ENGINE

Engine - Repair

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

Punch engine numbers at marked surface with number punch.

Magnesium crankcase with sticker

M47/M47TU/M47T2

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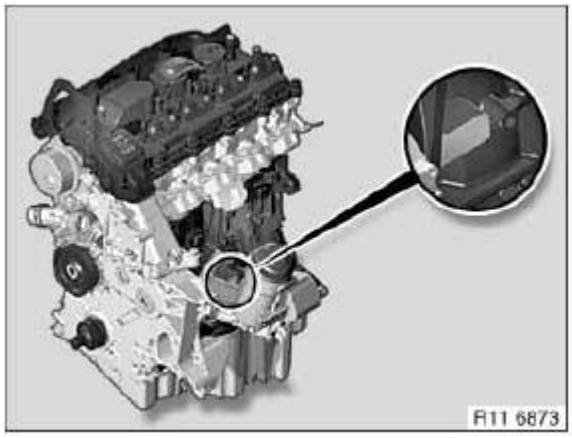


Fig. 1: Identifying M47 / M47TU / M47T2
Courtesy of BMW OF NORTH AMERICA, INC.

M57/M57TU/M57T2

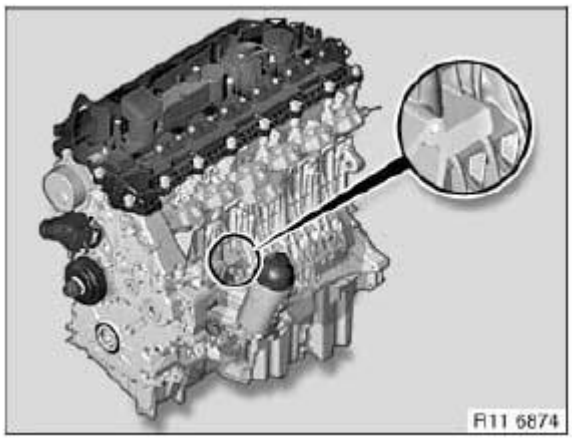


Fig. 2: Identifying M57 / M57TU / M57T2
Courtesy of BMW OF NORTH AMERICA, INC.

M67/M67TU

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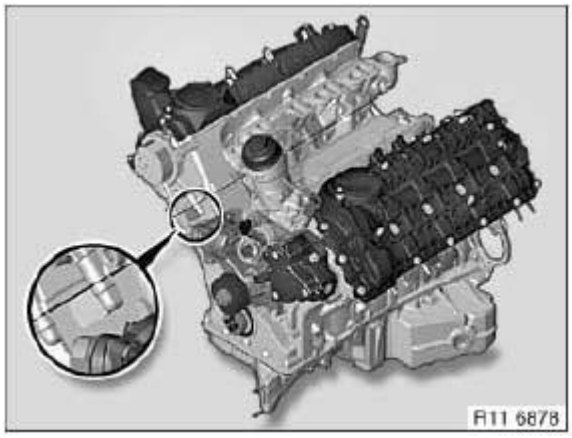


Fig. 3: Identifying M67 / M67TU
Courtesy of BMW OF NORTH AMERICA, INC.

N47/N47S/N47C/N57 N57S

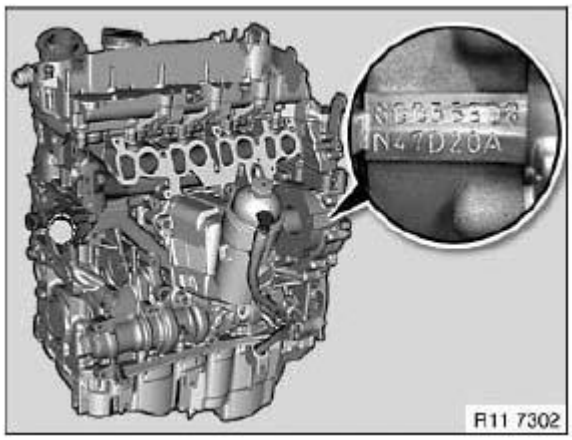


Fig. 4: Identifying N47 / N47S / N47C / N57 N57S
Courtesy of BMW OF NORTH AMERICA, INC.

M52/M52TU

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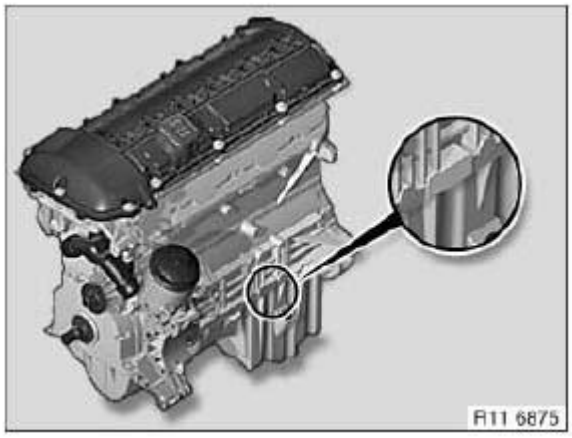


Fig. 5: Identifying M52 / M52TU Engine
Courtesy of BMW OF NORTH AMERICA, INC.

M54

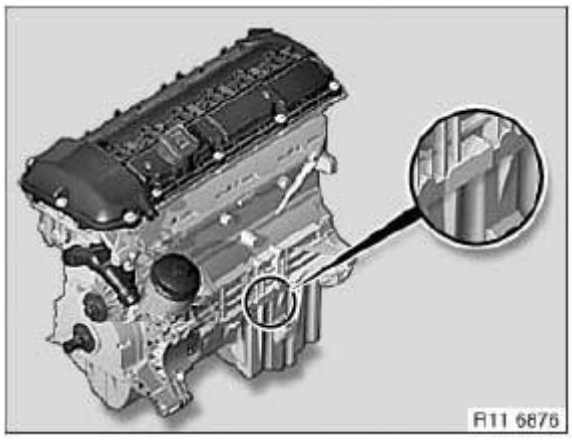


Fig. 6: Identifying M54 Engine
Courtesy of BMW OF NORTH AMERICA, INC.

M56

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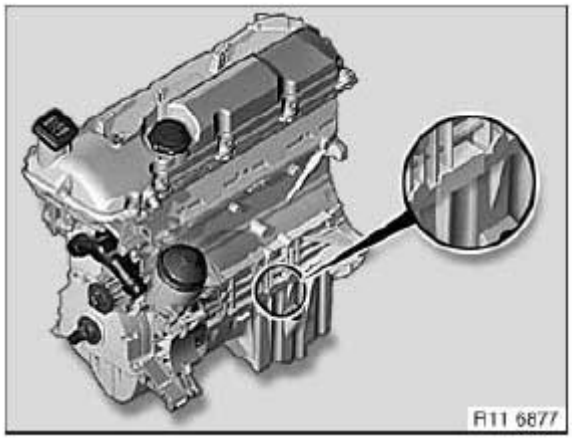


Fig. 7: Identifying M56 Engine
Courtesy of BMW OF NORTH AMERICA, INC.

N40/N45/N45T/N43

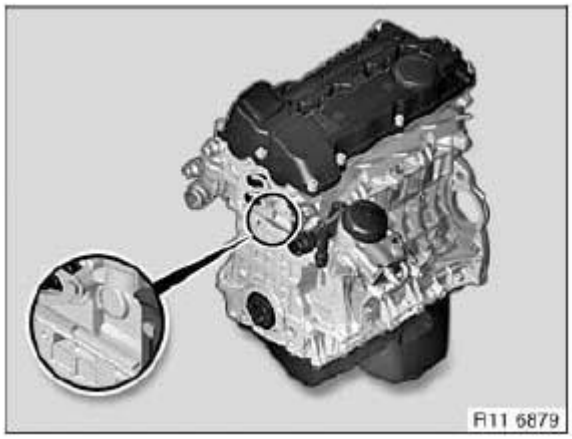


Fig. 8: Identifying N40 / N45 / N45T / N43 Engine
Courtesy of BMW OF NORTH AMERICA, INC.

N42/N46/N46T

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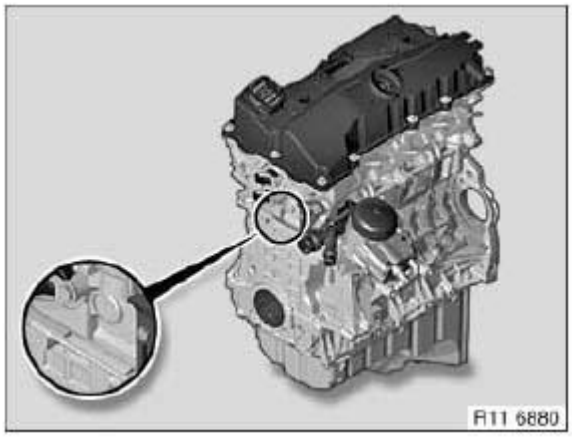


Fig. 9: Identifying N42 / N46 / N46T Engine
Courtesy of BMW OF NORTH AMERICA, INC.

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

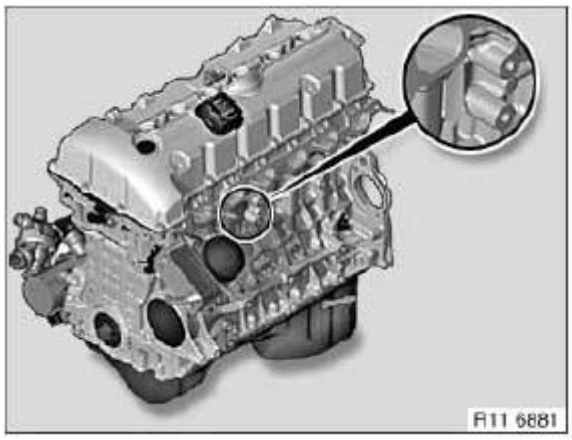


Fig. 10: Identifying N51 / N52 / N52K / N52T / N53 / N54 / N55 Engine
Courtesy of BMW OF NORTH AMERICA, INC.

N62/N62TU

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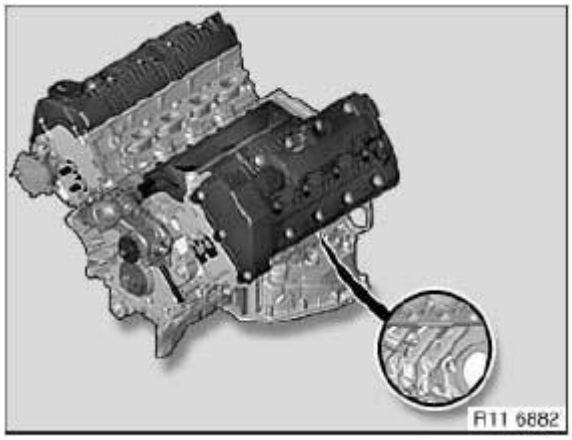


Fig. 11: Identifying N62 / N62TU Engine
Courtesy of BMW OF NORTH AMERICA, INC.

N73

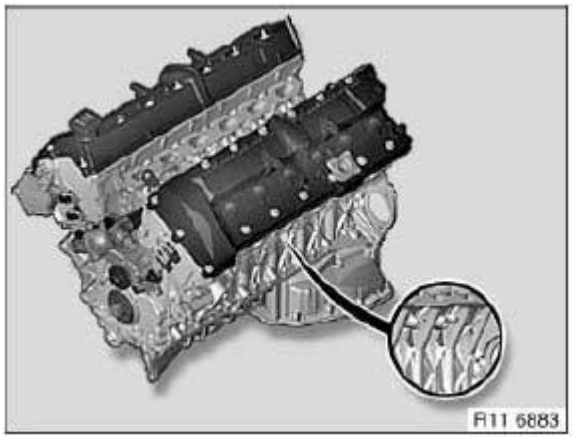


Fig. 12: Identifying N73 Engine
Courtesy of BMW OF NORTH AMERICA, INC.

S54

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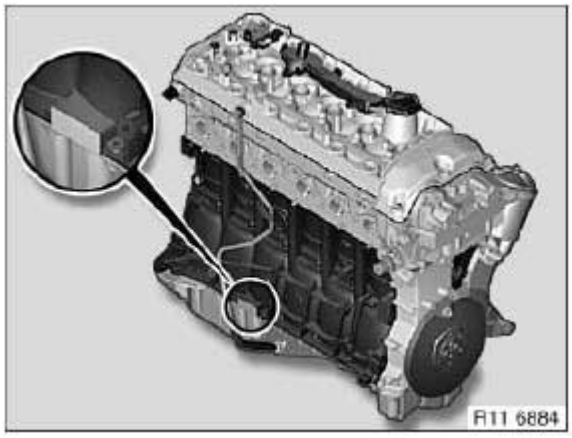


Fig. 13: Identifying S54 Engine
Courtesy of BMW OF NORTH AMERICA, INC.

S85/S65

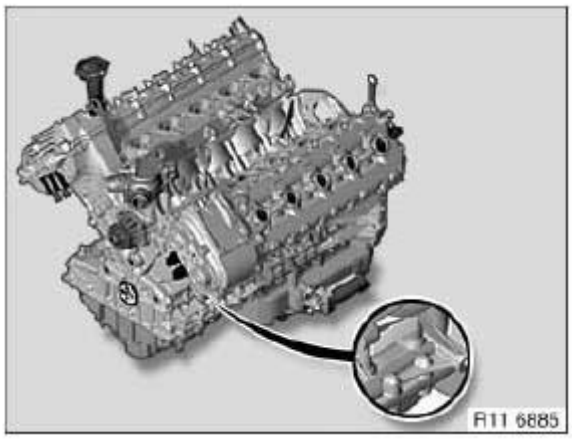


Fig. 14: Identifying S85 / S65 Engine
Courtesy of BMW OF NORTH AMERICA, INC.

W10/W11

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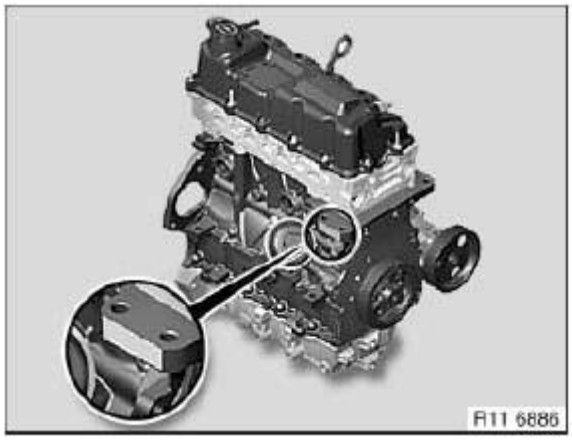


Fig. 15: Identifying W10 / W11 Engine
Courtesy of BMW OF NORTH AMERICA, INC.

N12/N14/N16/N18



Fig. 16: Identifying N12 / N14 / N16/ N18 Engine
Courtesy of BMW OF NORTH AMERICA, INC.

W17

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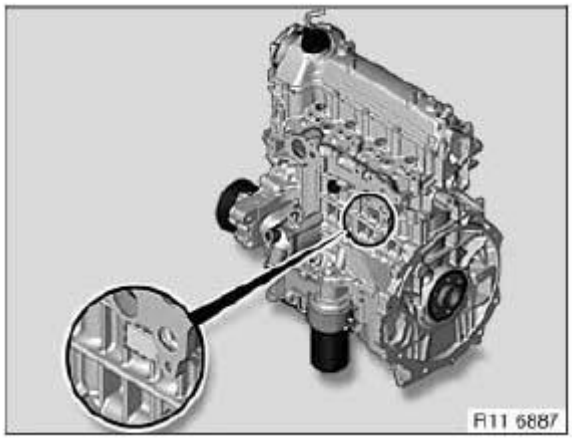


Fig. 17: Identifying W17 Engine
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 00... ENGINE OIL SERVICE (N52K)

Notes

WARNING: Danger of scalding!

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

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

IMPORTANT: Risk of damage!

Protect belt drive against dirt.

Cover with suitable materials.

Recycling

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

Observe country-specific waste-disposal regulations.

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

Tightening torque **11 42 1AZ** .

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

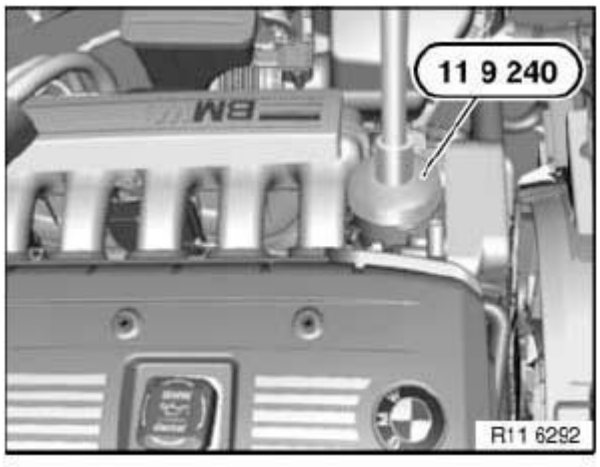


Fig. 18: Removing Oil Filter Cap With Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Presentation: without underbody protection.

Unclip service opening on underbody protection.

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

Tightening torque **11 13 1AZ** .

Installation:

Replace sealing ring

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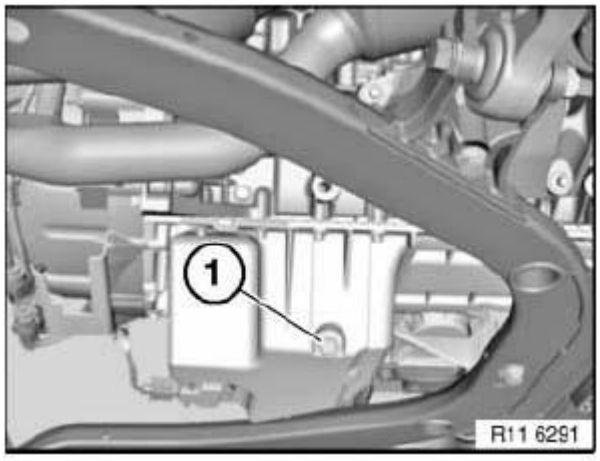


Fig. 19: Identifying Screw Plug On Oil Sump
Courtesy of BMW OF NORTH AMERICA, INC.

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

Installation:

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

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

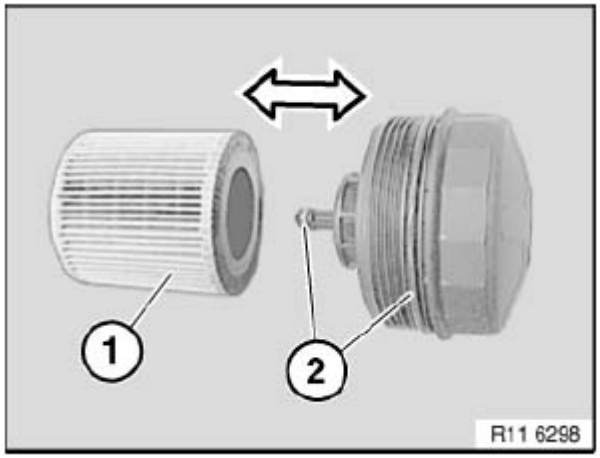


Fig. 20: Identifying Oil Filter Element And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

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

Tightening torque **11 42 1AZ** .

NOTE: Pour in ENGINE OIL .

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

Turn off engine

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

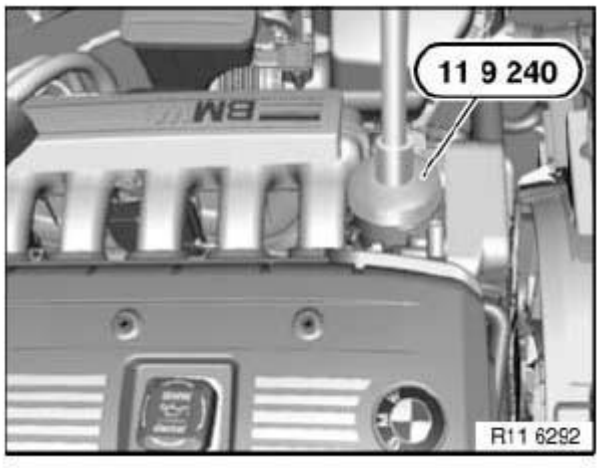


Fig. 21: Removing Oil Filter Cap With Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Checking engine oil level:

- Park vehicle on a horizontal surface
- Allow engine at normal operating temperature to run for three minutes with increased revs (approx. 1100 RPM)
- Read off engine oil level in instrument cluster or on Control Display
- Top up engine oil if necessary

MOUNTING ENGINE ON ASSEMBLY STAND (N52K)

Notes

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

Necessary preliminary tasks

- Remove **ENGINE**

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

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

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

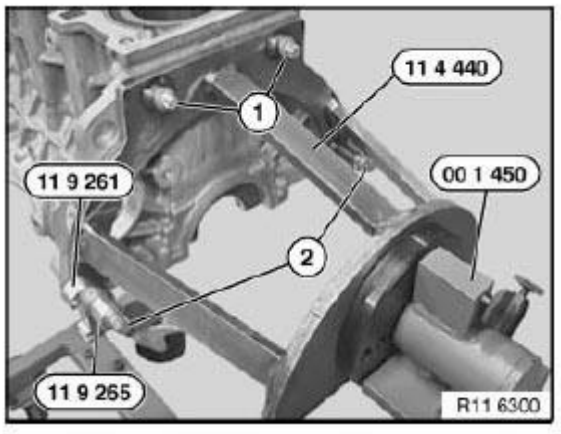


Fig. 22: Connecting Engine With Special Tool 11 4 440 Using Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

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

1.0 Sealing compound for injection

SEALING COMPOUND REFERENCE CHART - INJECTION

	Repair instructions (engine)	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
1.1	N40, N42, N45, N46, N43, N45N, N46N	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 128367 sealing compound
1.2	N40, N42, N45, N46, N43, N45N, N46N	Loctite 128357 liquid gasket	83 19 7 536 051	Sealing between crankcase upper and lower halves
1.3	N51, N52, N53, N54, N52N, N55	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 193140 sealing compound
1.4	N51, N52, N53, N54, N52N, N55	Loctite 193140 liquid gasket	83 19 0 439 030	Sealing between crankcase upper and lower halves
1.5	S65, S85	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 193140 sealing compound
1.6	S65, S85	Loctite 193140 liquid gasket	83 19 0 439 030	Sealing between crankcase upper and lower halves

2.0 Sealing compound for application

SEALING COMPOUND REFERENCE CHART - APPLICATION

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	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
2.1	M41, M47, M47TU, M47T2, M50, M51, M52, M52TU, M54, M57, M57TU, M57T2, M60, M62 N40, N42, N45, N45N, N46, N46N, N43, N47, N47top, N47C N47D1 N51, N52, N52N, N53, N54, N55, N57, N57S N62, N62TU, N63, N73, N73H, N74 S14, S38, S50, S52, S54, S62, S65, S85 N12, N14, N16, N18	Drei Bond 1209 liquid gasket	07 58 9 062 376	For sealing separation points on crankcase
2.2	N12, N14, N16, N18 W16, N47top, N47D1, N47C1 N57D1,	Loctite 5970 liquid gasket	83 19 0 404 517	83 19 0 404 517 Sealing between crankcase upper and lower sections. Sealing of gear case cover, oil sump, coolant pump, component carrier.
2.3	N12, N14, N16, N18 W16	Loctite 648 liquid gasket	07 58 9 067 732	Sealing between cover sleeve and crankcase

3.0 Cleaning agent

CLEANING AGENT REFERENCE CHART

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
3.1	N45, N46, N45T, N46T, N43, N51, N52, N52Kp, N52TU, N53, N55, N63, N63S, N63Hyprid, N74	Cold cleaner (chlorine free)	83 19 0 026 956	Cleaning assemblies, washing engine

4.0 Lubricant for application

LUBRICANT REFERENCE CHART - APPLICATION

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
4.1	N20, N42, N46, N46TU, N51, N52, N52KP, N52TU, N55, N62, N62TU, N73	Lubricating grease Longtime PD1	83 19 2 160 340	For greasing the splined shaft on actuator drive/gearing of intermediate shaft.

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4.2	M47, M47TU, M47T2, M57, M57TU, M57T2,	High temperature paste	83 19 2 152 323	For greasing the threads on the exhaust turbocharger.
4.3	N12, N14, N16, N18 N40, N42, N45, N45TU N46, N46TU, N43. N51, N52, N52Kp, N52TU, N53, N54, N55. N62, N62TU, N63, N73, N73H, N74. S65, S85.	High temperature paste (NEVER-SEEZ compound)	83 23 0 140 233	For greasing the threads on the oxygen sensors.
4.4	N47, N47O1 N47C1, N47T N47D1 N57 N57D1	Copper paste	81 22 9 400 794	For greasing the double hex head bolt on the exhaust turbocharger.

5.0 Lubricants to loosen locked screw connections

SEALING COMPOUND REFERENCE CHART - SCREW CONNECTION

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

11 00 050 REMOVING AND INSTALLING ENGINE (N52K)

Notes

IMPORTANT: Aluminium-magnesium materials.

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

A magnesium crankcase requires aluminium screws/bolts exclusively.

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

Aluminium screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

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

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

Necessary preliminary tasks:

- Move engine bonnet into **SERVICE POSITION**
- Remove **EXHAUST SYSTEM**
- Remove **AUTOMATIC TRANSMISSION** or **MANUAL TRANSMISSION**
- Remove front output shafts (AWD only)
- Drain off **ENGINE OIL**
- Clamp off **BATTERY NEGATIVE LEAD**
- Remove **INTAKE FILTER HOUSING**
- Remove **FAN COWL** with electric fan
- Remove **RADIATOR**
- Remove **WATER PUMP**
- Remove **COOLANT THERMOSTAT**
- Detach all coolant hoses from engine
- Remove **MICROFILTER HOUSING**
- Remove **INTAKE PLENUM**
- Detach vacuum line from **BRAKE BOOSTER**
- Unfasten **IGNITION WIRING HARNESS** and lay to one side
- Unfasten **ENGINE WIRING HARNESS** and lay to one side
- Remove **INJECTION PIPE** and place to one side

Release **AIR-CONDITIONING COMPRESSOR** (1) and set down on front axle carrier.

NOTE: E60/E61 only.

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

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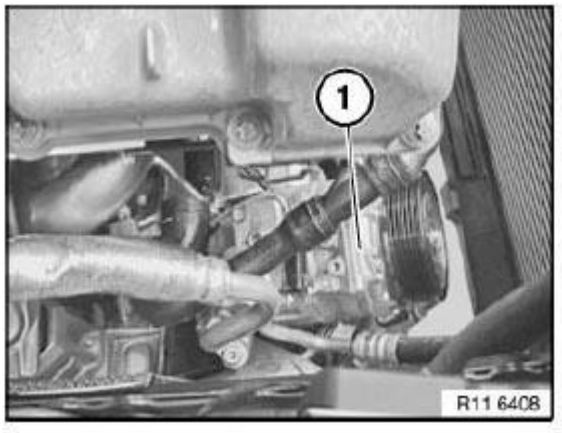


Fig. 23: Identifying Coolant Pipe
Courtesy of BMW OF NORTH AMERICA, INC.

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

NOTE: Do not disconnect hydraulic lines.

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

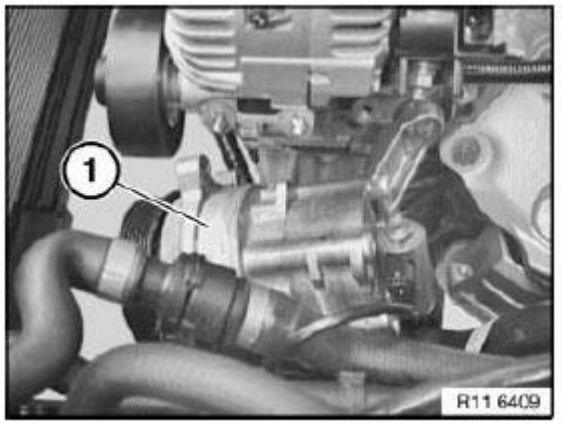


Fig. 24: Identifying Power Steering Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Screw towing eye (1) into cylinder head.

Tightening torque **11 12 9AZ** .

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

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

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Lift engine out with engine crane.

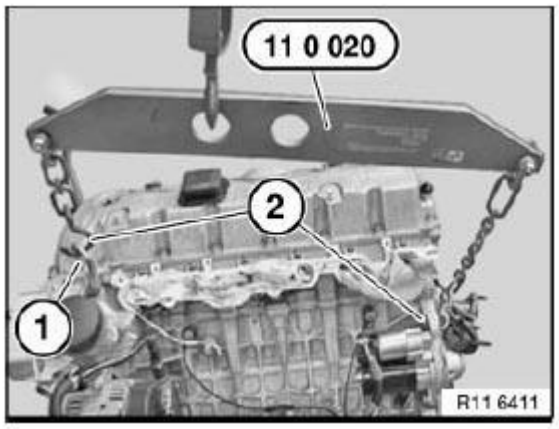


Fig. 25: Lift Engine Out Using Engine Crane
Courtesy of BMW OF NORTH AMERICA, INC.

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

Release screws (1).

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

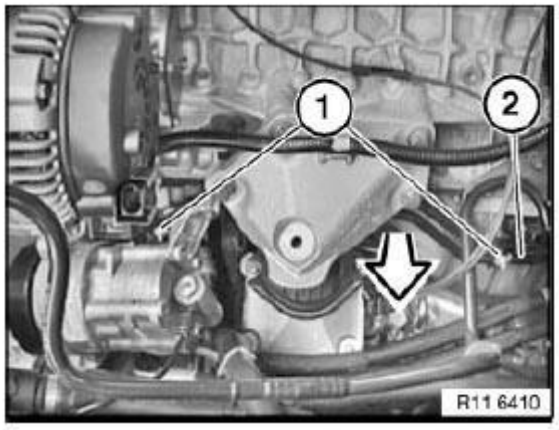


Fig. 26: Removing Oil-Water Heat Exchanger With Hydraulic Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

11 00 REMOVING AND INSTALLING/REPLACING ACOUSTIC COVER (N52/N52K)

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IMPORTANT: Aluminium-magnesium materials.

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

A magnesium crankcase requires aluminium screws/bolts exclusively.

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

Aluminium screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

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

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

Unfasten screws (1 and 3).

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

Lift off acoustic cover (4)

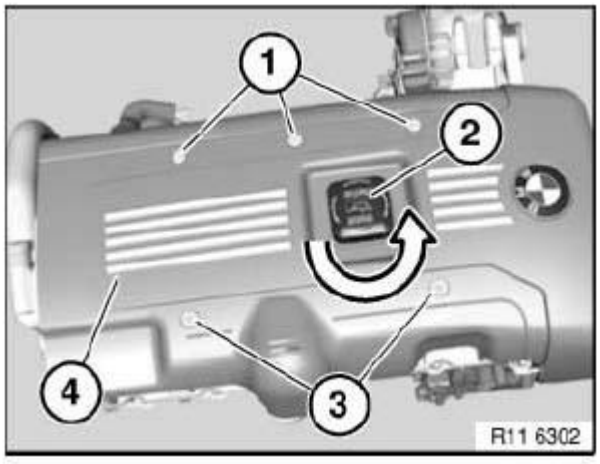


Fig. 27: Removing Oil Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks

- Remove **MICROFILTER HOUSING**
- Remove **TENSION STRUT**

Release screws.

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Tightening torque **11 12 7AZ** .

Remove acoustic cover.

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

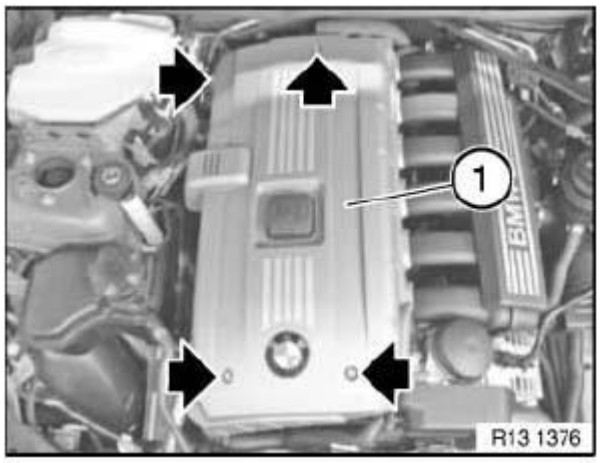


Fig. 28: Locating Engine Oil Cover Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

11 00 REMOVING AND INSTALLING/REPLACING IGNITION COIL COVER (N52K)

Necessary preliminary tasks

- Remove **MICROFILTER HOUSING**

Release screws (arrow).

Tightening torque **11 12 6AZ** .

Remove ignition coil cover (1) towards top.

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

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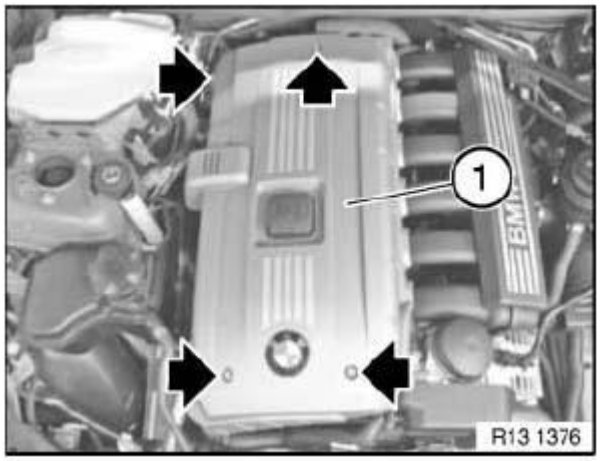


Fig. 29: Locating Engine Oil Cover Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

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

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

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

Protective measures/rules of conduct

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

First aid measures

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

NOTE: Do not use solvents/thinners.

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

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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

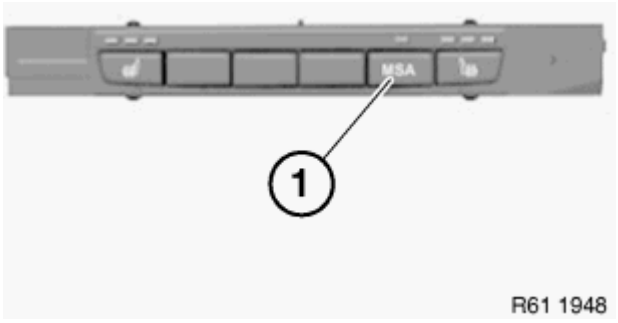


Fig. 30: Identifying MSA Button
Courtesy of BMW OF NORTH AMERICA, INC.

- 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

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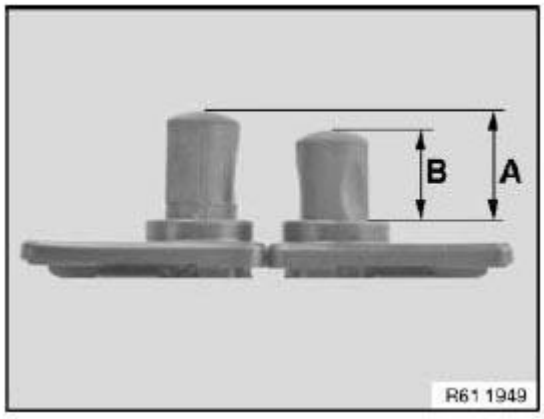


Fig. 31: Identifying Engine Bonnet/Hood Basic Setting And Workshop Mode
Courtesy of BMW OF NORTH AMERICA, INC.

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

When working with diagnosis tools

- Observe instructions in diagnosis tool

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 (N52K, N53)

Notes

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WARNING: Risk of injury!

Observe following instructions relating to special tool:

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

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

Necessary preliminary tasks:

- Secure engine bonnet in **SERVICE POSITION**
- Remove **INTAKE FILTER HOUSING**

Only on E92, E93:

Unclip two cover caps (1) on left and right of side panel screw connection with special tool **64 1 020** .

Installation:

Replace damaged cover caps.

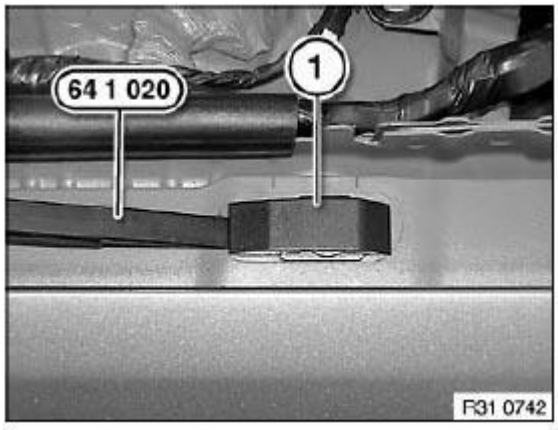


Fig. 32: Removing Cover Cap Using Special Tool (64 1 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble transverse member 00 6 000 with special tools:

- 00 6 051 (profile strips)

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- 00 6 070 (supports)
- 00 6 052(supports)
- 00 6 031 (connections)

complete.

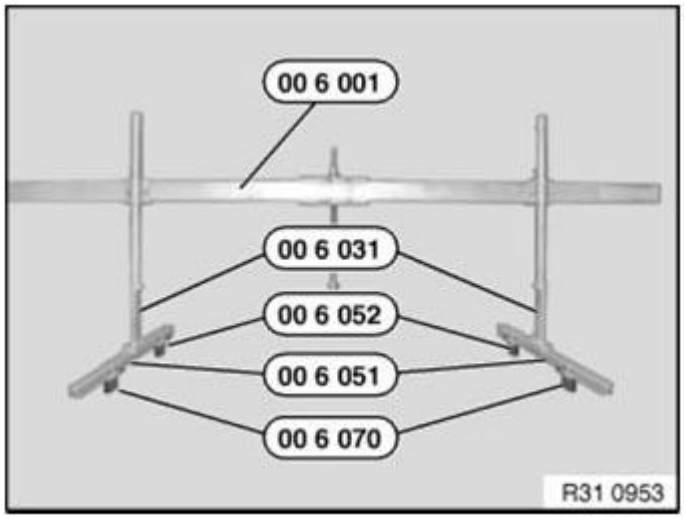


Fig. 33: Identifying Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

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

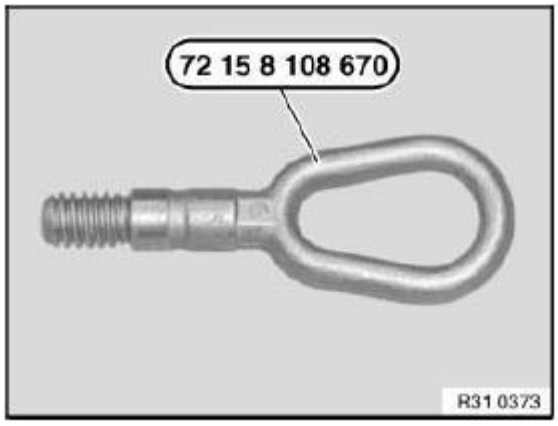


Fig. 34: Identifying Towing Hook (72 15 8 108 670)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Avoid a change of engine position in the transverse or longitudinal direction. Always make sure there is sufficient clearance between the engine (or its attachment parts) and the body.

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IMPORTANT: For N52K: Aluminium-magnesium materials.

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

A magnesium crankcase requires aluminium screws/bolts exclusively.

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

Aluminium screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

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

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

Release front screws (1) on acoustic cover (2).

Torque for N52K **11 12 6AZ** .

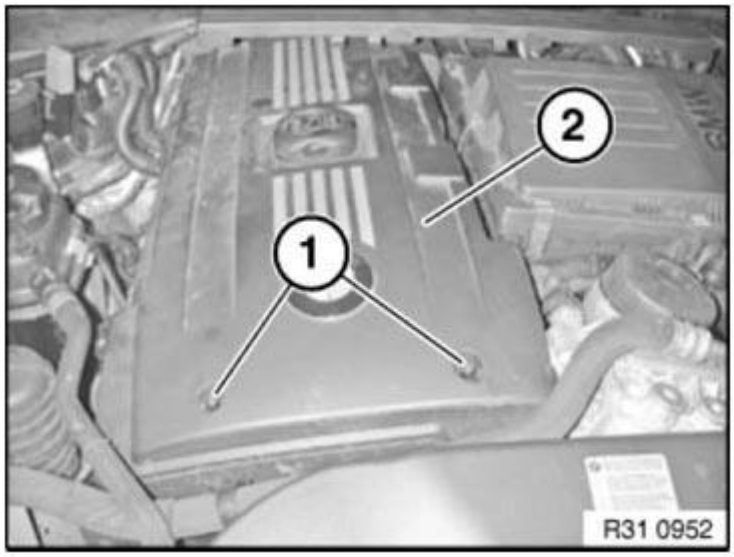


Fig. 35: Identifying Acoustic Cover With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Raise acoustic cover (1) slightly.

Screw in towing hook (2) and tighten down to approx. 30 Nm.

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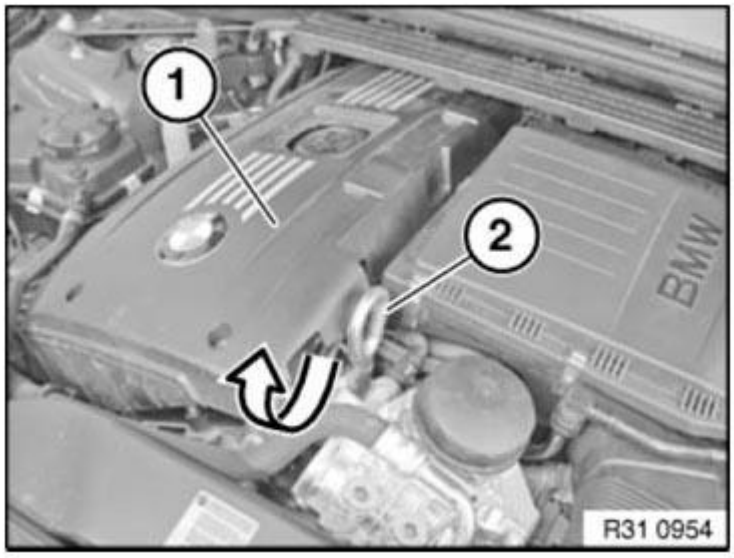


Fig. 36: Lifting Acoustic Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on front panel (2).

Tightening torque **41 33 1AZ** .

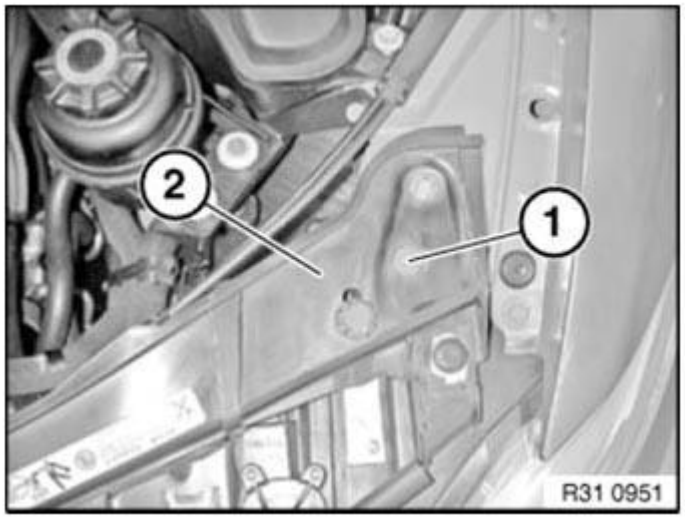


Fig. 37: Identifying Front Panel With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

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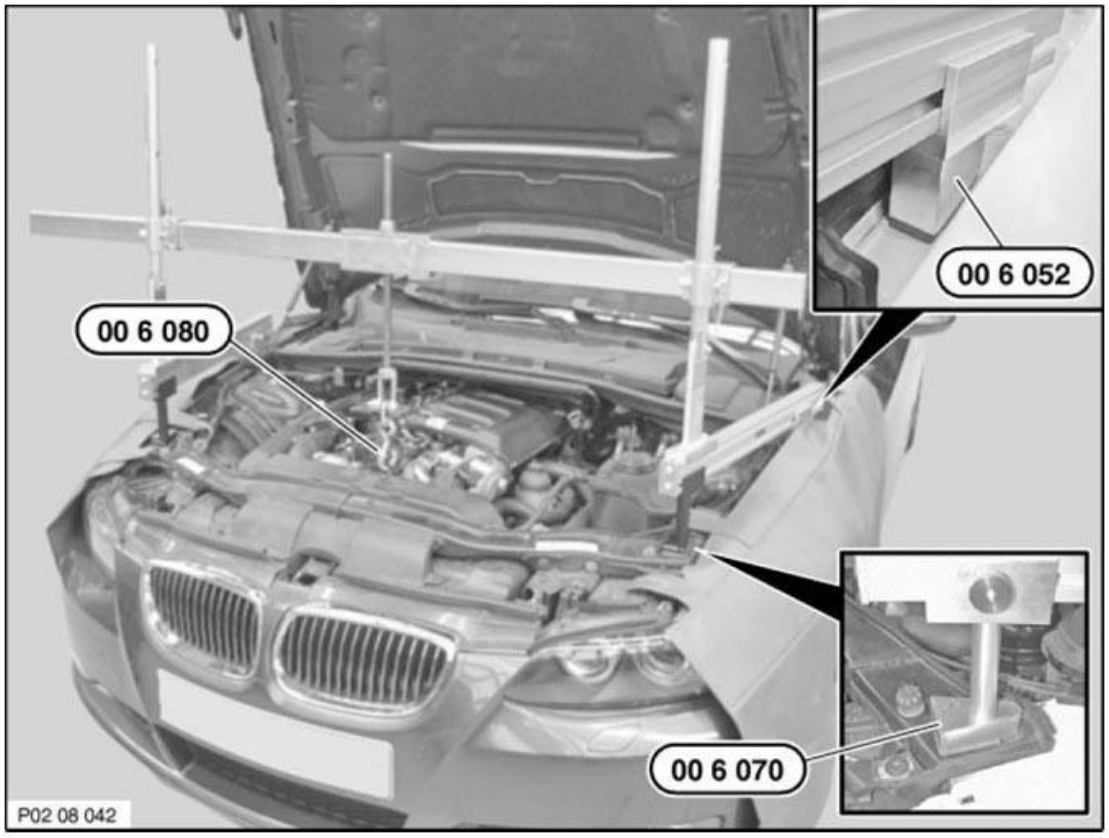


Fig. 38: Identifying Special Tool In Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Fit transverse member 00 6 000 with a 2nd person helping.

Place supports in front in the area of front panel attachment and in the rear on the fasteners of the side panels.

Bolt connections of transverse member 00 6 001 must point to windscreen.

Adapt bevel of special tool 00 6 052 to inclination of side panels.

Special tool 00 6 070 consists of a left and right support.

Secure chain with coat hook 00 6 080 to spindle 00 6 002 and align centrally over towing hook.

Attach special tool to towing hook.

WARNING: Risk of injury!

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

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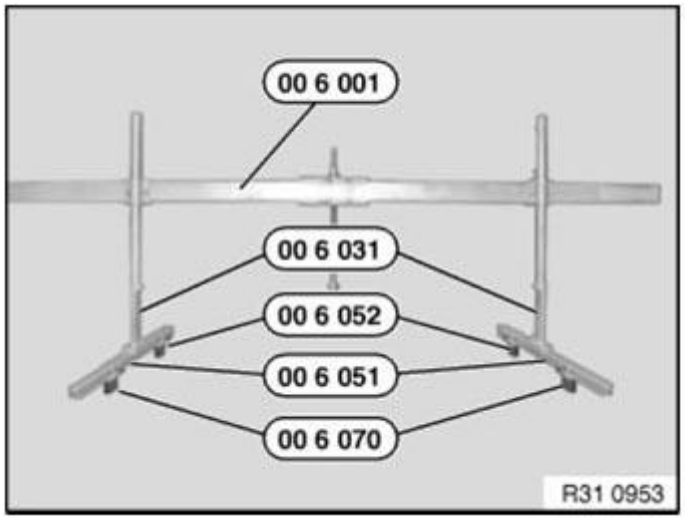


Fig. 39: Identifying Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Raise engine approx. 10 mm with transverse member.

Installation:

Replace self-locking nuts.

Tightening torque **22 11 2AZ** .

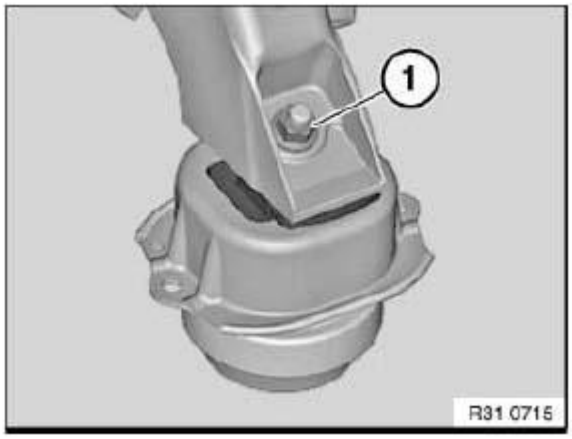


Fig. 40: Identifying Nut
Courtesy of BMW OF NORTH AMERICA, INC.

CYLINDER HEAD WITH COVER

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

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Notes

**IMPORTANT: Pressure-test cylinder head to max. 3 bar.
Heat cylinder head to 60°.
Check for bubble formation in a water bath.**

Necessary preliminary tasks:

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

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

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

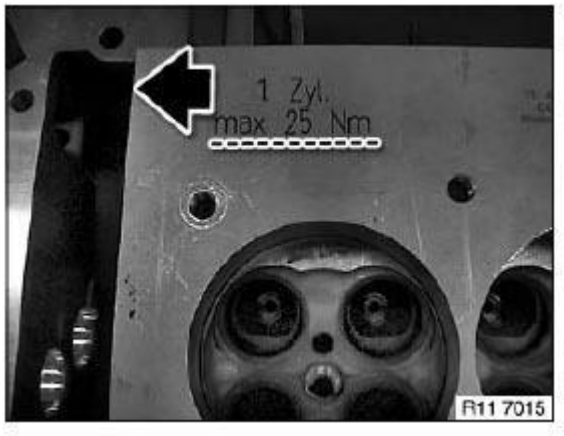


Fig. 41: Identifying Special Tool (11 4 341) On Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

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

Installation:

Cylinder no. 1 is marked.

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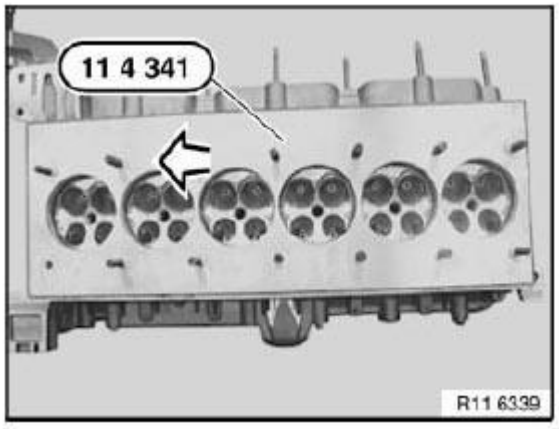


Fig. 42: Identifying Special Tool (11 4 341) On Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

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

Sealing flange must rest flat.

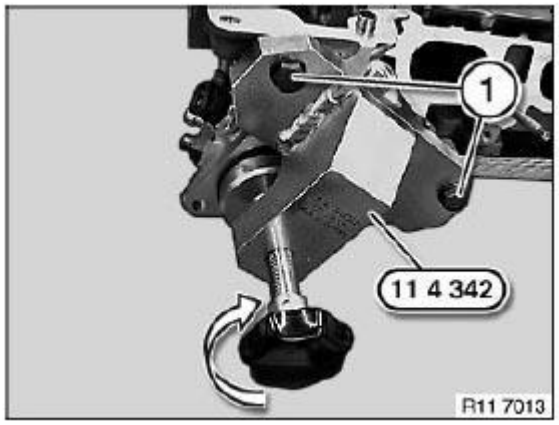


Fig. 43: Identifying Special Tool (11 4 342) With Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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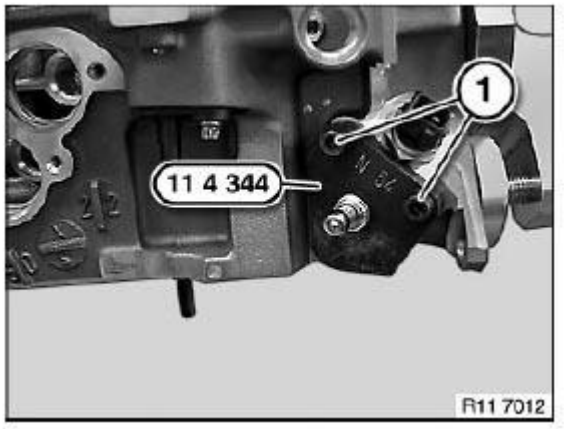


Fig. 44: Identifying Special Tool (11 4 344) With Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 100 REMOVING AND INSTALLING CYLINDER HEAD (N52K)

Notes

IMPORTANT: Aluminium-magnesium materials.

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

A magnesium crankcase requires aluminium screws/bolts exclusively.

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

Aluminium screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

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

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

Necessary preliminary tasks:

- Remove **EXHAUST SYSTEM**
- Drain **COOLANT**
- Drain off **ENGINE OIL**
- Remove both **EXHAUST MANIFOLDS**

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- Remove **INTAKE PLENUM**
- Detach coolant hoses from cylinder head
- Remove **INTAKE AND EXHAUST CAMSHAFT ADJUSTERS**

IMPORTANT: Fit new cylinder head screws.
Do not wash off bolt coating.
There must be no fluids or contaminants in any of the threaded holes for the cylinder head bolt connections.

Risk of corrosion and cracking!

Apply a **light** coat of oil to washer contact areas and threads of new cylinder head bolts.

Release screws (1).

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

Set down timing chain.

IMPORTANT: If the timing chain is stowed in the gearcase, the crankshaft must no longer be rotated.
This would cause the timing chain on the crankshaft sprocket wheel to jam or jump.

Installation:

The timing chain is lifted out with a hook only during assembly.

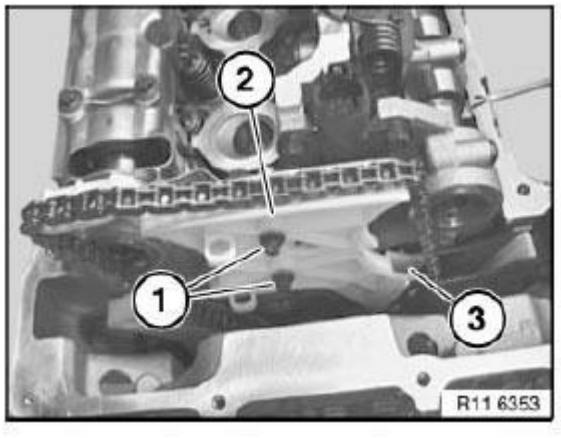


Fig. 45: Identifying Timing Chain Module With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

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

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Remove eccentric shaft sensor (1) towards front.

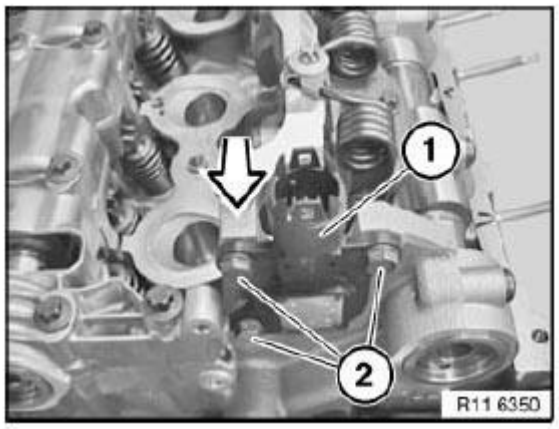


Fig. 46: Removing Eccentric Shaft Sensor Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

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

Release screw (1).

Remove magnet wheel (2) towards front.

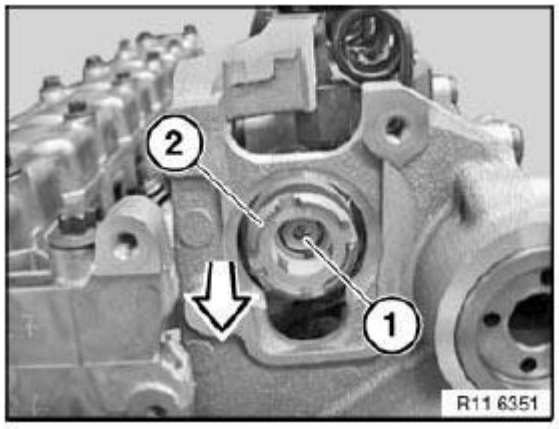


Fig. 47: Removing Magnet Wheel Towards Front
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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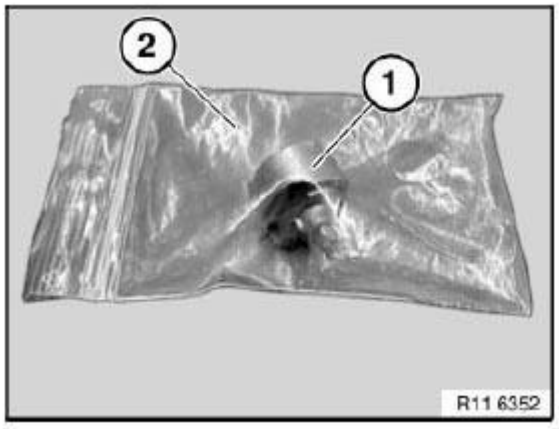


Fig. 48: Identifying Magnet Wheel In Plastic Bag
Courtesy of BMW OF NORTH AMERICA, INC.

Pre-tension eccentric shaft (1) upwards in direction of arrow.

Remove stop screw between 1st and 2nd cylinders.

Tightening torque **11 37 5AZ** .

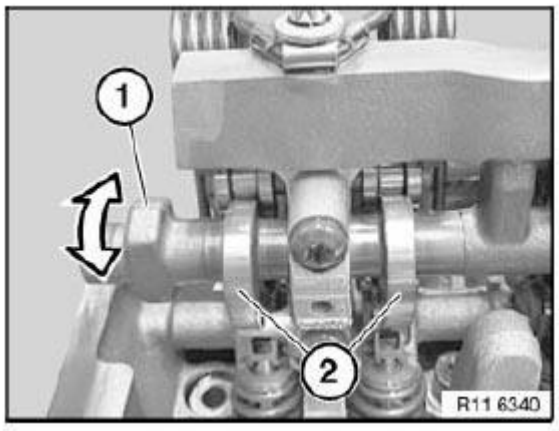


Fig. 49: Identifying Eccentric Shaft With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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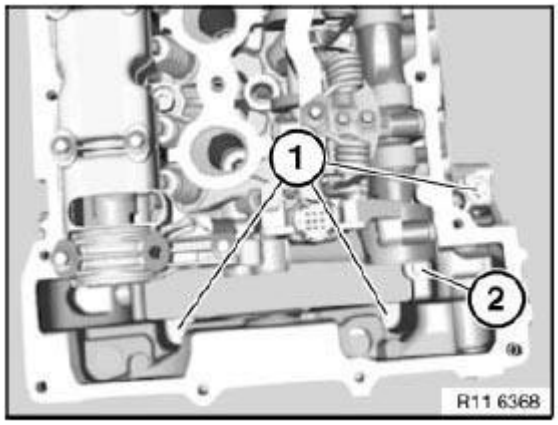


Fig. 50: Identifying Timing Chain Module Mounting Screws And Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (2).

