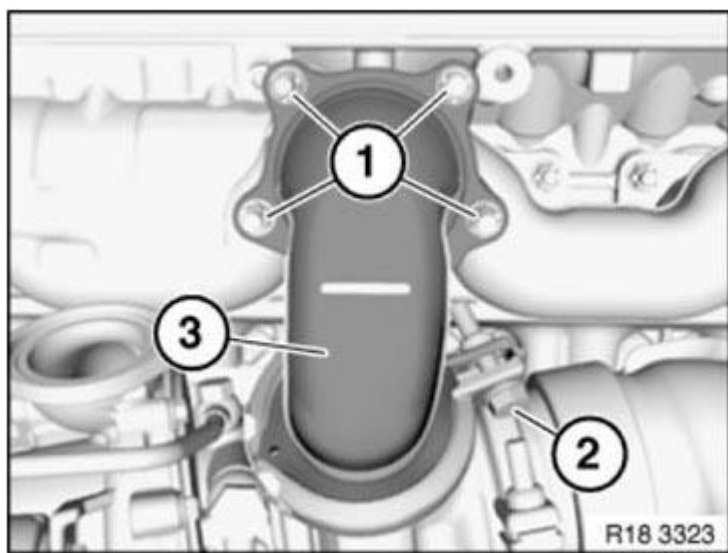


Fig. 457: Identifying Intermediate Tube, Self-Locking Nut And V-Band Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten bolt (1).

Tightening torque: see 4AZ in **11 62 EXHAUST MANIFOLD**

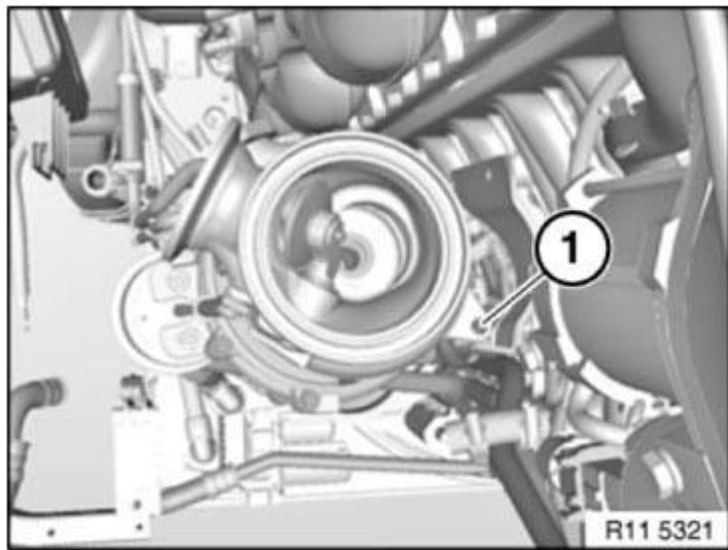


Fig. 458: Identifying Exhaust Turbocharger Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check vacuum connections.

Observe BMW diagnosis instructions.

1. Complete vehicle
2. Drive
3. Engine electrical system
4. Air supply
5. Boost pressure control

11 65 010 REMOVING AND INSTALLING/REPLACING PRESSURE ACCUMULATOR (N74)

Necessary preliminary tasks:

- Remove acoustic cover

Disconnect plug connection at charging pressure sensors (1).

Release cable strap holder (2) at pressure accumulator.

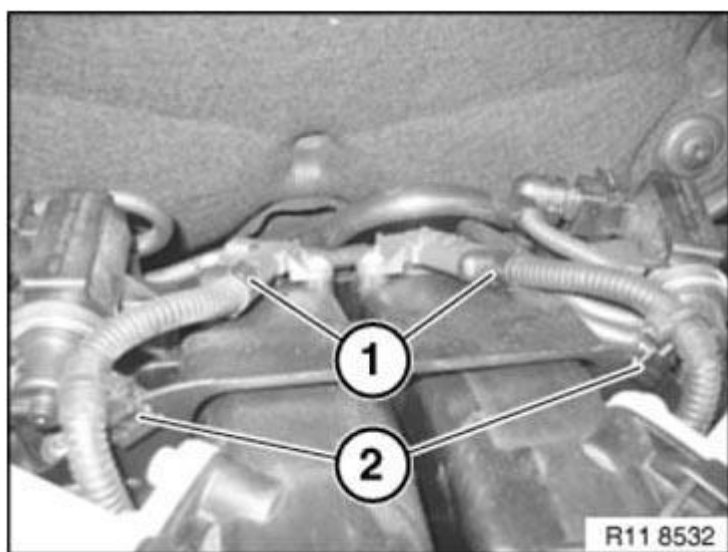


Fig. 459: Identifying Charging Pressure Sensors And Cable Strap Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip vacuum line for brake servo at pressure accumulator.

Disconnect vacuum lines (1) on electro-pneumatic pressure converter (EPDW) OUT for wastegate valves.

Pull off pressure accumulator (2) on left and right upwards in the direction of the arrow.

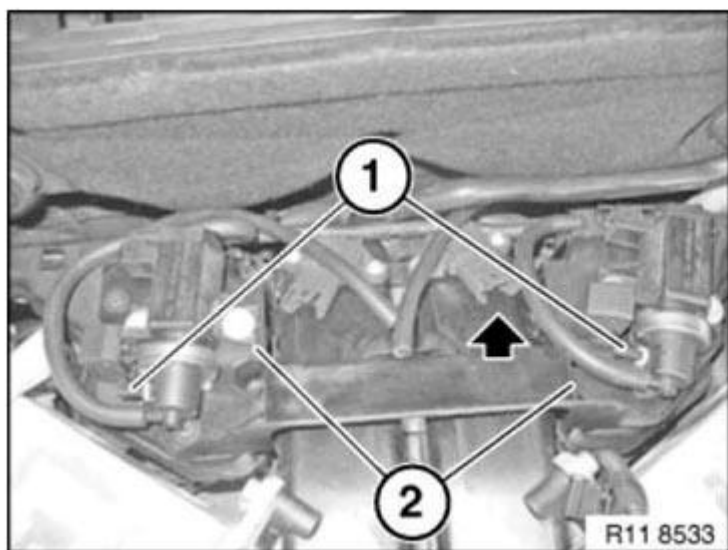


Fig. 460: Identifying Pressure Accumulator And Vacuum Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect vacuum line (1) to vacuum pump at pressure accumulator on left and right.

