ENGINE

Engine - Repair

ENGINE, GENERAL

11 00 039 CHECKING COMPRESSION OF ALL CYLINDERS (S65)

IMPORTANT: High tension - mortal danger!
Disconnect all supply leads from ignition coils (interrupt power supply to ignition coils).

IMPORTANT: Check Schrader valve on special tool 11 0 235 for correct seating (engine damage).
The throttle valves cannot be opened by opening the throttle.
The compression check is carried out exclusively by means of the idle actuators.
A compression check is only possible with the diagnosis tester.
The catalytic converter will incur damage if the fuel injectors are not switched off.

Necessary preliminary tasks:

- Remove **microfilter housing** See **6431062 REMOVING AND INSTALLING/REPLACING LEFT LOWER MICROFILTER HOUSING SECTION** or **6431063 REMOVING AND INSTALLING/REPLACING RIGHT LOWER MICROFILTER HOUSING SECTION** .
- Remove all **spark plugs** See **1213512 REMOVING AND INSTALLING/REPLACING ALL IGNITION COILS (S65)** or **1212011 REPLACING ALL SPARK PLUGS (S65)** .
- Connect diagnosis tester.
-

1. Service function.
2. Drive.
3. Engine electronics
4. Switch off fuel injection.

IMPORTANT: Fuel injectors are switched off.

5. Actuate starter motor for 8 seconds.

Screw special tool 11 0 235 into spark plug hole.

Check that sealing ring is in perfect condition on special tool 11 0 235.

Connection (1) for diagnosis tester or special tool 11 0 224.

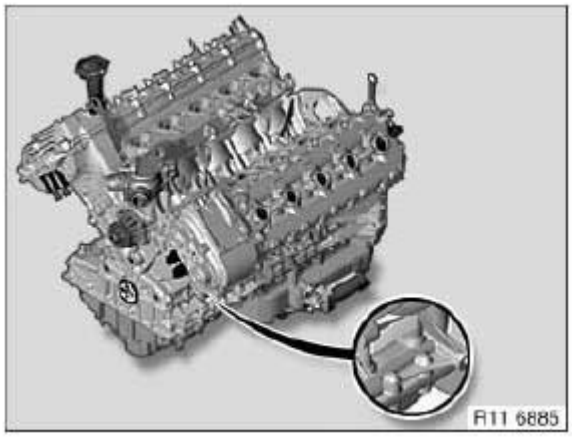

Fig. 16: Identifying Engine (S85/S65)
Courtesy of BMW OF NORTH AMERICA, INC.

W10/W11

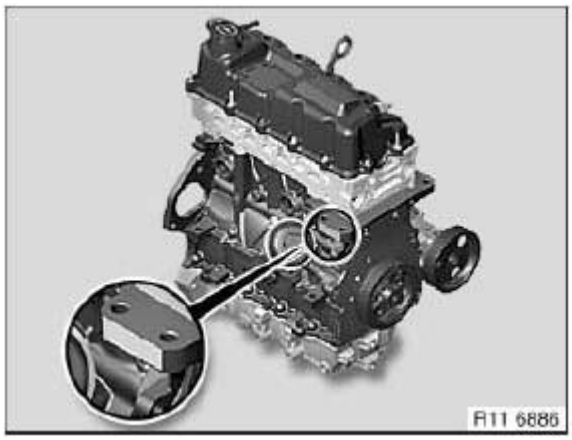

Fig. 17: Identifying Engine (W10/W11)
Courtesy of BMW OF NORTH AMERICA, INC.

N12/N14/N16/N18

- **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

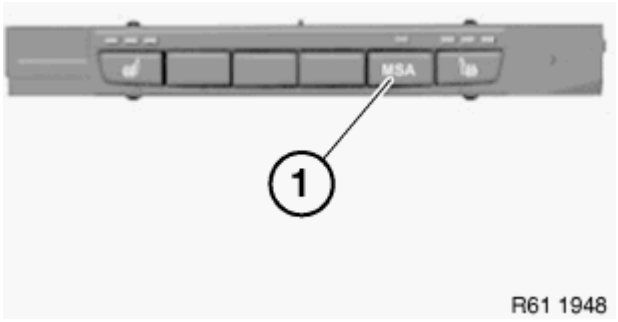

Fig. 32: Identifying MSA Button
Courtesy of BMW OF NORTH AMERICA, INC.