Tightening torque **11 12 3AZ** .

Release screws (1).

Tightening torque **11 12 4AZ** .

Installation:

Replace aluminium screws

IMPORTANT: Observe different bolt heads.

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

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

NOTE: Picture shows intake and exhaust camshafts removed.

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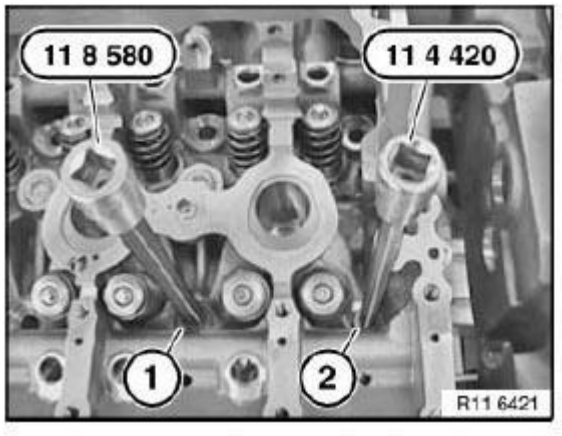


Fig. 51: Removing Cylinder Head Bolts Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

Tightening torque **11 12 2AZ** .

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

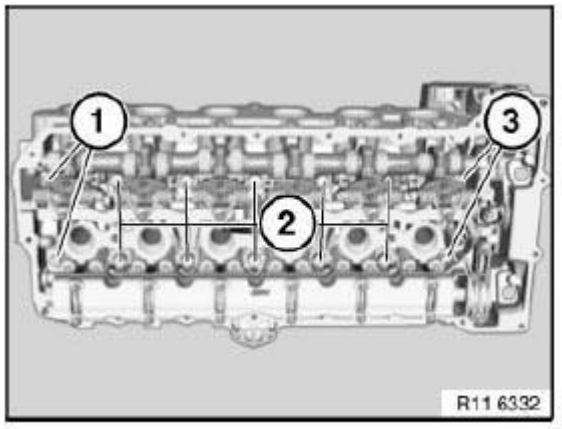


Fig. 52: Releasing Cylinder Head Bolts Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **11 12 1AZ** .

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

Risk of damage!

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

Tightening torque **11 12 5AZ** .

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

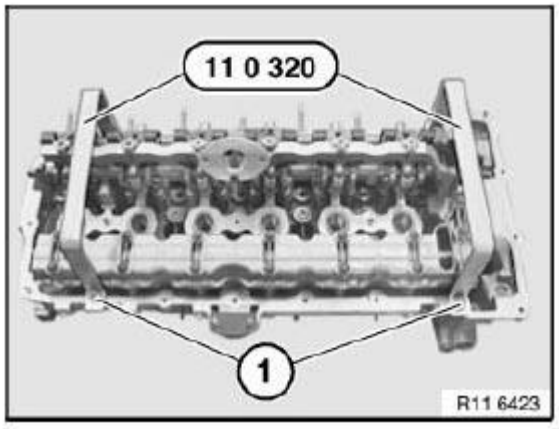


Fig. 53: Identifying Special Tool 11 0 320 With Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

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

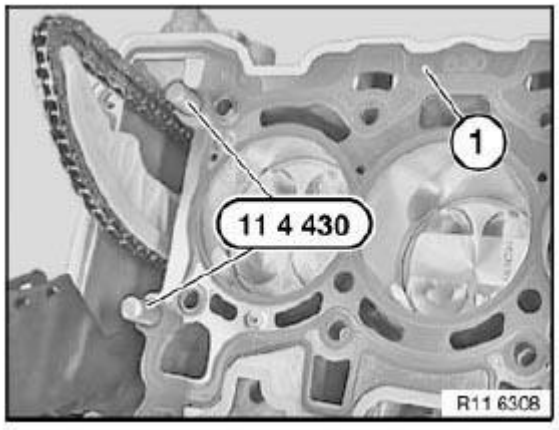


Fig. 54: Inserting Special Tool 11 4 430 Into Bores
Courtesy of BMW OF NORTH AMERICA, INC.

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

IMPORTANT: Do not use any metal-cutting tools.

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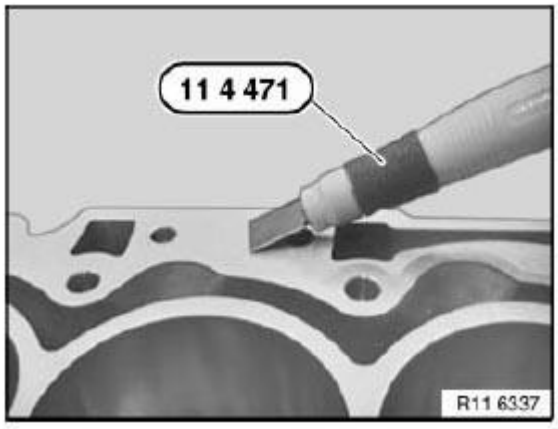


Fig. 55: Remove Coarse Residues On Sealing Surfaces Using Special Tool 11 4 471
Courtesy of BMW OF NORTH AMERICA, INC.

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

IMPORTANT: Do not use any metal-cutting tools.

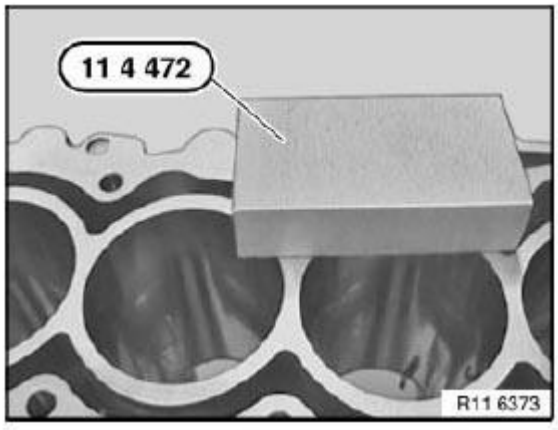


Fig. 56: Remove Fine Residues On Sealing Surfaces Using Special Tool 11 4 472
Courtesy of BMW OF NORTH AMERICA, INC.

There must be no fluids or contaminants in any of the threaded holes (1) for the cylinder head bolt connections.

Risk of corrosion and cracking!

Clean all threaded holes.

Replace **CYLINDER HEAD GASKET** .

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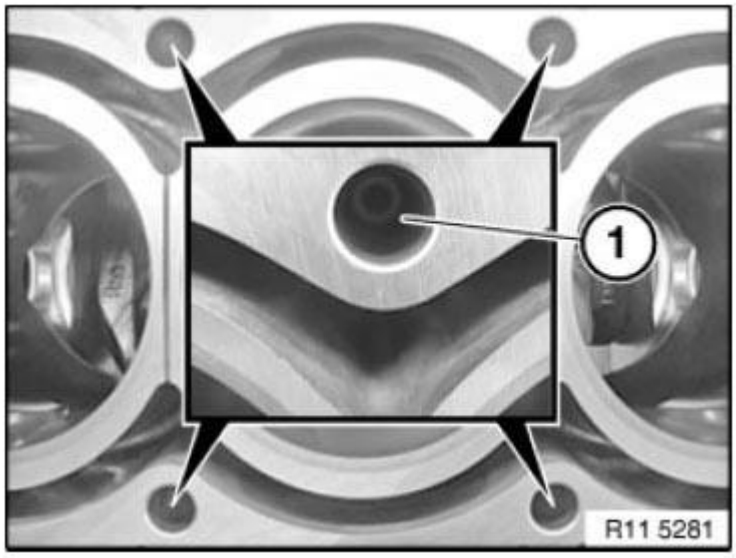


Fig. 57: Identifying Threaded Hole
Courtesy of BMW OF NORTH AMERICA, INC.

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

Fit new cylinder head screws.

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

Tightening torque **11 12 1AZ**

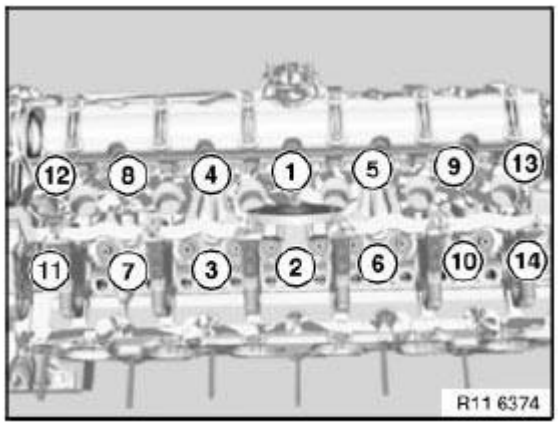


Fig. 58: Insert Cylinder Head Bolts Using Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

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

Tightening torque **11 12 2AZ** .

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NOTE: Picture shows intake and exhaust camshafts removed.

Observe sequence for tightening cylinder head bolts without fail

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

Installation:

- **Jointing torque:**

  All cylinder head bolts 1 to 14 to 30 Nm

- **1st angle of rotation:**

  All cylinder head bolts 1 to 14 to 90°

- **2nd angle of rotation:**

  Only cylinder head bolts 1 to 10 to 90°

- **3rd angle of rotation:**

All cylinder head bolts 1 to 14 to 45°

Insert bolts (1).

Tightening torque **11 12 4AZ** .

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

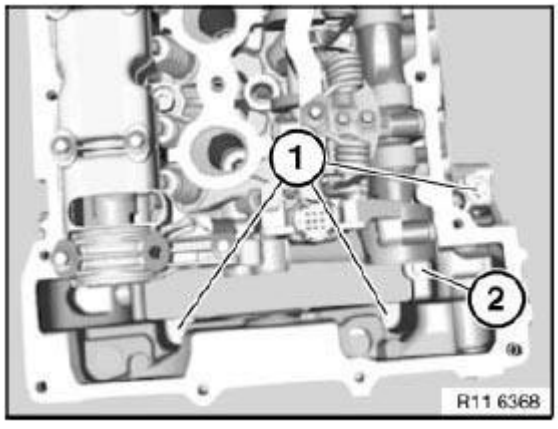


Fig. 59: Identifying Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Insert bolt (2).

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Tightening torque **11 12 3AZ** .

Installation:

Replace aluminium screws

Assemble engine.

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

IMPORTANT: Aluminium-magnesium materials.

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

A magnesium crankcase requires aluminium screws/bolts exclusively.

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

Aluminium screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

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

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

Necessary preliminary tasks

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

Unlock and detach vent hose (1).

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

Release screws (3) on electric servomotor.

Tightening torque **11 37 3AZ** .

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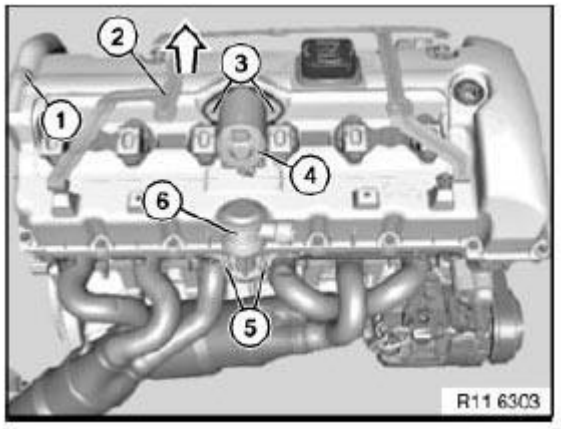


Fig. 60: Removing Metal Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

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

Release screw on electric servomotor.

Tightening torque **11 37 3AZ** .

Remove servomotor (4) in direction of arrow.

If necessary, release nuts (5).

Tightening torque **11 72 1AZ** .

If necessary, remove secondary air valve (6).

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

Release screws in area (1).

Tightening torque **11 12 5AZ** .

Installation:

Replace aluminium screws

Release threaded pin (2).

Tightening torque **11 12 5AZ** .

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Installation

Replace aluminium screws.

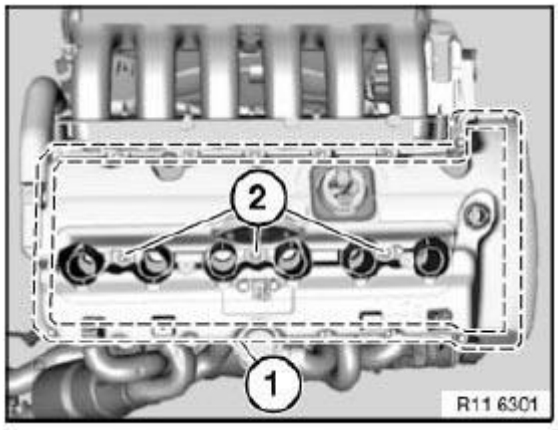


Fig. 61: Identifying Threaded Pins And Screw Mounting Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

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

Remove slotted sleeves (2).

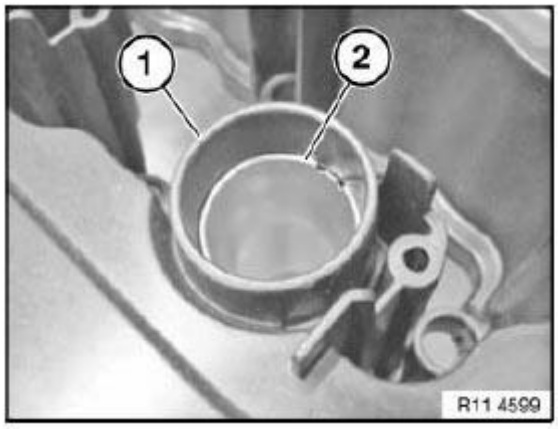


Fig. 62: Identifying Cylinder Head Cover And Slotted Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Clean all sealing faces (1 and 2).

IMPORTANT: Do not use any metal-cutting tools.

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Installation:

Replace gaskets (1 and 2)

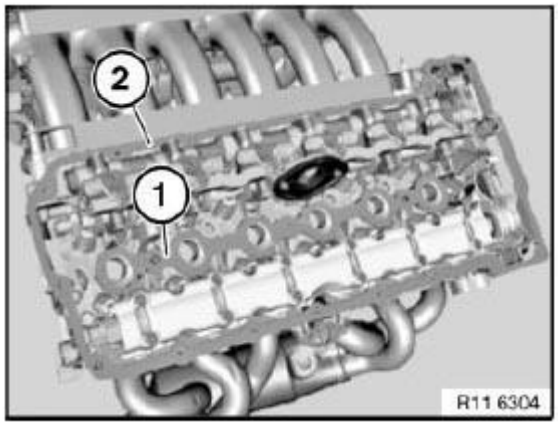


Fig. 63: Identifying Sealing Faces
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 101 REPLACING CYLINDER HEAD GASKET (N52K)

Notes

IMPORTANT: Aluminium-magnesium materials.

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

A magnesium crankcase requires aluminium screws/bolts exclusively.

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

Aluminium screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

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

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

Necessary preliminary tasks

- Remove **CYLINDER HEAD** .

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

Remove cylinder head seal.

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

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

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

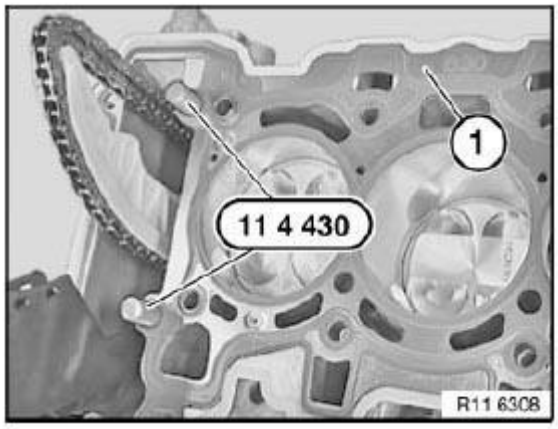


Fig. 64: Inserting Special Tool (11 4 430) Into Bores
Courtesy of BMW OF NORTH AMERICA, INC.

There must be no fluids or contaminants in any of the threaded holes (1) for the cylinder head bolt connections.

IMPORTANT: Work on sealing surface on engine block and on cylinder head with special tool 11 4 470 only.

Do not use any metal-cutting tools.

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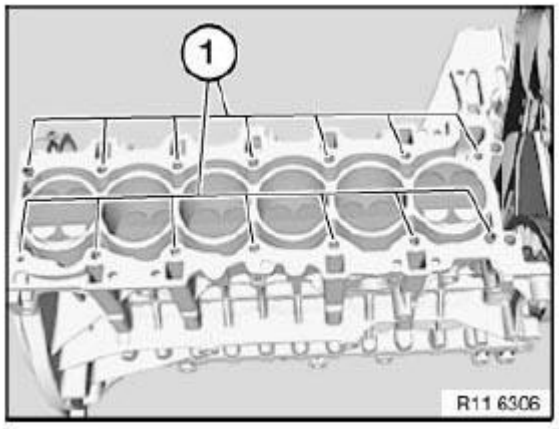


Fig. 65: Identifying Threaded Holes Position
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

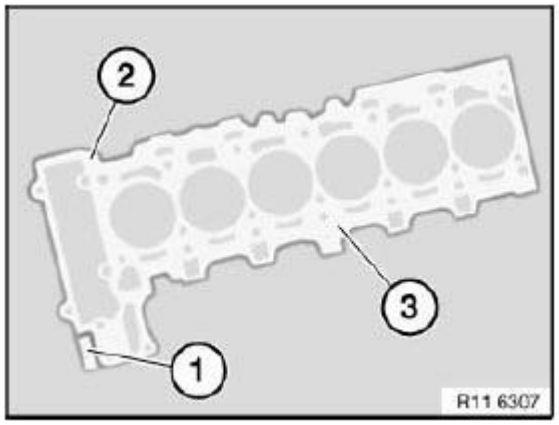


Fig. 66: Identifying Cylinder Head Gasket With Rubber Coating
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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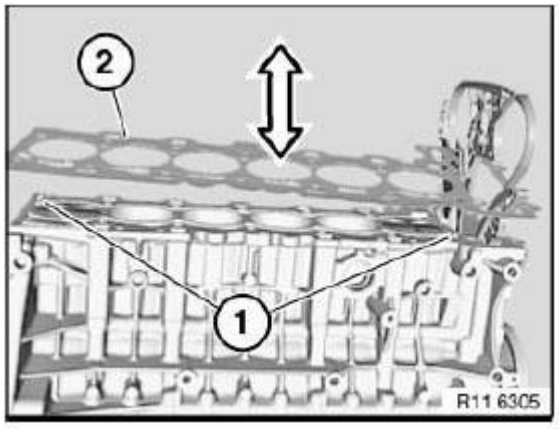


Fig. 67: Mounting Cylinder Head Gasket On Engine Block
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check cylinder head for DEVIATION FROM FLATNESS .

Check cylinder head for **WATER LEAKS** .

Assemble engine.

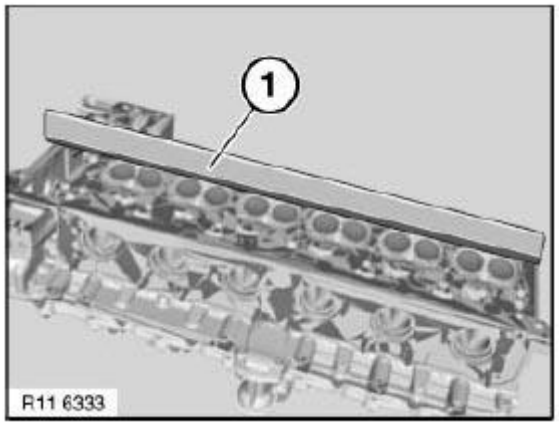
11 12 719 RESURFACING CYLINDER HEAD SEALING FACE (N52K)

Necessary preliminary tasks

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

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

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



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

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

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

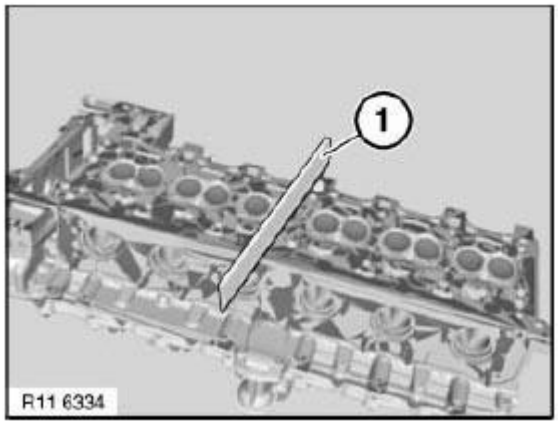


Fig. 69: Checking Cylinder Head Sealing Faces Evenness Using Standard Straight-Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Check cylinder head for **WATER LEAKS** .

Assemble engine.

OIL SUMP

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

IMPORTANT: When performing repair work on the engine oil, coolant or fuel circuit, you must protect the alternator against dirt contamination.

Risk of damage!

Cover alternator with suitable materials.

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

IMPORTANT: Aluminium-magnesium materials.

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

A magnesium crankcase requires aluminium screws/bolts exclusively.

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

Aluminium screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

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

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

Necessary preliminary work

- Lower **FRONT AXLE** .
- Drain and add **ENGINE OIL**

NOTE: The lines must be detached from the oil sump on vehicles with automatic transmission; if necessary, detach oil pump and set aside.

Unclip electrical lines (2) of monitoring sensors from holder (3).

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

Release bolts (5) on gearbox.

Tightening torque **11 13 7AZ** .

Lay holder (3) to one side.

Disconnect plug connection (4) on oil level sensor.

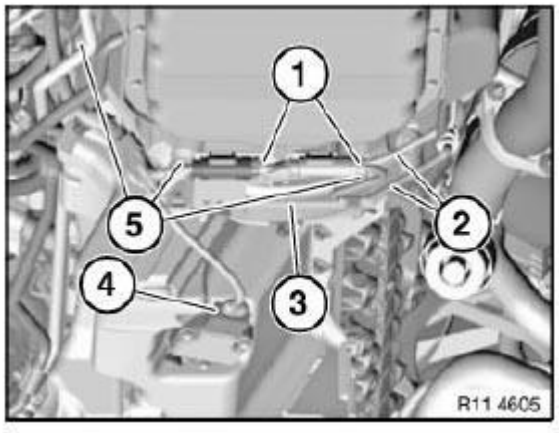


Fig. 70: Identifying Plug Connection, Electrical Lines And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

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Detach return hose (2).

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

Observe different tightening torques.

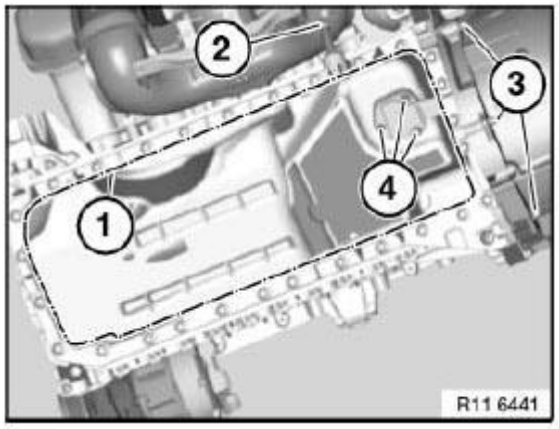


Fig. 71: Identifying Return Hose, Nuts And Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts along line (1).

Tightening torque **11 13 2AZ / 3AZ** .

Installation note:

Replace aluminium screws.

If necessary, release nuts (4). Remove oil level sensor.

Tightening torque **11 13 11AZ** .

Installation note:

Replace sealing ring.

IMPORTANT: There must be no adhesive residues in the lower section of the crankcase retaining threads.

Clean retaining threads and sealing surfaces.

Installation note:

Replace all seals.

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Assemble engine.

HOUSING COVER

11 14 151 REPLACING CRANKSHAFT SEAL (N52K) UP TO 12/31/08

Necessary preliminary tasks

- Remove **AUTOMATIC TRANSMISSION** or **MANUAL TRANSMISSION**
- Remove **FLYWHEEL**

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

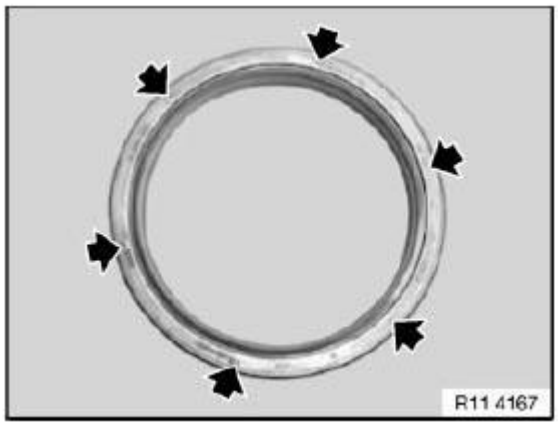


Fig. 72: Locating Crankshaft Radial Seal Removal Openings
Courtesy of BMW OF NORTH AMERICA, INC.

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

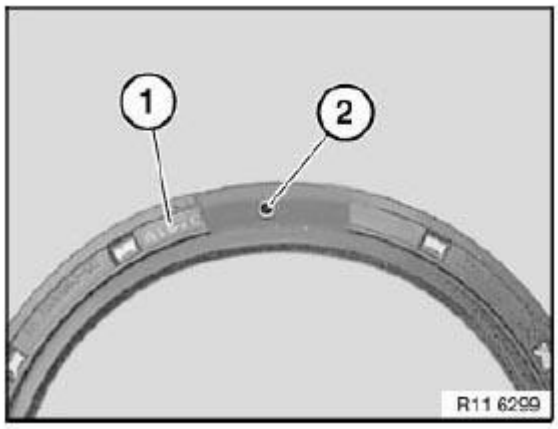


Fig. 73: Identifying Rubber Coating And Removal Opening

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Courtesy of BMW OF NORTH AMERICA, INC.

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

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

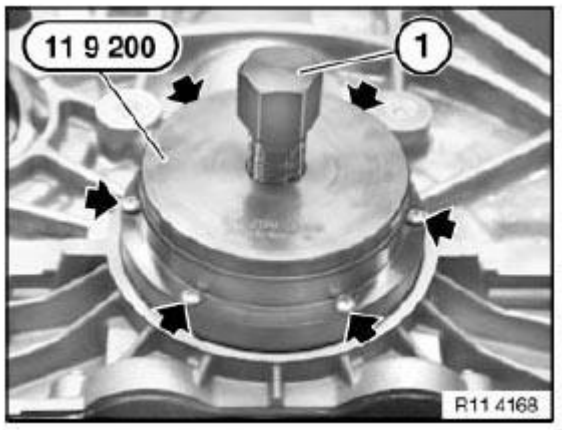


Fig. 74: Fitting Special Tool (11 9 200)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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

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

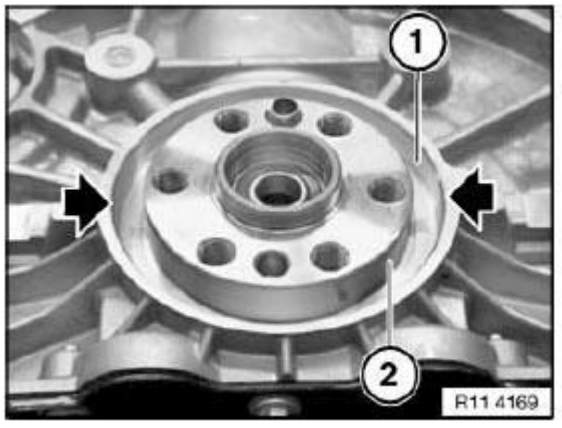


Fig. 75: Locating Oil Running Surface
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Support bushing (4) is contained in scope of delivery of crankshaft radial seal (1).

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When crankshaft radial seal (1) is installed, only support bushing (4) may be used as a slip bushing.

Crankshaft radial seal (1) has a groove (2) on both left and right sides.

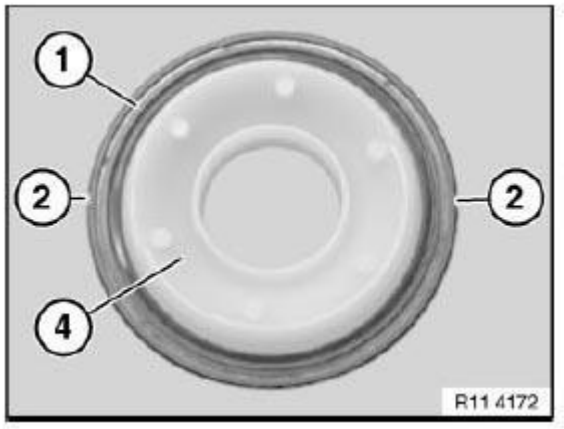


Fig. 76: Identifying Radial Seal, Bushings And Groove
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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

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

Screw on metering needle.

Insert piston for pressing out.

Syringe (2) contains the sealing compound Loctite, manufacturer's number 128357.

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

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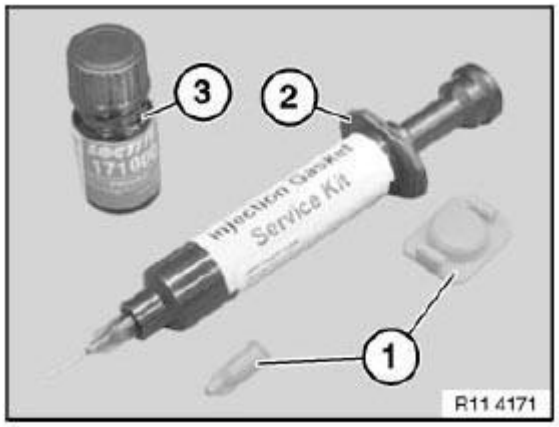


Fig. 77: Identifying Primer Loctite Bottle, Injector And Screw Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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

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

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

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

Carefully remove support bush (4).

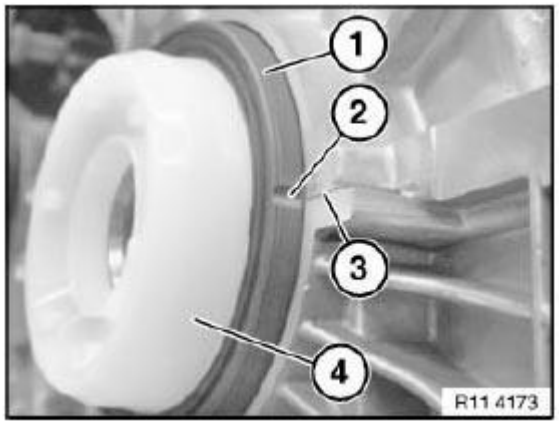


Fig. 78: Identifying Radial Seal, Groove Housing Partition And Bush
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Spacer ring (1) is supplied with radial shaft seal.

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

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Fit spacer ring (1) on pre-assembled radial shaft seal.

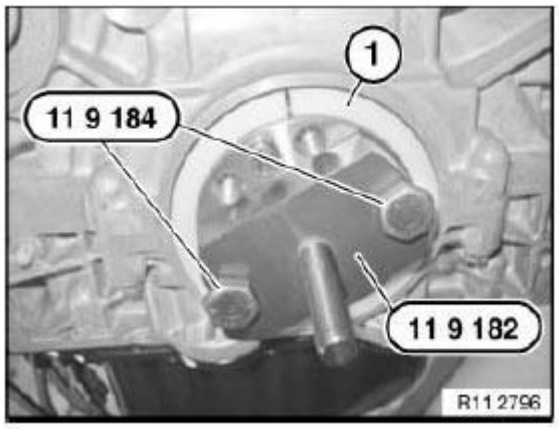


Fig. 79: Mounting Special Tool 11 9 182 With Screws To Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in radial shaft seal and spacer ring with special tool 11 9 181 in conjunction with special tool 11 9 183.

Then remove spacer ring again.

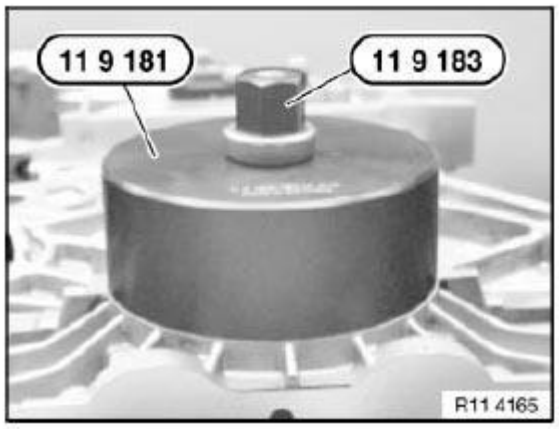


Fig. 80: Installing Radial Shaft Seal And Spacer Ring Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Before filling with sealing compound:

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

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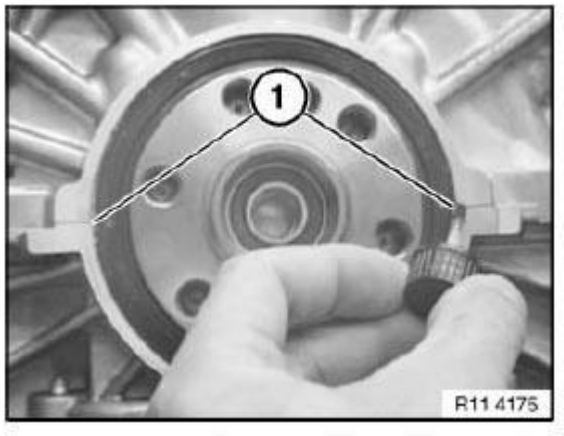


Fig. 81: Inserting Brush Into Grooves
Courtesy of BMW OF NORTH AMERICA, INC.

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

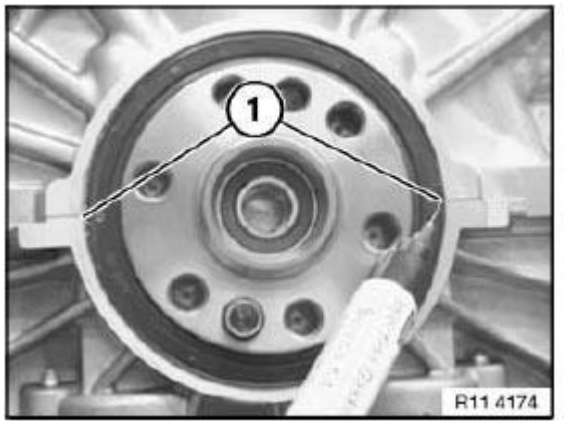


Fig. 82: Filing Grooves With Loctite Sealing Compound Using Injector
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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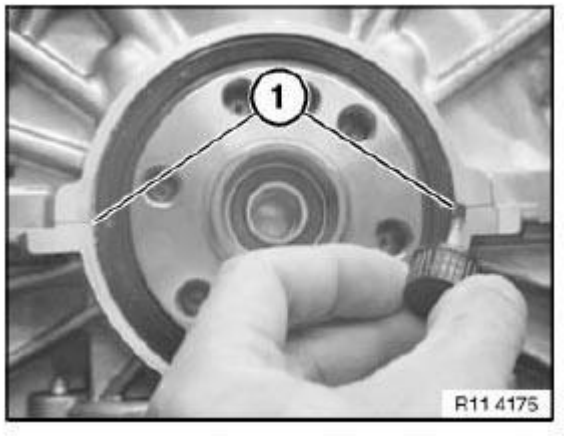


Fig. 83: Coating Sealing Compound Surface Using Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

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

Necessary preliminary tasks:

- Remove **FLYWHEEL**

IMPORTANT: Magnet wheel (1) is magnetic.

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

Remove magnet wheel (1) from crankshaft.

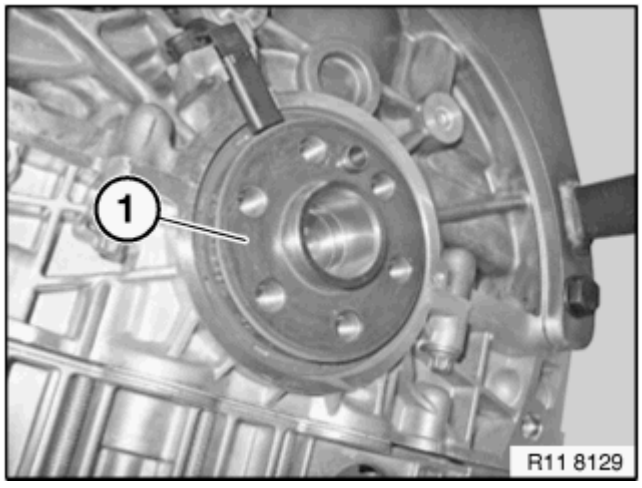


Fig. 84: Identifying Magnet Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw on pulse sensor (1).

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

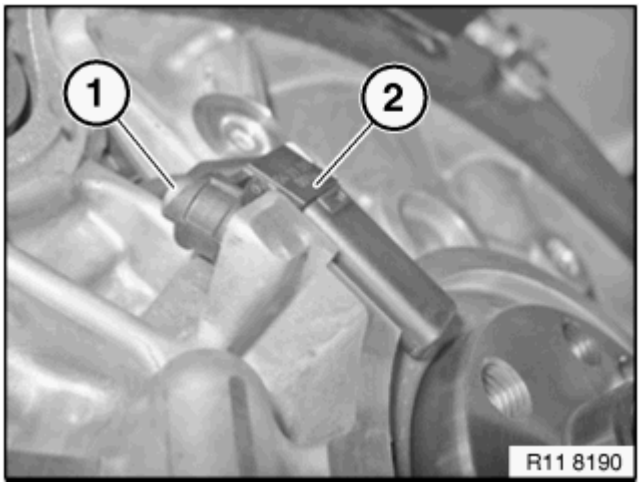


Fig. 85: Identifying Pulse Sensor And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Drill size maximum 2.5 millimeters.

Remove shavings immediately.

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

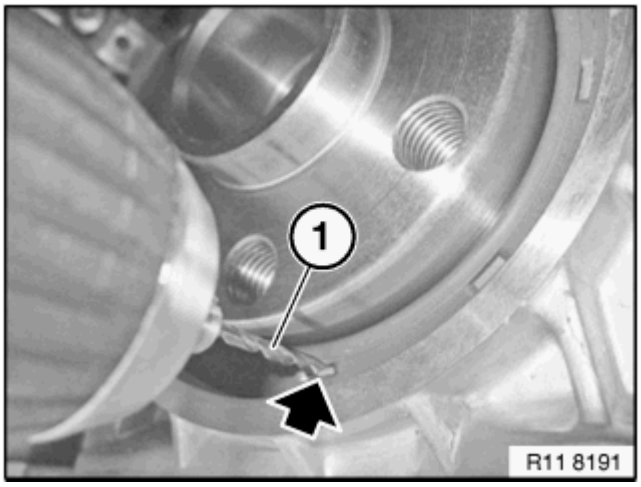


Fig. 86: Drilling Hole In Radial Shaft Seal Using Drill
Courtesy of BMW OF NORTH AMERICA, INC.

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

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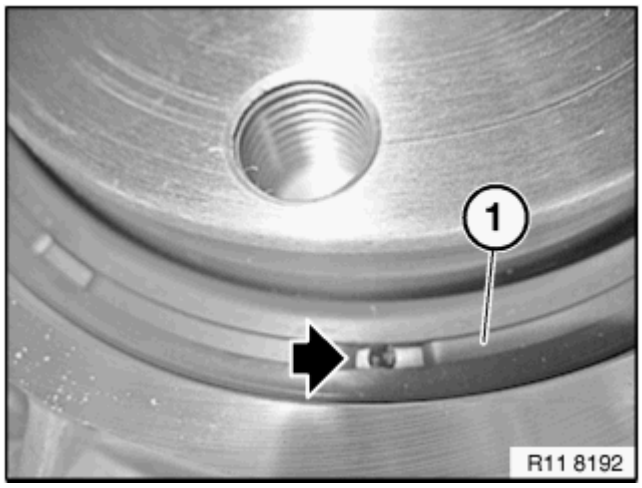


Fig. 87: Identifying Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

IMPORTANT: Immediately carefully remove residual shavings.

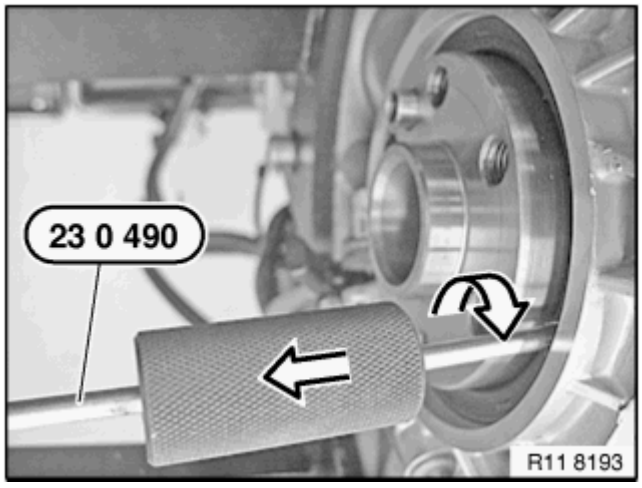


Fig. 88: Screwing In Special Tool 23 0 490 In Clockwise Direction
Courtesy of BMW OF NORTH AMERICA, INC.

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

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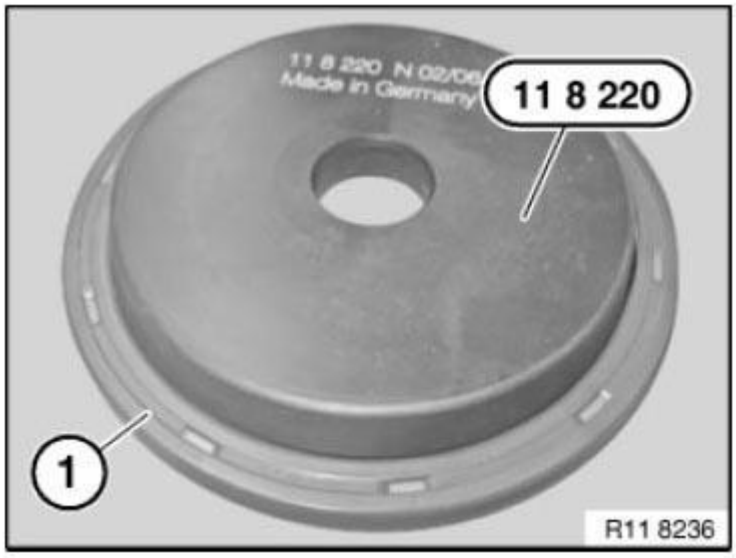


Fig. 89: Identifying Radial Shaft Seal On Special Tool 11 8 220
Courtesy of BMW OF NORTH AMERICA, INC.

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

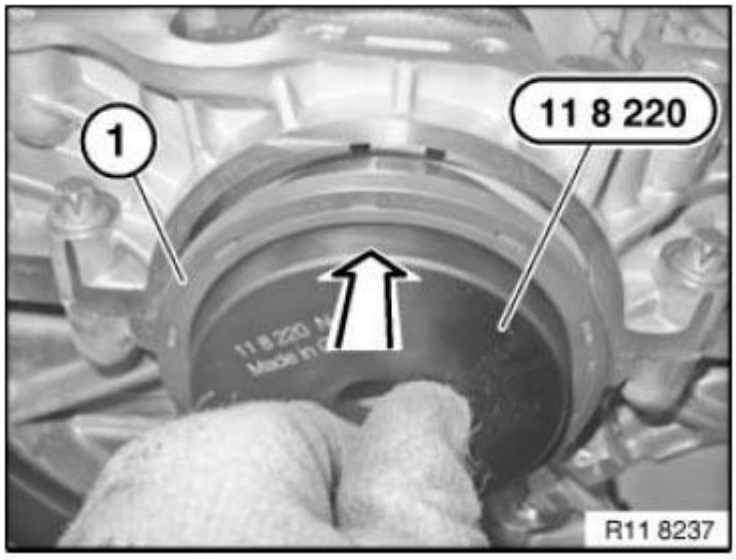


Fig. 90: Positioning Radial Shaft Seal Using Special Tool 11 8 220 On Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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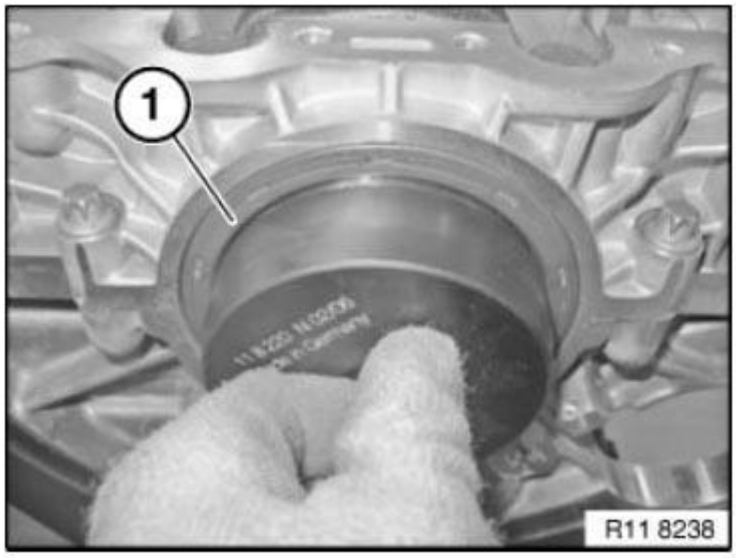


Fig. 91: Moving Radial Shaft Seal Parallel Up Against Crankcase
Courtesy of BMW OF NORTH AMERICA, INC.

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

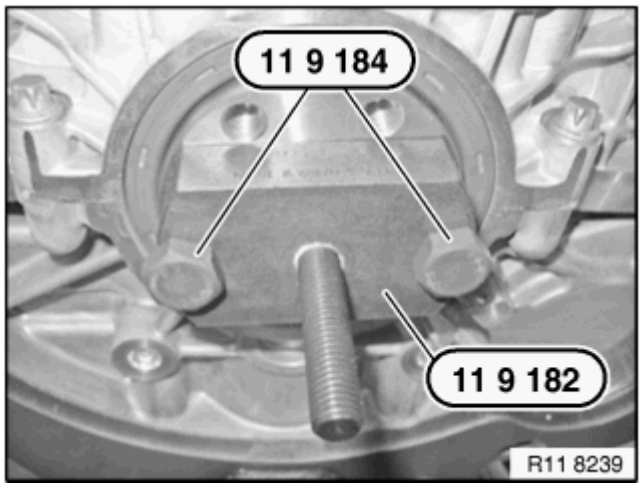


Fig. 92: Fastening Special Tool 11 9 182 With Special Tool 11 9 184 On Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

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

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

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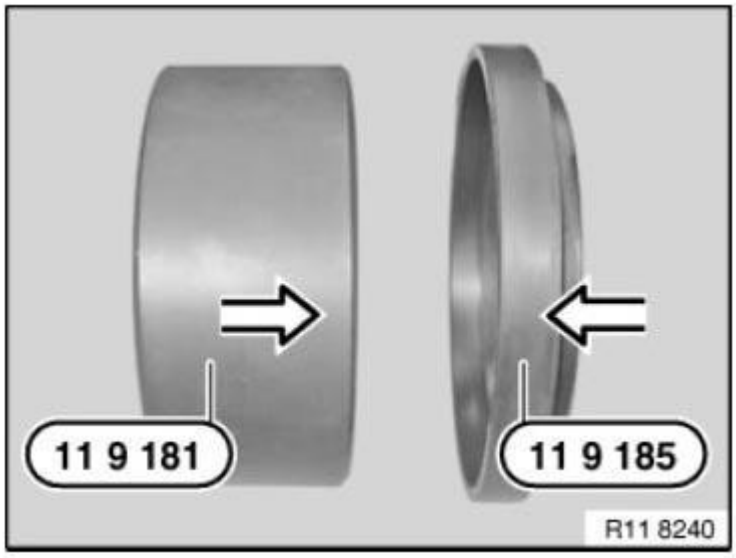


Fig. 93: Connecting Special Tool 11 9 185 Onto Special Tool 11 8 181
Courtesy of BMW OF NORTH AMERICA, INC.

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

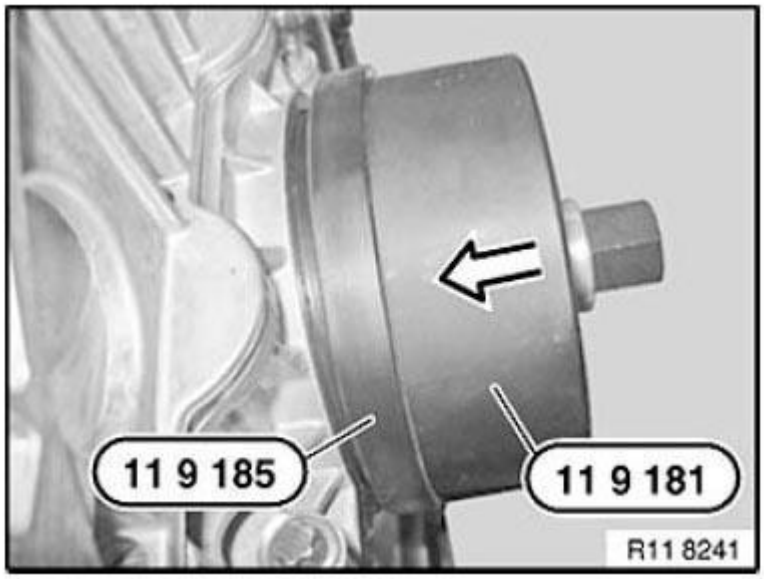


Fig. 94: Installing Rear Crankshaft Seal Using Tool 119 180/181
Courtesy of BMW OF NORTH AMERICA, INC.

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

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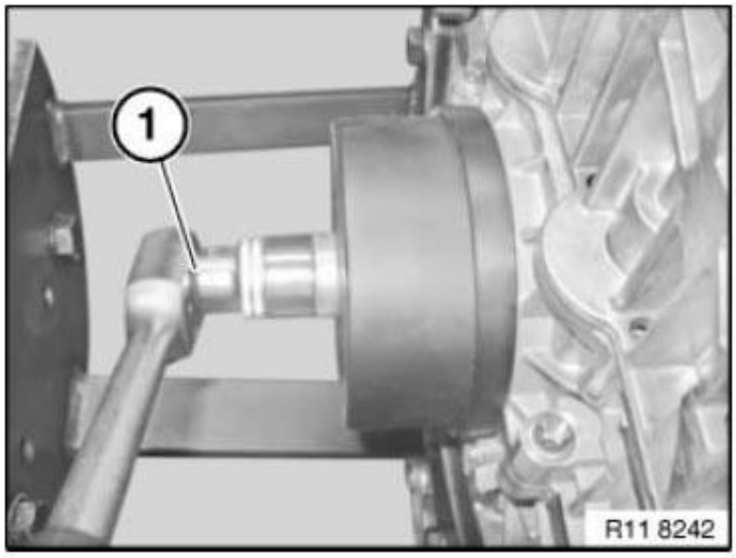


Fig. 95: Screwing On Radial Shaft Seal Using Special Tool 11 9 183
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

11 14 005 REPLACING FRONT CRANKSHAFT SEAL (N52K)

Notes

Necessary preliminary tasks:

- Remove **VIBRATION DAMPER**

IMPORTANT: Do not release central bolt.

If the central bolt is released, the sprocket wheels of the timing chain and the oil pump will no longer be non-positively connected to the crankshaft. Inlet and exhaust camshafts can turn in relation to crankshaft.

Risk of damage!

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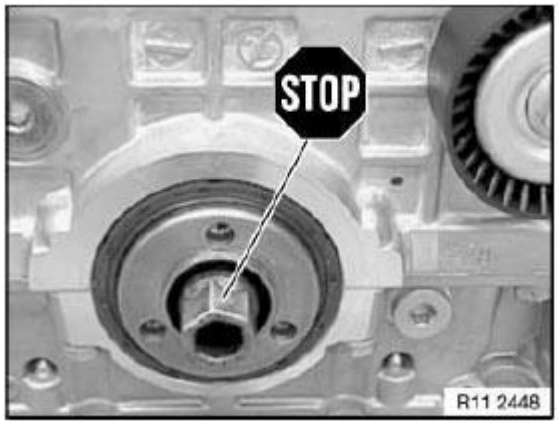


Fig. 96: Identifying Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Turn back special tool 11 9 222.

Push special tool 11 9 221 onto crankshaft.

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

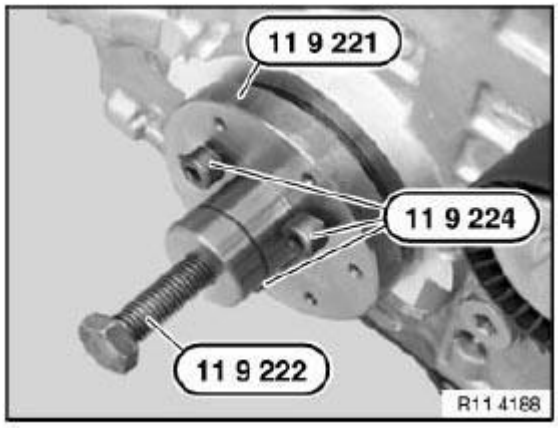


Fig. 97: Pushing Special Tool 11 9 221 Onto Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

Screw in spindle 11 0 372.

Release crankshaft seal from housing.

Repeat the operation several times if necessary.

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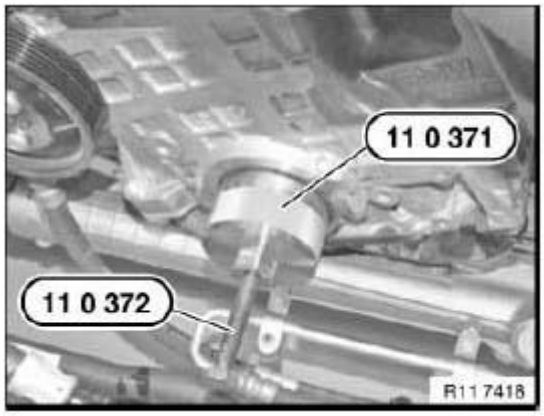


Fig. 98: Mounting Special Tool 11 0 371 Into Crankshaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

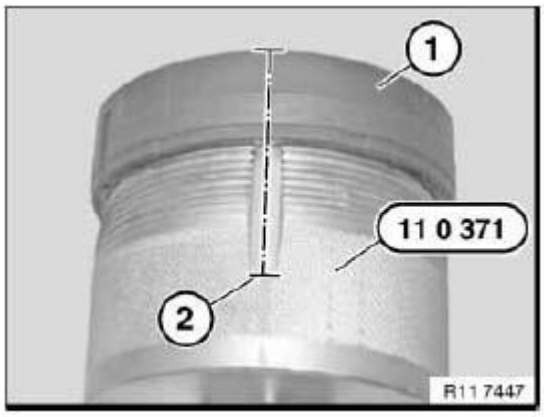


Fig. 99: Identifying Crankshaft Seal At Cutting Line
Courtesy of BMW OF NORTH AMERICA, INC.

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

Installation:

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

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

Illustration N42.

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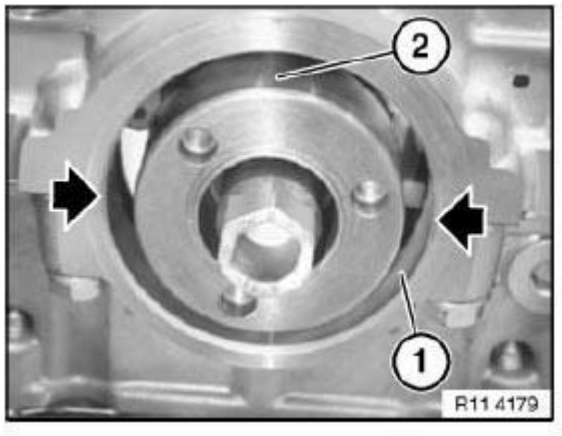


Fig. 100: Identifying Sealing Surface And Running Surface
Courtesy of BMW OF NORTH AMERICA, INC.

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

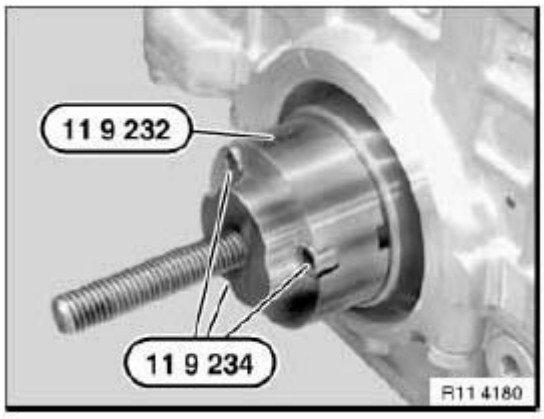


Fig. 101: Mounting Special Tool 11 9 232 With Screws To Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Support sleeve (1) is supplied with crankshaft seal (2).

When crankshaft seal (2) is installed, only support sleeve (1) may be used as a slip sleeve.

Crankshaft seal (2) has a groove on both left and right sides.

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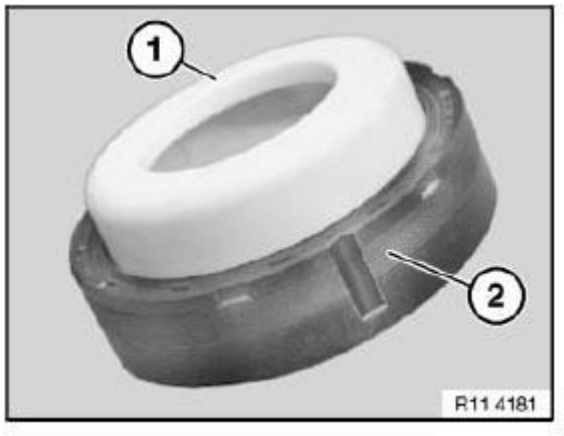


Fig. 102: Identifying Crankshaft Seal And Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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

Screw on metering needle.

Insert piston for pressing out.

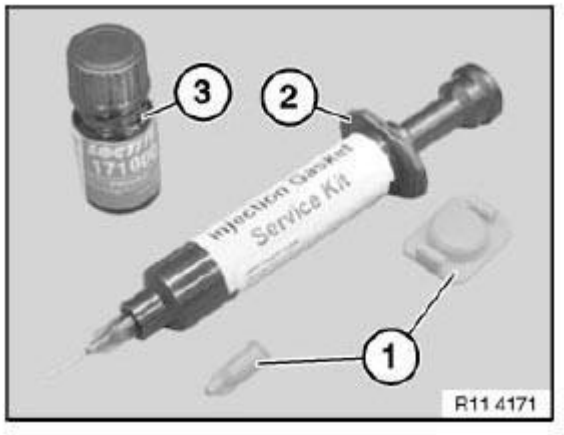


Fig. 103: Identifying Primer Loctite Bottle, Injector And Screw Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Injector (2) contains the sealing compound Loctite, manufacturer's number 128357.

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

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

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

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

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

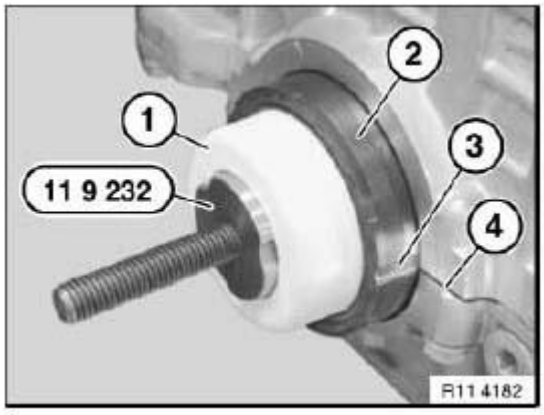


Fig. 104: Pushing Support Sleeve With Crankshaft Seal Onto Special Tool 11 9 232
Courtesy of BMW OF NORTH AMERICA, INC.

