

**ENGINE****Engine - Repair Instructions - 550i****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.

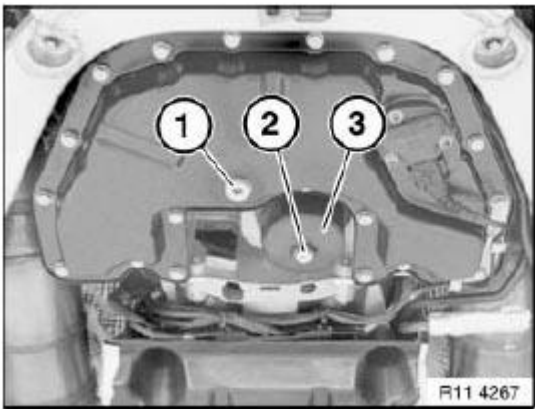
Observe country-specific waste-disposal regulations.

**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).



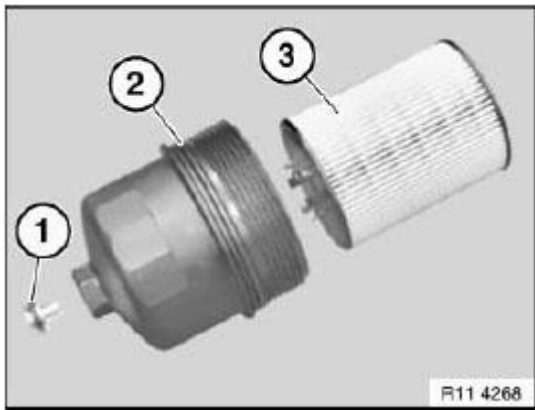
**Fig. 1: Identifying Oil Drain Plug, Oil Filter Cap And Oil Filter Cover**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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: Identifying Oil Filter Element And Sealing Rings**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Replace sealing ring.

Install oil drain plug (1) and tighten down.

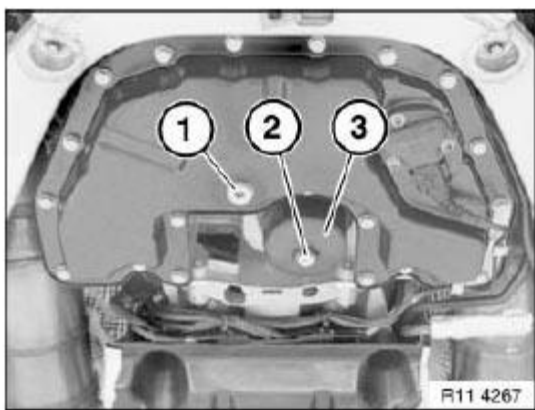
Tightening torque, see **11 13 OIL PAN**

Insert and tighten down oil filter cover (3).

Tightening torque, see **11 42 OIL FILTER AND PIPES**

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 Cap And Oil Filter Cover**  
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)**

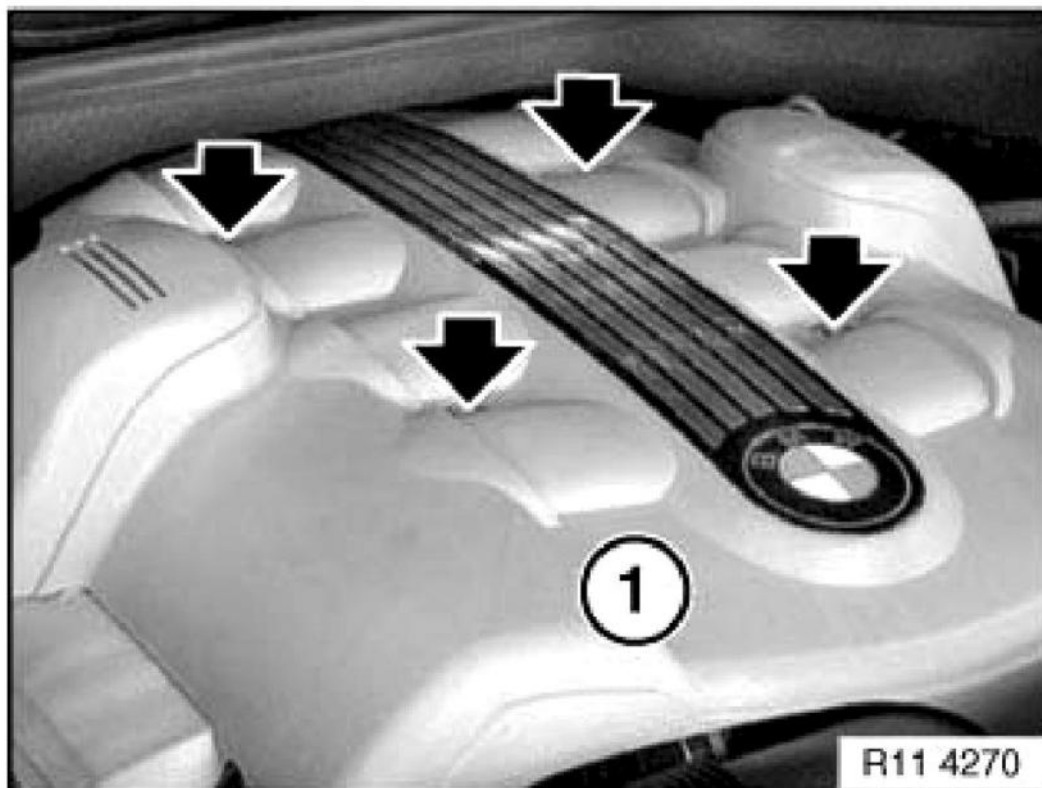


W05 95 001

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

#### **Necessary preliminary tasks:**

- Remove acoustic cover.



**Fig. 5: Identifying Acoustic Cover**

Courtesy of BMW OF NORTH AMERICA, INC.

- 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** . See ENGINE- SPECIAL TOOLS .

### Necessary preliminary tasks:

- Disconnect negative battery lead.
- **Follow instructions for disconnecting and connecting battery.**
- Both exhaust manifolds remain on engine during removal.

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

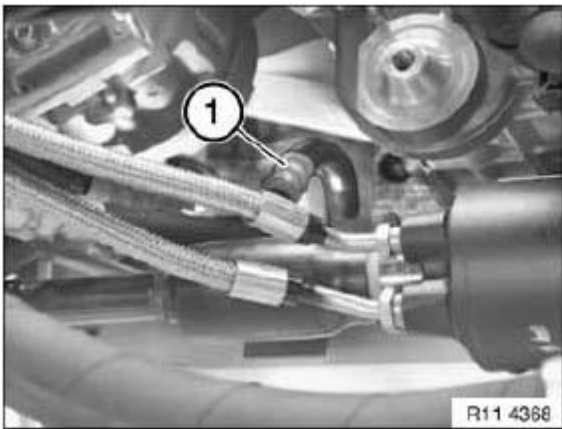
### WORK STEPS REFERENCE

Work step	Note:
Lift engine hood into assembly position <b>Secure engine in installation position with special tool</b> <b>Remove gearbox</b>	After removing transmission, secure engine against tilting.
<b>Remove intake filter housing</b>	
<b>Remove radiator</b>	
<b>Remove radiator lines.</b>	
<b>Remove expansion tank.</b>	
<b>Remove intake air manifold</b>	
<b>Remove heater radiator line.</b>	
<b>Unlock engine wiring harness section on control unit and detach.</b>	Wiring harness remains on engine.
<b>Unlock spark plug wiring harness section on control unit and detach.</b>	Wiring harness remains on engine.
Release negative lead on spring strut dome.	
Release battery positive lead at positive terminal.	
<b>Detach vacuum line and vacuum hose from vacuum pump.</b>	
<b>Unlock line on tank venting valve and disconnect.</b>	
Remove both oxygen monitor sensors.	
Remove both oxygen control sensors	
Release negative lead on engine support arm.	
<b>Remove vibration damper and tensioning pulley from A/C compressor drive belt</b>	
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.
<b>Remove lower universal joint of steering spindle</b>	

### Vehicles with Dynamic Drive only:

Unlock and detach hydraulic line (1).



**Fig. 6: 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. 7: Identifying Special Tool (11 0 000)**

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** . See **MAINTENANCE AND GENERAL INFORMATION - SPECIAL TOOLS** .
- **00 0 202**
- **00 0 204**
- **00 0 208**
- **11 0 000** . See **ENGINE- SPECIAL TOOLS** .

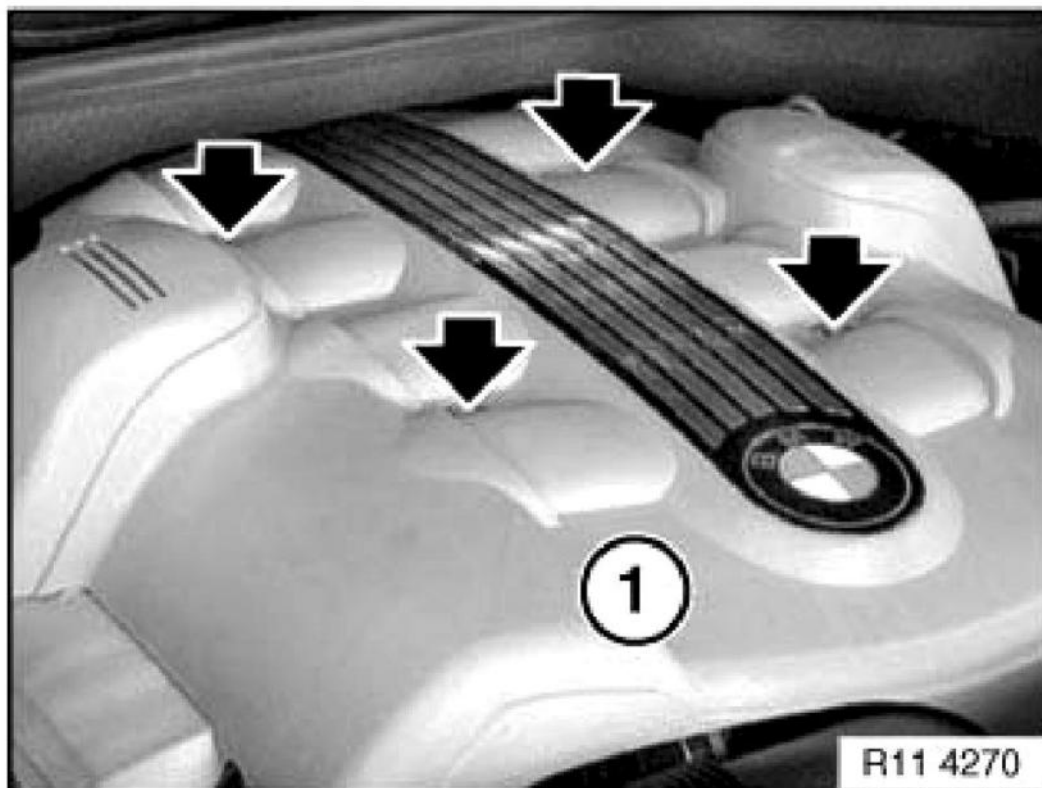
**WARNING: Danger of injury!**

**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 **engine bonnet/hood in service position** . See **51 00... SERVICE POSITION OF ENGINE HOOD/BONNET**
- Unfasten **acoustic cover** screws. Raise cover and remove toward front.

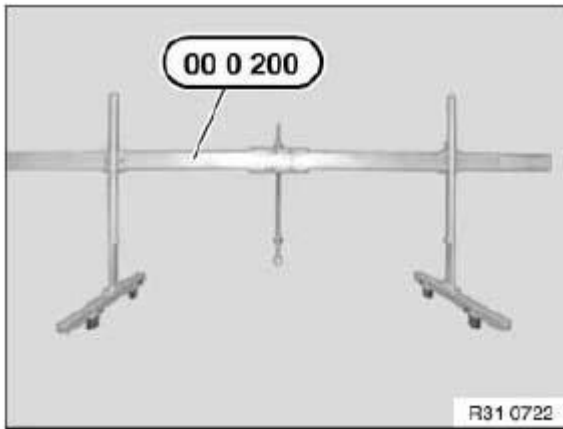


**Fig. 8: Identifying Acoustic Cover**

Courtesy of BMW OF NORTH AMERICA, INC.

- Remove **intake filter housing** . See **13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING** .
- Detach **coolant expansion tank and place to one side** . See **17 11 000 REMOVING AND INSTALLING RADIATOR (N62)** .
- Remove **tension strut (on spring strut dome)** . See **51 71 373 REMOVING AND INSTALLING/REPLACING 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. 9: Identifying Assemble Transverse Member (00 0 200)**  
 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.

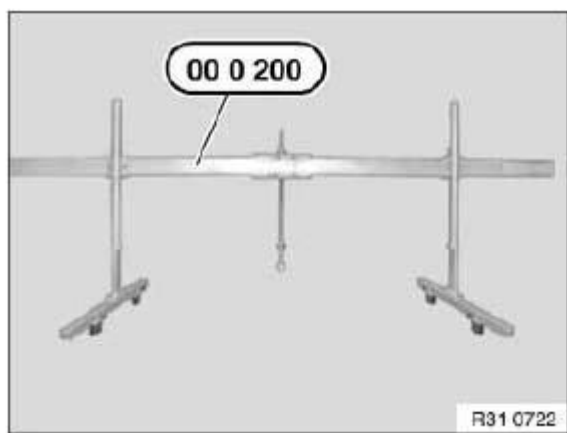
Attach suitable chains to special tool 11 0 000 and suspend from both engine suspension eyes.



**Fig. 10: Identifying Special Tool (11 0 000)**  
 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. 11: Identifying Assemble Transverse Member (00 0 200)**  
Courtesy of BMW OF NORTH AMERICA, INC.

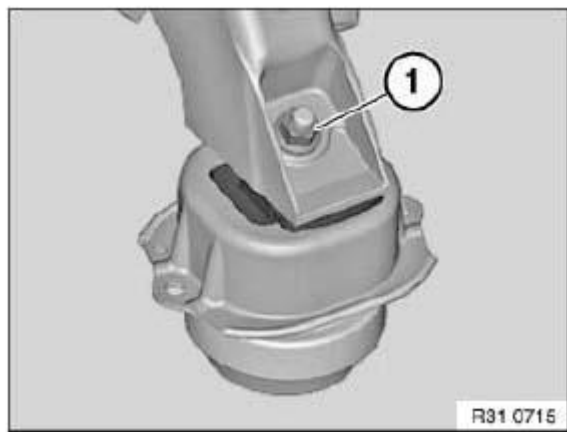
Unscrew nuts (1).

Raise engine approx. 10 mm with transverse member.

*Installation:*

Replace self-locking nuts.

Tightening torque, see **22 11 2AZ.** .

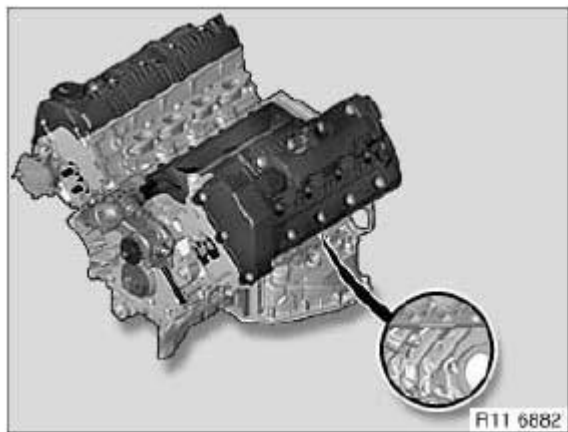


**Fig. 12: Identifying Nuts**  
Courtesy of BMW OF NORTH AMERICA, INC.

## ENGINE IDENTIFICATION

Drive in engine numbers at marked surface with impact tool.

N62



**Fig. 13: Identifying Engine Identification - N62/N62TU**  
Courtesy of BMW OF NORTH AMERICA, INC.

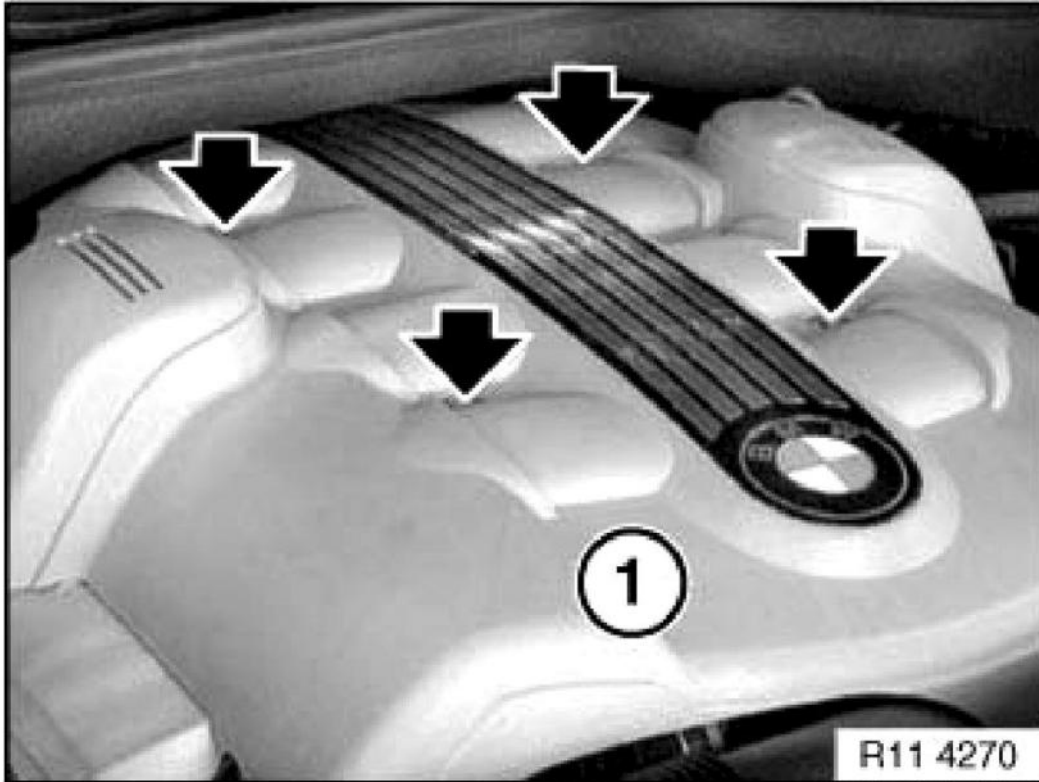
## CYLINDER HEAD WITH COVER

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

(cylinder bank 5 to 8)

*Necessary preliminary tasks:*

- Remove **design cover** .
- Unfasten **acoustic cover** screws. Raise cover and remove toward front. Remove **acoustic cover** .



**Fig. 14: Identifying Acoustic Cover**

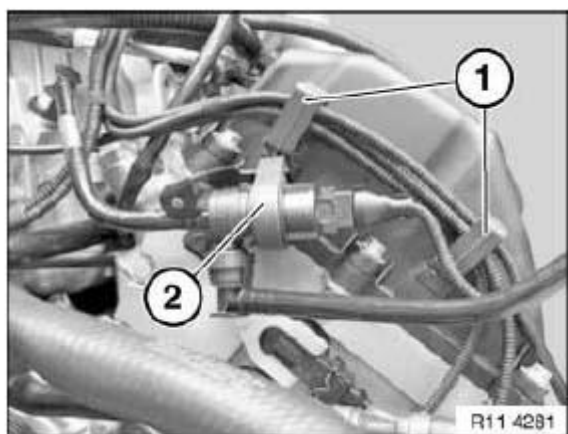
Courtesy of BMW OF NORTH AMERICA, INC.

- Remove **center engine compartment partition wall** (not E60, E61).
- Remove left and right microfilter housing lower section. (only E60, E61). See **64 31 061 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT MICROFILTER HOUSING LOWER SECTION** .
- Remove **ignition coil cover** .

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

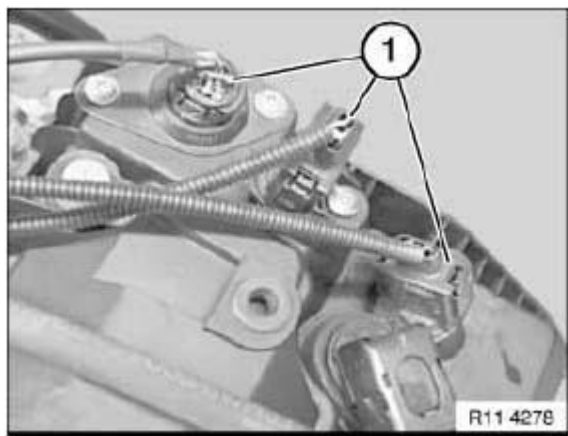
Unclip cable holder (1) with cables.

Pull tank venting valve (2) off holder.



**Fig. 15: Identifying Tank Venting Valve And Cable Holder**  
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) and remove.



**Fig. 16: Identifying Plug**  
Courtesy of BMW OF NORTH AMERICA, INC.

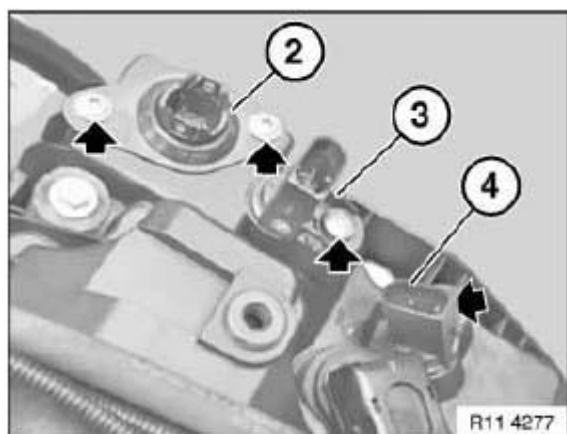
Release screws and remove sealing element (2).

Remove sensors (3 and 4).

*Installation:*

Replace sealing element (2).

Replace sealing rings on sensors (3 and 4).



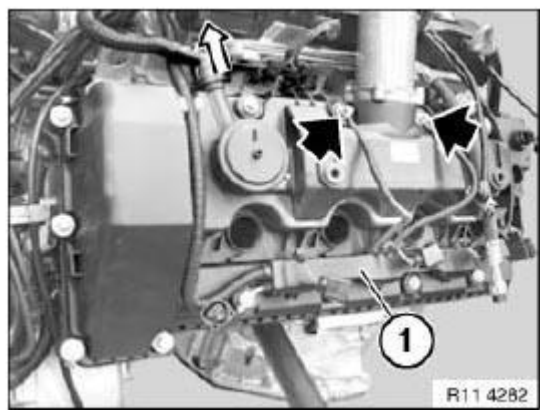
**Fig. 17: Identifying Sensors And Sealing Element**  
Courtesy of BMW OF NORTH AMERICA, INC.

Removing ignition coils.

Release both grounding cables.

Unlock and detach vent hose.

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



**Fig. 18: Identifying Cable Duct**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove servomotor for left eccentric shaft.

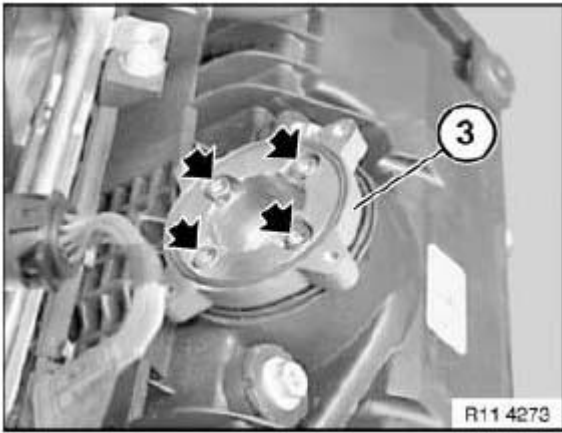
Unfasten screws.

Remove spacer (3) upwards.

*Installation:*



Replace sealing ring.



**Fig. 19: Identifying Spacer**

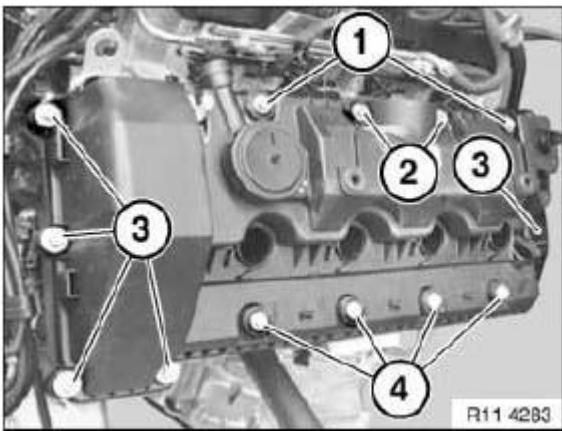
Courtesy of BMW OF NORTH AMERICA, INC.

Remove injection pipe

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

If necessary, pull out oil dipstick.

Remove cylinder head cover.



**Fig. 20: Identifying Screw Connections**

Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Note installation direction of sealing ring (1).

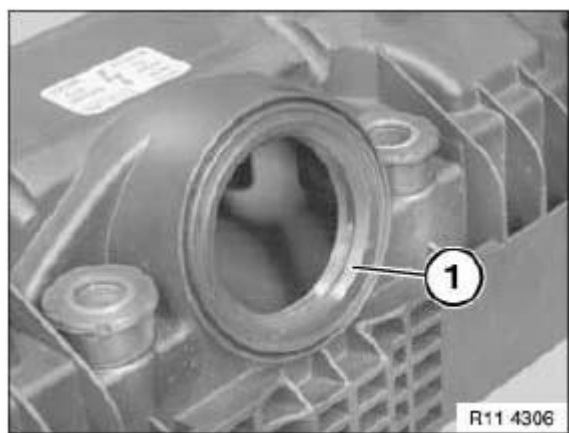
Groove in sealing ring (1) points outwards.



**Fig. 21: Identifying Sealing Ring**

Courtesy of BMW OF NORTH AMERICA, INC.

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



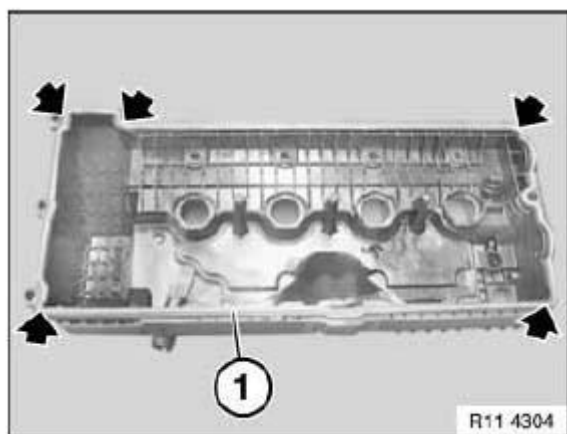
**Fig. 22: Identifying Sealing Ring**

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.



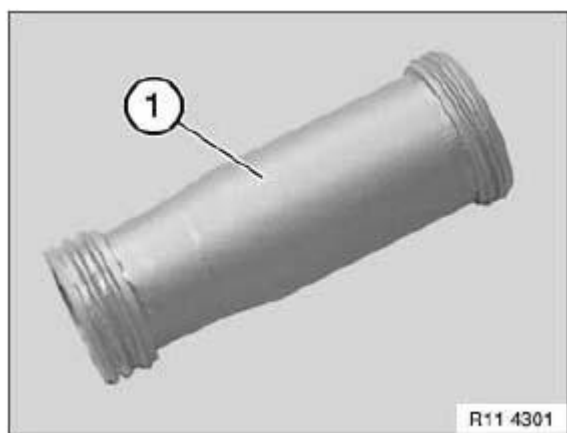
**Fig. 23: Identifying Gasket**

Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Replace spark plug domes.

Coat rubber seals on spark plug dome (1) with anti-friction rubber coating.



**Fig. 24: Identifying Spark Plug Dome**

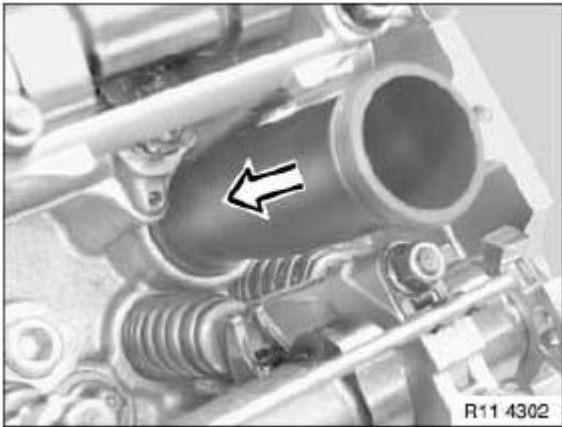
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Install spark plug domes in cylinder head.

**When fitting cylinder head cover:**

Align spark plug domes to cylinder head cover.



**Fig. 25: Aligning Spark Plug Domes To Cylinder Head Cover**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Clean seal residue from sealing surfaces.

Coat contact surfaces of joint with Drei Bond 1209.

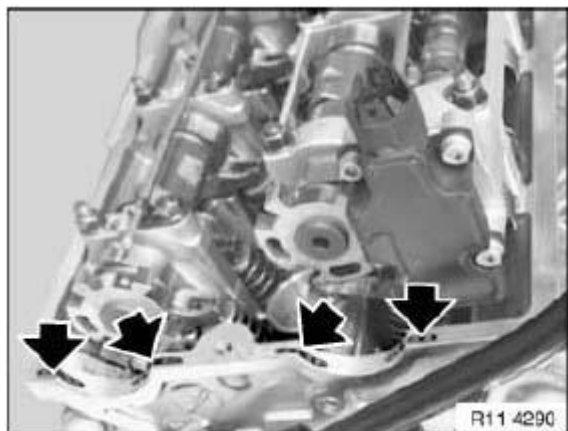


**Fig. 26: Locating Contact Surfaces Of Joint**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

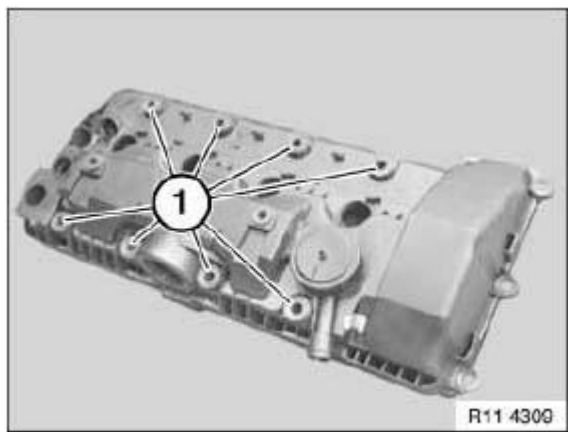
Clean seal residue from sealing surfaces.

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



**Fig. 27: Locating Drei Bond Applying Area**  
Courtesy of BMW OF NORTH AMERICA, INC.

Replace sealing elements (1).



**Fig. 28: Identifying Sealing Elements (1)**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

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



**Fig. 29: Locating Rear Side Of Cylinder Head**  
Courtesy of BMW OF NORTH AMERICA, INC.

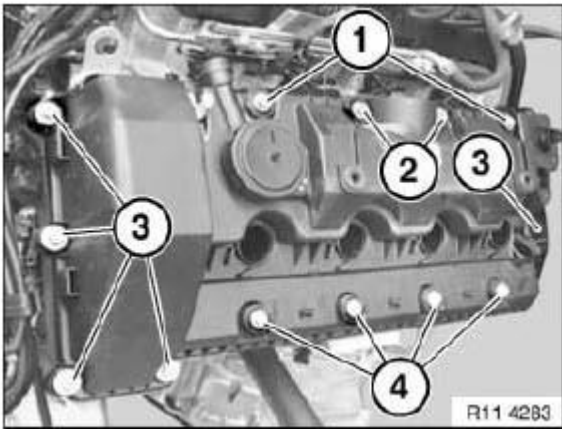
*Installation:*

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.



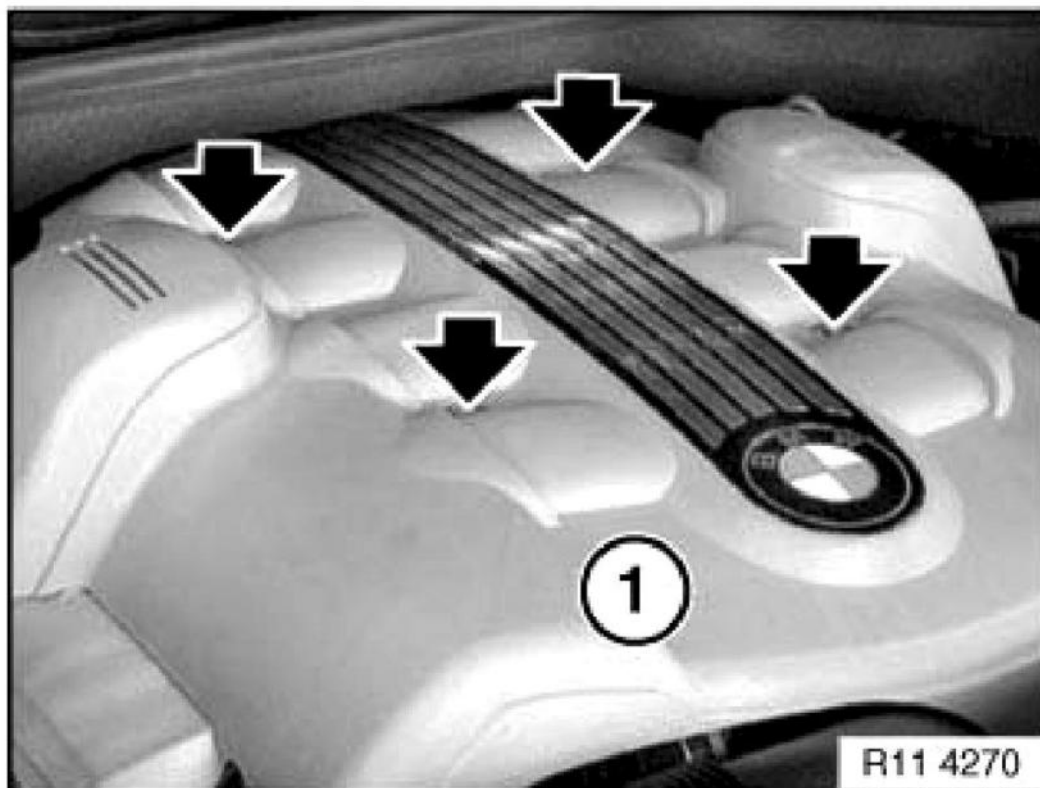
**Fig. 30: Identifying Screw Connections**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

**(cylinder bank 1 to 4)**

Remove **design cover**

Unfasten **acoustic cover** screws. Raise cover and remove toward front. Remove **acoustic cover**



**Fig. 31: Identifying Acoustic Cover**

Courtesy of BMW OF NORTH AMERICA, INC.

Remove **center of assembly partition wall**

Remove electronics box cover.

Remove electronics box seal.

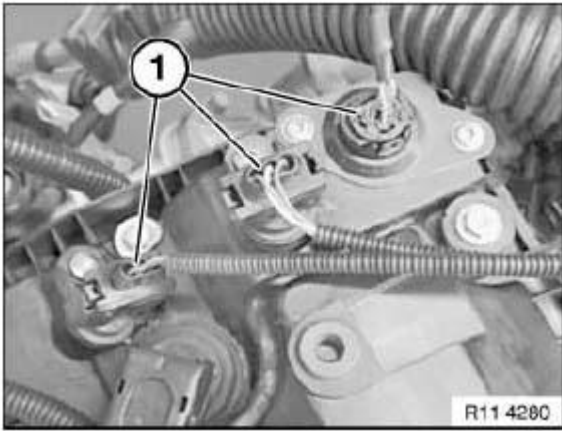
Remove ignition coil cover.

Remove **intake filter housing (without raw air housing)**. . See **13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER 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. 32: Identifying Plug**

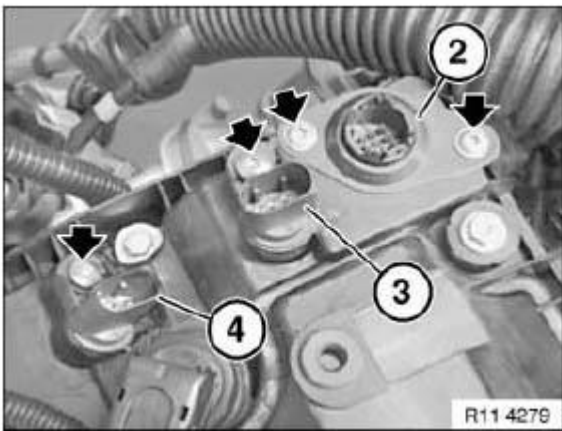
Courtesy of BMW OF NORTH AMERICA, INC.

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. 33: Identifying Sealing Element And Sealing Rings**

Courtesy of BMW OF NORTH AMERICA, INC.

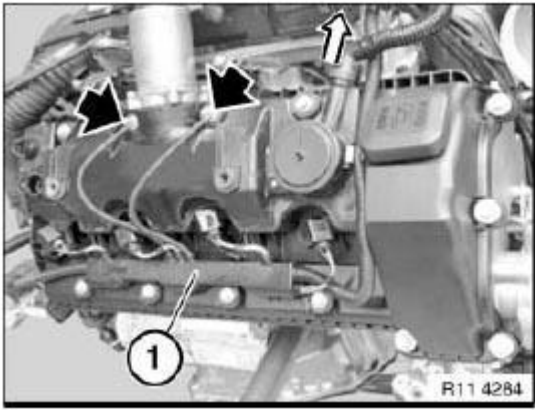
Removing ignition coils.

Release both grounding cables.

Unlock and detach vent hose.



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



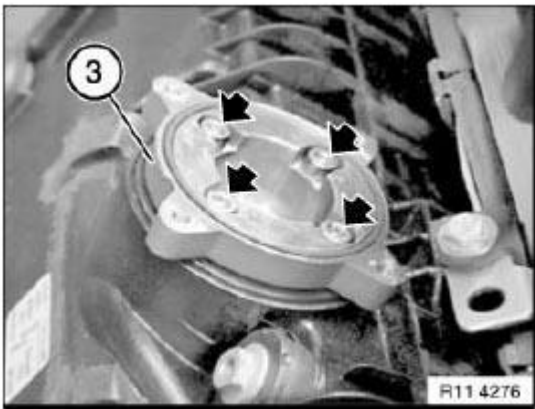
**Fig. 34: Identifying Cable Duct**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove servomotor for right eccentric shaft.

Unfasten screws.

Remove spacer (3) upwards.

Replace seal.

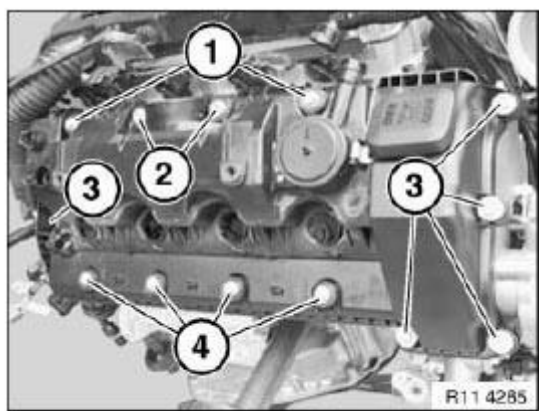


**Fig. 35: Identifying Spacer**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove injection pipe.

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

Remove cylinder-head cover.



**Fig. 36: Identifying Screw Connections**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

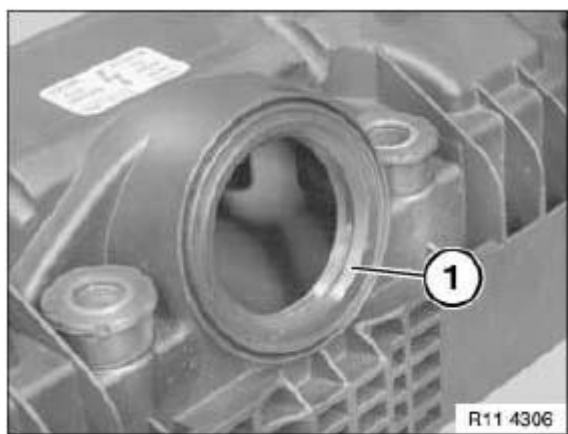
Note installation direction of sealing ring (1).

Groove in sealing ring (1) points outwards.



**Fig. 37: Identifying Sealing Ring**  
Courtesy of BMW OF NORTH AMERICA, INC.

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



**Fig. 38: Identifying Sealing Ring**

Courtesy of BMW OF NORTH AMERICA, INC.

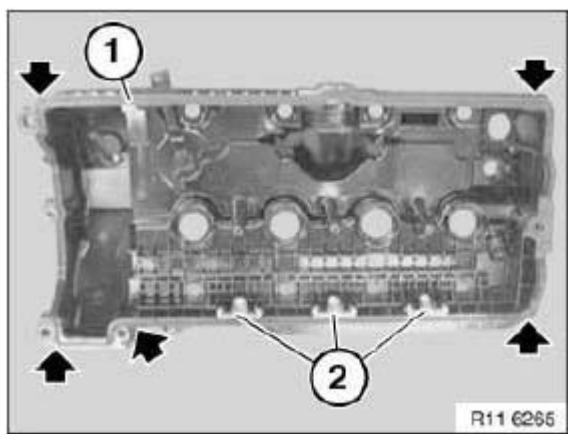
*Installation:*

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.



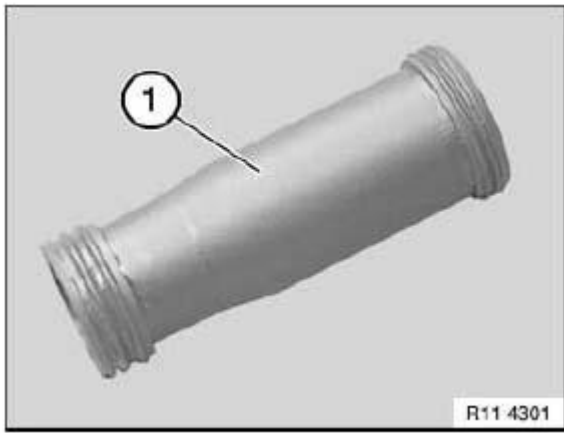
**Fig. 39: Identifying Gasket**

Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Replace spark plug domes.

Coat rubber seals on spark plug dome (1) with anti-friction rubber coating.



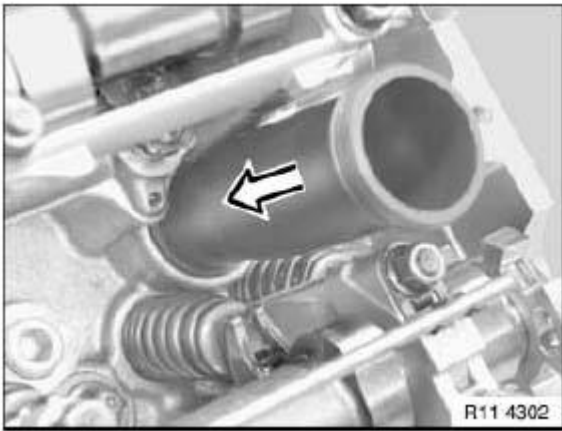
**Fig. 40: Identifying Spark Plug Dome**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Install spark plug domes in cylinder head.

When fitting cylinder head cover:

Align spark plug domes to cylinder head cover.



**Fig. 41: Aligning Spark Plug Domes To Cylinder Head Cover**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Installation:**

Clean seal residue from sealing surfaces.

Coat contact surfaces of joint with Drei Bond 1209.

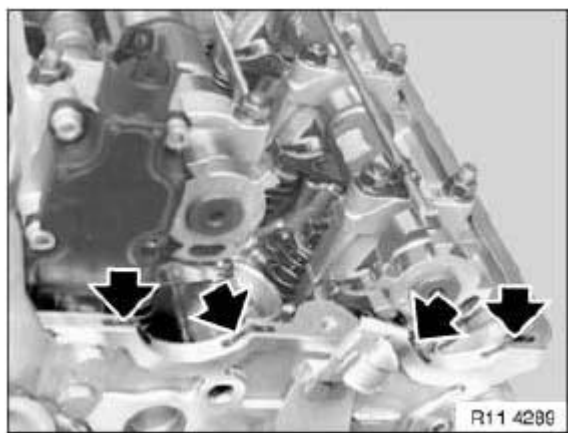


**Fig. 42: Locating Contact Surfaces Of Joint**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

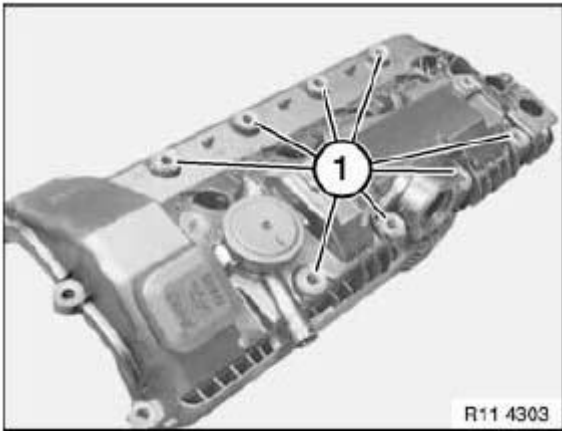
Clean seal residue from sealing surfaces.

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



**Fig. 43: Identifying Drei Bond 1209 Sealing Agent Applying Area**  
Courtesy of BMW OF NORTH AMERICA, INC.

Replace sealing elements (1).

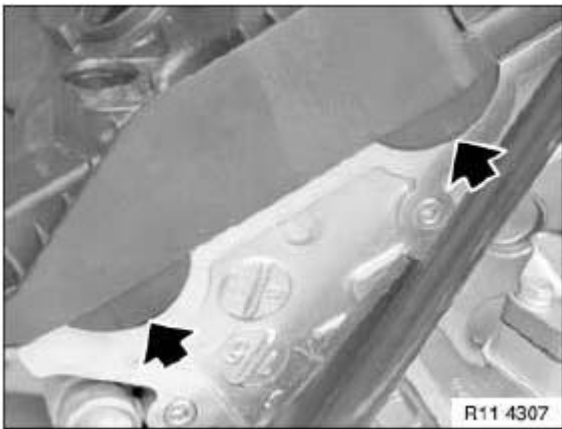


**Fig. 44: Identifying Sealing Elements**

Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

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



**Fig. 45: Locating Rear Side Of Cylinder Head**

Courtesy of BMW OF NORTH AMERICA, INC.

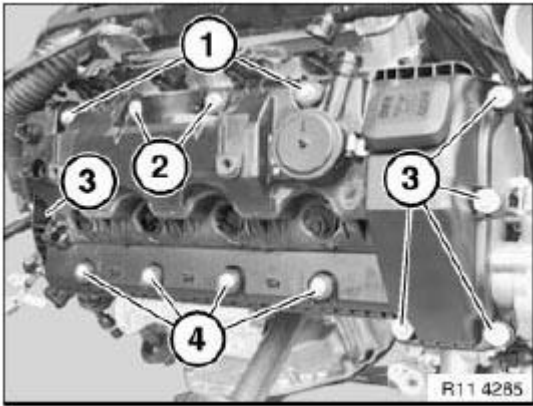
*Installation:*

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**.



**Fig. 46: Identifying Cylinder Head Cover And Screw Connections**

Courtesy of BMW OF NORTH AMERICA, INC.

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

## **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, see 11 11 5AZ in **11 11 ENGINE BLOCK** .

Top up coolant. Vent cooling system and check for leaks. See **17 00 039 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.

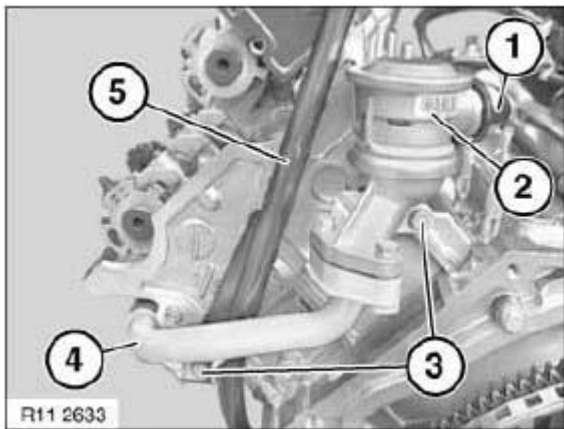
Detach hose (1) on check valve (2).

**E65 only:**

Release screws (3).

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

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



**Fig. 47: Identifying Guide Tube, Check Valve, Hose And Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

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

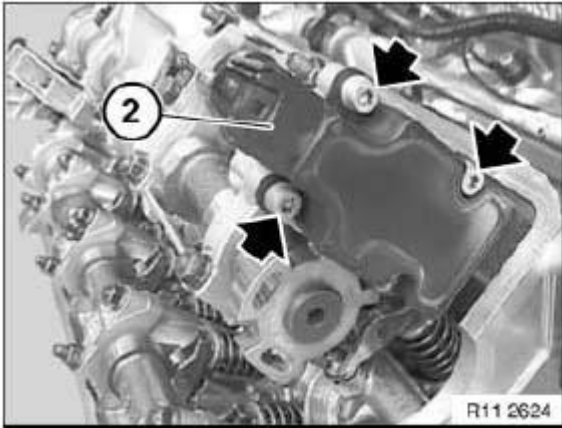
**Removal:**



Removal of cylinder head is described separately from installation.

Remove inlet and exhaust adjustment unit on left side.

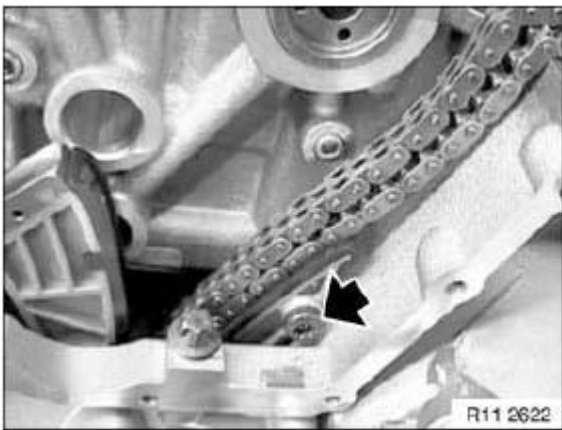
**NOTE:** Illustration with engine removed.



**Fig. 48: Identifying Eccentric Shaft Sensor**  
Courtesy of BMW OF NORTH AMERICA, INC.

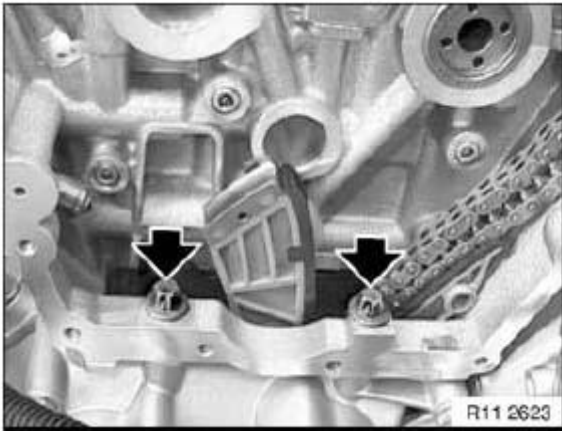
Remove eccentric shaft sensor (2).

Detach guide rail from cylinder head.



**Fig. 49: Locating Guide Rail Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws between cylinder head and timing case cover.



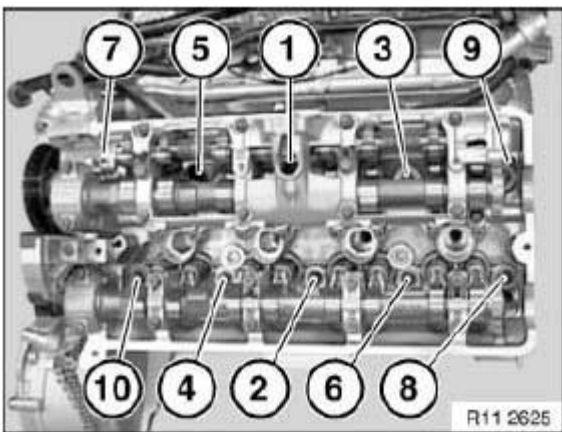
**Fig. 50: Locating Screws Between Cylinder Head And Timing Case Cover**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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. 51: Identifying Cylinder-Head Bolts Torque Sequence**  
Courtesy of BMW OF NORTH AMERICA, INC.

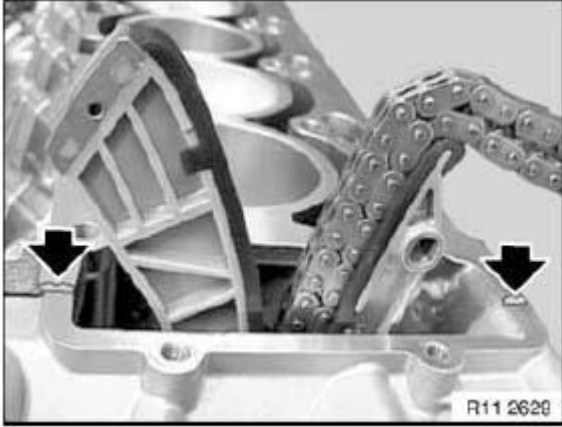
#### Installation:

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).

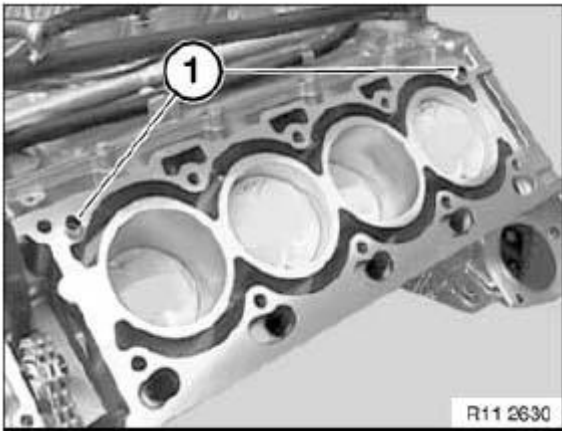
Coat joint between engine block and timing case cover with Drei Bond 1209.



**Fig. 52: Identifying Drei Bond 1209 Applying Area**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

Fit new cylinder-head seal.



**Fig. 53: Identifying Dowel Sleeves**  
Courtesy of BMW OF NORTH AMERICA, INC.

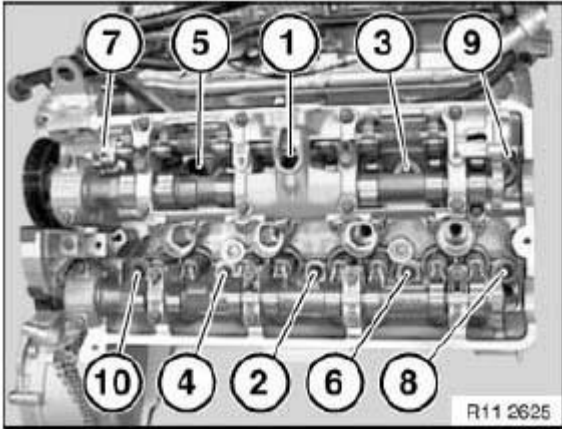
Put the cylinder head on.