- 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.

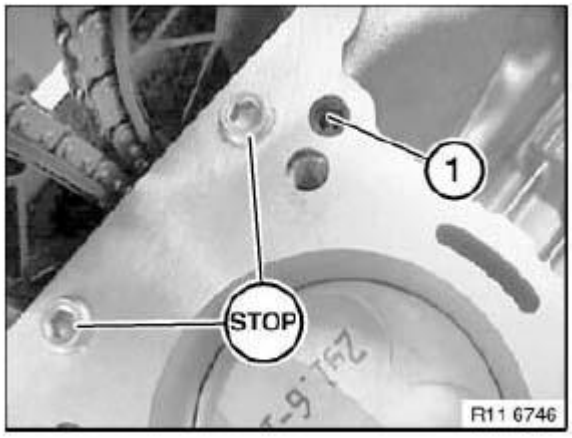

Fig. 70: Identifying Oil Bore
Courtesy of BMW OF NORTH AMERICA, INC.

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

Clean sealing faces with special tool 11 4 470.

Do not use any metal-cutting tools.

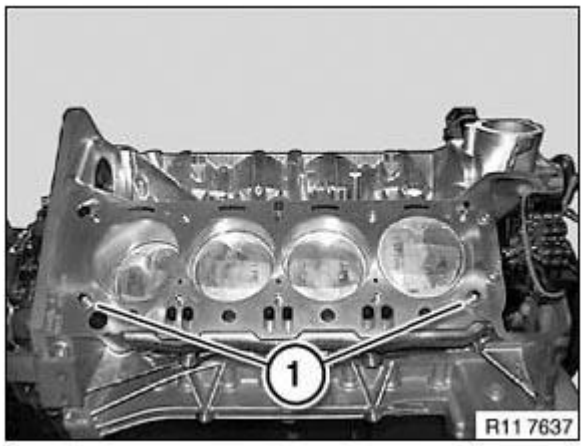

Fig. 71: Identifying Dowel Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

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

Clean sealing faces with special tool 11 4 470.

Do not use any metal-cutting tools.

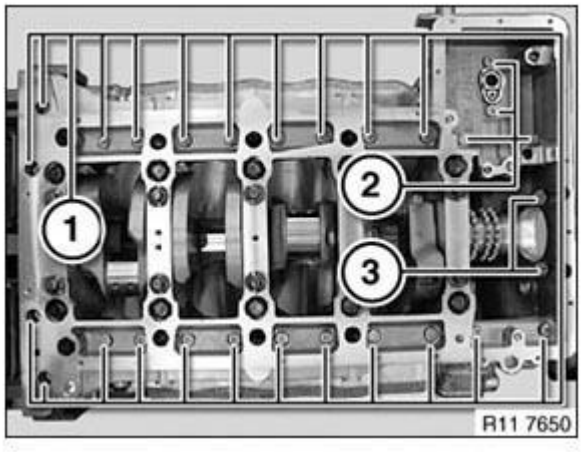

Fig. 106: Identifying Bedplate Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out crankshaft (1) with aid of a second person in direction of arrow.

NOTE: Weight of crankshaft approx. 22 kg.

Picture shows S85.

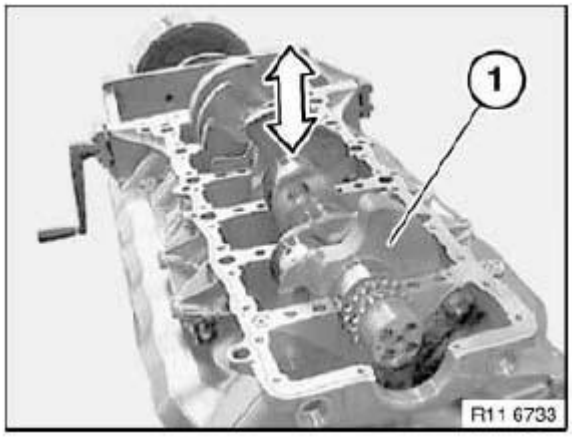

Fig. 107: Levering Out Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If the lower crankcase section (bedplate) is opened and closed again, fit special main bearing shells marked with (R) on the bearing backs.

