

ENGINE**Engine - Repair Instructions - V8 (N62, N62TU)****00 ENGINE, GENERAL****00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN****Danger of poisoning!**

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

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

Protective measures/rules of conduct:

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

First aid measures:

- Do not induce vomiting.

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

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

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN**Danger of injury!**

Contact with eyes or skin may result in injury!

Possible symptoms are:

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

Protective measures/rules of conduct:

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

First aid measures:

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

NOTE: Do not use solvents/thinners.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: Danger of poisoning if oil is ingested/absorbed through the skin!

Risk of injury if oil comes into contact with eyes and skin!

Recycling:

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released:

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

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

00 00 610 ENGINE OIL SERVICE (N62/N62TU)*Recycling:*

Catch and dispose of used oil.

Observe country-specific waste-disposal regulations.

NOTE: For purposes of clarity, this work step is shown without the reinforcement plate.

Open oil drain plug (1) in oil sump.

Remove oil drain plug (2) on oil filter cap (3).

Release oil filter cover (3).

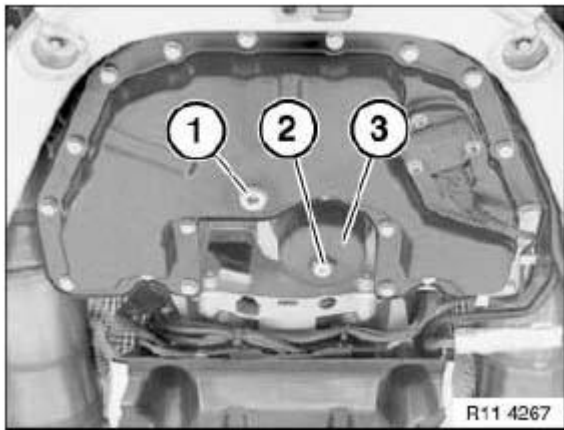


Fig. 1: Identifying Oil Drain Plug, Oil Filter Cap And Oil Filter Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace and lubricate sealing rings (1 and 2).

Replace oil filter element (3) and slide into oil filter cover.

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

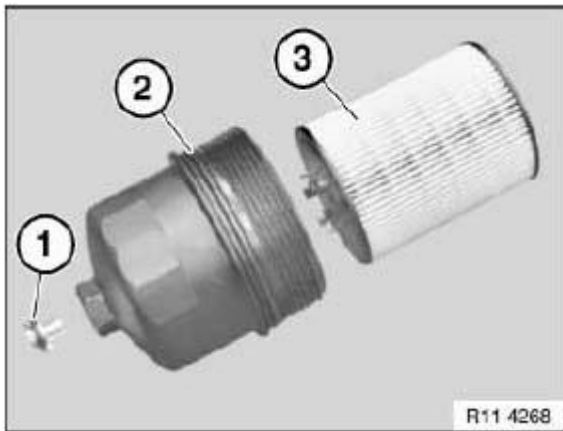


Fig. 2: Replacing Oil Filter Element

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing ring.

Install oil drain plug (1) and tighten down.

Tightening torque: 11 13 1AZ . See **OIL PAN** for specs.

Insert and tighten down oil filter cover (3).

Tightening torque: 11 42 2AZ . See **OIL FILTER AND PIPES** for specs.

Insert oil drain plug (2) on oil filter cap (3) and tighten down.

Tightening torque: 10 Nm.

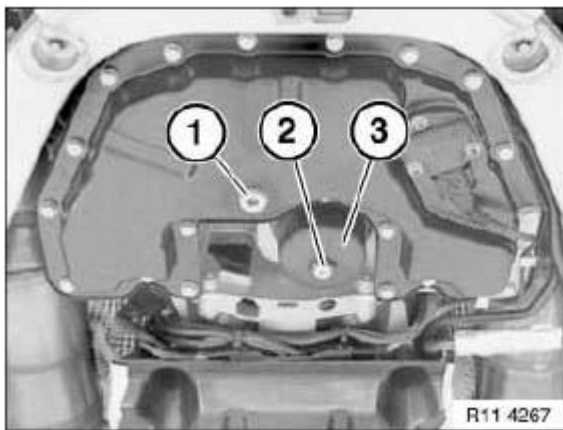


Fig. 3: Identifying Oil Drain Plug, Oil Filter Cover And Oil Filter Cap

Courtesy of BMW OF NORTH AMERICA, INC.

Pour in engine oil.

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

Switch off engine, wait approx. 5 minutes and then check engine oil level.

Top up engine oil if necessary.

11 00 045 CHECKING ABSOLUTE COMPRESSION OF ALL CYLINDERS

Diagnosis and Information System (DIS)



W05 95 001

Fig. 4: Diagnosis And Information System (DIS) Tester
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Remove **ACOUSTIC COVER**.
- Remove right ignition coil cover.
- Connect DIS Tester.

Test:

- Call up Diagnosis
- Select car > right arrow key
- Function selection
 - Complete vehicle
 - Drive
 - Engine management
 - Valve gear
 - Valvetronic variable valve gear
 - Mechanical components / function
- Test schedule > right arrow key
 - Compression test > right arrow key
- Follow DIS Tester instructions.

NOTE: Clear fault memory

11 00 050 REMOVING AND INSTALLING ENGINE (N62 / N62TU)

Special tools required:

- **11 0 000**

Necessary preliminary tasks:

- Disconnect negative battery lead.
- Follow instructions for disconnecting and connecting battery.
- Both exhaust manifolds remain on engine during removal.
- BMW ALPINA B7 vehicles:
 - Order parts in accordance with BMW ALPINA
 - If necessary, modify ALPINA-specific parts

Observe specified tightening torque and safety precautions in all work steps.

WORK STEP REFERENCE CHART

Work step	Note:
Lift engine hood into assembly position	After removing transmission, secure engine against tilting.
Secure engine in installation position with special tool	
Remove gearbox	
Remove <u>INTAKE FILTER HOUSING</u>	
Remove radiator	
Remove radiator lines.	
Remove expansion tank.	

Remove <u>INTAKE AIR MANIFOLD</u>	
Remove heater radiator line.	
Unlock engine wiring harness section on control unit and detach.	Wiring harness remains on engine.
Unlock spark plug wiring harness section on control unit and detach.	Wiring harness remains on engine.
Release negative lead on spring strut dome.	
Release battery positive lead at positive terminal.	
<u>DETACH VACUUM LINE AND VACUUM HOSE FROM VACUUM PUMP.</u>	
<u>UNLOCK LINE ON TANK VENTING VALVE AND DISCONNECT .</u>	
Remove both oxygen monitor sensors. See <u>REPLACING LEFT OXYGEN MONITOR SENSOR (N62 / N62TU)</u> and <u>REPLACING RIGHT OXYGEN MONITOR SENSOR (N62/N62TU).</u>	
Remove both oxygen control sensors. See <u>REPLACING LEFT OXYGEN CONTROL SENSOR (N62/N62TU)</u> and <u>REPLACING RIGHT OXYGEN CONTROL SENSOR (N62/N62TU).</u>	
Release negative lead on engine support arm.	
<u>REMOVE VIBRATION DAMPER AND TENSIONING PULLEY FROM A/C COMPRESSOR DRIVE BELT</u>	
Release power steering pump on bracket, hydraulic lines remain connected.	Do not remove power steering pump, secure against falling down.
Release A/C compressor on bracket, lines remain connected, do not evacuate A/C system.	Do not remove A/C compressor, secure against falling down.
Release ABS control unit on bracket, lines remain connected.	Do not remove ABS control unit, secure against falling down.
Remove lower universal joint of steering spindle	

Vehicles with Dynamic Drive only:

Unlock and detach hydraulic line (1).

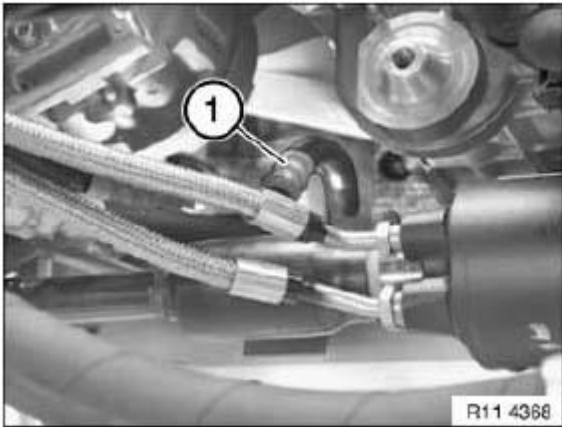


Fig. 5: Identifying Hydraulic Line

Courtesy of BMW OF NORTH AMERICA, INC.

Suspend engine off-center from special tool 11 0 000 .

Release engine mounts on left and right from above.

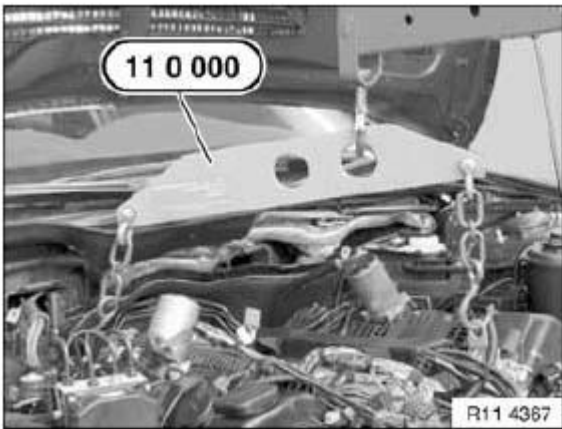


Fig. 6: Identifying Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

Protect assembly compartment and hydraulic lines against damage.

Installation:

Observe specified tightening torque and safety precautions in all work steps.

11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N62, N62TU)

Special tools required:

- **00 0 200**

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

WARNING: Danger of injury!

Observe following instructions relating to special tool:

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

Necessary preliminary tasks:

- Secure 5100 ENGINE BONNET/HOOD IN SERVICE POSITION (5-SERIES) , 51 00 ... SERVICE POSITION OF ENGINE HOOD/BONNET (6-SERIES) or 51 00 ... SERVICE POSITION OF ENGINE HOOD/BONNET (7-SERIES)
- Remove ACOUSTIC COVER
- Remove 13 71 000 INTAKE FILTER HOUSING
- Detach 17 11 100 COOLANT EXPANSION TANK (5-SERIES shown; others similiar) , and place to one side
- Remove tension strut (on spring strut dome)

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

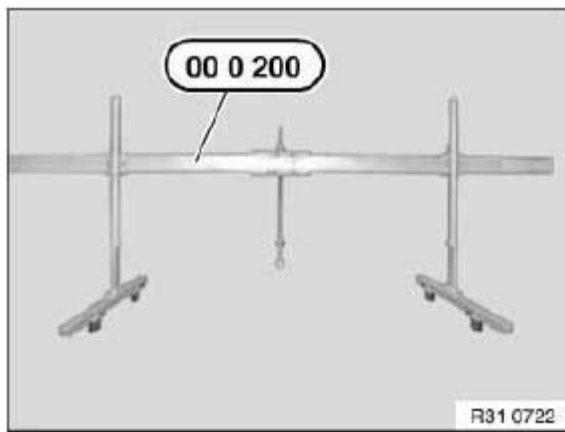


Fig. 7: Identifying Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

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

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

IMPORTANT: Risk of damage!

Position transverse member 00 0 200 with a 2nd person helping by way of rests (1) on bolt connections of side panels.

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

Attach suitable chains to special tool 11 0 000 and suspend from both engine suspension eyes.

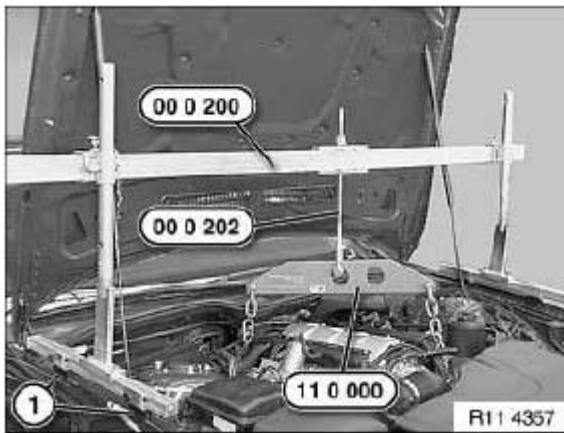


Fig. 8: Identifying Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Danger of injury!

Tighten down all adjusting screws and nuts on transverse member 00 0 200.

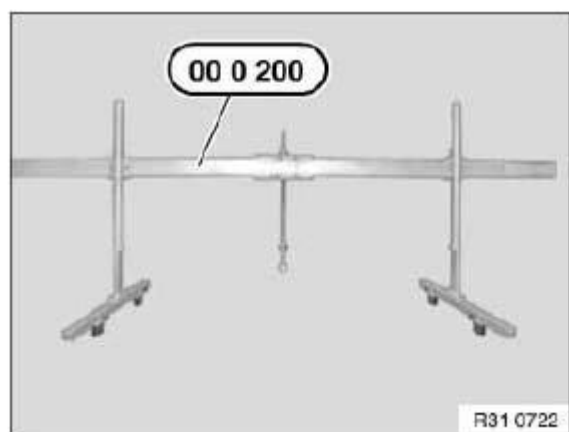


Fig. 9: Identifying Special Tool

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 . See **ENGINE SUSPENSION** for specs.

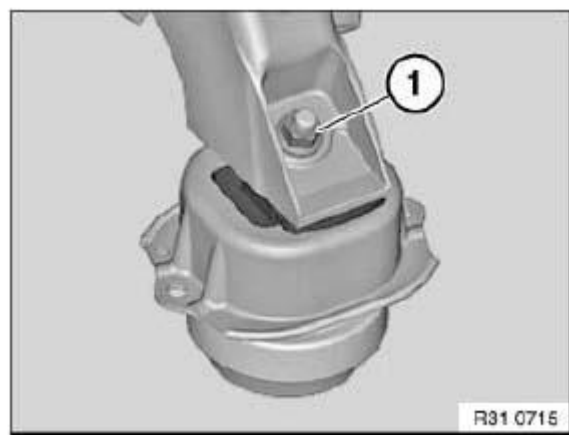


Fig. 10: Identifying Nut

Courtesy of BMW OF NORTH AMERICA, INC.

ENGINE IDENTIFICATION

Drive in engine numbers at marked surface with impact tool.

M47 / M47TU / M47T2

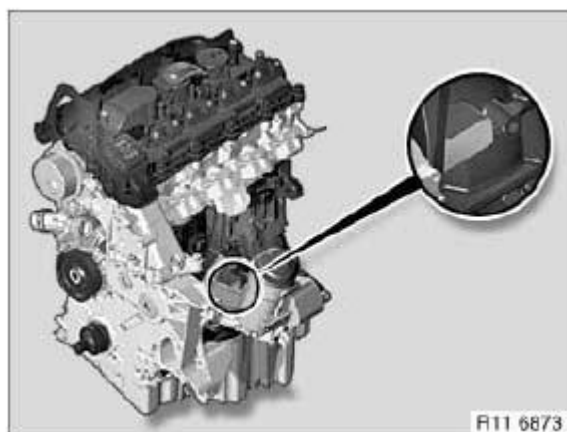


Fig. 11: Identifying Engine Identification Number - M47 / M47TU / M47T2
Courtesy of BMW OF NORTH AMERICA, INC.

M57 / M57TU / M57T2

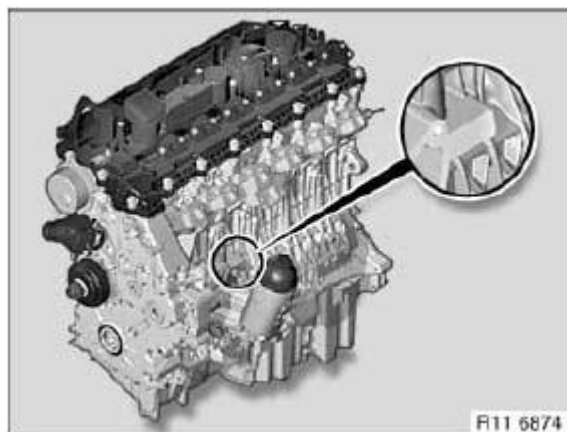


Fig. 12: Identifying Engine Identification Number - M57
Courtesy of BMW OF NORTH AMERICA, INC.

M67 / M67TU

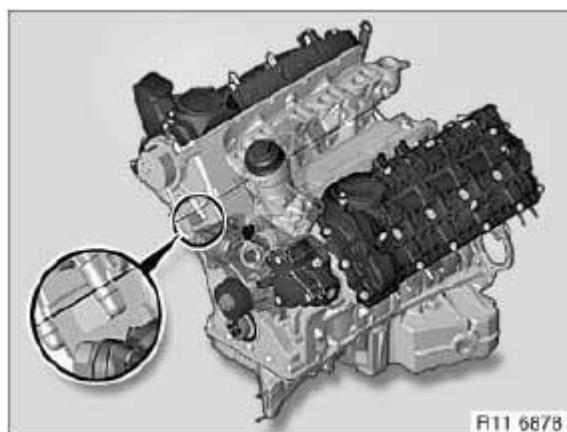


Fig. 13: Identifying Engine Identification Number - M67
Courtesy of BMW OF NORTH AMERICA, INC.

N47

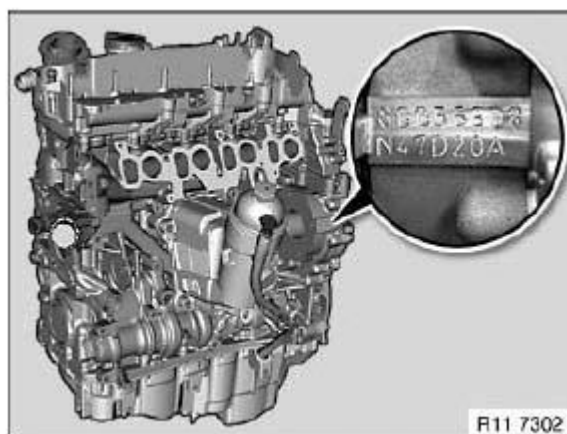


Fig. 14: Identifying Engine Identification Number - N47
Courtesy of BMW OF NORTH AMERICA, INC.

M52 / M52TU

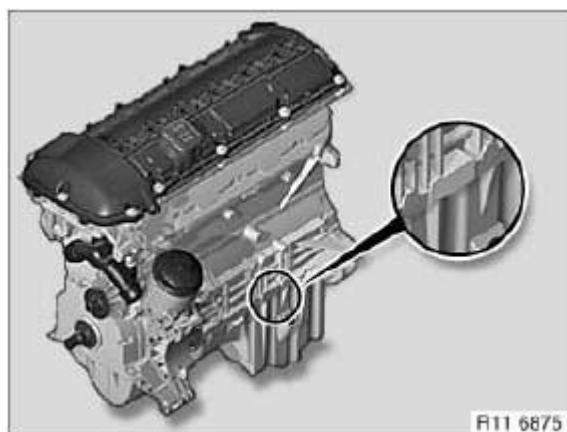


Fig. 15: Identifying Engine Identification Number - M52
Courtesy of BMW OF NORTH AMERICA, INC.

M54

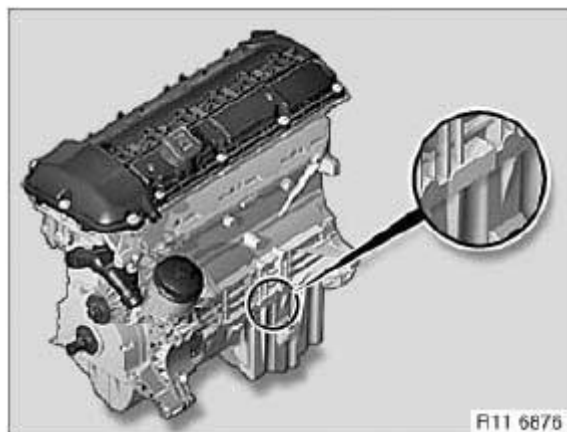


Fig. 16: Identifying Engine Identification Number - M54
Courtesy of BMW OF NORTH AMERICA, INC.

M56

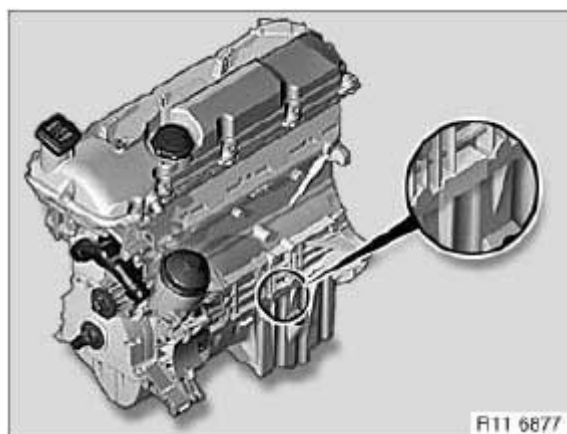


Fig. 17: Identifying Engine Identification Number - M56
Courtesy of BMW OF NORTH AMERICA, INC.

N40 / N45

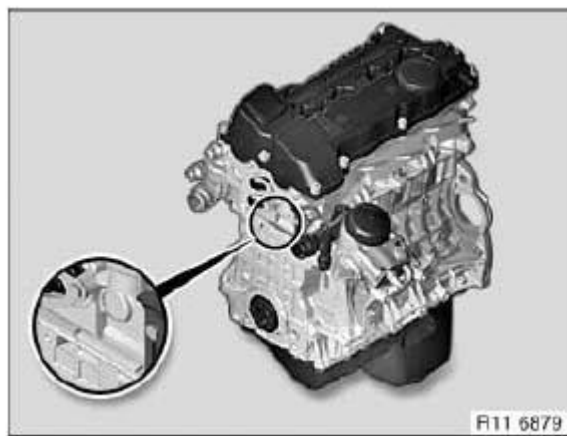


Fig. 18: Identifying Engine Identification Number - N40 / N45
Courtesy of BMW OF NORTH AMERICA, INC.

N42 / N46 / N46T

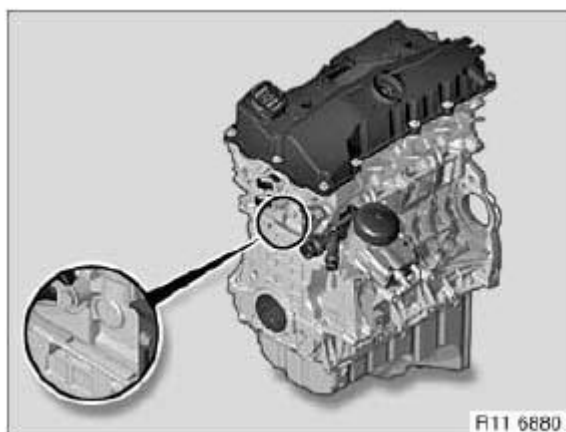


Fig. 19: Identifying Engine Identification Number - N42 / N46 / N46T
Courtesy of BMW OF NORTH AMERICA, INC.

N51 / N52 / N52K / N53 / N54

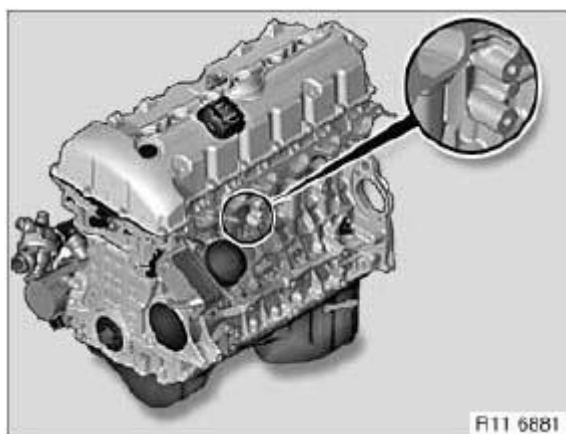


Fig. 20: Identifying Engine Identification Number - N51 / N52K
Courtesy of BMW OF NORTH AMERICA, INC.

N62

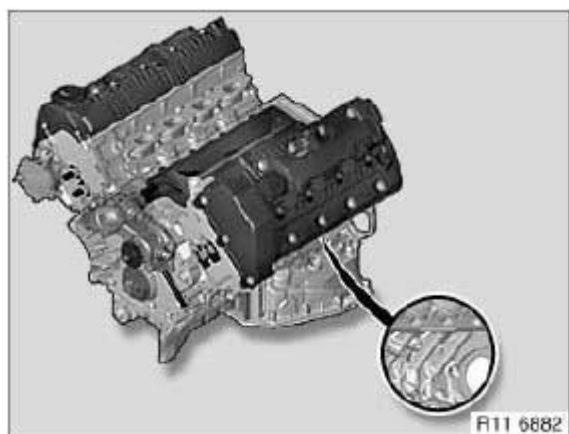


Fig. 21: Identifying Engine Identification Number - N62
Courtesy of BMW OF NORTH AMERICA, INC.

N73

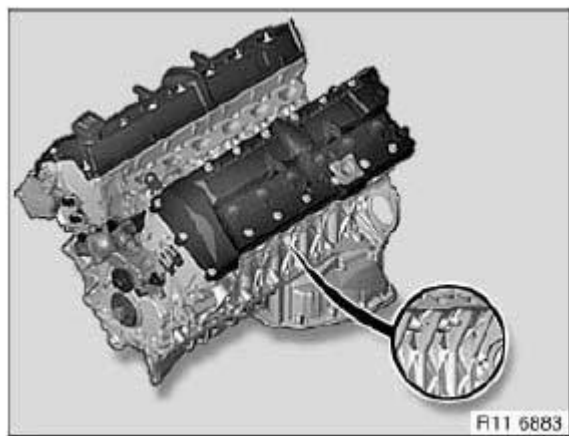


Fig. 22: Identifying Engine Identification Number - N73
Courtesy of BMW OF NORTH AMERICA, INC.

S54

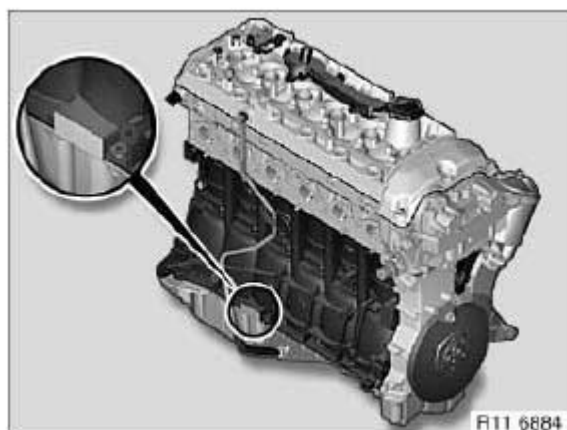


Fig. 23: Identifying Engine Identification Number - S54
Courtesy of BMW OF NORTH AMERICA, INC.

S85

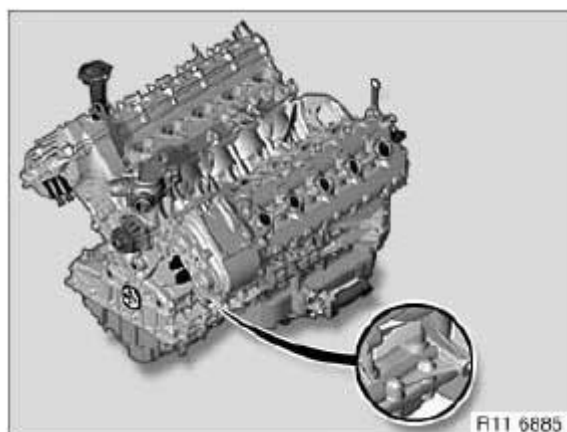


Fig. 24: Identifying Engine Identification Number - S85
Courtesy of BMW OF NORTH AMERICA, INC.

W10 / W11

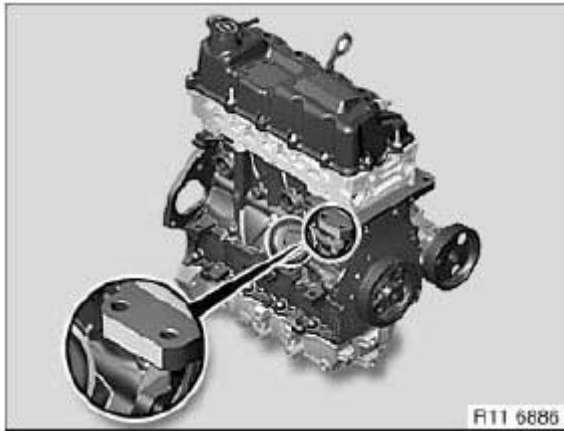


Fig. 25: Identifying Engine Identification Number - W10 / W11
Courtesy of BMW OF NORTH AMERICA, INC.

W17

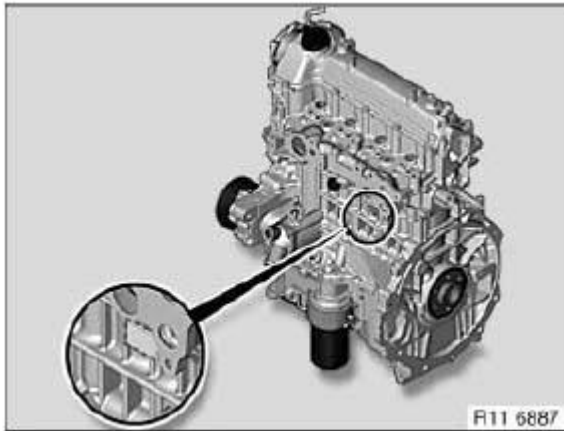


Fig. 26: Identifying Engine Identification Number - W17
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

12 CYLINDER HEAD WITH COVER

11 12 005 REMOVING AND INSTALLING/SEALING LEFT CYLINDER HEAD COVER (N62/N62TU)

(cylinder bank 5 to 8)

Necessary preliminary tasks:

- Remove design cover
- Remove ACOUSTIC COVER

- Remove centre engine compartment partition wall
- Remove ignition coil cover
- BMW ALPINA B7 vehicles:
 - Remove radial compressor

NOTE: For purposes of clarity, the following work steps are shown on the engine after it has been removed.

Unclip cable holder (1) with cables.

Pull tank venting valve (2) off holder.

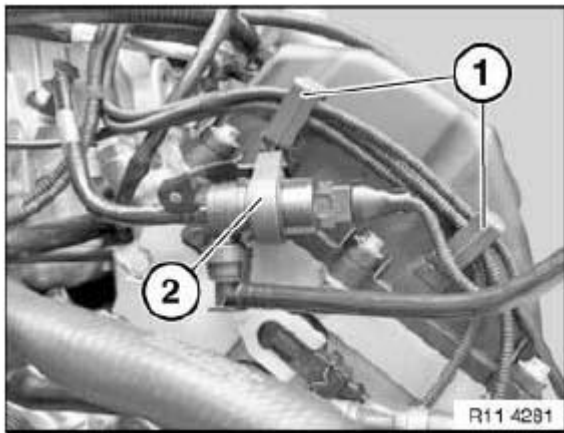


Fig. 27: Identifying Tank Venting Valve And Cable Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) and remove.

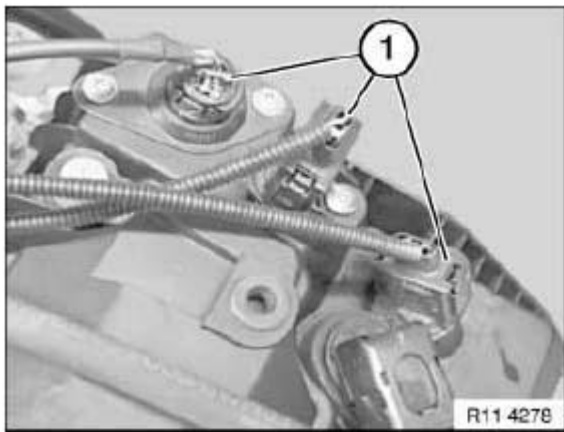


Fig. 28: Identifying Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and remove sealing element (2).

Remove sensors (3 and 4).

Installation:

Replace sealing element (2).

Replace sealing rings on sensors (3 and 4).

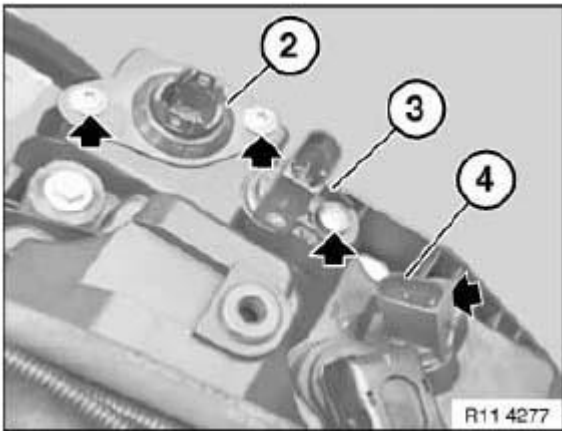


Fig. 29: Identifying Sealing Element And Sealing Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Removing ignition coils.

Release both grounding cables.

Unlock and detach vent hose.

Unclip cable duct (1) and remove cable from holder.

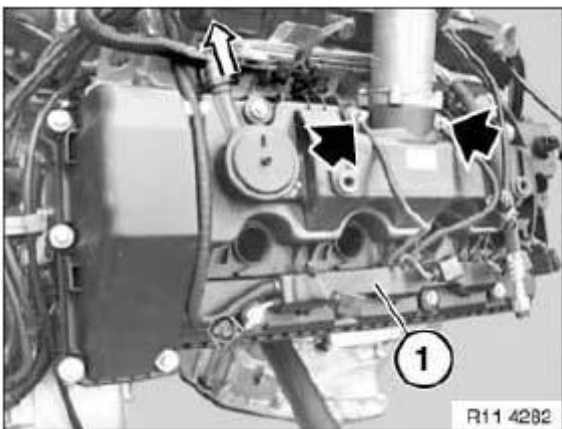


Fig. 30: Identifying Cable Duct

Courtesy of BMW OF NORTH AMERICA, INC.

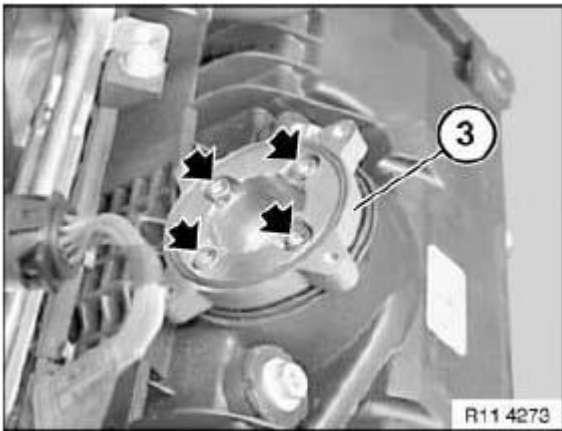
Remove SERVOMOTOR FOR LEFT ECCENTRIC SHAFT.

Unfasten screws.

Remove spacer (3) upwards.

Installation:

Replace sealing ring.

**Fig. 31: Identifying Sealing Ring**

Courtesy of BMW OF NORTH AMERICA, INC.

Remove INJECTION PIPE

Release screw connections (1, 2, 3 and 4).

If necessary, pull out oil dipstick.

Remove cylinder head cover.

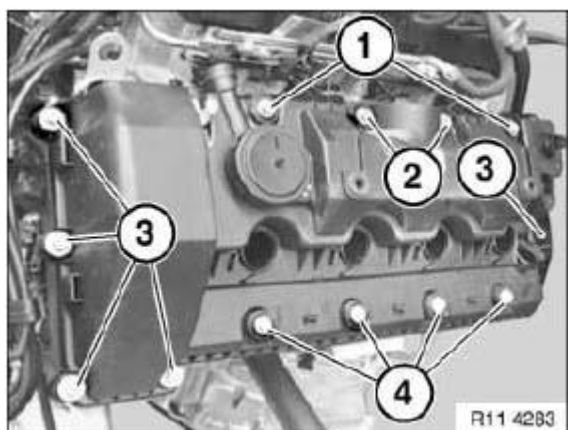


Fig. 32: Identifying Screw Connections

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Note installation direction of sealing ring (1).

Groove in sealing ring (1) points outwards.



Fig. 33: Identifying Sealing Ring

Courtesy of BMW OF NORTH AMERICA, INC.

Replace sealing ring (1) and press into cylinder head cover until flush.

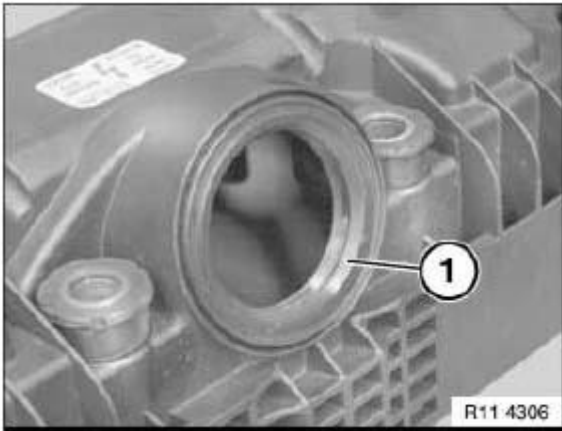


Fig. 34: Identifying Sealing Ring

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace seal (1).

Align gasket (1) loosely in cover groove. Starting at corner radii, secure gasket (1) in cover groove and press into groove so that it is free of tension.

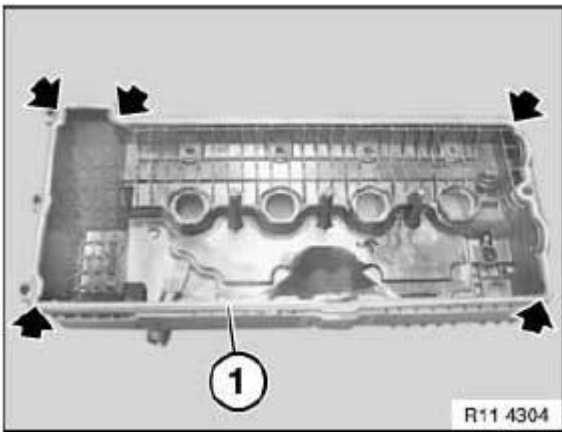


Fig. 35: Identifying Gasket

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace spark plug domes.

Coat rubber seals on spark plug dome (1) with antifriction rubber coating.

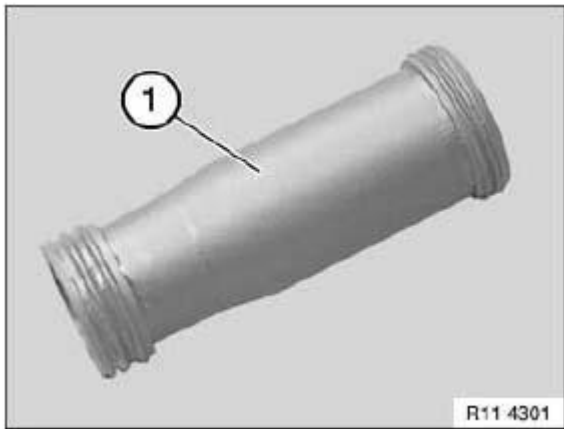


Fig. 36: Identifying Spark Plug Dome
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Install spark plug domes in cylinder head.

When fitting cylinder head cover:

Align spark plug domes to cylinder head cover.

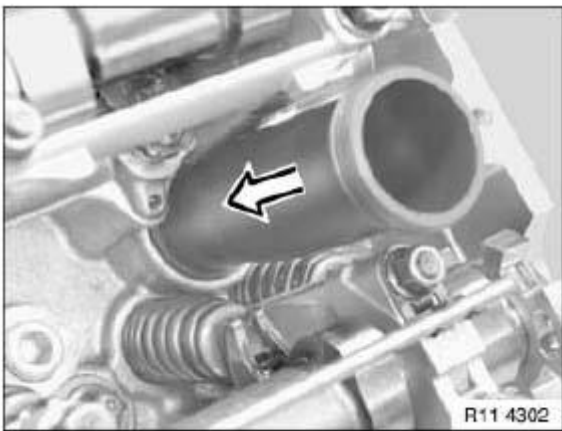


Fig. 37: Installing Spark Plug Domes In Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean seal residue from sealing surfaces.

Coat contact surfaces of joint with Drei Bond 1209.



Fig. 38: Locating Sealing Surface

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean seal residue from sealing surfaces.

Apply a thin, uniform bead of Drei Bond 1209 sealing agent to transition area of half-moon sections.

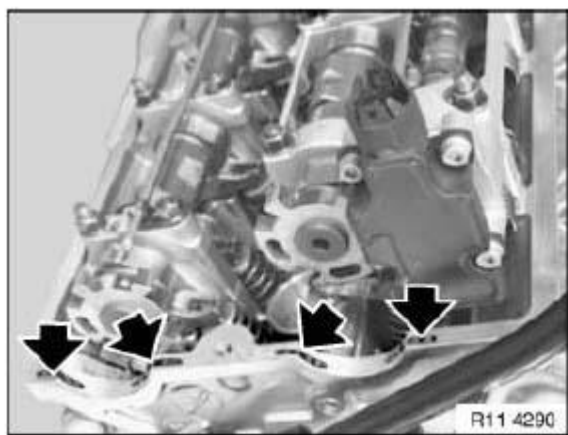


Fig. 39: Locating Sealing Surface

Courtesy of BMW OF NORTH AMERICA, INC.

Replace sealing elements (1).

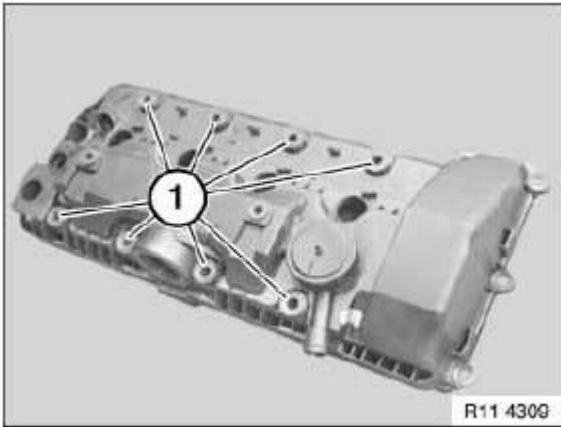


Fig. 40: Identifying Sealing Elements

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure gasket is correctly seated at sides and on rear side of cylinder head.

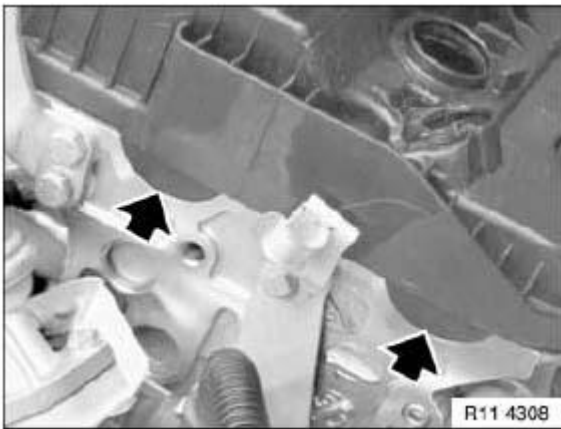


Fig. 41: Locating Gasket Seated Position

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Screw connections (1, 2, 3 and 4) of cylinder head cover are different.

Replace screw connections (3).

Insert screw connections (1, 2 and 3) without pretension and align cover.

Tighten down screw connections (1, 2 and 3) in diagonal sequence from inside to outside.

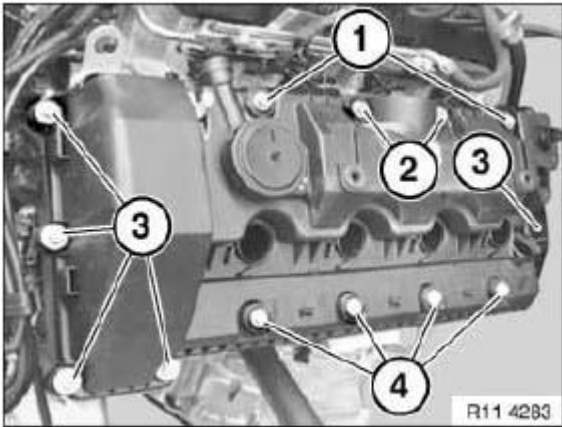


Fig. 42: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

11 12 006 REMOVING AND INSTALLING/SEALING RIGHT CYLINDER HEAD COVER (N62/N62TU)

(cylinder bank 1 to 4)

Remove design cover

Remove acoustic cover

Remove centre of assembly partition wall

Remove electronics box cover.

Remove electronics box seal.

These work steps are described in the section **REPLACING CONTROL UNIT**.

Remove ignition coil cover.

Remove intake filter housing (without raw air housing).

Remove intake hose with air-mass flow sensor

NOTE: For purposes of clarity, the following work steps are shown on the engine after it has been removed.

Unlock plug (1) and remove.

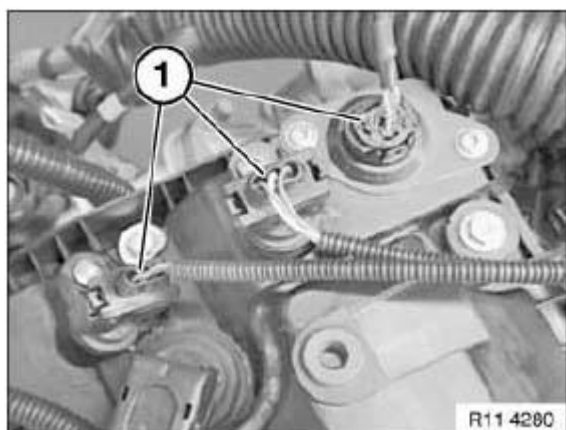


Fig. 43: Identifying Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and remove sealing element (2).

Remove sensors (3 and 4).

Installation:

Replace sealing element (2).

Replace sealing rings on sensors (3 and 4).

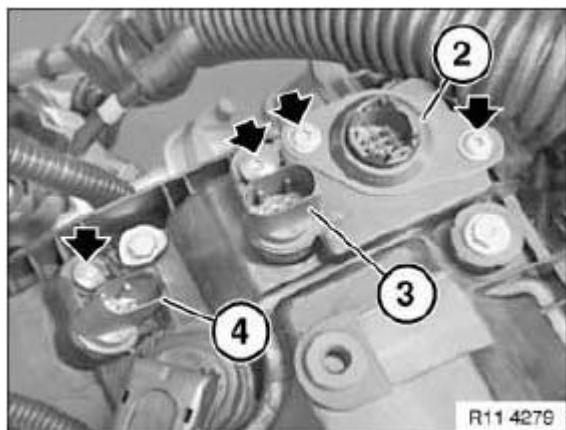


Fig. 44: Identifying Sealing Element, Sensors And Sealing Rings

Courtesy of BMW OF NORTH AMERICA, INC.

Removing ignition coils.

Release both grounding cables.

Unlock and detach vent hose.

Unclip cable duct (1) and remove cable from holder.

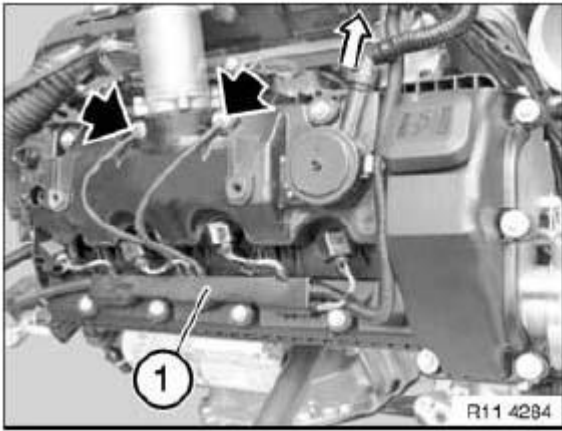


Fig. 45: Identifying Cable Duct

Courtesy of BMW OF NORTH AMERICA, INC.

Remove SERVOMOTOR FOR RIGHT ECCENTRIC SHAFT.

Unfasten screws.

Remove spacer (3) upwards.

Replace seal.

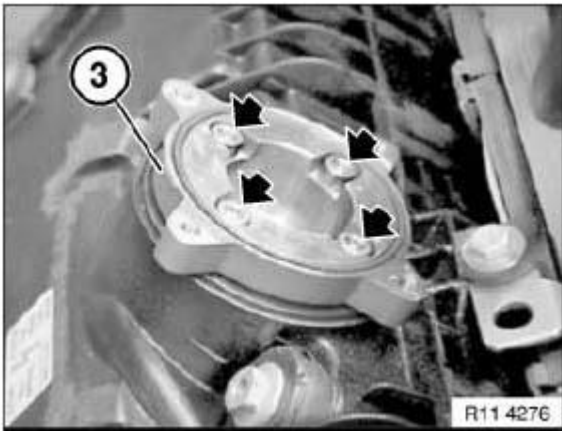


Fig. 46: Identifying Spacer

Courtesy of BMW OF NORTH AMERICA, INC.

Remove INJECTION PIPE .

Release screw connections (1, 2, 3 and 4).

Remove cylinder-head cover.

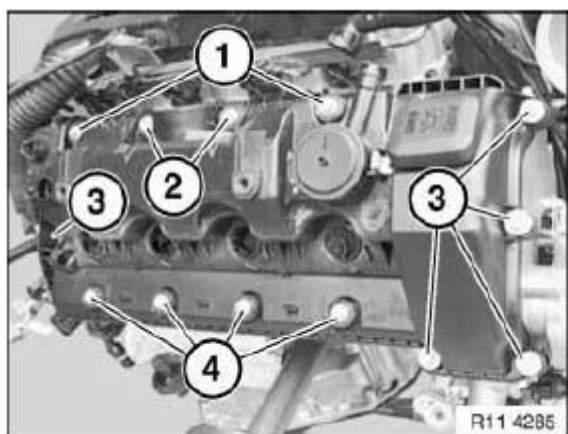


Fig. 47: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Note installation direction of sealing ring (1).

Groove in sealing ring (1) points outwards.



Fig. 48: Identifying Sealing Ring

Courtesy of BMW OF NORTH AMERICA, INC.

Replace sealing ring (1) and press into cylinder head cover until flush.

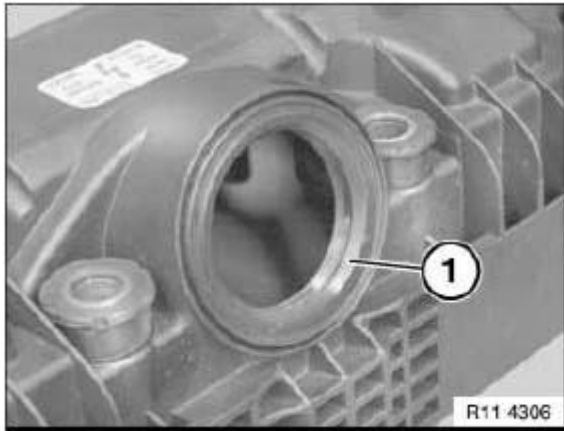


Fig. 49: Identifying Sealing Ring

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace seal (1).

Align gasket (1) loosely in cover groove. Starting at corner radii, secure gasket (1) in cover groove and press into groove so that it is free of tension.

Installation:

Make sure sliding rails are correctly seated when mounting on cylinder head.

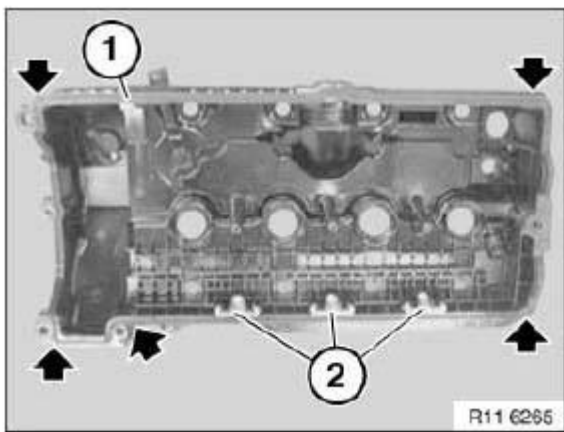


Fig. 50: Identifying Gasket

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace spark plug domes.

Coat rubber seals on spark plug dome (1) with antifriction rubber coating.

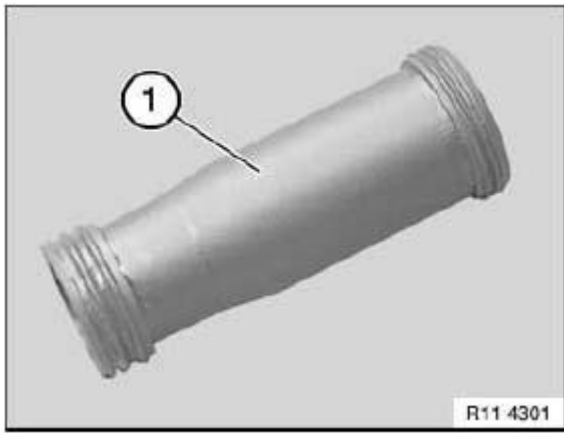


Fig. 51: Identifying Spark Plug Dome
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Install spark plug domes in cylinder head.

When fitting cylinder head cover:

Align spark plug domes to cylinder head cover.

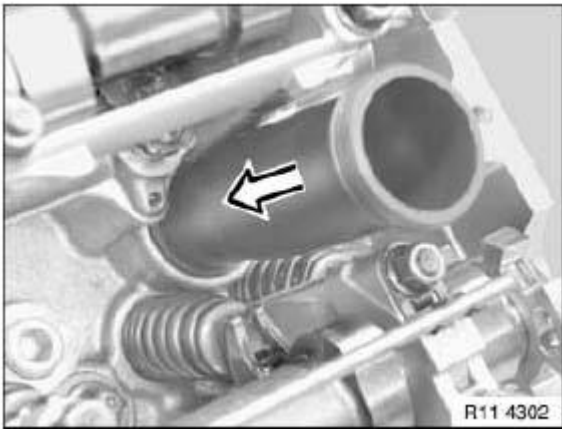


Fig. 52: Installing Spark Plug Domes In Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean seal residue from sealing surfaces.

Coat contact surfaces of joint with Drei Bond 1209.

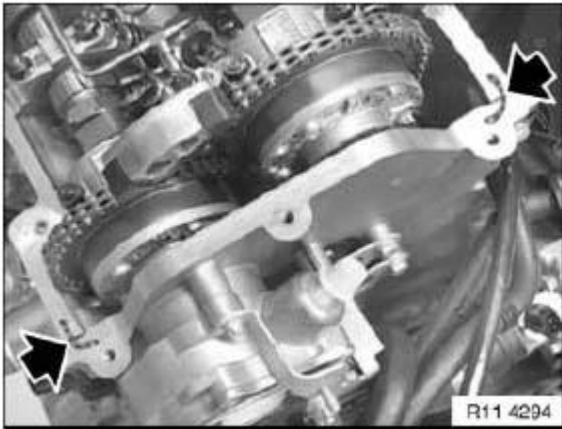


Fig. 53: Locating Sealing Surface

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean seal residue from sealing surfaces.

Apply a thin, uniform bead of Drei Bond 1209 sealing agent to transition area of half-moon sections.

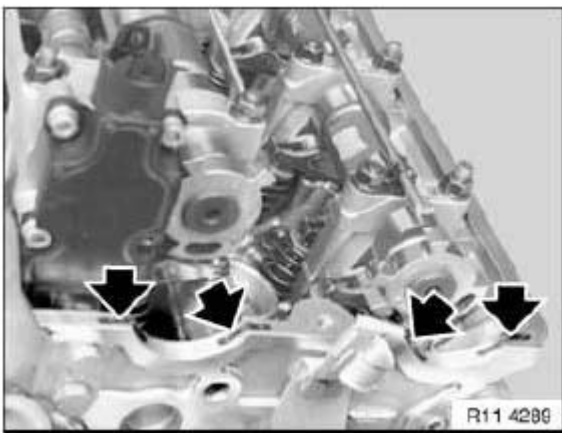


Fig. 54: Locating Sealing Surface

Courtesy of BMW OF NORTH AMERICA, INC.

Replace sealing elements (1).

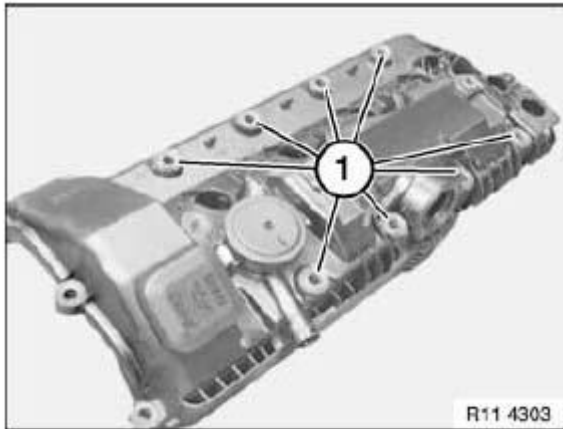


Fig. 55: Identifying Sealing Element

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure gasket is correctly seated at sides and on rear side of cylinder head.

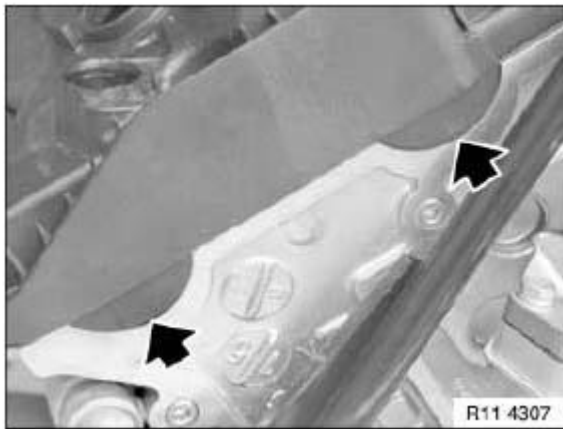


Fig. 56: Locating Gasket Seated Position

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Screw connections (1, 2, 3 and 4) of cylinder head cover are **different**.

Replace screw connections (3).

Move cylinder head cover with gasket into assembly position.

Secure cylinder head cover, starting with screw connection (4) from **front**.

Tighten down screw connections (1, 2 and 3) in diagonal sequence from inside to outside.

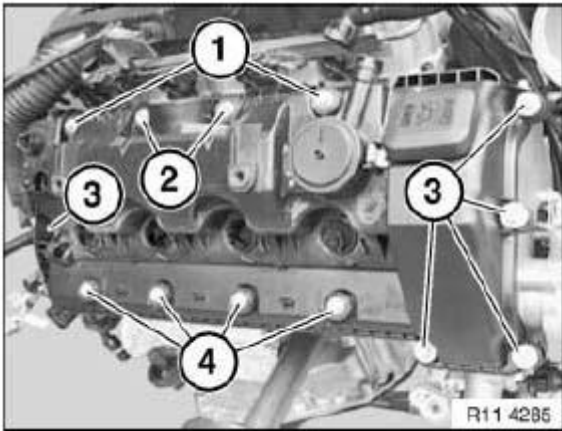


Fig. 57: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

11 12 105 REMOVING AND INSTALLING LEFT CYLINDER HEAD (N62 FROM 9/03 AND N62TU)

(cylinder bank 5 to 8)

NOTE: To remove the exhaust manifolds, the engine must be secured in the installation position with the special tool and then the front axle bracket lowered.

Remove left exhaust manifold.

After removing exhaust manifolds:

Reinstall front axle bracket provisionally and remove special tool for securing engine in installation position.

Open drain plug for coolant on left side of engine block.

Drain off coolant and dispose of correctly.

Installation:

Replace sealing ring.

Tightening torque of drain plug 11 11 5AZ . See **ENGINE BLOCK** for specs.

Top up coolant. Vent cooling system and check for leaks. See **VENTING COOLING SYSTEM AND CHECKING FOR LEAKS (N62)** or **VENTING COOLING SYSTEM AND CHECKING FOR LEAKS (N62, N62TU)** .

Remove ignition coils on cylinder bank 5 to 8.

Remove **SERVOMOTOR FOR LEFT ECCENTRIC SHAFT.**

Remove INTAKE AIR MANIFOLD.

Remove LEFT CYLINDER HEAD COVER.

Remove LEFT TIMING CASE COVER.

Disconnect plug connections and lay engine wiring harness to one side.

Remove spark plugs on cylinder bank 5 to 8.

Remove vent hose on cylinder head.

NOTE: Illustration with engine removed.

Detach hose (1) on check valve (2).

E65 only:

Release screws (3).

Remove tube (4) with check valve (2).

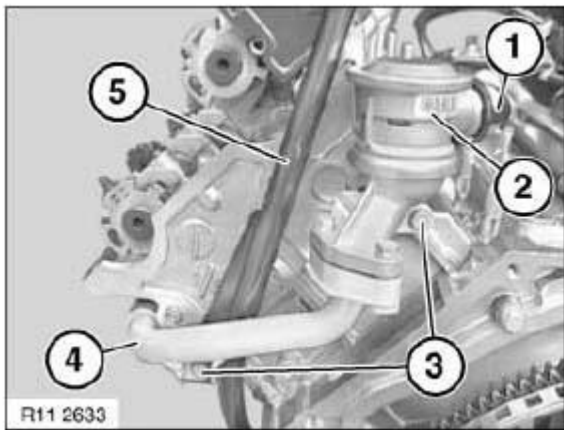


Fig. 58: Identifying Hose, Check Valve, Tube And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Do not remove guide tube (5) for oil dipstick.

Installation:

Replace sealing ring on tube (4) and coat with antiseize agent.

Removal:

Removal of cylinder head is described separately from installation.

Remove INLET AND EXHAUST ADJUSTMENT UNIT ON LEFT SIDE.

NOTE: Illustration with engine removed.

Remove eccentric shaft sensor (2).

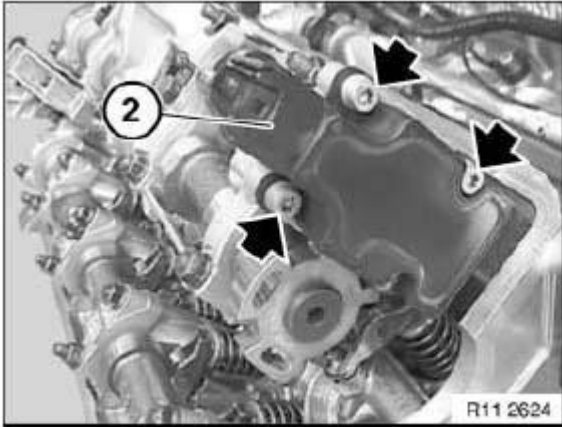


Fig. 59: Identifying Eccentric Shaft Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Detach guide rail from cylinder head.

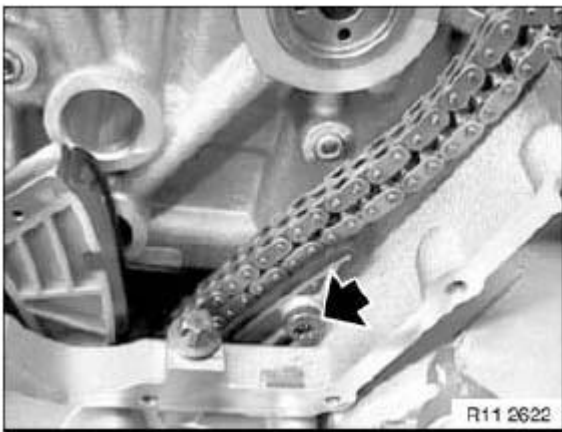


Fig. 60: Locating Guide Rail Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws between cylinder head and timing case cover.

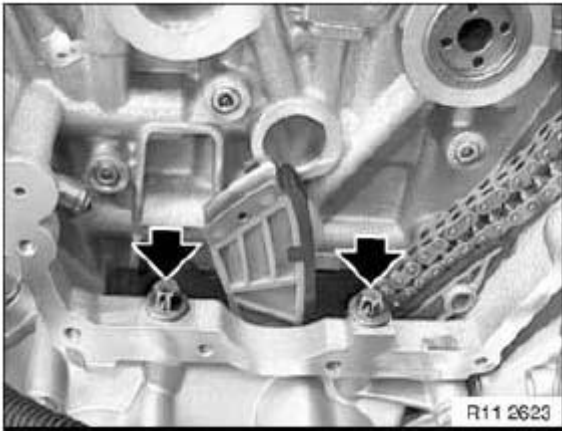


Fig. 61: Locating Timing Case Cover Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: At narrow points, use a socket with 3/8" drive and a short extension.

Release cylinder-head bolts in sequence 10 ... 1.

Lift off cylinder head.

Lift off cylinder head gasket.

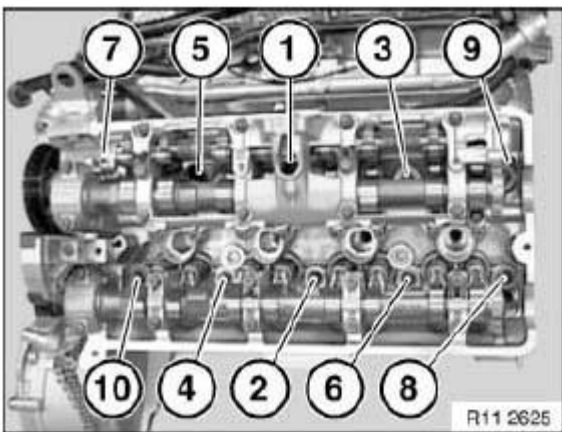


Fig. 62: Releasing Cylinder-Head Bolts In Reverse Order
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Installation of cylinder head is described separately from removal.

Clean sealing faces of cylinder head and crankcase; if necessary, remove gasket debris with wooden scraper.

Make sure no gasket debris drops into the oil and coolant ducts.

Threaded bores in engine block must be free of dirt and oil (risk of cracking).

Coat joint between engine block and timing case cover with Drei Bond 1209.

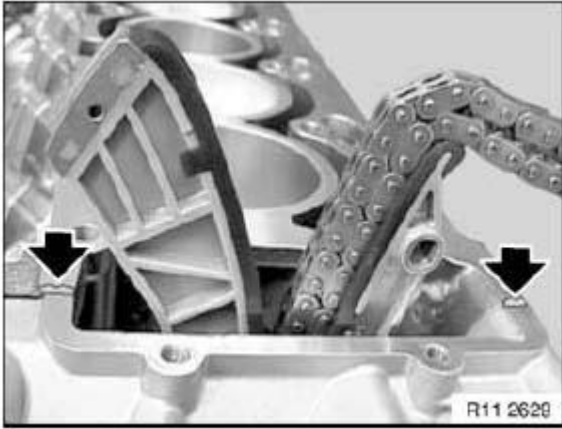


Fig. 63: Locating Coat Joint Between Engine Block And Timing Case Cover
Courtesy of BMW OF NORTH AMERICA, INC.

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

Fit new cylinder-head seal.

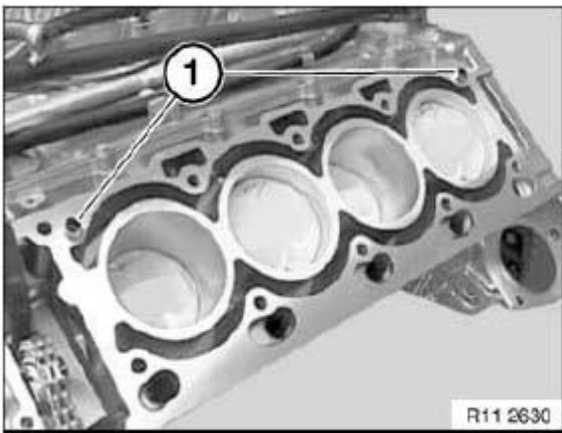


Fig. 64: Identifying Dowel Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Put the cylinder head on.

NOTE: Do not wash off bolt coating. Insert new cylinder head bolts and initially tighten so that they are free of play.

At narrow points, use a socket with 3/8" drive and a short extension.

Tighten down the cylinder-head bolts in order 1 ... 10.

Tightening torque: 11 12 8AZ . See **CYLINDER HEAD WITH COVER** for specs.

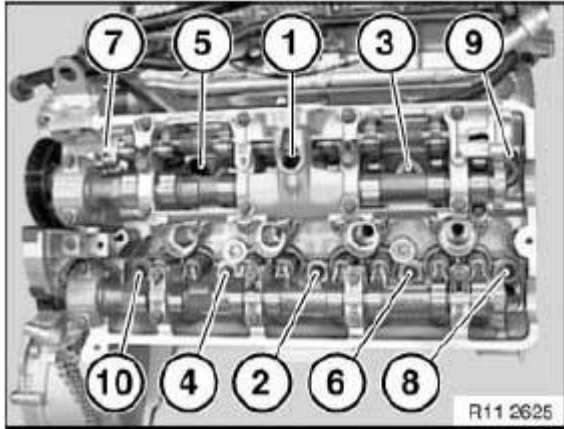


Fig. 65: Tightening Sequence Of Cylinder-Head Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

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

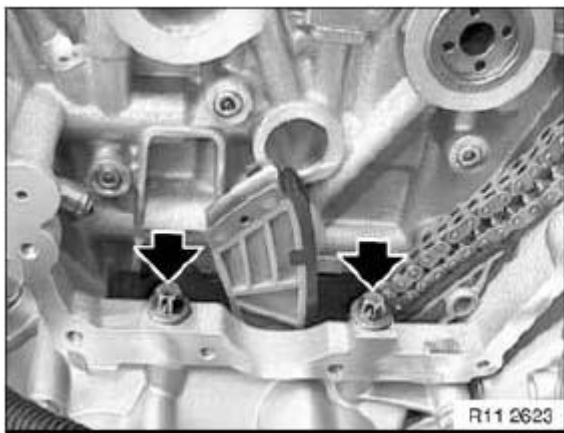


Fig. 66: Locating Timing Case Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Insert screw plug (1).

Installation:

Failure to install the screw (1) will result in a malfunction in the VANOS control.

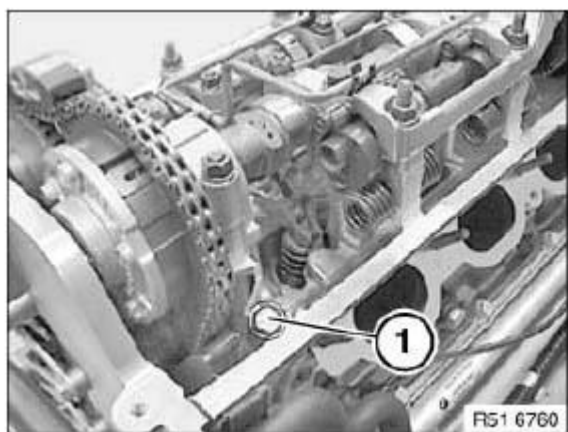


Fig. 67: Identifying Screw Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Insert and tighten down guide rail screw.

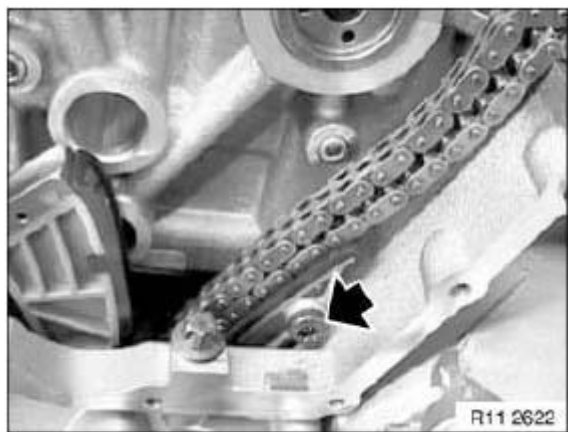


Fig. 68: Locating Guide Rail Screw

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Illustration with engine removed.

Install eccentric shaft sensor (2).

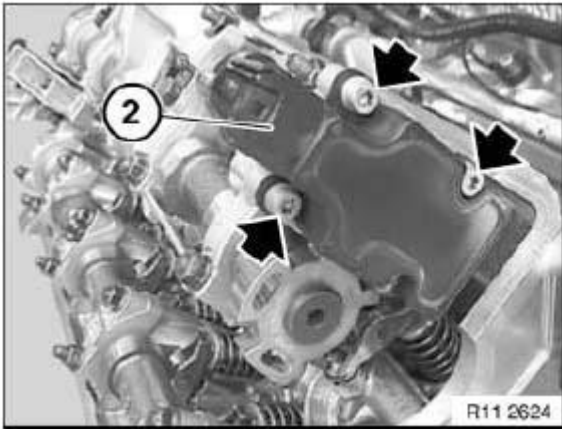


Fig. 69: Identifying Eccentric Shaft Sensor
 Courtesy of BMW OF NORTH AMERICA, INC.

Install INLET AND EXHAUST ADJUSTMENT UNIT ON LEFT SIDE.

Assemble engine.

11 12 106 REMOVING AND INSTALLING RIGHT CYLINDER HEAD (N62 FROM 9/03 AND N62TU)

(cylinder bank 1 to 4)

NOTE: To remove the exhaust manifolds, the engine must be secured in the installation position with the special tool and then the front axle bracket lowered.

Remove right exhaust manifold.

After removing exhaust manifolds:

Reinstall front axle bracket provisionally and remove special tool for securing engine in installation position.

Open drain plug for coolant on right side of engine block.

Drain off coolant and dispose of correctly.

Installation:

Replace sealing ring.

Tightening torque of drain plug 11 11 5AZ . See ENGINE BLOCK for specs.

Top up coolant. Vent cooling system and check for leaks.

Remove ignition coils on cylinder bank 1 to 4.

Remove servomotor for right eccentric shaft.

Remove **INTAKE AIR MANIFOLD**.

Remove **RIGHT CYLINDER HEAD COVER**.

Remove **RIGHT TIMING CASE COVER**.

Disconnect plug connections and lay engine wiring harness to one side.

Remove spark plugs on cylinder bank 1 to 4.

Remove vent hose on cylinder head.

NOTE: Illustration with engine removed.

Detach hose (1) on check valve (4).

Unfasten screws (2).

IMPORTANT: A spacer bushing is secured with screw (3) behind tube (5).

Release screw (3) and remove check valve (4), tube (5) and spacer bushing.

Unclip cables (6 and 7).

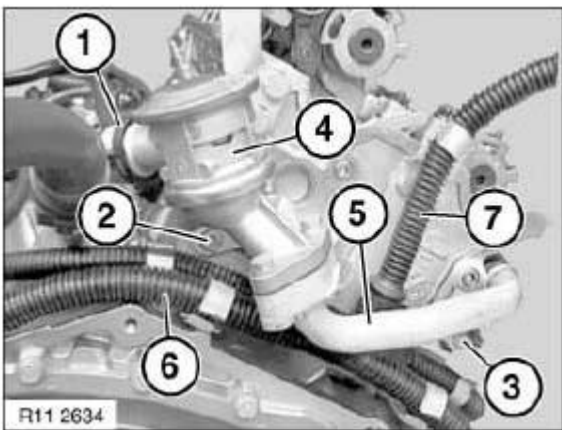


Fig. 70: Identifying Hose, Check Valve, Tube, Cable And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing ring on tube (5) and coat with antiseize agent.

Removal:

Removal of cylinder head is described separately from installation.

Remove **INLET AND EXHAUST ADJUSTMENT UNIT ON RIGHT SIDE.**

Slacken off chain tensioning piston (1) by approx. one turn.

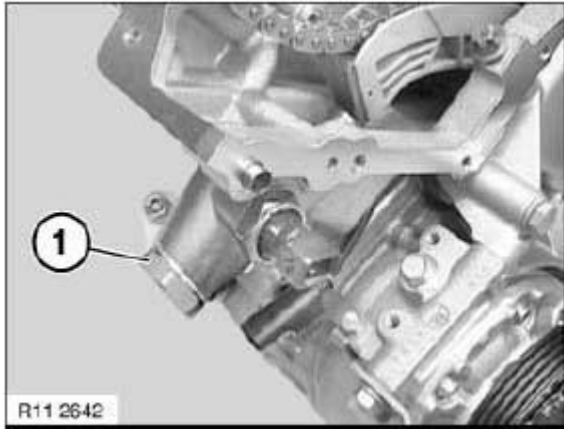


Fig. 71: Identifying Chain Tensioning Piston
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Illustration with engine removed.

Remove eccentric shaft sensor (2).

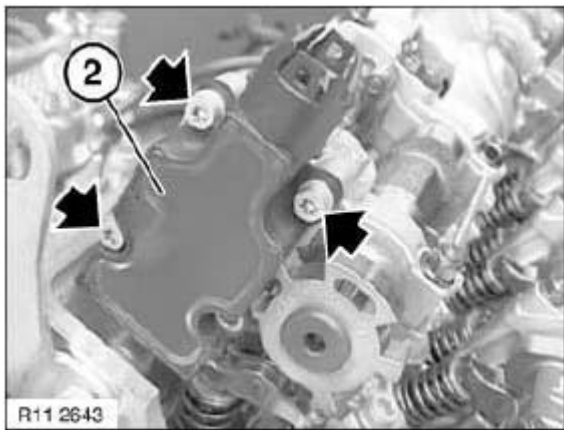


Fig. 72: Identifying Eccentric Shaft Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Detach guide rail from cylinder head.

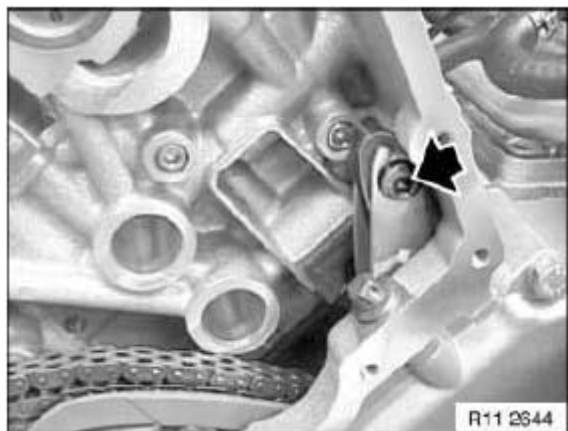


Fig. 73: Identifying Guide Rail Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws between cylinder head and timing case cover.

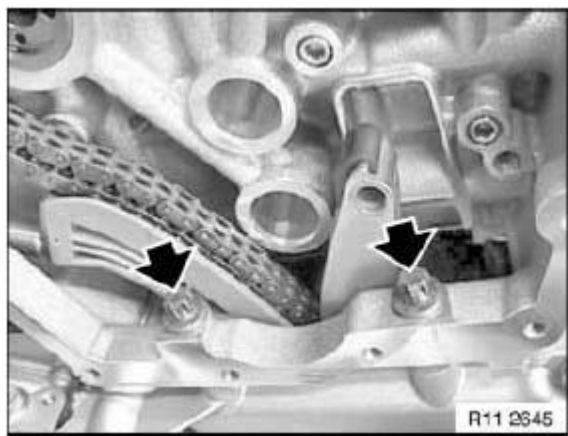


Fig. 74: Locating Timing Case Cover Screws

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: At narrow points, use a socket with 3/8" drive and a short extension.

Release cylinder-head bolts in sequence 10 ... 1.

Lift off cylinder head.

Lift off cylinder head gasket.

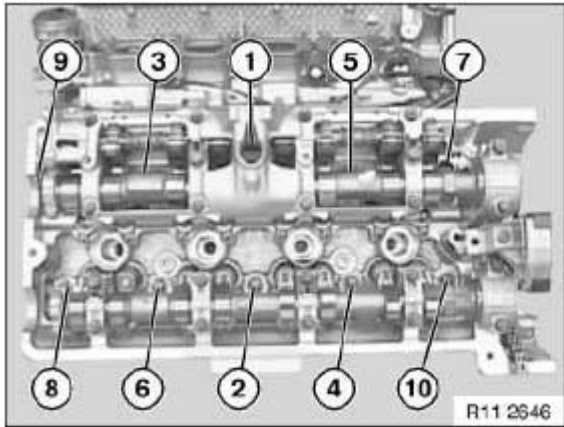


Fig. 75: Releasing Cylinder-Head Bolts In Reverse Order
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove chain tensioning piston (1).

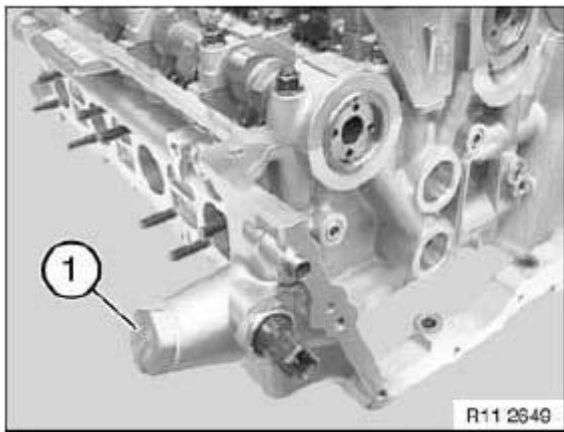


Fig. 76: Identifying Chain Tensioning Piston
 Courtesy of BMW OF NORTH AMERICA, INC.

Place chain tensioning piston (1) on a level surface and compress slowly and carefully.

Repeat this procedure twice.



Fig. 77: Compressing Chain Tensioning Piston On Level Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Installation of cylinder head is described separately from removal.

Clean sealing faces of cylinder head and crankcase; if necessary, remove gasket debris with wooden scraper. Make sure no gasket debris drops into the oil and coolant ducts.

Threaded bores in engine block must be free of dirt and oil (risk of cracking).

Replace sealing ring.

Install chain tensioning piston (1) and initially tighten screw connection without play.

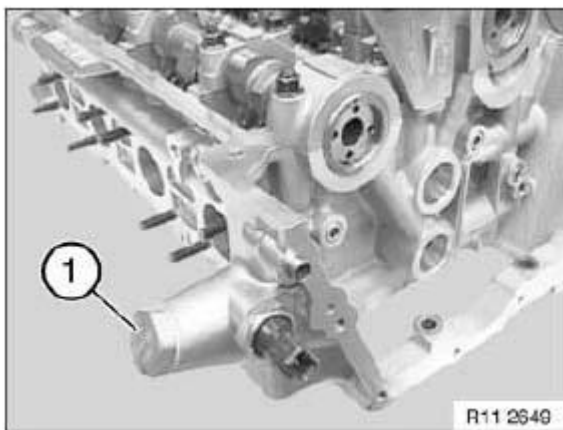


Fig. 78: Identifying Chain Tensioning Piston
Courtesy of BMW OF NORTH AMERICA, INC.

Coat joint between engine block and timing case cover with Drei Bond 1209.

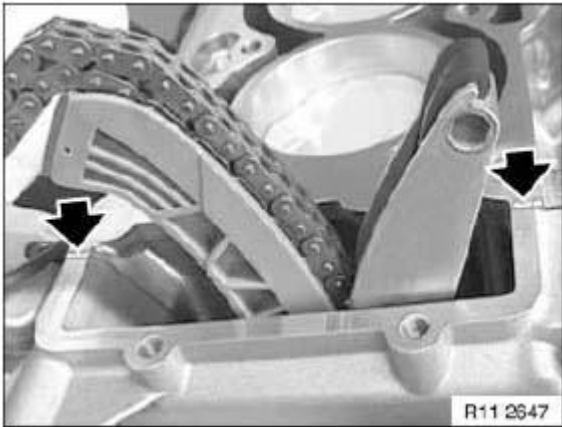


Fig. 79: Coat Joint Between Engine Block And Timing Case Cover
 Courtesy of BMW OF NORTH AMERICA, INC.

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

Fit new cylinder-head seal.

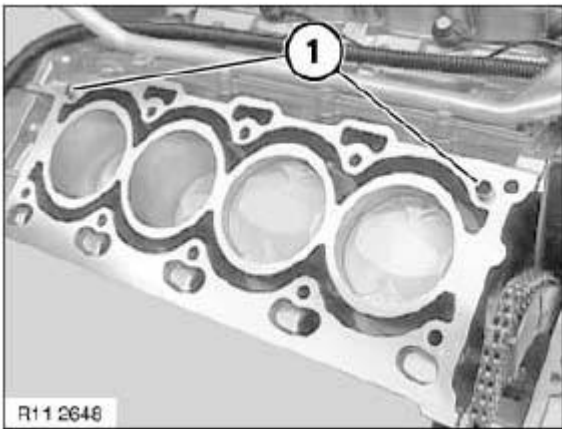


Fig. 80: Identifying Dowel Sleeves
 Courtesy of BMW OF NORTH AMERICA, INC.