**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.

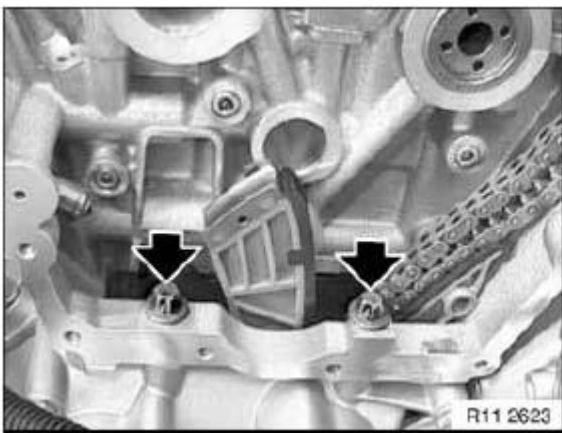
Tighten down the cylinder-head bolts in order 1... 10.

Tightening torque, see 11 12 8AZ in CYLINDER HEAD WITH COVER .



**Fig. 54: Identifying Cylinder-Head Bolts Torque Sequence**  
Courtesy of BMW OF NORTH AMERICA, INC.

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



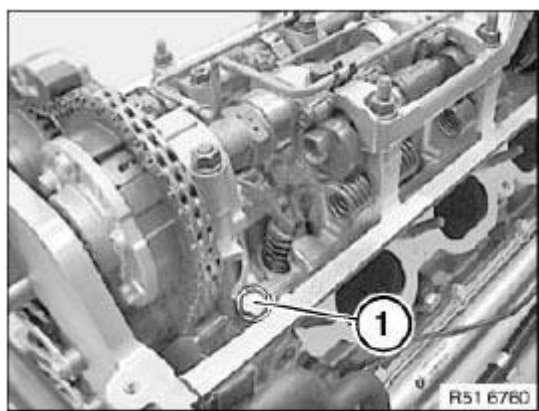
**Fig. 55: Locating Screws Between Cylinder Head And Timing Case Cover**  
Courtesy of BMW OF NORTH AMERICA, INC.

#### **Replacement:**

Insert screw plug (1).

#### *Installation:*

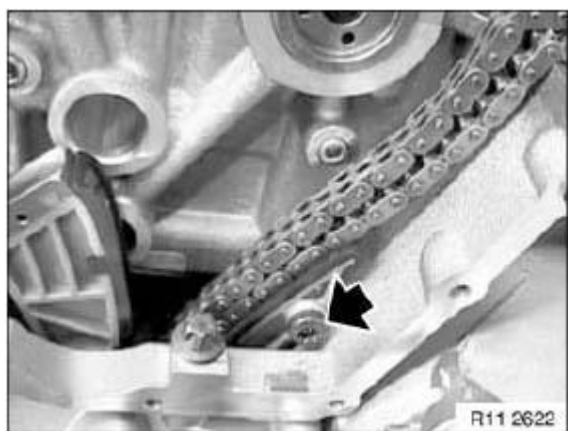
Failure to install the screw (1) will result in a malfunction in the VANOS control.



**Fig. 56: Identifying Screw Plug**

Courtesy of BMW OF NORTH AMERICA, INC.

Insert and tighten down guide rail screw.

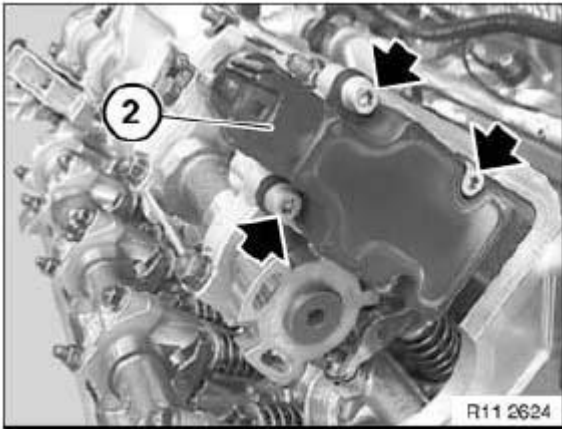


**Fig. 57: Locating Guide Rail Screw**

Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** Illustration with engine removed.

Install eccentric shaft sensor (2).



**Fig. 58: 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, see 11 11 5AZ in 11 11 ENGINE BLOCK .

Top up coolant. **Vent cooling system and check for leaks.** See 17 00 039 VENTING COOLING SYSTEM AND CHECKING FOR LEAKS (N62, N62TU) .

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.

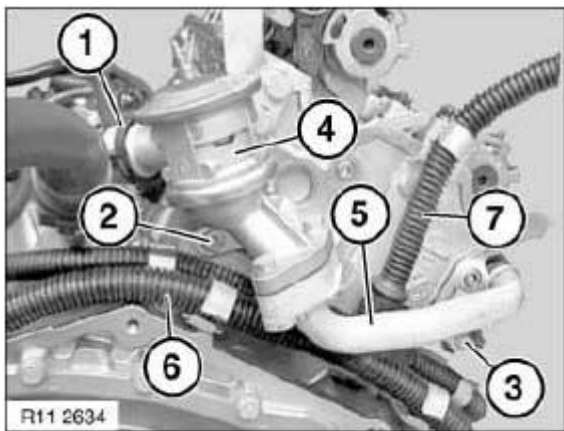
Detach hose (1) on check valve (4).

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. 59: Identifying Check Valve, Hose, Tube And Cables**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

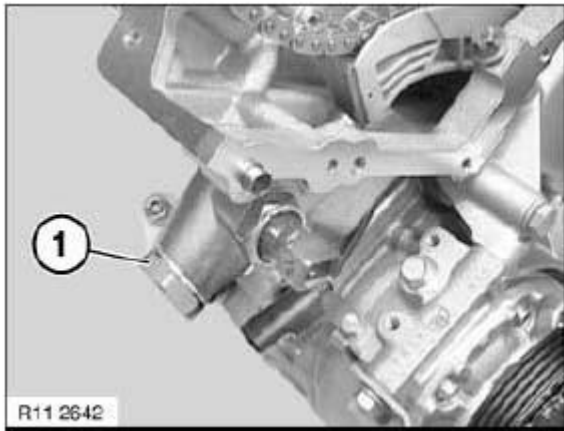
Replace sealing ring on tube (5) and coat with antiseize agent.

**Removal:**

Removal of cylinder head is described separately from installation.

Remove inlet and exhaust adjustment unit on right side.

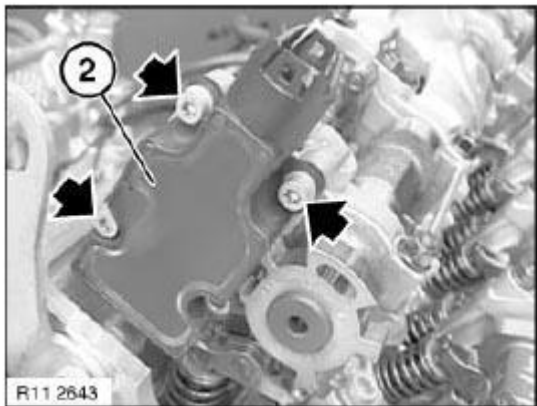
Slacken off chain tensioning piston (1) by approx. one turn.



**Fig. 60: Identifying Chain Tensioning Piston**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** Illustration with engine removed.

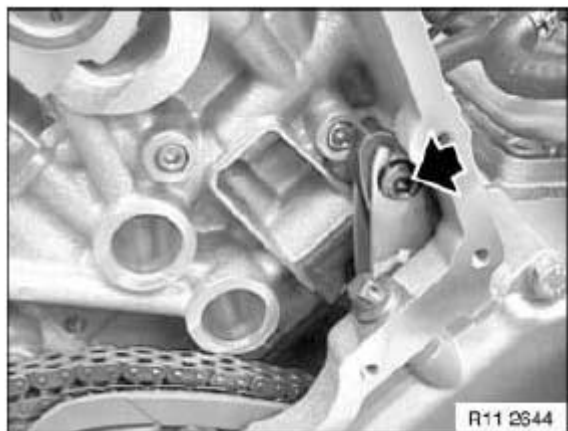
Remove eccentric shaft sensor (2).



**Fig. 61: Identifying Eccentric Shaft Sensor**  
Courtesy of BMW OF NORTH AMERICA, INC.

Detach guide rail from cylinder head.

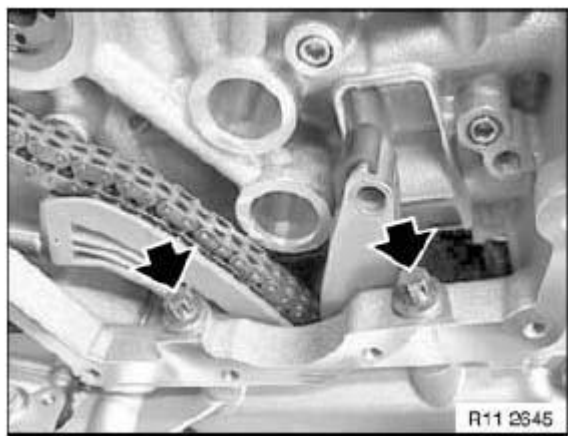




**Fig. 62: Locating Guide Rail Screw**

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws between cylinder head and timing case cover.



**Fig. 63: Locating Screws Between Cylinder Head And Timing Case Cover**

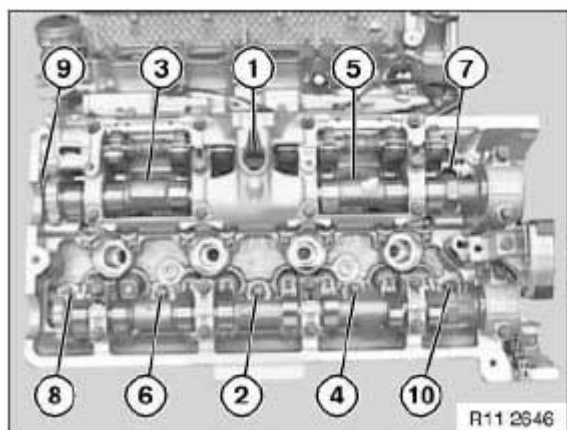
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

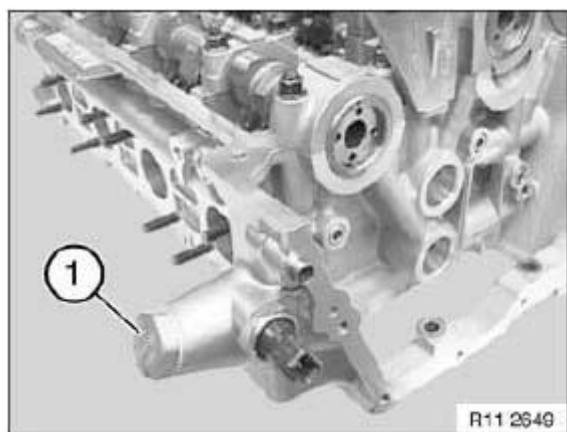
Lift off cylinder head.

Lift off cylinder head gasket.



**Fig. 64: Identifying Cylinder-Head Bolts Torque Sequence**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove chain tensioning piston (1).



**Fig. 65: 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. 66: Compressing Chain Tensioning Piston**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Installation:**

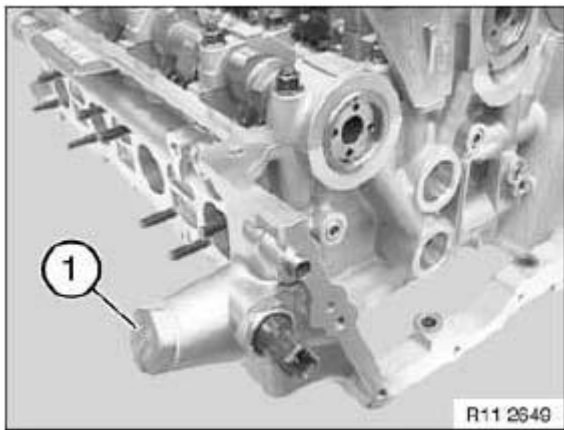
Installation of cylinder head is described separately from removal.

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).

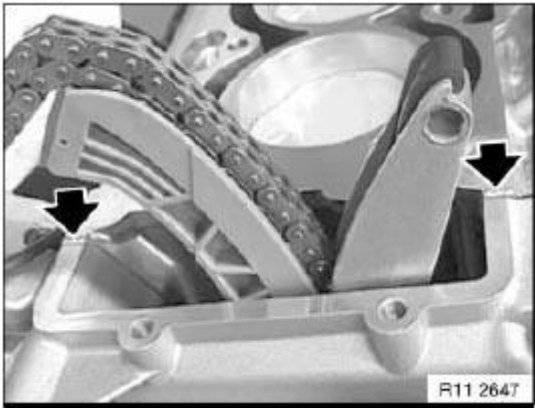
Replace sealing ring.

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



**Fig. 67: Identifying Chain Tensioning Piston**  
Courtesy of BMW OF NORTH AMERICA, INC.

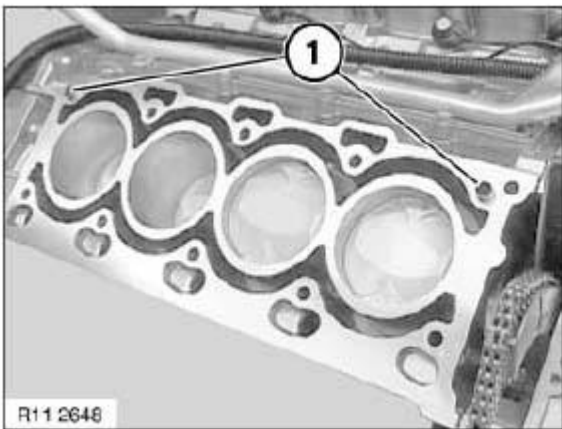
Coat joint between engine block and timing case cover with Drei Bond 1209.



**Fig. 68: Identifying Drei Bond 1209 Applying Area**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

Fit new cylinder-head seal.



**Fig. 69: Identifying Dowel Sleeves**  
Courtesy of BMW OF NORTH AMERICA, INC.

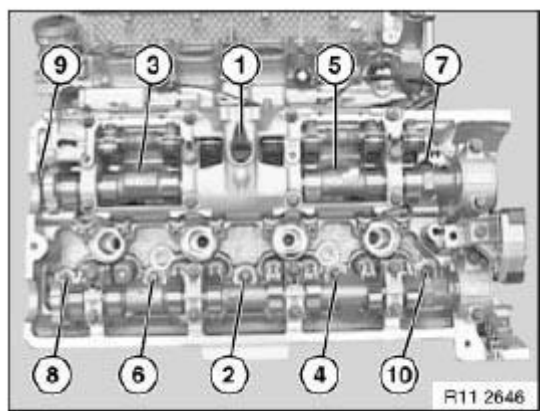
Put the cylinder head on.

**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.

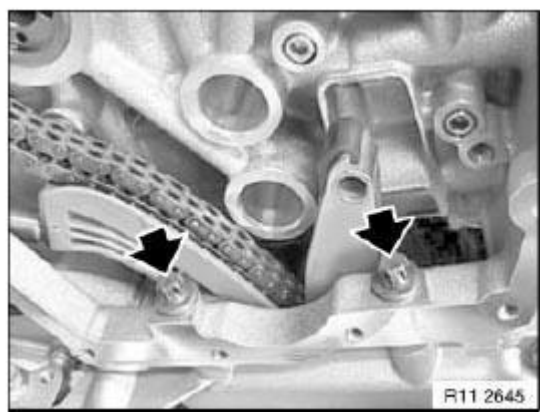
Tighten down the cylinder-head bolts in order 1... 10.

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



**Fig. 70: Identifying Cylinder-Head Bolts Torque Sequence**  
 Courtesy of BMW OF NORTH AMERICA, INC.

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



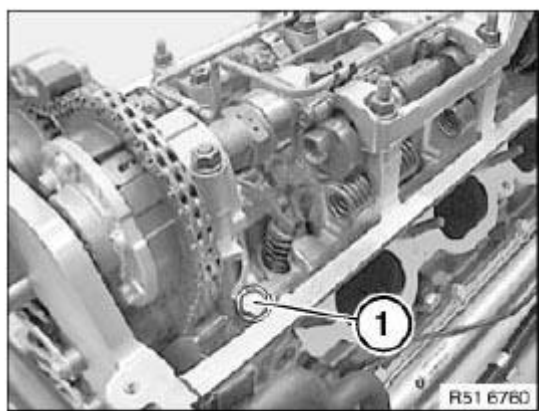
**Fig. 71: Locating Screws Between Cylinder Head And Timing Case Cover**  
 Courtesy of BMW OF NORTH AMERICA, INC.

#### **Replacement:**

Insert screw plug (1).

#### *Installation:*

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



**Fig. 72: Identifying Screw**

Courtesy of BMW OF NORTH AMERICA, INC.

Insert and tighten down guide rail screw.

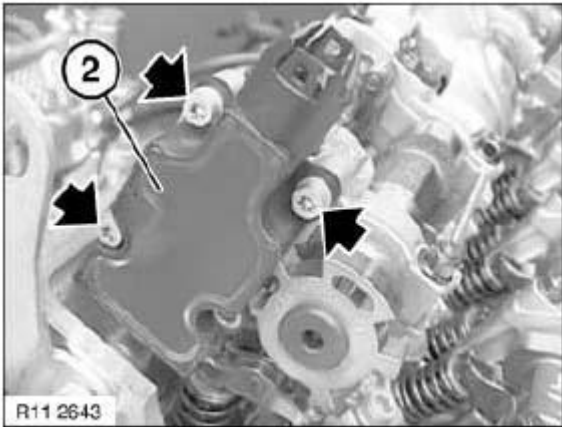


**Fig. 73: Locating Guide Rail Screw**

Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** Illustration with engine removed.

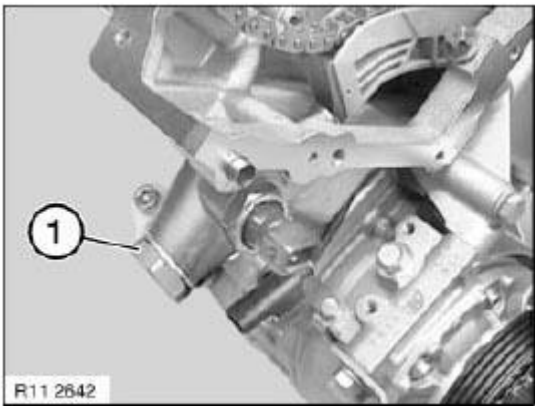
Install eccentric shaft sensor (2).



**Fig. 74: Identifying Eccentric Shaft Sensor**  
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down chain tensioning piston (1).

Tightening torque, see **11 31 8AZ** in CAMSHAFT .



**Fig. 75: Identifying Chain Tensioning Piston**  
Courtesy of BMW OF NORTH AMERICA, INC.

Install inlet and exhaust adjustment units on right side.

Assemble engine.

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

**Special tools required:**

- **11 9 000** . See ENGINE- SPECIAL TOOLS .
- **11 9 001**
- **11 9 002**

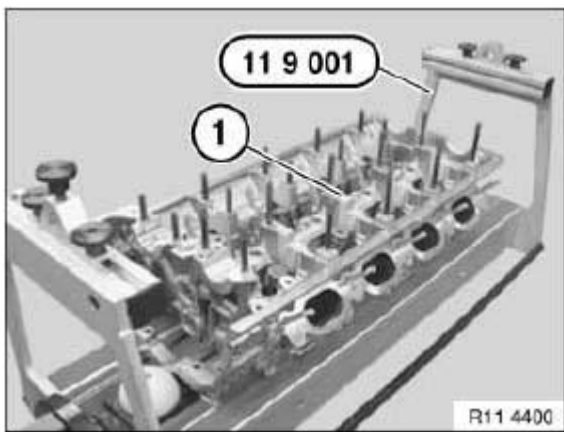
- 11 9 005
- 11 9 006
- 11 9 007
- 11 9 008
- 11 9 009
- 11 9 011
- 11 9 015

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°.

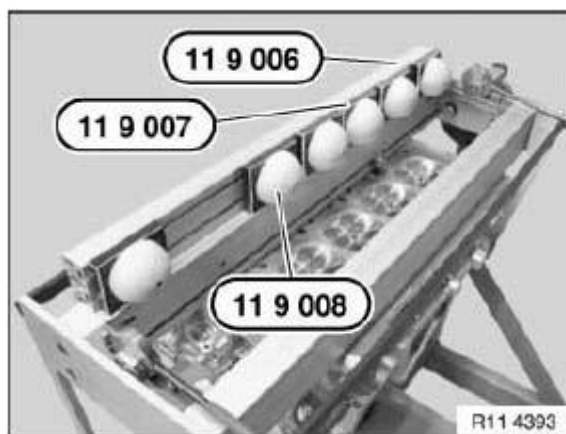


**Fig. 76: Identifying Special Tool (11 9 001)**  
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.

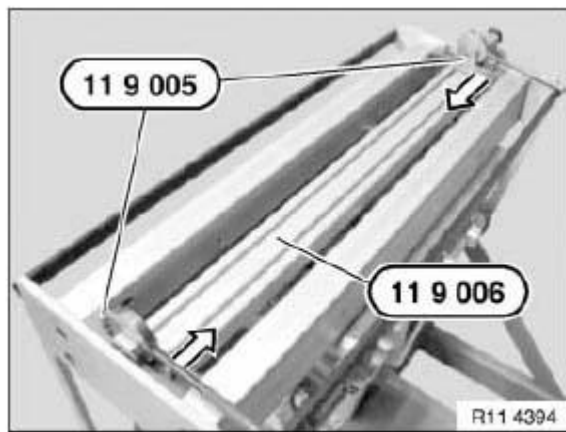




**Fig. 77: Identifying Special Tools**

Courtesy of BMW OF NORTH AMERICA, INC.

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

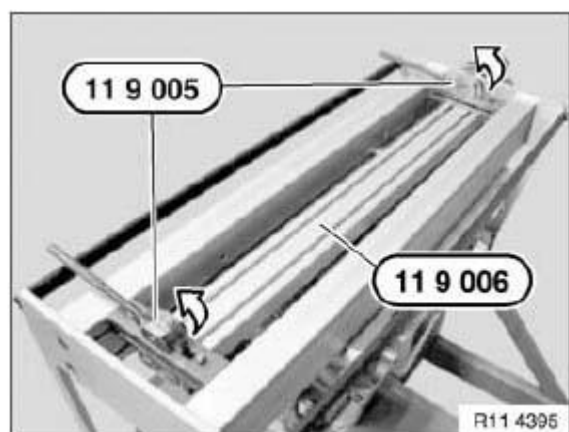


**Fig. 78: Identifying Special Tools**

Courtesy of BMW OF NORTH AMERICA, INC.

Turn lever of special tools **11 9 005** .

Turn special tool **11 9 001** through 180°.

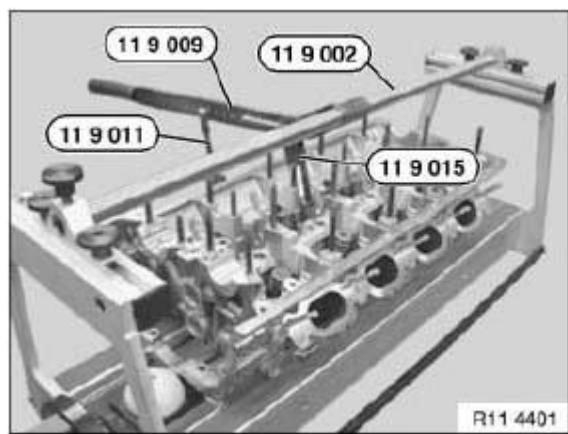


**Fig. 79: Identifying Special Tools**

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble clamping device with

- special tool 11 9 002 . See ENGINE- SPECIAL TOOLS .
- special tool 11 9 009
- special tool 11 9 011
- special tool 11 9 015



**Fig. 80: Identifying Special Tools**

Courtesy of BMW OF NORTH AMERICA, INC.

Remove all valve springs.

Remove all valve stem seals.

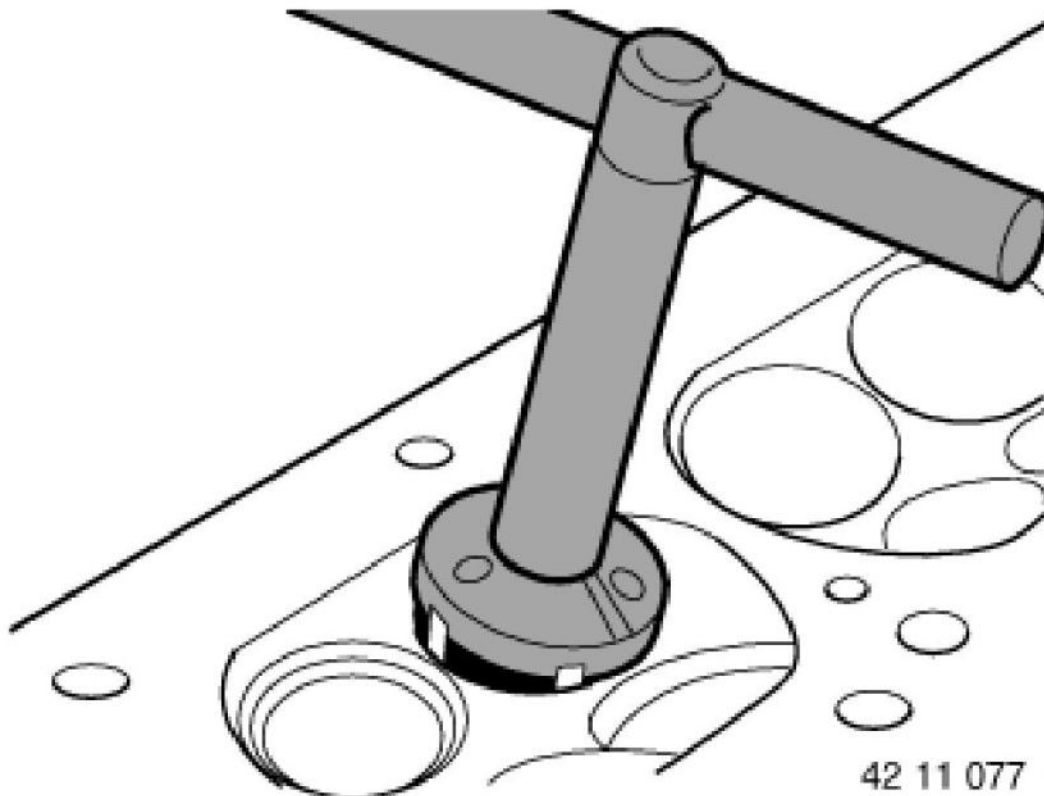
Remove **all** valves.

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

**Special tools required:**

- **00 3 520** . See MAINTENANCE AND GENERAL INFORMATION - SPECIAL TOOLS .
- **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.



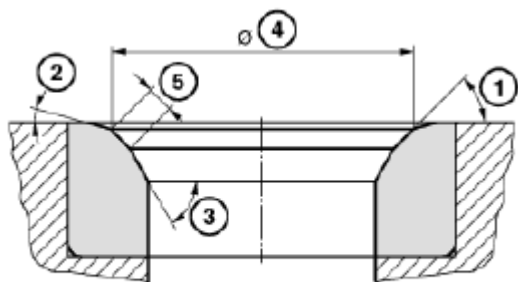
**Fig. 81: Machining Valve Seat Surface**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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).  
See ENGINE - TECHNICAL DATA (N62TU) .

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).



60 11 161 E

**Fig. 82: Identifying Valve-Seat Angle**

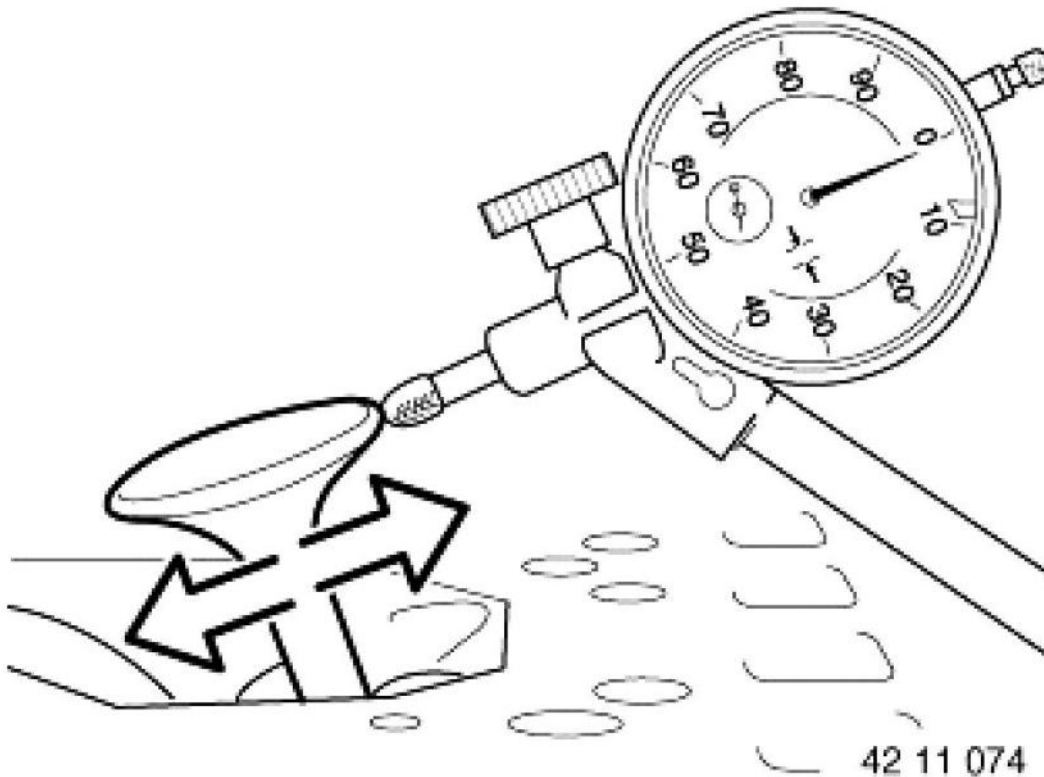
Courtesy of BMW OF NORTH AMERICA, INC.

#### 11 12 595 CHECKING A VALVE GUIDE FOR WEAR (N62)

(valve removed)

To measure tilt clearance, install a new valve so that end of valve stem is flush with valve guide. Attach dial gauge and measure tilt clearance.

**NOTE:** Max. permissible tilt clearance. See 11 12 CYLINDER HEAD WITH COVER N62TU .



**Fig. 83: Identifying Holding Fixture**

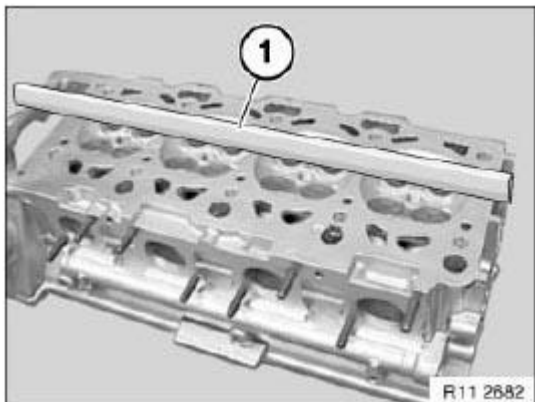
Courtesy of BMW OF NORTH AMERICA, INC.

#### 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.

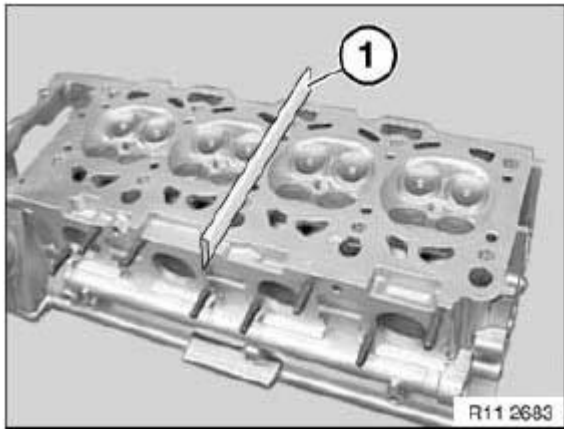


**Fig. 84: Checking Evenness Of Cylinder Head Sealing Face**

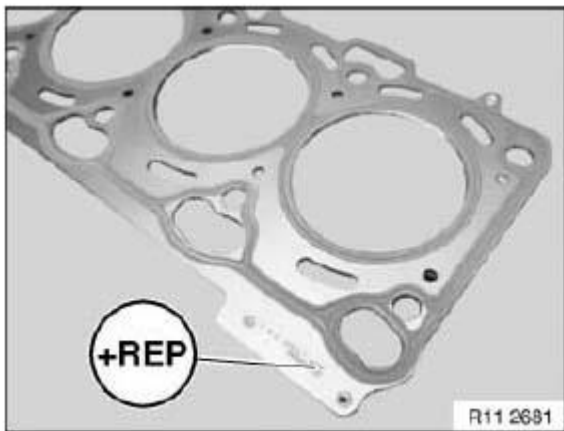
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** Maximum plane deviation: transversal 0.05 mm.

- Machining limit

**NOTE:** A cylinder head seal 0.3 mm thicker than usual can be obtained for machined (milled) cylinder heads.**Fig. 85: Checking Evenness Of Cylinder Head Sealing Face**

Courtesy of BMW OF NORTH AMERICA, INC.

**Fig. 86: Identifying Thicker 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 . See **ENGINE- SPECIAL TOOLS** .

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

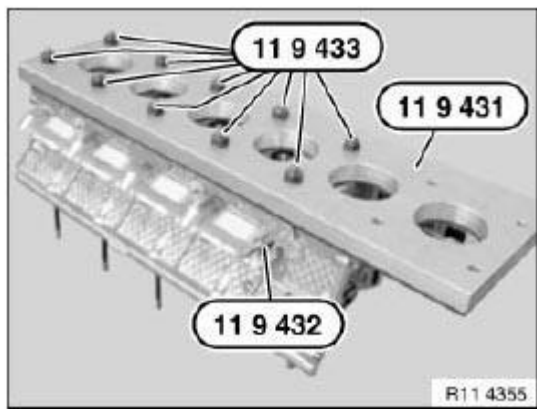
(cylinder head dismantled)

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. 87: Identifying Special Tools**

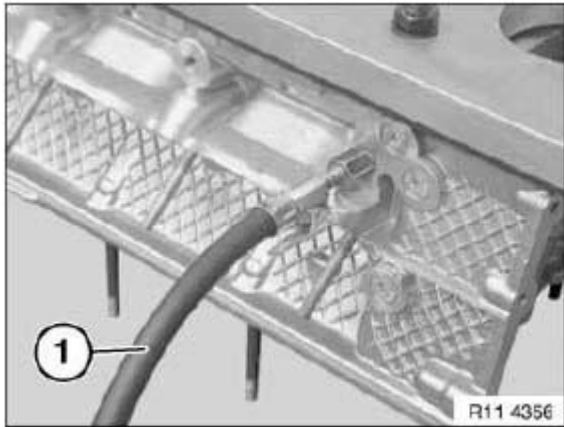
Courtesy of BMW OF NORTH AMERICA, INC.

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. 88: Identifying Compressed Air Hose**  
 Courtesy of BMW OF NORTH AMERICA, INC.

## OIL SUMP

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

Special tools required:

- 17 0 030 . See COOLING SYSTEM - SPECIAL TOOLS .

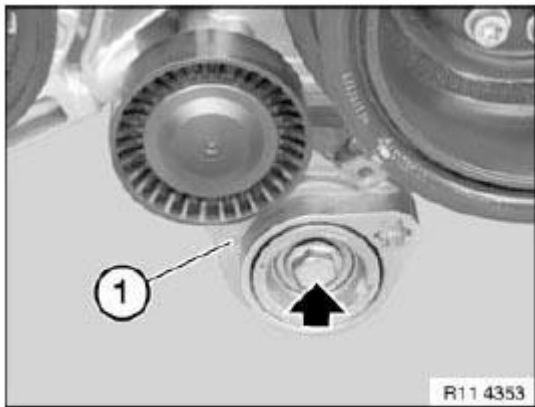
#### WORK STEPS REFERENCE

Work step	Note:
Remove <b>design cover</b>	
Remove center front panel	
Remove <b>fan clutch</b> (E65 only)	
Remove <b>fan cowl</b> (E65 only)	
Remove <b>electric fan</b> (E60 only). See <u>17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N62, N62TU)</u>	
Remove <u><b>alternator drive belt</b></u>	
Remove <b>A/C compressor drive belt</b>	
Remove <b>acoustic cover</b>	
Secure engine in <b>installation position</b> with special tool	
Release nuts on left and right engine mounts at top	
Remove <b>reinforcement plate</b>	
Drain off <b>engine oil</b>	
Remove <b>lower oil sump section</b>	
Lower <b>front axle support</b>	<b>NOTE:</b> To remove the oil sump, you must lower the front axle support.



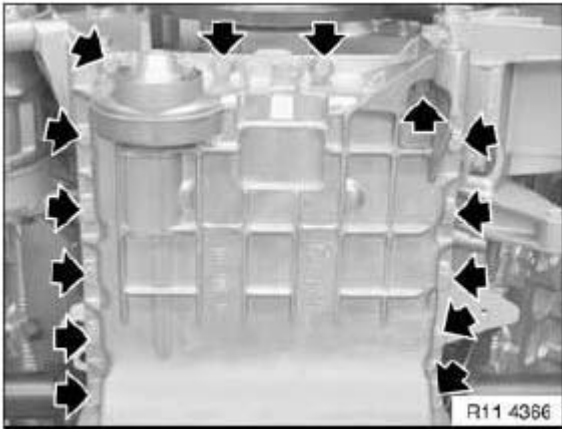
	<b>There is no need to perform a front axle alignment check.</b>
Release power steering pump on bracket, hydraulic lines remain connected. Secure power steering pump against falling down.	
Unlock and disconnect hydraulic lines from heat exchanger with special tool <b>17 0 030</b> . Release hydraulic lines on automatic transmission. Release holder for hydraulic lines. Remove hydraulic lines.	Installation location: on radiator at bottom left. Transmission fluid emerges when hydraulic lines are released. Catch and dispose of escaping transmission fluid. <i>Installation:</i> Check fluid level in automatic transmission; top up if necessary.
Unclip cable duct of oxygen sensors from automatic transmission.	

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



**Fig. 89: Identifying Tensioner**  
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws.



**Fig. 90: Locating Screws**

Courtesy of BMW OF NORTH AMERICA, INC.

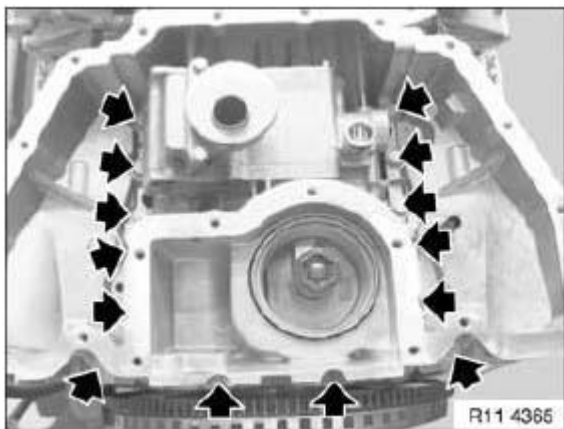
Release screws and remove oil sump top section.

*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.



**Fig. 91: Locating Screws**

Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque, see 11 13 2AZ in OIL SUMP .

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

*Necessary preliminary tasks:*

- Remove **reinforcement plate** . See **31 10 010 REMOVING AND INSTALLING/REPLACING 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).

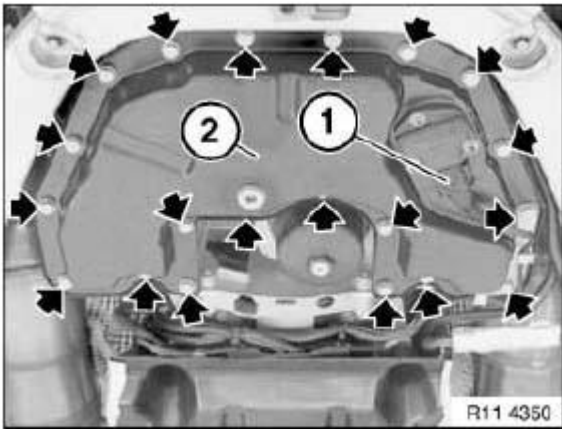
Tightening torque, see **11 13 2AZ** in **OIL SUMP** .

*Installation:*

Clean sealing surfaces.

Replace seal.

Replace screws.



**Fig. 92: Locating Oil Sump Bottom Section And Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

When replacing oil sump bottom section:

Convert oil level sensor.

Replace sealing ring.

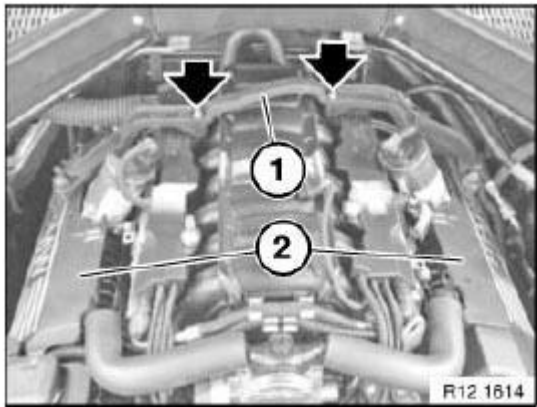
**12 13 511 REPLACING IGNITION COIL (N62TU)**

*Necessary preliminary tasks:*

- Switch off ignition.
- **Remove intake filter housing** . See **13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING** .

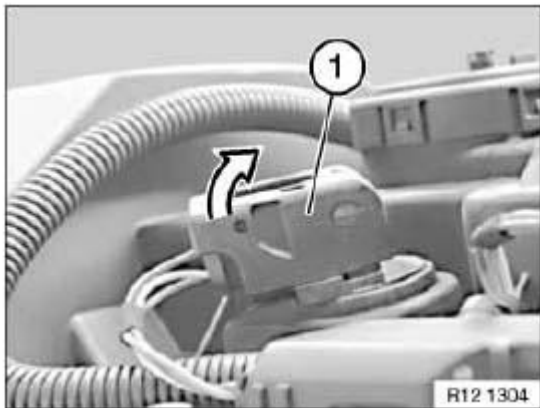
Release screws and remove holder (1).

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



**Fig. 93: Identifying Ignition Coil Covers And Holder**  
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug fastener (1) of ignition coil.

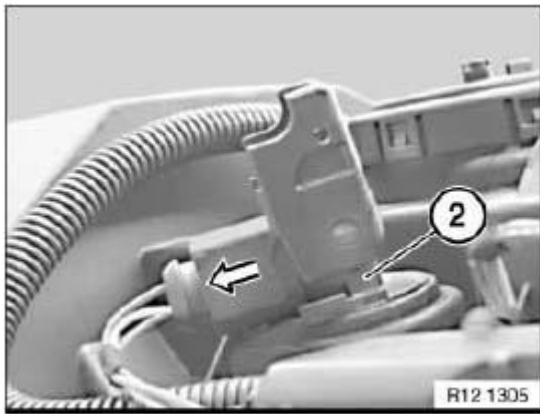


**Fig. 94: Unlocking Plug Fastener**  
Courtesy of BMW OF NORTH AMERICA, INC.

Detach ignition coil connector in direction of arrow.

Pull out ignition coil (2).

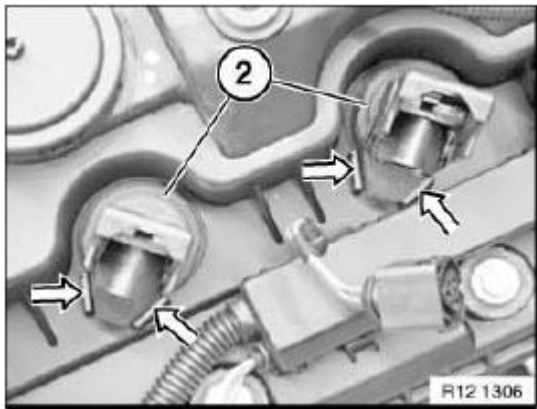
This procedure is applicable to all ignition coils.



**Fig. 95: Pulling Out Ignition Coil**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Installation:**

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



**Fig. 96: Inserting Rubber Seal On Ignition Coils**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

**NOTE:** Read out DME fault memory.  
Check function of DME.

## HOUSING COVER

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

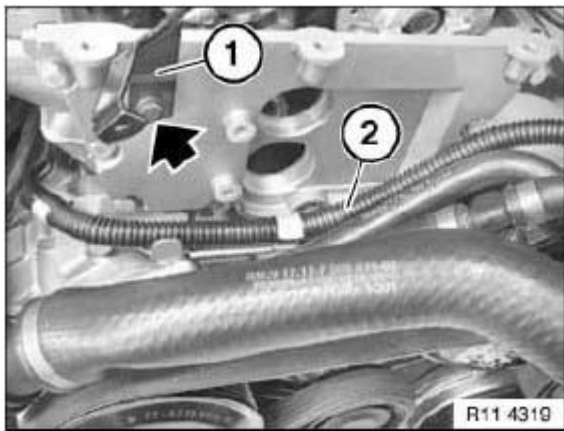
(cylinder bank 5 to 8)

*Necessary preliminary tasks:*

- Remove **left cylinder head cover.**
- Remove **both solenoid valves on left side**
- Release alternator (air-cooled). See **12 31 020 REMOVING AND INSTALLING/REPLACING ALTERNATOR (N62) .**

Release screw, remove holder (1).

Remove line (2) from holder.

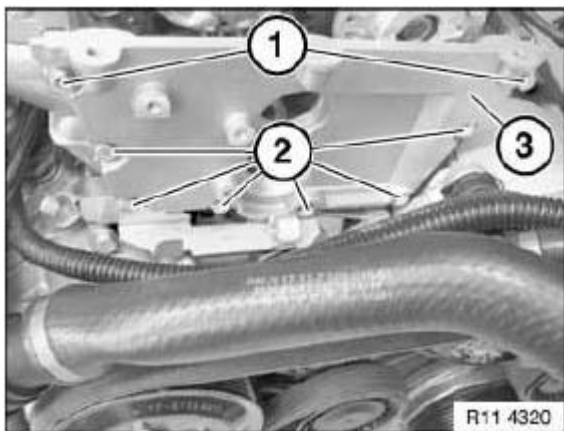


**Fig. 97: Locating Holder And Line**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1 and 2).

Tightening torque **11 14 3AZ.**

Remove timing case cover (3).

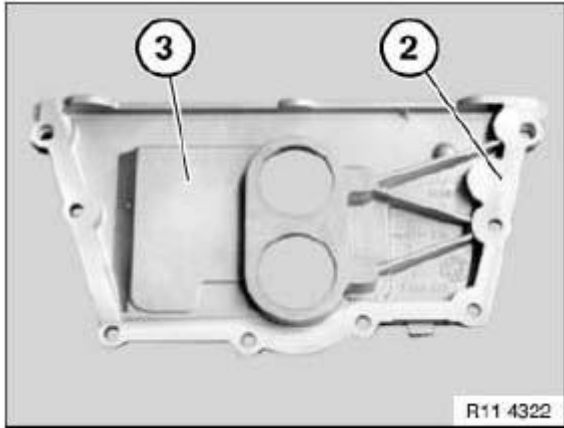


**Fig. 98: Identifying Timing Case Cover And Screws**

Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

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

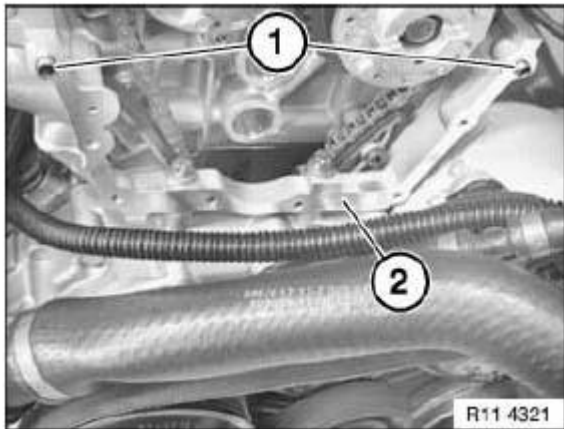


**Fig. 99: Identifying Timing Case Cover And Sealing Face**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

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

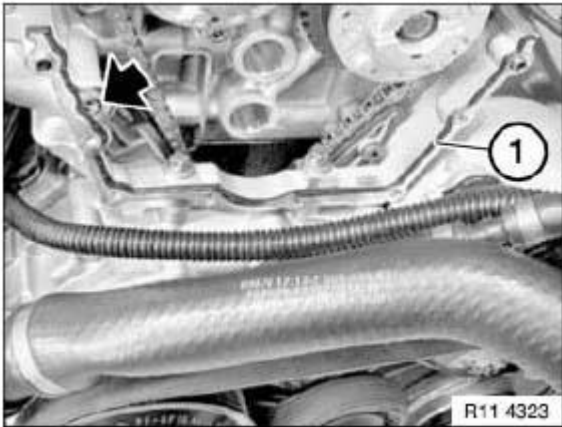
Free sealing face (2) of seal debris and clean.



**Fig. 100: Identifying Adapter Sleeves And Sealing Face**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

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



**Fig. 101: Identifying Gasket**

Courtesy of BMW OF NORTH AMERICA, INC.

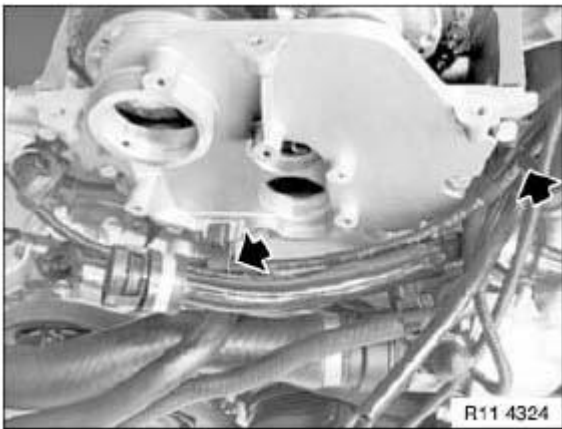
### 11 14 085 REMOVING AND INSTALLING TOP RIGHT TIMING CASE COVER (N62 / N62TU)

(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. 102: Locating Cable**

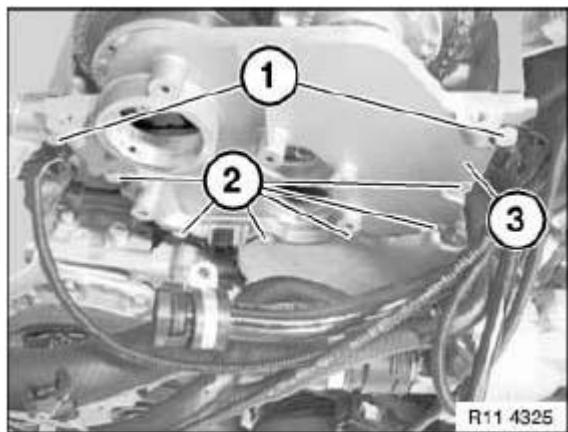
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1 and 2).

Tightening torque 11 14 3AZ. .



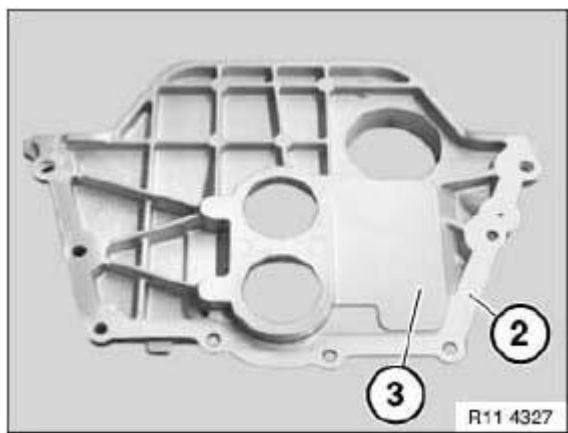
Remove timing case cover (3).



**Fig. 103: Identifying Timing Case Cover And Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

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

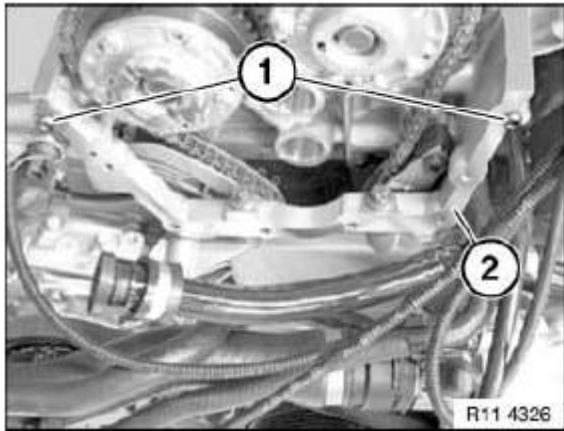


**Fig. 104: Identifying Timing Case Cover And Sealing Face**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

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

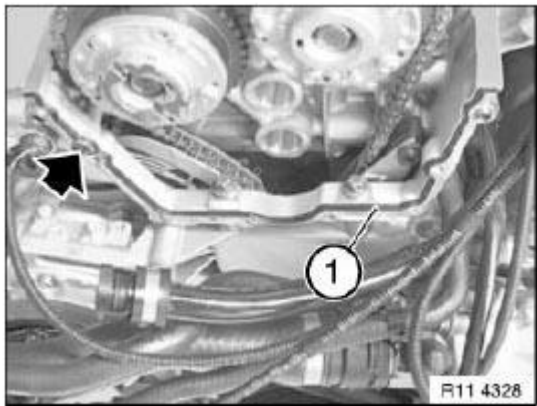
Free sealing face (2) of seal debris and clean.



**Fig. 105: Identifying Adapter Sleeves And Sealing Face**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

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



**Fig. 106: 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** . See **MANUAL TRANSMISSION - SPECIAL TOOLS** .

*Necessary preliminary tasks:*

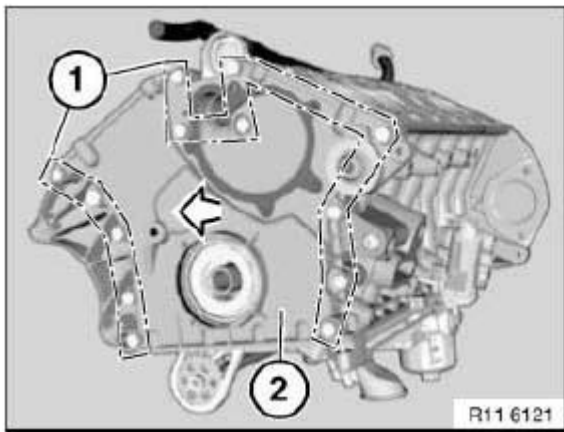
- Remove **engine**
- Remove **both cylinder heads**
- Remove **lower oil sump section**

- 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 end cover

Release screws along lines (1).

Tightening torque **11 14 2AZ.**

Remove timing case cover (2) towards front.

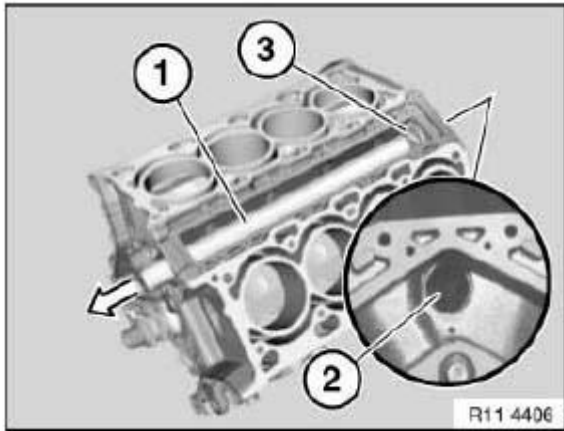


**Fig. 107: Identifying Timing Case Cover And Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

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. 108: Driving Out Water Pipe With Special Tool**  
 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, see 11 14 1AZ in **11 14 CASE COVERS** .