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

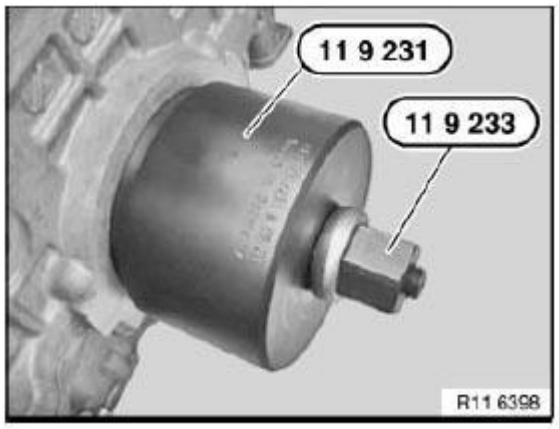


Fig. 105: Installing Crankshaft Seal With Special Tool 11 9 231 In Conjunction With Special Tool 11 9 233
Courtesy of BMW OF NORTH AMERICA, INC.

Before filling with sealing compound:

Moisten brush with Loctite primer, manufacturer's number 171000. Insert brush as far as possible into grooves

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(1) on crankshaft seal in order to coat housing partition on engine block.

Illustration N42.

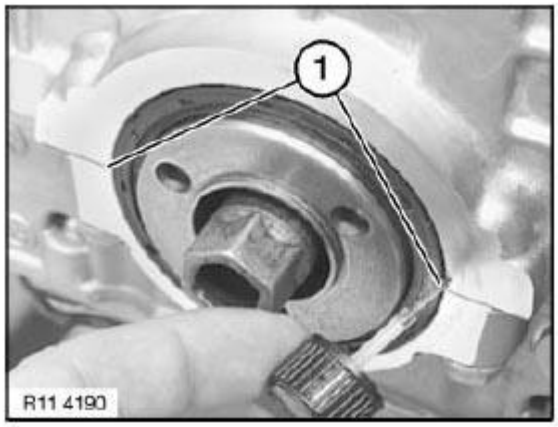


Fig. 106: Coating Housing Partition On Engine Block Using Brush Moistened With Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

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

Illustration N42.

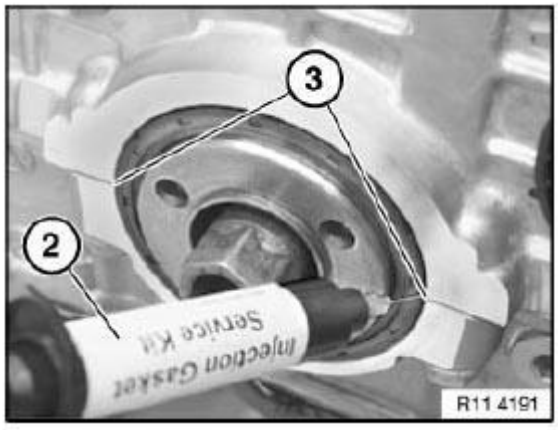


Fig. 107: Filling Both Grooves With Loctite Sealing Compound Using Injector
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

Illustration N42.

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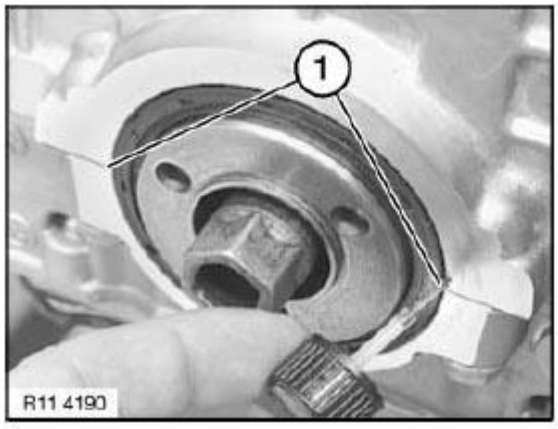


Fig. 108: Coating Surface Of Sealing Compound In Both Grooves With Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

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

Necessary preliminary tasks

- Remove **FAN COWL** with electric fan
- Remove alternator **DRIVE BELT**
- Remove **DRIVE BELT TENSIONER**

NOTE: The procedure is the same as for the crankshaft radial seal.

Expose removal openings on sealing cover.

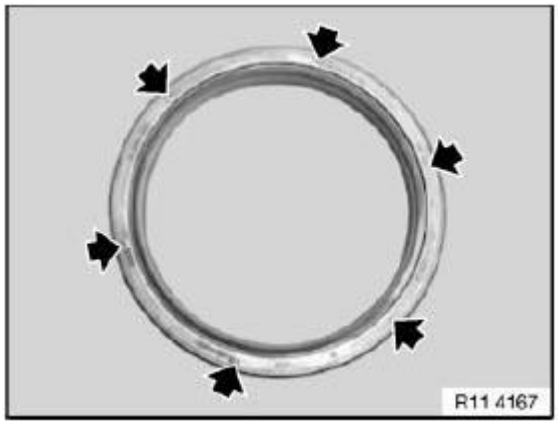


Fig. 109: Locating Crankshaft Radial Seal Removal Openings
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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

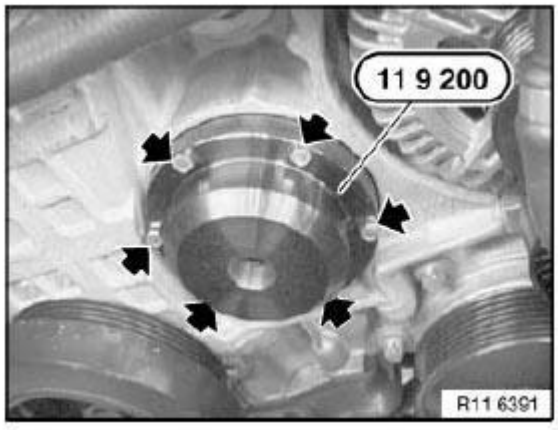


Fig. 110: Inserting Screws Until Flush Only Using Special Tool 11 9 200
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 11 4 362.

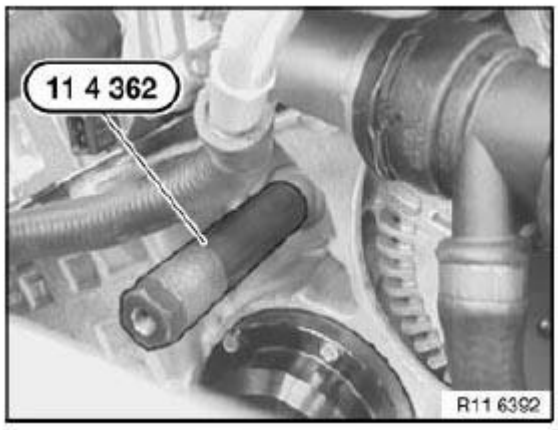


Fig. 111: Installing Special Tool 11 4 362
Courtesy of BMW OF NORTH AMERICA, INC.

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

Secure with knurled screw (1).

Screw special tool 11 4 364 into special tool **11 9 200** and screw out in direction of arrow.

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

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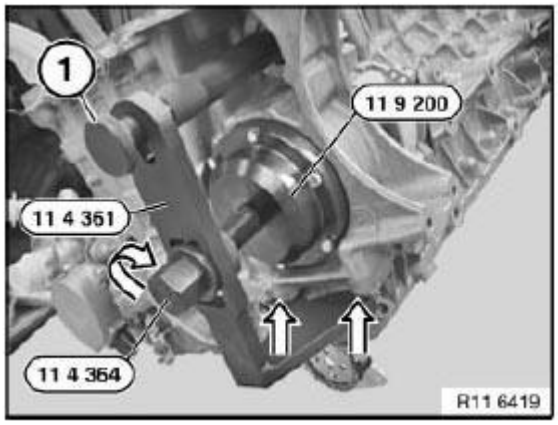


Fig. 112: Connecting Special Tool 11 4 364 Into Special Tool 11 9 200 And Screwing Out
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

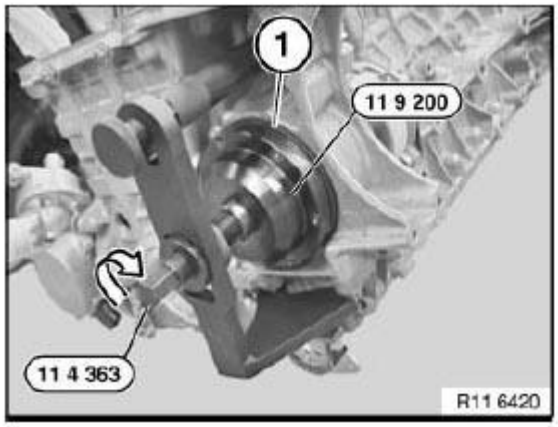


Fig. 113: Mounting Sealing Cover With Special Tool 11 4 363
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

CRANKSHAFT WITH BEARING

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

Notes

IMPORTANT: Aluminium-magnesium materials.

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

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A magnesium crankcase requires aluminium screws/bolts exclusively.

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

Aluminium screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

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

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

Necessary preliminary tasks

- Remove **AUTOMATIC TRANSMISSION** or **MANUAL TRANSMISSION**
- Remove **CLUTCH**

For vehicles with optional extra SA205 (automatic transmission)

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

Installation:

Replace aluminium screws

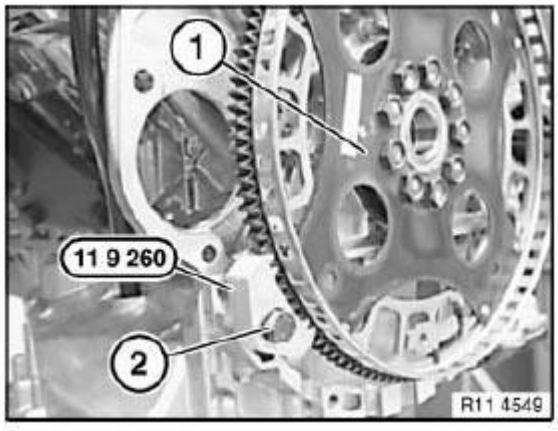


Fig. 114: Supporting Flywheel With Existing Transmission Bolt And Special Tool 11 9 260
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten flywheel screws.

Tightening torque **11 22 1AZ** .

Installation:

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Flywheel (1) is secured with an alignment pin.

Fit new flywheel screws.

Clean all threads for flywheel screws in crankshaft.

For vehicles without optional extra SA205 (automatic transmission)

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

Installation:

Replace aluminium screws

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

Tightening torque **11 22 2AZ** .

Installation

Flywheel is secured with a dowel pin.

Fit new flywheel screws.

Clean all threads for flywheel screws in crankshaft.

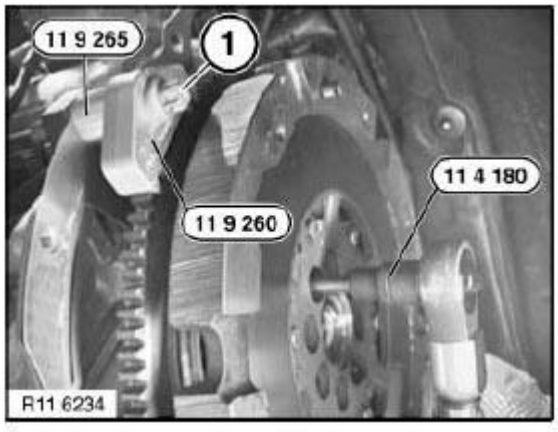


Fig. 115: Removing Flywheel Bolt Using Special Tool 11 4 180
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

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

Notes

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IMPORTANT: Aluminium-magnesium materials.

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

A magnesium crankcase requires aluminium screws/bolts exclusively.

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

Aluminium screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

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

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

Necessary preliminary tasks

- Remove **CRANKSHAFT**

Checking position of oil spray nozzles

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

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

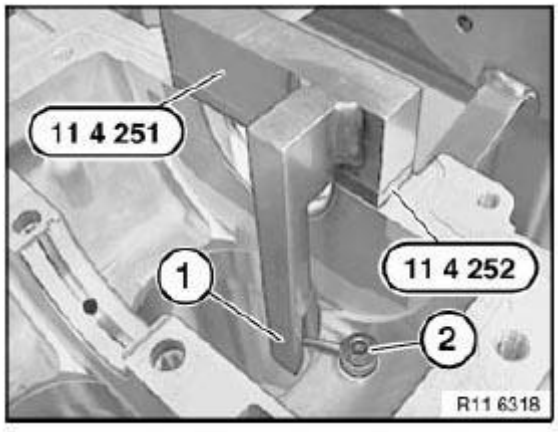


Fig. 116: Checking Oil Spray Nozzle Position According To Position On Special Tool 11 4 251
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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Tightening torque **11 11 5AZ** .

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

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

Observe **BEARING CLASSIFICATION** .

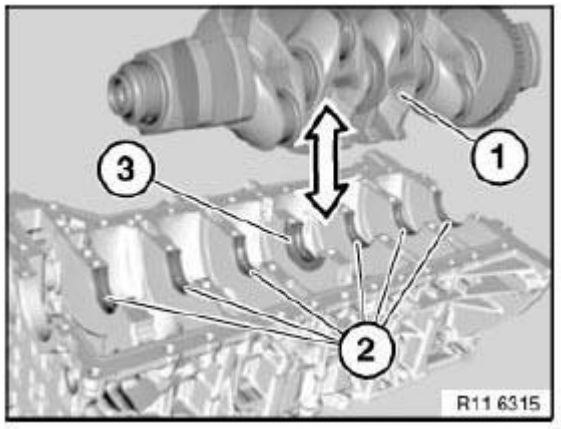


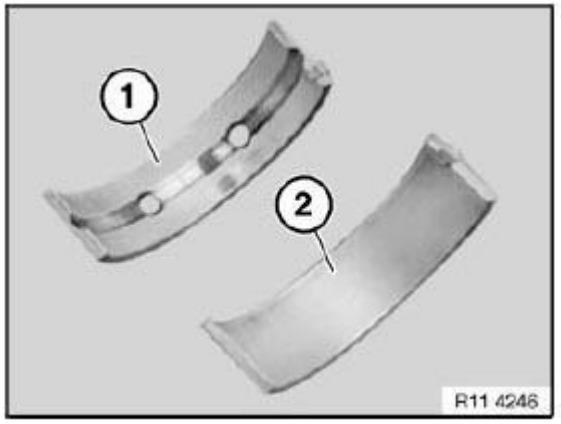
Fig. 117: Removing Guide Bearing Shell And Bearing Shells
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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

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

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



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Fig. 118: Identifying Bearing Shell With/Without Lubricant Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Surface (1) for identification on crankshaft web 1.

Seven-digit part number (2).

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

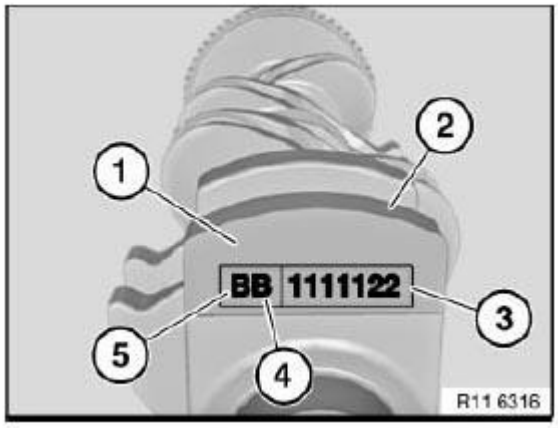


Fig. 119: Identifying Seven Digit Code On Crankshaft Web Surface
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Code letters (4 and 5) are exclusively required for a machined crankshaft.

Code letter (4) as per table, main bearing.

B= build date 1 (B 1 2 3 -0.25 mm).

B= build date 2 (C 1 2 3 -0.50 mm).

Code letter (5) as per table, lift bearing.

B= construction stage 1 (-0.25 mm).

C = construction stage 2 (-0.50 mm)

Observe **BEARING CLASSIFICATION** .

Main bearing classification (1) in crankcase, code letters A/B or C, see table.

Installation:

When all the letters and number code have been determined, the bearing shell color must be allocated, see table.

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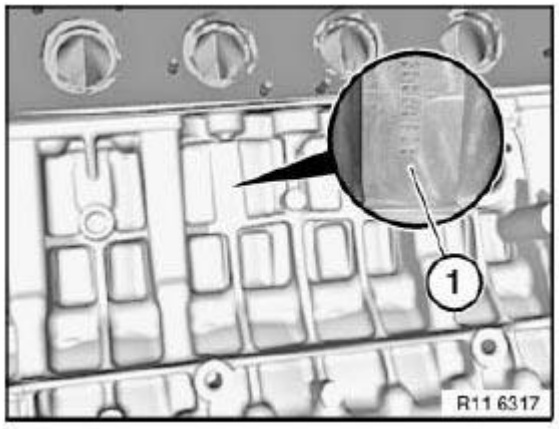


Fig. 120: Identifying Bearing Classification Of Crankcase Upper Section
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The letter/number combination produces a bearing shell pairing.

Identification by different colors.

IMPORTANT: First bearing point is on the timing drive.
The color combination Yellow and Red must not be fitted.
Engine damage will result if excessively small bearing play is determined.

Code letters on crankcase

Code letter A = bearing shell (1) color Yellow.

Code letter B = bearing shell (1) color Green.

Code letter C = bearing shell (1) color Red.

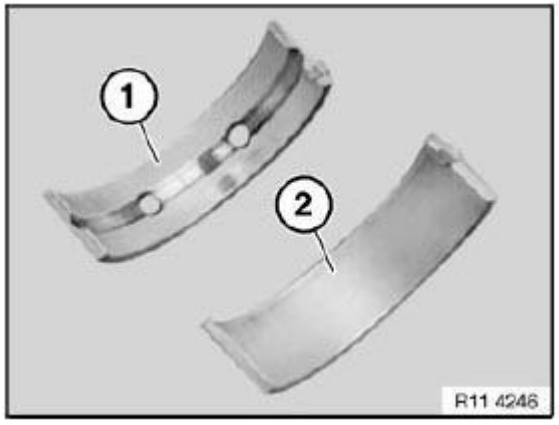


Fig. 121: Identifying Bearing Shell

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Courtesy of BMW OF NORTH AMERICA, INC.

Code numbers on crankshaft

Code number 1 = bearing shell (2) Yellow.

Code number 2 = bearing shell (2) Green.

Code number 3 = bearing shell (2) Red.

IMPORTANT: The color combination Yellow and Red must not be fitted; the bearing colors Green/Green must be selected for this color combination, see table.

Installation example:

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

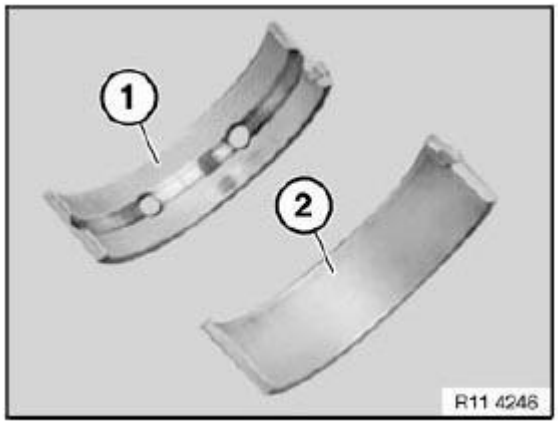


Fig. 122: Identifying Bearing Shell
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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

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

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

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

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

Installation

Possible color combinations for mounting the crankshaft in the crankcase.

CRANKCASE INSTALLATION COLOR REFERENCE CHART

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

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

Installation:

Clean all sealing surfaces.

IMPORTANT: Do not use any metal-cutting tools.

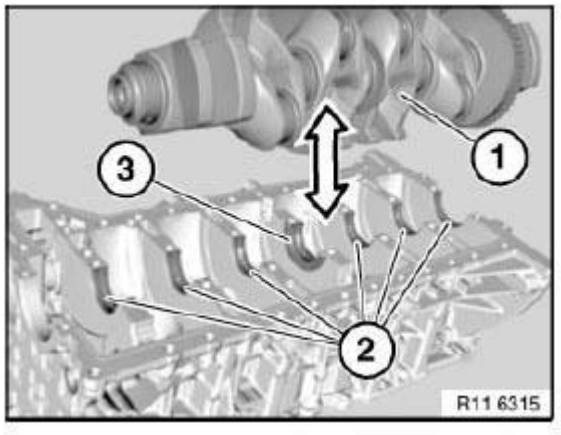


Fig. 123: Identifying Bearing Shells
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

Installation:

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

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Use the existing screws to determine the bearing play.

Set up **BEDPLATE** with bearing shells.

Remove bedplate.

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

Installation:

Remove plastic thread.

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

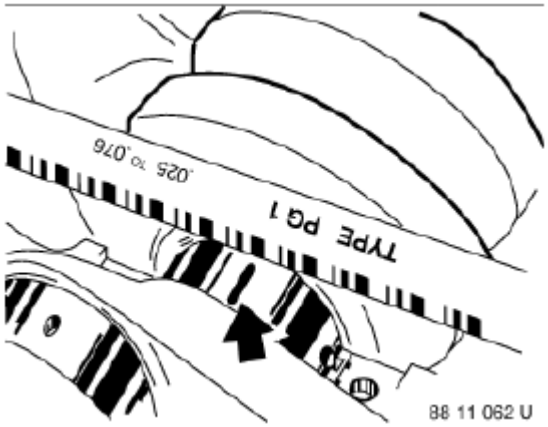


Fig. 124: Checking Radial Clearance At Width Of Flattened Plastic Thread (Plastigage)
Courtesy of BMW OF NORTH AMERICA, INC.

Install **BEDPLATE**.

Assemble engine.

11 21 500 REPLACING CRANKSHAFT (N52K)

Notes

IMPORTANT: Aluminium-magnesium materials.

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

A magnesium crankcase requires aluminium screws/bolts exclusively.

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

Aluminium screws/bolts are permitted with and without

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color coding (blue).

For reliable identification:

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

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

Necessary preliminary tasks

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

Release screws (1).

Tightening torque **11 13 6AZ** .

Installation:

Replace aluminium screws

Remove oil deflector (2).

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

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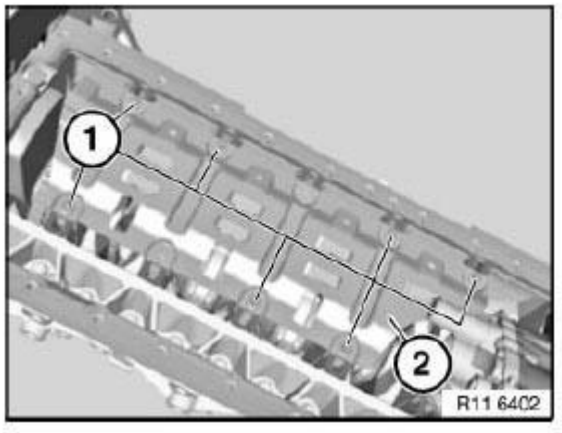


Fig. 125: Identifying Screws And Oil Deflector
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 11 2AZ** .

Unfasten screws (2).

Tightening torque **11 11 3AZ** .

Installation:

Replace aluminium screws

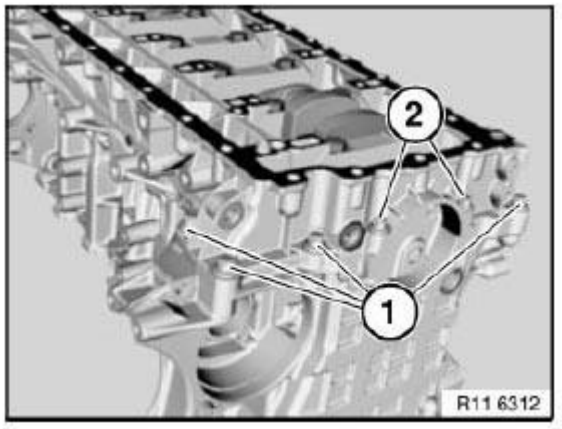


Fig. 126: Identifying Aluminium Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 11 4AZ** .

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Unfasten screws (2).

Tightening torque **11 11 2AZ** .

Installation:

Replace aluminium screws

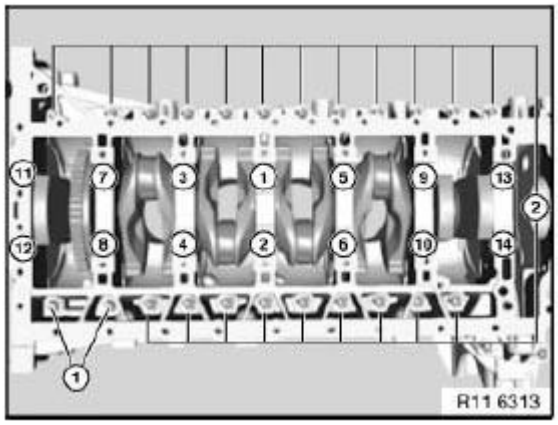


Fig. 127: Identifying Steel Screws
Courtesy of BMW OF NORTH AMERICA, INC.

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

Tightening torque **11 11 1AZ** .

Release screws (1).

Tightening torque **11 11 3AZ** .

Installation:

Replace aluminium screws

Lift out bedplate.

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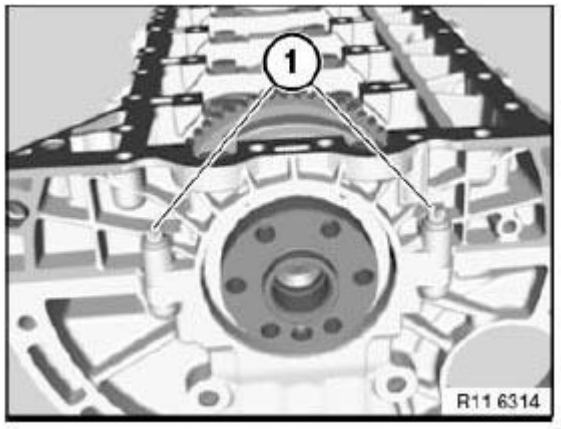


Fig. 128: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove crankshaft (1) in direction of arrow.

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

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

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

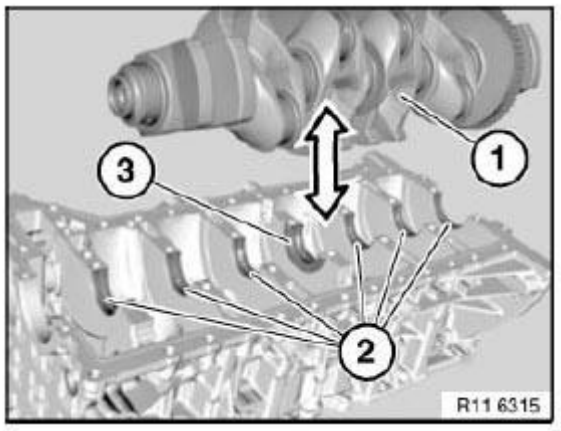


Fig. 129: Identifying Bearing Shells
Courtesy of BMW OF NORTH AMERICA, INC.

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

Install all **BEARING SHELLS** .

Installation:

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Lubricate all bearing points with engine oil.

NOTE: Graphic shows N46.

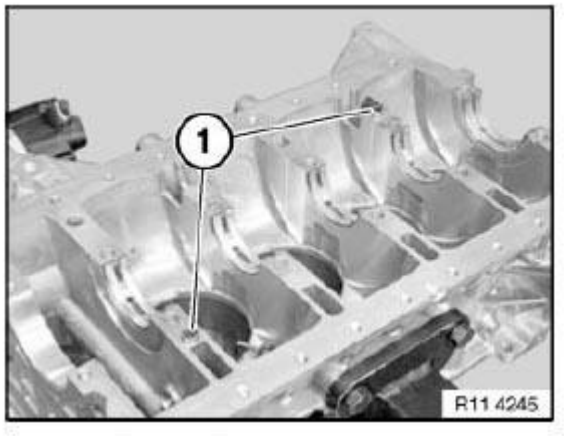


Fig. 130: Identifying Adapter Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Insert crankshaft (1).

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

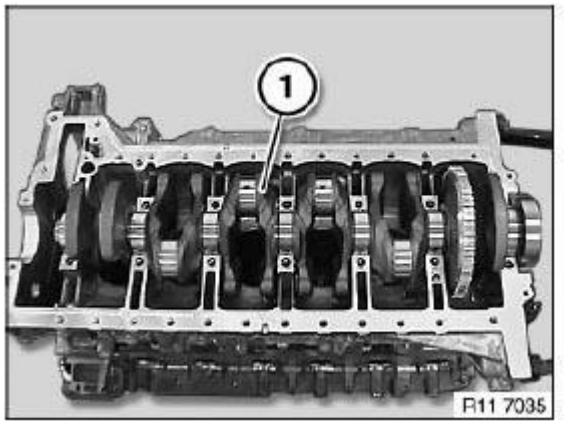


Fig. 131: Identifying Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

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

Tightening torque **11 11 1AZ** .

Tighten screws (2) from inside outwards.

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Tightening torque **11 11 2AZ** .

Tighten screws (1).

Tightening torque **11 11 4AZ** .

Installation:

Replace aluminium screws

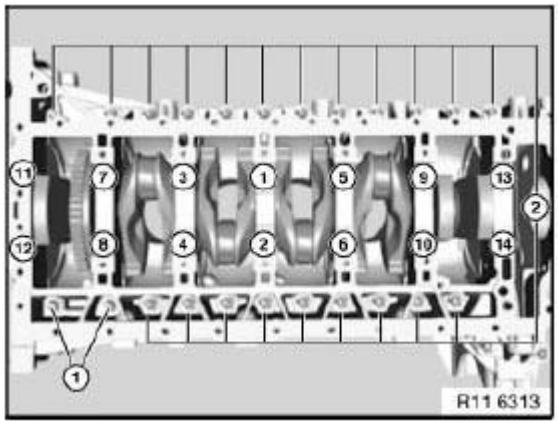


Fig. 132: Identifying Steel Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten aluminium screws exclusively with special tool **00 9 120** .

IMPORTANT: In the case of aluminium screws, jointing torque and angle of rotation must be observed without fail.

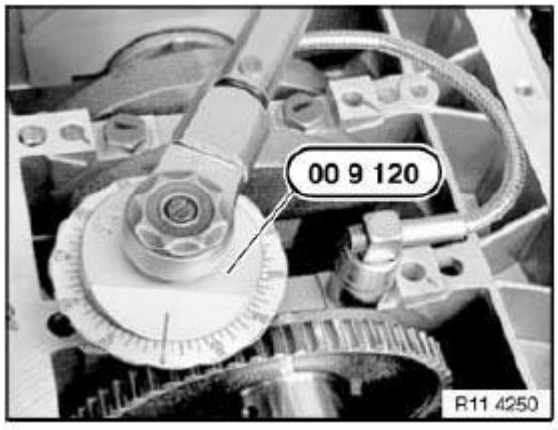


Fig. 133: Tightening Main Bearing Bolts Using Special Tool (00 9 120)
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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

Move crankshaft in direction of arrow.

Determine **BEARING PLAY** .

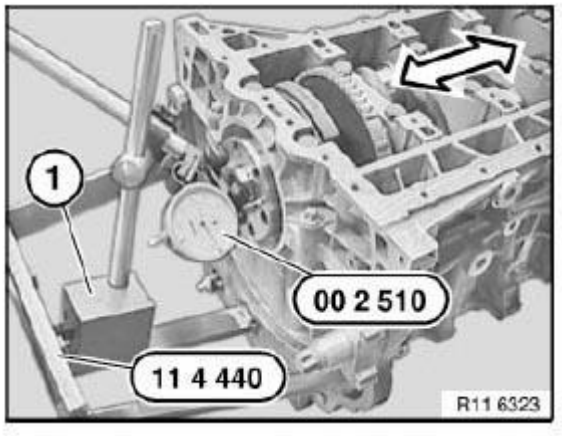


Fig. 134: Direction Of Moving Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

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

Installation

Always replace nozzles (1).

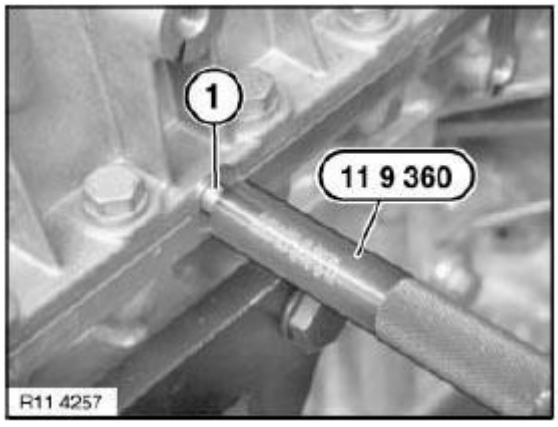


Fig. 135: Drive In Nozzles Using Special Tool 11 9 360
Courtesy of BMW OF NORTH AMERICA, INC.

Replace **CRANKSHAFT RADIAL SEAL** at front.

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

Installation

Use **PRIMER 1.3 AND LIQUID GASKET 1.4** .

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

Screw on nozzle for injecting liquid gasket.

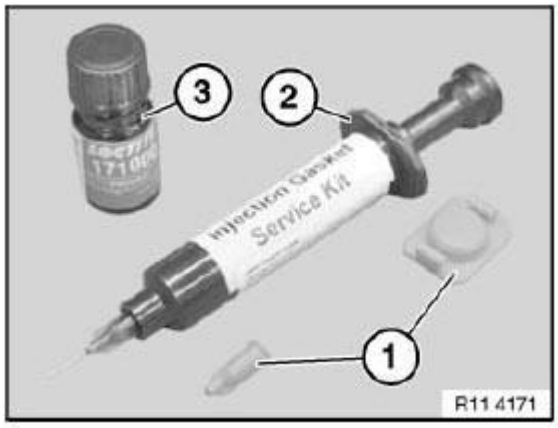


Fig. 136: Identifying Injector, Sealing Compound And Bottle
Courtesy of BMW OF NORTH AMERICA, INC.

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

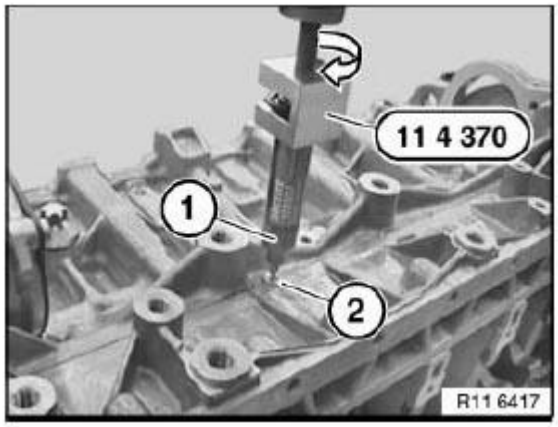


Fig. 137: Inserting Liquid Gasket Using Special Tool 11 4 370
Courtesy of BMW OF NORTH AMERICA, INC.

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

(Picture shows N40).

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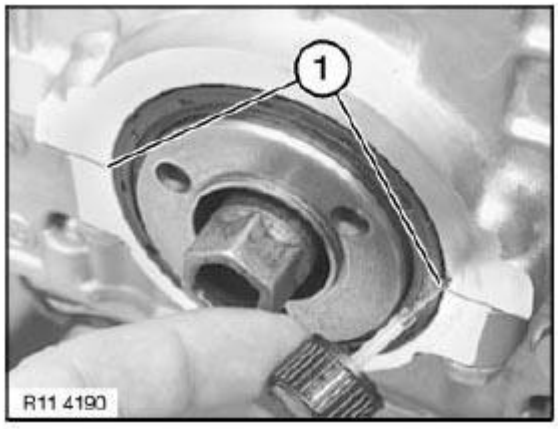


Fig. 138: Escaping Liquid Gasket With Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

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

Necessary preliminary tasks

- Remove **CLUTCH** .

Remove guide bearing with special tool 11 2 340.

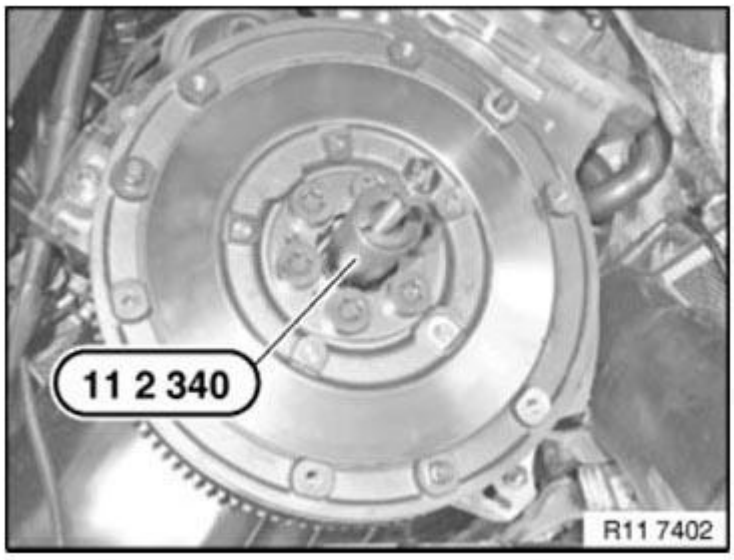


Fig. 139: Removing Guide Bearing Using Special Tool 11 2 340
Courtesy of BMW OF NORTH AMERICA, INC.

Install new thrust bearing and drive firmly home with special tool 11 2 350 in conjunction with special tool **00 5 500** .

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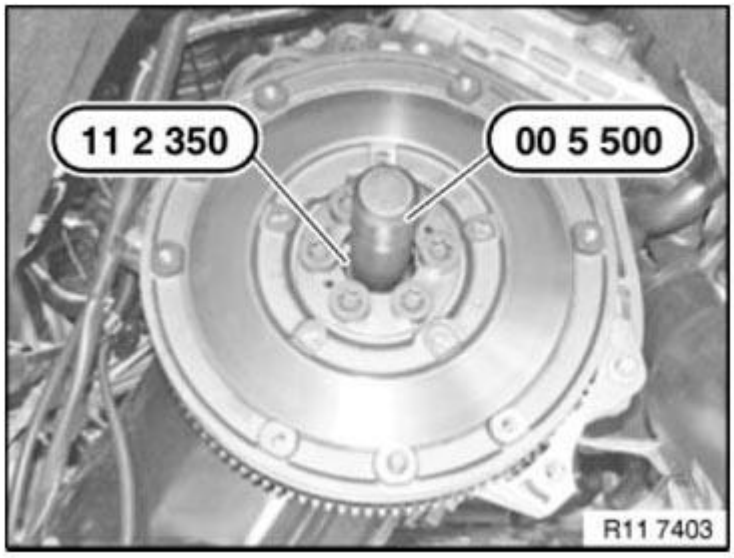


Fig. 140: Installing New Thrust Bearing Using Special Tool 11 2 350 And 00 5 500
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

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

Notes

IMPORTANT: Aluminium-magnesium materials.

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

A magnesium crankcase requires aluminium screws/bolts exclusively.

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

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

For reliable identification:

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

Risk of damage!

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

IMPORTANT: Changed procedure.
It is not necessary to remove the cylinder head and the crankshaft.

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Necessary preliminary tasks

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

Release screws (1).

Pull out oil pump intake pipe (2).

Tightening torque: **11 13**

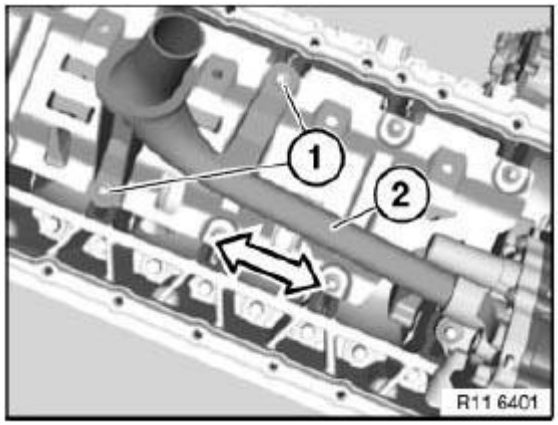


Fig. 141: Removing Intake Pipe
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

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

Installation:

Replace aluminium screws

Remove oil deflector (2).

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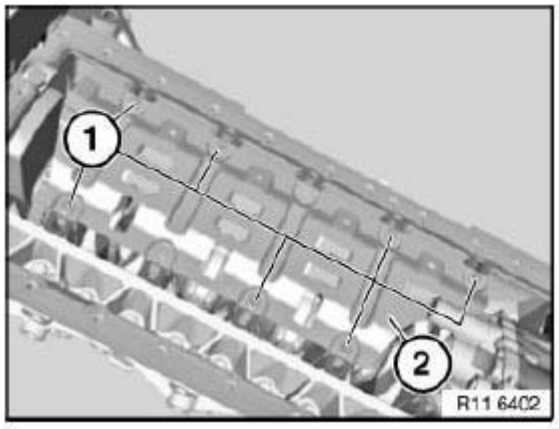


Fig. 142: Identifying Screws And Oil Deflector
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

Release central bolt (2).

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

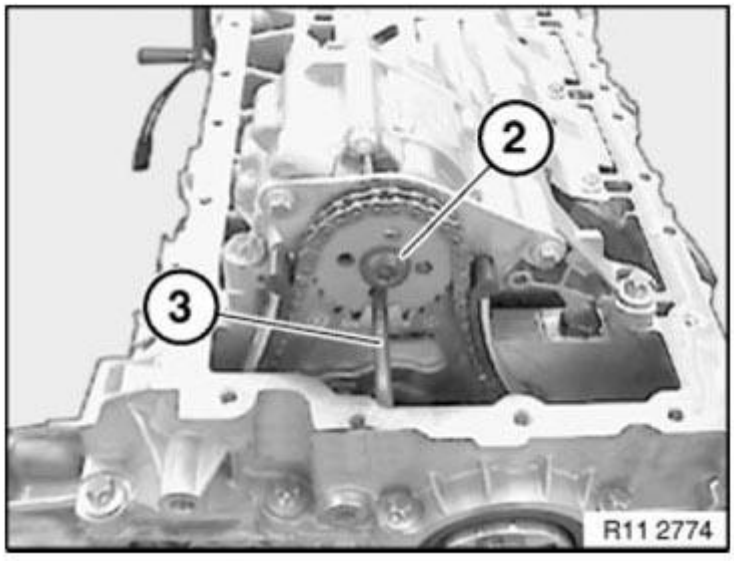


Fig. 143: Identifying Oil Deflector And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (2).

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

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Installation:

Replace aluminium screws

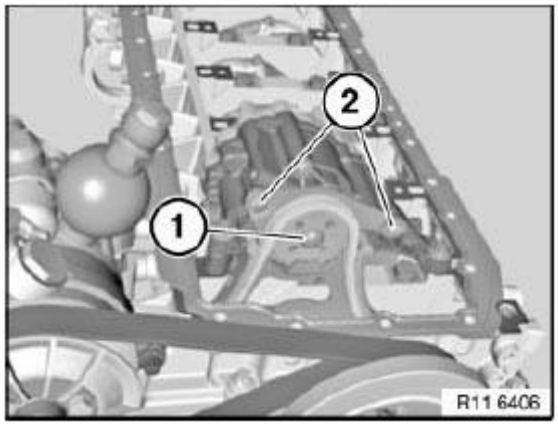


Fig. 144: Identifying Bolt And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove screw plug (1) from crankcase at front.

NOTE: Replace gasket.

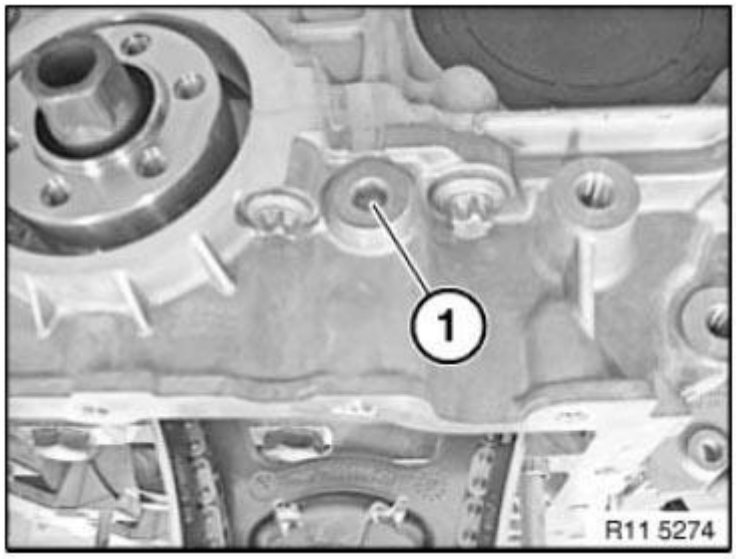


Fig. 145: Identifying Screw Plug
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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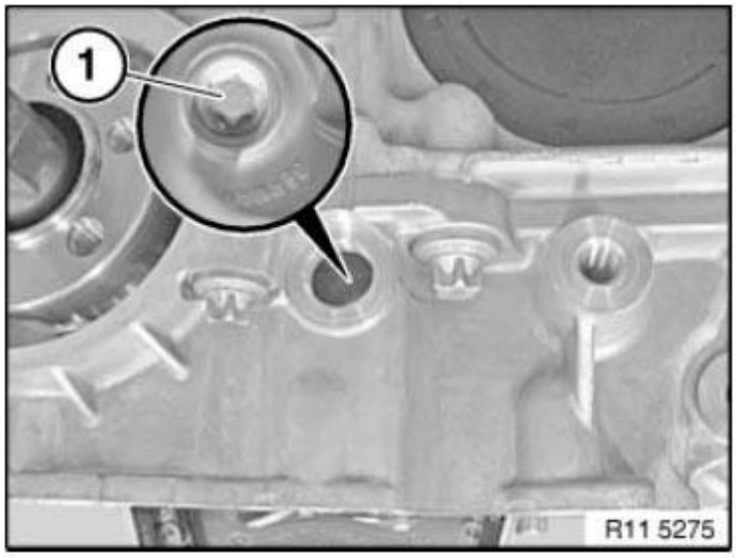


Fig. 146: Identifying Oil Pump Triangular Drive Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Version 1

IMPORTANT: Observe different screw lengths.

Release screws (1).

Tightening torque **11 41 2AZ** .

Tightening torque **11 41 3AZ** .

Installation:

Replace aluminium screws

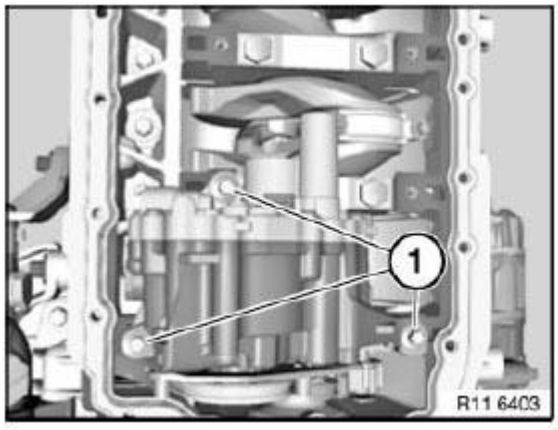


Fig. 147: Identifying Screws

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Courtesy of BMW OF NORTH AMERICA, INC.

Version 2

IMPORTANT: Observe different screw lengths.
Release oil pump screws (1).
Tightening torque: 11 41 2AZ .
Installation:

Replace aluminium screws

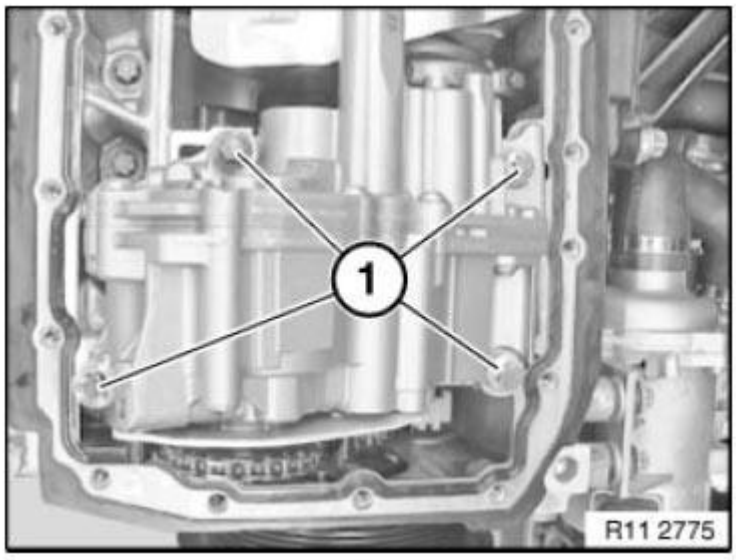


Fig. 148: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Detach sprocket (1) in direction of arrow.

NOTE: The chain tensioner pushes the timing chain (3) of the triangular drive upward.

Do **not** remove camshaft sprocket.

Remove oil pump (2) in direction of arrow.

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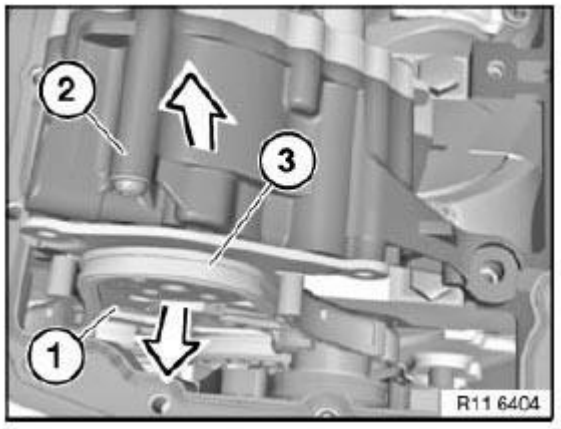


Fig. 149: Pulling Drive Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

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

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

Install oil pump (2).

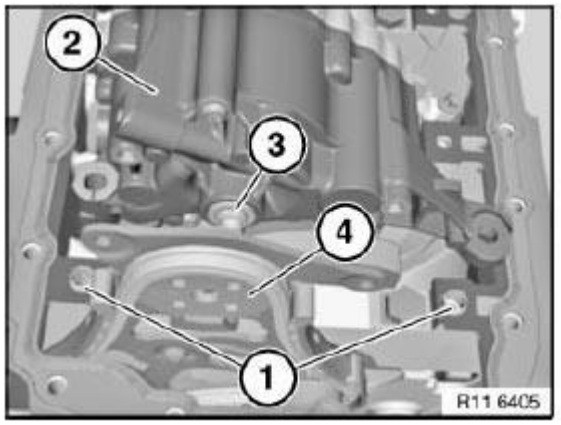


Fig. 150: Identifying Spacer Bushings And Oil Pump
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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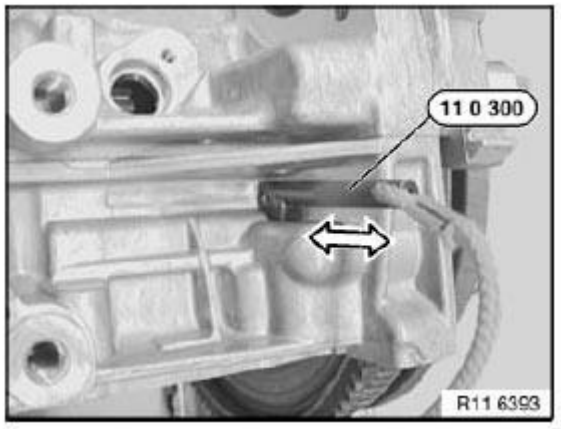


Fig. 151: Securing Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Secure flywheel with special tool (1)

11 9 260 and special tool (2) 11 9 266.

TIGHTENING TORQUE

NOTE: Make sure that the special tool (1) completely engages in the flywheel teeth (see arrow)

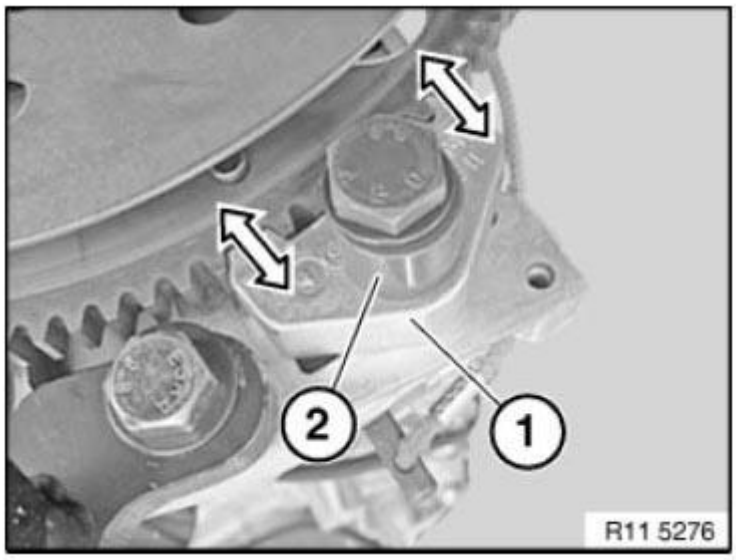


Fig. 152: Securing Flywheel Using Special Tool 11 9 260/11 9 266
Courtesy of BMW OF NORTH AMERICA, INC.

Automatic transmission

Release flywheel bolts (1).

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Release special tool (2).

Remove flywheel (3).

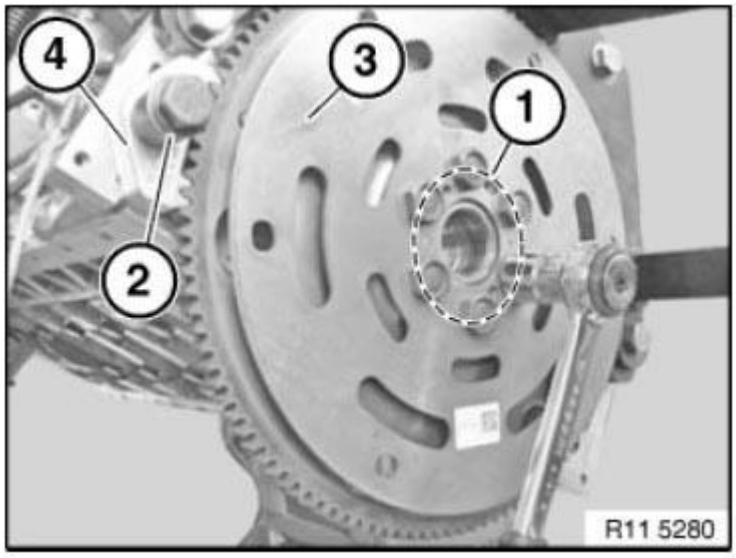


Fig. 153: Identifying Flywheel With Bolts And Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Manual gearbox

IMPORTANT: Position crankshaft at TDC.

Remove dual-mass flywheel.

Secure flywheel with special tool 11 9 260 .

Remove VIBRATION DAMPER .

Release flywheel bolts with special tool 11 4 180 .

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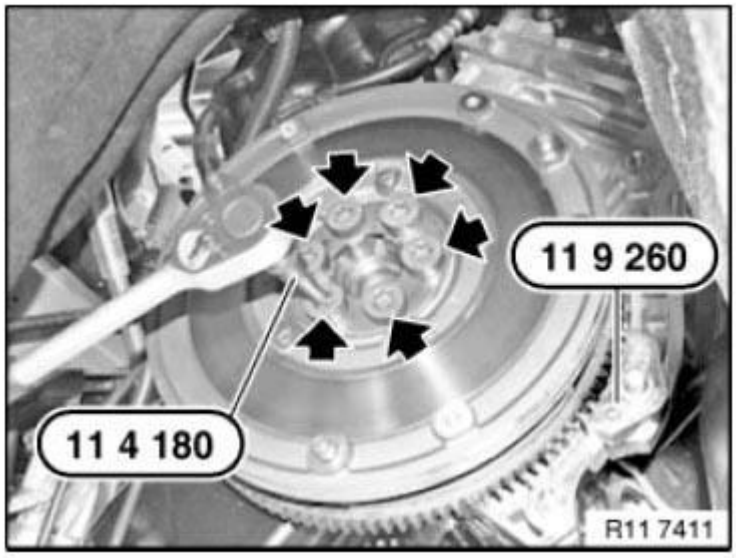


Fig. 154: Removing Flywheel Bolts Using Special Tool 11 4 180
Courtesy of BMW OF NORTH AMERICA, INC.

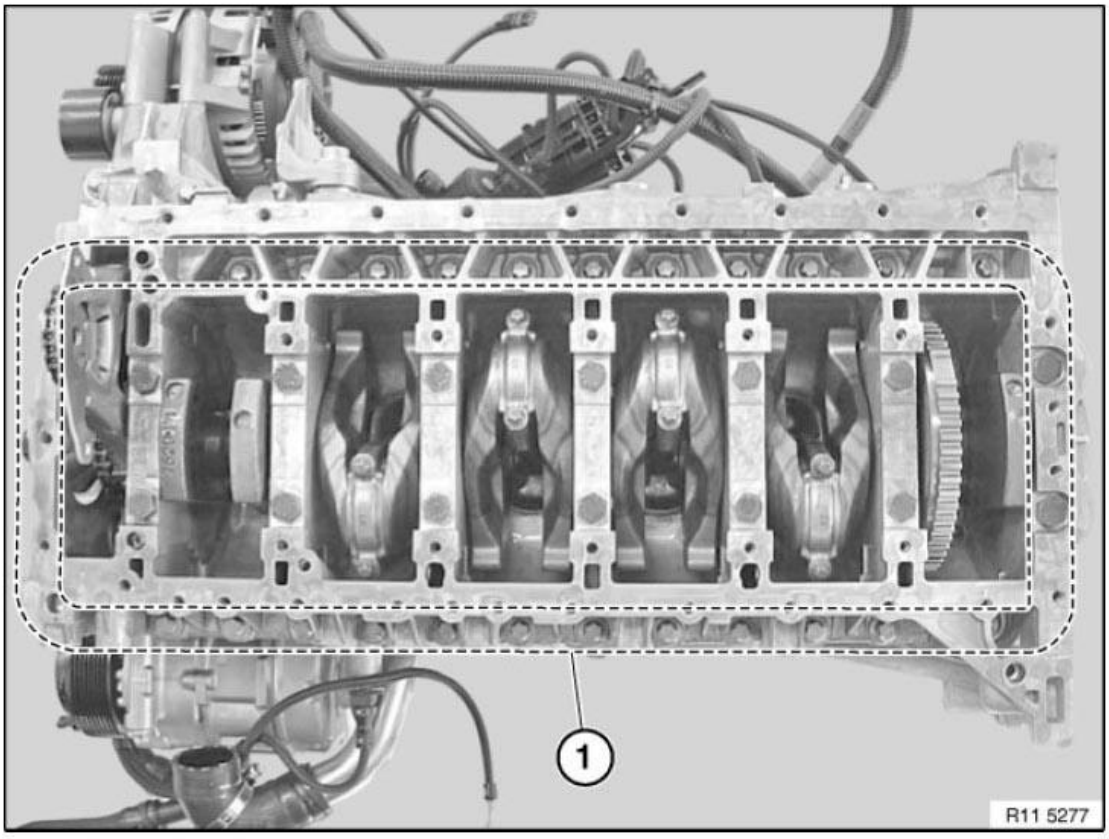


Fig. 155: Identifying Crankshaft Bolt Mounting Area
Courtesy of BMW OF NORTH AMERICA, INC.