Put the cylinder head on.

NOTE: Do not wash off bolt coating. Insert new cylinder head bolts and initially tighten so that they are free of play.

At narrow points, use a socket with 3/8" drive and a short extension.

Tighten down the cylinder-head bolts in order 1 ... 10.

Tightening torque: 11 12 8AZ . See **CYLINDER HEAD WITH COVER** for specs.

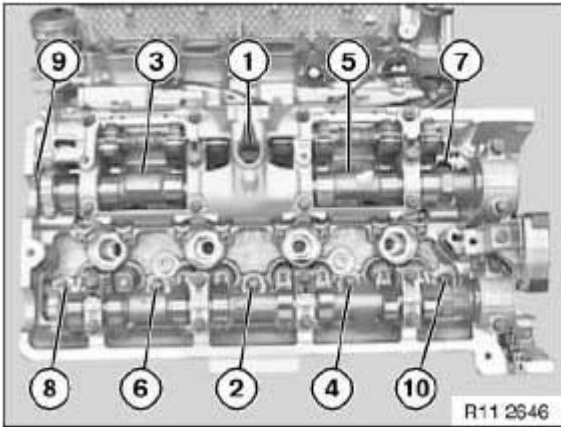


Fig. 81: Tightening Sequence Of Cylinder-Head Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

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

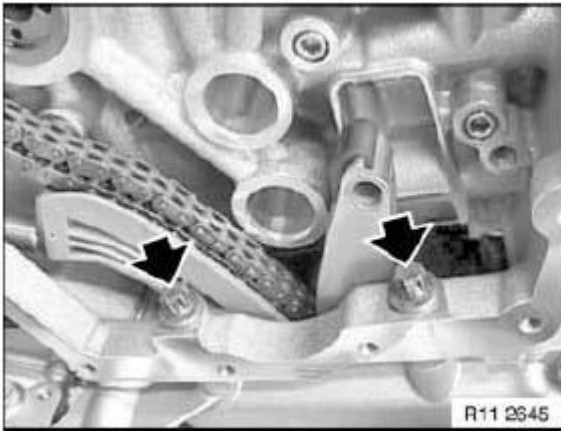


Fig. 82: Locating Timing Case Cover Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Insert screw plug (1).

Installation:

Failure to install the screw (1) will result in a malfunction in the VANOS control.

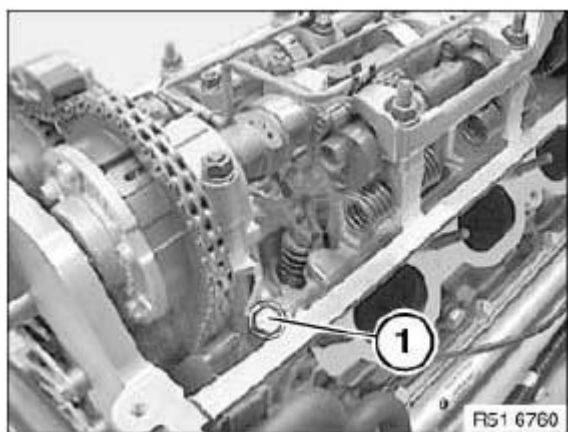


Fig. 83: Identifying Screw Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Insert and tighten down guide rail screw.

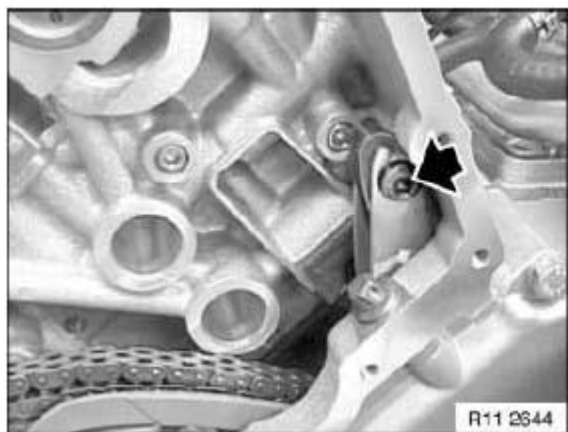


Fig. 84: Identifying Guide Rail Screw

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Illustration with engine removed.

Install eccentric shaft sensor (2).

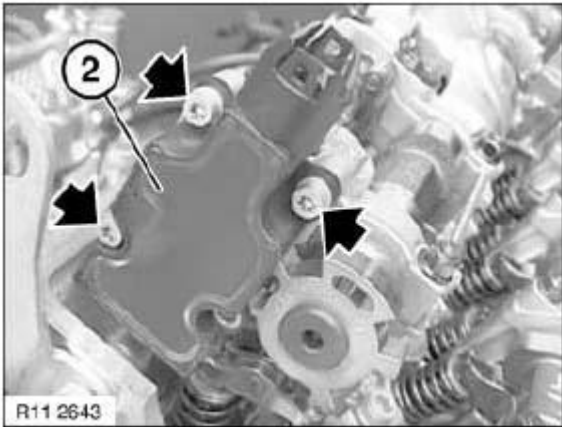


Fig. 85: Identifying Eccentric Shaft Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down chain tensioning piston (1).

Tightening torque: 11 31 8AZ . See CAMSHAFT for specs.

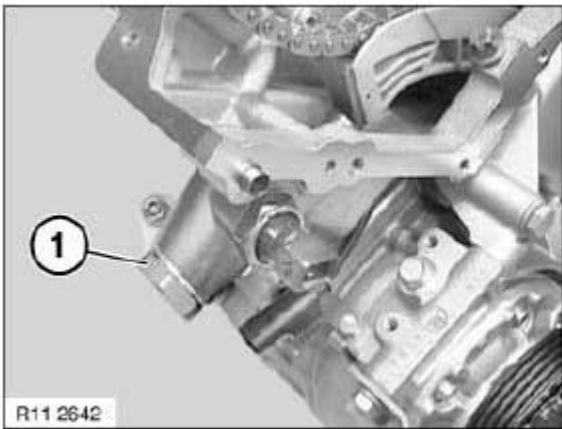


Fig. 86: Identifying Chain Tensioning Piston
Courtesy of BMW OF NORTH AMERICA, INC.

Install INLET AND EXHAUST ADJUSTMENT UNIT ON RIGHT SIDE.

Assemble engine.

11 12 503 DISASSEMBLING AND ASSEMBLING CYLINDER HEAD (N62/N62TU)

Special tools required:

- 11 9 000
- 11 9 001
- 11 9 002

- 11 9 005
- 11 9 006
- 11 9 007
- 11 9 008
- 11 9 009
- 11 9 011
- 11 9 015

Have special tool 11 9 000 ready for removing valve springs.

Secure cylinder head (1) on special tool 11 9 001 .

NOTE: **Secure cylinder head from above with screws contained in scope of delivery on special tool 11 9 001 .**

Turn special tool 11 9 001 through 180°.

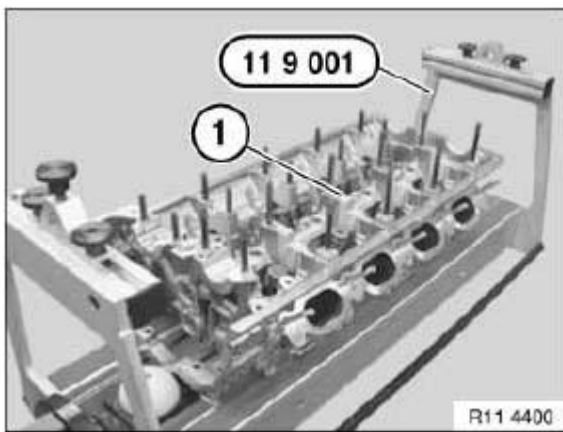


Fig. 87: Identifying Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Align special tool 11 9 008 in conjunction with special tool 11 9 007 on special tool 11 9 006 to relevant combustion chamber.

Place special tool 11 9 006 on cylinder head.

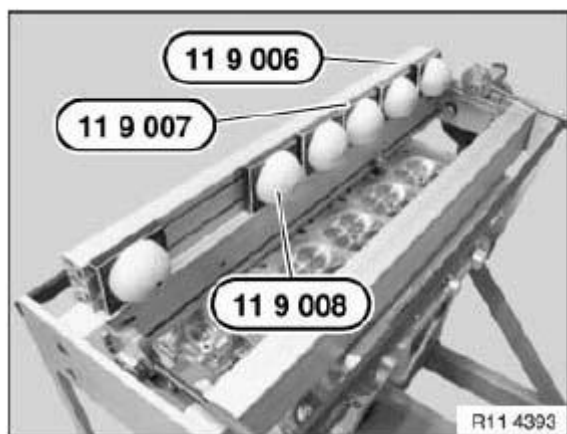


Fig. 88: Identifying Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

Slide both special tools 11 9 005 in direction of arrow as far as they will go.

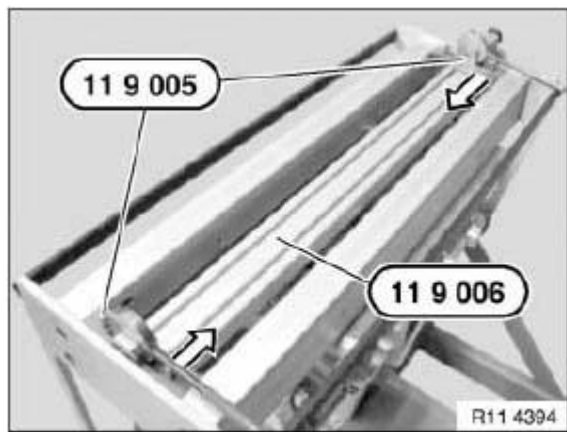


Fig. 89: Identifying Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

Turn lever of special tools 11 9 005 .

Turn special tool 11 9 001 through 180°.

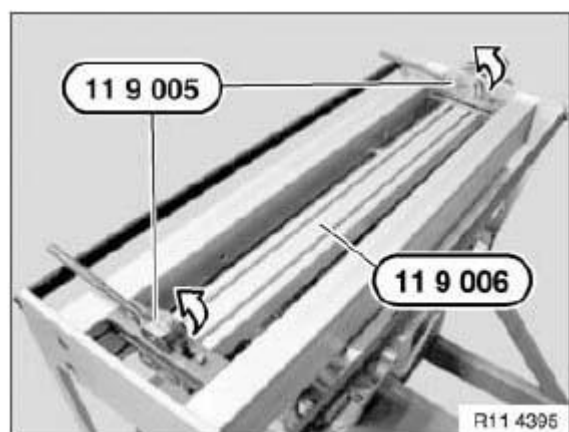


Fig. 90: Identifying Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble clamping device with

- special tool 11 9 002
- special tool 11 9 009
- special tool 11 9 011
- special tool 11 9 015

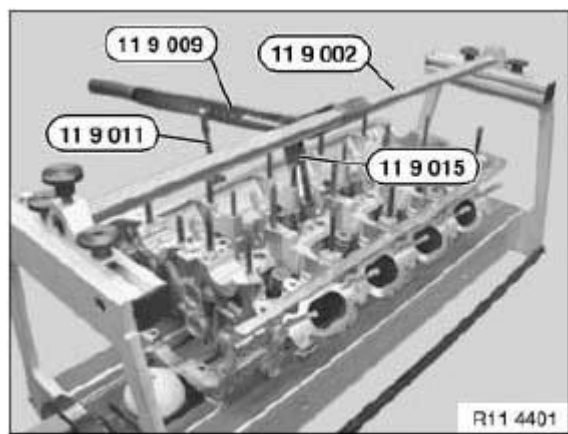


Fig. 91: Identifying Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

Remove all valve springs.

Remove all VALVE STEM SEALS.

Remove ALL VALVES.

11 12 527 REMACHINING A VALVE SEAT - CYLINDER HEAD DISASSEMBLED (N62)

Special tools required:

- 00 3 520
- 00 3 580

Machine valve seat surface with special tool 00 3 520 or with 00 3 580 in accordance with tool manufacturer's instructions.

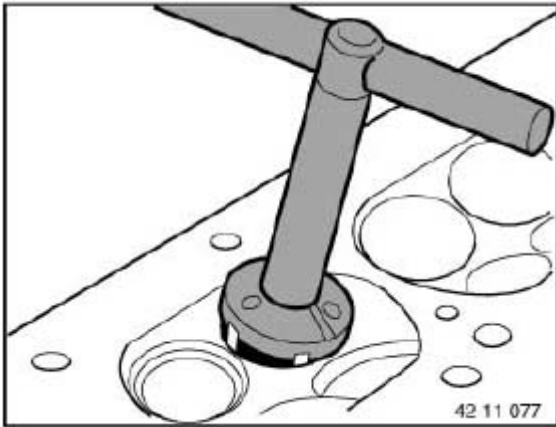


Fig. 92: Machining Valve Seat

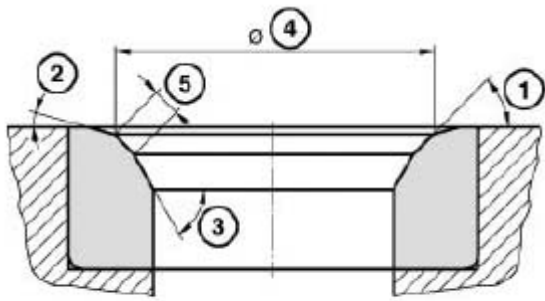
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After machining valve-seat surface: Remachine outside and inside diameters with correction milling tool to the specified diameters until you obtain valve seat width (5).

1. Valve-seat angle
2. Correction angle, external diameter
3. Correction angle, internal diameter
4. Valve seat, external diameter
5. Valve seat width

Items (1) to (5).

See **CYLINDER HEAD WITH COVER**



60 11 161 E

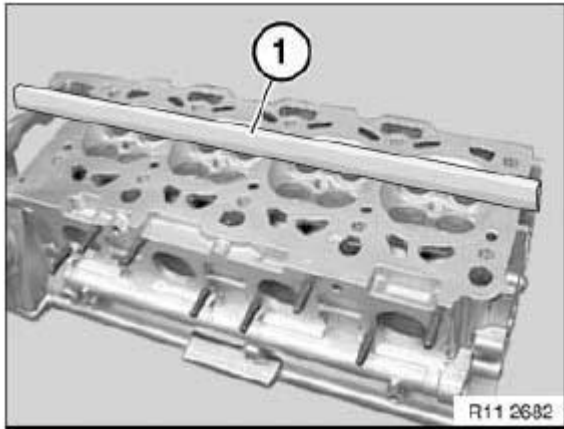
Fig. 93: Identifying Valve-Seat Surface

Courtesy of BMW OF NORTH AMERICA, INC.

11 12 719 MILLING CYLINDER HEAD SEALING FACE (N62/N62TU)

(cylinder head dismantled)

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

NOTE: Maximum plane deviation: longitudinal 0.10 mm.**Fig. 94: Checking Evenness Of Cylinder Head Sealing Face**

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Maximum plane deviation: transversal 0.05 mm.

- **MACHINING LIMIT**

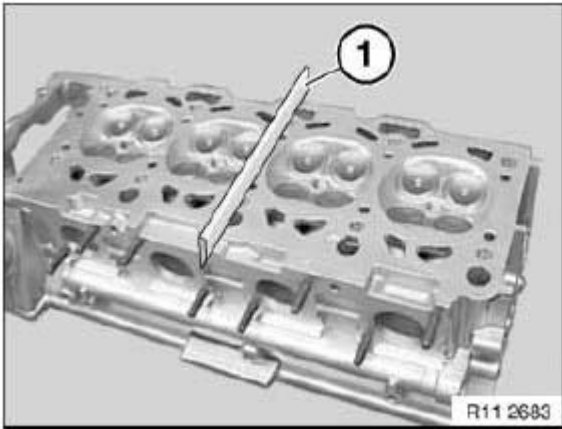


Fig. 95: Checking Plane Deviation

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: A cylinder head seal 0.3 mm thicker than usual can be obtained for machined (milled) cylinder heads.

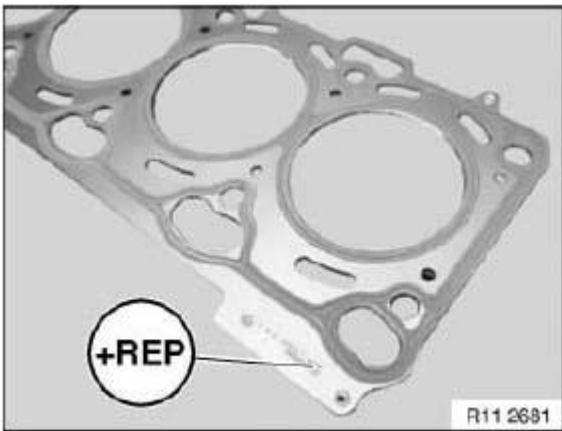


Fig. 96: Identifying Cylinder Head Seal

Courtesy of BMW OF NORTH AMERICA, INC.

11 12 729 CHECKING CYLINDER HEAD FOR WATER LEAKS (N62/N62TU)

Special tools required:

- 11 9 430
- 11 9 431
- 11 9 432
- 11 9 433

(cylinder head dismantled)

Prepare special tool kit 11 9 430.

NOTE: Special tool kit 11 9 430 can be used for cylinder bank 1 to 4 and cylinder bank 5 to 8.

Place special tool 11 9 431 on cylinder head sealing surface, insert screws (special tool 11 9 433) and tighten down.

Seal coolant aperture with special tool 11 9 432 and tighten down.

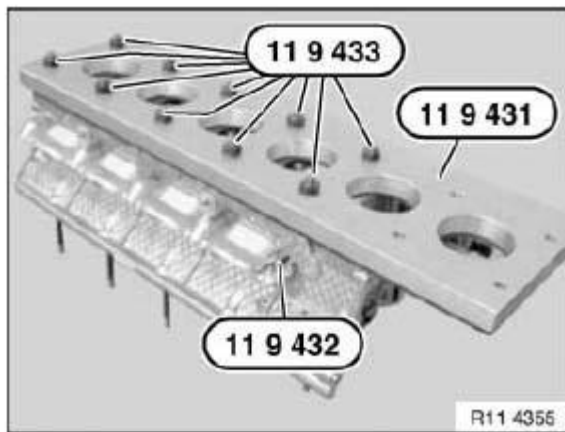


Fig. 97: Identifying Special Tools On Cylinder Head Sealing Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Connect compressed air hose (1) to pressure gauge.

Immerse cylinder head in a water bath. Inspection pressure 4.5 bar.

Check cylinder head for escaping air (cracks).

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

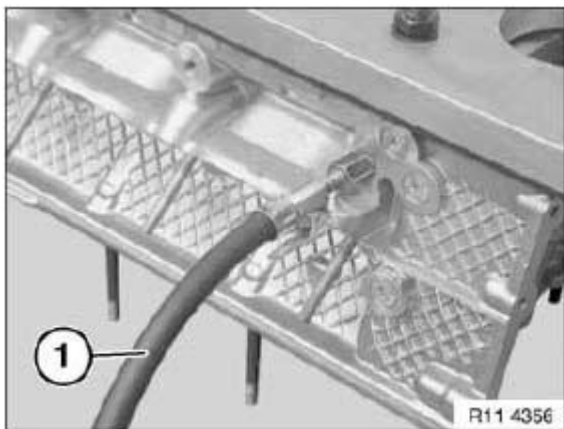


Fig. 98: Identifying Air Hose

Courtesy of BMW OF NORTH AMERICA, INC.

13 OIL SUMP**11 13 010 REMOVING AND INSTALLING/REPLACING OIL SUMP TOP SECTION (N62/N62TU)**

Special tools required:

- **17 0 030**

WORK REFERENCE CHART

Work step	Note:
Remove design cover	
Remove center front panel	
Remove FAN CLUTCH (E65 only)	
Remove fan cowl (E65 only)	
Remove ELECTRIC FAN (E60 only)	
Remove ALTERNATOR DRIVE BELT	
Remove A/C COMPRESSOR DRIVE BELT	
Remove ACOUSTIC COVER	
Secure engine in installation position with special tool	
Release nuts on left and right engine mounts at top	
Remove REINFORCEMENT PLATE	
Drain off engine oil	
Remove LOWER OIL SUMP SECTION	
Lower FRONT AXLE SUPPORT	NOTE: To remove the oil sump, you must lower the front axle support. There is no need to perform a front axle alignment check.
Release power steering pump on bracket, hydraulic lines remain connected. Secure power steering pump against falling down.	
Unlock and disconnect hydraulic lines from heat exchanger with special tool 17 0 030.	Installation location: on radiator at bottom left. Transmission fluid emerges when hydraulic lines are released. Catch and dispose of escaping transmission fluid. Installation: Check fluid level in automatic transmission; top up if necessary.
Release hydraulic lines on automatic transmission.	
Release holder for hydraulic lines. Remove hydraulic lines.	
Unclip cable duct of oxygen sensors from automatic transmission.	

Release screw, remove tensioner (1) from A/C compressor drive belt (E65 only).

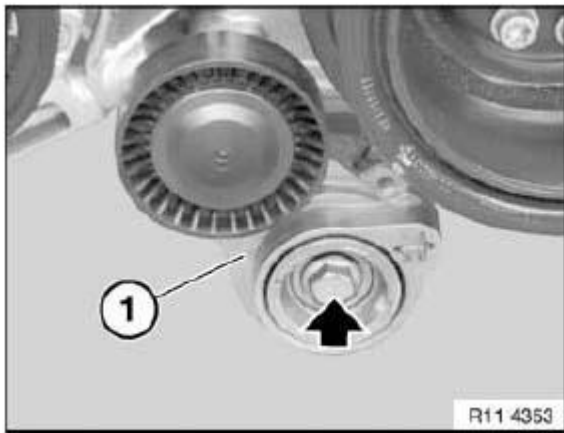


Fig. 99: Identifying A/C Compressor Drive Belt Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws.

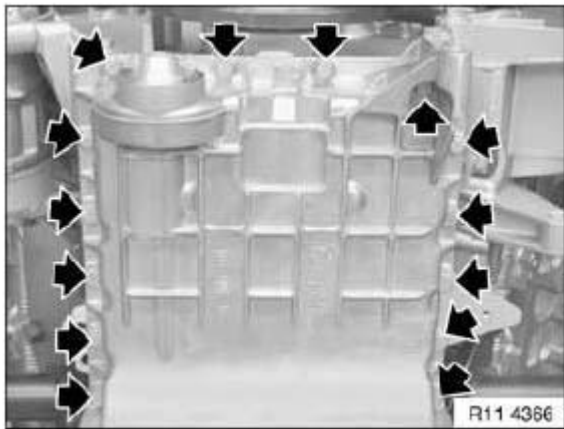


Fig. 100: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and remove oil sump top section.

Installation:

Replace sealing ring on dipstick guide tube.

Free sealing faces of seal debris and clean.

1. Replace gasket.
2. Install oil sump.
3. Insert all screws on transmission end,

4. Tighten down all screws on oil sump.

Tightening torque: 11 13 2AZ . See **OIL PAN** for specs.

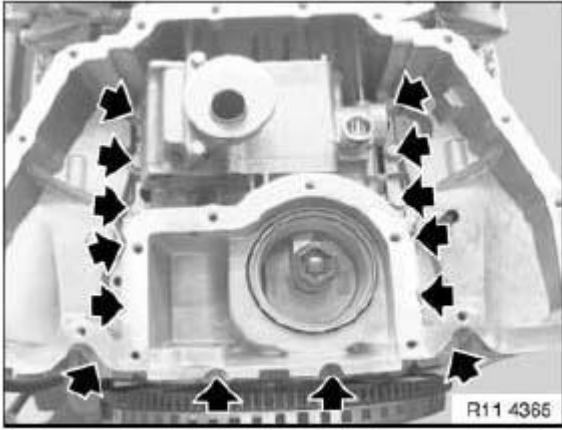


Fig. 101: Locating Oil Sump Top Section Screws
Courtesy of BMW OF NORTH AMERICA, INC.

11 13 020 REMOVING AND INSTALLING/REPLACING OIL SUMP BOTTOM SECTION (N62/N62TU)

Necessary preliminary tasks:

- Remove **REINFORCEMENT PLATE**
- Remove oil drain plug and drain engine oil.

Unlock plug connection (1) on oil level sensor and disconnect.

Release screws and remove oil sump bottom section (2).

Tightening torque: 11 13 2AZ . See **OIL PAN** for specs.

Installation:

Clean sealing surfaces.

Replace seal.

Replace screws.

When replacing oil sump bottom section:

Convert oil level sensor.

Replace sealing ring.

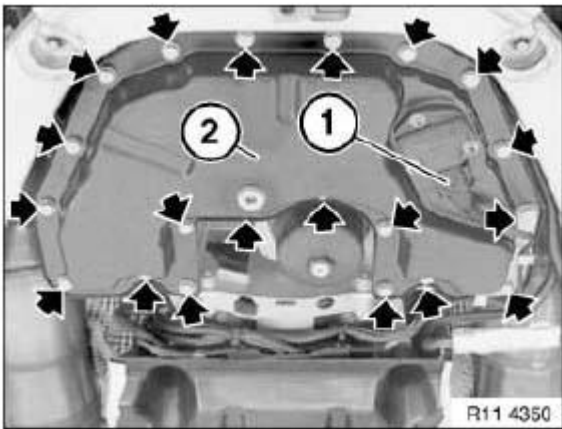


Fig. 102: Locating Oil Sump Bottom Section Screws
Courtesy of BMW OF NORTH AMERICA, INC.

12 13 511 REPLACING IGNITION COIL (N62TU)

Necessary preliminary tasks:

- Switch off ignition
- Remove **INTAKE FILTER HOUSING**

Release screws and remove holder (1).

Pull ignition coil covers (2) out of rubber grommets.

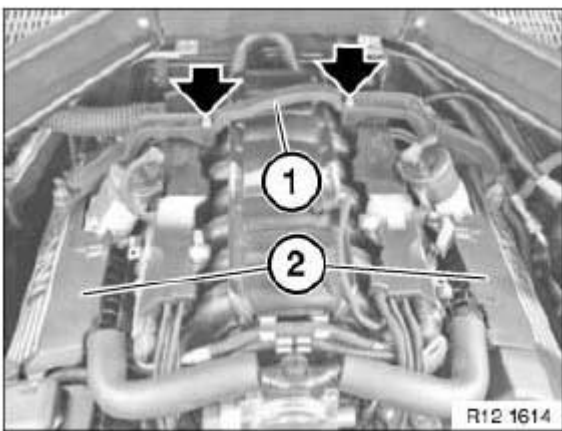


Fig. 103: Identifying Holder And Ignition Coil Covers
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug fastener (1) of ignition coil.

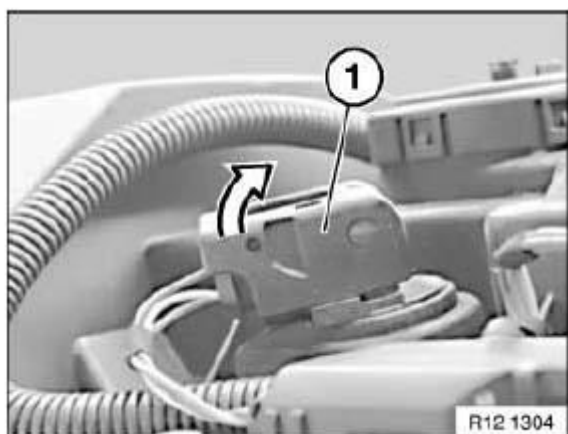


Fig. 104: Identifying Plug Fastener

Courtesy of BMW OF NORTH AMERICA, INC.

Detach ignition coil connector in direction of arrow.

Pull out ignition coil (2).

This procedure is applicable to all ignition coils.

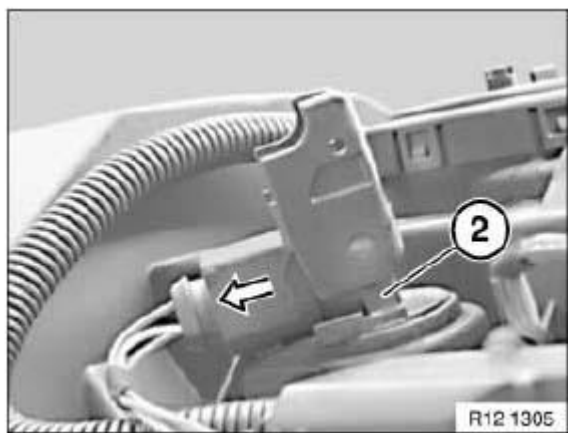


Fig. 105: Pulling Out Ignition Coil

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert rubber seal on ignition coils (2) between guides.

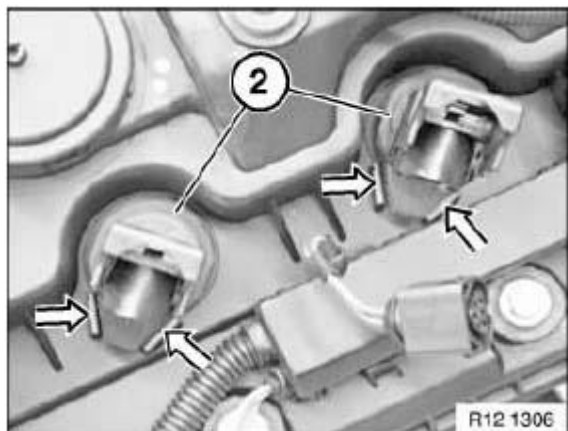


Fig. 106: Inserting Rubber Seal On Ignition Coils Between Guides
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

NOTE: **Read out DME fault memory.**

Check function of DME.

14 HOUSING COVER

REMOVING ACOUSTIC COVER (N62/N62TU)

Unfasten screws.

Raise acoustic cover (1) and remove towards front.

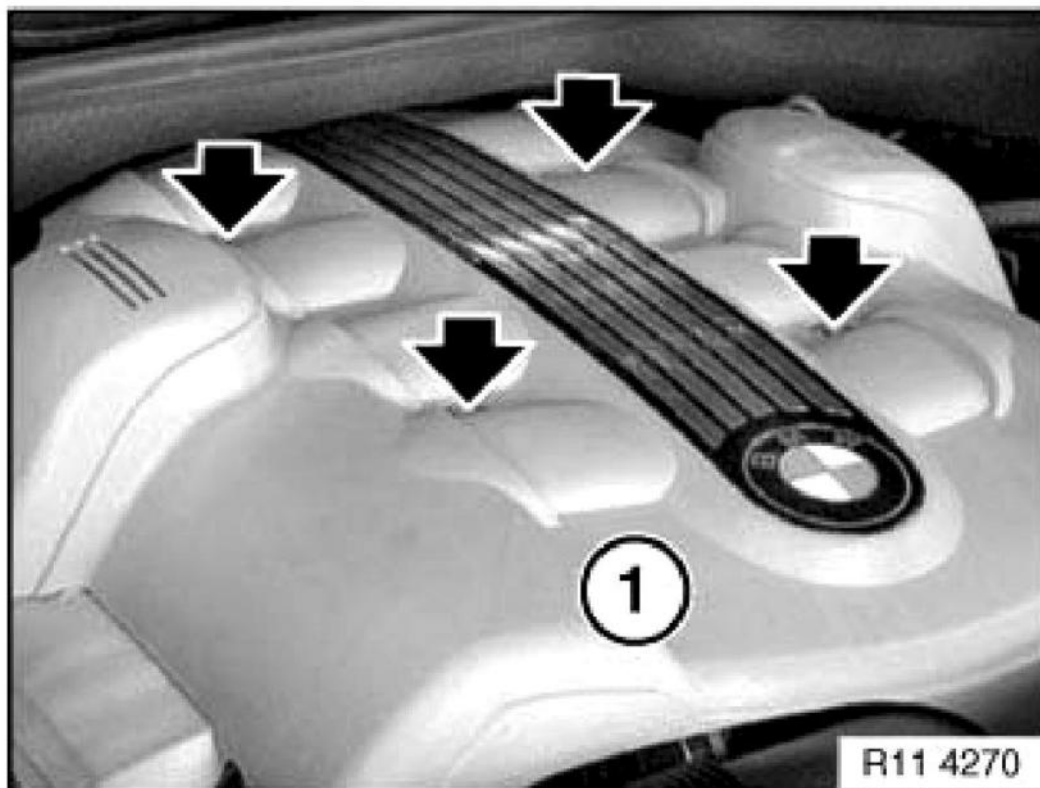


Fig. 107: Identifying Acoustic Cover

Courtesy of BMW OF NORTH AMERICA, INC.

11 14 080 REMOVING AND INSTALLING TOP LEFT TIMING CASE COVER (N62/N62TU)

(cylinder bank 5 to 8)

Necessary preliminary tasks:

- Remove **LEFT CYLINDER HEAD COVER**.
- Remove **BOTH SOLENOID VALVES ON LEFT SIDE**
- Release **ALTERNATOR** (air-cooled)
- BMW ALPINA B7 vehicles:
 - Remove support block for radial compressor

Release screw, remove holder (1).

Remove line (2) from holder.

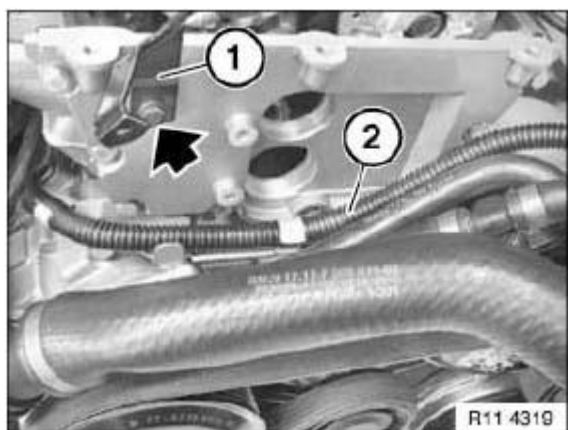


Fig. 108: Identifying Holder And Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1 and 2).

Remove timing case cover (3).

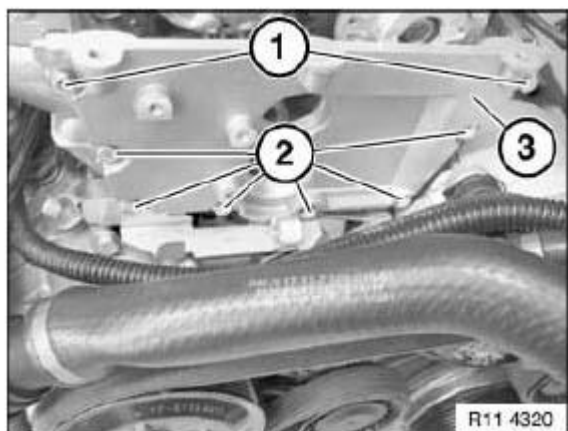


Fig. 109: Identifying Timing Case Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Free sealing face (2) on timing case cover (3) of seal debris and clean.

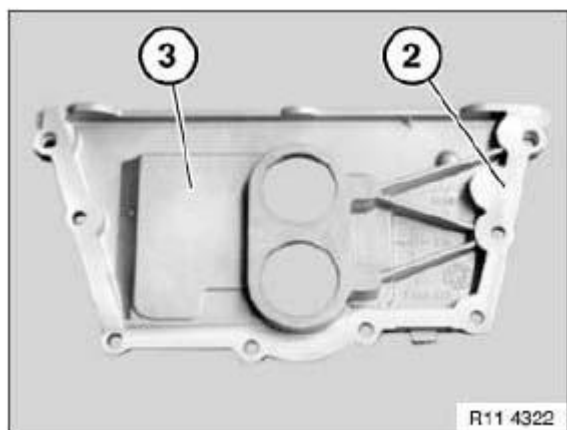


Fig. 110: Identifying Sealing Face And Timing Case Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check adapter sleeves (1) for damage and correct installation position; replace if necessary.

Free sealing face (2) of seal debris and clean.

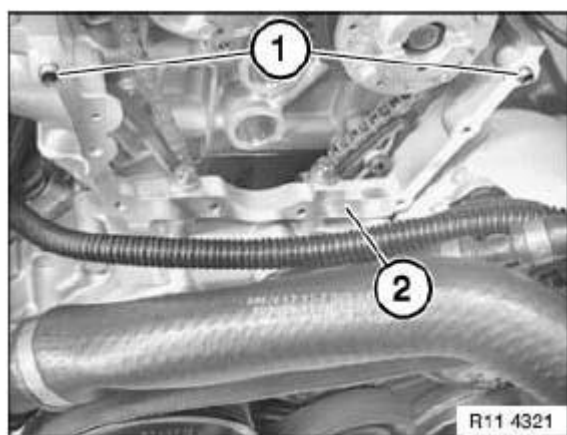


Fig. 111: Identifying Adapter Sleeves And Sealing Face
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace gasket (1) and check for correct installation position.

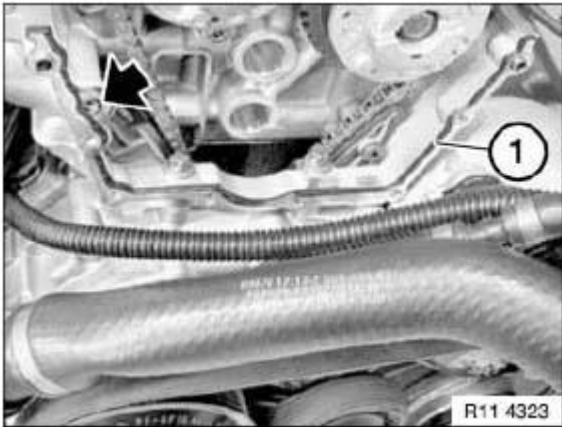


Fig. 112: Identifying Gasket

Courtesy of BMW OF NORTH AMERICA, INC.

11 14 085 REMOVING AND INSTALLING TOP RIGHT TIMING CASE COVER (N62 / N62TU)

(cylinder bank 1 to 4)

Necessary preliminary tasks:

- Remove **RIGHT CYLINDER HEAD COVER**
- Remove **VACUUM PUMP**
- Remove **BOTH SOLENOID VALVES ON RIGHT SIDE**

Remove cable from holder.

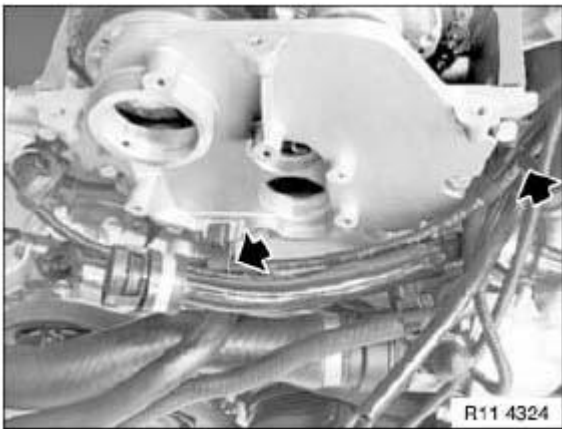


Fig. 113: Removing Cable From Holder

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1 and 2).

Remove timing case cover (3).

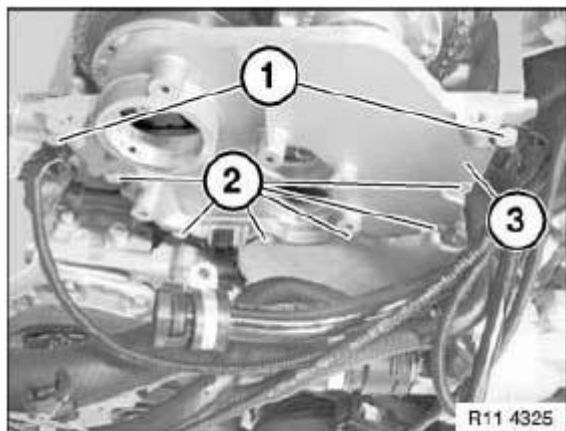


Fig. 114: Identifying Timing Case Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Free sealing face (2) on timing case cover (3) of seal debris and clean.

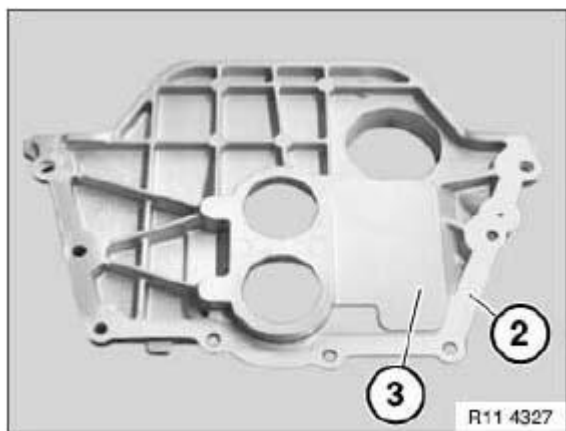


Fig. 115: Identifying Timing Case Cover And Sealing Face
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check adapter sleeves (1) for damage and correct installation position; replace if necessary.

Free sealing face (2) of seal debris and clean.

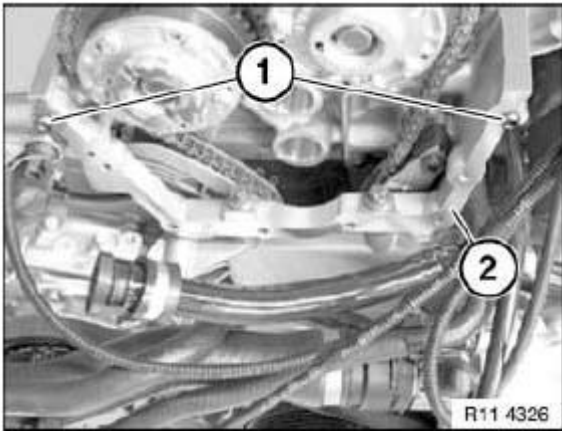


Fig. 116: Identifying Adapter Sleeves And Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace gasket (1) and check for correct installation position.

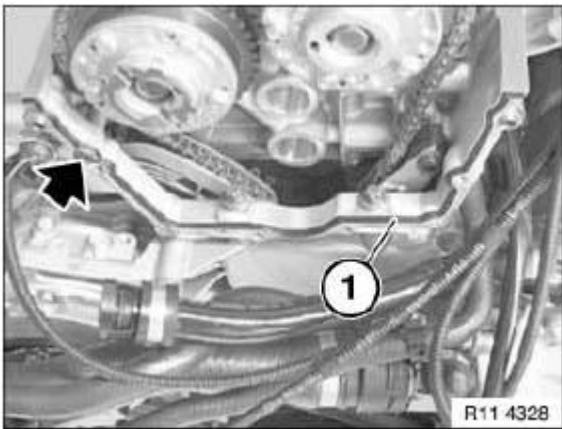


Fig. 117: Identifying Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

11 14 110 REMOVING AND INSTALLING BOTTOM TIMING CASE COVER (N62 / N62TU)

Special tools required:

- **23 1 040**

Necessary preliminary tasks:

- Remove **ENGINE**
- Remove both cylinder heads. See **REMOVING AND INSTALLING LEFT CYLINDER HEAD (N62 FROM 9/03 AND N62TU)** and **REMOVING AND INSTALLING RIGHT CYLINDER HEAD (N62**

FROM 9/03 AND N62TU)

- Remove **LOWER OIL SUMP SECTION**
- Remove **UPPER OIL SUMP SECTION**
- Remove **VIBRATION DAMPER**
- Remove **WATER PUMP**
- Remove tensioner from poly-V-belt
- Remove alternator with housing
- Remove **HUB FOR VIBRATION DAMPER**
- Remove **FLYWHEEL**
- Remove rear coolant cap

Release screws along lines (1).

Remove timing case cover (2) towards front.

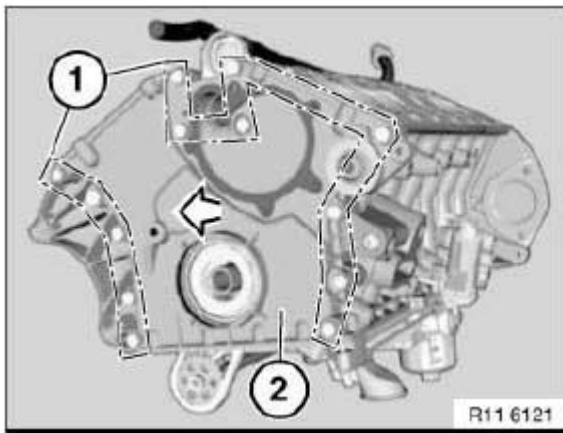


Fig. 118: Identifying Timing Case Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Drive out water pipe (1) with special tool 23 1 040 at cutout (2) towards front.

Installation:

Replace water pipe (1) and sealing ring (3).

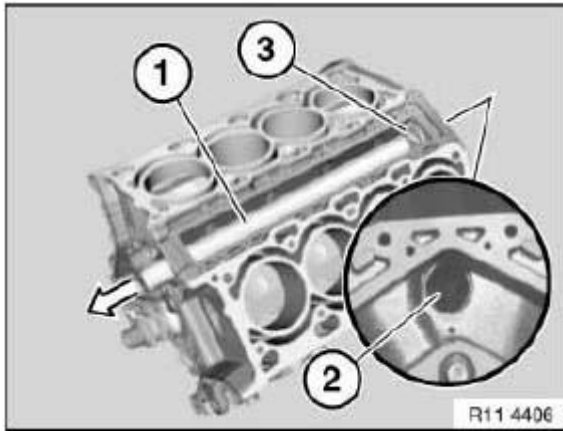


Fig. 119: Identifying Water Pipe And Sealing Ring
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing surfaces and replace seal.

Install timing case cover, insert all screws and initially tighten to approx. 5 Nm.

Fully tighten all screws in alternate sequence.

Tightening torque: 11 14 1AZ . See CASE COVERS for specs.

IMPORTANT: Once all screws have been tightened down, retighten them in a second operation.

Replace RADIAL SEAL in timing case at bottom.

**11 14 141 REPLACING RADIAL SHAFT SEAL IN TIMING CASE COVER AT BOTTOM
 (N62/N62TU)**

Special tools required:

- 11 9 410
- 11 9 420

Necessary preliminary tasks:

- REMOVING HUB FOR VIBRATION DAMPER

Position lever (2) for removing radial shaft seal (1) horizontally and install special tool 11 9 410.

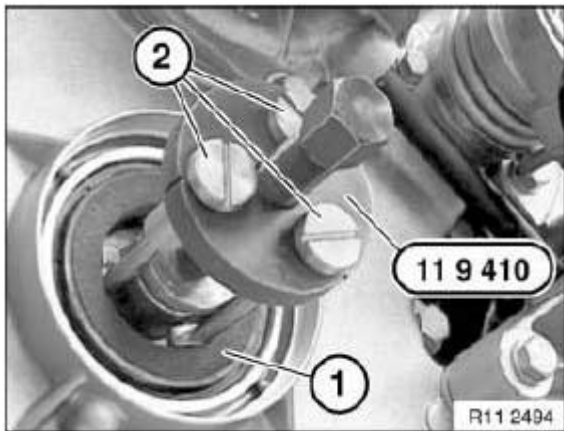


Fig. 120: Identifying Lever And Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Turn lever (2) so that it grips behind radial shaft seal (1).

Turn bolt (3) on special tool 11 9 410 to remove radial shaft seal (1).

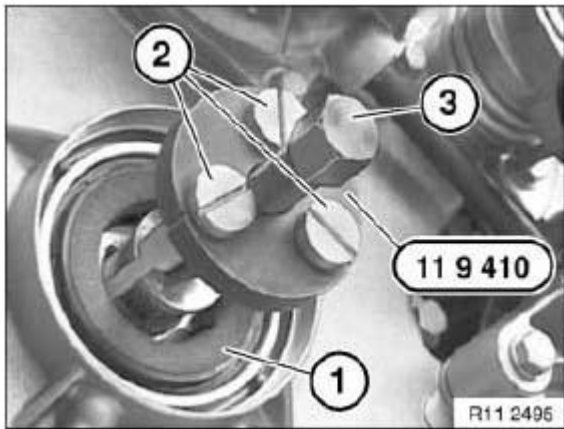


Fig. 121: Identifying Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Radial shaft seal may only be supported with a "support sleeve".

If the radial shaft seal (1) is stored for longer than six months without the support sleeve (2), its operational reliability can no longer be guaranteed and it must not be reused.

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

Do not touch the sealing lip with your fingers.



Fig. 122: Identifying Support Sleeve

Courtesy of BMW OF NORTH AMERICA, INC.

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

Fit radial shaft seal (1) on timing case cover.

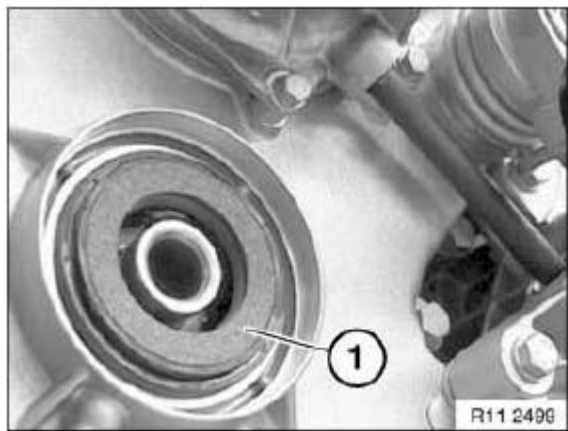


Fig. 123: Identifying Radial Shaft Seal

Courtesy of BMW OF NORTH AMERICA, INC.

Using special tool 11 9 420 and central bolt (3), install radial shaft seal flush with timing case cover.

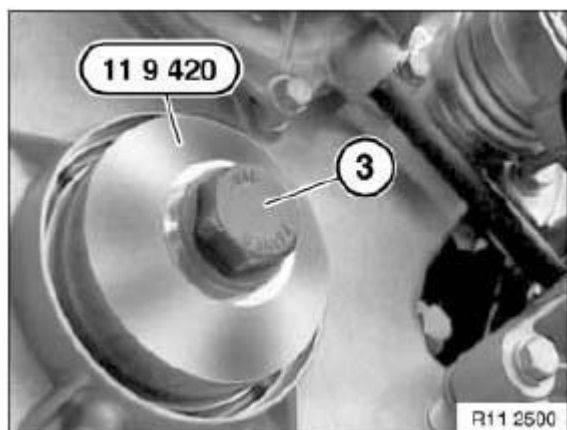


Fig. 124: Identifying Central Bolt

Courtesy of BMW OF NORTH AMERICA, INC.

11 14 151 REPLACING CRANKSHAFT RADIAL SHAFT SEAL (N62 / N62TU)

Special tools required:

- 11 2 390

(transmission side)

Necessary preliminary tasks:

- Remove transmission
- Drain off engine oil
- Remove **FLYWHEEL**

Release screws (2).

Release screws (1).

Carefully remove end cover.

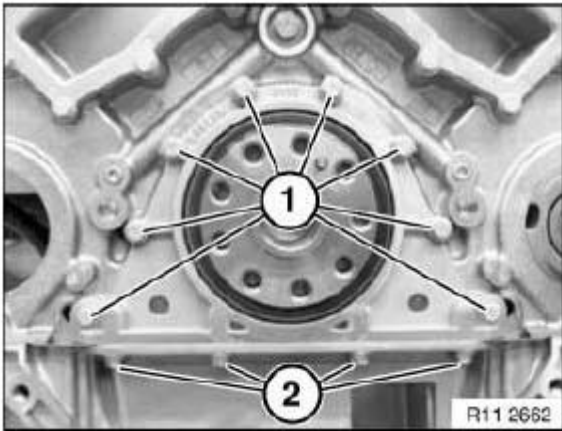


Fig. 125: Identifying Cover Screws

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The sealing lip of the radial shaft seal is highly sensitive and must not be kinked.

Do not touch the sealing lip with your fingers.

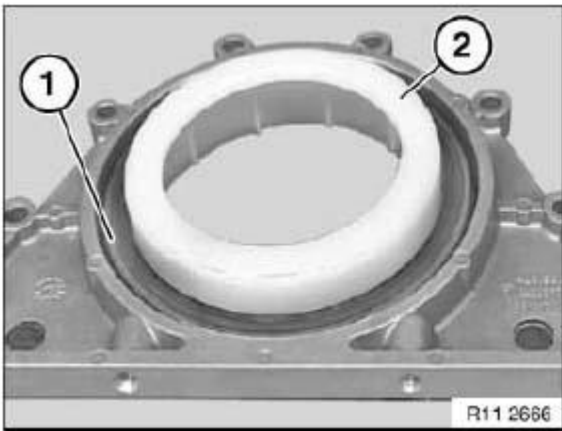


Fig. 126: Identifying Radial Shaft Seal

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Support sleeve (2) is included in scope of delivery. If the radial shaft seal (1) is stored for longer than six months without the support sleeve (2), its operational reliability can no longer be guaranteed and it must not be reused. The support sleeve (2) remains in the radial shaft seal and is used as a slip sleeve in the installation described later.

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

When the radial shaft seal is installed, only the support sleeve included in the scope of delivery may be used as

a slip sleeve.

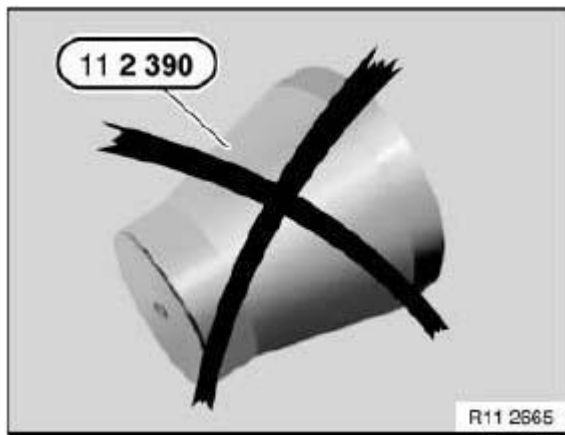


Fig. 127: Identifying Support Sleeve

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The radial shaft seal can only be replaced completely with the end cover.

The gasket is an integral part of the end cover and cannot be replaced individually.

Installation:

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

Keep sealing faces clean and free of oil.

Coat contact points on joint along oil sump with Drei Bond 1209.

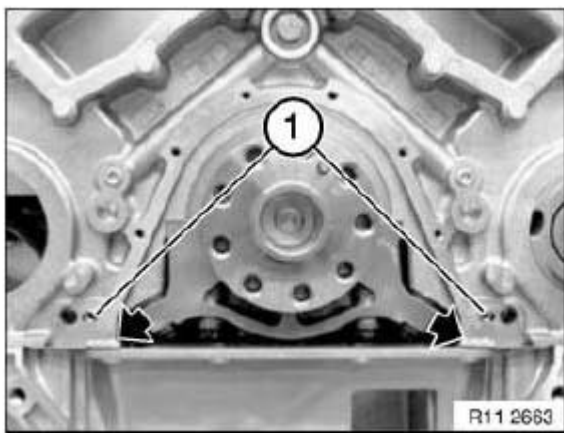


Fig. 128: Identifying Dowel Sleeves

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Lightly oil running surface of crankshaft.

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

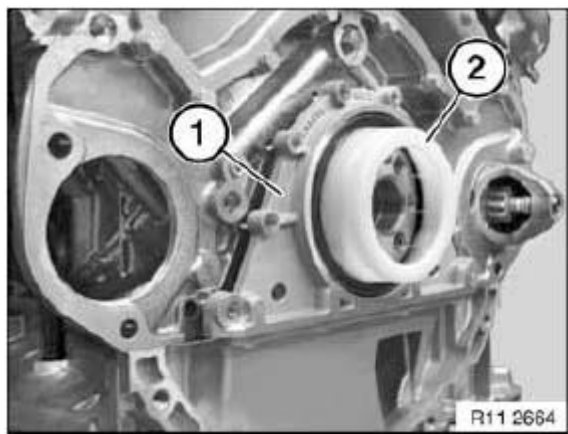


Fig. 129: Identifying Support Sleeve And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screws (1) and initially tighten without play.

Insert screws (2) and initially tighten without play.

Tighten down screws (1).

Tighten down screws (2).

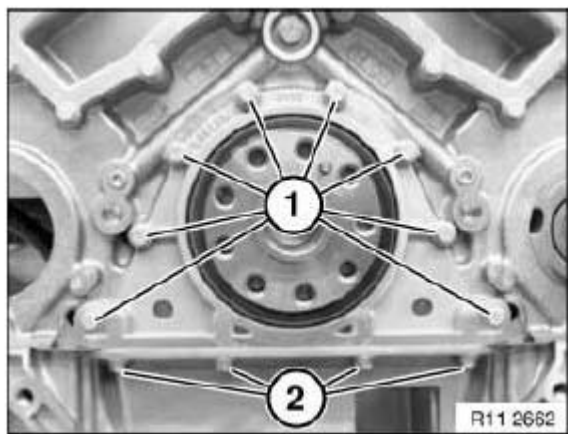


Fig. 130: Identifying Down Screws
Courtesy of BMW OF NORTH AMERICA, INC.

21 CRANKSHAFT WITH BEARING

11 21 500 REPLACING CRANKSHAFT (N62 / N62TU)**CRANKSHAFT REFERENCE**

Operation:	Note:
Remove ENGINE	
Remove cylinder head (cylinder bank 1 to 4)	
Remove cylinder head (cylinder bank 5 to 8)	
Remove HUB FOR VIBRATION DAMPER	
Removing lower timing case cover	
Removing oil pan. See REMOVING AND INSTALLING/REPLACING OIL SUMP TOP SECTION (N62/N62TU) and REMOVING AND INSTALLING/REPLACING OIL SUMP BOTTOM SECTION (N62/N62TU)	
Remove OIL PUMP	
Removing piston	
Remove FLYWHEEL	

Release main bearing inclined screw connection (1).

Installation:

Tightening torque: 11 11 3AZ . See **ENGINE BLOCK** for specs.

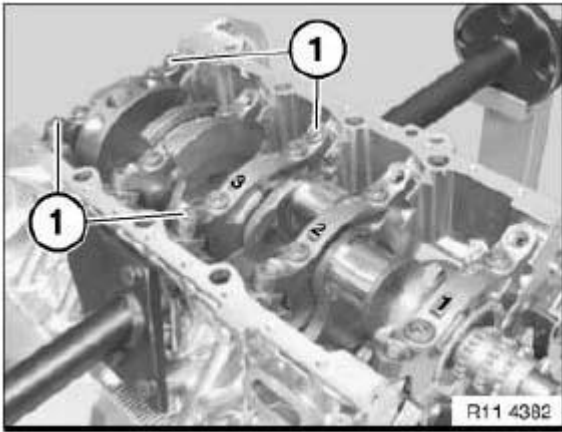


Fig. 131: Identifying Main Bearing Inclined Screw Connection
 Courtesy of BMW OF NORTH AMERICA, INC.

Release spacer bolt (2).

Tightening torque: 11 11 3AZ . See **ENGINE BLOCK** for specs.

Release main bearing screws.

Tightening torque: 11 11 2AZ . See **ENGINE BLOCK, CYLINDER CRANKCASE** for specs.

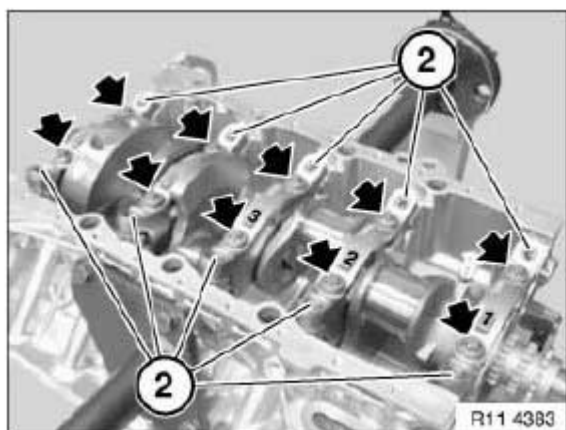


Fig. 132: Identifying Spacer Bolt

Courtesy of BMW OF NORTH AMERICA, INC.

Remove main bearing caps 1 to 5.

Lever out crankshaft.

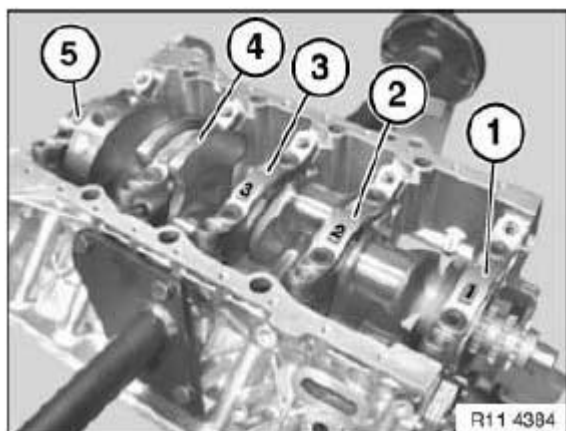


Fig. 133: Identifying Main Bearing Caps

Courtesy of BMW OF NORTH AMERICA, INC.

Replace MAIN CRANKSHAFT BEARING SHELLS.

Replace CONROD BEARING SHELLS.

11 21 531 REPLACING ALL MAIN CRANKSHAFT BEARING SHELLS (N62/N62TU)

Special tools required:

- 00 2 590
- 00 9 120

Necessary preliminary tasks:

- (engine dismantled)
- Clean components before installing.
- Preparatory tasks are described in the section **REPLACING CRANKSHAFT.**

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

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

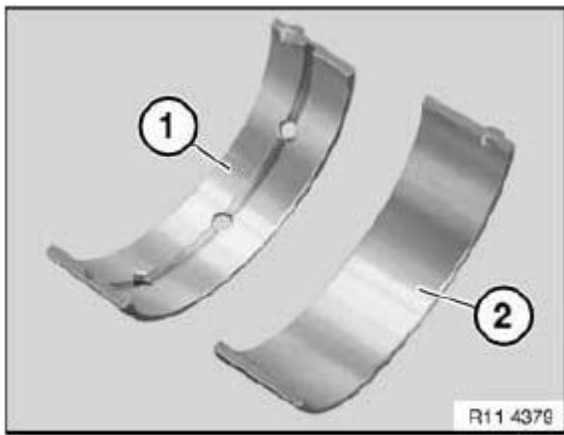


Fig. 134: Identifying Main Bearing Shells
Courtesy of BMW OF NORTH AMERICA, INC.

The letter (1) denotes the crankshaft construction stage.

S= Series

B= Construction stage 1

C= Construction stage 2

The numbers (2) denote the bearing shell classification for the relevant bearing position from 1 to 5 (main bearing cap).

1= yellow

2= green

3= violet

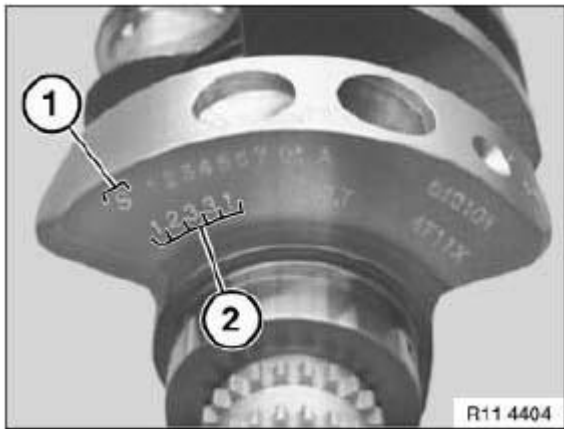


Fig. 135: Identifying Crankshaft Construction Stage And Bearing Shell Classification
 Courtesy of BMW OF NORTH AMERICA, INC.

The letters (1) denote the bearing shell classification for the relevant bearing position from 1 to 5 in the crankcase and is located on the transmission side in the Vee. The first letter on the left applies to the first bearing position at the front.

Y= yellow

G= green

V= violet

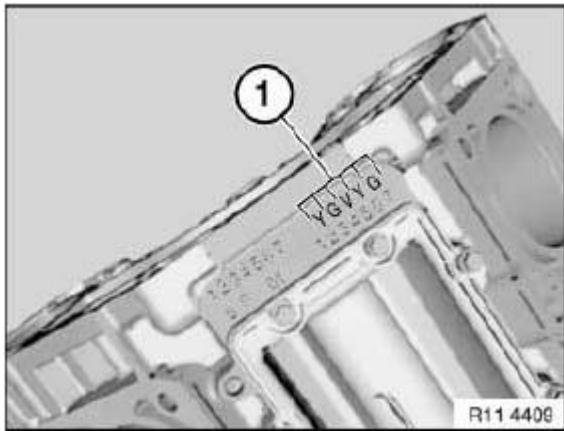


Fig. 136: Identifying Bearing Shell Classification Letters
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Main bearing caps (1, 2 and 3) are identified with punch numbers.

Main bearing caps (4 and 5) are not identified.

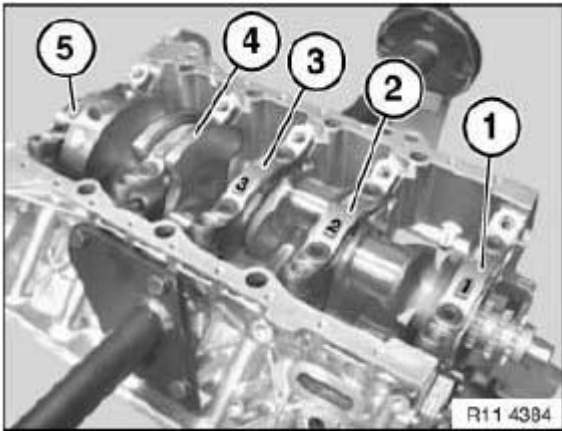


Fig. 137: Identifying Main Bearing Caps
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Main bearing cap number 5 can be identified by the surfaces (1) for the stop disks of the thrust bearing.

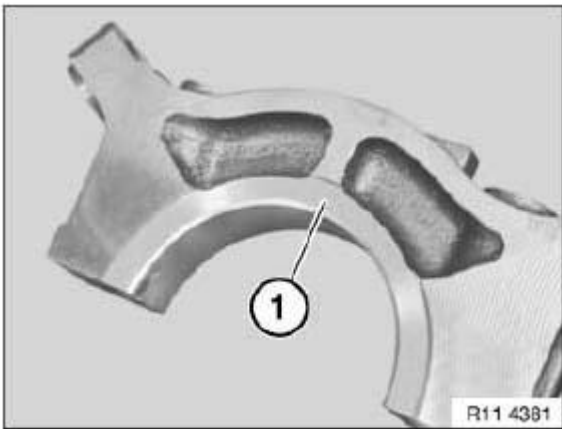
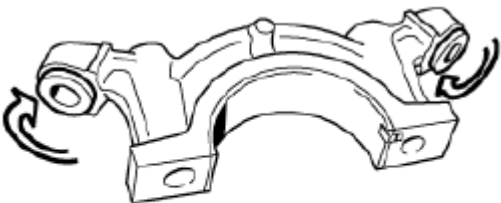


Fig. 138: Identifying Thrust Bearing Stop Disk Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew thread support bushings in main bearing caps.



60 11 211

Fig. 139: Identifying Main Bearing Cap

Courtesy of BMW OF NORTH AMERICA, INC.

Checking main bearing clearance:

To check crankshaft bearing clearance, use old main bearing screws.

There must be no oil in the blind holes (risk of cracking).

Do not twist crankshaft.

Fit special tool 00 2 590 (Plastigage Type PG 1) to the oilfree crankshaft.

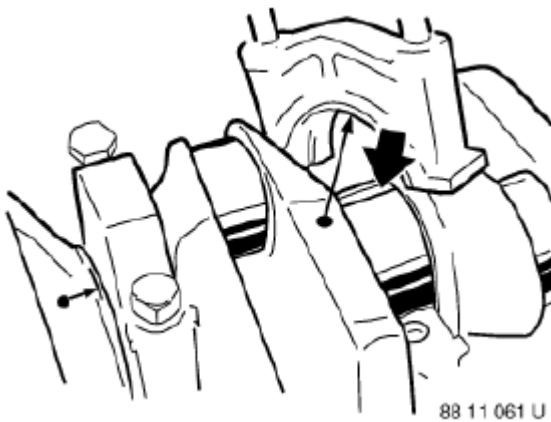


Fig. 140: Identifying Crankshaft Holes

Courtesy of BMW OF NORTH AMERICA, INC.

1. Tighten all screws on main bearing cover with jointing torque.
2. Tighten down all screws on main bearing caps with special tool 00 9 120 and torsion angle.

Tightening torque: 11 11 2AZ . See **ENGINE BLOCK, CYLINDER CRANKCASE** for specs.

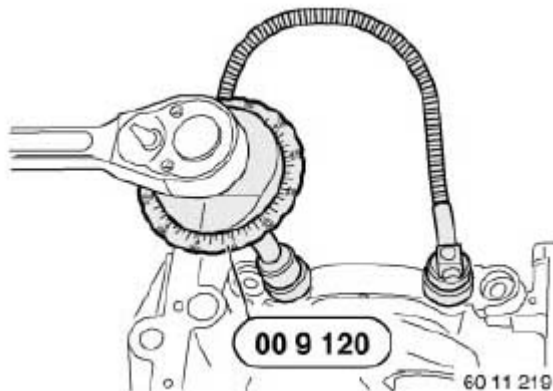


Fig. 141: Identifying Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

Remove main bearing cap.

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

MAIN BEARING PLAY .

- Remove plastic thread.
- Lubricate bearing shells and bearing shells.



Fig. 142: Checking Main Bearing Play
Courtesy of BMW OF NORTH AMERICA, INC.

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

Do not wash off bolt coating.

No oil is permitted in the blind bores! (Danger of cracking).

Tightening specifications for main bearing:

1. Tighten all screws on main bearing cover with jointing torque.
2. Unfasten screws on main bearing cover 5.
3. Strike back and front of crankshaft with plastic hammer to center thrust bearing (do not damage crankshaft).

CHECK AXIAL PLAY .

Check guide bearing shell, crankshaft and crankcase if necessary.

4. Tighten screws of main bearing cover 5 with jointing torque.
5. Tightening torque: 11 11 2AZ . See **ENGINE BLOCK, CYLINDER CRANKCASE** for specs.

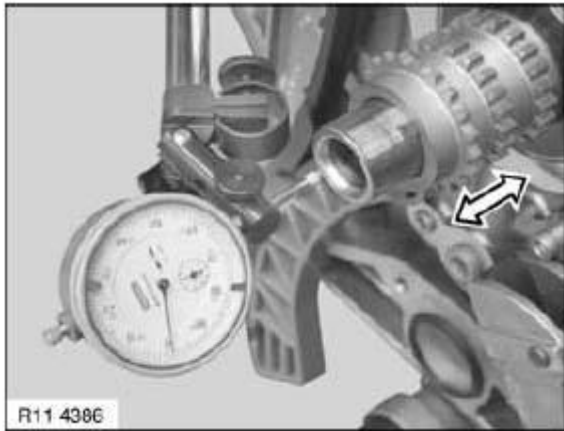


Fig. 143: Checking Axial Play

Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down all screws on main bearing caps with special tool 00 9 120 and torsion angle.

Tightening torque: 11 11 2AZ . See **ENGINE BLOCK, CYLINDER CRANKCASE** for specs.

Tighten down thread support bushings (2).

Tightening torque: 11 11 3AZ . See **ENGINE BLOCK** for specs.

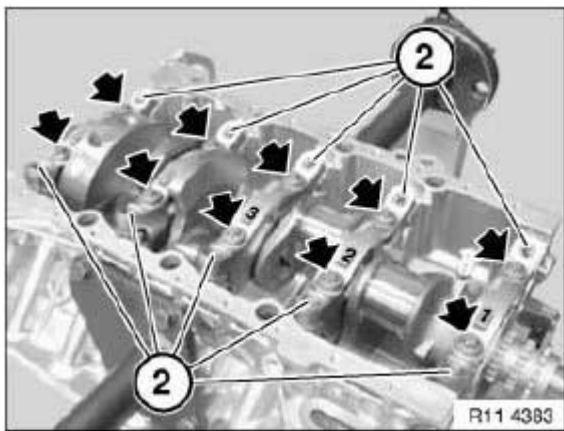


Fig. 144: Identifying Main Bearing Cap Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Replace flanged head screws (1) and tighten down.

Tightening torque: 11 11 3AZ . See **ENGINE BLOCK** for specs.

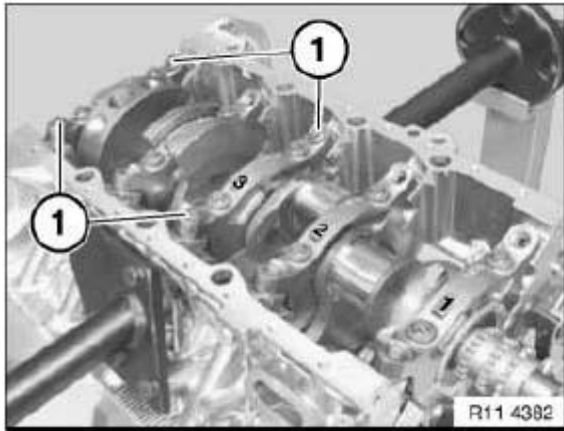


Fig. 145: Identifying Head Screws

Courtesy of BMW OF NORTH AMERICA, INC.

22 FLYWHEEL

11 22 000 REMOVING AND INSTALLING/REPLACING FLYWHEEL (N62/N62TU)

Special tools required:

- 11 4 180
- 11 9 260
- 11 9 262
- 11 9 263
- 11 9 264

Necessary preliminary tasks:

- Remove automatic transmission. See **REMOVING AND INSTALLING AUTOMATIC TRANSMISSION (6HP26Z/N62)** or **REMOVING AND INSTALLING AUTOMATIC TRANSMISSION (6HP26Z/N62TU) FROM 03/07** .
- Remove manual transmission. See **REMOVING AND INSTALLING TRANSMISSION (GS6-53BZ)** or **REMOVING AND INSTALLING TRANSMISSION (GS6S53BZ SMG)** .
- Remove **CLUTCH** .

Automatic transmissions only:

Block flywheel (1) with special tools 11 9 260 / 11 9 263 / 11 9 264.

Unfasten flywheel screws.

Remove flywheel (1).

Installation:

Clean threads on flywheel screws in crankshaft.

Flywheel (1) is secured with an alignment pin.

Fit flywheel (1).

Fit new flywheel screws.

Tightening torque: 11 22 1AZ . See **FLYWHEEL** for specs.

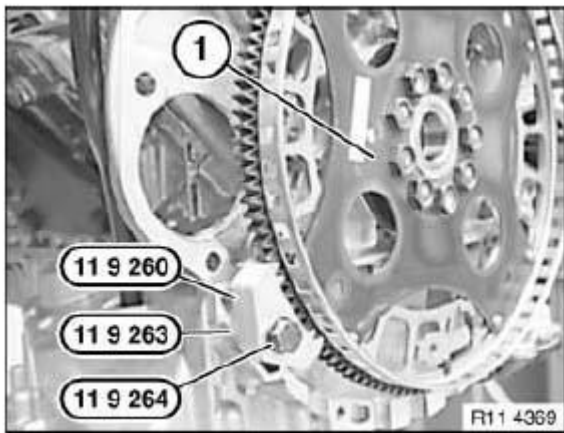


Fig. 146: Identifying Special Tools For Flywheel
Courtesy of BMW OF NORTH AMERICA, INC.

Manual transmissions only:

Block flywheel (dual-mass) with special tools 11 9 260 / 11 9 262 / 11 9 263.

Release flywheel screws with special tool 11 4 180.

Installation:

Flywheel (1) is secured with an alignment pin.

IMPORTANT: Do not use screw locking varnish .

Tightening torque: 11 22 1AZ . See **FLYWHEEL** for specs.

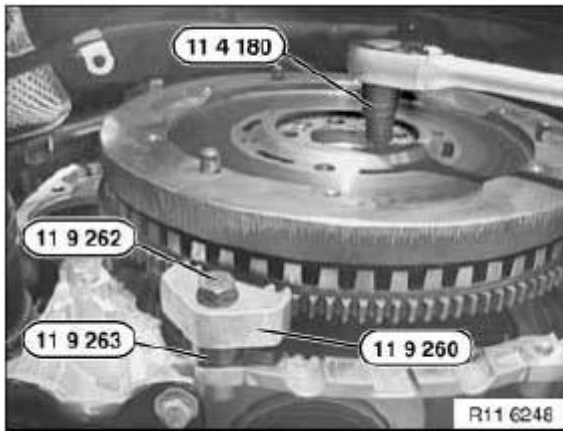


Fig. 147: Identifying Special Tools For Flywheel (Manual Transmission)
 Courtesy of BMW OF NORTH AMERICA, INC.

23 VIBRATION DAMPER

11 23 010 REMOVING AND INSTALLING/REPLACING VIBRATION DAMPER (N62/N62TU)

Necessary preliminary tasks:

- Remove ALTERNATOR DRIVE BELT
- Remove A/C compressor drive belt. See REPLACING A/C COMPRESSOR DRIVE BELT (N62) or REPLACING A/C COMPRESSOR DRIVE BELT WITH BELT TENSIONER (N62/N62TU).
- Remove REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N62, N62TU)

Release bolts and remove vibration damper (1).

NOTE: On BMW ALPINA B7 vehicles, the additional radial compressor belt pulley must be removed as well.

When replacing the bolts, bear in mind the altered bolt length in BMW ALPINA B7 vehicles.

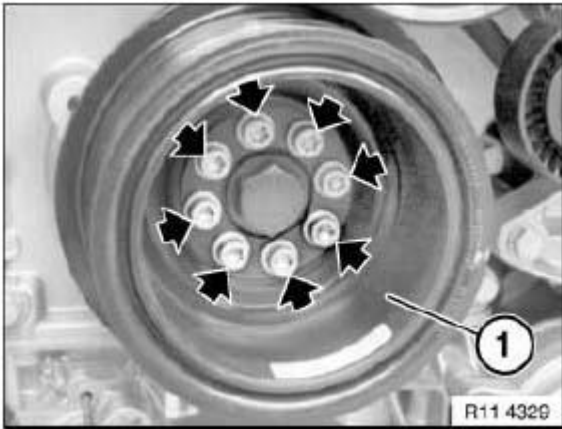


Fig. 148: Identifying Vibration Damper
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Vibration damper is secured on hub with an alignment pin (4).

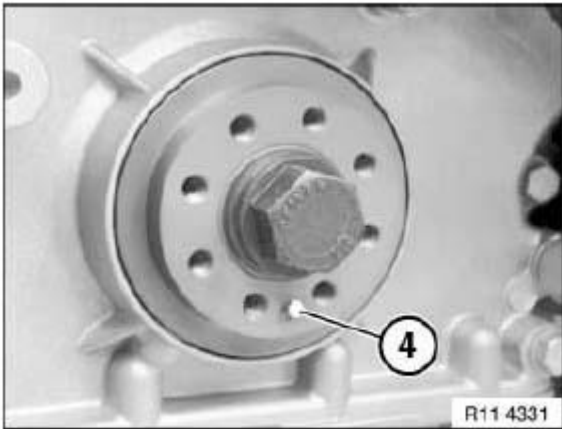


Fig. 149: Identifying Vibration Damper Alignment Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit bore (2) in vibration damper (1) on alignment pin in hub.

Fit disk (3).

Replace screws.

Tightening torque: 11 23 3AZ . See **VIBRATION DAMPER** for specs.

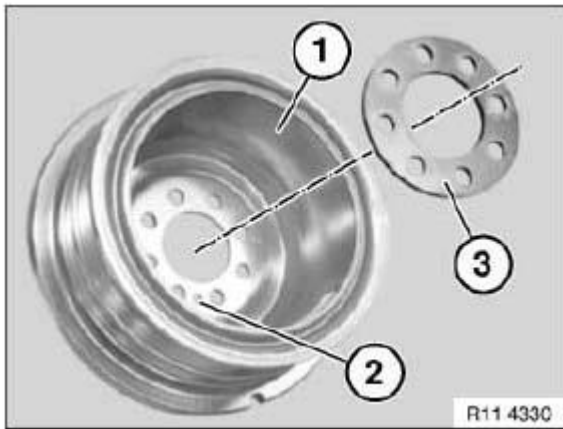


Fig. 150: Identifying Disk And Vibration Damper
 Courtesy of BMW OF NORTH AMERICA, INC.

11 23 031 REMOVING AND INSTALLING/REPLACING VIBRATION DAMPER HUB (N62/N62TU)

Special tools required:

- 11 3 460
- 11 9 451
- 11 9 452
- 11 9 453
- 11 9 454

Necessary preliminary tasks:

- Remove design cover
- Remove **FAN CLUTCH** (E65)
- Remove fan cowl (E65)
- Remove **ELECTRIC FAN** (E60)
- Remove **DRIVE BELT** for alternator
- Remove drive belt for A/C compressor. See **REPLACING A/C COMPRESSOR DRIVE BELT (N62)** or **REPLACING A/C COMPRESSOR DRIVE BELT WITH BELT TENSIONER (N62/N62TU)**.
- Remove front engine underguard
- Remove tensioner from A/C compressor drive belt (E65)
- Remove **VIBRATION DAMPER**

Screw special tool 11 9 451 in conjunction with special tool 11 9 452 to vibration damper hub and to oil sump.

Release central bolt (1).

Remove special tools.

Remove hub for vibration damper.

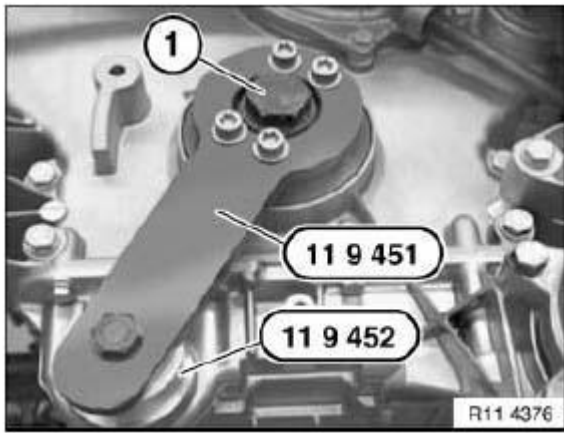


Fig. 151: Identifying Special Tools

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check vibration damper hub and radial seal, replace if necessary.

Align groove in vibration damper hub to parallel key and install vibration damper hub.

Replace central bolt (1).

Tighten down central bolt (1) to joining torque.

Tightening torque: 11 23 2AZ . See **VIBRATION DAMPER** for specs.

Installation:

Fit special tool 11 3 460 on special tool 11 9 451.

NOTE: **Special tool 11 3 460 is magnetic.**

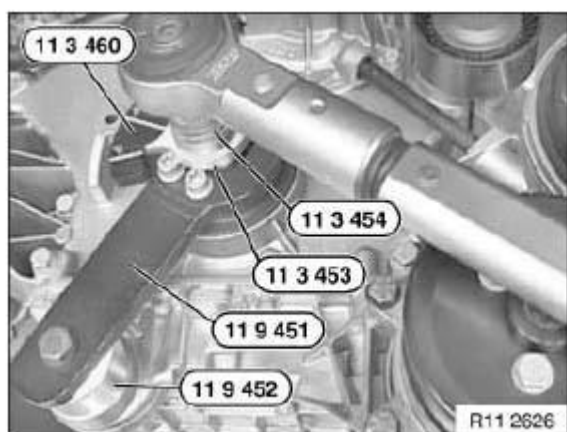


Fig. 152: Identifying Special Tools

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Select 0° position and secure special tool 11 9 453 with clamping screw on socket (special tool 11 9 454).

Tighten the central screw with torsion angle.

Tightening torque: 11 23 2AZ . See **VIBRATION DAMPER** for specs.