**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)**

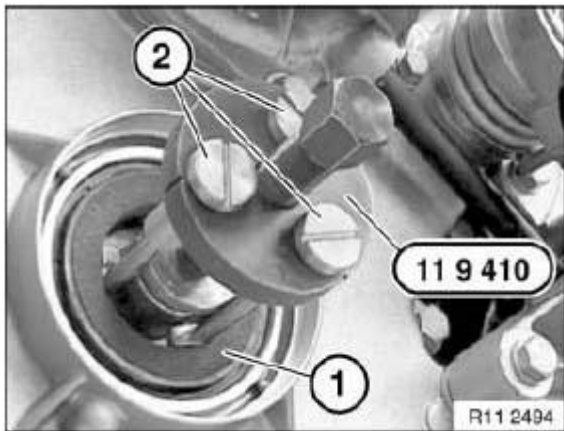
**Special tools required:**

- 11 9 410 . See **ENGINE- SPECIAL TOOLS** .
- 11 9 420

*Necessary preliminary tasks:*

- **Removing hub for vibration damper**

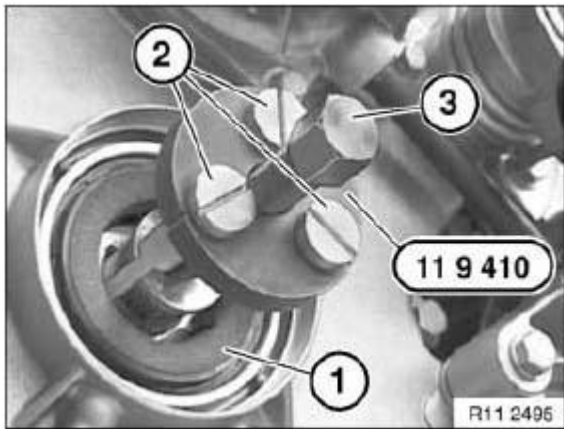
Position lever (2) for removing radial shaft seal (1) horizontally and install special tool **11 9 410**.



**Fig. 109: Identifying Radial Shaft Seal And Lever**  
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. 110: Identifying Radial Shaft Seal And Special Tool (11 9 410)**  
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.

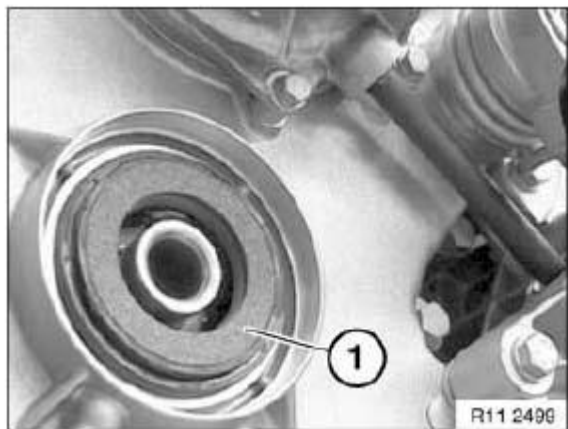
**IMPORTANT:** The sealing lip of the radial shaft seal is highly sensitive and must not be kinked under any circumstances.  
Do not touch the sealing lip with your fingers.



**Fig. 111: Identifying Radial Shaft Seal And Support Sleeve**  
Courtesy of BMW OF NORTH AMERICA, INC.

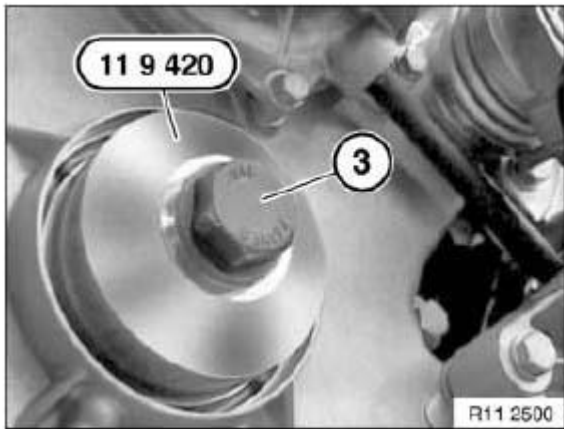
Remove support sleeve (2) from radial shaft seal (1).

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



**Fig. 112: 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. 113: Identifying Special Tool (11 9 420) And 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 . See ENGINE- SPECIAL TOOLS .

(transmission side)

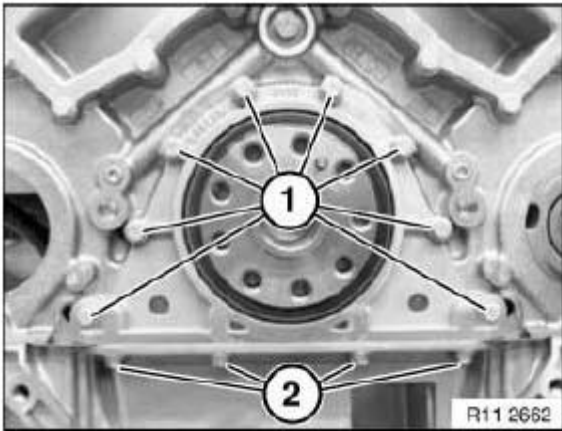
##### *Necessary preliminary tasks:*

- Remove **transmission** . See appropriate article in TRANSMISSIONS. See 24 00 023 REMOVING AND INSTALLING AUTOMATIC TRANSMISSION (6HP26Z/N62TU) FROM 03/07 , 23 00 018 REMOVING AND INSTALLING TRANSMISSION (GS6-53BZ) N62/N62TU or 23 00 112 REMOVING AND INSTALLING TRANSMISSION (GS6S53BZ SMG) .
- Drain off **engine oil** . See 00 00 610 ENGINE OIL SERVICE (N62/N62TU) .
- Remove **flywheel**

Release screws (2).

Release screws (1).

Carefully remove end cover.



**Fig. 114: Identifying Screws**

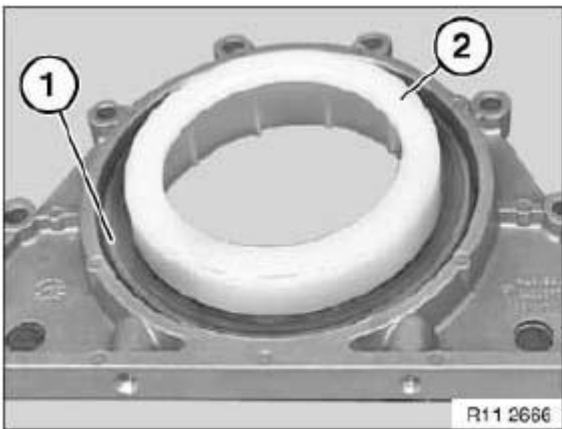
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

**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.



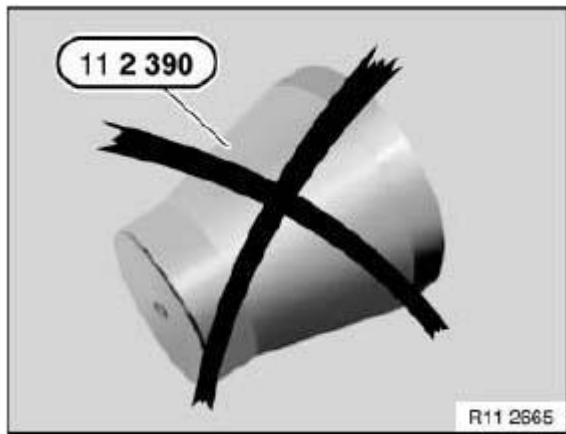
**Fig. 115: Identifying Support Sleeve And Radial Shaft Seal**

Courtesy of BMW OF NORTH AMERICA, INC.

**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. 116: Identifying Special Tool (11 2 390)**  
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.

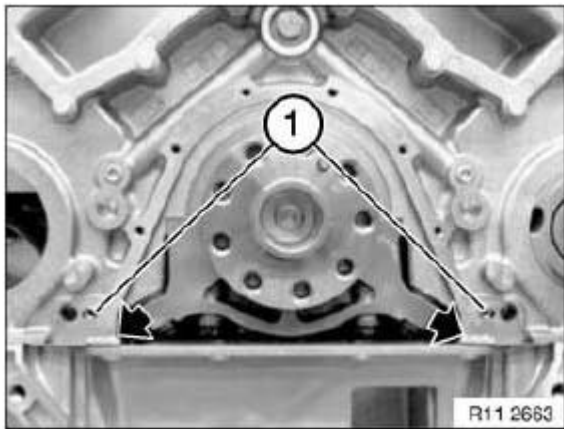
*Installation:*

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.



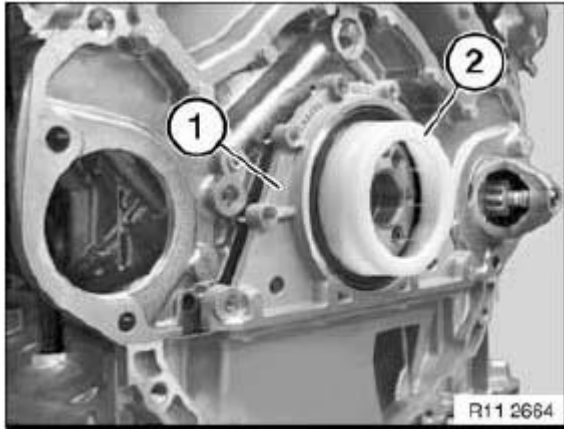
**Fig. 117: Identifying Dowel Sleeves**

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.



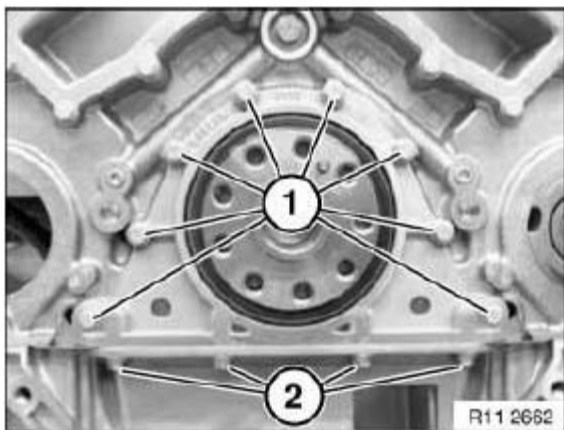
**Fig. 118: Identifying Support Sleeve And End Cover**  
Courtesy of BMW OF NORTH AMERICA, INC.

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. 119: Identifying Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

## CRANKSHAFT WITH BEARING

### 11 21 500 REPLACING CRANKSHAFT (N62 / N62TU)

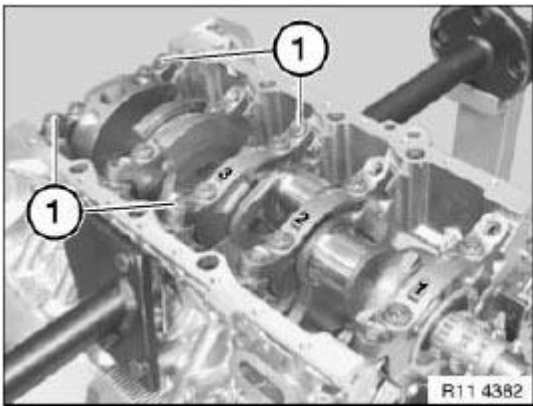
#### CRANKSHAFT REPLACING OPERATION REFERENCE

Operation:	Note:
Remove <u>engine</u>	
Remove <u>cylinder head</u> (cylinder bank 1 to 4)	
Remove <u>cylinder head</u> (cylinder bank 5 to 8)	
Remove <u>hub for vibration damper</u>	
Remove lower timing case cover	
<u>Remove oil pan</u>	
Remove <u>oil</u> pump	
Remove <u>piston</u>	
Remove <u>flywheel</u>	

Release main bearing inclined screw connection (1).

*Installation:*

Tightening torque, see 11 11 3AZ in ENGINE BLOCK .



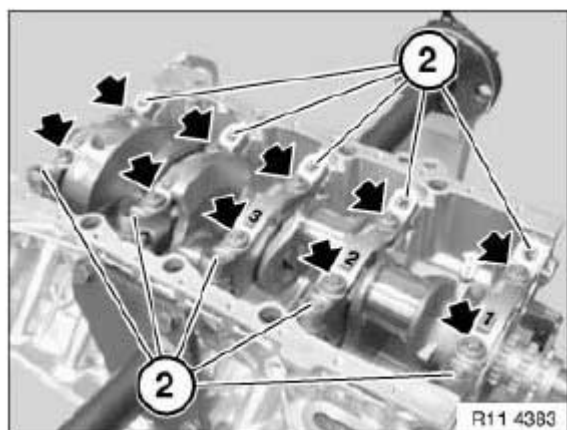
**Fig. 120: Identifying Screw Connection**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Release spacer bolt (2).

Tightening torque, see 11 11 3AZ in ENGINE BLOCK .

Release main bearing screws.

Tightening torque, see 11 11 2AZ in ENGINE BLOCK .

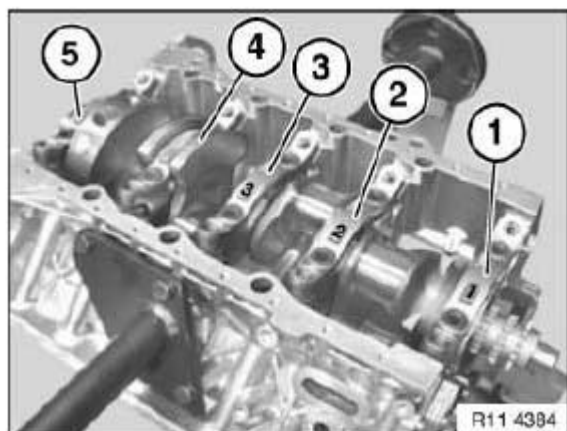


**Fig. 121: Identifying Spacer Bolt**

Courtesy of BMW OF NORTH AMERICA, INC.

Remove main bearing caps 1 to 5.

Lever out crankshaft.



**Fig. 122: 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)

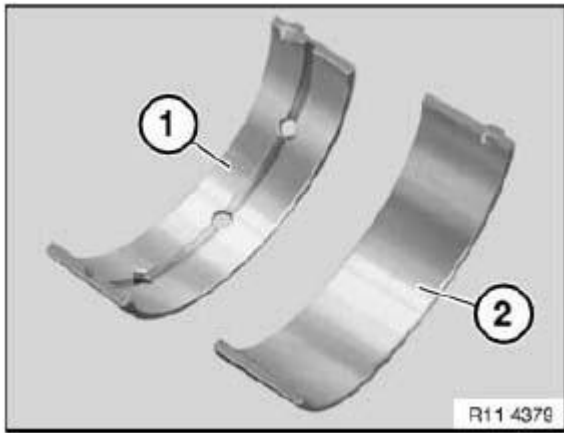
Special tools required:

- 00 2 590 . See MAINTENANCE AND GENERAL INFORMATION - SPECIAL TOOLS .
- 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. 123: 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

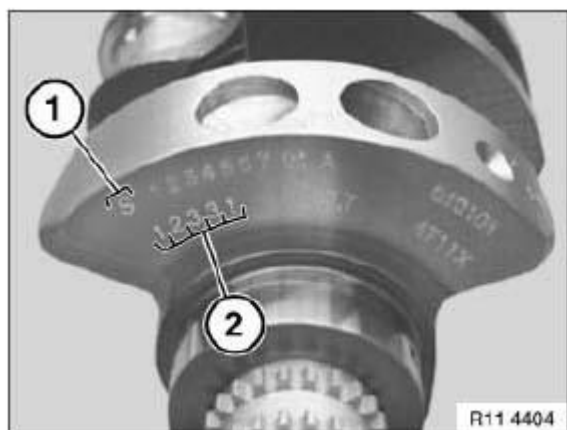
C= Construction stage 2

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



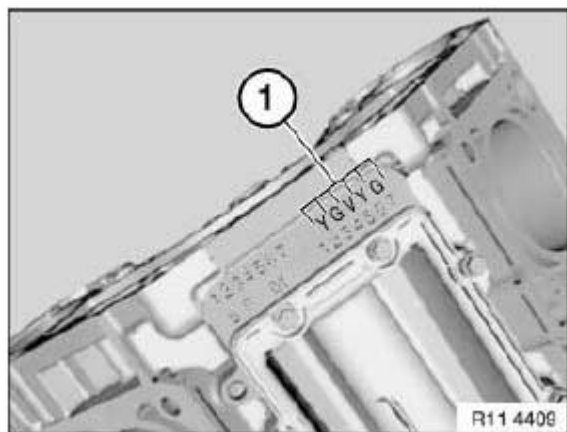
**Fig. 124: Identifying Crankshaft Construction Stage Specification**  
 Courtesy of BMW OF NORTH AMERICA, INC.

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

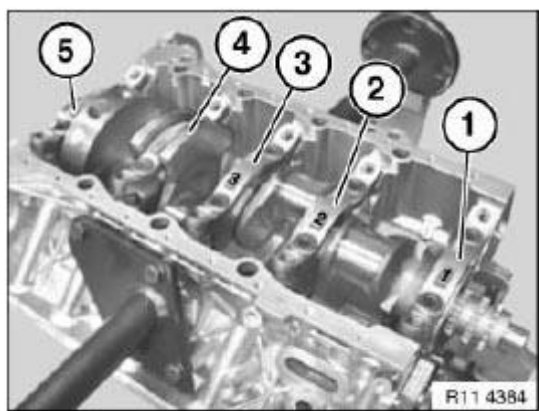
G= green

V= violet



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

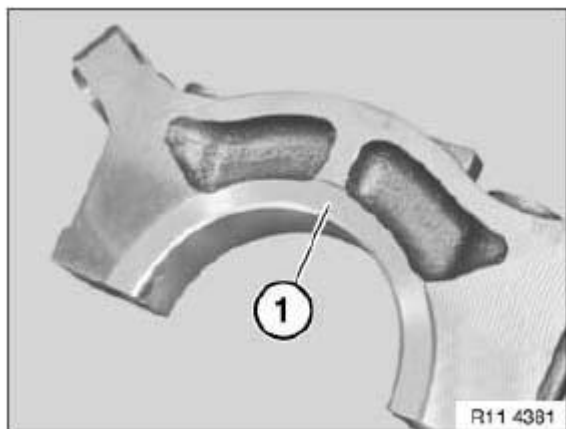
**NOTE:** Main bearing caps (1, 2 and 3) are identified with punch numbers.  
 Main bearing caps (4 and 5) are not identified.



**Fig. 126: Identifying Main Bearing Caps**

Courtesy of BMW OF NORTH AMERICA, INC.

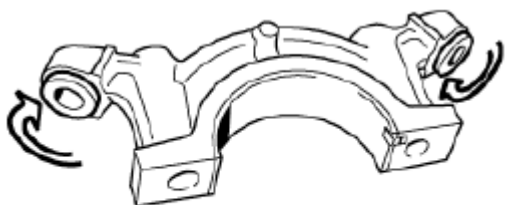
**NOTE:** Main bearing cap number 5 can be identified by the surfaces (1) for the stop disks of the thrust bearing.



**Fig. 127: Identifying Main Bearing Cap Number**

Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew thread support bushings in main bearing caps.



60 11 211

**Fig. 128: Unscrewing Thread Support Bushings**

Courtesy of BMW OF NORTH AMERICA, INC.

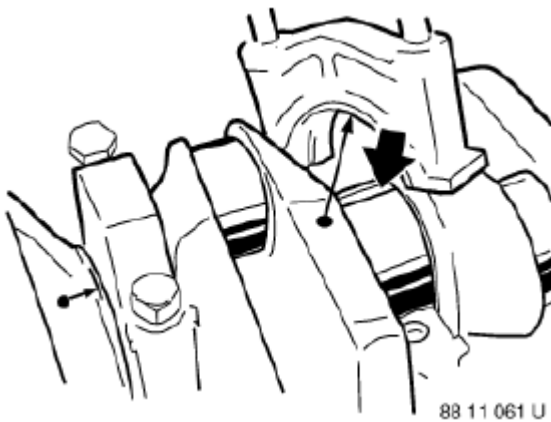
### Checking main bearing clearance:

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.

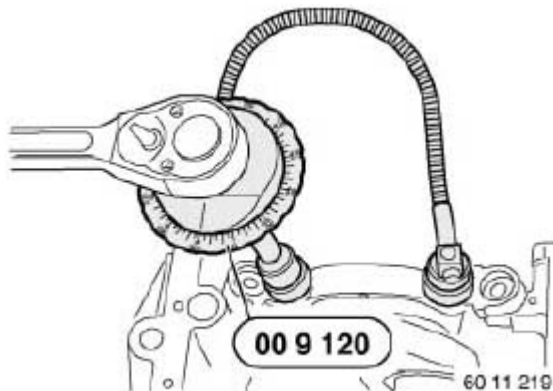
Fit special tool **00 2 590** (Plastigage Type PG 1) to the oil-free crankshaft.



**Fig. 129: Identifying Crankshaft Main Bearing**  
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, see **11 11 2AZ** in **ENGINE BLOCK**.



**Fig. 130: Tightening Screws On Main Bearing Cover**  
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. 131: 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).

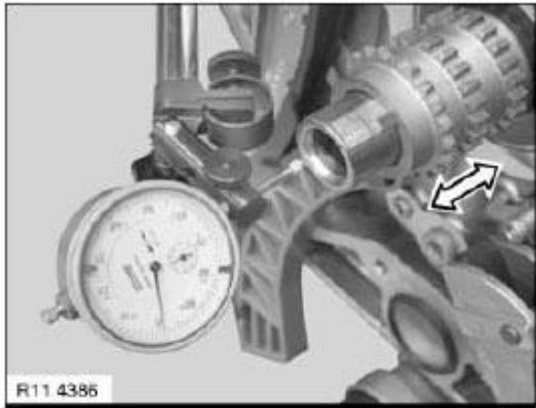
Tightening specifications for main bearing:

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.** See CRANKSHAFT WITH BEARING .

Check guide bearing shell, crankshaft and crankcase if necessary.

4. Tighten screws of main bearing cover 5 with jointing torque.
5. Tightening torque, see 11 11 2AZ in ENGINE BLOCK .



**Fig. 132: Checking Axial Play**

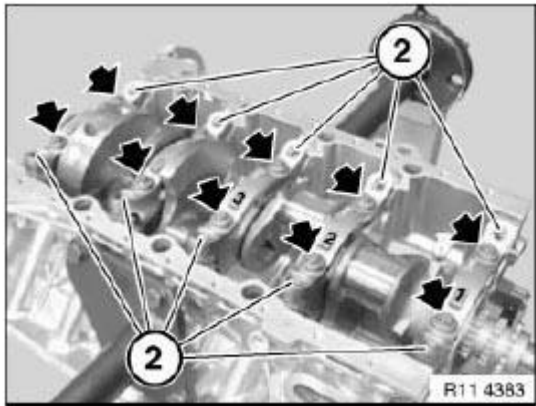
Courtesy of BMW OF NORTH AMERICA, INC.

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

Tightening torque, see **11 11 2AZ** . in **ENGINE BLOCK** .

Tighten down thread support bushings (2).

Tightening torque, see **11 11 3AZ** in **ENGINE BLOCK** .

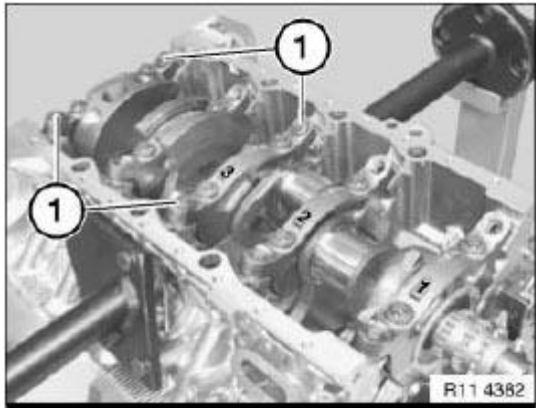


**Fig. 133: Identifying Thread Support Bushings**

Courtesy of BMW OF NORTH AMERICA, INC.

Replace flanged head screws (1) and tighten down.

Tightening torque, see **11 11 3AZ** .in **ENGINE BLOCK** .



**Fig. 134: Identifying Flanged Head Screws**  
 Courtesy of BMW OF NORTH AMERICA, INC.

## FLYWHEEL

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

#### Special tools required:

- 11 4 180 . See ENGINE- SPECIAL TOOLS .
- 11 9 260
- 11 9 262
- 11 9 263
- 11 9 264

#### *Necessary preliminary tasks:*

- Remove **automatic transmission**. See AUTOMATIC TRANSMISSION - REPAIR INSTRUCTIONS .
- Remove **manual transmission**. See MANUAL TRANSMISSION - REPAIR INSTRUCTIONS .
- Remove **clutch**. See CLUTCH - REPAIR INSTRUCTIONS .

#### **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:*

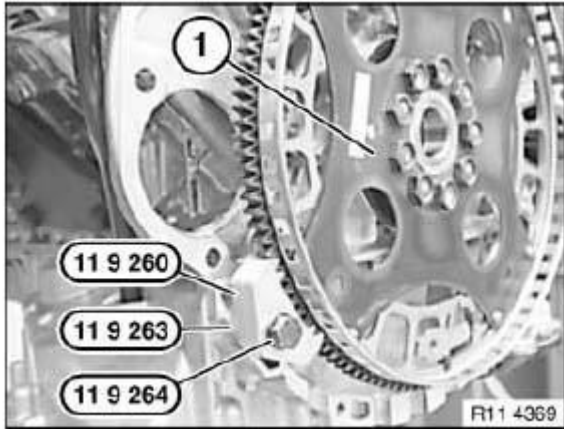
Clean threads on flywheel screws in crankshaft.

Flywheel (1) is secured with an alignment pin.

Fit flywheel (1).

Fit new flywheel screws.

Tightening torque, see **11 22 1AZ** in **FLYWHEEL** .



**Fig. 135: Identifying Special Tools And Flywheel**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Manual transmissions only:**

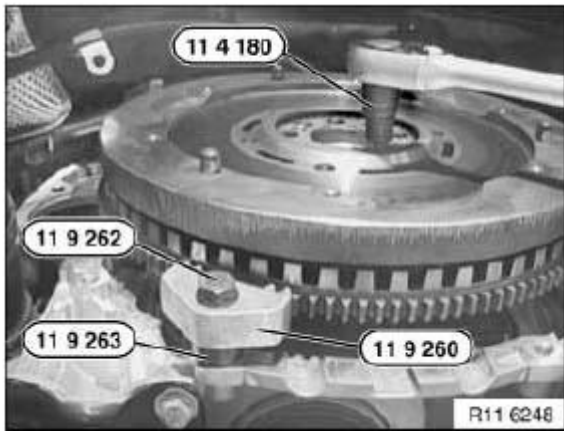
Block flywheel (dual-mass) with special tools **11 9 260** / **11 9 262** / **11 9 263** .

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.**



**Fig. 136: Identifying Special Tools**

Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque, see 11 22 1AZ in FLYWHEEL .

## 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
- Remove fan cowl . See 17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N62, N62TU)

Release bolts and remove vibration damper (1).

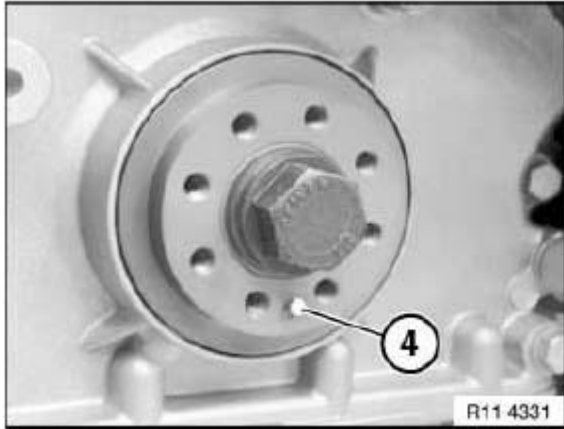


**Fig. 137: Identifying Vibration Damper**

Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

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



**Fig. 138: Identifying Alignment Pin**  
Courtesy of BMW OF NORTH AMERICA, INC.

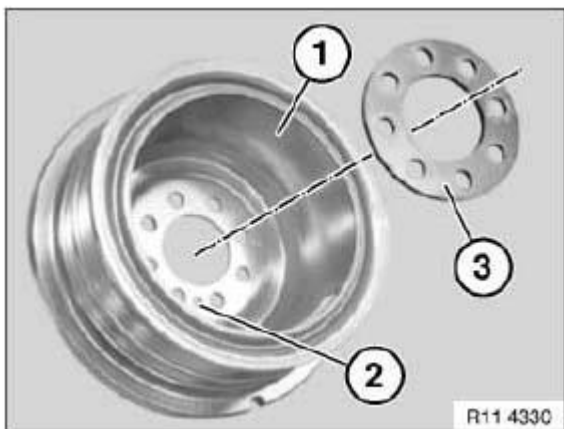
*Installation:*

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

Fit disk (3).

Replace screws.

Tightening torque, see **11 23 3AZ** in **VIBRATION DAMPER** .



**Fig. 139: Identifying Vibration Damper, Bore And Disk**  
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 . See ENGINE- SPECIAL TOOLS .
- 11 9 451
- 11 9 452
- 11 9 453
- 11 9 454

*Necessary preliminary tasks:*

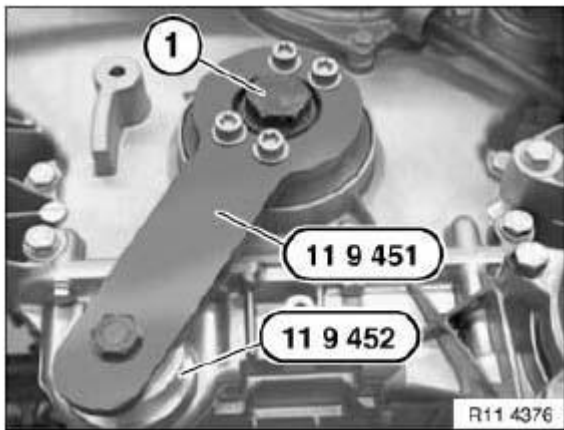
- Remove design cover
- Remove **electric fan** (E60). See 17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N62, N62TU)
- Remove alternator drive belt
- Remove A/C compressor drive belt
- Remove front engine underguard
- Remove vibration damper

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. 140: Identifying Special Tools And Central Bolt**  
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).

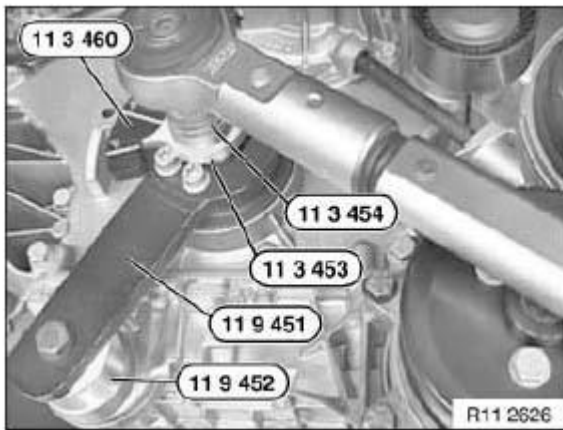
Tighten down central bolt (1) to joining torque.

Tightening torque, see **11 23 2AZ** in **VIBRATION DAMPER** .

*Installation:*

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

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



**Fig. 141: Identifying Special Tools**

Courtesy of BMW OF NORTH AMERICA, INC.

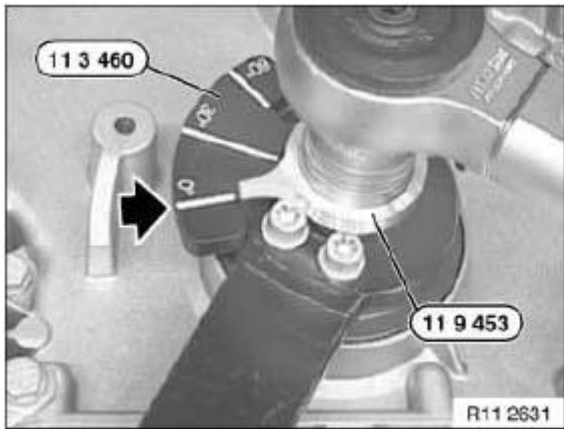
**Installation:**

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, see **11 23 2AZ** in **VIBRATION DAMPER** .





**Fig. 142: Identifying Special Tools**

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

## CONNECTING ROD WITH BEARING

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

Special tools required:

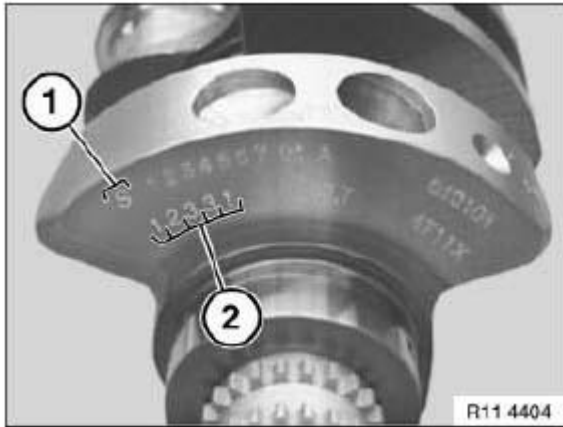
- 00 2 590 . See MAINTENANCE AND GENERAL INFORMATION - SPECIAL TOOLS .
- 00 9 120
- 11 2 110 . See ENGINE- SPECIAL TOOLS .

(piston removed)

**IMPORTANT:** Note grinding stages on crankshaft. See CRANKSHAFT WITH BEARING .

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).

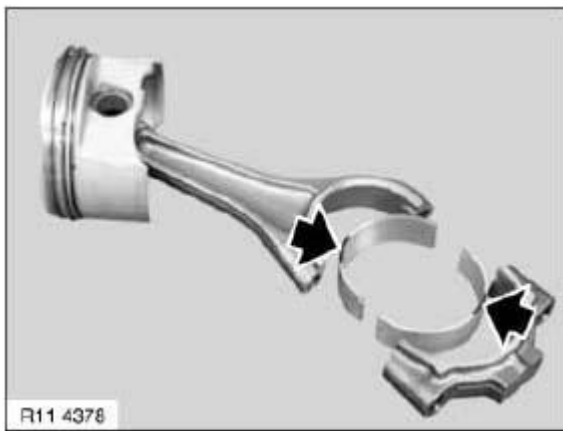


**Fig. 143: Identifying Bearing Shell Classification Number**  
Courtesy of BMW OF NORTH AMERICA, INC.

Install new conrod bearing shells.

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

Install piston.



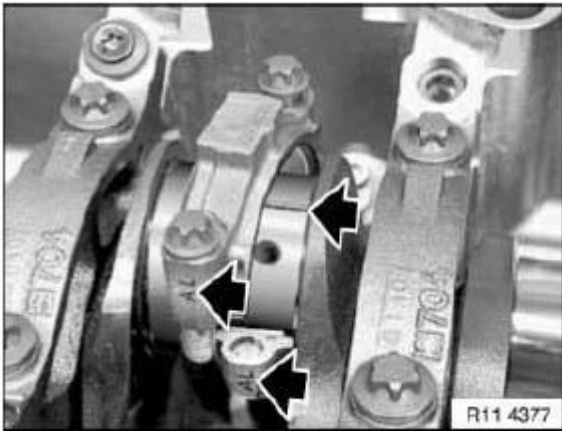
**Fig. 144: Locating Conrod Bearing Shells**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Check connecting-rod bearing clearance:**

Piston in BDC position.

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

Fit bearing caps so that pair numbers match up.



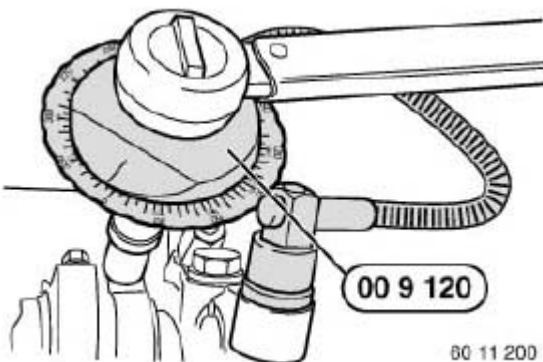
**Fig. 145: Locating Connecting-Rod Bearing**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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, see 11 24 1AZ in 11 24 CONNECTING RODS AND BEARINGS .

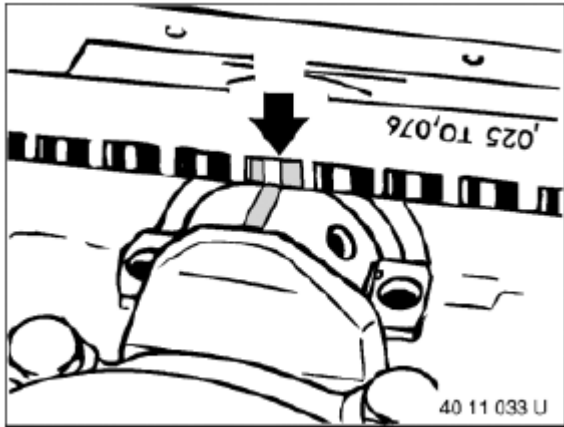


**Fig. 146: Tightening Conrod Bolts With Special Tool (00 9 120)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

#### **Conrod bearing clearance.**

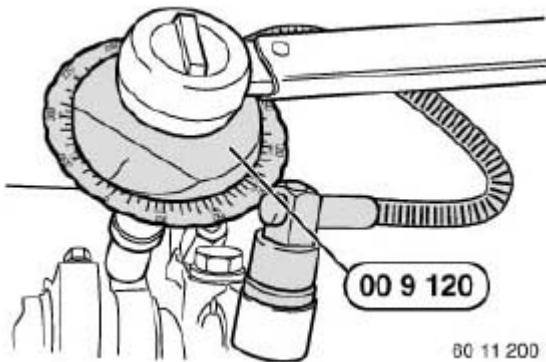
- Remove plastic thread.
- Lubricate crankshaft and bearing shells.
- Install new conrod bolts.



**Fig. 147: 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, see **11 24 1AZ** in **11 24 CONNECTING RODS AND BEARINGS** .



**Fig. 148: Tightening Conrod Bolts With Special Tool**  
Courtesy of BMW OF NORTH AMERICA, INC.

## PISTON WITH RINGS AND PIN

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

Special tools required:

- **00 9 120** . See **MAINTENANCE AND GENERAL INFORMATION - SPECIAL TOOLS** .
- **11 5 430** . See **ENGINE- SPECIAL TOOLS** .
- **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.

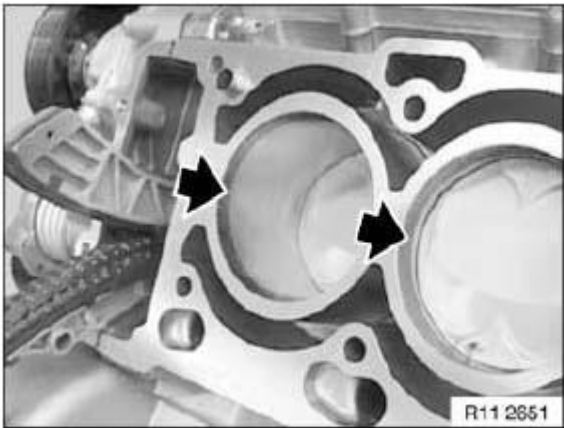
Conrods and conrod bearing caps are denoted with the same pairing letters, do not mix them up.

*Necessary preliminary tasks:*

- (engine removed)
- Install **engine on assembly stand**
- Remove **both cylinder heads**
- **Remove oil pan**
- Remove **oil pump**

In event of heavy oil carbon residue:

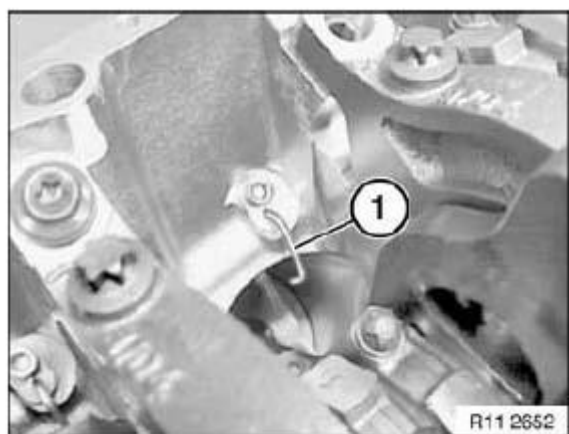
Carefully remove oil carbon residue from cylinder wall.



**Fig. 149: Locating Cylinder Wall**

Courtesy of BMW OF NORTH AMERICA, INC.

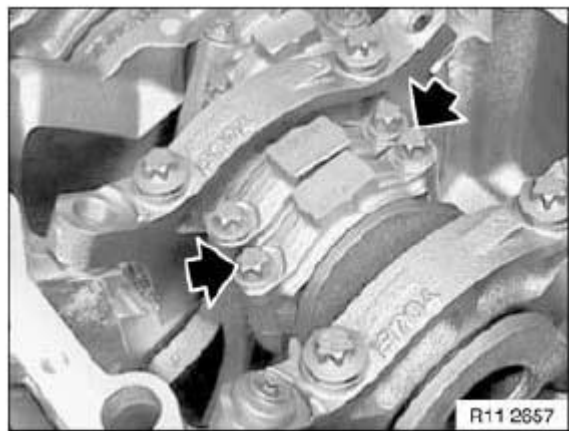
**IMPORTANT:** When removing and installing pistons, make sure piston cooling spray nozzles (1) are not damaged.



**Fig. 150: Identifying Piston Cooling Spray Nozzles**  
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.

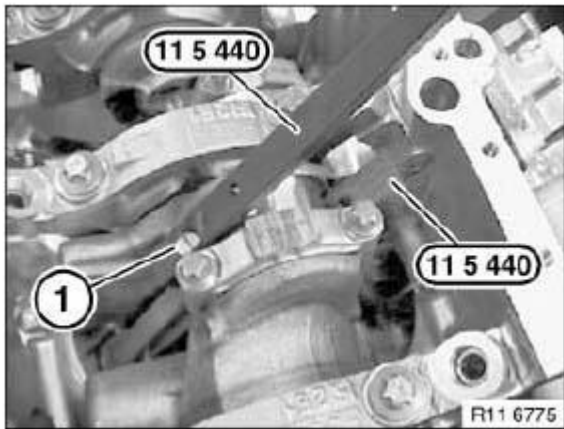


**Fig. 151: Locating Conrods And Conrod Bearing Caps**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.

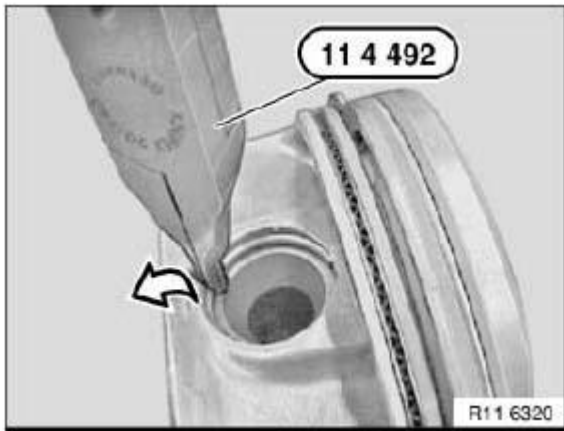


**Fig. 152: Identifying Special Tool (11 5 440)**

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.

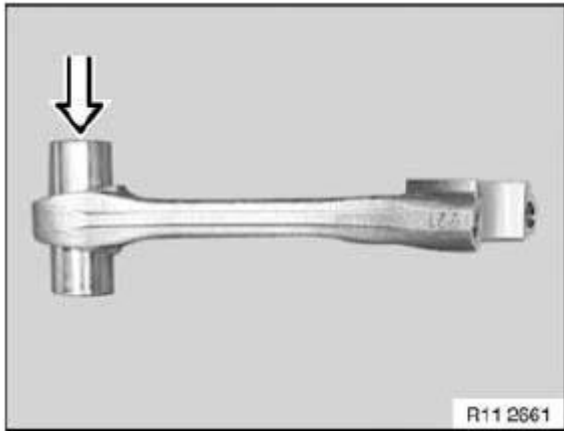


**Fig. 153: Identifying Special Tool (11 4 492)**

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.

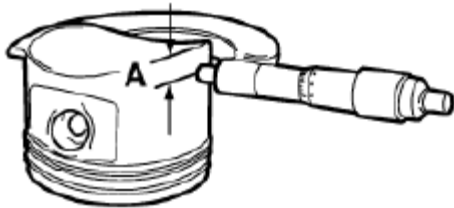


**Fig. 154: Pressing Piston Pin**

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. 155: Measuring Piston Diameter With Micrometer**

Courtesy of BMW OF NORTH AMERICA, INC.

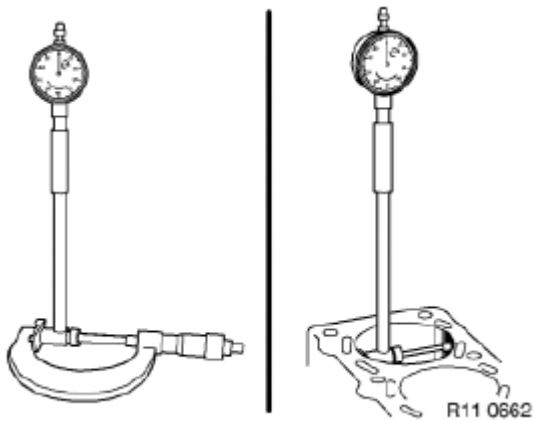
Adjust micrometer to cylinder bore of engine block. Set internal caliper on micrometer to zero. Measure bottom, center and top of cylinder bore in direction of travel and direction of engine rotation.

**Diameter of cylinder bore.** See ENGINE - TECHNICAL DATA (N62TU) .

**Piston installation clearance.** See ENGINE - TECHNICAL DATA (N62TU) .

**Total permissible wear tolerance.** See ENGINE - TECHNICAL DATA (N62TU) .





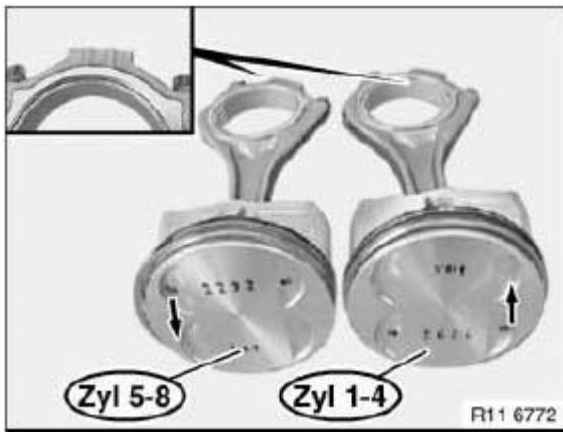
**Fig. 156: Measuring Cylinder Bore Of Engine Block**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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. 157: Identifying Cylinder Bank Number**  
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. 158: Identifying Cylinder Bank Number**  
Courtesy of BMW OF NORTH AMERICA, INC.

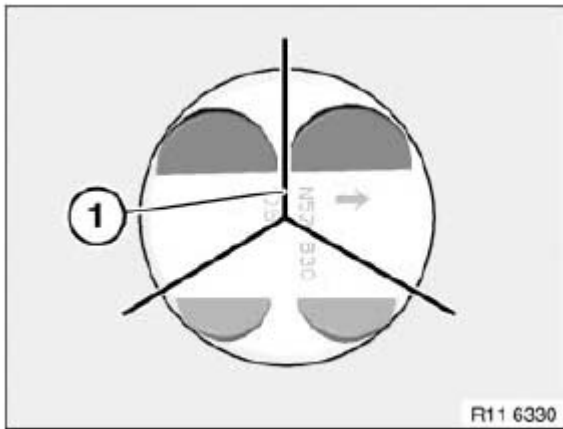
Install retaining ring.



**Fig. 159: Installing 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:** See illustration.  
Illustration shows N52.



**Fig. 160: Identifying Contact Points Of Piston Rings**  
 Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

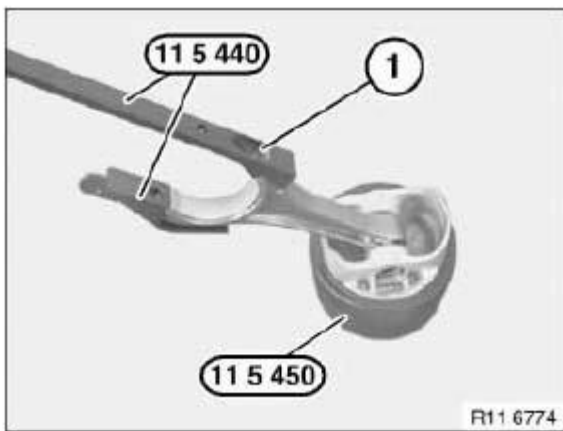
**B40 and B48:**

Insert special tools 11 5 440 in conrod.

*Installation:*

**B40:**

Prepare piston with rings with special tool **11 5 450**.



**Fig. 161: Identifying Special Tools (11 5 440)**  
 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

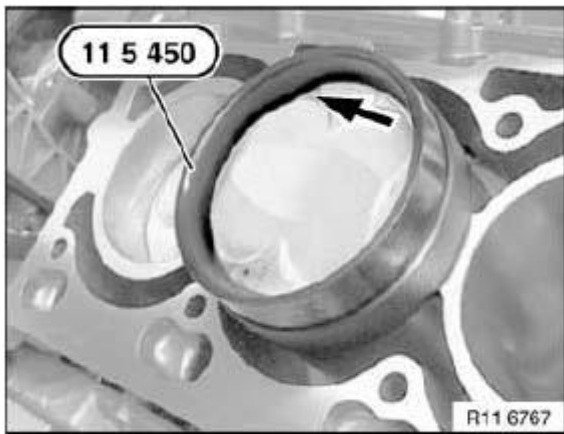
each other but do not position above the piston pin boss.

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. 162: Identifying Special Tools (11 5 450)**  
Courtesy of BMW OF NORTH AMERICA, INC.

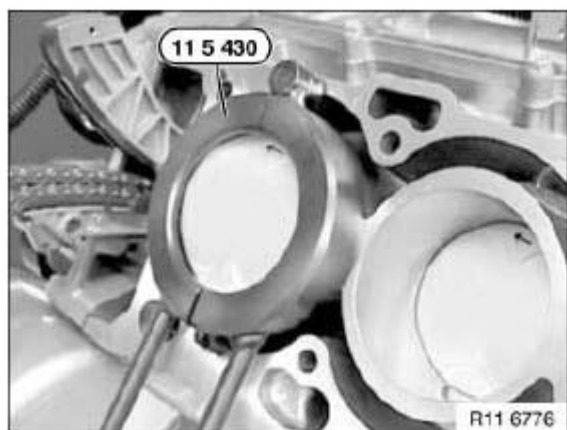
**B48:**

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.**

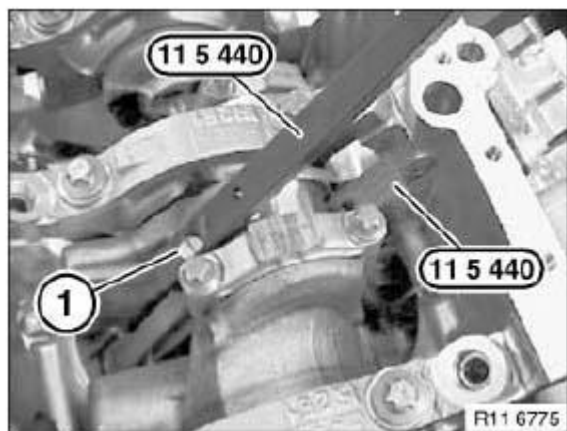
Press in piston with finger force only.



**Fig. 163: Identifying Special Tools (11 5 430)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Attach crankpin to connecting rod.

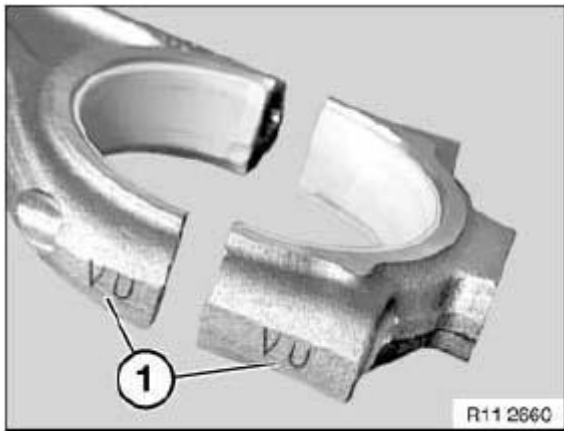
Remove special tools 11 5 450.



**Fig. 164: Identifying Special Tools (11 5 440)**  
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.

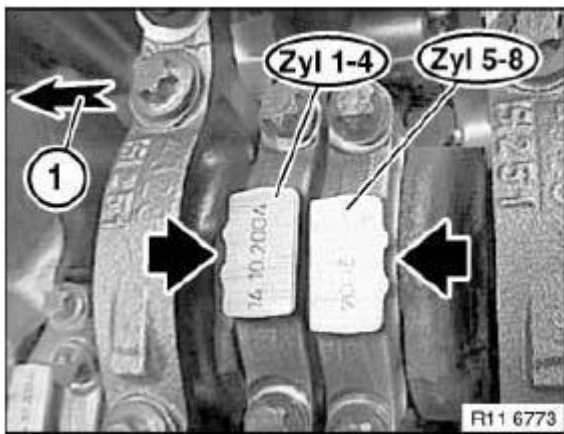


**Fig. 165: Identifying Conrods And Conrod Bearing Caps & Same Pairing Letters**  
 Courtesy of BMW OF NORTH AMERICA, INC.

**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.

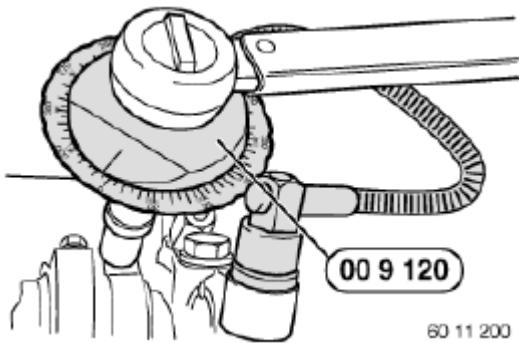
Install new conrod bolts.



**Fig. 166: Identifying Conrod Of Cylinder Number**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Secure conrod with special tool 00 9 120.