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

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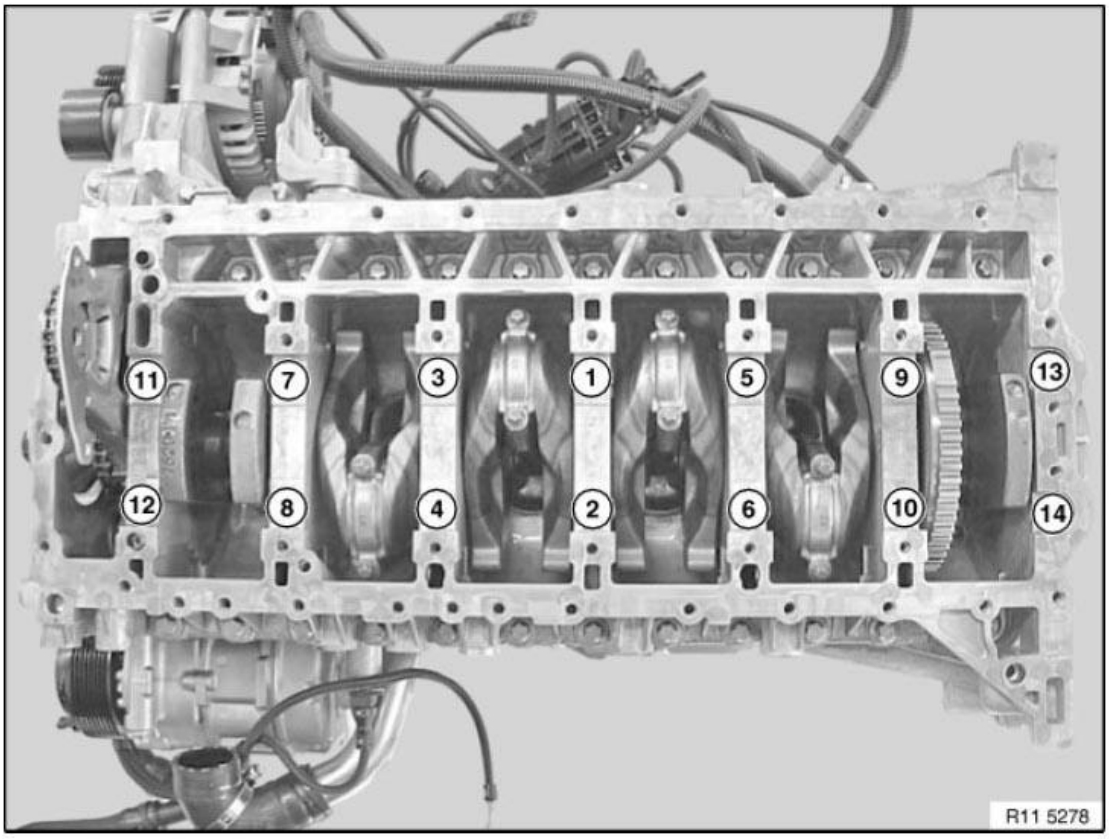


Fig. 156: Identifying Crankshaft Bolt Releasing Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release crankcase bolts M10 in sequence 14 to 1.

Release crankcase lower section (1) from crankcase upper section (2) with suitable tool (3)

Remove crankcase lower section (1) upwards.

IMPORTANT: Do not rotate crankshaft without crankcase lower section (1) (risk of damage).

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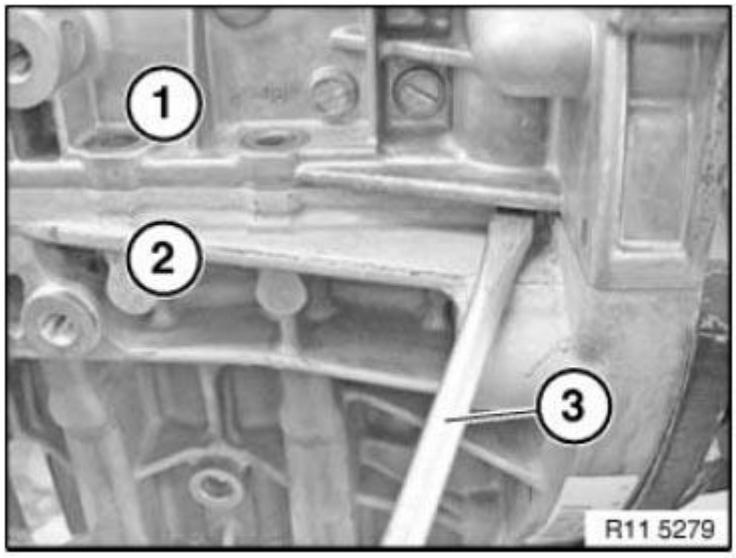


Fig. 157: Removing Crankshaft (Lower Section And Upper Section) Using Tool
Courtesy of BMW OF NORTH AMERICA, INC.

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

Carefully remove radial shaft seal (1).

Catch escaping engine oil with a cloth (2).

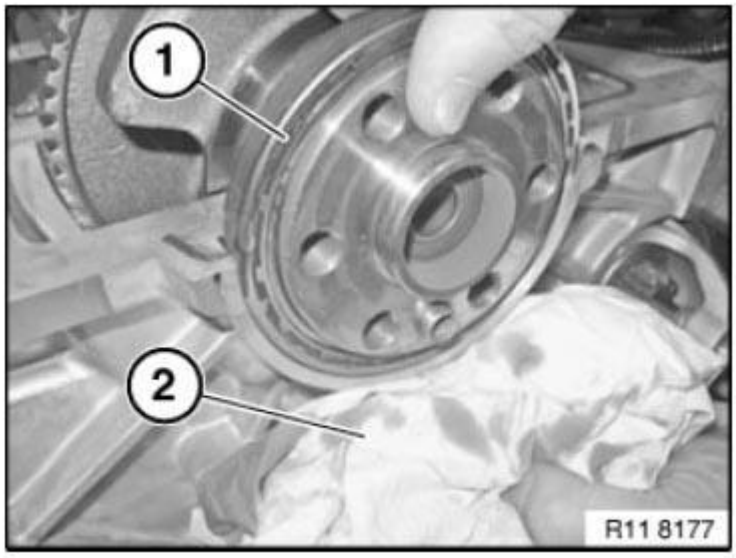


Fig. 158: Removing Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully remove radial shaft seal (1) towards front.

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Catch escaping engine oil with a cloth (2).

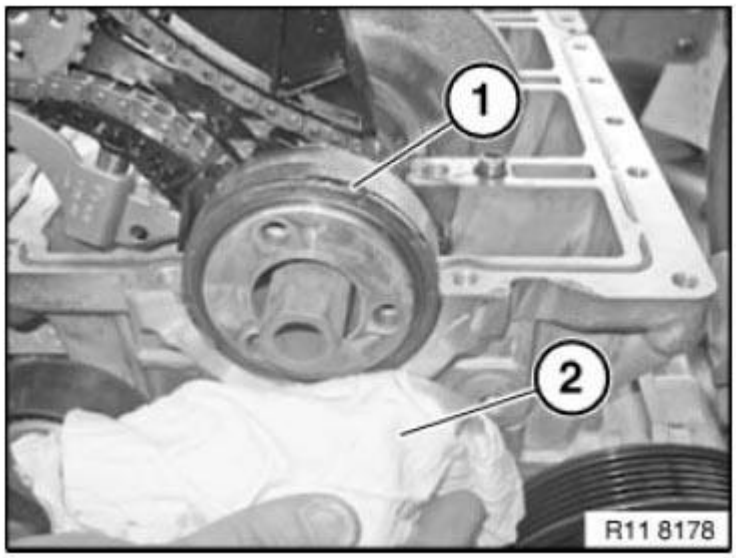


Fig. 159: Catching Escaping Engine Oil Using Cloth
Courtesy of BMW OF NORTH AMERICA, INC.

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

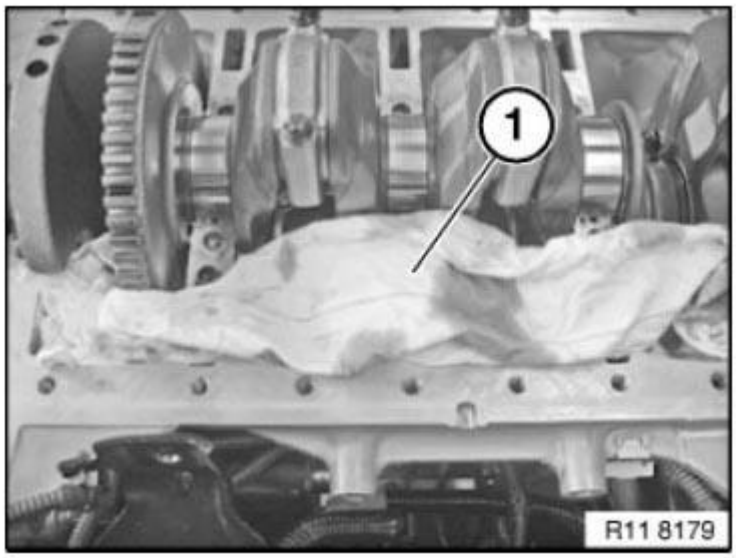


Fig. 160: Protecting Crankcase Against Sealant Residues Using Cloth
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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Installation:

Replace injector nozzles (2).

Clean all threads with compressed air.

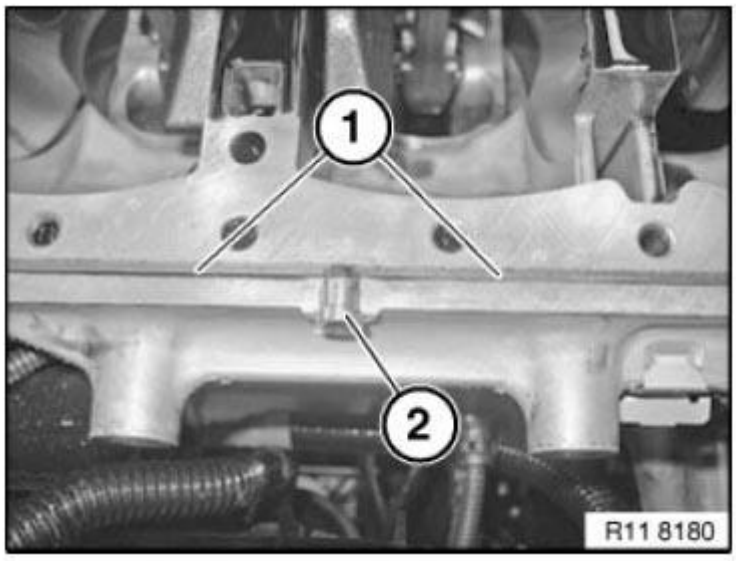


Fig. 161: Identifying Injector Nozzle And Sealant Residue
Courtesy of BMW OF NORTH AMERICA, INC.

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

Screw in all M10 crankcase bolts.

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

Tightening torque: 20 Nm

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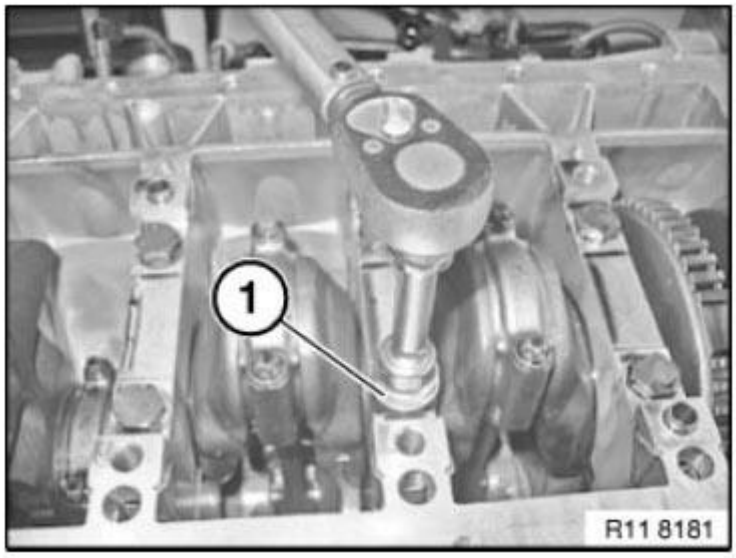


Fig. 162: Screwing In All M10 Crankcase Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

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

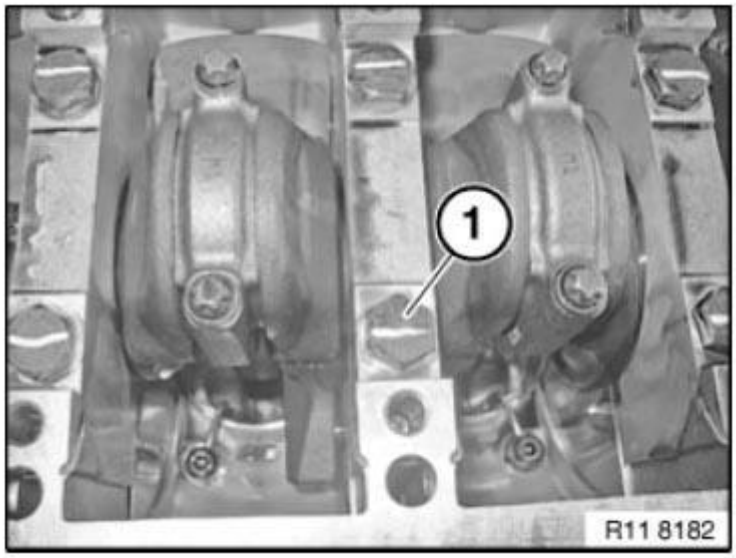


Fig. 163: Identify M10 Crankcase Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

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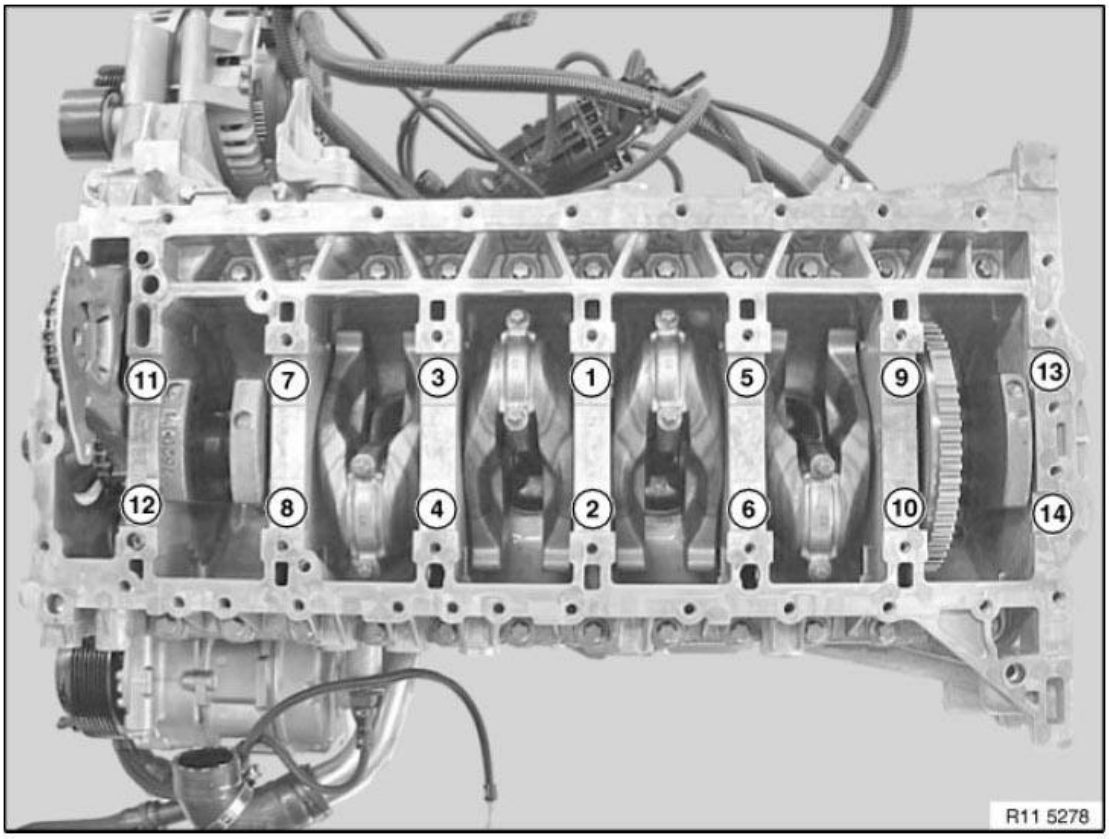


Fig. 164: Identifying Crankcase Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

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

Tightening torque: **11 11 1AZ**

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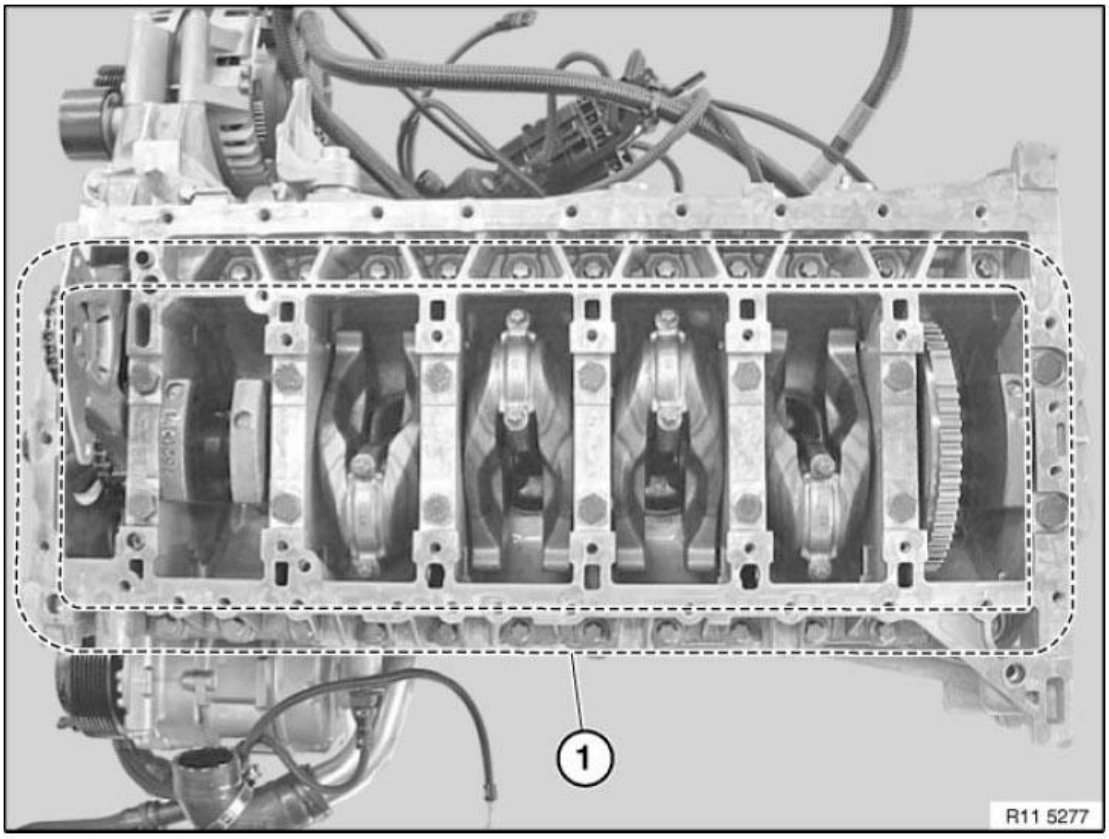


Fig. 165: Identifying Crankcase Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Insert all crankcase bolts (1).

IMPORTANT: Observe different lengths and sizes of the bolts.

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

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

NOTE: Replace screw.

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

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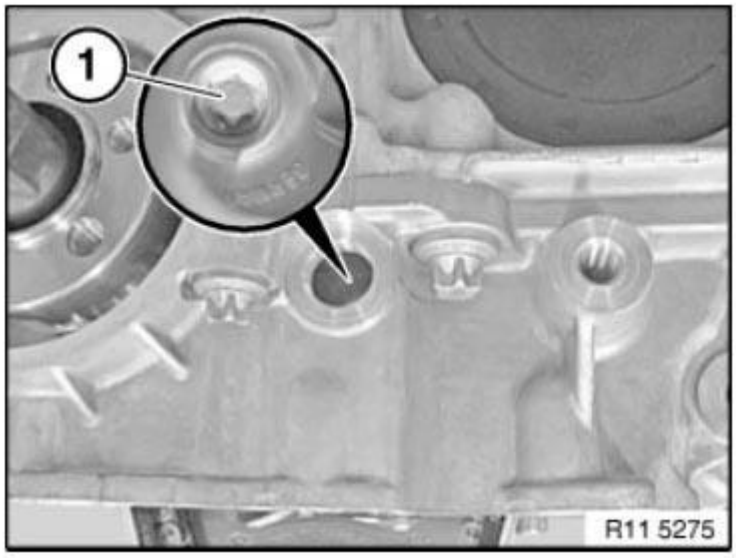


Fig. 166: Identifying Oil Pump Triangular Drive Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten screw plug on front of crankcase.

Tightening torque: **11 11 8AZ**

Installation:

Replace sealing ring.

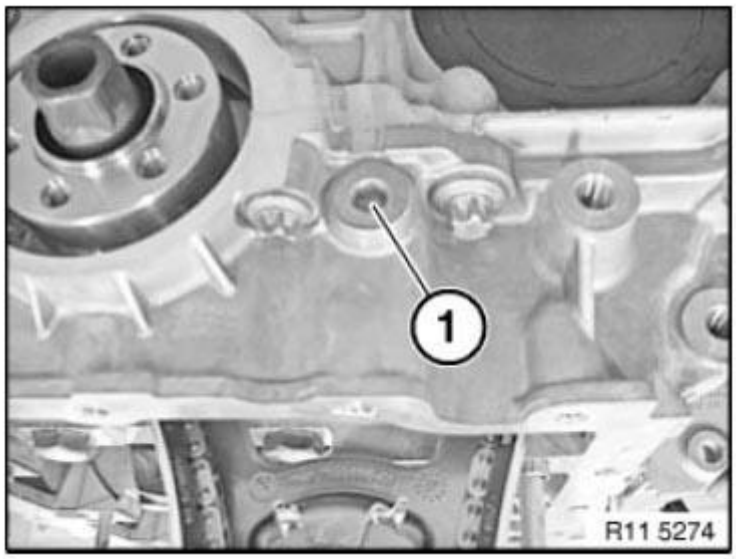


Fig. 167: Identifying Screw Plug On Crankcase
Courtesy of BMW OF NORTH AMERICA, INC.

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

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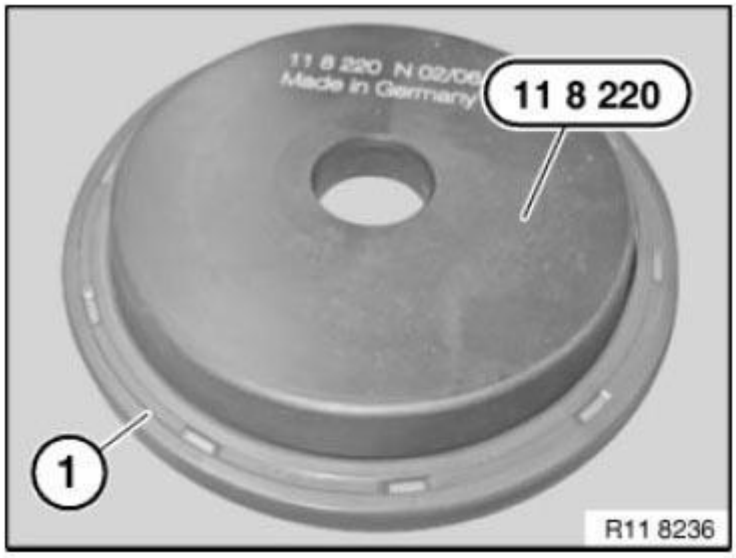


Fig. 168: Identifying Radial Shaft Seal On Special Tool 11 8 220
Courtesy of BMW OF NORTH AMERICA, INC.

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

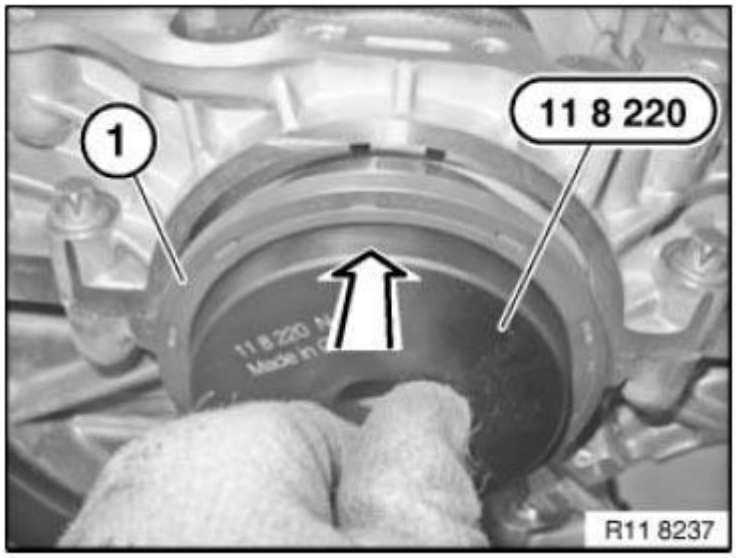


Fig. 169: Positioning Radial Shaft Seal Using Special Tool 11 8 220 On Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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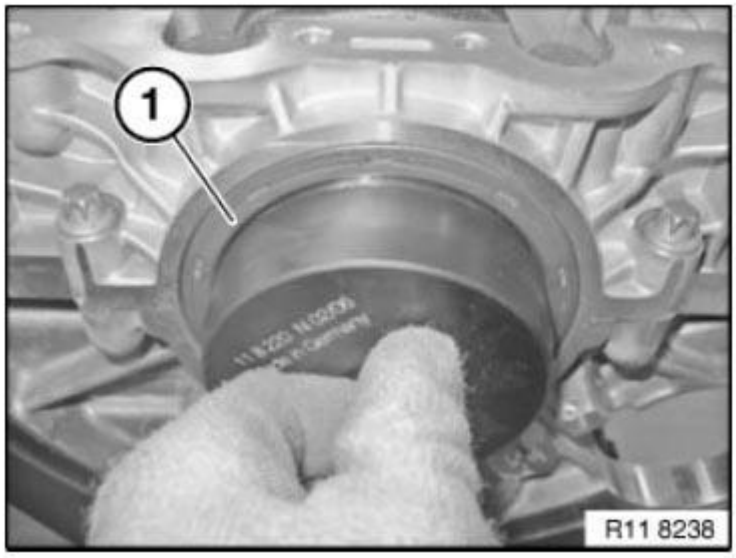


Fig. 170: Moving Radial Shaft Seal Parallel Up Against Crankcase
Courtesy of BMW OF NORTH AMERICA, INC.

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

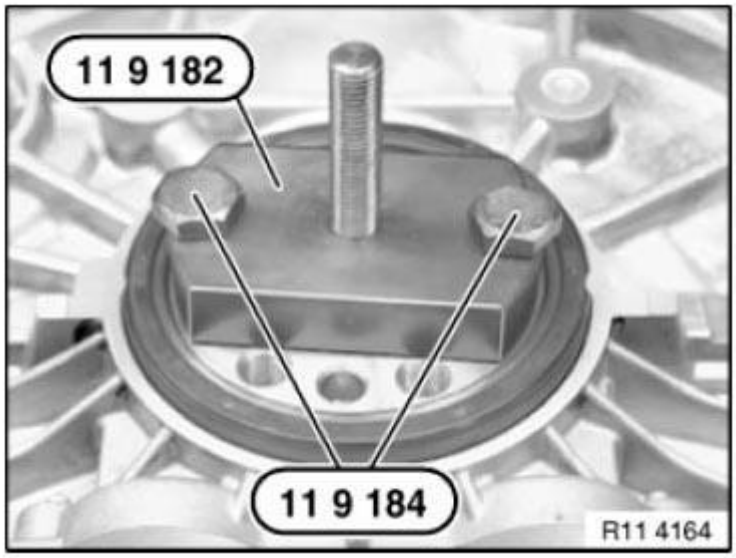


Fig. 171: Screwing Special Tool 11 9 182 With Screws (Special Tool 11 9 184) To Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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

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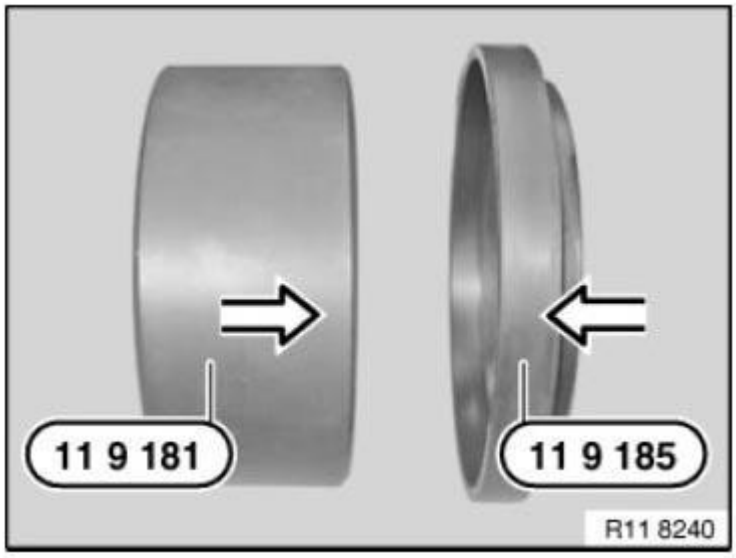


Fig. 172: Connecting Special Tool 11 9 185 Onto Special Tool 11 8 181
Courtesy of BMW OF NORTH AMERICA, INC.

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

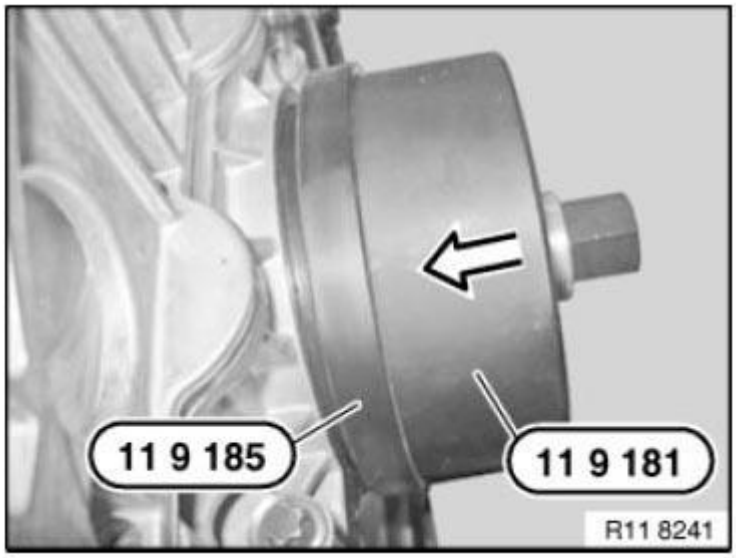


Fig. 173: Pulling Radial Shaft Seal Using Special Tool 11 9 181/11 9 185/11 9 183
Courtesy of BMW OF NORTH AMERICA, INC.

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

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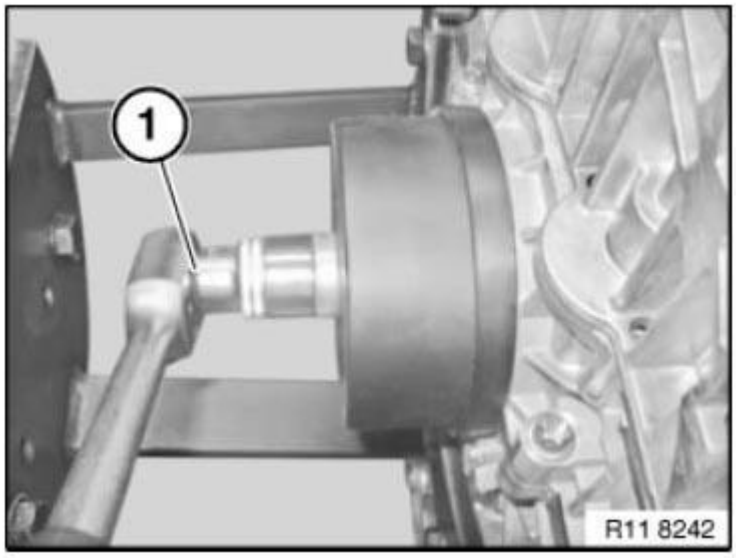


Fig. 174: Screwing On Radial Shaft Seal Using Special Tool 11 9 183
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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

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

NOTE: Graphic N42.

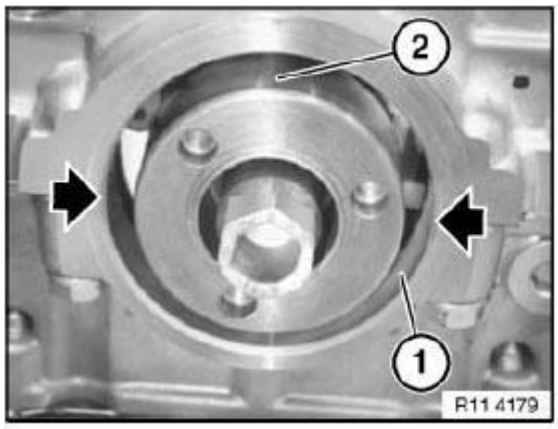


Fig. 175: Identifying Sealing Surface And Running Surface For Crankshaft Radial Seal
Courtesy of BMW OF NORTH AMERICA, INC.

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

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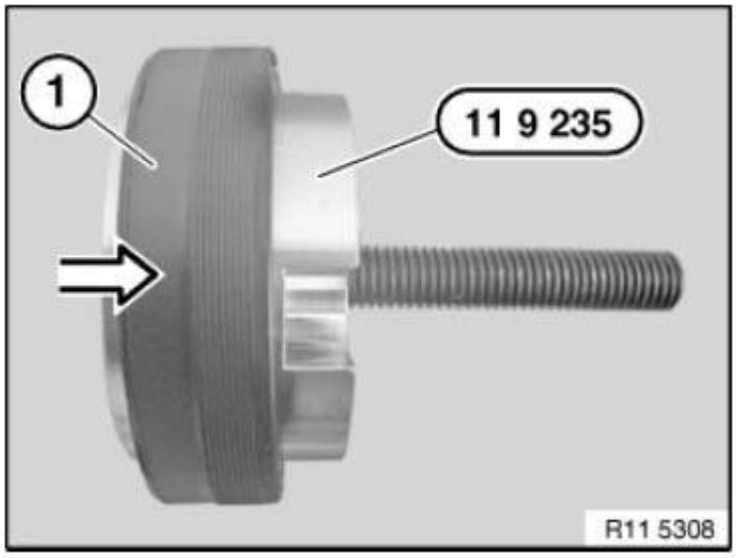


Fig. 176: Pushing Radial Shaft Seal (11 9 235) On Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

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

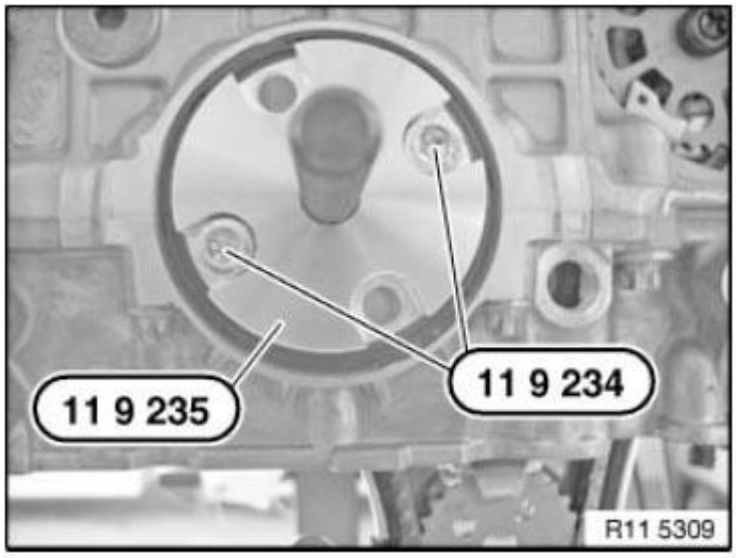


Fig. 177: Mounting Special Tool 11 9 235 With Special Tool 11 9 234 On Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

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

Align groove (2) of radial shaft seal (1) centered to the housing partition (3.

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

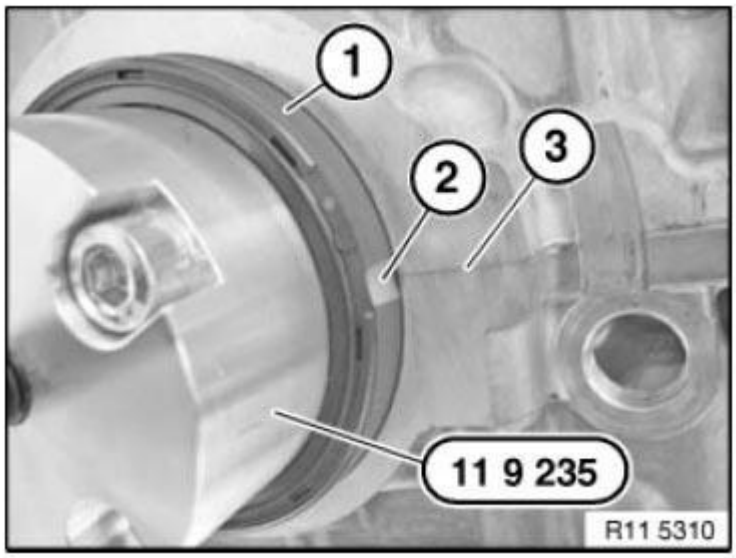


Fig. 178: Identifying Radial Shaft Seal, Housing Partition And Groove
Courtesy of BMW OF NORTH AMERICA, INC.

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

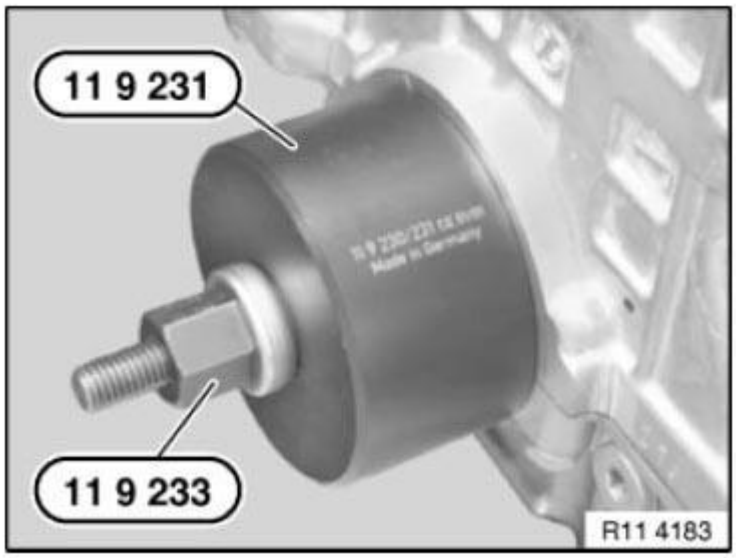


Fig. 179: Inserting Radial Seal With Special Tool 11 9 231 And 11 9 233
Courtesy of BMW OF NORTH AMERICA, INC.

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

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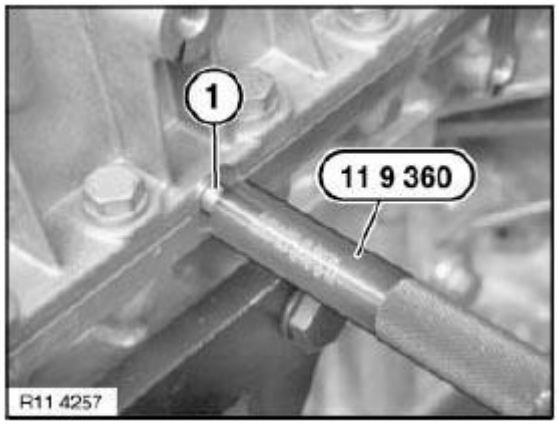


Fig. 180: Inserting Nozzles Using Special Tool 11 9 360
Courtesy of BMW OF NORTH AMERICA, INC.

After fitting both sealing rings, check both sealing ducts for clearance.

Blow compressed air (1) at max. 6 bar into injector nozzle (2).

Compressed air must emerge at both sealing rings on left and right from the outlet bores.

IMPORTANT: If the compressed air does not flow out of all ducts. the crankcase must again be taken apart and cleaned.

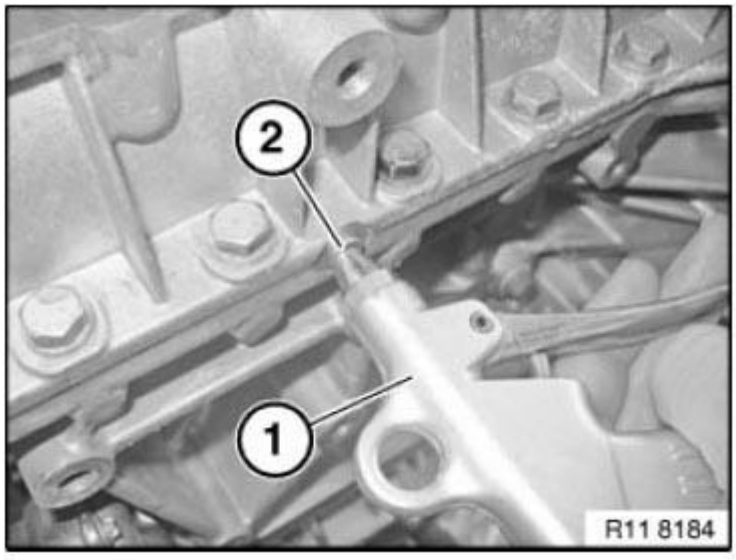


Fig. 181: Blowing Compressed Air Into Injector Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Use **PRIMER 1.3 AND LIQUID SEAL 1.4** .

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

Injector nozzles for injecting sealing compound are not required.

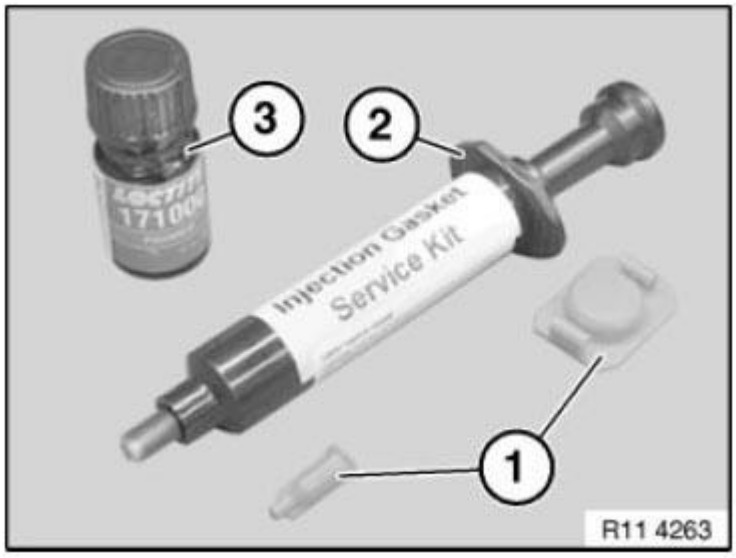


Fig. 182: Identifying Injector With Primer Bottle
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

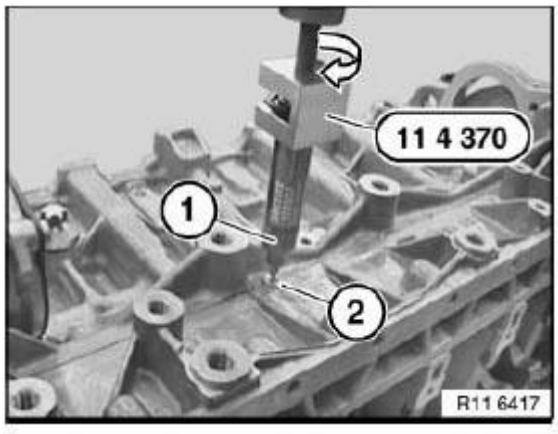


Fig. 183: Inserting Liquid Sealing Compound Using Special Tool 11 4 370
Courtesy of BMW OF NORTH AMERICA, INC.

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

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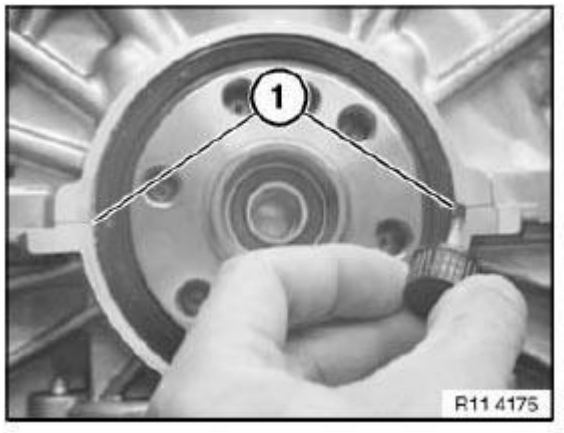


Fig. 184: Coating Surface Of Sealing Compound In Both Grooves Using Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

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

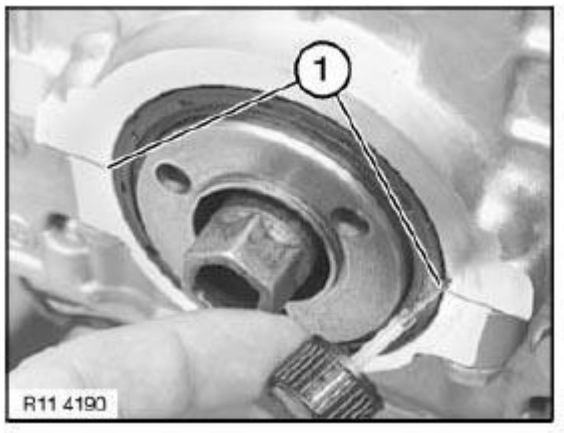


Fig. 185: Sealing Escaping Liquid Gasket With Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

FLYWHEEL

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

Notes

IMPORTANT: Aluminium-magnesium materials.

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

A magnesium crankcase requires aluminium screws/bolts exclusively.

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

Aluminium screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

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

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

Necessary preliminary tasks:

- Remove **AUTOMATIC TRANSMISSION** or **MANUAL TRANSMISSION**
- Remove **CLUTCH**

For vehicles with optional extra SA205 (automatic transmission):

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

Installation:

Replace aluminium screws

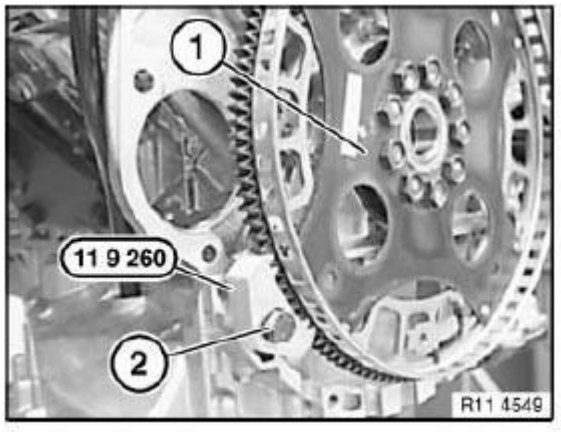


Fig. 186: Identifying Flywheel And Existing Transmission Bolt With Special Tool (11 9 260)
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten flywheel screws.

Tightening torque **11 22 1AZ** .

Installation:

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Flywheel (1) is secured with an alignment pin.

Fit new flywheel screws.

Clean all threads for flywheel screws in crankshaft.

For vehicles without optional extra SA205 (automatic transmission)

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

Installation:

Replace aluminium screws

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

Tightening torque **11 22 2AZ** .

Installation:

Flywheel is secured with a dowel pin.

Fit new flywheel screws.

Clean all threads for flywheel screws in crankshaft.

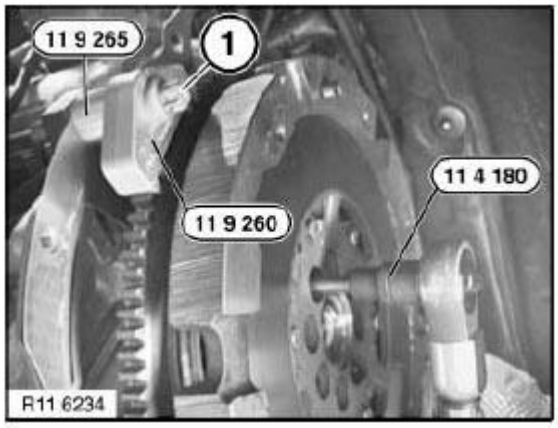


Fig. 187: Identifying Existing Transmission Bolt With Special Tools (11 9 255, 11 9 260 And 11 4 180)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 22 513 REPLACING ROLLER BEARING FOR DUAL-MASS FLYWHEEL

Notes

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NOTE: Flywheel removed!

Position special tool 11 2 010 in roller bearing.

Twist out roller bearing with special tool 11 2 343.

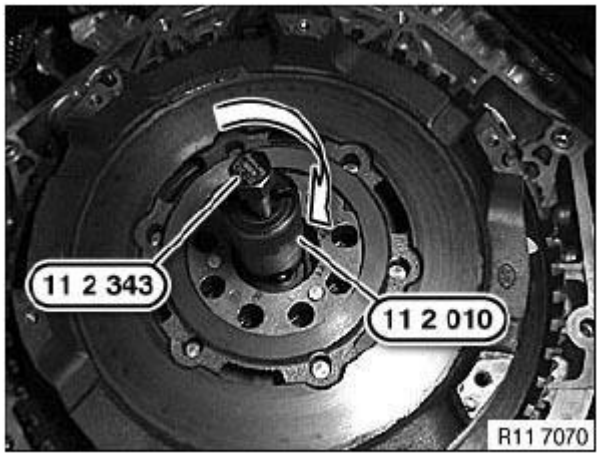


Fig. 188: Twisting Roller Bearing With Special Tool 11 2 343
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble special tools 11 2 350 and **00 5 500** .

Drive in roller bearing with special tools 11 2 350 and **00 5 500** in direction of arrow as far as it will go.

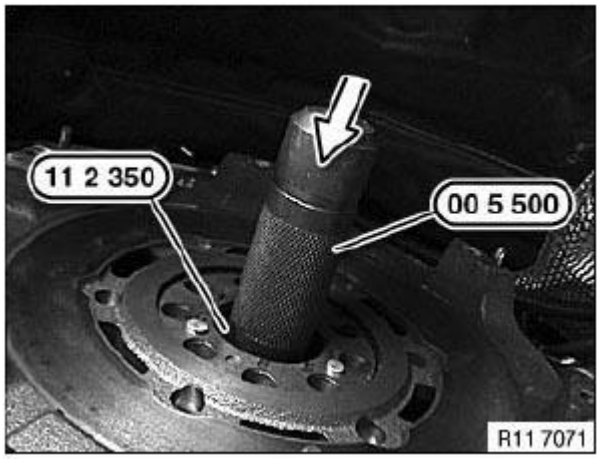


Fig. 189: Installing Roller Bearing Using Special Tools 11 2 350 And 00 5 500
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 22 513 REPLACING ROLLER BEARING FOR DUAL-MASS FLYWHEEL

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Notes

NOTE: Flywheel removed!

Using hydraulic press (1) and special tool 21 2 051, press out dual-mass flywheel downwards on engine side.

IMPORTANT: Risk of damage:
Roller bearing must not be driven out.

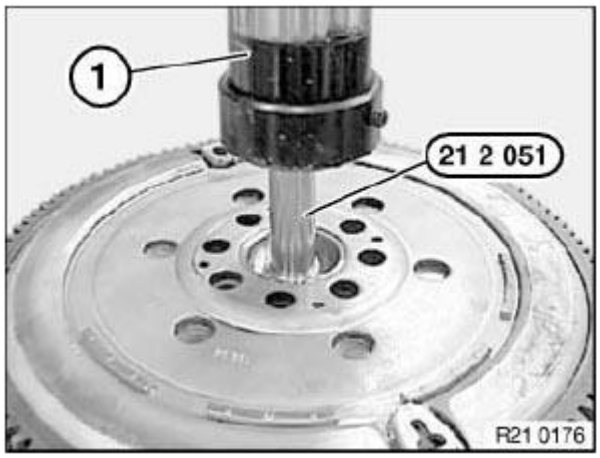


Fig. 190: Pressing Roller Bearing Out Of Dual-Mass Flywheel Downwards On Engine Side
Courtesy of BMW OF NORTH AMERICA, INC.

Push roller bearing (2) onto special tool 21 2 052.

Using hydraulic press (1), press roller bearing into dual-mass flywheel as far as it will go on clutch side.

IMPORTANT: Risk of damage:

Observe press-in instruction:

- **Roller bearing must not be driven in.**
- **Roller bearing mounting force/travel monitored:**

  Min. 2000N 1 mm before end of pressing in.

  Max. 15000N during entire press-in procedure.

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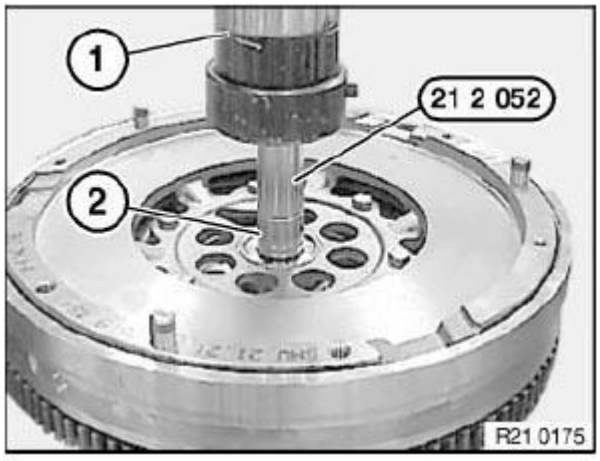


Fig. 191: Pressing Roller Bearing Into Dual-Mass Flywheel
Courtesy of BMW OF NORTH AMERICA, INC.

VIBRATION DAMPER

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

Necessary preliminary tasks

- Remove **UNDERBODY PROTECTION** .
- Remove **DRIVE BELT**

Release screws (1).

Tightening torque **11 23 1AZ** .

Remove vibration damper (2).

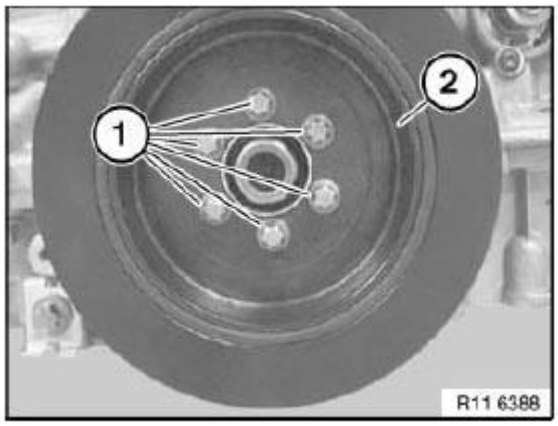


Fig. 192: Identifying Screws And Vibration Damper
Courtesy of BMW OF NORTH AMERICA, INC.

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Assemble engine.

CONNECTING ROD WITH BEARING

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

Notes

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

Necessary preliminary tasks

- Remove **OIL SUMP**

IMPORTANT: All crankshaft crank pins are classified.

Possible classifications per connecting rod at top and bottom:

r: Red

b: Blue

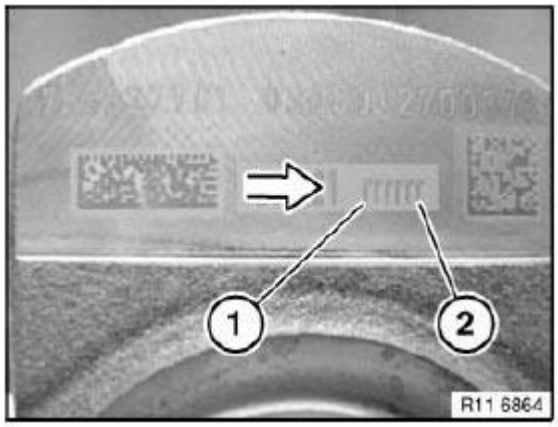


Fig. 193: Direction Of Fitting Color In Connecting Rod And Connecting Rod Bearing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

Example:

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Possible classification: rbbrrb

Cylinder 1: Classification Red/Red

Cylinder 2: Classification Blue/Blue

Cylinder 3: Classification Blue/Blue

Cylinder 4: Classification Red/Red

Cylinder 5: Classification Red/Red

Cylinder 6: Classification Blue/Blue

Release connecting rod bolts (1).

Remove connecting rod bearing cap (2).

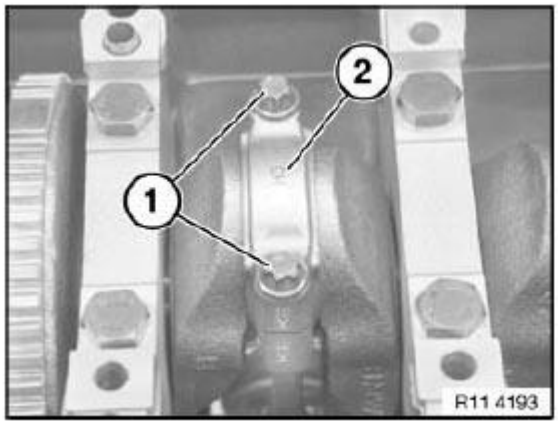


Fig. 194: Identifying Bearing Caps And Connecting Rod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

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

Gently release connecting rod from crankshaft.

Remove connecting rod bearing shells (1 and 2).

Install new connecting rod bearing shells.

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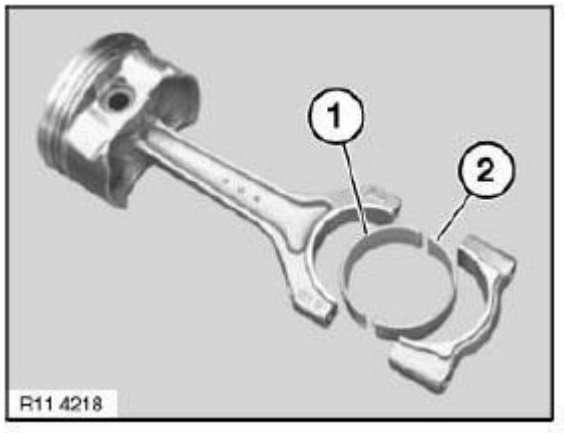


Fig. 195: Identifying Bearing Shell Colors
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Pay attention to guide lugs during installation.

IMPORTANT: All crankshaft crank pins are classified.

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

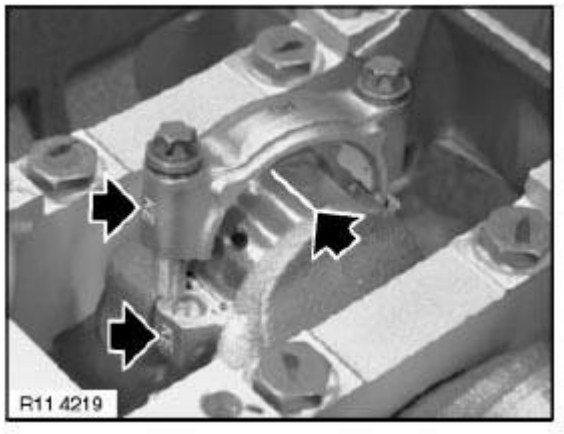
Check connecting rod bearing clearance.