Replace all bearing shells (2).

Replace guide bearing (3).

Installation:

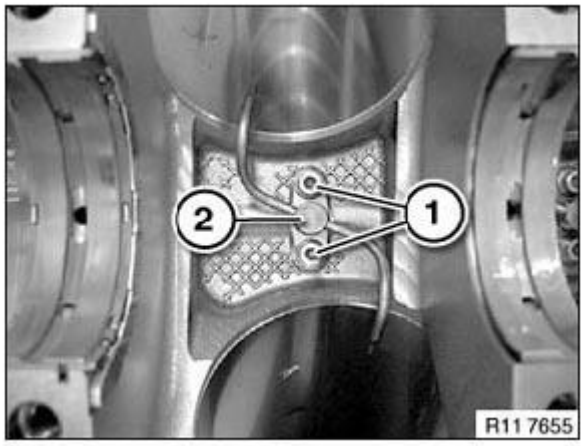

Fig. 154: Identifying Oil Nozzle And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove holder for oil pipes.

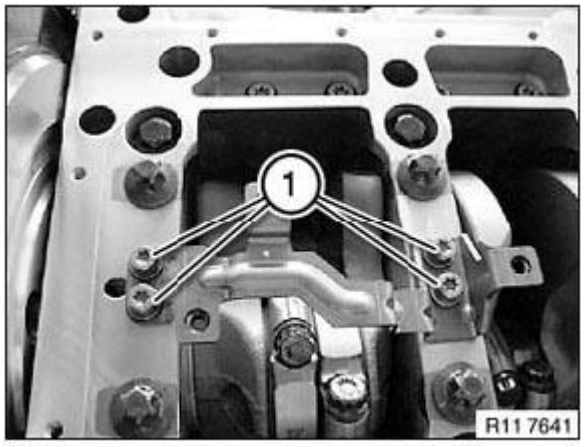

Fig. 155: Identifying Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release connecting rod bolts (1) with special tool 12 2 100.

Remove connecting rod bearing cap with bearing shell.

IMPORTANT: Screw central bolt fully once.

1. **Joining 20 Nm**
2. **Settling torque 80 Nm**
3. **Torsion angle 200°**
4. **Unscrew central bolt.**
5. **Preload central bolt to 10 Nm.**

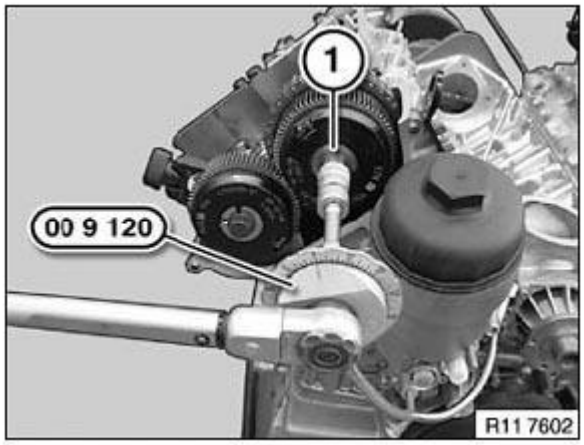

Fig. 205: Securing Central Bolt Using Special Tool (00 9 120)
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt (1) with special tool **00 9 120 TORQUE ANGLE MEASURING DIAL** .

IMPORTANT: Screw central bolt fully once.

1. **Joining 20 Nm**
2. **Settling torque 80 Nm**
3. **Torsion angle 200°**
4. **Unscrew central bolt.**
5. **Preload central bolt to 10 Nm.**

Tightening torque: **11 12 2AZ** .

E Intake camshaft

A Exhaust camshaft.

IMPORTANT: Risk of mix-up with cylinder bank 5-8.
Arrow must point in direction of travel to chain drive.

Remove bearing caps.

Installation:

Lubricate all bearing points with engine oil.