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



**Fig. 167: Identifying Special Tool (00 9 120)**

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

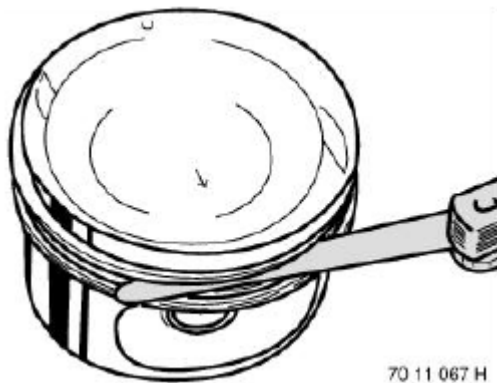
### 11 25 671 REPLACING PISTON RINGS ON ALL PISTONS (N62)

(piston removed)

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

**Technical Data** - see ENGINE - TECHNICAL DATA (N62TU) .

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

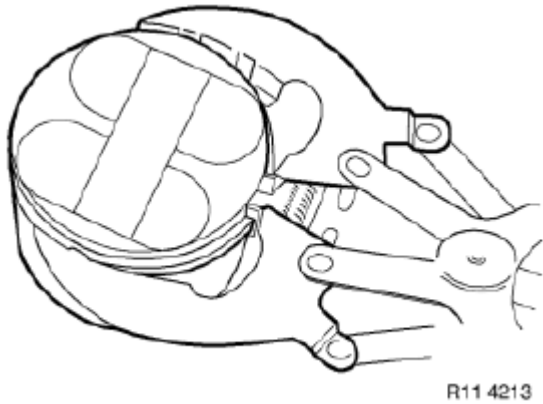


**Fig. 168: Measuring Axial Clearance Of Piston Rings In Piston Ring Groove**

Courtesy of BMW OF NORTH AMERICA, INC.

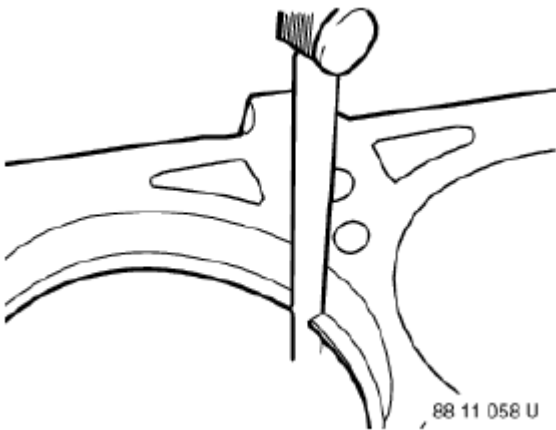
Remove piston rings (1 and 2) with piston ring compressing pliers.

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

Measure end clearance. See ENGINE - TECHNICAL DATA (N62TU) .



**Fig. 170: Measuring Piston Ring End Clearance**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

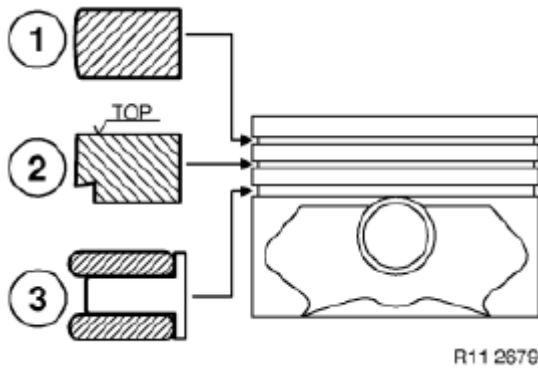
*Installation:*

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. 171: Identifying Plain Compression Ring And Stepped Compression Ring**  
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.

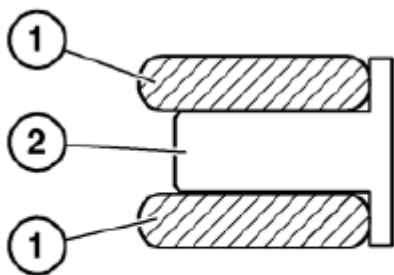
**CAUTION: Incorrect installation possible.**

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.

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



R11 2680

**Fig. 172: Identifying Steel Band Rings And Support Spring**  
Courtesy of BMW OF NORTH AMERICA, INC.

## V-RIBBED BELT WITH TENSIONER

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

**Special tools required:**

- **11 3 340** . See **ENGINE- SPECIAL TOOLS** .

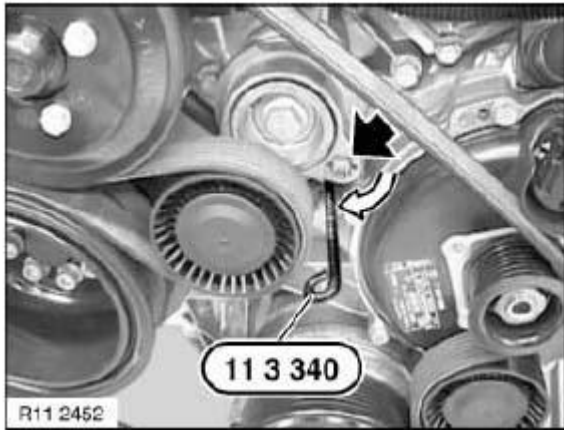
*Necessary preliminary tasks:*

- Remove fan clutch with fan impeller (E65/66)

**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. 173: Identifying Special Tool (11 3 340)**  
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. 174: Identifying Drive Belt Route**

Courtesy of BMW OF NORTH AMERICA, INC.

### 11 28 050 REPLACING A/C COMPRESSOR DRIVE BELT (N62)

#### Special tools required:

- **64 1 040** . See HEATING AND AIR CONDITIONING - SPECIAL TOOLS .

#### *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.

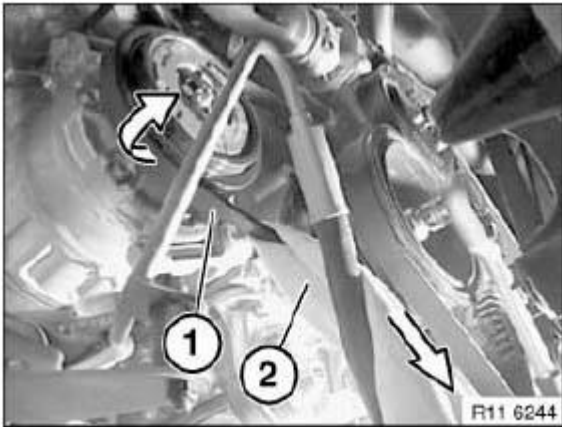
Check drive belt for coolant and oil residues, replace if necessary.

**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.



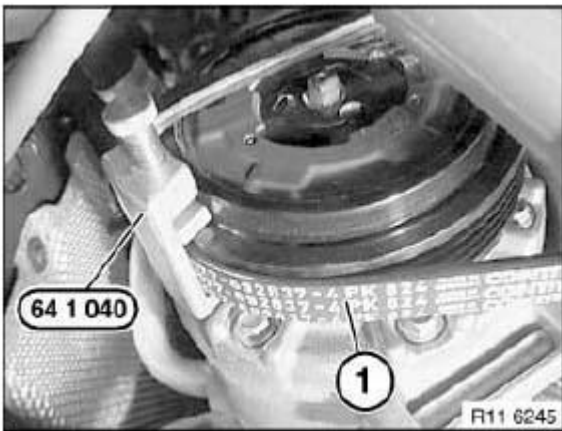
**Fig. 175: Removing Drive Belt**

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 DynamicDrive optional extra, detach bracket from A/C compressor (*risk of damage*).

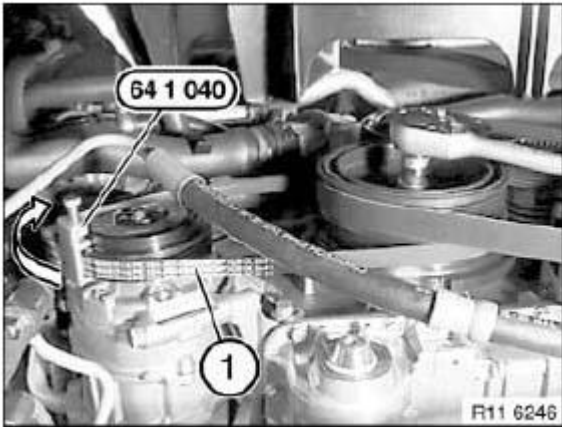


**Fig. 176: Identifying Drive Belt**

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. 177: Identifying Special Tool (64 1 040)**  
 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** . See ENGINE- SPECIAL TOOLS .

*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.**

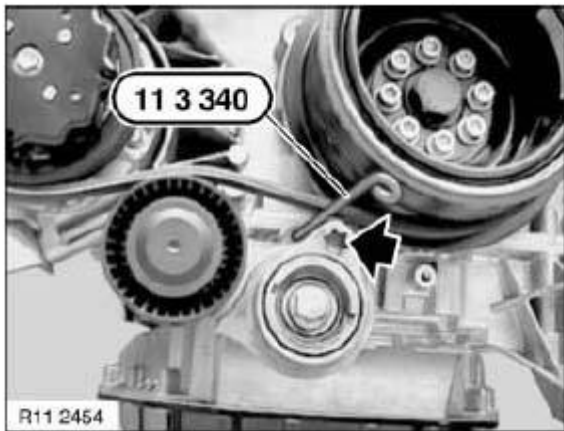
Pretension belt tensioner slowly and carefully with a Torx socket as far as it will go and secure with special tool **11 3 340**.

Remove drive belt.

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

Put on the drive belt.

Remove special tool **11 3 340**.



**Fig. 178: Identifying Special Tool (11 3 340)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Check that drive belt is correctly positioned on pulleys.



**Fig. 179: Identifying Drive Belt Correctly Positioned On Pulleys**  
 Courtesy of BMW OF NORTH AMERICA, INC.

## CAMSHAFT

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

**Special tools required:**

- 11 9 470 . See ENGINE- SPECIAL TOOLS .
- 11 9 472
- 11 9 473

- 11 9 474
- 11 9 475
- 11 9 480
- 11 9 490

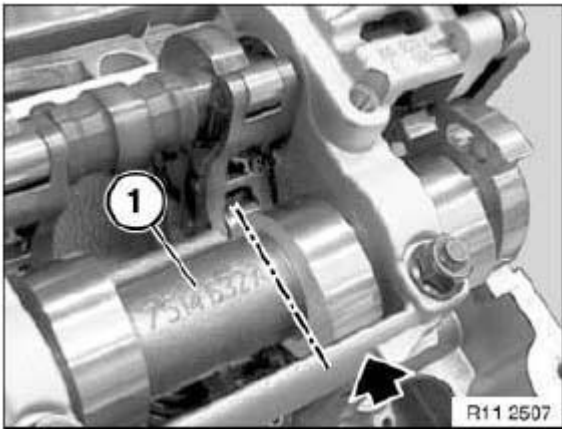
(cylinder bank 5 to 8)

*Necessary preliminary tasks:*

- Remove servomotor for left eccentric shaft
- Remove ignition coils on cylinder bank 5 to 8 . See IGNITION COIL .
- 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.

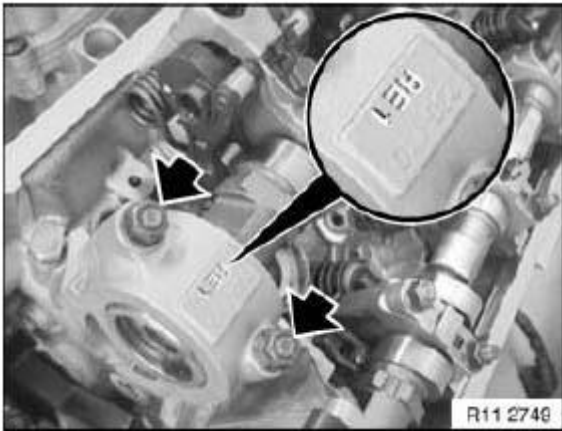


**Fig. 180: Identifying Camshaft Lettering On 8th Cylinder Point**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

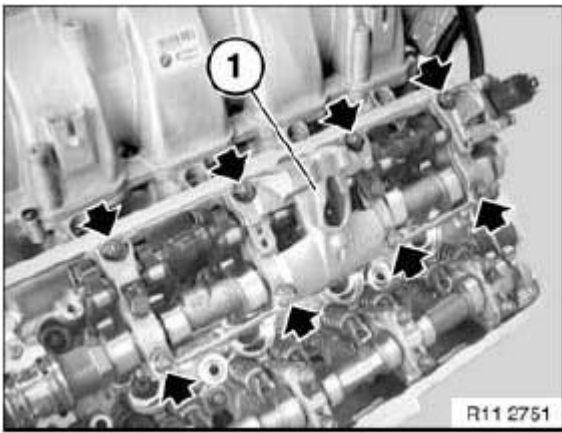
**NOTE:** Bearing caps of inlet camshaft are marked on cylinder bank 5 to 8 with R E1 to R E5 from inlet side.

Release nuts and remove bearing cap R E1.



**Fig. 181: Locating Camshaft Bearing Caps**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

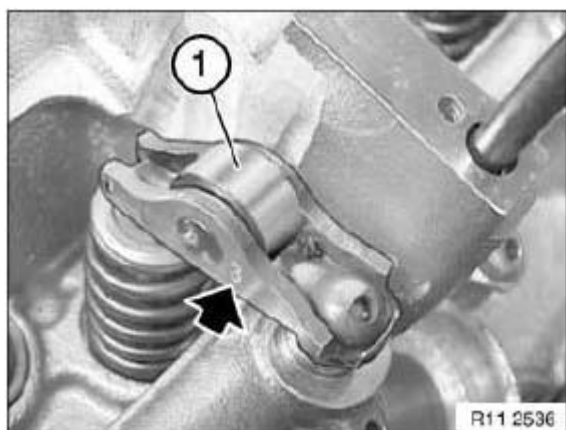


**Fig. 182: Locating Bearing Bracket Nuts**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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. 183: Identifying Rocker Arm**

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.

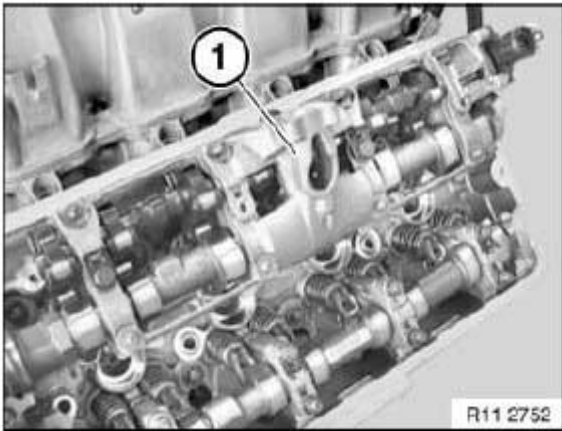


**Fig. 184: Identifying Special Tool (11 9 470)**

Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Do not tilt bearing bracket (1).**

Carefully lift out bearing bracket (1).

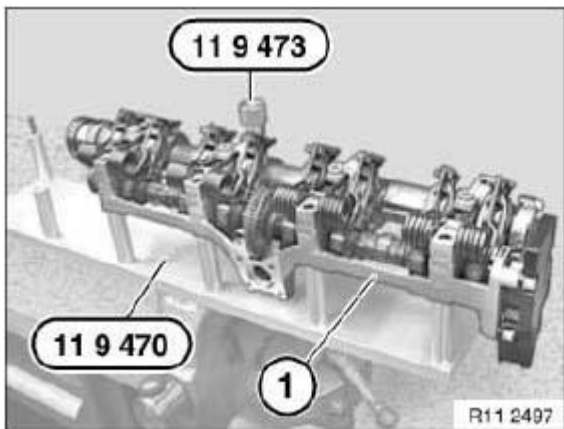


**Fig. 185: Identifying Bearing Bracket**

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** ).

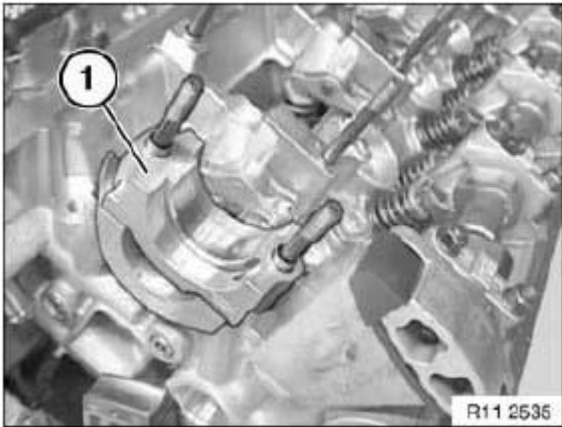


**Fig. 186: Secure Bearing Bracket With Special Tool 11 9 473**

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.

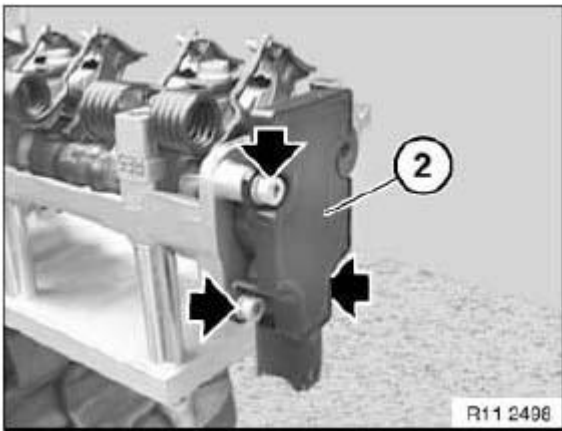
**NOTE:** Lower section of bearing bracket (1) remains on cylinder head.



**Fig. 187: 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).



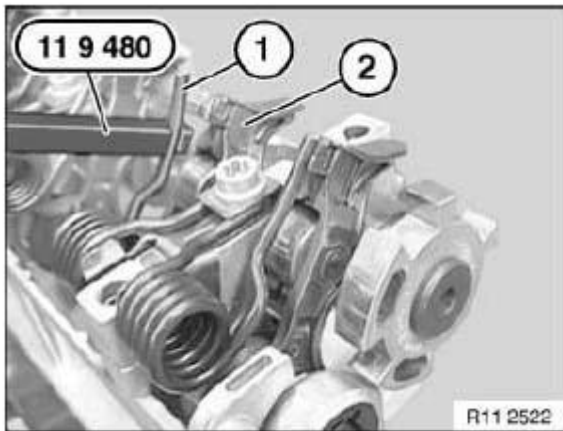
**Fig. 188: Identifying Eccentric Shaft Sensor**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

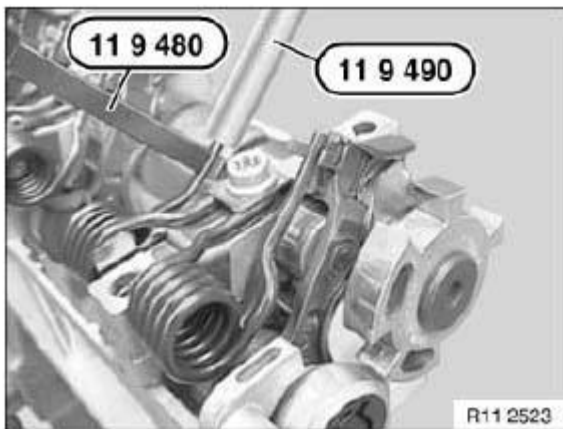
**IMPORTANT:** Keep holding torsion spring (1) with special tool 11 9 480.



**Fig. 189: Identifying Torsion Spring And Intermediate Lever**  
Courtesy of BMW OF NORTH AMERICA, INC.

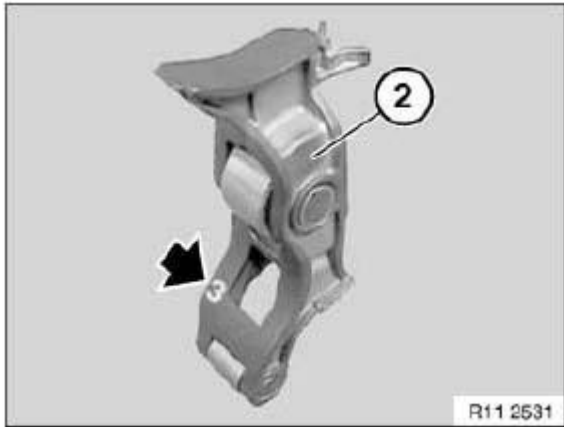
Attach special tool **11 9490** to end of torsion spring.

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



**Fig. 190: Identifying Special Tool (11 9490)**  
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.

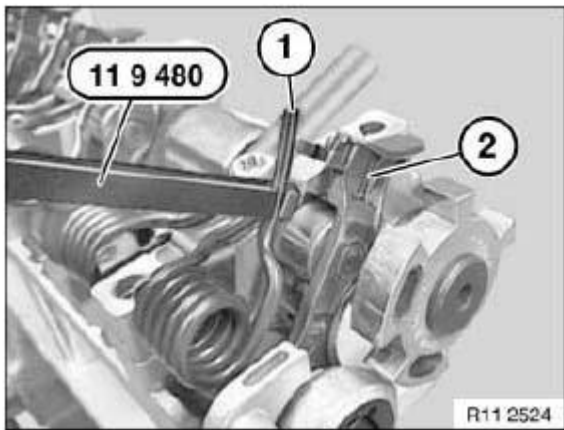


**Fig. 191: Identifying Intermediate Levers**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.**

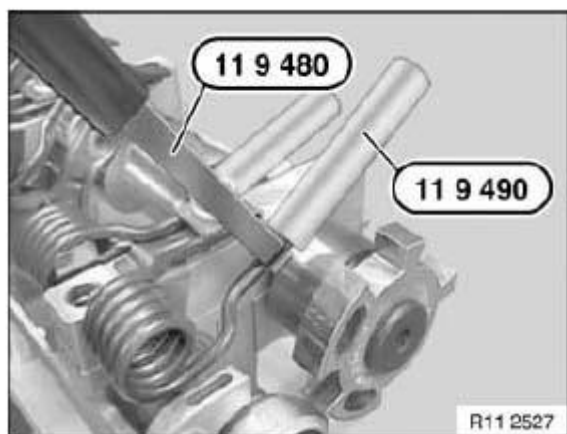


**Fig. 192: Identifying Intermediate Lever And Torsion Spring**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

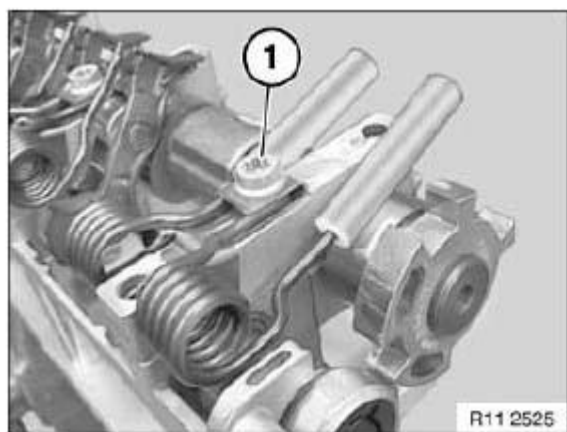
Support end of torsion spring protected with special tool

**11 9 490** on inlet camshaft.



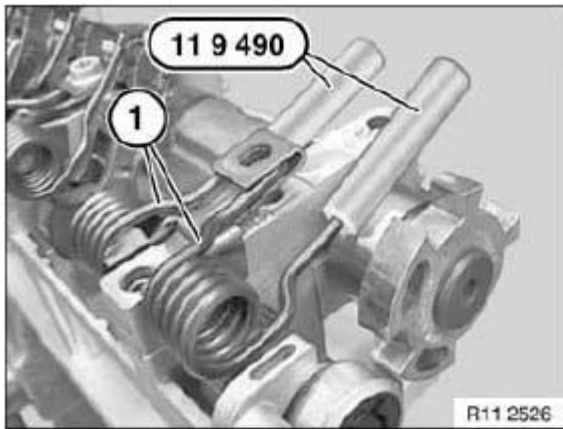
**Fig. 193: Identifying Special Tool (11 9 490)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).



**Fig. 194: Identifying Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

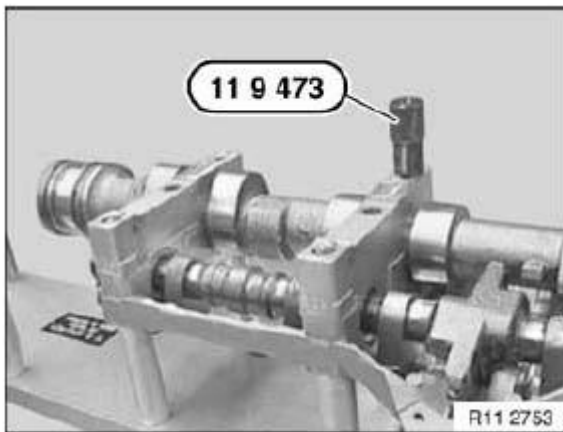
Remove torsion spring (1) and special tool 11 9 490.



**Fig. 195: 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 ).

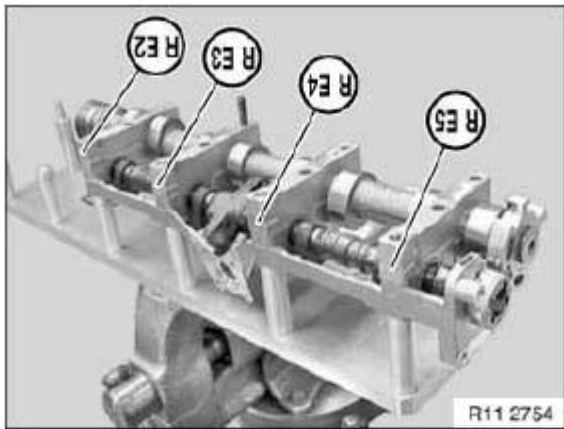


**Fig. 196: Identifying Special Tool (11 9 473)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

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

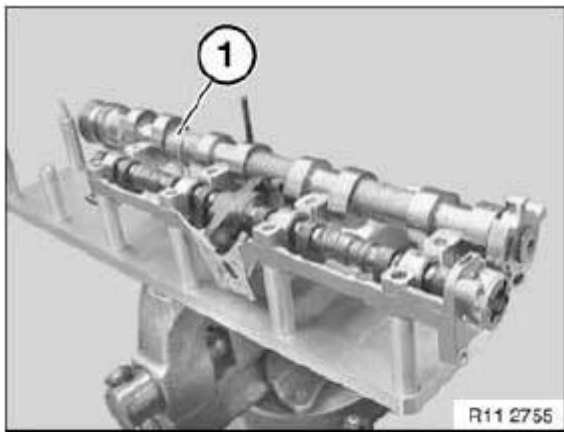
**NOTE:** Bearing caps are marked in graphic with R E2 to R E5.

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



**Fig. 197: Identifying Bearing Caps R E2 To R E5**  
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out inlet camshaft (1).



**Fig. 198: Identifying Inlet Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** Further tasks:  
The section Removing and installing left eccentric shaft contains important installation instructions.

If necessary, replace plain compression rings (1).

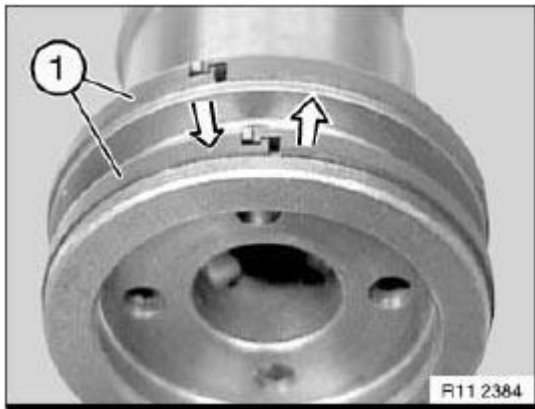
**IMPORTANT:** Plain compression rings (1) can easily break.

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.

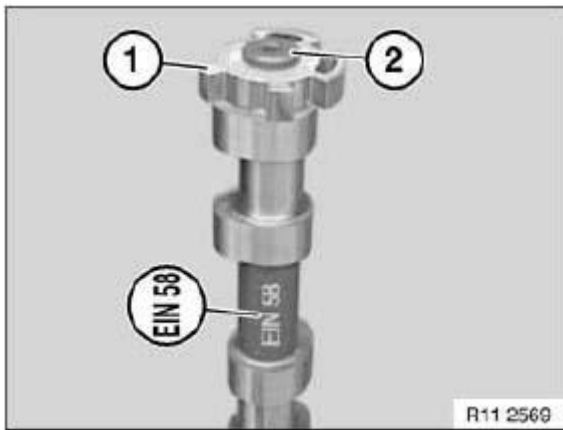


**Fig. 199: Identifying Plain Compression Rings**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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).



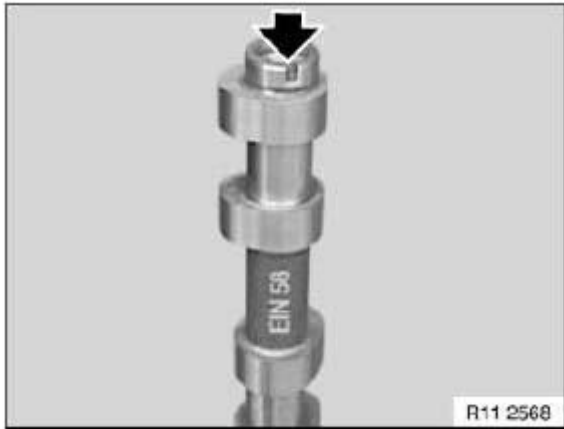
**Fig. 200: Identifying Screw And Sensor Gear**  
Courtesy of BMW OF NORTH AMERICA, INC.

#### 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.

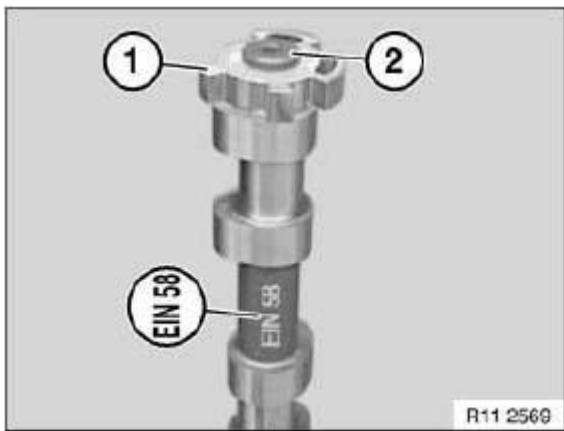


**Fig. 201: Identifying Camshaft Groove**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

Insert screw (2) and tighten down.

Tightening torque, see **11 31 14AZ** in CAMSHAFT .



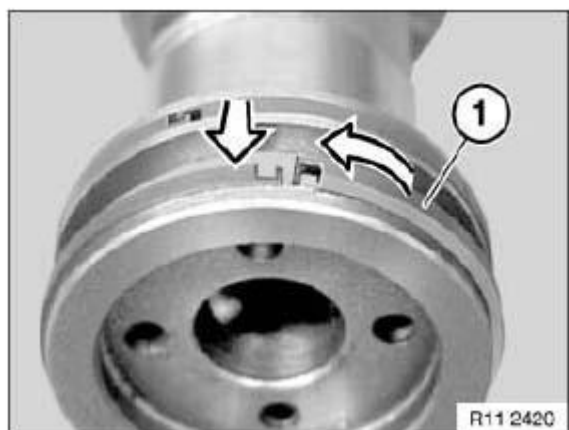
**Fig. 202: Identifying Sensor Gear And Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

Installing plain compression rings (1):

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

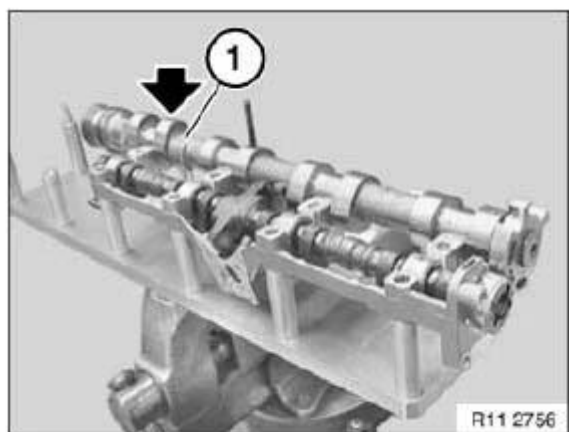
Carefully pull compression ring (1) apart and install from front.

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



**Fig. 203: Identifying Plain Compression Rings**  
Courtesy of BMW OF NORTH AMERICA, INC.

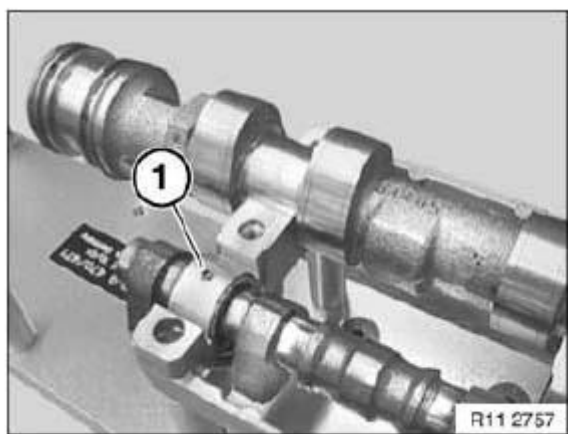
Insert inlet camshaft (1) so that cams point upwards at cylinder 5 as shown in graphic.



**Fig. 204: Identifying Inlet Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

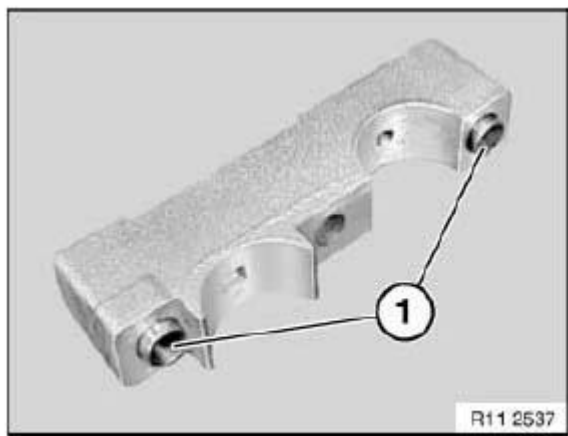
**NOTE:**        **Bearing shell (1) is guided in a groove in bearing cap.**



**Fig. 205: Identifying Bearing Shell**

Courtesy of BMW OF NORTH AMERICA, INC.

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

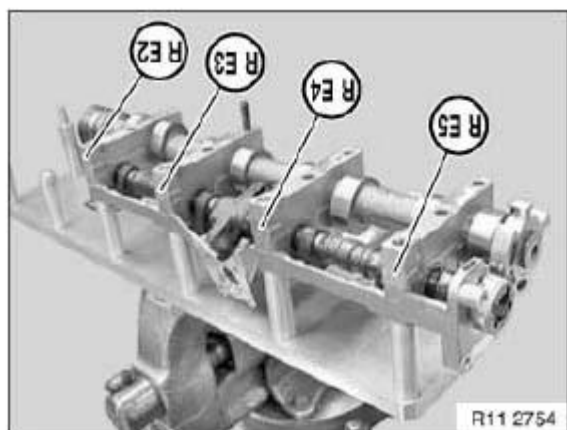


**Fig. 206: Identifying Dowel Sleeves**

Courtesy of BMW OF NORTH AMERICA, INC.

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

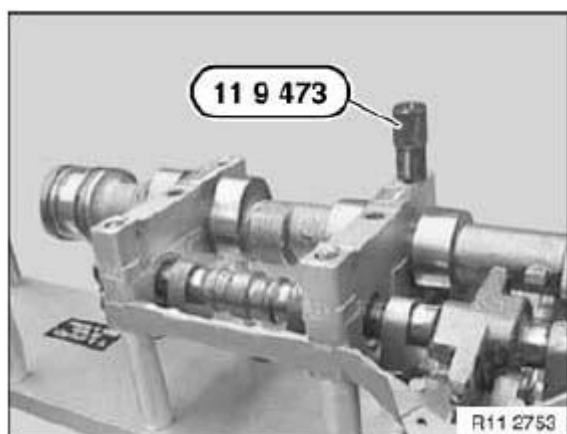
Fit bearing caps R E2 to R E5.



**Fig. 207: Identifying Bearing Caps R E2 To R E5**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

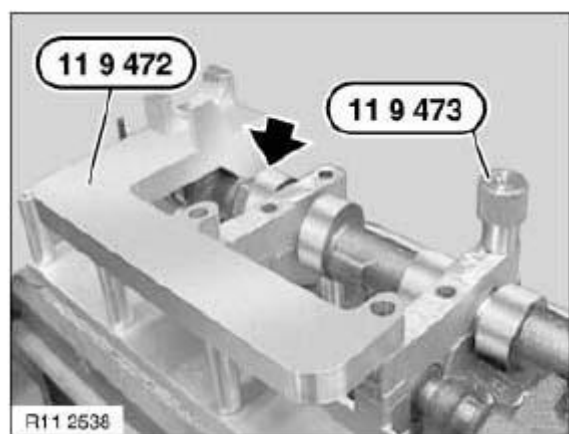
Secure bearing bracket and bearing cap with nut (special tool 11 9 473 ).



**Fig. 208: Identifying Special Tool (11 9 473)**  
Courtesy of BMW OF NORTH AMERICA, INC.

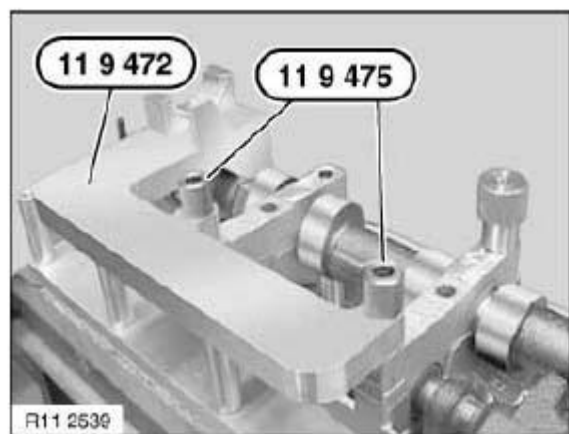
**NOTE:** The mounting of the bearing bracket described later can only be performed if the first bearing of the inlet camshaft is aligned with special tool 11 9 472 .

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



**Fig. 209: Identifying Special Tool (11 9 473)**  
Courtesy of BMW OF NORTH AMERICA, INC.

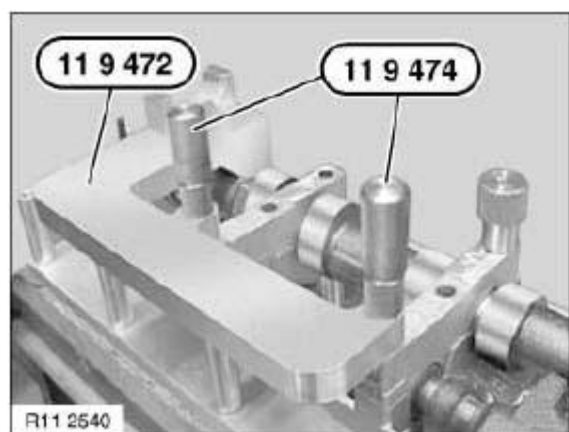
Fit centering sleeves (special tool 11 9 475 ) and align special tool 11 9 472 to bearing caps 2 and 3.



**Fig. 210: Identifying Special Tool (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.

**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.

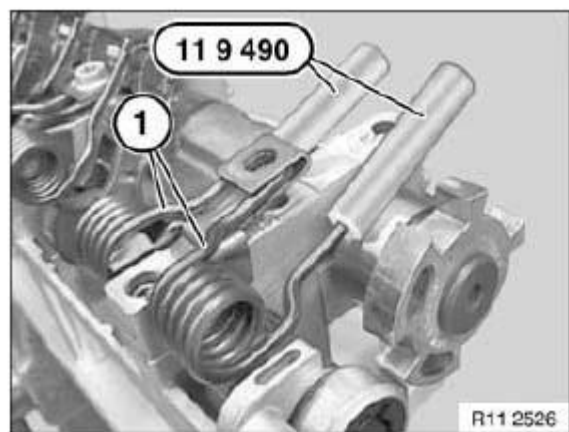


**Fig. 211: Identifying Special Tool (11 9 472) And (11 9 474)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

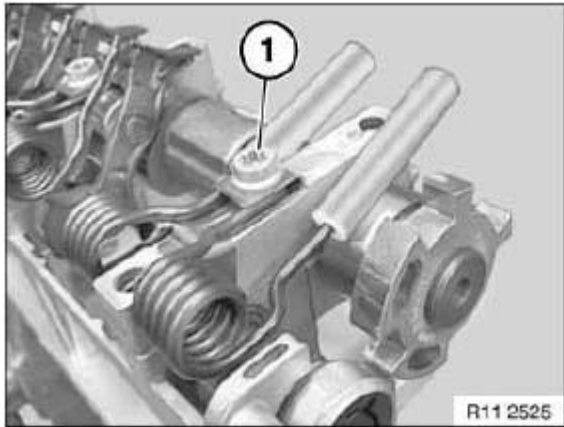
Attach special tool **11 9 490** to ends of torsion spring.

Install torsion spring (1).



**Fig. 212: Identifying Special Tool (11 9 490) And Torsion Spring**  
Courtesy of BMW OF NORTH AMERICA, INC.

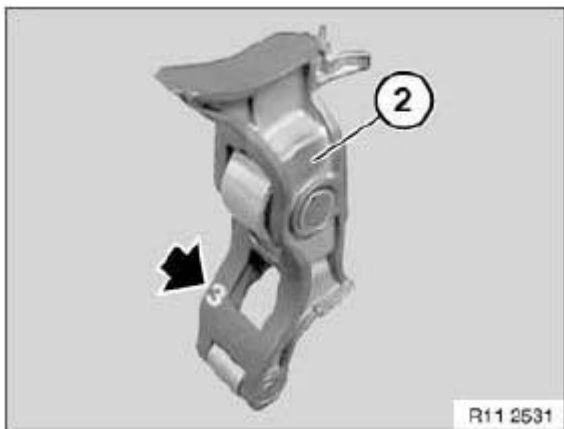
Insert screw (1) and tighten down.



**Fig. 213: 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.



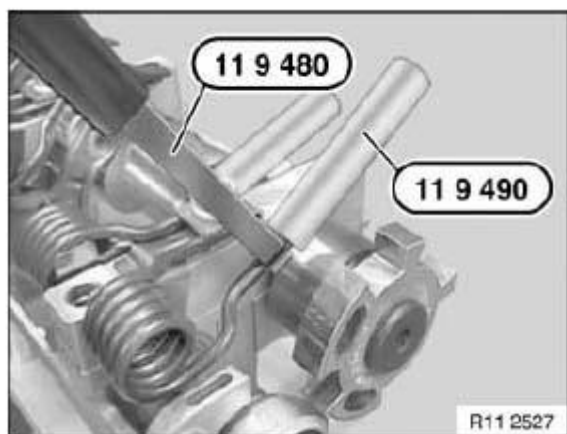
**Fig. 214: Identifying Intermediate Levers**

Courtesy of BMW OF NORTH AMERICA, INC.

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

Remove special tool 11 9 490.



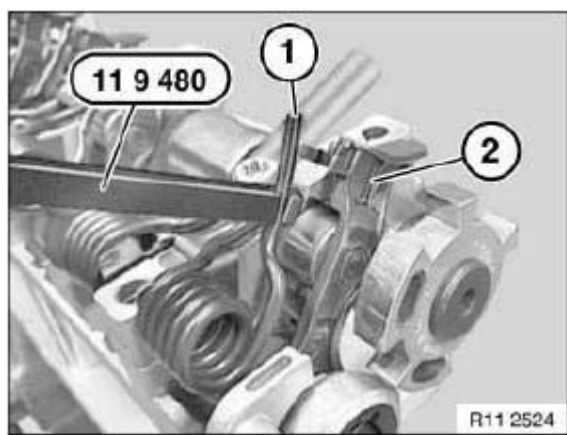


**Fig. 215: Identifying Special Tool (11 9 490)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

Install intermediate lever (2) from above.

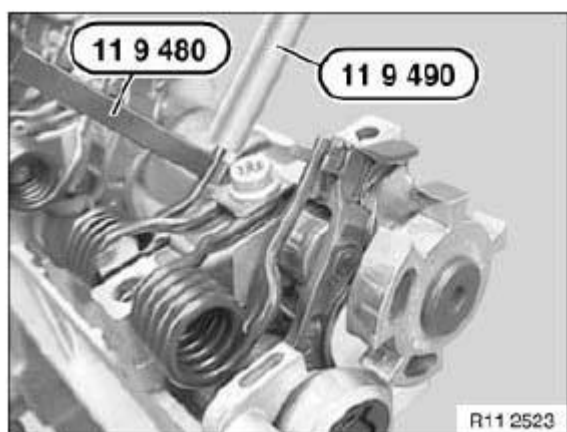
Insert end of torsion spring (1) into guide on intermediate lever (2).



**Fig. 216: Identifying 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**.

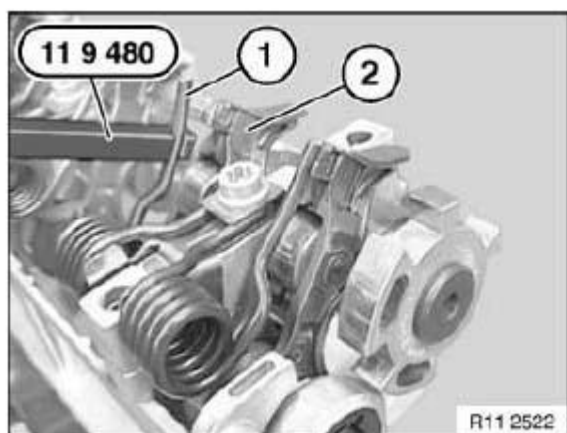


**Fig. 217: Identifying Special Tool (11 9 490)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

Install intermediate lever (2) from above.

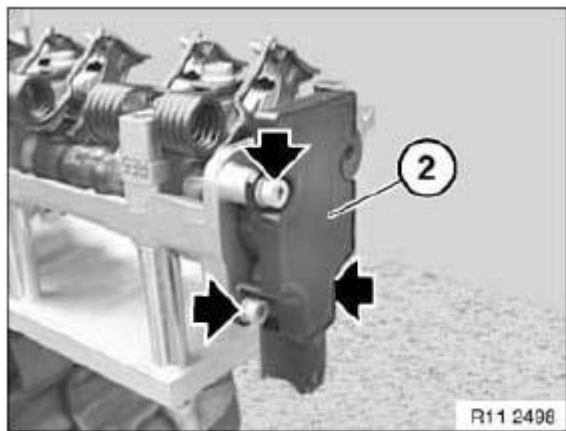
Insert end of torsion spring (1) into guide on intermediate lever (2).



**Fig. 218: Identifying Special Tool (11 9 480) And Torsion Spring**  
Courtesy of BMW OF NORTH AMERICA, INC.

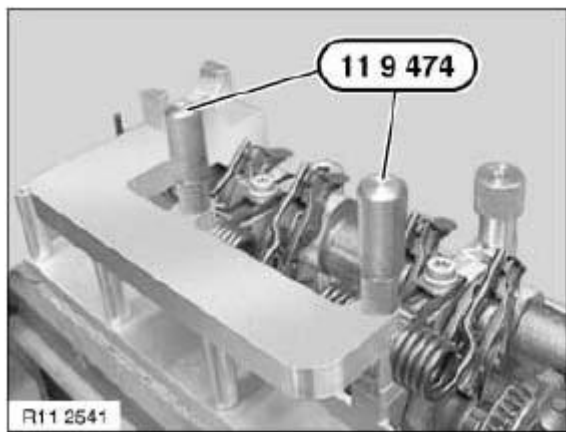
Install eccentric shaft sensor (2).

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



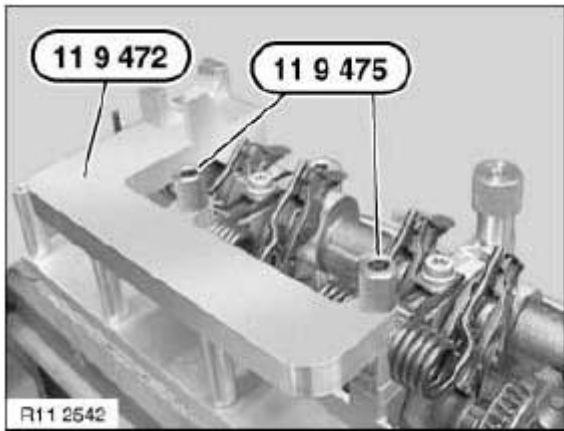
**Fig. 219: Identifying Eccentric Shaft Sensor**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool **11 9 474** .



**Fig. 220: Identifying Special Tool (11 9 474)**  
Courtesy of BMW OF NORTH AMERICA, INC.

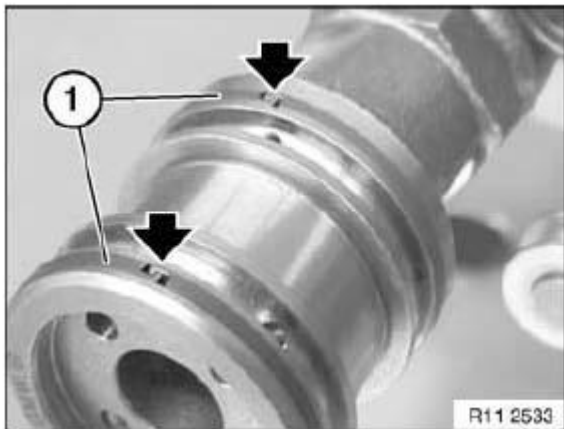
Remove special tool **11 9 472** and special tool **11 9 475** .



**Fig. 221: Identifying Special Tool (11 9 472) And (11 9 475)**  
Courtesy of BMW OF NORTH AMERICA, INC.

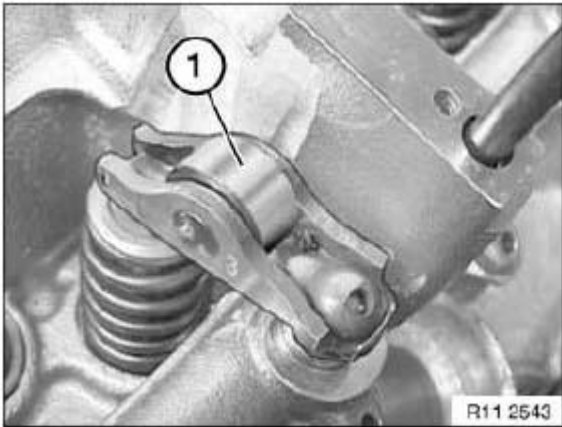
Ends of compression rings (1) point upwards.

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



**Fig. 222: 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.

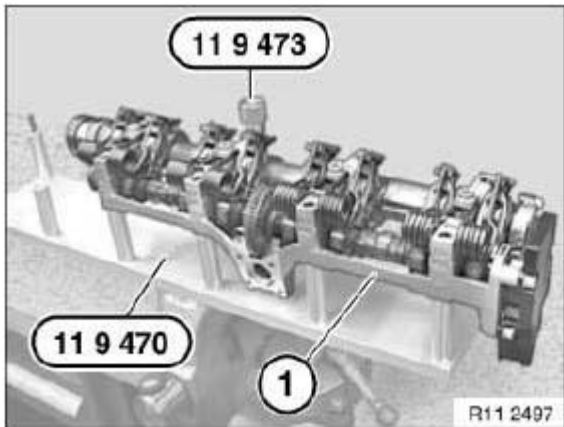


**Fig. 223: Identifying Rocker Arm**

Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 473 .

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



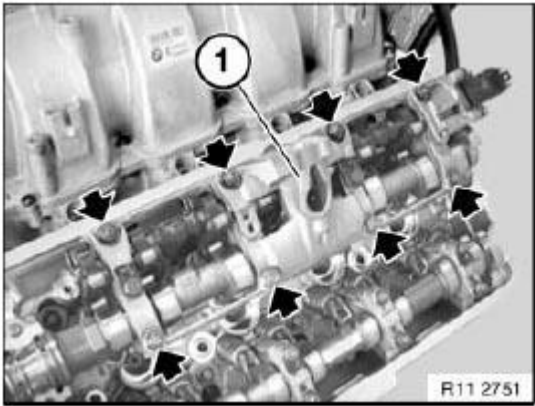
**Fig. 224: Identifying Bearing Bracket With Special Tool**

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.



**Fig. 225: Locating Bearing Bracket Nuts**

Courtesy of BMW OF NORTH AMERICA, INC.

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

Tighten down nuts from inside to outside.

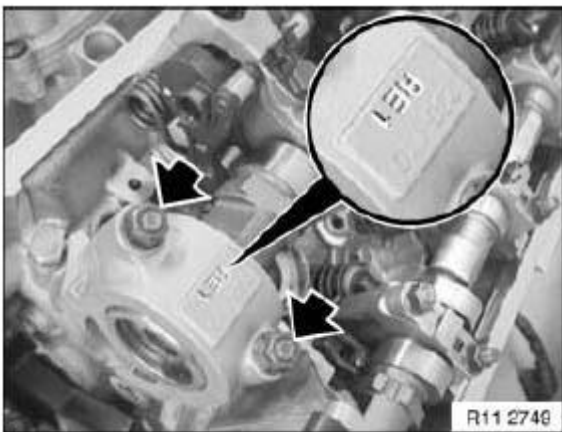
Tightening torque, see 11 31 1AZ in CAMSHAFT .

**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, see 11 31 1AZ. in CAMSHAFT .



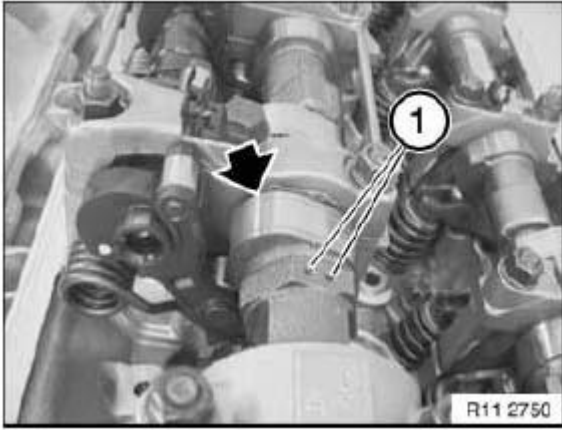
**Fig. 226: Identifying Bearing Cap R E1**

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. 227: Identifying Inlet Camshaft Marking**  
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 . See ENGINE- SPECIAL TOOLS .
- 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.



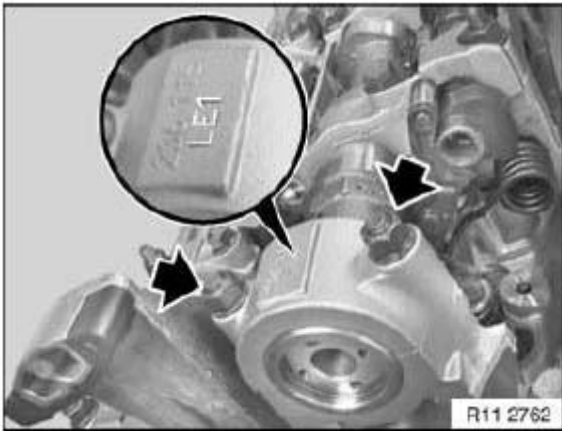
**Fig. 228: Locating Inlet Camshaft Lobe**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

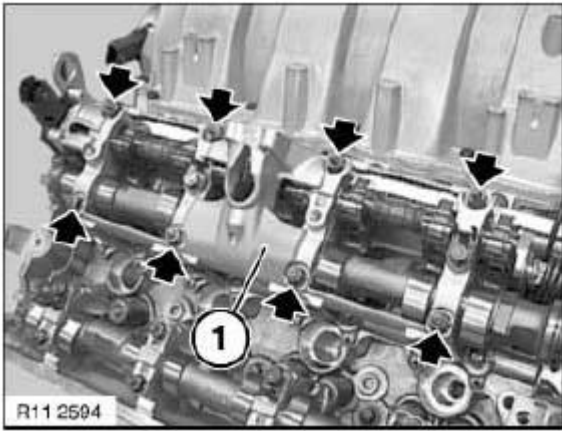
Release nuts and remove bearing cap L E1.