Installation note:

If necessary, modify the electro-pneumatic pressure converter (EPDW).

Connections (2 and 3) at vacuum container to the pressure converter connector (VAC).

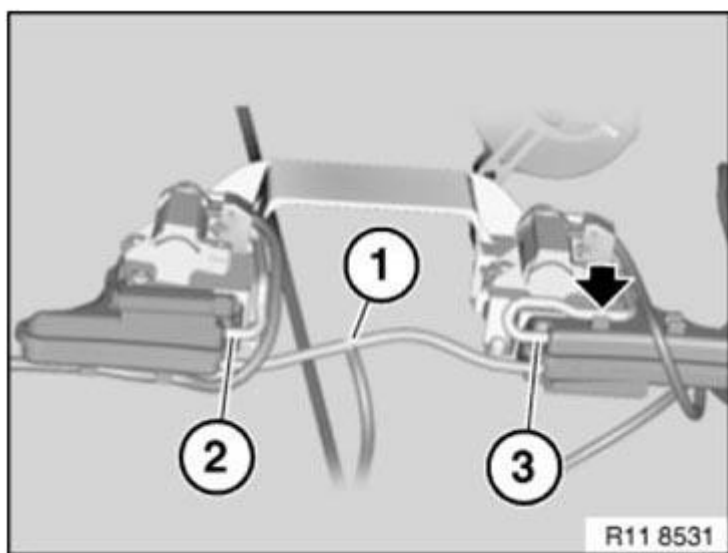


Fig. 461: Identifying Vacuum Line To Electropneumatic Pressure Converter Connector And T-Piece
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check installation position of left-hand vacuum line.

Make sure rubber grommets (1) are not damaged and are in the right position.

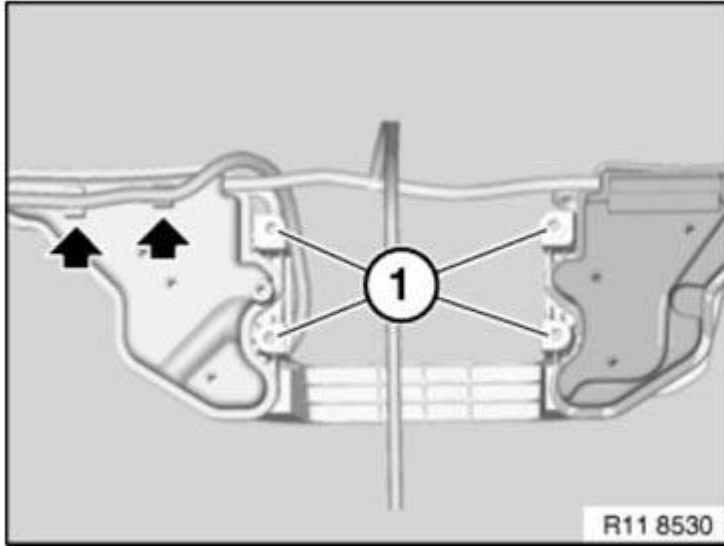


Fig. 462: Identifying Rubber Grommets
Courtesy of BMW OF NORTH AMERICA, INC.

Check vacuum connections for correct routing.

Check vacuum system for leaks.

Assemble engine.

VACUUM PUMP

11 66 000 REMOVING AND INSTALLING/REPLACING VACUUM PUMP (N74)

IMPORTANT: Installation:

Due to the risk of damage to the engine gaskets/seals and the lack of brake boosting, make sure before starting the engine that all the vacuum lines are connected.

Necessary preliminary tasks:

- Press brake pedal several times in order to reduce vacuum pressure in brake booster.
- Remove **FAN COWL WITH ELECTRIC FAN** .

Unlock and detach vacuum line (1).

Unfasten screws (2).

Tightening torque: see 1AZ in 11 66 VACUUM PUMP

Pull off vacuum hose (3).

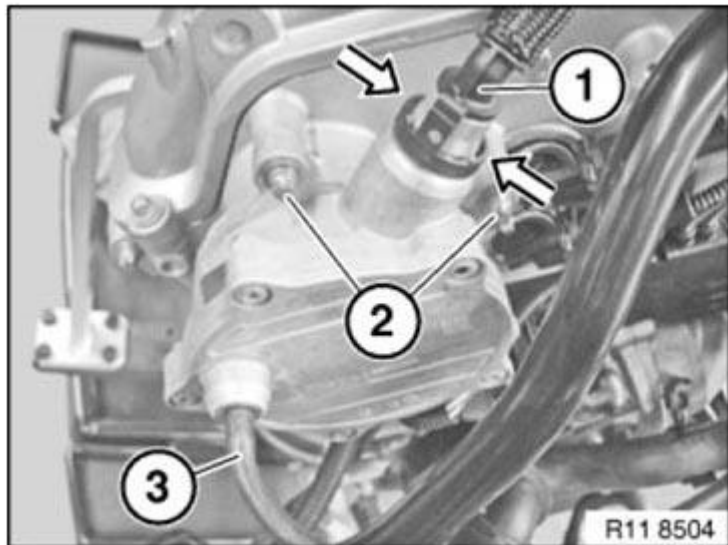


Fig. 463: Identifying Screws, Vacuum Hose And Vacuum Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: see 1AZ in 11 66 VACUUM PUMP

Remove vacuum pump (3).

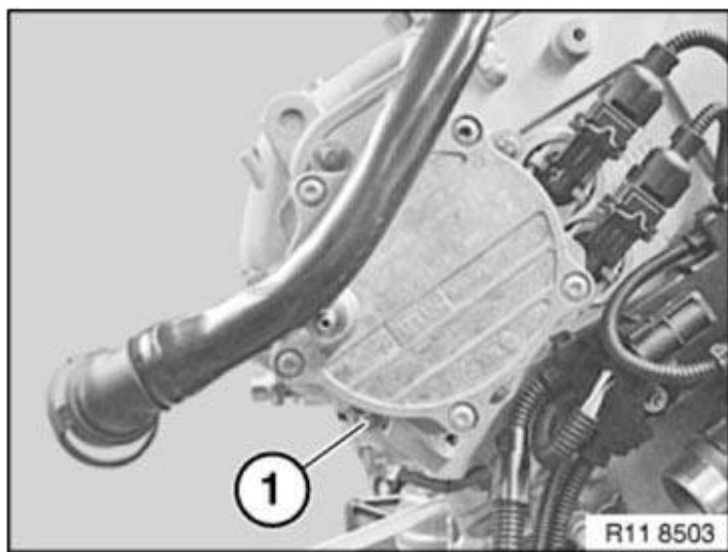


Fig. 464: Identifying Vacuum Pump Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Drive (1) must be rotated into correct position prior to installation.