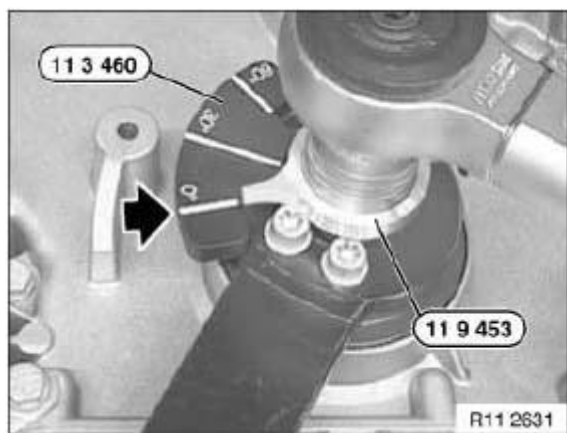


Fig. 153: Identifying Special Tool With Clamping Screw On Socket

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

24 CONNECTING ROD WITH BEARING

11 24 571 REPLACING ALL CONROD BEARINGS (N62/N62TU)

Special tools required:

- 00 2 590
- **00 9 120**
- 11 2 110

(piston removed)

IMPORTANT: Note GRINDING STAGES ON CRANKSHAFT

The letter (1) denotes the crankshaft construction stage.

The numbers (2) denote the bearing shell classification for the relevant bearing position from 1 to 5 (main bearing cap).

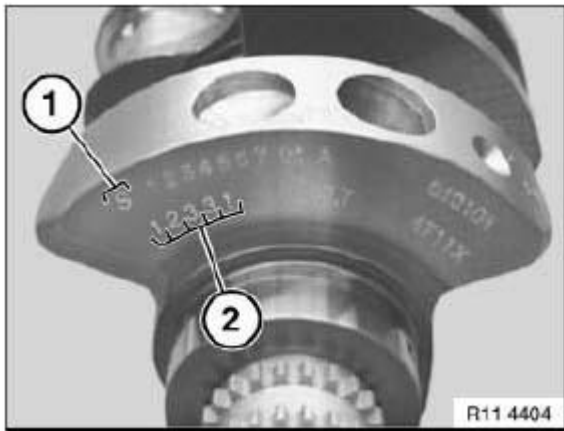


Fig. 154: Identifying Crankshaft Construction Stage And Bearing Shell Classification
Courtesy of BMW OF NORTH AMERICA, INC.

Install new conrod bearing shells.

Insert one red and one blue bearing shell for each conrod.

Install piston.

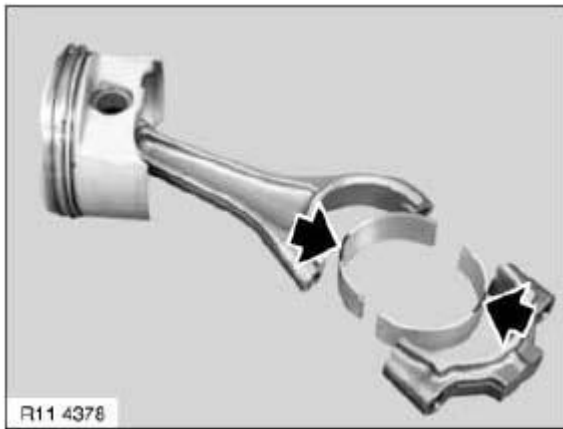


Fig. 155: Inserting Bearing Shell In Conrod
 Courtesy of BMW OF NORTH AMERICA, INC.

Check connecting-rod bearing clearance:

Piston in BDC position.

Fit special tool 00 2 590 (Plastigage Type PG 1) to the oilfree crankshaft.

Fit bearing caps so that pair numbers match up.

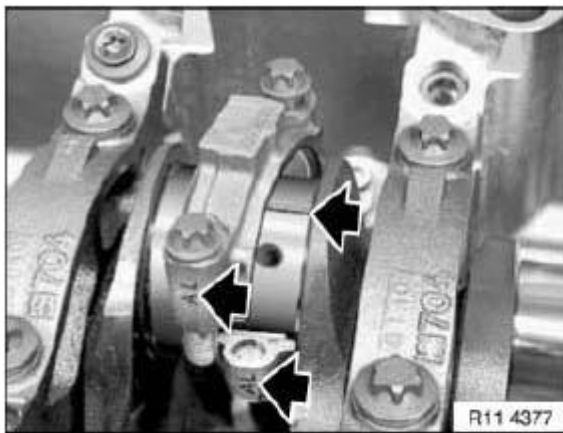


Fig. 156: Locating Bearing Caps
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not distort conrods or crankshaft.

Use conrod bolts to check conrod bearing clearance.

Tighten down conrod bolts with special tool 00 9 120 or special tool 11 2 110.

Tightening torque: 11 24 1AZ . See **CONNECTING RODS AND BEARINGS** for specs.

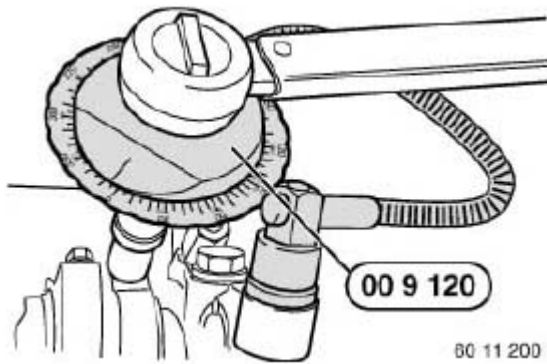


Fig. 157: Identifying Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

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

CONROD BEARING CLEARANCE .

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

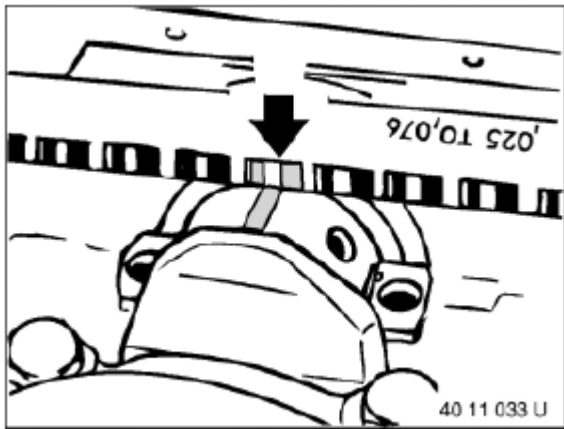


Fig. 158: Checking Conrod Bearing Clearance

Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down conrod bolts with special tool 00 9 120 or special tool 11 2 110.

Tightening torque: 11 24 1AZ . See **CONNECTING RODS AND BEARINGS** for specs.

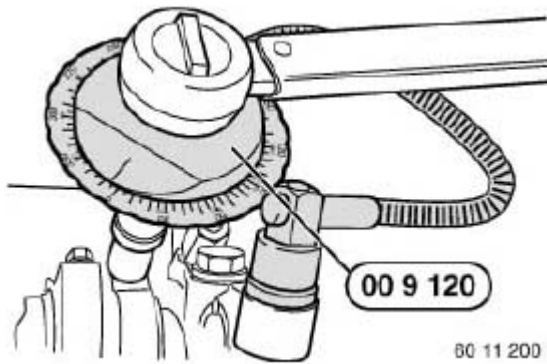


Fig. 159: Identifying Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

25 PISTON WITH RINGS AND PIN

11 25 530 REMOVING AND INSTALLING/REPLACING ALL PISTONS (N62TU)

Special tools required:

- 00 9 120
- 11 5 430
- 11 5 440
- 11 5 450

IMPORTANT: Re-install piston, conrod and bearing shells back in the same position and in the same installation location.

Conrods and conrod bearing caps are denoted with the same pairing letters, do not mix them up.

Necessary preliminary tasks:

- (engine removed)
- Install engine on assembly stand
- Remove both cylinder heads. See REMOVING AND INSTALLING LEFT CYLINDER HEAD (N62 FROM 9/03 AND N62TU) and REMOVING AND INSTALLING RIGHT CYLINDER HEAD (N62 FROM 9/03 AND N62TU).
- Removing oil pan. See REMOVING AND INSTALLING/REPLACING OIL SUMP TOP SECTION (N62/N62TU) and REMOVING AND INSTALLING/REPLACING OIL SUMP BOTTOM SECTION (N62/N62TU).
- Remove OIL PUMP

In event of heavy oil carbon residue:

Carefully remove oil carbon residue from cylinder wall.

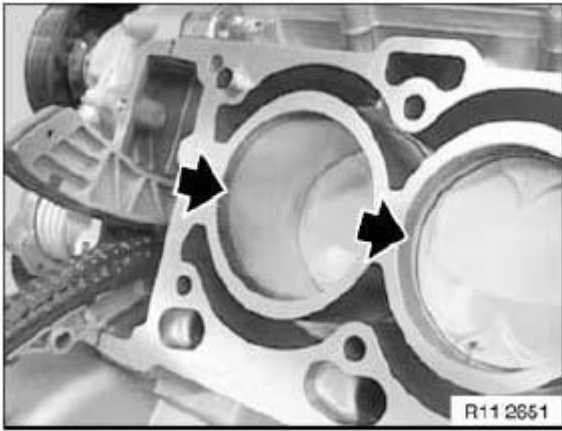


Fig. 160: Removing Oil Carbon Residue From Cylinder Wall
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When removing and installing pistons, make sure piston cooling spray nozzles (1) are not damaged.

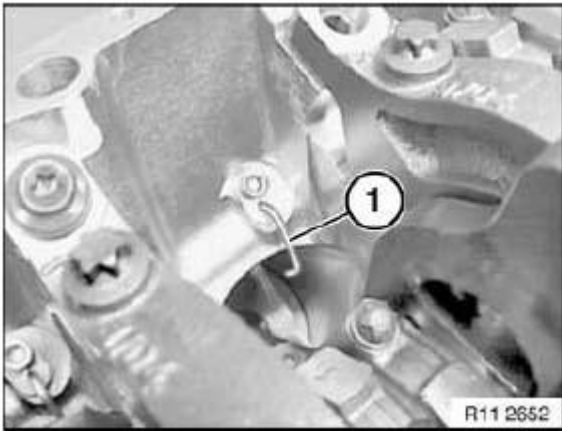


Fig. 161: Identifying Piston Cooling Spray Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew conrod bearing cover.

IMPORTANT: Conrods and conrod bearing caps are denoted with the same pairing letters.
Set down conrod bearing caps in order.

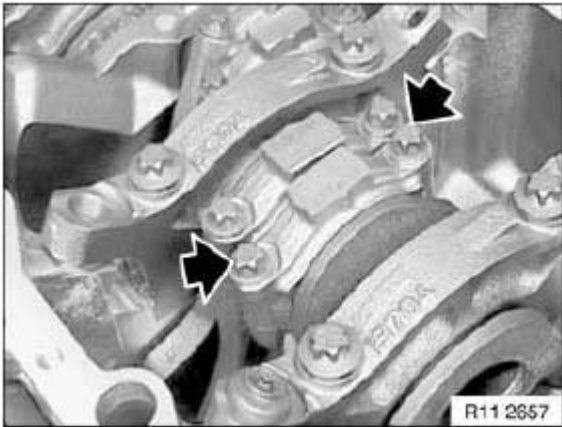


Fig. 162: Identifying Conrod Bearing Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 11 5 440 in conrod.

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

Remove conrod with piston from cylinder head side.

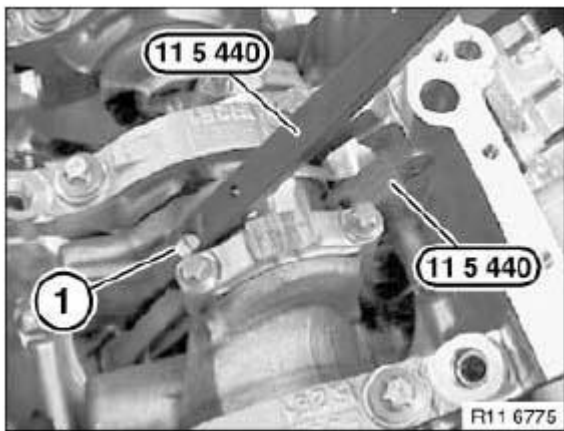


Fig. 163: Identifying Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Piston and piston pin are matched to each other.

Mixing up the components will result in engine damage.

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

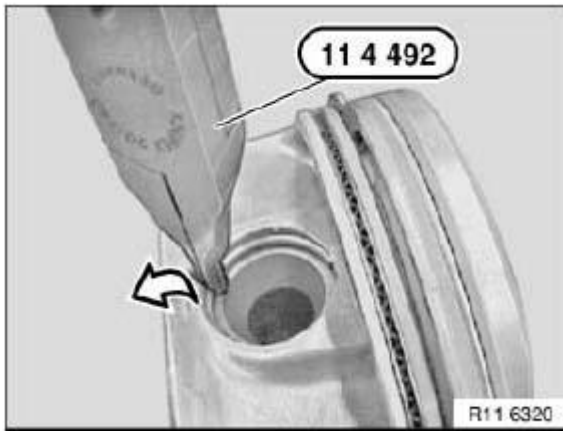


Fig. 164: Identifying Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace connecting rods.

NOTE: The conrods can also be replaced individually.

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

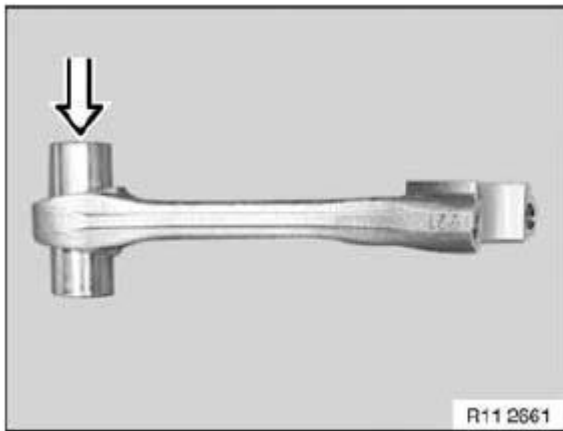


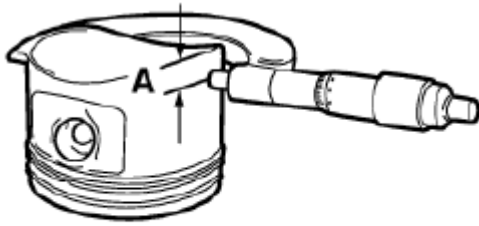
Fig. 165: Pressing Piston Pin

Courtesy of BMW OF NORTH AMERICA, INC.

Prior to installation, measure piston installation clearance:

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

MEASURING POINT A .



88 11 051 U

Fig. 166: Checking Piston Diameter With Micrometer
 Courtesy of BMW OF NORTH AMERICA, INC.

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

DIAMETER OF CYLINDER BORE .

PISTON INSTALLATION CLEARANCE .

TOTAL PERMISSIBLE WEAR TOLERANCE .

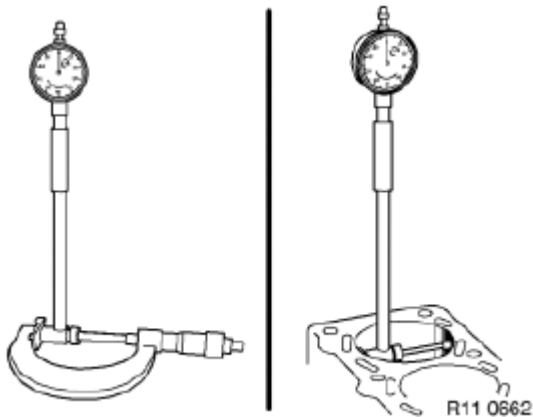


Fig. 167: Checking Cylinder Bore Diameter
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The pistons and conrods of cylinders 1 to 8 are identical.

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

Cylinder bank 1 to 4

Mount conrod on piston in such a way that arrow on piston points **upwards** and marking on conrod points **upwards**.

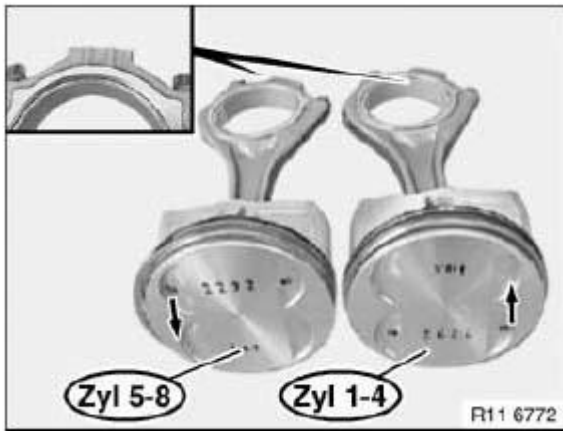


Fig. 168: Identifying Piston Points

Courtesy of BMW OF NORTH AMERICA, INC.

Cylinder bank 5 to 8

Mount conrod on piston in such a way that arrow on piston points **downwards** and marking on conrod points **upwards**.

INSTALL CONROD BEARING.

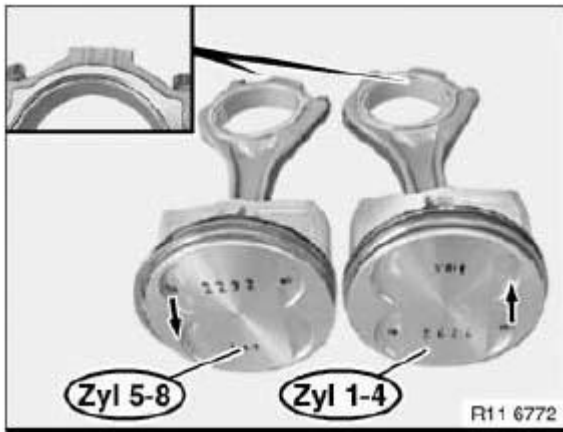


Fig. 169: Identifying Conrod Bearing

Courtesy of BMW OF NORTH AMERICA, INC.

Install retaining ring.



Fig. 170: Identifying Retaining Ring

Courtesy of BMW OF NORTH AMERICA, INC.

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

NOTE: Illustration shows N52.

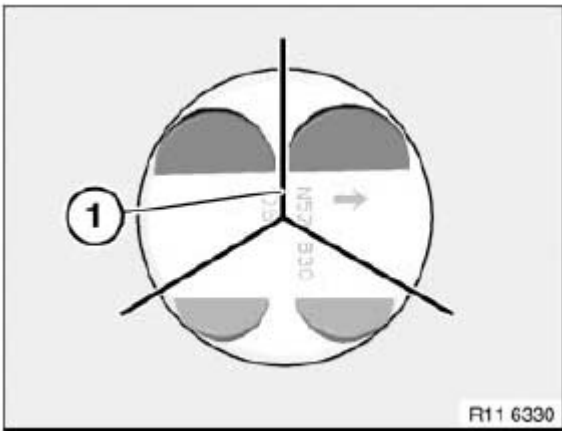


Fig. 171: Identifying Contact Points

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

B40 and B48:

Insert special tools 11 5 440 in conrod.

Installation:

B40:

Prepare piston with rings with special tool 11 5 450.

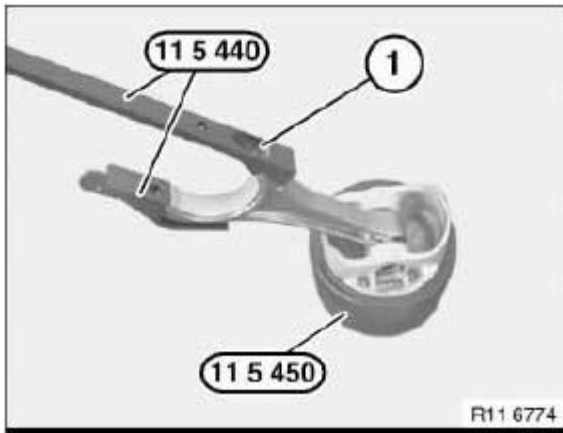


Fig. 172: Identifying Special Tools

Courtesy of BMW OF NORTH AMERICA, INC.

B40:

Lightly coat pistons and piston rings with oil. Offset the contact points of the piston rings by approx. 120° to each other but do not position above the piston pin boss.

Slide in special tool 11 5 450 with piston (1).

Install piston so that arrow points to camshaft drive.

IMPORTANT: Danger of piston ring failure.

Press in piston with finger force only.

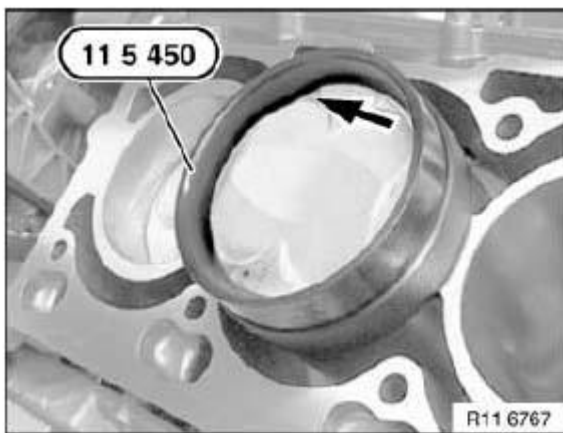


Fig. 173: Identifying Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

B48:

Keep piston rings compressed with special tool 11 5 430.

Install piston so that arrow points to camshaft drive.

IMPORTANT: Danger of piston ring failure.

Press in piston with finger force only.

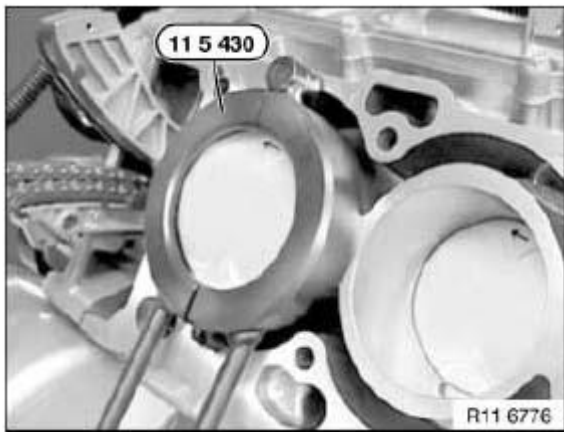


Fig. 174: Identifying Special Tool For Piston Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Attach crankpin to connecting rod.

Remove special tools 11 5 450.

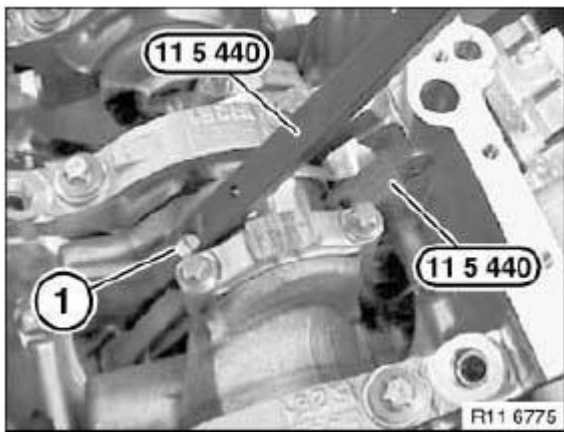


Fig. 175: Identifying Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

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

conrod.

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

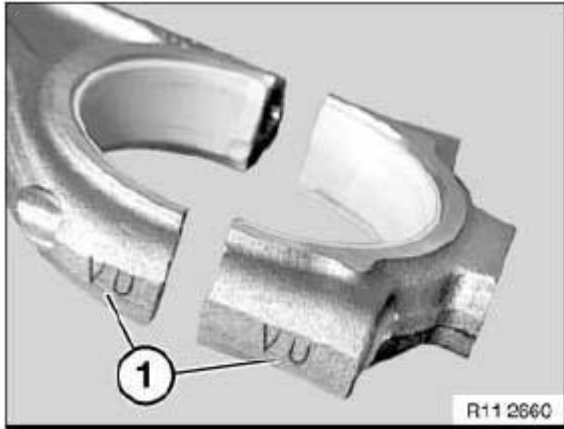


Fig. 176: Identifying Pairing Letters

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Conrod of cylinder 1 to 4 is installed in direction of travel, see arrow (1), front.

Conrod of cylinder 5 to 8 is installed in direction of travel, see arrow (1), rear.

Markings on conrod must be situated on the outside (see arrows)

Incorrect assembly will result in engine damage.

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

Fit bearing cap so that pairing letters match up.

Install new conrod bolts.

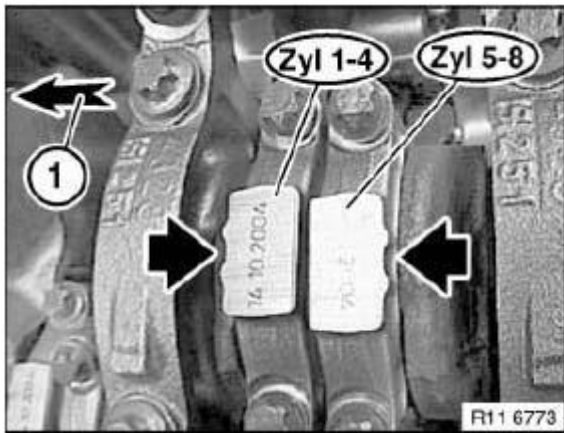


Fig. 177: Identifying Conrod Marking
Courtesy of BMW OF NORTH AMERICA, INC.

Secure conrod with special tool 00 9 120.

Tightening torque: 11 24 1AZ . See CONNECTING RODS AND BEARINGS for specs.

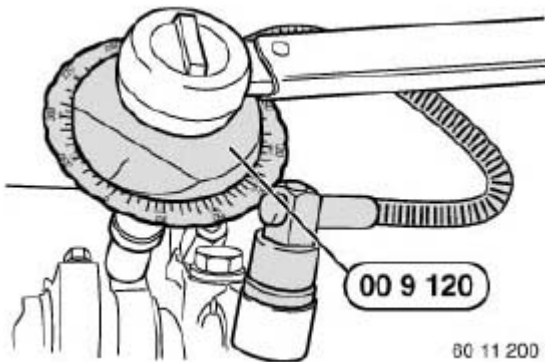


Fig. 178: Identifying Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 25 671 REPLACING PISTON RINGS ON ALL PISTONS (N62)

(piston removed)

Measuring axial clearance of piston rings in piston ring groove (1 and 2):

TECHNICAL DATA .

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

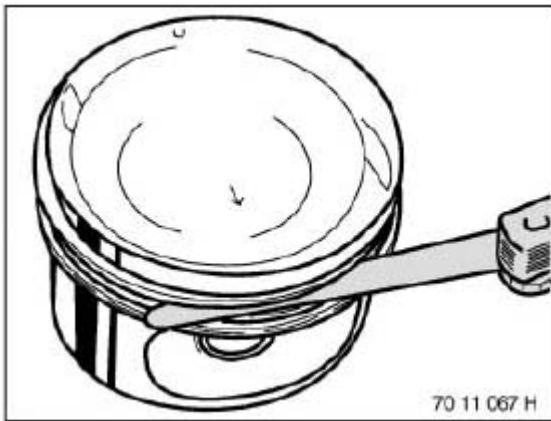


Fig. 179: Checking Piston Ring Axial Clearance
Courtesy of BMW OF NORTH AMERICA, INC.

Remove piston rings (1 and 2) with piston ring compressing pliers.

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

Put aside piston rings in correct sequence and installation position.

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

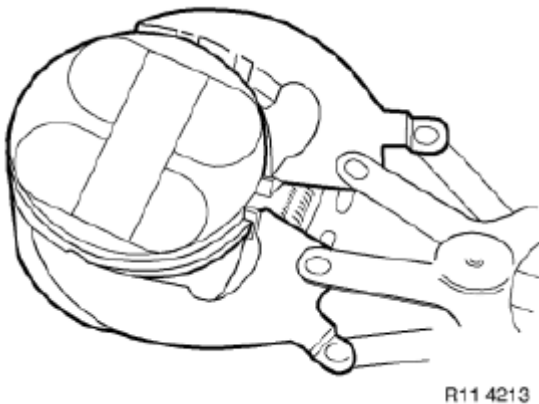
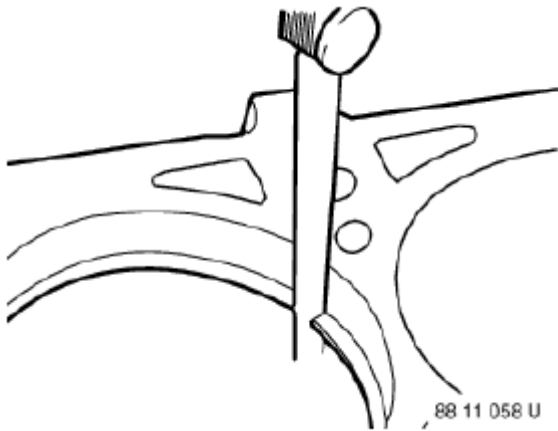


Fig. 180: Removing Piston Rings With Piston Ring Compressing Pliers
Courtesy of BMW OF NORTH AMERICA, INC.

MEASURE END CLEARANCE .

**Fig. 181: Checking End Clearance**

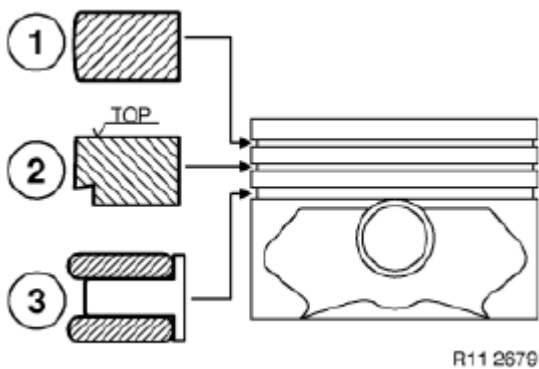
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows a schematic representation.*Installation:*

Install piston rings with "TOP" to piston top.

1. Plain compression ring
2. Stepped compression ring "Top"
3. Steel band ring with support spring

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

**Fig. 182: Identifying Piston Rings Position**

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

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

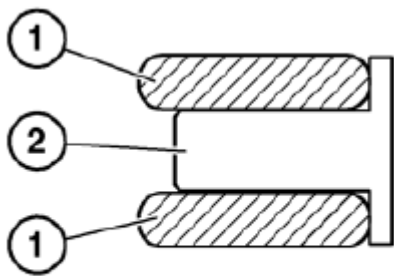
Insert support spring (2) into piston ring groove.

CAUTION: Incorrect installation possible.

Contact points of support spring (2) slip very easily over each other when fitted.

Contact points must be positioned exactly on each other.

If the contact points overlap, the oil scraper ring will be damaged when the piston is installed.



R11 2680

Fig. 183: Identifying Support Spring

Courtesy of BMW OF NORTH AMERICA, INC.

Then fit steel band rings (1) so that contact joints are offset approx. 120°.

28 V-RIBBED BELT WITH TENSIONER, DEFLECTION ELEMENT

11 28 010 REPLACING ALTERNATOR DRIVE BELT (N62/N62TU)

Special tools required:

- 11 3 340

Necessary preliminary tasks:

- Remove **FAN CLUTCH WITH FAN IMPELLER** (E65/66)
- BMW ALPINA B7 vehicles:
 - Remove radial compressor drive belt

NOTE: If the drive belt is to be reused:

Mark direction of travel and reinstall drive belt in same direction of travel.

Pretension belt tensioner slowly and carefully with a Torx socket as far as it will go and secure with special tool 11 3 340.

Remove drive belt.

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

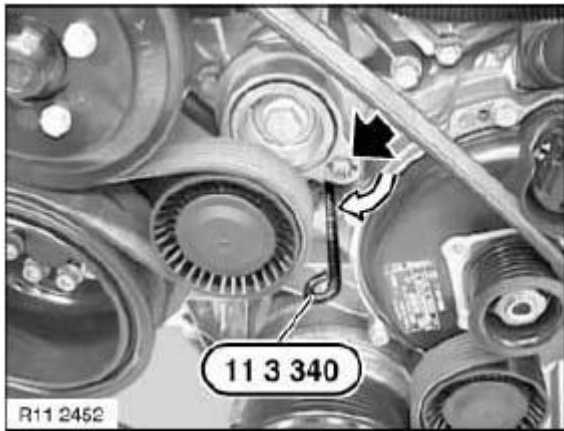


Fig. 184: Identifying Drive Belt Travel Direction
Courtesy of BMW OF NORTH AMERICA, INC.

Put on the drive belt.

Remove special tool 11 3 340.

Installation:

Check that drive belt is correctly positioned on pulleys.

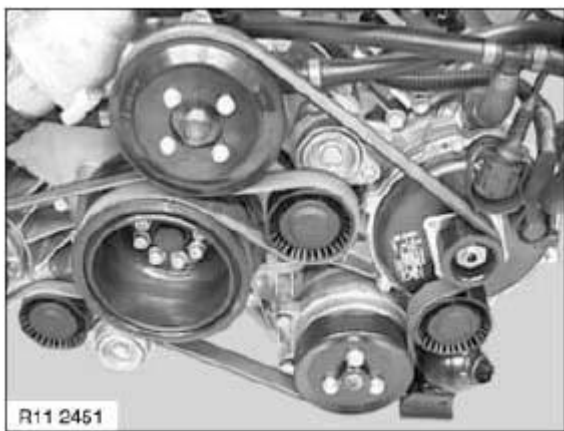


Fig. 185: Identifying Drive Belt Position
Courtesy of BMW OF NORTH AMERICA, INC.

11 28 050 REPLACING A/C COMPRESSOR DRIVE BELT (N62)**Special tools required:**

- 64 1 040

Necessary preliminary tasks:

- Remove ALTERNATOR DRIVE BELT.
- Remove engine splash guard.

Installation:

If reusing the drive belt, mark the direction of rotation and reinstall in the same direction.

Check drive belt for coolant and oil residues, replace if necessary.

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

Rotate engine at central bolt in direction of engine rotation.

At the same time, pull off drive belt (1) towards front in direction of arrow using a clean cloth (2).

Remove drive belt (1) towards front.

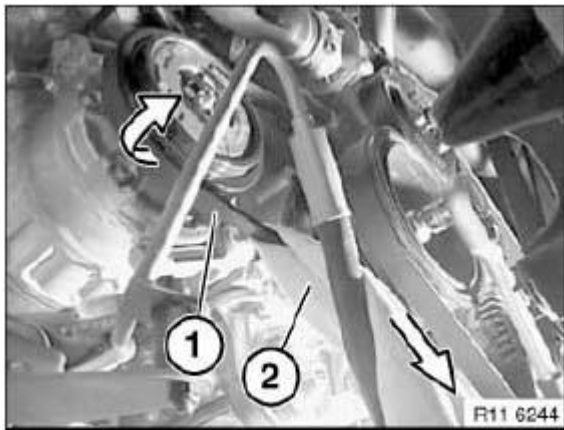


Fig. 186: Pulling Off Drive Belt

Courtesy of BMW OF NORTH AMERICA, INC.

Place drive belt (1) in position.

Clamp drive belt (1) with special tool 64 1 040 on belt pulley.

NOTE: With Dynamic Drive optional extra, detach bracket from A/C compressor (risk of

damage) .

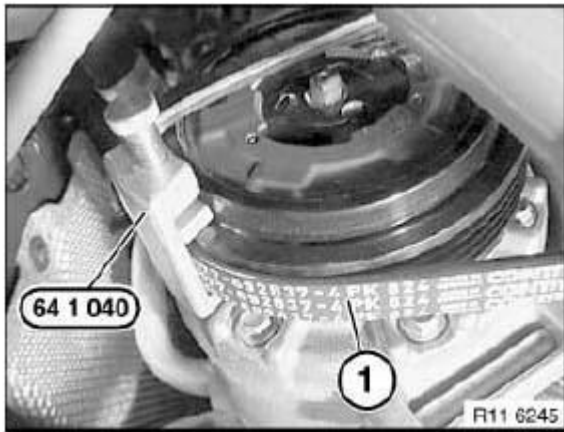


Fig. 187: Clamping Drive Belt With Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine at central bolt in direction of rotation until drive belt is fully guided in belt pulley.

Remove special tool 64 1 040.

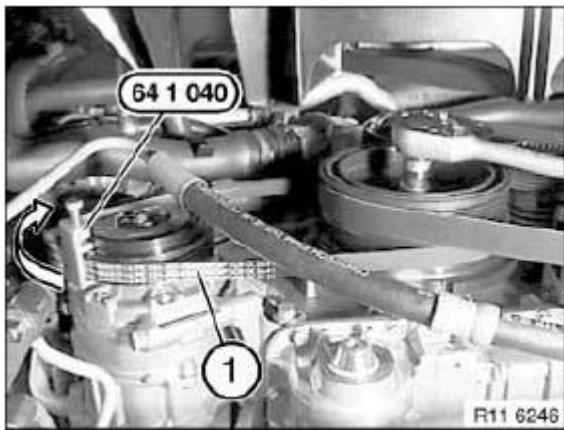


Fig. 188: Identifying Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check installation position of drive belt.

Assemble vehicle.

11 28 050 REPLACING A/C COMPRESSOR DRIVE BELT WITH BELT TENSIONER (N62/N62TU)

Special tools required:

- 11 3 340

Necessary preliminary tasks:

- Remove ALTERNATOR DRIVE BELT
- Remove engine splash guard.

NOTE: If the drive belt is to be reused:

Mark direction of travel and reinstall drive belt in same direction of travel.

Pretension belt tensioner slowly and carefully with a Torx socket as far as it will go and secure with special tool 11 3 340.

Remove drive belt.

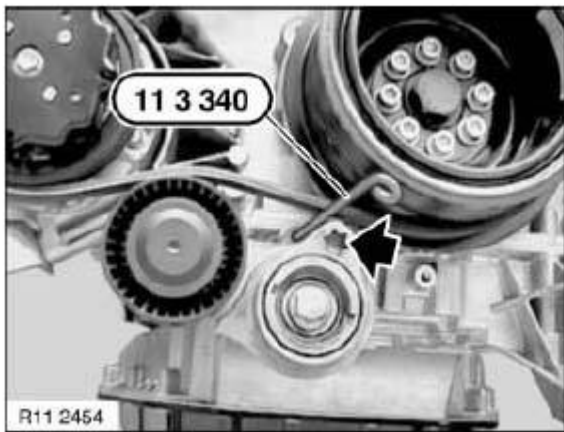


Fig. 189: Securing Drive Belt With Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

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

Put on the drive belt.

Remove special tool 11 3 340.

Installation:

Check that drive belt is correctly positioned on pulleys.

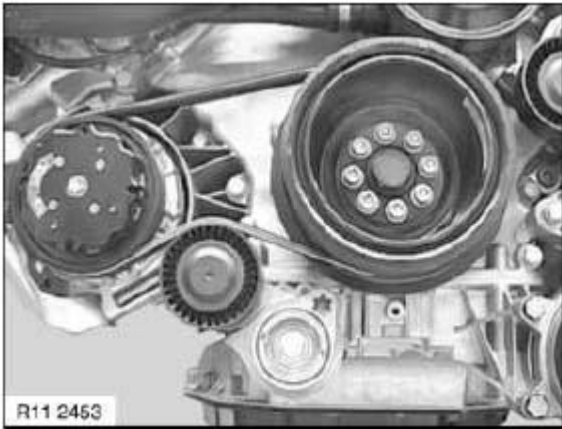


Fig. 190: Identifying Drive Belt Position
Courtesy of BMW OF NORTH AMERICA, INC.

31 CAMSHAFT

11 31 032 REMOVING AND INSTALLING/REPLACING LEFT INLET CAMSHAFT (N62 FROM 9/03 AND N62TU)

Special tools required:

- 11 9 470
- 11 9 472
- 11 9 473
- 11 9 474
- 11 9 475
- 11 9 480
- 11 9 490

(cylinder bank 5 to 8)

Necessary preliminary tasks:

- Remove SERVOMOTOR FOR LEFT ECCENTRIC SHAFT
- Remove ignition coils on cylinder bank 5 to 8
- Remove LEFT CYLINDER HEAD COVER
- Remove spark plugs on cylinder bank 5 to 8
- Remove LEFT INLET AND EXHAUST ADJUSTMENT UNITS

IMPORTANT: The inlet camshaft must first be rotated so that when the bearing bracket is removed the intermediate levers do not slip out and damage the camshaft.

Rotate inlet camshaft against direction of rotation until lettering (1) on 8th cylinder points upwards in cylinder axis and cam is horizontal.

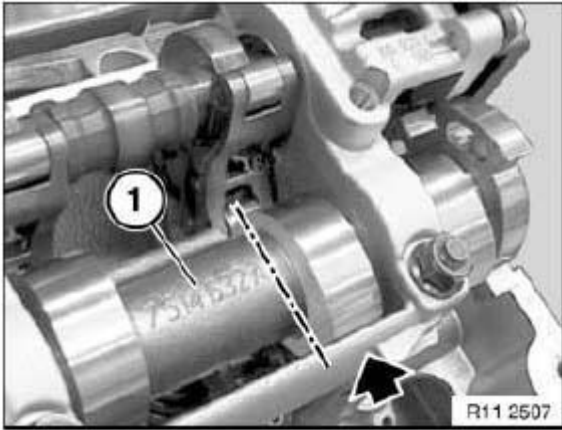


Fig. 191: Locating Inlet Camshaft Position
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Camshaft bearing caps of cylinders 1 to 4 and 5 to 8 must not be mixed up.

NOTE: Bearing caps of inlet camshaft are marked on cylinder bank 5 to 8 with R E1 to R E5 from inlet side.

Release nuts and remove bearing cap R E1.

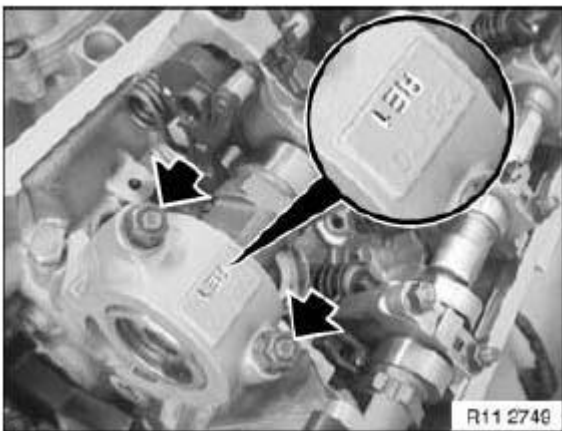


Fig. 192: Locating Camshaft Bearing Caps Of Cylinders
Courtesy of BMW OF NORTH AMERICA, INC.

Release 8 nuts of bearing bracket (1) from outside to inside.

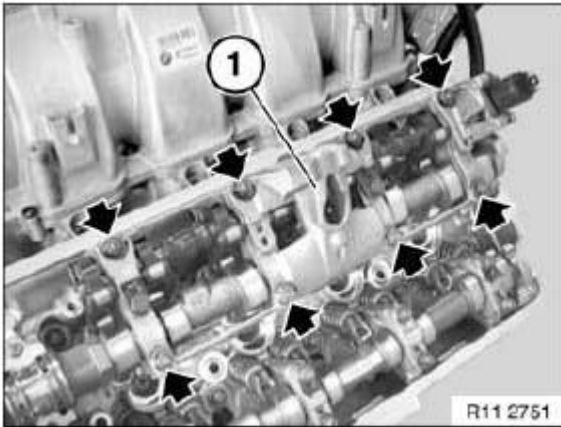


Fig. 193: Locating Bearing Bracket

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Rocker arms are freely accessible after bearing bracket has been removed.

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

IMPORTANT: Rocker arms (1) are divided into individual tolerance classes.

The tolerance classes are designated as illustrated with the numbers from 1 to 4.

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

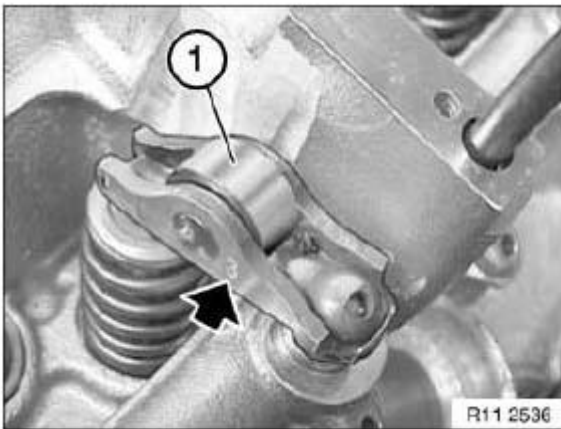


Fig. 194: Locating Rocker Arms On Inlet Side

Courtesy of BMW OF NORTH AMERICA, INC.

When replacing rocker arms (1) on inlet side: install rocker arms of the same tolerance class in the same position.

Clamp special tool 11 9 470 as illustrated in a vice.

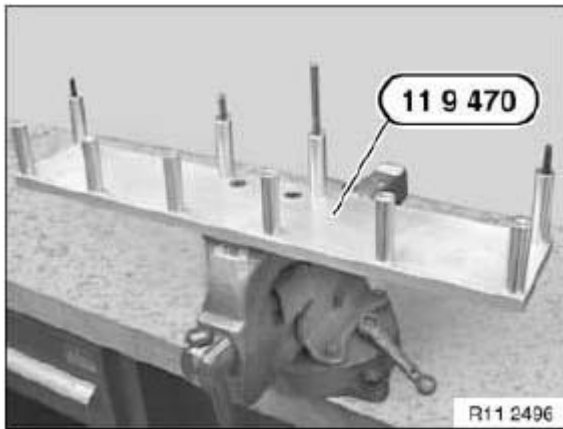


Fig. 195: Identifying Special Tool (11 9 470)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not tilt bearing bracket (1).

Carefully lift out bearing bracket (1).

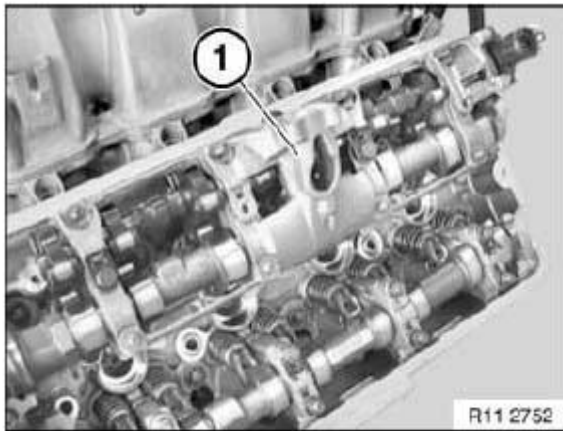


Fig. 196: Identifying Bearing Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Place bearing bracket (1) with inlet camshaft and eccentric shaft as illustrated on special tool 11 9 470.

Secure bearing bracket (1) with a nut (special tool 11 9 473).

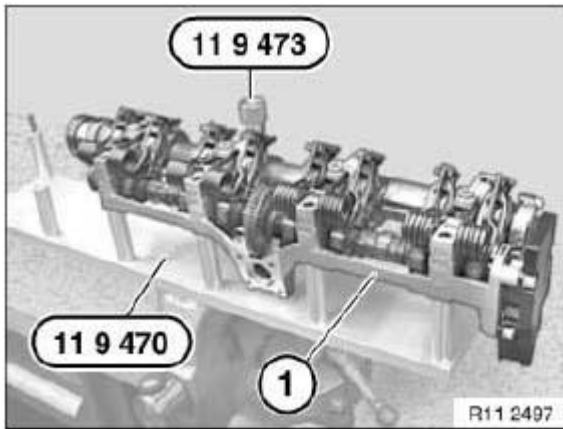


Fig. 197: Identifying Special Tools (11 9 470) And (11 9 473)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The lower section of the bearing bracket (1) is machined with the cylinder head and must not be mixed up.

NOTE: Lower section of bearing bracket (1) remains on cylinder head.

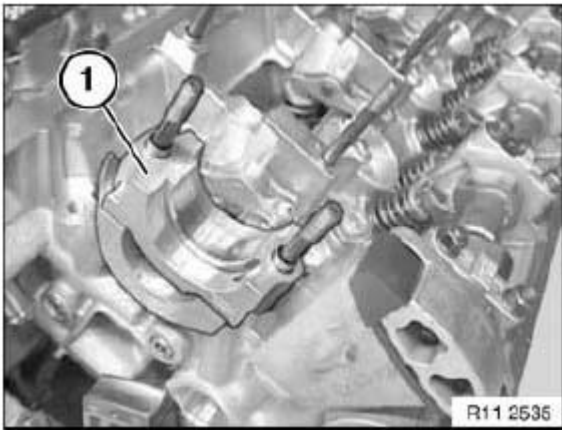


Fig. 198: Identifying Lower Section Of Bearing Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: This work step will only be necessary if after the inlet camshaft has been removed the eccentric shaft is also to be removed.

If necessary, remove eccentric shaft sensor (2).

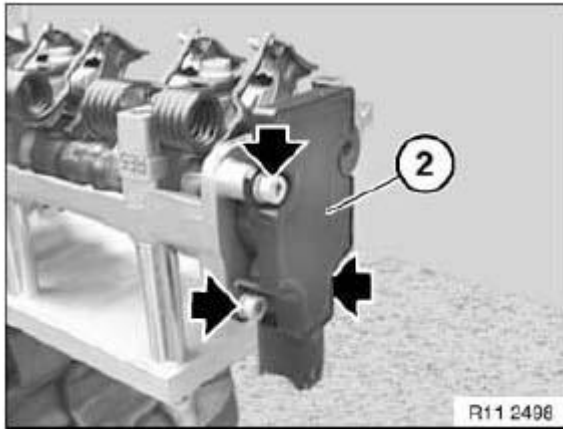


Fig. 199: Locating Eccentric Shaft Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Removal of the intermediate levers and torsion springs is described on the 8th cylinder. The same procedure is applicable to cylinders 5 to 7.

Raise one end of torsion spring (1) with special tool 11 9 480.

Lift out intermediate lever (2) and set down in an orderly fashion.

IMPORTANT: Keep holding torsion spring (1) with special tool 11 9 480.

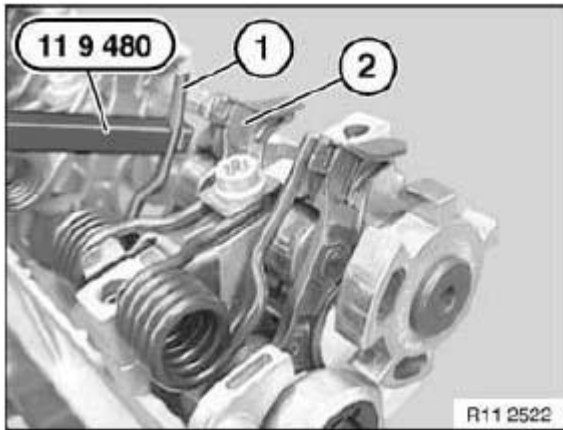


Fig. 200: Identifying Torsion Spring And Intermediate Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 11 9490 to end of torsion spring.

Support end of torsion spring protected with special tool 11 9490 on inlet camshaft.

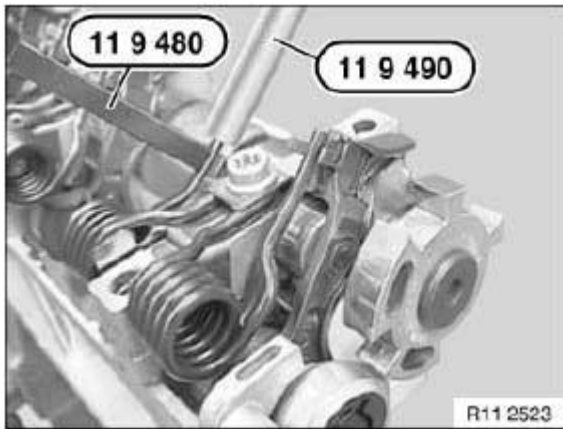


Fig. 201: Identifying Special Tool For Torsion Spring
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Intermediate levers (2) are divided into individual tolerance classes.

Only intermediate levers of the same tolerance class may be fitted in a single cylinder head.

The tolerance classes are designated as illustrated with the numbers from 1 to 5.

Used intermediate levers (2) may only be reused in the same position.

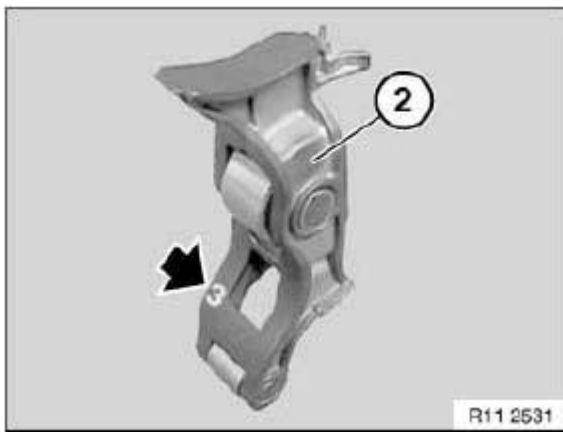


Fig. 202: Locating Intermediate Levers
 Courtesy of BMW OF NORTH AMERICA, INC.

Raise second end of torsion spring (1) with special tool 11 9 480.

Lift out intermediate lever (2) and set down in an orderly fashion.

IMPORTANT: Keep holding torsion spring (1) with special tool 11 9 480.

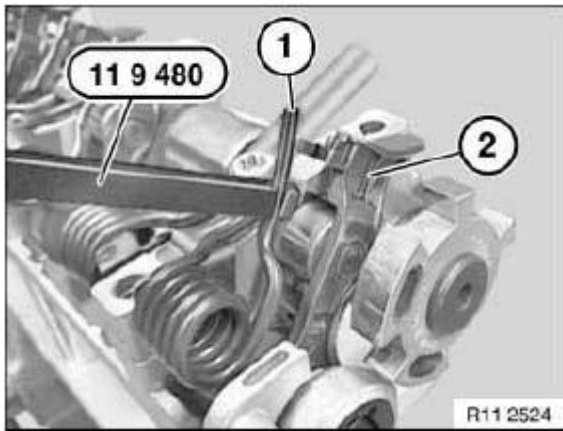


Fig. 203: Identifying Torsion Spring And Intermediate Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 11 9490 to second end of torsion spring.

Support end of torsion spring protected with special tool 11 9 490 on inlet camshaft.

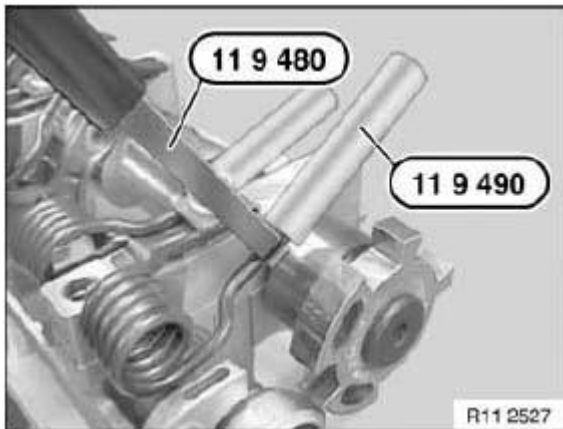


Fig. 204: Identifying Special Tool (11 9 480) And (11 9 490)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

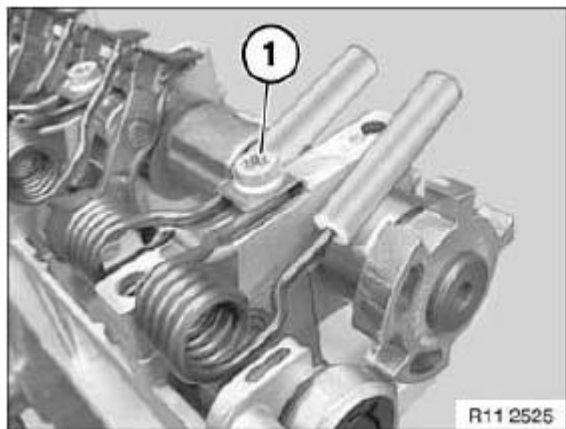


Fig. 205: Identifying Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Remove torsion spring (1) and special tool 11 9 490.

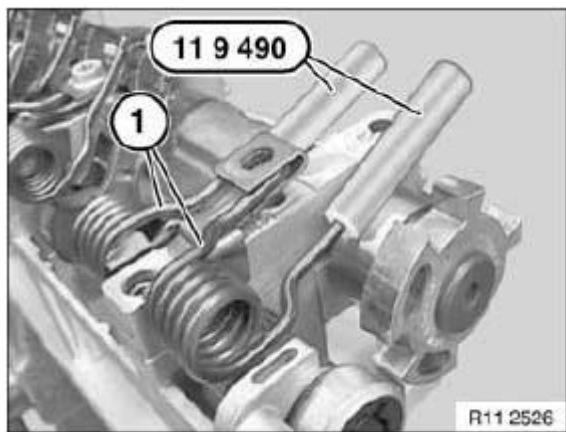


Fig. 206: Identifying Torsion Spring And Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

Remove intermediate levers and torsion springs of cylinders 5 to 7 according to the same procedure and set down in an orderly fashion.

Unscrew nut (special tool 11 9 473).

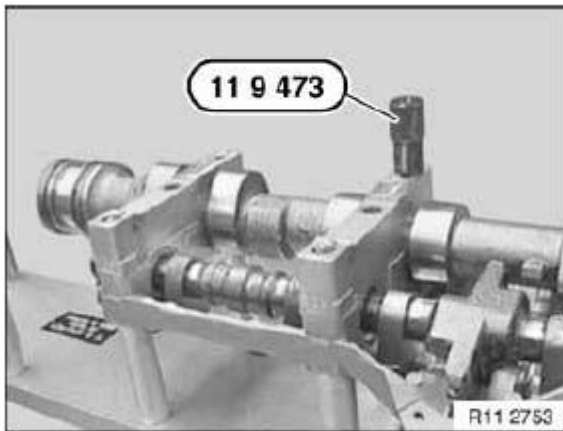


Fig. 207: Identifying Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Camshaft bearing caps of cylinders 1 to 4 and 5 to 8 must not be mixed up.

NOTE: Bearing caps are marked in graphic with R E2 to R E5.

Remove bearing caps R E2 to R E5 and place to one side in order.

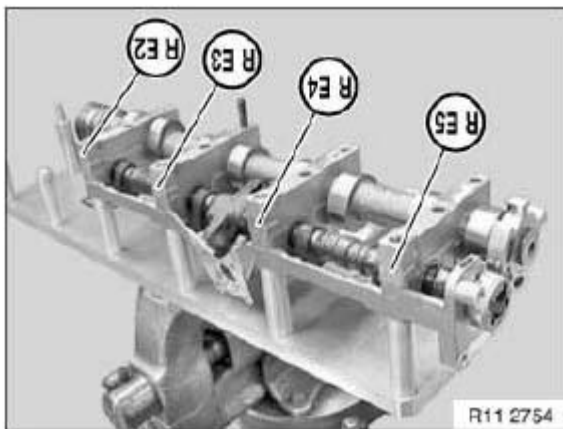


Fig. 208: Identifying Bearing Caps Marks

Courtesy of BMW OF NORTH AMERICA, INC.

Lift out inlet camshaft (1).

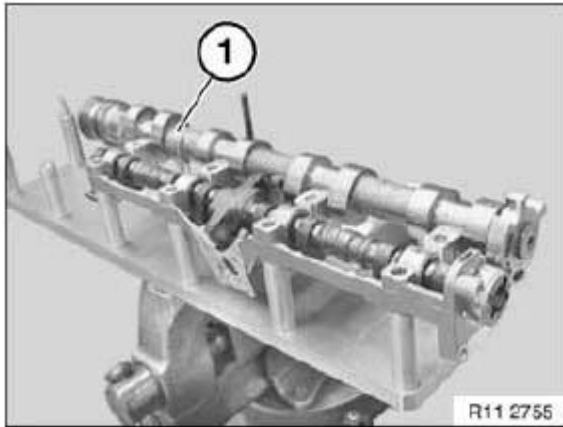


Fig. 209: Identifying Inlet Camshaft

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Further tasks:

The article REMOVING AND INSTALLING LEFT ECCENTRIC SHAFT contains important installation instructions.

If necessary, replace plain compression rings (1).

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

Plain compression rings (1) are engaged at joint.

Press compression ring (1) on one side into groove, pull up on other side and remove catch.

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

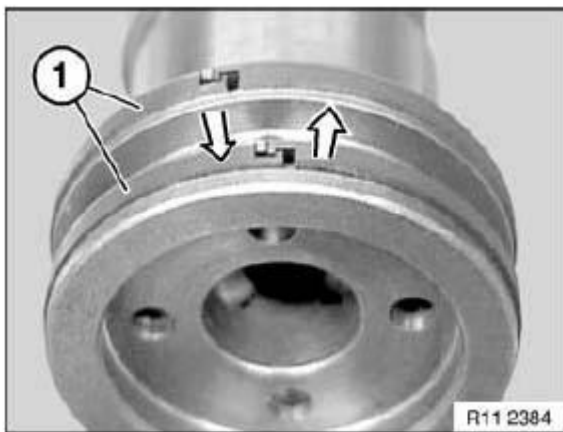


Fig. 210: Identifying Compression Ring

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Inlet camshaft of cylinder bank 5 to 8 is marked with "EIN 58".

If necessary, replace sensor gear (1).

Release screw (2) and remove sensor gear (1).

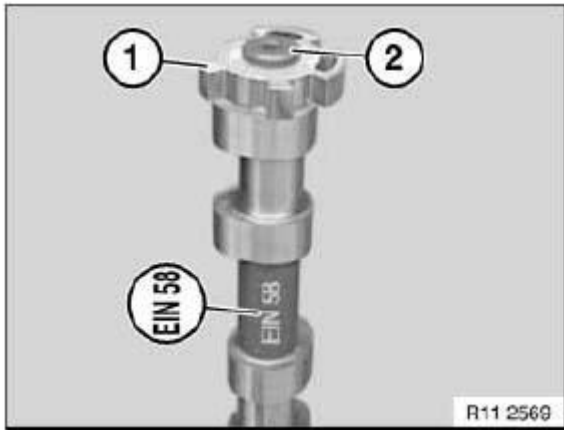


Fig. 211: Identifying Sensor Gear And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Installation of inlet camshaft is described separately from removal.

Clean all bearings and cams of inlet camshaft and lubricate with engine oil.

NOTE: Camshaft has a groove and sensor gear has a lug for fastening purposes.

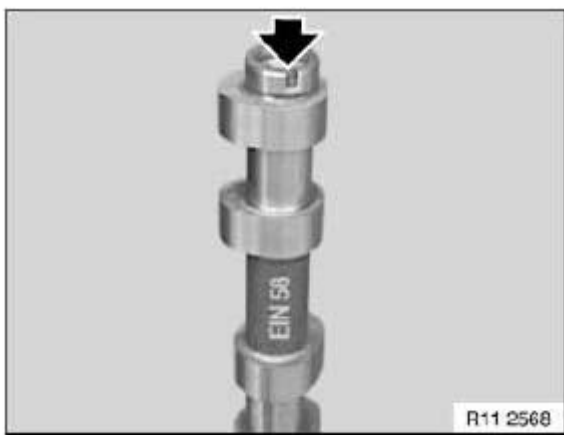


Fig. 212: Locating Sensor Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Fit sensor gear (1) and align to groove in camshaft.

Insert screw (2) and tighten down.

Tightening torque: 11 31 14AZ . See CAMSHAFT for specs.

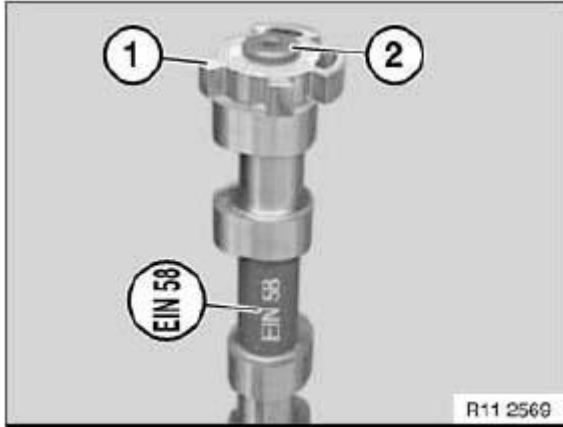


Fig. 213: Aligning Sensor Gear With Camshaft Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Installing plain compression rings (1):

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

Carefully pull compression ring (1) apart and install from front.

Press compression ring (1) on one side into groove, install catch on other side.

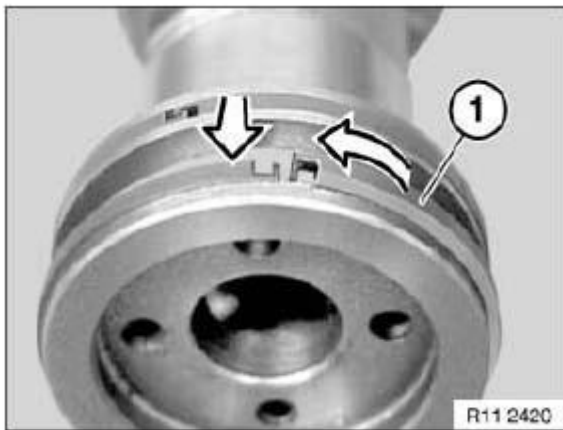


Fig. 214: Pulling Compression Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Insert inlet camshaft (1) so that cams point upwards at cylinder 5 as shown in graphic.

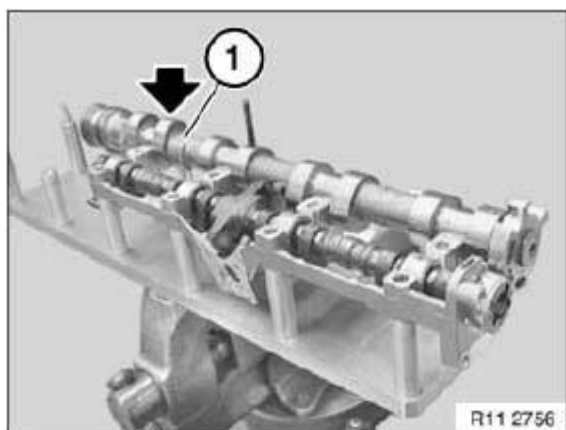


Fig. 215: Identifying Inlet Camshaft

Courtesy of BMW OF NORTH AMERICA, INC.

Make sure bearing shells (1) of eccentric shaft are engaged in bearing bracket.

NOTE: Bearing shell (1) is guided in a groove in bearing cap.

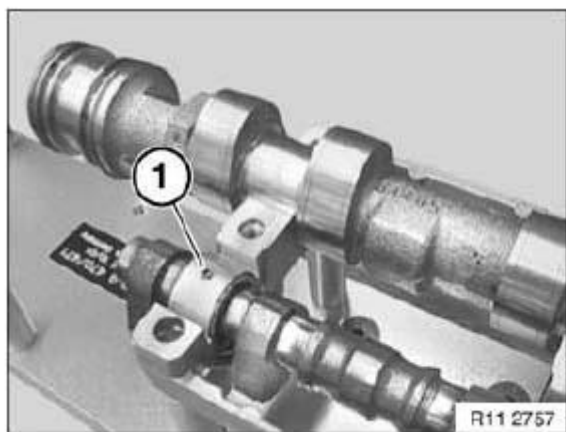


Fig. 216: Identifying Bearing Shell

Courtesy of BMW OF NORTH AMERICA, INC.

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

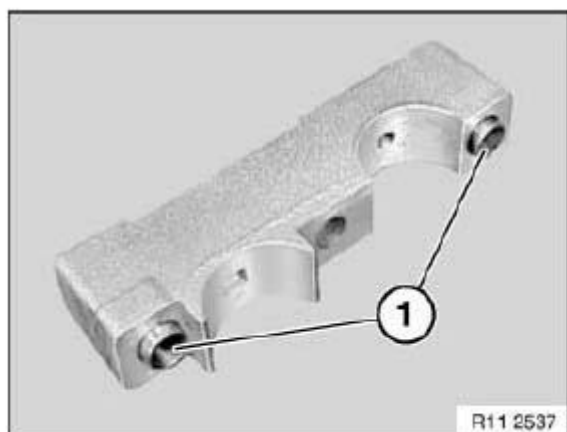


Fig. 217: Identifying Dowel Sleeves

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Bearing caps are marked in graphic with R E2 to R E5.

Fit bearing caps R E2 to R E5.

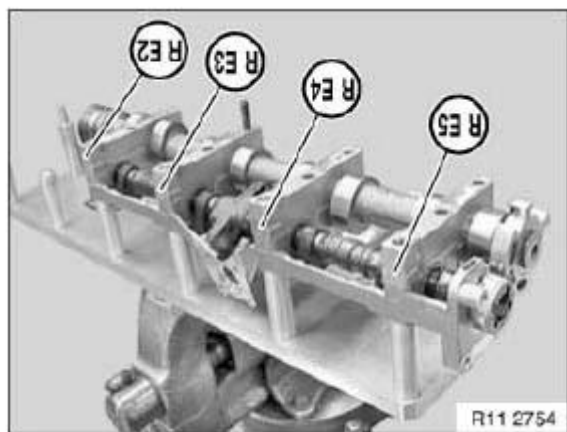


Fig. 218: Identifying Bearing Cap Marks

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Initially tighten special tool 11 9 473 without play only.

Secure bearing bracket and bearing cap with nut (special tool 11 9 473).

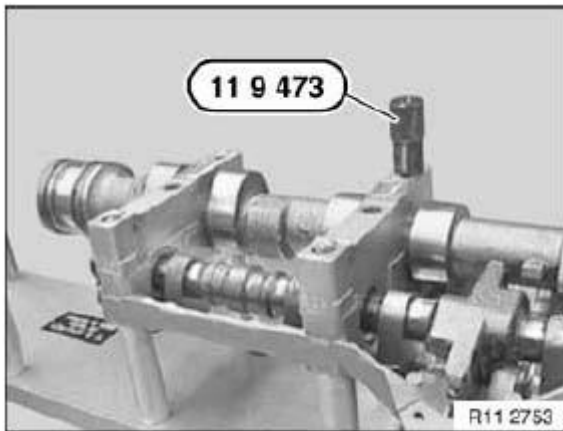


Fig. 219: Identifying Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The mounting of the bearing bracket described later can only be performed if the first bearing of the inlet camshaft is aligned with special tool 11 9 472.

Fit special tool 11 9 472 as shown in graphic and align inlet camshaft.

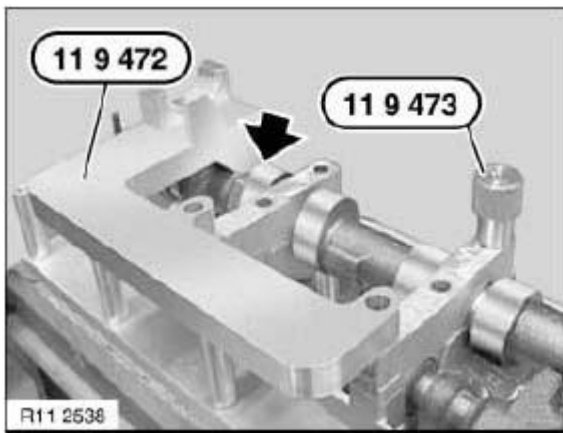


Fig. 220: Fitting Special Tools

Courtesy of BMW OF NORTH AMERICA, INC.

Fit centering sleeves (special tool 11 9 475) and align special tool 11 9 472 to bearing caps 2 and 3.

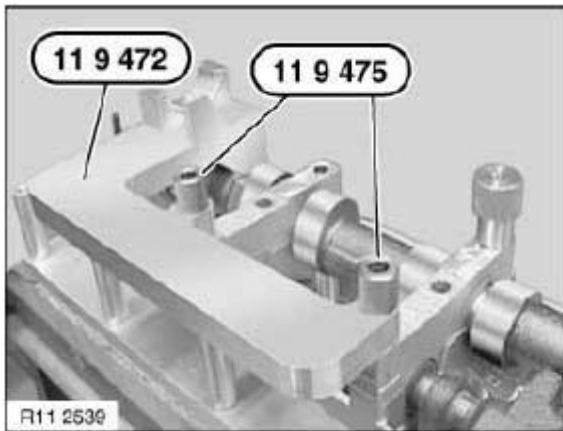


Fig. 221: Aligning Special Tool To Bearing Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 11 9 474 and initially tighten without play.

NOTE: Special tools 11 9 472, 11 9 474 and 11 9 475 remain fitted until all torsion springs and intermediate levers have been installed.

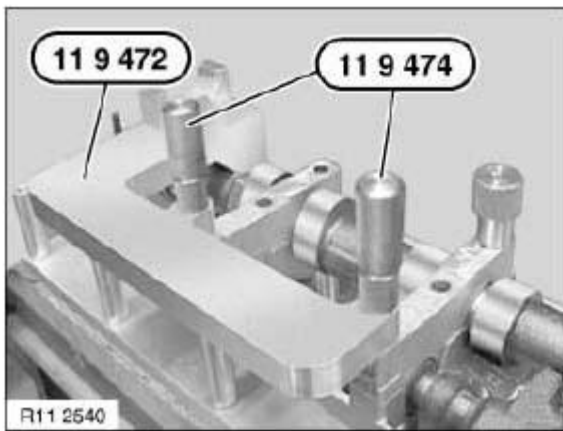


Fig. 222: Identifying Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Installation of the intermediate levers and torsion springs is described on the 8th cylinder. The same procedure is applicable to cylinders 5 to 7.

Attach special tool 11 9 490 to ends of torsion spring.

Install torsion spring (1).

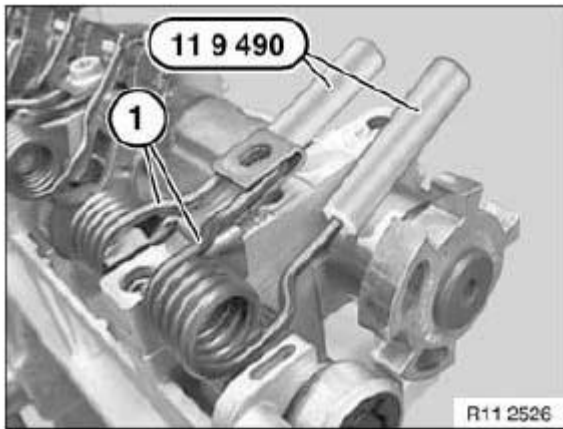


Fig. 223: Identifying Torsion Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screw (1) and tighten down.

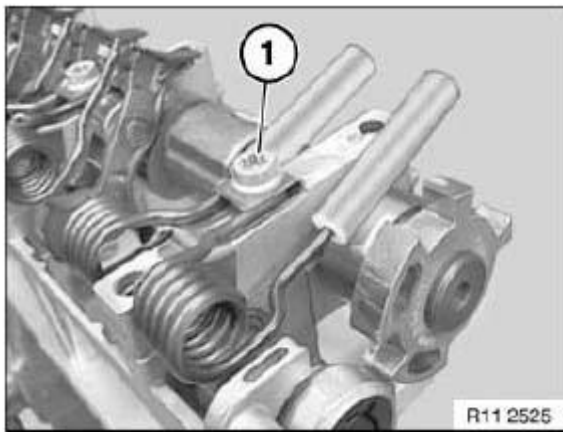


Fig. 224: Identifying Torsion Spring Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Intermediate levers (2) are divided into individual tolerance classes.

Only intermediate levers of the same tolerance class may be fitted in a single engine.

The tolerance classes are designated as illustrated with the numbers from 1 to 5.

Used intermediate levers (2) may only be reused in the same position.

Lubricate all sliding surfaces on intermediate lever (2) with engine oil.

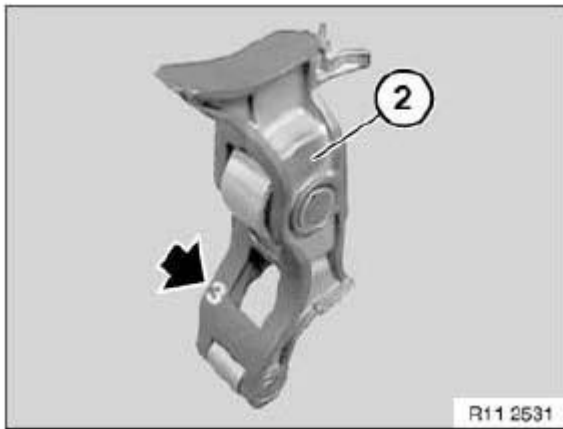


Fig. 225: Locating Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

Raise torsion spring (1) with special tool 11 9 480.

Remove special tool 11 9 490.

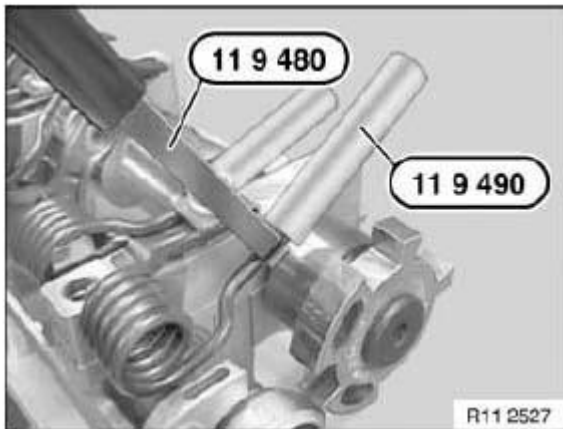


Fig. 226: Identifying Special Tool (11 9 480) And (11 9 490)
Courtesy of BMW OF NORTH AMERICA, INC.

Hold torsion spring (1) with special tool 11 9 480.

Install intermediate lever (2) from above.

Insert end of torsion spring (1) into guide on intermediate lever (2).

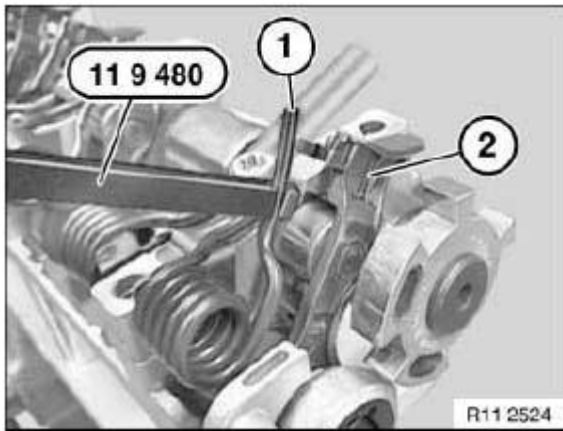


Fig. 227: Identifying Torsion Spring And Intermediate Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Raise second end of torsion spring with special tool 11 9 480.

Remove special tool 11 9 490.

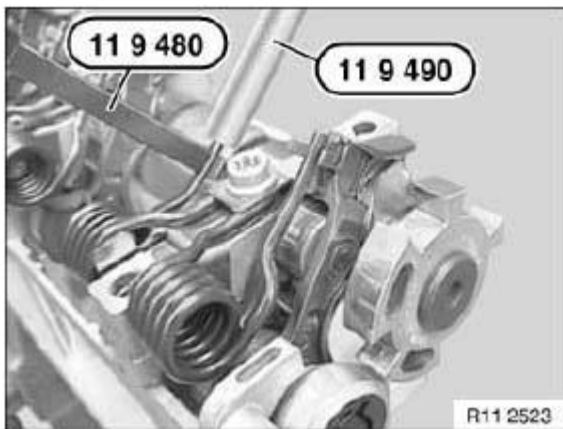


Fig. 228: Identifying Special Tool For Torsion Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Hold torsion spring (1) with special tool 11 9 480.

Install intermediate lever (2) from above.

Insert end of torsion spring (1) into guide on intermediate lever (2).

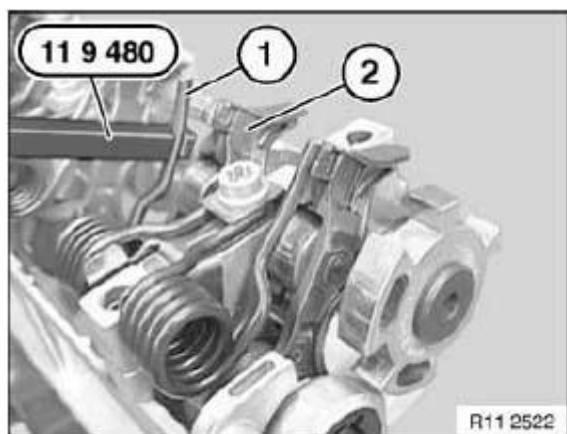


Fig. 229: Identifying Torsion Spring And Intermediate Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Install eccentric shaft sensor (2).

Insert screws and tighten down eccentric shaft sensor (2).

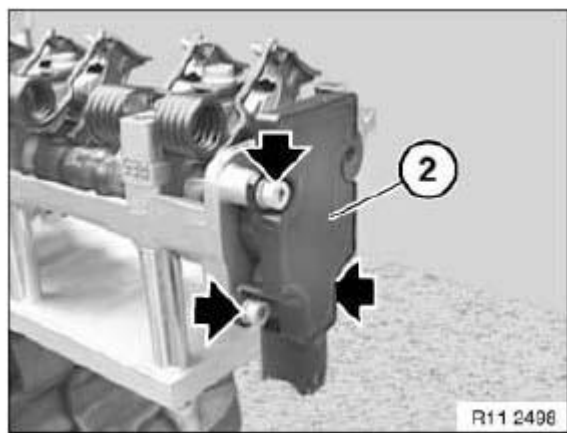


Fig. 230: Identifying Eccentric Shaft Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 474.

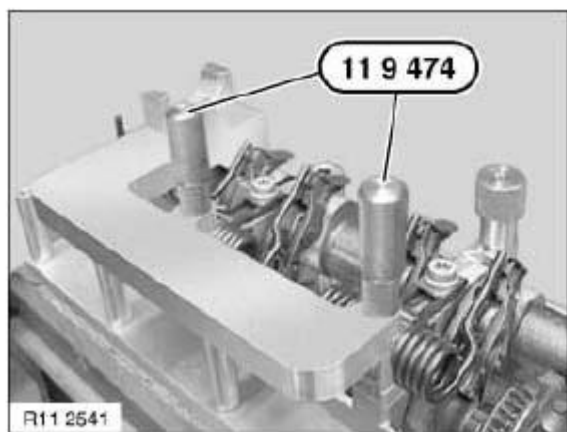


Fig. 231: Identifying Special Tool (11 9 474)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 472 and special tool 11 9 475.

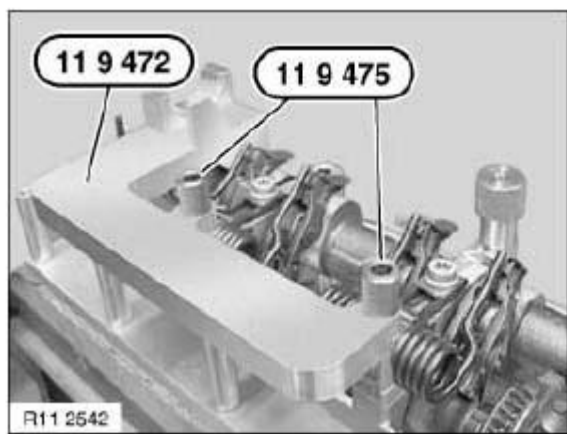


Fig. 232: Identifying Special Tools (11 9 472) And (11 9 475)
Courtesy of BMW OF NORTH AMERICA, INC.

Ends of compression rings (1) point upwards.

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

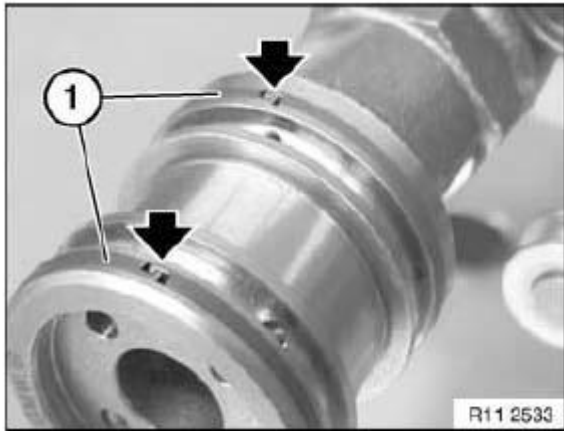


Fig. 233: Identifying Compression Rings
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) slip slightly when bearing bracket is fitted.