**Fig. 229: Locating Camshaft Bearing Caps**  
Courtesy of BMW OF NORTH AMERICA, INC.

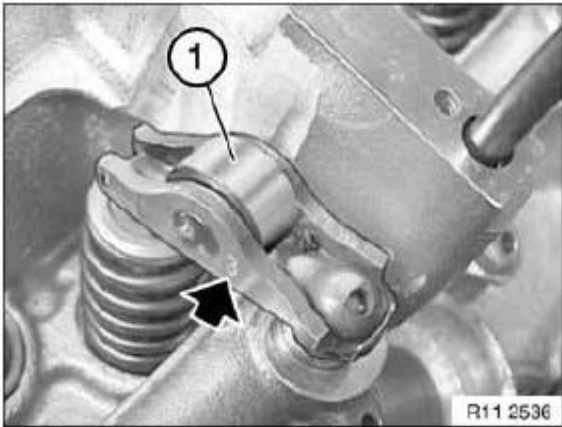
Release 8 nuts of bearing bracket (1) from outside to inside.



**Fig. 230: Locating Bearing Bracket Nuts**  
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.

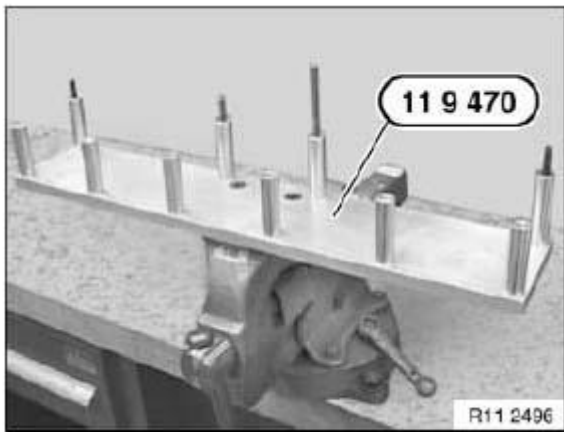


**Fig. 231: Identifying Rocker Arm**

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.

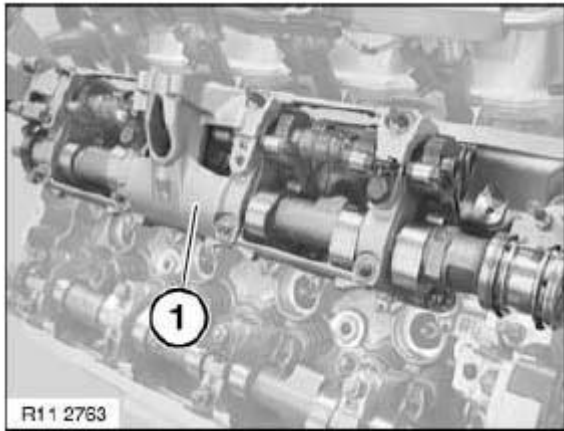


**Fig. 232: Identifying Special Tool (11 9 470)**

Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Do not tilt bearing bracket (1).**

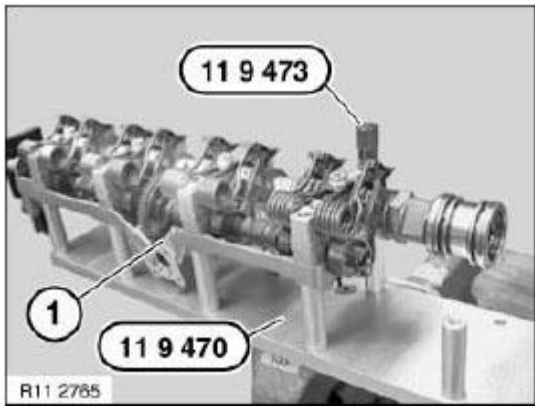
Carefully lift out bearing bracket (1).



**Fig. 233: 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**.

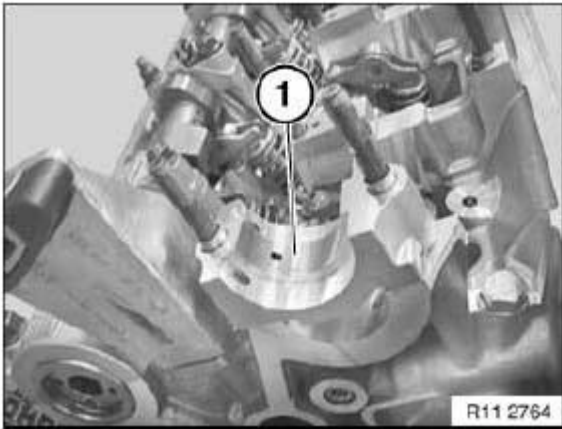
Secure bearing bracket (1) with a nut (special tool **11 9 473** ).



**Fig. 234: Identifying Bearing Bracket And Special Tool**  
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.

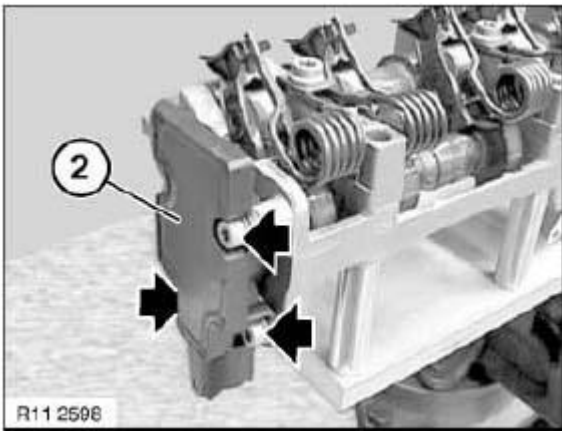
**NOTE:** Lower section of bearing bracket (1) remains on cylinder head.



**Fig. 235: 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).



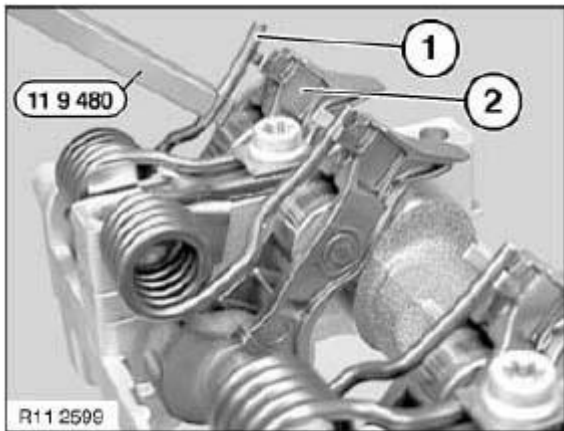
**Fig. 236: Identifying Eccentric Shaft Sensor**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

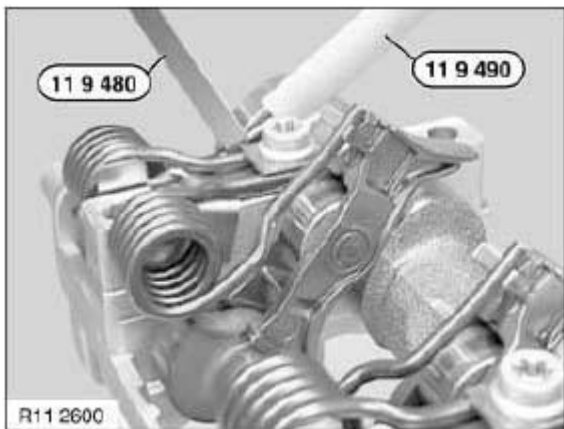
**IMPORTANT:** Keep holding torsion spring (1) with special tool 11 9 480.



**Fig. 237: Identifying Intermediate Lever And Torsion Spring**  
Courtesy of BMW OF NORTH AMERICA, INC.

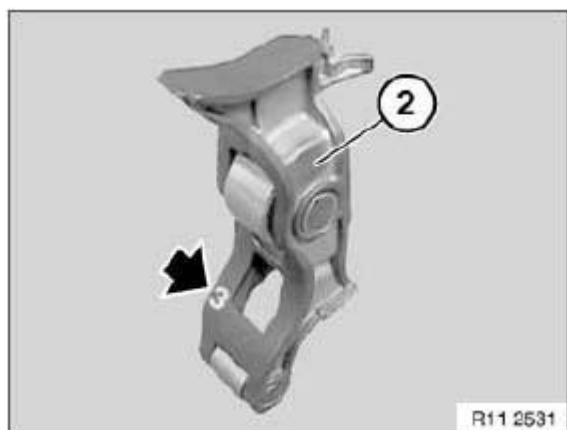
Attach special tool **11 9 490** to end of torsion spring.

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



**Fig. 238: Identifying Special Tools**  
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.

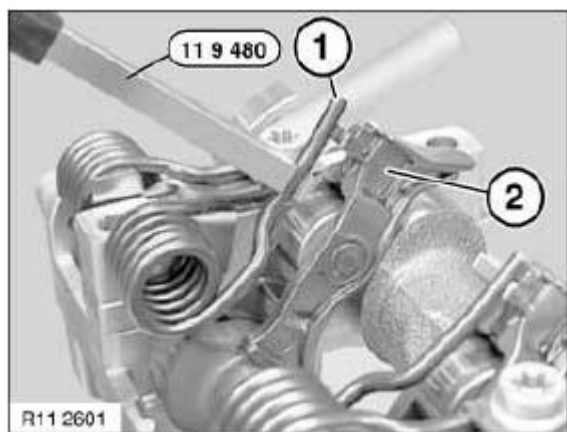


**Fig. 239: Identifying Intermediate Levers**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.

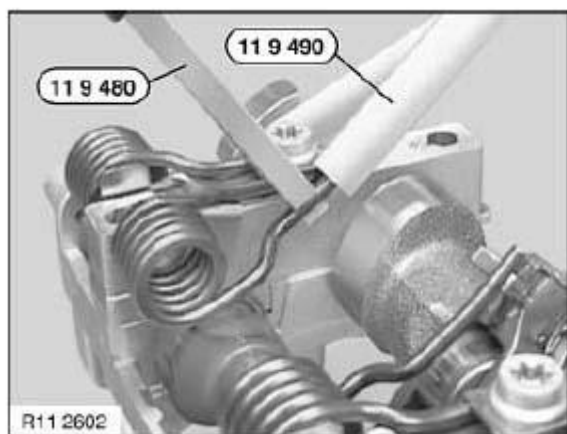
**IMPORTANT: Keep holding torsion spring (1) with special tool 11 9 480.**



**Fig. 240: Identifying Intermediate Lever And Torsion Spring With Special Tool**  
Courtesy of BMW OF NORTH AMERICA, INC.

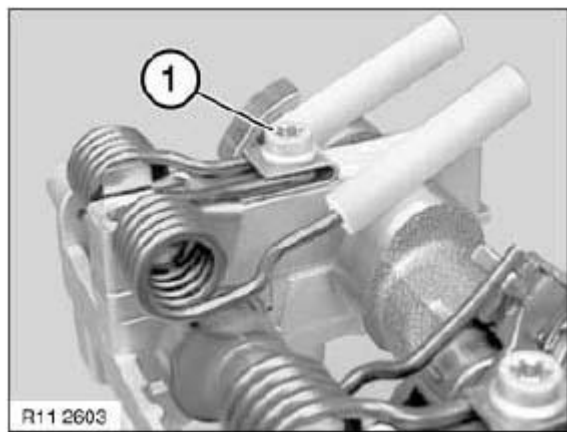
Attach special tool 11 9 490 to second end of torsion spring.

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



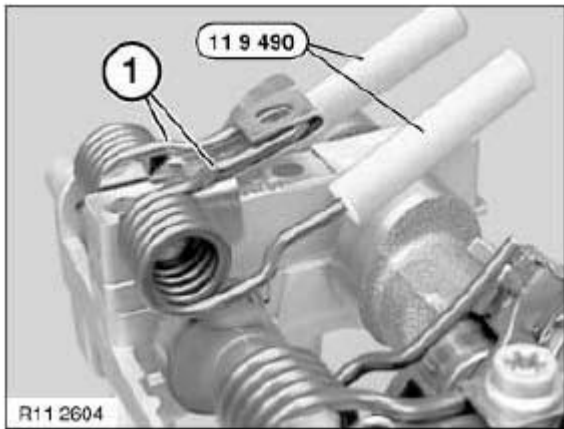
**Fig. 241: Identifying Special Tool (00 9 490)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).



**Fig. 242: Identifying Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

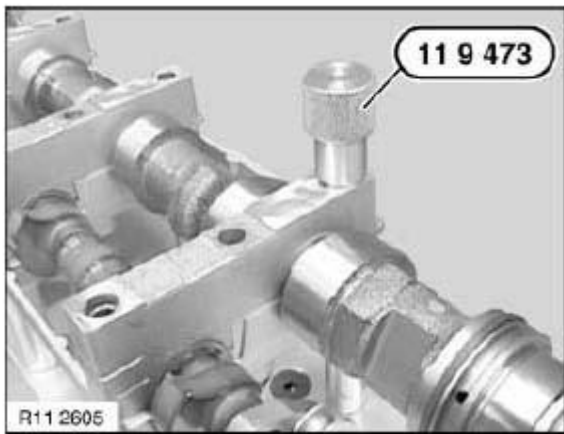
Remove torsion spring (1) and special tool 11 9 490.



**Fig. 243: 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 ).



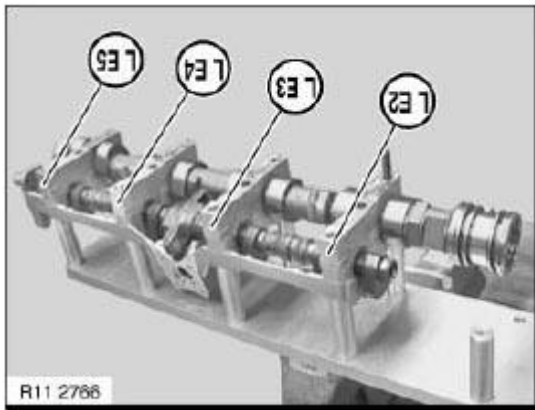
**Fig. 244: Identifying Special Tool (11 9 473)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

**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.

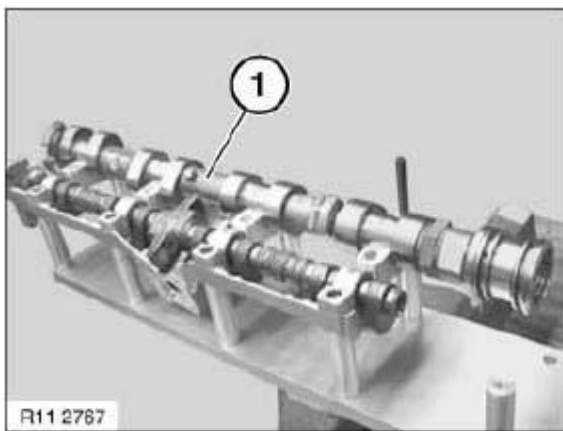
Remove bearing caps L E2 to L E5 and place to one side in order.





**Fig. 245: Identifying Bearing Caps L E2 To L E5**  
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out inlet camshaft (1).



**Fig. 246: 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.

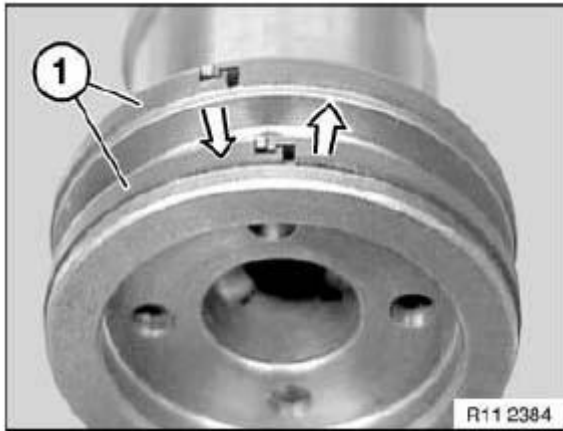
If necessary, replace plain compression rings (1).

**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.

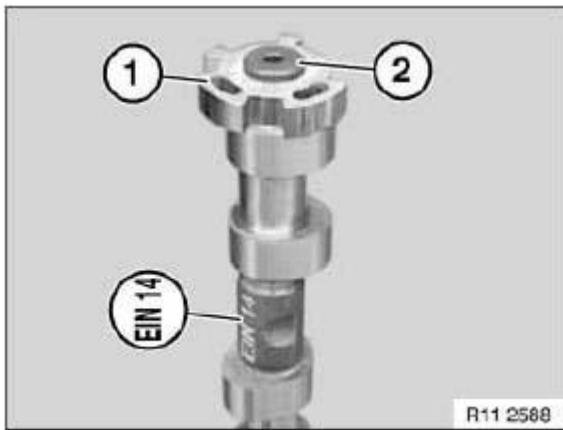


**Fig. 247: Identifying Compression Ring**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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. 248: 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.

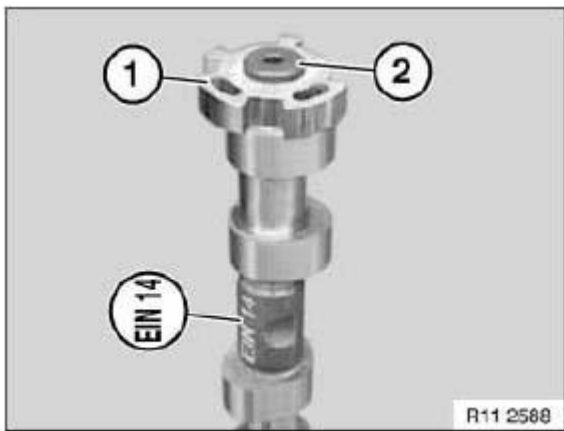


**Fig. 249: Identifying Camshaft Groove And Sensor Gear Lug**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

Insert screw (2) and tighten down.

Tightening torque, see **11 31 14AZ** in CAMSHAFT .



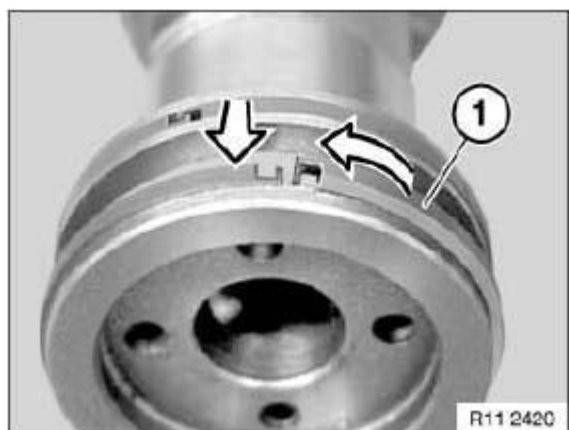
**Fig. 250: Identifying Sensor Gear And Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

Installing plain compression rings (1):

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

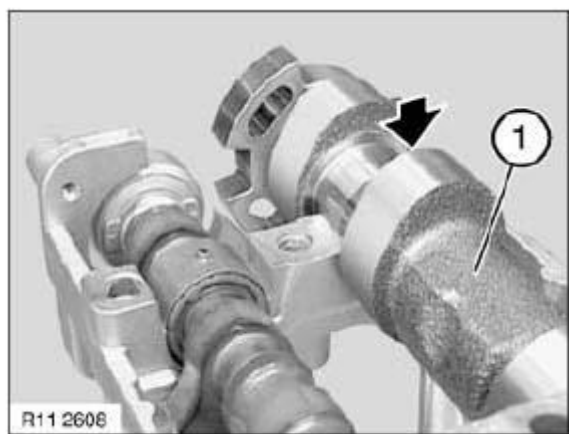
Carefully pull compression ring (1) apart and install from front.

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



**Fig. 251: Identifying Compression Ring**  
Courtesy of BMW OF NORTH AMERICA, INC.

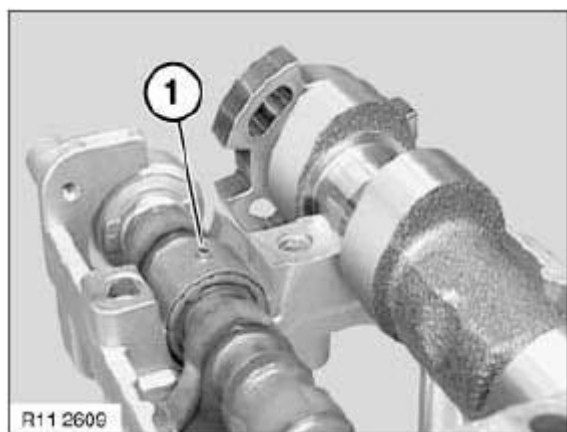
Insert inlet camshaft (1) so that cams point upwards at 4th cylinder as shown in graphic.



**Fig. 252: Identifying Inlet Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

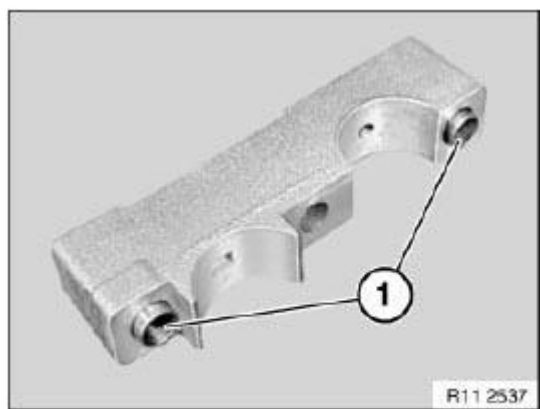
**NOTE:** Bearing shell (1) is guided in a groove in bearing cap.



**Fig. 253: Identifying Bearing Shell**

Courtesy of BMW OF NORTH AMERICA, INC.

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

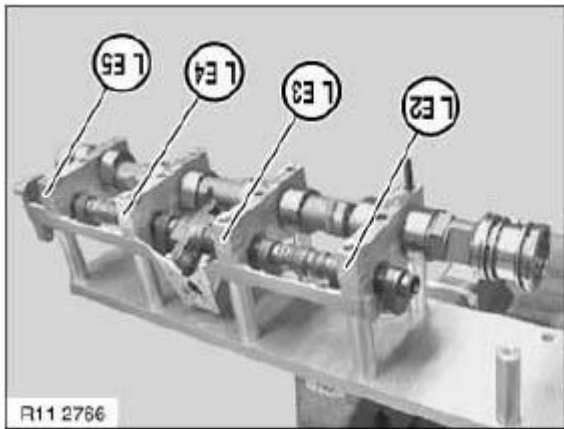


**Fig. 254: Identifying Dowel Sleeves**

Courtesy of BMW OF NORTH AMERICA, INC.

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

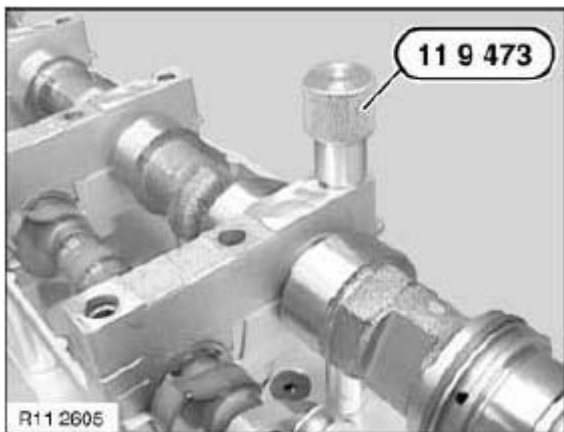
Fit bearing caps L E2 to L E5.



**Fig. 255: Identifying Bearing Caps L E2 To L E5**  
 Courtesy of BMW OF NORTH AMERICA, INC.

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

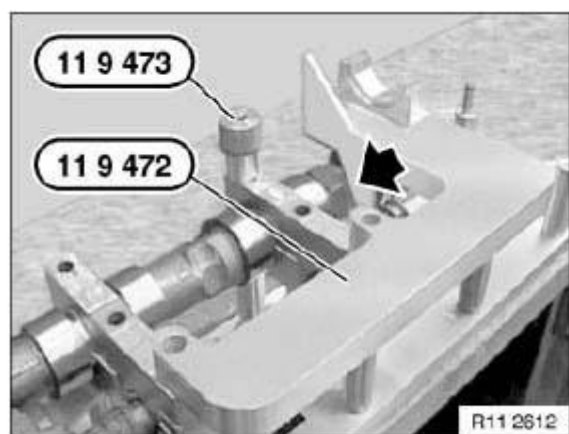
Secure bearing bracket and bearing cap with nut (special tool 11 9 473 ).



**Fig. 256: Identifying Special Tool (11 9 473)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

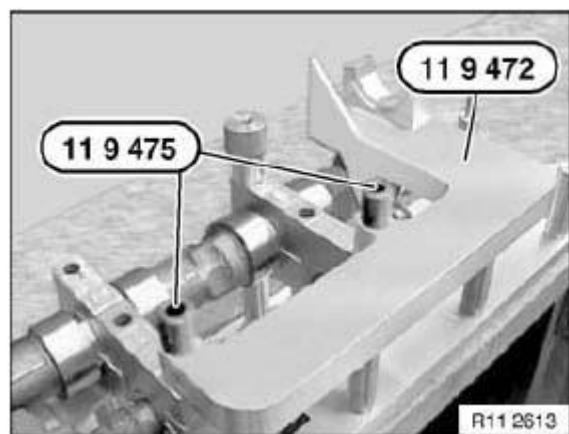
**NOTE:** The mounting of the bearing bracket described later can only be performed if the first bearing of the inlet camshaft is aligned with special tool 11 9 472 .

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



**Fig. 257: Identifying Special Tool (11 9 472) And (11 9 473)**  
Courtesy of BMW OF NORTH AMERICA, INC.

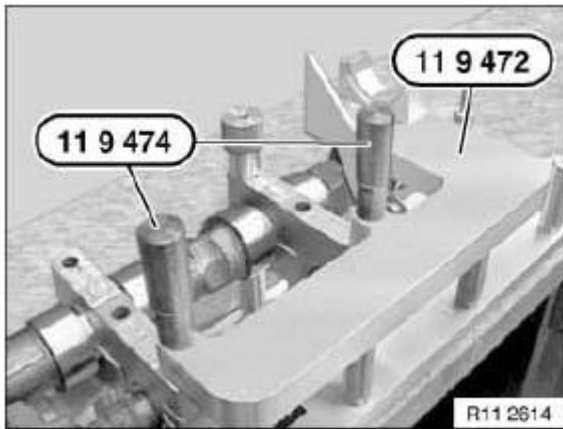
Fit centering sleeves (special tool 11 9 475 ) and align special tool 11 9 472 to bearing caps 2 and 3.



**Fig. 258: Identifying Special Tool (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.

**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.



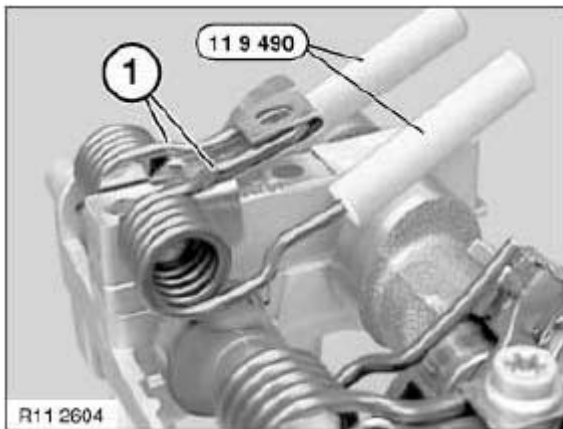
**Fig. 259: Identifying Special Tool (11 9 472) And (11 9 474)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

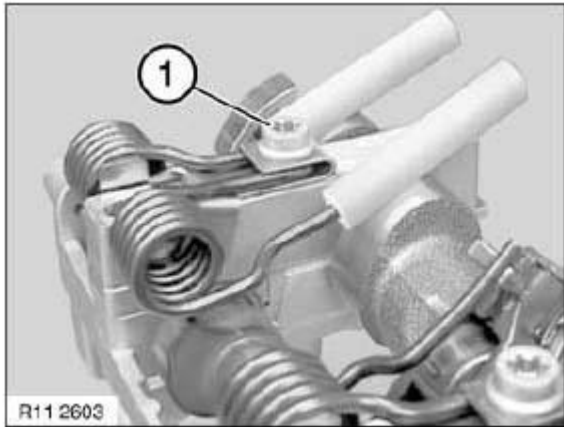
Install torsion spring (1).



**Fig. 260: Identifying Special Tool (11 9 490) And Torsion Spring**  
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screw (1) and tighten down.

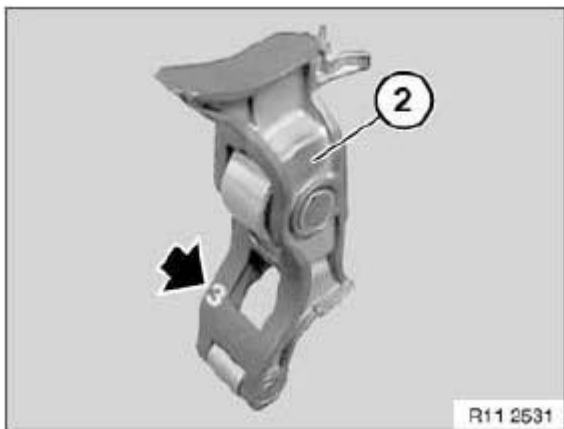




**Fig. 261: Identifying Screw**

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.

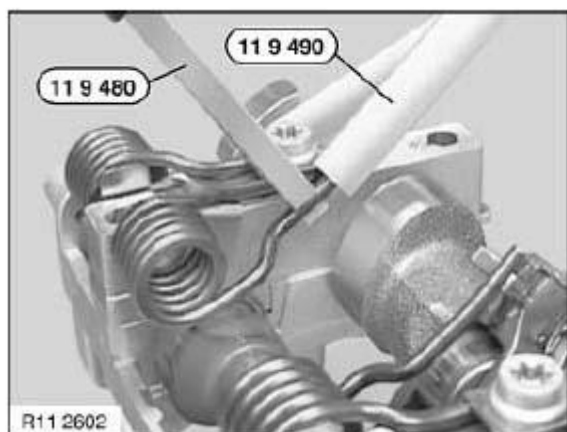


**Fig. 262: Identifying Intermediate Levers**

Courtesy of BMW OF NORTH AMERICA, INC.

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

Remove special tool 11 9 490.

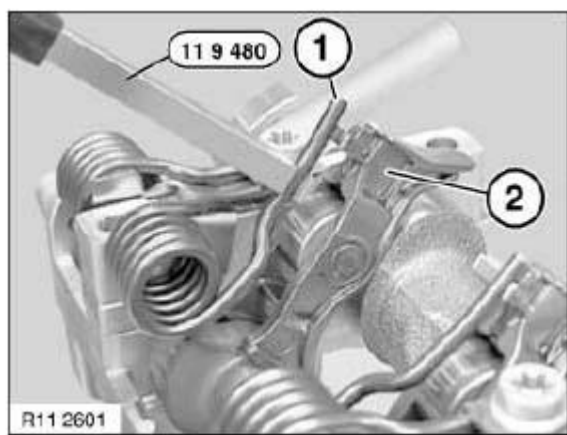


**Fig. 263: Identifying Torsion Spring With Special Tool**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

Install intermediate lever (2) from above.

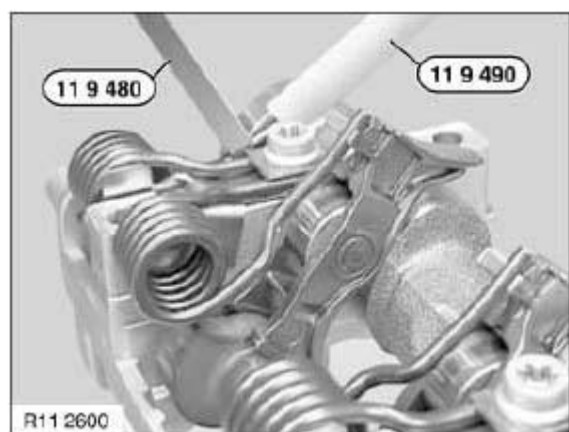
Insert end of torsion spring (1) into guide on intermediate lever (2).



**Fig. 264: 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.

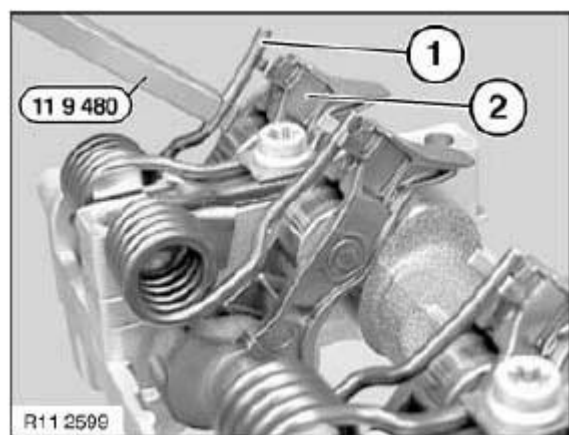


**Fig. 265: Identifying Special Tool (11 9 490)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

Install intermediate lever (2) from above.

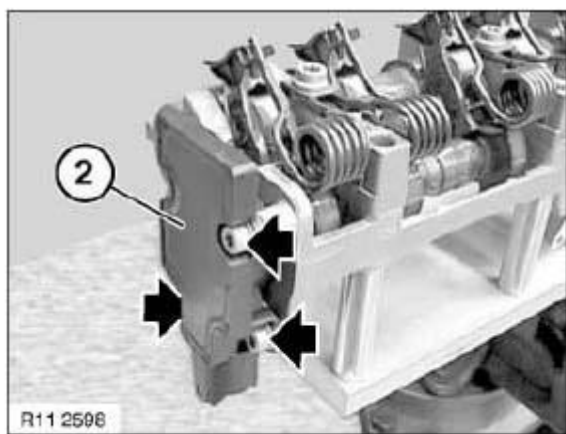
Insert end of torsion spring (1) into guide on intermediate lever (2).



**Fig. 266: Identifying Torsion Spring And Intermediate Lever**  
Courtesy of BMW OF NORTH AMERICA, INC.

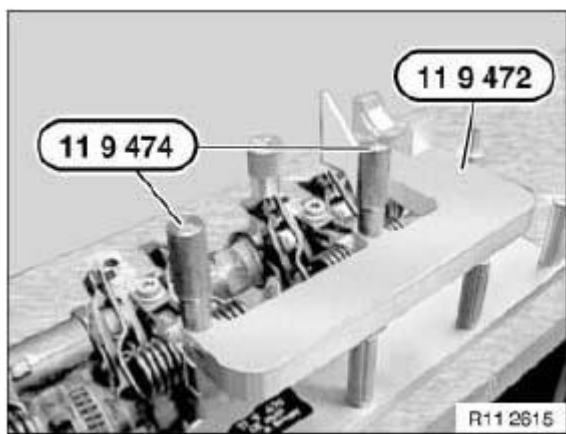
Install eccentric shaft sensor (2).

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



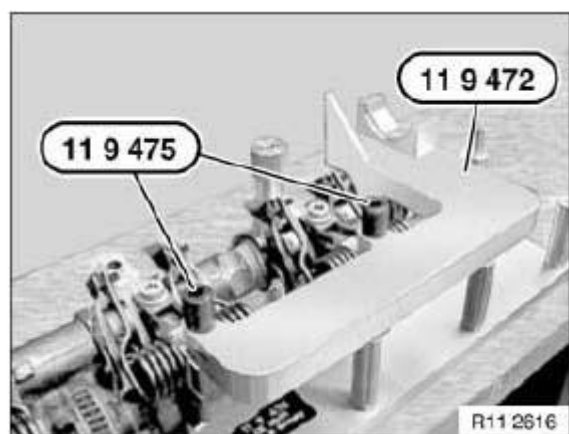
**Fig. 267: Identifying Eccentric Shaft Sensor**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 474 .



**Fig. 268: Identifying Special Tool (11 9 472) And (11 9 474)**  
Courtesy of BMW OF NORTH AMERICA, INC.

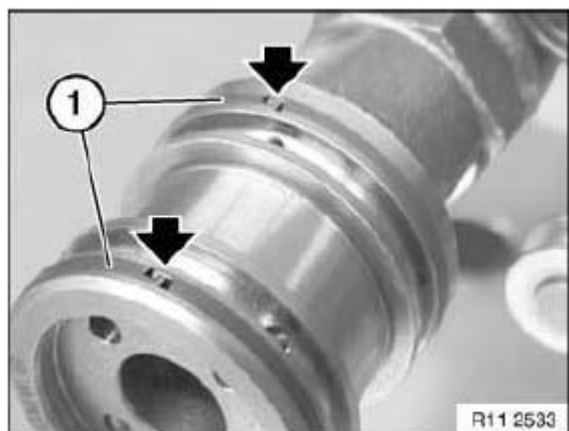
Remove special tool 11 9 472 and special tool 11 9 475 .



**Fig. 269: Identifying Special Tool (11 9 472) And (11 9 475)**  
Courtesy of BMW OF NORTH AMERICA, INC.

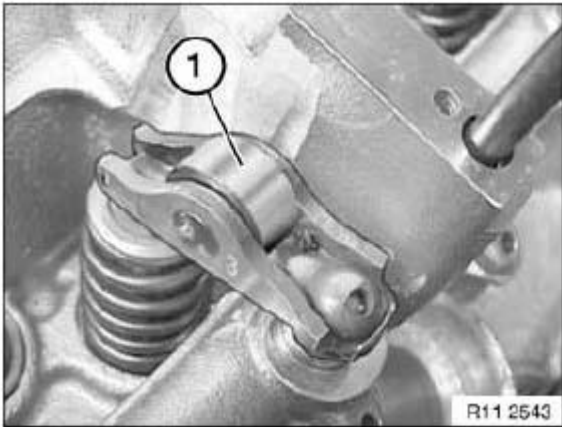
Ends of compression rings (1) point upwards.

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



**Fig. 270: 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.

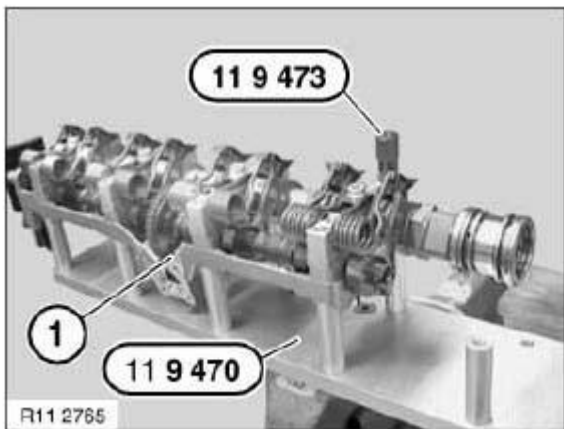


**Fig. 271: Identifying Rocker Arm**

Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 473 .

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



**Fig. 272: Identifying Bearing Bracket And Special Tool**

Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Do not tilt bearing bracket (1).**

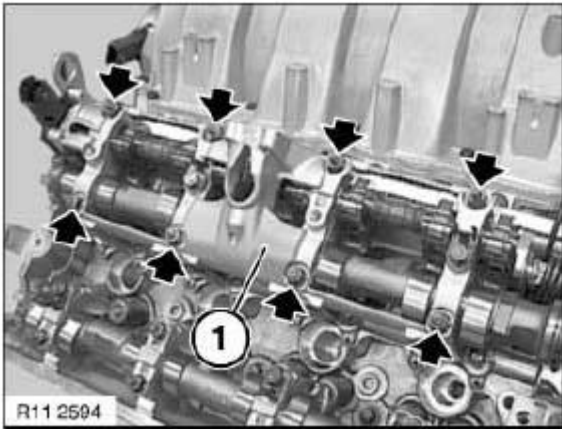
Lower bearing bracket (1) from above and carefully bring into contact with cylinder head.

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, see 11 31 1AZ in CAMSHAFT .



**Fig. 273: Locating Bearing Bracket Nuts**

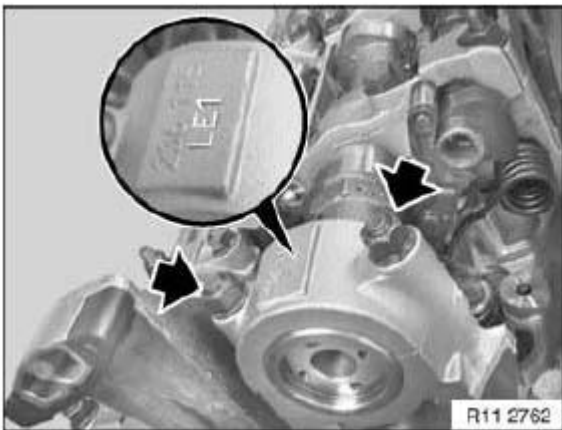
Courtesy of BMW OF NORTH AMERICA, INC.

**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, see 11 31 1AZ in CAMSHAFT .

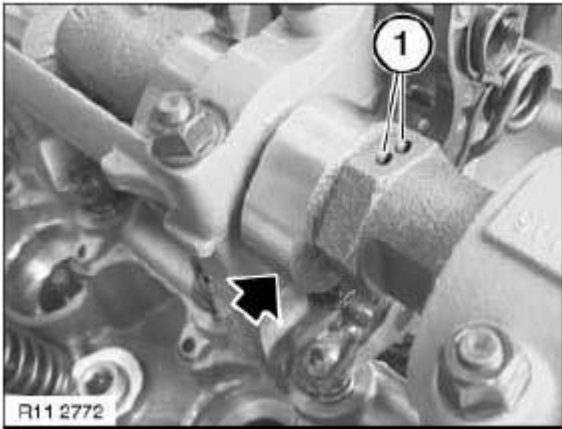


**Fig. 274: Identifying Bearing Cap L E1**

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. 275: Identifying Hexagon Drive Of Inlet Camshaft**  
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)**

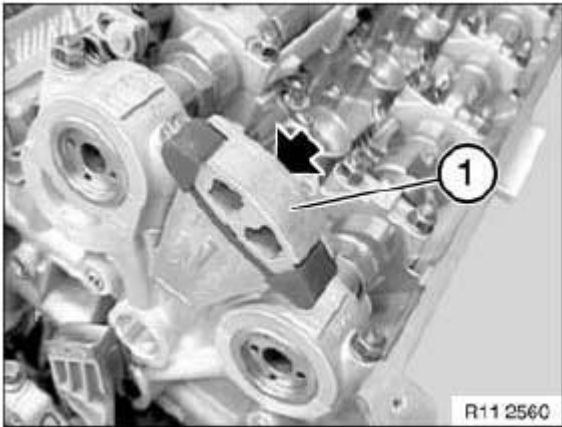
**(cylinder bank 5 to 8)**

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).

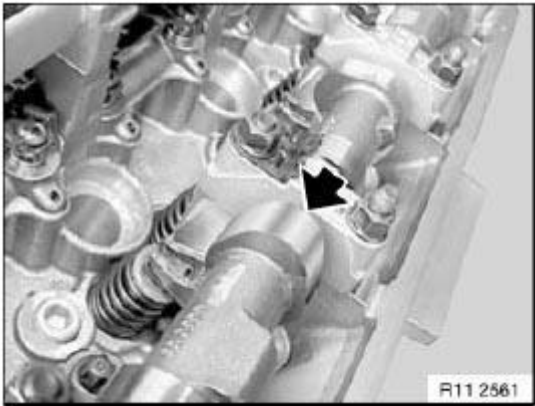




**Fig. 276: Identifying Slide Rail**

Courtesy of BMW OF NORTH AMERICA, INC.

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



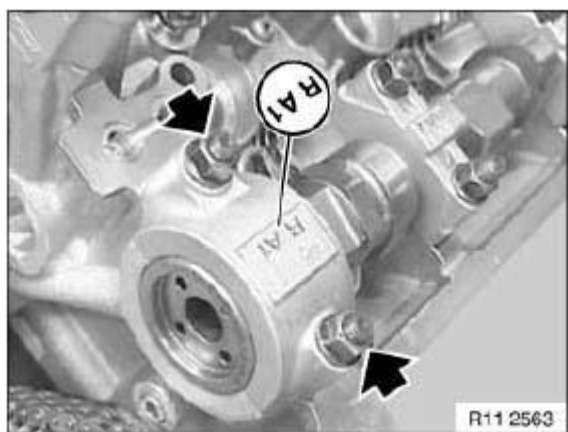
**Fig. 277: Locating Exhaust Camshaft Lobe**

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.

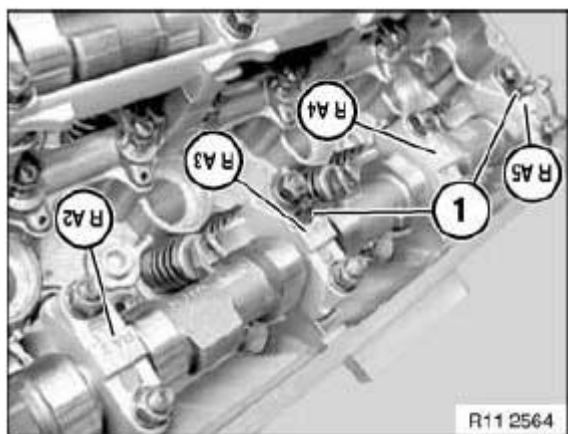
Release nuts and remove bearing cap R A1.



**Fig. 278: Locating Camshaft Bearing Caps**  
Courtesy of BMW OF NORTH AMERICA, INC.

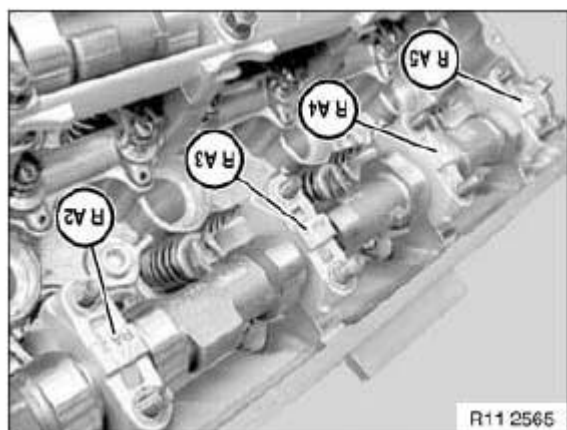
**NOTE:** Retaining clips (1) for oil line are fitted on bearing caps 3 and 5.

Release nuts on bearing caps R A2 to R A5.



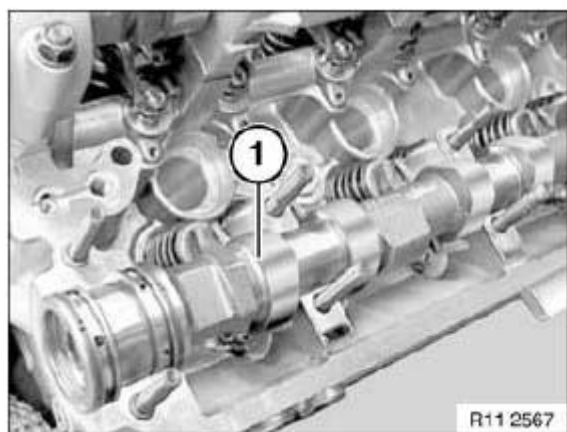
**Fig. 279: Identifying Nuts On Bearing Caps R A2 To R A5**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bearing caps R A2 to R A5.



**Fig. 280: Identifying Bearing Caps R A2 To R A5**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove exhaust camshaft (1).



**Fig. 281: Identifying Exhaust Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

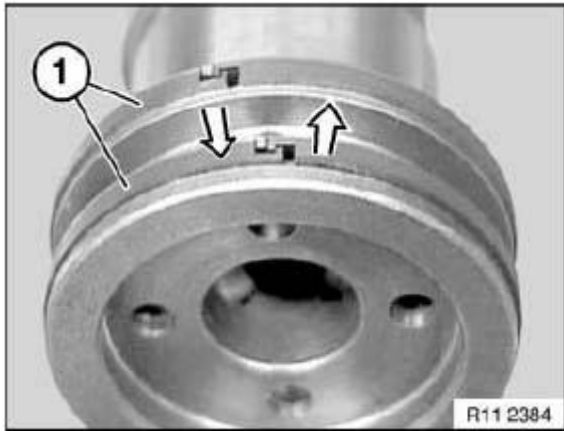
If necessary, replace plain compression rings (1).

**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.

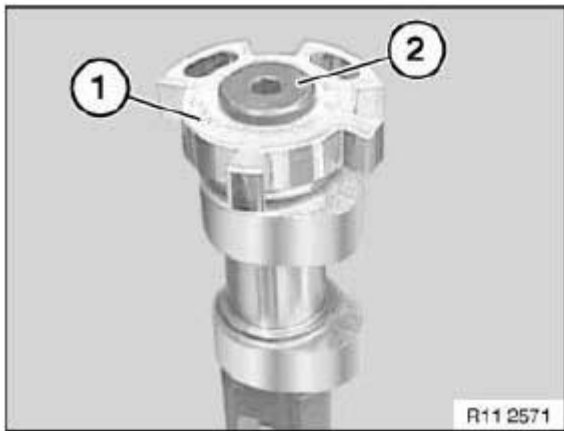
Carefully pull compression ring (1) apart and remove towards front.



**Fig. 282: 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. 283: 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.

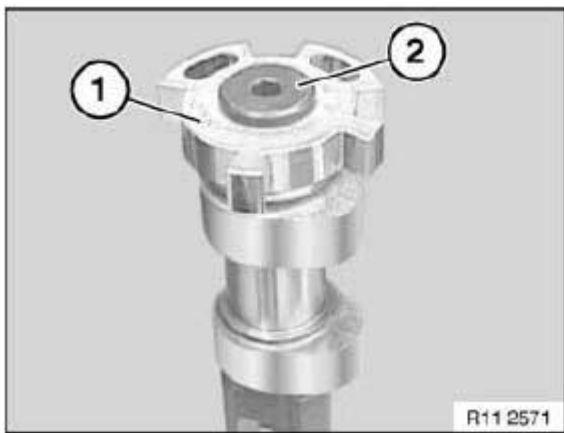


**Fig. 284: Locating Camshaft Groove And Sensor Gear Lug**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

Insert screw (2) and tighten down.

Tightening torque, see **11 31 14AZ** in CAMSHAFT .



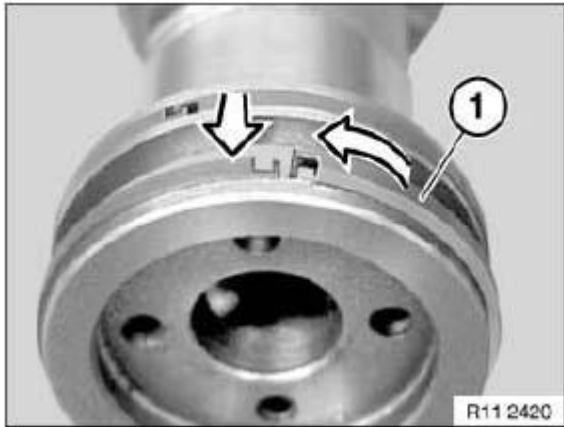
**Fig. 285: Identifying Sensor Gear And Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

Installing plain compression rings (1):

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

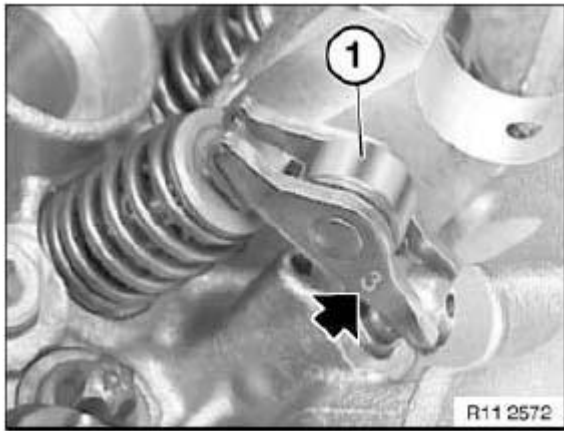
Carefully pull compression ring (1) apart and install from front.

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



**Fig. 286: 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.

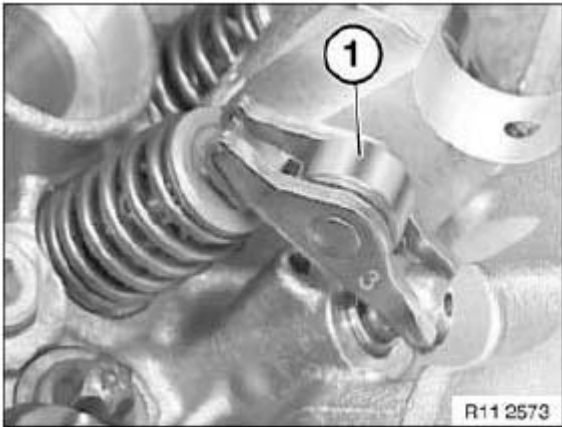


**Fig. 287: Identifying Rocker Arm**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.



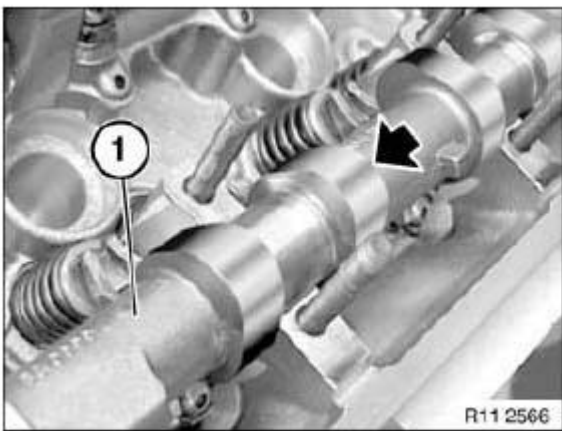
**Fig. 288: Identifying Rocker Arm**

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.



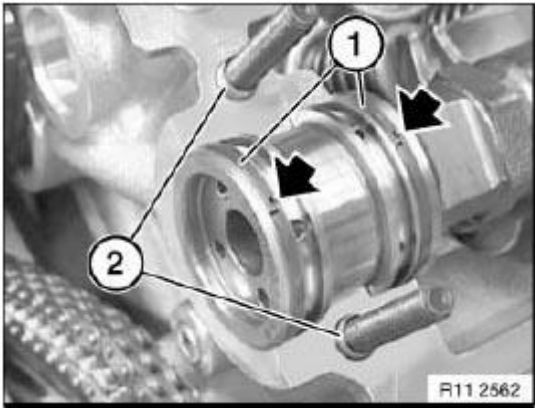
**Fig. 289: Identifying Exhaust Camshaft**

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.



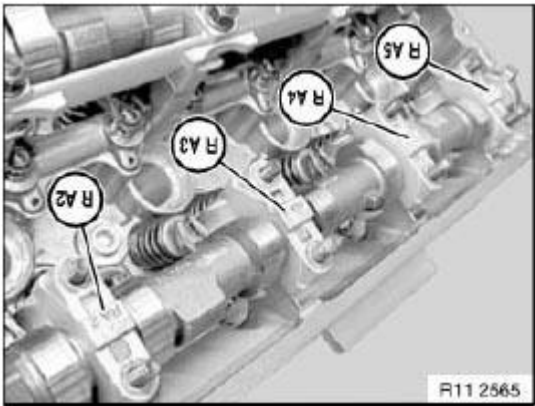
**Fig. 290: Identifying Dowel Sleeves**

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. 291: Identifying Bearing Caps R A2 To R A5**

Courtesy of BMW OF NORTH AMERICA, INC.