Installation:

Replace sealing ring (2) and coat with grease to facilitate fitting.

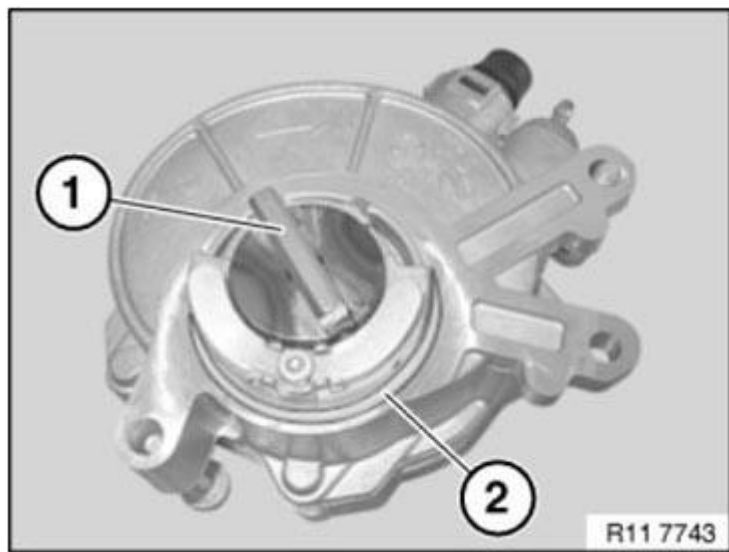


Fig. 465: Identifying Drive And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Align vacuum pump drive to groove (1) of intake camshaft.

Vacuum pump can be installed easier when groove (1) is vertically aligned.

NOTE: **Illustrations show N73.**

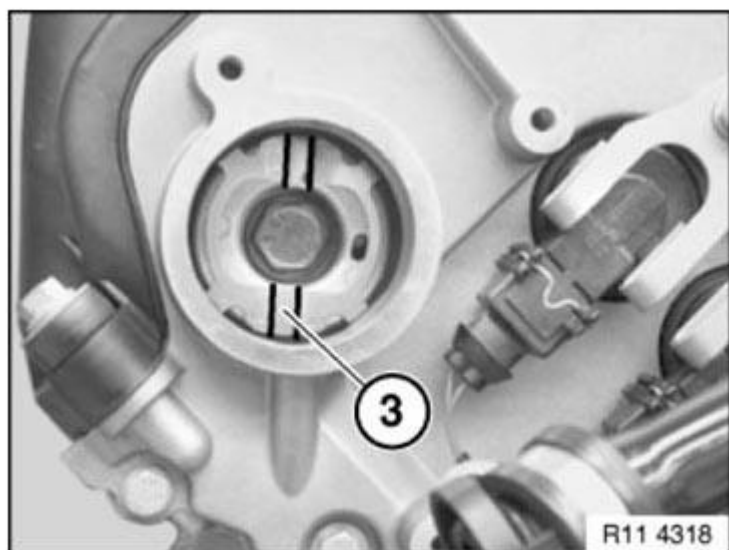


Fig. 466: Identifying Intake Camshaft Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Check function of DME.

Check vacuum pump for leaks and correct operation.

AIR PUMP, LINES AND CONTROL VALVES

11 72 000 REMOVING AND INSTALLING/REPLACING AIR PUMP (N74)

Necessary preliminary tasks:

- Disconnect negative battery cable.
- Remove FAN COWL WITH ELECTRIC FAN .
- Remove right-hand INTAKE SILENCER HOUSING
- Evacuate AIR CONDITIONING SYSTEM .
- Undo both AIR-CONDITIONING LINES at condenser.

Disconnect connector (1).

Unlock air hose (2) and remove.

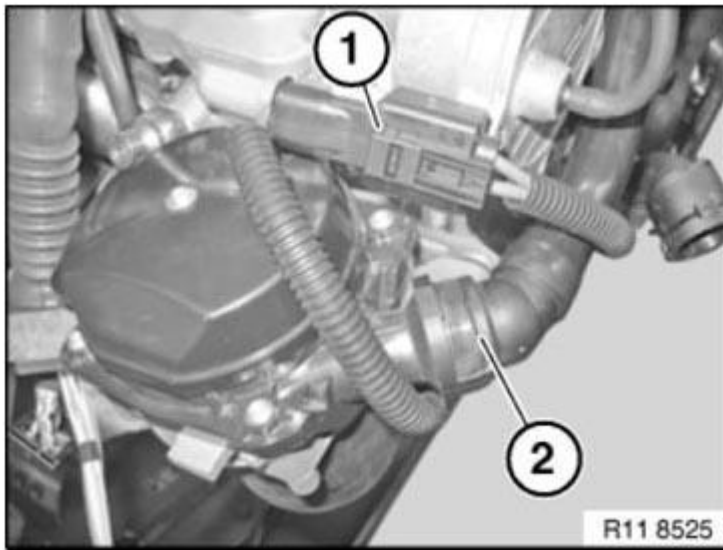


Fig. 467: Identifying Air Hose And Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken screws (1)

Remove air pump (2).

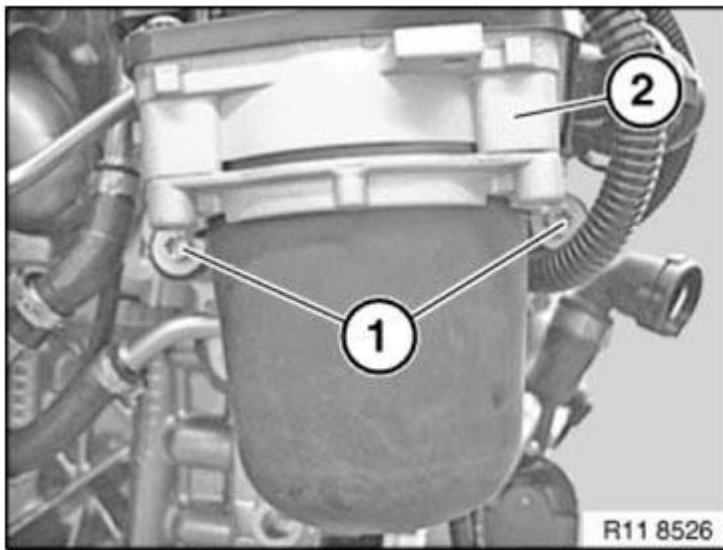


Fig. 468: Identifying Air Pump And Slacken Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Check function of DME.