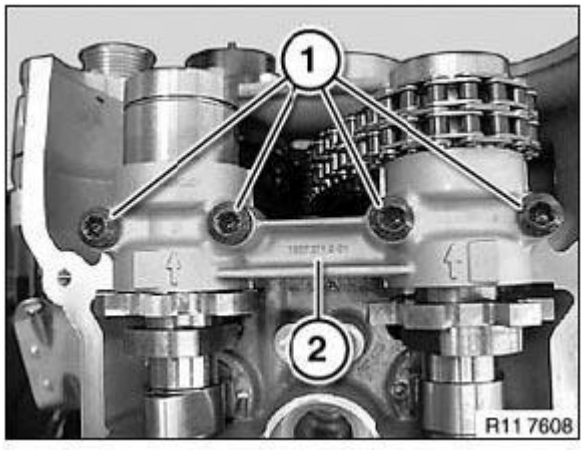

Fig. 241: Identifying Camshaft Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) from outside inwards in 1/2 turns.

Tightening torque: **11 12 2AZ** .

Remove exhaust camshaft for cylinders 1 to 4.

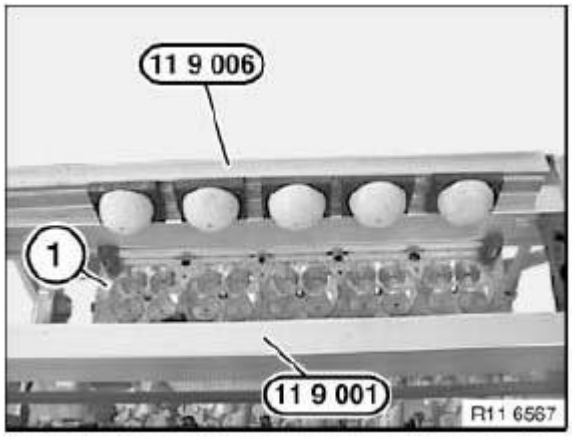

Fig. 265: Identifying Cylinder Head On Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Insert aluminum profile rail (1) and align.

Secure eccentric clamping levers (2 and 3).

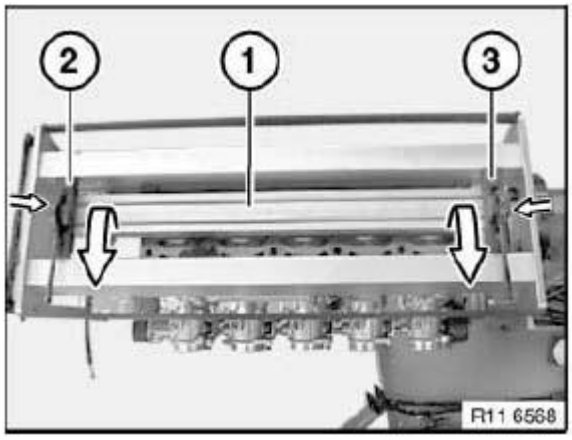

Fig. 266: Securing Eccentric Clamping Levers
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Special tools S85 11 5 281 and 11 5 282 must be modified to S65.

Special tool 11 5 281 for **removing** valve keys.

Special tool 11 5 282 for **installing** valve keys.

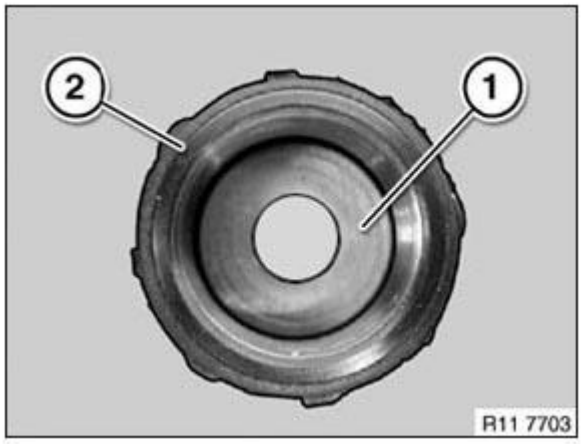

Fig. 290: Identifying Washer And Valve Cage
Courtesy of BMW OF NORTH AMERICA, INC.