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

Align rockers (1) straight.

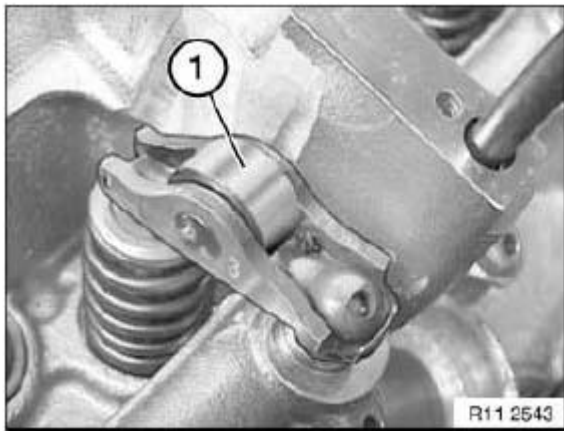


Fig. 234: Identifying Rocker Arms On Inlet Side
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 473.

Remove bearing bracket (1) from special tool 11 9 470.

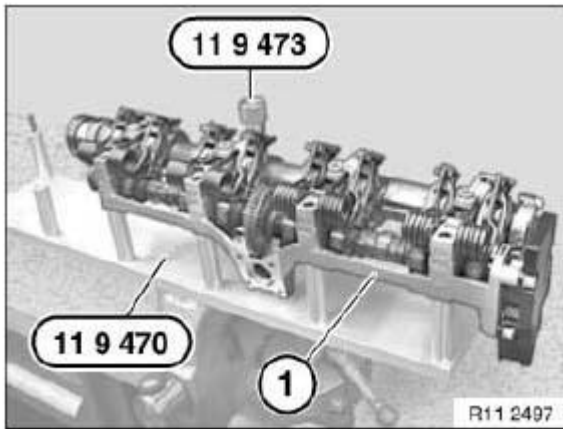


Fig. 235: Identifying Special Tools (11 9 470) And (11 9 473)
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not tilt bearing bracket (1).

Lower bearing bracket (1) from above and carefully bring into contact with cylinder head.

Insert nuts and tighten by hand without play.

IMPORTANT: Make sure none of the intermediate levers or rocker arms have slipped out.

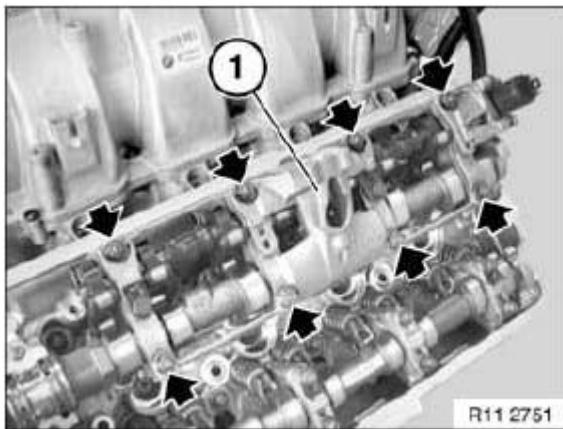


Fig. 236: Locating Bearing Bracket
 Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down nuts from inside to outside.

Tightening torque: 11 31 1AZ . See CAMSHAFT for specs.

IMPORTANT: Camshaft bearing caps of cylinders 1 to 4 and 5 to 8 must not be mixed up.

Fit bearing cap R E1 in such a way that marking is legible from inlet side.

Install nuts and tighten down.

Tightening torque: 11 31 1AZ . See CAMSHAFT for specs.

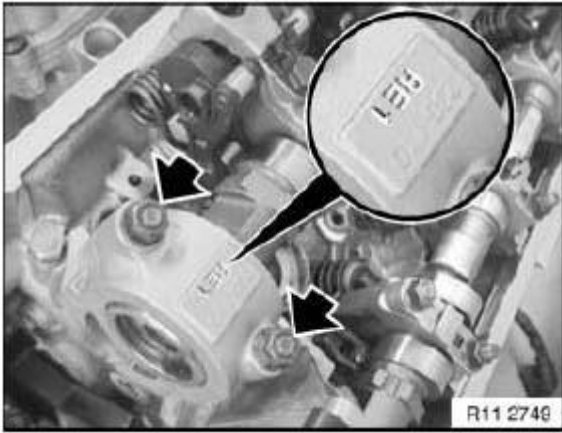


Fig. 237: Locating Camshaft Bearing Caps Of Cylinders
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate inlet camshaft in direction of rotation until cam on 5th cylinder points upwards at an angle as shown in illustration.

NOTE: The marking (1) on the hexagon drive of the inlet camshaft faces upwards.

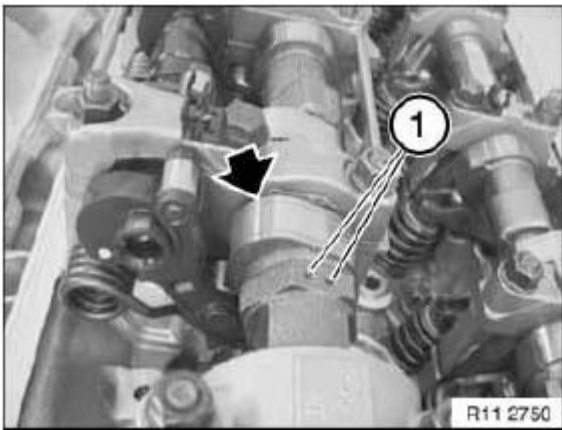


Fig. 238: Locating Camshaft Bearing Caps Of Cylinders
Courtesy of BMW OF NORTH AMERICA, INC.

Install INLET AND EXHAUST ADJUSTMENT UNIT ON LEFT SIDE.

Install spark plugs on cylinder bank 5 to 8.

Install **LEFT CYLINDER HEAD COVER**.

Install ignition coils on cylinder bank 5 to 8.

Install **SERVOMOTOR FOR LEFT ECCENTRIC SHAFT**.

Assemble engine.

11 31 034 REMOVING AND INSTALLING/REPLACING RIGHT INLET CAMSHAFT (N62 FROM 9/03 AND N62TU)

Special tools required:

- **11 9 470**
- **11 9 472**
- **11 9 473**
- **11 9 474**
- **11 9 475**
- **11 9 480**
- **11 9 490**

(cylinder bank 1 to 4)

Necessary preliminary tasks:

- Remove **SERVOMOTOR FOR RIGHT ECCENTRIC SHAFT**
- Remove ignition coils on cylinder bank 1 to 4
- Remove **RIGHT CYLINDER HEAD COVER**
- Remove spark plugs on cylinder bank 1 to 4
- Remove **RIGHT INLET AND EXHAUST ADJUSTMENT UNITS**

IMPORTANT: The inlet camshaft must first be rotated so that when the bearing bracket is removed the intermediate levers do not slip out and damage the camshaft.

Rotate inlet camshaft in direction of rotation until cam on 1st cylinder is positioned horizontally as shown in illustration.



Fig. 239: Locating Inlet Camshaft Position

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Camshaft bearing caps of cylinders 1 to 4 and 5 to 8 must not be mixed up.

NOTE: Bearing caps of inlet camshaft are marked on cylinder bank 1 to 4 with L E1 to L E5 from inlet side.

Release nuts and remove bearing cap L E1.

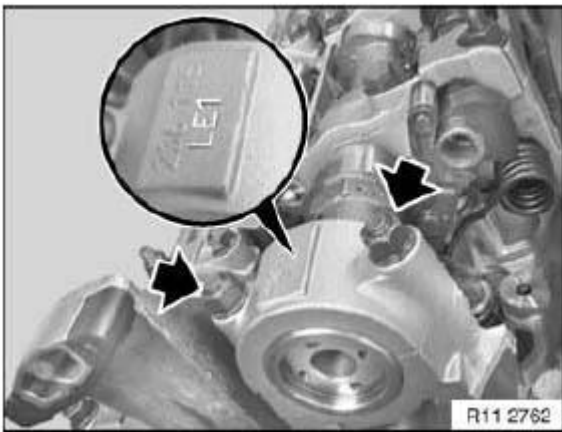


Fig. 240: Locating Bearing Cap Marks

Courtesy of BMW OF NORTH AMERICA, INC.

Release 8 nuts of bearing bracket (1) from outside to inside.

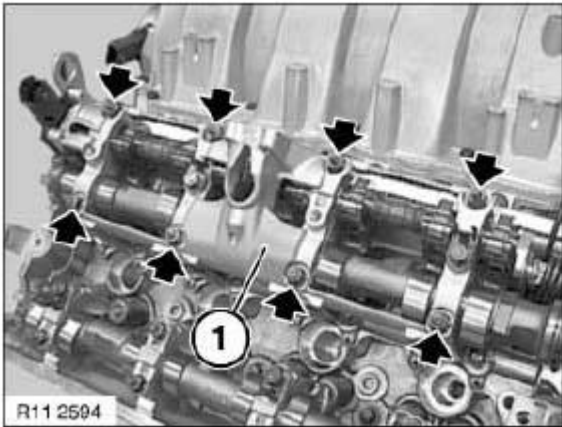


Fig. 241: Locating Bearing Bracket

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Rocker arms are freely accessible after bearing bracket has been removed.

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

IMPORTANT: Rocker arms (1) are divided into individual tolerance classes.

The tolerance classes are designated as illustrated with the numbers from 1 to 4.

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

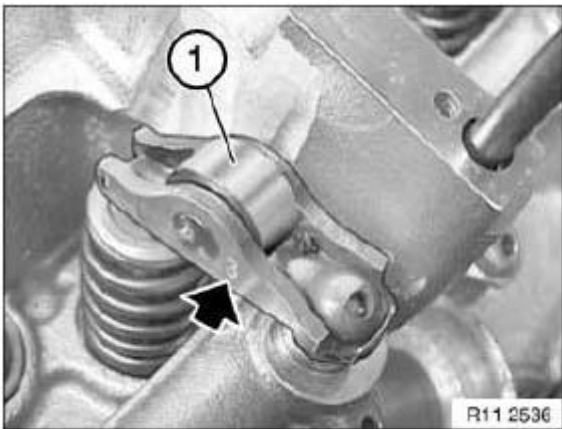


Fig. 242: Locating Rocker Arms On Inlet Side

Courtesy of BMW OF NORTH AMERICA, INC.

When replacing rocker arms (1) on inlet side: install rocker arms of the same tolerance class in the same position.

Clamp special tool 11 9 470 as illustrated in a vice.

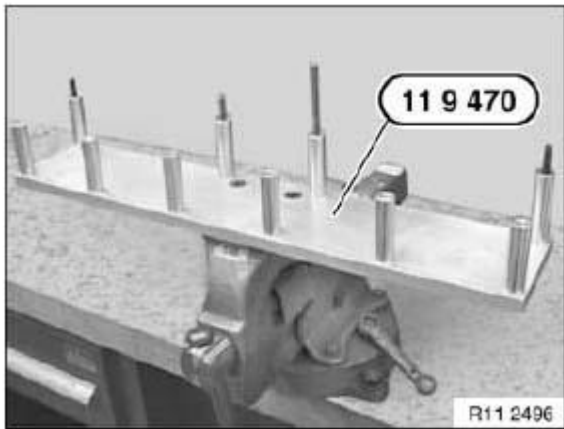


Fig. 243: Identifying Special Tool (11 9 470)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not tilt bearing bracket (1).

Carefully lift out bearing bracket (1).

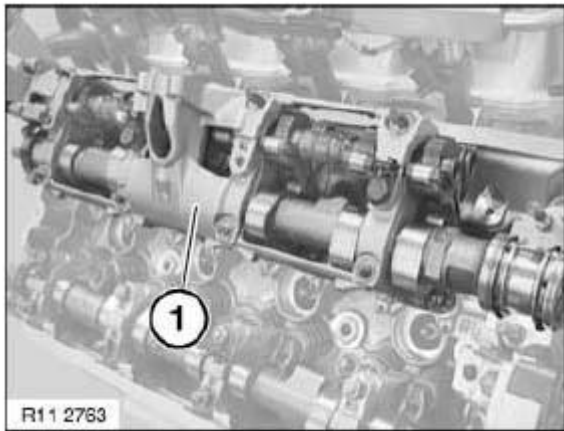


Fig. 244: Identifying Tilt Bearing Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Place bearing bracket (1) with inlet camshaft and eccentric shaft as illustrated on special tool 11 9 470.

Secure bearing bracket (1) with a nut (special tool 11 9 473).

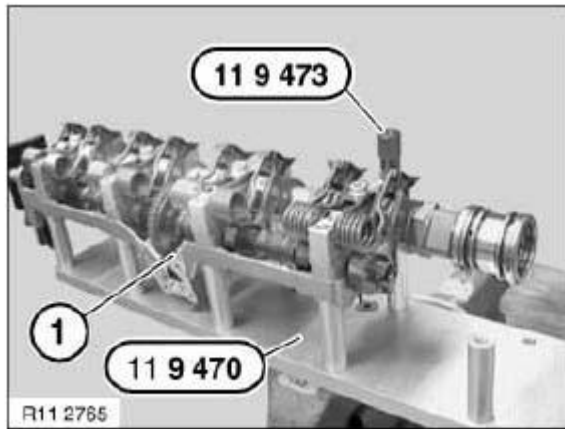


Fig. 245: Identifying Special Tools (11 9 473) And (11 9 470)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The lower section of the bearing bracket (1) is machined with the cylinder head and must not be mixed up.

NOTE: Lower section of bearing bracket (1) remains on cylinder head.

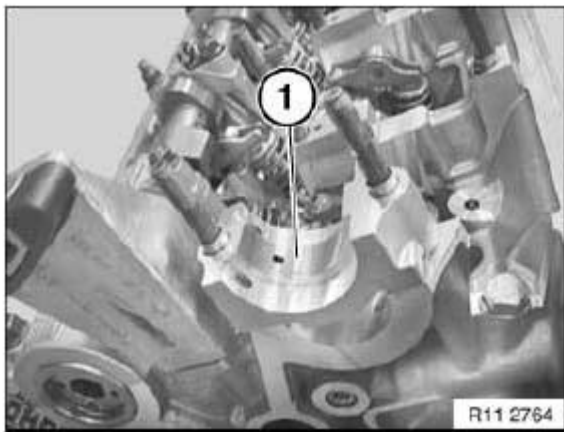


Fig. 246: Identifying Bearing Bracket Lower Section
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: This work step will only be necessary if after the inlet camshaft has been removed the eccentric shaft is also to be removed.

If necessary, remove eccentric shaft sensor (2).

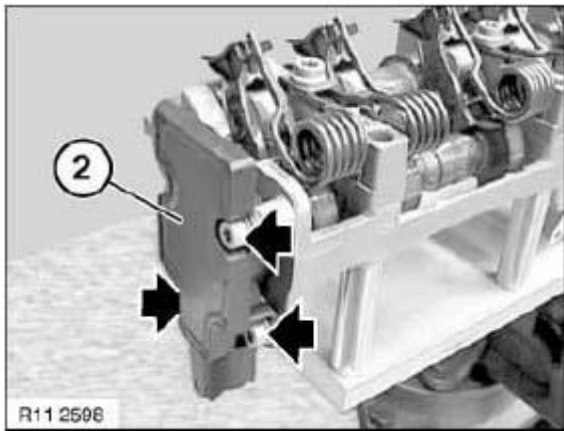


Fig. 247: Identifying Eccentric Shaft Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Removal of the intermediate levers and torsion springs is described on the 4th cylinder. The same procedure is applicable to cylinders 1 to 3.

Raise one end of torsion spring (1) with special tool 11 9 480.

Lift out intermediate lever (2) and set down in an orderly fashion.

IMPORTANT: Keep holding torsion spring (1) with special tool 11 9 480.

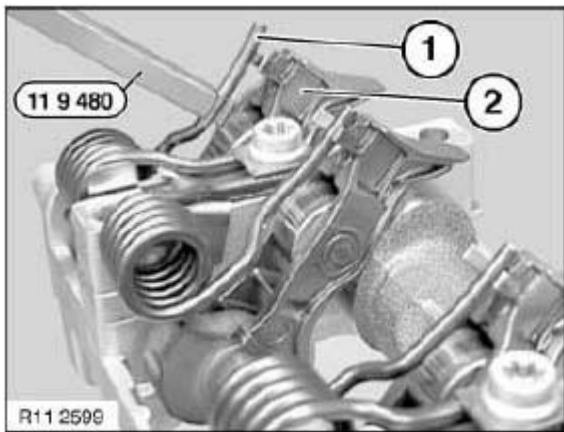


Fig. 248: Identifying Torsion Spring And Intermediate Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 11 9 490 to end of torsion spring.

Support end of torsion spring protected with special tool 11 9 490 on inlet camshaft.

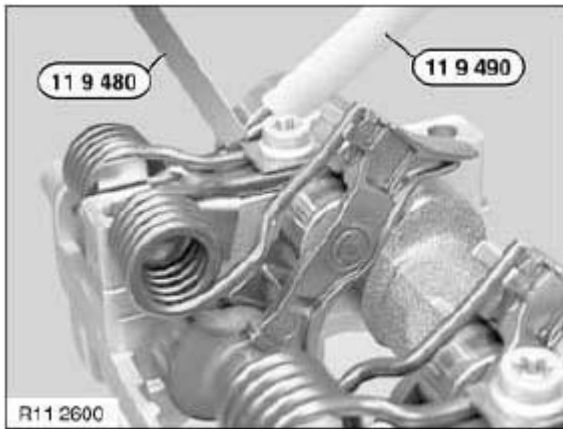


Fig. 249: Identifying Special Tool (11 9 480) And (11 9 490)
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Intermediate levers (2) are divided into individual tolerance classes.

Only intermediate levers of the same tolerance class may be fitted in a single cylinder head.

The tolerance classes are designated as illustrated with the numbers from 1 to 5.

Used intermediate levers (2) may only be reused in the same position.

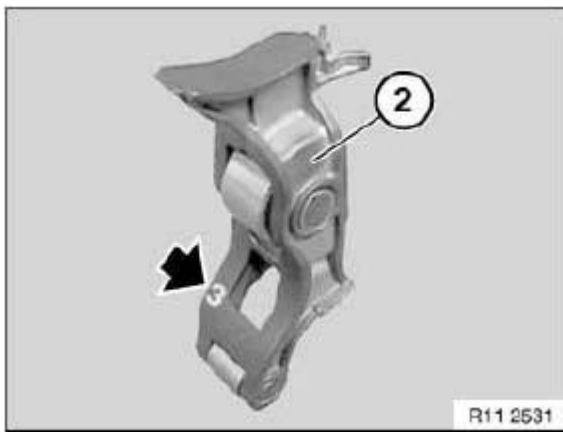


Fig. 250: Locating Intermediate Levers
 Courtesy of BMW OF NORTH AMERICA, INC.

Raise second end of torsion spring (1) with special tool 11 9 480.

Lift out intermediate lever (2) and set down in an orderly fashion.

IMPORTANT: Keep holding torsion spring (1) with special tool 11 9 480.

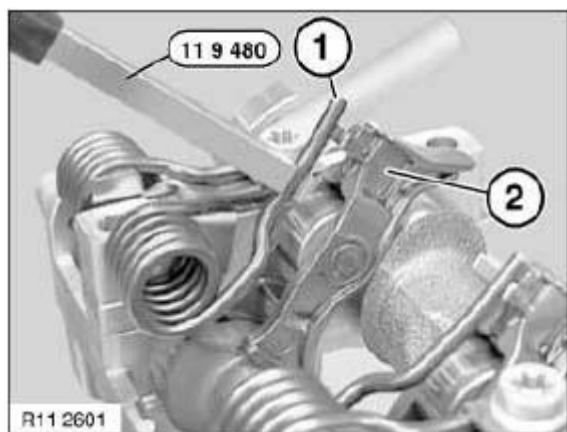


Fig. 251: Holding Torsion Spring With Special Tool (11 9 480)
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 11 9 490 to second end of torsion spring.

Support end of torsion spring protected with special tool 11 9 490 on inlet camshaft.

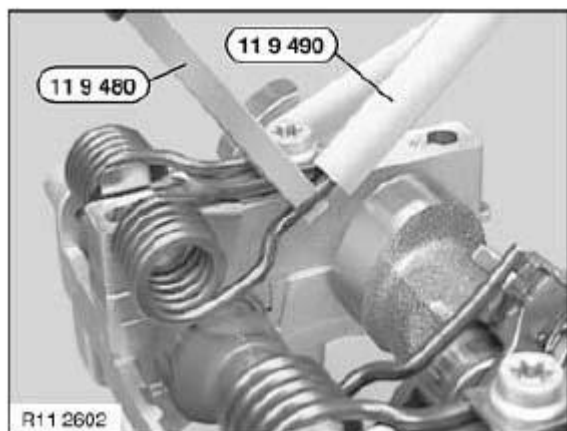


Fig. 252: Identifying Special Tool (11 9 480) And (11 9 490)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

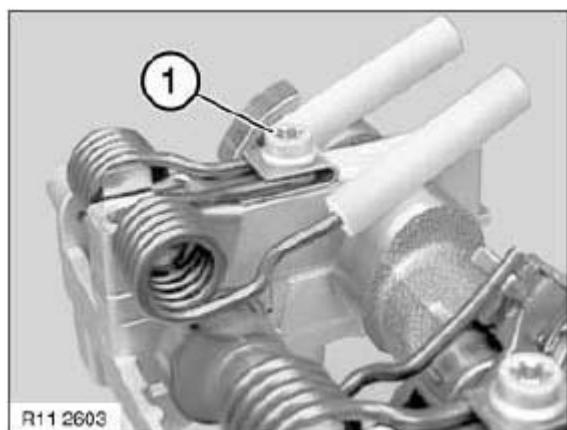


Fig. 253: Identifying Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Remove torsion spring (1) and special tool 11 9 490.

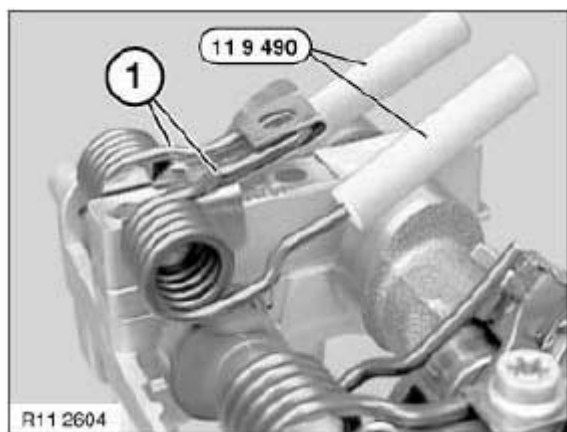


Fig. 254: Identifying Torsion Spring And Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

Remove intermediate levers and torsion springs of cylinders 1 to 3 according to the same procedure and set down in an orderly fashion.

Unscrew nut (special tool 11 9 473).

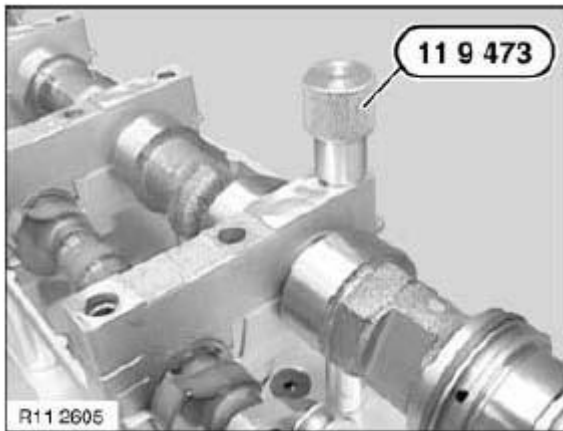


Fig. 255: Identifying Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Camshaft bearing caps of cylinders 1 to 4 and 5 to 8 must not be mixed up.

NOTE: Bearing caps are marked in graphic with L E2 to L E5.

Remove bearing caps L E2 to L E5 and place to one side in order.

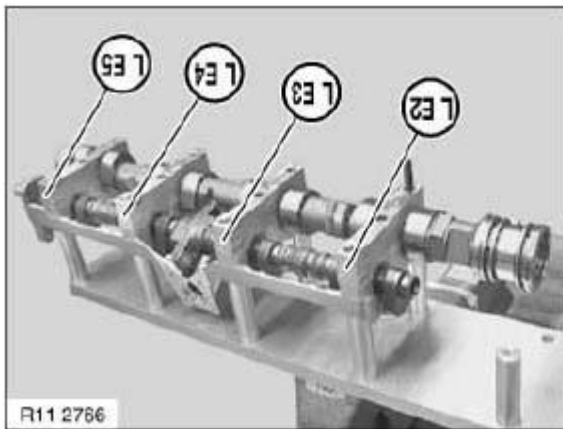


Fig. 256: Identifying Bearing Cap Marks

Courtesy of BMW OF NORTH AMERICA, INC.

Lift out inlet camshaft (1).

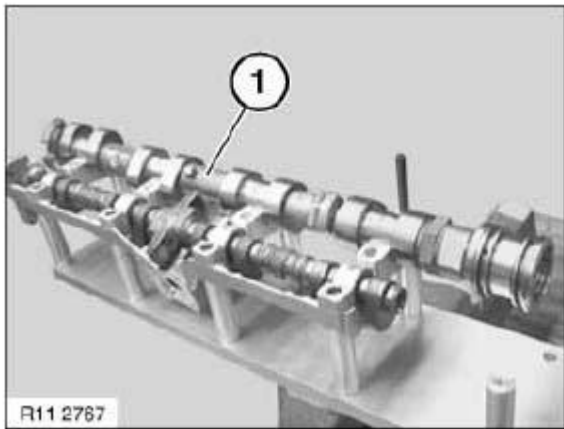


Fig. 257: Identifying Inlet Camshaft

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Further tasks:

The section REMOVING AND INSTALLING RIGHT ECCENTRIC SHAFT contains important installation instructions.

If necessary, replace plain compression rings (1).

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

Plain compression rings (1) are engaged at joint.

Press compression ring (1) on one side into groove, pull up on other side and remove catch.

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

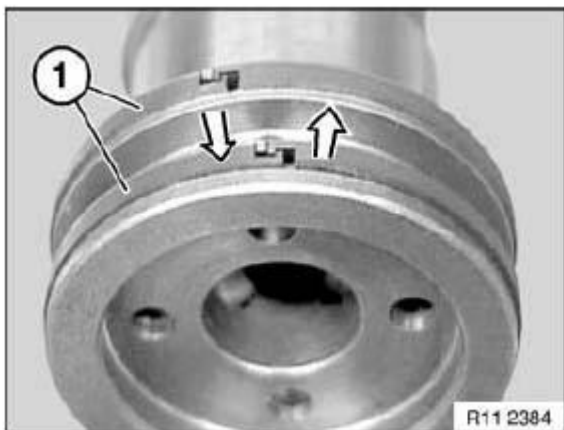


Fig. 258: Identifying Compression Rings

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Inlet camshaft of cylinder bank 1 to 4 is marked with "EIN 14".

If necessary, replace sensor gear (1).

Release screw (2) and remove sensor gear (1).

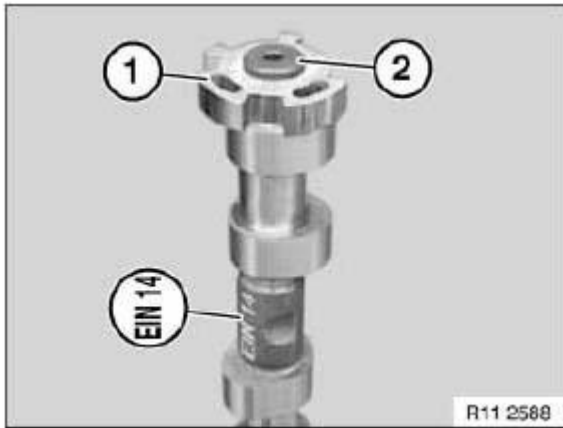


Fig. 259: Identifying Sensor Gear And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Installation of inlet camshaft is described separately from removal.

Clean all bearings and cams of inlet camshaft and lubricate with engine oil.

NOTE: Camshaft has a groove and sensor gear has a lug for fastening purposes.



Fig. 260: Locating Sensor Lug
Courtesy of BMW OF NORTH AMERICA, INC.

Fit sensor gear (1) and align to groove in camshaft.

Insert screw (2) and tighten down.

Tightening torque: 11 31 14AZ . See CAMSHAFT for specs.

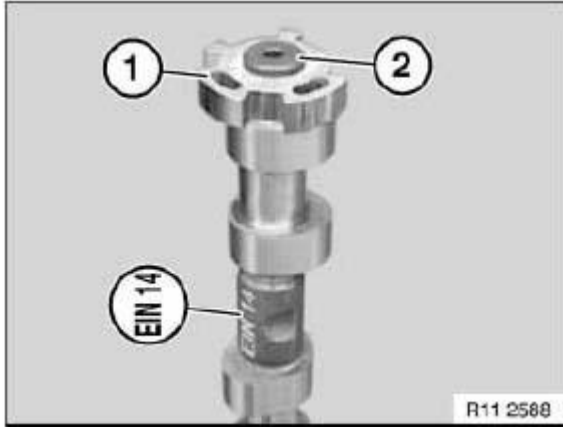


Fig. 261: Identifying Sensor Gear And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installing plain compression rings (1):

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

Carefully pull compression ring (1) apart and install from front.

Press compression ring (1) on one side into groove, install catch on other side.

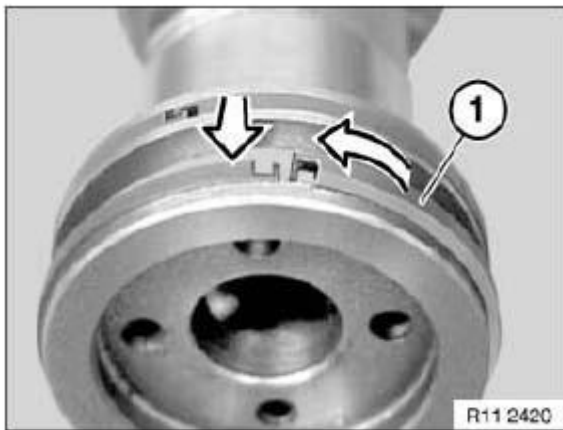


Fig. 262: Identifying Compression Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Insert inlet camshaft (1) so that cams point upwards at 4th cylinder as shown in graphic.

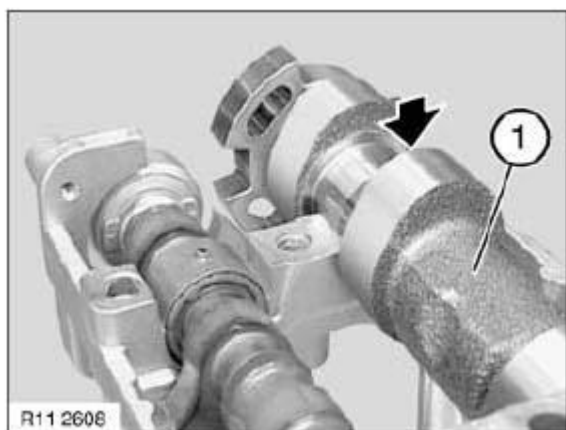


Fig. 263: Identifying Inlet Camshaft

Courtesy of BMW OF NORTH AMERICA, INC.

Make sure bearing shells (1) of eccentric shaft are engaged in bearing bracket.

NOTE: Bearing shell (1) is guided in a groove in bearing cap.

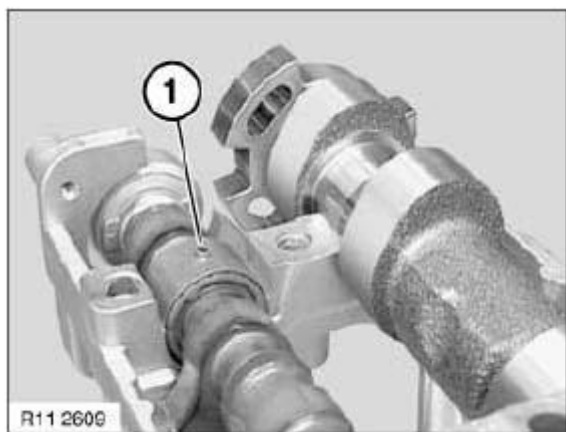


Fig. 264: Identifying Bearing Shell

Courtesy of BMW OF NORTH AMERICA, INC.

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

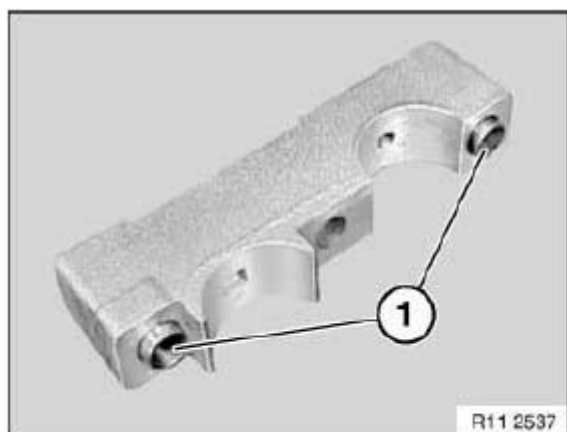


Fig. 265: Identifying Dowel Sleeves

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Bearing caps are marked in graphic with L E2 to L E5.

Fit bearing caps L E2 to L E5.

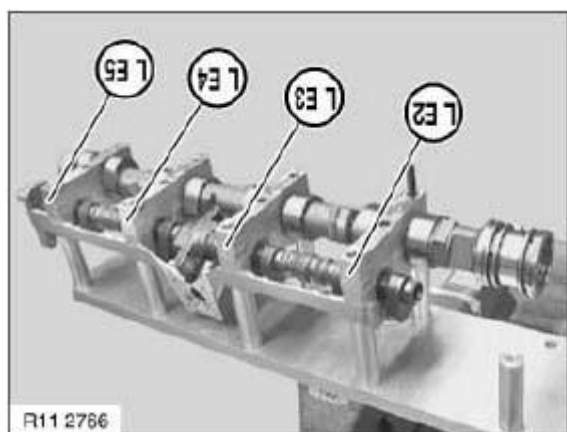


Fig. 266: Identifying Bearing Caps Marks

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Initially tighten special tool 11 9 473 without play only.

Secure bearing bracket and bearing cap with nut (special tool 11 9 473).

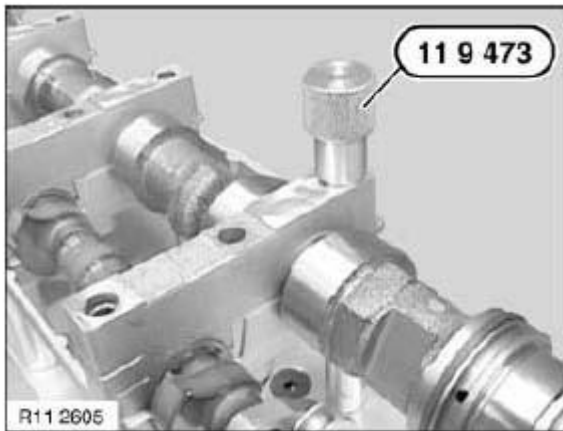


Fig. 267: Identifying Special Tool

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The mounting of the bearing bracket described later can only be performed if the first bearing of the inlet camshaft is aligned with special tool 11 9 472.

Fit special tool 11 9 472 as shown in graphic and align inlet camshaft.

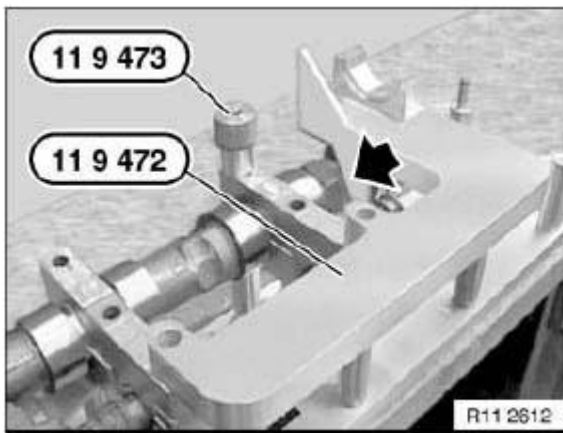


Fig. 268: Identifying Special Tools

Courtesy of BMW OF NORTH AMERICA, INC.

Fit centering sleeves (special tool 11 9 475) and align special tool 11 9 472 to bearing caps 2 and 3.

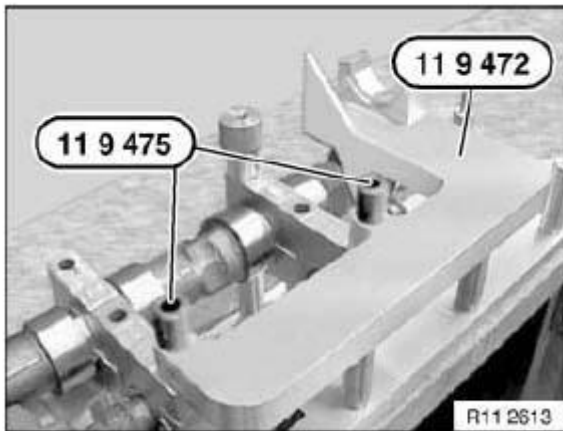


Fig. 269: Identifying Special Tools

Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 11 9 474 and initially tighten without play.

NOTE: Special tools 11 9 472, 11 9 474 and 11 9 475 remain fitted until all torsion springs and intermediate levers have been installed.

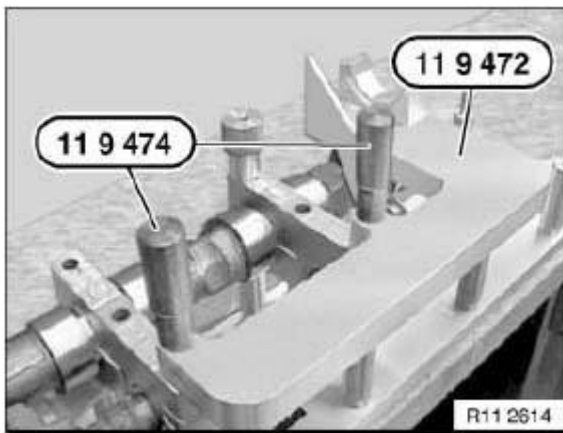


Fig. 270: Identifying Special Tools For Torsion Springs

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Installation of the intermediate levers and torsion springs is described on the 4th cylinder.

The same procedure is applicable to cylinders 1 to 3.

Attach special tool 11 9 490 to ends of torsion spring.

Install torsion spring (1).

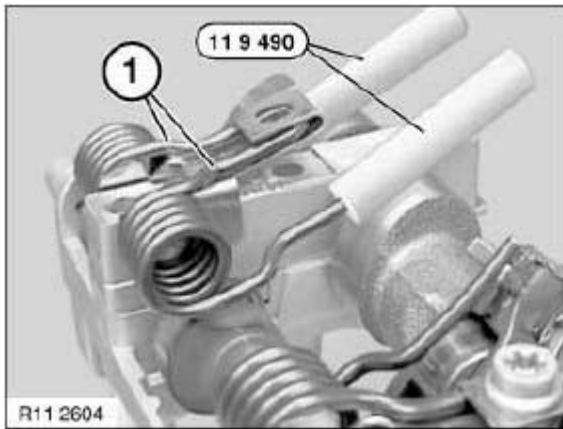


Fig. 271: Identifying Torsion Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screw (1) and tighten down.

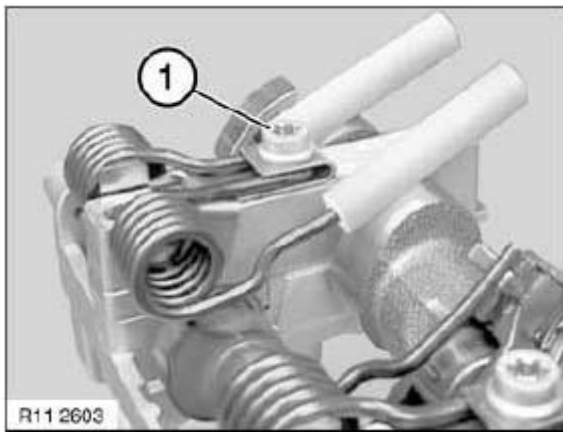


Fig. 272: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Intermediate levers (2) are divided into individual tolerance classes.

Only intermediate levers of the same tolerance class may be fitted in a single engine.

The tolerance classes are designated as illustrated with the numbers from 1 to 5.

Used intermediate levers (2) may only be reused in the same position.

Lubricate all sliding surfaces on intermediate lever (2) with engine oil.

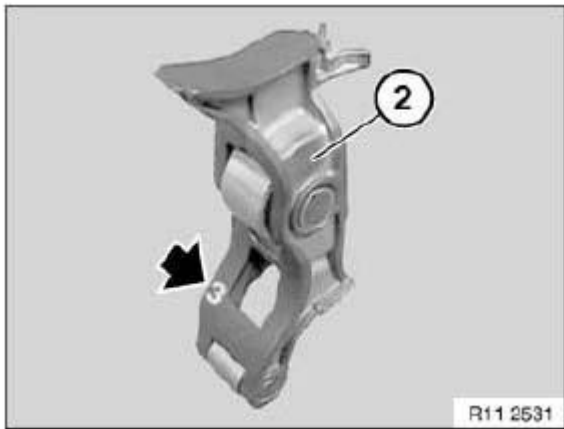


Fig. 273: Locating Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

Raise torsion spring (1) with special tool 11 9 480.

Remove special tool 11 9 490.

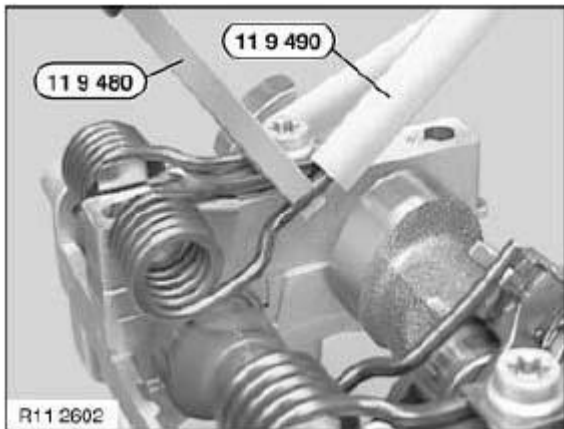


Fig. 274: Identifying Special Tool (11 9 480) And (11 9 490)
Courtesy of BMW OF NORTH AMERICA, INC.

Hold torsion spring (1) with special tool 11 9 480.

Install intermediate lever (2) from above.

Insert end of torsion spring (1) into guide on intermediate lever (2).

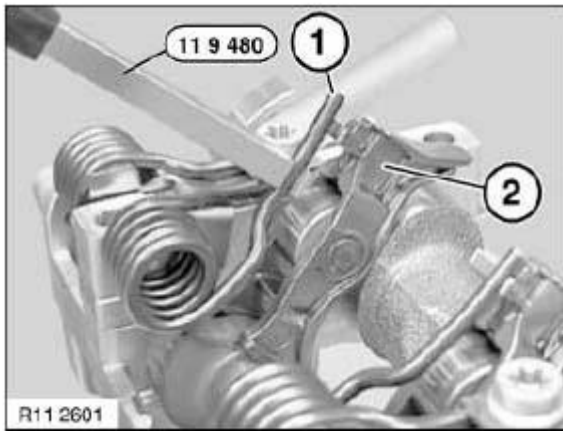


Fig. 275: Holding Torsion Spring With Special Tool (11 9 480)
Courtesy of BMW OF NORTH AMERICA, INC.

Raise second end of torsion spring with special tool 11 9 480.

Remove special tool 11 9 490.

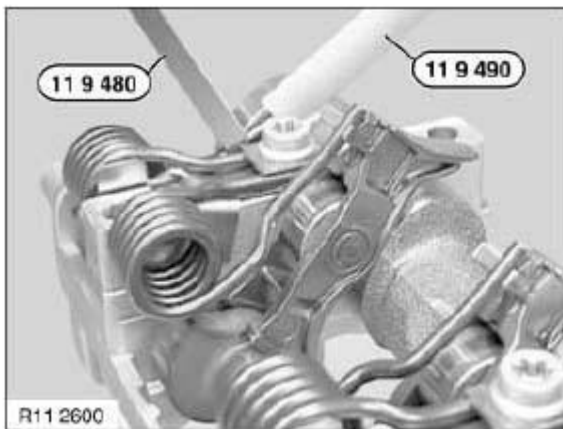


Fig. 276: Identifying Special Tool (11 9 480) And (11 9 490)
Courtesy of BMW OF NORTH AMERICA, INC.

Hold torsion spring (1) with special tool 11 9 480.

Install intermediate lever (2) from above.

Insert end of torsion spring (1) into guide on intermediate lever (2).

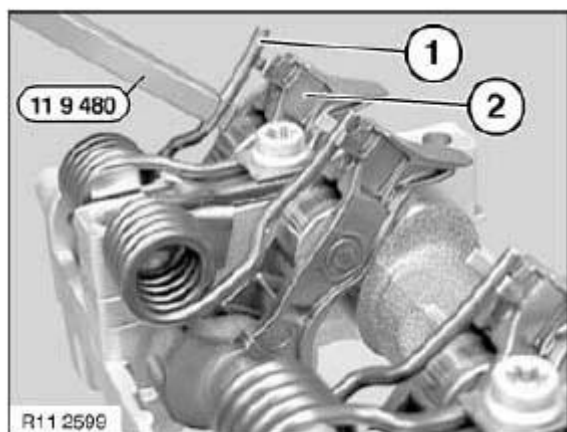


Fig. 277: Identifying Intermediate Lever And Torsion Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Install eccentric shaft sensor (2).

Insert screws and tighten down eccentric shaft sensor (2).

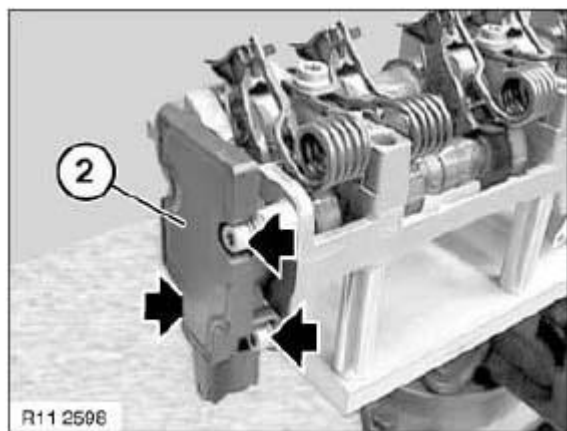


Fig. 278: Identifying Eccentric Shaft Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 474.

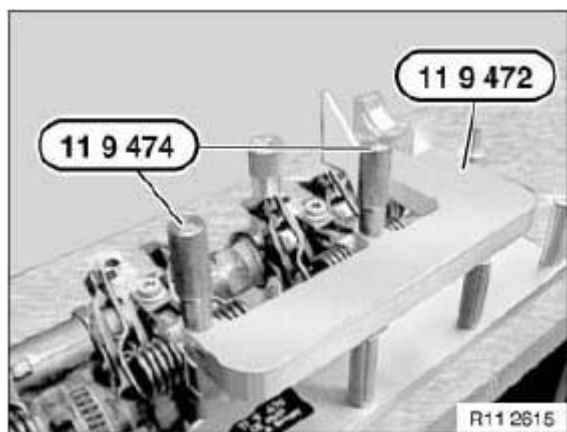


Fig. 279: Identifying Special Tool (11 9 474) And (11 9 472)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 472 and special tool 11 9 475.

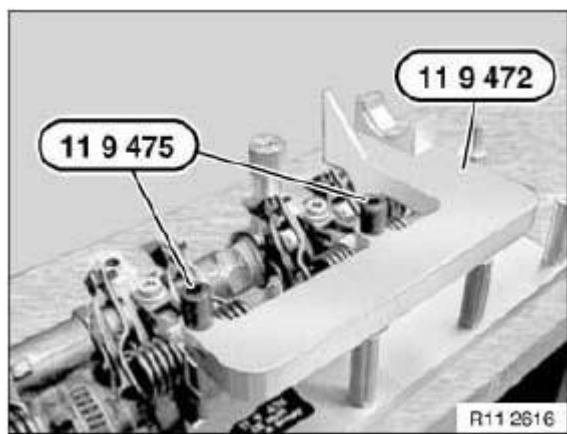


Fig. 280: Identifying Special Tools (11 9 475) And (11 9 472)
Courtesy of BMW OF NORTH AMERICA, INC.

Ends of compression rings (1) point upwards.

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

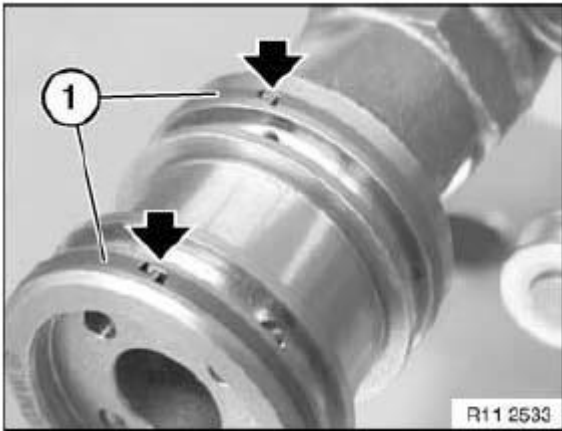


Fig. 281: Identifying Compression Rings

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) slip slightly when bearing bracket is fitted.

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

Align rockers (1) straight.

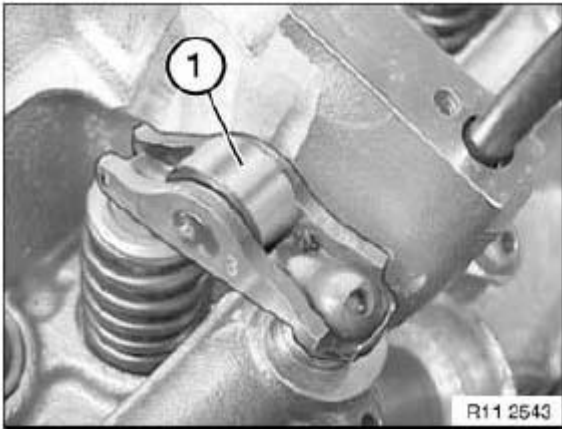


Fig. 282: Identifying Rocker Arms On Inlet Side

Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 473.

Remove bearing bracket (1) from special tool 11 9 470.

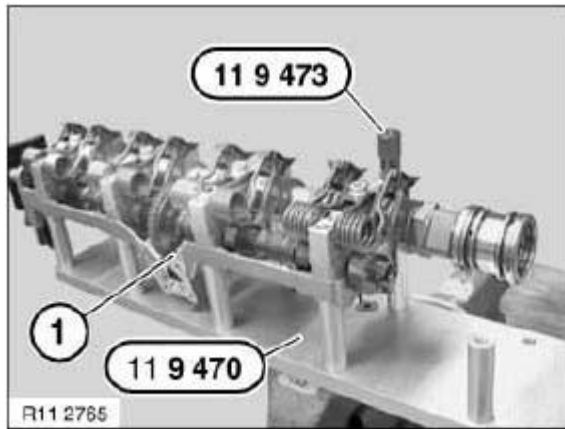


Fig. 283: Identifying Special Tools (11 9 473) And (11 9 470)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not tilt bearing bracket (1).

Lower bearing bracket (1) from above and carefully bring into contact with cylinder head.

Insert nuts and tighten by hand without play.

IMPORTANT: Make sure none of the intermediate levers or rocker arms have slipped out.

Tighten down nuts from inside to outside.

Tightening torque: 11 31 1AZ . See CAMSHAFT for specs.

IMPORTANT: Camshaft bearing caps of cylinders 1 to 4 and 5 to 8 must not be mixed up.

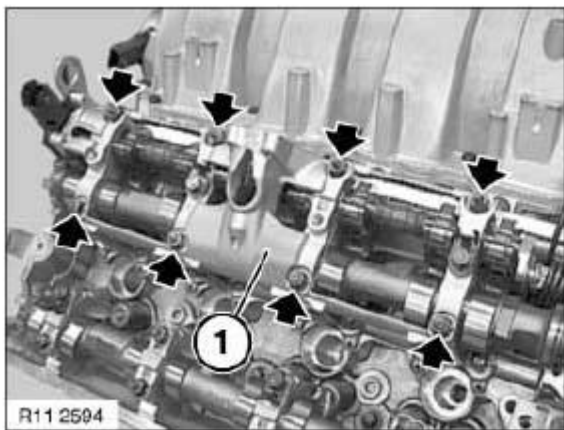


Fig. 284: Locating Bearing Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Fit bearing cap L E1 in such a way that marking is legible from inlet side.

Install nuts and tighten down.

Tightening torque: 11 31 1AZ . See CAMSHAFT for specs.

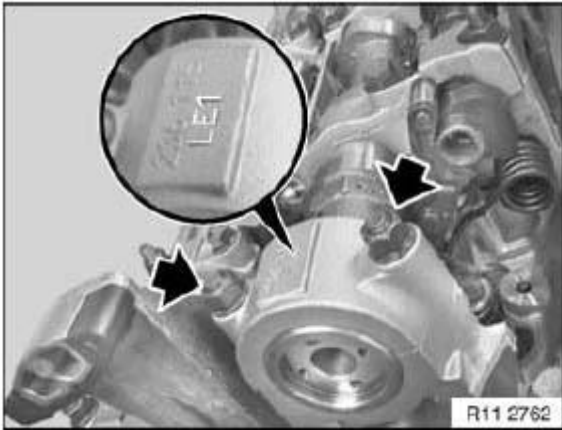


Fig. 285: Locating Bearing Cap Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Rotate inlet camshaft at hexagon head against direction of rotation until cam on 1st cylinder points downwards at an angle as shown in graphic.

NOTE: The marking (1) on the hexagon drive of the inlet camshaft faces upwards.

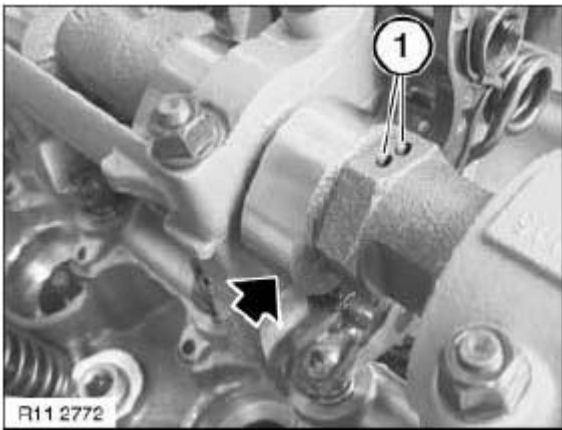


Fig. 286: Identifying Inlet Camshaft Marking

Courtesy of BMW OF NORTH AMERICA, INC.

Install INLET AND EXHAUST ADJUSTMENT UNIT ON RIGHT SIDE.

Install spark plugs on cylinder bank 1 to 4.

Install **RIGHT CYLINDER HEAD COVER**.

Install ignition coils on cylinder bank 1 to 4.

Install **SERVOMOTOR FOR RIGHT ECCENTRIC SHAFT**.

Assemble engine.

11 31 036 REMOVING AND INSTALLING/REPLACING LEFT EXHAUST CAMSHAFT (N62/N62TU)

(cylinder bank 5 to 8)

Necessary preliminary tasks:

- Remove **SERVOMOTOR FOR LEFT ECCENTRIC SHAFT**
- Remove ignition coils on cylinder bank 5 to 8
- Remove **LEFT CYLINDER HEAD COVER**
- Remove spark plugs on cylinder bank 5 to 8
- Remove **LEFT INLET AND EXHAUST ADJUSTMENT UNITS**

Remove slide rail (1).

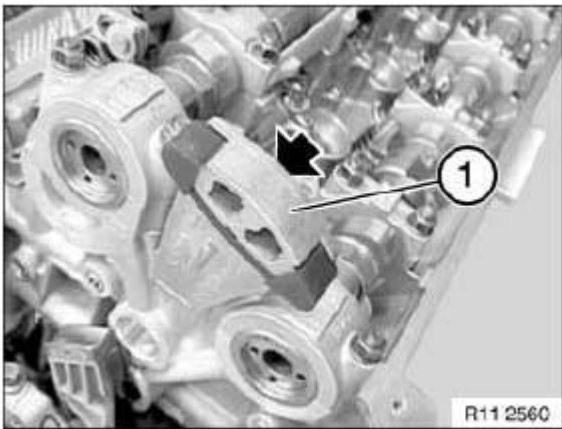


Fig. 287: Identifying Slide Rail

Courtesy of BMW OF NORTH AMERICA, INC.

Rotate exhaust camshaft at hexagon head until exhaust cam on cylinder (6) is facing upwards.

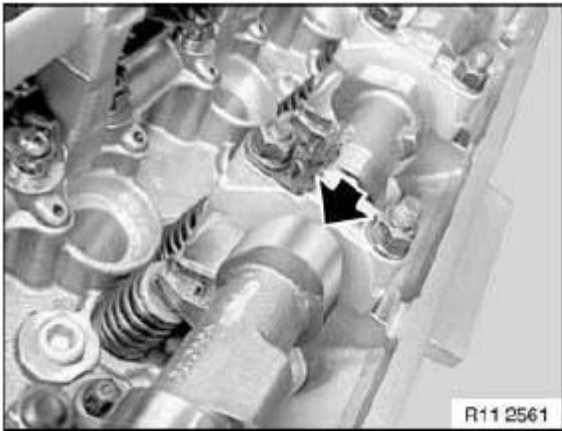


Fig. 288: Identifying Exhaust Cam On Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Camshaft bearing caps of cylinders 1 to 4 and 5 to 8 must not be mixed up.

NOTE: Bearing caps of exhaust camshaft are marked on cylinder bank 5 to 8 with R A1 to R A5 from inlet side.

Release nuts and remove bearing cap R A1.

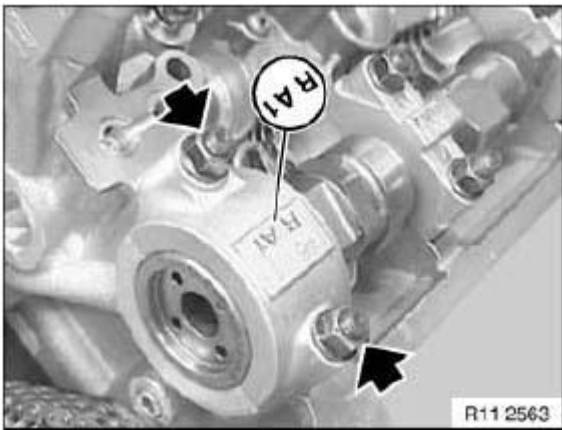


Fig. 289: Identifying Camshaft Bearing Caps
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Retaining clips (1) for oil line are fitted on bearing caps 3 and 5.

Release nuts on bearing caps R A2 to R A5.

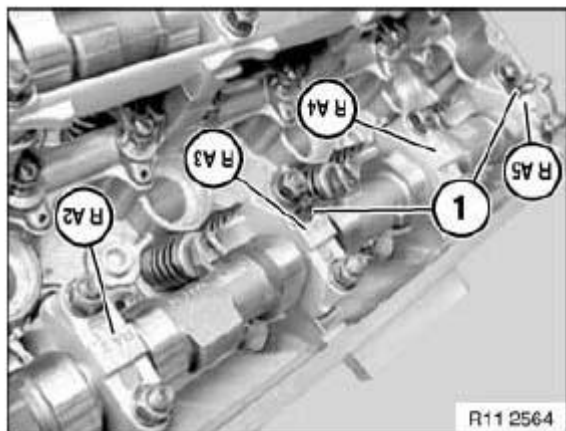


Fig. 290: Identifying Retaining Clips

Courtesy of BMW OF NORTH AMERICA, INC.

Remove bearing caps R A2 to R A5.

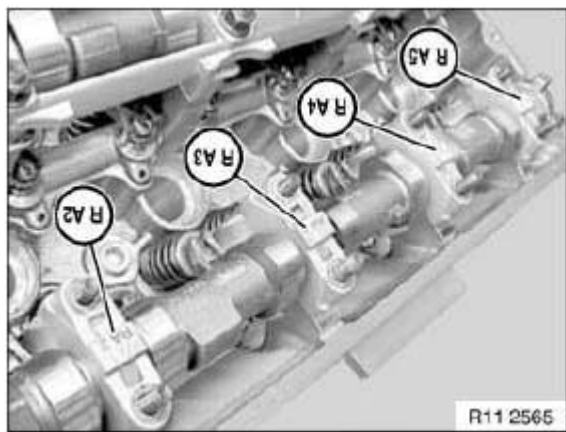


Fig. 291: Identifying Bearing Caps

Courtesy of BMW OF NORTH AMERICA, INC.

Remove exhaust camshaft (1).

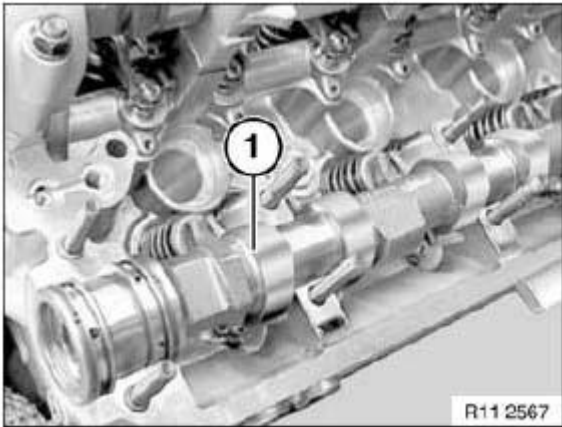


Fig. 292: Identifying Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace plain compression rings (1).

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

Plain compression rings (1) are engaged at joint.

Press compression ring (1) on one side into groove, pull up on other side and remove catch.

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

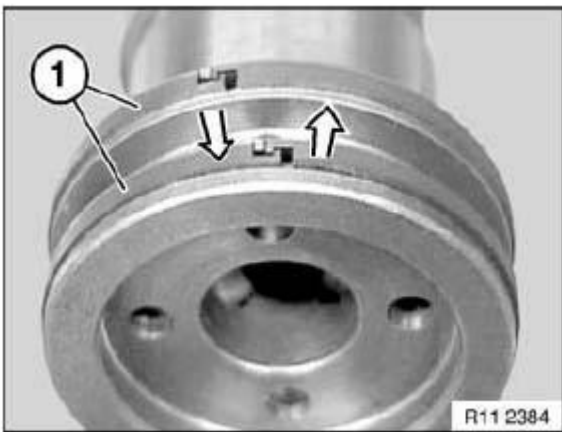


Fig. 293: Identifying Compression Ring
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace sensor gear (1).

Release screw (2) and remove sensor gear (1).

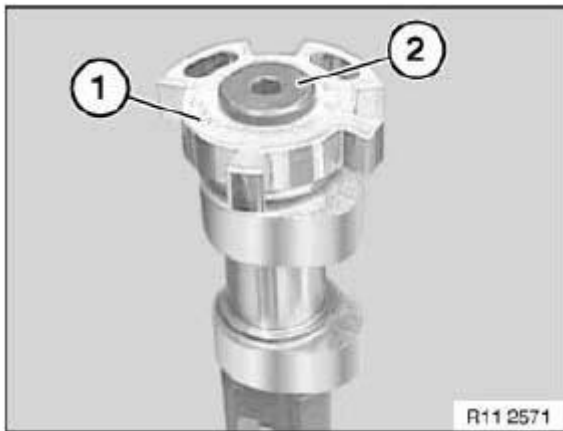


Fig. 294: Identifying Sensor Gear And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Installation of exhaust camshaft is described separately from removal.

Clean all bearings and cams of exhaust camshaft and lubricate with engine oil.

NOTE: Camshaft has a groove and sensor gear has a lug for fastening purposes.



Fig. 295: Identifying Sensor Gear Lug
Courtesy of BMW OF NORTH AMERICA, INC.

Fit sensor gear (1) and align to groove in camshaft.

Insert screw (2) and tighten down.

Tightening torque: 11 31 14AZ . See **CAMSHAFT** for specs.

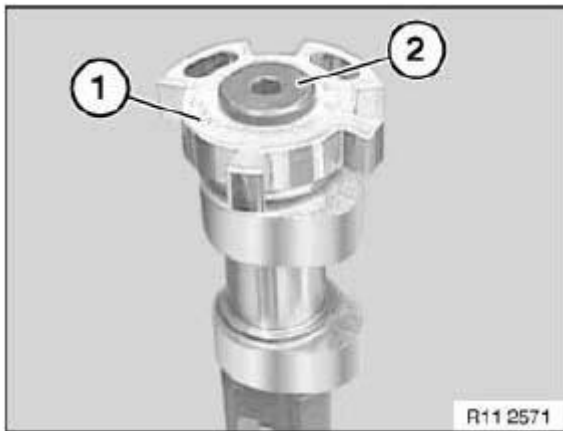


Fig. 296: Identifying Sensor Gear And Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Installing plain compression rings (1):

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

Carefully pull compression ring (1) apart and install from front.

Press compression ring (1) on one side into groove, install catch on other side.

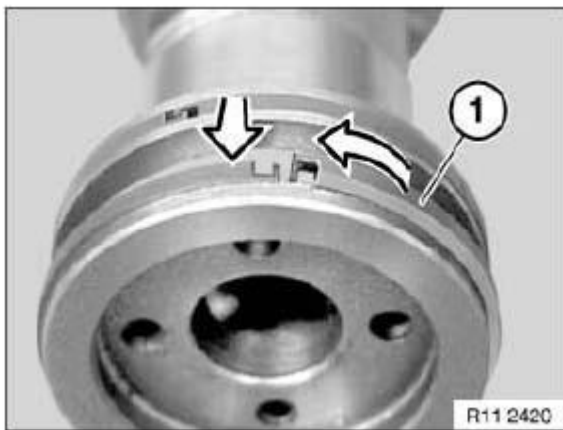


Fig. 297: Identifying Compression Ring
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Rocker arms (1) of exhaust camshaft are of same design as rocker arms of inlet camshaft.

The classification 3 shown in the graphic has no effect on the function on the exhaust camshaft.

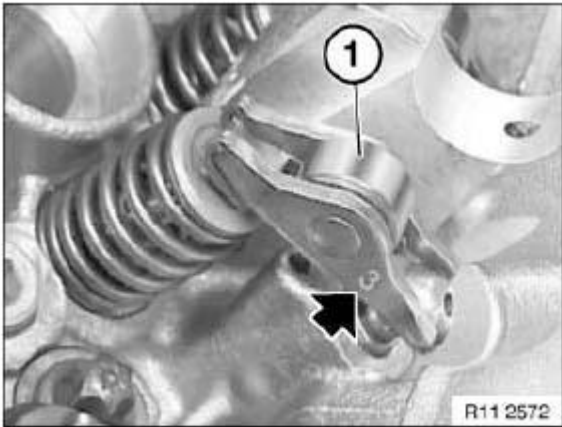


Fig. 298: Identifying Rocker Arm

Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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

Align rockers (1) straight.

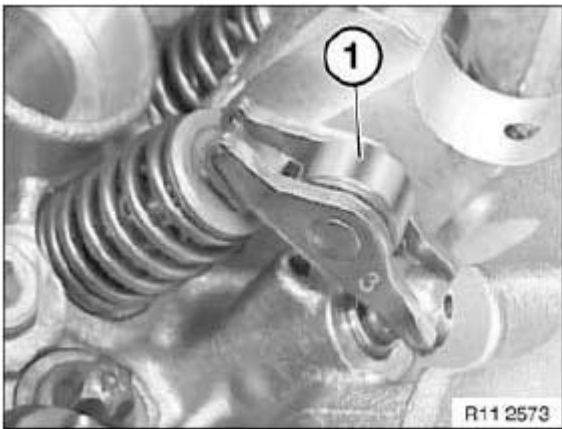


Fig. 299: Identifying Rocker Arm

Courtesy of BMW OF NORTH AMERICA, INC.

Lubricate exhaust camshaft and bearing caps with engine oil.

Install exhaust camshaft (1).

Rotate exhaust camshaft (1) until exhaust cam on cylinder 6 is facing upwards.

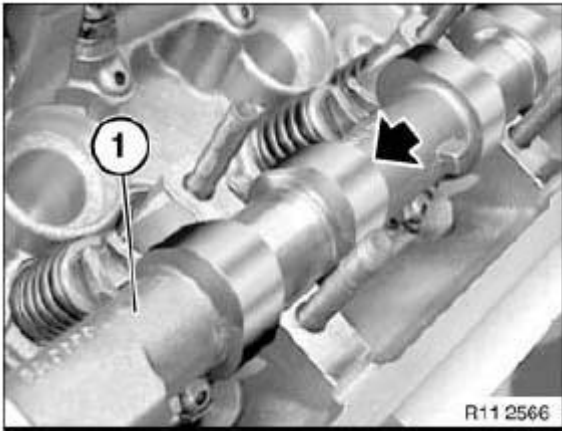


Fig. 300: Identifying Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Check dowel sleeves (2) for damage and correct installation position.

Ends of compression rings (1) point upwards.

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

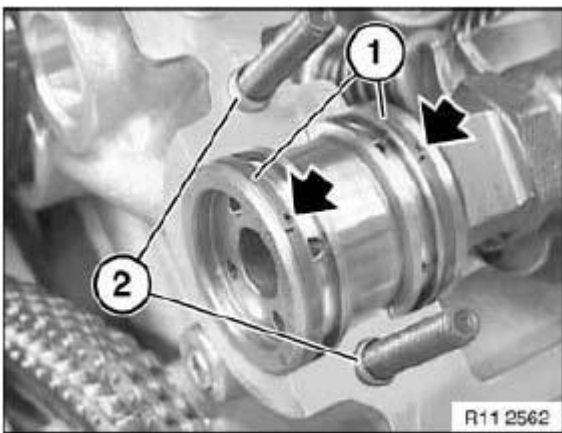


Fig. 301: Identifying Compression Rings And Dowel Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Camshaft bearing caps of cylinders 1 to 4 and 5 to 8 must not be mixed up.

NOTE: Bearing caps of exhaust camshaft are marked on cylinder bank 5 to 8 with R A1 to R A5 from inlet side.

Fit bearing caps R A2 to R A5.

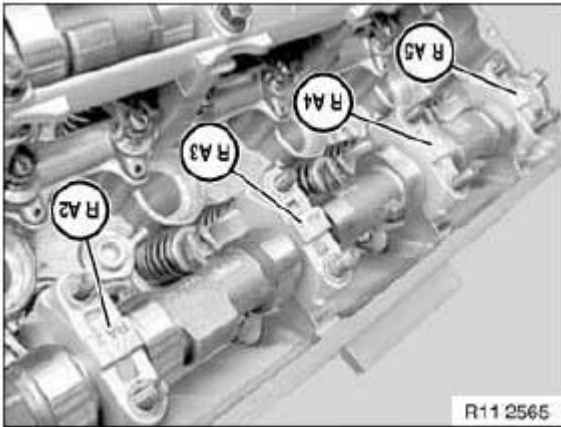


Fig. 302: Identifying Camshaft Bearing Caps
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Retaining clips (1) for oil line are fitted on bearing caps 3 and 5.

Insert nuts and tighten by hand without play.

Tighten down nuts on bearing caps R A2 to R A5 in 1/2 turn increments evenly from inside to outside.

Tightening torque: 11 31 1AZ . See CAMSHAFT for specs.

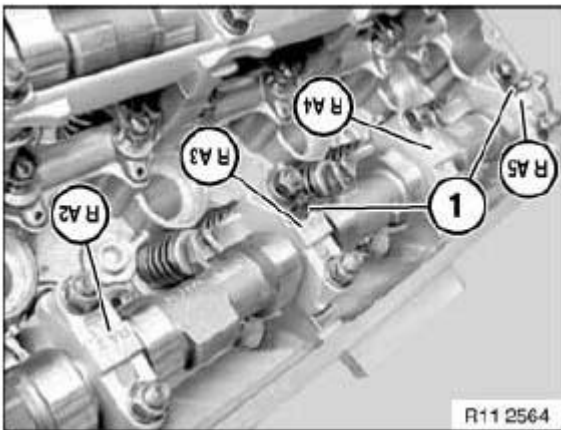


Fig. 303: Identifying Retaining Clips
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Camshaft bearing caps of cylinders 1 to 4 and 5 to 8 must not be mixed up.

Fit bearing cap R A1 in such a way that marking is legible from inlet side.

Install nuts and tighten down.

Tightening torque: 11 31 1AZ . See CAMSHAFT for specs.

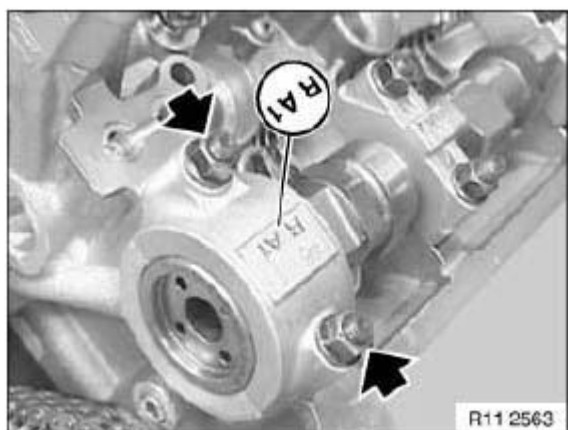


Fig. 304: Identifying Bearing Cap Mark
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: A gasket (2) is installed between cylinder head and slide rail (1).

Replace gasket (2) and preinstall on slide rail (1).

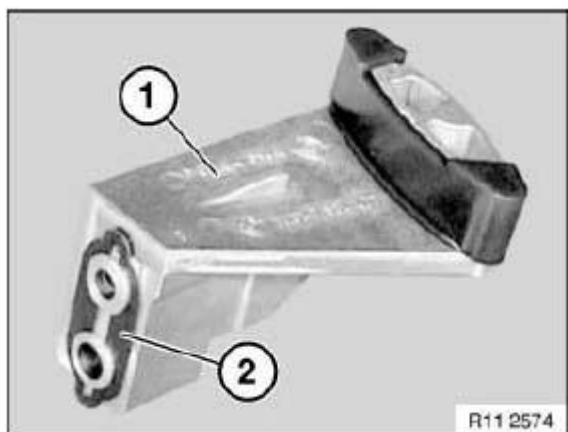


Fig. 305: Identifying Gasket And Slide Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Install slide rail (1) with gasket, insert screw and tighten down.

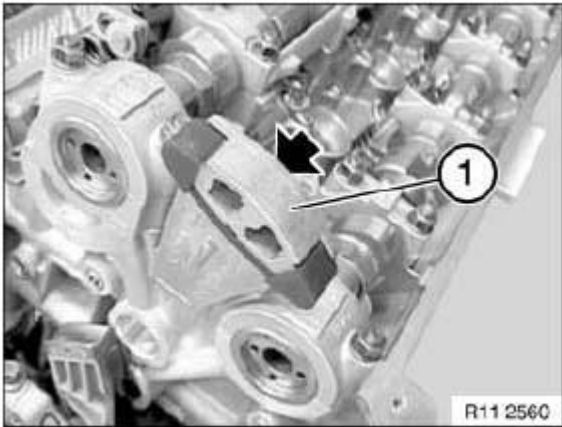


Fig. 306: Identifying Slide Rail With Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate exhaust camshaft against direction of rotation until cam on 5th cylinder points upwards at an angle as shown in illustration.

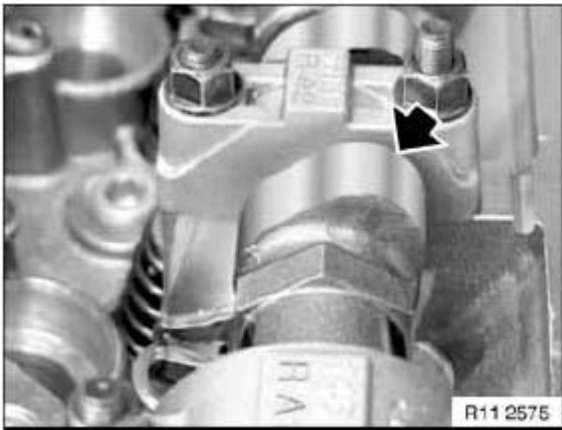


Fig. 307: Locating Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

INSTALL INLET AND EXHAUST ADJUSTMENT UNIT ON LEFT SIDE.

Install spark plugs on cylinder bank 5 to 8.

INSTALL LEFT CYLINDER HEAD COVER.

Install ignition coils on cylinder bank 5 to 8.

Assemble engine.

**11 31 038 REMOVING AND INSTALLING/REPLACING RIGHT EXHAUST CAMSHAFT
(N62/N62TU)**

(cylinder bank 1 to 4)

Necessary preliminary tasks:

- Remove **SERVOMOTOR FOR RIGHT ECCENTRIC SHAFT**
- Remove ignition coils on cylinder bank 1 to 4
- Remove **RIGHT CYLINDER HEAD COVER**
- Remove spark plugs on cylinder bank 1 to 4
- Remove **RIGHT INLET AND EXHAUST ADJUSTMENT UNITS**

Remove slide rail (1).

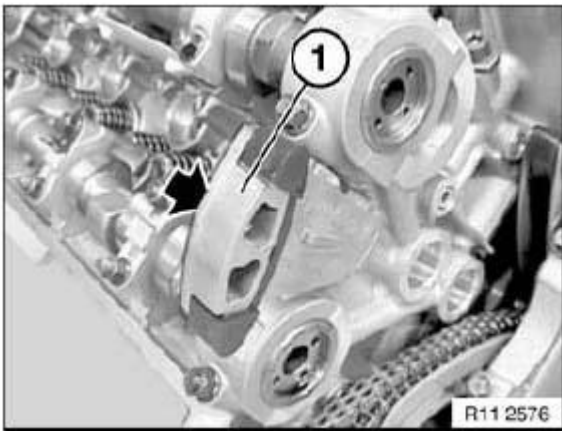


Fig. 308: Identifying Slide Rail

Courtesy of BMW OF NORTH AMERICA, INC.

Rotate exhaust camshaft at hexagon head against direction of rotation until exhaust cam on cylinder (2) faces upwards.

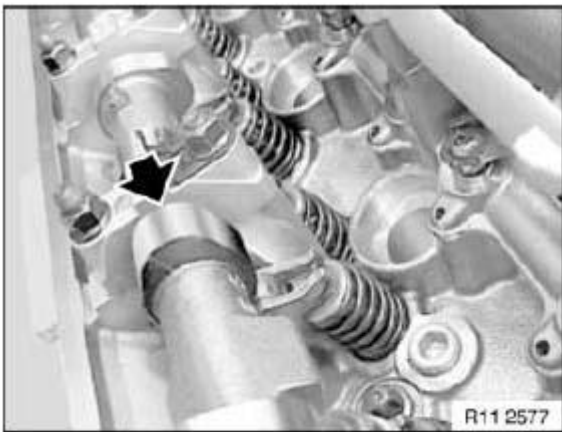


Fig. 309: Identifying Exhaust Cam Position

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Camshaft bearing caps of cylinders 1 to 4 and 5 to 8 must not be mixed up.

NOTE: Bearing caps of exhaust camshaft are marked on cylinder bank 1 to 4 with L A1 to L A5 from inlet side.

Release nuts and remove bearing cap L A1.

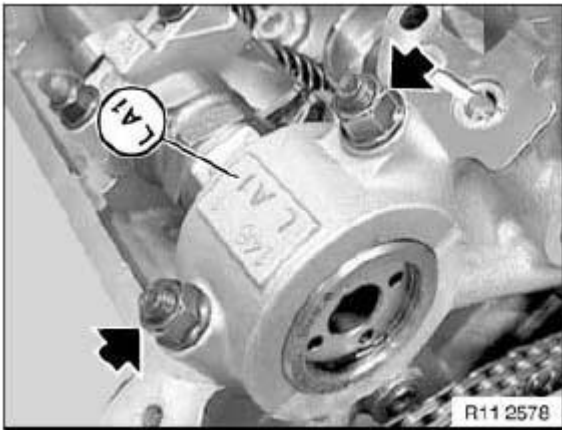


Fig. 310: Identifying Camshaft Bearing Caps
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Retaining clips (1) for oil line are fitted on bearing caps 3 and 5.

Release nuts on bearing caps L A2 to L A5.

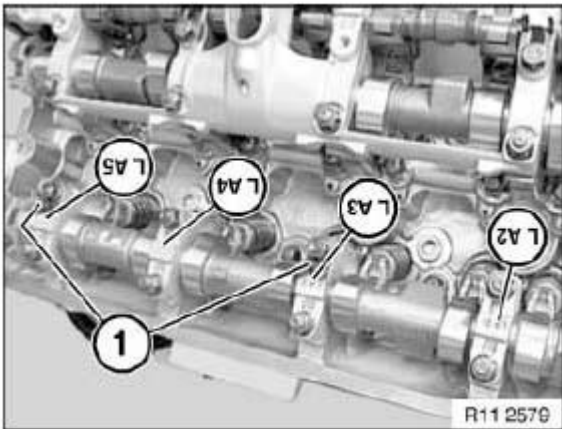


Fig. 311: Identifying Retaining Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bearing caps L A2 to L A5.

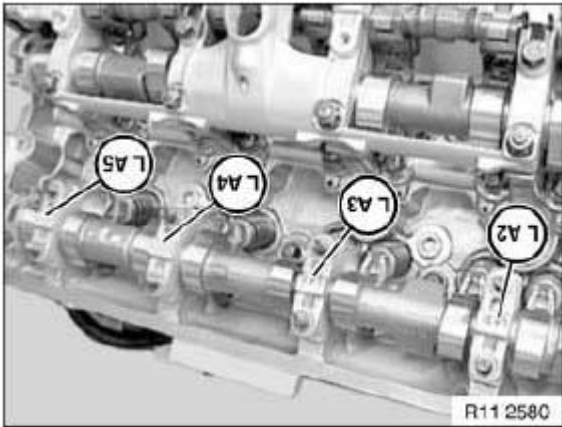


Fig. 312: Identifying Bearing Caps

Courtesy of BMW OF NORTH AMERICA, INC.

Remove exhaust camshaft (1).

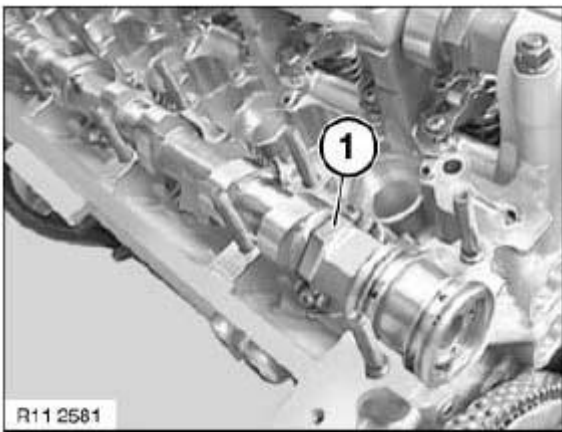


Fig. 313: Identifying Exhaust Camshaft

Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace plain compression rings (1).

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

Plain compression rings (1) are engaged at joint.

Press compression ring (1) on one side into groove, pull up on other side and remove catch.

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

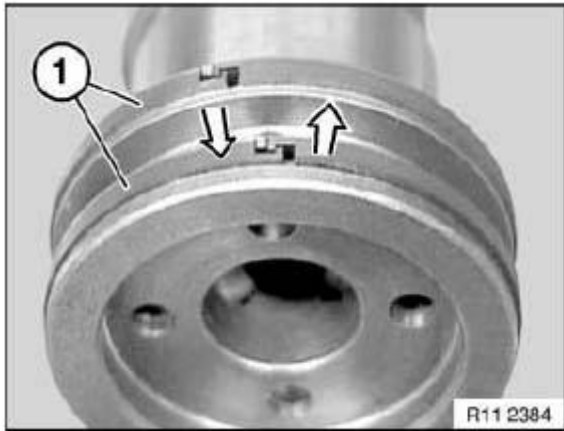


Fig. 314: Identifying Compression Ring
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace sensor gear (1).