TURBOCHARGER PRESSURE CONVERTERS

11 74 509 REPLACING BOTH PRESSURE CONVERTERS FOR TURBOCHARGER (N74)**Necessary preliminary tasks:**

- Remove **ENGINE COVER**.

Pressure converter, cylinders 1-6

Disconnect plug connection (3) on pressure converter.

Installation note:

Plug connection (3) must snap audibly into place!

Disconnect black vacuum hose (1) at connection (VAC = vacuum reservoir).

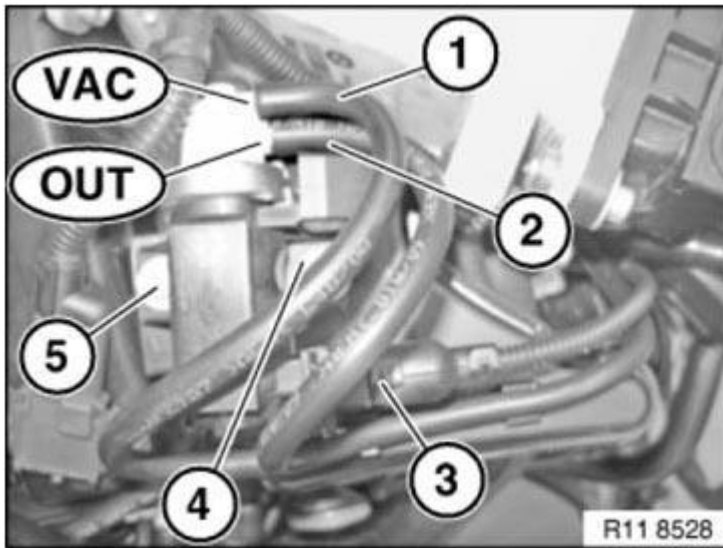


Fig. 469: Identifying Vacuum Hoses, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect black vacuum hose (2) at connection (OUT = vacuum unit of exhaust turbocharger).

Undo screws (4 and 5)

Tightening torque: see 2AZ in **11 00 STANDARD SCREW CONNECTION**

Remove pressure converter.

Pressure converter, cylinders 7-12

Disconnect plug connection (3) on pressure converter.

Installation note:

Plug connection (3) must snap audibly into place!

Disconnect black vacuum hose (1) at connection (VAC = vacuum reservoir).

Disconnect black vacuum hose (2) at connection (OUT = vacuum unit of exhaust turbocharger).

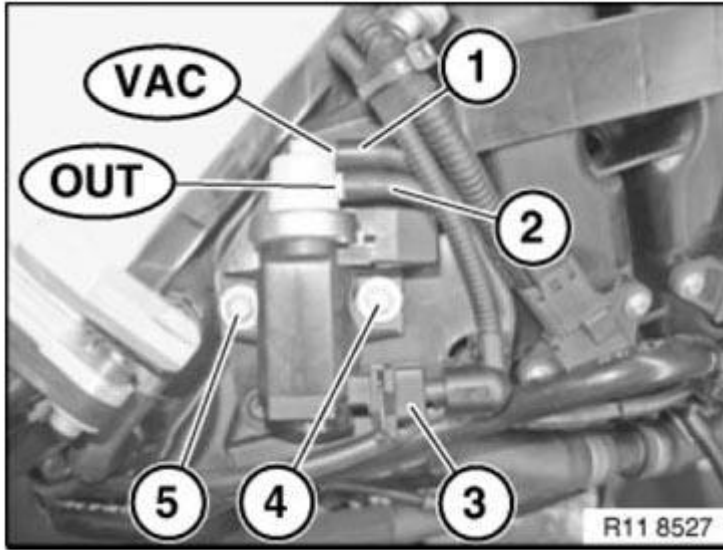


Fig. 470: Identifying Vacuum Hoses, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Undo screws (4 and 5)

Tightening torque: see 2AZ in 11 00 STANDARD SCREW CONNECTION

Remove pressure converter.

Check activation via BMW diagnosis system.

EMISSION CONTROL, OXYGEN SENSOR

11 78 530 REPLACING LEFT CONTROL SENSOR (N74)

WARNING: Scalding hazard!

Only perform this work after engine has cooled down.

Necessary preliminary tasks:

- Check function of DME control unit.
- Switch off ignition.
- Remove **PRESSURE PIPE** .

Release plug connector (1) and pull off.

Unclip control sensor cable (2) at retaining clips.

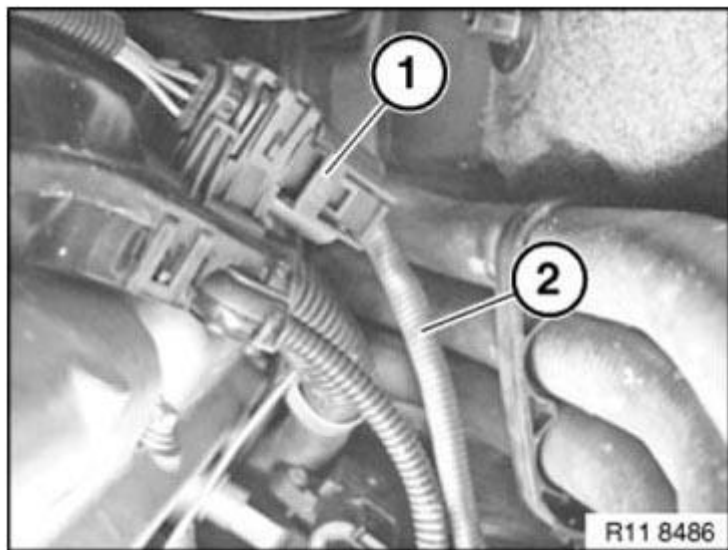


Fig. 471: Identifying Plug Connector And Control Sensor Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Release control sensor with special tool 11 7 020.