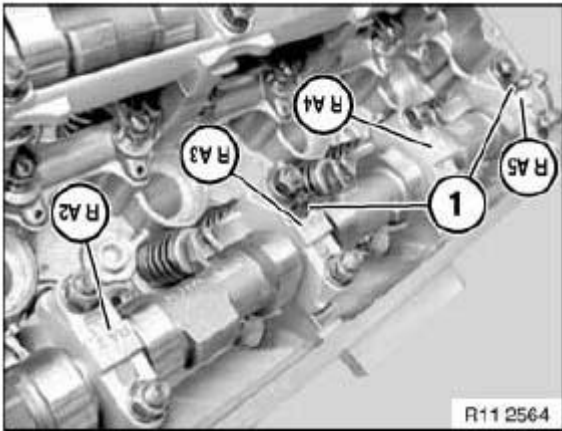
**NOTE:** Retaining clips (1) for oil line are fitted on bearing caps 3 and 5.

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, see **11 31 1AZ** in CAMSHAFT .





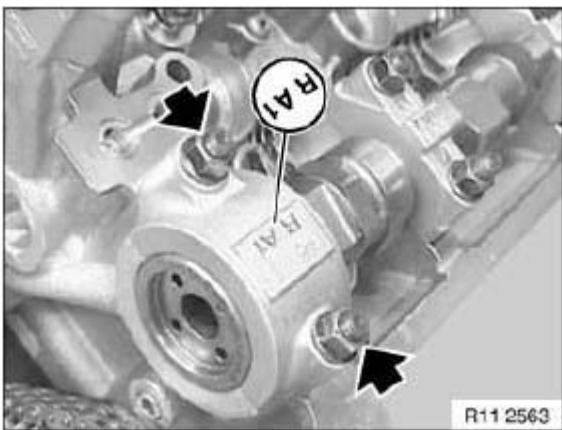
**Fig. 292: Identifying Nuts On Bearing Caps R A2 To R A5**  
 Courtesy of BMW OF NORTH AMERICA, INC.

**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.

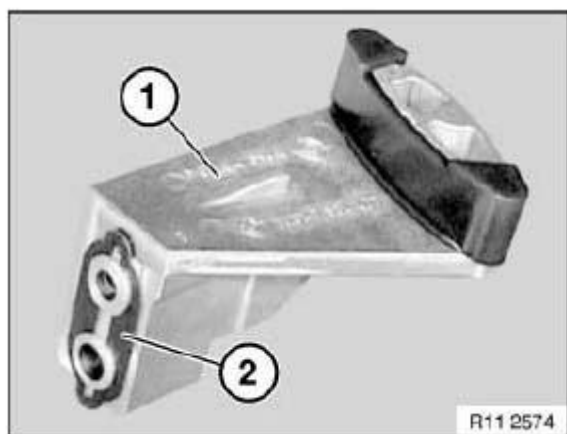
Tightening torque, see 11 31 1AZ in CAMSHAFT .



**Fig. 293: Identifying Bearing Cap R A1**  
 Courtesy of BMW OF NORTH AMERICA, INC.

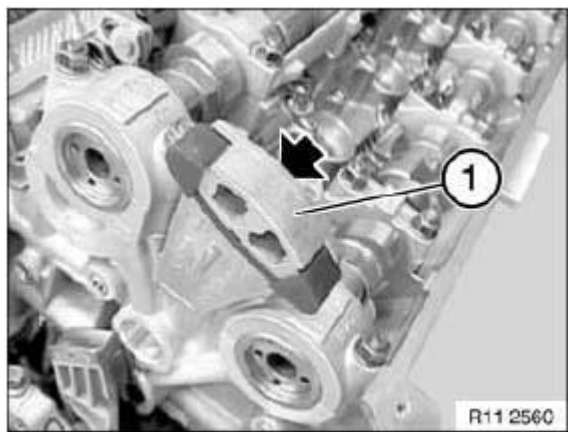
**NOTE:** A gasket (2) is installed between cylinder head and slide rail (1).

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



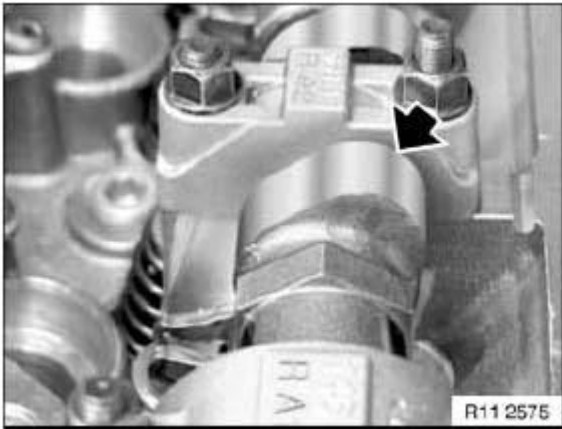
**Fig. 294: Identifying Slide Rail And Gasket**  
Courtesy of BMW OF NORTH AMERICA, INC.

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



**Fig. 295: Identifying Slide Rail**  
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. 296: Locating Exhaust Camshaft Lobe**  
Courtesy of BMW OF NORTH AMERICA, INC.

Install left inlet and exhaust adjustment units

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.

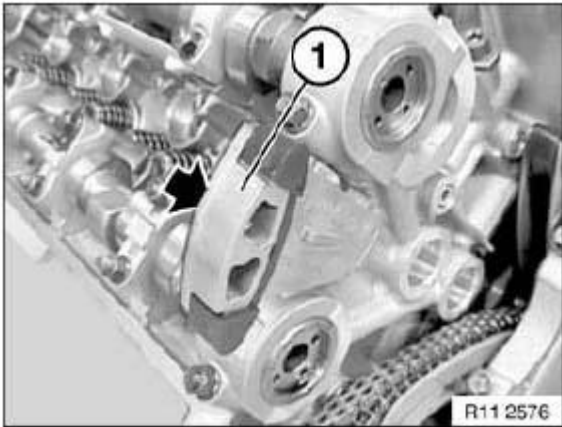
### **11 31 038 REMOVING AND INSTALLING/REPLACING RIGHT EXHAUST CAMSHAFT (N62/N62TU)**

**(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

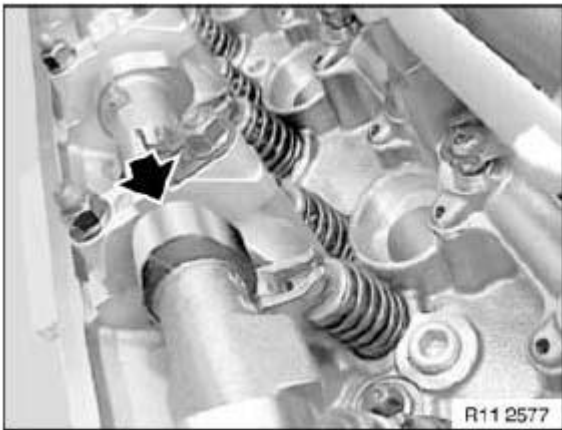
Remove slide rail (1).



**Fig. 297: 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.



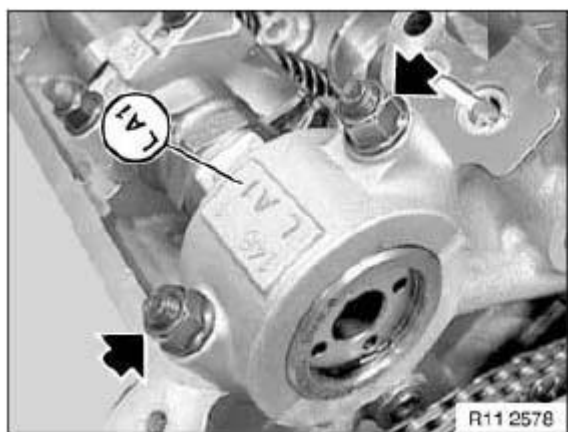
**Fig. 298: Identifying Exhaust Camshaft Lobe**

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.

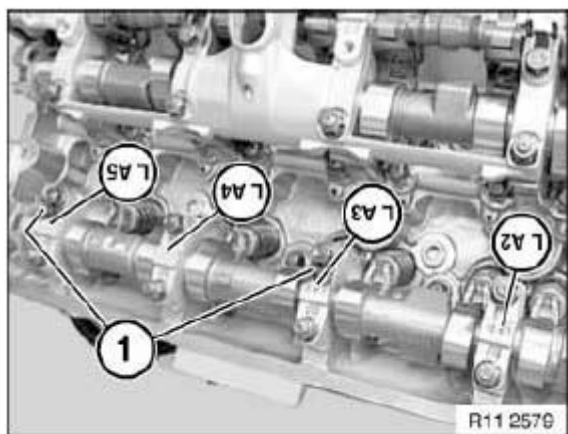
Release nuts and remove bearing cap L A1.



**Fig. 299: Identifying Bearing Cap L A1**  
Courtesy of BMW OF NORTH AMERICA, INC.

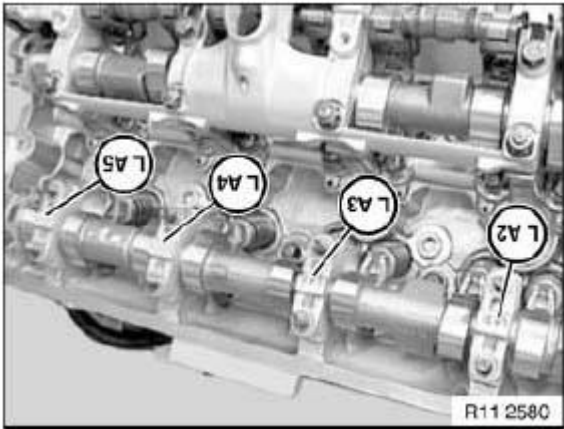
**NOTE:** Retaining clips (1) for oil line are fitted on bearing caps 3 and 5.

Release nuts on bearing caps L A2 to L A5.



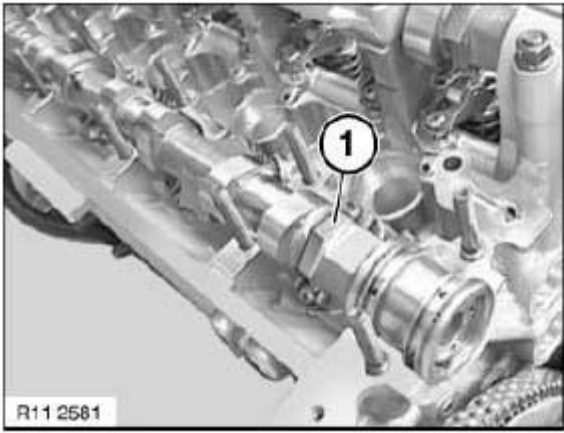
**Fig. 300: Identifying Nuts On Bearing Caps L A2 To L A5**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bearing caps L A2 to L A5.



**Fig. 301: Identifying Bearing Caps L A2 To L A5**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove exhaust camshaft (1).



**Fig. 302: Identifying Exhaust Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

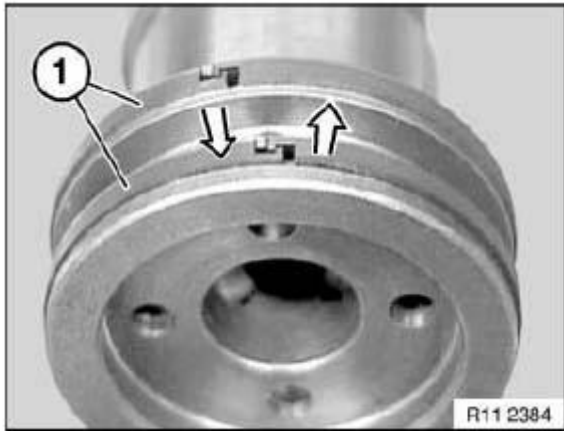
If necessary, replace plain compression rings (1).

**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. 303: 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. 304: 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.

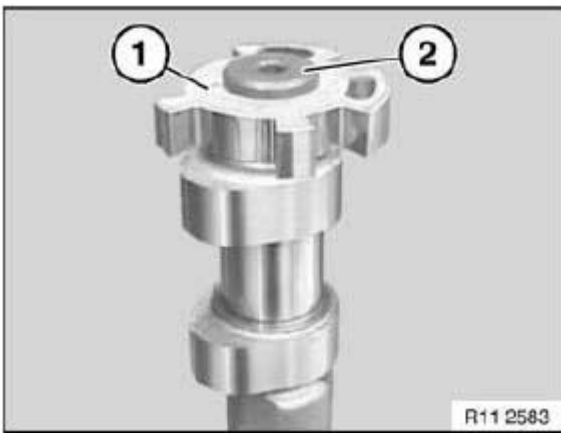


**Fig. 305: Identifying Camshaft Groove And Sensor Gear Lug**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

Insert screw (2) and tighten down.

Tightening torque, see **11 31 14AZ** in CAMSHAFT .



**Fig. 306: Identifying Sensor Gear And Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

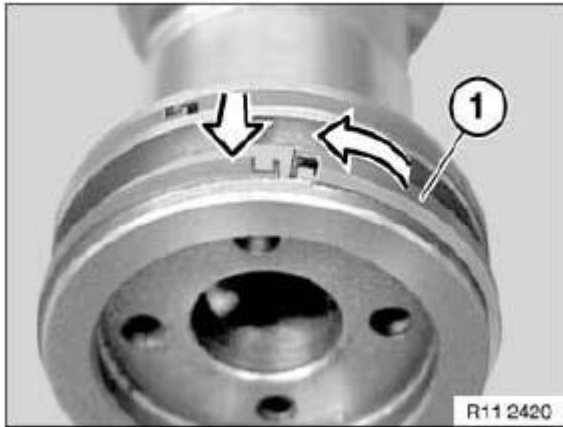
**Installing plain compression rings (1):**

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

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

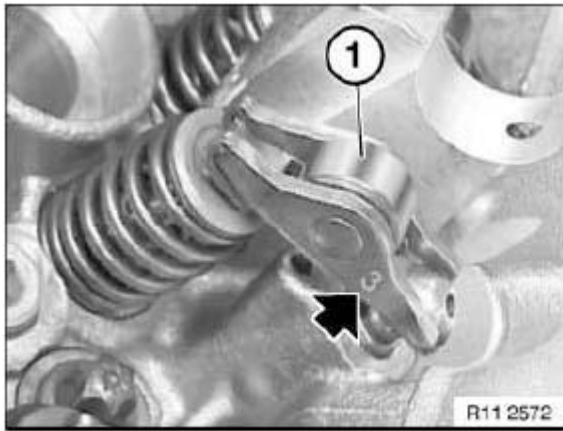
Press compression ring (1) on one side into groove, install catch on other side.





**Fig. 307: 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.

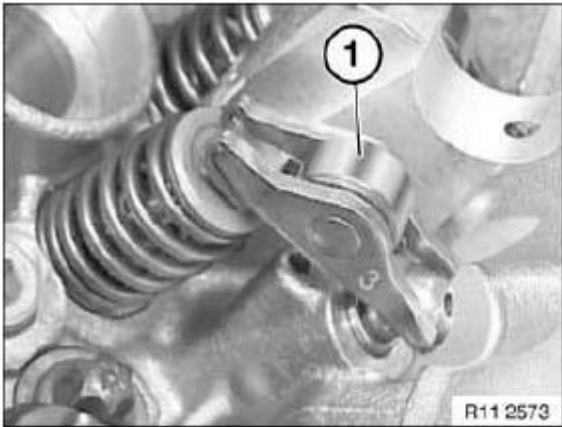


**Fig. 308: Identifying Rocker Arm**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.



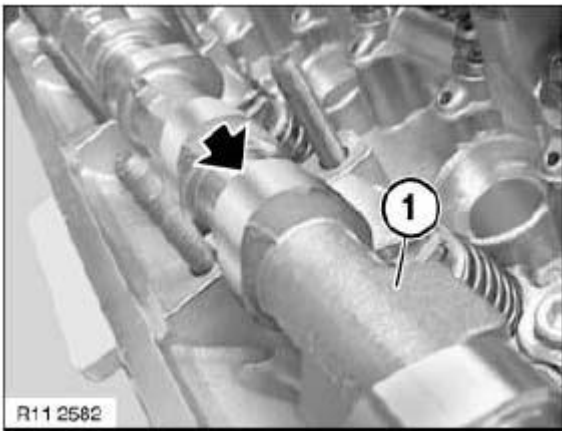
**Fig. 309: Identifying Rocker Arm**

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 2 is facing upwards.



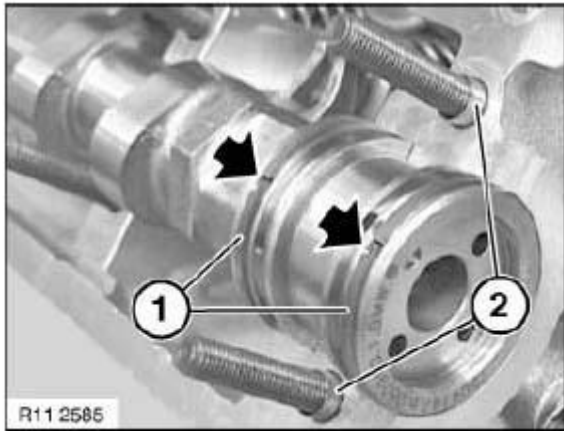
**Fig. 310: Identifying Exhaust Camshaft**

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.



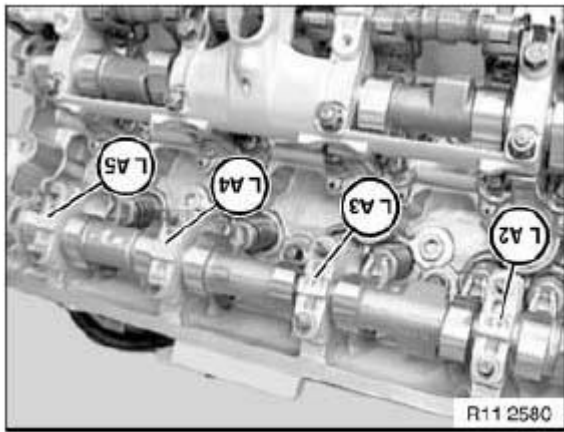
**Fig. 311: Identifying Dowel Sleeves**

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 1 to 4 with L A1 to L A5 from inlet side.

Fit bearing caps L A2 to L A5.



**Fig. 312: Identifying Bearing Caps L A2 To L A5**

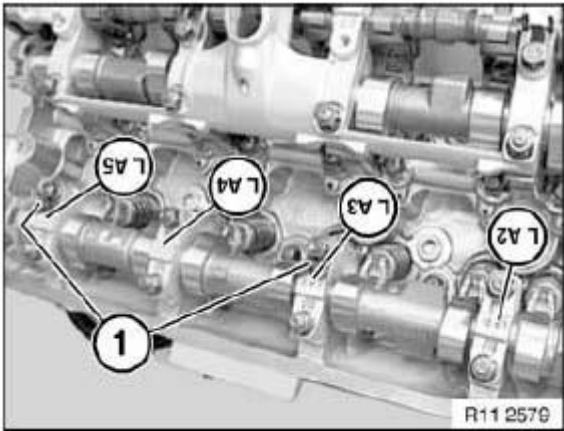
Courtesy of BMW OF NORTH AMERICA, INC.

**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, see **11 31 1AZ** in **CAMSHAFT** .



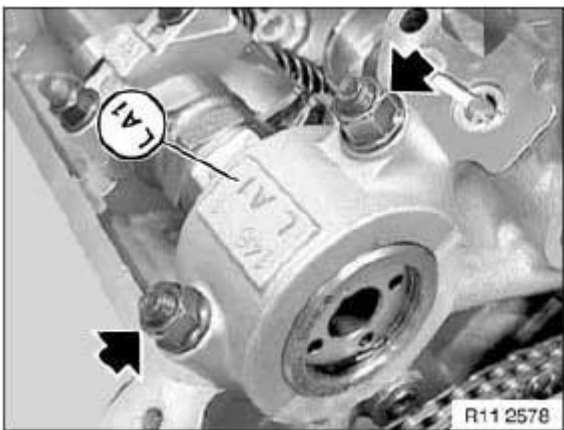
**Fig. 313: Identifying Nuts On Bearing Caps L A2 To L A5**  
 Courtesy of BMW OF NORTH AMERICA, INC.

**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.

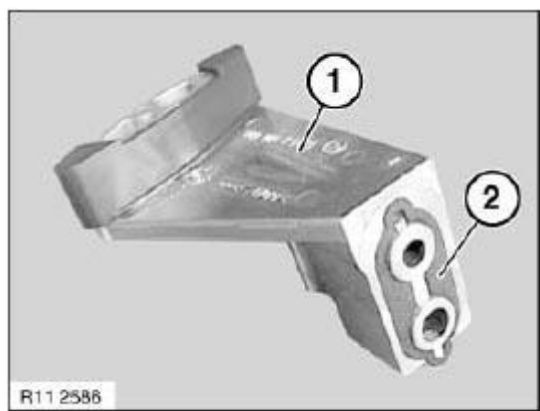
Tightening torque, see 11 31 1AZ in CAMSHAFT .



**Fig. 314: Identifying Bearing Cap L A1**  
 Courtesy of BMW OF NORTH AMERICA, INC.

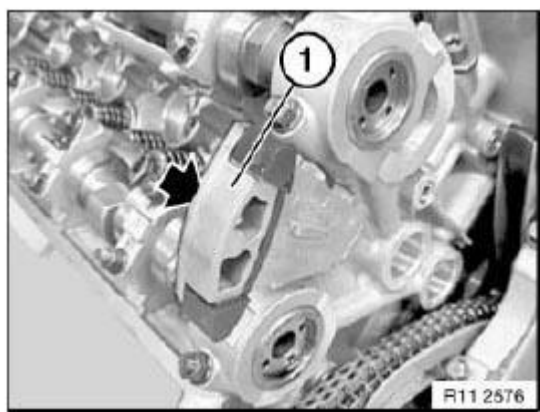
**NOTE:** A gasket (2) is installed between cylinder head and slide rail (1).

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



**Fig. 315: Identifying Slide Rail And Gasket**  
Courtesy of BMW OF NORTH AMERICA, INC.

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



**Fig. 316: Identifying Slide Rail**  
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. 317: Locating Exhaust Camshaft Lobe**  
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 . See ENGINE- SPECIAL TOOLS .
- 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).

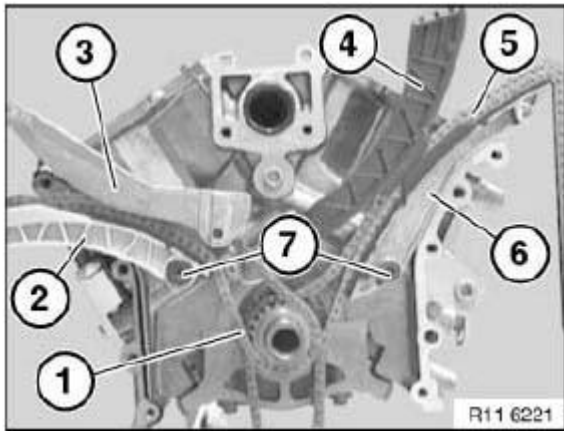
Remove tensioning rails (2 and 4).

*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. 318: Identifying Timing Chain, Guide Rails And Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

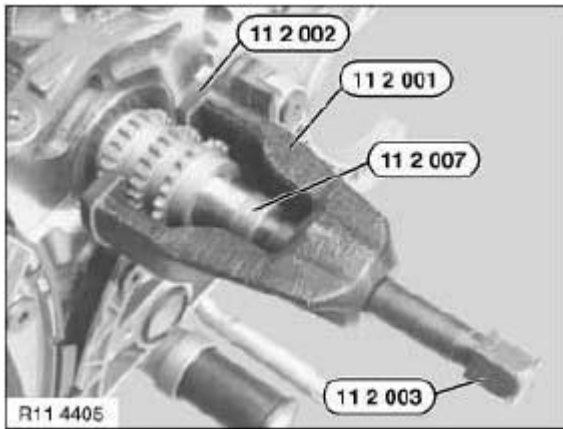
Attach special tools **11 2 001** and **11 2 002** to crankshaft.

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.



**Fig. 319: Identifying Special Tools**

Courtesy of BMW OF NORTH AMERICA, INC.

**WARNING: Burning hazard! Wear gloves.**

Assemble engine.

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

##### Special tools required:

- 11 9 190 . See ENGINE- SPECIAL TOOLS .
- 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.

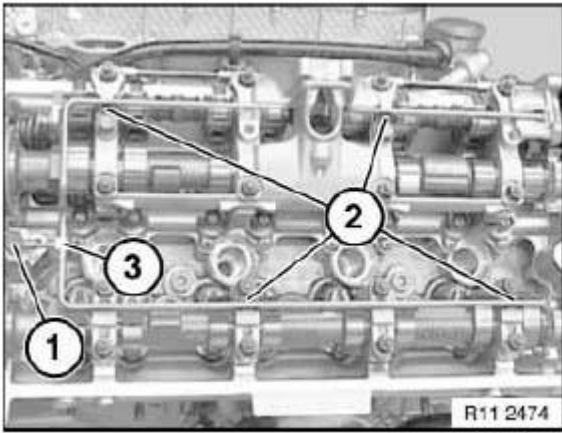
If necessary, remove fan cowl. See 17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N62, N62TU)

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

Release screw (1).



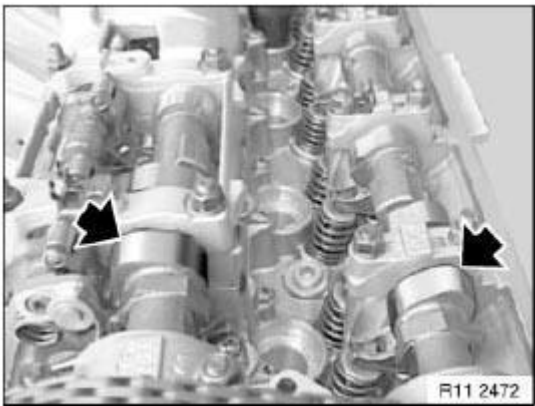
Unclip oil line (3) from retainers (2) and remove.



**Fig. 320: 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.

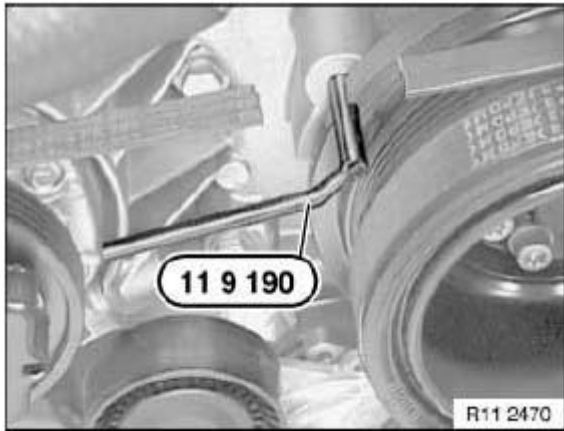
**NOTE:** With 1st cylinder in firing TDC position, cams of inlet and exhaust camshafts at 5th cylinder point upwards at an angle as shown in illustration.



**Fig. 321: Locating Inlet And Exhaust Camshafts Lobe**  
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. 322: Identifying Special Tool (11 9 190)**

Courtesy of BMW OF NORTH AMERICA, INC.

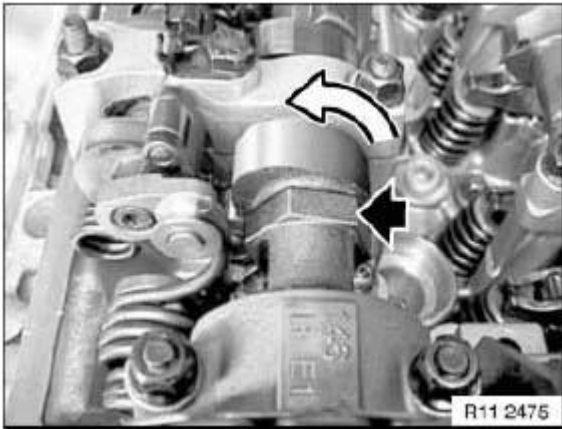
**IMPORTANT:** When the engine is shut down, the inlet and exhaust adjustment unit is normally locked in its initial position. The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the adjustment 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.



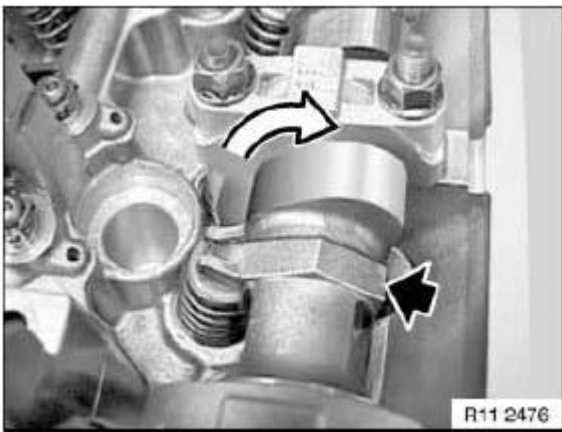
**Fig. 323: Locating Hexagon Head Of Inlet Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.



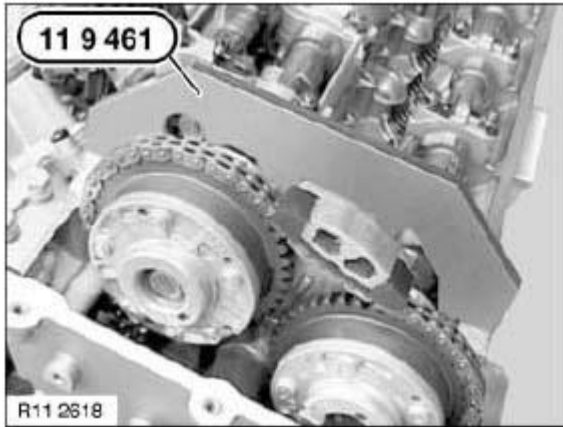
**Fig. 324: Locating Hexagon Head Of Exhaust Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

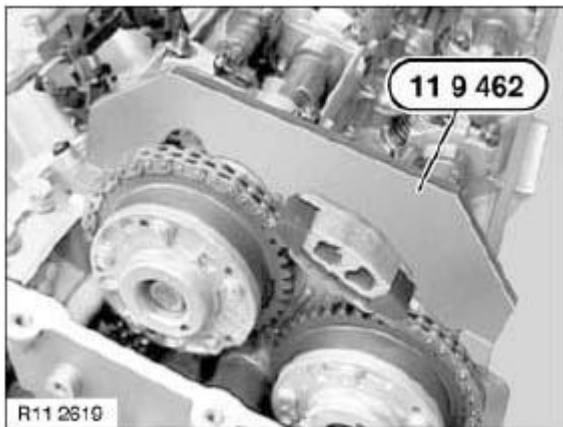


**Fig. 325: Placing Special Tool (11 9 461) On Inlet Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

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. 326: Placing Special Tool (11 9 462) On Exhaust Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

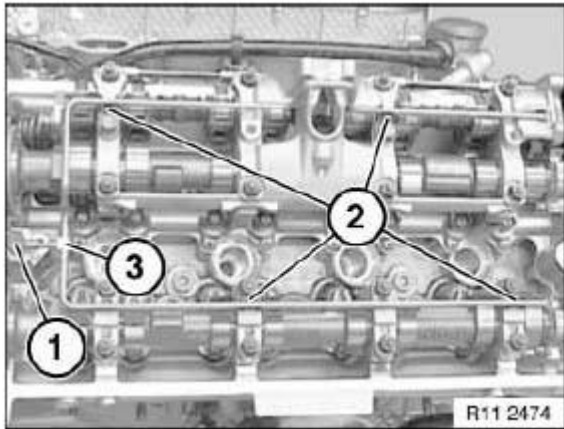
Remove all special tools.

**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. 327: Identifying 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 . See ENGINE- SPECIAL TOOLS .
- 11 9 461
- 11 9 462

**(cylinder bank 1 to 4)**

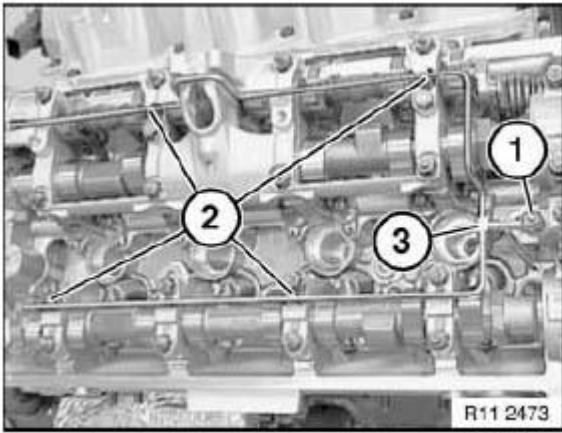
*Necessary preliminary tasks:*

- 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** . See 17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N62, N62TU)

**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. 328: 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.

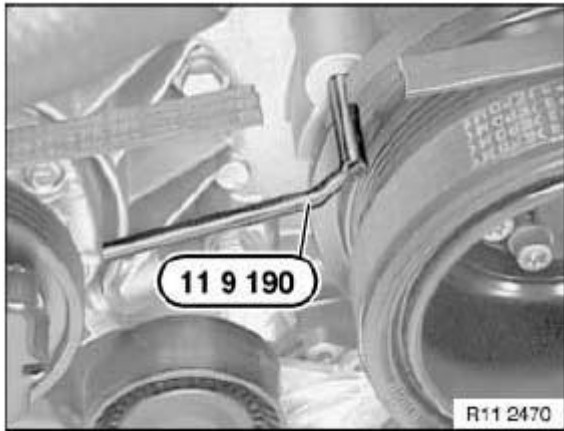
Cam of inlet camshaft points downwards at an angle:



**Fig. 329: Locating Inlet And Exhaust Camshaft**  
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. 330: Identifying Special Tool (11 9 190)**

Courtesy of BMW OF NORTH AMERICA, INC.

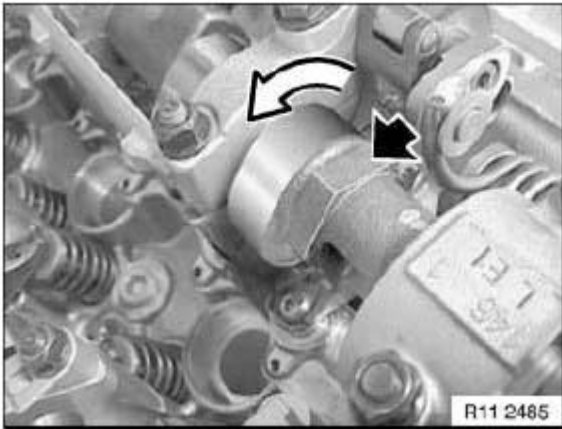
**IMPORTANT:** When the engine is shut down, the inlet and exhaust adjustment unit is normally locked in its initial position. The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the adjustment 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.



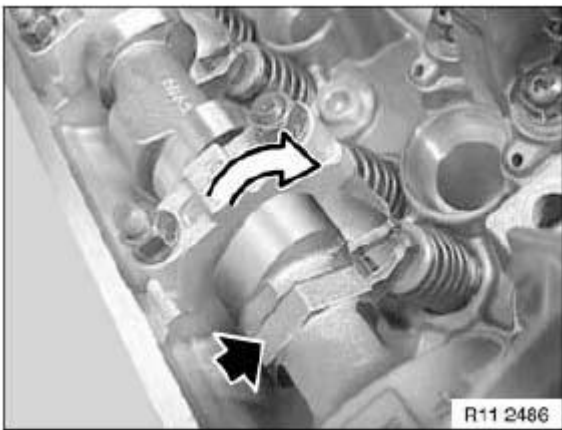
**Fig. 331: Locating Hexagon Head Of Inlet Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.



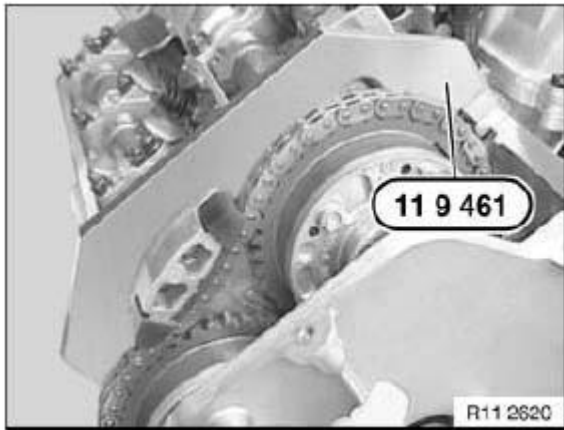
**Fig. 332: Locating Hexagon Head Of Exhaust Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

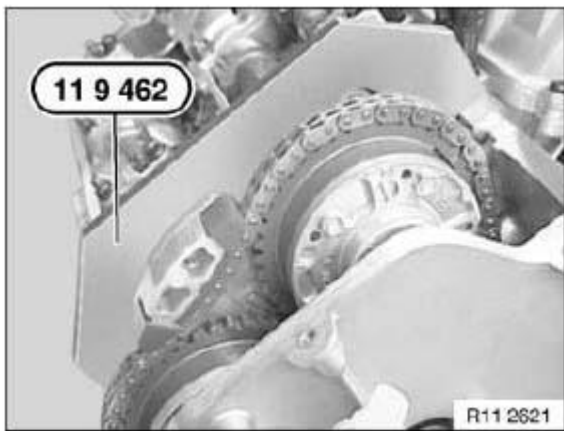


**Fig. 333: Identifying Special Tool (11 9 461) On Inlet Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

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. 334: Identifying Special Tool (11 9 462) On Exhaust Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

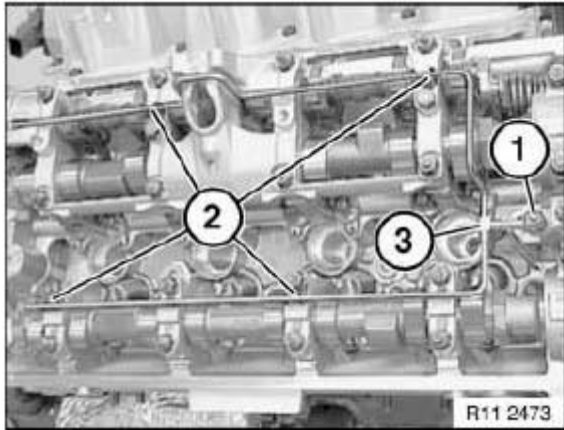
Remove all special tools.

**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. 335: Identifying Oil Line And 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 . See ENGINE- SPECIAL TOOLS .
- 11 9 460
- 11 9 461
- 11 9 462
- 11 9 463

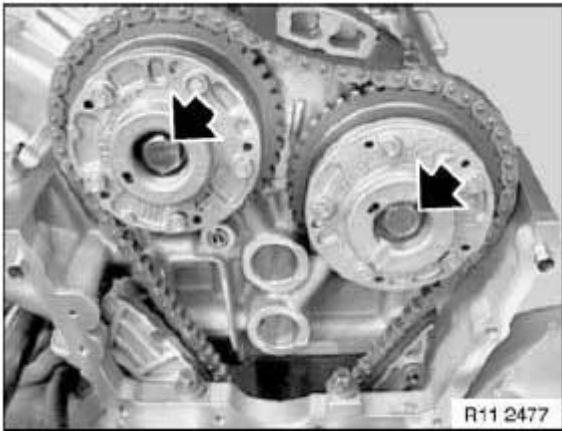
(cylinder bank 5 to 8)

*Necessary preliminary tasks:*

- Check camshaft timing on left side
- Remove left timing case cover.

**NOTE:** When slackening screws, grip camshafts at hexagon head.

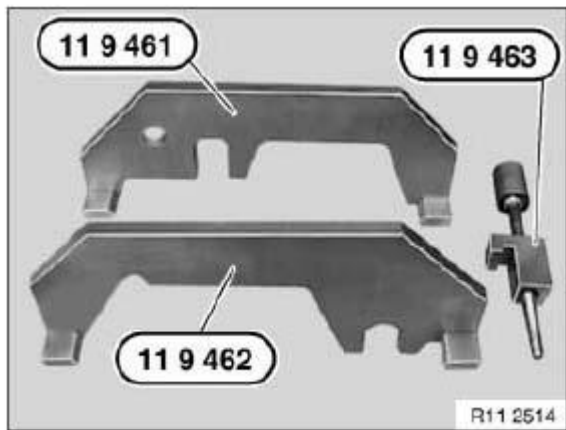
Slacken screws of exhaust and inlet adjustment unit.



**Fig. 336: Slacken screws of exhaust and inlet 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).**



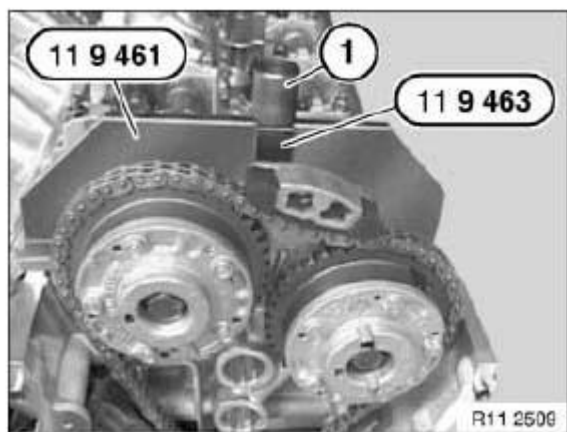
**Fig. 337: Identifying Special Tools**  
Courtesy of BMW OF NORTH AMERICA, INC.

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. 338: Identifying Special Tool (11 9 461) On Inlet Camshaft**  
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.

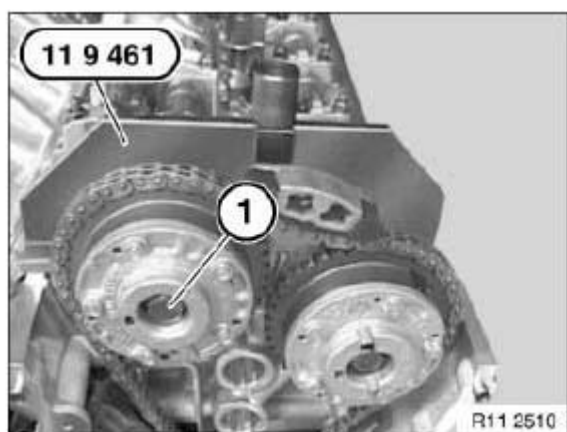


**Fig. 339: Identifying Special Tool (11 9 461) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** When tightening down screw (1), grip camshaft at hexagon head.

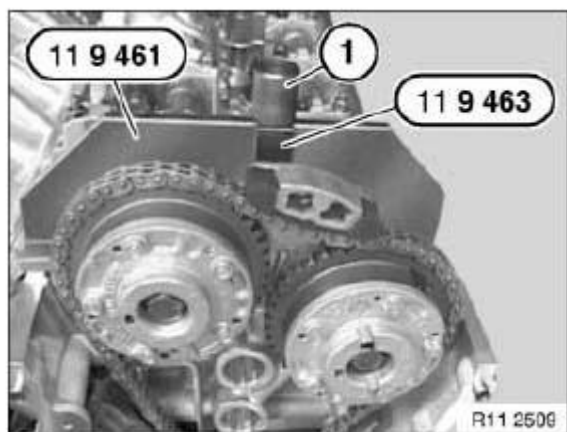
Tighten down screw (1) of inlet adjustment unit.

Tightening torque, see **11 36 16AZ** in **11 36 VARIABLE CAMSHAFT CONTROL** .



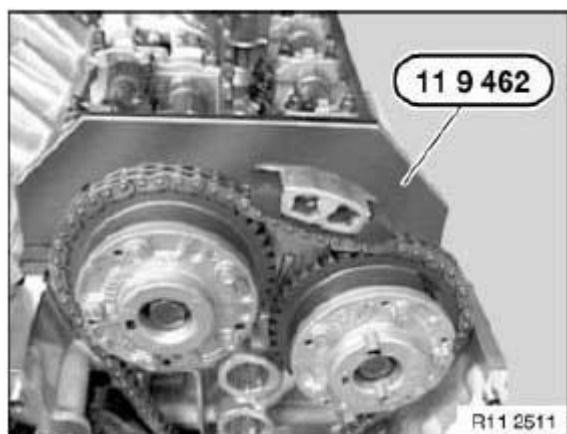
**Fig. 340: Identifying Special Tool (11 9 461) And Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1), remove special tools **11 9 463** and **11 9 461** from inlet camshaft.



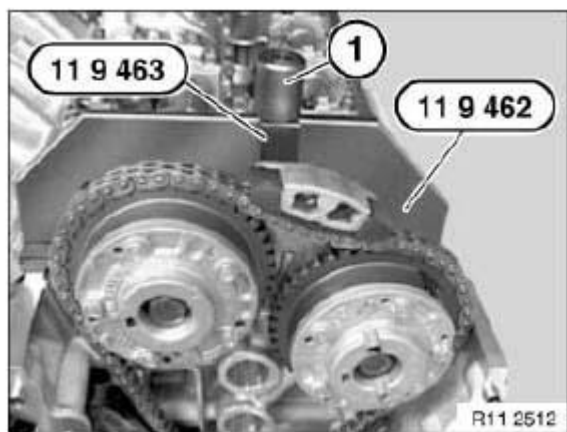
**Fig. 341: Identifying Special Tool (11 9 461) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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. 342: Identifying Special Tool (11 9 462) On Exhaust Camshaft**  
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.

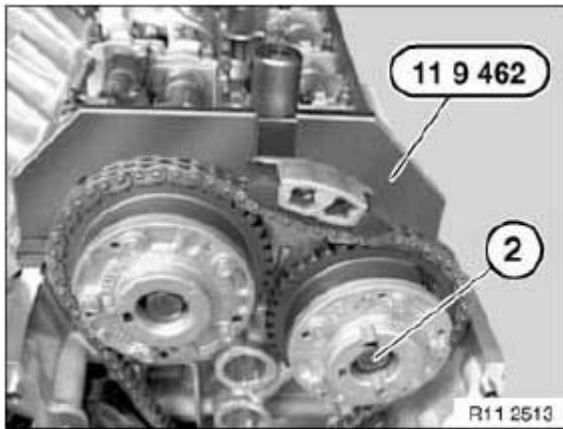


**Fig. 343: Identifying Special Tool (11 9 462) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** When tightening down screw (2), grip camshaft at hexagon head.

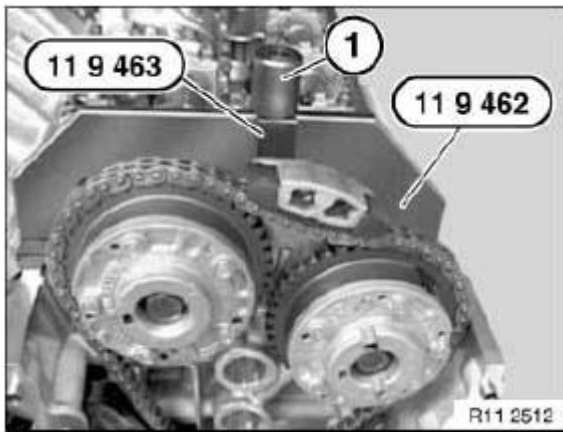
Tighten down screw (2) of exhaust adjustment unit.

Tightening torque, see **11 36 16AZ** in **11 36 VARIABLE CAMSHAFT CONTROL** .



**Fig. 344: Identifying Special Tool (11 9 462) And Screw**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1), remove special tools **11 9 463** and **11 9 462** from exhaust camshaft.

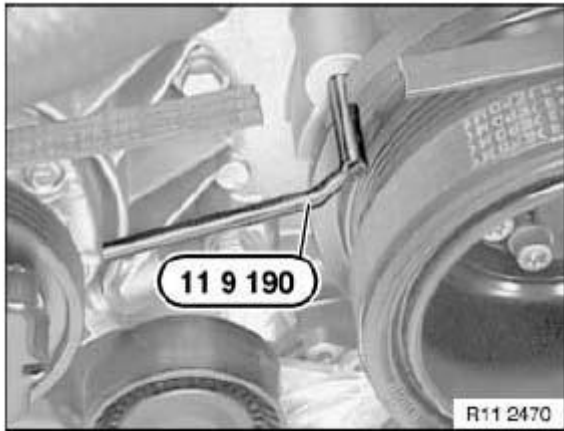


**Fig. 345: Identifying Special Tool (11 9 462) And (11 9 463)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

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.

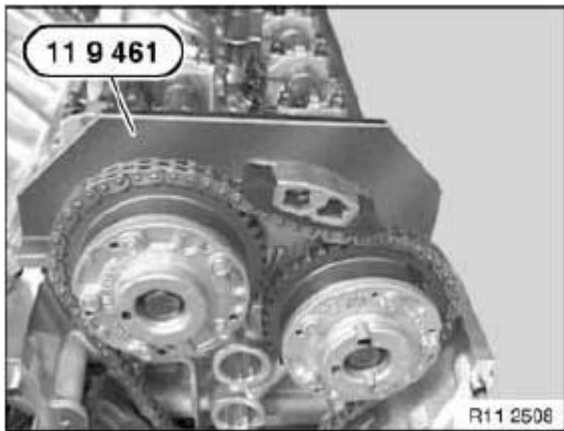


**Fig. 346: Identifying Special Tool (11 9 190)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.

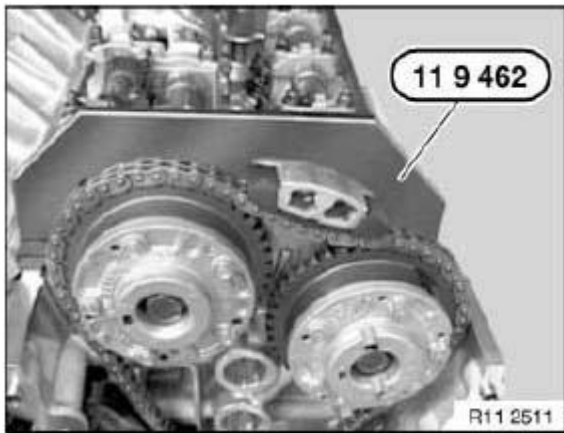


**Fig. 347: Identifying Special Tool (11 9 461) On Inlet Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

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. 348: Identifying Special Tool (11 9 462) On Exhaust Camshaft**  
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** . See **ENGINE- SPECIAL TOOLS** .
- **11 9 460**
- **11 9 461**
- **11 9 462**
- **11 9 463**

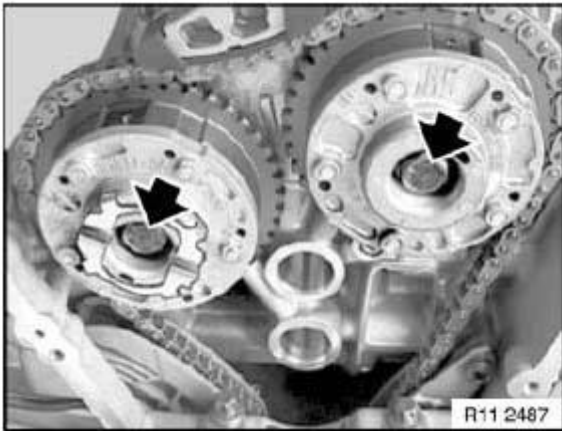
**(cylinder bank 1 to 4)**

*Necessary preliminary tasks:*

- **Check camshaft timing on right side.**
- Remove **right timing case cover.**

**NOTE:**        **When slackening screws, grip camshafts at hexagon head.**

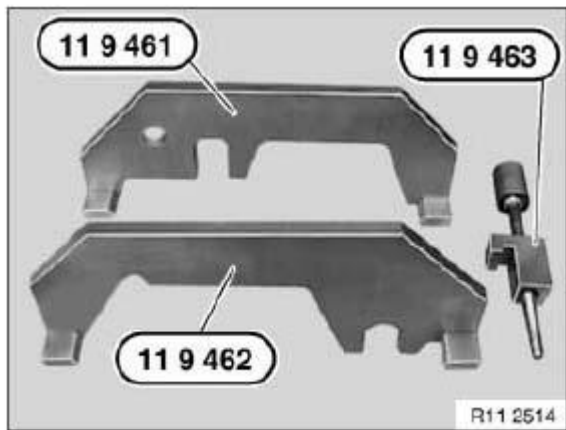
Slacken screws of exhaust and inlet adjustment unit.



**Fig. 349: Slacken Screws Of Exhaust And Inlet 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).**



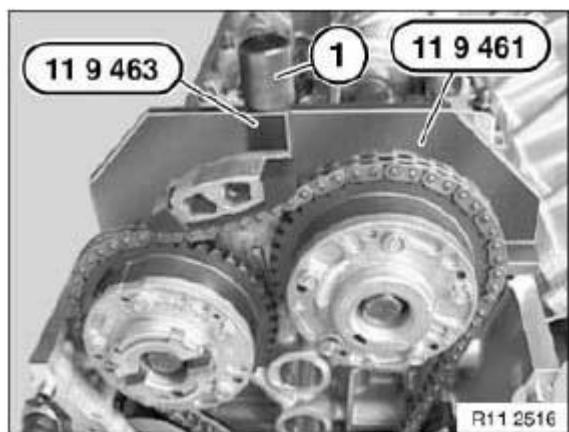
**Fig. 350: Identifying Special Tools**  
Courtesy of BMW OF NORTH AMERICA, INC.

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. 351: Identifying Special Tool (11 9 461) On Inlet Camshaft**  
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.

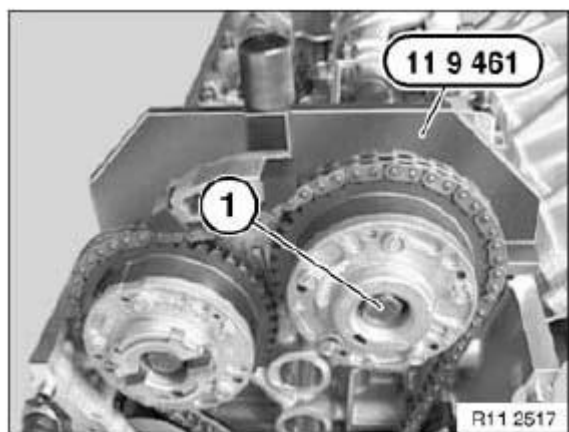


**Fig. 352: Identifying Special Tools (11 9 461) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** When tightening down screw (1), grip camshaft at hexagon head.

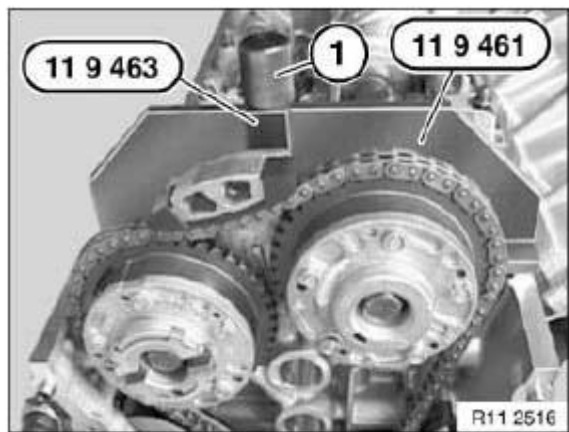
Tighten down screw (1) of inlet adjustment unit.

Tightening torque, see **11 36 16AZ** in **11 36 VARIABLE CAMSHAFT CONTROL** .



**Fig. 353: Identifying Special Tools (11 9 461) And Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1), remove special tools 11 9 463 and 11 9 461 from inlet camshaft.