Piston in BDC position.

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

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

Fit connecting rod bearing cap so that pairing letters match up.



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

IMPORTANT: Do not distort connecting rods or crankshaft.

Use the old connecting rod bolts to check connecting rod clearance.

Tighten down connecting rod bolts with special tool **00 9 120** .

Tightening torque **11 24 1AZ** .

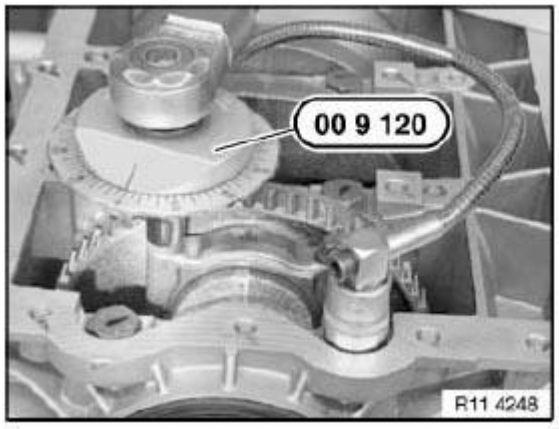
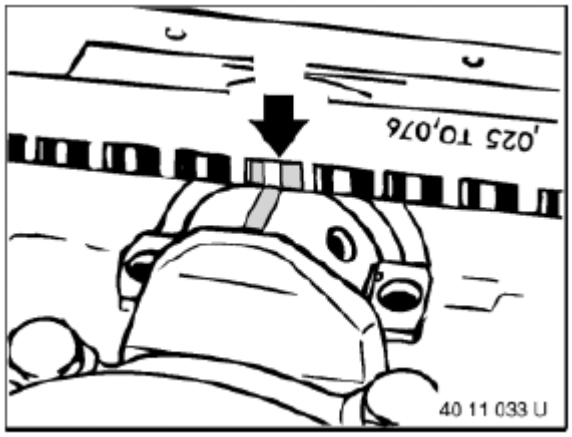


Fig. 197: Adjusting Torsion Angle Of Connecting Rod Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew connecting rod bearing cap. Read off connecting rod **BEARING PLAY** at width of flattened plastic thread on measurement scale.

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



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Fig. 198: Checking Connecting-Rod Bearing Play
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **11 24 1AZ** .

Assemble engine.

PISTON WITH RINGS AND PIN

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

Notes

WARNING: Risk of injury!

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

IMPORTANT: If piston, connecting rod, big end bearing cap and connecting rod bearing shell are to be reused, they must be installed in the same position.

Individual replacement of a connecting rod is not permitted. Connecting rods are classified by weight categories and are only available as a set for all cylinders.

Connecting rod and big end bearing cap are marked with identical pairing letters and must not be mixed up.

Danger of engine damage!

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

Necessary preliminary tasks

- Remove **ENGINE**
- Mount engine on **ASSEMBLY STAND**
- Remove intake **PLENUM**
- Remove **CYLINDER HEAD** .
- Remove **OIL SUMP**
- Remove **OIL PUMP**

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

IMPORTANT: Do not use any metal-cutting tools.

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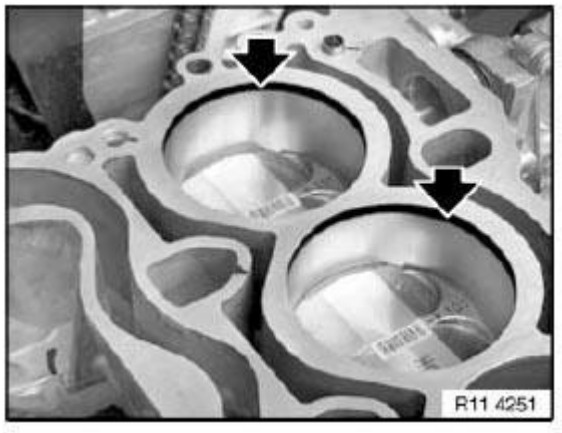


Fig. 199: Locating Oil Carbon Residue
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Oil spray nozzle (2) must not be maladjusted or bent.

Risk of damage!

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

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

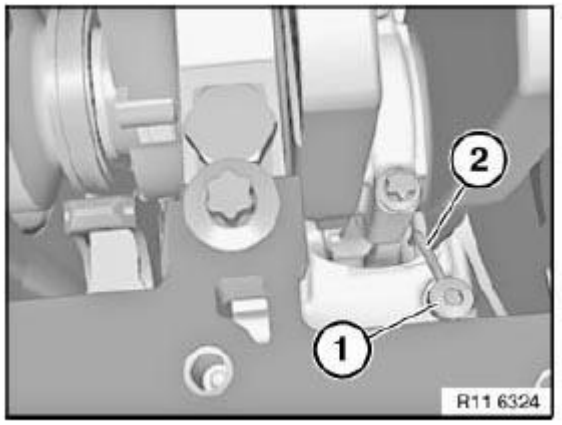


Fig. 200: Identifying Screw And Oil Spray Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Release connecting rod bolts (1).

Tightening torque **11 24 1AZ** .

Installation:

Replace screws

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Remove connecting rod bearing cap (2) in direction of arrow.

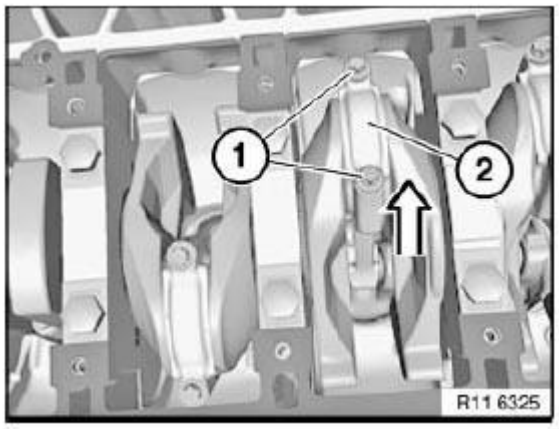


Fig. 201: Removing Connecting Rod Bearing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

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

Danger of engine damage!

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

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

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

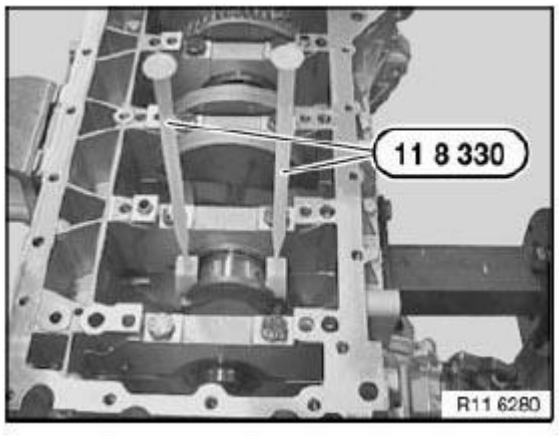


Fig. 202: Identifying Special Tool (11 8 330) Attached To Connecting Rod
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not touch the oil spray nozzle when removing the components.

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Risk of damage!

Preliminary work

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

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

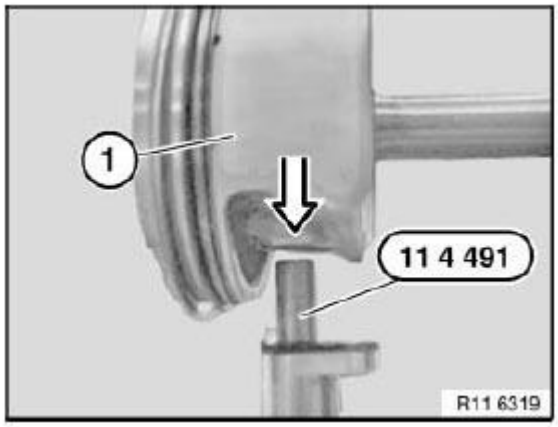


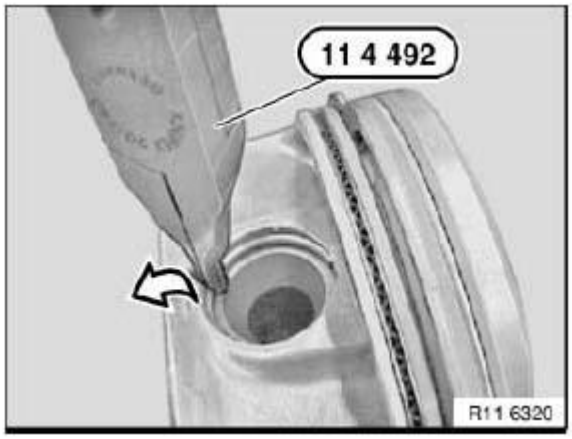
Fig. 203: Identifying Piston With Special Tool (11 4 491)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury!

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

WARNING: Safety goggles must be worn.

Lever out circlip for gudgeon pin with special tool 11 4 492 in direction of arrow.

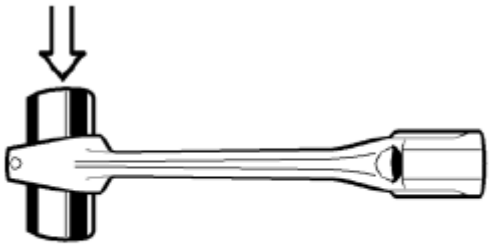


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Fig. 204: Levering Out Piston Circlip With Special Tool (11 4 492)
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace connecting rods.

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



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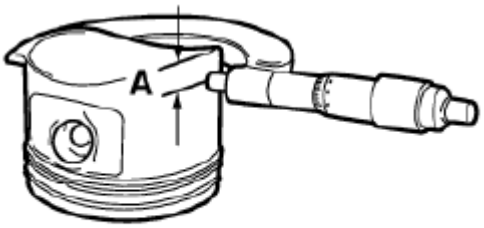
Fig. 205: Installing Gudgeon Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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

Measure piston installation clearance:

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



88 11 051 U

Fig. 206: Measuring Piston Diameter
Courtesy of BMW OF NORTH AMERICA, INC.

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

Diameter of cylinder bore.

Piston **INSTALLATION CLEARANCE** .

If necessary, replace piston.

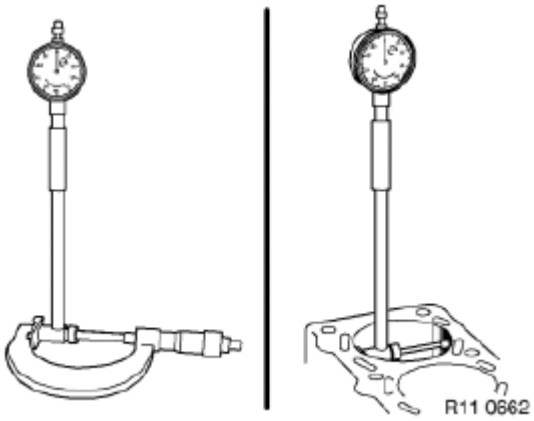


Fig. 207: Checking Diameter Of Cylinder Bore
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Safety goggles must be worn.

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

Move piston pin circlip (2) into installation position.

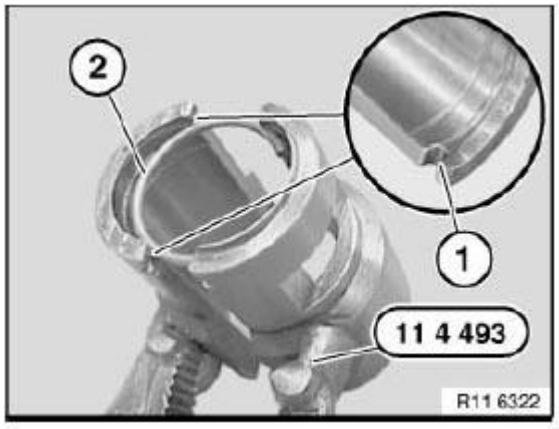


Fig. 208: Inserting Gudgeon Pin Circlip Into Special Tool Groove
Courtesy of BMW OF NORTH AMERICA, INC.

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WARNING: Safety goggles must be worn.

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

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

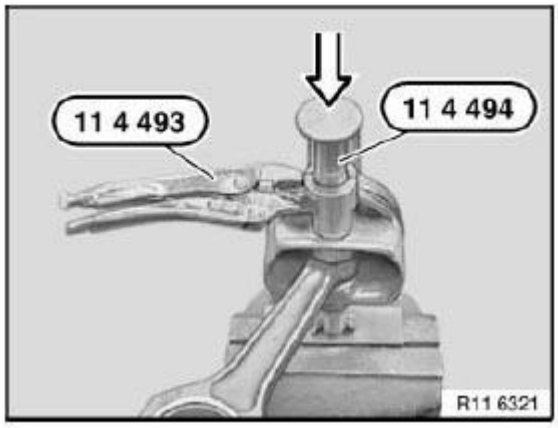


Fig. 209: Identifying Special Tool (11 4 493 And 11 4 494) On Connecting Rod Small End
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For vehicles with B30 engine.

Install all **PISTON RINGS** .

Install all **CONNECTING ROD BEARING SHELLS** .

Coat piston (2) and piston rings with oil.

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

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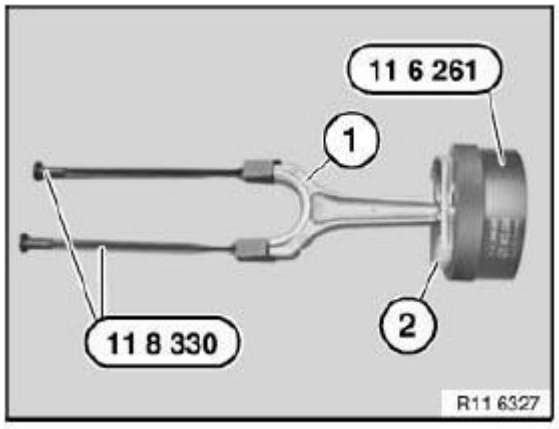


Fig. 210: Attaching Special Tool In Conrod
Courtesy of BMW OF NORTH AMERICA, INC.

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

Installation:

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

NOTE: For vehicles with B25 engine.

Install all **PISTON RINGS** .

Install all **CONNECTING ROD BEARING SHELLS** .

Coat piston (2) and piston rings with oil.

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

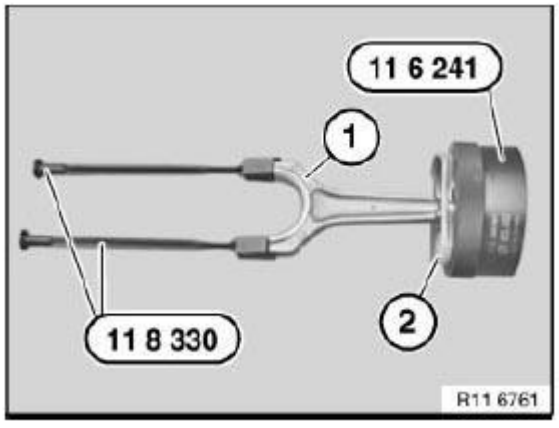


Fig. 211: Identifying Piston And Connecting Rod With Special Tools (11 8 330 And 11 6 241)
Courtesy of BMW OF NORTH AMERICA, INC.

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

Installation:

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

Insert piston (1) with connecting rod in cylinder.

IMPORTANT: Do not touch the oil spray nozzle when installing the components.

Risk of damage!

Danger of piston ring failure.

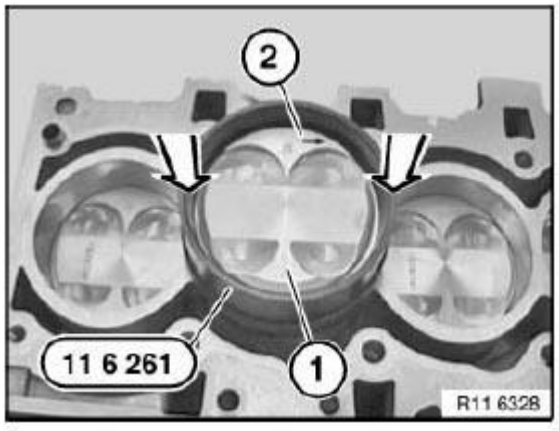


Fig. 212: Inserting Piston On Piston Crown Points
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

Press in piston (1) with special tool 11 6 261/11 6 241.

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

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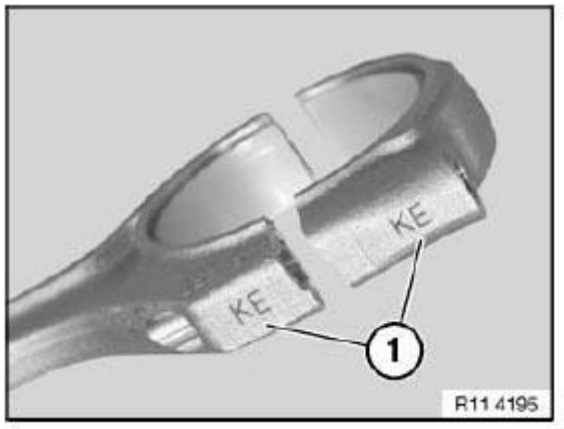


Fig. 213: Identification Of Conrod Bearing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

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

Join connecting rod and connecting rod bearing journal.

Detach special tool **11 8 330** .

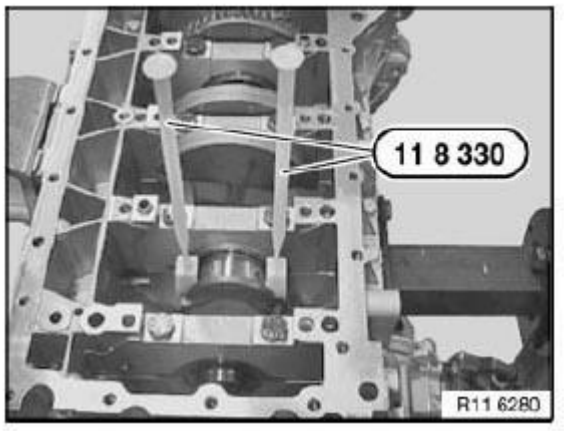


Fig. 214: Identifying Special Tool (11 8 330)
Courtesy of BMW OF NORTH AMERICA, INC.

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

Installation:

Replace screws

Install new connecting rod bolts (1).

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

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Risk of damage!

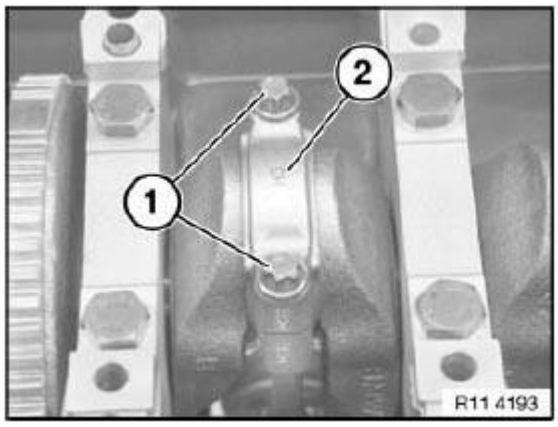


Fig. 215: Identifying Bearing Caps And Connecting Rod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **11 24 1AZ** .

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

Tightening torque **11 24 1AZ** .

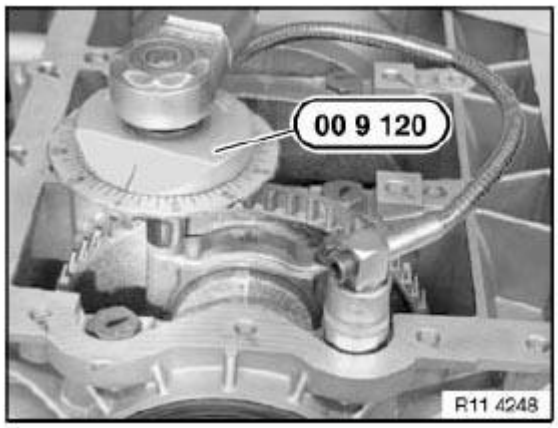


Fig. 216: Adjusting Torsion Angle Of Conrod Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

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

Necessary preliminary tasks

- Removing all **PISTONS**

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Measuring **AXIAL CLEARANCE** of piston rings in piston ring groove.

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

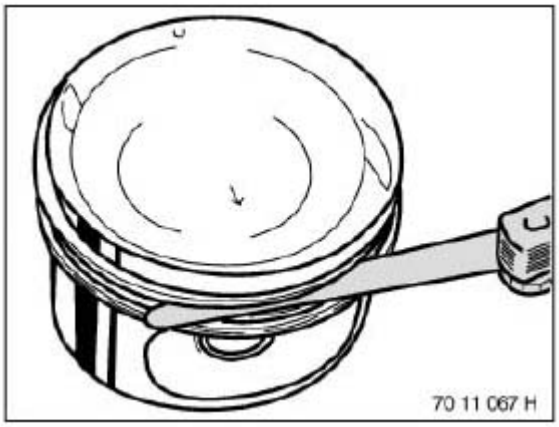


Fig. 217: Checking Piston Ring Clearance
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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

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

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

Installation:

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

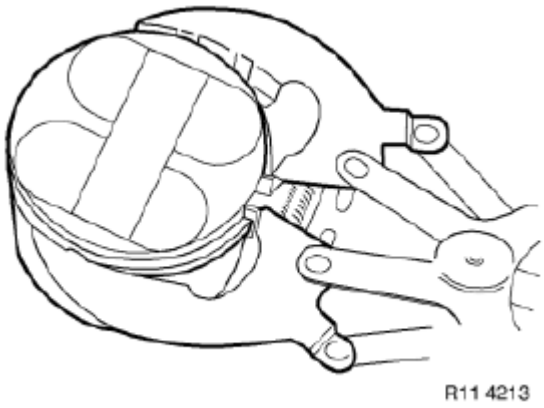


Fig. 218: Removing Compression Ring And Stepped Ring

 © 2011 Mitchell Repair Information Company, LLC.

Courtesy of BMW OF NORTH AMERICA, INC.

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

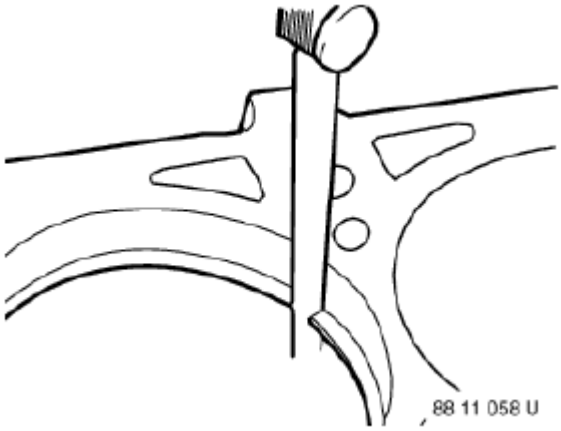


Fig. 219: Measuring Piston Rings Contact Clearance With Feeler Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Schematic diagram of piston rings.

Installation:

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

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

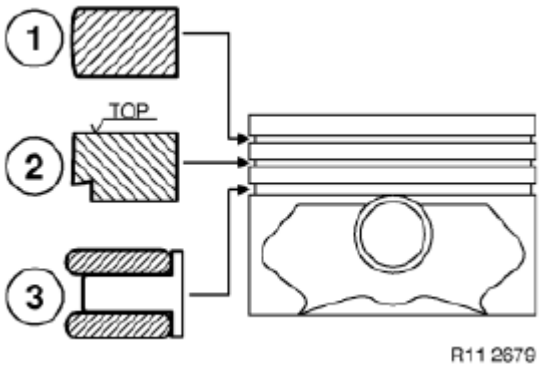


Fig. 220: Identifying Piston Rings
Courtesy of BMW OF NORTH AMERICA, INC.

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

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Installation:

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

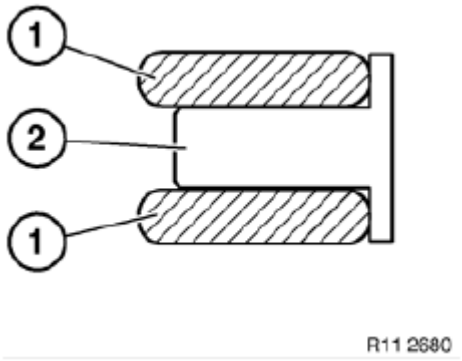


Fig. 221: Identifying Steel Band Ring And Support Spring
Courtesy of BMW OF NORTH AMERICA, INC.

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

NOTE: Picture shows N52.

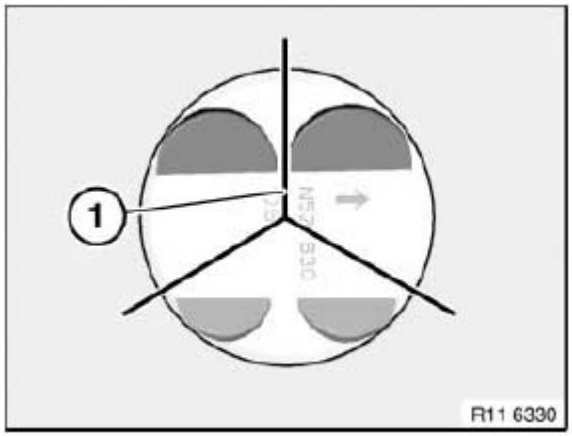


Fig. 222: Identifying Contact Points Of Piston Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

V-RIBBED BELT W.TENS./DEFLECT.ELEMT

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

IMPORTANT: Aluminium-magnesium materials.

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

A magnesium crankcase requires aluminium screws/bolts exclusively.

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

Aluminium screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

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

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

Necessary preliminary tasks

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

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

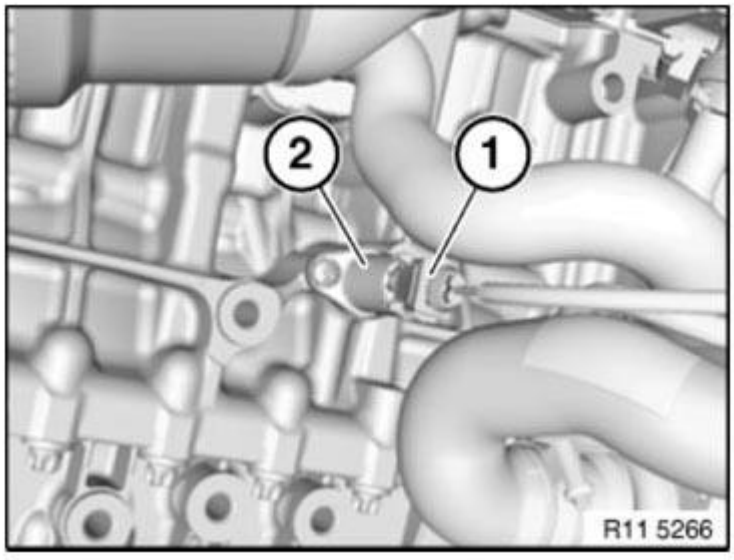


Fig. 223: Identifying Hydraulic Valve With Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove hydraulic valve (2).

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TIGHTENING TORQUE

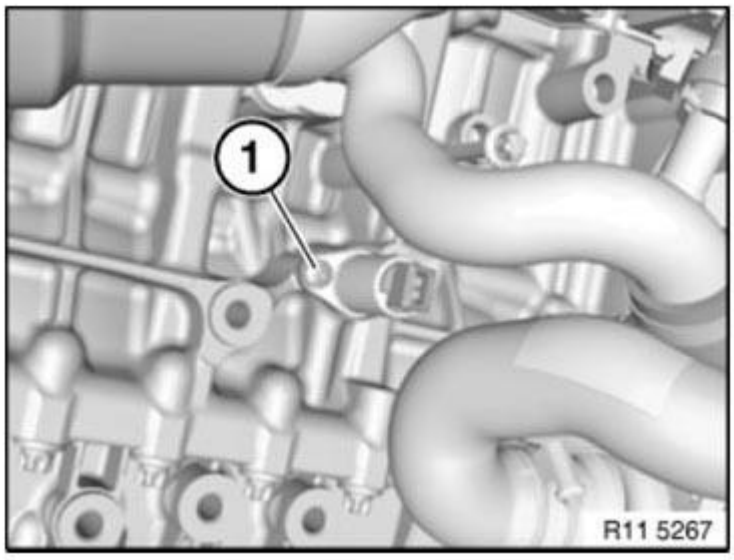


Fig. 224: Identifying Hydraulic Valve Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Replace O-ring (1).

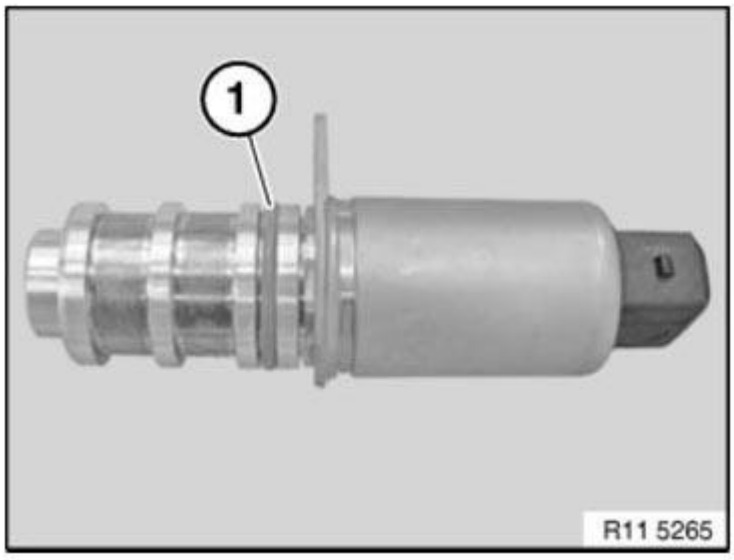


Fig. 225: Identifying O-Ring
Courtesy of BMW OF NORTH AMERICA, INC.

11 28 010 REPLACING ALTERNATOR DRIVE BELT (N52K)

Notes

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IMPORTANT: Aluminium-magnesium materials.

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

A magnesium crankcase requires aluminium screws/bolts exclusively.

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

Aluminium screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

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

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

Necessary preliminary tasks:

- Remove **FAN COWL** with electric fan

Course of drive belt E6x, E9x, E8x

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

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

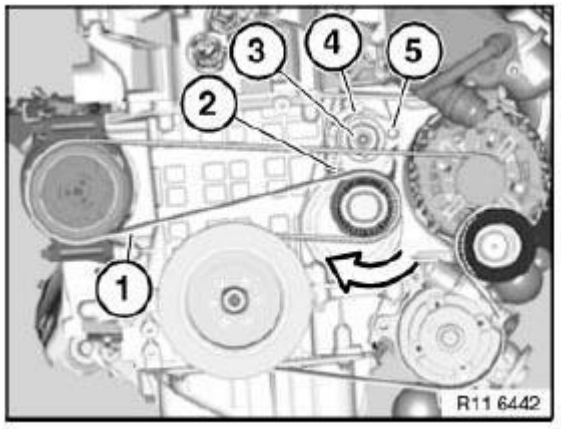


Fig. 226: Identifying Drive Belt Routing
Courtesy of BMW OF NORTH AMERICA, INC.

Hold belt tensioner (3) under tension.

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

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Load is removed from tensioning pulley (2).

Remove drive belt (1)

Course of drive belt E85

Turn belt tensioner (1) in direction of arrow until bore is flush on housing.

Hold belt tensioner (1) under tension.

Load is removed from tensioning pulley (2).

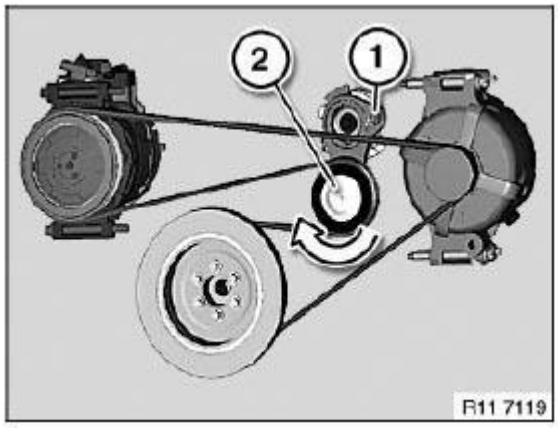


Fig. 227: Turning Belt Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

All:

Secure belt tensioner (1) in place with special tool **11 3 340** .

Remove drive belt upwards.

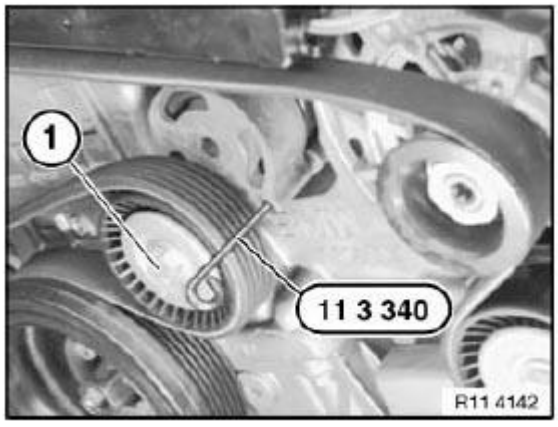


Fig. 228: Identifying Belt Tensioner With Special Tool (11 3 340)

 © 2011 Mitchell Repair Information Company, LLC.

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Installation

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

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

Notes

IMPORTANT: Aluminium-magnesium materials.

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

A magnesium crankcase requires aluminium screws/bolts exclusively.

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

Aluminium screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

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

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

Necessary preliminary tasks

- Remove **DRIVE BELT**

E9x only

Remove special tool **11 3 340** .

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

Tightening torque **11 28 1AZ** .

Installation:

Replace aluminium screws

Remove belt tensioner (4).

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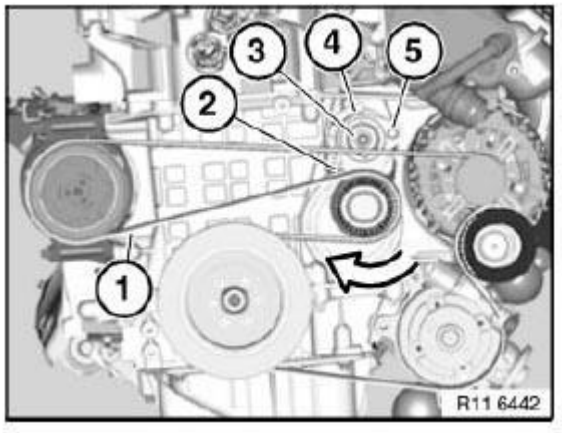


Fig. 229: Identifying Belt Tensioner With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

CAMSHAFT

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

Necessary preliminary tasks

- Remove **CYLINDER HEAD COVER**

Remove fastener (1) in direction of arrow.

Installation

Install fastener (1) with bore facing outwards.

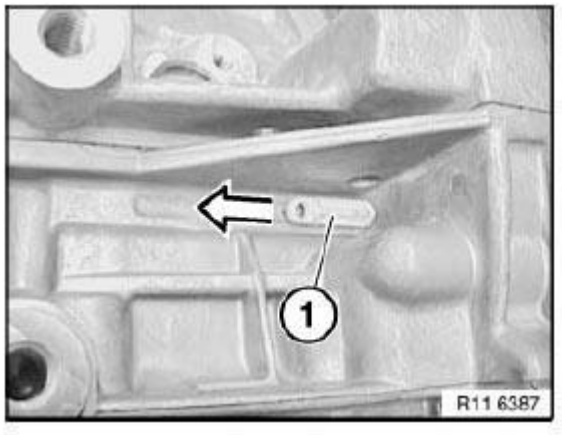


Fig. 230: Installing Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate crankshaft at central bolt into TDC position.

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

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

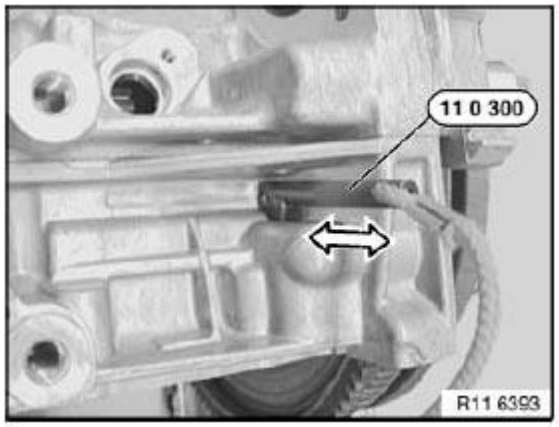


Fig. 231: Sliding Special Tool 11 00 300 Into Special Tool Bore For Securing Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

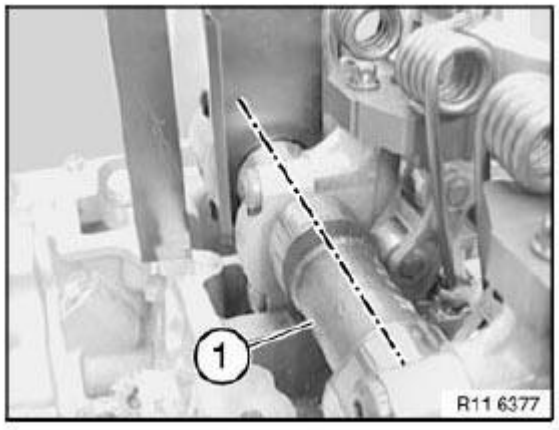


Fig. 232: Identifying Cams Of Inlet Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

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

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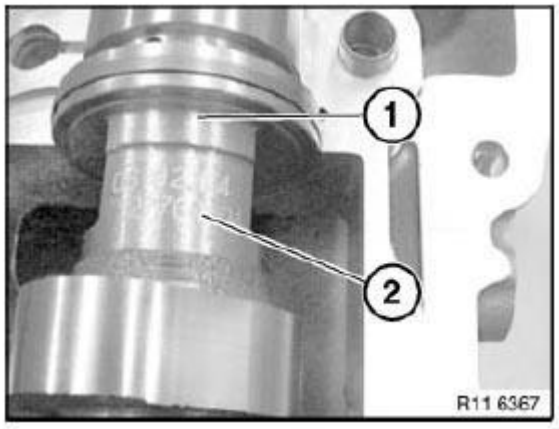


Fig. 233: Identifying Part Number On Camshafts
Courtesy of BMW OF NORTH AMERICA, INC.

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

Cam follower (1) is not actuated.

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

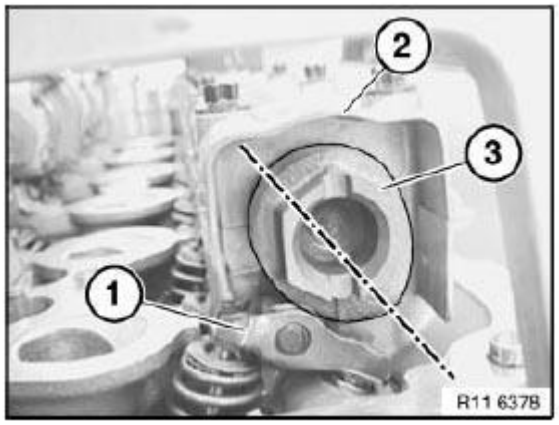


Fig. 234: Identifying Camshaft Position With Cam Follower
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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

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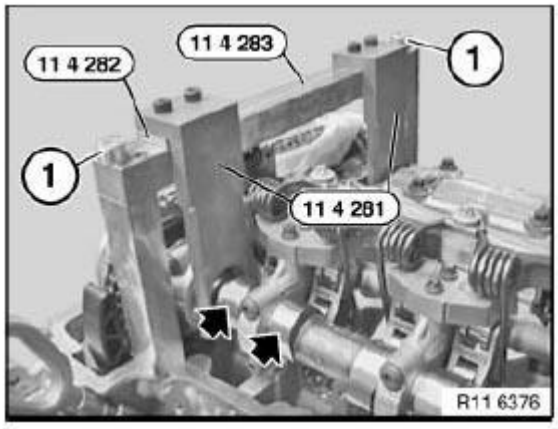


Fig. 235: Identifying Special Tools Fitted To Camshaft And Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Release central bolts (1).

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

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

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

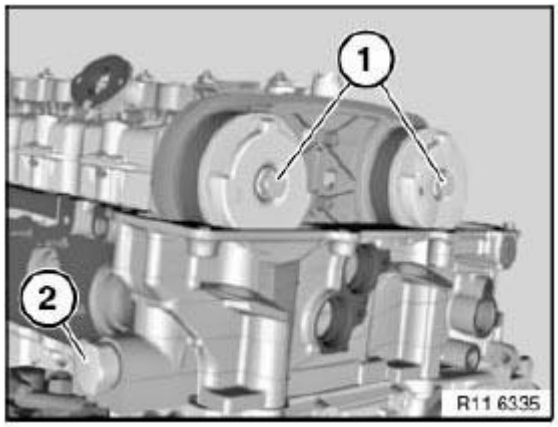


Fig. 236: Identifying Central Bolt And Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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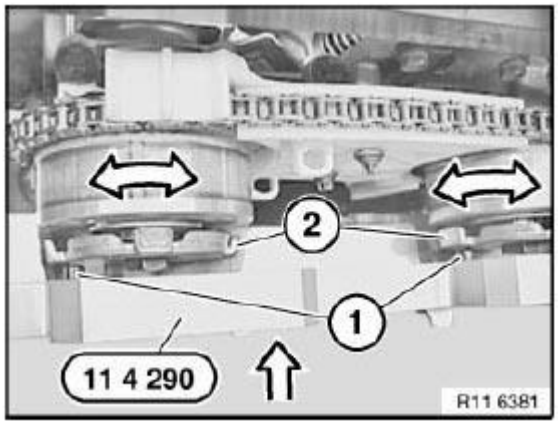


Fig. 237: Turn Sensor Gears
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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

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

Tightening torque **11 36 1AZ** .

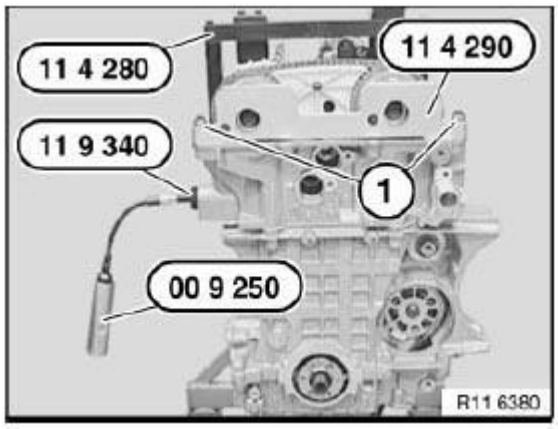


Fig. 238: Identifying Bolts With Special Tools (11 4 280, 11 4 290, 11 9 340 And 00 9 250)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

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

Necessary preliminary tasks

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- Remove **CYLINDER HEAD COVER**
- Remove **UNDERBODY PROTECTION**

Remove fastener (1) in direction of arrow.

Installation

Install fastener (1) with bore facing outwards.

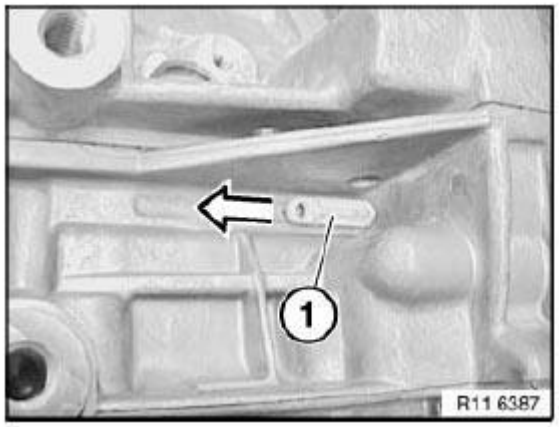


Fig. 239: Installing Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate crankshaft at central bolt into TDC position.

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

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

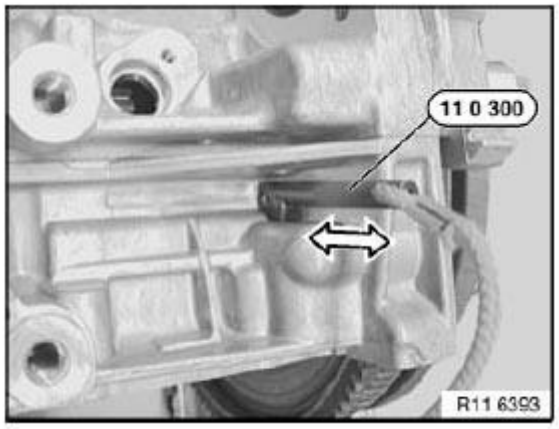


Fig. 240: Rotating Crankshaft At Central Bolt

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Courtesy of BMW OF NORTH AMERICA, INC.

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

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

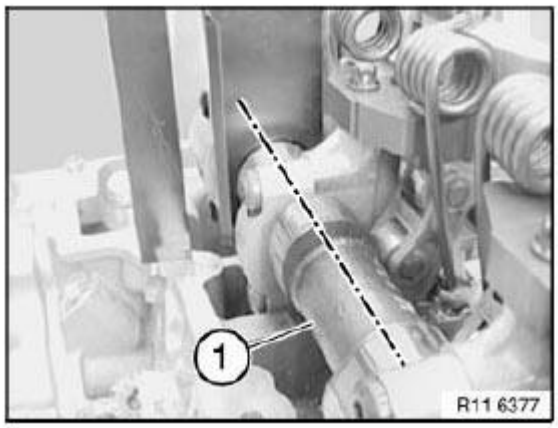


Fig. 241: Identifying Cams Of Inlet Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

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

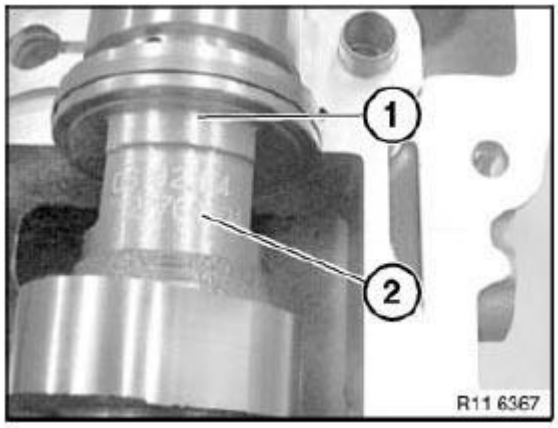


Fig. 242: Identifying Part Numbers Camshafts
Courtesy of BMW OF NORTH AMERICA, INC.

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

Cam follower (1) is not actuated.

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

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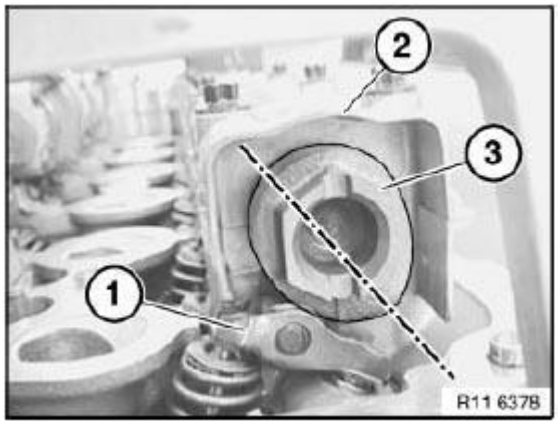


Fig. 243: Identifying Camshaft Position With Cam Follower
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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

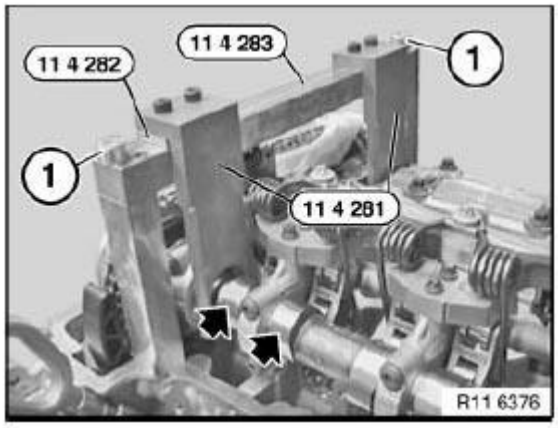


Fig. 244: Identifying Special Tools Fitted To Camshaft And Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, adjust **VALVE TIMING** .

Assemble engine.

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

Release chain tensioner (1).

Tightening torque **11 31 6AZ** .

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

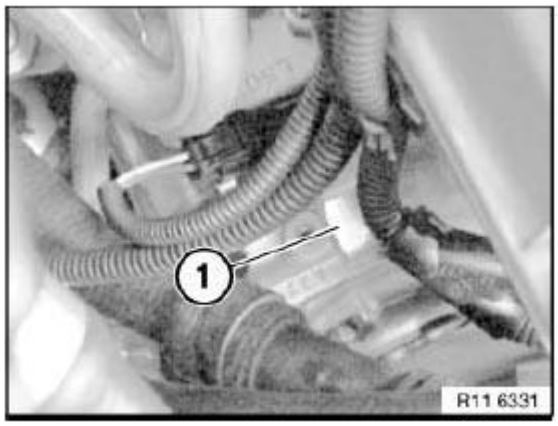


Fig. 245: Identifying Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

No sealing ring is fitted during series-production assembly.

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

If the chain tensioner is reused, its oil chamber must be drained. Place chain tensioner on a level working surface and slowly compress.

Repeat procedure twice.



Fig. 246: Compressing Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

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

Special tools required:

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

Notes

IMPORTANT: It is absolutely essential to follow an exact procedure for removing and installing the exhaust camshaft.

Risk of damage!

The upper and lower bearing strips must be pre-tensioned with a total of six special tools 11 4 461.

Necessary preliminary tasks

- Remove **CYLINDER HEAD COVER**
- Remove **EXHAUST CAMSHAFT ADJUSTER**
- Adjust **VALVE TIMING**

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

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

Remove upper bearing strip (1).

Remove exhaust camshaft from lower bearing strip.

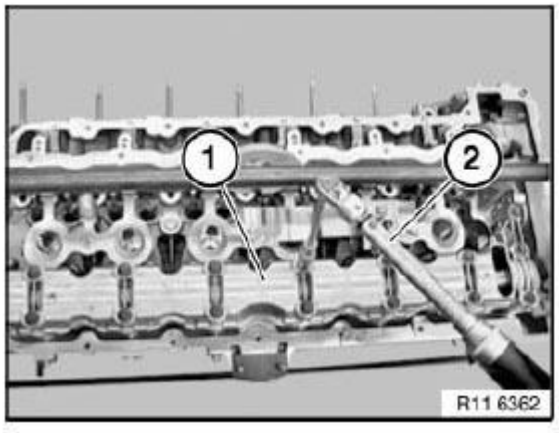


Fig. 247: Identifying Lower And Upper Bearing Strips In Camshaft

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Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Markings of intake and exhaust camshafts are different. Mixing up the intake and exhaust camshaft will result in engine damage.

A Exhaust camshaft.

E Intake camshaft

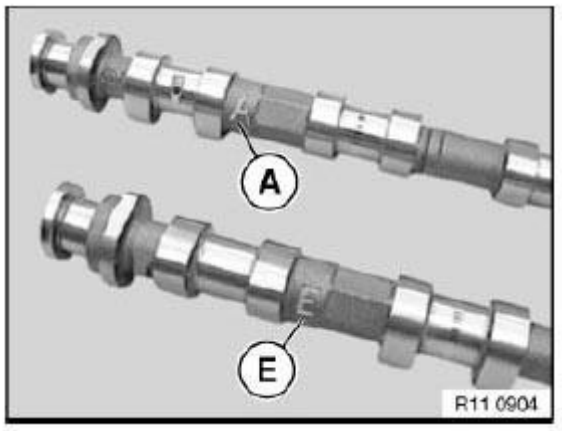


Fig. 248: Identifying Exhaust Camshaft And Inlet Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

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

Plain compression rings (1) are engaged at joint.

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

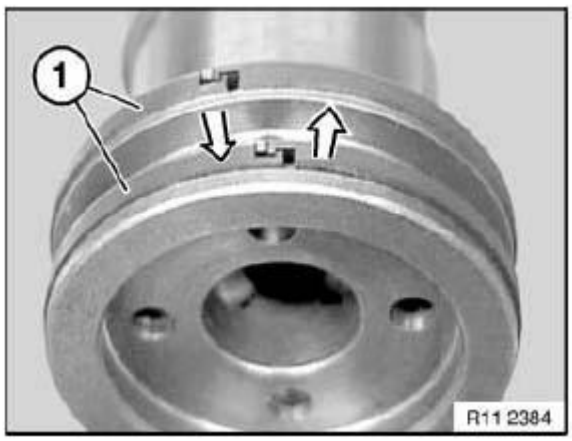


Fig. 249: Identifying Compression Rings
Courtesy of BMW OF NORTH AMERICA, INC.

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

Mounting bearing strip

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

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

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

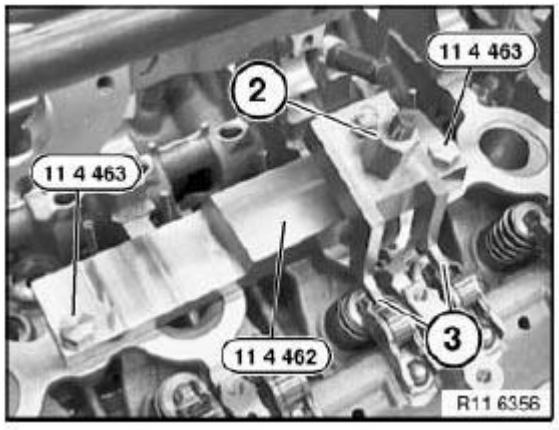


Fig. 250: Identifying Rocker Arms And Spindle Nut With Special Tools (11 4 463 And 11 4 462)
Courtesy of BMW OF NORTH AMERICA, INC.

Press down rocker arms (3) on cylinder no. 2 with spindle nut (2) of special tool 11 4 462.

Installation:

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

Refer to removing and installing/replacing all **CAM FOLLOWERS** .

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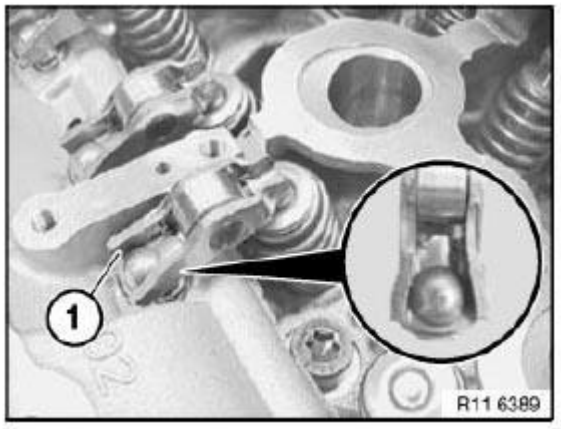


Fig. 251: Identifying Cam Follower Seat
Courtesy of BMW OF NORTH AMERICA, INC.

Position lower bearing strip (1) with exhaust camshaft (2) on rocker arms.

Align exhaust camshaft (2).

Cylinder nos. 2 and 4 are at valve overlap.

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

Part number (4) on mounting flats of exhaust camshaft (2) points upwards.

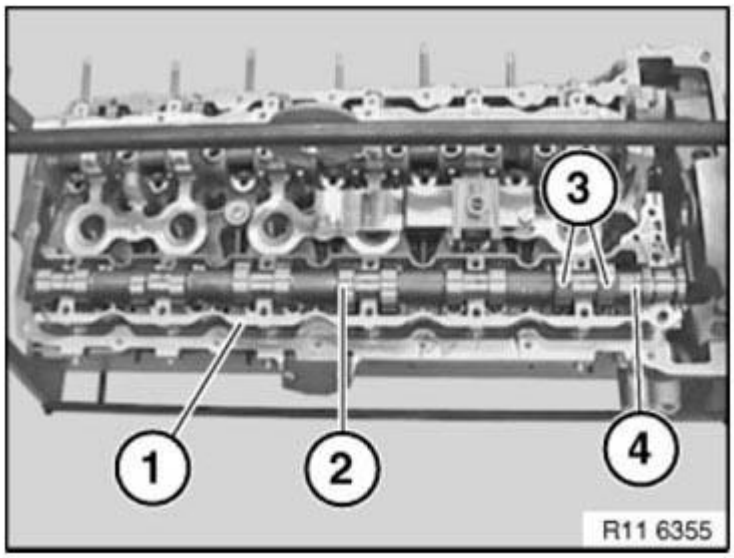


Fig. 252: Identifying Cams, Part Number On Exhaust Camshaft And Bearing Strip
Courtesy of BMW OF NORTH AMERICA, INC.

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

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Clean threaded holes

Fit upper bearing strip (1).

Insert bolts dry.

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

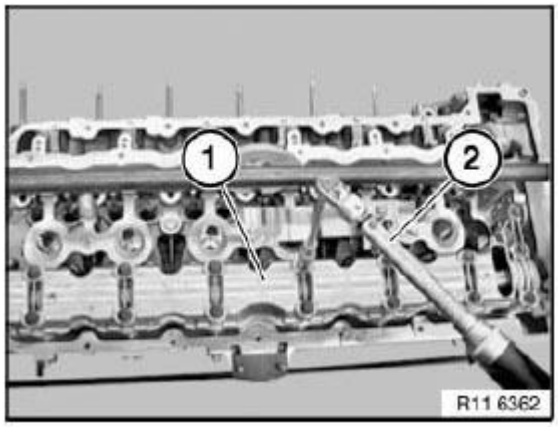


Fig. 253: Identifying Lower And Upper Bearing Strips
Courtesy of BMW OF NORTH AMERICA, INC.

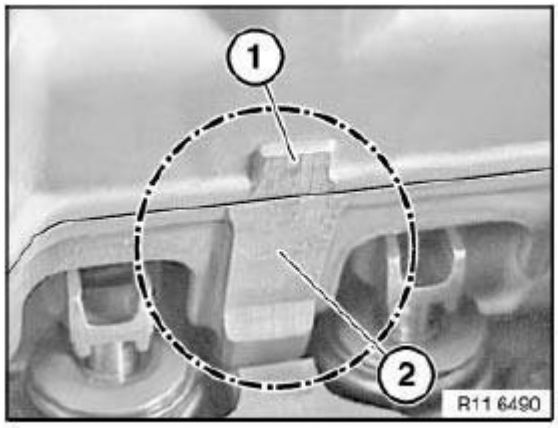
Join exhaust camshaft to upper and lower bearing strips (1) with torque wrench (2) from inside outwards to **8 Nm** .

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

Installation:

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

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



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Fig. 254: Identifying Bearing Strips Alignment
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Schematic depiction of special tool 11 4 461 at upper bearing strip (1) and lower bearing strip (2).

Pre-tension all special tools 11 4 461 with special tool **11 4 350** only.

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

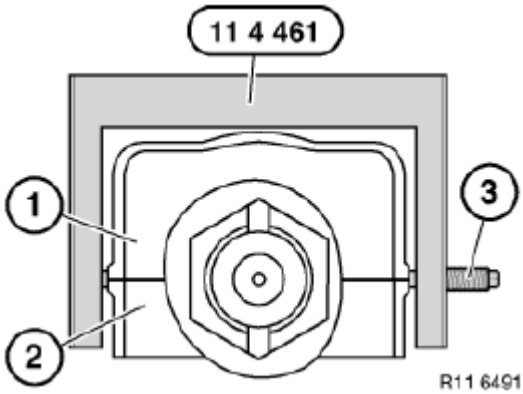


Fig. 255: Identifying Screw, Upper And Lower Bearing Strips With Special Tool (11 4 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 4 461 over screw connection of bearing strips.