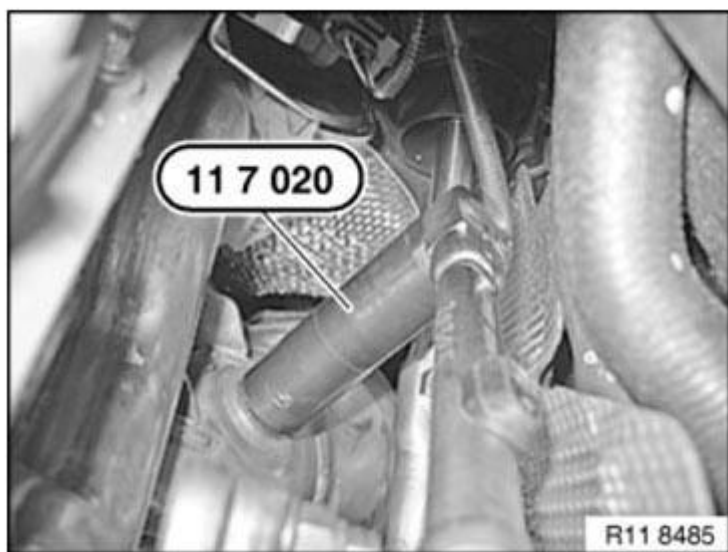


Fig. 472: Releasing Control Sensor Using Special Tool 11 7 020

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The threads of new lambda control/monitoring sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a lambda control/monitoring sensor is to be reused, apply a thin and even coating of Never Seez Compound to the thread only.

The part of the lambda control/monitoring sensor which projects into the exhaust branch (sensor ceramics) must **not** be cleaned and **not** coated with lubricant.

Secure control sensor with special tool 11 7 020 and a torque wrench (1).

Tightening torque: see 1AZ in **11 78 EMISSIONS CONTROL, CONTROL SENSOR / MONITORING SENSOR**

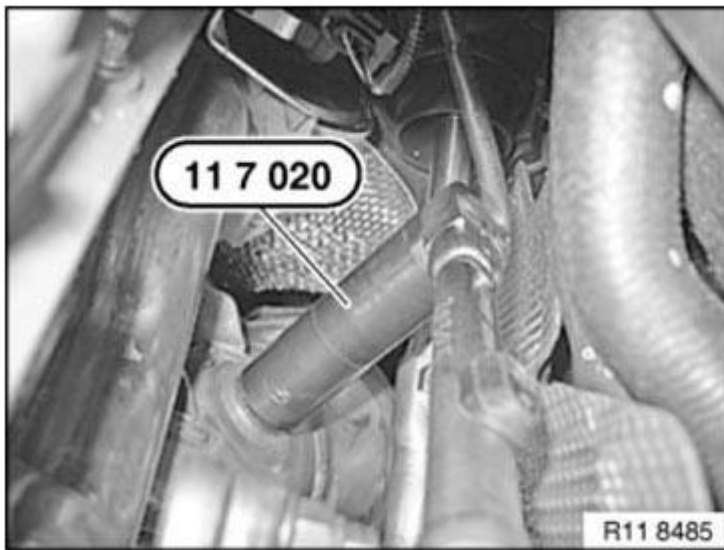


Fig. 473: Securing Control Sensor Using Special Tool 11 7 020
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check function of DME control unit.

Pay attention to cable routing of control sensor.

11 78 540 REPLACING LEFT MONITOR SENSOR (N74)

WARNING: Scalding hazard!

Only perform this work after engine has cooled down.

Necessary preliminary tasks:

- Check function of DME control unit
- Turn off ignition
- Remove **REAR UNDERBODY PROTECTION**

Remove heat shield (2) of the left side.

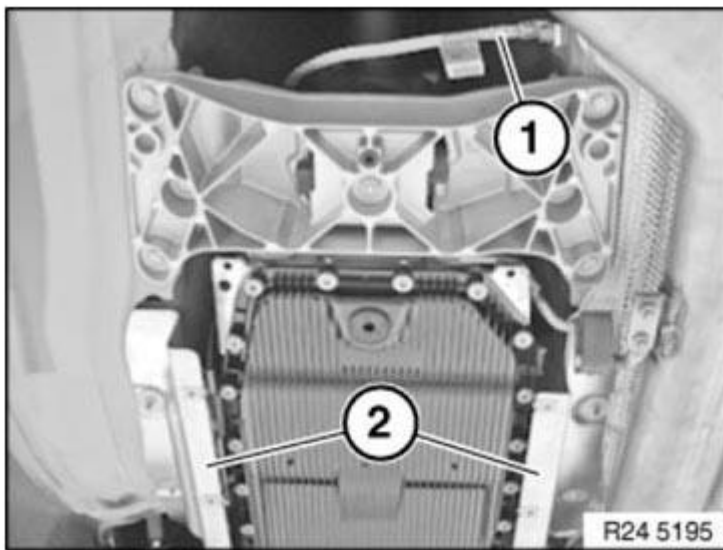


Fig. 474: Identifying Heat Shield

Courtesy of BMW OF NORTH AMERICA, INC.

Release exhaust system (1) at the catalytic converters.

Remove (2) sealing ring.

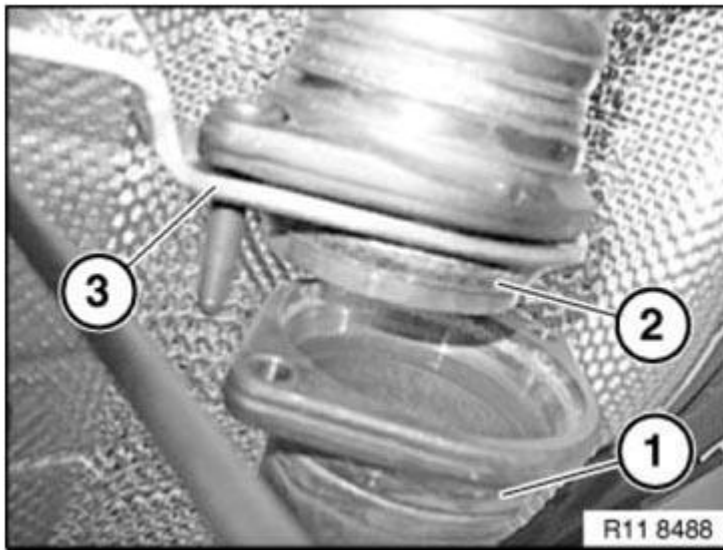


Fig. 475: Identifying Exhaust System And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove exhaust holder (2).