Insert felt washer (2) with smooth side facing down in valve cage (1).

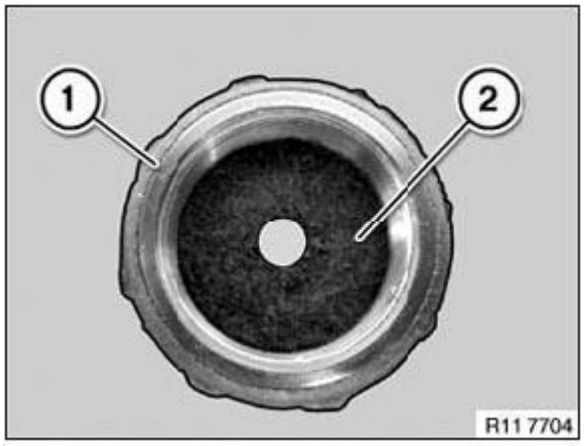

Fig. 291: Identifying Felt Washer And Valve Cage
Courtesy of BMW OF NORTH AMERICA, INC.

Insert washer (3) in valve cage (1).

Screw down special tool 11 5 281 with inserted special tool 11 9 951 again.

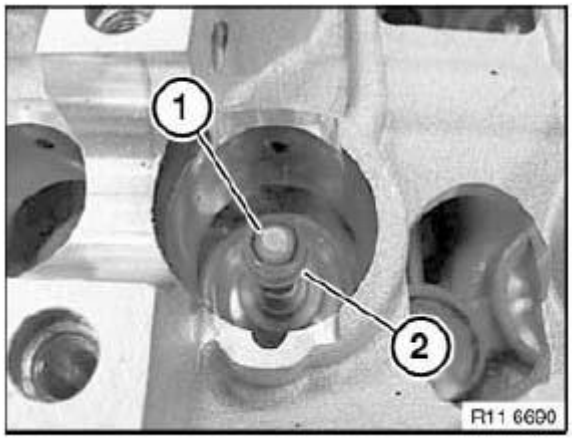

Fig. 308: Identifying Valve Stem Seal And Mounting Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Press on valve stem seal with special tool 11 5 270 in direction of arrow as far as it will go.

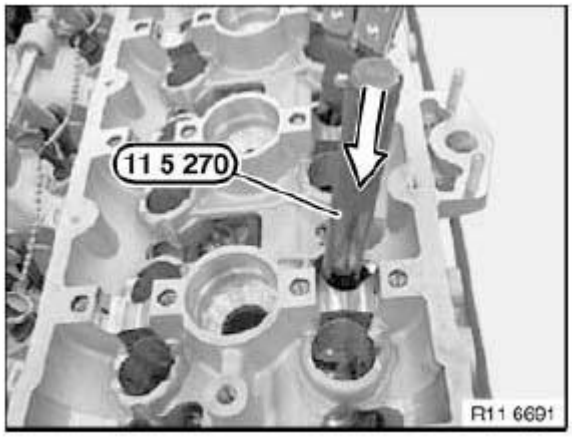

Fig. 309: Pressing Valve Stem Seal Using Special Tool (11 5 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

VARIABLE CAMSHAFT TIMING

11 36 144 REMOVING AND INSTALLING/REPLACING LEFT EXHAUST VANOS GEAR (S65)

IMPORTANT: Central bolts on VANOS gears have left-hand threads.
Do not release the central bolt of the adjustment units without the special tool 119970 GAUGE .
Grease contact surfaces of central bolts with copper paste.

Necessary preliminary tasks:

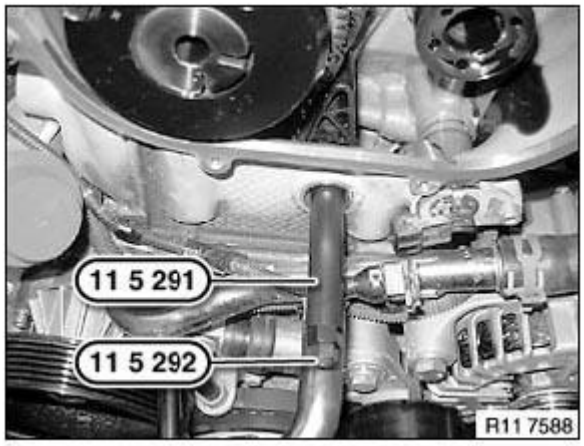

Fig. 350: Identifying Special Tool (11 5 291 And 11 5 292)
Courtesy of BMW OF NORTH AMERICA, INC.