Release screw (2) and remove sensor gear (1).

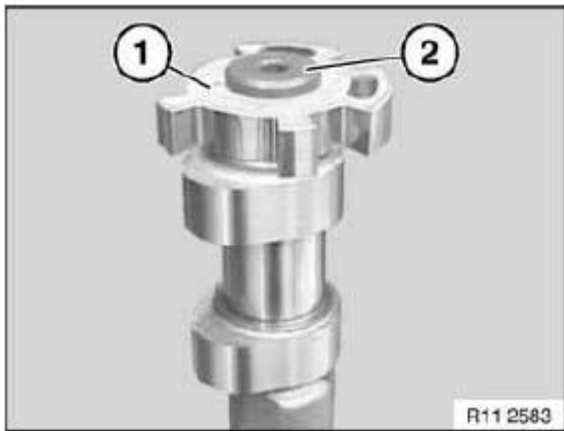


Fig. 315: Identifying Sensor Gear And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Installation of exhaust camshaft is described separately from removal.

Clean all bearings and cams of exhaust camshaft and lubricate with engine oil.

NOTE: Camshaft has a groove and sensor gear has a lug for fastening purposes.

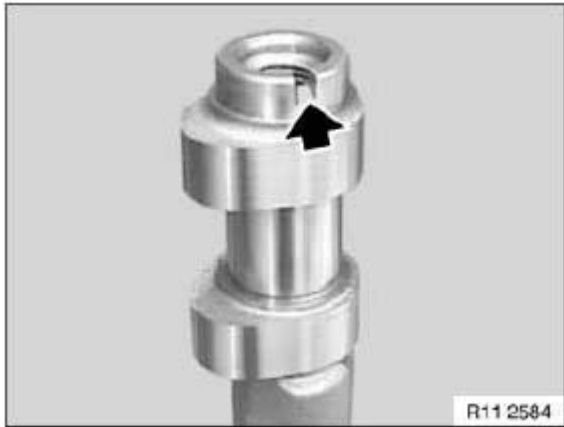


Fig. 316: Identifying Sensor Gear Lug
Courtesy of BMW OF NORTH AMERICA, INC.

Fit sensor gear (1) and align to groove in camshaft.

Insert screw (2) and tighten down.

Tightening torque: 11 31 14AZ . See CAMSHAFT for specs.



Fig. 317: Identifying Sensor Gear And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installing plain compression rings (1):

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

Carefully pull compression ring (1) apart and install from front.

Press compression ring (1) on one side into groove, install catch on other side.

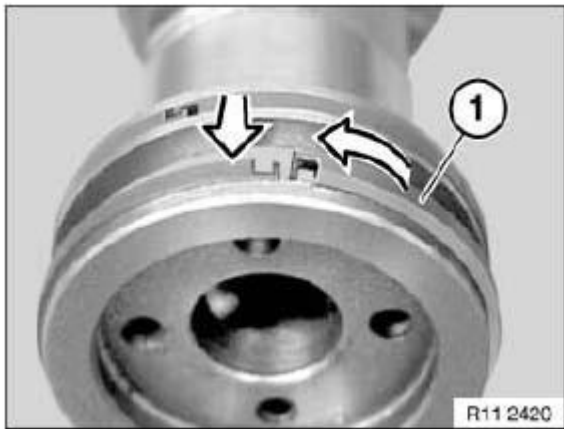


Fig. 318: Identifying Compression Ring
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Rocker arms (1) of exhaust camshaft are of same design as rocker arms of inlet camshaft.

The classification 3 shown in the graphic has no effect on the function on the exhaust camshaft.

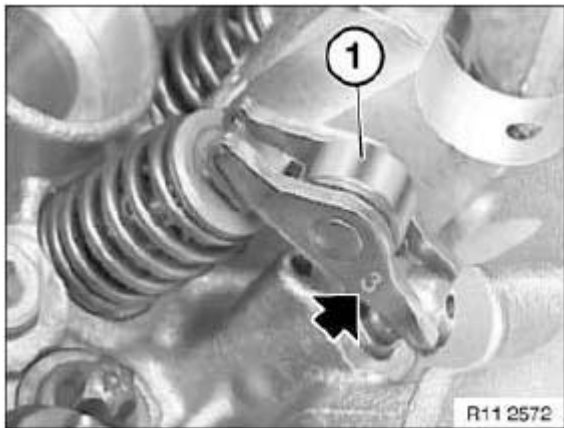


Fig. 319: Identifying Rocker Arm
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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

Align rockers (1) straight.

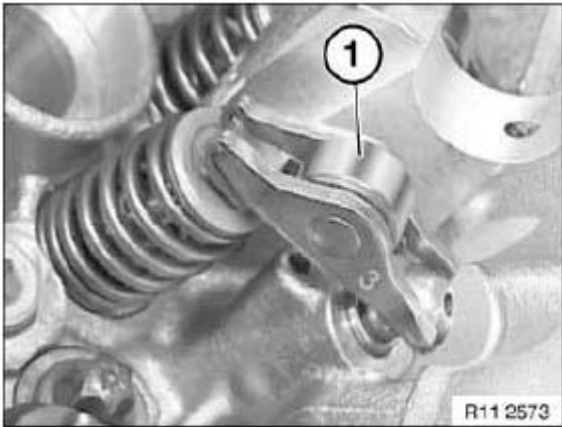


Fig. 320: Identifying Rocker Arm Position
Courtesy of BMW OF NORTH AMERICA, INC.

Lubricate exhaust camshaft and bearing caps with engine oil.

Install exhaust camshaft (1).

Rotate exhaust camshaft (1) until exhaust cam on cylinder 2 is facing upwards.

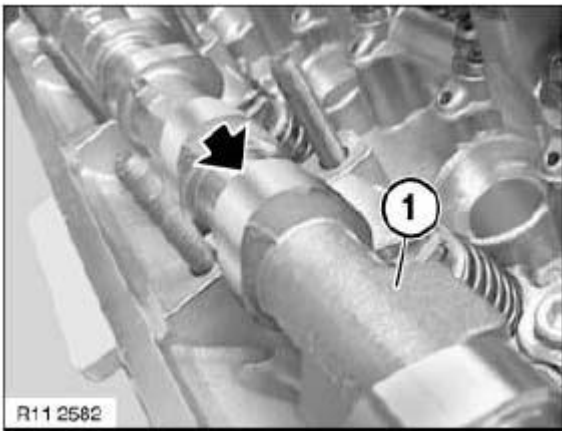


Fig. 321: Identifying Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Check dowel sleeves (2) for damage and correct installation position.

Ends of compression rings (1) point upwards.

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

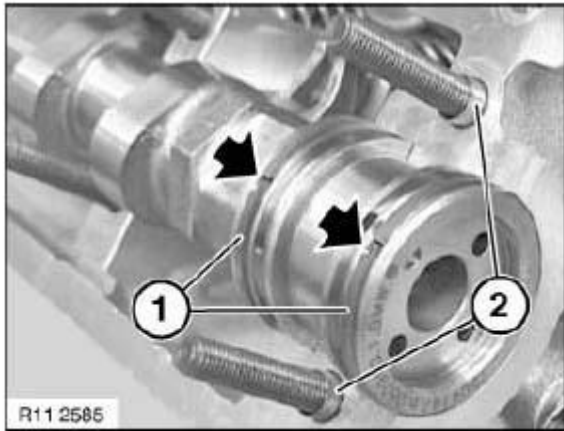


Fig. 322: Identifying Compression Rings
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Camshaft bearing caps of cylinders 1 to 4 and 5 to 8 must not be mixed up.

NOTE: Bearing caps of exhaust camshaft are marked on cylinder bank 1 to 4 with L A1 to L A5 from inlet side.

Fit bearing caps L A2 to L A5.

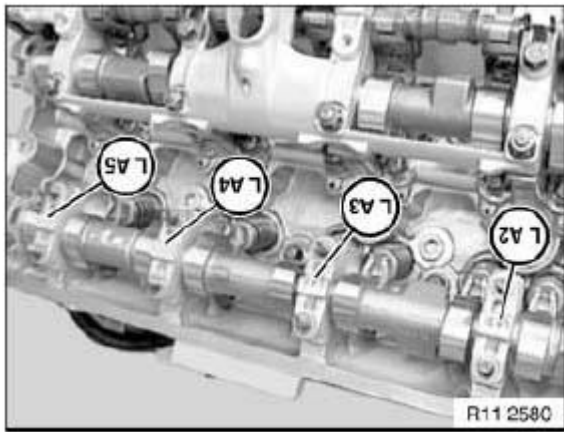


Fig. 323: Identifying Bearing Caps Mark
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Retaining clips (1) for oil line are fitted on bearing caps 3 and 5.

Insert nuts and tighten by hand without play.

Tighten down nuts on bearing caps L A2 to L A5 in 1/2 turn increments evenly from inside to outside.

Tightening torque: 11 31 1AZ . See **CAMSHAFT** for specs.

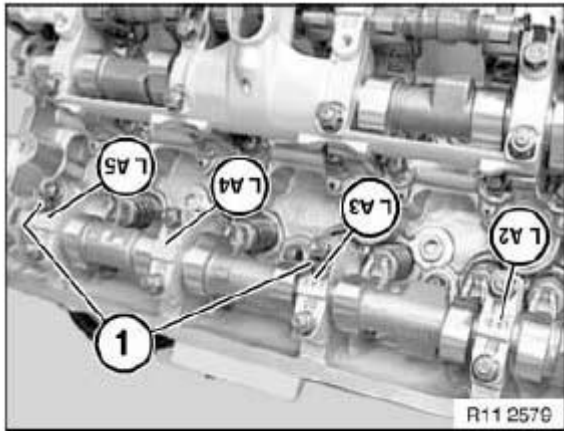


Fig. 324: Identifying Retaining Clips

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Camshaft bearing caps of cylinders 1 to 4 and 5 to 8 must not be mixed up.

Fit bearing cap L A1 in such a way that marking is legible from inlet side.

Install nuts and tighten down.

Tightening torque: 11 31 1AZ . See **CAMSHAFT** for specs.

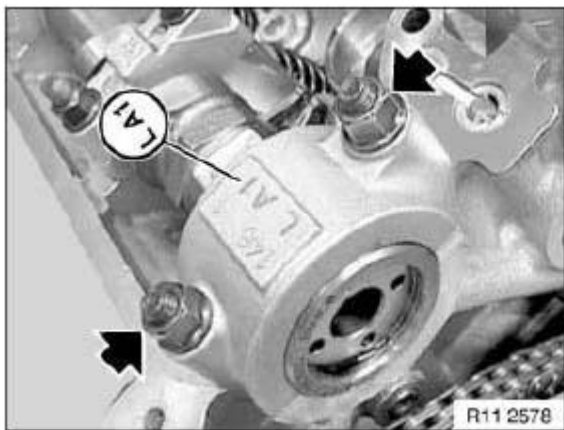


Fig. 325: Identifying Bearing Cap Mark

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: A gasket (2) is installed between cylinder head and slide rail (1).

Replace gasket (2) and preinstall on slide rail (1).

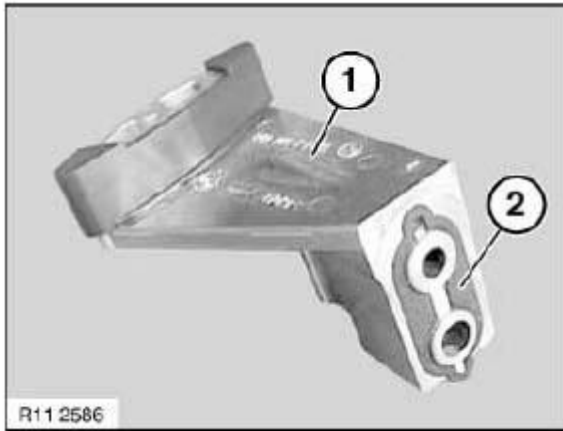


Fig. 326: Identifying Gasket And Slide Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Install slide rail (1) with gasket, insert screw and tighten down.

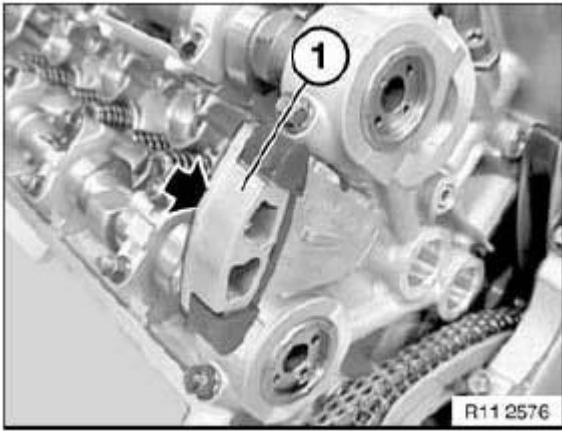


Fig. 327: Identifying Slide Rail With Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate exhaust camshaft against direction of rotation until cam on 1st cylinder points upwards at an angle as shown in graphic.

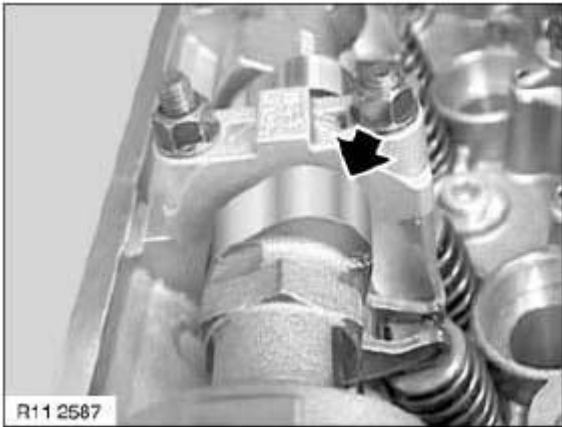


Fig. 328: Identifying Exhaust Camshaft Cam
Courtesy of BMW OF NORTH AMERICA, INC.

Install **INLET AND EXHAUST ADJUSTMENT UNIT ON RIGHT SIDE.**

Install spark plugs on cylinder bank 1 to 4.

Install **RIGHT CYLINDER HEAD COVER.**

Install ignition coils on cylinder bank 1 to 4.

Assemble engine.

11 31 052 REPLACING BOTH TIMING CHAINS (N62/N62TU)

Special tools required:

- **11 2 001**
- **11 2 002**
- **11 2 003**
- **11 2 007**

Necessary preliminary tasks:

- Remove lower **TIMING CASE COVER**

Remove timing chain (1).

Remove timing chain (5).

Release screws (7).

Remove guide rails (3 and 6).

Remove tensioning rails (2 and 4).

Installation:

Maintain tension of timing chains when installing timing case cover.

Observe sparking protection on timing case cover.

Make sure timing chain (1) is correctly installed when placing it in guide rail (3).

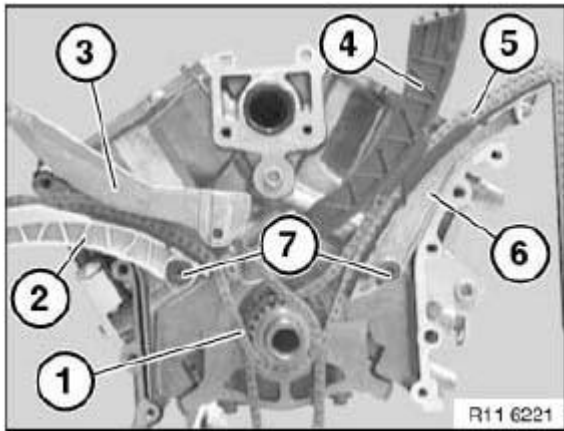


Fig. 329: Identifying Timing Chain And Guide Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tools 11 2 001 and 11 2 002 to crankshaft.

Insert special tool 11 2 007 and remove sprocket wheel with special tool 11 2 003.

Installation:

Check sprocket wheels for wear, replace if necessary.

Heat sprocket wheel to 60 °C.

WARNING: Burning hazard! Wear gloves.

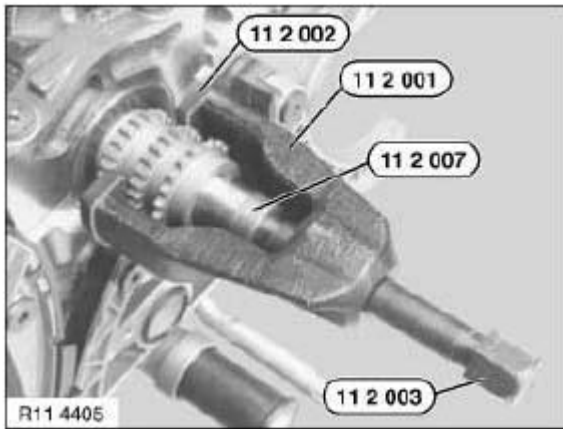


Fig. 330: Identifying Special Tools For Crankshaft
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 070 CHECKING CAMSHAFT TIMING ON LEFT SIDE (N62/N62TU)

Special tools required:

- 11 9 190
- 11 9 461
- 11 9 462

(cylinder bank 5 to 8)

Necessary preliminary tasks:

- Remove SERVOMOTOR FOR LEFT ECCENTRIC SHAFT
- Remove LEFT CYLINDER HEAD COVER

Remove all spark plugs on cylinder bank 5 to 8.

If necessary, remove fan cowl.

IMPORTANT: Screw (1) is a special screw and must not be replaced with a normal M8 screw.

Release screw (1).

Unclip oil line (3) from retainers (2) and remove.

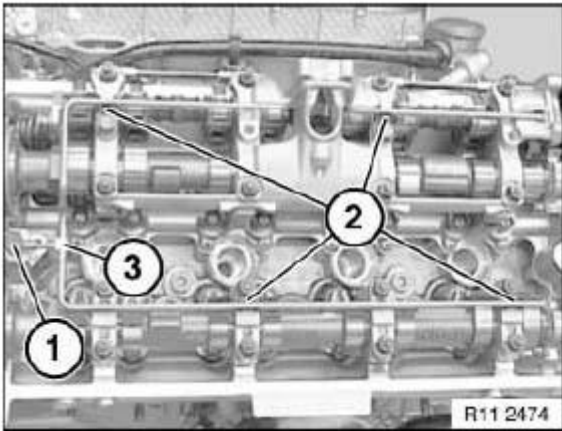


Fig. 331: Identifying Oil Line And Retainers
 Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine at central bolt in direction of rotation to firing TDC position of 1st cylinder.

NOTE: With 1st cylinder in firing TDC position, cams of inlet and exhaust camshafts at 5th cylinder point upwards at an angle as shown in illustration.

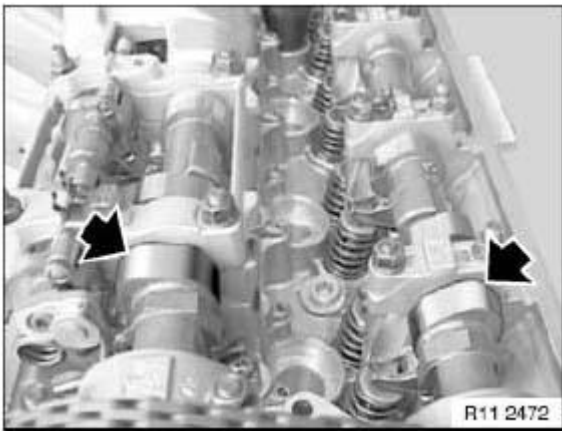


Fig. 332: Locating Camshaft Cam
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Alignment hole for TDC position is at front on timing case cover.

Crank engine at central bolt and secure vibration damper with special tool 11 9 190 in firing TDC position of 1st cylinder.

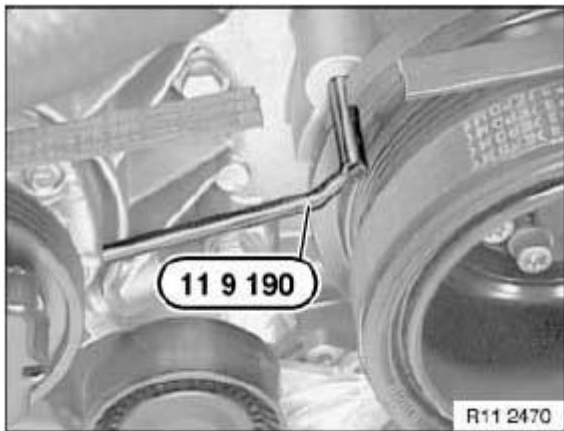


Fig. 333: Identifying Special Tool (11 9 190)

Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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

Checking locking of inlet adjustment unit in initial position:

Engage hexagon head of inlet camshaft and attempt to rotate inlet camshaft carefully against direction of rotation.

If there is no fixed connection between inlet camshaft and inlet adjustment unit, rotate inlet camshaft against direction of rotation as far as it will go.

The inlet adjustment unit is locked in the initial position when the inlet camshaft is non-positively connected to the inlet adjustment unit.

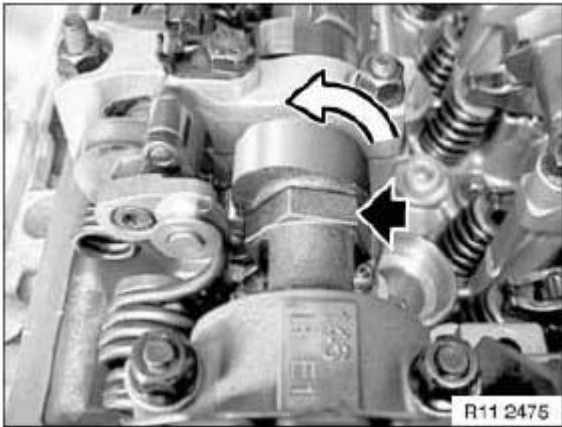


Fig. 334: Rotating Inlet Camshaft

Courtesy of BMW OF NORTH AMERICA, INC.

Checking locking of exhaust adjustment unit in initial position:

Engage hexagon head of exhaust camshaft and attempt to rotate exhaust camshaft carefully in direction of rotation.

If there is no fixed connection between exhaust camshaft and exhaust adjustment unit, rotate exhaust camshaft in direction of rotation as far as it will go.

The exhaust adjustment unit is locked in the initial position when the exhaust camshaft is non-positively connected to the exhaust adjustment unit.

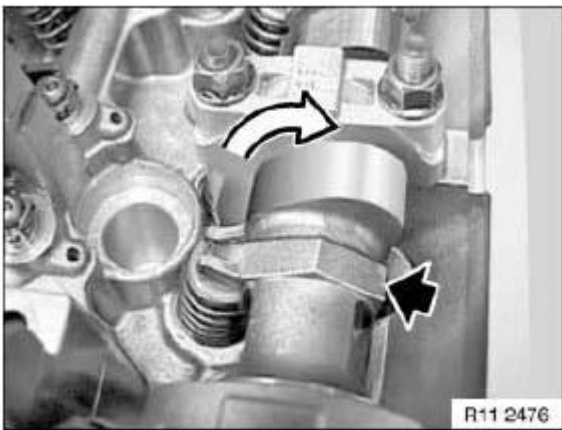


Fig. 335: Rotating Exhaust Camshaft

Courtesy of BMW OF NORTH AMERICA, INC.

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

Place special tool 11 9 461 on inlet camshaft and check timing.

NOTE: The timing is correctly adjusted when special tool 11 9 461 rests flat on the cylinder head or protrudes by up to 0.5 mm to the exhaust side.

Remove special tool 11 9 461 from inlet camshaft.

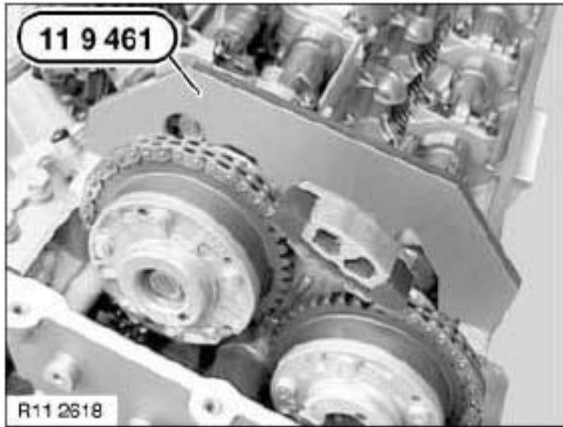


Fig. 336: Identifying Special Tool (11 9 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 462 on exhaust camshaft and check timing.

NOTE: The timing is correctly adjusted when special tool 11 9 462 rests flat on the cylinder head or protrudes by up to 0.5 mm to the exhaust side.

IF NECESSARY, ADJUST CAMSHAFT TIMING ON LEFT SIDE.

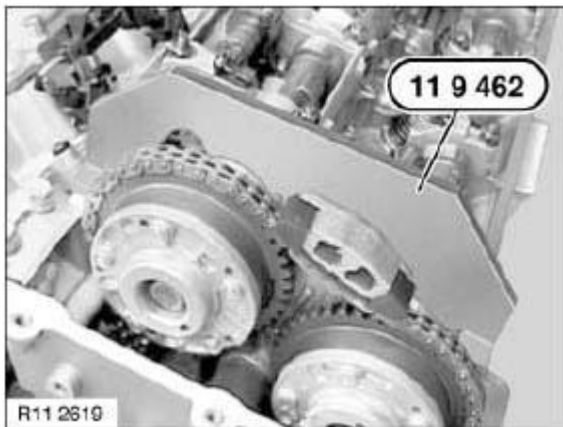


Fig. 337: Identifying Special Tool (11 9 462)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

IMPORTANT: Screw (1) is a special screw and must not be replaced with a normal M8 screw.

Clip oil line (3) into retainers (2).

Insert screw (1) and tighten down.

Assemble engine.

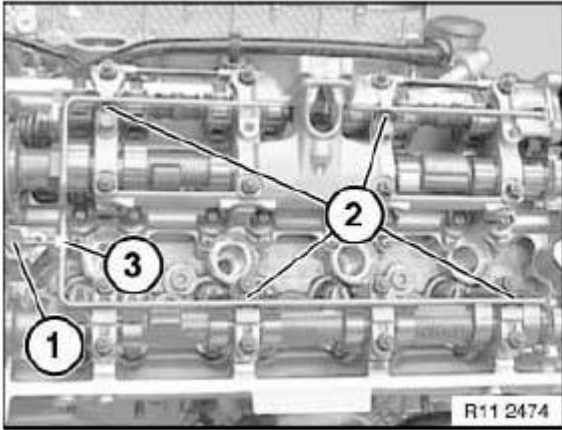


Fig. 338: Identifying Clip Oil Line, Retainers And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

11 31 071 CHECKING CAMSHAFT TIMING ON RIGHT SIDE (N62/N62TU)

Special tools required:

- 11 9 190
- 11 9 461
- 11 9 462

(cylinder bank 1 to 4)

Necessary preliminary tasks:

- Remove SERVOMOTOR FOR RIGHT ECCENTRIC SHAFT
- Remove RIGHT CYLINDER HEAD COVER
- Remove all spark plugs on cylinder bank 1 to 4
- If necessary, remove fan cowl

IMPORTANT: Screw (1) is a special screw and must not be replaced with a normal M8 screw.

Release screw (1).

Unclip oil line (3) from retainers (2) and remove.

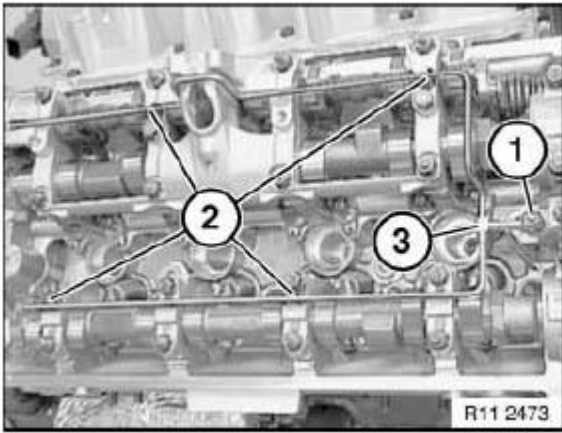


Fig. 339: Identifying Oil Line, Retainers And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine at central bolt in direction of rotation to firing TDC position of 1st cylinder.

NOTE: In firing TDC position, cam of exhaust camshaft at 1st cylinder points upwards at an angle.

Cam of inlet camshaft points downwards at an angle:



Fig. 340: Crank Engine At Central Bolt In Direction Of Rotation To Firing TDC Position
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Alignment hole for TDC position is at front on timing case cover.

Crank engine at central bolt and secure vibration damper with special tool 11 9 190 in firing TDC position of 1st cylinder.

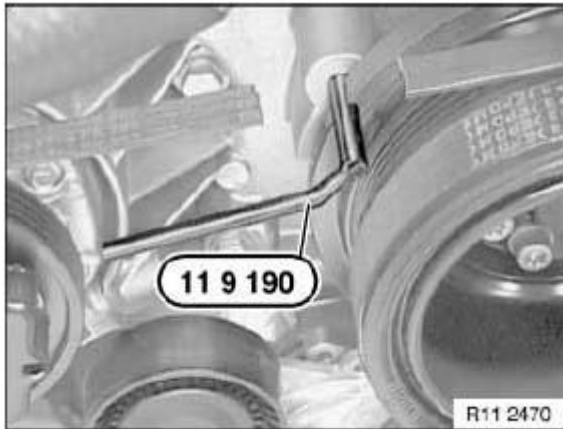


Fig. 341: Identifying Special Tool (11 9 190)

Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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

Checking locking of inlet adjustment unit in initial position:

Engage hexagon head of inlet camshaft and attempt to rotate inlet camshaft carefully against direction of rotation. If there is no fixed connection between inlet camshaft and inlet adjustment unit, rotate inlet camshaft against direction of rotation as far as it will go.

The inlet adjustment unit is locked in the initial position when the inlet camshaft is non-positively connected to the inlet adjustment unit.

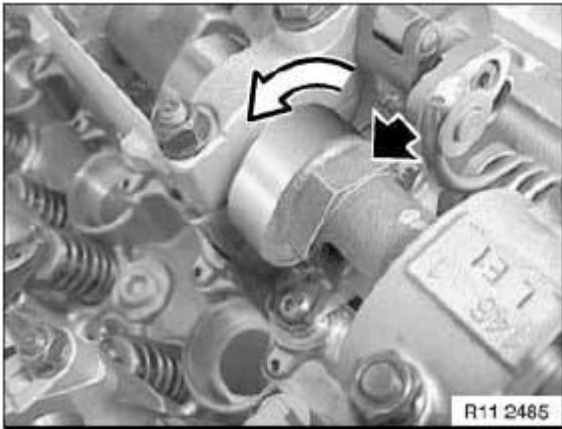


Fig. 342: Rotating Inlet Camshaft

Courtesy of BMW OF NORTH AMERICA, INC.

Checking locking of exhaust adjustment unit in initial position:

Engage hexagon head of exhaust camshaft and attempt to rotate exhaust camshaft carefully in direction of rotation.

If there is no fixed connection between exhaust camshaft and exhaust adjustment unit, rotate exhaust camshaft in direction of rotation as far as it will go.

The exhaust adjustment unit is locked in the initial position when the exhaust camshaft is non-positively connected to the exhaust adjustment unit.

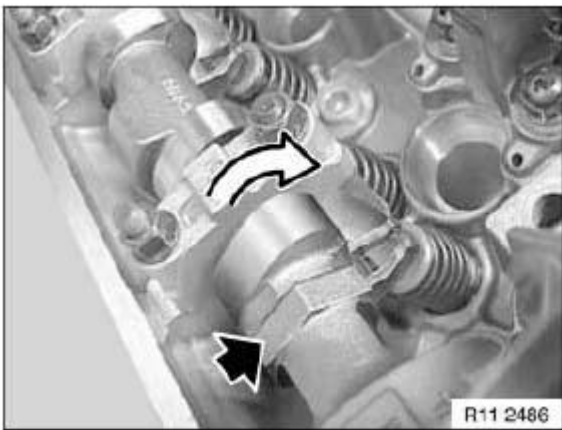


Fig. 343: Rotating Exhaust Camshaft

Courtesy of BMW OF NORTH AMERICA, INC.

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

Place special tool 11 9 461 on inlet camshaft and check timing.

NOTE: The timing is correctly adjusted when special tool 11 9 461 rests flat on the cylinder head or protrudes by up to 0.5 mm to the exhaust side.

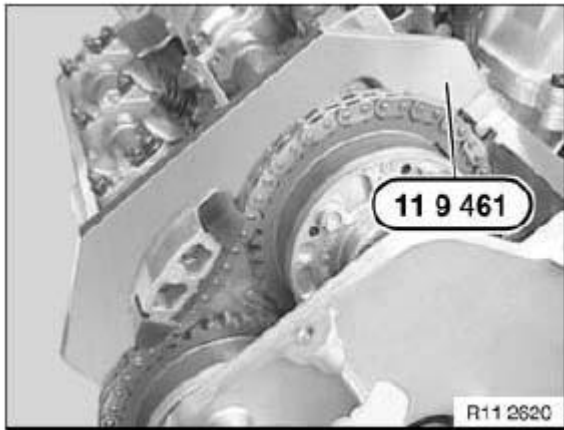


Fig. 344: Identifying Special Tool (11 9 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 462 on exhaust camshaft and check timing.

NOTE: The timing is correctly adjusted when special tool 11 9 462 rests flat on the cylinder head or protrudes by up to 0.5 mm to the exhaust side.

If necessary, adjust CAMSHAFT TIMING ON RIGHT SIDE

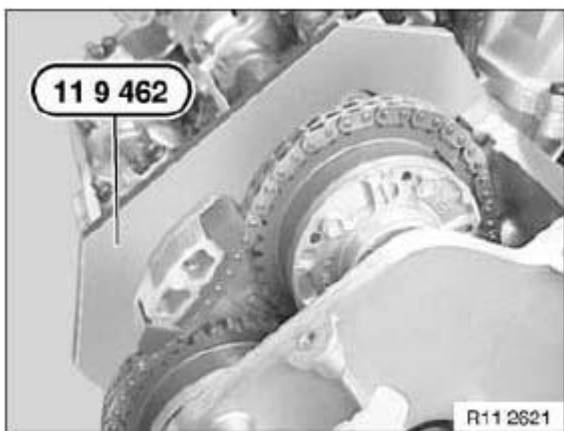


Fig. 345: Identifying Special Tool (R11 2621)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

IMPORTANT: Screw (1) is a special screw and must not be replaced with a normal M8 screw.

Clip oil line (3) into retainers (2).

Insert screw (1) and tighten down.

Assemble engine.

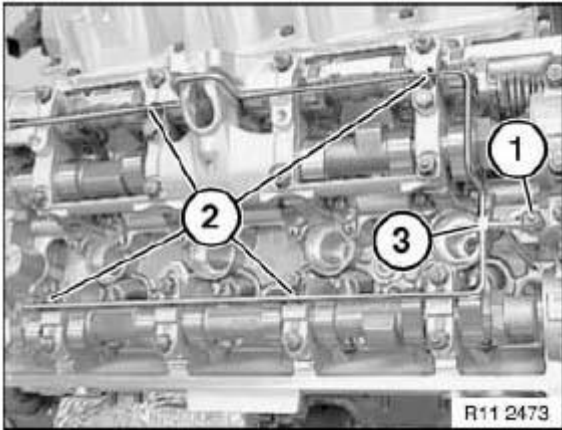


Fig. 346: Identifying Oil Line, Retainers And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

11 31 573 ADJUSTING CAMSHAFT TIMING ON LEFT SIDE (N62 / N62TU)

Special tools required:

- 11 9 190
- 11 9 460
- 11 9 461
- 11 9 462
- 11 9 463

(cylinder bank 5 to 8)

Necessary preliminary tasks:

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

NOTE: When slackening screws, grip camshafts at hexagon head.

Slacken screws of exhaust and inlet adjustment unit.

Get special tool kit 11 9 460 ready for securing camshafts.

NOTE: Special tool 11 9 461 for securing inlet camshaft.

Special tool 11 9 462 for securing exhaust camshaft.

Special tool 11 9 463 (holder with screw).

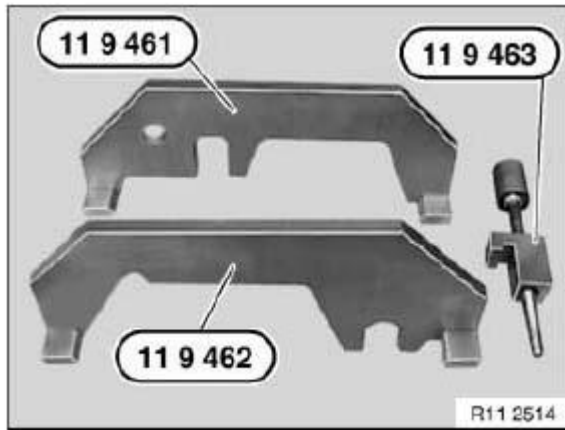


Fig. 347: Identifying Special Tool (11 9 461), (11 9 463) And (11 9 462)
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 461 on inlet camshaft and align inlet camshaft so that special tool 11 9 461 rests without a gap on cylinder head.

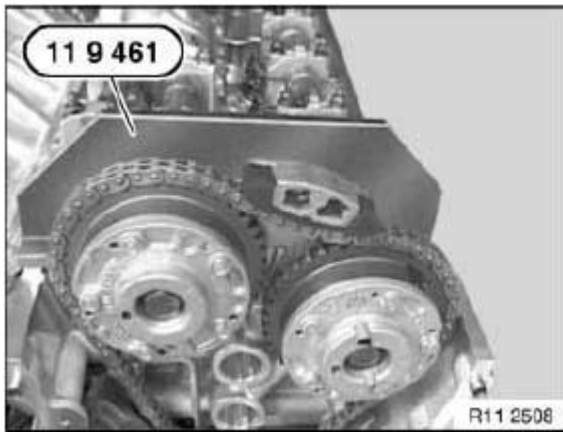


Fig. 348: Identifying Special Tool (11 9 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 463, secure screw (1) in thread for oil line and tighten down by hand.

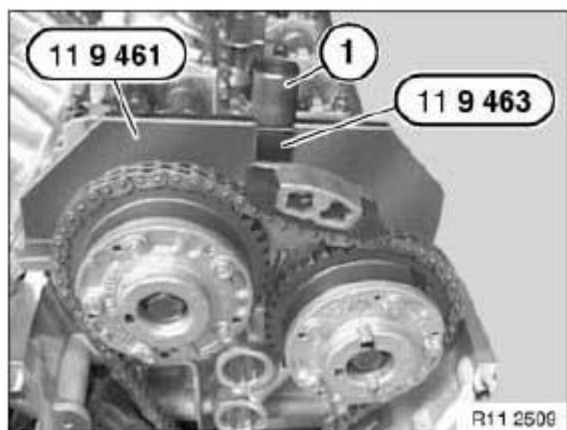


Fig. 349: Identifying Special Tool (11 9 461) And (11 9 463)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: When tightening down screw (1), grip camshaft at hexagon head.

Tighten down screw (1) of inlet adjustment unit.

Tightening torque: 11 36 16AZ . See VARIABLE CAMSHAFT CONTROL or specs.

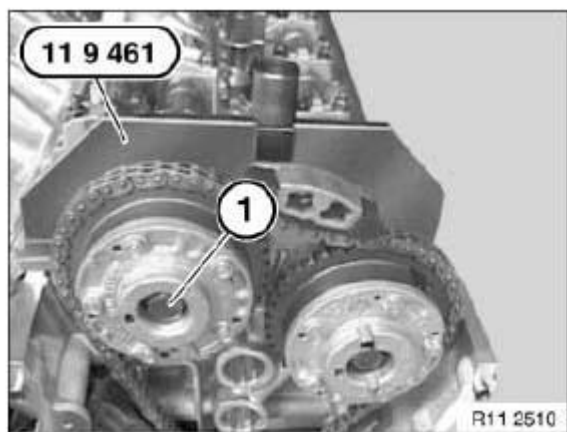


Fig. 350: Identifying Special Tool (11 9 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1), remove special tools 11 9 463 and 11 9 461 from inlet camshaft.

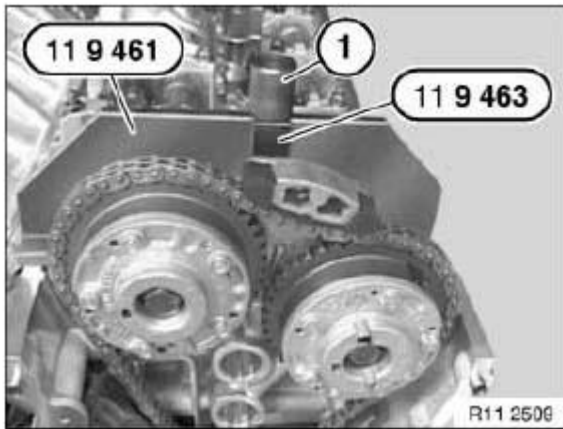


Fig. 351: Identifying Special Tool (11 9 461) And (11 9 463)
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 462 on exhaust camshaft and align exhaust camshaft so that special tool 11 9 462 rests without a gap on cylinder head.

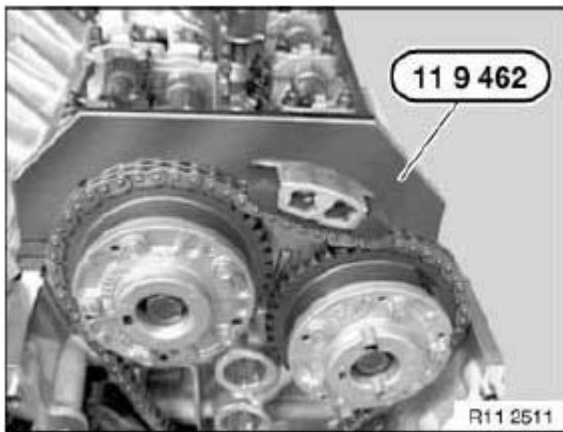


Fig. 352: Identifying Special Tool (11 9 462)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 463, secure screw (1) in thread for oil line and tighten down by hand.

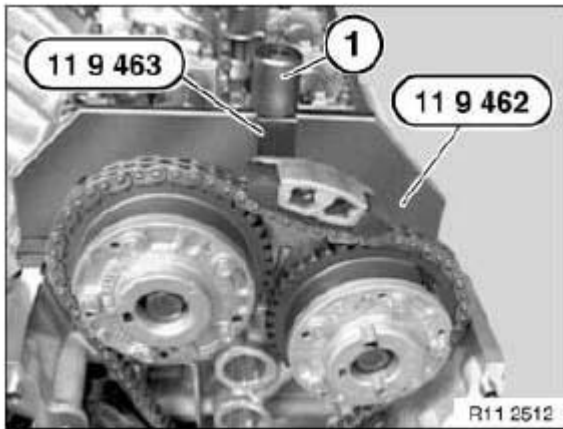


Fig. 353: Identifying Special Tool (11 9 463) And (11 9 462)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: When tightening down screw (2), grip camshaft at hexagon head.

Tighten down screw (2) of exhaust adjustment unit.

Tightening torque: 11 36 16AZ . See VARIABLE CAMSHAFT CONTROL or specs.

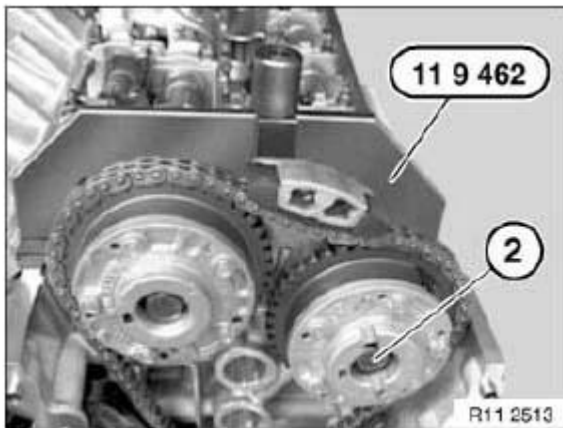


Fig. 354: Identifying Special Tool (11 9 462)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1), remove special tools 11 9 463 and 11 9 462 from exhaust camshaft.

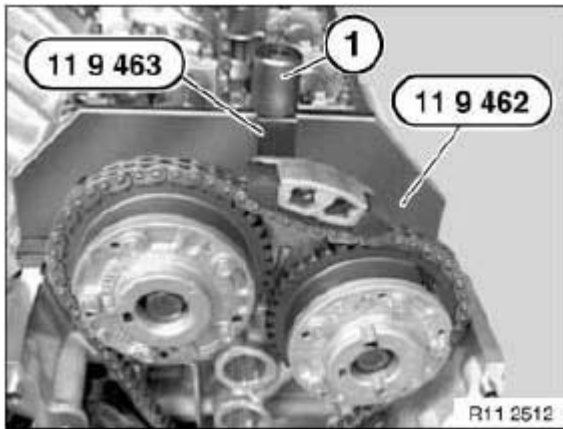


Fig. 355: Identifying Special Tool (11 9 463) And (11 9 462)
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 190.

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

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

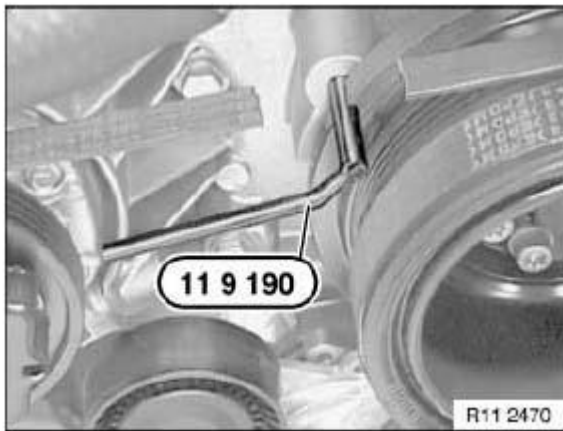


Fig. 356: Identifying Special Tool (11 9 190)
 Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 461 on inlet camshaft and check timing.

NOTE: The timing is correctly adjusted when special tool 11 9 461 rests flat on the cylinder head or protrudes by up to 0.5 mm to the exhaust side.

Remove special tool 11 9 461 from inlet camshaft.

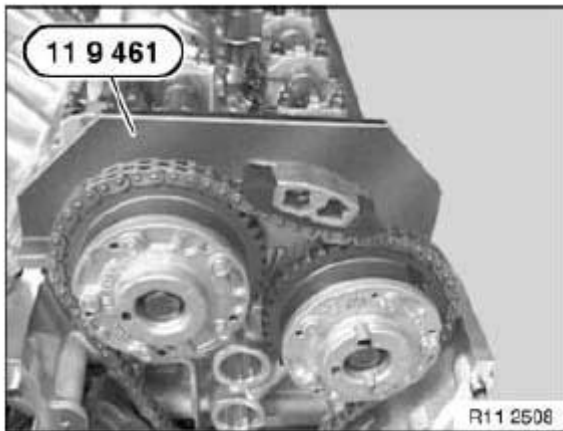


Fig. 357: Identifying Special Tool (11 9 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 462 on exhaust camshaft and check timing.

NOTE: The timing is correctly adjusted when special tool 11 9 462 rests flat on the cylinder head or protrudes by up to 0.5 mm to the exhaust side.

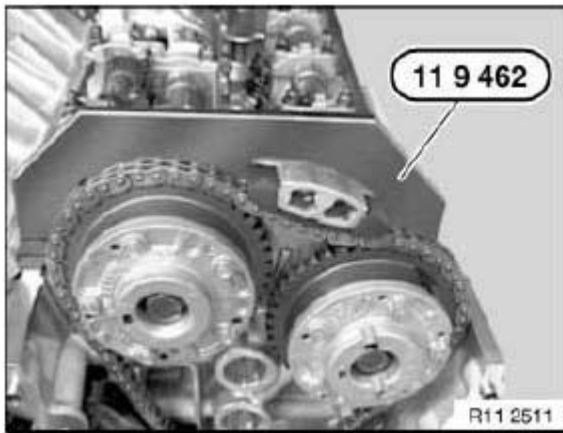


Fig. 358: Identifying Special Tool (11 9 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

11 31 574 ADJUSTING CAMSHAFT TIMING ON RIGHT SIDE (N62 / N62TU)

Special tools required:

- **11 9 190**
- **11 9 460**

- 11 9 461
- 11 9 462
- 11 9 463

(cylinder bank 1 to 4)

Necessary preliminary tasks:

- Are described in the operation "CHECKING CAMSHAFT TIMING ON RIGHT SIDE".
- Remove RIGHT TIMING CASE COVER

NOTE: When slackening screws, grip camshafts at hexagon head.

Slacken screws of exhaust and inlet adjustment unit.

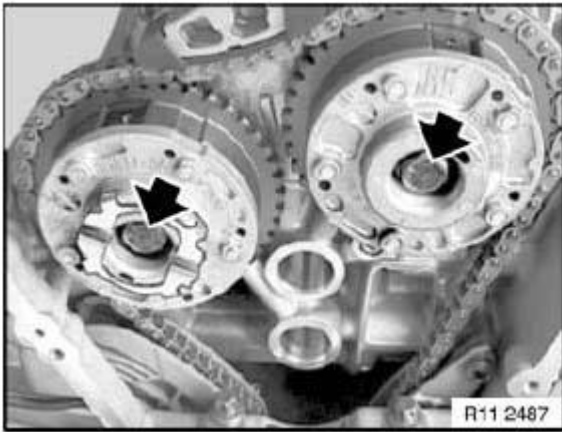


Fig. 359: Slacken Screws Of Exhaust And Inlet
Courtesy of BMW OF NORTH AMERICA, INC.

Get special tool kit 11 9 460 ready for securing camshafts.

NOTE: Special tool 11 9 461 for securing inlet camshaft.

Special tool 11 9 462 for securing exhaust camshaft.

Special tool 11 9 463 (holder with screw).

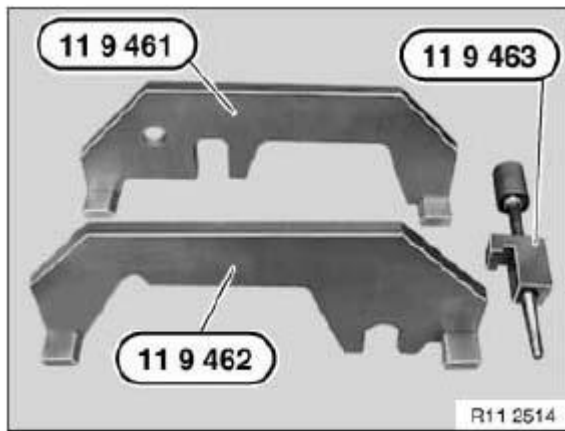


Fig. 360: Identifying Special Tool (11 9 461), (11 9 463) And (11 9 462)
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 461 on inlet camshaft and align inlet camshaft so that special tool 11 9 461 rests without a gap on cylinder head.

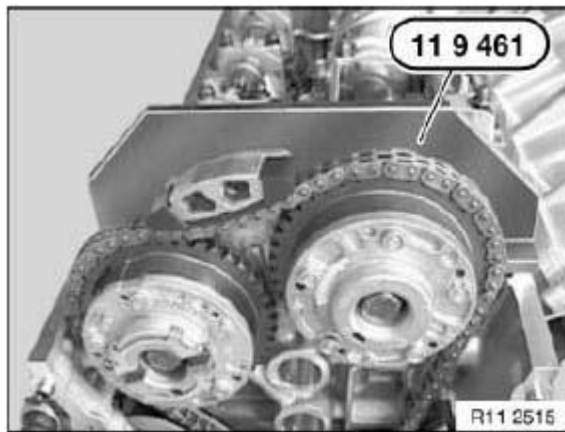


Fig. 361: Identifying Special Tool (11 9 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 463, secure screw (1) in thread for oil line and tighten down by hand.

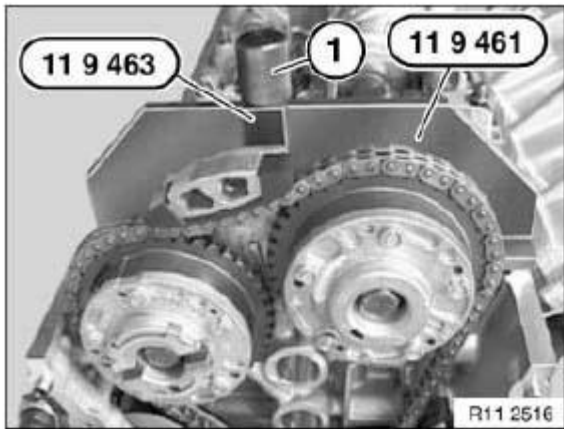


Fig. 362: Identifying Special Tool (11 9 463) And (11 9 461)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: When tightening down screw (1), grip camshaft at hexagon head.

Tighten down screw (1) of inlet adjustment unit.

Tightening torque: 11 36 16AZ . See VARIABLE CAMSHAFT CONTROL or specs.

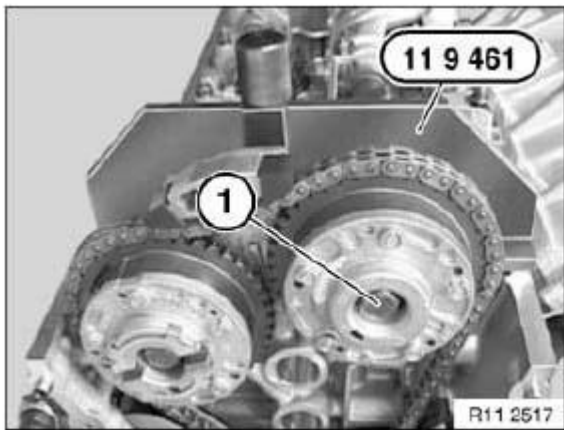


Fig. 363: Identifying Special Tool (11 9 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1), remove special tools 11 9 463 and 11 9 461 from inlet camshaft.

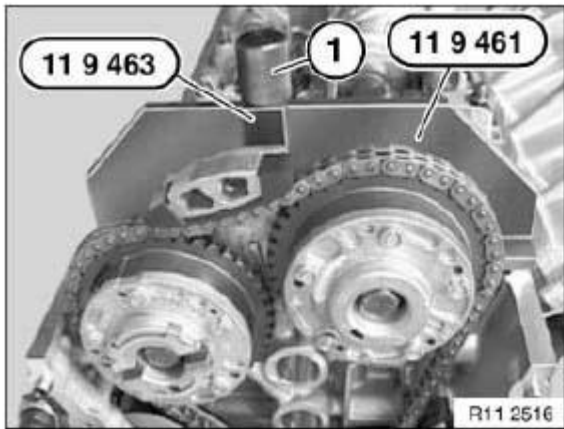


Fig. 364: Identifying Special Tool (11 9 463) And (11 9 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 462 on exhaust camshaft and align exhaust camshaft so that special tool 11 9 462 rests without a gap on cylinder head.

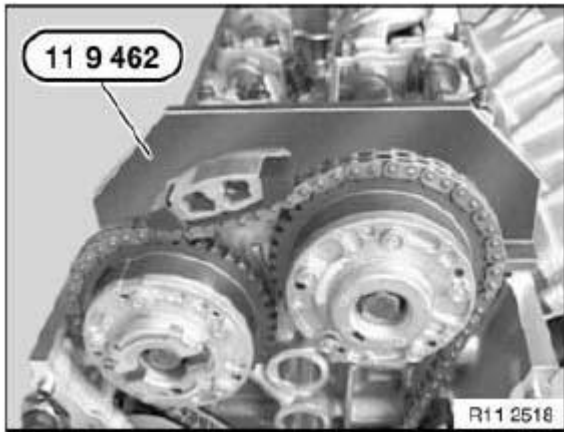


Fig. 365: Identifying Special Tool (11 9 462)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 463, secure screw (1) in thread for oil line and tighten down by hand.

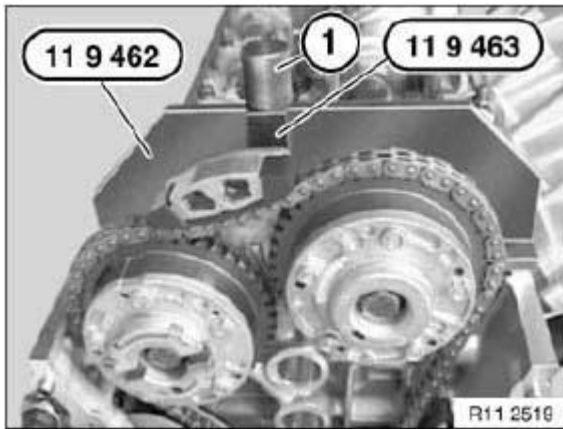


Fig. 366: Identifying Special Tool (11 9 462) And (11 9 463)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: When tightening down screw (2), grip camshaft at hexagon head.

Tighten down screw (2) of exhaust adjustment unit.

Tightening torque: 11 36 16AZ . See VARIABLE CAMSHAFT CONTROL or specs.

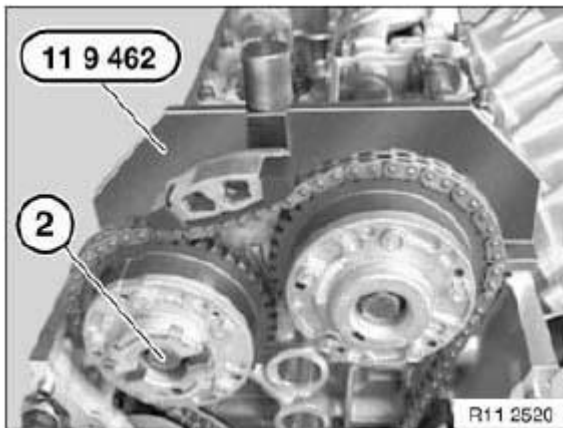


Fig. 367: Identifying Special Tool (11 9 462)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1), remove special tools 11 9 463 and 11 9 462 from exhaust camshaft.

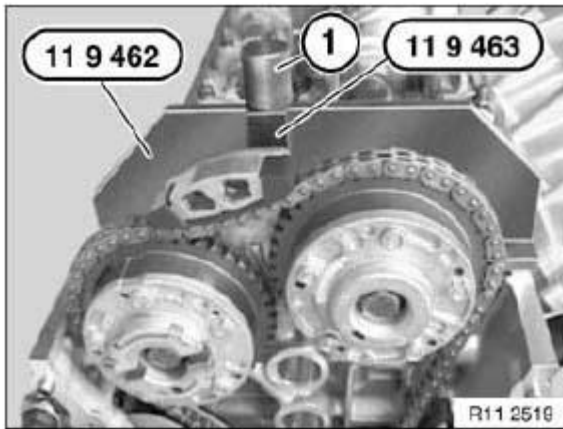


Fig. 368: Identifying Special Tool (11 9 462) And (11 9 463)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 190.

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

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

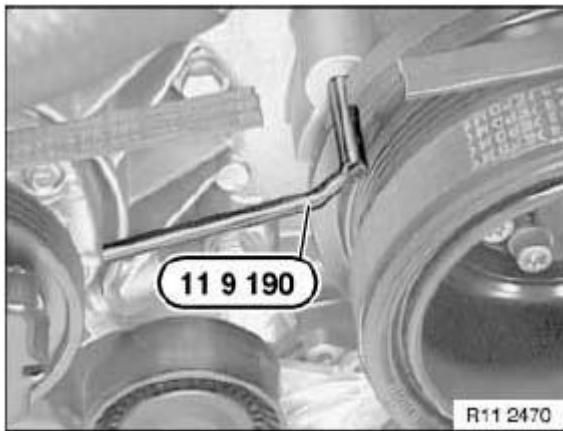


Fig. 369: Identifying Special Tool (11 9 190)
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 461 on inlet camshaft and check timing.

NOTE: The timing is correctly adjusted when special tool 11 9 461 rests flat on the cylinder head or protrudes by up to 0.5 mm to the exhaust side.

Remove special tool 11 9 461 from inlet camshaft.

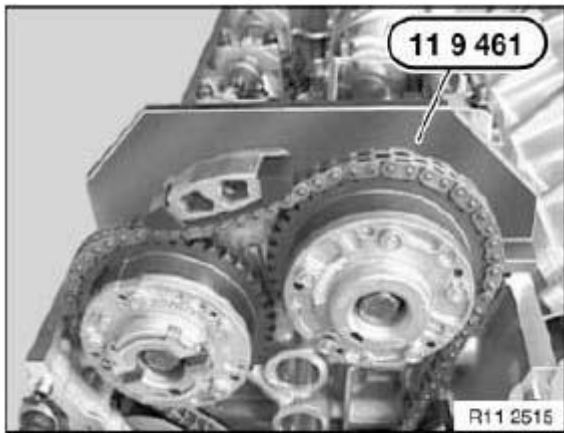


Fig. 370: Identifying Special Tool (11 9 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 462 on exhaust camshaft and check timing.

NOTE: The timing is correctly adjusted when special tool 11 9 462 rests flat on the cylinder head or protrudes by up to 0.5 mm to the exhaust side.

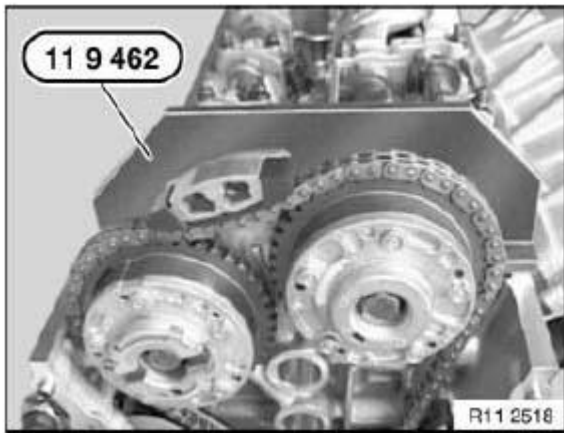


Fig. 371: Identifying Special Tool (11 9 462)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

33 ROCKER ARM WITH BEARING MOUNT

**11 33 516 REMOVING AND INSTALLING/REPLACING ROCKER ARMS ON LEFT INLET SIDE
(N62 FROM 9/03 AND N62TU)**

Special tools required:

- 11 9 470
- 11 9 473

(cylinder bank 5 to 8)

Removal of rocker arms is described separately from installation.

Necessary preliminary tasks:

- Remove SERVOMOTOR FOR LEFT ECCENTRIC SHAFT
- Remove ignition coils on cylinder bank 5 to 8
- Remove LEFT CYLINDER HEAD COVER
- Remove spark plugs on cylinder bank 5 to 8
- Remove LEFT INLET AND EXHAUST ADJUSTMENT UNITS

IMPORTANT: The inlet camshaft must first be rotated so that when the bearing bracket is removed the intermediate levers do not slip out and damage the camshaft.

Rotate inlet camshaft against direction of rotation until lettering (1) on 8th cylinder points upwards in cylinder axis and cam is horizontal.

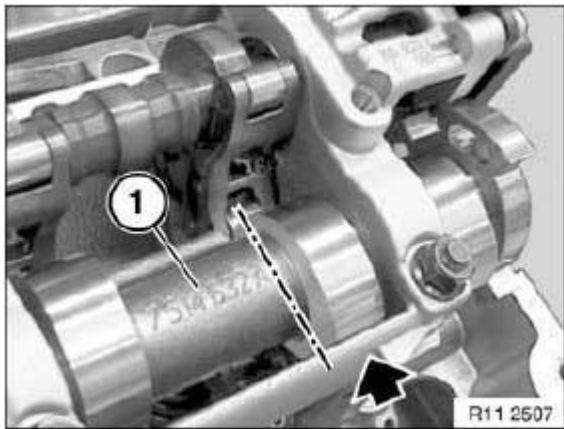


Fig. 372: Locating Inlet Camshaft Position
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Camshaft bearing caps of cylinders 1 to 4 and 5 to 8 must not be mixed up.

NOTE: Bearing caps of inlet camshaft are marked on cylinder bank 5 to 8 with R E1 to R E5 from inlet side.

Release nuts and remove bearing cap R E1.

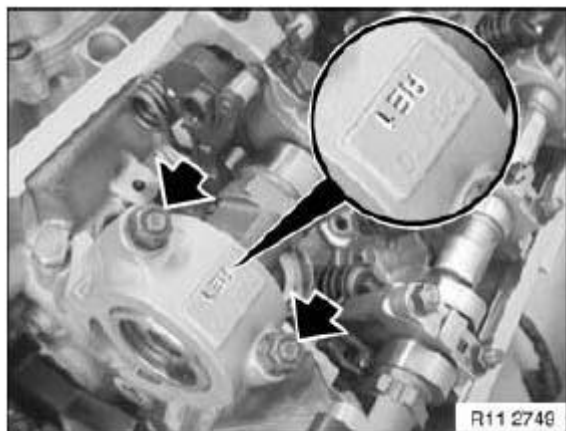


Fig. 373: Locating Camshaft Bearing Caps Of Cylinders
Courtesy of BMW OF NORTH AMERICA, INC.

Release 8 nuts of bearing bracket (1) from outside to inside.

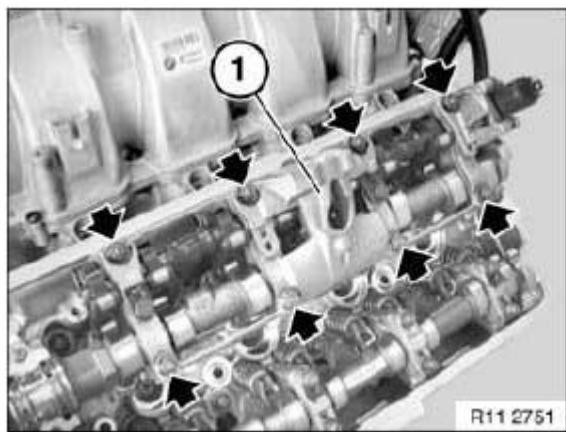


Fig. 374: Locating Bearing Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Clamp special tool 11 9 470 as illustrated in a vice.

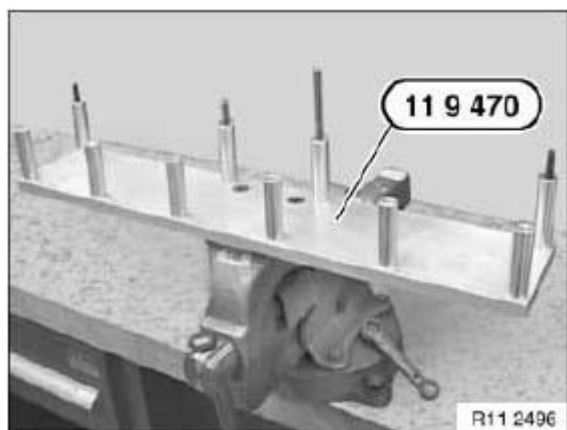


Fig. 375: Identifying Special Tool (11 9 470)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not tilt bearing bracket (1).

Carefully lift out bearing bracket (1).

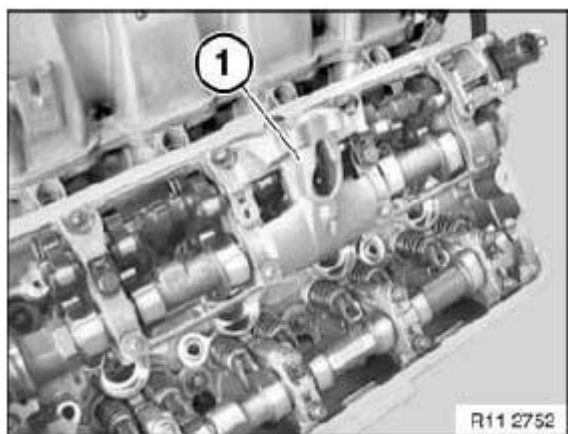


Fig. 376: Identifying Bearing Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Place bearing bracket (1) with inlet camshaft and eccentric shaft as illustrated on special tool 11 9 470.

Secure bearing bracket (1) with a nut (special tool 11 9 473).

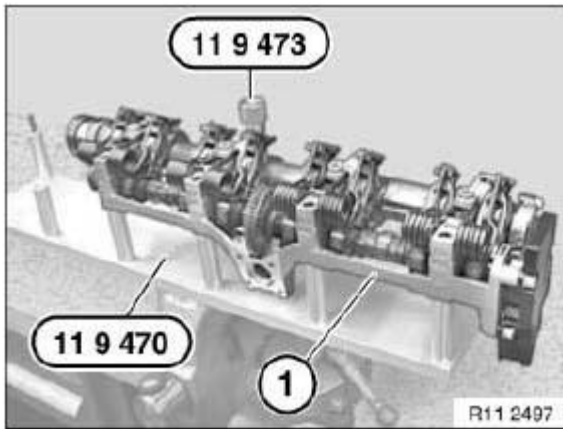


Fig. 377: Identifying Special Tools (11 9 470) And (11 9 473)
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The lower section of the bearing bracket (1) is machined with the cylinder head and must not be mixed up.

NOTE: Lower section of bearing bracket (1) remains on cylinder head.

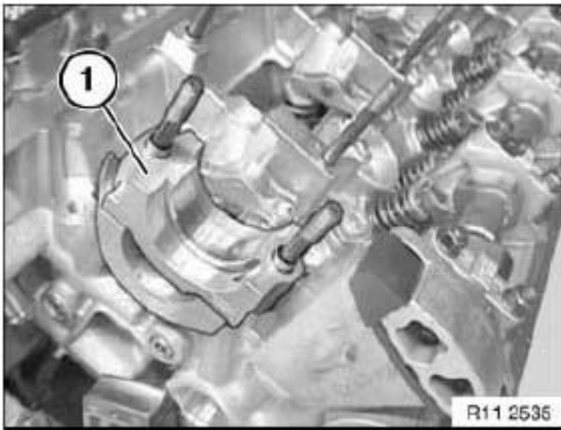


Fig. 378: Identifying Lower Section Of Bearing Bracket
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) are divided into individual tolerance classes.

The tolerance classes are designated as illustrated with the numbers from 1 to 4.

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

Remove rocker arms (1) on inlet side and set aside in neat order.

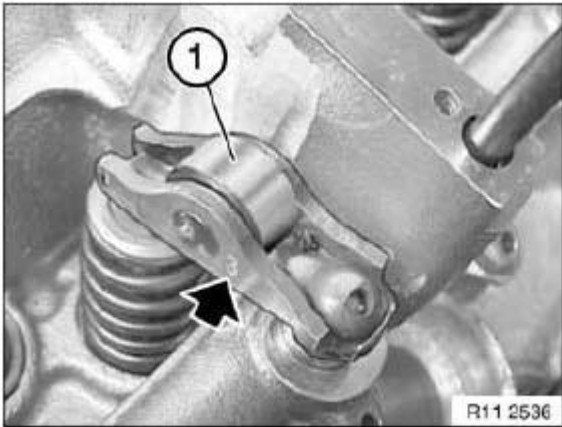


Fig. 379: Locating Rocker Arms On Inlet Side
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement only:

When replacing rocker arms (1) on inlet side:

Rocker arms have new tolerance classes and must be assigned to the old tolerance classes and fitted in the same position.

Old 1 = new 2A

Old 2 = new 2A

Old 3 = new 2B

Old 4 = new 2B



Fig. 380: Identifying Rocker Arms On Inlet Side
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Installation of rocker arms is described separately from removal.

Clean all bearings and cams of inlet camshaft and lubricate with engine oil.

Ends of compression rings (1) point upwards.

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

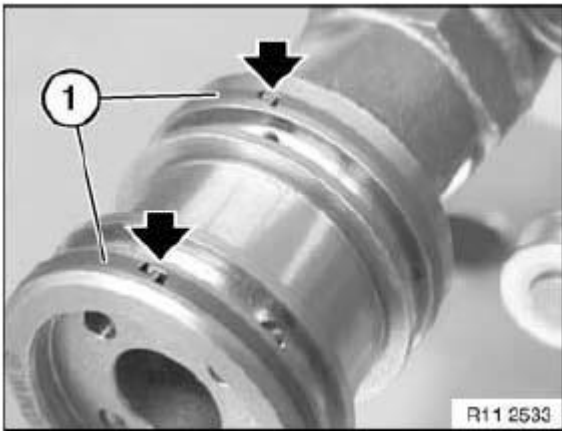


Fig. 381: Identifying Compression Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Install rocker arms (1) on inlet side.

IMPORTANT: Rocker arms (1) slip slightly when bearing bracket is fitted.

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

Align rockers (1) straight.

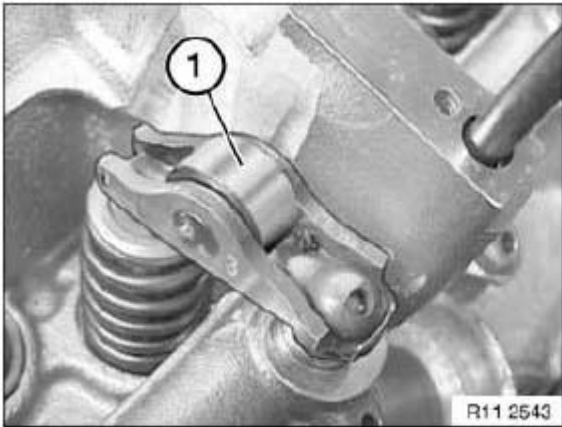


Fig. 382: Identifying Rocker Arms On Inlet Side
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 473.

Remove bearing bracket (1) from special tool 11 9 470.

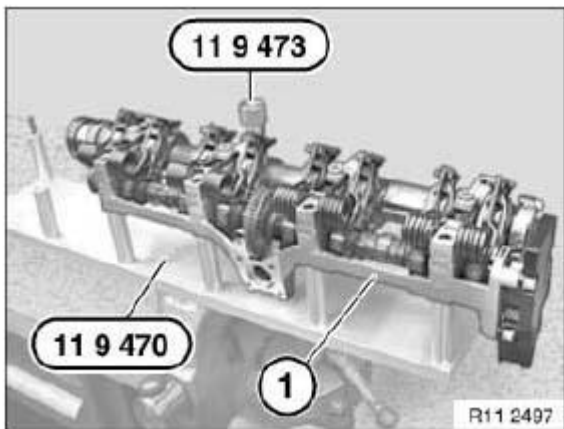


Fig. 383: Identifying Special Tools (11 9 470) And (11 9 473)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not tilt bearing bracket (1).

Lower bearing bracket (1) from above and carefully bring into contact with cylinder head.

Insert nuts and tighten by hand without play.

IMPORTANT: Make sure none of the intermediate levers or rocker arms have slipped out.

Tighten down nuts from inside to outside.

Tightening torque: 11 31 1AZ . See **CAMSHAFT** for specs.

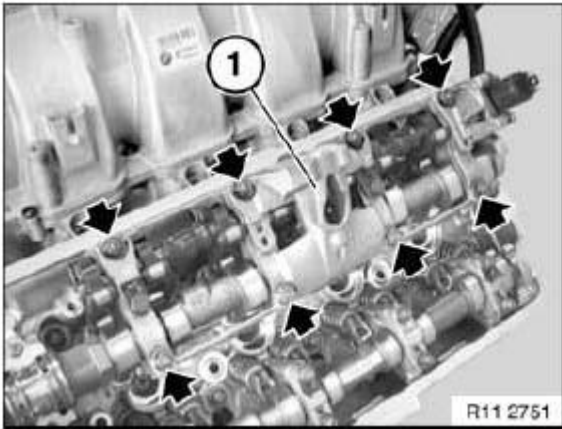


Fig. 384: Locating Bearing Bracket

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Camshaft bearing caps of cylinders 1 to 4 and 5 to 8 must not be mixed up.

Fit bearing cap R E1 in such a way that marking is legible from inlet side.

Install nuts and tighten down.

Tightening torque: 11 31 1AZ . See CAMSHAFT for specs.

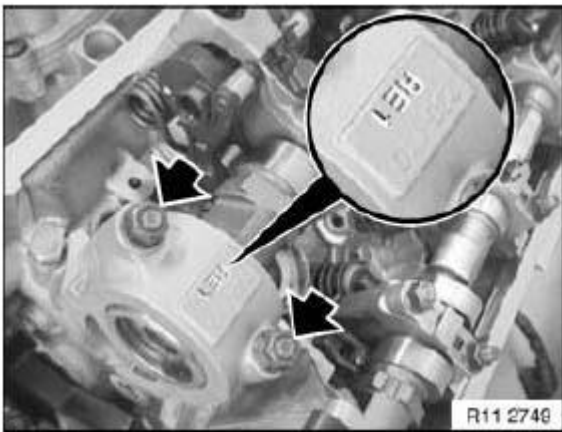


Fig. 385: Locating Camshaft Bearing Caps Of Cylinders

Courtesy of BMW OF NORTH AMERICA, INC.

Rotate inlet camshaft in direction of rotation until cam on 5th cylinder points upwards at an angle as shown in illustration.

NOTE: The marking (1) on the hexagon drive of the inlet camshaft faces upwards.

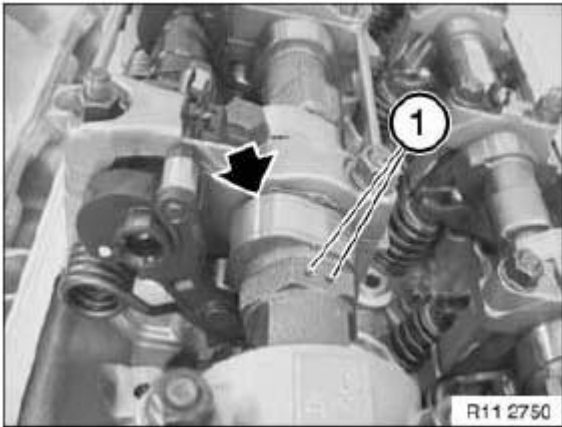


Fig. 386: Locating Camshaft Bearing Caps Of Cylinders
 Courtesy of BMW OF NORTH AMERICA, INC.

INSTALL INLET AND EXHAUST ADJUSTMENT UNIT ON LEFT SIDE.

Install spark plugs on cylinder bank 5 to 8.

INSTALL LEFT CYLINDER HEAD COVER.

Install ignition coils on cylinder bank 5 to 8.

Install **SERVOMOTOR FOR LEFT ECCENTRIC SHAFT.**

Assemble engine.

**11 33 517 REMOVING AND INSTALLING/REPLACING ROCKER ARMS ON RIGHT INLET SIDE
 (N62 FROM 9/03 AND N62TU)**

Special tools required:

- **11 9 470**
- **11 9 473**

(cylinder bank 1 to 4)

Necessary preliminary tasks:

- Removal of rocker arms is described separately from installation.
- Remove **SERVOMOTOR FOR RIGHT ECCENTRIC SHAFT**
- Remove ignition coils on cylinder bank 1 to 4
- Remove **RIGHT CYLINDER HEAD COVER**
- Remove spark plugs on cylinder bank 1 to 4
- Remove **RIGHT INLET AND EXHAUST ADJUSTMENT UNITS**

IMPORTANT: The inlet camshaft must first be rotated so that when the bearing bracket is removed the intermediate levers do not slip out and damage the camshaft.

Rotate inlet camshaft in direction of rotation until cam on 1st cylinder is positioned horizontally as shown in illustration.



Fig. 387: Locating Inlet Camshaft Position
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Camshaft bearing caps of cylinders 1 to 4 and 5 to 8 must not be mixed up.

NOTE: Bearing caps of inlet camshaft are marked on cylinder bank 1 to 4 with L E1 to L E5 from inlet side.

Release nuts and remove bearing cap L E1.

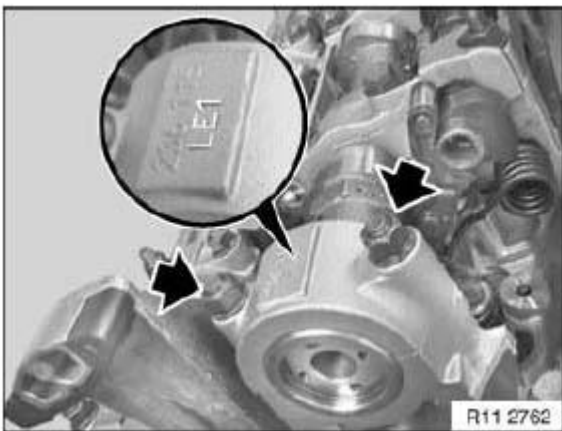


Fig. 388: Locating Bearing Cap Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release 8 nuts of bearing bracket (1) from outside to inside.

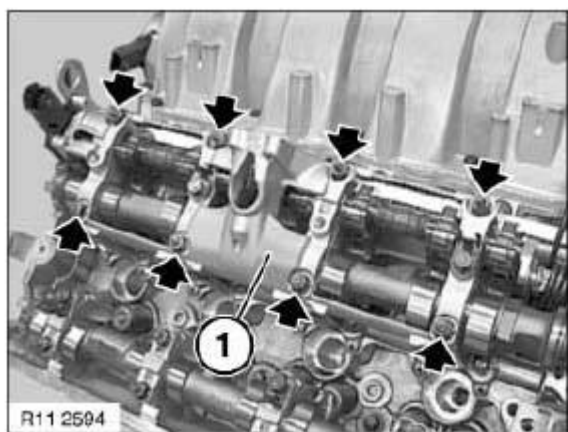


Fig. 389: Locating Bearing Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Clamp special tool 11 9 470 as illustrated in a vice.

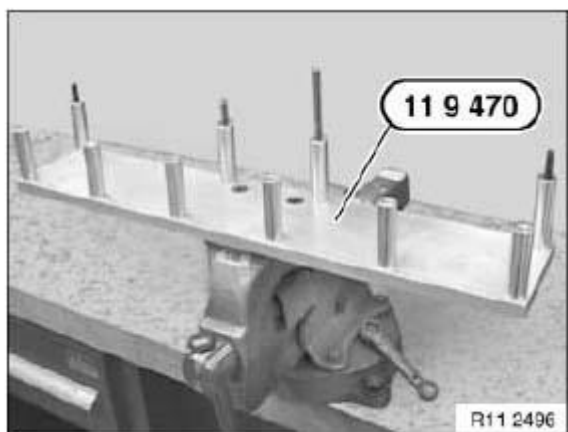


Fig. 390: Identifying Special Tool (11 9 470)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not tilt bearing bracket (1).

Carefully lift out bearing bracket (1).

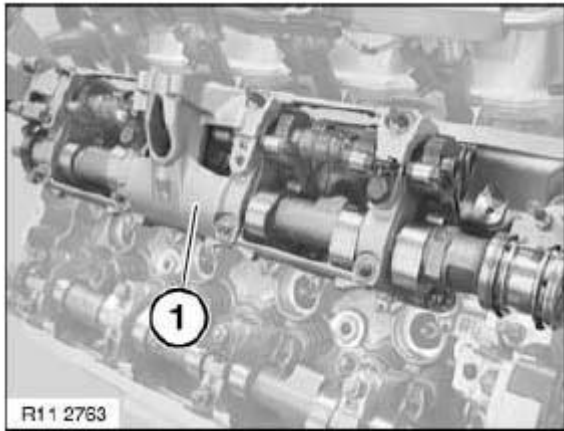


Fig. 391: Identifying Tilt Bearing Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Place bearing bracket (1) with inlet camshaft and eccentric shaft as illustrated on special tool 11 9 470.

Secure bearing bracket (1) with a nut (special tool 11 9 473).