Tightening torque: see 3AZ in **18 31 EXHAUST SYSTEM**

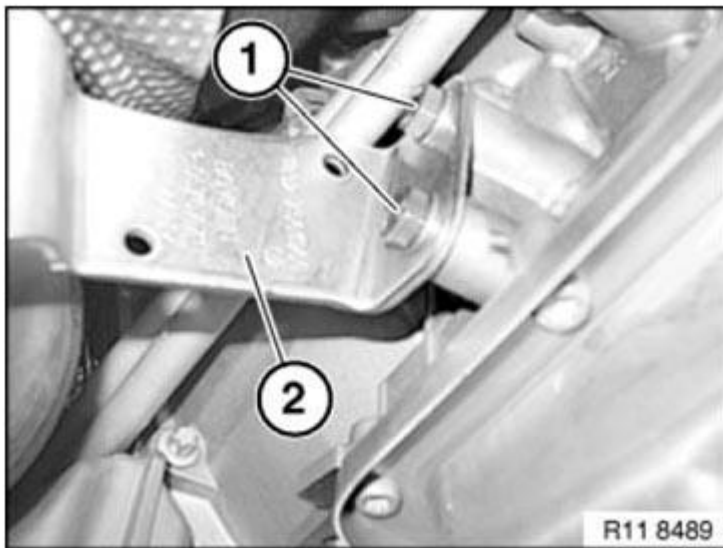


Fig. 476: Identifying Exhaust Holder With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip plug connection (2) of the oxygen sensor from the holder (1).

Release oxygen sensor cable (3) from the retaining clips (4).

Disconnect plug connection of the oxygen sensor (2).

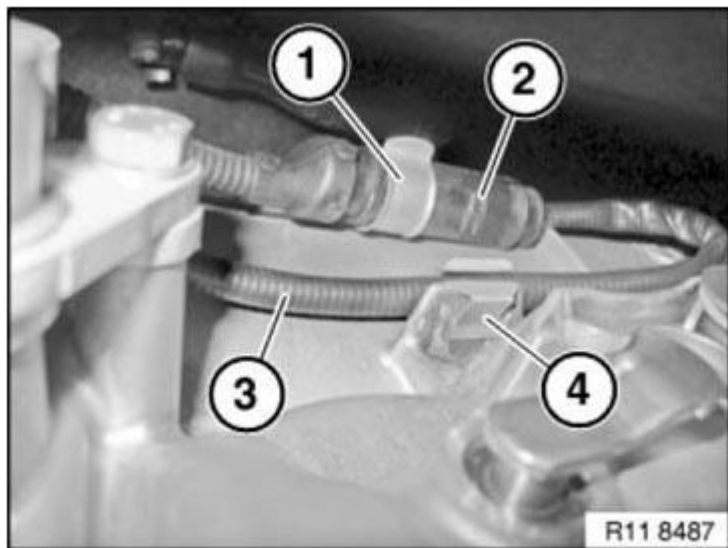


Fig. 477: Identifying Oxygen Sensor, Cable, Plug Connection, Holder And Retaining Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Detach oxygen sensor cable (1) from the retaining clips (2).

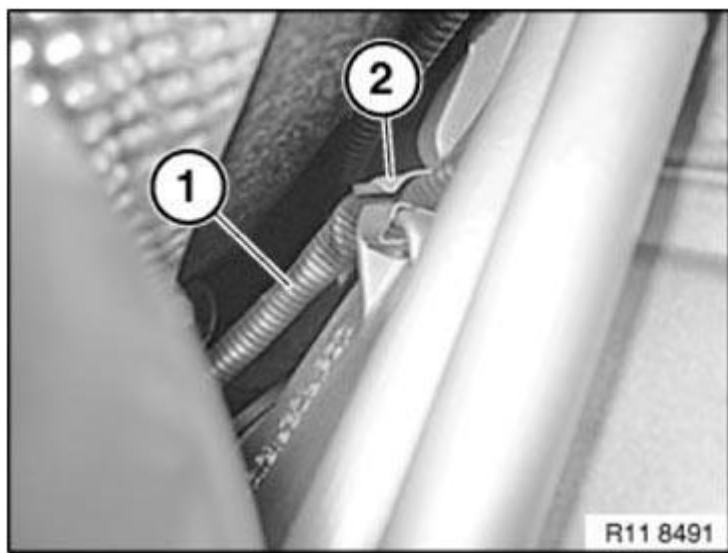


Fig. 478: Identifying Oxygen Sensor Cable And Retaining Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Release monitoring sensor (1) with special tools 11 7 030 and 11 9 150.

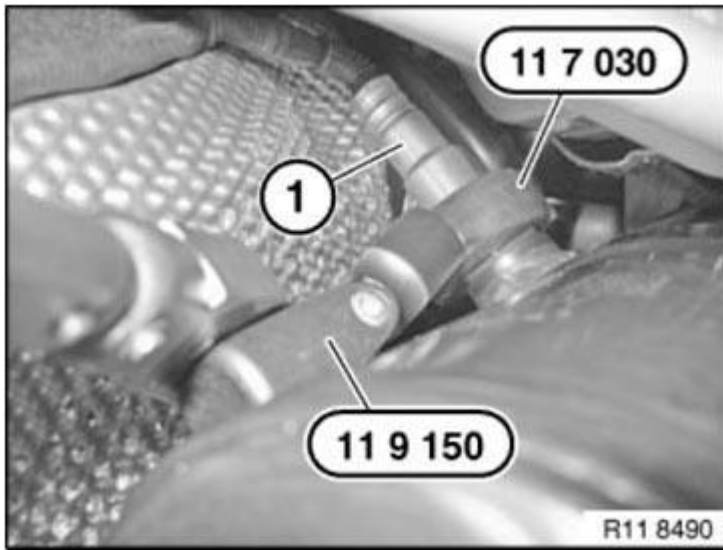


Fig. 479: Releasing Monitoring Sensor Using Special Tools 11 7 030 And 11 9 150
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The threads of new lambda control/monitoring sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a lambda control/monitoring sensor is to be reused, apply a thin and even coating of Never Seez Compound to the thread only.

The part of the lambda control/monitoring sensor which projects into the exhaust branch (sensor ceramics) must **not** be cleaned and **not** coated with lubricant.