Install chain tensioner (1).

Installation:

Replace sealing ring.

Tightening torque: **11 31 1AZ** .

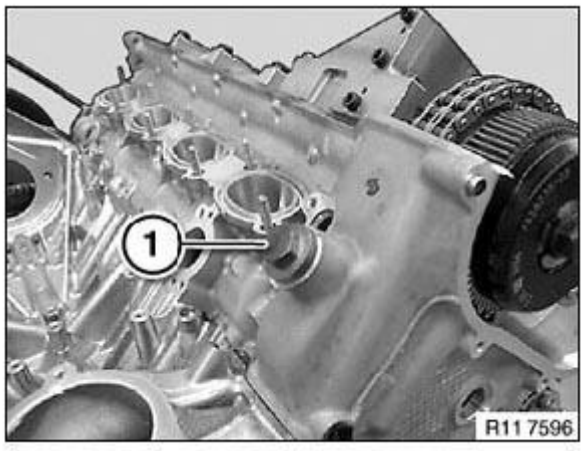

Fig. 351: Identifying Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Insert central bolt (1) and screw with special tool **00 9 120 TORQUE ANGLE MEASURING DIAL** .

1. Joining 10 Nm
2. Joining 20 Nm
3. Settling torque 80 Nm
4. Torsion angle 200°

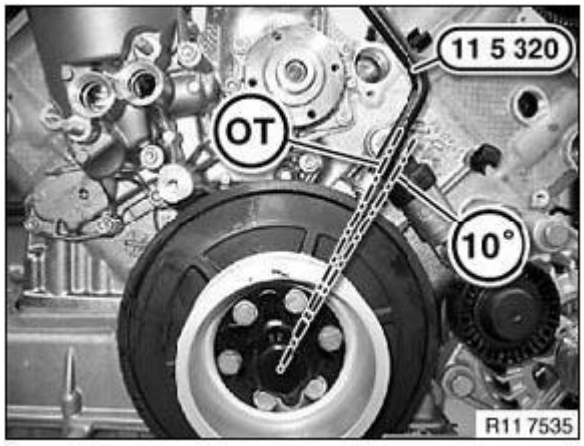

Fig. 385: Identifying Crankshaft Position
Courtesy of BMW OF NORTH AMERICA, INC.

Position of inlet camshafts, cyl. 1-4, in firing TDC position of cylinder no. 1.

Dihedron of inlet camshafts is vertical to cylinder axis, letters/numbers on camshafts point upwards (E1).

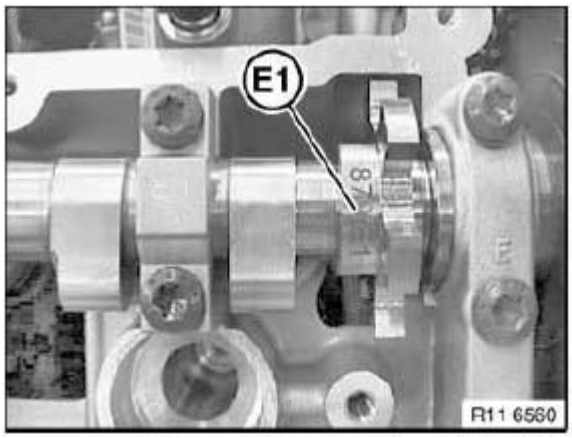

Fig. 386: Identifying Inlet Camshaft Designation
Courtesy of BMW OF NORTH AMERICA, INC.

Position of exhaust camshafts, cyl. 1-4, in firing TDC position of cylinder no. 1.

Dihedron of camshafts is vertical to cylinder axis, letters/numbers (A1) on camshafts (1) point upwards.