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

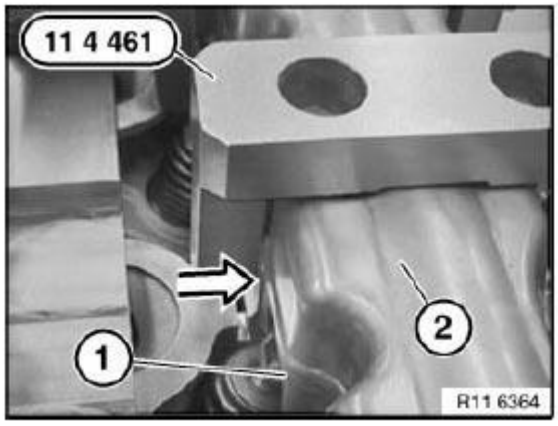


Fig. 256: Identifying Special Tool (11 4 461) Over Bearing Strips Screw Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Initially tighten screw of special tool 11 4 461 to ground surfaces of upper bearing strip (1) and lower bearing

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strip (2).

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

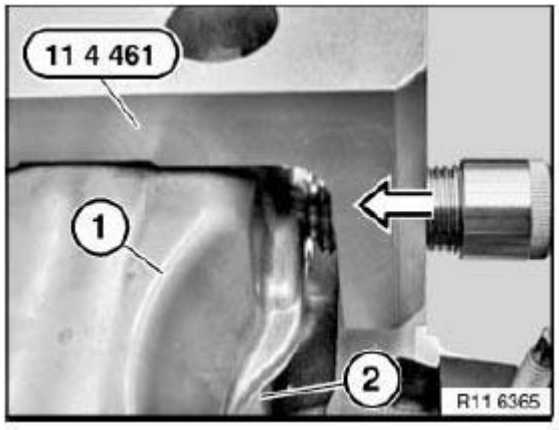


Fig. 257: Tightening Special Tool 11 4 461 Screw To Ground Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Set special tool 11 4 350 to 2 Nm.

Pre-tension all special tools 11 4 461 with special tool **11 4 350** only.

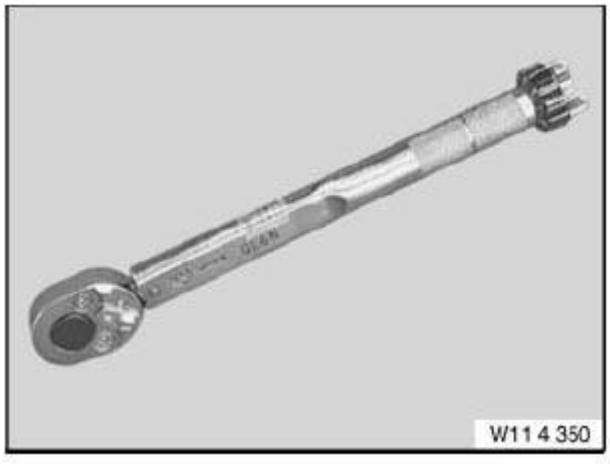


Fig. 258: Identifying 11 4 350 Torque Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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

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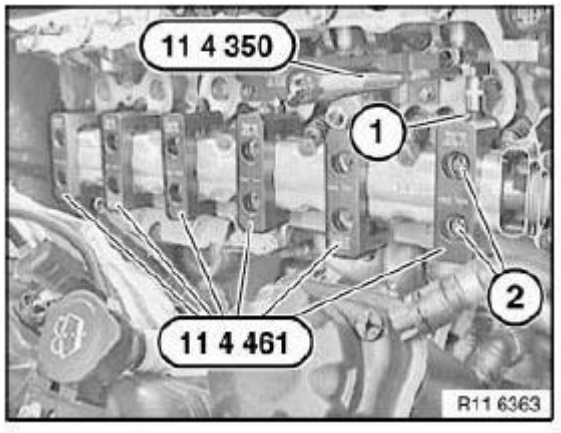


Fig. 259: Identifying Screws With Special Tools (11 4 350 And 11 4 461)
Courtesy of BMW OF NORTH AMERICA, INC.

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

Tightening torque **11 31 1AZ** .

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

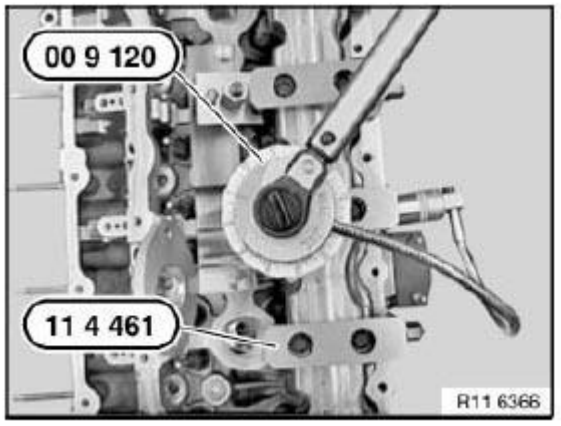


Fig. 260: Identifying Special Tools (00 9 120 And 11 4 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

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

Notes

IMPORTANT: Aluminium magnesium materials.

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

A magnesium crankcase requires aluminium screws/bolts exclusively.

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

Aluminium screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

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

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

Necessary preliminary tasks

- Remove **CYLINDER HEAD COVER**
- Remove **INTAKE CAMSHAFT ADJUSTER**
- Remove **INTERMEDIATE LEVER**
- Adjust **VALVE TIMING**

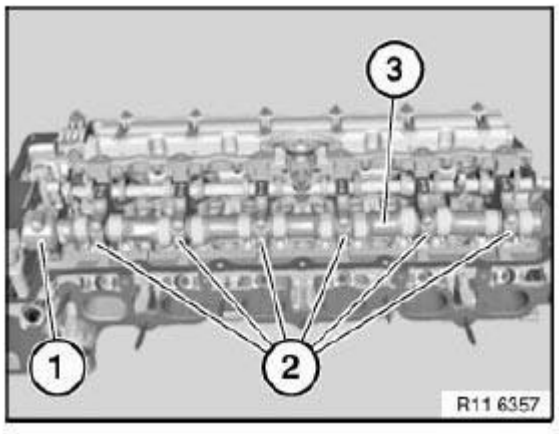
NOTE: All bearing caps (1 and 2) are marked with numbers from 1 to 6.

Bearing cap (1) is a thrust bearing.

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

Tightening torque **11 31 2AZ** .

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



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Fig. 261: Identifying Bearing Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Remove intake camshaft (2) towards top.

Installation:

Clean all bearing points and lubricate with oil.

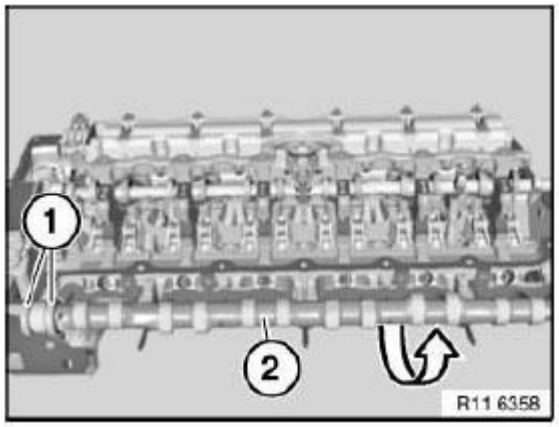


Fig. 262: Removing Intake Camshaft Towards Top
Courtesy of BMW OF NORTH AMERICA, INC.

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

Plain compression rings (1) are engaged at joint.

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

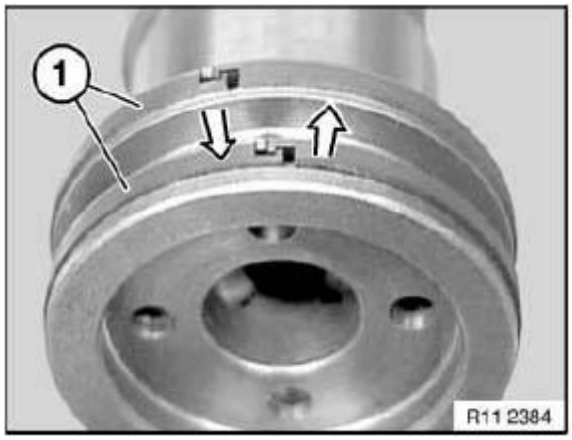


Fig. 263: Identifying Compression Rings
Courtesy of BMW OF NORTH AMERICA, INC.

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**IMPORTANT: Markings of intake and exhaust camshafts are different.
Mixing up the intake and exhaust camshafts will result in engine damage.**

**A Exhaust camshaft.
E Intake camshaft**

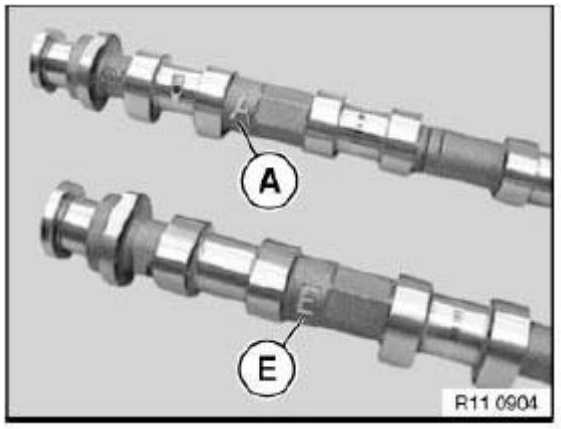


Fig. 264: Identifying Exhaust Camshaft And Inlet Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Insert intake camshaft (1) so that part number on mounting flats points upwards.

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

Attach special tool 11 4 281 to mounting flats.

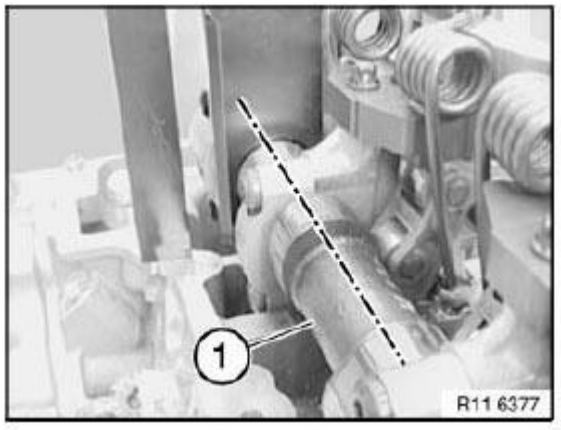


Fig. 265: Identifying Cams Of Inlet Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 051 REPLACING TIMING CHAIN (N52K)

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Notes

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove all **SPARK PLUGS**
- Remove **CHAIN TENSIONER** .
- Remove **CRANKSHAFT RADIAL SEAL** at front
- Remove drive belt **TENSIONER**
- Remove **VIBRATION DAMPER**

Remove fastener (1) in direction of arrow.

Installation

Install fastener (1) with bore facing outwards.

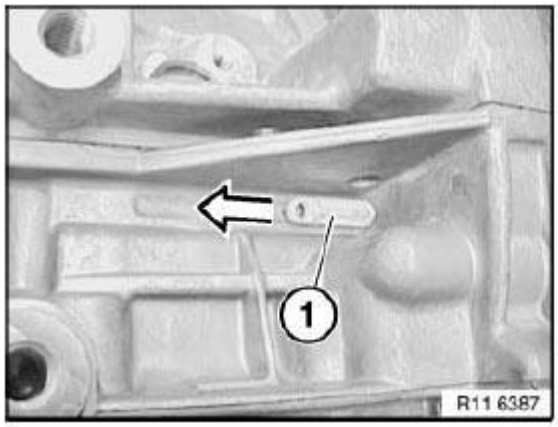


Fig. 266: Installing Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate crankshaft at central bolt into TDC position.

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

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

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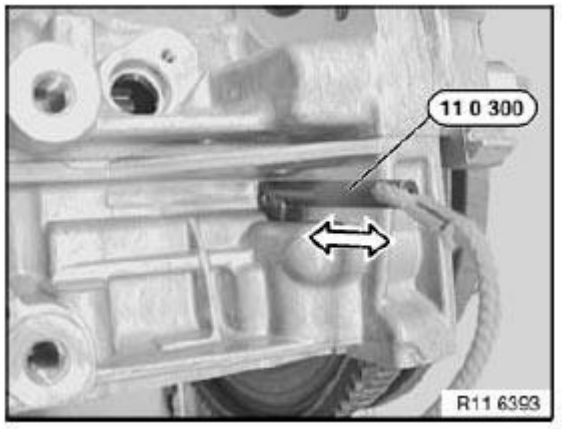


Fig. 267: Sliding Special Tool 11 0 300 Into Bore For Securing Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

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

IMPORTANT: Do not remove special tool 11 0 300 to release central bolt (1).
Employ a second person for gripping when releasing central bolt (1).

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

Release central bolt (1).

Tightening torque **11 21 1AZ** .

Remove hub towards front.

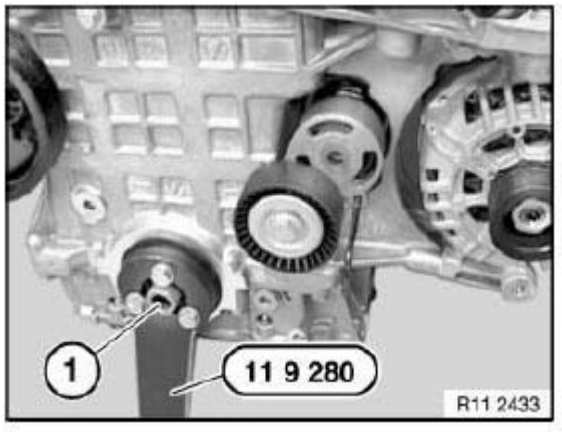


Fig. 268: Identifying Central Bolt With Special Tool (11 9 280)
Courtesy of BMW OF NORTH AMERICA, INC.

Open plug (1).

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Tightening torque **11 31 7AZ** .

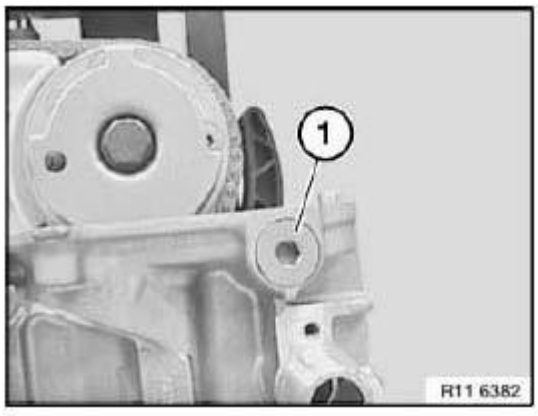


Fig. 269: Identifying Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Open plug (1).

Tightening torque **11 11 7AZ** .

Installation:

Replace aluminium screws

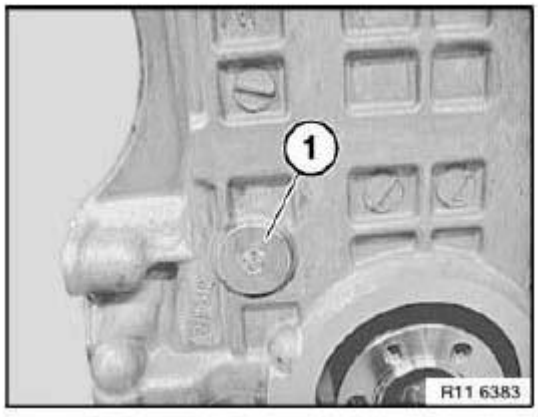


Fig. 270: Identifying Plug
Courtesy of BMW OF NORTH AMERICA, INC.

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

Tightening torque **11 31 5AZ** .

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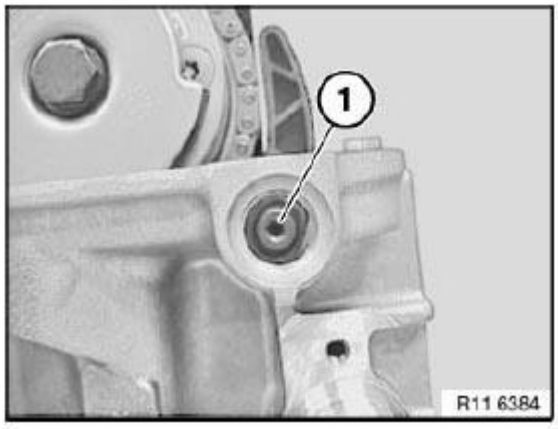


Fig. 271: Identifying Bearing Pin
Courtesy of BMW OF NORTH AMERICA, INC.

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

Tightening torque **11 31 4AZ** .

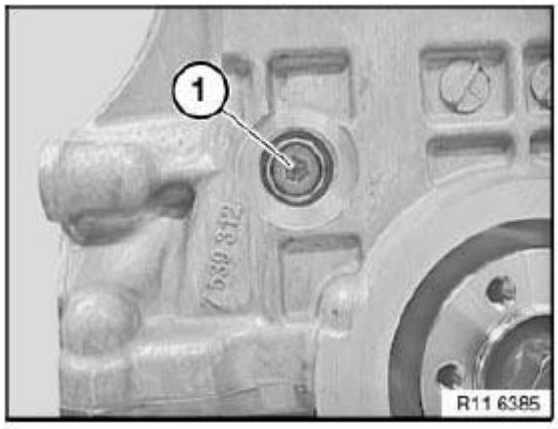


Fig. 272: Identifying Bearing Pin
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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

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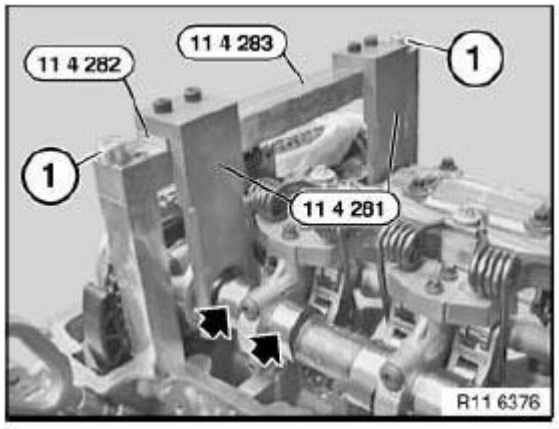


Fig. 273: Identifying Special Tools Fitted To Camshaft And Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

Remove **INLET AND EXHAUST ADJUSTMENT UNIT** .

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

Tightening torque **11 31 3AZ** .

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

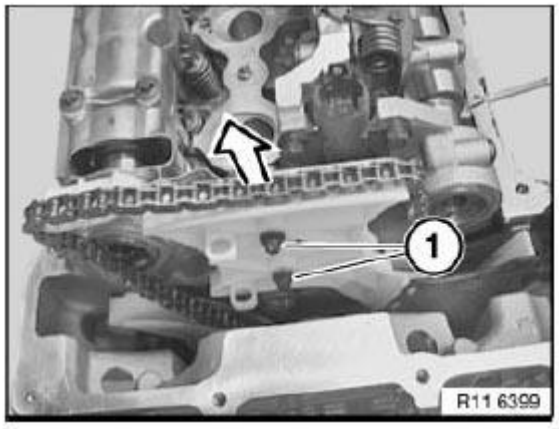


Fig. 274: Removing Chain Module With Timing Chain And Sprocket Wheel Upwards
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Note installation direction of sprocket wheel (2).

Collar (see arrow) on sprocket wheel (2) points to engine.

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Incorrect assembly will result in engine damage.

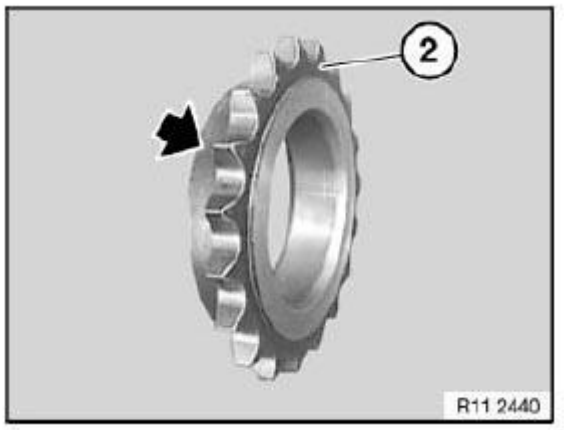


Fig. 275: Identifying Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

Installation:

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

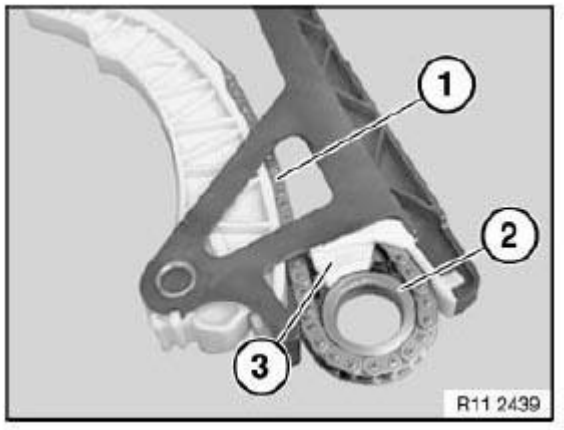


Fig. 276: Identifying Timing Chain And Chain Module
Courtesy of BMW OF NORTH AMERICA, INC.

Install hub with central bolt.

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

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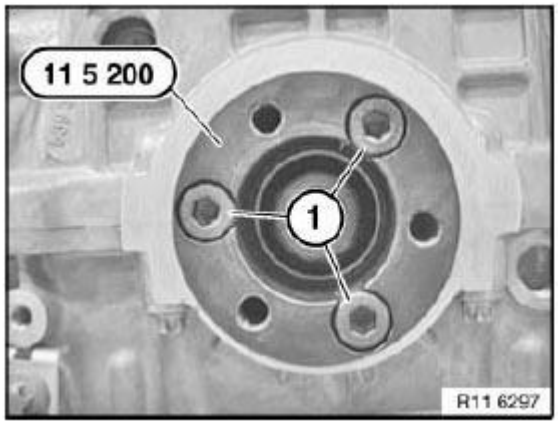


Fig. 277: Identifying Screws With Special Tool (11 5 200)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **TENSIONER** for drive belt.

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

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

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

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

Tighten central bolt to jointing torque.

Tightening torque **11 21 1AZ** .

Mark central bolt and hub with paint.

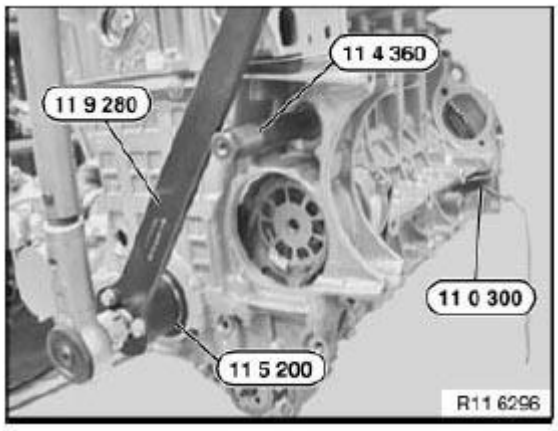


Fig. 278: Identifying Special Tool (11 9 280, 11 4 360, 11 5 200 And 11 0 300)
Courtesy of BMW OF NORTH AMERICA, INC.

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Mark special tools with colored line (1).

See picture.

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

Risk of damage!

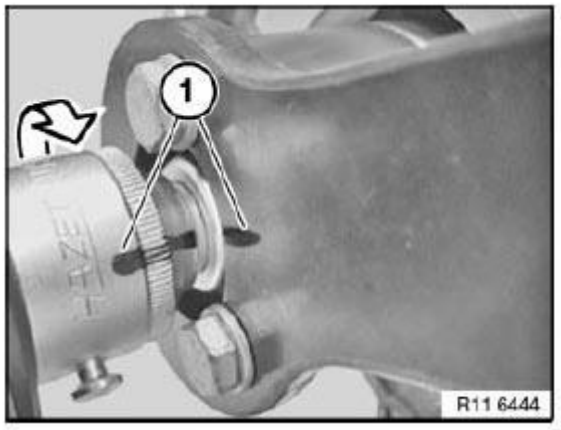


Fig. 279: Identifying Colored Line
Courtesy of BMW OF NORTH AMERICA, INC.

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

Tightening torque **11 21 1AZ** .

Tighten central bolt with a second person helping.

Tightening torque **11 21 1AZ** .

Install **INLET AND EXHAUST ADJUSTMENT UNITS** .

Install **CHAIN TENSIONER** .

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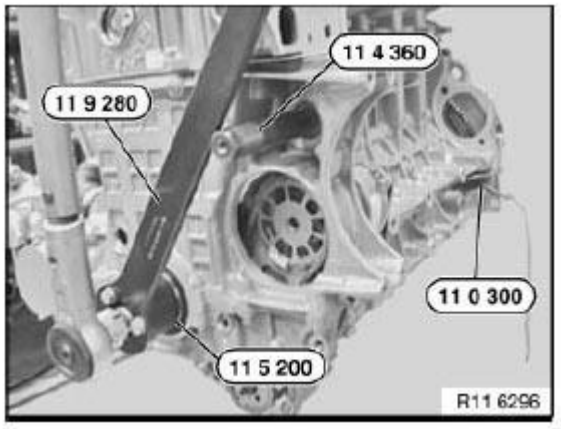


Fig. 280: Identifying Special Tool (11 9 280, 11 4 360, 11 5 200 And 11 0 300)
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine twice.

Check **TIMING** .

If necessary, adjust **VALVE TIMING** .

Assemble engine.

ROCKER ARM WITH BEARING MOUNT

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

Necessary preliminary tasks

- Remove **CYLINDER HEAD COVER**
- Remove **INTERMEDIATE LEVER**
- Remove **EXHAUST CAMSHAFT** .

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

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

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

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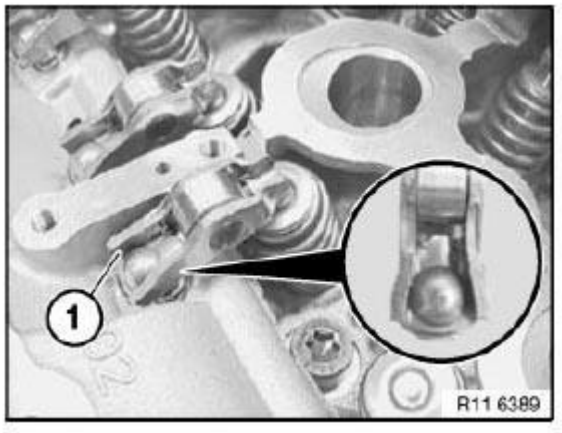


Fig. 281: Identifying Cam Follower Seat
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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

Remove HVCA element (1) in direction of arrow.

Installation

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

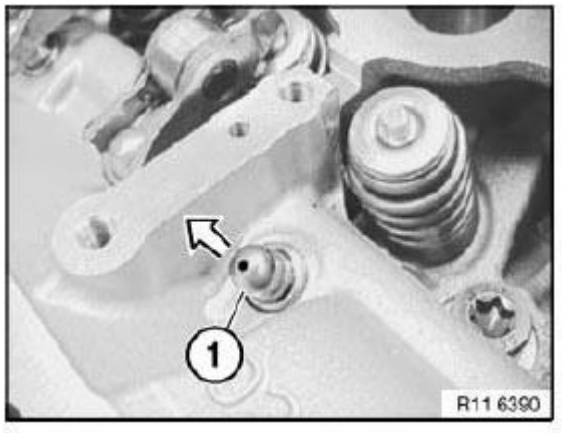


Fig. 282: Removing HVCA Element
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

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

VALVES WITH SPRINGS

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

Necessary preliminary tasks

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

Arrangement

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

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

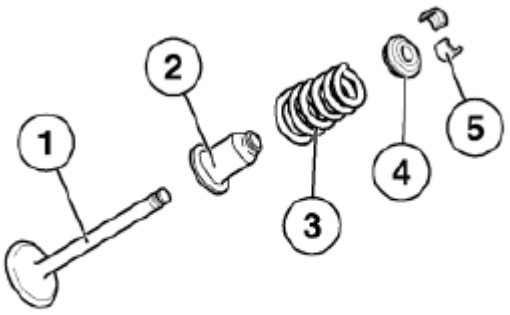


Fig. 283: Exploded View Of Valve Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

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

11 34 715 REPLACING ALL VALVE SPRINGS (N52K)

Necessary preliminary tasks

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- Remove **CYLINDER HEAD**
- Remove **EXHAUST CAMSHAFT** .
- Remove **INTERMEDIATE LEVER**
- Remove **INLET CAMSHAFT**
- Remove **CAM FOLLOWERS**

Place cylinder head on special tool **11 9 000** .

Press down **inlet valves** with special tool 11 9 017.

Press down **exhaust valves** with special tool 11 0 346.

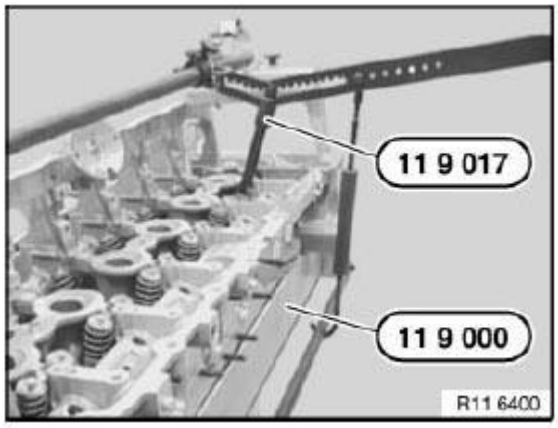
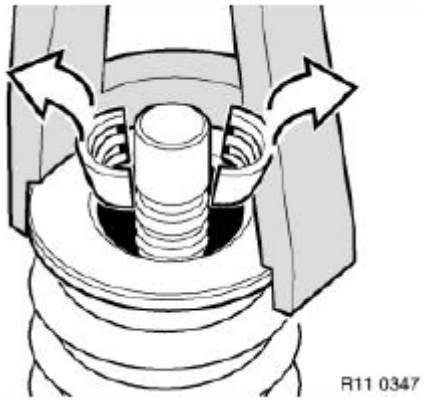


Fig. 284: Identifying Special Tools (11 9 000 And 11 9 017)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove valve cotters with a magnet.

Remove valve spring with spring plates.

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



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Fig. 285: Removing Valve Spring And Spring Cup
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect installation possible.
Incorrect installation will result in valve spring breakage.
Risk of mixing up the valve springs for the inlet and exhaust valves.

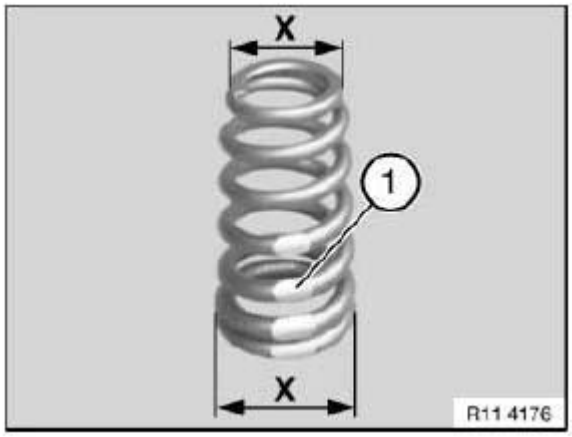


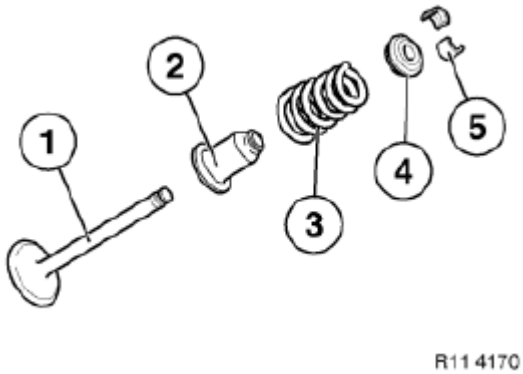
Fig. 286: Identifying Valve Spring Dimensions
Courtesy of BMW OF NORTH AMERICA, INC.

The valve spring is color-coded (1) at the lower end.

Install the valve spring so that the larger diameter points to the lower spring plate.

Arrangement:

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



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Fig. 287: Exploded View Of Valve Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

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

11 34 560 REPLACING ALL VALVE STEM SEALS (N52K)

Necessary preliminary tasks

- Remove **CYLINDER HEAD** .
- Remove **INTERMEDIATE LEVER**
- Remove **ECCENTRIC SHAFT**
- Remove **INLET CAMSHAFT**
- Remove **EXHAUST CAMSHAFT** .
- Remove **CAM FOLLOWERS**

Firmly press special tool **11 1 480** onto old valve stem seals.

Detach valve stem seal from valve stem by turning and simultaneously pulling special tool **11 1 480** .

Installation:

Insert all **VALVES** .

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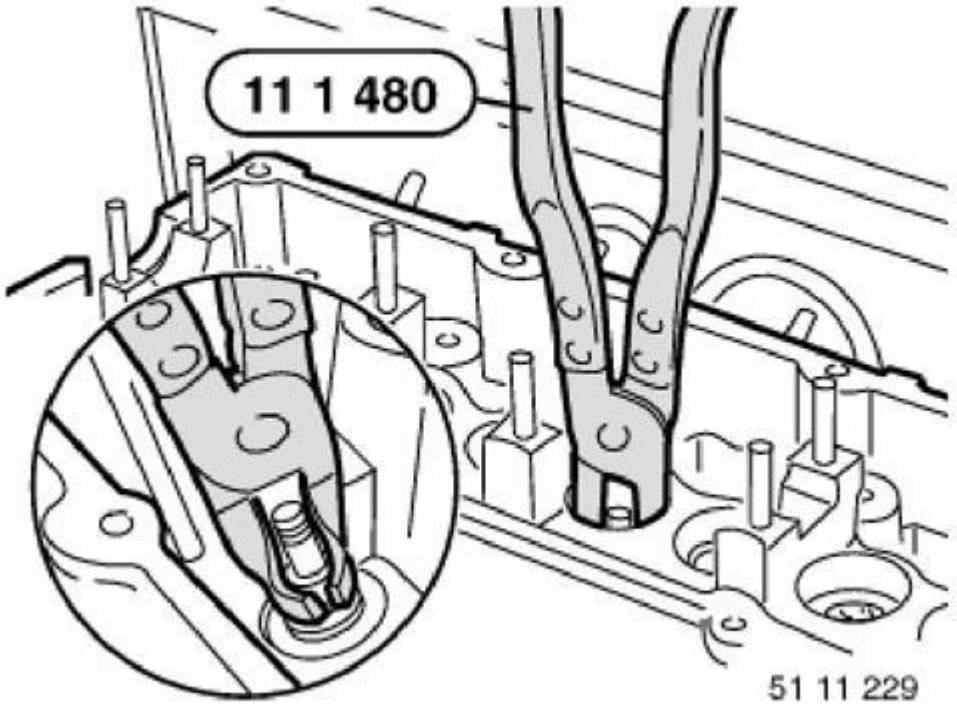


Fig. 288: Removing Valve Stem Seal From Valve Stem Using Special Tool (11 1 480)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For use on the N52K engine, special tool 11 6 380 must be remachined according to the picture with a 10 mm dia. drill bit to a depth of B = approx. 23 mm.

This modification has already been taken into account for reordering.

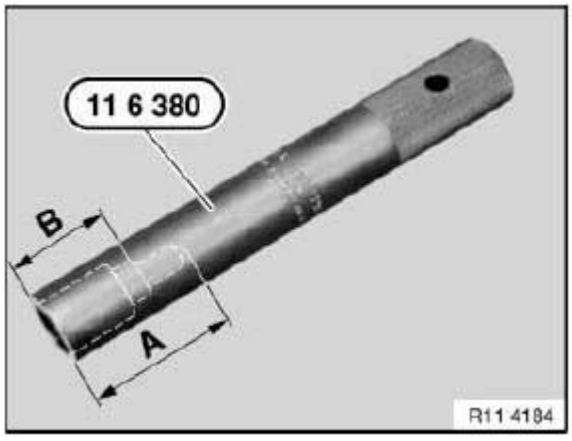


Fig. 289: Identifying Special Tool (11 6 380) Dimensions

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Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Different diameters at valve stem.
All valve stem seals are color-coded.

For 5 mm dia. valves, the valve stem seal is marked red or brown.

For 6 mm dia. valves, the valve stem seal is marked green or light green.

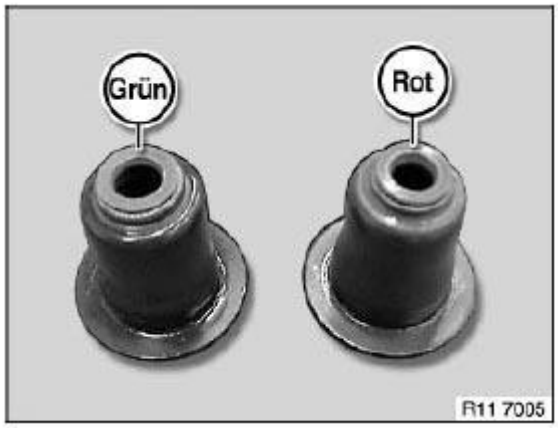


Fig. 290: Identifying Valve Stem Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Fit the mounting sleeves (plastic sleeves) contained in the delivery specification on the valve stem end.

Lubricate mounting sleeve.

Press on valve stem seal by hand with special tool **11 6 380** as far as it will go.

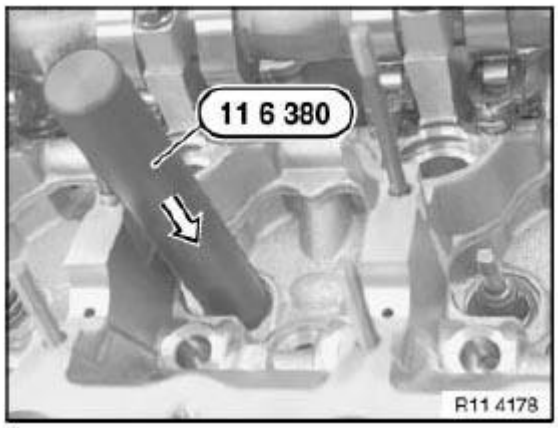


Fig. 291: Pressing Valve Stem Seal By Hand Using Special Tool (11 6 380)
Courtesy of BMW OF NORTH AMERICA, INC.

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Assemble engine.

VARIABLE CAMSHAFT TIMING

11 36 655 REMOVING AND INSTALLING/REPLACING BOTH SOLENOID VALVES (N52K)

IMPORTANT: It is essential to observe conditions of absolute cleanliness when removing and installing the inlet and exhaust solenoid valves.

Possible malfunction if valves are contaminated:

- **Rough running**
- **OBD fault entry**
- **Exhaust emission characteristics**
- **Low engine power**

Necessary preliminary tasks

Disconnect plug connection (1) on inlet solenoid valve (2).

Release screw (3).

NOTE: Secure support and sealing ring against falling down.

Remove inlet solenoid valve (2) with bracket towards front.

Disconnect plug connection (6) on exhaust solenoid valve (5).

Release screw (4).

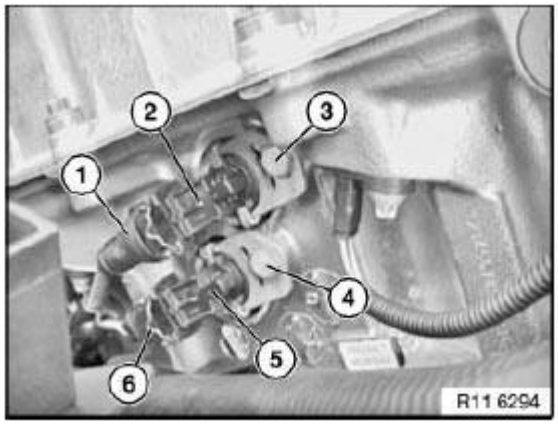


Fig. 292: Identifying Solenoid Valve With Plug Connection And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

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NOTE: Secure support and sealing ring against falling down.

Remove exhaust solenoid valve (5) with bracket towards front.

Tightening torque **11 36 3AZ** .

IMPORTANT: Risk of mixing up plug connections (1 and 6).

Installation:

Replace support and sealing rings

Assemble engine.

Check function of DME.

11 36 046 REMOVING AND INSTALLING/REPLACING INLET AND EXHAUST ADJUSTMENT UNITS (N52K)

Necessary preliminary tasks

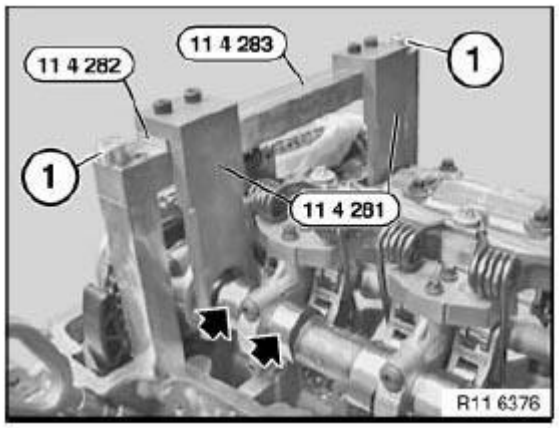
- Remove **CYLINDER HEAD COVER**
- Check **TIMING**

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

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

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

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



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Fig. 293: Identifying Special Tools Fitted To Camshaft And Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Release chain tensioner (2).

Tightening torque **11 31 6AZ** .

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

Tightening torque **11 36 1AZ** .

Installation:

Replace central bolts

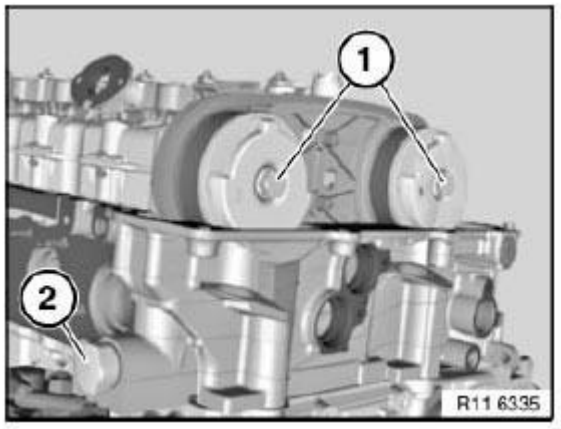


Fig. 294: Identifying Central Bolt And Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

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

Remove exhaust adjustment unit (1) from exhaust camshaft.

Remove inlet adjustment unit (2) from inlet camshaft.

Installation:

To facilitate removal and installation of the inlet and exhaust adjustment units, turn the sensor gears at the opening downwards.

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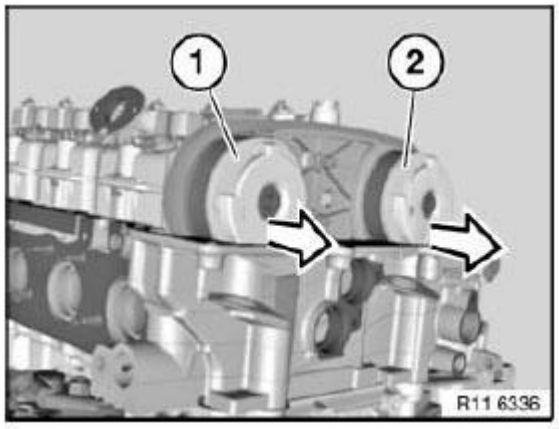


Fig. 295: Removing Inlet/Exhaust Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of mixing up the inlet and exhaust adjustment units.

Danger of engine damage!

Inlet and exhaust adjustment units are different.

VANOS is marked with AUS/EX for the exhaust camshaft.

VANOS is marked with EIN/IN for the inlet camshaft.

Sensor gears can be fitted alternatively.

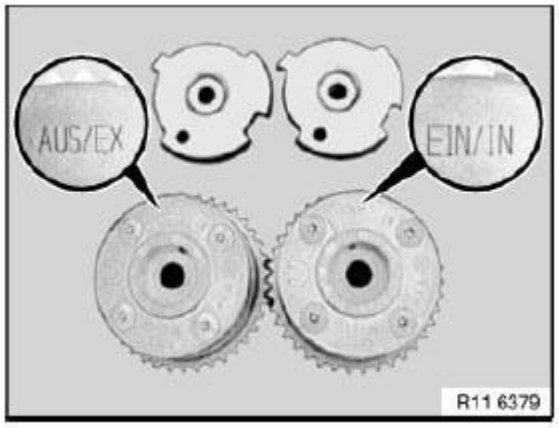


Fig. 296: Identifying AUS And EX Marks For Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Position inlet and exhaust adjustment units on camshafts.

Installation position of inlet and exhaust adjustment units can be freely selected.

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Insert central bolts (1).

Tightening torque **11 36 1AZ** .

Installation:

Replace central bolts

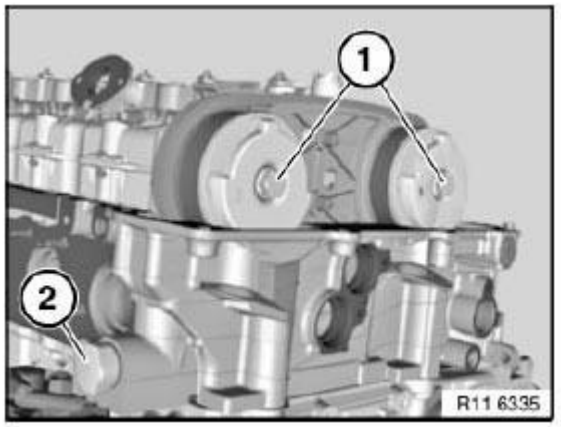


Fig. 297: Identifying Central Bolt And Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

IMPORTANT: Incorrect installation possible!

Press clamping rail (1) by hand against guide rail and make sure timing chain is guided in clamping rail (1).

NOTE: Schematic representation of removed timing chain module.

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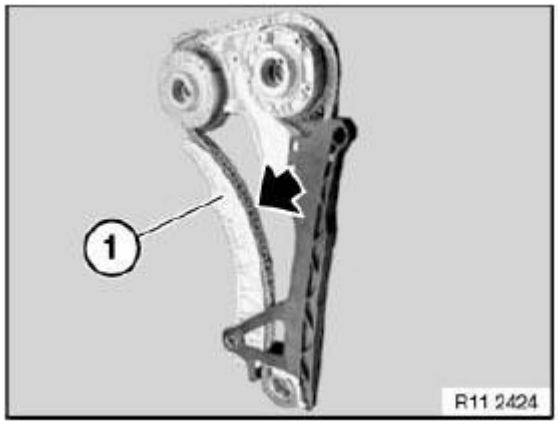


Fig. 298: Locating Clamping Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust **VALVE TIMING** .

Fit **CHAIN TENSIONER** .

Assemble engine.

VARIABLE VALVE GEAR

11 37 005 REMOVING AND INSTALLING/REPLACING ECCENTRIC SHAFT (N52K)

Necessary preliminary tasks

- Remove **CYLINDER HEAD COVER**
- Remove **INTERMEDIATE LEVER**

If necessary, move eccentric shaft (1) on twin surface to minimum lift (2).

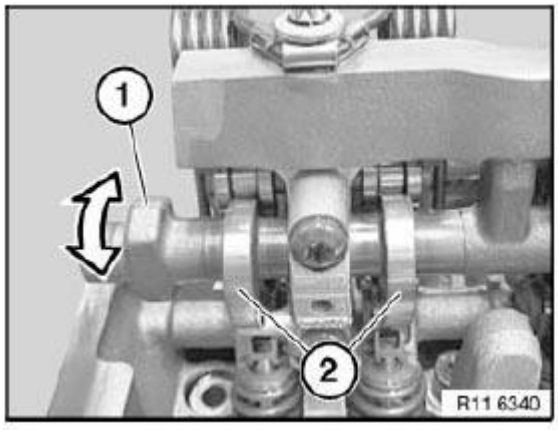


Fig. 299: Turning Eccentric Shaft To Minimum Lift

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Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: All bearing caps (1 and 2) of eccentric shaft are marked with numbers from 1 to 6 (1 for 1st cylinder to 6 for 6th cylinder).

Bearing cap 6 (1) is provided with a stop.

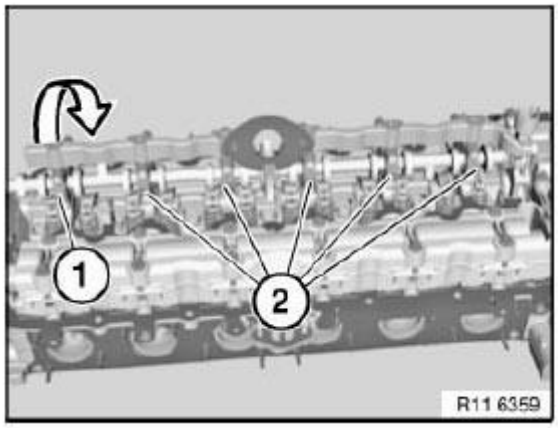


Fig. 300: Identifying Bearing Cap With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws on bearing cap 6 (1).

Release screws on bearing caps 1 to 5 (2).

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

Remove eccentric shaft with gentle tilting and turning movements.

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

Release screw.

Remove magnet wheel (1).

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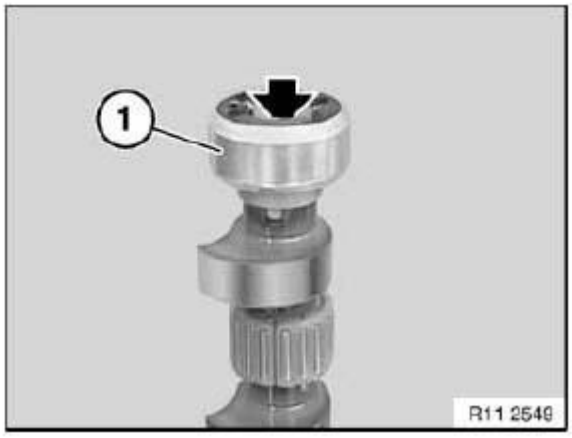


Fig. 301: Identifying Magnet Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

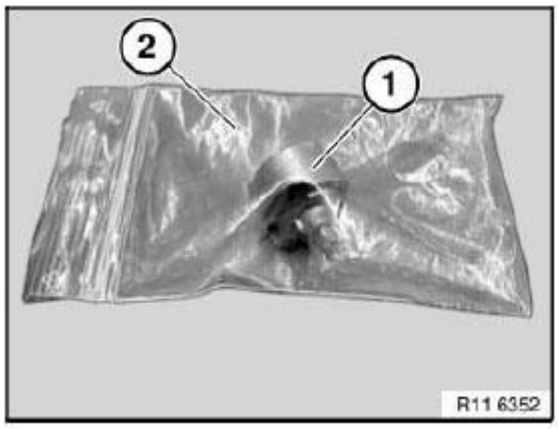


Fig. 302: Identifying Magnet Wheel And Plastic Bag
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Needle bearing (1) can break very easily.

Carefully pull needle bearing (1) apart at point of separation.

Remove all needle bearings (1) from eccentric shaft.

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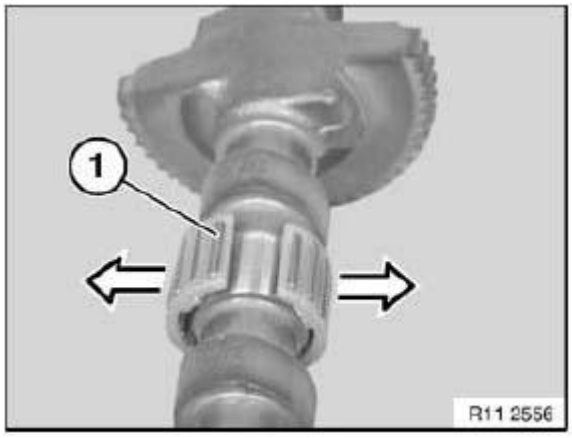


Fig. 303: Identifying Needle Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Install bearing shells (1) as pictured.

NOTE: Always replace bearing shells (1) and needle bearings together.

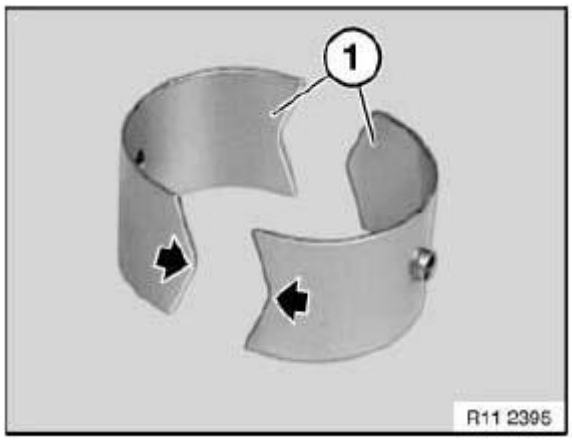


Fig. 304: Identifying Bearing Shells
Courtesy of BMW OF NORTH AMERICA, INC.

Install bearing shell (1) with tip facing down (see arrow) in cylinder head.

Install bearing shell (2) with tip facing up in bearing cap.

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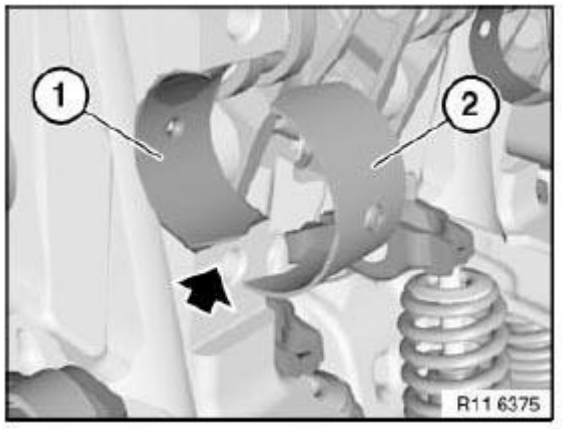


Fig. 305: Identifying Bearing Shell
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: All bearing caps (1 and 2) of eccentric shaft are marked with numbers from 1 to 6 (1 for 1st cylinder to 6 for 6th cylinder).
Bearing cap 6 (1) is provided with a stop.

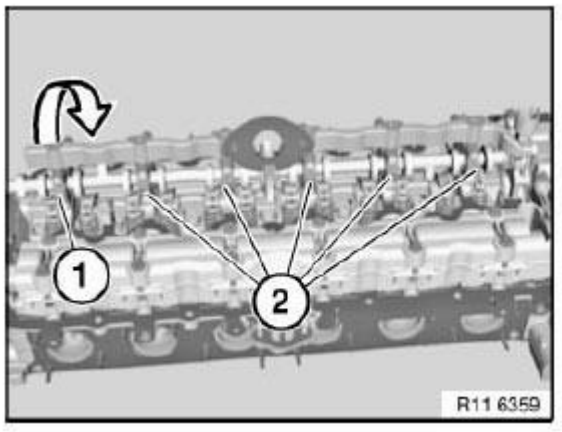


Fig. 306: Identifying Bearing Cap And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Insert eccentric shaft.

Adjust eccentric shaft on dihedron to minimum stroke.

Fit all bearing caps (1 and 2).

Insert all screws.

Tightening torque **11 12 7AZ** .

Installation:

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Spline teeth of eccentric shaft must be greased with **LONGTIME PD 1 (2.2)** .

Assemble engine.

11 37 010 REMOVING AND INSTALLING/REPLACING INTERMEDIATE LEVERS (N52K)

Notes

IMPORTANT: Aluminium-magnesium materials.

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

A magnesium crankcase requires aluminium screws/bolts exclusively.

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

Aluminium screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

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

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

NOTE: There are 2 different versions of the guide block

IMPORTANT: Establish size of guide blocks.
Version 1
Size 55.2 mm
Version 2
Size 58 mm
The description of version 2 starts on page 8.

Version 1

Size (1) 55.2 mm

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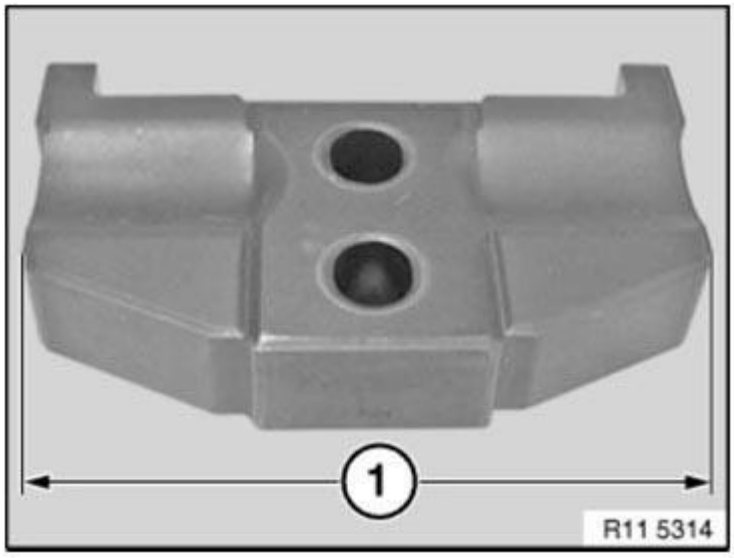


Fig. 307: Identifying Guide Block Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks

- Remove **CYLINDER HEAD COVER**

If necessary, move eccentric shaft (1) on twin surface to minimum lift (2).

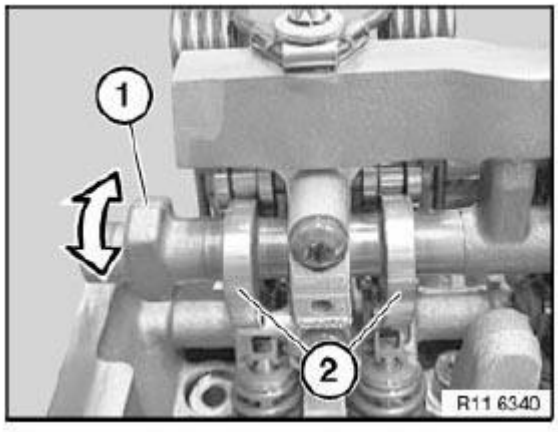


Fig. 308: Turning Eccentric Shaft To Minimum Lift
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Oil spray nozzle must be removed from 3rd cylinder (make a note of installation position of oil spray nozzle).

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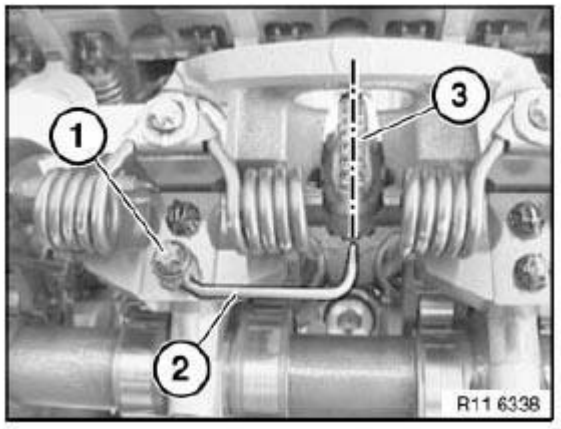


Fig. 309: Identifying Oil Spray Nozzle, Spline Teeth And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Oil spray nozzle must be removed from 3rd cylinder (make a note of installation position of oil spray nozzle).

Secure special tool **11 4 270** to guide block (2) using locking pliers (3).