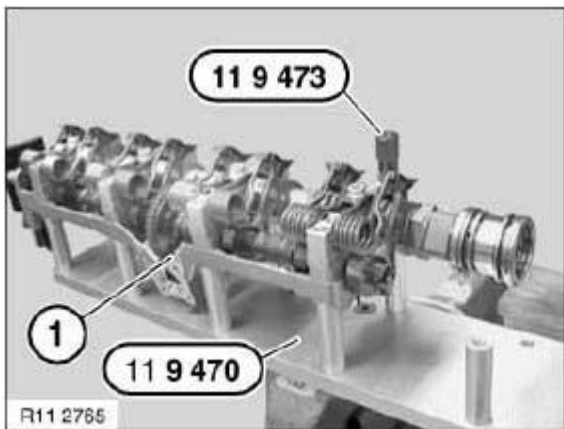


Fig. 392: Identifying Special Tools (11 9 473) And (11 9 470)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The lower section of the bearing bracket (1) is machined with the cylinder head and must not be mixed up.

NOTE: Lower section of bearing bracket (1) remains on cylinder head.

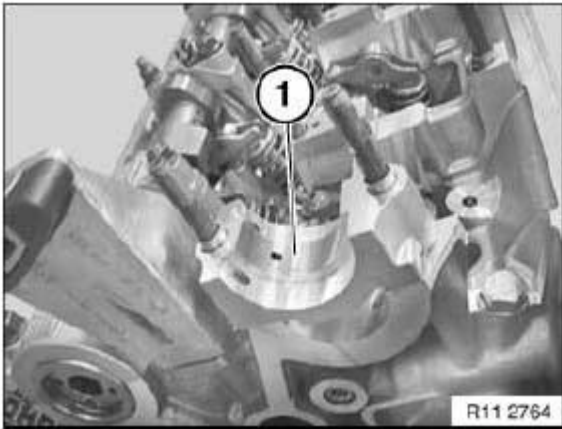


Fig. 393: Identifying Bearing Bracket Lower Section
Courtesy of BMW OF NORTH AMERICA, INC.

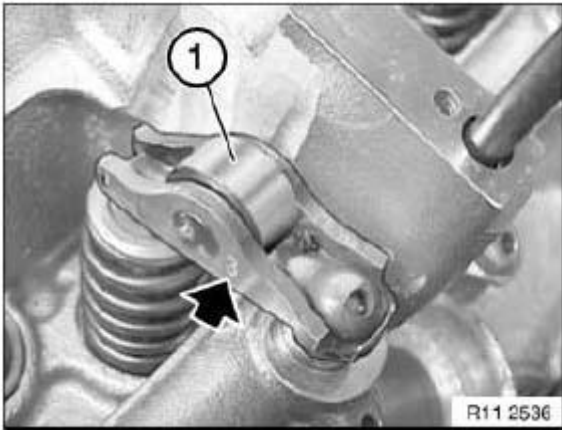


Fig. 394: Locating Rocker Arms On Inlet Side
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) are divided into individual tolerance classes.

The tolerance classes are designated as illustrated with the numbers from 1 to 4.

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

When replacing rocker arms (1) on inlet side: install rocker arms of the same tolerance class in the same position.

Remove rocker arms (1) on inlet side and set aside in neat order.



Fig. 395: Locating Rocker Arms On Inlet Side
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement only:

When replacing rocker arms (1) on inlet side:

Rocker arms have new tolerance classes and must be assigned to the old tolerance classes and fitted in the same position.

Old 1 = new 2A

Old 2 = new 2A

Old 3 = new 2B

Old 4 = new 2B

Installation:

Installation of rocker arms is described separately from removal.

Clean all bearings and cams of inlet camshaft and lubricate with engine oil.

Ends of compression rings (1) point upwards.

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

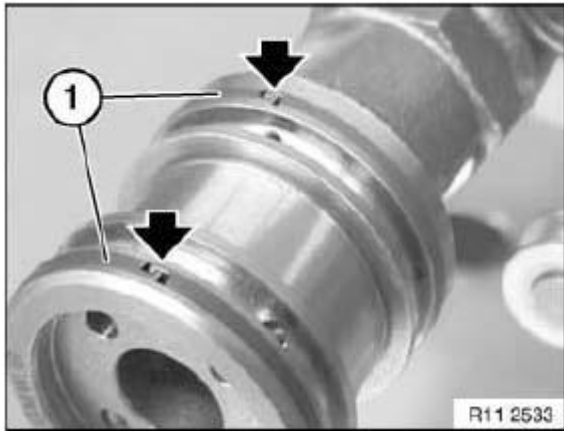


Fig. 396: Identifying Compression Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Install rocker arms (1) on inlet side.

IMPORTANT: Rocker arms (1) slip slightly when bearing bracket is fitted.

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

Align rockers (1) straight.

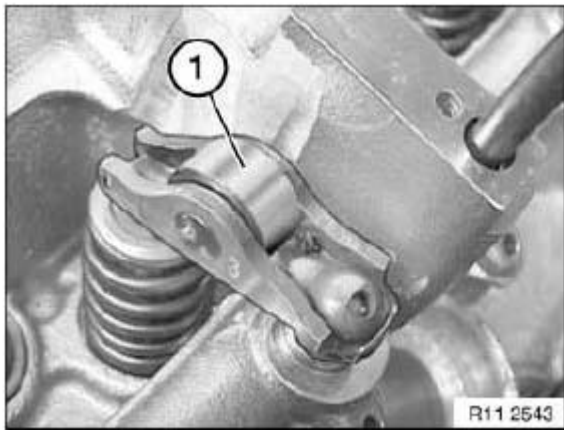


Fig. 397: Identifying Rocker Arms On Inlet Side
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 473.

Remove bearing bracket (1) from special tool 11 9 470.

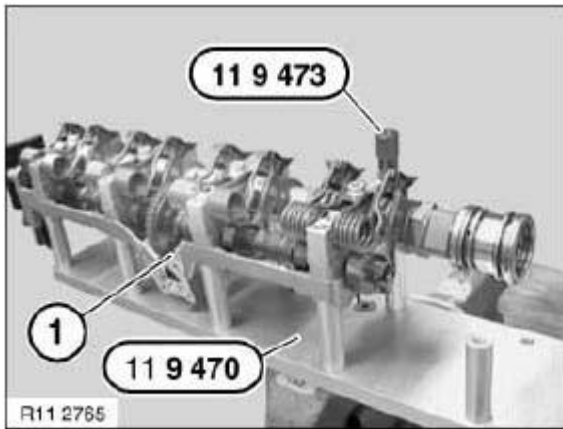


Fig. 398: Identifying Special Tools (11 9 473) And (11 9 470)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not tilt bearing bracket (1).

Lower bearing bracket (1) from above and carefully bring into contact with cylinder head.

Insert nuts and tighten by hand without play.

IMPORTANT: Make sure none of the intermediate levers or rocker arms have slipped out.

Tighten down nuts from inside to outside.

Tightening torque: 11 31 1AZ . See CAMSHAFT for specs.

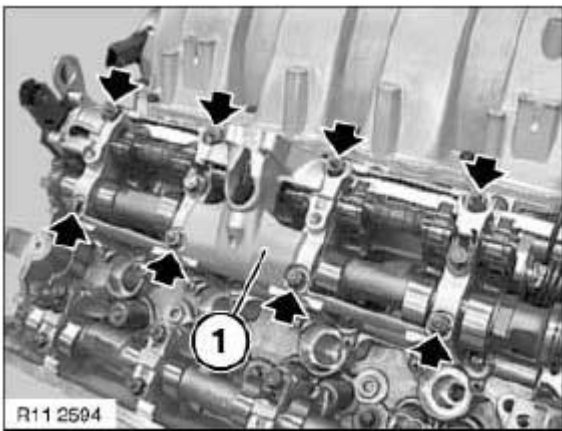


Fig. 399: Locating Bearing Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Camshaft bearing caps of cylinders 1 to 4 and 5 to 8 must not be mixed up.

Fit bearing cap L E1 in such a way that marking is legible from inlet side.

Install nuts and tighten down.

Tightening torque: 11 31 1AZ . See CAMSHAFT for specs.

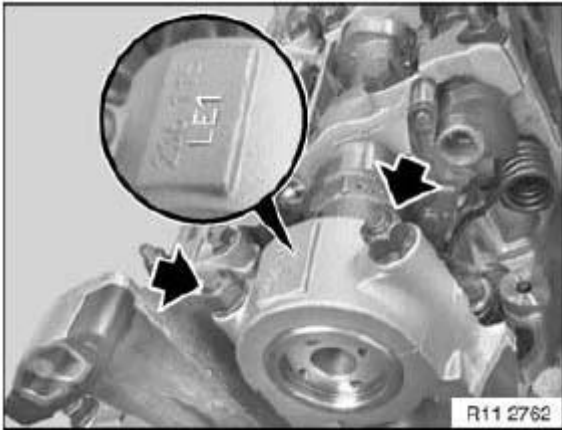


Fig. 400: Locating Bearing Cap Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Rotate inlet camshaft at hexagon head against direction of rotation until cam on 1st cylinder points downwards at an angle as shown in illustration.

NOTE: The marking (1) on the hexagon drive of the inlet camshaft faces upwards.

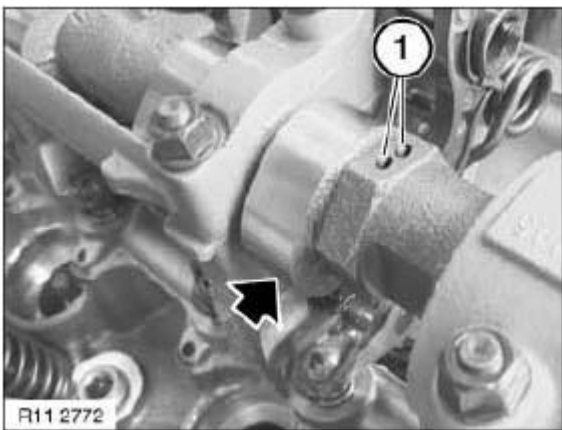


Fig. 401: Identifying Inlet Camshaft Marking

Courtesy of BMW OF NORTH AMERICA, INC.

Install INLET AND EXHAUST ADJUSTMENT UNIT ON RIGHT SIDE.

Install spark plugs on cylinder bank 1 to 4.

Install **RIGHT CYLINDER HEAD COVER.**

Install ignition coils on cylinder bank 1 to 4.

Install **SERVOMOTOR FOR RIGHT ECCENTRIC SHAFT.**

Assemble engine.

34 VALVES WITH SPRINGS

11 34 552 REMOVING AND INSTALLING/REPLACING ALL VALVES (N62)

(cylinder head removed)

Preliminary tasks are described in **DISASSEMBLING AND ASSEMBLING CYLINDER HEAD.**

Remove valve springs.

REMOVE VALVE STEM SEALS.

Remove valves from cylinder head.

Installation:

If necessary, check valve guide for wear.

IF NECESSARY, REMACHINE VALVE SEAT.

IMPORTANT: Incorrect installation possible.

Valve springs of exhaust and inlet camshafts are different. Incorrect installation will result in engine damage.

NOTE: Valve springs for exhaust valves are approx. 4 mm longer.

1. Valve springs of inlet valves
2. Valve springs of exhaust valves

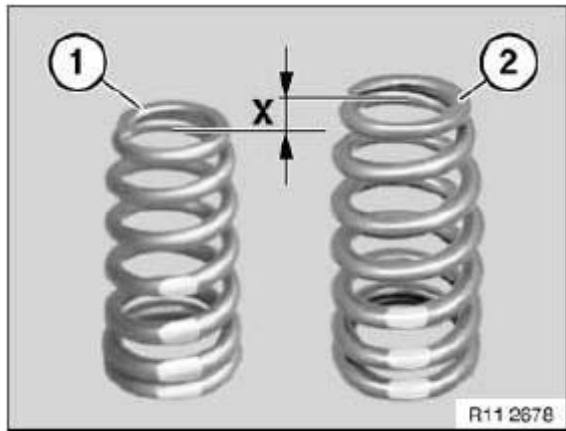


Fig. 402: Identifying Valve Springs Of Inlet Valves And Exhaust Valves
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect installation possible.

Incorrect installation will result in valve spring breakage.

Color marking (1) is normally on lower end of valve spring.

Only the diameter is decisive for the correct installation of the valve springs.

Install valve spring so that larger diameter points to spring plate at bottom.

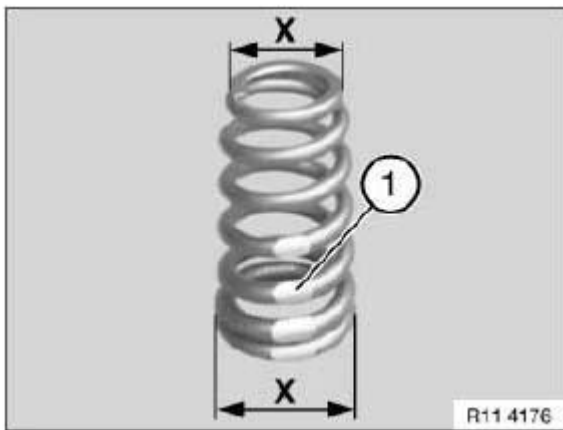
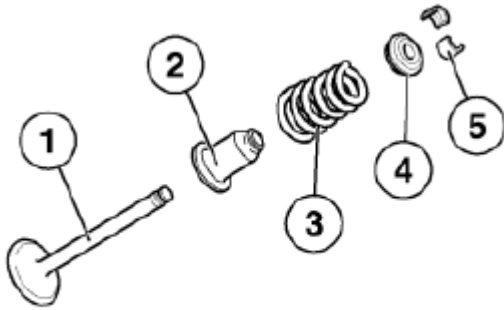


Fig. 403: Identifying Color Marking On Lower End Of Valve Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement:

1. Valve
2. Valve stem seal with spring plate, bottom

3. Valve spring
4. Top plate spring
5. Valve tapers



R11 4170

Fig. 404: Identifying Valve, Valve Spring And Top Plate Spring
Courtesy of BMW OF NORTH AMERICA, INC.

11 34 560 REPLACING ALL VALVE STEM SEALS (N62)

Special tools required:

- 11 1 380
- 11 6 370
- 11 6 380

Preliminary tasks are described in **DISASSEMBLING AND ASSEMBLING CYLINDER HEAD**.

Press special tool 11 6 370 onto valve stem seal.

Withdraw valve stem seal by turning and simultaneously unscrewing special tool 11 6 370.

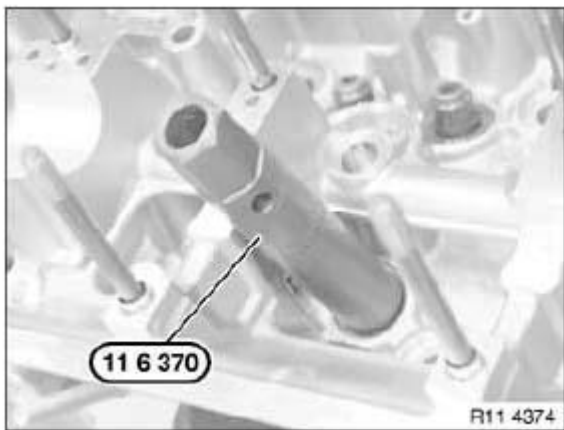


Fig. 405: Identifying Special Tool (11 6 370)

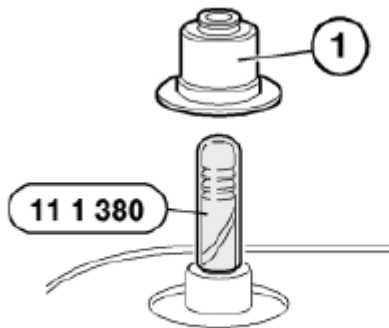
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Lubricate valve stem with oil and insert valve.

Fit special tool 11 1 380.

Coat new valve stem seal (1) with oil and install.

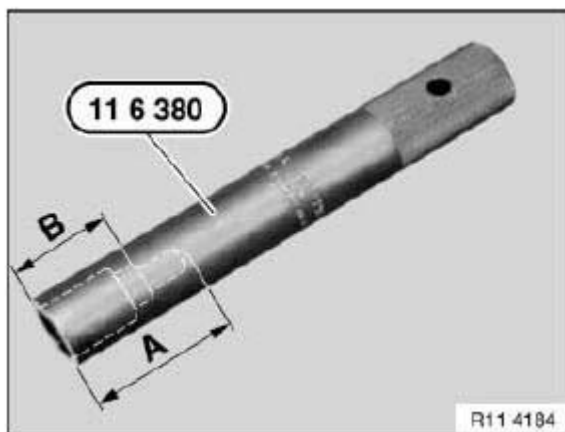


R11 4200

Fig. 406: Identifying Special Tool (11 1 380)

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For use on the N62 engine, special tool 11 6 380 must be remachined in accordance with the illustration with a 6.2 mm dia. drill bit to a depth of A = approx. 45 mm. This modification has already been taken into account for reordering.



R11 4184

Fig. 407: Identifying Special Tool (11 6 380)

Courtesy of BMW OF NORTH AMERICA, INC.

Press on valve stem seal with special tool 11 6 380 by hand as far as it will go.



Fig. 408: Identifying Special Tool (11 6 380)
Courtesy of BMW OF NORTH AMERICA, INC.

11 34 715 REPLACING ALL VALVE SPRINGS (N62TU)

Special tools required:

- 11 0 346
- **11 9 470**

(cylinder head removed)

Preliminary tasks are described in **DISASSEMBLING AND ASSEMBLING CYLINDER HEAD.**

Remove bearing bracket (1) with inlet camshaft and stow in special tool 11 9 470.

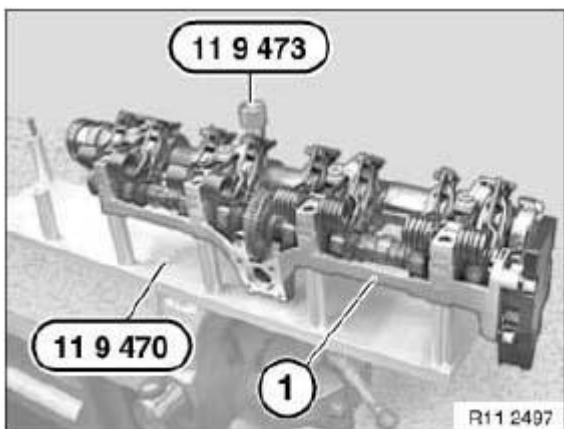


Fig. 409: Identifying Special Tools (11 9 470) And (11 9 473)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove exhaust camshaft.

Using special tool (11 0 346), press down valve spring on spring cap, top, and remove valve keys.

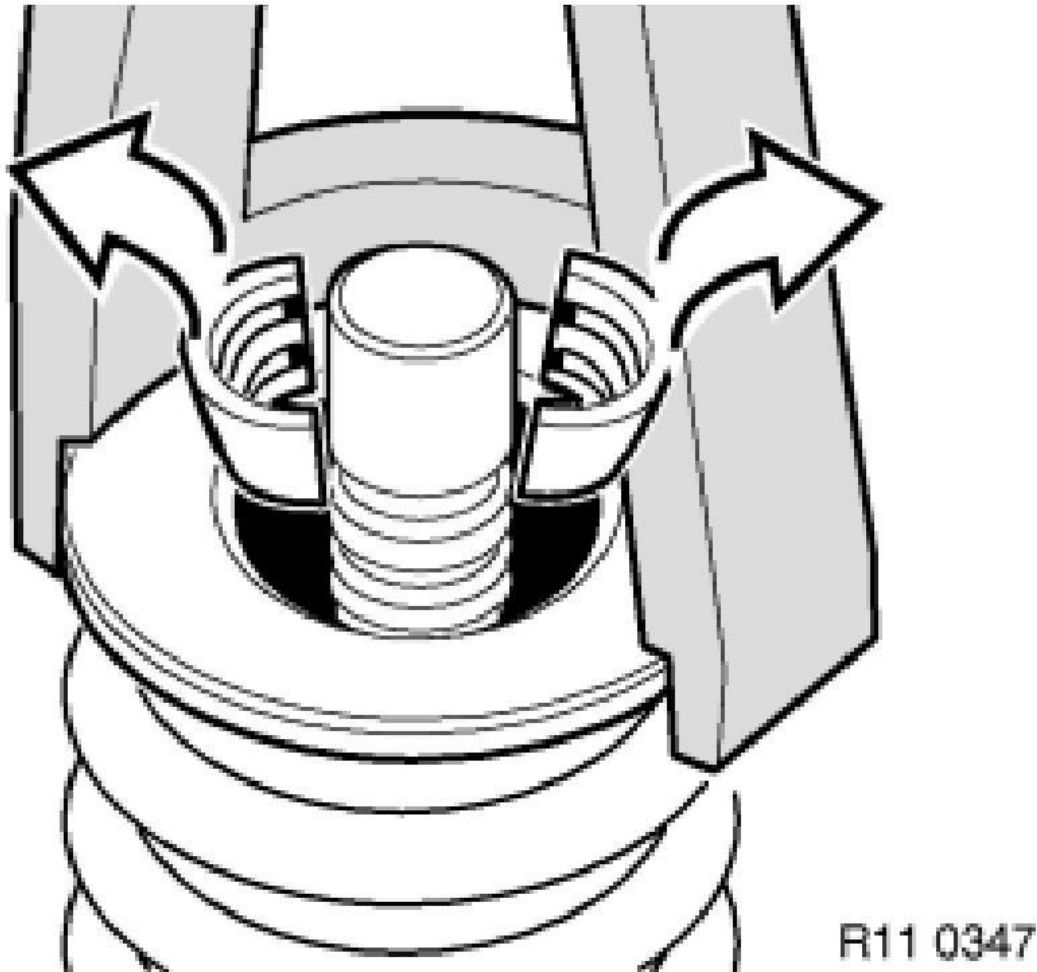


Fig. 410: Removing Valve Spring On Spring Cap
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect installation possible.

Incorrect installation will result in valve spring breakage.

The color coding (1) is normally located on the lower end of the valve spring.

Only the diameter is decisive for the correct installation of the valve springs.

Install valve spring so that larger diameter points to spring plate at bottom.

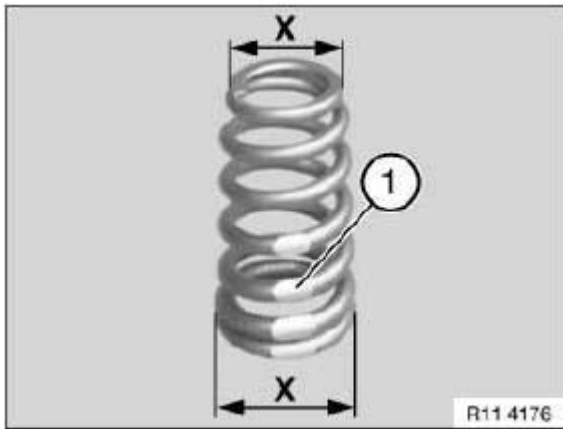
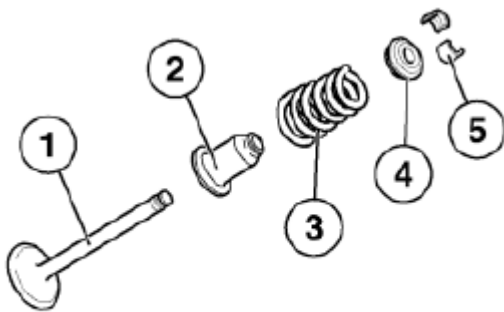


Fig. 411: Identifying Color Marking On Lower End Of Valve Spring
 Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement:

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



R11 4170

Fig. 412: Identifying Valve, Valve Spring And Top Plate Spring
 Courtesy of BMW OF NORTH AMERICA, INC.

36 VARIABLE CAMSHAFT TIMING

11 36 047 REMOVING AND INSTALLING/REPLACING INLET AND EXHAUST ADJUSTMENT UNITS ON LEFT SIDE (N62/N62TU)

Special tools required:

- **11 9 190**

- 11 9 460
- 11 9 461
- 11 9 462
- 11 9 463

(cylinder bank 5 to 8)

Necessary preliminary tasks:

- Read fault memory and make a documentary record
- Remove SERVOMOTOR FOR LEFT ECCENTRIC SHAFT
- Remove LEFT CYLINDER HEAD COVER
- Remove all spark plugs on cylinder bank 5 to 8
- If necessary, remove fan cowl
- Remove LEFT TIMING CASE COVER

Removal:

Removal of inlet and exhaust adjustment units is described separately from installation.

IMPORTANT: Screw (1) is a special screw and must not be replaced with a normal M8 screw.

Release screw (1).

Unclip oil line (3) from retainers (2) and remove.

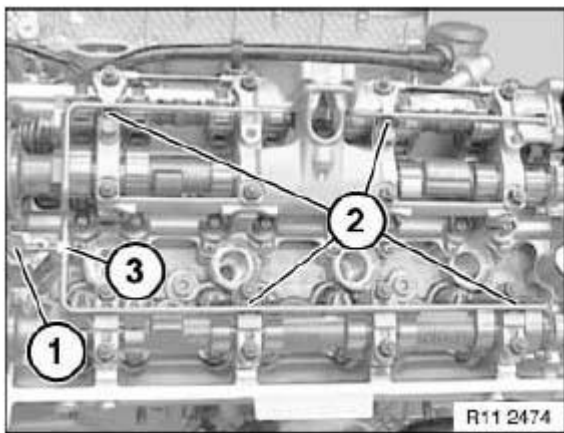


Fig. 413: Identifying Oil Line, Retainers And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine at central bolt in direction of rotation to firing TDC position of 1st cylinder.

NOTE: With 1st cylinder in firing TDC position, cams of inlet and exhaust camshafts at 5th cylinder point upwards at an angle as shown in graphic.

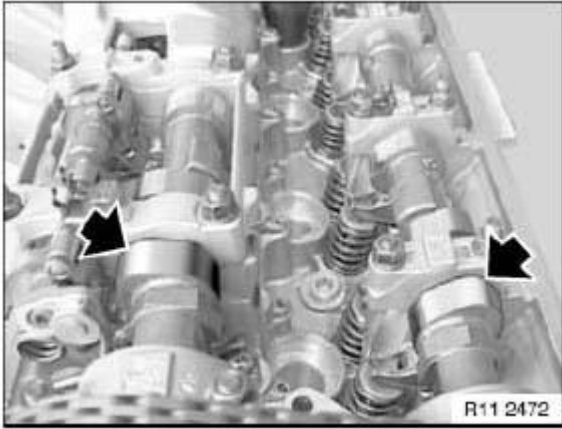


Fig. 414: Identifying Inlet And Exhaust Camshafts Upwards Positions
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Alignment hole for TDC position is at front on timing case cover.

Crank engine at central bolt and secure vibration damper with special tool 11 9 190 in firing TDC position of 1st cylinder.

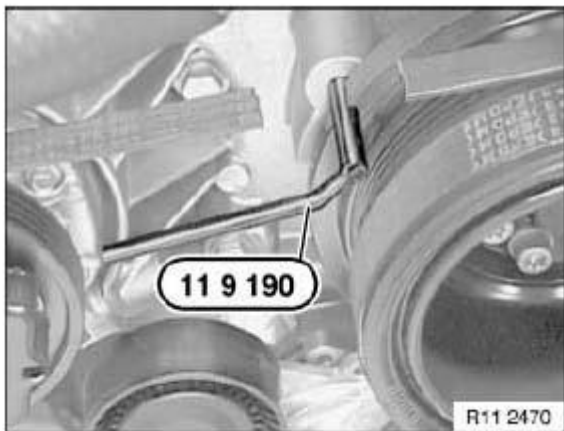


Fig. 415: Identifying Special Tool (11 9 190)
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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

Checking locking of inlet adjustment unit in initial position:

Engage hexagon head of inlet camshaft and attempt to rotate inlet camshaft carefully against direction of rotation.

If there is no fixed connection between inlet camshaft and inlet adjustment unit, rotate inlet camshaft against direction of rotation as far as it will go.

The inlet adjustment unit is locked in the initial position when the inlet camshaft is non-positively connected to the inlet adjustment unit.

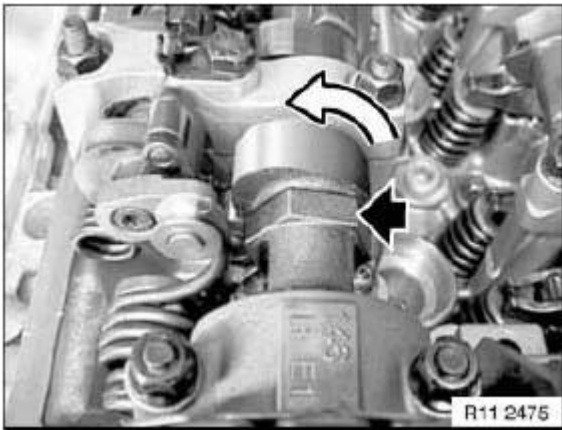


Fig. 416: Rotating Inlet Camshaft Against Direction
Courtesy of BMW OF NORTH AMERICA, INC.

Checking locking of exhaust adjustment unit in initial position:

Engage hexagon head of exhaust camshaft and attempt to rotate exhaust camshaft carefully in direction of rotation.

If there is no fixed connection between exhaust camshaft and exhaust adjustment unit, rotate exhaust camshaft in direction of rotation as far as it will go.

The exhaust adjustment unit is locked in the initial position when the exhaust camshaft is non-positively connected to the exhaust adjustment unit.

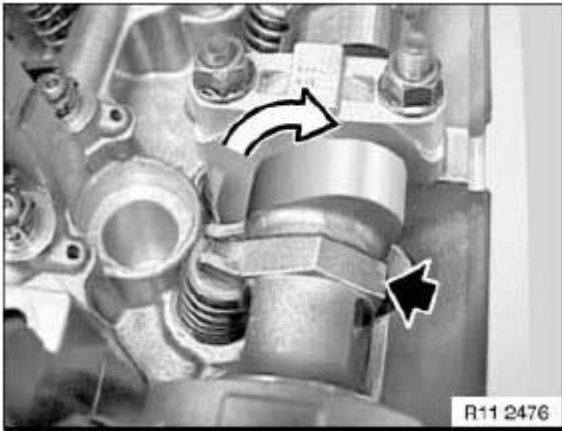


Fig. 417: Rotating Exhaust Camshaft Against Direction
Courtesy of BMW OF NORTH AMERICA, INC.

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

Remove special tool 11 9 190.

Crank engine at central bolt against direction of rotation to 45° before TDC position.

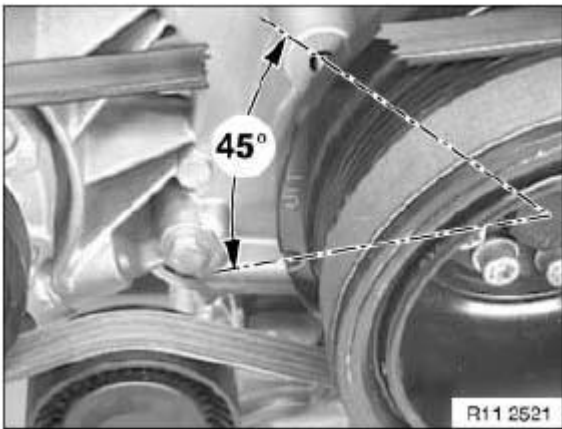


Fig. 418: Identifying Rotation To 45° Before TDC Position
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: When slackening screws, grip camshafts at hexagon head.

Slacken screws of exhaust and inlet adjustment unit.

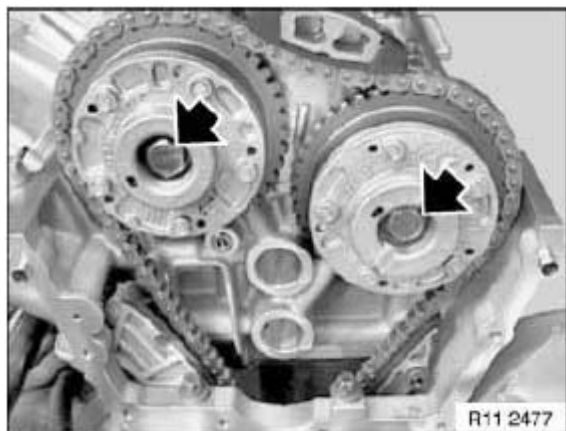


Fig. 419: Locating Slackening Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove screw on exhaust adjustment unit.

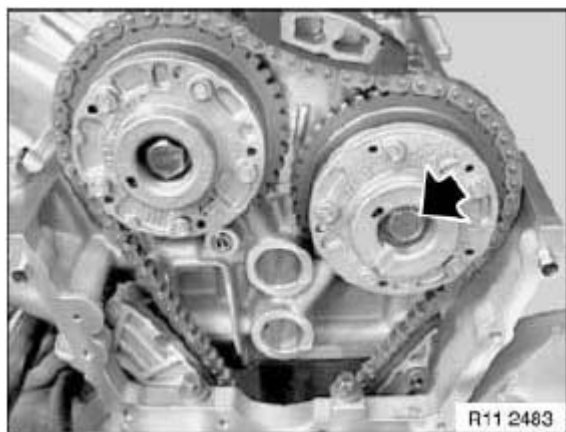


Fig. 420: Locating Exhaust Adjustment Unit Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Vigorously press back tensioner rail (3) several times to remove oil in chain tensioner.

Feed out exhaust adjustment unit (2).

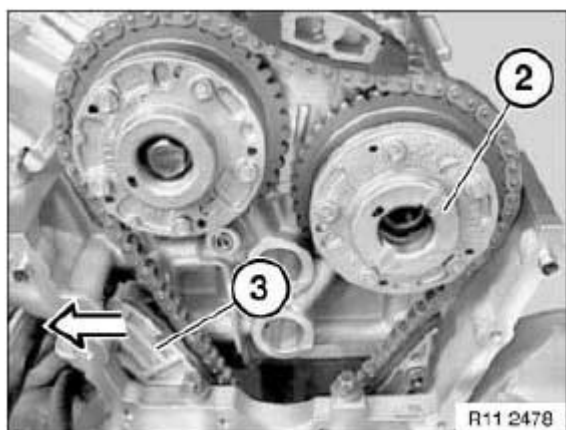


Fig. 421: Identifying Back Tensioner Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Remove screw on inlet adjustment unit.

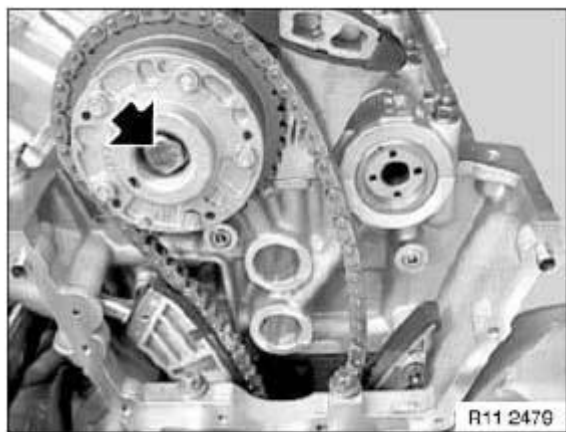


Fig. 422: Locating Inlet Adjustment Unit Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out inlet adjustment unit (1).

Secure timing chain to prevent it from sliding down.

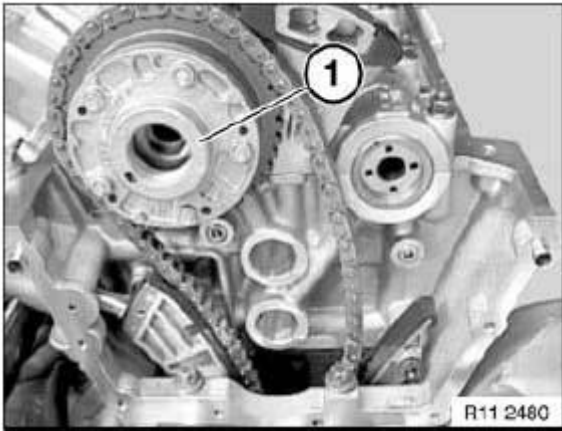


Fig. 423: Identifying Inlet Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Installation of inlet and exhaust adjustment units is described separately from removal.

IMPORTANT: Danger of mix-up:

Inlet and exhaust adjustment units are different.

Mixing up the inlet and exhaust adjustment units will cause damage to the engine.

1. Inlet adjustment unit (1) is marked with EIN and IN.
2. Exhaust adjustment unit (2) is marked with AUS and EX.

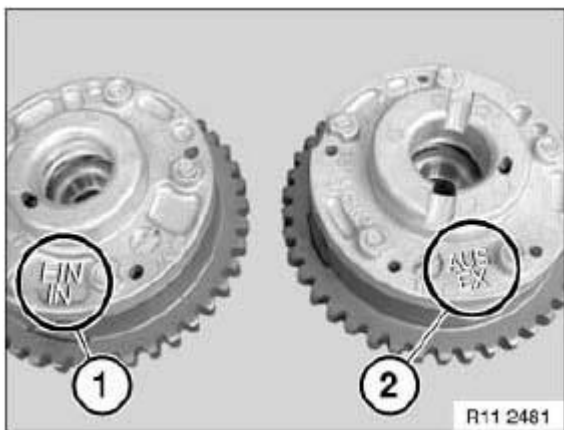


Fig. 424: Identifying Inlet And Exhaust Adjustment Unit Mark
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Position of inlet adjustment unit (1) to timing chain can be freely selected.

Pull timing chain up.

Feed inlet adjustment unit (1) into timing chain and fit onto inlet camshaft.

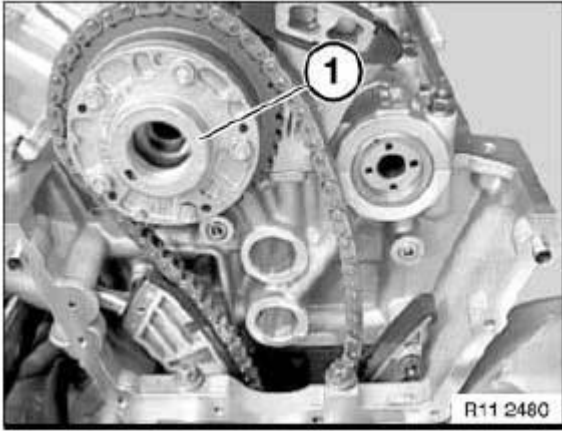


Fig. 425: Identifying Inlet Adjustment Unit Positions
Courtesy of BMW OF NORTH AMERICA, INC.

Replace screw.

Install screw on inlet adjustment unit.

Tighten screw without play and then slacken off again by half a turn.

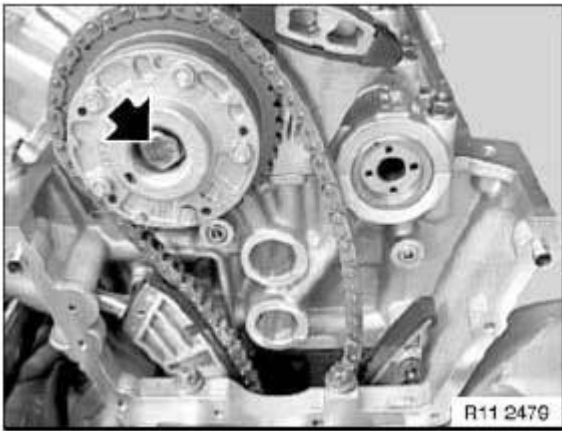


Fig. 426: Locating Screw On Inlet Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Position of exhaust adjustment unit (2) to timing chain can be freely selected.

Pull timing chain up.

Feed exhaust adjustment unit (2) into timing chain.

Press tensioner rail (3) back and fit exhaust adjustment unit (2) onto exhaust camshaft.

NOTE: If tensioner rail (3) cannot be pressed back far enough to enable fitting of exhaust adjustment unit (2):

Remove chain tensioner.

Place chain tensioner on a level surface and compress slowly and carefully.

Repeat this procedure twice.

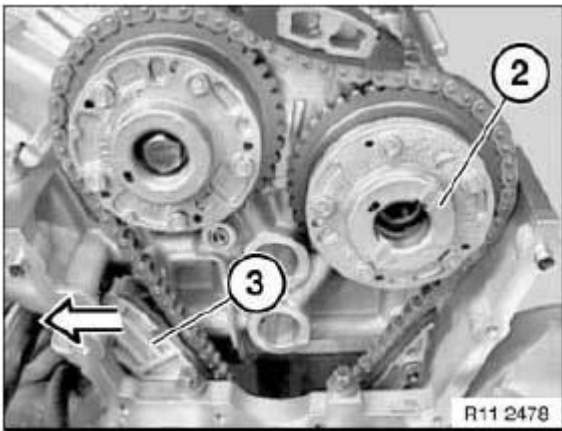


Fig. 427: Identifying Exhaust Adjustment Unit And Tensioner Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing ring.

Install chain tensioner and tighten down.

Tightening torque: 11 31 8AZ . See **CAMSHAFT** for specs.

Fit exhaust adjustment unit (2).

Replace screw.

Install screw on exhaust adjustment unit.

Tighten screw without play and then slacken off again by half a turn.

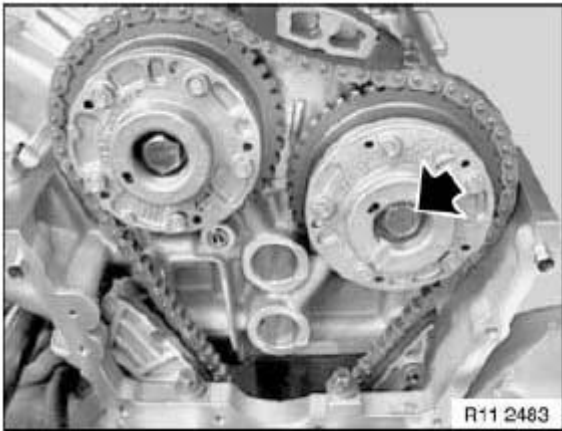


Fig. 428: Locating Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Get special tool kit 11 9 460 ready for securing camshafts.

- NOTE:**
- Special tool 11 9 461 for securing inlet camshaft.**
 - Special tool 11 9 462 for securing exhaust camshaft.**
 - Special tool 11 9 463 (holder with screw).**

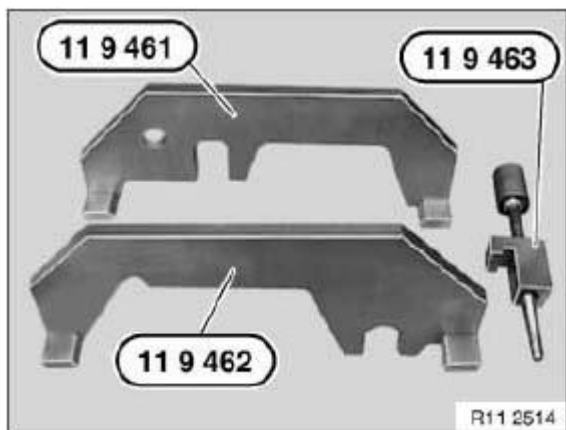


Fig. 429: Identifying Special Tool (11 9 461), (11 9 463) And (11 9 462)
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 461 on inlet camshaft and align inlet camshaft so that special tool 11 9 461 rests without a gap on cylinder head.

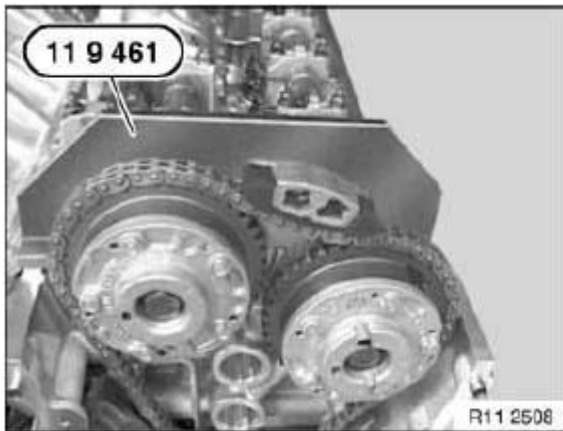


Fig. 430: Identifying Special Tool (11 9 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 463, secure screw (1) in thread for oil line and tighten down by hand.

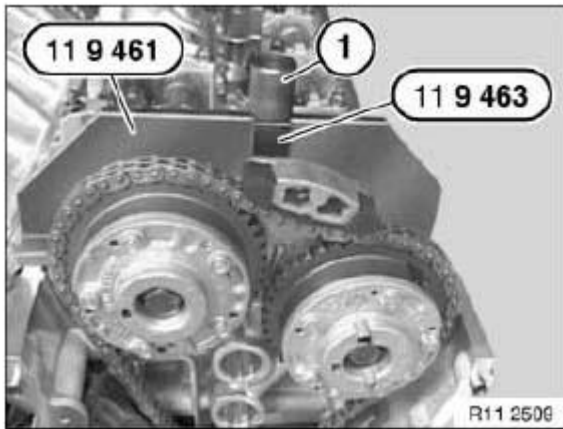


Fig. 431: Identifying Special Tool (11 9 461) And (11 9 463)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Make sure screws of inlet and exhaust adjustment units have been slackened off by a half turn.

Crank engine at central bolt from 45° before TDC position in direction of rotation to firing TDC position.

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

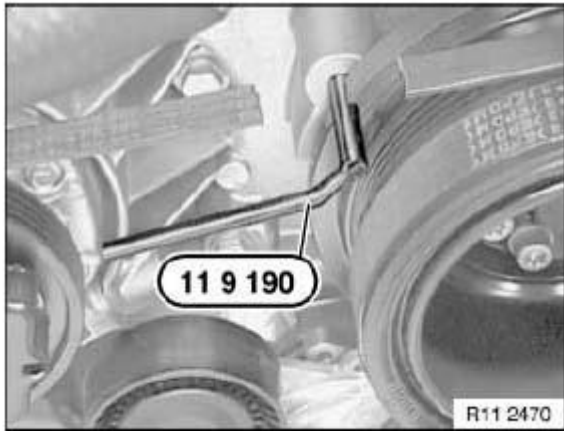


Fig. 432: Identifying Special Tool (11 9 190)

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: When tightening down screw (1), grip camshaft at hexagon head.

Tighten down screw (1) of inlet adjustment unit.

Tightening torque: 11 36 16AZ . See VARIABLE CAMSHAFT CONTROL for specs.

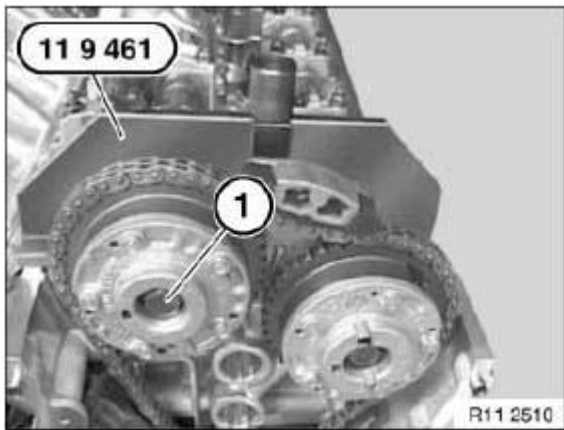


Fig. 433: Identifying Special Tool (11 9 461)

Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove special tools 11 9 463 / 11 9 461 from inlet camshaft.

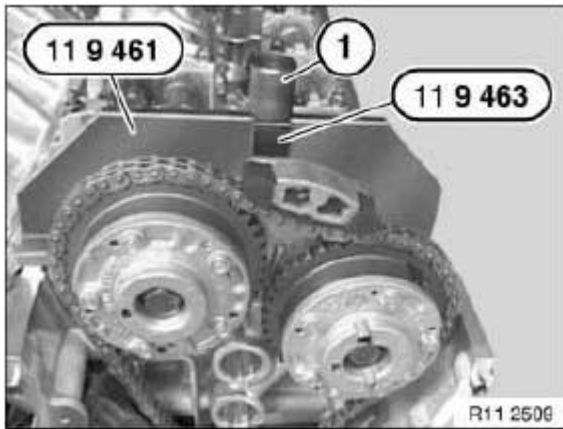


Fig. 434: Identifying Special Tool (11 9 461) And (11 9 463)
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 462 on exhaust camshaft and align exhaust camshaft so that special tool 11 9 462 rests without a gap on cylinder head.

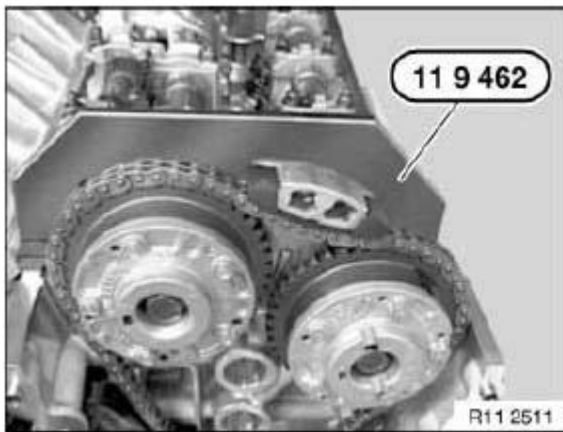


Fig. 435: Identifying Special Tool (11 9 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 463, secure screw (1) in thread for oil line and tighten down by hand.

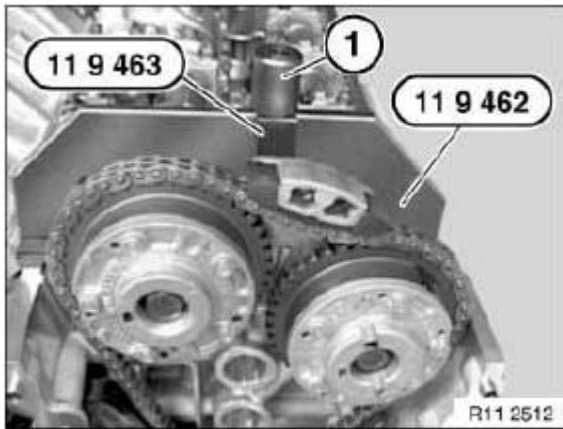


Fig. 436: Identifying Special Tool (11 9 463) And (11 9 462)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: When tightening down screw (2), grip camshaft at hexagon head.

Tighten down screw (2) of exhaust adjustment unit.

Tightening torque: 11 36 16AZ . See VARIABLE CAMSHAFT CONTROL for specs.

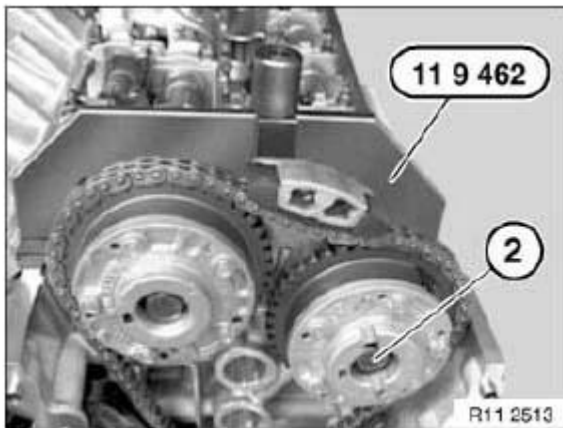


Fig. 437: Identifying Special Tool (11 9 462)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove special tools 11 9 463 / 11 9 462 from exhaust camshaft.

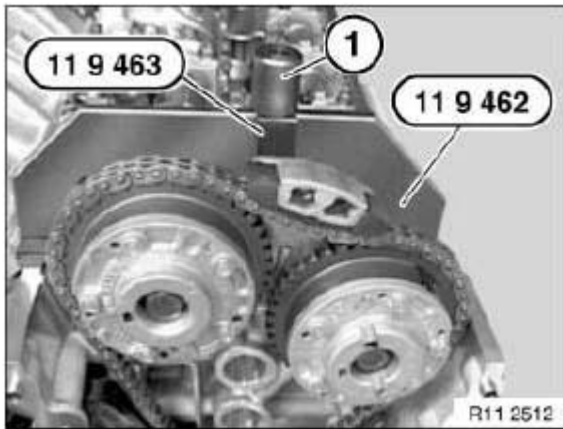


Fig. 438: Identifying Special Tool (11 9 463) And (11 9 462)
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 190.

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

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

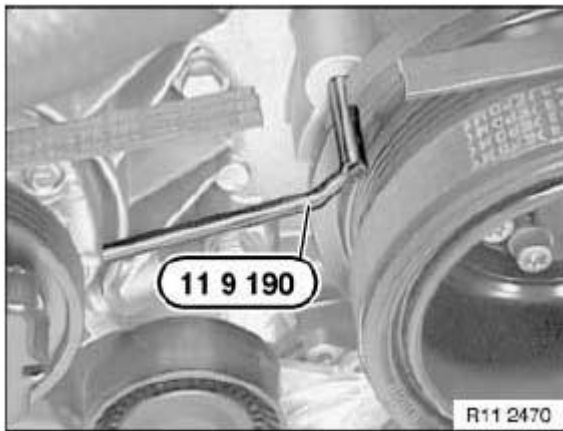


Fig. 439: Identifying Special Tool (11 9 190)
 Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 461 on inlet camshaft and check timing.

NOTE: The timing is correctly adjusted when special tool 11 9 461 rests flat on the cylinder head or protrudes by up to 0.5 mm to the exhaust side.

Remove special tool 11 9 461 from inlet camshaft.

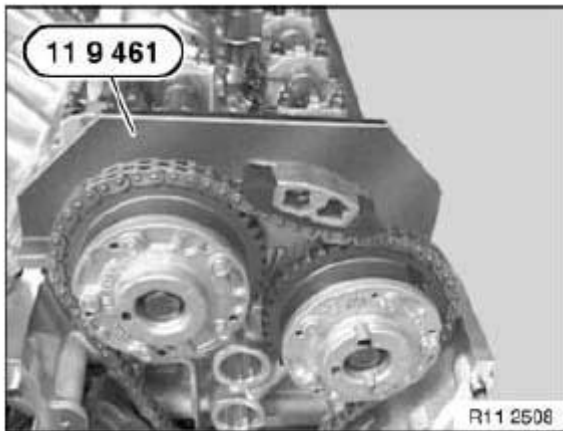


Fig. 440: Identifying Special Tool (11 9 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 462 on exhaust camshaft and check timing.

NOTE: The timing is correctly adjusted when special tool 11 9 462 rests flat on the cylinder head or protrudes by up to 0.5 mm to the exhaust side.

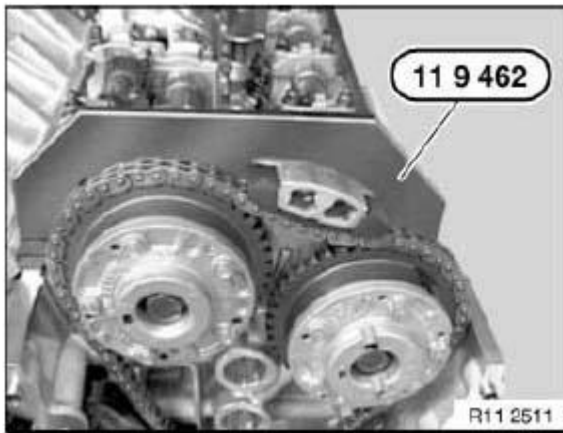


Fig. 441: Identifying Special Tool (11 9 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

IMPORTANT: Screw (1) is a special screw and must not be replaced with a normal M8 screw.

Clip oil line (3) into retainers (2).

Insert screw (1) and tighten down.

Assemble engine.

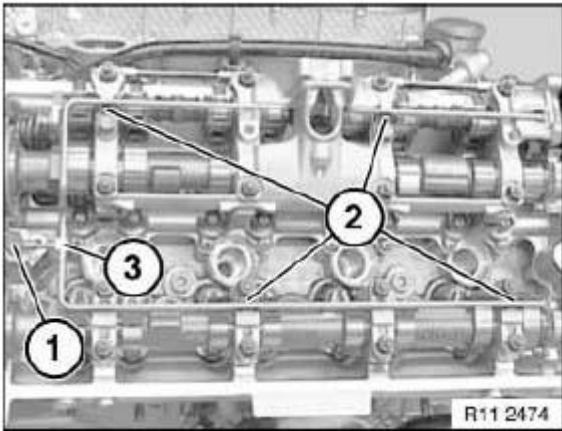


Fig. 442: Identifying Oil Line, Retainers And Screw
 Courtesy of BMW OF NORTH AMERICA, INC.

11 36 048 REMOVING AND INSTALLING/REPLACING INLET AND EXHAUST ADJUSTMENT UNITS ON RIGHT SIDE (N62/N62TU)

Special tools required:

- 11 9 190
- 11 9 460
- 11 9 461
- 11 9 462
- 11 9 463

(cylinder bank 1 to 4)

Necessary preliminary tasks:

- Read fault memory and make a documentary record
- Remove SERVOMOTOR FOR RIGHT ECCENTRIC SHAFT
- Remove RIGHT CYLINDER HEAD COVER
- Remove all spark plugs on cylinder bank 1 to 4
- If necessary, remove fan cowl
- Remove RIGHT TIMING CASE COVER

Removal:

Removal of inlet and exhaust adjustment units is described separately from installation.

IMPORTANT: Screw (1) is a special screw and must not be replaced with a normal M8 screw.

Release screw (1).

Unclip oil line (3) from retainers (2) and remove.

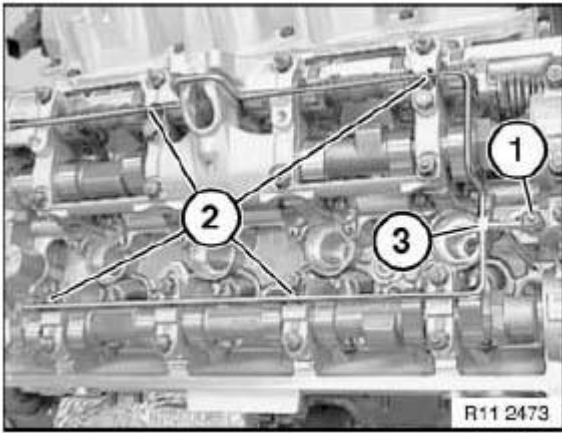


Fig. 443: Identifying Oil Line, Retainers And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine at central bolt in direction of rotation to firing TDC position of 1st cylinder.

NOTE: In firing TDC position, cam of exhaust camshaft at 1st cylinder points upwards at an angle.

Cam of inlet camshaft points downwards at an angle.



Fig. 444: Locating Crank Engine Central Bolt In Direction Of Rotation To Firing TDC Position
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Alignment hole for TDC position is at front on timing case cover.

Crank engine at central bolt and secure vibration damper with special tool 11 9 190 in firing TDC position of 1st cylinder.

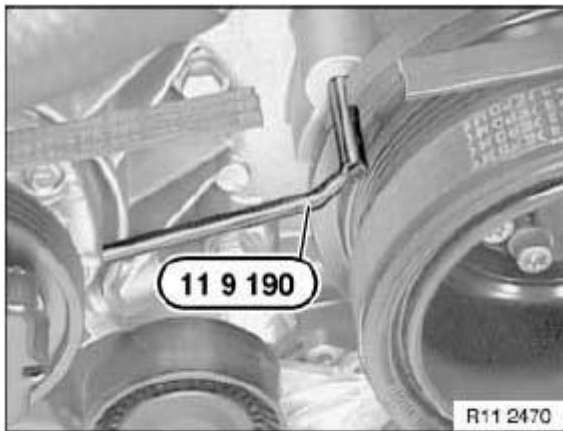


Fig. 445: Identifying Special Tool (11 9 190)

Courtesy of BMW OF NORTH AMERICA, INC.

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

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

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

Checking locking of inlet adjustment unit in initial position:

Engage hexagon head of inlet camshaft and attempt to rotate inlet camshaft carefully against direction of rotation.

If there is no fixed connection between inlet camshaft and inlet adjustment unit, rotate inlet camshaft against direction of rotation as far as it will go.

The inlet adjustment unit is locked in the initial position when the inlet camshaft is non-positively connected to the inlet adjustment unit.

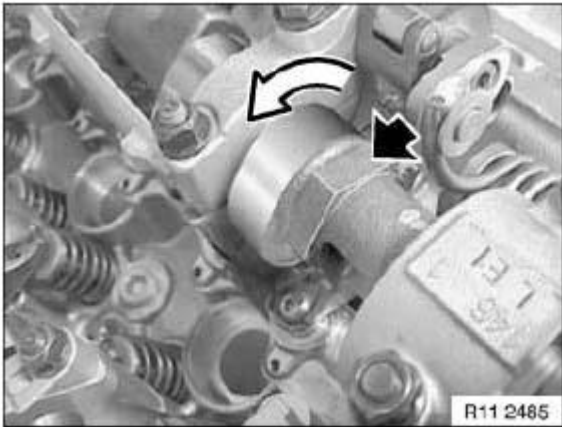


Fig. 446: Rotating Inlet Camshaft

Courtesy of BMW OF NORTH AMERICA, INC.

Checking locking of exhaust adjustment unit in initial position:

Engage hexagon head of exhaust camshaft and attempt to rotate exhaust camshaft carefully in direction of rotation.

If there is no fixed connection between exhaust camshaft and exhaust adjustment unit, rotate exhaust camshaft in direction of rotation as far as it will go.

The exhaust adjustment unit is locked in the initial position when the exhaust camshaft is non-positively connected to the exhaust adjustment unit.

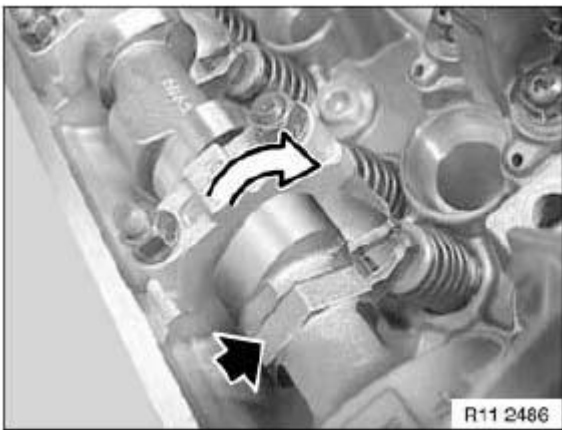


Fig. 447: Identifying Central Bolt Rotation To 45° Before TDC Position

Courtesy of BMW OF NORTH AMERICA, INC.

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

Remove special tool 11 9 190.

Crank engine at central bolt against direction of rotation to 45° before TDC position.

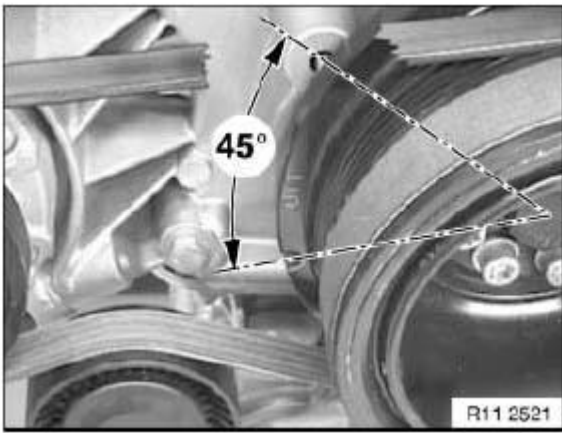


Fig. 448: Locating Slackening Screws

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: When slackening screws, grip camshafts at hexagon head.

Slacken screws of exhaust and inlet adjustment unit.

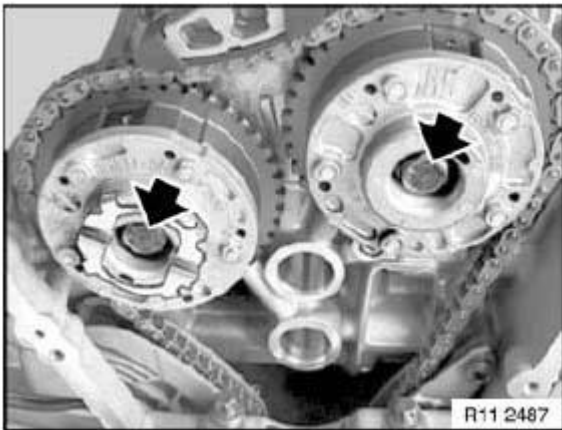


Fig. 449: Locating Slacken Screws Of Exhaust And Inlet

Courtesy of BMW OF NORTH AMERICA, INC.

Remove screw on inlet adjustment unit.



Fig. 450: Identifying Inlet Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Vigorously press back tensioner rail (3) several times to remove oil in chain tensioner.

Feed out inlet adjustment unit (1).

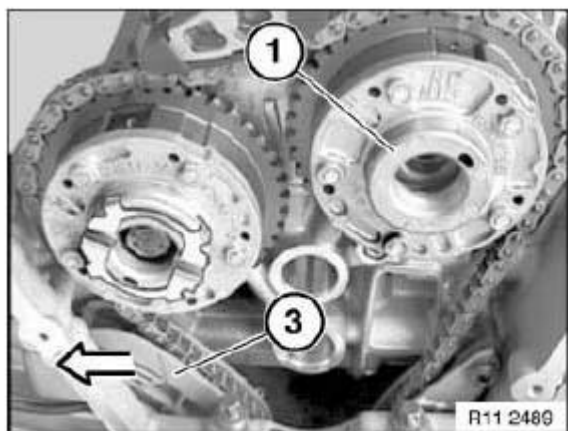


Fig. 451: Identifying Back Tensioner Rail And Inlet Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Remove screw on exhaust adjustment unit.

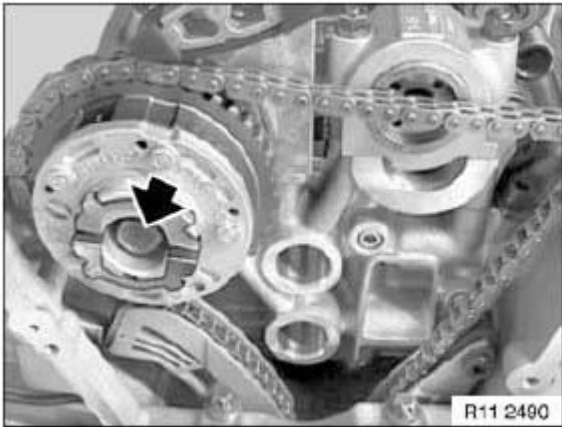


Fig. 452: Identifying Exhaust Adjustment Unit Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out exhaust adjustment unit (2).

Secure timing chain to prevent it from sliding down.

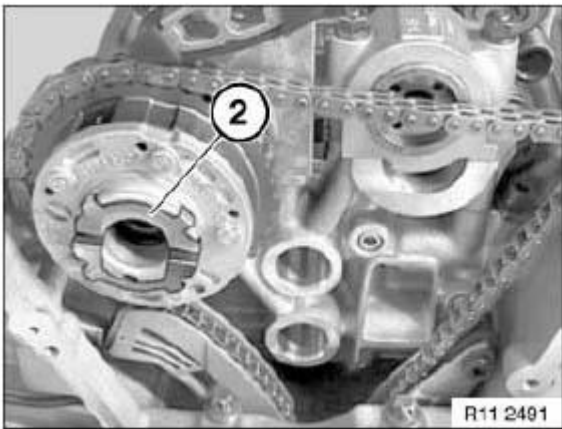


Fig. 453: Identifying Exhaust Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Installation of inlet and exhaust adjustment units is described separately from removal.

IMPORTANT: Danger of mix-up:

Inlet and exhaust adjustment units are different.

Mixing up the inlet and exhaust adjustment units will cause damage to the engine.

1. Inlet adjustment unit (1) is marked with EIN and IN.

2. Exhaust adjustment unit (2) is marked with AUS and EX.

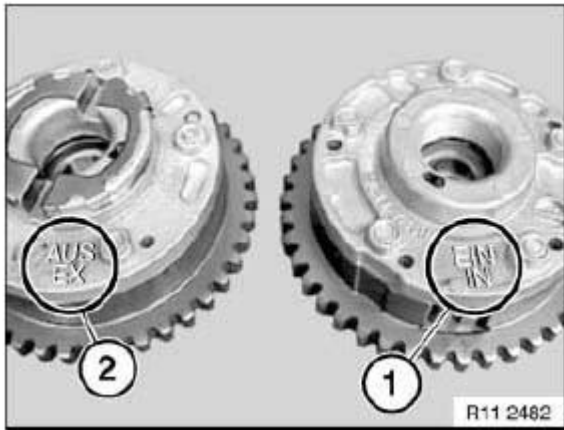


Fig. 454: Identifying Inlet And Exhaust Adjustment Unit Mark
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The exhaust adjustment unit on cylinder bank 1 to 4 also has a metal clip (3) for driving the vacuum pump.

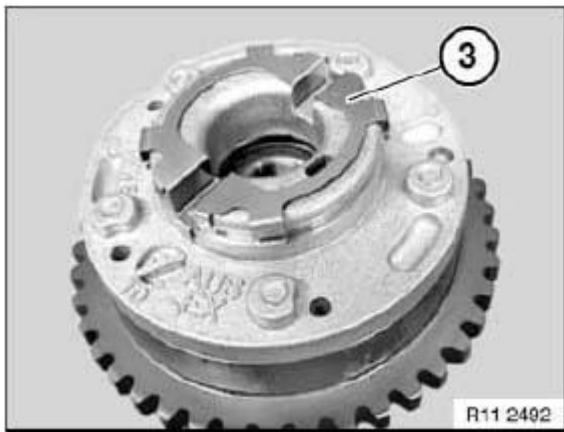


Fig. 455: Identifying Metal Clip
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Position of exhaust adjustment unit (2) to timing chain can be freely selected.

Pull timing chain up.

Feed exhaust adjustment unit (2) into timing chain and fit onto exhaust camshaft.

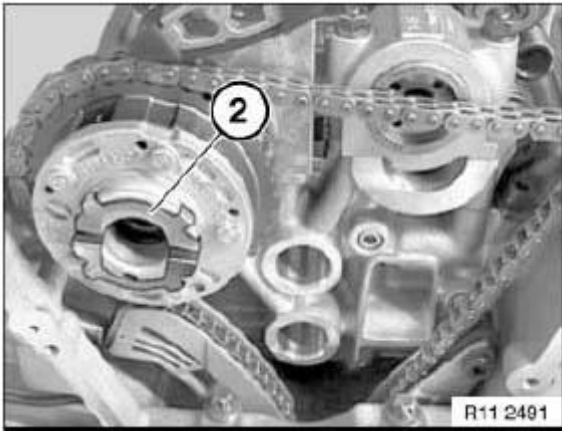


Fig. 456: Identifying Exhaust Adjustment Unit Into Timing Chain
Courtesy of BMW OF NORTH AMERICA, INC.

Replace screw.

Install screw on exhaust adjustment unit.

Tighten screw without play and then slacken off again by half a turn.

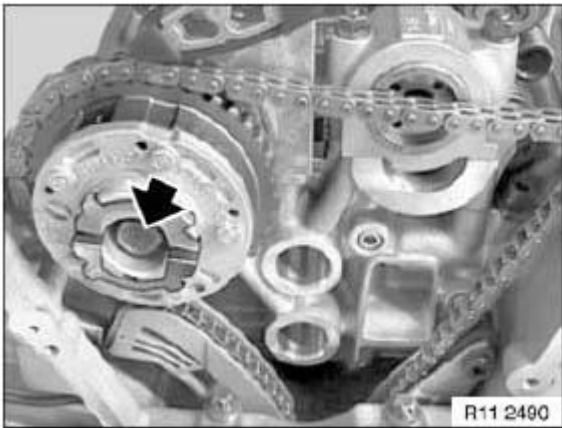


Fig. 457: Identifying Exhaust Adjustment Unit Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Position of inlet adjustment unit (1) to timing chain can be freely selected.

Pull timing chain up.

Feed inlet adjustment unit (1) into timing chain.

Press tensioner rail (3) back and fit inlet adjustment unit (1) onto inlet camshaft.

NOTE: If tensioner rail (3) cannot be pressed back far enough to enable fitting of inlet

adjustment unit (1):

Slacken off chain tensioner by approx. three turns.

Fit inlet adjustment unit (1).

Replace and insert screw on inlet adjustment unit (1).

Tighten down chain tensioner.

Tightening torque of chain tensioner, 11 31 8AZ . See CAMSHAFT for specs.

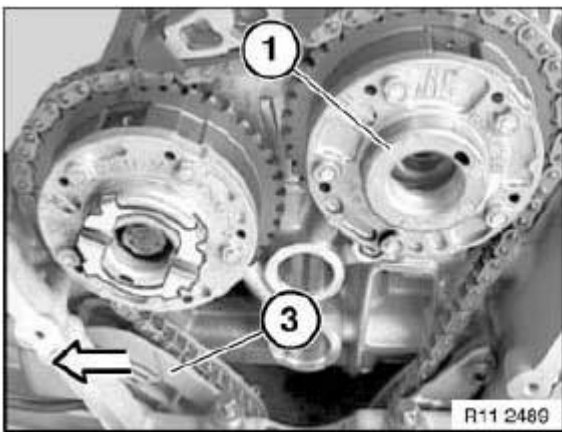


Fig. 458: Pressing Tensioner Rail Back And Inlet Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten screw on inlet adjustment unit without play and then slacken off again by a half turn.



Fig. 459: Identifying Exhaust Adjustment Unit Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Get special tool kit 11 9 460 ready for securing camshafts.

NOTE: Special tool 11 9 461 for securing inlet camshaft.

Special tool 11 9 462 for securing exhaust camshaft.

Special tool 11 9 463 (holder with screw).

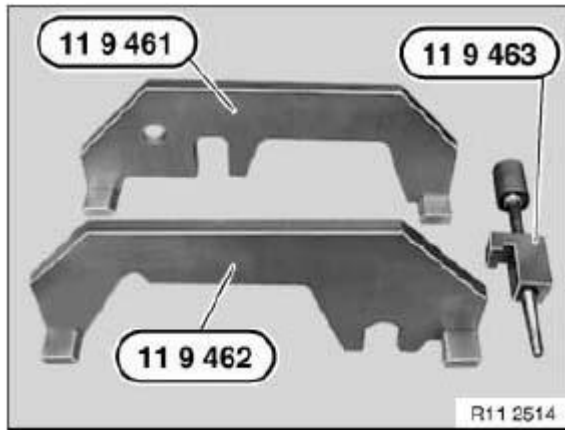


Fig. 460: Identifying Special Tool (11 9 461), (11 9 463) And (11 9 462)
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 461 on inlet camshaft and align inlet camshaft so that special tool 11 9 461 rests without a gap on cylinder head.

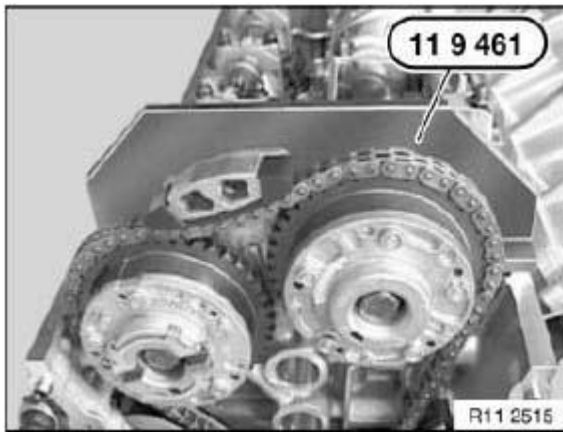


Fig. 461: Identifying Special Tool (11 9 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 463, secure screw (1) in thread for oil line and tighten down by hand.

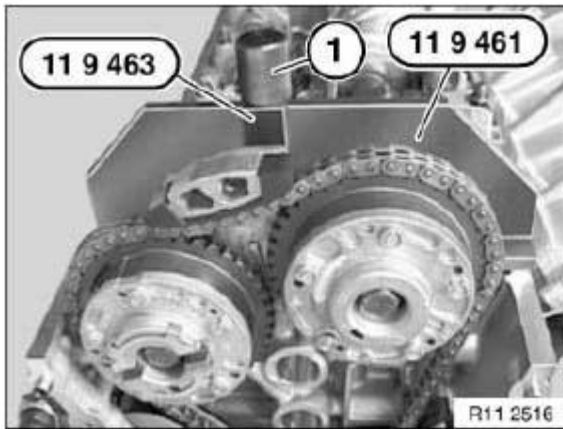


Fig. 462: Identifying Special Tool (11 9 463) And (11 9 461)
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Make sure screws of inlet and exhaust adjustment units have been slackened off.

Crank engine at central bolt from 45° before TDC position in direction of rotation to firing TDC position.

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

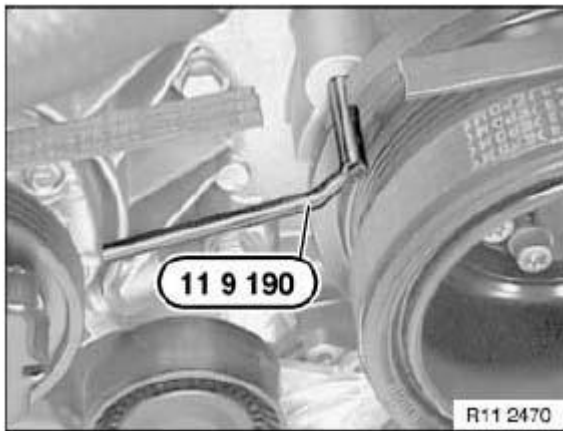


Fig. 463: Identifying Special Tool (11 9 190)
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: When tightening down screw (1), grip camshaft at hexagon head.

Tighten down screw (1) of inlet adjustment unit.

Tightening torque: 11 36 16AZ . See **VARIABLE CAMSHAFT CONTROL** for specs.

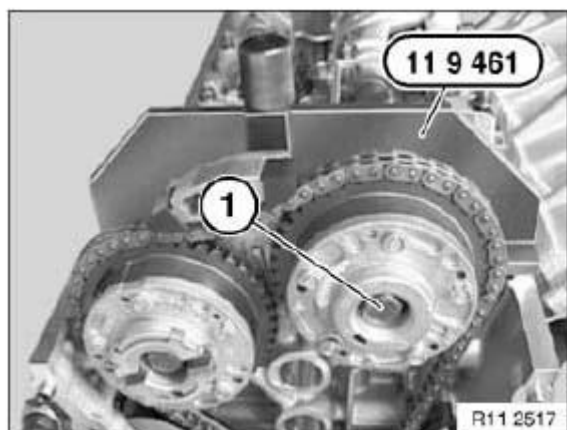


Fig. 464: Identifying Inlet Adjustment Unit Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove special tools 11 9 463/11 9 461 from inlet camshaft.

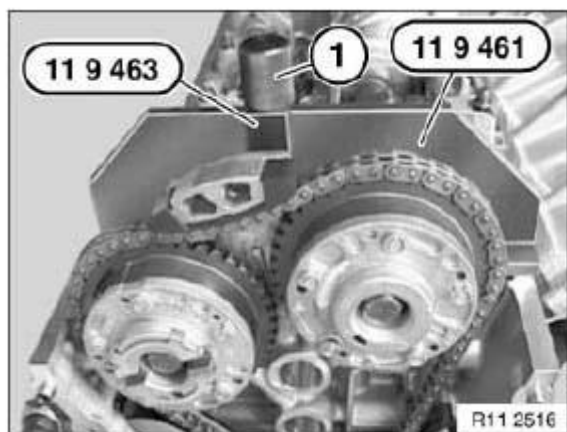


Fig. 465: Identifying Special Tool (11 9 463) And (11 9 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 462 on exhaust camshaft and align exhaust camshaft so that special tool 11 9 462 rests without a gap on cylinder head.



Fig. 466: Identifying Special Tool (11 9 462)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 463, secure screw (1) in thread for oil line and tighten down by hand.

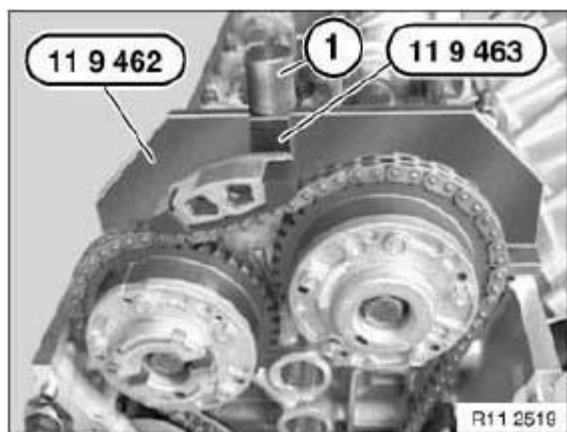


Fig. 467: Identifying Special Tool (11 9 462) And (11 9 463)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: When tightening down screw (2), grip camshaft at hexagon head.

Tighten down screw (2) of exhaust adjustment unit.

Tightening torque: 11 36 16AZ . See VARIABLE CAMSHAFT CONTROL for specs.

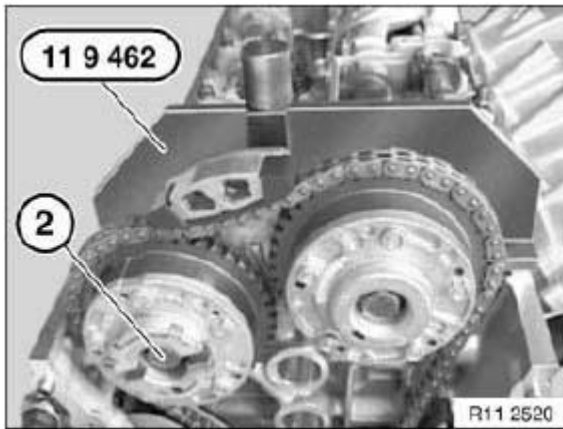


Fig. 468: Identifying Special Tool (11 9 462)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove special tools 11 9 463/11 9 462 from exhaust camshaft.

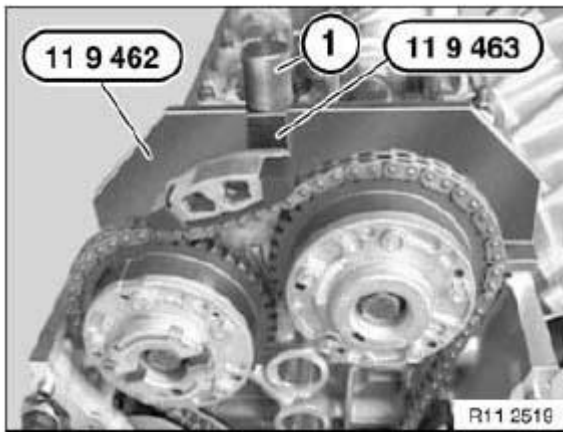


Fig. 469: Identifying Special Tool (11 9 462) And (11 9 463)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 190.

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

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

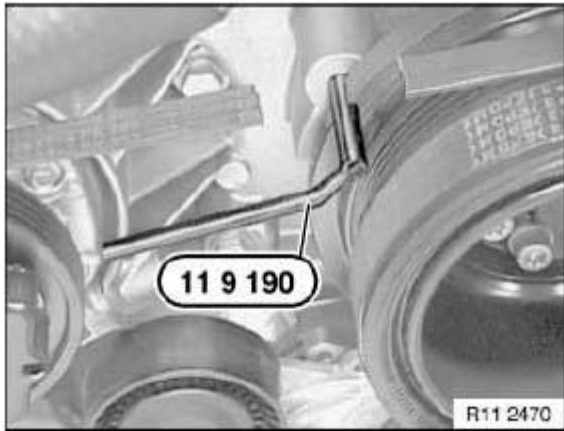


Fig. 470: Identifying Special Tool (11 9 190)
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 461 on inlet camshaft and check timing.

NOTE: The timing is correctly adjusted when special tool 11 9 461 rests flat on the cylinder head or protrudes by up to 0.5 mm to the exhaust side.

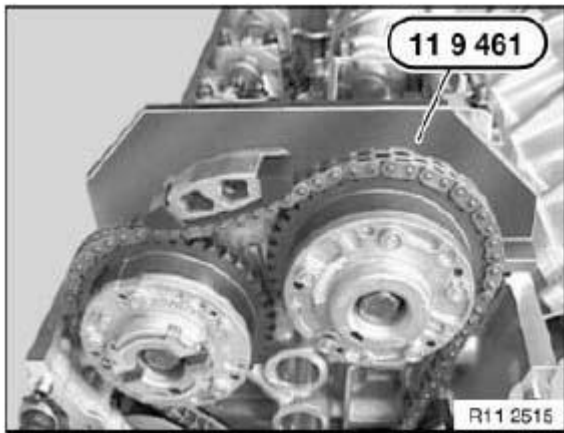


Fig. 471: Identifying Special Tool (11 9 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 462 on exhaust camshaft and check timing.