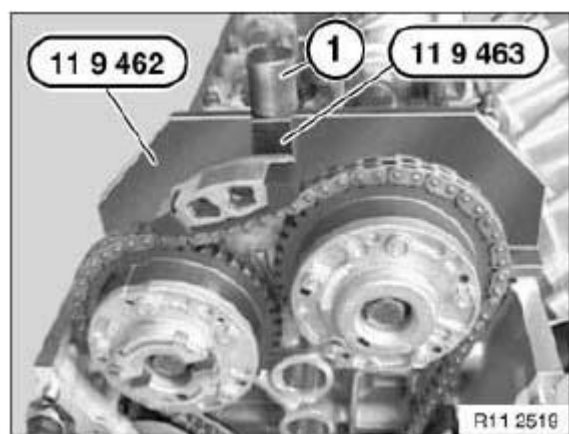
**Fig. 354: Identifying Special Tools (11 9 461) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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. 355: Identifying Special Tool (11 9 462) On Exhaust Camshaft**  
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.

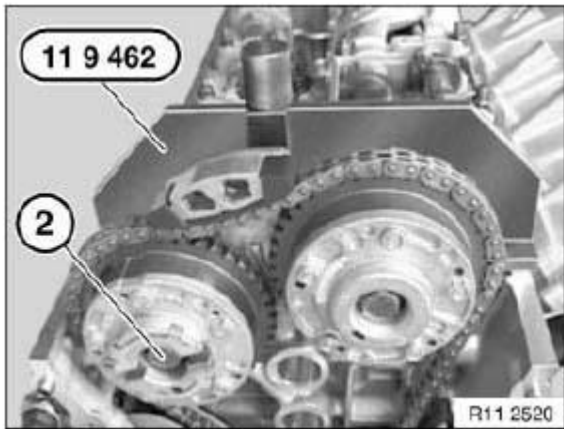


**Fig. 356: Identifying Special Tools (11 9 462) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** When tightening down screw (2), grip camshaft at hexagon head.

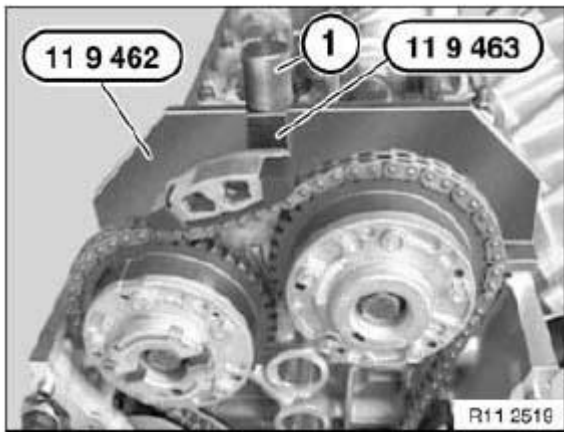
Tighten down screw (2) of exhaust adjustment unit.

Tightening torque, see **11 36 16AZ** in **11 36 VARIABLE CAMSHAFT CONTROL** .



**Fig. 357: Identifying Special Tools (11 9 462) And Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1), remove special tools 11 9 463 and 11 9 462 from exhaust camshaft.

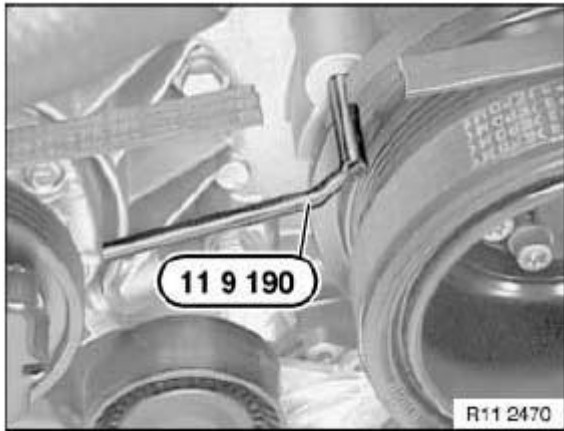


**Fig. 358: Identifying Special Tools (11 9 462) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.

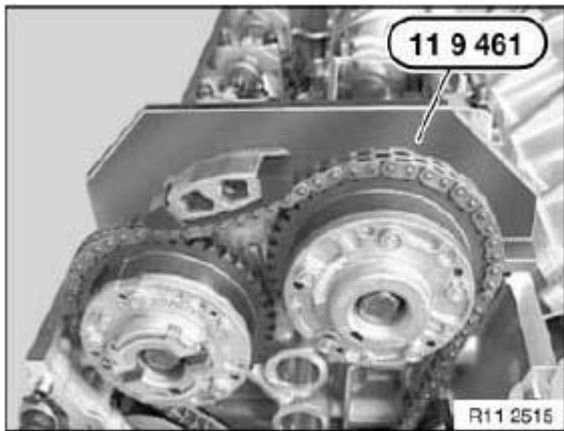


**Fig. 359: Identifying Special Tool (11 9 190)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.

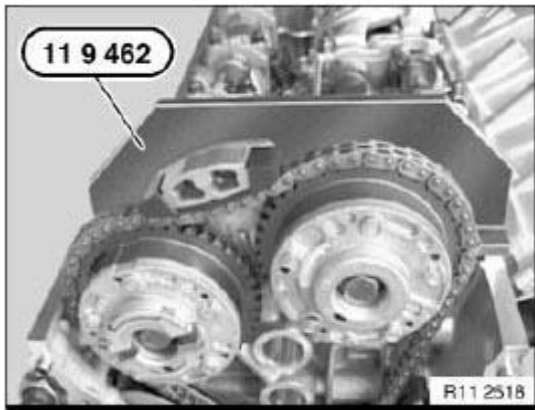
Remove special tool **11 9 461** from inlet camshaft.



**Fig. 360: Identifying Special Tool (11 9 461) On Inlet Camshaft**  
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. 361: Identifying Special Tools (11 9 461) And (11 9 463)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

### **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** . See ENGINE- SPECIAL TOOLS .
- **11 9 473**

**(cylinder bank 5 to 8)**

Removal of rocker arms is described separately from installation.

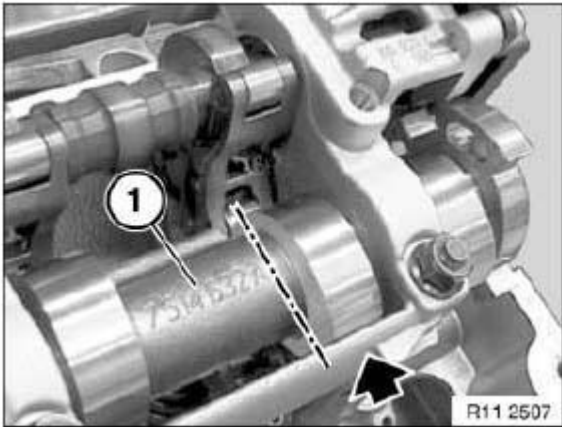
#### *Necessary preliminary tasks:*

- 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.



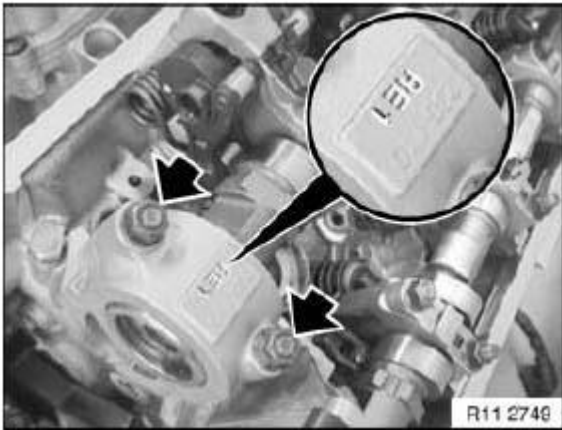


**Fig. 362: Identifying Camshaft Lettering On 8th Cylinder Point**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

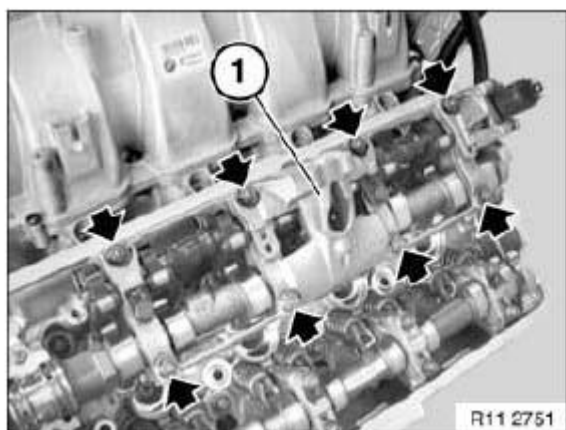
**NOTE:** Bearing caps of inlet camshaft are marked on cylinder bank 5 to 8 with R E1 to R E5 from inlet side.

Release nuts and remove bearing cap R E1.



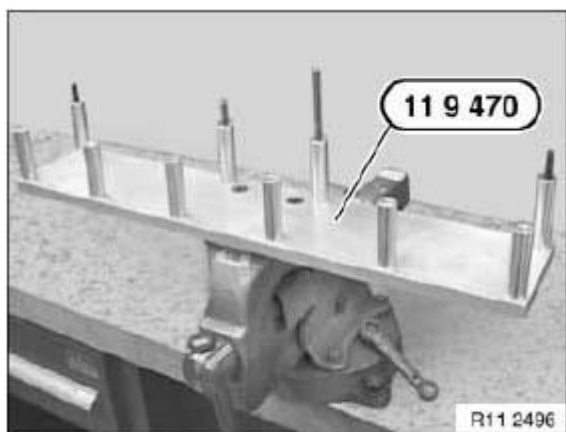
**Fig. 363: Identifying Bearing Cap R E1**  
Courtesy of BMW OF NORTH AMERICA, INC.

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



**Fig. 364: Locating Bearing Bracket Nuts**  
Courtesy of BMW OF NORTH AMERICA, INC.

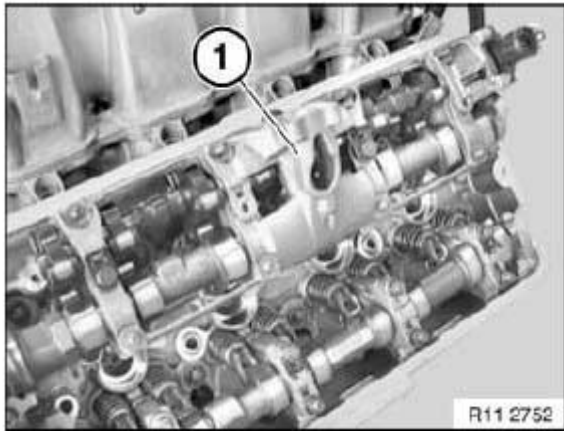
Clamp special tool **11 9 470** as illustrated in a vice.



**Fig. 365: 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).

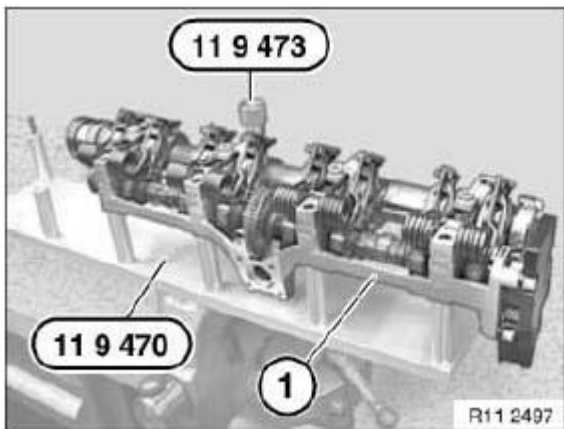


**Fig. 366: Identifying Bearing Bracket**

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** ).

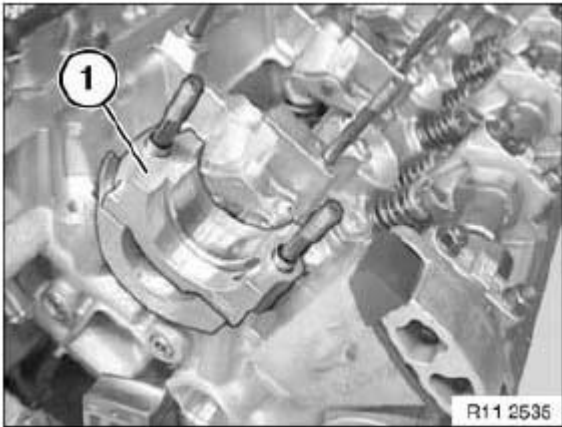


**Fig. 367: Identifying Special Tool (11 9 470) And (11 9 473)**

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.

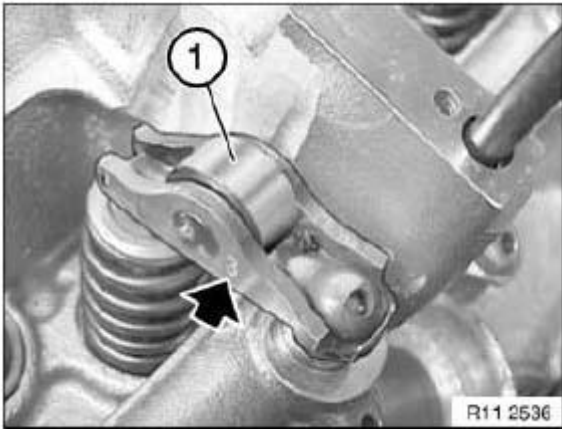
**NOTE:** Lower section of bearing bracket (1) remains on cylinder head.



**Fig. 368: 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. 369: Identifying Rocker Arm**  
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 = new 2A

1

Old = new 2A

2

Old = new 2B

3

Old = new 2B

4



**Fig. 370: Identifying Rocker Arm Classification**  
Courtesy of BMW OF NORTH AMERICA, INC.

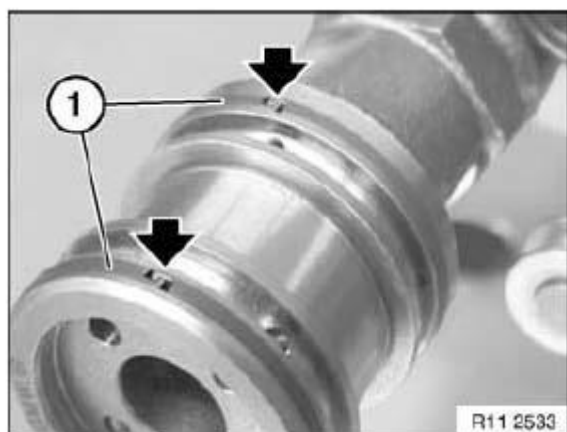
**Installation:**

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.

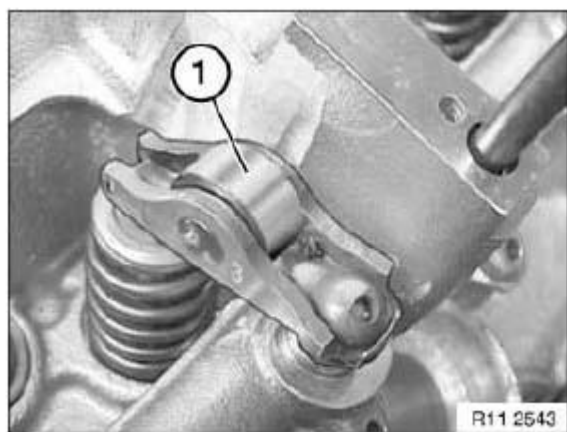


**Fig. 371: Identifying Compression Rings**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.

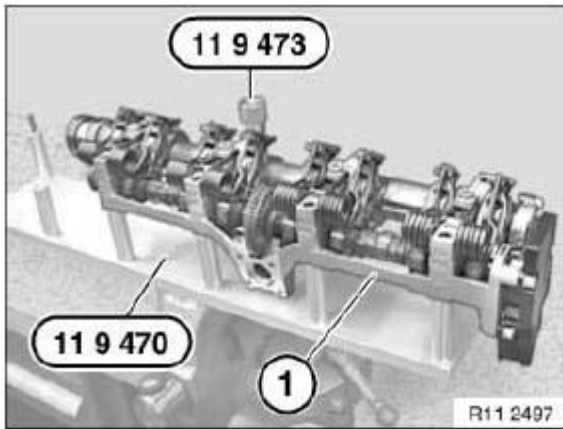
Align rockers (1) straight.



**Fig. 372: Identifying Rocker Arm**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 473 .

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



**Fig. 373: Identifying Special Tool (11 9 470) And (11 9 473)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Do not tilt bearing bracket (1).**

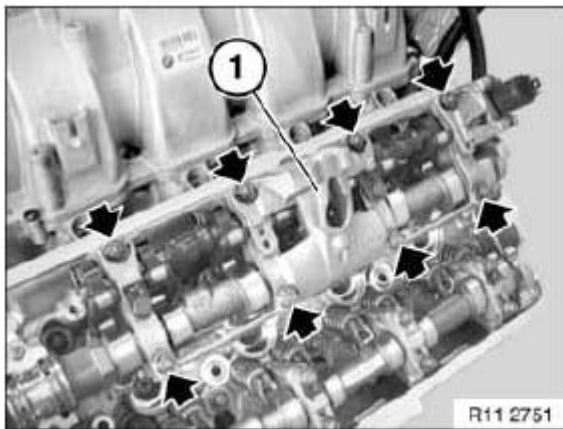
Lower bearing bracket (1) from above and carefully bring into contact with cylinder head.

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, see 11 31 1AZ in CAMSHAFT .



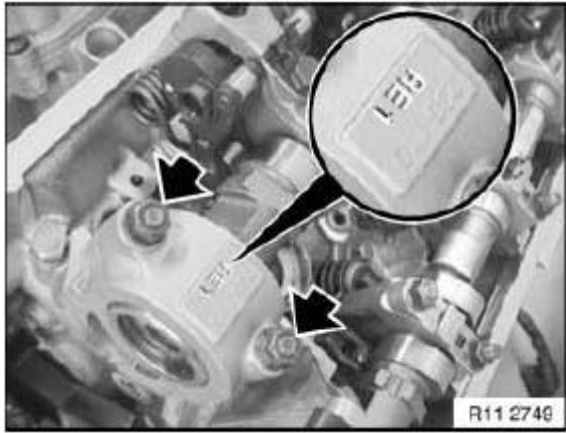
**Fig. 374: Locating Bearing Bracket Nuts**  
 Courtesy of BMW OF NORTH AMERICA, INC.

**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.

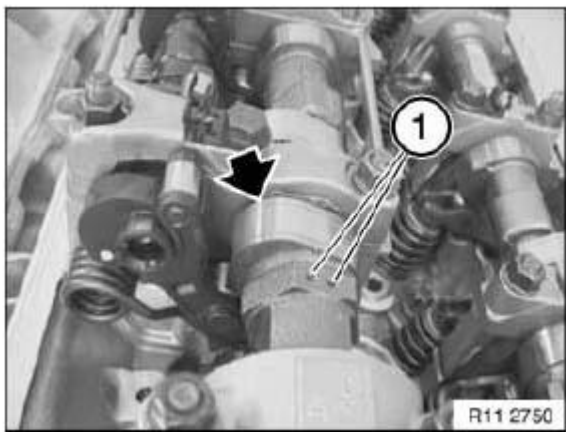
Tightening torque, see **11 31 1AZ** in CAMSHAFT .



**Fig. 375: Identifying Bearing Cap R E1**  
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. 376: Identifying Hexagon Drive Of Inlet 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.

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 . See ENGINE- SPECIAL TOOLS .
- 11 9 473

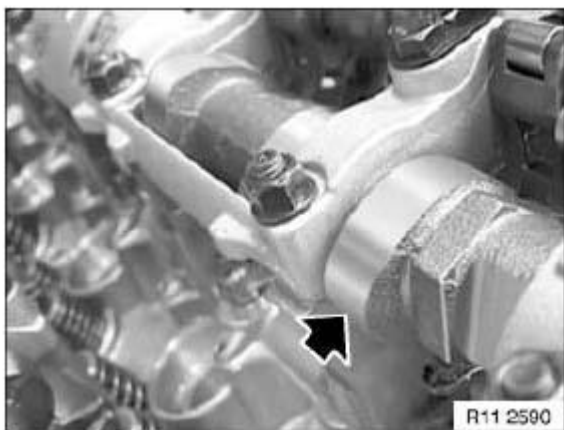
**(cylinder bank 1 to 4)**

*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.



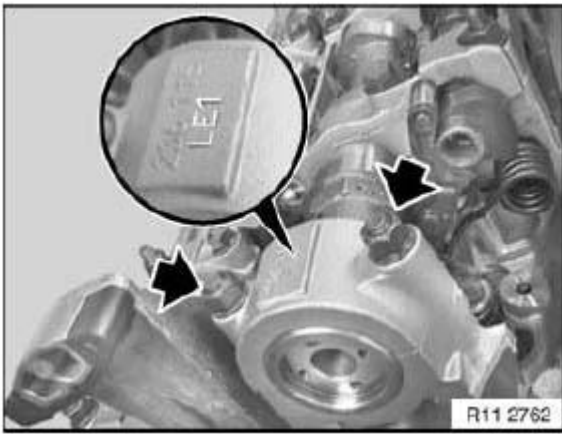
**Fig. 377: Locating Inlet Camshaft Lobe**

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.

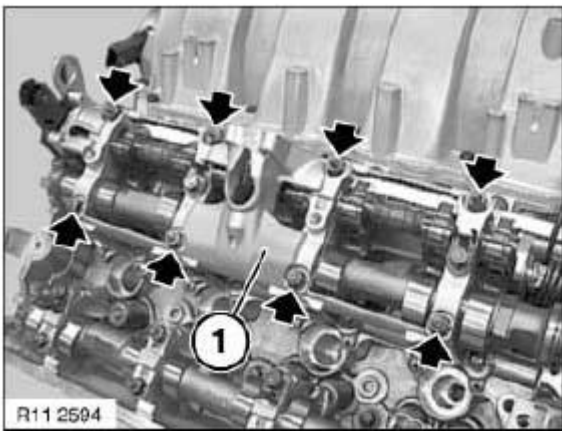
**NOTE:** Bearing caps of inlet camshaft are marked on cylinder bank 1 to 4 with L E1 to L E5 from inlet side.

Release nuts and remove bearing cap L E1.

**Fig. 378: Identifying Bearing Cap L E1**

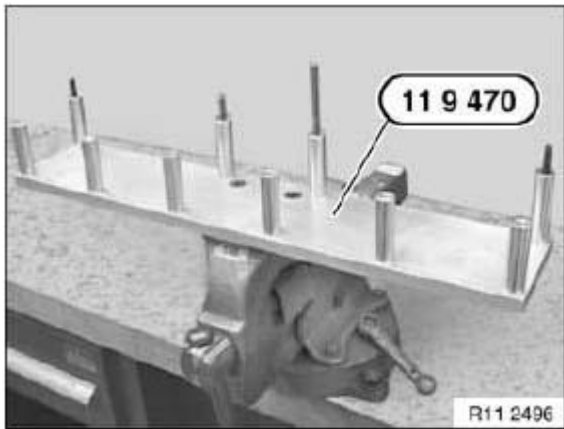
Courtesy of BMW OF NORTH AMERICA, INC.

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

**Fig. 379: Locating Bearing Bracket Nuts**

Courtesy of BMW OF NORTH AMERICA, INC.

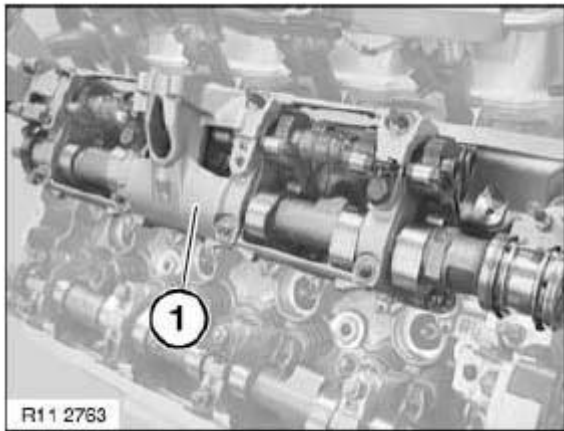
Clamp special tool 11 9 470 as illustrated in a vice.



**Fig. 380: Identifying Special Tool (11 9 470)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Do not tilt bearing bracket (1).**

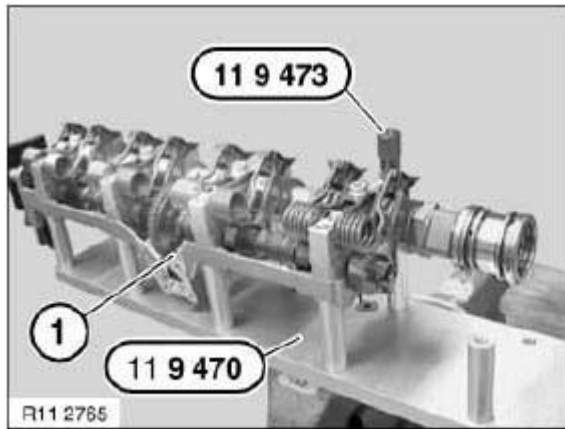
Carefully lift out bearing bracket (1).



**Fig. 381: 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**.

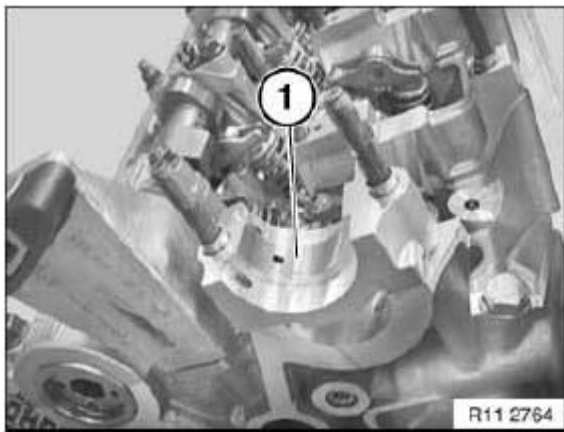
Secure bearing bracket (1) with a nut (special tool **11 9 473** ).



**Fig. 382: Identifying Special Tool (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.

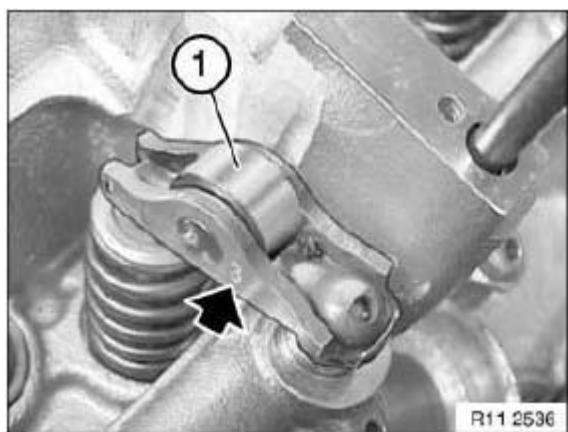


**Fig. 383: Identifying Lower Section Of Bearing Bracket**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

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. 384: Identifying Rocker Arm**

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 = new 2A

1

Old = new 2A

2

Old = new 2B

3

Old = new 2B

4



**Fig. 385: Identifying Rocker Arm Classification**  
 Courtesy of BMW OF NORTH AMERICA, INC.

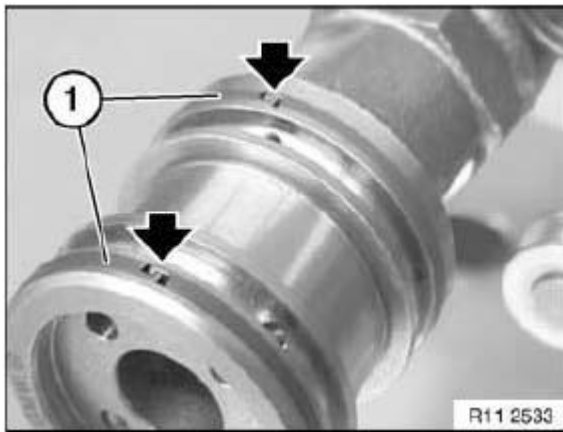
**Installation:**

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.

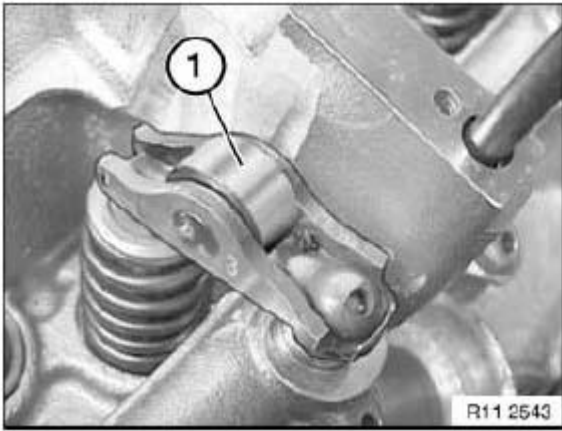


**Fig. 386: Identifying Compression Rings**  
 Courtesy of BMW OF NORTH AMERICA, INC.

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.

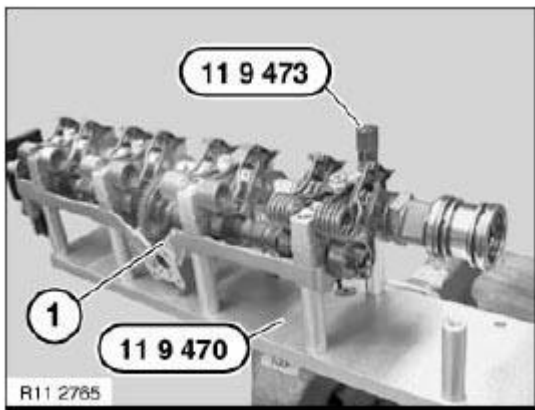


**Fig. 387: Identifying Rocker Arm**

Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 473 .

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



**Fig. 388: Identifying Special Tool (11 9 470) And (11 9 473)**

Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Do not tilt bearing bracket (1).**

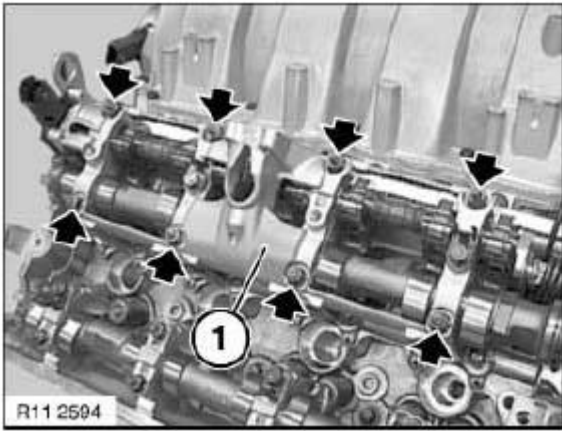
Lower bearing bracket (1) from above and carefully bring into contact with cylinder head.

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, see **11 31 1AZ** in CAMSHAFT .



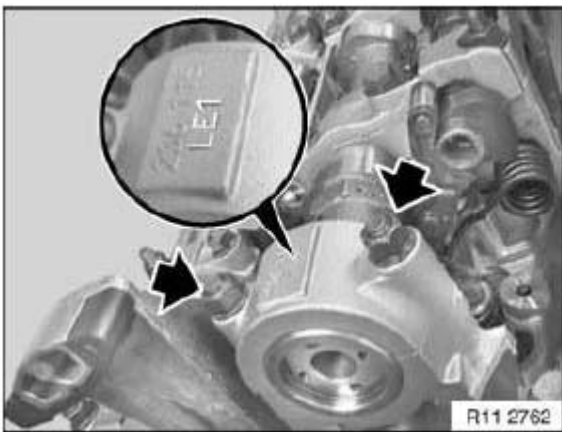
**Fig. 389: Locating Bearing Bracket Nuts**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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, see **11 31 1AZ** in CAMSHAFT .

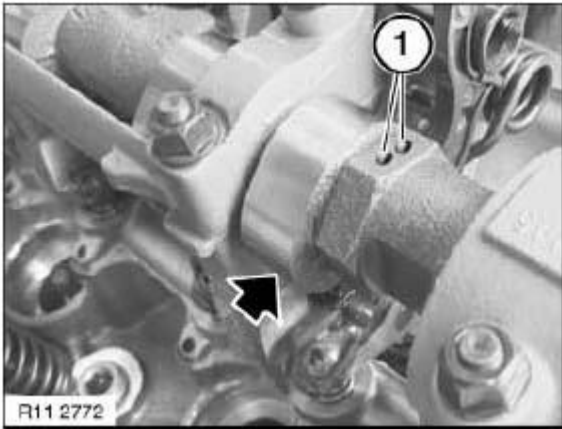


**Fig. 390: Locating Camshaft Bearing Caps**  
Courtesy of BMW OF NORTH AMERICA, INC.

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. 391: Identifying Hexagon Drive Of Inlet Camshaft**  
 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 37 012 REMOVING AND INSTALLING/REPLACING LEFT INTERMEDIATE LEVERS (N62 FROM 9/03 AND N62TU)

**Special tools required:**

- 11 9 470 . See ENGINE- SPECIAL TOOLS .
- 11 9 472
- 11 9 473
- 11 9 474
- 11 9 475
- 11 9 480
- 11 9 490

**(cylinder bank 5 to 8)**

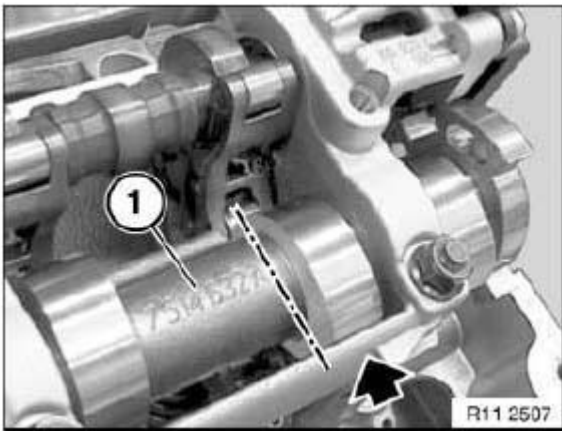
Removal of intermediate levers is described separately from installation.

*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.

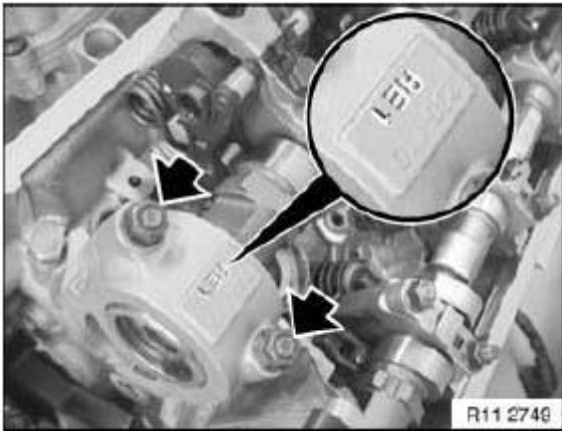


**Fig. 392: Identifying Camshaft Lettering On 8th Cylinder Point**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

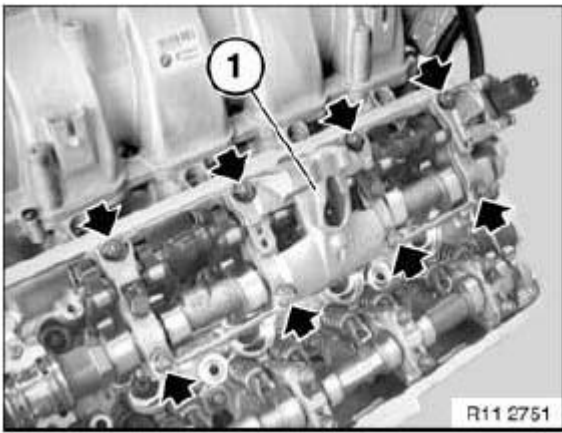
**NOTE:** Bearing caps of inlet camshaft are marked on cylinder bank 5 to 8 with R E1 to R E5 from inlet side.

Release nuts and remove bearing cap R E1.



**Fig. 393: Identifying Nuts And Bearing Cap R E1**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

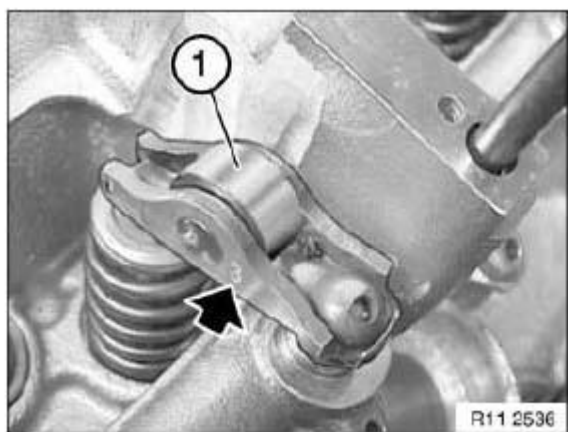


**Fig. 394: Locating Bearing Bracket Nuts**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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. 395: Identifying Rocker Arm**

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.

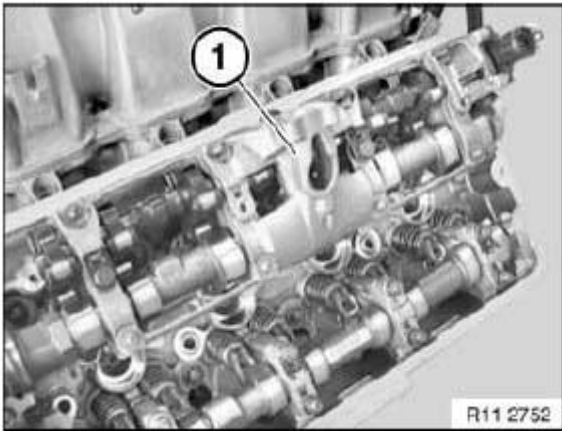


**Fig. 396: Identifying Special Tool (11 9 470)**

Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Do not tilt bearing bracket (1).**

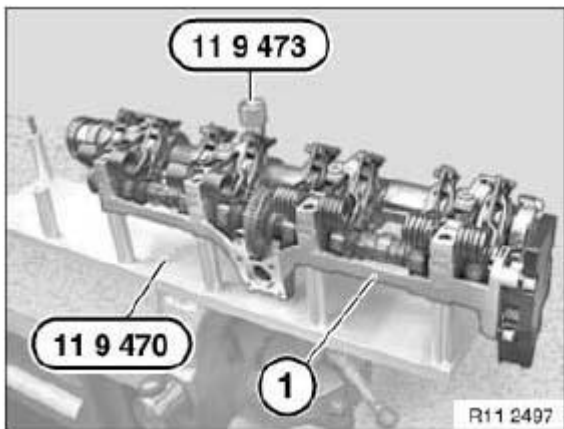
Carefully lift out bearing bracket (1).



**Fig. 397: 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**.

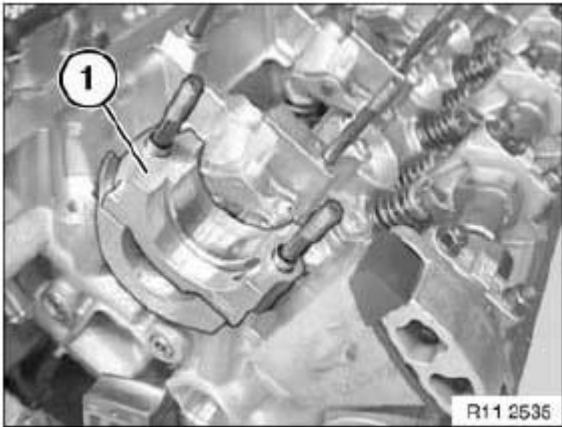
Secure bearing bracket (1) with a nut (special tool **11 9 473** ).



**Fig. 398: Identifying Special Tool (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.

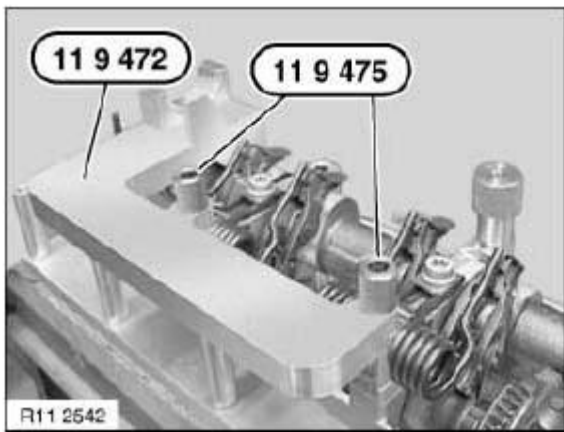


**Fig. 399: Identifying Lower Section Of Bearing Bracket**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** The mounting of the bearing bracket described later can only be carried out if the inlet camshaft has not been axially displaced.

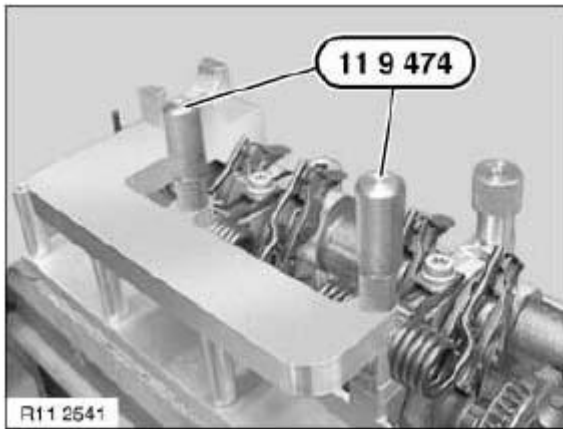
Special tools **11 9 472** and **11 9 475** prevent the inlet camshaft from rotating and moving while the intermediate levers are installed.

Fit special tool **11 9 472** and secure with special tool **11 9 475**.



**Fig. 400: Identifying Special Tool (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.



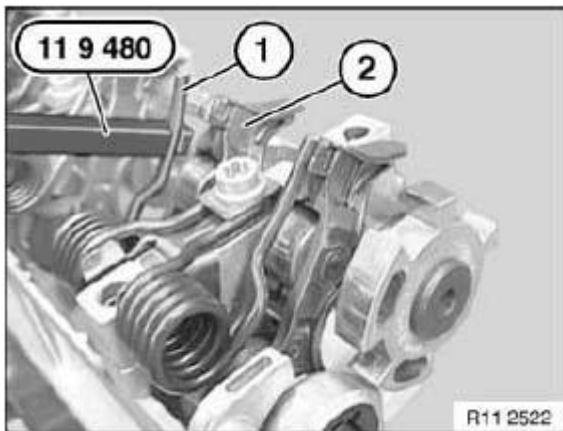
**Fig. 401: Identifying Special Tool (11 9 474)**

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.

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

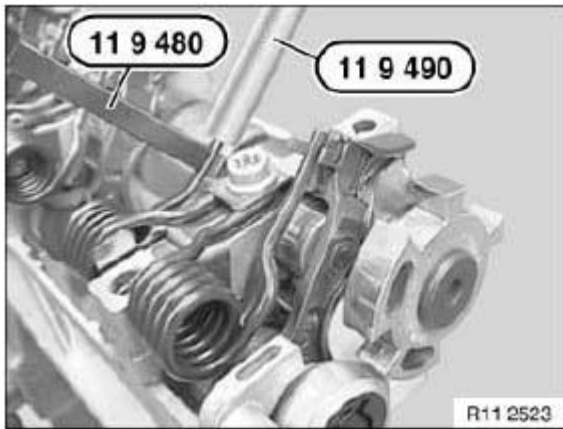


**Fig. 402: Identifying Special Tool (11 9 480) And Torsion Spring**

Courtesy of BMW OF NORTH AMERICA, INC.

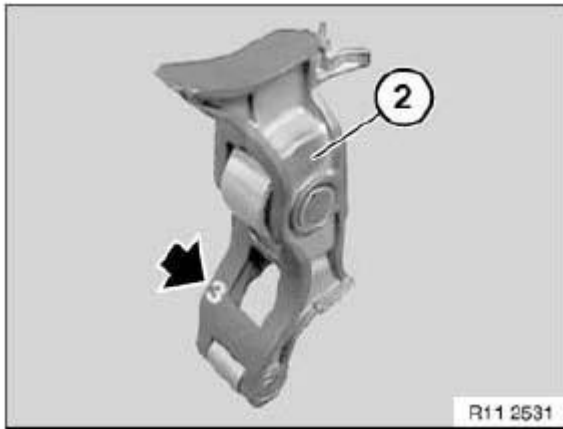
Attach special tool 11 9 490 to end of torsion spring.

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



**Fig. 403: 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.



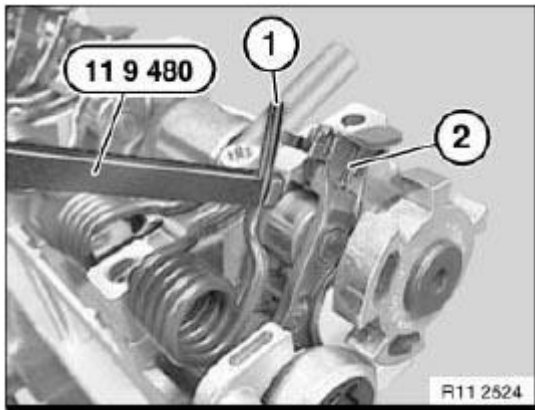
**Fig. 404: Identifying Intermediate Levers**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.

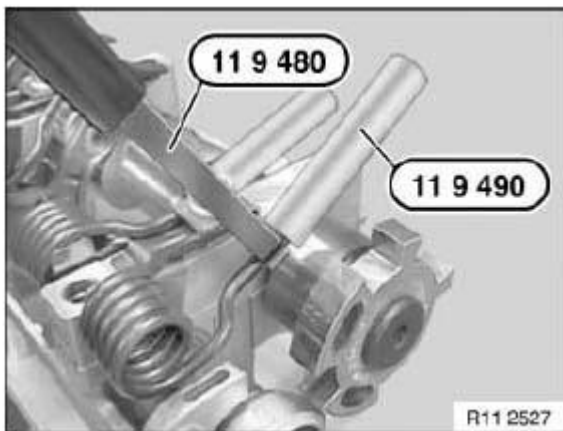
**IMPORTANT:** Keep holding torsion spring (1) with special tool 11 9 480.





**Fig. 405: Identifying 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. 406: Identifying Special Tool (11 9 480) And (11 9 490)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

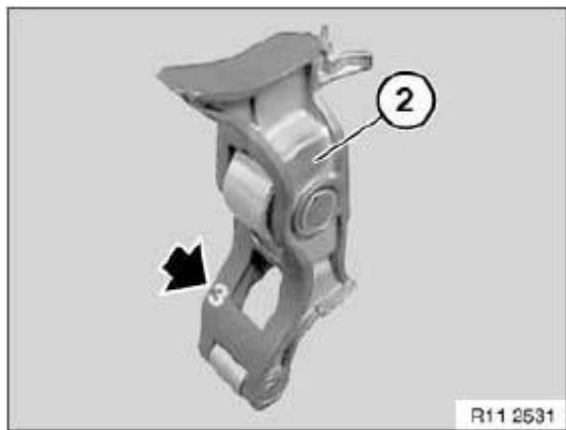
#### **Installation:**

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.

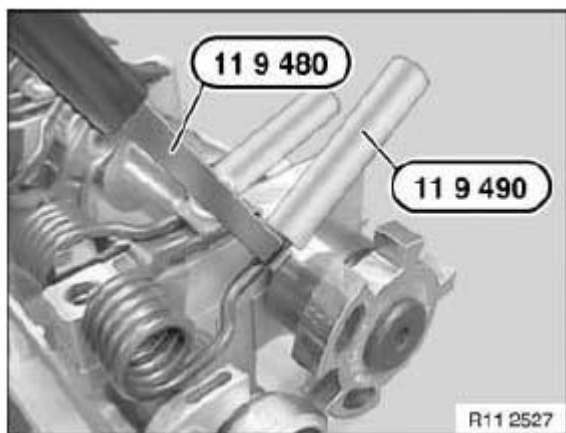
Lubricate all sliding surfaces on intermediate lever (2) with engine oil.



**Fig. 407: Identifying 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.

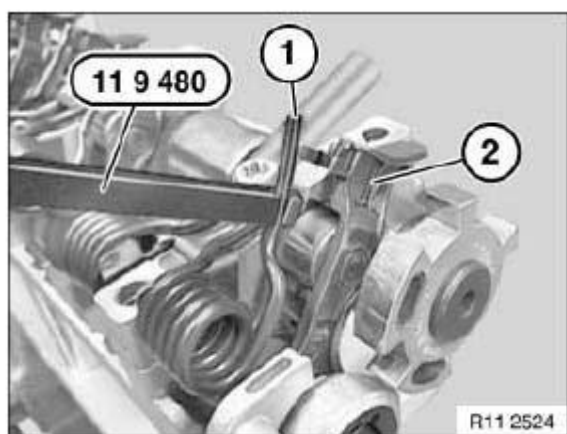


**Fig. 408: Identifying Special Tool (11 9 480) And (11 9 490)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

Install intermediate lever (2) from above.

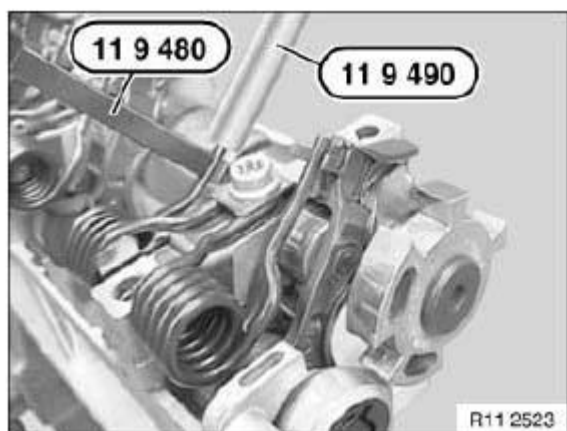
Insert end of torsion spring (1) into guide on intermediate lever (2).



**Fig. 409: Identifying Special Tool (11 9 480) 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**.

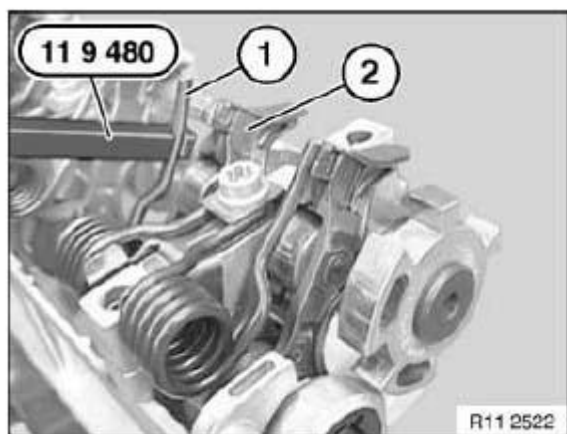


**Fig. 410: Identifying Special Tool (11 9 480) And (11 9 490)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

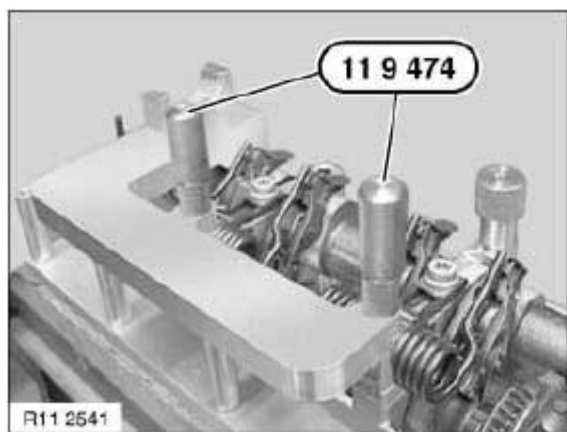
Install intermediate lever (2) from above.

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



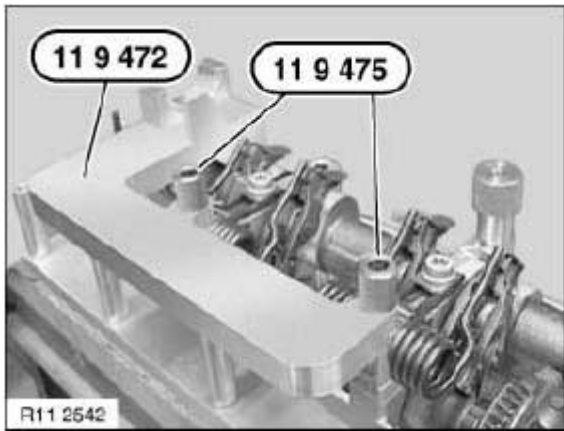
**Fig. 411: Identifying Special Tool (11 9 480) And Torsion Spring**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 474 .



**Fig. 412: Identifying Special Tool (11 9 474)**  
Courtesy of BMW OF NORTH AMERICA, INC.

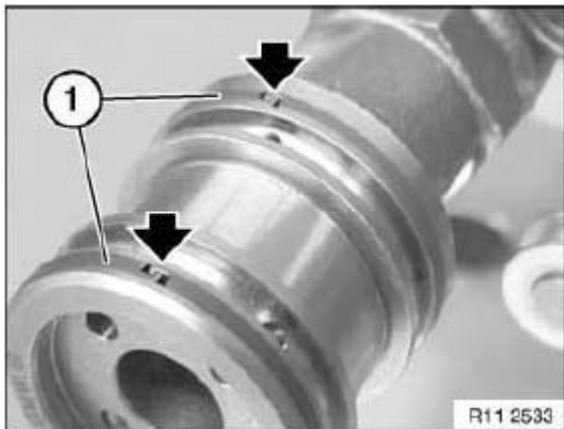
Remove special tools 11 9 472 and special tools 11 9 475 .



**Fig. 413: Identifying Special Tool (11 9 472) And (11 9 475)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Ends of compression rings (1) point upwards.

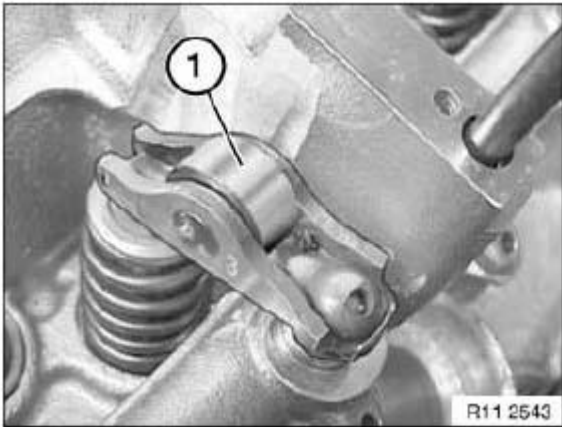
Make sure compression rings (1) are engaged at ends.



**Fig. 414: 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.

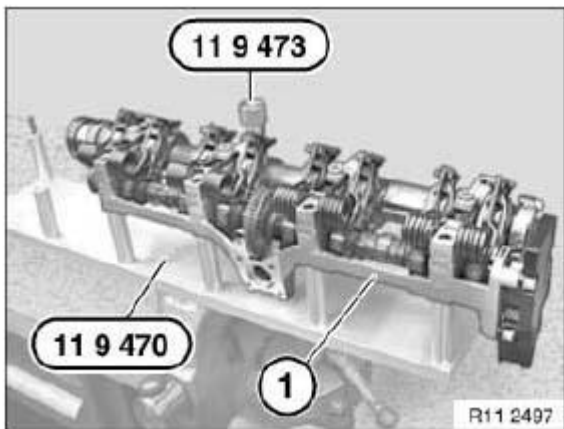


**Fig. 415: Identifying Rocker Arm**

Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 473 .