IMPORTANT: Special tool 11 4 270 is only secured to guide block (2).
The position of the locking pliers (3) on the special tool 11 4 270 must not be altered. Risk of damage!

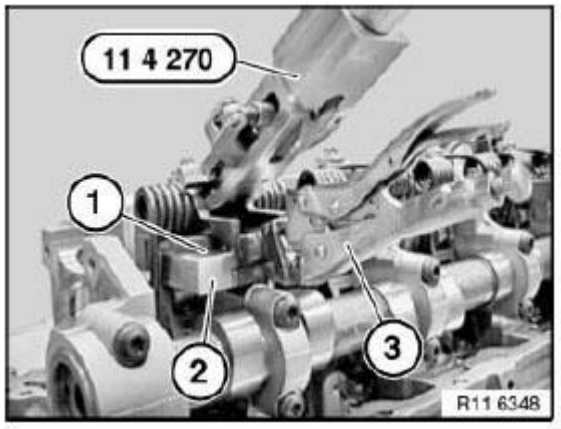


Fig. 310: Identifying Gripping Pliers And Guide Block With Special Tool (11 4 270)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury in event of incorrect use.

IMPORTANT: Improper handling. Risk of damage!

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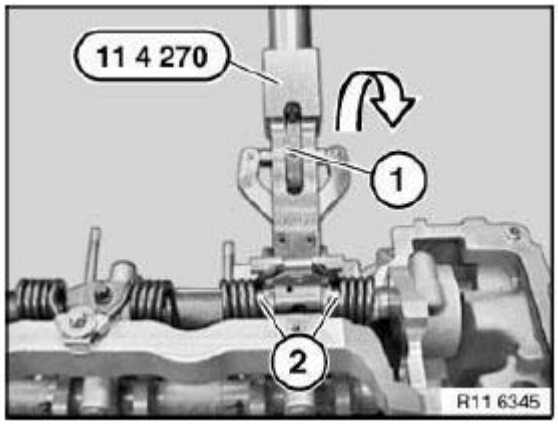


Fig. 311: Identifying Bearing Pins And Knurled Screw With Special Tool (11 4 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Secure both bearing pins (2) in torsion springs with knurled screw (1) of special tool **11 4 270** .

Press special tool **11 4 270** to stop in direction of arrow.

Release screw (2) of torsion spring.

Tightening torque **11 37 2AZ** .

To avoid misalignment of screw (2) with torsion spring, it is necessary when releasing screw (2) to relieve the tension on the special tool **11 4 270** evenly.

IMPORTANT: Thread on cylinder head. Risk of damage!

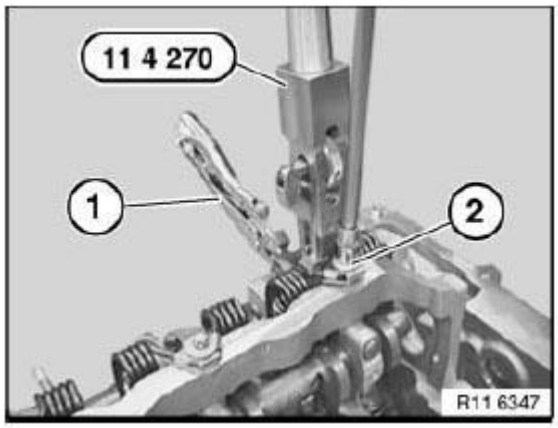


Fig. 312: Removing Torsion Spring Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release tension on torsion spring (1) with special tool **11 4 270** .

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NOTE: Metal lug (2) can not be disassembled and must not be removed.

Installation:

Replace torsion spring (1) if metal lug (2) is faulty.

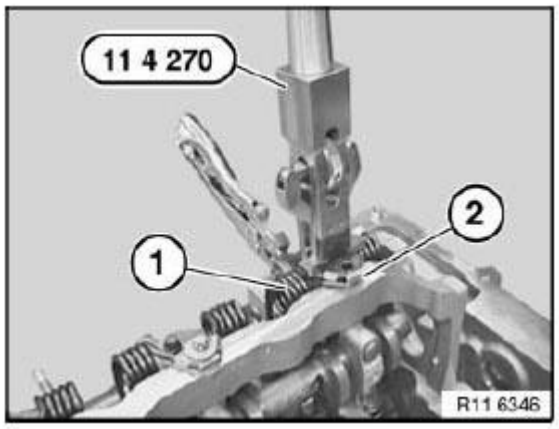


Fig. 313: Identifying Return Spring And Metal Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

Press torsion spring apart at positions (1).

Remove torsion spring towards top.

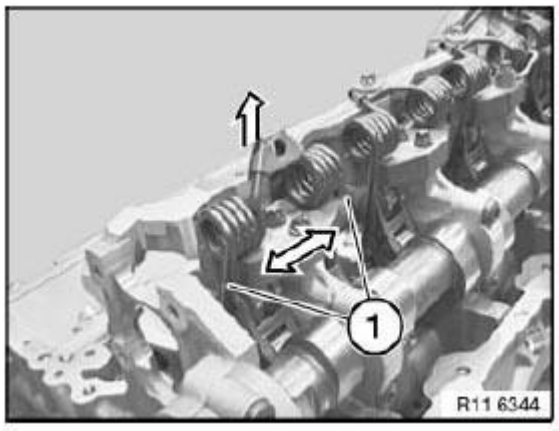


Fig. 314: Pressing Torsion Spring Apart
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Uniform distribution must not be changed.
Place all components in clean and orderly condition in special tool 11 4 481.

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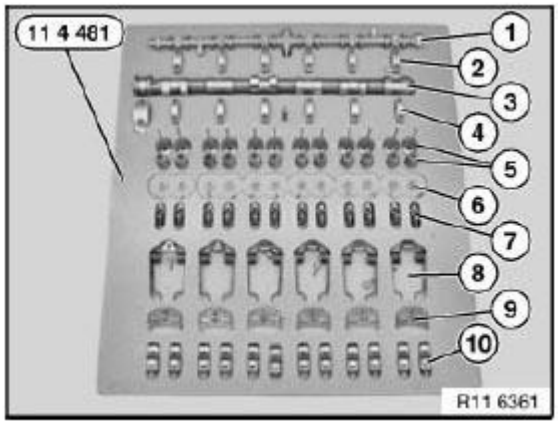


Fig. 315: Identifying Components With Special Tool (11 4 481)
Courtesy of BMW OF NORTH AMERICA, INC.

All components must be reinstalled in the same positions in an engine which has already been in use.

1. Eccentric shaft with bearing
2. Bearing caps of eccentric shaft (set out in order)
3. Intake camshaft
4. Bearing caps of inlet camshaft (set out in order)
5. Intake valves with valve springs
6. Valve plates and valve cotters
7. Cam followers with HVCA elements (set out in order)
8. Torsion springs
9. Guide blocks (set out in order)
10. Intermediate levers (set out in order)

Release screws (1) on guide block (2).

Tightening torque **11 37 1AZ** .

Place all guide blocks (2) in neat order in special tool 11 4 481.

Installation:

Mixing up the guide blocks (2) will cause the engine to suffer idle-speed fluctuations.

This will result in maladjustment of **uniform distribution.**

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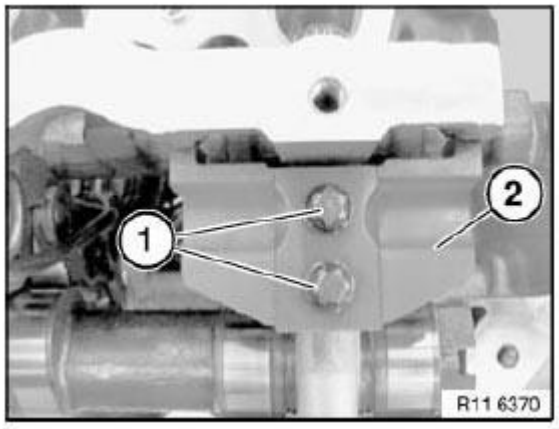


Fig. 316: Identifying Screws And Guide Block
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

All contact surfaces (1) of guide block must be clean and free from oil and grease. If necessary, clean contact surfaces (1).

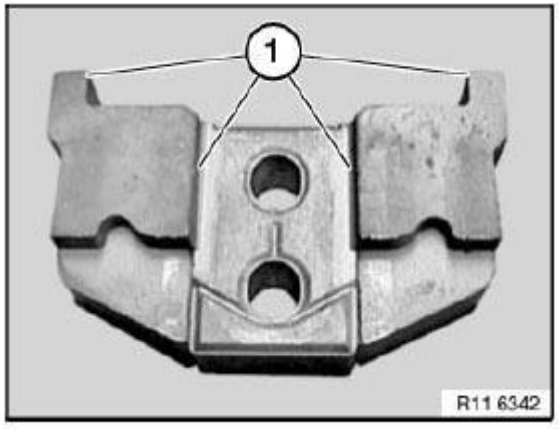


Fig. 317: Identifying Guide Block Contact Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out intermediate levers (2).

Place all intermediate levers (2) in neat order in special tool 11 4 481.

Installation:

Mixing up the intermediate levers (2) will cause the engine to suffer idle-speed fluctuations.

Installation

All contact surfaces (1) must be clean and free from oil and grease. If necessary, clean contact surfaces (1).

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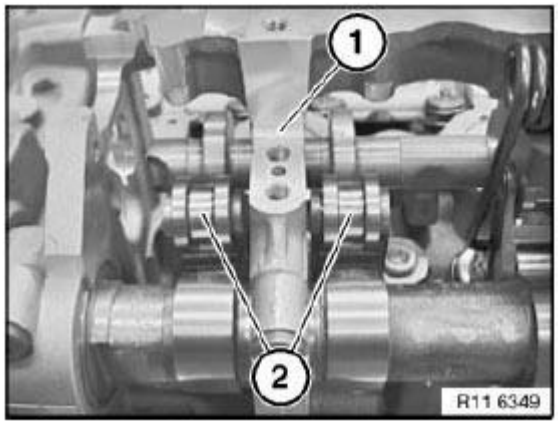


Fig. 318: Identifying Contact Surfaces And Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

All intermediate levers (1) are classified.

All intermediate levers (1) must be reinstalled in the same positions in an engine which has already been in use.

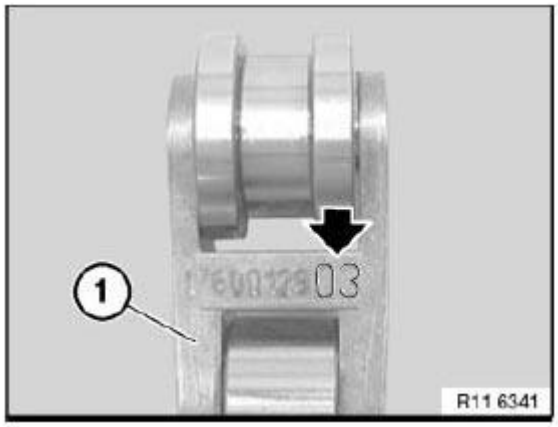


Fig. 319: Identifying Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Before installing intermediate levers (2), make sure cam followers are correctly positioned.

Risk of damage!

Install intermediate levers (2).

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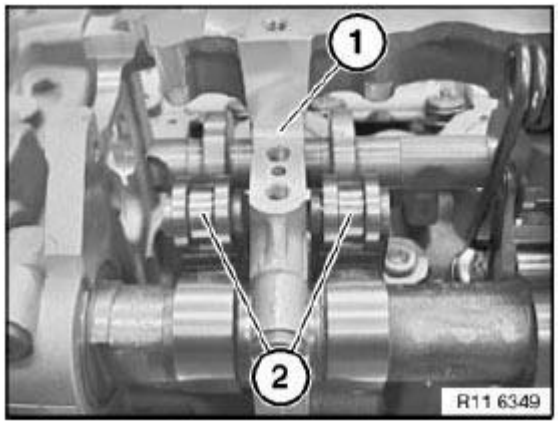


Fig. 320: Identifying Contact Surfaces And Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

Fit guide block (2) cleanly into opening.

Tighten screws (1) hand-tight.

Check that intermediate levers are in correct installation position.

Release screws (1) by a 1/4 turn.

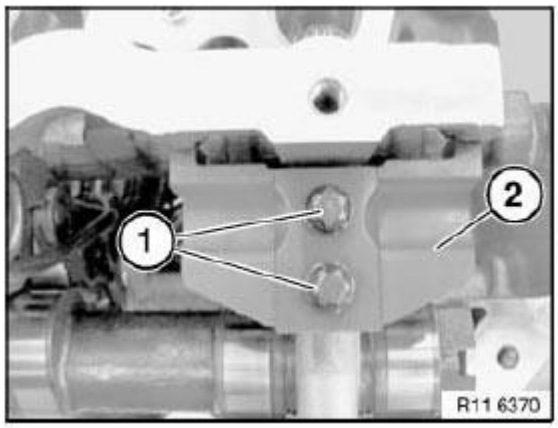


Fig. 321: Identifying Screws And Guide Block
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **11 4 450** to screw fixing (1) of eccentric shaft.

Move eccentric lever (3) on special tool **11 4 450** in direction of arrow.

Guide block is now pretensioned.

Insert screws (2) of guide blocks.

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Tightening torque **11 37 1AZ** .

Installation:

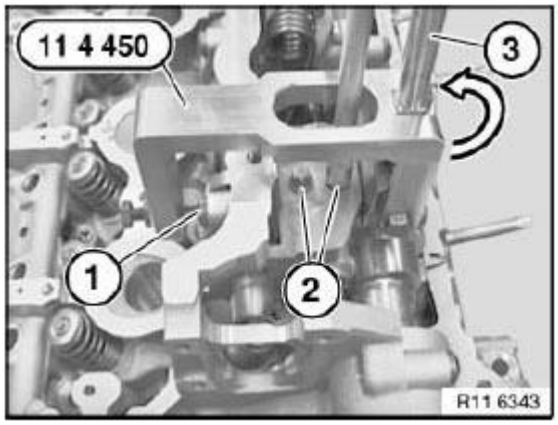


Fig. 322: Turning Eccentric Lever
Courtesy of BMW OF NORTH AMERICA, INC.

At cylinder no. 3, the guide block can be pre-installed with one screw (internal) only.

Oil spray nozzle is fitted only after torsion spring has been installed.

Install torsion spring (2) on guide block.

Installation:

Insert torsion spring (2) in intermediate lever (1) (see arrow).

Check that cam follower (3) is in correct installation position.

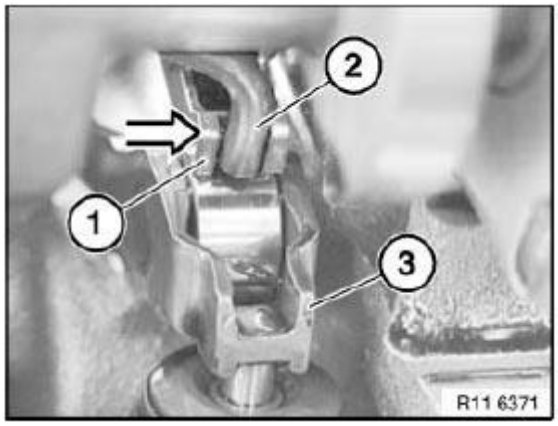


Fig. 323: Inserting Torsion Spring In Intermediate Lever
Courtesy of BMW OF NORTH AMERICA, INC.

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Secure special tool **11 4 270** to guide block (2) using locking pliers (3).

IMPORTANT: Special tool 11 4 270 is only secured to guide block (2). The position of the locking pliers (3) on the special tool 11 4 270 must not be altered. Risk of damage!

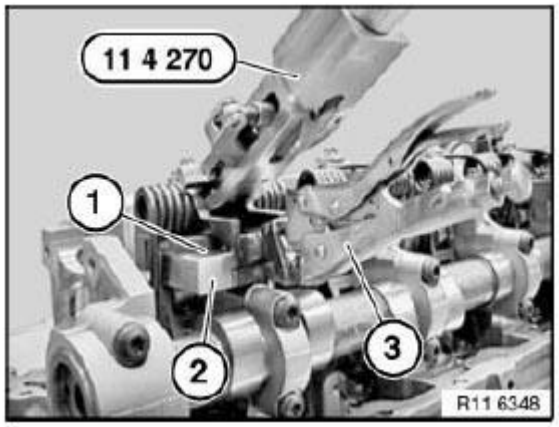


Fig. 324: Identifying Gripping Pliers And Guide Block With Special Tool (11 4 270)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury in event of incorrect use.

IMPORTANT: Improper handling. Risk of damage!

Secure both bearing pins (2) in torsion springs with knurled screw (1) of special tool **11 4 270** .

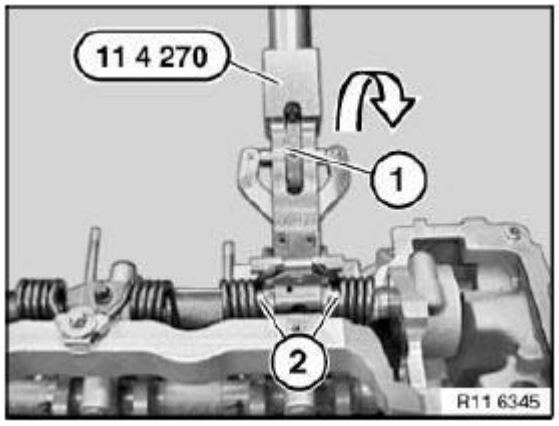


Fig. 325: Identifying Bearing Pins And Knurled Screw With Special Tool (11 4 270)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check torsion spring on intermediate lever to ensure correct installation

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position.

Press special tool **11 4 270** to stop in direction of arrow.

Insert screw (2) of torsion spring.

Tightening torque **11 37 2AZ** .

To avoid misalignment of screw (2) with torsion spring, it is necessary when inserting screw (2) to increase tension on special tool **11 4 270** evenly.

IMPORTANT: Thread on cylinder head. Risk of damage!

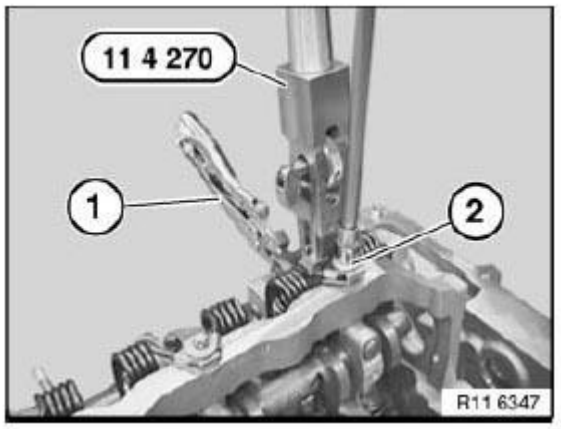


Fig. 326: Identifying Steel Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool **11 4 270** .

At cylinder no. 3, adjust oil spray nozzle (2) so that oil spray points precisely towards spline teeth (3).

Insert screw (1) with oil spray nozzle (2) (external).

Tightening torque **11 37 4AZ** .

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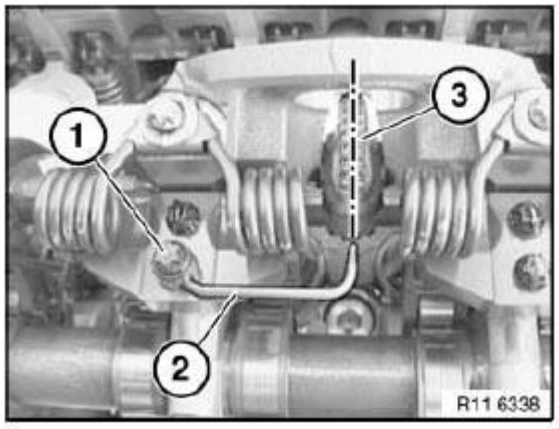


Fig. 327: Identifying Oil Spray Nozzle, Spline Teeth And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Version 2

Size (1) 58 mm

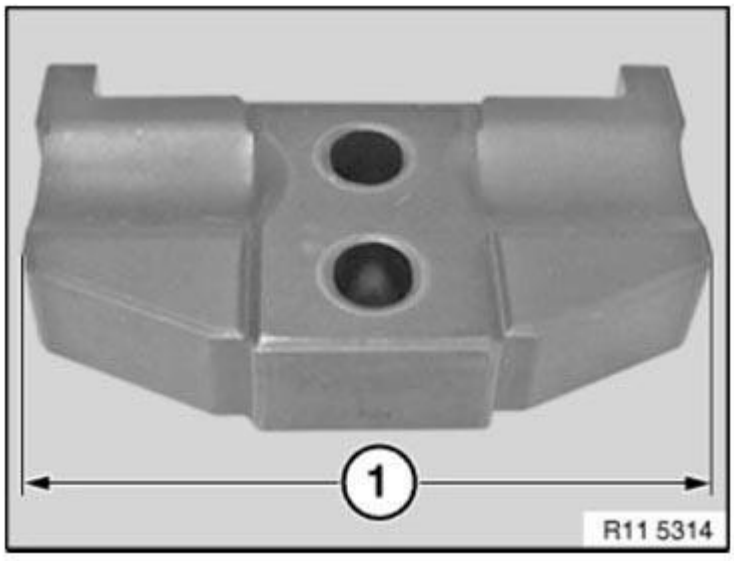


Fig. 328: Identifying Guide Block Dimensions
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks

- Remove **CYLINDER HEAD COVER**

If necessary, move eccentric shaft (1) on twin surface to minimum lift (2).

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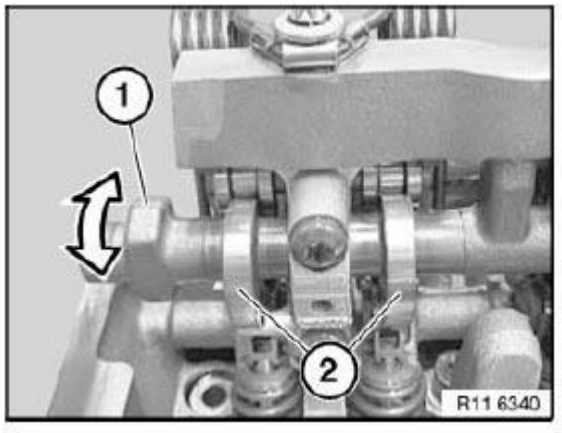


Fig. 329: Turning Eccentric Shaft To Minimum Lift
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Oil spray nozzle must be removed from 3rd cylinder (make a note of installation position of oil spray nozzle).

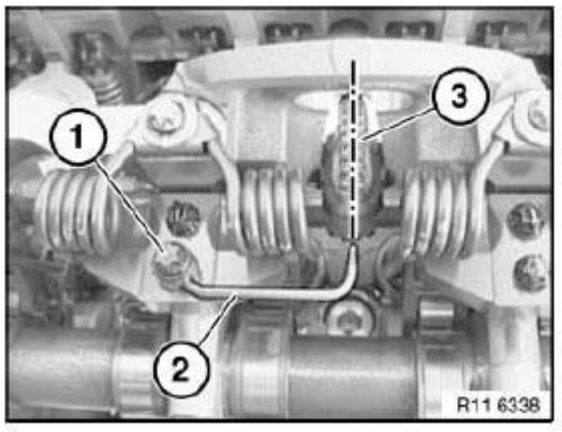


Fig. 330: Identifying Oil Spray Nozzle, Spline Teeth And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **11 7 110** on return spring (1) (see arrows).

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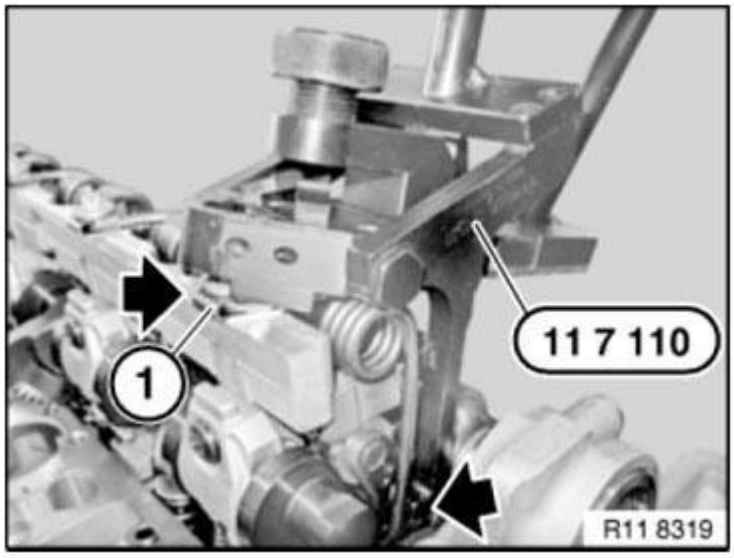


Fig. 331: Locating Special Tool (11 7 110) On Return Spring
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury in event of incorrect use.

IMPORTANT: Improper handling. Risk of damage!

Place special tool **11 7 110** flat on cylinder head.

Turn knurled screw (1) in direction of arrow until both clamping levers secure return spring in guide block.

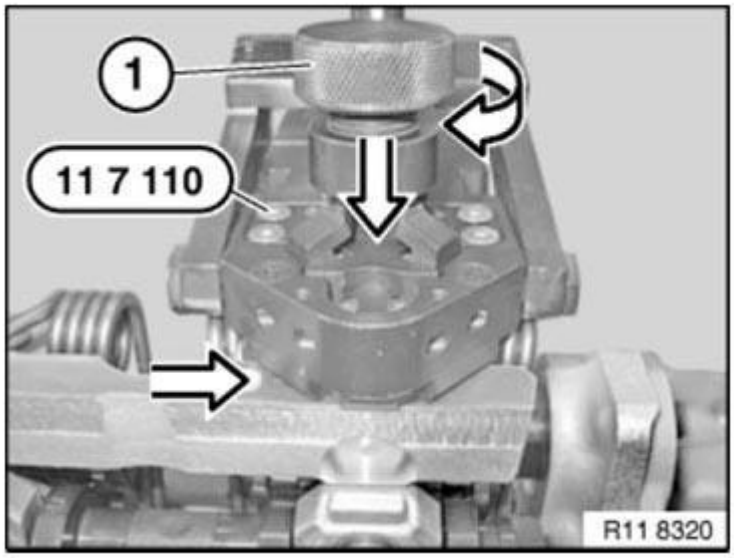


Fig. 332: Turning Knurled Screw
Courtesy of BMW OF NORTH AMERICA, INC.

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Return spring is correctly preloaded when both clamping levers are parallel to guide block.

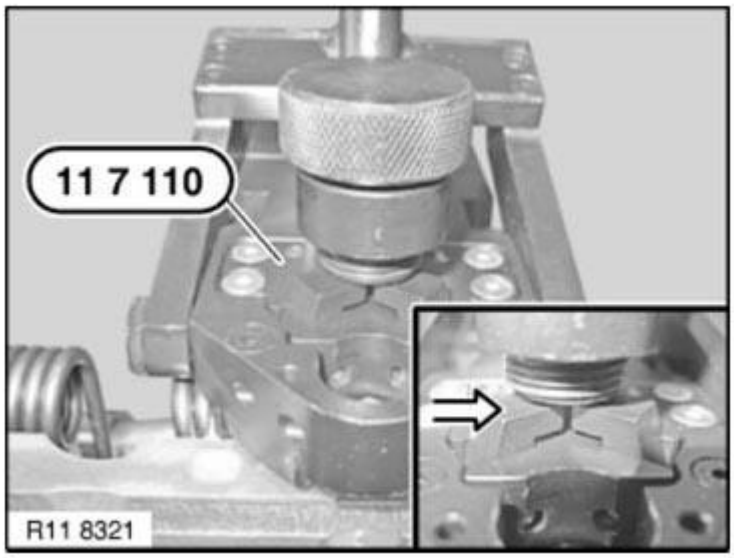


Fig. 333: Identifying Guide Block With Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Left and right return springs (1) must be positioned in lateral guide of special tool **11 7 110** .

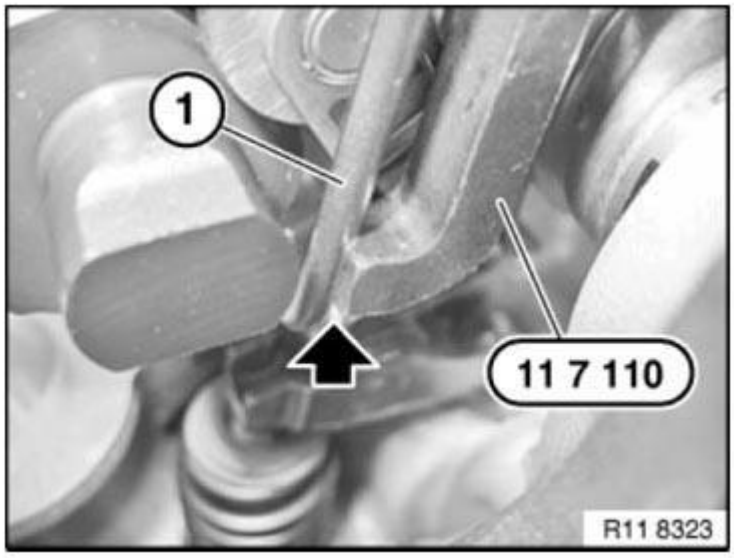


Fig. 334: Identifying Return Springs In Lateral Special Tool 11 7 110 Lateral Guide
Courtesy of BMW OF NORTH AMERICA, INC.

Preload return spring with lever (1) on special tool **11 7 110** in direction of arrow.

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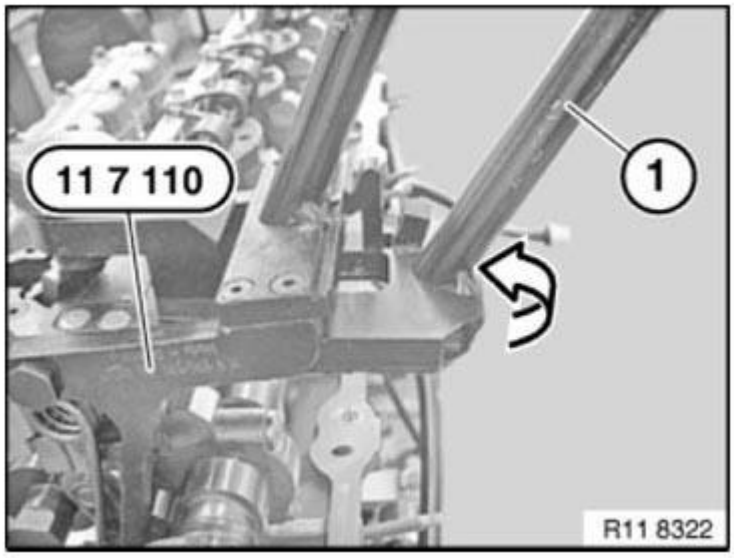


Fig. 335: Identifying Return Spring With Lever And Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

Lock special tool **11 7 110** with catch on lever (1).

IMPORTANT: Screw fixing on return spring can only be released with special tool 11 7 110 secured.

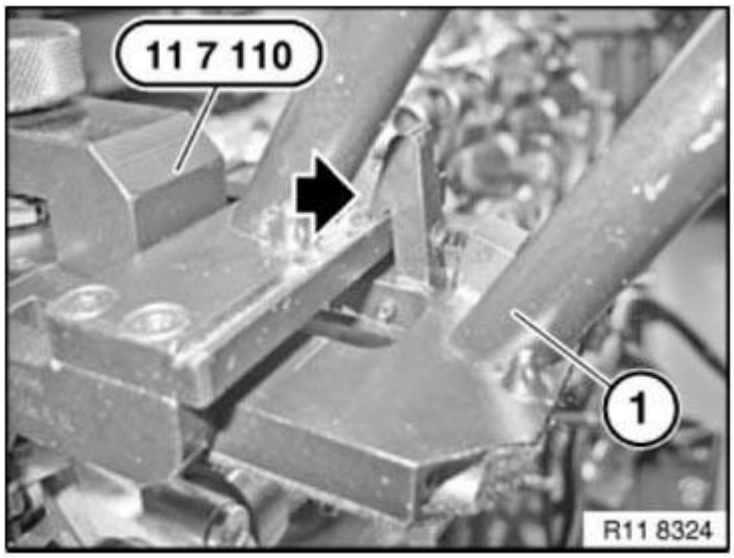


Fig. 336: Locking Special Tool 11 7 110 With Catch On Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

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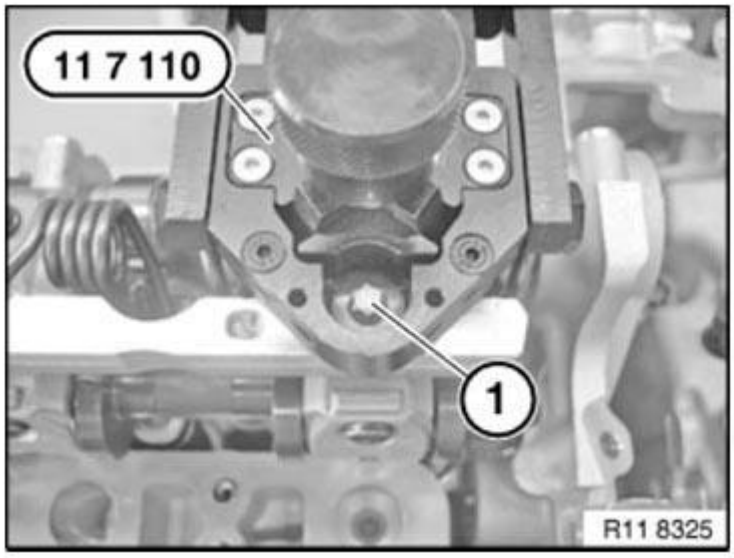


Fig. 337: Identifying Special Tool 11 7 110 And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury in event of incorrect use.

Lever (1) is under pre-tension.

IMPORTANT: Improper handling.

Risk of damage!

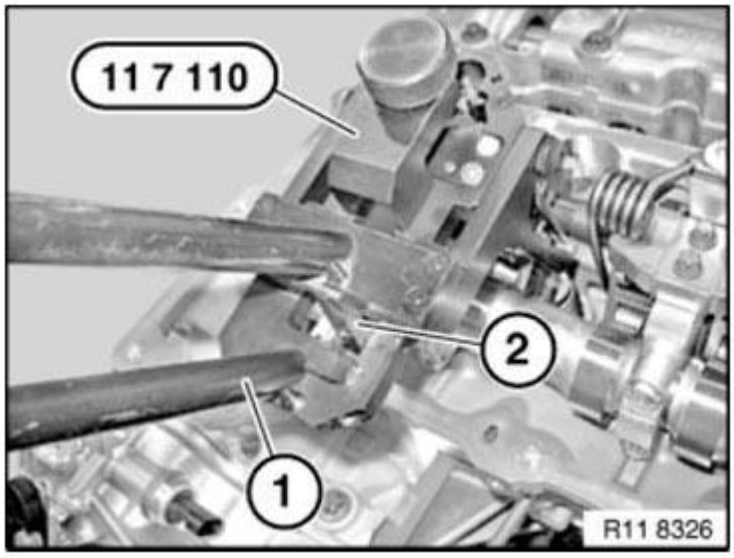


Fig. 338: Identifying Latching Hook, Lever With Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

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Secure lever (1)

Press back latching hook (2).

Return spring tension can now be released.

Release knurled screw (1) on special tool **11 7 110** in direction of arrow.

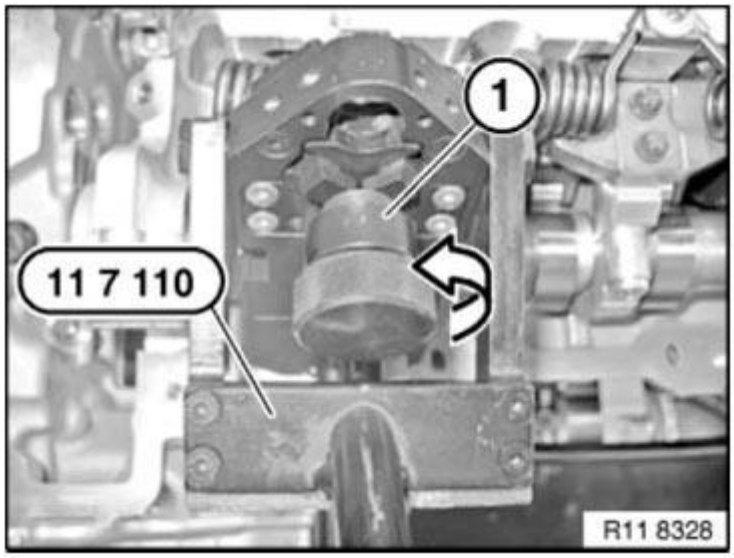


Fig. 339: Releasing Knurled Screw On Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

Release special tool **11 7 110** in direction of arrow from return spring (1).

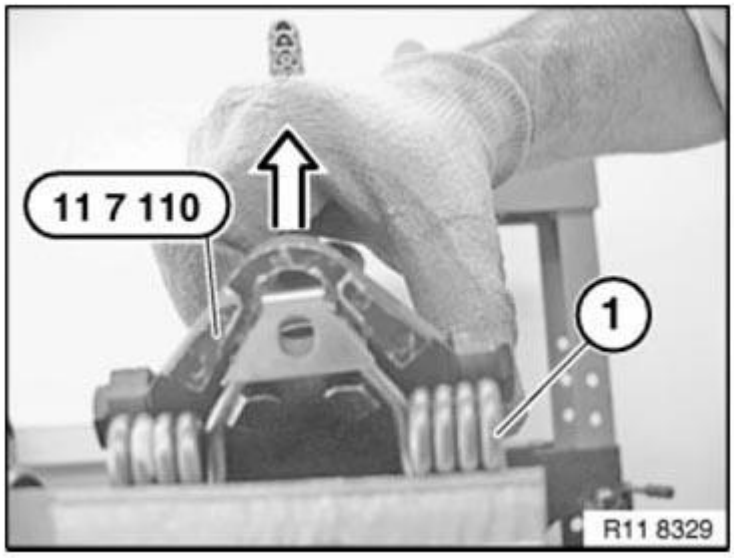


Fig. 340: Releasing Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

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Press torsion spring apart at positions (1).

Remove torsion spring towards top.

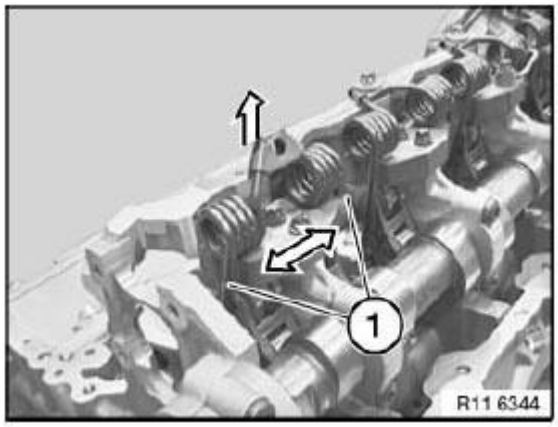


Fig. 341: Pressing Torsion Spring Apart
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Uniform distribution must not be changed.
Place all components in clean and orderly condition in special tool 11 4 481.

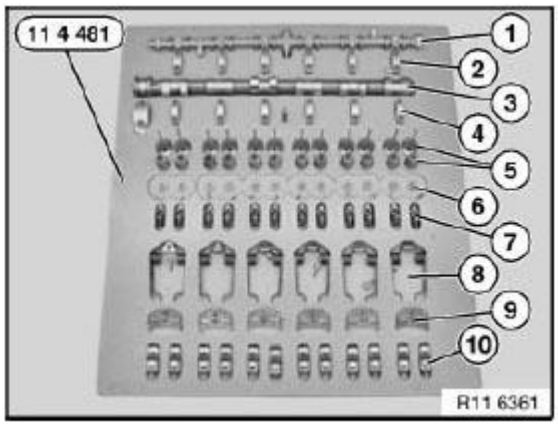


Fig. 342: Identifying Components With Special Tool (11 4 481)
Courtesy of BMW OF NORTH AMERICA, INC.

All components must be reinstalled in the same positions in an engine which has already been in use.

1. Eccentric shaft with bearing
2. Bearing caps of eccentric shaft (set out in order)
3. Intake camshaft
4. Bearing caps of inlet camshaft (set out in order)
5. Intake valves with valve springs

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6. Valve plates and valve cotters
7. Cam followers with HVCA elements (set out in order)
8. Torsion springs
9. Guide blocks (set out in order)
10. Intermediate levers (set out in order)

Release screws (1) on guide block (2).

Tightening torque **11 37 1AZ** .

Place all guide blocks (2) in neat order in special tool 11 4 481.

Installation:

Mixing up the guide blocks (2) will cause the engine to suffer idle-speed fluctuations.

This will result in maladjustment of **uniform distribution.**

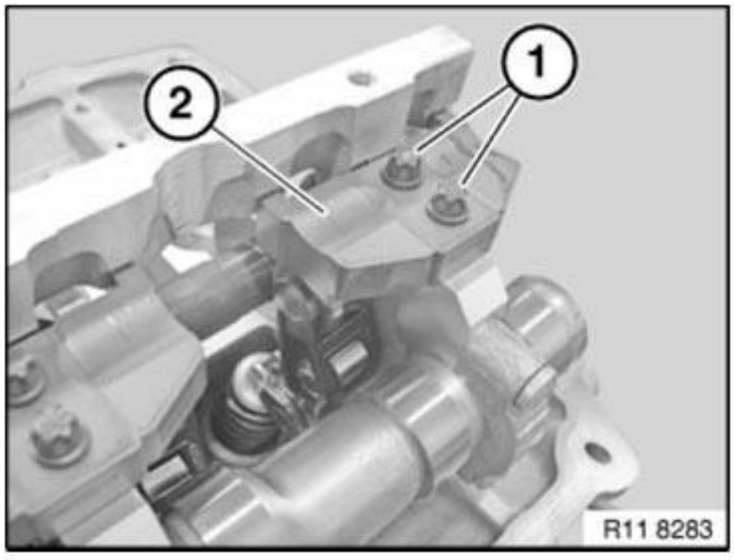


Fig. 343: Identifying Guide Block With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

All contact surfaces (1) of guide block must be clean and free from oil and grease. If necessary, clean contact surfaces (1).

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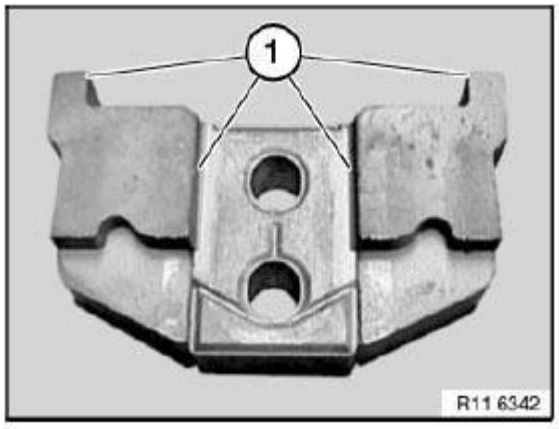


Fig. 344: Identifying Guide Block Contact Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out intermediate levers (2).

Place all intermediate levers (2) in neat order in special tool 11 4 481.

Installation:

Mixing up the intermediate levers (2) will cause the engine to suffer idle-speed fluctuations.

Installation:

All contact surfaces (1) must be clean and free from oil and grease. If necessary, clean contact surfaces (1).

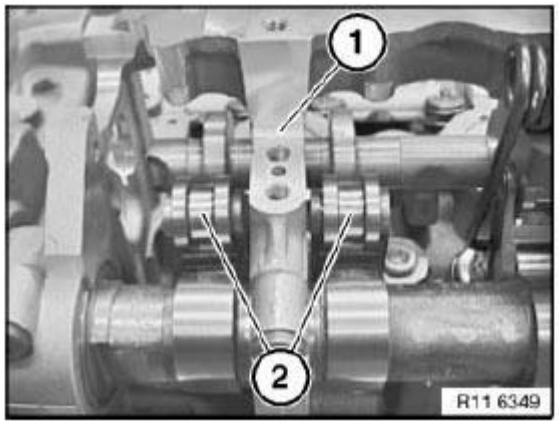


Fig. 345: Identifying Contact Surfaces And Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

All intermediate levers (1) are classified.

All intermediate levers (1) must be reinstalled in the same positions in an engine which has already been in use.

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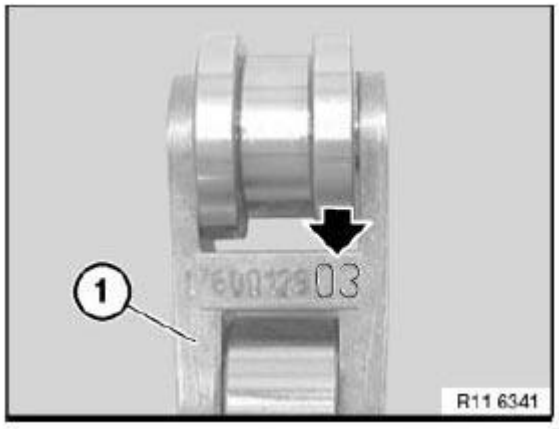


Fig. 346: Identifying Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Before installing intermediate levers (2), make sure cam followers are correctly positioned.

Risk of damage!

Install intermediate levers (2).

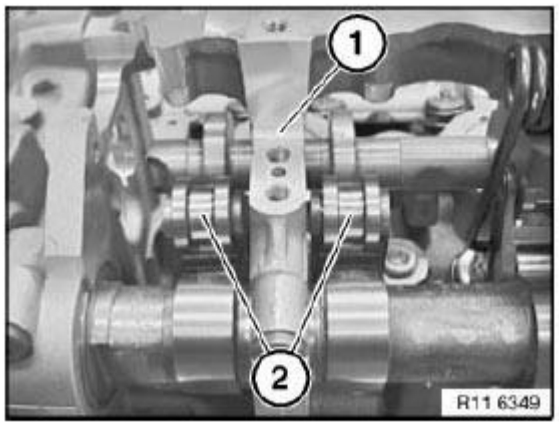


Fig. 347: Identifying Contact Surfaces And Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

Fit guide block (2) cleanly into opening.

Tighten screws (1) hand-tight.

Check that intermediate levers are in correct installation position.

Release screws (1) by a 1/4 turn.

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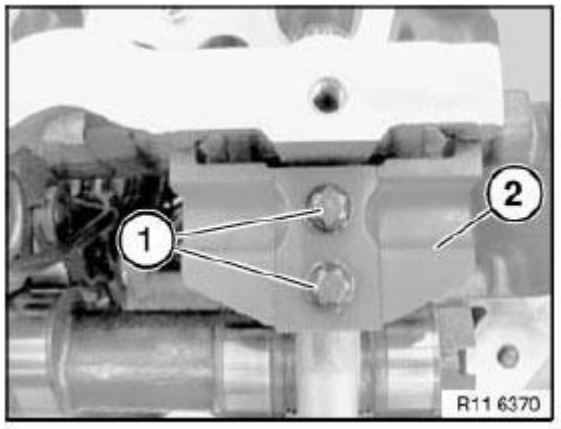


Fig. 348: Identifying Screws And Guide Block
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **11 4 450** to screw fixing (1) of eccentric shaft.

Move eccentric lever (3) on special tool **11 4 450** in direction of arrow.

Guide block is now pretensioned.

Insert screws (2) of guide blocks.

Tightening torque **11 37 1AZ** .

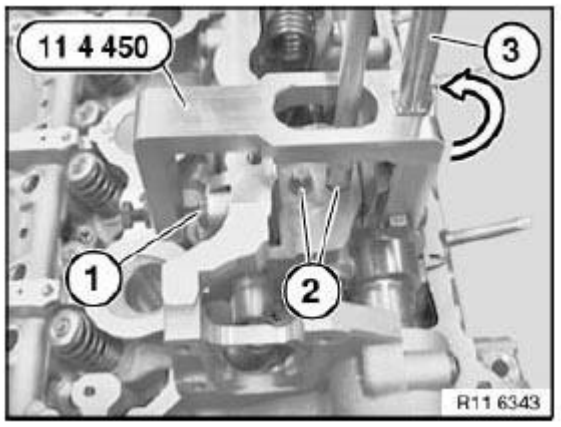


Fig. 349: Turning Eccentric Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

At cylinder no. 3, the guide block can be pre-installed with one screw (internal) only.

Oil spray nozzle is fitted only after torsion spring has been installed.

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Install torsion spring (2) on guide block.

Installation

Insert torsion spring (2) in intermediate lever (1) (see arrow).

Check that cam follower (3) is in correct installation position.

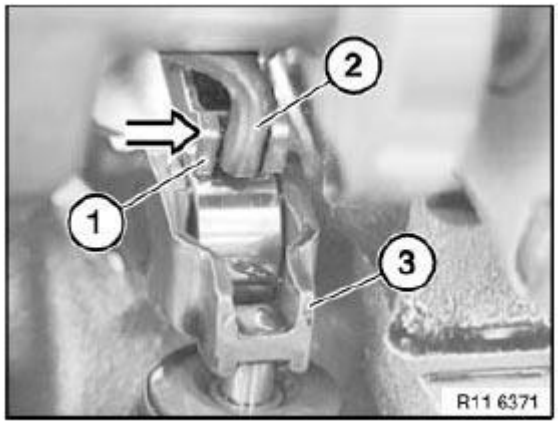


Fig. 350: Inserting Torsion Spring In Intermediate Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool **11 7 110** on return spring.

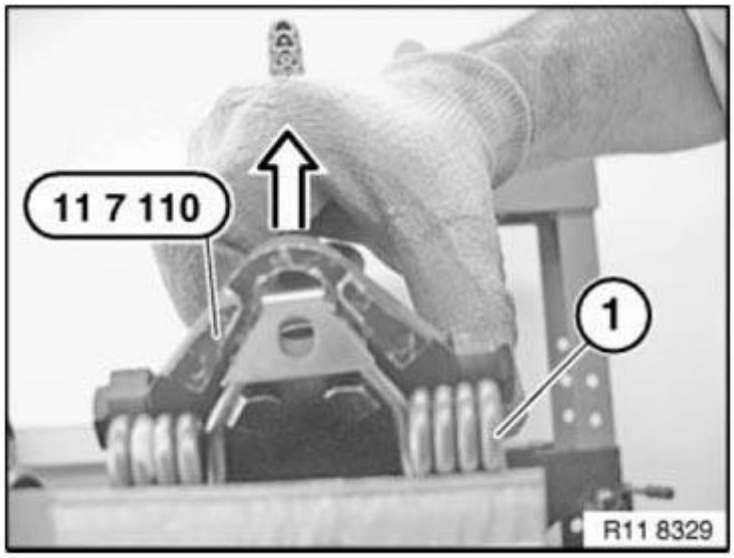


Fig. 351: Positioning Special Tool 11 7 110 On Return Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Clamp return spring with knurled screw (1) in direction of arrow.

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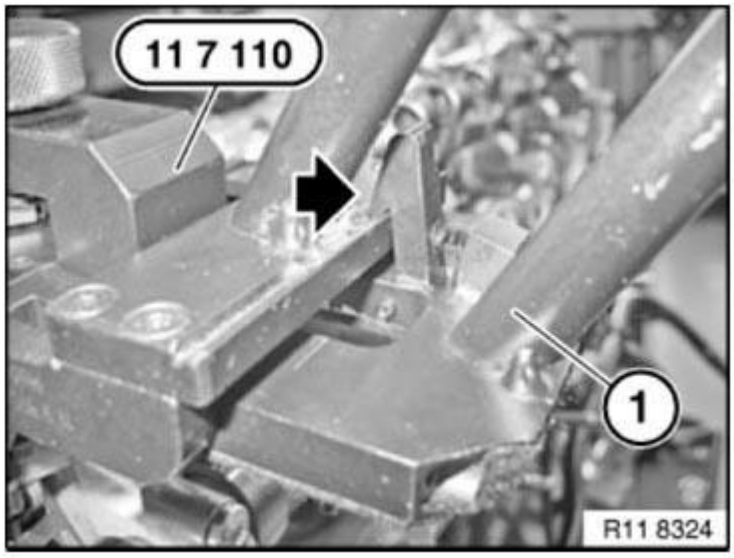


Fig. 352: Clamping Return Spring With Knurled Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Return spring (1) is positioned correctly when catches (see arrows) are surrounding return spring (1).

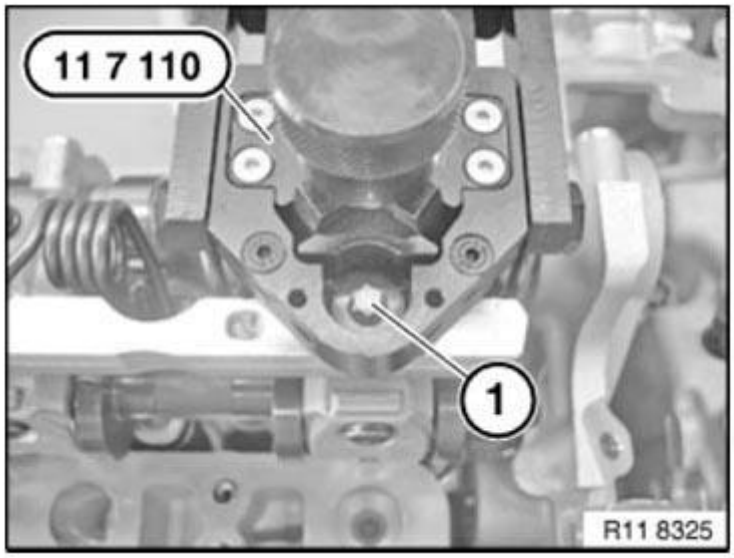


Fig. 353: Identifying Return Spring With Screws And Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury in event of incorrect use.

IMPORTANT: Improper handling.

Risk of damage!

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Check return spring on intermediate lever to ensure correct installation position.

Press special tool **11 7 110** to stop in direction of arrow.

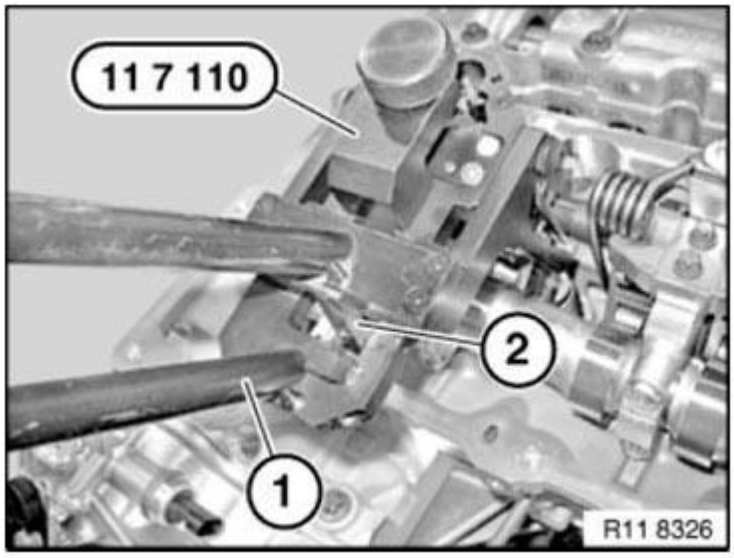


Fig. 354: Identifying Latching Hook, Lever With Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Pay attention to thread on cylinder head.

Risk of damage!

Tighten bolt (1).

Tightening torque **11 37 2AZ** .

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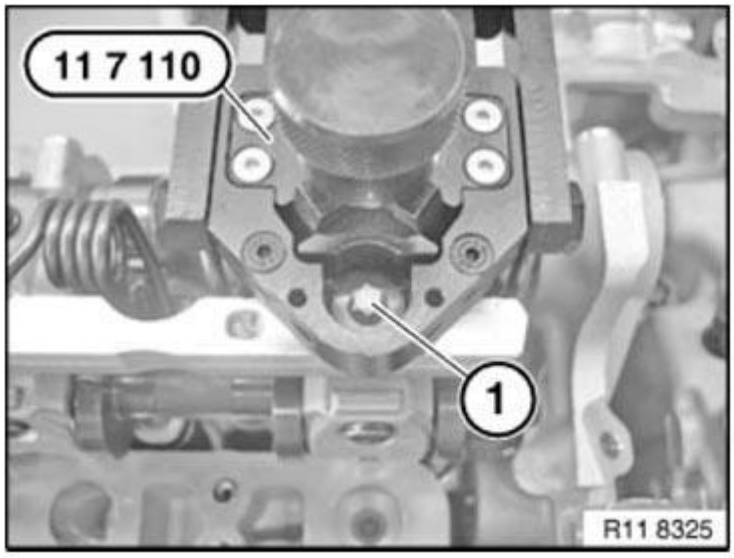


Fig. 355: Identifying Return Spring With Screws And Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

At cylinder no. 3, adjust oil spray nozzle (2) so that oil spray points precisely towards spline teeth (3).

Insert screw (1) with oil spray nozzle (2) (external).

Tightening torque **11 37 4AZ** .

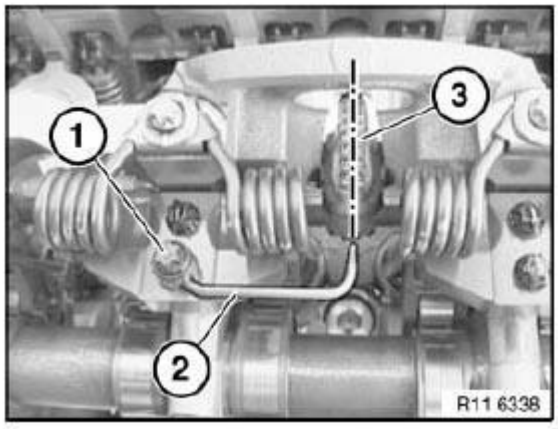


Fig. 356: Identifying Oil Spray Nozzle, Spline Teeth And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

OIL SUPPLY

11 40 000 CHECKING ENGINE OIL PRESSURE (WITHOUT HYDRAULIC VALVE)

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Notes

IMPORTANT: The regulated oil pump can only be checked and measured with the diagnosis system.
Vehicles with a regulated oil pump have a HYDRAULIC VALVE fitted.
If a hydraulic valve is fitted, proceed in accordance with CHECKING ENGINE OIL PRESSURE .

Necessary preliminary tasks

- Remove **ACOUSTIC COVER**
- Protect drive belt against dirt
- Have a cleaning cloth ready to catch escaping oil

Disconnect plug connection on oil pressure switch (3)

Remove oil pressure switch (3).

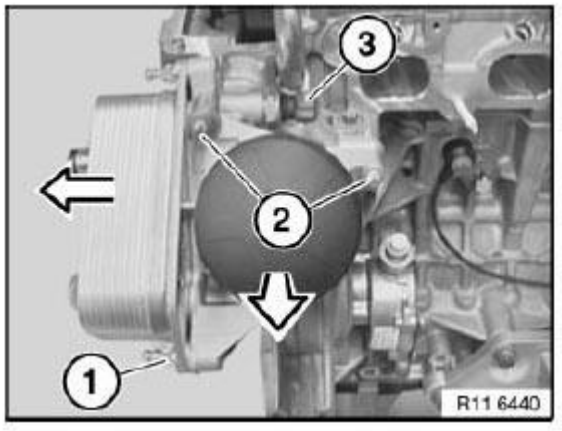


Fig. 357: Releasing Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool **11 4 050** with sealing ring.