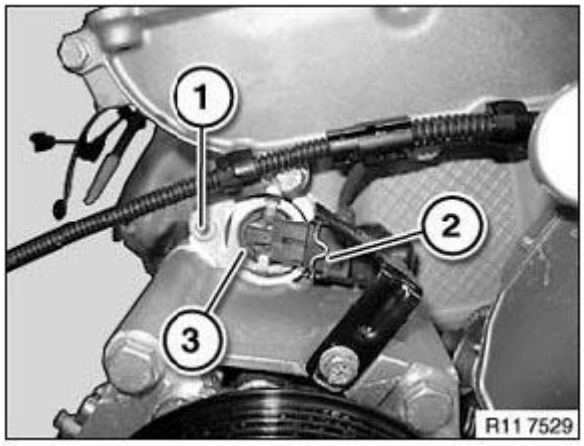

Fig. 411: Identifying Screw And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection on solenoid valve for inlet adjustment.

Release screws (1).

Remove inlet solenoid valve (2).

Installation:

Replace O-ring.

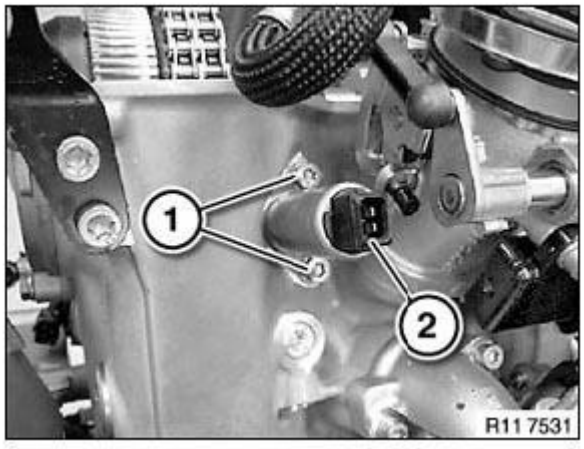

Fig. 412: Identifying Screws And Inlet Solenoid Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Perform VANOS test.

OIL PUMP WITH FILTER AND DRIVE

Unclip retainer (2).

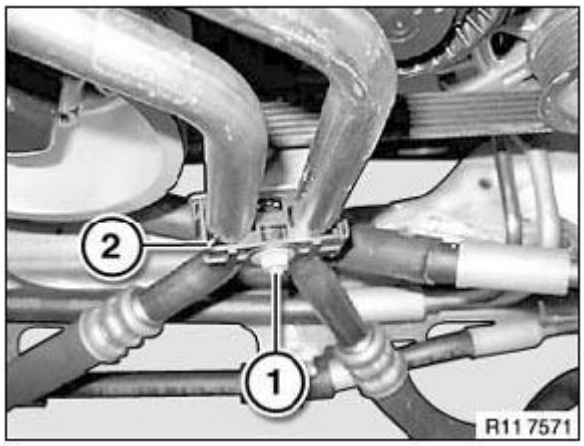

Fig. 438: Identifying Retainer And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Disconnect oil line (2).

Installation:

Replace O-ring.

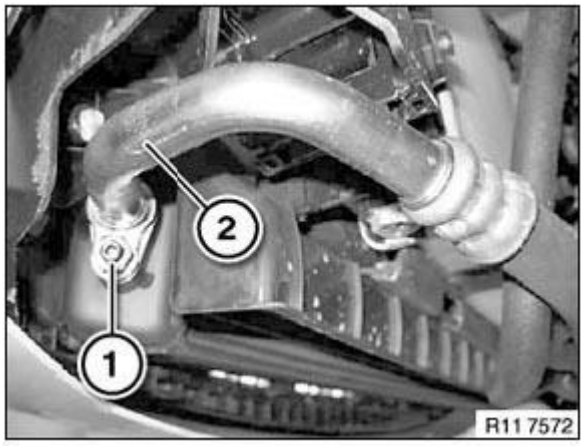

Fig. 439: Identifying Oil Line And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Park vehicle on a horizontal surface.

Allow engine at normal operating temperature to run for 3 minutes with increased revs (min. 1000/max. 1500