Fasten monitoring sensor (1) with special tools 11 7 030 and 11 9 150.

Installation:

When special tool 11 9 150 is used in conjunction with special tool 11 7 030, 47 Nm on the torque wrench dial corresponds to an actual tightening torque of 50 Nm.

Tightening torque: see 1AZ in **11 78 EMISSIONS CONTROL, CONTROL SENSOR / MONITORING SENSOR**

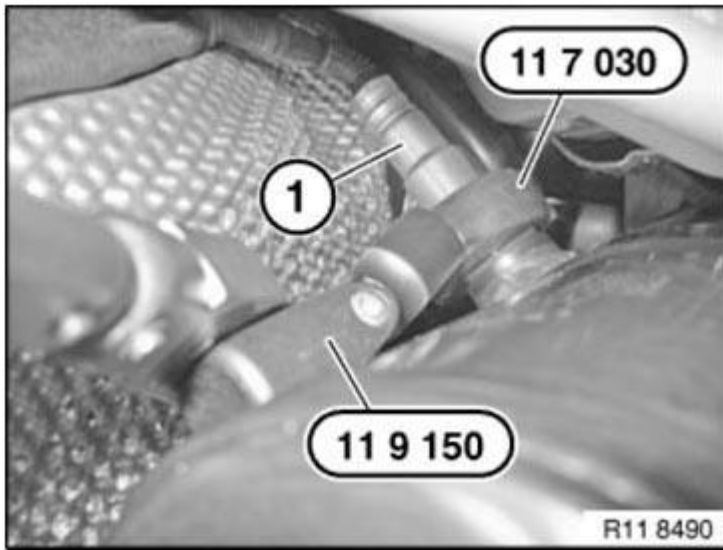


Fig. 480: Tightening Monitoring Sensor Using Special Tools 11 7 030 And 11 9 150
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check function of DME control unit.

Pay attention to cable routing of monitor sensor.

11 78 533 REPLACING RIGHT CONTROL SENSOR (N74)

WARNING: Scalding hazard!

Only perform this work after engine has cooled down.

Necessary preliminary tasks:

- Check function of DME control unit
- Turn off ignition
- Remove right **CHARGE AIR PIPE**

Release plug connector (1) and pull off.

Unclip control sensor cable (2) from holder.

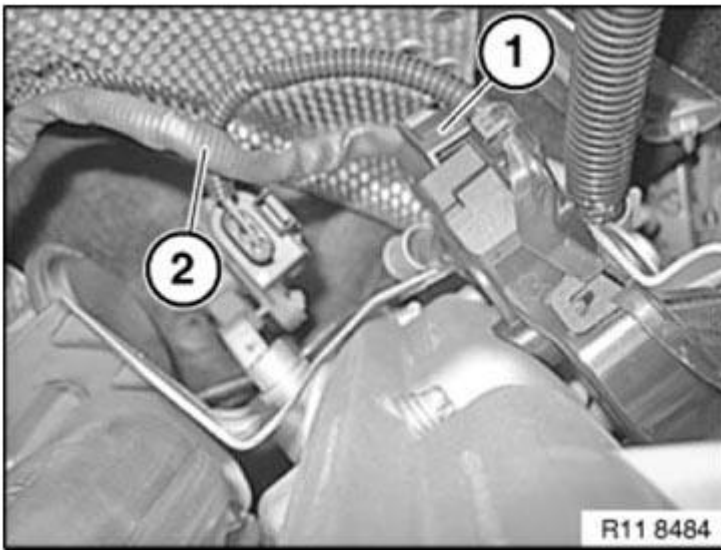


Fig. 481: Identifying Control Sensor Cable And Plug Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare special tool **11 4 260** with a 15° extension (1).

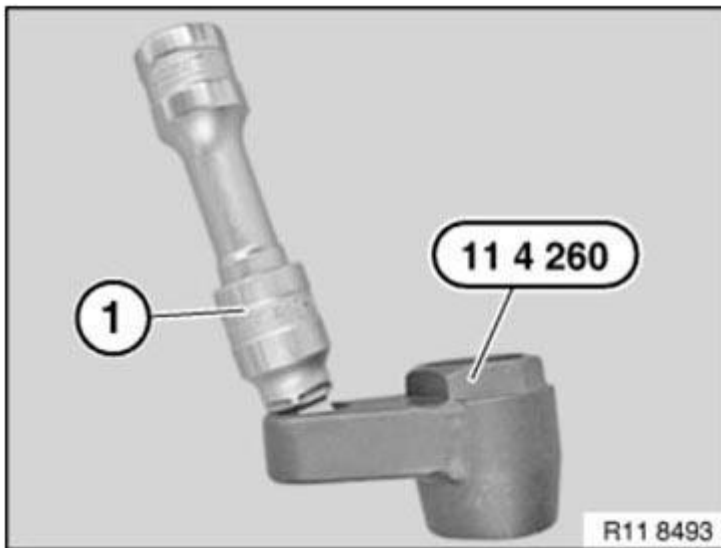


Fig. 482: Preparing Special Tool 11 4 260 With Angle Extension
Courtesy of BMW OF NORTH AMERICA, INC.

Release control sensor with special tool **11 4 260** .

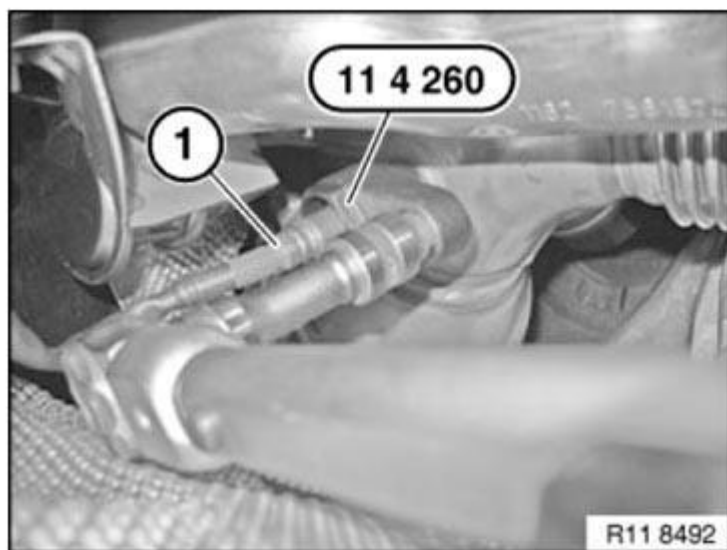


Fig. 483: Releasing Control Sensor Using Special Tool 11 4 260
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The threads of new lambda control/monitoring sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a lambda control/monitoring sensor is to be reused, apply a thin and even coating of Never Seez Compound to the thread only.