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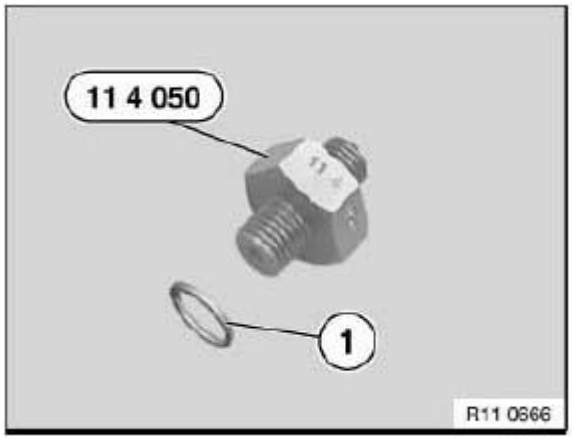


Fig. 358: Identifying Special Tool (11 4 050) And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Check engine oil pressure with diagnosis system

Connect special tools 13 6 054 and 13 6 051.

Check engine oil pressure with pressure gauge

Connect special tools 13 3 063 and 13 3 061.

Start engine and check **ENGINE OIL PRESSURE** .

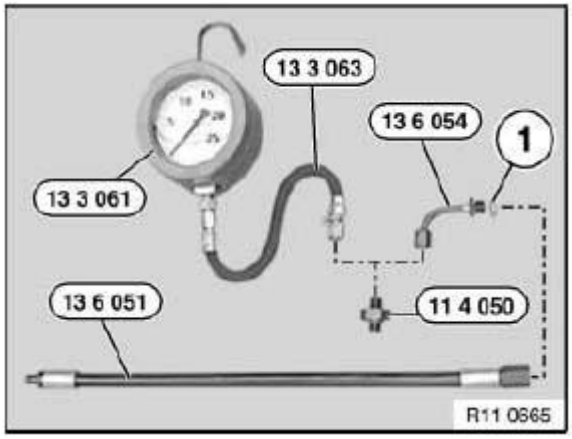


Fig. 359: Checking Engine Oil Pressure
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 40 000 CHECKING ENGINE OIL PRESSURE (WITH HYDRAULIC VALVE)

Notes

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IMPORTANT: The regulated oil pump can only be checked and measured with the diagnosis system.

Vehicles with a regulated oil pump have a HYDRAULIC VALVE fitted.

Diagnosis path:

- **DME Motor Electronics**
- **Complete vehicle**
- **Drive**
- **Engine electronics**
- **Engine oil**
- **Oil-pressure control**

Special tool 11 9 250 must be converted for the N52k and N53.

Necessary preliminary tasks:

- Connect BMW diagnosis system to vehicle.
- Observe diagnosis instructions.
- Protect drive belt against dirt
- Have a cleaning cloth ready to catch escaping oil

Secure special tool 11 9 250 at hexagon head in a vice.

Release insert (2) using a screwdriver (1) in direction of arrow.

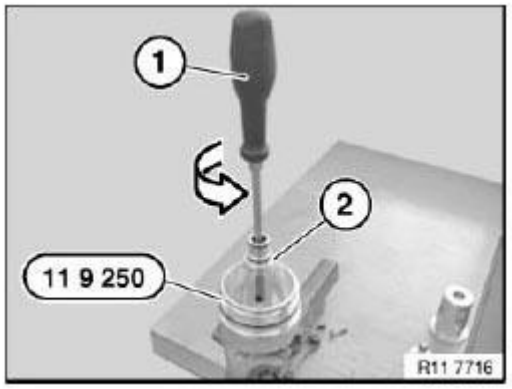


Fig. 360: Releasing Insert Using Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw piece (1) on special tool 11 6 410.

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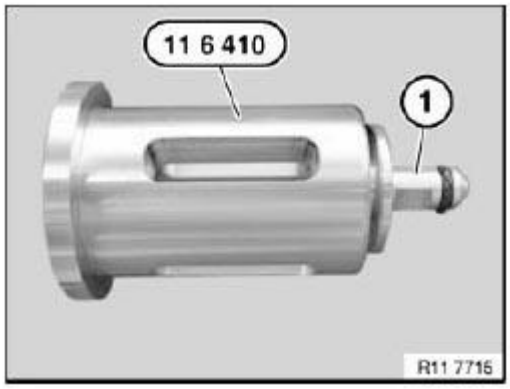


Fig. 361: Identifying Screw Piece With Special Tool (11 6 410)
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool 11 6 410 in special tool 11 9 250.

Insert central screw with a screwdriver (1) hand-tight.

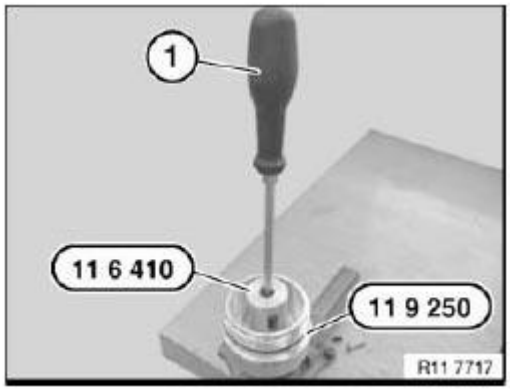


Fig. 362: Inserting Central Screw Using Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screw piece (1) hand-tight in direction of arrow on special tool 11 6 410.

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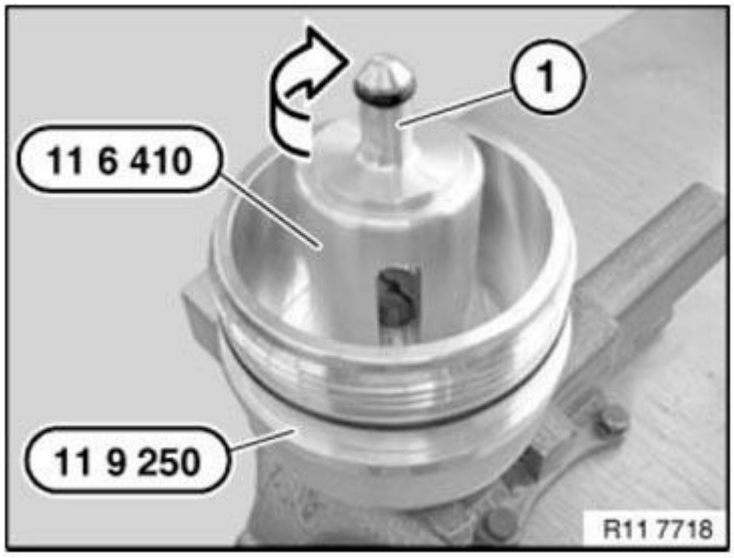


Fig. 363: Tightening Screw Piece
Courtesy of BMW OF NORTH AMERICA, INC.

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

Tightening torque: **11 42 1AZ**

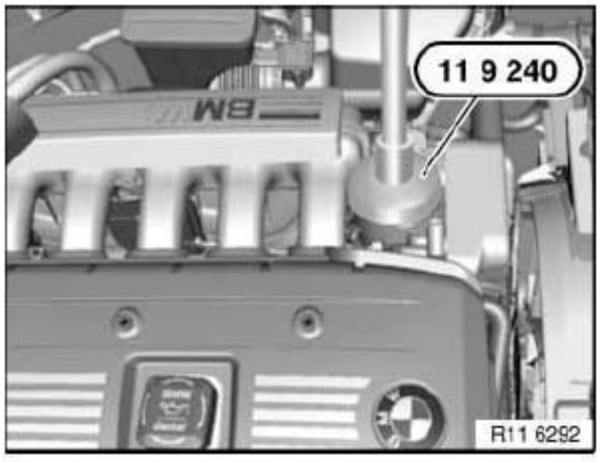


Fig. 364: Removing Oil Filter Cap Using Special Tool (11 9 240)
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully detach filter element.

Installation

Check all O-rings for damage, replace if necessary.

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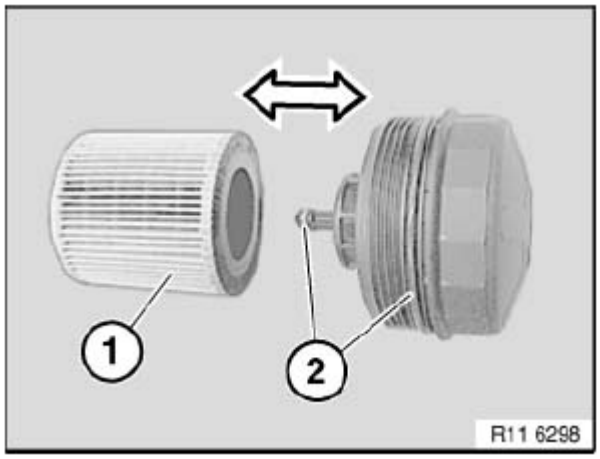


Fig. 365: Identifying Filter Element
Courtesy of BMW OF NORTH AMERICA, INC.

Install filter element (1) in special tool 11 9 250.

Installation:

Coat O-ring with engine oil.

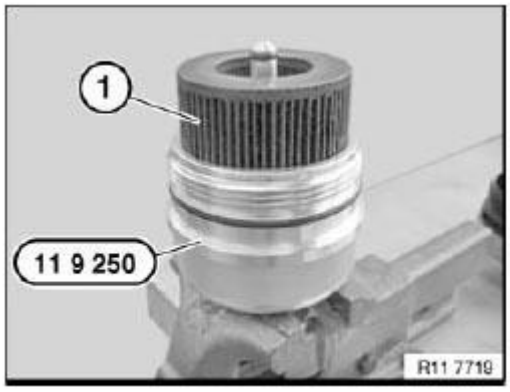


Fig. 366: Identifying Filter Element With Special Tool (11 9 250)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Engine oil pressure measurement is only possible with the diagnosis system.

Screw in special tool 11 9 250 with a filter element.

Secure special tool 13 6 051 with a sealing ring to special tool.

Start engine and check **ENGINE OIL PRESSURE** .

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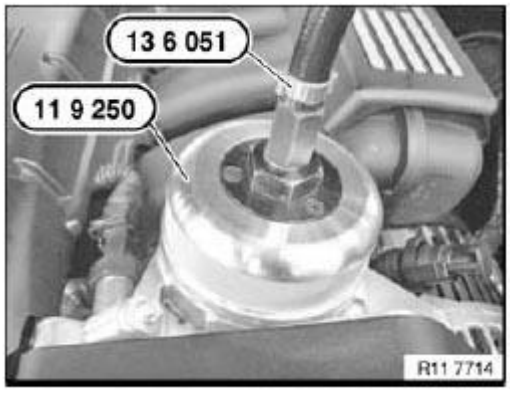


Fig. 367: Identifying Special Tool (13 6 051 And 11 9 250)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

OIL PUMP WITH FILTER AND DRIVE

11 41 010 REMOVING AND INSTALLING/REPLACING CHAIN MODULE FOR OIL PUMP/VACUUM PUMP (N52K)

Notes

IMPORTANT: Aluminium-magnesium materials.

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

A magnesium crankcase requires aluminium screws/bolts exclusively.

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

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

For reliable identification:

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

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

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove **OIL SUMP**
- Remove **DRIVE BELT**
- Remove drive belt **TENSIONER**

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- Remove **VIBRATION DAMPER**
- Remove **SEALING COVER** for vacuum pump

Procedure on installed engine

Turn sprocket (3) with central bolt at crankshaft into position until special tool **11 0 290** can be secured.

Simultaneously secure special tool **11 0 290** to sprocket (3) and special tool 11 4 362.

Release screw (2) for sprocket (3).

Tightening torque **11 66 2AZ** .

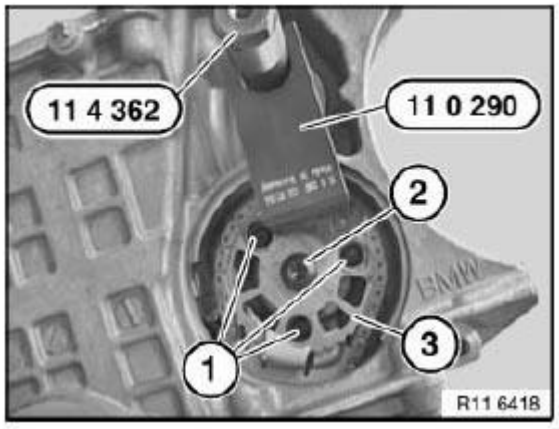


Fig. 368: Identifying Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Press timing chain with chain tensioner (1) in direction of arrow.

Disconnect timing chain with special tool **11 4 120** .

Feed out sprocket (3) at hexagon head (4) of vacuum pump.

Installation:

If the chain module is replaced, a mounting bar (2) is already pre-installed.

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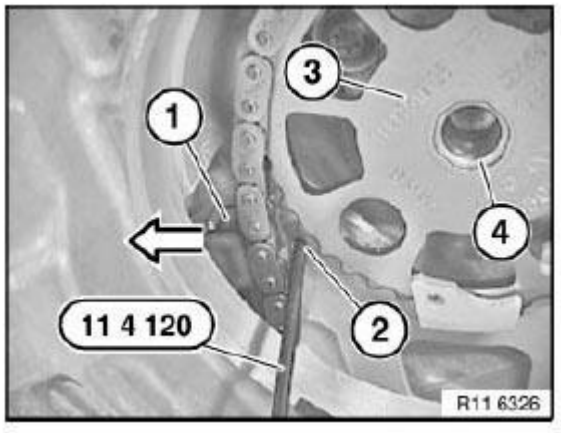


Fig. 369: Pressing Timing Chain Using Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: To release bolt (1), insert a 6 mm drill bit between sprocket and oil pump housing.

Release screw (1) for sprocket.

Tightening torque **11 41 6AZ** .

Release screws (2) for chain module.

Tightening torque **11 41 5AZ** .

Installation:

Replace aluminium screws

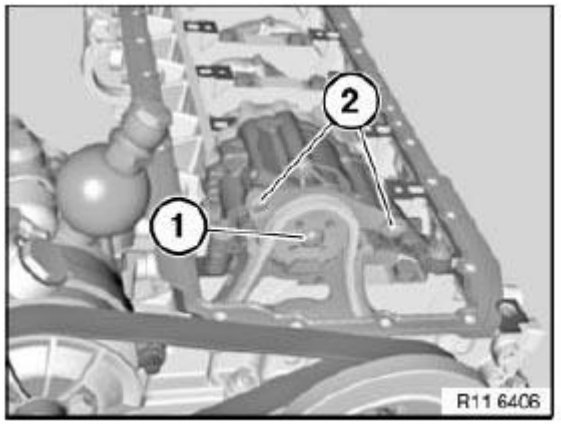


Fig. 370: Identifying Bolt And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Secure crankshaft and camshaft with special tools **11 0 300** and **11 4 280** (refer to **CHECKING TIMING**).

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IMPORTANT: Do not remove special tools 11 0 300 and 11 4 280 to release central bolt (1). Employ a second person for gripping when releasing central bolt (1).

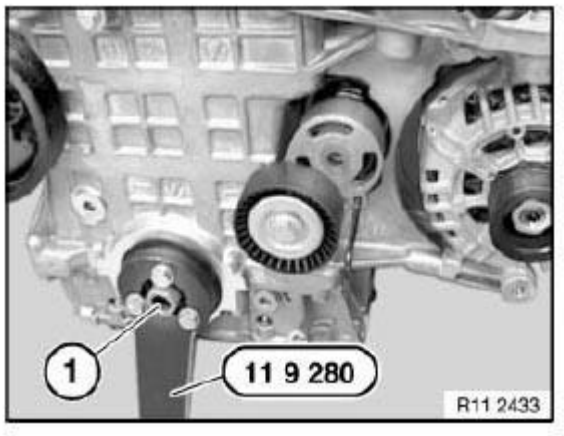


Fig. 371: Identifying Central Bolt With Special Tool (11 9 280)
Courtesy of BMW OF NORTH AMERICA, INC.

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

Release central screw (1).

Tightening torque **11 21 1AZ** .

Installation:

Replace central bolt (1)

Remove hub (2) towards front.

Installation:

Replace **CRANKSHAFT RADIAL SEAL** at front.

Open screw plug on bedplate.

Tightening torque **11 11 5AZ** .

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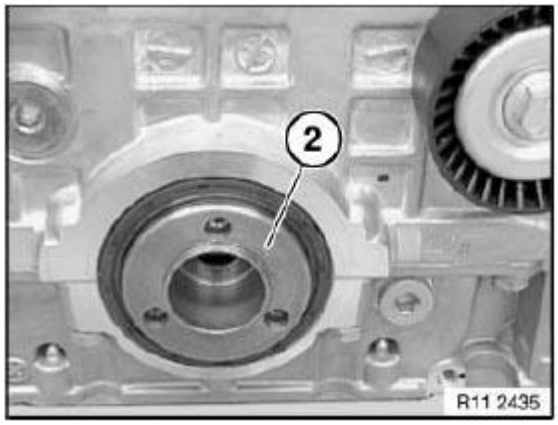


Fig. 372: Identifying Front Hub
Courtesy of BMW OF NORTH AMERICA, INC.

Release aluminium screw (1) with special tool **11 8 640** .

Tightening torque **11 41 4AZ** .

Installation:

Replace aluminium screws

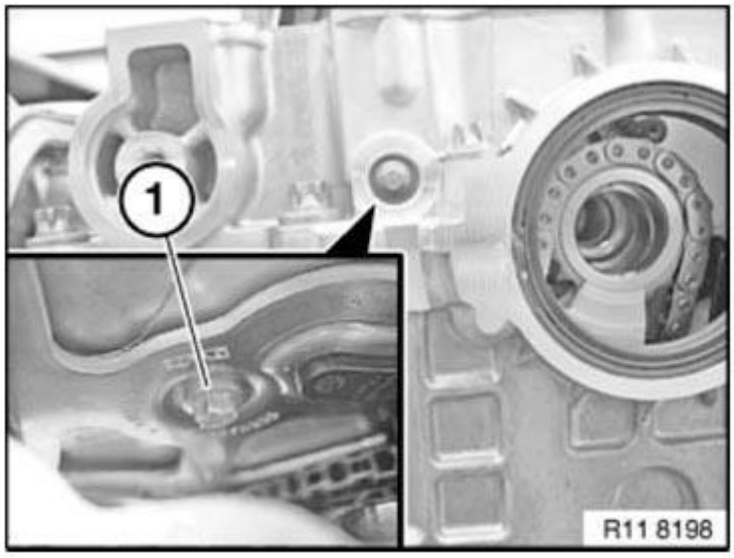


Fig. 373: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove chain module (1) in direction of arrow.

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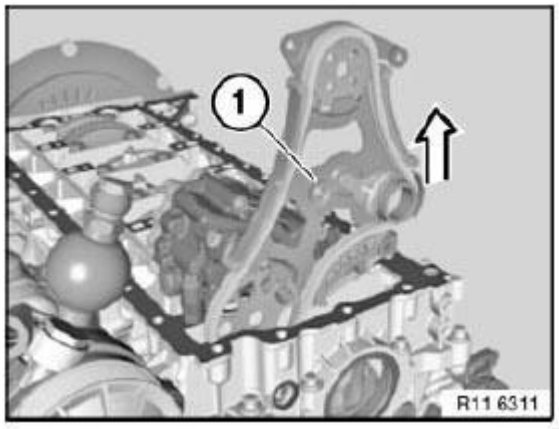


Fig. 374: Removing Chain Module
Courtesy of BMW OF NORTH AMERICA, INC.

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

Incorrect assembly will result in engine damage.

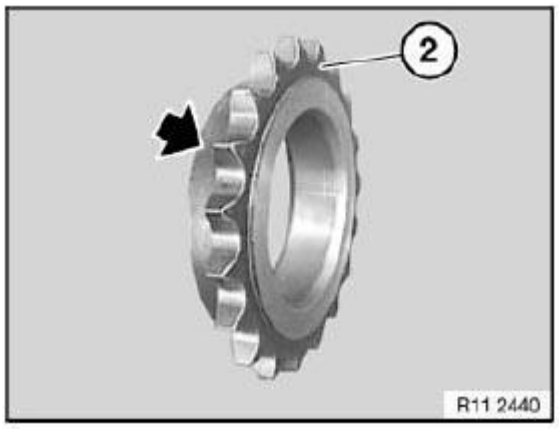


Fig. 375: Locating Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Procedure on removed engine

NOTE: Engine is mounted on special tool 11 4 440 .

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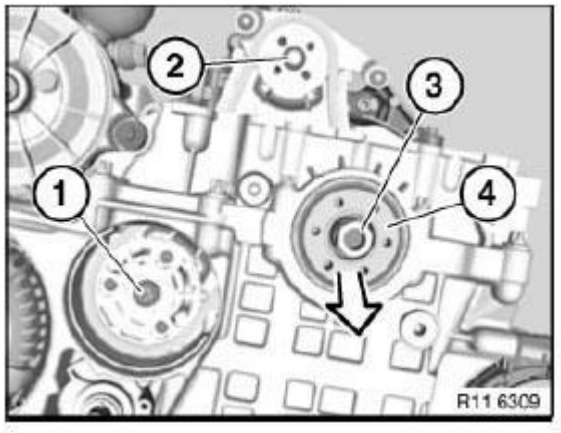


Fig. 376: Identifying Sprocket Wheel Screws, Central Bolt And Front Hub
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) for sprocket.

Tightening torque **11 66 2AZ** .

Release screw (2) for sprocket.

Tightening torque **11 41 6AZ** .

Release central bolt (3).

Tightening torque **11 21 1AZ** .

Installation:

Mark central bolt (3) with a colored dot.

Replace central bolt (3)

Remove hub (4) towards front.

All:

Install hub with new central bolt.

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

Do **not** remove special tools **11 0 300** and **11 4 280** .

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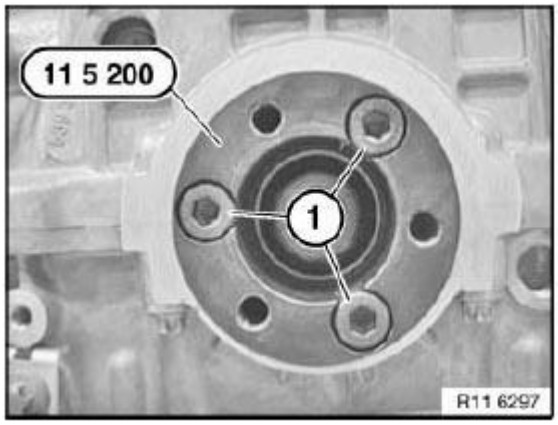


Fig. 377: Identifying Screws With Special Tool (11 5 200)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **TENSIONER** for drive belt.

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

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

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

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

Tighten central bolt to jointing torque.

Tightening torque **11 21 1AZ** .

Mark central bolt and hub with paint.

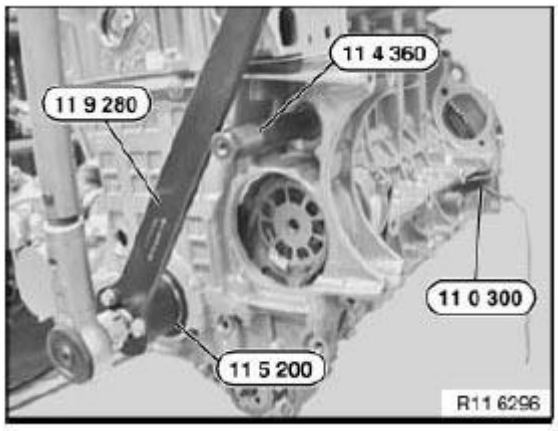


Fig. 378: Identifying Special Tool (11 9 280, 11 4 360, 11 5 200 And 11 0 300)
Courtesy of BMW OF NORTH AMERICA, INC.

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Mark special tools with colored line (1).

See picture.

IMPORTANT: Do not remove the special tool while tightening the central bolt to angle of rotation.

Risk of damage!

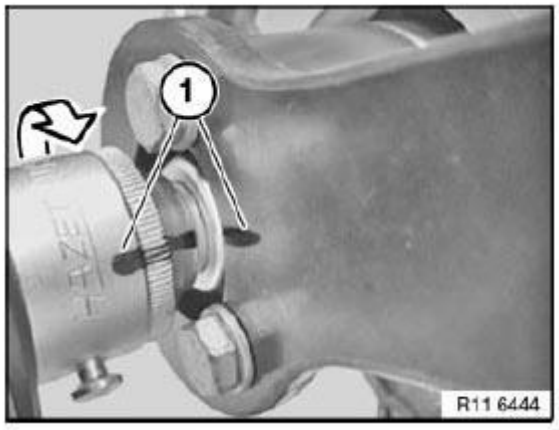


Fig. 379: Identifying Colored Line
Courtesy of BMW OF NORTH AMERICA, INC.

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

Tightening torque **11 21 1AZ** .

Installation:

Replace **CRANKSHAFT RADIAL SEAL** at front.

Assemble engine.

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

IMPORTANT: Aluminium-magnesium materials.

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

A magnesium crankcase requires aluminium screws/bolts exclusively.

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

Aluminium screws/bolts are permitted with and without

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color coding (blue).

For reliable identification:

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

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

Necessary preliminary tasks

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

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

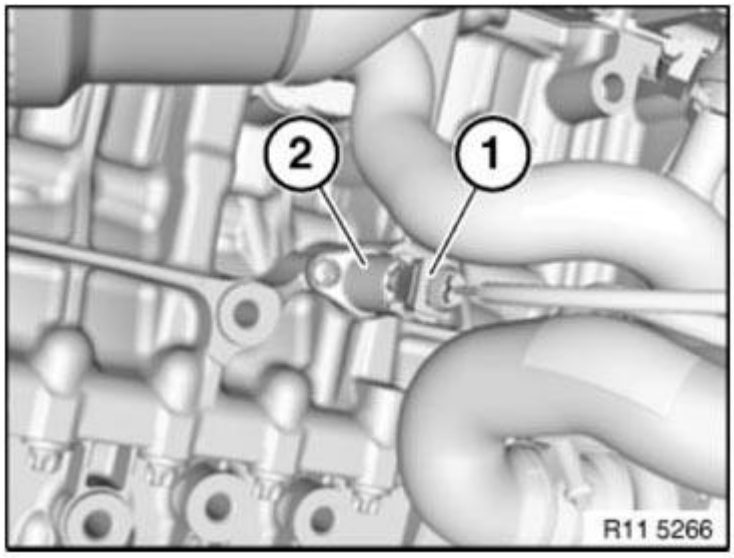


Fig. 380: Identifying Hydraulic Valve With Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove hydraulic valve (2).

TIGHTENING TORQUE

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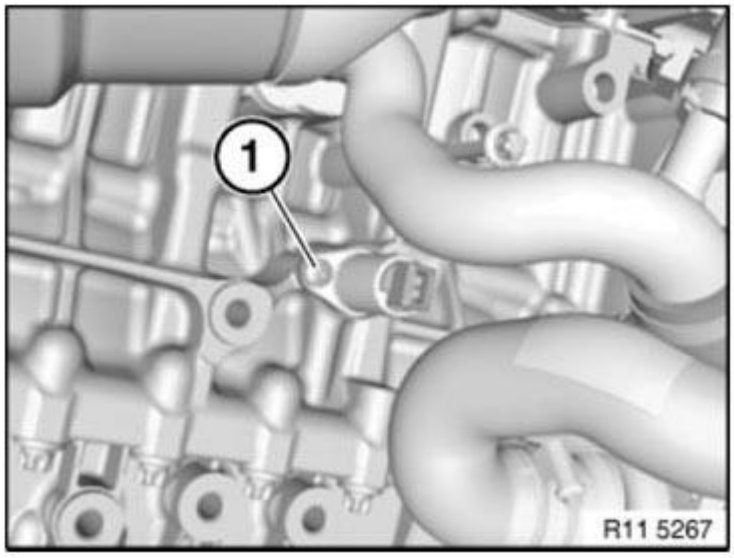


Fig. 381: Identifying Hydraulic Valve With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replace O-ring (1).

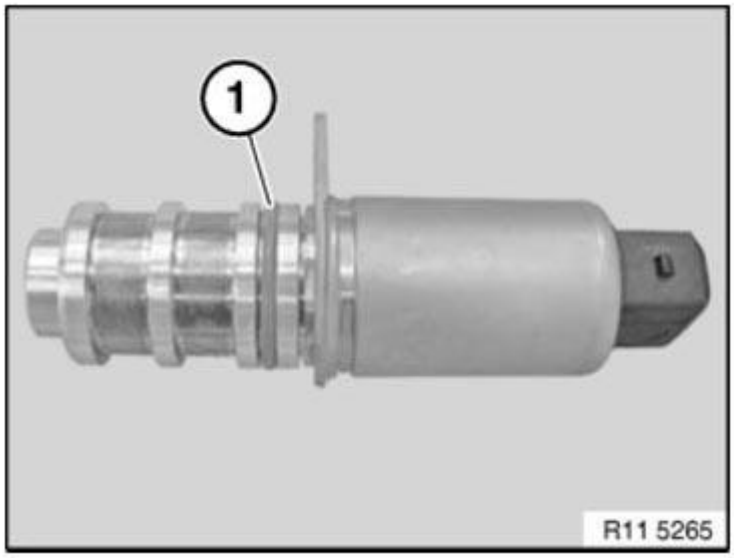


Fig. 382: Identifying O-Ring
Courtesy of BMW OF NORTH AMERICA, INC.

11 41 000 REMOVING AND INSTALLING/REPLACING OIL PUMP (N52K)

Necessary preliminary tasks

- Remove **OIL SUMP**

Release screws (1).

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Tightening torque **11 41 1AZ** .

Installation:

Replace aluminium screws

Remove intake pipe (2) in direction of arrow.

Installation:

Replace sealing ring.

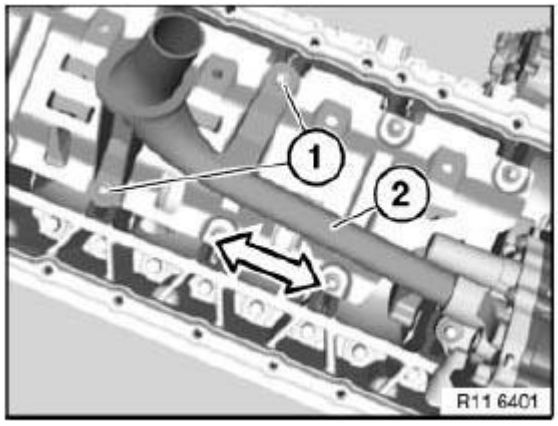


Fig. 383: Removing Intake Pipe
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: To release bolt (1), insert a 6 mm drill bit between sprocket wheel and oil pump housing.

Release bolt (1).

Tightening torque **11 41 6AZ** .

Release screws (2).

Tightening torque **11 41 5AZ** .

Installation:

Replace aluminium screws.

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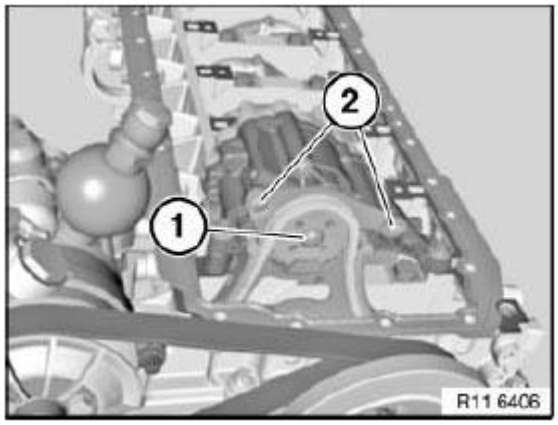


Fig. 384: Identifying Bolt And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe different screw lengths.

Release screws (1).

Tightening torque **11 41 2AZ** .

Tightening torque **11 41 3AZ** .

Installation:

Replace aluminium screws

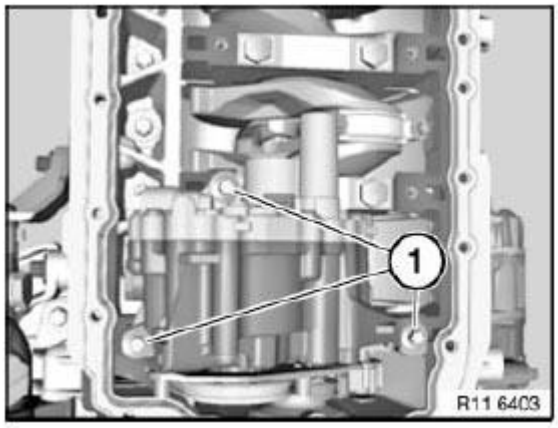


Fig. 385: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Detach sprocket wheel (1) in direction of arrow.

NOTE: Chain tensioner presses timing chain (3) upwards.

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Do **not** remove sprocket wheel (1).

Remove oil pump (2) in direction of arrow.

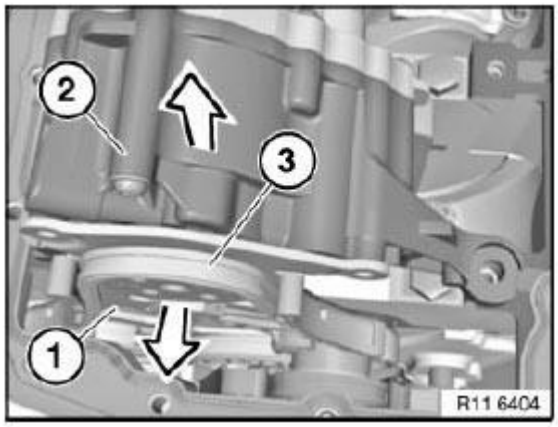


Fig. 386: Pulling Drive Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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

Align twin surface (3) on oil pump (2) to sprocket wheel (4).

Install oil pump (2).

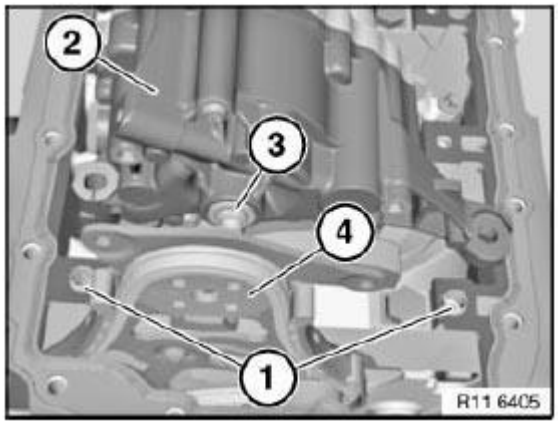


Fig. 387: Identifying Spacer Bushings And Oil Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

OIL FILTER AND LINES

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11 42 020 REMOVING AND INSTALLING/REPLACING FULLFLOW OIL FILTER (N52)

WARNING: Danger of scalding!

Only perform these tasks on an engine that has cooled down.

Recycling

Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks

- Drain **COOLANT** .
- Remove intake air **MANIFOLD** .
- Unfasten oil filter cover.
- Protect drive belt against dirt.

Release screw (1).

Tightening torque: **11 42 1AZ**

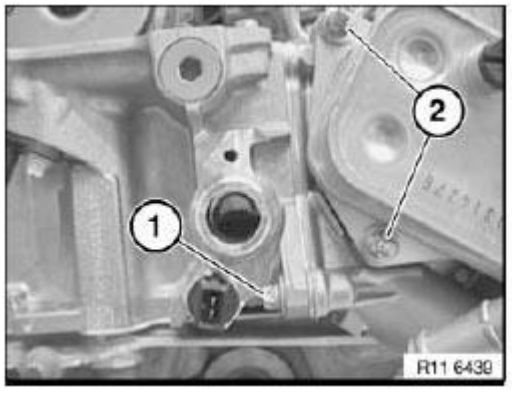


Fig. 388: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (2).

NOTE: Have cleaning cloth ready to catch residual oil.

Tightening torque: **11 42 1AZ**

Installation:

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Replace all seals.

If necessary, replace filter element.

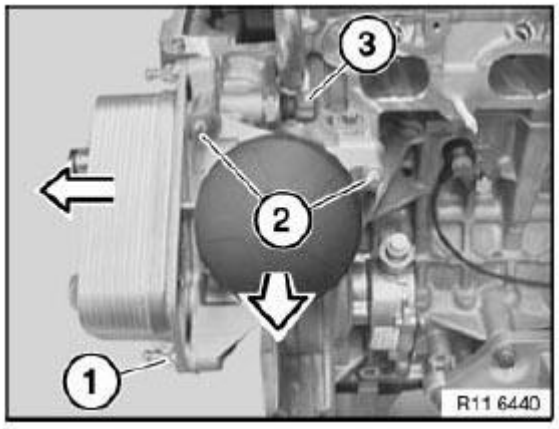


Fig. 389: Releasing Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

NOTE: Protect drive belt against dirt.

Installation:

VENTING INSTRUCTIONS must be observed without fail.

WATER PUMP WITH DRIVE

11 51 000 REMOVING AND INSTALLING/REPLACING WATER PUMP (N52K)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

Recycling

Catch and dispose of drained coolant in a suitable container.

Observe country-specific waste-disposal regulations.

IMPORTANT: If a water pump that has already been operated is reused, it must be filled with coolant immediately after removal.
Mixture ratio, water: coolant = 1 : 1

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Protect plug connections against coolant and contamination.
Cover plug connections with suitable materials.

IMPORTANT: Aluminium-magnesium materials.

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

A magnesium crankcase requires aluminium screws/bolts exclusively.

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

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

For reliable identification:

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

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

Necessary preliminary tasks

- Remove **COOLANT THERMOSTAT**

Loosen hose clamps (1).

Remove coolant hose.

Tightening torque **11 53 5AZ** .

Unfasten hose clip (2).

Remove coolant hose.

Tightening torque **11 53 3AZ** .

Disconnect plug connection (4).

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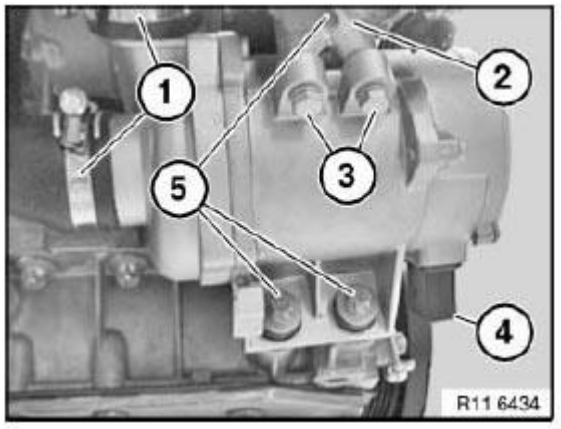


Fig. 390: Identifying Coolant Hose, Plug Connection With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (3).

Tightening torque **11 53 1AZ** .

Release screws (5).

Tightening torque **11 51 1AZ** .

Installation:

Replace aluminium screws

Installation:

If the electric water pump is reused, it must be rotated one turn due to the breakaway torque at the blade wheels.

Assemble engine.

VENTING INSTRUCTIONS must be observed **without fail** .

THERMOSTAT AND CONNECTIONS

11 53 000 REMOVING AND INSTALLING/REPLACING COOLANT THERMOSTAT (N52K)

WARNING: Risk of scalding!

Only perform these tasks on an engine that has cooled down.

Danger of injury!

Risk of skidding due to coolant on the floor.

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Recycling

Catch and dispose of drained coolant in a suitable collecting vessel.

Observe country-specific waste disposal regulations.

IMPORTANT: Read and comply with GENERAL NOTES .
Protect plug connections against coolant and dirt contamination.

Cover plug connections with suitable materials.

Necessary preliminary work

- Remove **UNDERBODY PROTECTION**

NOTE: Illustration shows coolant thermostat removed.

Disconnect coolant hoses (arrows) on the thermostat (1) with clamping tongs.

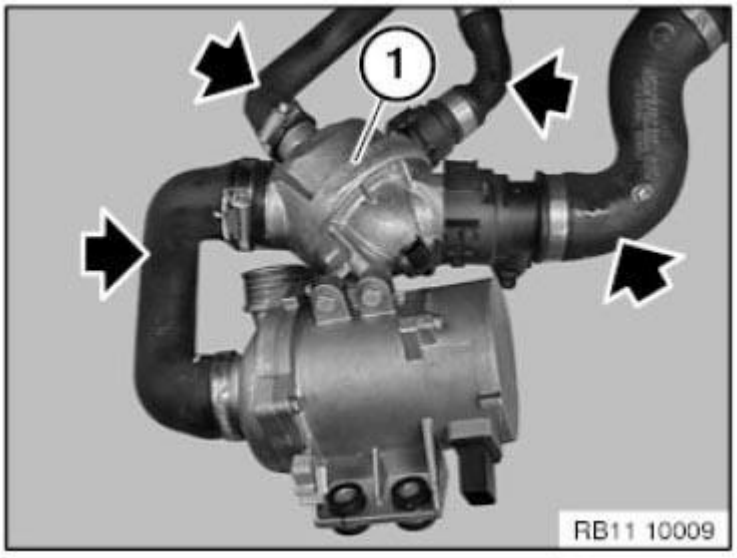


Fig. 391: Locating Thermostat Coolant Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For a better overview, the picture and text refer to the component when removed.

Unfasten hose clamp (1).

Tightening torque **11 53 5AZ** .

Remove coolant hose.

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Unfasten hose clamp (2).

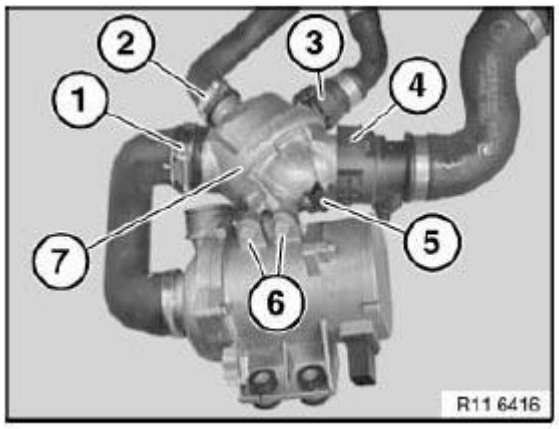


Fig. 392: Identifying Hose Clamp And Coolant Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **11 53 6AZ** .

Remove coolant hose.

Unlock and detach coolant hose (3).

Unlock and detach coolant hose (4).

Disconnect plug connection (5).

Release screws (6).

Tightening torque **11 53 1AZ** .

Remove coolant thermostat (7).

Assemble engine.

FILL THE COOLING SYSTEM .

CHECK THE COOLING SYSTEM FOR TIGHTNESS AND FUNCTION.

INTAKE MANIFOLD

11 61 050 REMOVING AND INSTALLING AIR INTAKE MANIFOLD (N52K)

Necessary preliminary tasks

- Remove **TENSION STRUT**

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- Remove **INTAKE FILTER HOUSING**
- Remove **IGNITION COIL COVER**

Open holder (2).

Disconnect plug connection (1) under of air intake manifold.

Release both crankcase breathers (3).

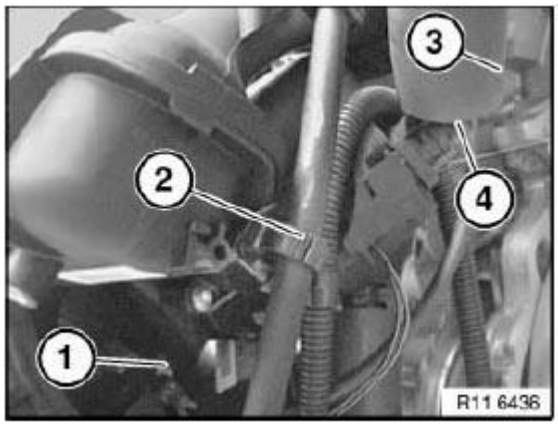


Fig. 393: Identifying Plug Connection, Holders And Crankcase Breathers
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Disconnect plug connection (3).

Release screws (4).

Detach engine wiring harness (2) from air intake manifold and lay to one side.

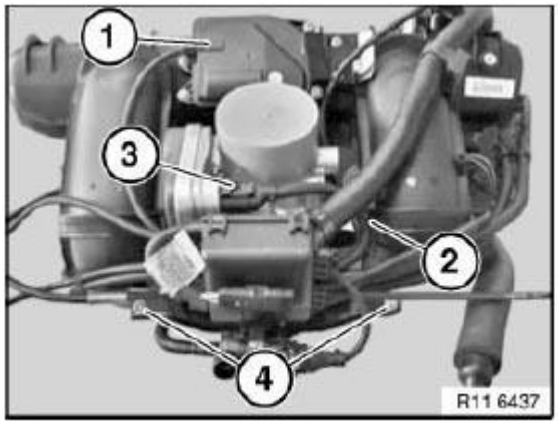


Fig. 394: Identifying Engine Wiring Harness, Plug Connections And Screws

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Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on oil pressure switch (2).

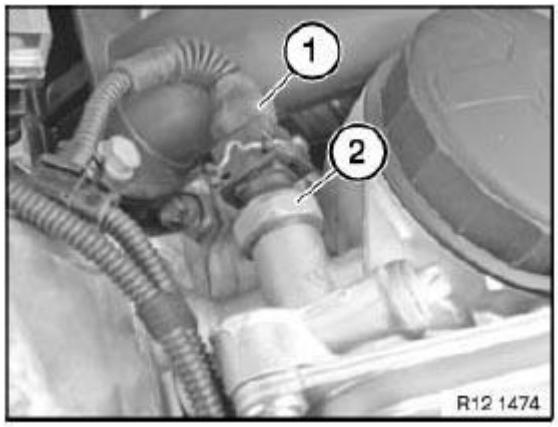


Fig. 395: Identifying Oil Pressure Switch And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release fuel rail (2) and lay to one side.

NOTE: Do not detach fuel line.

Release screws (1).

Tightening torque **11 61 1AZ** .

Unscrew nuts (3).

Tightening torque **11 61 2AZ** .

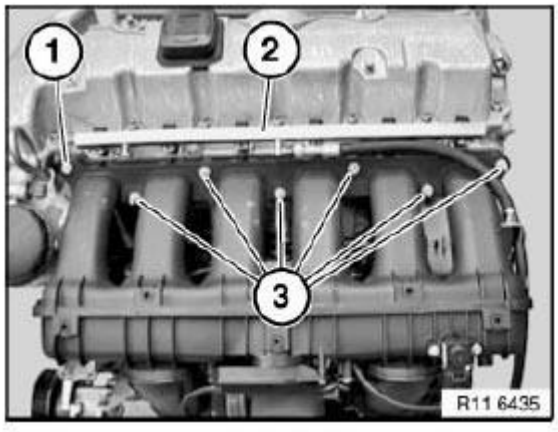


Fig. 396: Identifying Fuel Rail With Screw And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

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Raise air intake manifold approx. 10 cm.

Disconnect plug connections (1) at bottom.

Release tank vent line behind throttle valve assembly.

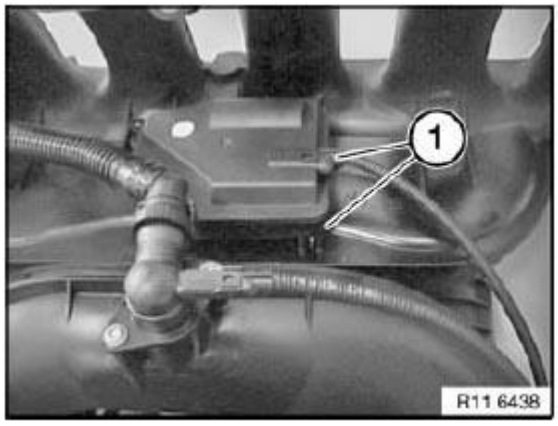


Fig. 397: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Replace all seals.

Assemble engine.

EXHAUST MANIFOLD

18 40 050 REMOVING AND INSTALLING/REPLACING FRONT EXHAUST MANIFOLD (N52, N52K)

Necessary preliminary tasks

- Remove **REAR EXHAUST MANIFOLD**

NOTE: The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.

Remove **CONTROL SENSOR** from cylinders 1 to 3.

Remove **MONITORING SENSOR** from cylinders 1 to 3.

Unscrew nuts.

Remove exhaust manifold (1).

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Installation:

Clean sealing faces and replace seals.

Replace nuts.

Tightening torque **18 40 1AZ** .

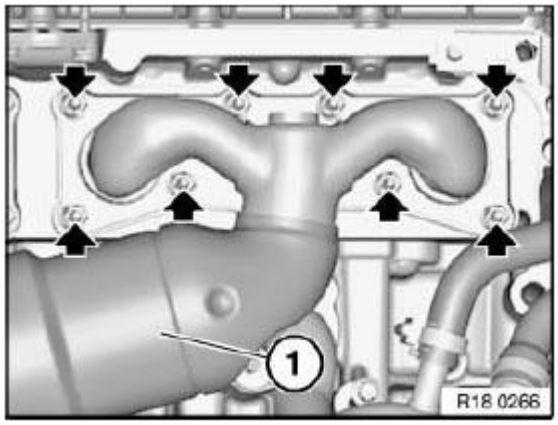


Fig. 398: Identifying Exhaust Manifold With Mounting Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

18 40 060 REMOVING AND INSTALLING/REPLACING REAR EXHAUST MANIFOLD (N52, N52K)

Necessary preliminary work

- Remove **IGNITION COIL COVER**
- Release **COOLANT EXPANSION TANK** and place to one side.

  Do **not** remove the expansion tank and doe **not** drain coolant.

- Remove **UNDERBODY PROTECTION**
- Remove **COMPLETE EXHAUST SYSTEM** .

NOTE: The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.

Remove **CONTROL SENSOR** from cylinders 4 to 6.

Remove **MONITORING SENSOR** from cylinders 4 to 6.

Unscrew nuts.

Remove exhaust manifold (1).

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Installation note:

Clean sealing surfaces and replace seals.

Replace nuts.

Tightening torque, **18 40 1AZ**

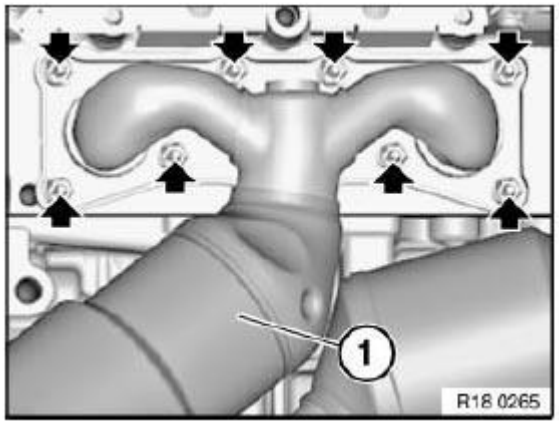


Fig. 399: Identifying Exhaust Manifold With Mounting Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

VACUUM PUMP

11 66 000 REMOVING AND INSTALLING OR REPLACING VACUUM PUMP (N52)

Necessary preliminary work

- Remove **DRIVE BELT**.
- Remove **BELT TENSIONER** for drive belt.
- Remove **SEALING CAP** for vacuum pump.
- Remove intake **PLENUM**.

Rotate crankshaft at central bolt.

Rotate camshaft sprocket (3) until drilled holes and screws (1) match up.

Screw in special tool 11 4 362 (adapter).

Secure special tool **11 0 290** in sprocket (3) and on special tool 11 4 362 (adapter).

Release screw (2).

Tightening torque: **11 66 2AZ** .

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Release screws (1) and secure against falling out.

Tightening torque: **11 66 1AZ** .

Remove vacuum pump towards rear.

Installation note:

Replace gasket.

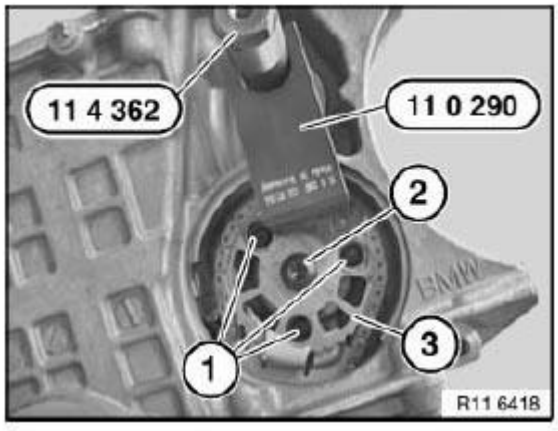


Fig. 400: Identifying Special Tool (11 0 290) And (11 4 362)
Courtesy of BMW OF NORTH AMERICA, INC.

Press chain tensioner with chain (1) in direction of arrow.

Insert special tool **11 4 120** .

Remove special tool **11 0 290** .

Remove camshaft sprocket (2) in direction of arrow.

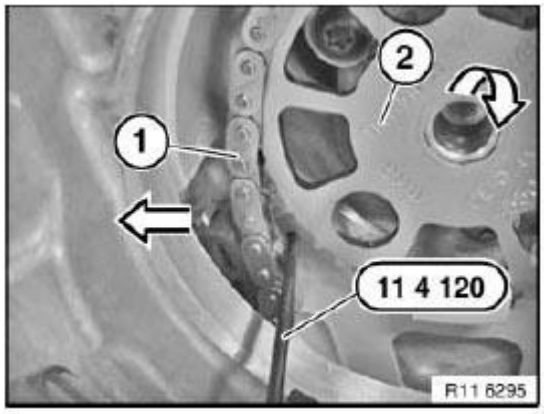


Fig. 401: Removing Camshaft Sprocket

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Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

EMISSION CONTROL, OXYGEN SENSOR

11 78 513 REPLACING BOTH LAMBDA OXYGEN CONTROL SENSORS (N52K)

Notes

WARNING: Risk of burning!

Work should only be carried out on an exhaust system that has cooled down.

Installation note:

The threads of new oxygen control sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a oxygen control sensor is to be reused, apply a thin and even coating of Never Seez compound to the thread only.

The part of the lambda control sensor which projects into the exhaust system branch (sensor ceramics) must **not** be cleaned and **not** coated with lubricant.

Lambda control sensor, cylinder nos. 1 to 3

NOTE: The lambda control sensor on the exhaust manifold of cylinder nos. 1 to 3 is accessible from above. The exhaust system does not have to be removed.

Lambda control sensor, cylinder nos. 1 to 3

Necessary preliminary tasks:

- **REMOVE** exhaust system (only E60, E61, E63, E64)

Disconnect plug connection on oxygen control sensor (1).

Release lambda control sensor (1) on exhaust manifold of cylinder nos. 4 to 6 with special tool **11 4 260** .

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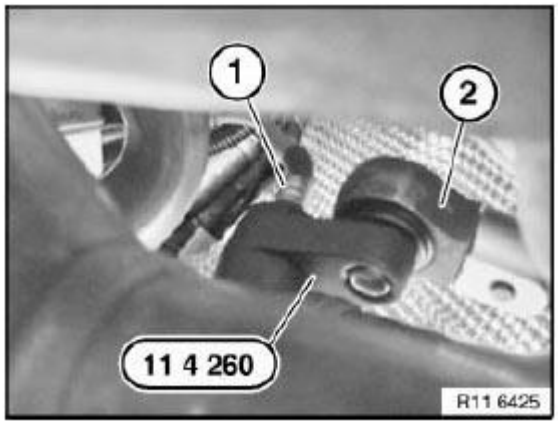


Fig. 402: Removing Lambda Oxygen Control Sensor Using Special Tool 11 4 260
Courtesy of BMW OF NORTH AMERICA, INC.

All:

Installation note:

Cable color of lambda control sensor, cylinders nos. 1 to 3 = black.

Cable color of lambda control sensor, cylinders nos. 4 to 6 = grey.

Tightening torque **11 78 1AZ** .

Assemble engine.

Check function of DME.

11 78 545 REPLACING BOTH LAMBDA OXYGEN MONITORING SENSORS (N52K)

Notes

WARNING: Risk of burning!

Work should only be carried out on an exhaust system that has cooled down.

Necessary preliminary tasks:

- Remove **UNDERBODY PROTECTION**

Installation note:

The threads of new lambda monitoring sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

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If a lambda monitoring sensor is to be reused, apply a thin and even coating of Never Seez Compound to the thread only.

The part of the lambda monitoring sensor which projects into the exhaust system branch (sensor ceramics) must **not** be cleaned and **not** coated with lubricant.

Disconnect plug connection on lambda monitoring sensor (1).

Release lambda monitoring sensor (1) on exhaust manifold of cylinder nos. 1 to 3 with special tool **11 9 150** .

Tightening torque **11 78 1AZ** .

Installation note:

Cable color of lambda monitoring sensor (1), cylinders nos. 1 to 3 = black.

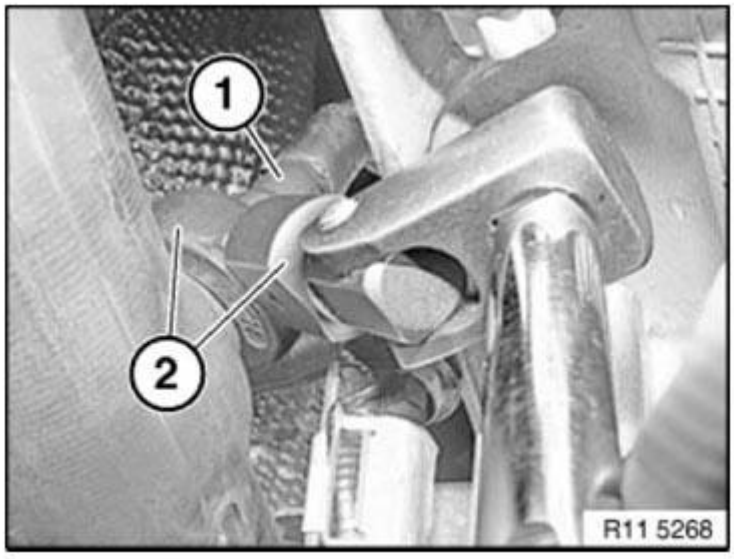


Fig. 403: Removing Lambda Monitoring Sensor Plug Connection Using Special Tool (11 9 150)
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection on lambda monitoring sensor (1).

Release lambda monitoring sensor (1) on exhaust manifold of cylinder nos. 4 to 6 with special tool **11 9 150** .

Tightening torque **11 78 1AZ** .

Installation note:

Cable color of lambda monitoring sensor (1), cylinders nos. 4 to 6 = grey.

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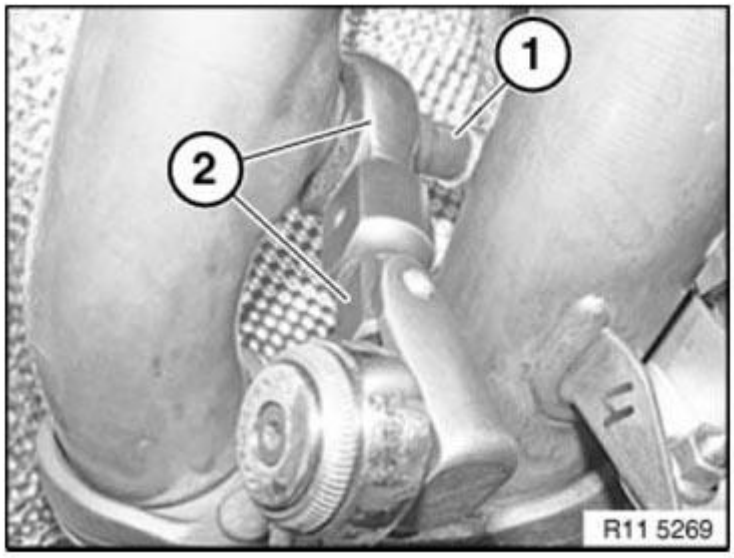


Fig. 404: Removing Lambda Monitoring Sensor Plug Connection Using Special Tool (11 9 150)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

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