NOTE: The timing is correctly adjusted when special tool 11 9 462 rests flat on the cylinder head or protrudes by up to 0.5 mm to the exhaust side.

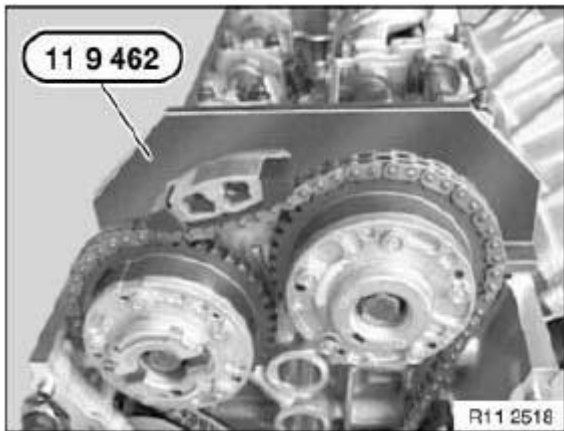


Fig. 472: Identifying Special Tool (11 9 462)
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

IMPORTANT: Screw (1) is a special screw and must not be replaced with a normal M8 screw.

Clip oil line (3) into retainers (2).

Insert screw (1) and tighten down.

Assemble engine.

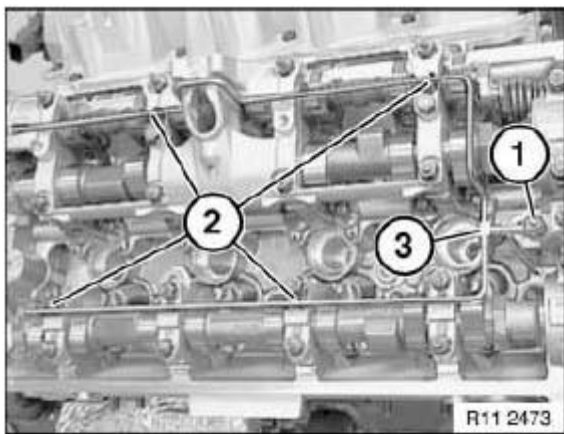


Fig. 473: Identifying Oil Line, Retainers And Screw
 Courtesy of BMW OF NORTH AMERICA, INC.

11 36 715 REMOVING AND INSTALLING/REPLACING BOTH LEFT SOLENOID VALVES (N62/N62TU)

(cylinder bank 5 to 8)

Necessary preliminary tasks:

- Read out fault memory of control unit of Digital Motor Electronics (DME)
- Switch off ignition
- Remove design cover
- Unlock hose on tank venting valve and disconnect.

NOTE: Solenoid valve (1) controls adjustment unit on inlet side.

Solenoid valve (2) controls adjustment unit on exhaust side.

Unlock plug of solenoid valves (1 and 2) and disconnect.

Release screws and remove holder (3).

Pull out solenoid valves (1 and 2).

Installation:

Check holder (3) for deformation; replace if necessary.

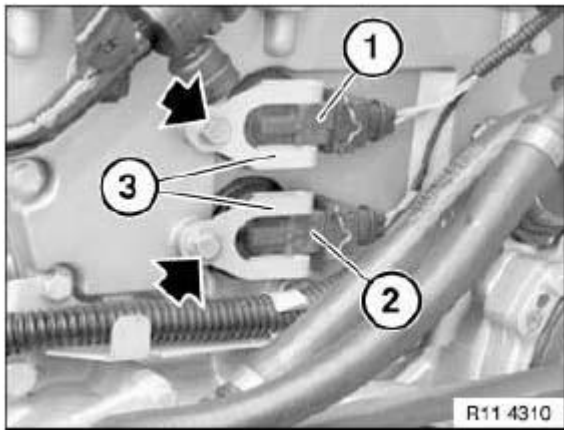


Fig. 474: Locating Solenoid Valves And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing faces (1) on cylinder head.

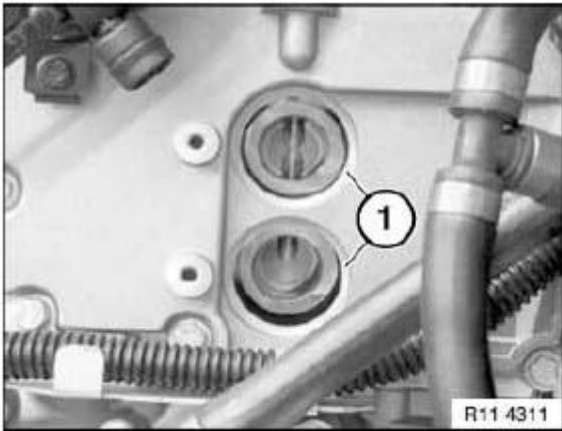


Fig. 475: Identifying Sealing Faces On Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace O-rings (1 and 2) on solenoid valve (3) and lubricate.

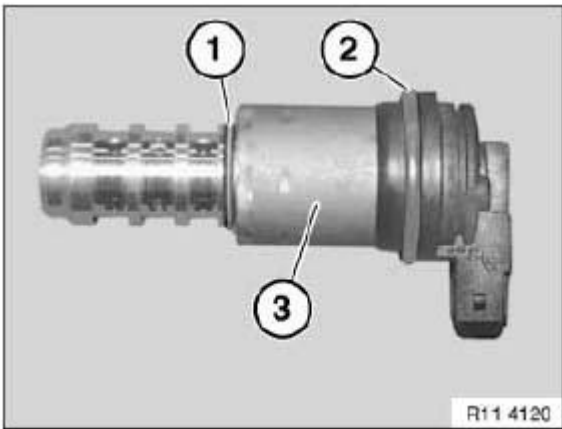


Fig. 476: Identifying O-Rings On Solenoid Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Press in solenoid valve as far as it will go.

Make sure holders are in correct installation positions.

Install and tighten down screws.

Now clear the fault memory.

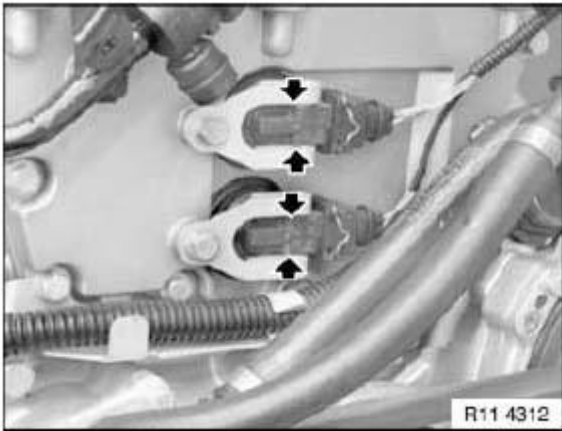


Fig. 477: Locating Solenoid Valve

Courtesy of BMW OF NORTH AMERICA, INC.

11 36 720 REMOVING AND INSTALLING/REPLACING BOTH RIGHT SOLENOID VALVES (N62/N62TU)

(cylinder bank 1 to 4)

Necessary preliminary tasks:

- Read out fault memory of control unit of Digital Motor Electronics (DME)
- Switch off ignition
- Remove **ACOUSTIC COVER**
- Remove design cover
- Remove upper section of intake filter housing with air-mass flow sensor and intake hose

NOTE: Solenoid valve (1) controls adjustment unit on inlet side.

Solenoid valve (2) controls adjustment unit on exhaust side.

Unlock plug of solenoid valves (1 and 2) and disconnect.

Release screws and remove holder (3).

Pull out solenoid valves (1 and 2).

Installation:

Check holder (3) for deformation; replace if necessary.

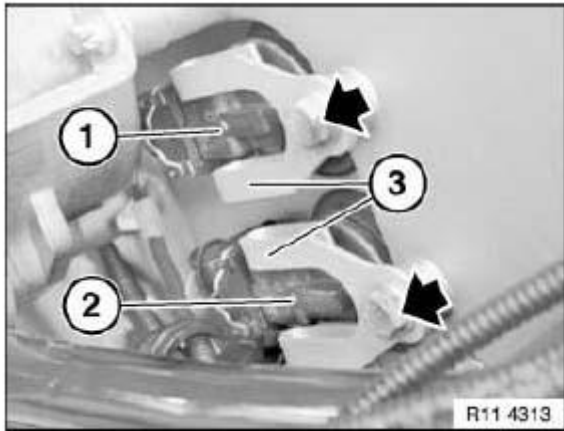


Fig. 478: Locating Solenoid Valves And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing faces (1) on cylinder head.

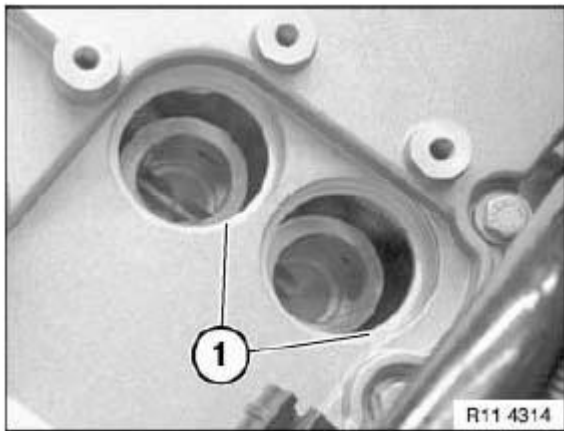


Fig. 479: Identifying Sealing Faces On Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace O-rings (1 and 2) on solenoid valve (3) and lubricate.

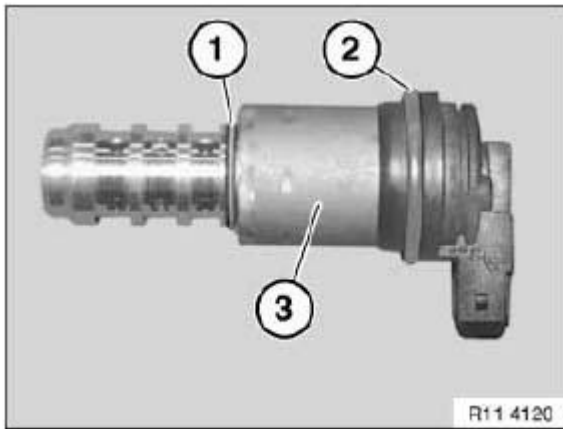


Fig. 480: Identifying O-Rings On Solenoid Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Press in solenoid valves as far as they will go.

Make sure holders are in correct installation positions.

Install and tighten down screws.

Now clear the fault memory.

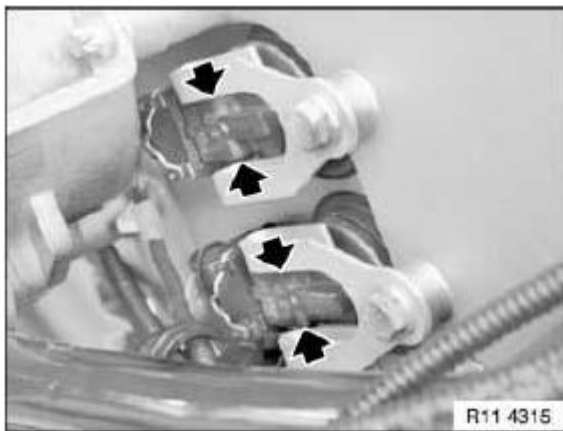


Fig. 481: Locating Solenoid Installation Positions
Courtesy of BMW OF NORTH AMERICA, INC.

37 VARIABLE VALVE GEAR

11 37 006 REMOVING AND INSTALLING/REPLACING LEFT ECCENTRIC SHAFT (N62 FROM 9/03 AND N62TU)

(cylinder bank 5 to 8)

Necessary preliminary tasks:

- Remove servomotor for left eccentric shaft
- Remove ignition coils on cylinder bank 5 to 8
- Remove spark plugs on cylinder bank 5 to 8
- Remove left cylinder head cover
- Remove left inlet and exhaust adjustment units
- Remove **LEFT INLET CAMSHAFT**

Eccentric shafts from 2/2003:

NOTE: Eccentric shafts of cylinders 1 to 4 and 5 to 8 are identical parts.

IMPORTANT: Note installation direction of eccentric shafts.

Depending on the side on which the magnet wheel is fitted, the eccentric shafts are used for cylinders 1 to 4 or 5 to 8.

Incorrect assembly will result in engine damage.

NOTE: The work steps are only described on one bearing position. The procedure is identical for the other bearing positions.

Carefully tilt bearing shell (1) to one side and simultaneously remove towards top.

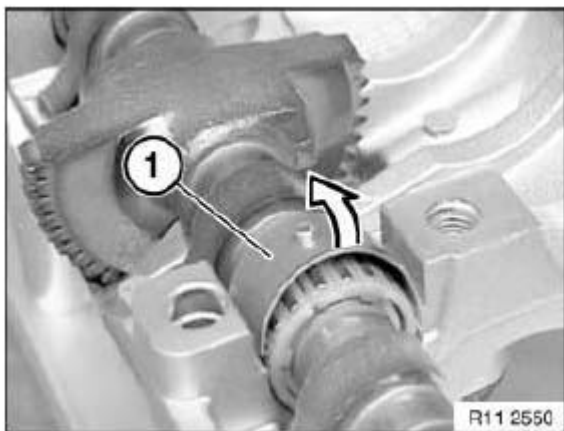


Fig. 482: Removing Bearing Shell

Courtesy of BMW OF NORTH AMERICA, INC.

Lift out eccentric shaft (1).

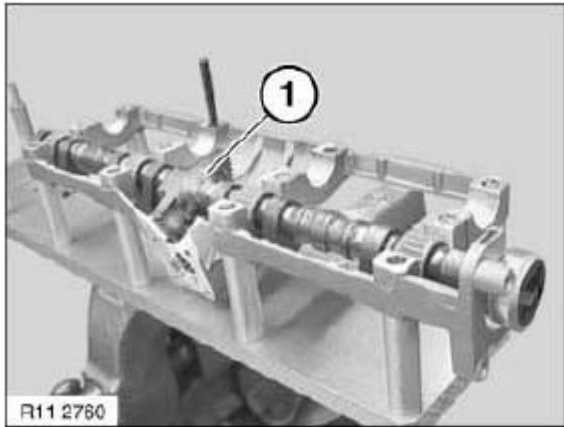


Fig. 483: Identifying Eccentric Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Removal of magnet wheel (if necessary):

NOTE: Carefully clamp eccentric shaft (1) as illustrated with protective jaws (2) in a vice.

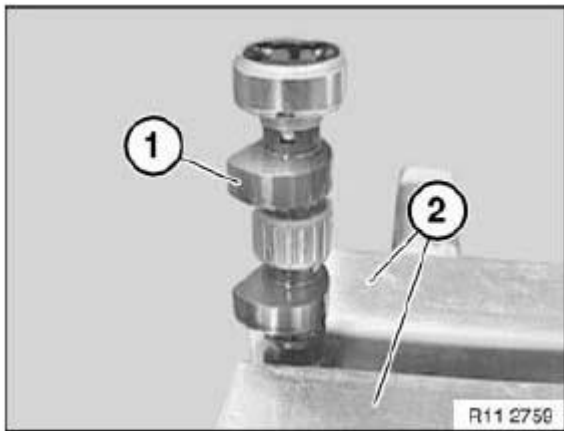


Fig. 484: Clamping Eccentric Shaft Illustrated With Protective Jaws In Vice
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of mix-up:

It is very easy to mix up left and right or front and rear on the eccentric shaft.

If necessary, mark the side on which the magnet wheel is fitted.

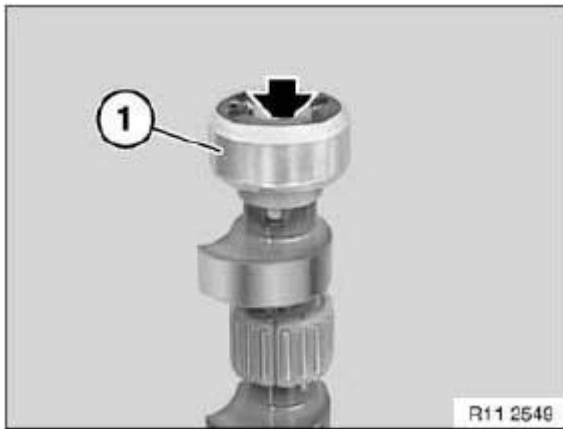


Fig. 485: Placing Magnet Wheel In Plastic Bag
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Magnet wheel (1) is extremely magnetic.

After removal, place magnet wheel in a plastic bag to protect it against metal chips.

Release screw and remove magnet wheel (1).

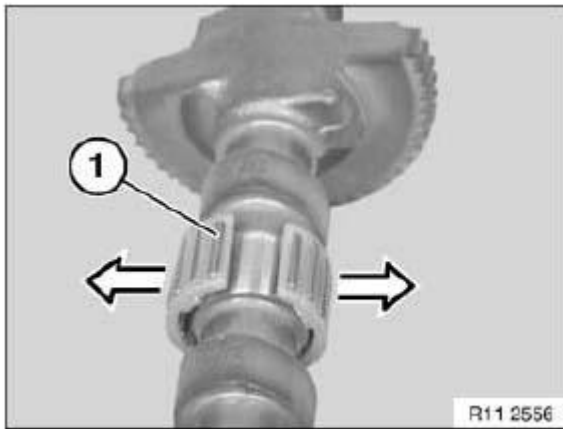


Fig. 486: Removing Needle Bearings
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Needle bearings (1) break off very easily when removed and installed.

Carefully press needle bearings (1) apart at split position only to such an extent that they can be removed from eccentric shaft.

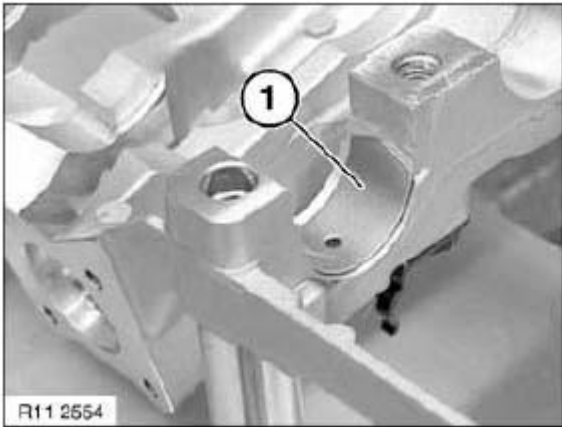


Fig. 487: Identifying Bearing Shells

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the needle-roller bearings are replaced, the bearing shells must be replaced as well.

Carefully press bearing shell (1) to one side and simultaneously remove towards top.

Installation

Installation of eccentric shaft is described separately from removal.

NOTE: Lubricate eccentric shaft at bearing positions.

Replace needle bearing (1).

IMPORTANT: Needle bearings break off very easily when installed.

Carefully press needle bearings (1) apart at split position only to such an extent that they can be fitted over eccentric shaft.

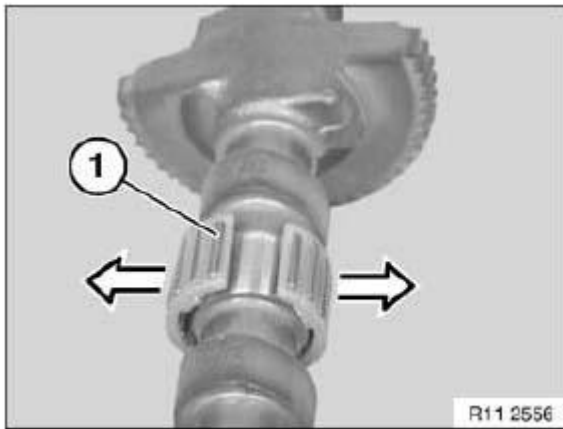


Fig. 488: Removing Needle Bearings
Courtesy of BMW OF NORTH AMERICA, INC.

Eccentric shafts from 2/2003:

NOTE: Eccentric shafts of cylinders 1 to 4 and 5 to 8 are identical parts.

IMPORTANT: Note installation direction of eccentric shafts.

Depending on the side on which the magnet wheel is fitted, the eccentric shafts are used for cylinders 1 to 4 or 5 to 8.

Incorrect assembly will result in engine damage.

Installation of magnet wheel:

NOTE: Carefully clamp eccentric shaft (1) as illustrated with protective jaws (2) in a vice.

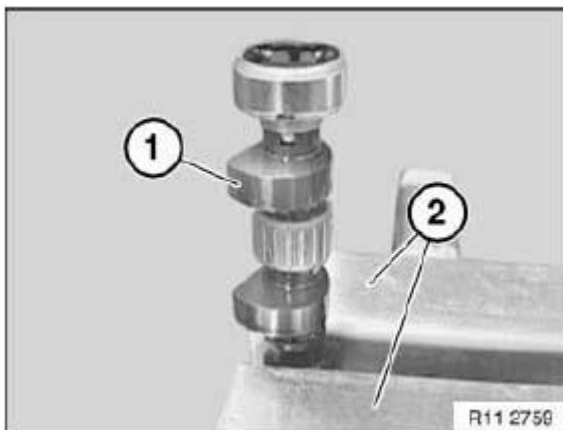


Fig. 489: Clamping Eccentric Shaft Illustrated With Protective Jaws In Vice

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect assembly will result in engine damage.

Assembling eccentric shaft for cylinder bank 5 to 8:

The machined curvature (3) and the groove in the eccentric shaft must point forwards as illustrated. The unmachined surface on the eccentric points to the left.

Secure magnet wheel (1) with lug in eccentric shaft groove.

IMPORTANT: Only install original antimagnetic screw (2).

Insert screw (2) and tighten down.

Tightening torque: 11 37 1AZ . See VARIABLE VALVE GEAR for specs.

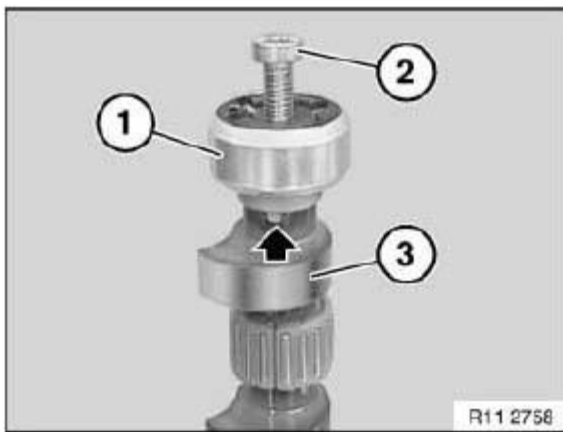


Fig. 490: Locating Machined Curvature
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Replace bearing shells (1) of needle bearings.

IMPORTANT: Bearing shells (1) must be installed in such a way that ends of bearing shells (1) face each other as shown in illustration.

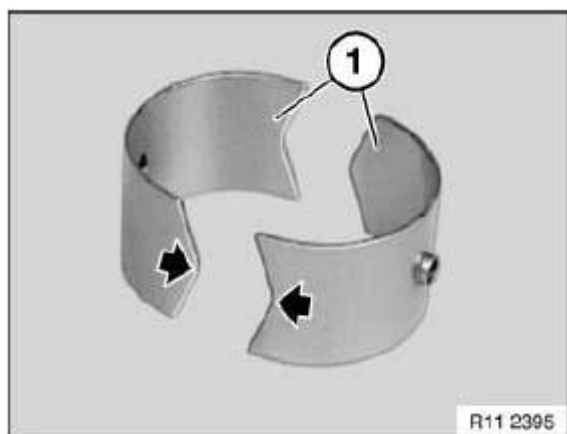


Fig. 491: Identifying Bearing Shells

Courtesy of BMW OF NORTH AMERICA, INC.

Insert bearing shells (1) into bearing bracket so that it is secured in bore (2).

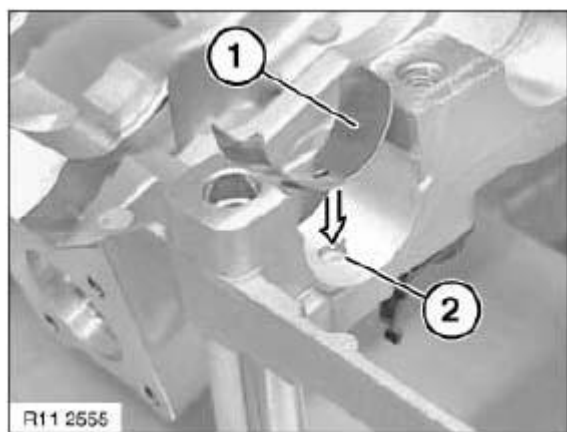


Fig. 492: Inserting Bearing Shells Into Bearing Bracket

Courtesy of BMW OF NORTH AMERICA, INC.

Lubricate bearing shells (1) with engine oil.

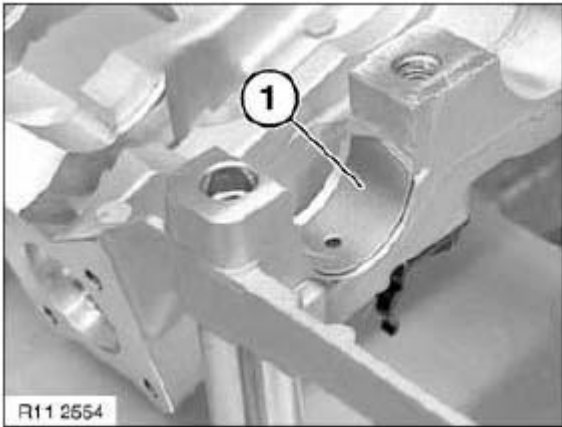


Fig. 493: Identifying Bearing Shells With Engine Oil
Courtesy of BMW OF NORTH AMERICA, INC.

Cylinder bank 5 to 8:

IMPORTANT: The machined curvature (1) of the eccentric points inwards.

Install eccentric shaft as shown in graphic.

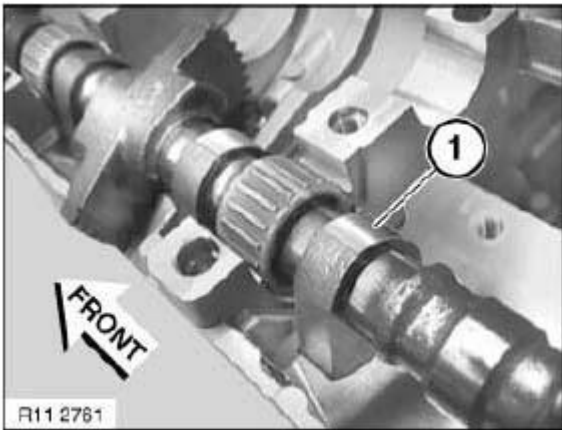


Fig. 494: Identifying Machined Curvature Of Eccentric Points
Courtesy of BMW OF NORTH AMERICA, INC.

Lubricate bearing shells (1) with engine oil. Install bearing shells (1).

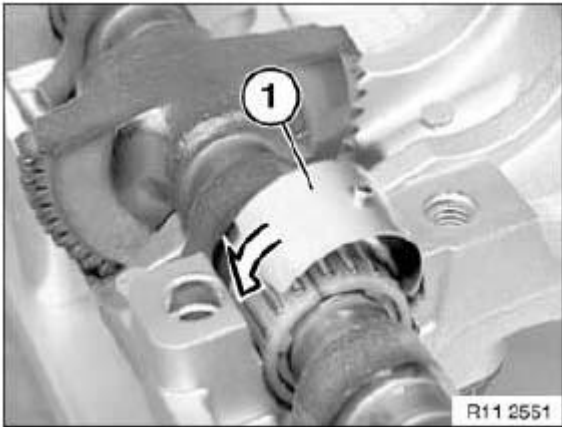


Fig. 495: Installing Bearing Shells

Courtesy of BMW OF NORTH AMERICA, INC.

Bearing shells (1) must snap audibly into place. Check correct position of bearing shells (1).

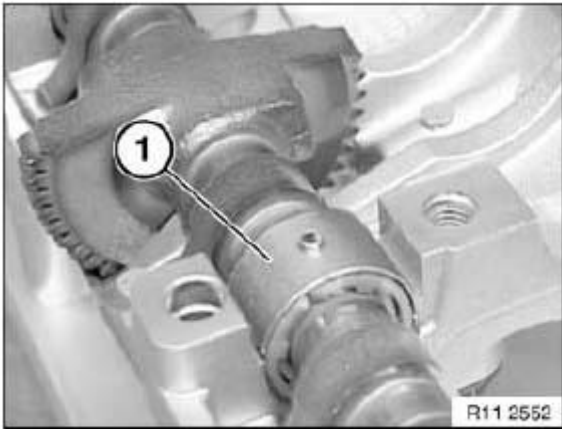


Fig. 496: Identifying Bearing Shells Installation Positions

Courtesy of BMW OF NORTH AMERICA, INC.

Install LEFT INLET CAMSHAFT.

Assemble engine.

11 37 008 REMOVING AND INSTALLING/REPLACING RIGHT ECCENTRIC SHAFT (N62 FROM 9/03 AND N62TU)

(cylinder bank 1 to 4)

Necessary preliminary tasks:

- Remove servomotor for right eccentric shaft
- Remove ignition coils on cylinder bank 1 to 4

- Remove spark plugs on cylinder bank 1 to 4
- Remove right cylinder head cover
- Remove right inlet and exhaust adjustment units
- Remove **RIGHT INLET CAMSHAFT**

Eccentric shafts from 2/2003:

NOTE: Eccentric shafts of cylinders 1 to 4 and 5 to 8 are identical parts.

IMPORTANT: Note installation direction of eccentric shafts. Depending on the side on which the magnet wheel is fitted, the eccentric shafts are used for cylinders 1 to 4 or 5 to 8.

Incorrect assembly will result in engine damage.

Removal:

Removal of eccentric shaft is described separately from installation.

NOTE: The work steps are only described on one bearing position. The procedure is identical for the other bearing positions.

Carefully tilt bearing shell (1) to one side and simultaneously remove towards top.

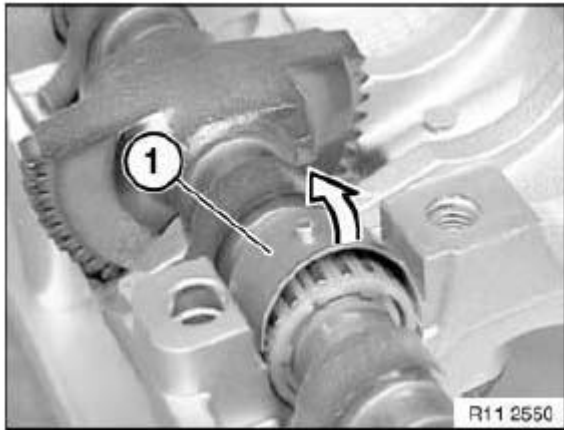


Fig. 497: Locating Bearing Shells Installation Positions
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out eccentric shaft (2).

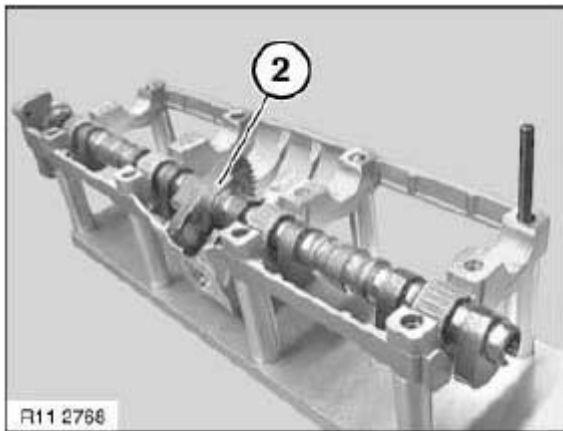


Fig. 498: Identifying Eccentric Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Removal of magnet wheel (if necessary):

NOTE: Carefully clamp eccentric shaft (1) as illustrated with protective jaws (2) in a vice.

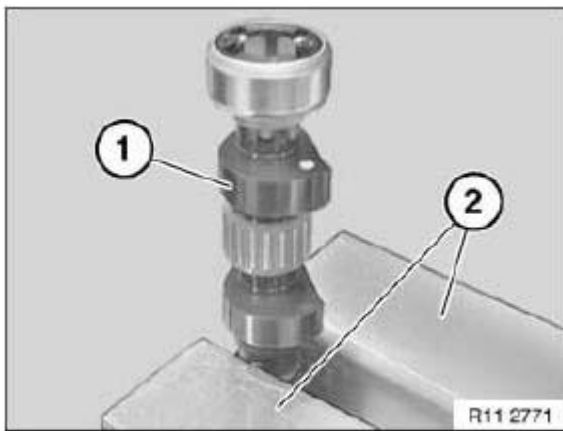


Fig. 499: Clamping Eccentric Shaft Installation With Protective Jaws In Vice
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Danger of mix-up:

It is very easy to mix up left and right or front and rear on the eccentric shaft.

If necessary, mark the side on which the magnet wheel is fitted.



Fig. 500: Identifying Magnet Wheel

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Magnet wheel (1) is extremely magnetic.

After removal, place magnet wheel in a plastic bag to protect it against metal chips.

Release screw and remove magnet wheel (1).

IMPORTANT: Needle bearings (1) break off very easily when removed and installed.

Carefully press needle bearings (1) apart at split position only to such an extent that they can be removed from eccentric shaft.

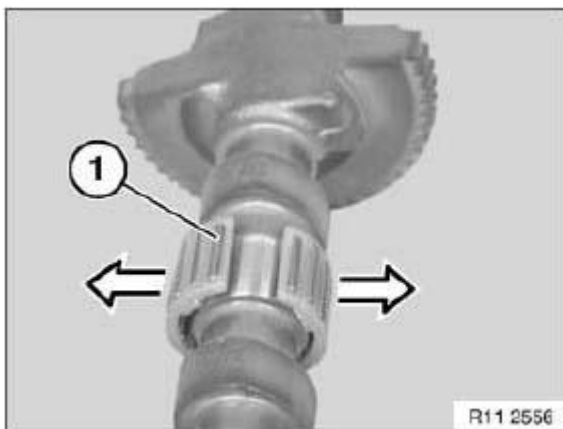


Fig. 501: Removing Needle Bearings

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the needle-roller bearings are replaced, the bearing shells must be replaced as well.

Carefully press bearing shell (1) to one side and simultaneously remove towards top.

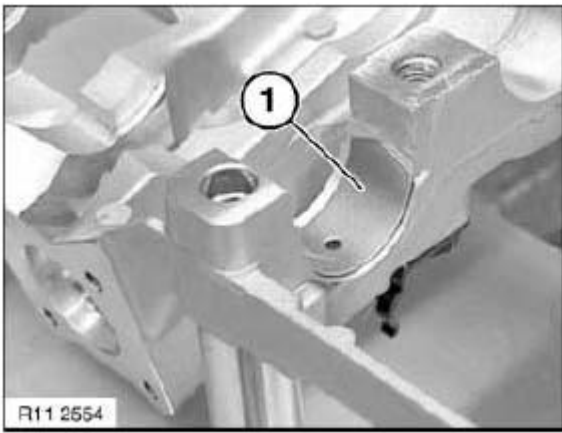


Fig. 502: Installing Bearing Shell

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Installation of eccentric shaft is described separately from removal.

NOTE: Lubricate eccentric shaft at bearing positions.

Replace needle bearing (1).

IMPORTANT: Needle bearings break off very easily when installed.

Carefully press needle bearings (1) apart at split position only to such an extent that they can be fitted over eccentric shaft.

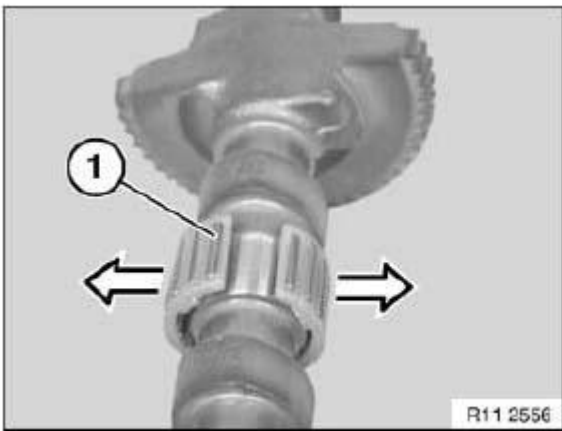


Fig. 503: Removing Needle Bearings

Courtesy of BMW OF NORTH AMERICA, INC.

Eccentric shafts from 2/2003:

NOTE: Eccentric shafts of cylinders 1 to 4 and 5 to 8 are identical parts.

IMPORTANT: Note installation direction of eccentric shafts.

Depending on the side on which the magnet wheel is fitted, the eccentric shafts are used for cylinders 1 to 4 or 5 to 8.

Incorrect assembly will result in engine damage.

Installation of magnet wheel:

NOTE: Carefully clamp eccentric shaft (1) as illustrated with protective jaws (2) in a vice.

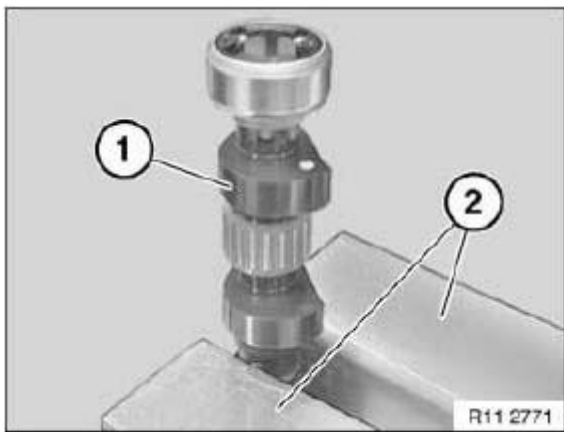


Fig. 504: Clamping Eccentric Shaft In Vice
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect assembly will result in engine damage.

Assemble eccentric shaft for cylinder bank 1 to 4: The machined curvature (3) and the groove in the eccentric shaft must point forwards as illustrated.

The unmachined surface on the eccentric points to the right.

Secure magnet wheel (1) with lug in eccentric shaft groove.

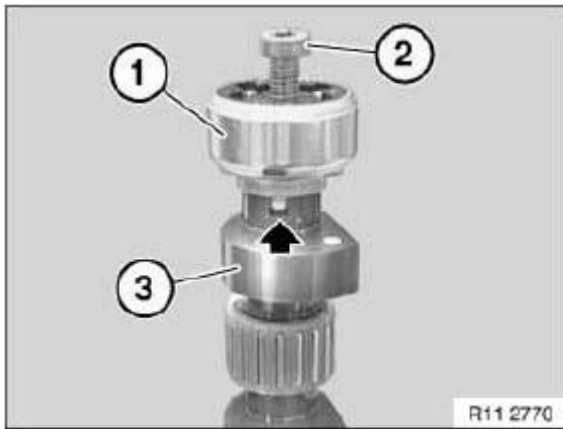


Fig. 505: Locating Machined Curvature
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Only install original antimagnetic screw (2).

Insert screw (2) and tighten down.

Tightening torque: 11 37 1AZ . See VARIABLE VALVE GEAR for specs.

NOTE: Replace bearing shells (1) of needle bearings.

IMPORTANT: Bearing shells (1) must be installed in such a way that ends of bearing shells (1) face each other as shown in illustration.

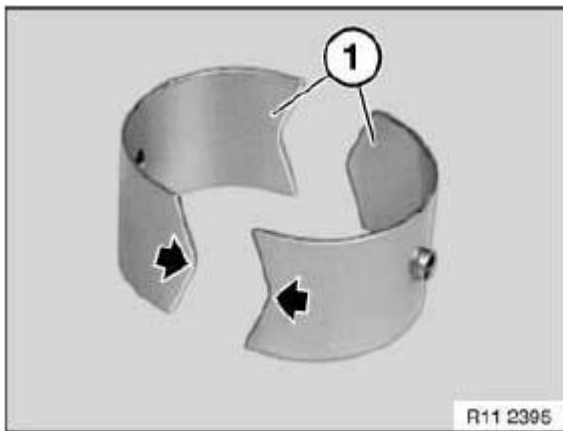


Fig. 506: Identifying Bearing Shells Face Installation Positions
Courtesy of BMW OF NORTH AMERICA, INC.

Insert bearing shells (1) into bearing bracket so that it is secured in bore (2).

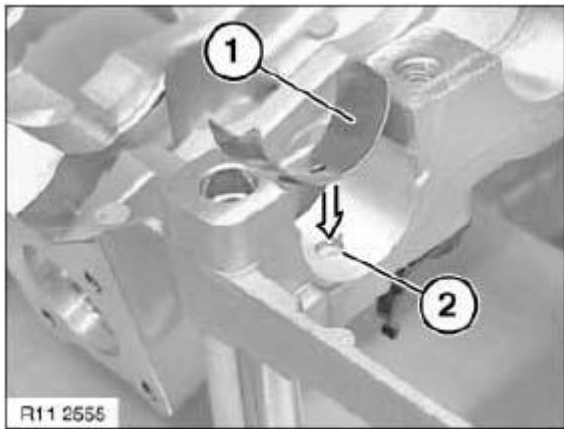


Fig. 507: Inserting Bearing Shells Into Bearing Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Lubricate bearing shells (1) with engine oil.

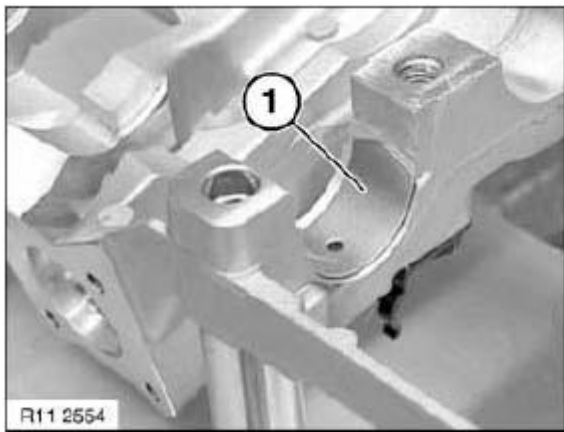


Fig. 508: Identifying Bearing Shells With Engine Oil
Courtesy of BMW OF NORTH AMERICA, INC.

Cylinder bank 1 to 4:

IMPORTANT: The machined curvature (1) of the eccentric points inwards.

The magnet wheel (2) is at the rear.

Install eccentric shaft as shown in graphic.

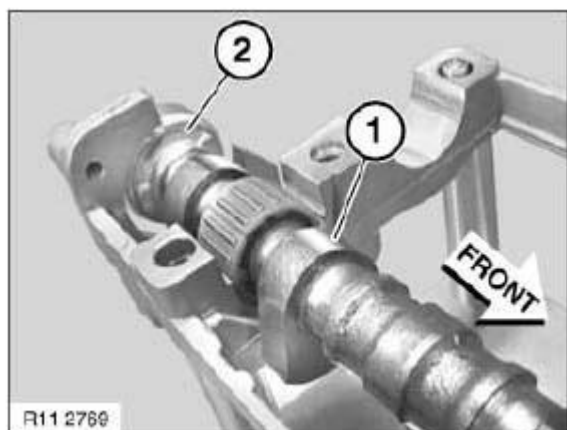


Fig. 509: Installing Eccentric Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Lubricate bearing shells (1) with engine oil.

Install bearing shells (1).

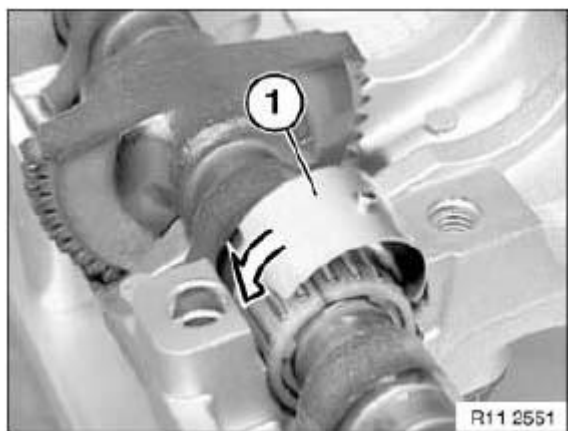


Fig. 510: Installing Bearing Shells
Courtesy of BMW OF NORTH AMERICA, INC.

Bearing shells (1) must snap audibly into place.

Check correct position of bearing shells (1).

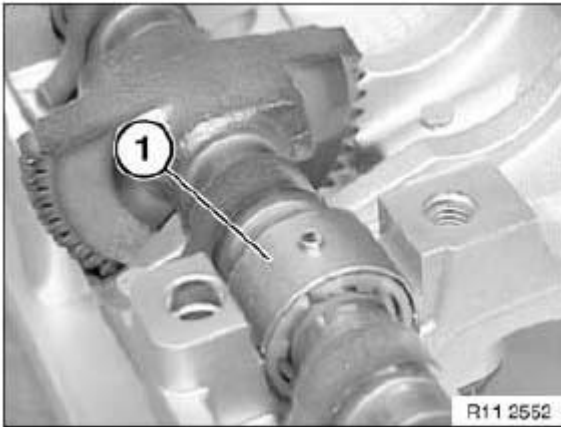


Fig. 511: Identifying Bearing Shells Installation Positions
Courtesy of BMW OF NORTH AMERICA, INC.

Install **RIGHT INLET CAMSHAFT**.

Assemble engine.

11 37 012 REMOVING AND INSTALLING/REPLACING LEFT INTERMEDIATE LEVERS (N62 FROM 9/03 AND N62TU)

Special tools required:

- **11 9 470**
- **11 9 472**
- **11 9 473**
- **11 9 474**
- **11 9 475**
- **11 9 480**
- **11 9 490**

(cylinder bank 5 to 8)

Removal of intermediate levers is described separately from installation.

Necessary preliminary tasks:

- Remove **SERVOMOTOR FOR LEFT ECCENTRIC SHAFT**
- Remove ignition coils on cylinder bank 5 to 8
- Remove **LEFT CYLINDER HEAD COVER**
- Remove spark plugs on cylinder bank 5 to 8
- Remove **LEFT INLET AND EXHAUST ADJUSTMENT UNITS**

IMPORTANT: The inlet camshaft must first be rotated so that when the bearing bracket is removed the intermediate levers do not slip out and damage the camshaft.

Rotate inlet camshaft against direction of rotation until lettering (1) on 8th cylinder points upwards in cylinder axis and cam is horizontal.

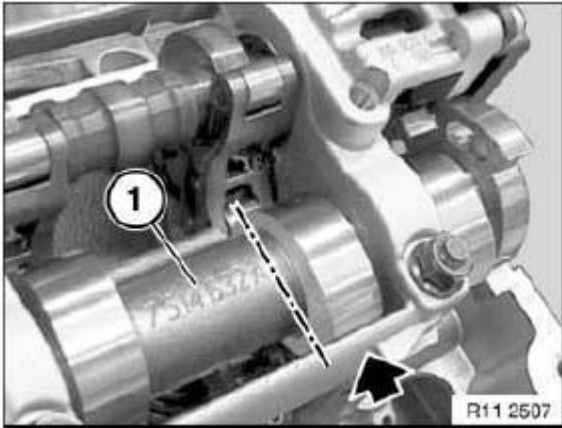


Fig. 512: Locating Inlet Camshaft Position
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Camshaft bearing caps of cylinders 1 to 4 and 5 to 8 must not be mixed up.

NOTE: Bearing caps of inlet camshaft are marked on cylinder bank 5 to 8 with R E1 to R E5 from inlet side.

Release nuts and remove bearing cap R E1.

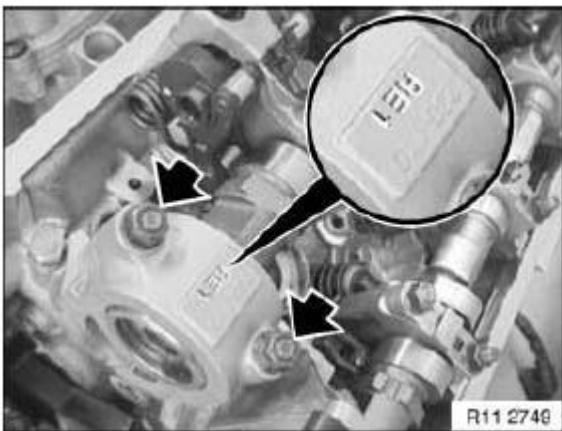


Fig. 513: Locating Camshaft Bearing Caps Of Cylinders
Courtesy of BMW OF NORTH AMERICA, INC.

Release 8 nuts of bearing bracket (1) from outside to inside.

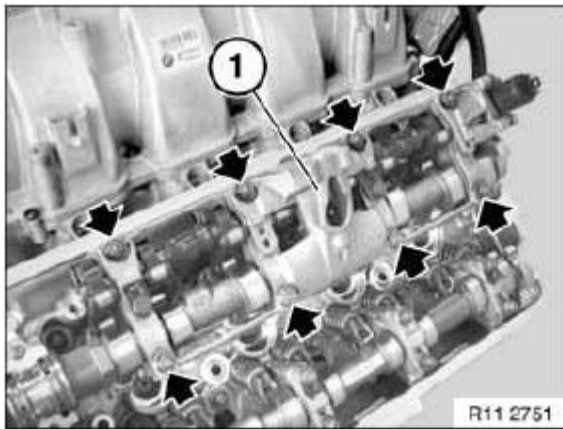


Fig. 514: Locating Bearing Bracket

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Rocker arms are freely accessible after bearing bracket has been removed.

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

IMPORTANT: Rocker arms (1) are divided into individual tolerance classes.

The tolerance classes are designated as illustrated with the numbers from 1 to 4.

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

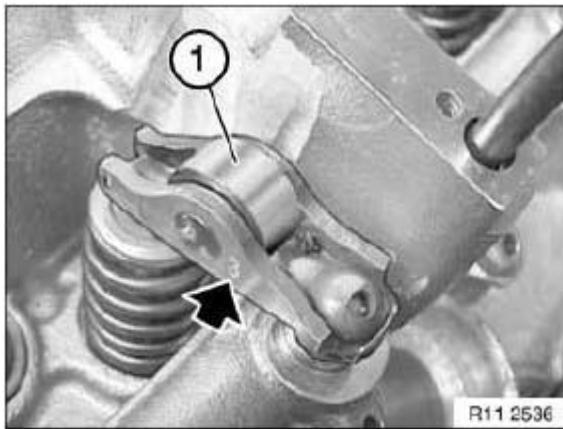


Fig. 515: Locating Rocker Arms On Inlet Side

Courtesy of BMW OF NORTH AMERICA, INC.

When replacing rocker arms (1) on inlet side: install rocker arms of the same tolerance class in the same position.

Clamp special tool 11 9 470 as illustrated in a vice.

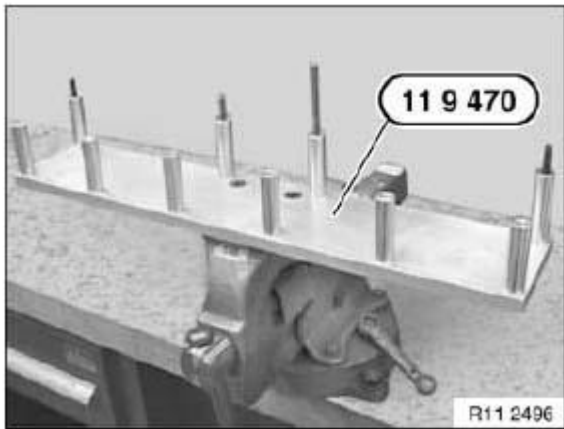


Fig. 516: Identifying Special Tool (11 9 470)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not tilt bearing bracket (1).

carefully lift out bearing bracket (1).

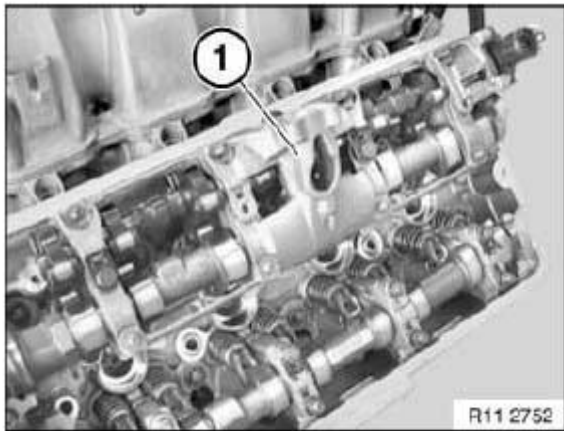


Fig. 517: Identifying Bearing Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Place bearing bracket (1) with inlet camshaft and eccentric shaft as illustrated on special tool 11 9 470.

Secure bearing bracket (1) with a nut (special tool 11 9 473).

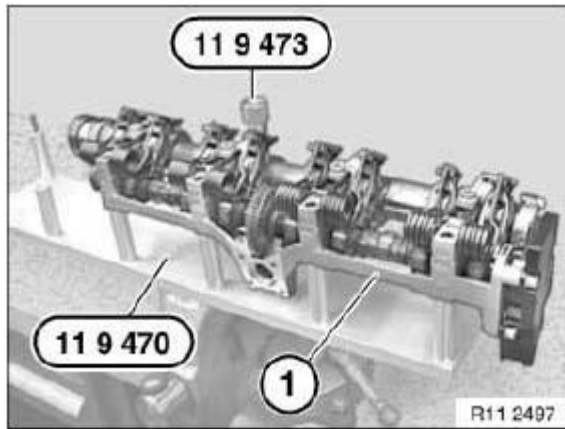


Fig. 518: Identifying Special Tools (11 9 470) And (11 9 473)
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The lower section of the bearing bracket (1) is machined with the cylinder head and must not be mixed up.

NOTE: Lower section of bearing bracket (1) remains on cylinder head.

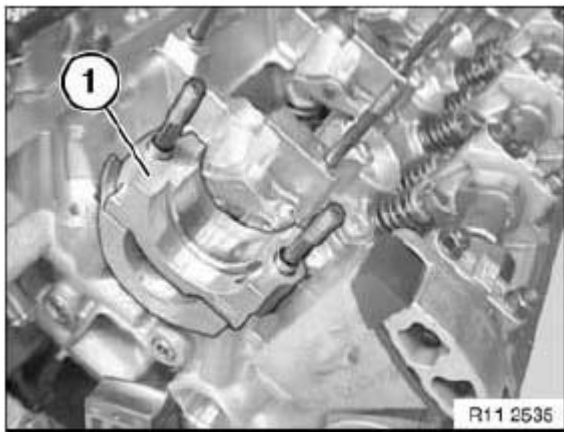


Fig. 519: Identifying Lower Section Of Bearing Bracket
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The mounting of the bearing bracket described later can only be carried out if the inlet camshaft has not been axially displaced.

Special tools 11 9 472 and 11 9 475 prevent the inlet camshaft from rotating and moving while the intermediate levers are installed.

Fit special tool 11 9 472 and secure with special tool 11 9 475.

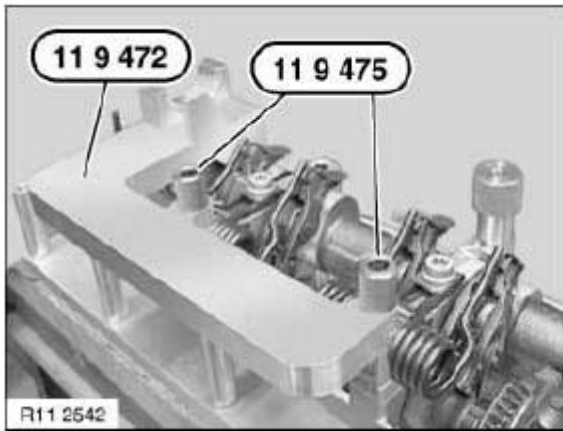


Fig. 520: Identifying Special Tools (11 9 472) And (11 9 475)
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 11 9 474 and initially tighten without play.

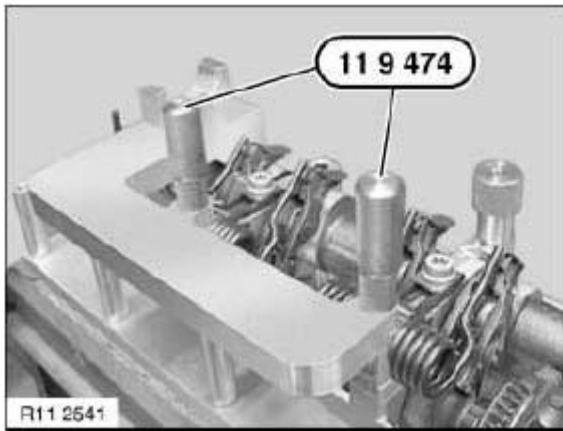


Fig. 521: Identifying Special Tool (11 9 474)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Removal of intermediate levers is described on 8th cylinder. The same procedure is applicable to cylinders 5 to 7.

Raise one end of torsion spring (1) with special tool 11 9 480.

Lift out intermediate lever (2) and set down in an orderly fashion.

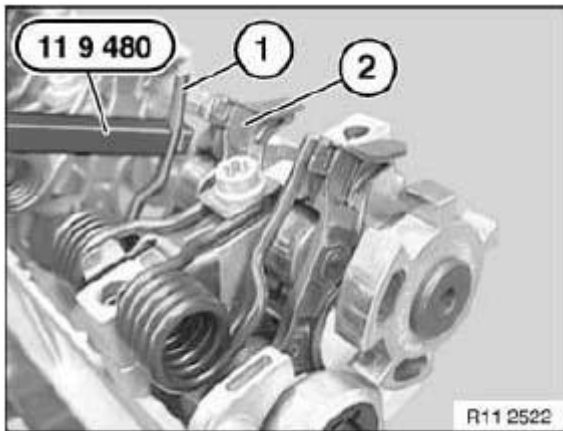


Fig. 522: Identifying Torsion Spring And Intermediate Lever
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Keep holding torsion spring (1) with special tool 11 9 480.

Attach special tool 11 9 490 to end of torsion spring. Support end of torsion spring protected with special tool 11 9 490 on inlet camshaft.

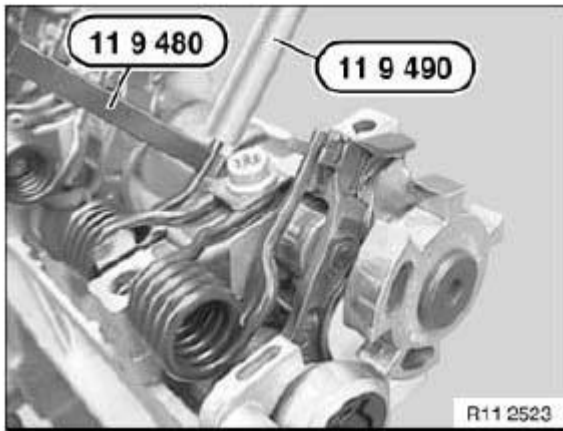


Fig. 523: Identifying Special Tool For Torsion Spring
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Intermediate levers (2) are divided into individual tolerance classes.

Only intermediate levers of the same tolerance class may be fitted in a single cylinder head.

The tolerance classes are designated as illustrated with the numbers from 1 to 5.

Used intermediate levers (2) may only be reused in the same position.

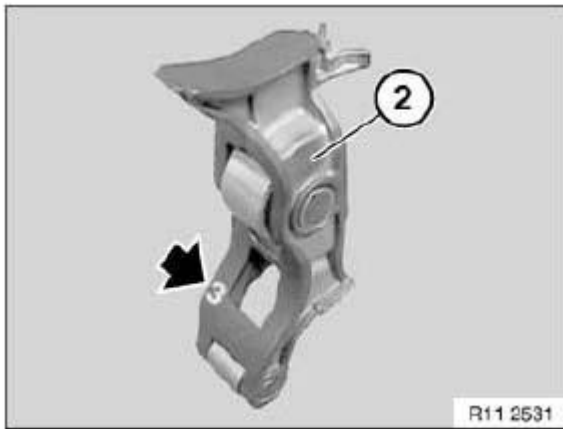


Fig. 524: Locating Intermediate Levers

Courtesy of BMW OF NORTH AMERICA, INC.

Raise second end of torsion spring (1) with special tool 11 9 480.

Lift out intermediate lever (2) and set down in an orderly fashion.

IMPORTANT: Keep holding torsion spring (1) with special tool 11 9 480.

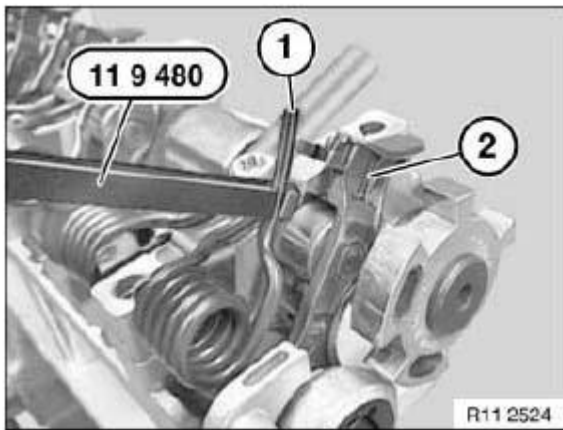


Fig. 525: Identifying Torsion Spring And Intermediate Lever

Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 11 9 490 to second end of torsion spring.

Support end of torsion spring protected with special tool 11 9 490 on inlet camshaft.

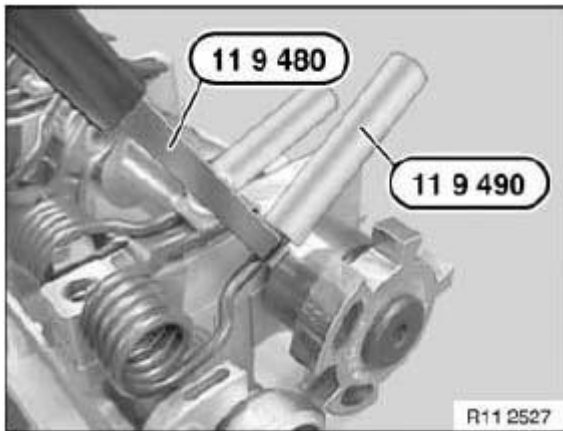


Fig. 526: Identifying Special Tool (11 9 480) And (11 9 490)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Installation of intermediate levers is described separately from removal.

Clean all bearings and cams of inlet camshaft and lubricate with engine oil.

IMPORTANT: Intermediate levers (2) are divided into individual tolerance classes.

Only intermediate levers of the same tolerance class may be fitted in a single cylinder head.

The tolerance classes are designated as illustrated with the numbers from 1 to 5.

Used intermediate levers (2) may only be reused in the same position.

Lubricate all sliding surfaces on intermediate lever (2) with engine oil.

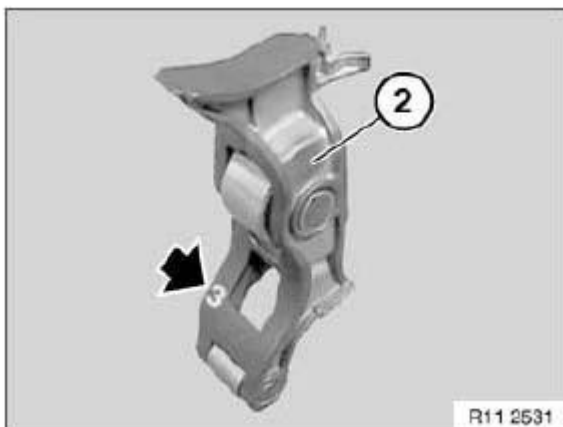
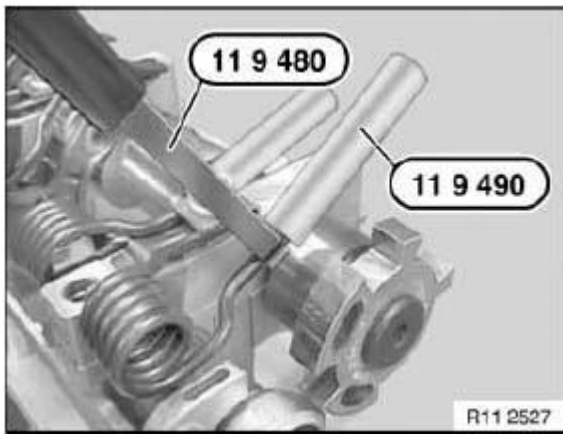


Fig. 527: Locating Intermediate Levers

Courtesy of BMW OF NORTH AMERICA, INC.

Raise torsion spring (1) with special tool 11 9 480.

Remove special tool 11 9 490.

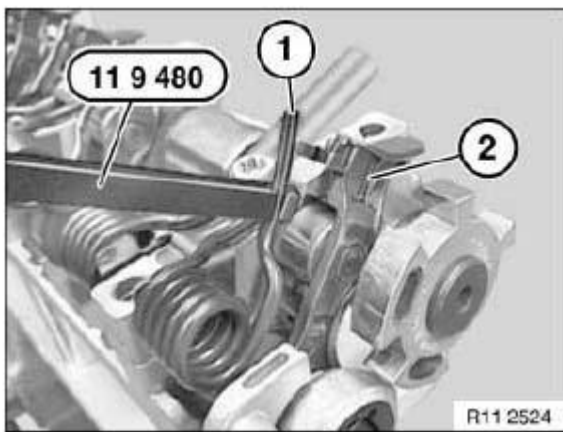
**Fig. 528: Identifying Special Tool (11 9 480) And (11 9 490)**

Courtesy of BMW OF NORTH AMERICA, INC.

Hold torsion spring (1) with special tool 11 9 480.

Install intermediate lever (2) from above.

Insert end of torsion spring (1) into guide on intermediate lever (2).

**Fig. 529: Identifying Torsion Spring And Intermediate Lever**

Courtesy of BMW OF NORTH AMERICA, INC.

Raise second end of torsion spring with special tool 11 9 480.

Remove special tool 11 9 490.

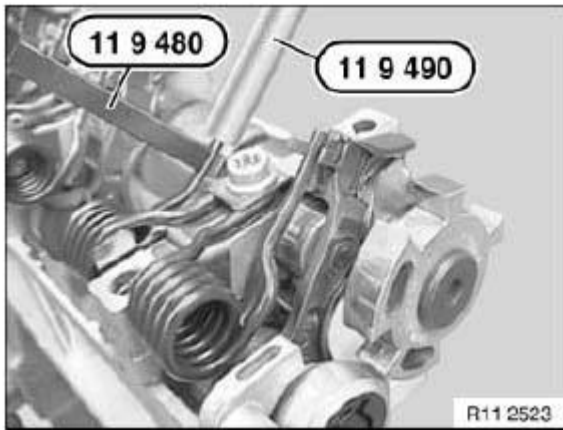


Fig. 530: Identifying Special Tool For Torsion Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Hold torsion spring (1) with special tool 11 9 480.

Install intermediate lever (2) from above.

Insert end of torsion spring (1) into guide on intermediate lever (2).

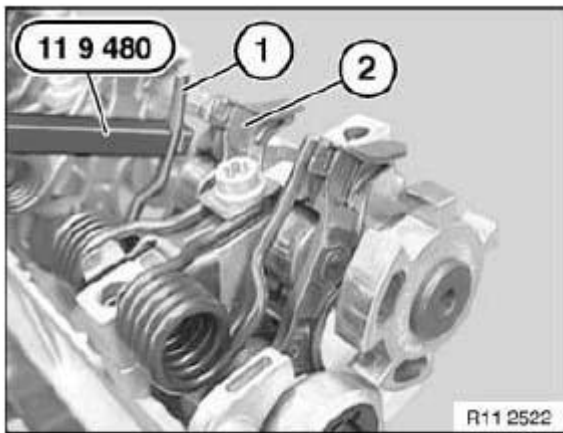


Fig. 531: Identifying Torsion Spring And Intermediate Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 474.

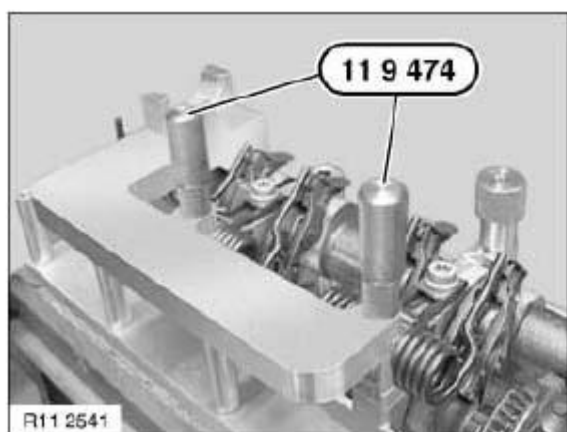


Fig. 532: Identifying Special Tool (11 9 474)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tools 11 9 472 and special tools 11 9 475.

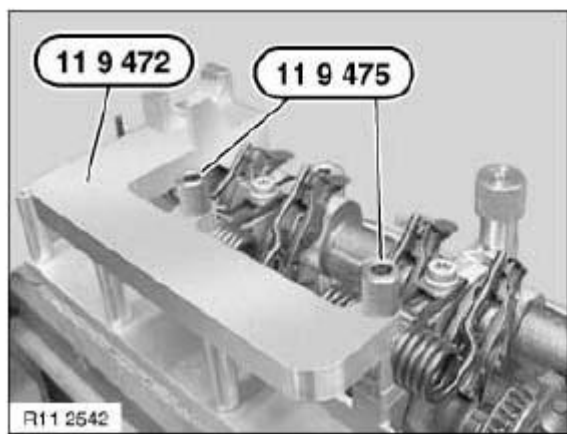


Fig. 533: Identifying Special Tools (11 9 472) And (11 9 475)
Courtesy of BMW OF NORTH AMERICA, INC.

Ends of compression rings (1) point upwards.

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

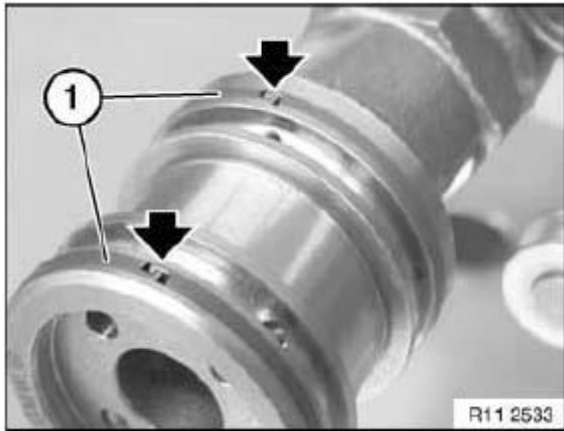


Fig. 534: Identifying Compression Rings

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) slip slightly when bearing bracket is fitted.

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

Align rockers (1) straight.

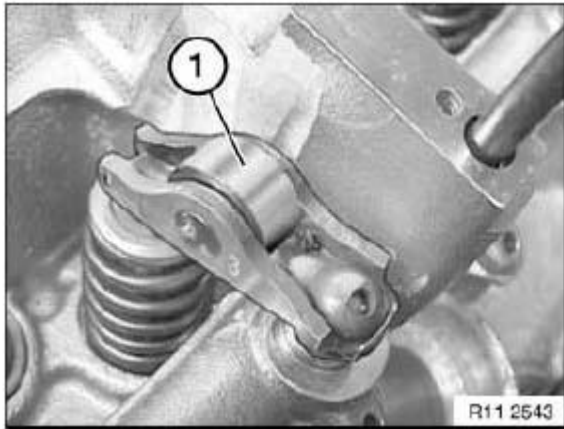


Fig. 535: Identifying Rocker Arms On Inlet Side

Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 473.

Remove bearing bracket (1) from special tool 11 9 470.

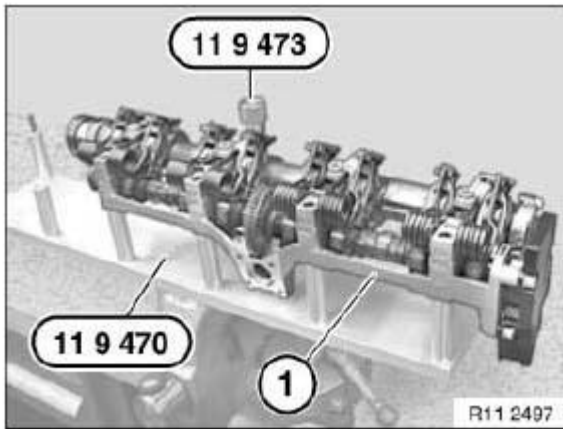


Fig. 536: Identifying Special Tools (11 9 470) And (11 9 473)
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not tilt bearing bracket (1).

Lower bearing bracket (1) from above and carefully bring into contact with cylinder head.

Insert nuts and tighten by hand without play.

IMPORTANT: Make sure none of the intermediate levers or rocker arms have slipped out.

Tighten down nuts from inside to outside.

Tightening torque: 11 31 1AZ . See CAMSHAFT for specs.

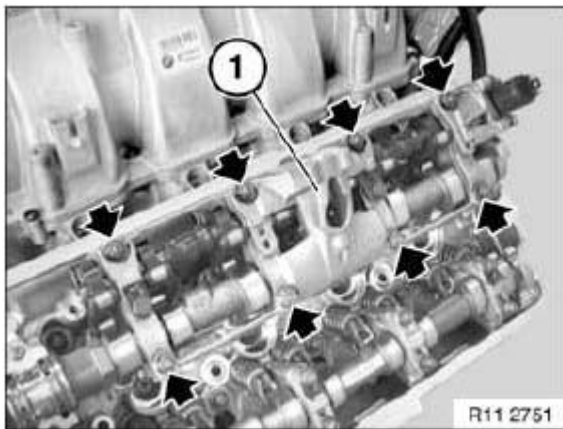


Fig. 537: Locating Bearing Bracket
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Camshaft bearing caps of cylinders 1 to 4 and 5 to 8 must not be mixed up.

Fit bearing cap R E1 in such a way that marking is legible from inlet side.

Install nuts and tighten down.

Tightening torque: 11 31 1AZ . See CAMSHAFT for specs.

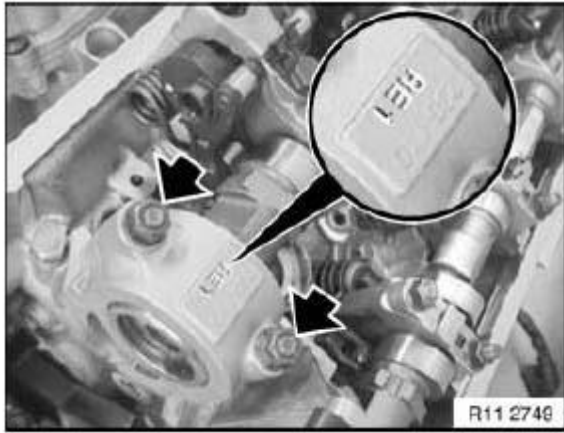


Fig. 538: Locating Camshaft Bearing Caps Of Cylinders
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate inlet camshaft in direction of rotation until cam on 5th cylinder points upwards at an angle as shown in illustration.

NOTE: The marking (1) on the hexagon drive of the inlet camshaft faces upwards.

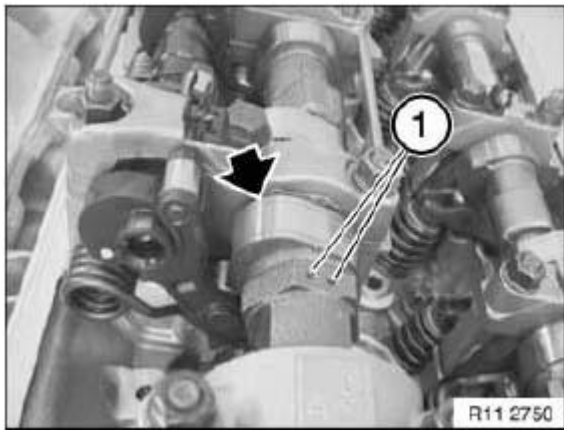


Fig. 539: Locating Camshaft Bearing Caps Of Cylinders
Courtesy of BMW OF NORTH AMERICA, INC.

Install INLET AND EXHAUST ADJUSTMENT UNIT ON LEFT SIDE.

Install spark plugs on cylinder bank 5 to 8.

Install **LEFT CYLINDER HEAD COVER**.

Install ignition coils on cylinder bank 5 to 8.

Install **SERVOMOTOR FOR LEFT ECCENTRIC SHAFT**.

Assemble engine.

11 37 014 REMOVING AND INSTALLING/REPLACING RIGHT INTERMEDIATE LEVERS (N62 FROM 9/03 AND N62TU)

Special tools required:

- **11 9 470**
- **11 9 472**
- **11 9 473**
- **11 9 474**
- **11 9 475**
- **11 9 480**
- **11 9 490**

(cylinder bank 1 to 4)

Removal of intermediate levers is described separately from installation.

Necessary preliminary tasks:

- Remove **SERVOMOTOR FOR RIGHT ECCENTRIC SHAFT**
- Remove ignition coils on cylinder bank 1 to 4
- Remove **RIGHT CYLINDER HEAD COVER**
- Remove spark plugs on cylinder bank 1 to 4
- Remove **RIGHT INLET AND EXHAUST ADJUSTMENT UNITS**

IMPORTANT: The inlet camshaft must first be rotated so that when the bearing bracket is removed the intermediate levers do not slip out and damage the camshaft.

Rotate inlet camshaft in direction of rotation until cam on 1st cylinder is positioned horizontally as shown in illustration.



Fig. 540: Locating Inlet Camshaft Position

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Camshaft bearing caps of cylinders 1 to 4 and 5 to 8 must not be mixed up.

NOTE: Bearing caps of inlet camshaft are marked on cylinder bank 1 to 4 with L E1 to L E5 from inlet side.

Release nuts and remove bearing cap L E1.

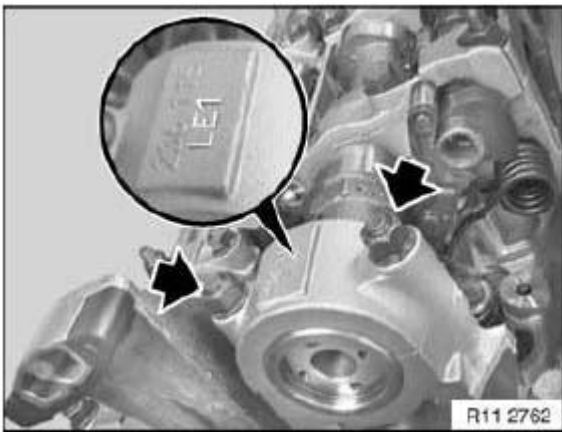


Fig. 541: Locating Bearing Cap Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Release 8 nuts of bearing bracket (1) from outside to inside.

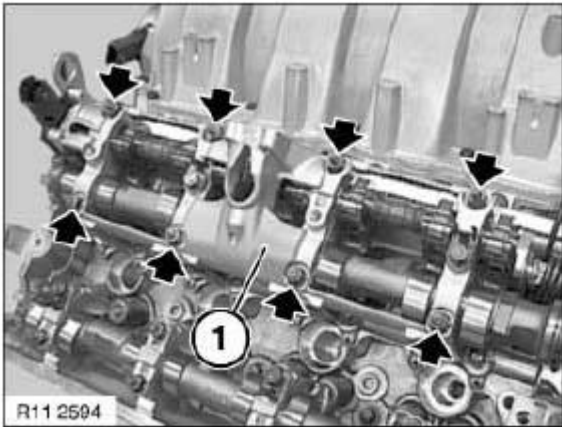


Fig. 542: Locating Bearing Bracket

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Rocker arms are freely accessible after bearing bracket has been removed.

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

IMPORTANT: Rocker arms (1) are divided into individual tolerance classes.

The tolerance classes are designated as illustrated with the numbers from 1 to 4.

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

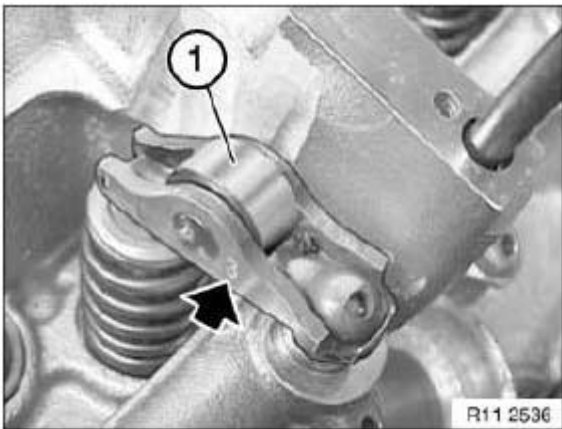


Fig. 543: Locating Rocker Arms On Inlet Side

Courtesy of BMW OF NORTH AMERICA, INC.

When replacing rocker arms (1) on inlet side: install rocker arms of the same tolerance class in the same position.

Clamp special tool 11 9 470 as illustrated in a vice.

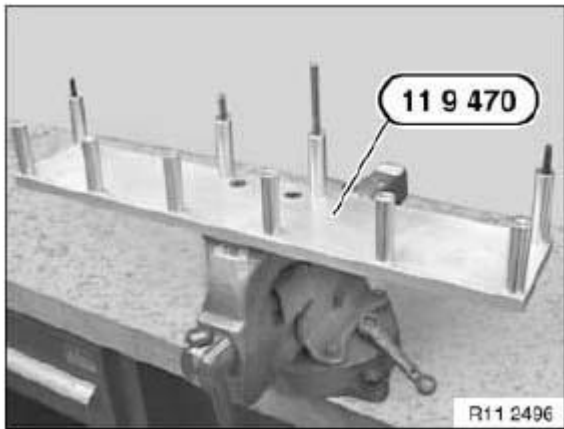


Fig. 544: Identifying Special Tool (11 9 470)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not tilt bearing bracket (1).

Carefully lift out bearing bracket (1).

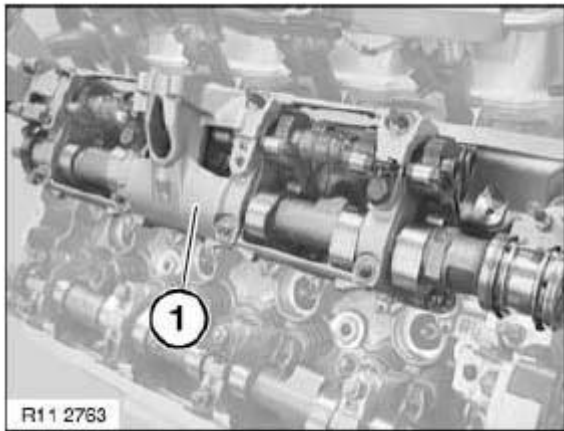


Fig. 545: Identifying Tilt Bearing Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Place bearing bracket (1) with inlet camshaft and eccentric shaft as illustrated on special tool 11 9 470.

Secure bearing bracket (1) with a nut (special tool 11 9 473).

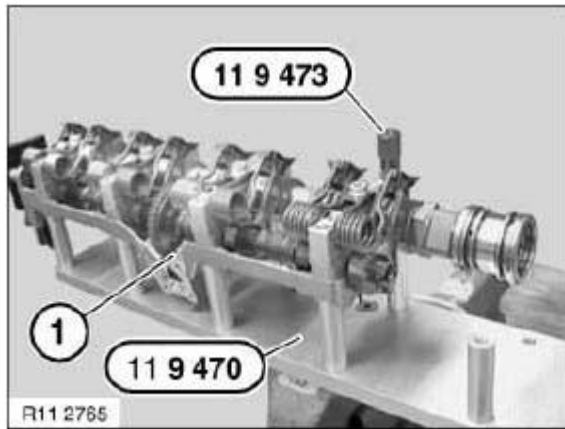


Fig. 546: Identifying Special Tools (11 9 473) And (11 9 470)
 Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The lower section of the bearing bracket (1) is machined with the cylinder head and must not be mixed up.

NOTE: Lower section of bearing bracket (1) remains on cylinder head.