The part of the lambda control/monitoring sensor which projects into the exhaust branch (sensor ceramics) must **not** be cleaned and **not** coated with lubricant.

Secure control sensor with special tool **11 4 260** and a torque wrench (1).

Tightening torque: see 1AZ in **11 78 EMISSIONS CONTROL, CONTROL SENSOR / MONITORING SENSOR**

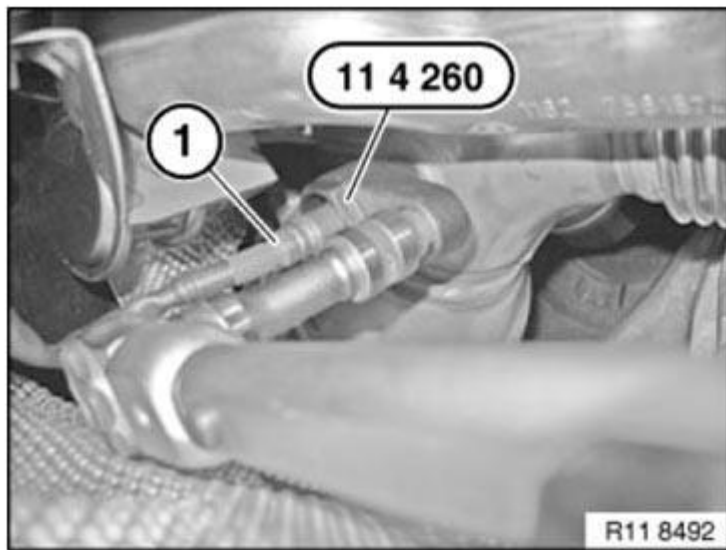


Fig. 484: Securing Control Sensor Using Special Tool 11 4 260
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check function of DME control unit.

Pay attention to cable routing of control sensor.

11 78 543 REPLACING RIGHT MONITOR SENSOR (N74)

WARNING: Scalding hazard!

Only perform this work after engine has cooled down.

Necessary preliminary tasks:

- Check function of DME control unit
- Switch off ignition.
- Remove engine underbody protection. See **FRONT UNDERBODY PROTECTION** and **REAR UNDERBODY PROTECTION** .

Detach monitoring sensor (1) from catalyst cylinders 1 - 6 with special tool 11 7 030 and 11 9 150.

Remove monitor sensor (1).

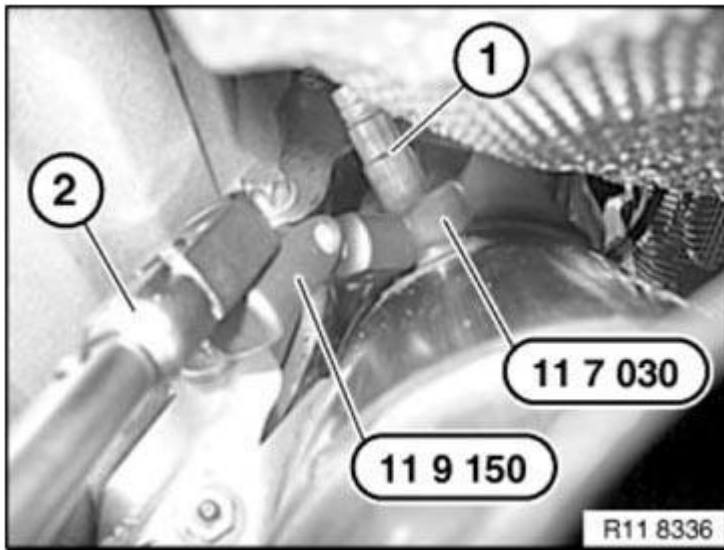


Fig. 485: Removing Monitoring Sensor From Catalyst Cylinders Using Special Tool 11 7 030 And 11 9 150

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The threads of new lambda control/monitoring sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a lambda control/monitoring sensor is to be reused, apply a thin and even coating of Never Seez Compound to the thread only.

The part of the lambda control/monitoring sensor which projects into the exhaust branch (sensor ceramics) must **not** be cleaned and **not** coated with lubricant.

Secure monitoring sensor (1) with special tool 11 7 030 and 11 9 150.

Tightening torque: see 1AZ in **11 78 EMISSIONS CONTROL, CONTROL SENSOR / MONITORING SENSOR**

IMPORTANT: When using special tool 11 7 030 in conjunction with 11 9 150, it is essential to reduce the prescribed tightening torque by 3 Nm to 47 Nm.

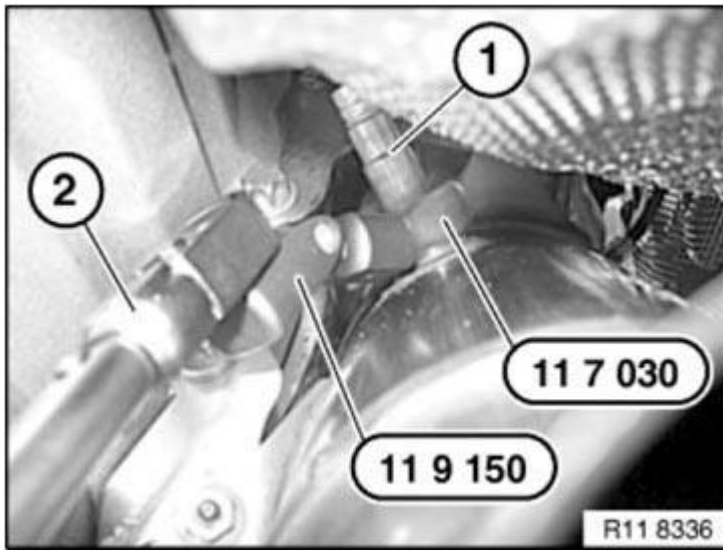


Fig. 486: Securing Monitoring Sensor From Catalyst Cylinders Using Special Tool 11 7 030 And 11 9 150
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check function of DME control unit.

Pay attention to cable routing of monitor sensor.