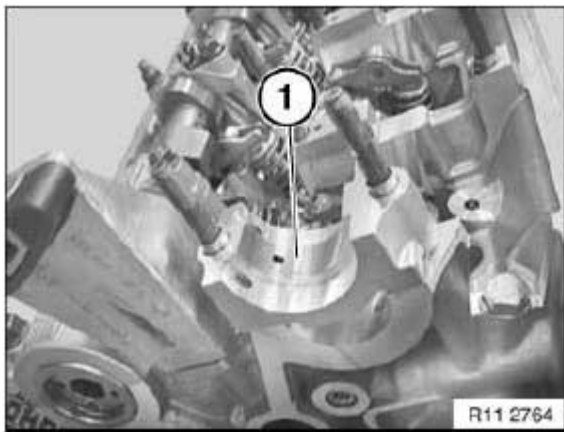


Fig. 547: Identifying Bearing Bracket Lower Section
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The mounting of the bearing bracket described later can only be carried out if the inlet camshaft has not been axially displaced.

Special tools 11 9 472 and 11 9 475 prevent the inlet camshaft from rotating and moving while the intermediate levers are installed.

Fit special tool 11 9 472 and secure with special tool 11 9 475.

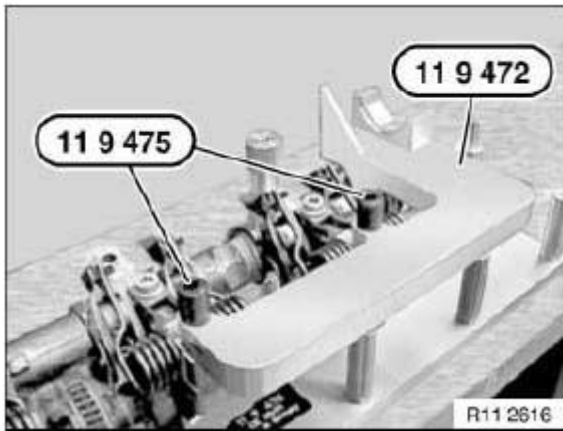


Fig. 548: Identifying Special Tools (11 9 475) And (11 9 472)
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 11 9 474 and initially tighten without play.

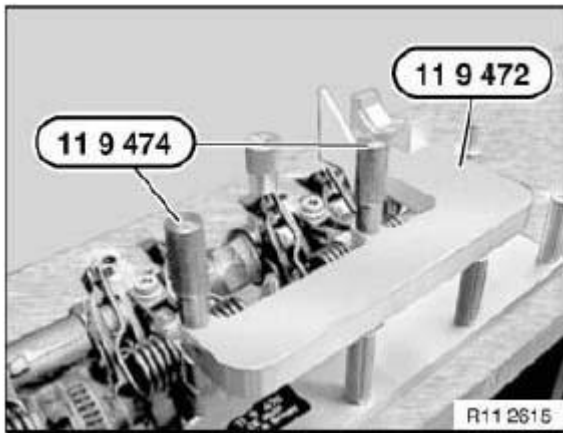


Fig. 549: Identifying Special Tool (11 9 461)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Removal of intermediate levers is described on 4th cylinder. The same procedure is applicable to cylinders 1 to 3.

Raise one end of torsion spring (1) with special tool 11 9 480.

Lift out intermediate lever (2) and set down in an orderly fashion.

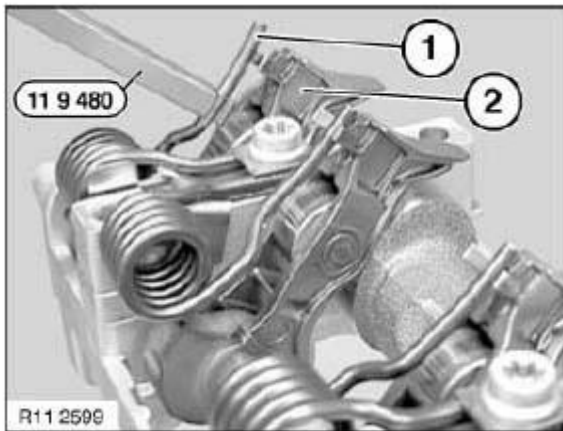


Fig. 550: Identifying Torsion Spring And Intermediate Lever
Courtesy of BMW OF NORTH AMERICA, INC.

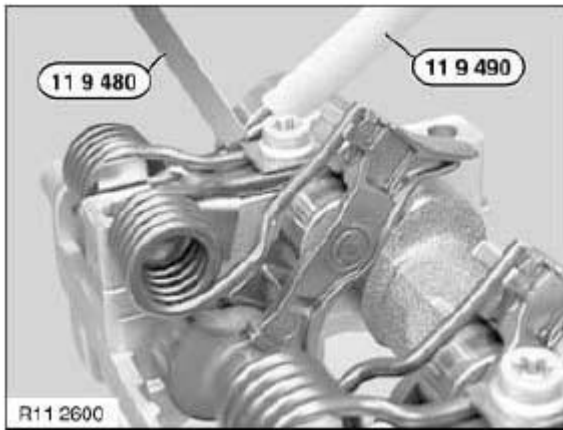


Fig. 551: Identifying Special Tool (11 9 480) And (11 9 490)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Intermediate levers (2) are divided into individual tolerance classes.

Only intermediate levers of the same tolerance class may be fitted in a single cylinder head.

The tolerance classes are designated as illustrated with the numbers from 1 to 5.

Used intermediate levers (2) may only be reused in the same position.

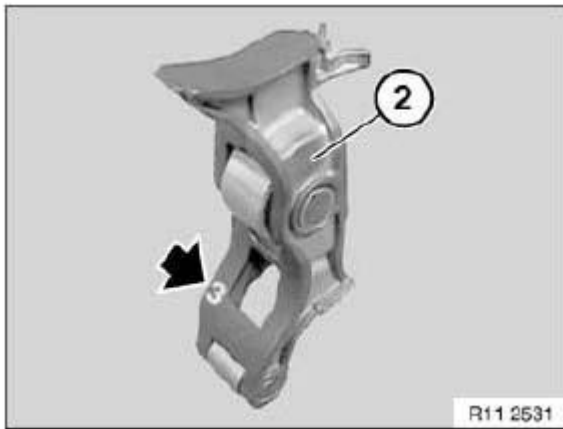


Fig. 552: Locating Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

Raise second end of torsion spring (1) with special tool 11 9 480.

Lift out intermediate lever (2) and set down in an orderly fashion.

IMPORTANT: Keep holding torsion spring (1) with special tool 11 9 480.

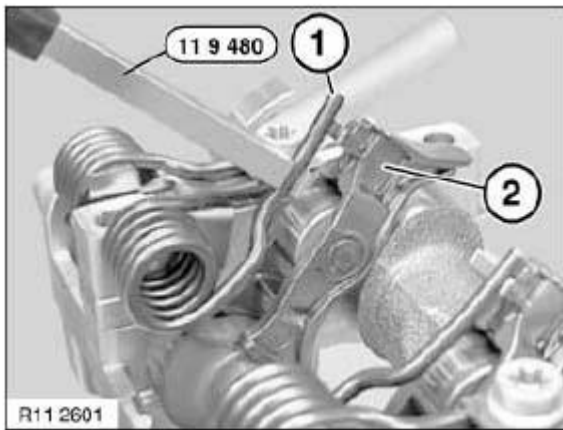


Fig. 553: Holding Torsion Spring With Special Tool (11 9 480)
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 11 9 490 to second end of torsion spring.

Support end of torsion spring protected with special tool 11 9 490 on inlet camshaft.

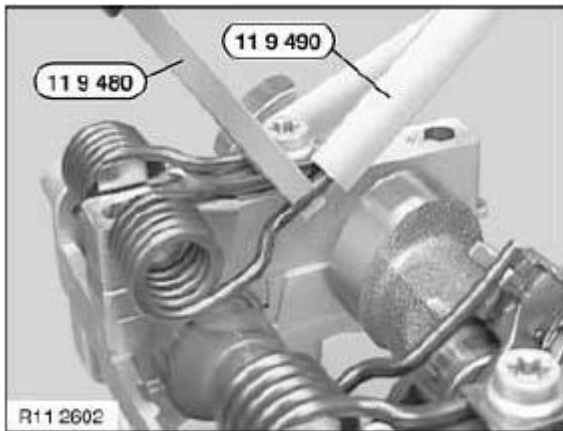


Fig. 554: Identifying Special Tool (11 9 480) And (11 9 490)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Removal of intermediate levers is described separately from installation.

Clean all bearings and cams of inlet camshaft and lubricate with engine oil.

IMPORTANT: Intermediate levers (2) are divided into individual tolerance classes.

Only intermediate levers of the same tolerance class may be fitted in a single cylinder head.

The tolerance classes are designated as illustrated with the numbers from 1 to 5.

Used intermediate levers (2) may only be reused in the same position.

Lubricate all sliding surfaces on intermediate lever (2) with engine oil.

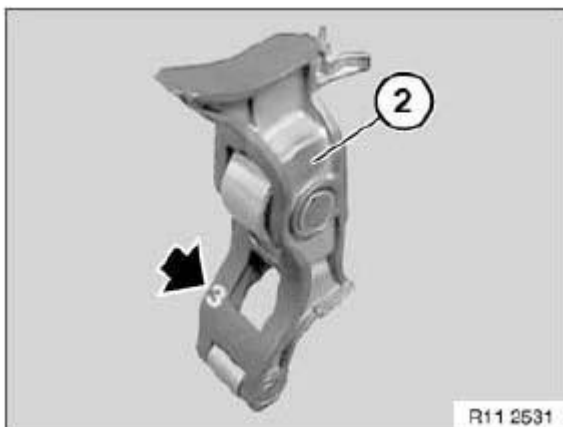
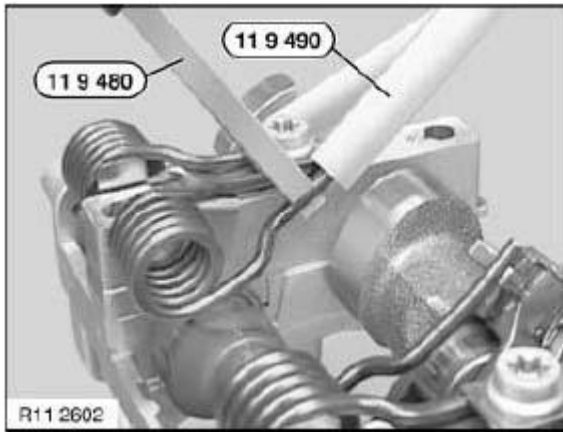


Fig. 555: Locating Intermediate Levers

Courtesy of BMW OF NORTH AMERICA, INC.

Raise torsion spring (1) with special tool 11 9 480.

Remove special tool 11 9 490.

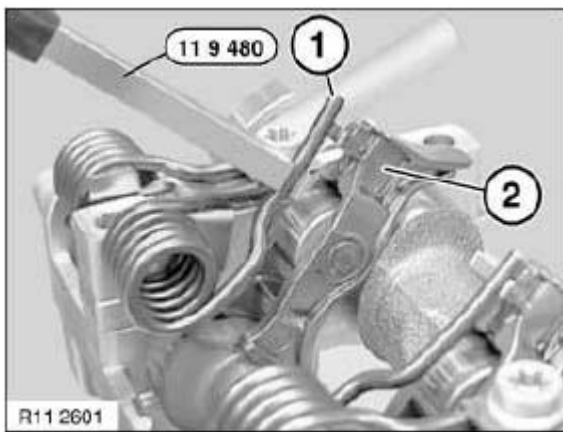
**Fig. 556: Identifying Special Tool (11 9 480) And (11 9 490)**

Courtesy of BMW OF NORTH AMERICA, INC.

Hold torsion spring (1) with special tool 11 9 480.

Install intermediate lever (2) from above.

Insert end of torsion spring (1) into guide on intermediate lever (2).

**Fig. 557: Holding Torsion Spring With Special Tool (11 9 480)**

Courtesy of BMW OF NORTH AMERICA, INC.

Raise second end of torsion spring with special tool 11 9 480.

Remove special tool 11 9 490.

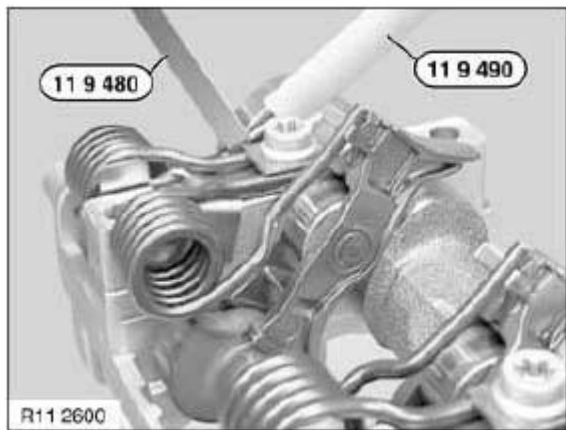


Fig. 558: Identifying Special Tool (11 9 480) And (11 9 490)
Courtesy of BMW OF NORTH AMERICA, INC.

Hold torsion spring (1) with special tool 11 9 480.

Install intermediate lever (2) from above.

Insert end of torsion spring (1) into guide on intermediate lever (2).

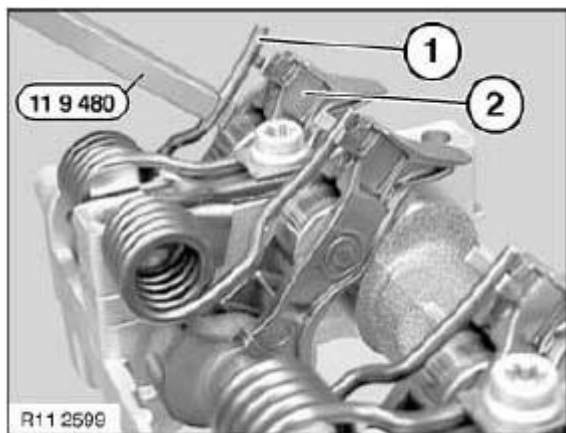


Fig. 559: Identifying Torsion Spring And Intermediate Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 474.

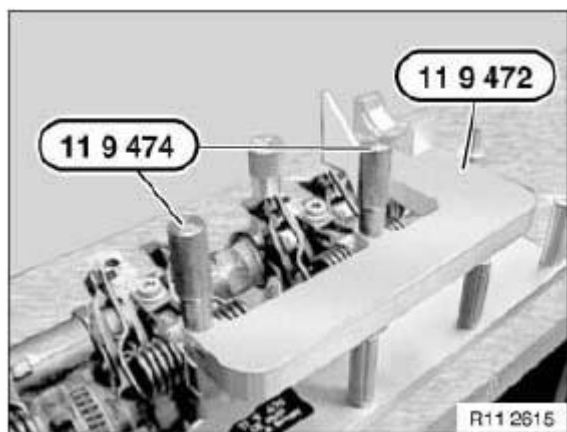


Fig. 560: Identifying Special Tool (11 9 474) And (11 9 472)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tools 11 9 472 and special tools 11 9 475.

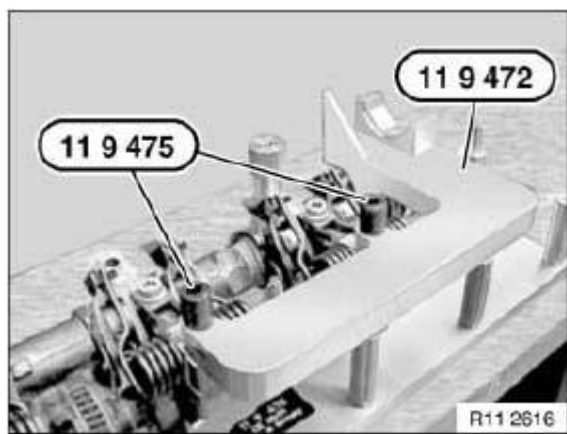


Fig. 561: Identifying Special Tools (11 9 475) And (11 9 472)
Courtesy of BMW OF NORTH AMERICA, INC.

Ends of compression rings (1) point upwards.

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

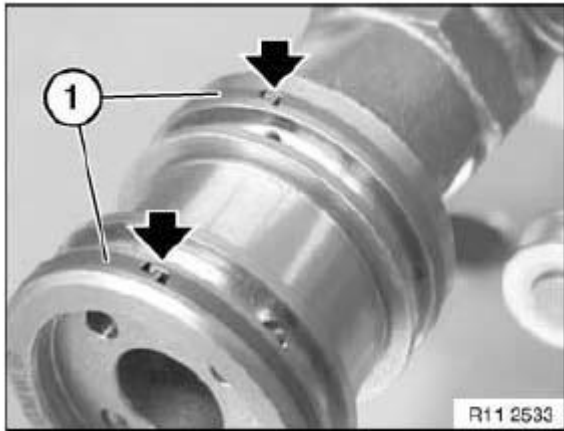


Fig. 562: Identifying Compression Rings

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rocker arms (1) slip slightly when bearing bracket is fitted.

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

Align rockers (1) straight.

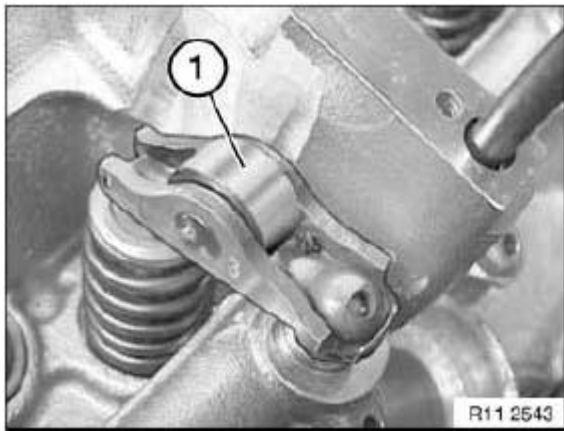


Fig. 563: Identifying Rocker Arms On Inlet Side

Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 473.

Remove bearing bracket (1) from special tool 11 9 470.

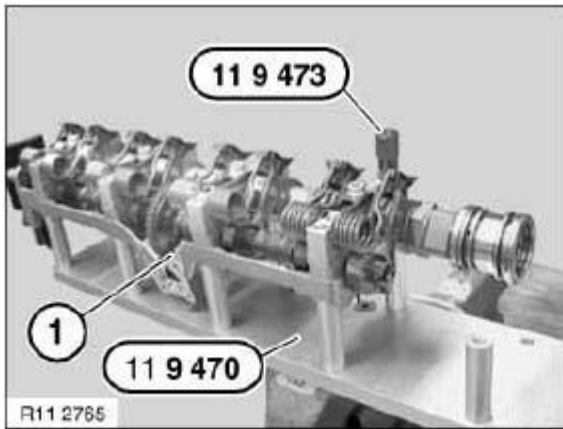


Fig. 564: Identifying Special Tools (11 9 473) And (11 9 470)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not tilt bearing bracket (1).

Lower bearing bracket (1) from above and carefully bring into contact with cylinder head.

Insert nuts and tighten by hand without play.

IMPORTANT: Make sure none of the intermediate levers or rocker arms have slipped out.

Tighten down nuts from inside to outside.

Tightening torque: 11 31 1AZ . See CAMSHAFT for specs.

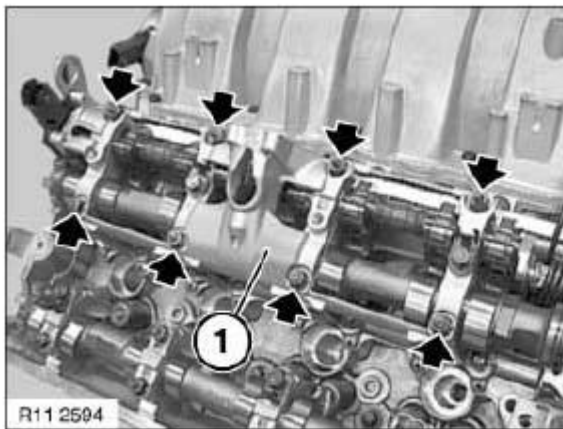


Fig. 565: Locating Bearing Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Camshaft bearing caps of cylinders 1 to 4 and 5 to 8 must not be mixed up.

Fit bearing cap L E1 in such a way that marking is legible from inlet side.

Install nuts and tighten down.

Tightening torque: 11 31 1AZ . See CAMSHAFT for specs.

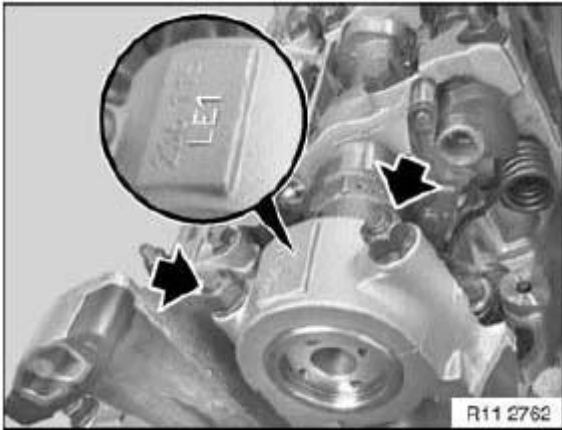


Fig. 566: Locating Bearing Cap Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate inlet camshaft at hexagon head against direction of rotation until cam on 1st cylinder points downwards at an angle as shown in illustration.

NOTE: The marking (1) on the hexagon drive of the inlet camshaft faces upwards.

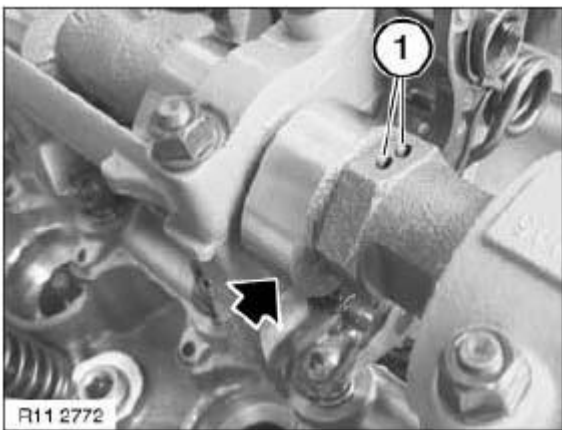


Fig. 567: Identifying Inlet Camshaft Marking
Courtesy of BMW OF NORTH AMERICA, INC.

Install INLET AND EXHAUST ADJUSTMENT UNIT ON RIGHT SIDE.

Install spark plugs on cylinder bank 1 to 4.

Install **RIGHT CYLINDER HEAD COVER**.

Install ignition coils on cylinder bank 1 to 4.

Install **SERVOMOTOR FOR RIGHT ECCENTRIC SHAFT**.

Assemble engine.

11 37 022 REMOVING AND INSTALLING/REPLACING SERVOMOTOR FOR LEFT ECCENTRIC SHAFT (N62/N62TU)

IMPORTANT: Follow instructions issued by diagnosis tester.

Risk of damage to intermediate shaft.

(cylinder bank 5 to 8)

Necessary preliminary tasks:

- Connect diagnosis tester.
- Remove **ACOUSTIC COVER**
- Remove ignition coil cover

IMPORTANT: Follow instructions issued by diagnosis tester.

Unlock plug (1) on servomotor (2) and disconnect.

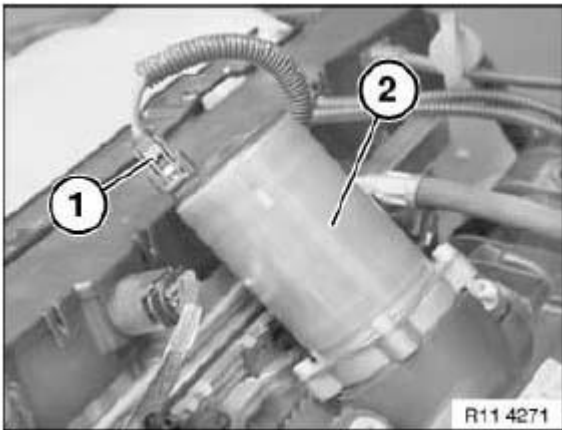


Fig. 568: Identifying Unlock Plug On Servomotor
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws.

Rotate servomotor (2) until no longer engaged in spline teeth of eccentric shaft.

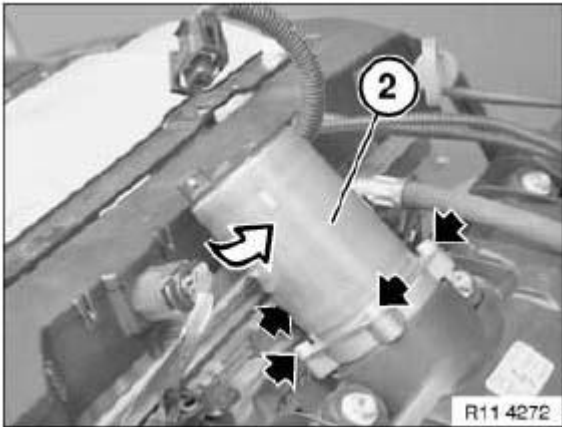


Fig. 569: Rotating Servomotor Until
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing ring on spacer.

Install servomotor (1) and screw in up to spacer.

Rotate servomotor (1) into correct installation position.

Install and tighten down screws.

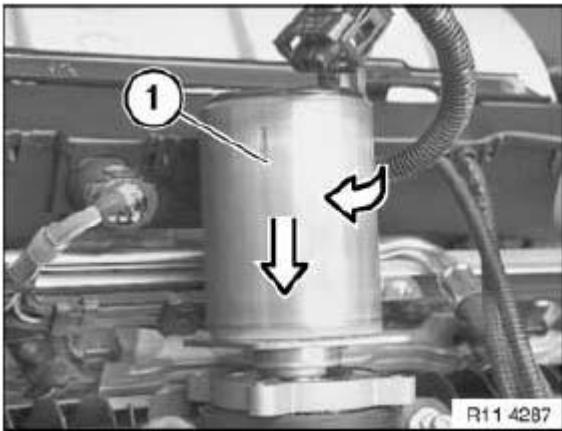


Fig. 570: Rotating Servomotor Into Correct Installation Position
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Read out fault memory of control unit of Digital Motor Electronics (DME).

Check stored fault messages.

Rectify faults.

Now clear the fault memory.

11 37 024 REMOVING AND INSTALLING/REPLACING SERVOMOTOR FOR RIGHT ECCENTRIC SHAFT (N62/N62TU)

IMPORTANT: Follow instructions issued by diagnosis tester.

Risk of damage to intermediate shaft.

(cylinder bank 1 to 4)

Necessary preliminary tasks:

- Connect diagnosis tester
- Remove ACOUSTIC COVER
- Remove ignition coil cover

IMPORTANT: Follow instructions issued by diagnosis tester.

Unlock plug (1) on servomotor (2) and disconnect.

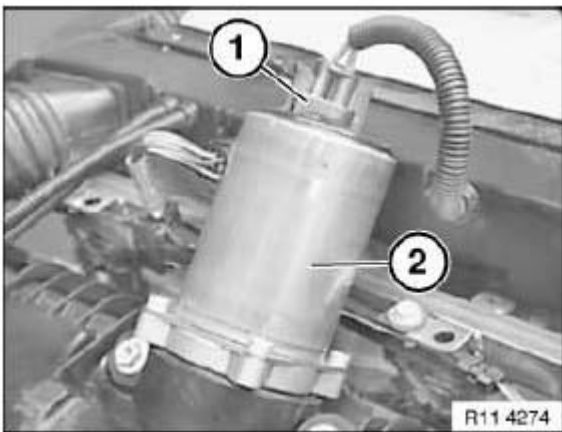
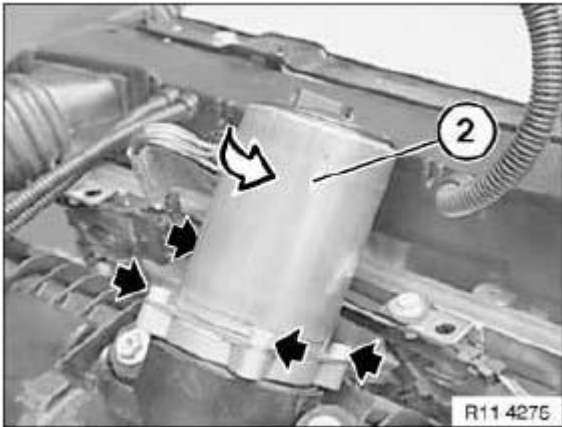


Fig. 571: Identifying Unlock Plug On Servomotor
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws.

Rotate servomotor (2) until no longer engaged in spline teeth of eccentric shaft.

**Fig. 572: Rotating Servomotor**

Courtesy of BMW OF NORTH AMERICA, INC.

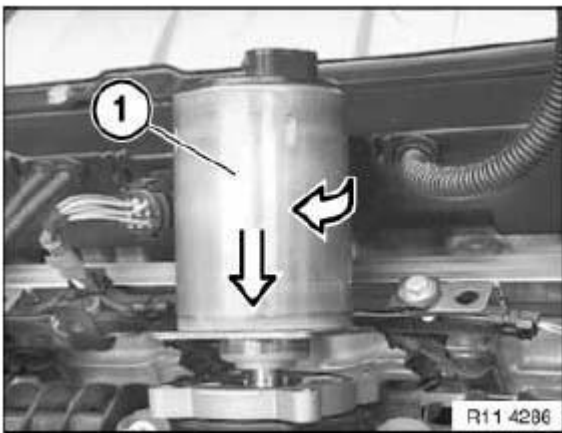
Installation:

Replace sealing ring on spacer.

Install servomotor (1) and screw in up to spacer.

Rotate servomotor (1) into correct installation position.

Install and tighten down screws.

**Fig. 573: Rotating Servomotor Into Correct Installation Position**

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Read out fault memory of control unit of Digital Motor Electronics (DME).

Check stored fault messages.

Rectify faults.

Now clear the fault memory.

11 37 035 REMOVING AND INSTALLING/REPLACING LEFT ECCENTRIC SHAFT SENSOR (N62/N62TU)

(cylinder bank 5 to 8)

Necessary preliminary tasks:

- Remove **LEFT CYLINDER HEAD COVER**

Unfasten screws.

Remove eccentric shaft sensor (1).

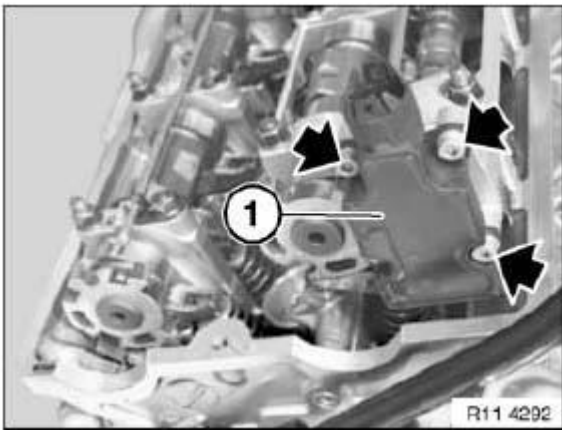


Fig. 574: Identifying Eccentric Shaft Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Read out fault memory of control unit of Digital Motor Electronics (DME).

Check stored fault messages.

Rectify faults.

Now clear the fault memory.

11 37 040 REMOVING AND INSTALLING/REPLACING RIGHT ECCENTRIC SHAFT SENSOR (N62/N62TU)

(cylinder bank 1 to 4)

Necessary preliminary tasks:

- Remove **RIGHT CYLINDER HEAD COVER**

Unfasten screws.

Remove eccentric shaft sensor (1).

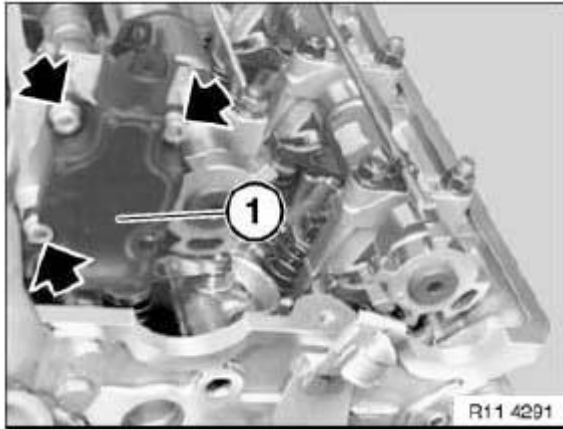


Fig. 575: Identifying Eccentric Shaft Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Read out fault memory of control unit of Digital Motor Electronics (DME).

Check stored fault messages.

Rectify faults.

Now clear the fault memory.

11 37 700 REPLACING CONTROL UNIT (VALVETRONIC)

Switch off ignition.

FOLLOW INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY .

Disconnect battery.

CAUTION: Follow INSTRUCTIONS FOR REMOVING AND INSTALLING ELECTRONIC CONTROL UNITS .

Observe following instructions before replacing control unit:

PROGRAM CONTROL UNIT .

Remove right fresh air duct.

Release screw and remove holder (1).

Release screws and remove cover (2) from control unit box.

NOTE: Release screws on seal (3) only when removing wiring harness.

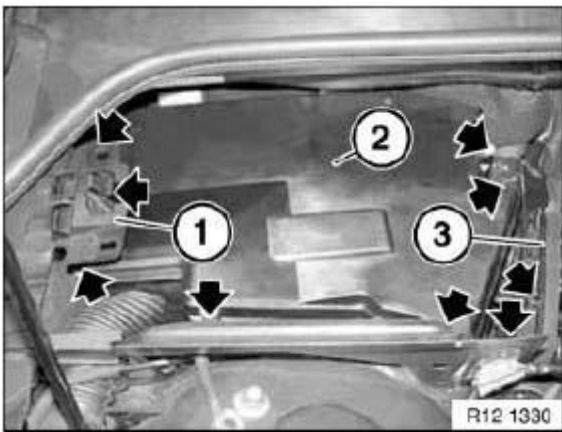


Fig. 576: Identifying Holder And Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert tabs (1) in openings (2) and close cover.

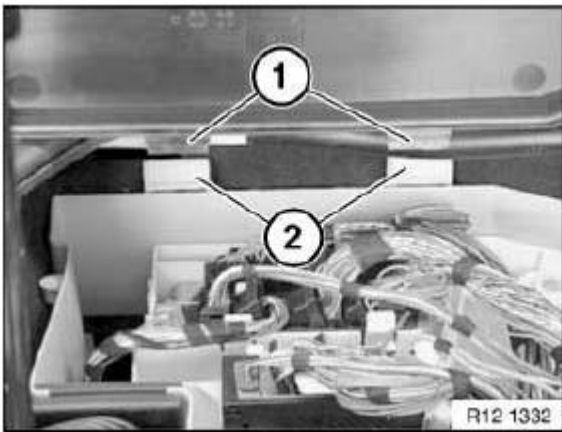


Fig. 577: Identifying Cover And Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach plug connections on Valvetronic control unit (1).

Remove Valvetronic control unit (1).

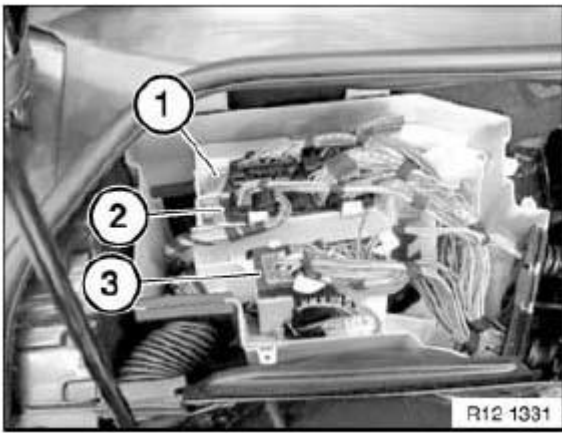


Fig. 578: Identifying Valvetronic Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Interrogate fault memory of DME control unit.

Check stored fault messages.

Rectify faults.

Then clear fault memory.

40 OIL SUPPLY

11 40 000 CHECKING ENGINE OIL PRESSURE

Special tools required:

- 11 4 050
- 13 3 061
- 13 3 063
- 13 6 051
- 13 6 054

NOTE: To check the engine oil pressure, the oil pressure switch must be removed and the special tools installed and connected.

NOTE: A small amount of oil will emerge when the oil pressure switch is removed. Have a cleaning cloth ready.

Make sure no oil runs onto belt drive.

Remove any remnants of oil immediately with cleaning cloth.

Remove oil pressure switch.

Installation:

Tightening torque: 12 61 1AZ . See **OIL PRESSURE, OIL TEMPERATURE, OIL LEVEL DISPLAY** for specs.

Install special tool 11 4 050 with sealing ring (1) in place of oil pressure switch.

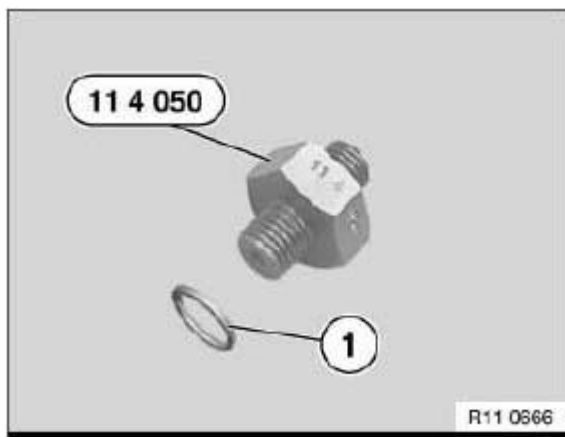


Fig. 579: Identifying Special Tool (11 4 050) With Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Check engine oil pressure with DIS Tester

Attach special tool 13 6 054 with sealing ring (1) and special tool 13 6 051 and connect to DIS Tester.

Check engine oil pressure with pressure gauge

Install special tool 13 3 063 and special tool 13 3 061 (pressure gauge).

Start engine and check engine oil pressure.

SPECIFIED VALUE .

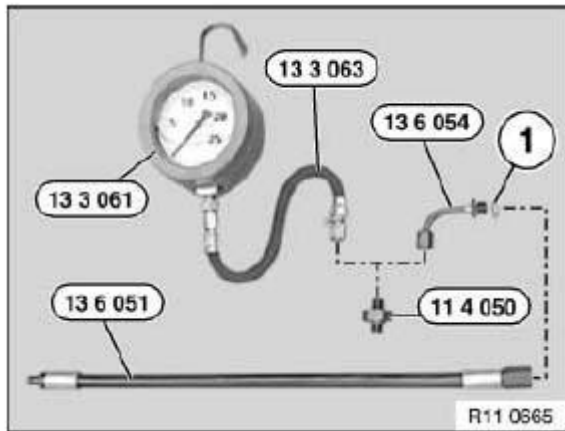


Fig. 580: Identifying Special Tool (13 3 063) And (13 3 061) (Pressure Gauge)
 Courtesy of BMW OF NORTH AMERICA, INC.

41 OIL PUMP WITH FILTER AND DRIVE

11 41 000 REMOVING AND INSTALLING/REPLACING OIL PUMP (N62)

Necessary preliminary tasks:

- Drain engine oil.
- Remove upper oil sump section. See **REMOVING AND INSTALLING/REPLACING OIL SUMP TOP SECTION (N62/N62TU)** and **REMOVING AND INSTALLING/REPLACING OIL SUMP BOTTOM SECTION (N62/N62TU)**.
- Remove **REINFORCEMENT PLATE** .

Unscrew nut (1).

Tightening torque: 11 41 4AZ . See **OIL PUMP WITH STRAINER AND DRIVE** for specs.

Remove oil pump sprocket wheel (2).

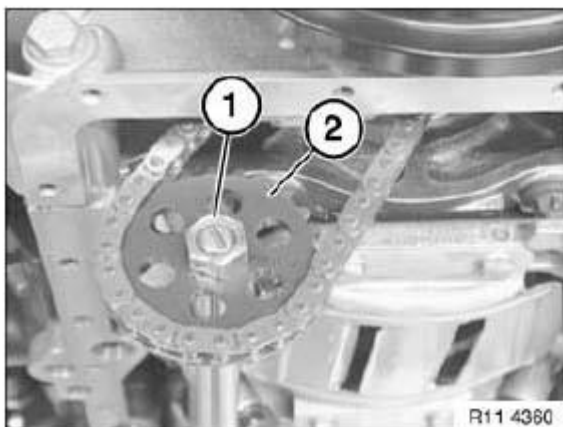


Fig. 581: Identifying Oil Pump Sprocket Wheel And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws, remove oil pump (1) with aid of a second person.

Installation:

Replace screws.

Tightening torque: 11 41 2AZ . See OIL PUMP WITH STRAINER AND DRIVE for specs.

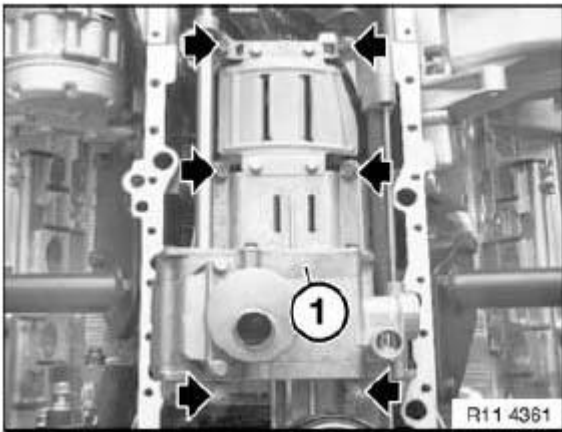


Fig. 582: Identifying Oil Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing ring (1).

Apply light coat of oil to sealing ring (1).

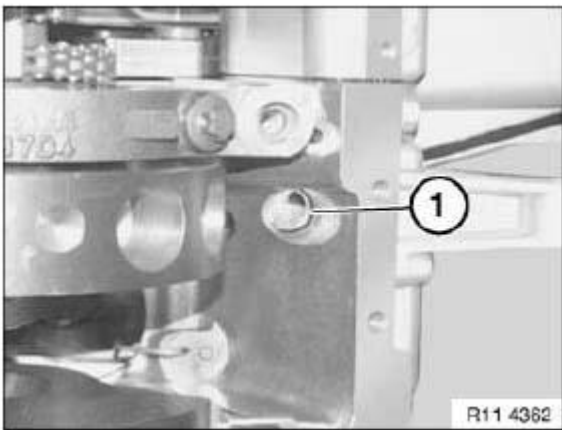


Fig. 583: Identifying Sealing Ring

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert oil line (2) in crankcase.

Do not damage sealing ring.

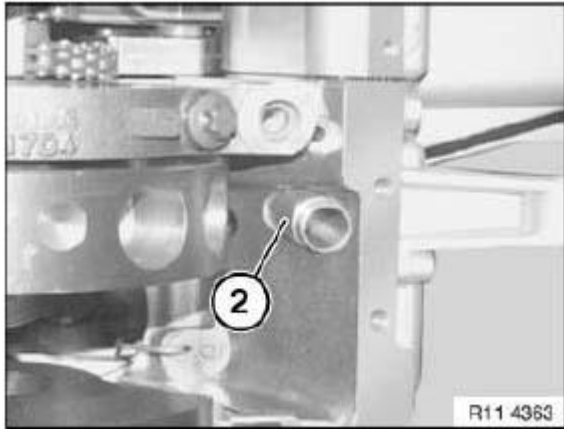


Fig. 584: Identifying Oil Line In Crankcase

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing ring (1).

Apply light coat of oil to sealing ring (1).

Insert oil line (2) in bore hole in oil pump.

Replace sealing ring (3).

Apply light coat of oil to sealing ring (3).

Do not damage sealing rings.

Make sure oil lines are correctly seated.

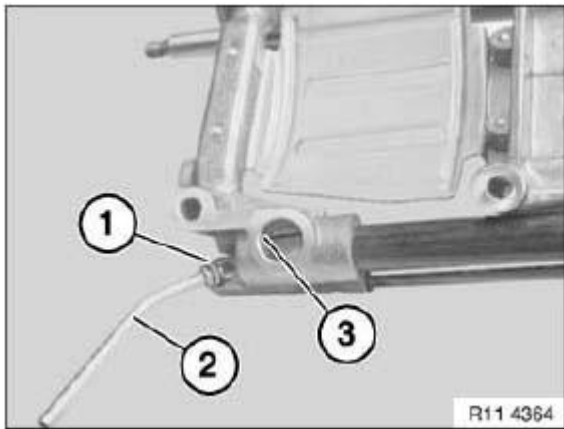


Fig. 585: Identifying Sealing Ring And Oil Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Install oil pump with aid of a second person.

Assemble engine.

43 OIL FILLING, DIPSTICK

11 43 000 REMOVING AND INSTALLING/SEALING GUIDE TUBE FOR OIL DIPSTICK (N62)

Necessary preliminary tasks:

- Remove INTAKE AIR MANIFOLD.
- Drain engine oil.

NOTE: For purposes of clarity, this work step is shown on the engine after it has been removed.

Unlock and detach vacuum line (1).

Release screws and remove check valve (2).

Remove guide tube (3) upwards.

Installation:

Replace sealing ring on guide tube.

Apply light coat of oil to seal.

Replacing sealing ring on check valve pipe.

Apply light coat of oil to seal.

Assemble engine.

Check engine for leaks.

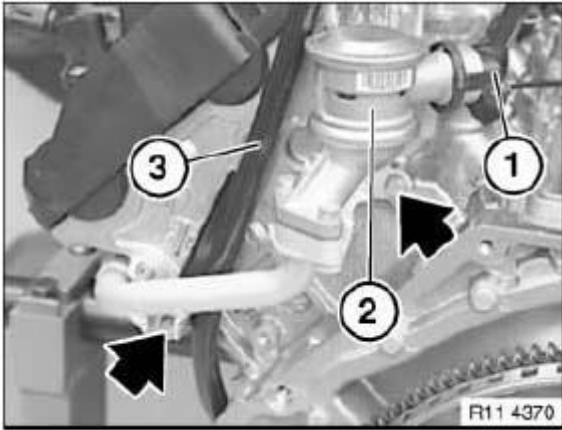


Fig. 586: Identifying Vacuum Line And Guide Tube
Courtesy of BMW OF NORTH AMERICA, INC.

51 WATER PUMP WITH DRIVE

11 51 000 REMOVING AND INSTALLING/REPLACING WATER PUMP (N62/N62TU)

WARNING: Only carry out work on the cooling system after the engine has cooled down (risk of scalding).

Follow INSTRUCTIONS FOR WORKING ON COOLING SYSTEM .

Necessary preliminary tasks:

- Drain and dispose of coolant from radiator.
- Remove fan cowl.
- Remove ELECTRIC FAN .
- Remove ALTERNATOR DRIVE BELT.

Unlock and detach plug connections (1).

Release screw and remove vacuum line holder.

Unlock and detach all coolant hoses on water pump.

Release screws and remove belt pulley (2).

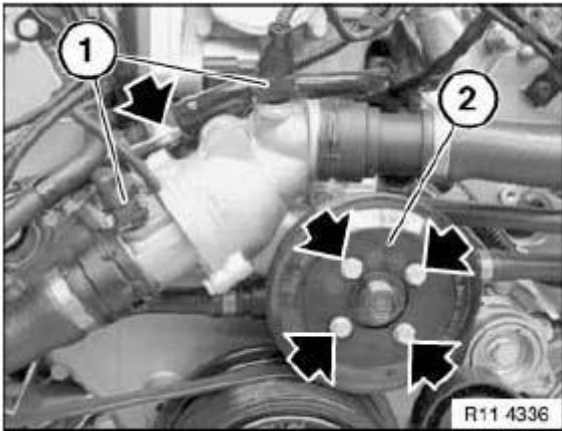


Fig. 587: Identifying Plug Connections And Belt Pulley Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove VIBRATION DAMPER.

Release screws and remove water pump (1).

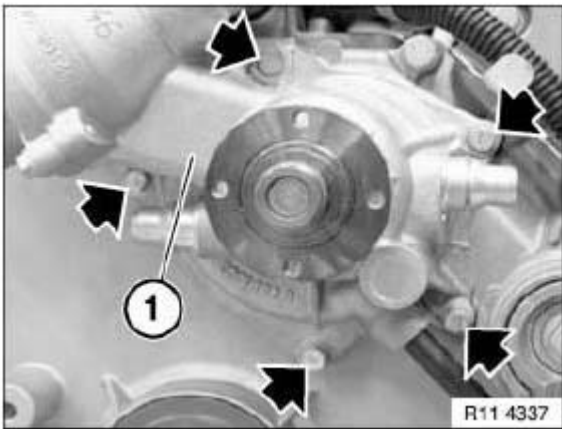


Fig. 588: Identifying Water Pump And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check adapter sleeve (1) for correct seating and damage; replace if necessary.

Clean sealing faces (2).

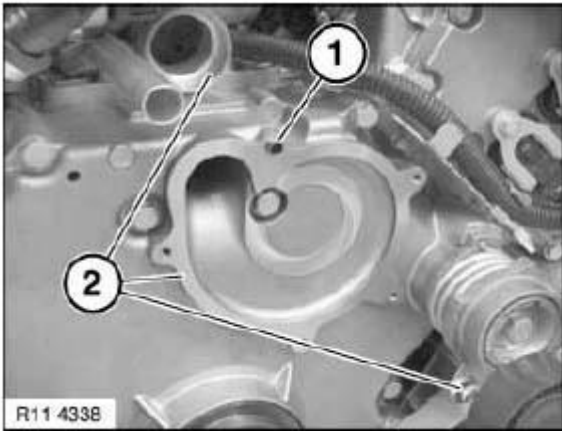


Fig. 589: Identifying Sealing Faces

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing surfaces.

Replace sealing rings (1 and 2).

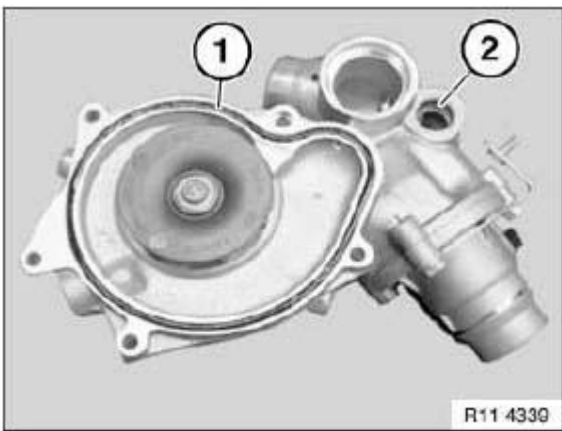


Fig. 590: Identifying Sealing Rings

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace both coolant pipes (1) and coat sealing surfaces with anti-friction rubber coating.

Thin coolant pipe (1) only with water-cooled alternator.

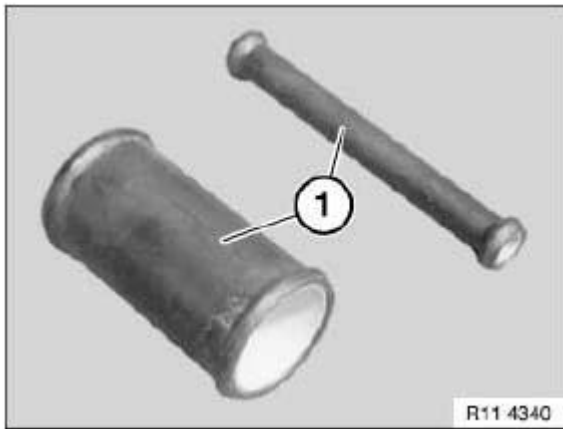


Fig. 591: Identifying Coolant Pipe

Courtesy of BMW OF NORTH AMERICA, INC.

- NOTE:** Remove coolant thermostat and coolant sensor of faulty water pump.
- Check coolant thermostat and coolant sensor for damage and replace if necessary.
- Install coolant thermostat and coolant sensor in new water pump.

Assemble engine.

VENT COOLING SYSTEM AND CHECK FOR LEAKS .

52 FAN

11 52 020 REMOVING AND INSTALLING OR REPLACING FAN CLUTCH (N62)

Special tools required:

- 11 5 040
- 11 5 050

CAUTION: Left-hand threads.

Using special tool 11 5 050 brace against pulley and unfasten cap nut from water pump using special tool 11 5 040.

Remove fan wheel with fan coupling from water pump.

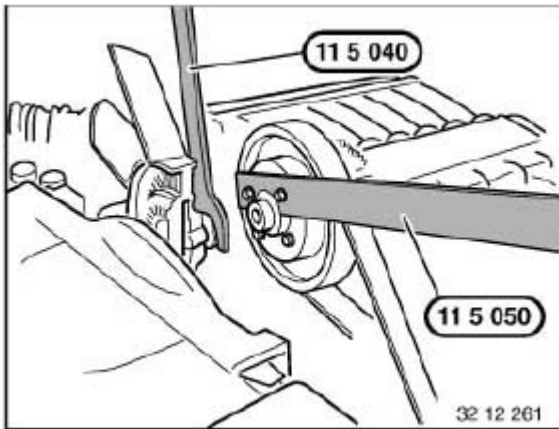


Fig. 592: Identifying Special Tool (11 5 050 And 11 5 040) On Water Pump
 Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Tighten down fan impeller using special tool 11 5 040.

Tightening torque: 11 52 1AZ . See **FAN** for specs.

NOTE: When using special tool 11 5 040, 30 Nm on the torque wrench scale are equivalent to a tightening torque of 40 Nm.

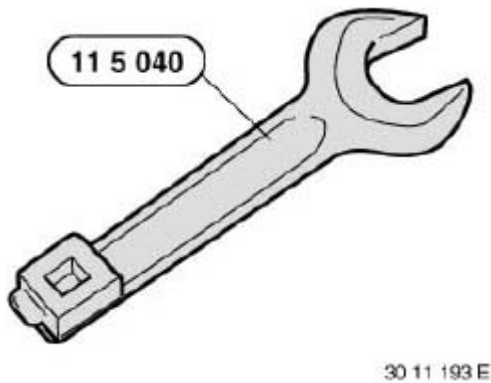


Fig. 593: Identifying Special Tool (11 5 040)
 Courtesy of BMW OF NORTH AMERICA, INC.

Release screws, detach fan from fan clutch.

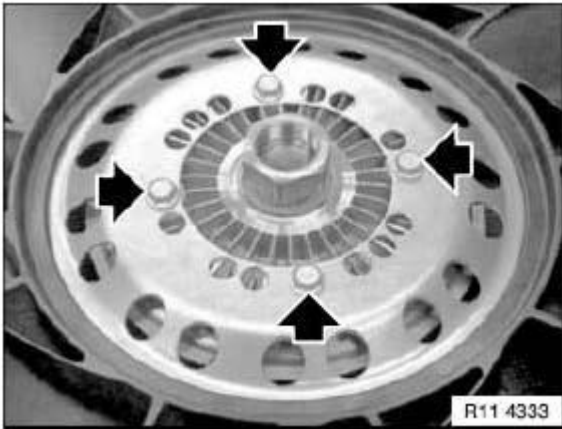


Fig. 594: Identifying Clutch Fan Screws
Courtesy of BMW OF NORTH AMERICA, INC.

53 THERMOSTAT AND CONNECTIONS

11 53 000 REMOVING AND INSTALLING/REPLACING COOLANT THERMOSTAT (N62)

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.

Follow instructions for working on cooling system.

Remove front underbody protection.

Remove coolant drain plug on radiator. Drain and dispose of coolant.

Unlock plug (1) and remove.

Unlock and detach water hose (2).

Unfasten nut.

Release screws and remove coolant thermostat (3).

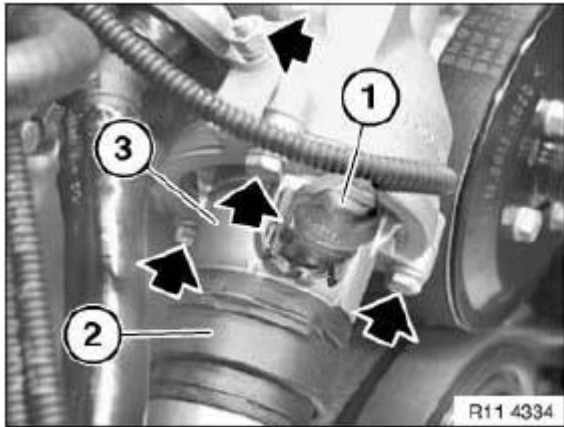


Fig. 595: Locating Coolant Thermostat, Water Hose And Unlock Plug
 Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Coolant thermostat is integrated in cover and can only be replaced as a complete unit.

Clean sealing surfaces.

Replace sealing ring (1).

Installation:

TOP UP COOLANT .

VENT COOLING SYSTEM AND CHECK FOR LEAKS .

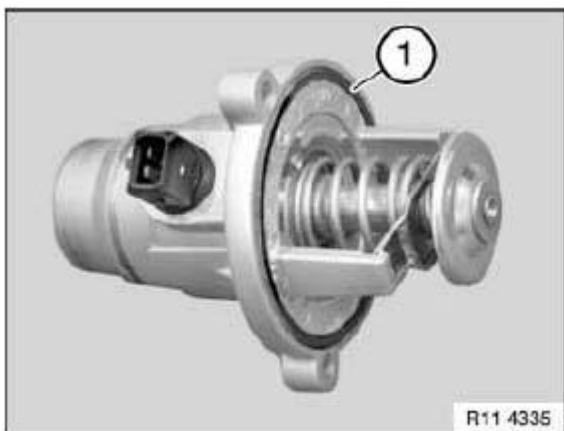


Fig. 596: Identifying Sealing Ring
 Courtesy of BMW OF NORTH AMERICA, INC.

61 INTAKE MANIFOLD

11 61 050 REMOVING AND INSTALLING INTAKE AIR MANIFOLD (N62)

Remove **ACOUSTIC COVER**.

Remove design cover.

Remove center of bulkhead.

Remove intake hose.

Remove **INJECTION PIPE** .

On rear side of manifold, unlock and disconnect plug on differential pressure sensor and on servomotor.

Unlock and detach vent hose (1).

Remove cable from holder.

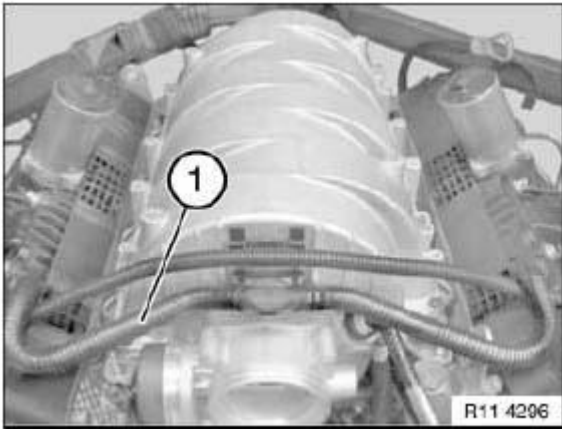


Fig. 597: Identifying Vent Hose

Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws.

Remove intake air manifold (2) upwards with aid of a second person.

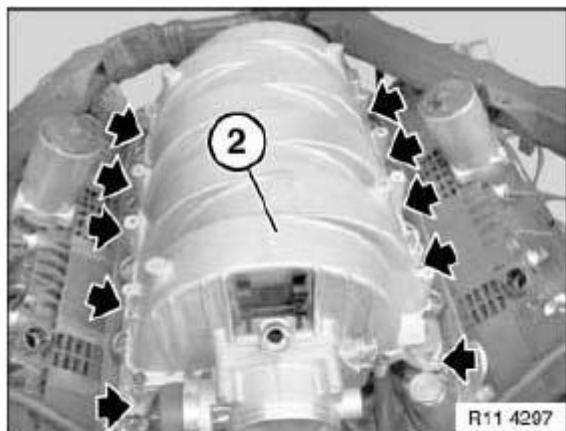


Fig. 598: Identifying Intake Air Manifold
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing faces (1) on intake air manifold (2).

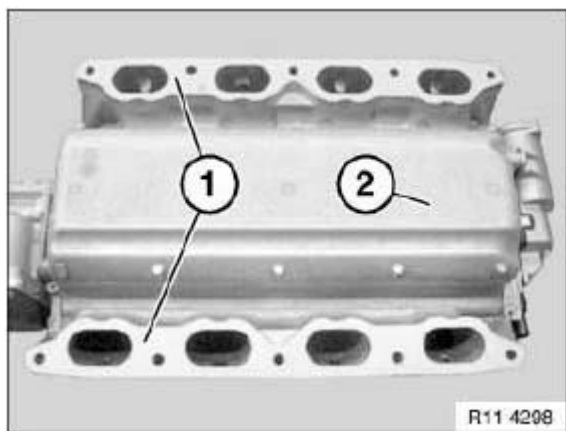


Fig. 599: Identifying Sealing Faces On Intake Air Manifold
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing face (1) on left and right.

Replace gasket on left and right.

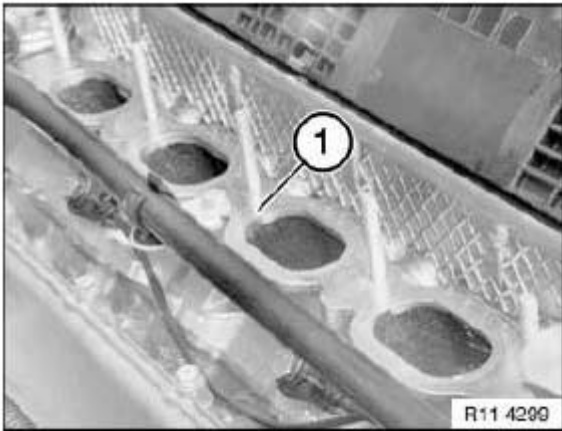


Fig. 600: Identifying Sealing Face On Left And Right
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check air intake system for leaks.

66 VACUUM PUMP

11 66 000 REMOVING AND INSTALLING/REPLACING VACUUM PUMP (N62/N62TU)

NOTE: Press brake pedal several times in order to reduce vacuum pressure in brake booster.

Installation location:

Vacuum pump is fitted on cylinder head 1 to 4 at front on exhaust camshaft.

Remove design cover.

Remove ACOUSTIC COVER.

Remove intake hose with air-mass flow sensor and upper section of intake filter housing.

IMPORTANT: Installation:

Due to the risk of damage to the engine gaskets/seals and the lack of brake boosting, make sure before starting the engine that all the vacuum lines are connected.

Open hose clip (1) and pull off vacuum line.

Release nuts on hose holders.

Remove vacuum hose.

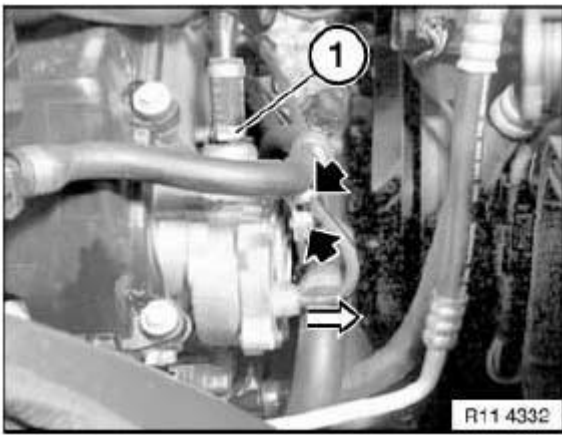


Fig. 601: Identifying Hose Clip

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and remove holder (1).

Remove vacuum pump (2).

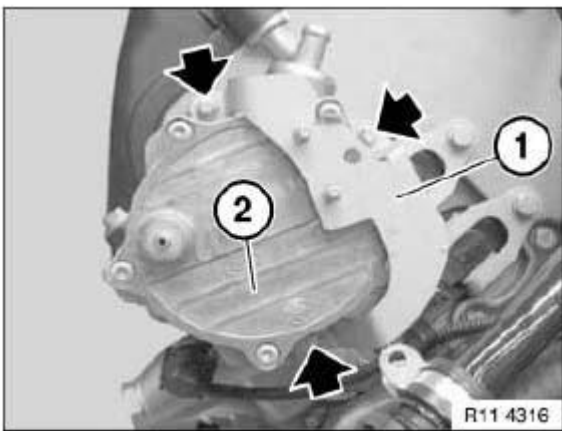


Fig. 602: Identifying Vacuum Pump

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing ring (1) and secure with grease.

Drive (2) must be rotated into correct position prior to installation.

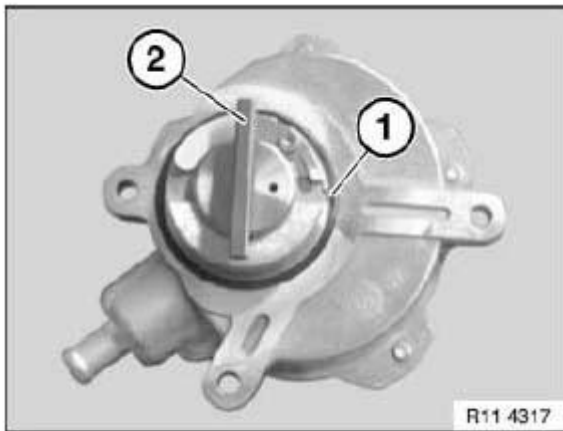


Fig. 603: Identifying Sealing Ring

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Align vacuum pump drive to groove (3) on exhaust camshaft.

Vacuum pump can best be installed when groove (3) is vertically aligned.

If vacuum pump cannot be installed, crank engine if necessary at central bolt into correct position.

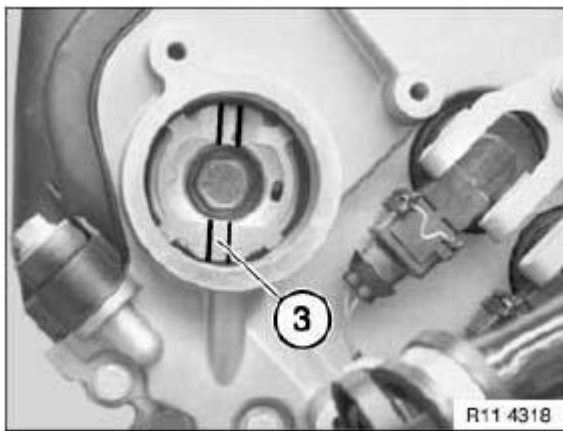


Fig. 604: Aligning Vacuum Pump Drive To Groove On Exhaust Camshaft

Courtesy of BMW OF NORTH AMERICA, INC.

72 AIR PUMP, LINES AND CONNECTIONS

11 72 000 REMOVING AND INSTALLING/REPLACING AIR PUMP (N62)

Remove upper section of intake filter housing.

Release retaining screws on coolant expansion tank.

Remove suction filter housing.

Remove raw air housing.

Unlock and disconnect pressure and suction lines (1).

Loosen screws (2).

Loosen screw (3).

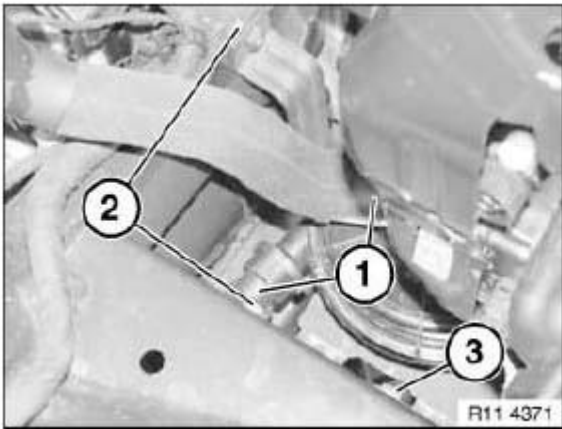


Fig. 605: Identifying Suction Lines And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove front splash guard.

Remove trim panel at bottom right.

Unlock plug (1) and remove.

Unscrew bolt (3).

Remove air pump (2).

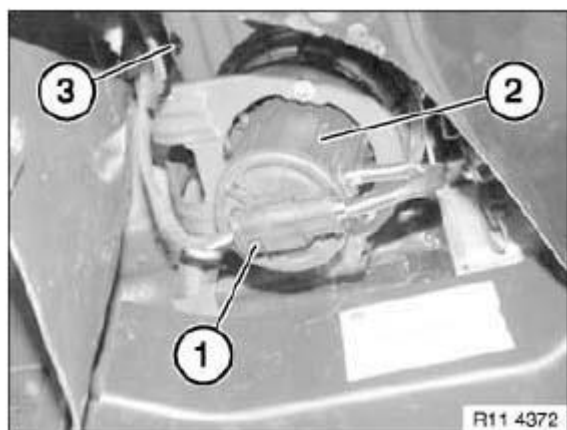


Fig. 606: Identifying Air Pump Bolt

Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts.

Unclip plug (1).

Remove holder from air pump.

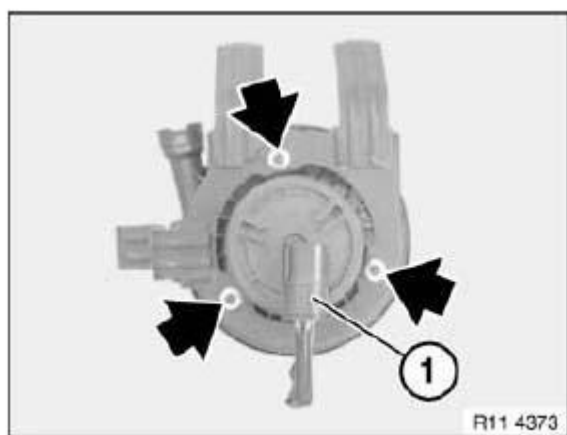


Fig. 607: Locating Air Pump Nut

Courtesy of BMW OF NORTH AMERICA, INC.

78 EMISSION CONTROL, OXYGEN SENSOR

11 78 530 REPLACING LEFT OXYGEN CONTROL SENSOR (N62/N62TU)

Special tools required:

- 11 7 030
- 11 9 150

(cylinder bank 5 to 8)

Necessary preliminary tasks:

- Switch off ignition
- Remove **REINFORCEMENT PLATE**

WARNING: Scalding hazard!

Only perform this task on an engine that has cooled down.

Unlock and detach plug connection (3).

Unclip control sensor cable.

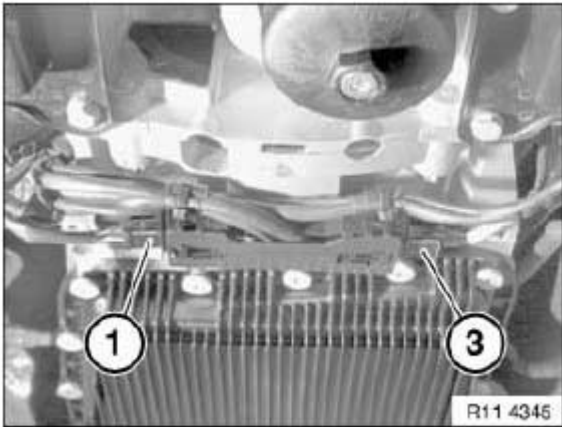


Fig. 608: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release control sensor (4) with special tool 11 7 030 in conjunction with 11 9 150.

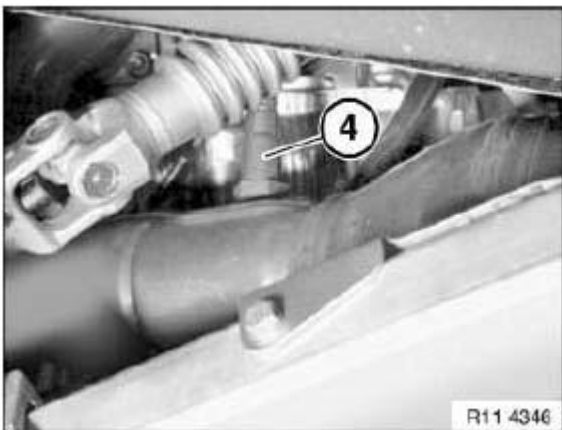


Fig. 609: Identifying Control Sensor

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Threads of new oxygen sensors are already coated with Never Seez Compound.

If the oxygen sensor is reused, only apply a thin and uniform coat of Never Seez Compound to thread.

Oxygen sensor section projecting into exhaust system branch must not be cleaned or come into contact with lubricant.

Installation:

When special tool 11 9 150 is used in conjunction with special tool 11 7 030, 47 Nm on the torque wrench dial corresponds to an actual tightening torque of 50 Nm.

Tighten down control sensor (4) with special tool 11 7 030 in conjunction with 11 9 150.

Tightening torque: 11 78 1AZ . See **EMISSIONS-CONTROL, LAMBDA OXYGEN SENSOR** for specs.

Pay attention to cable routing of control sensor.

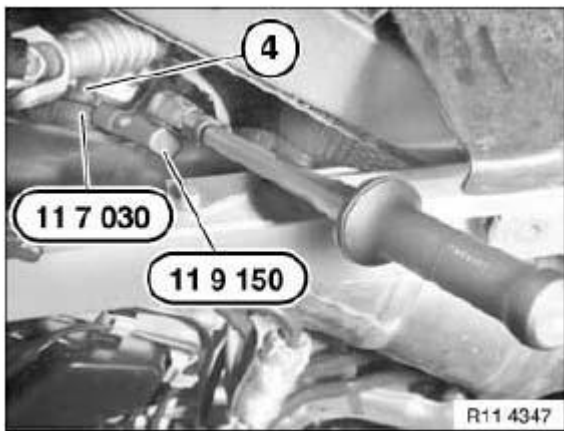


Fig. 610: Identifying Special Tool (11 7 030) And (11 9 150)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Read out fault memory of control unit of Digital Motor Electronics (DME).

Check stored fault messages.

Rectify faults.

Now clear the fault memory.

11 78 533 REPLACING RIGHT OXYGEN CONTROL SENSOR (N62/N62TU)**Special tools required:**

- **11 7 030**

(cylinder bank 1 to 4)

Necessary preliminary tasks:

- Switch off ignition.
- Remove **REINFORCEMENT PLATE**

WARNING: Scalding hazard!

Only perform this task on an engine that has cooled down.

Release plug connector (1) and pull off.

Unclip control sensor cable.

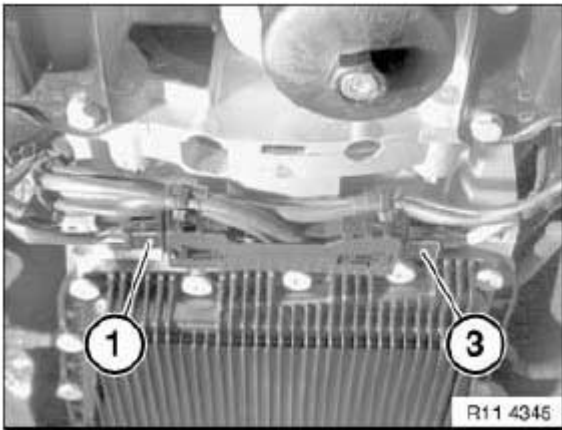


Fig. 611: Identifying Plug Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Release control sensor (2) with special tool 11 7 030.

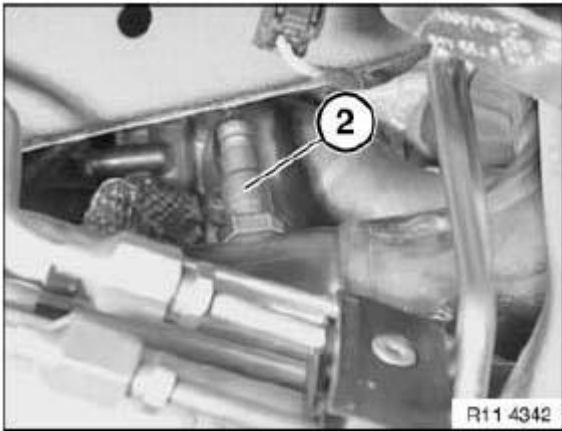


Fig. 612: Identifying Control Sensor

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Threads of new oxygen sensors are already coated with Never Seez Compound.

If the oxygen sensor is reused, only apply a thin and uniform coat of Never Seez Compound.

Oxygen sensor section projecting into exhaust system branch must not be cleaned or come into contact with lubricant.

Installation:

Tighten down control sensor (2) with special tool 11 7 030.

Tightening torque: 11 78 1AZ . See **EMISSIONS-CONTROL, LAMBDA OXYGEN SENSOR** for specs.

Pay attention to cable routing of control sensor.

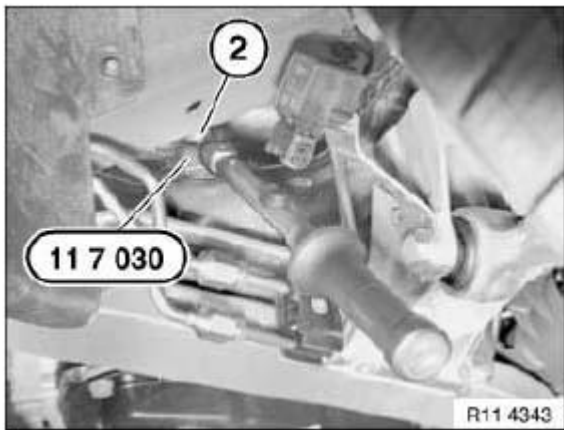


Fig. 613: Identifying Special Tool (11 7 030) On Control Sensor

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Different heat shields!

To prevent fraying, make sure that wiring harness (1) is correctly laid on heat shield (2).

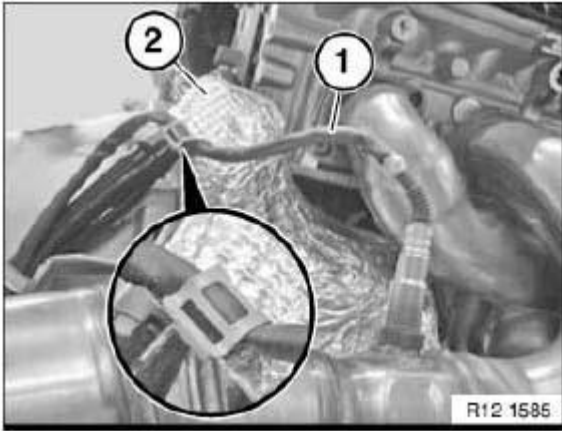


Fig. 614: Identifying Wiring Harness And Heat Shield

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Read out fault memory of control unit of Digital Motor Electronics (DME).

Check stored fault messages.

Rectify faults.

Now clear the fault memory.

11 78 540 REPLACING LEFT OXYGEN MONITOR SENSOR (N62 / N62TU)

Special tools required:

- **11 7 030**

(cylinder bank 5 to 8)

Necessary preliminary tasks:

- Switch off ignition.
- Remove **REAR UNDERBODY PROTECTION**

WARNING: Scalding hazard!

Only perform this task on an engine that has cooled down.

Unlock and detach plug connection (1) for monitor sensor (2).

Unclip monitor sensor cable.

Release monitor sensor (2) with special tool 11 7 030.

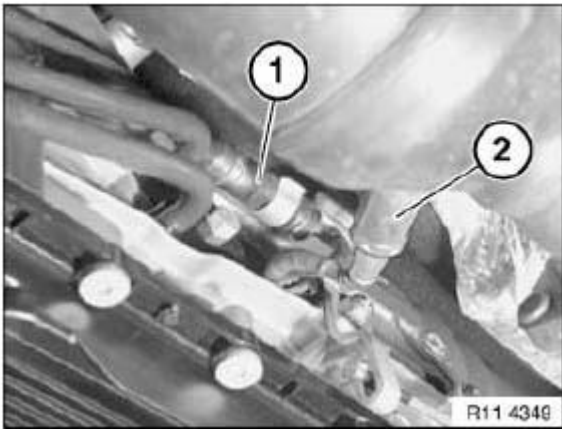


Fig. 615: Identifying Plug Connection And Monitor Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Threads of new oxygen sensors are already coated with Never Seez Compound.

If the oxygen sensor is reused, only apply a thin and uniform coat of Never Seez Compound to thread.

Oxygen sensor section projecting into exhaust system branch must not be cleaned or come into contact with lubricant.

Installation:

Tighten down monitor sensor (2) with special tool 11 7 030.

Tightening torque: 11 78 1AZ . See **EMISSIONS-CONTROL, LAMBDA OXYGEN SENSOR** for specs.

Pay attention to cable routing of monitor sensor.



Fig. 616: Identifying Special Tool (11 7 030) On Monitor Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Read out fault memory of control unit of Digital Motor Electronics (DME).

Check stored fault messages.

Rectify faults.

Now clear the fault memory.

11 78 543 REPLACING RIGHT OXYGEN MONITOR SENSOR (N62/N62TU)

Special tools required:

- **11 7 030**

(cylinder bank 1 to 4)

Necessary preliminary tasks:

- Switch off ignition
- Remove **REAR UNDERBODY PROTECTION**

WARNING: Scalding hazard!

Only perform this task on an engine that has cooled down.

Unlock and detach plug connection (1) for monitor sensor (2).

Unclip monitor sensor cable.

Release monitor sensor (2) with special tool 11 7 030.

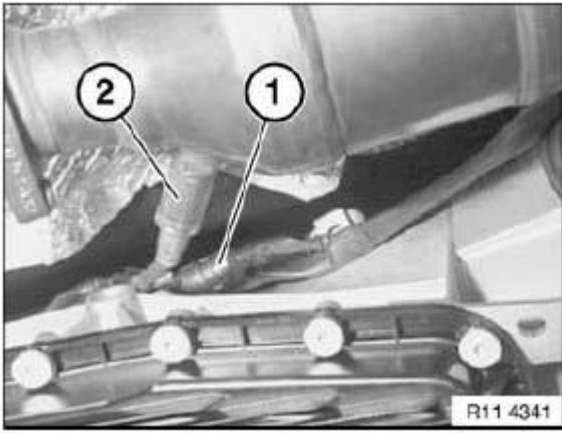


Fig. 617: Identifying Monitor Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Threads of new oxygen sensors are already coated with Never Seez Compound.

If the oxygen sensor is reused, only apply a thin and uniform coat of Never Seez Compound to thread.

Oxygen sensor section projecting into exhaust system branch must not be cleaned or come into contact with lubricant.

Installation:

Tighten down monitor sensor (2) with special tool 11 7 030.

Tightening torque: 11 78 1AZ . See **EMISSIONS-CONTROL, LAMBDA OXYGEN SENSOR** for specs.

Pay attention to cable routing of monitor sensor.

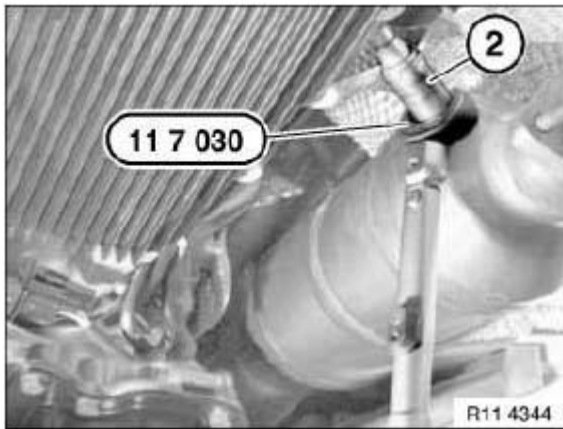


Fig. 618: Identifying Special Tool (11 7 030) On Monitor Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Read out fault memory of control unit of Digital Motor Electronics (DME).

Check stored fault messages.

Rectify faults.

Now clear the fault memory.

CRANKCASE VENT VALVE/POSITIVE CRANKCASE VENTILATION (PCV)

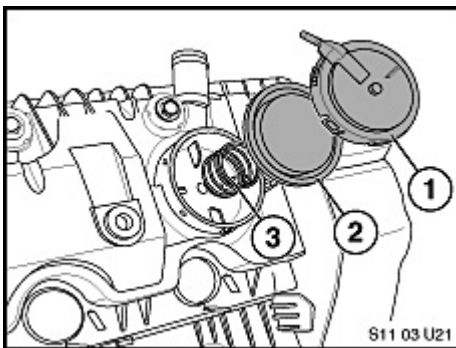


Fig. 619: Crankcase Vent Valve Components And Location
Courtesy of BMW OF NORTH AMERICA, INC.

1. Vent Valve Cover
2. Diaphragm
3. Spring