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



**Fig. 416: Identifying Special Tool (11 9 470) And (11 9 473)**

Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Do not tilt bearing bracket (1).**

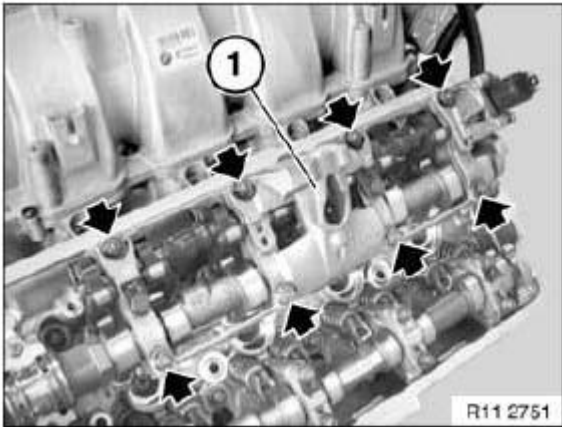
Lower bearing bracket (1) from above and carefully bring into contact with cylinder head.

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, see 11 31 1AZ in CAMSHAFT .



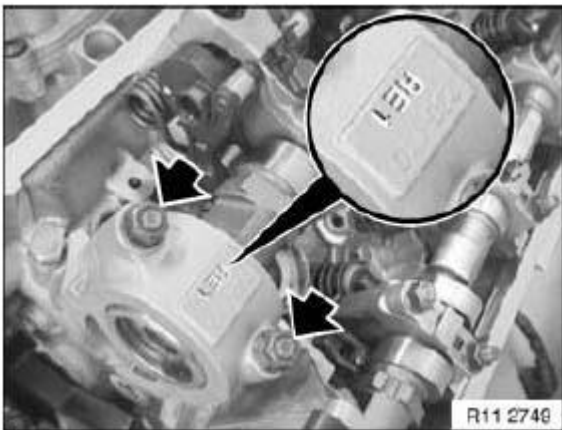
**Fig. 417: Locating Bearing Bracket Nuts**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

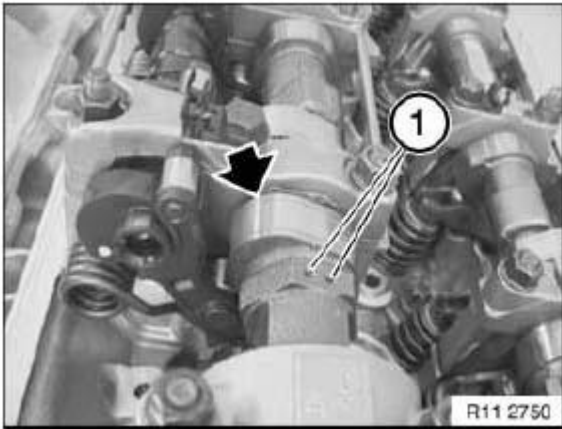
Tightening torque, see 11 31 1AZ in CAMSHAFT .



**Fig. 418: Identifying Nuts And Bearing Cap R E1**  
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. 419: Identifying Hexagon Drive Of Inlet 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.

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 . See ENGINE- SPECIAL TOOLS .
- 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.

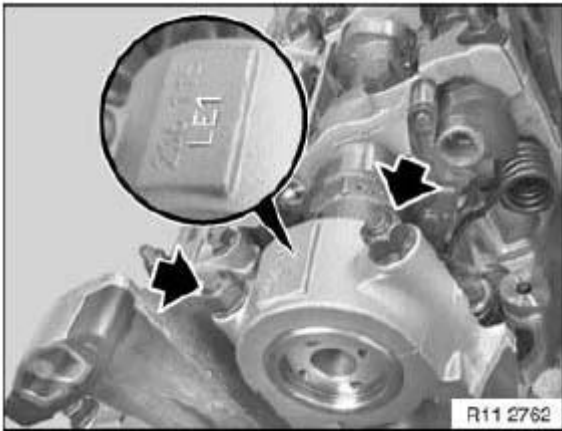


**Fig. 420: Locating Inlet Camshaft Lobe**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

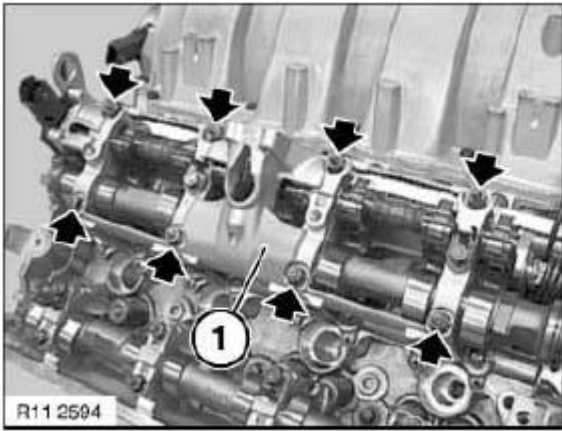
**NOTE:** Bearing caps of inlet camshaft are marked on cylinder bank 1 to 4 with L E1 to L E5 from inlet side.

Release nuts and remove bearing cap L E1.



**Fig. 421: Identifying Bearing Cap L E1**  
Courtesy of BMW OF NORTH AMERICA, INC.

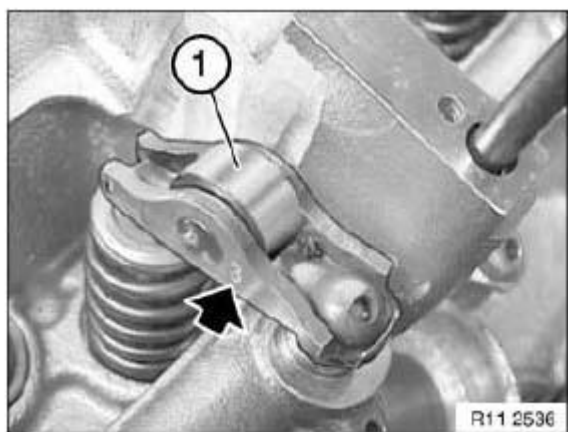
Release 8 nuts of bearing bracket (1) from outside to inside.



**Fig. 422: Locating Bearing Bracket Nuts**  
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. 423: Identifying Rocker Arm**

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.

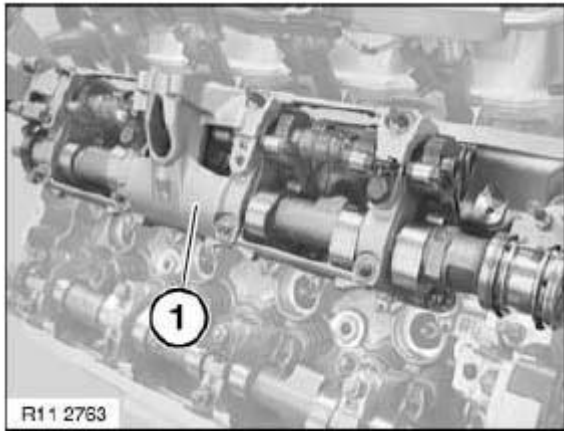


**Fig. 424: Identifying Special Tool (11 9 470)**

Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Do not tilt bearing bracket (1).**

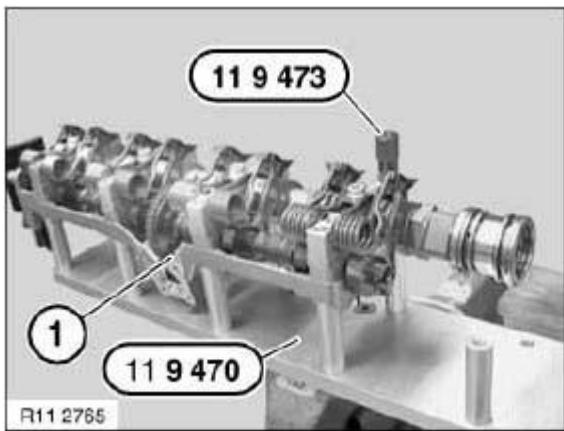
Carefully lift out bearing bracket (1).



**Fig. 425: 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**.

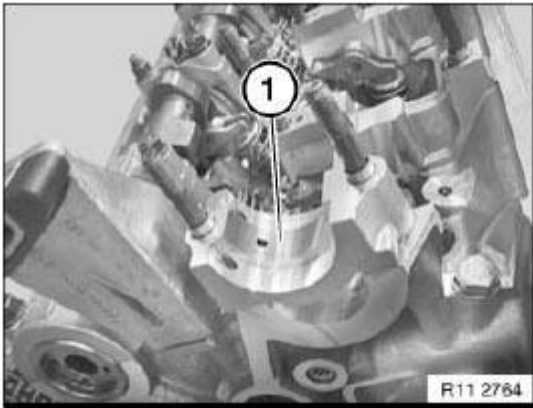
Secure bearing bracket (1) with a nut (special tool **11 9 473** ).



**Fig. 426: Identifying Special Tool (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.

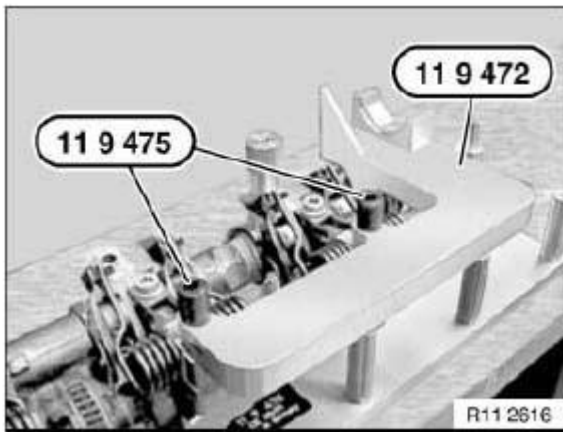


**Fig. 427: Identifying Lower Section Of Bearing Bracket**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** The mounting of the bearing bracket described later can only be carried out if the inlet camshaft has not been axially displaced.

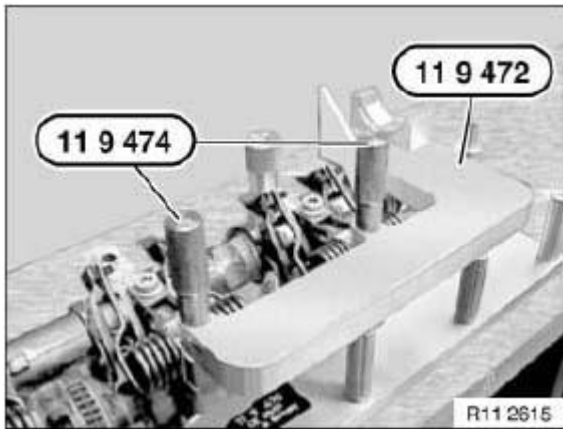
Special tools 11 9 472 and 11 9 475 prevent the inlet camshaft from rotating and moving while the intermediate levers are installed.

Fit special tool 11 9 472 and secure with special tool 11 9 475 .



**Fig. 428: Identifying Special Tools (11 9 472) And (11 9 472)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

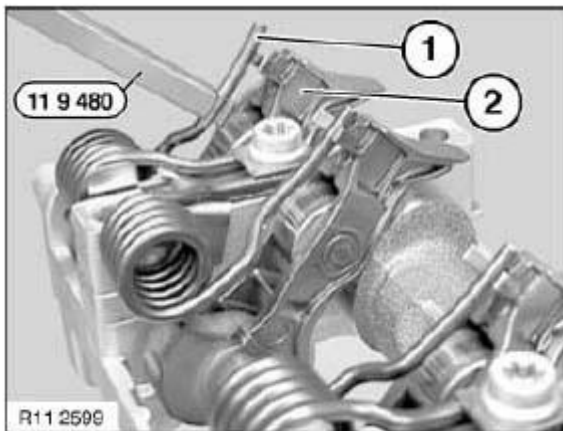


**Fig. 429: Identifying Special Tools (11 9 472) And (11 9 474)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

**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.

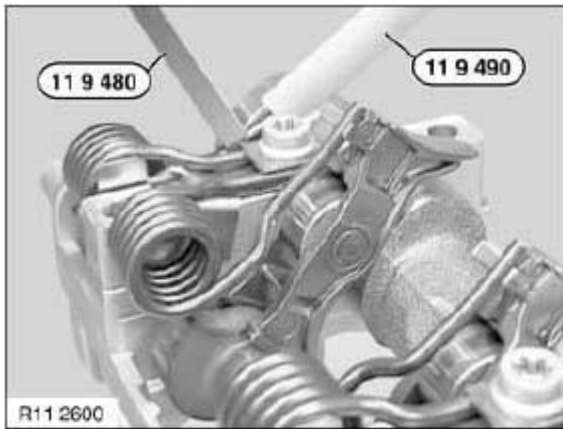
**IMPORTANT:** Keep holding torsion spring (1) with special tool 11 9 480.



**Fig. 430: Identifying Special Tools (11 9 480) And Torsion Spring**  
 Courtesy of BMW OF NORTH AMERICA, INC.

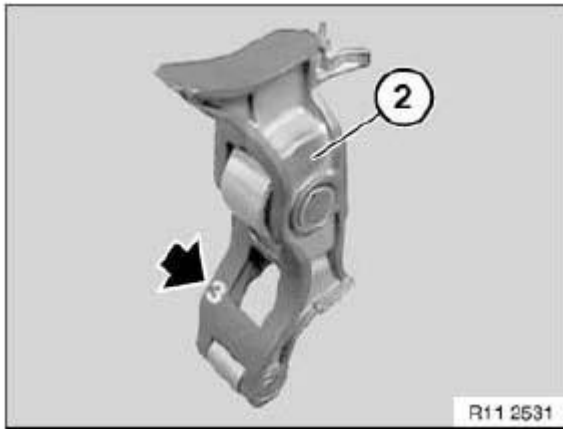
Attach special tool 11 9 490 to end of torsion spring.

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



**Fig. 431: Identifying Special Tools (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.

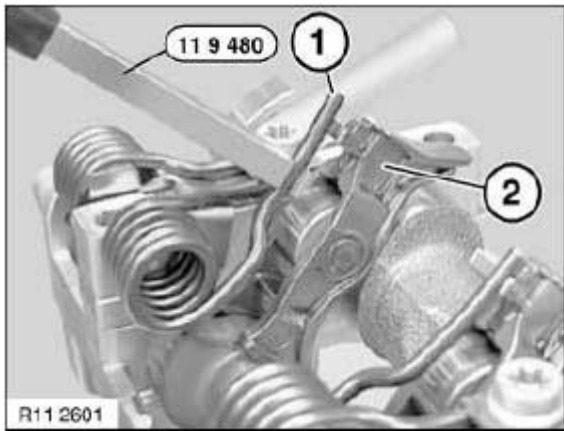


**Fig. 432: Identifying Intermediate Levers**  
 Courtesy of BMW OF NORTH AMERICA, INC.

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.

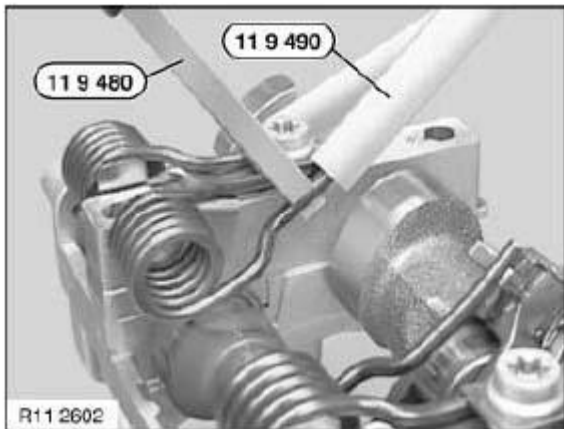
**IMPORTANT:** Keep holding torsion spring (1) with special tool 11 9 480.



**Fig. 433: Identifying 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. 434: 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.

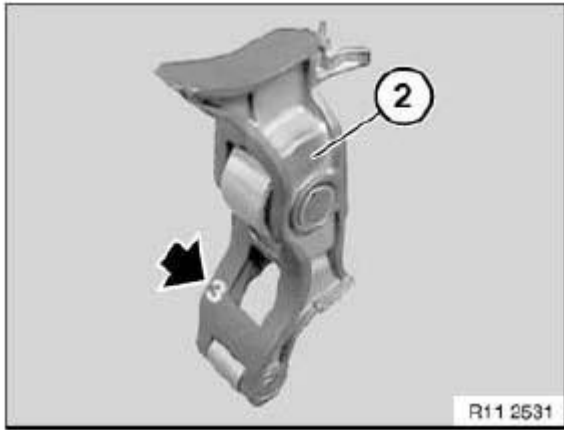
Clean all bearings and cams of inlet camshaft and lubricate with engine oil.

**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.**

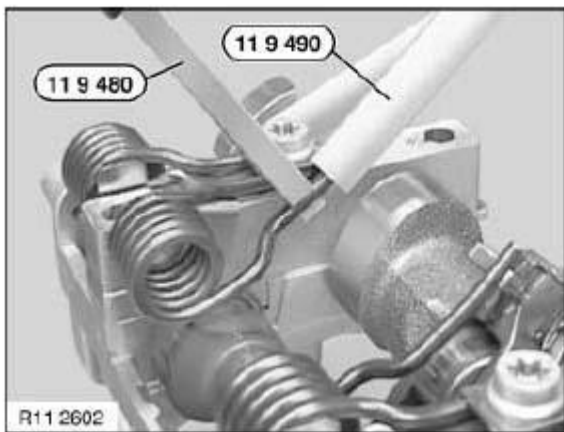
Lubricate all sliding surfaces on intermediate lever (2) with engine oil.



**Fig. 435: Identifying 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.

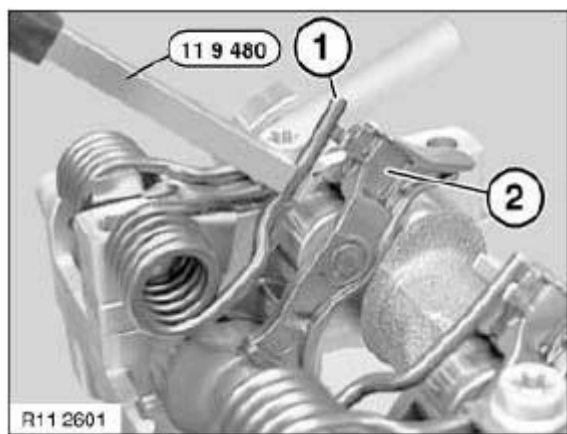


**Fig. 436: Identifying Special Tool (11 9 480) And (11 9 490)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

Install intermediate lever (2) from above.

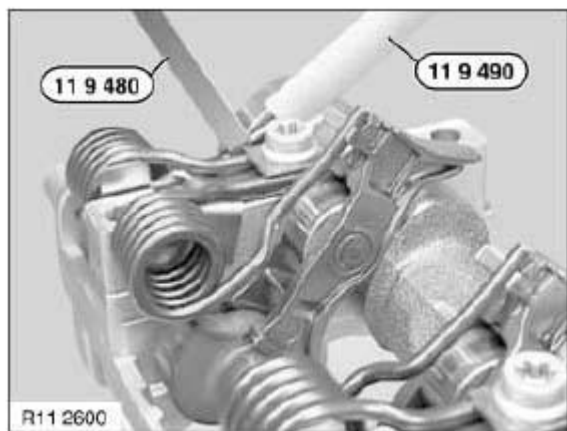
Insert end of torsion spring (1) into guide on intermediate lever (2).



**Fig. 437: Identifying 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**.

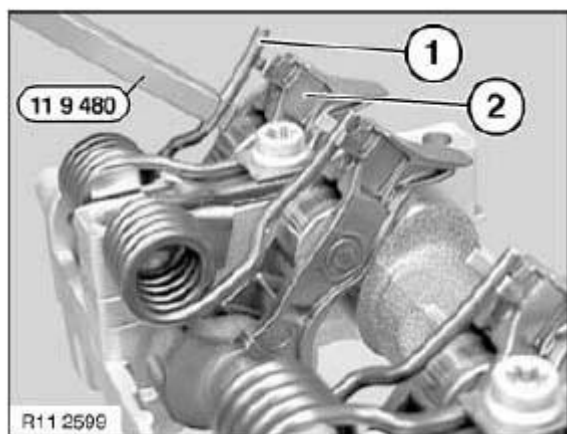


**Fig. 438: Identifying Special Tools (11 9 480) And (11 9 490)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

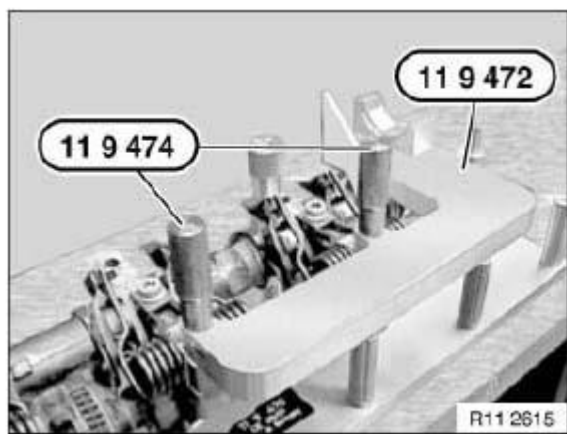
Install intermediate lever (2) from above.

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



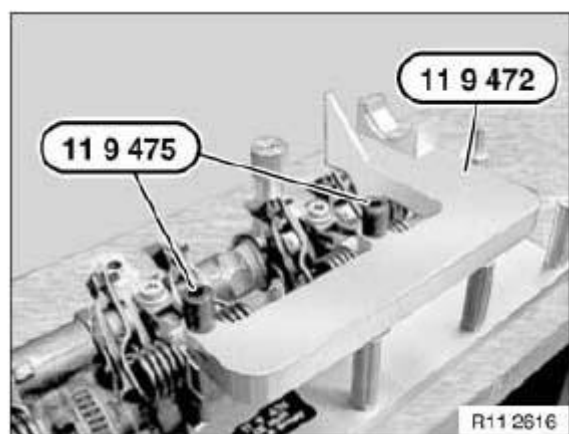
**Fig. 439: Identifying Special Tools (11 9 480) And Torsion Spring**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 474 .



**Fig. 440: Identifying Special Tools (11 9 472) And (11 9 474)**  
Courtesy of BMW OF NORTH AMERICA, INC.

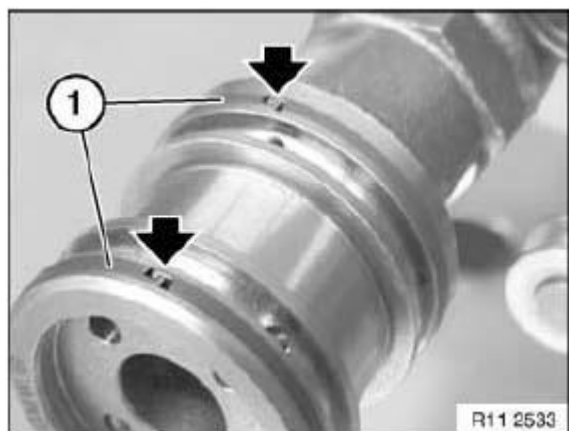
Remove special tools 11 9 472 and special tools 11 9 475 .



**Fig. 441: Identifying Special Tools (11 9 472) And (11 9 472)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Ends of compression rings (1) point upwards.

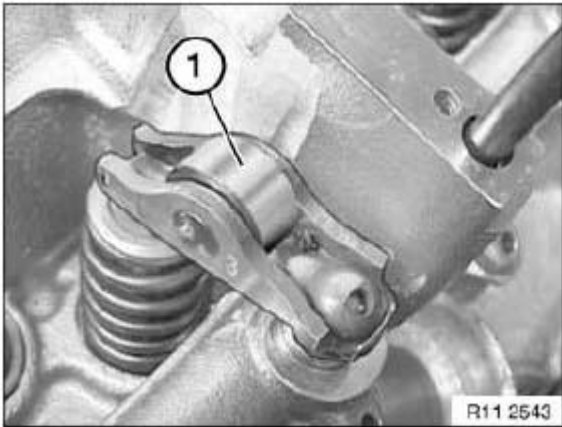
Make sure compression rings (1) are engaged at ends.



**Fig. 442: 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.

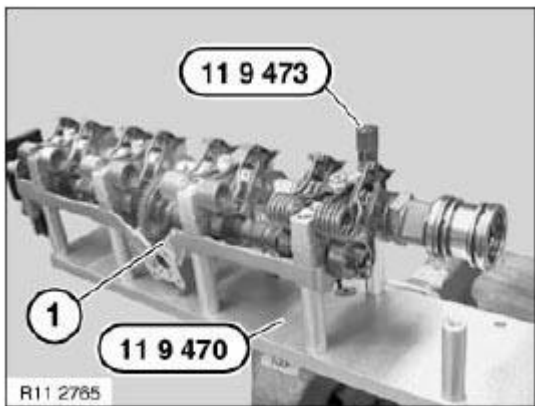


**Fig. 443: Identifying Rocker Arm**

Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 473 .

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



**Fig. 444: Identifying Bearing Bracket And Special Tool (11 9 470)**

Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Do not tilt bearing bracket (1).**

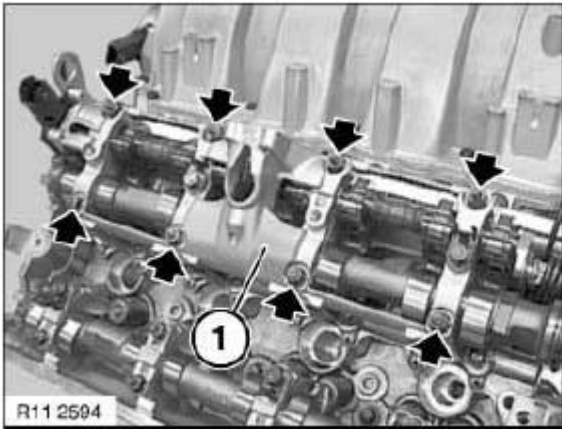
Lower bearing bracket (1) from above and carefully bring into contact with cylinder head.

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, see 11 31 1AZ in CAMSHAFT .



**Fig. 445: Locating Bearing Bracket Nuts**

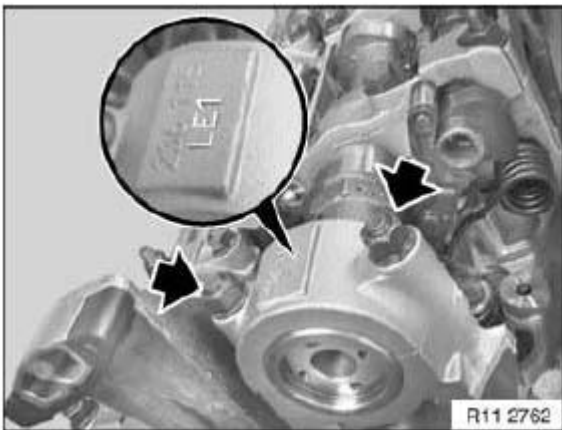
Courtesy of BMW OF NORTH AMERICA, INC.

**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, see 11 31 1AZ in CAMSHAFT .

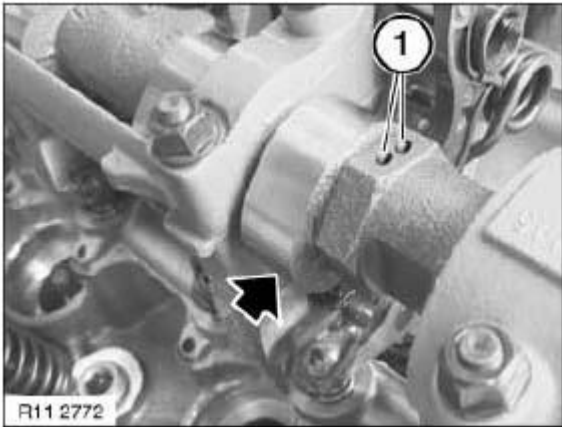


**Fig. 446: Identifying Bearing Cap L E1**

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. 447: Identifying Hexagon Drive Of Inlet Camshaft**  
 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.

## 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 . See ENGINE- SPECIAL TOOLS .
- 11 9 473

(cylinder bank 5 to 8)

Removal of rocker arms is described separately from installation.

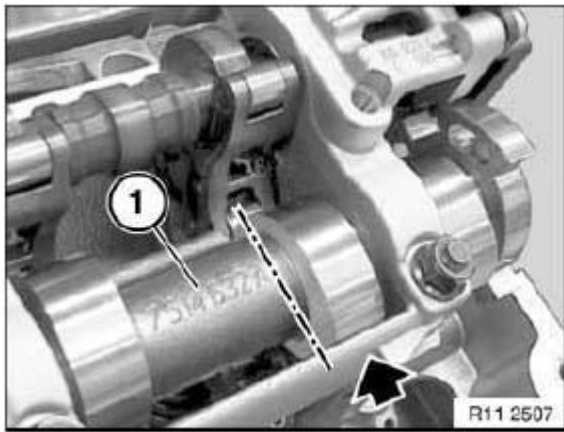
*Necessary preliminary tasks:*

- 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.

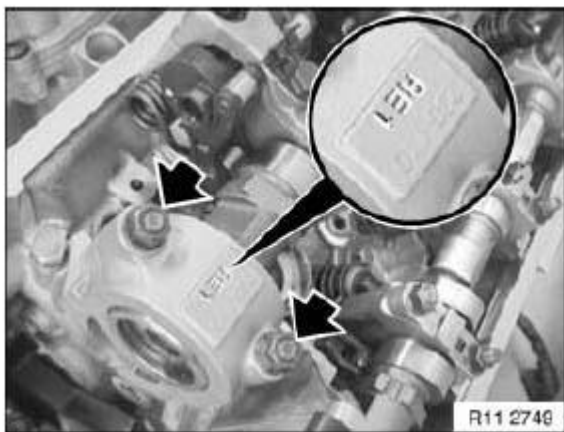


**Fig. 448: Identifying Camshaft Lettering On 8th Cylinder Point**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

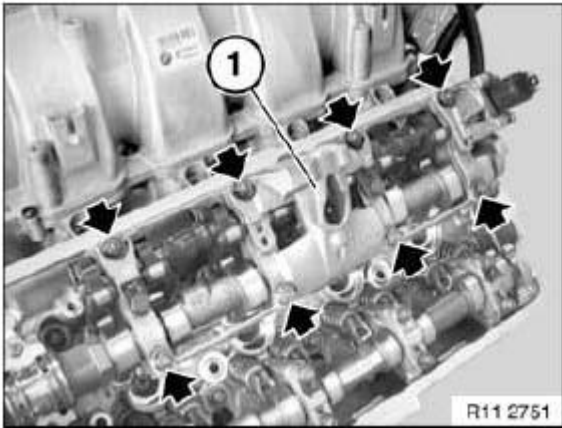
Release nuts and remove bearing cap R E1.





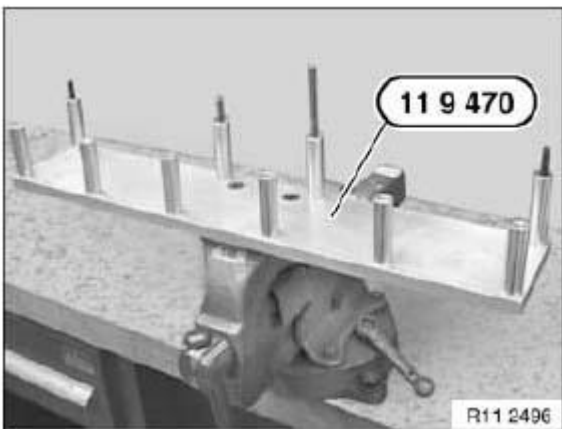
**Fig. 449: Identifying Nuts And Bearing Cap R E1**  
Courtesy of BMW OF NORTH AMERICA, INC.

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



**Fig. 450: Locating Bearing Bracket Nuts**  
Courtesy of BMW OF NORTH AMERICA, INC.

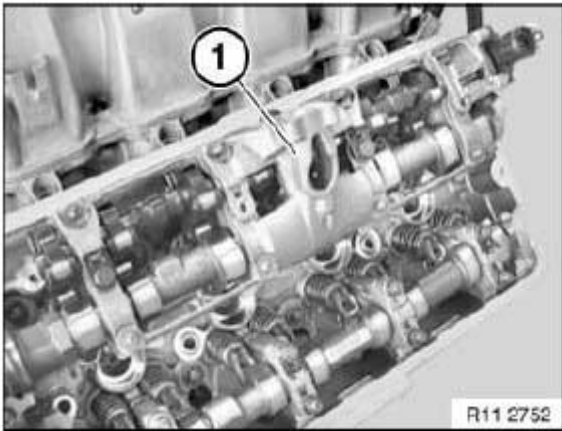
Clamp special tool 11 9 470 as illustrated in a vice.



**Fig. 451: 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).

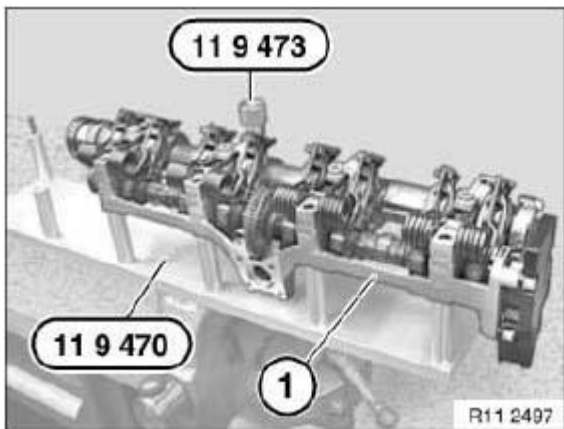


**Fig. 452: Identifying Bearing Bracket**

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** ).

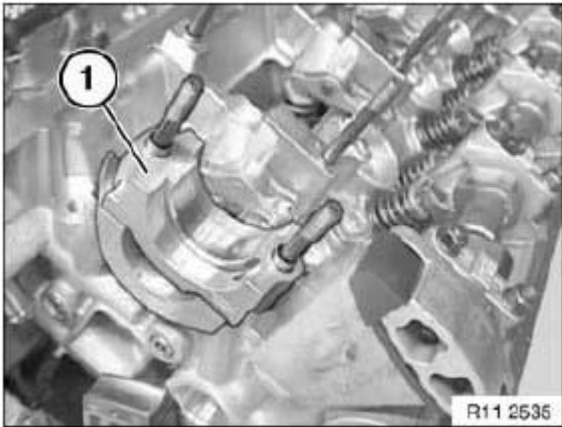


**Fig. 453: Identifying Special Tool (11 9 470) And (11 9 473)**

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.

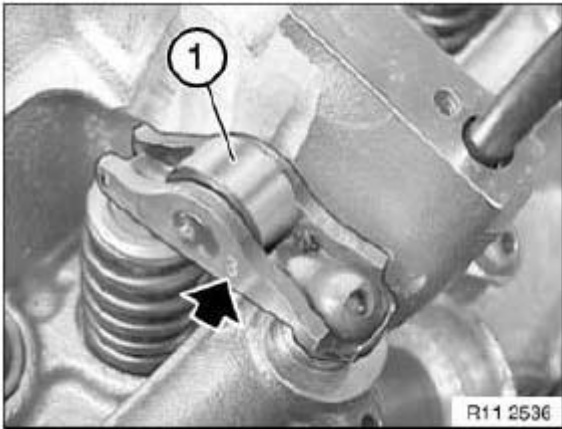
**NOTE:** Lower section of bearing bracket (1) remains on cylinder head.



**Fig. 454: 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. 455: Identifying Rocker Arm**  
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 = new 2A

1

Old = new 2A

2

Old = new 2B

3

Old = new 2B

4



**Fig. 456: Identifying Rocker Arm Classification**  
Courtesy of BMW OF NORTH AMERICA, INC.

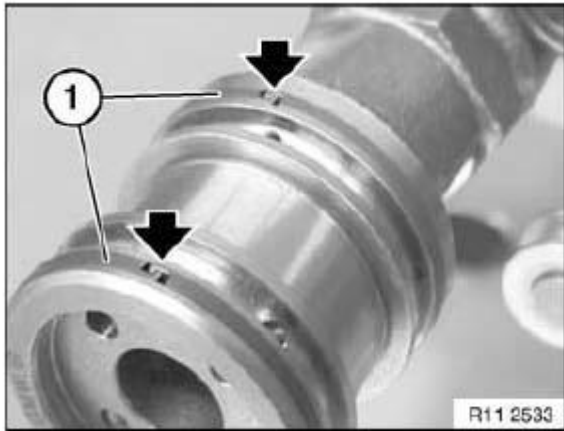
**Installation:**

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.

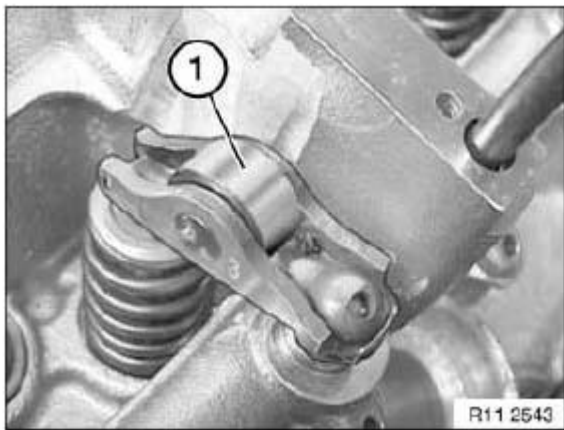


**Fig. 457: Identifying Compression Rings**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.

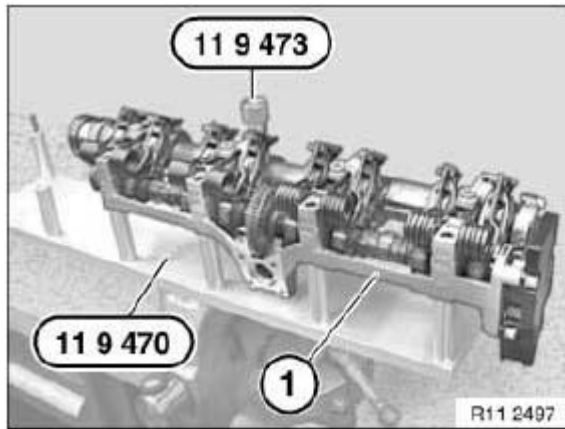
Align rockers (1) straight.



**Fig. 458: Identifying Rocker Arm**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 473 .

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



**Fig. 459: Identifying Special Tool (11 9 470) And (11 9 473)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Do not tilt bearing bracket (1).**

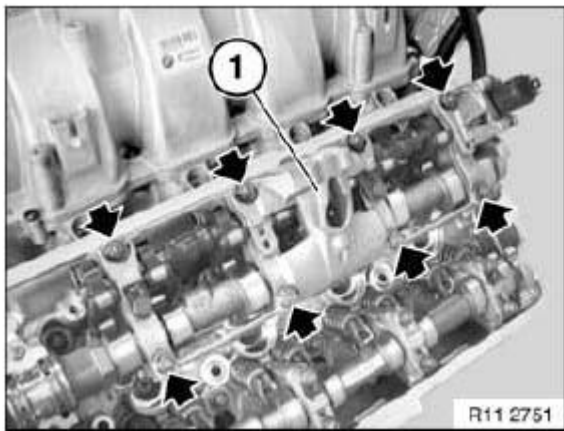
Lower bearing bracket (1) from above and carefully bring into contact with cylinder head.

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, see 11 31 1AZ in CAMSHAFT .



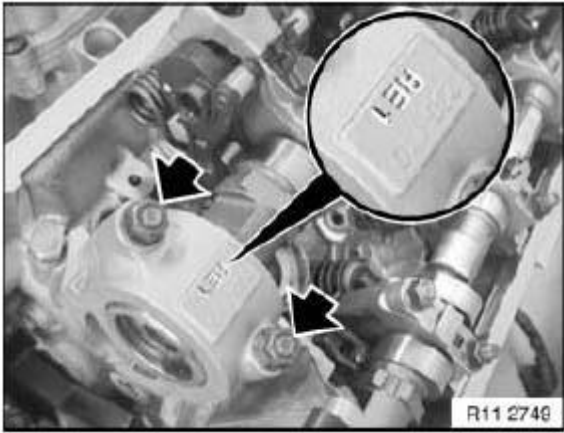
**Fig. 460: Locating Bearing Bracket Nuts**  
 Courtesy of BMW OF NORTH AMERICA, INC.

**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.

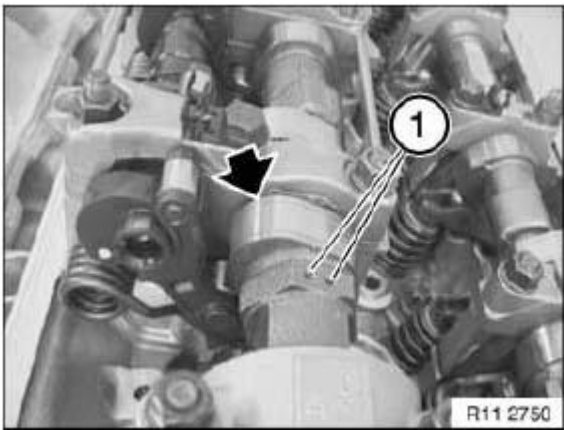
Tightening torque, see **11 31 1AZ** in CAMSHAFT .



**Fig. 461: Identifying Nuts And Bearing Cap R E1**  
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. 462: Identifying Hexagon Drive Of Inlet 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.

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 . See ENGINE- SPECIAL TOOLS .
- 11 9 473

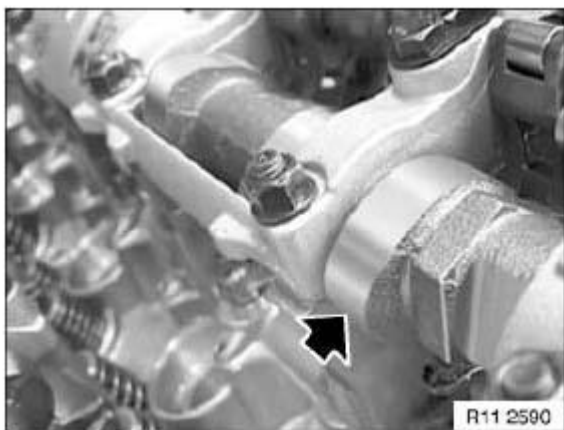
(cylinder bank 1 to 4)

*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.



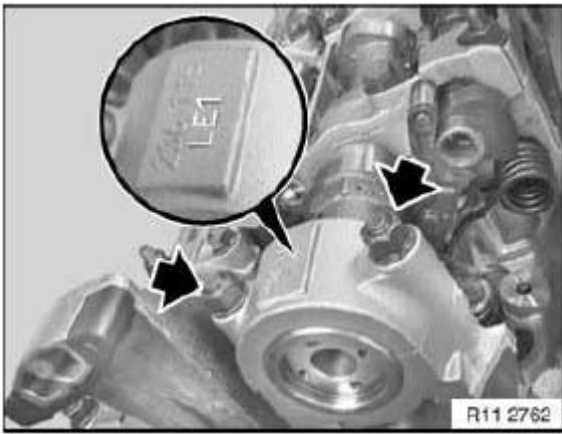


**Fig. 463: Locating Inlet Camshaft Lobe**

Courtesy of BMW OF NORTH AMERICA, INC.

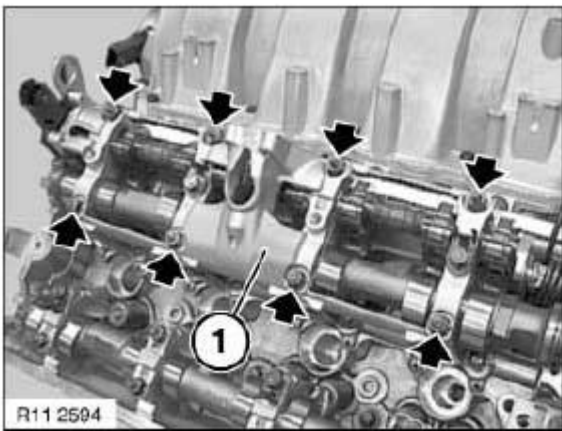
**IMPORTANT:** Camshaft bearing caps of cylinders 1 to 4 and 5 to 8 must not be mixed up.**NOTE:** Bearing caps of inlet camshaft are marked on cylinder bank 1 to 4 with L E1 to L E5 from inlet side.

Release nuts and remove bearing cap L E1.

**Fig. 464: Identifying Bearing Cap L E1**

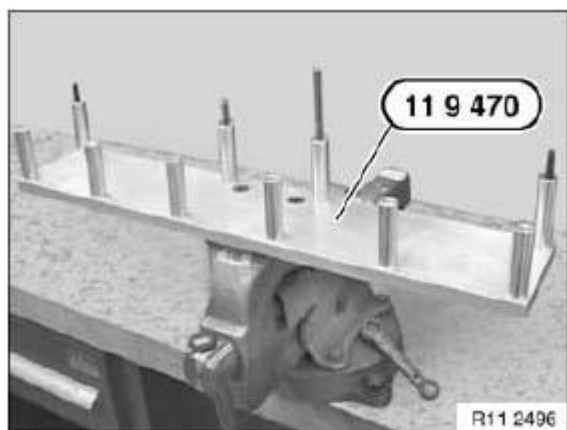
Courtesy of BMW OF NORTH AMERICA, INC.

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

**Fig. 465: Locating Bearing Bracket Nuts**

Courtesy of BMW OF NORTH AMERICA, INC.

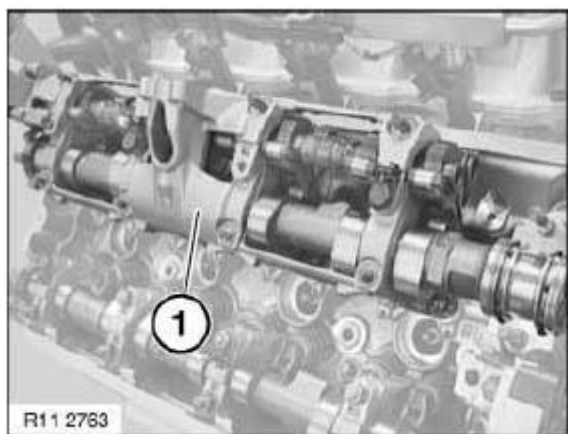
Clamp special tool 11 9 470 as illustrated in a vice.



**Fig. 466: Identifying Special Tool (11 9 470)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Do not tilt bearing bracket (1).**

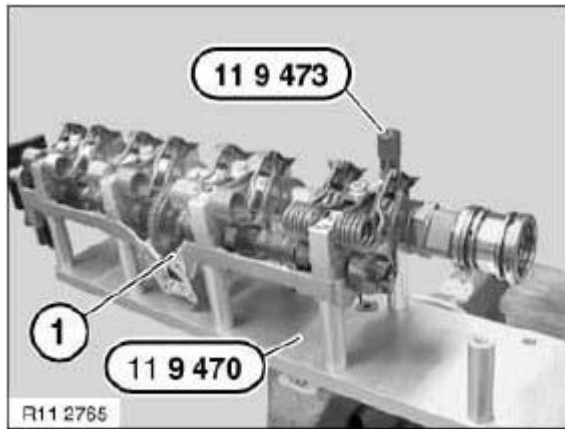
Carefully lift out bearing bracket (1).



**Fig. 467: 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**.

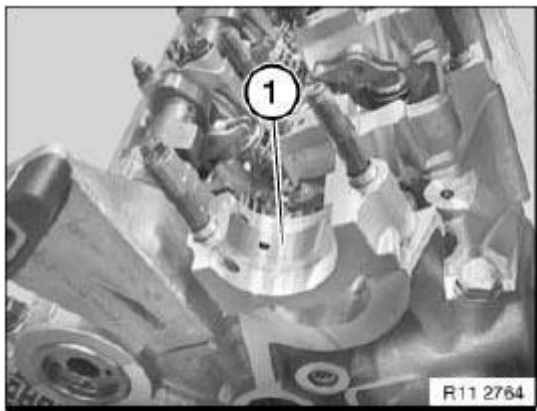
Secure bearing bracket (1) with a nut (special tool **11 9 473** ).



**Fig. 468: Identifying Special Tool (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.

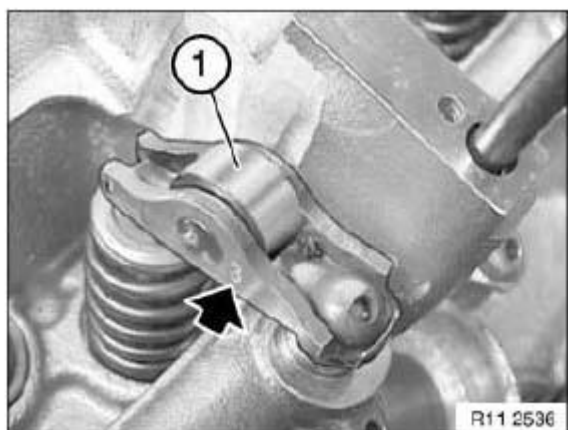


**Fig. 469: Identifying Lower Section Of Bearing Bracket**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

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. 470: Identifying Rocker Arm**

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 = new 2A

1

Old = new 2A

2

Old = new 2B

3

Old = new 2B

4



**Fig. 471: Identifying Rocker Arm Classification**  
Courtesy of BMW OF NORTH AMERICA, INC.

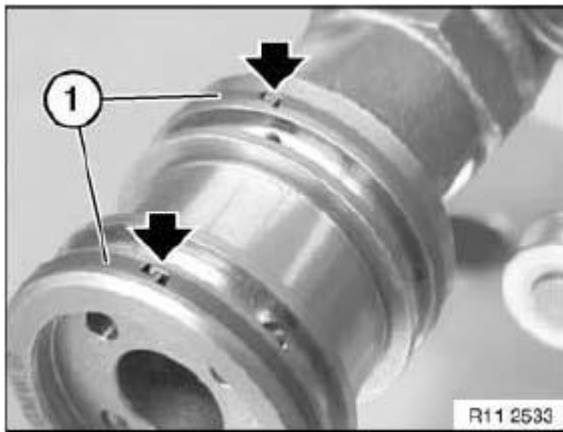
**Installation:**

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.

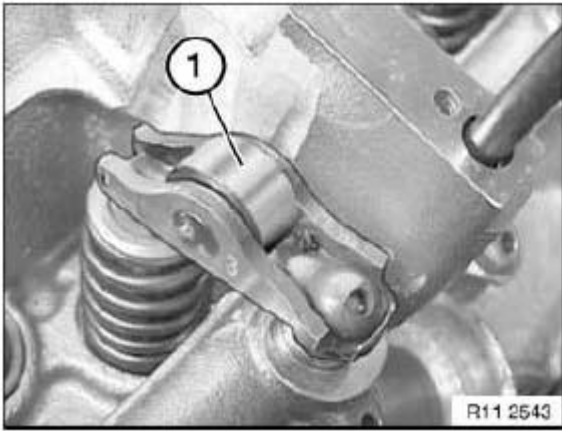


**Fig. 472: Identifying Compression Rings**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.

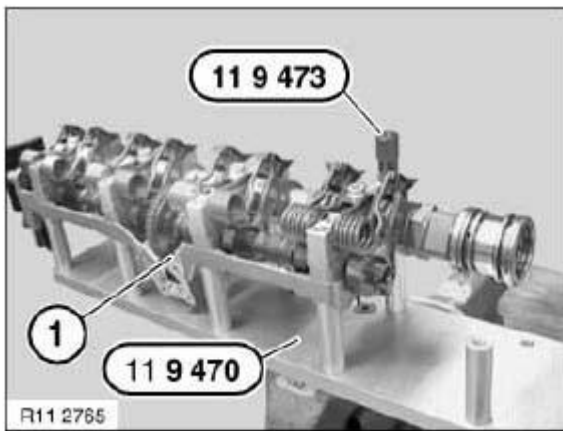


**Fig. 473: Identifying Rocker Arm**

Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 473 .

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



**Fig. 474: Identifying Special Tool (11 9 470) And (11 9 473)**

Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Do not tilt bearing bracket (1).**

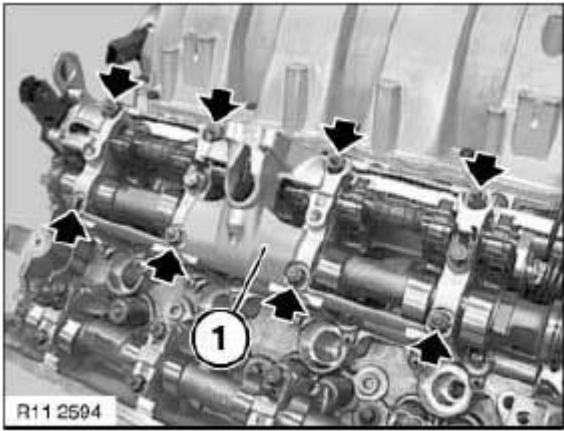
Lower bearing bracket (1) from above and carefully bring into contact with cylinder head.

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, see **11 31 1AZ** in CAMSHAFT .



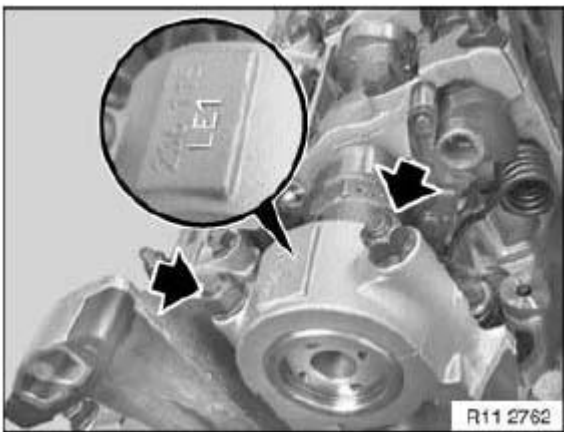
**Fig. 475: Locating Bearing Bracket Nuts**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

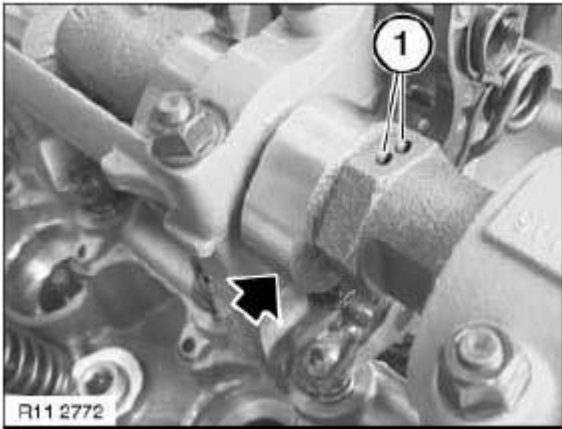
Tightening torque, see **11 31 1AZ** in CAMSHAFT .



**Fig. 476: Identifying Bearing Cap L E1**  
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. 477: Identifying Hexagon Drive Of Inlet Camshaft**  
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.

## 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.

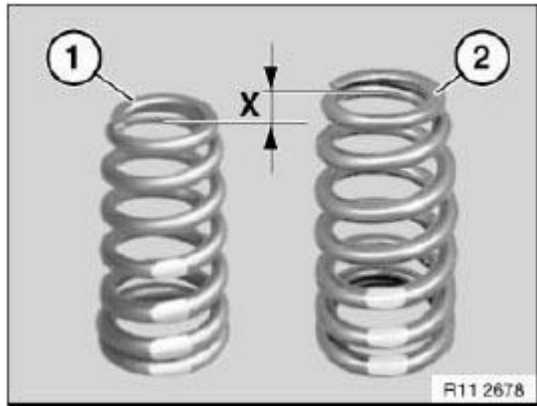


**IMPORTANT:** Incorrect installation possible.

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. 478: Identifying Valve Springs Of Inlet Valves And Exhaust Valves**  
Courtesy of BMW OF NORTH AMERICA, INC.

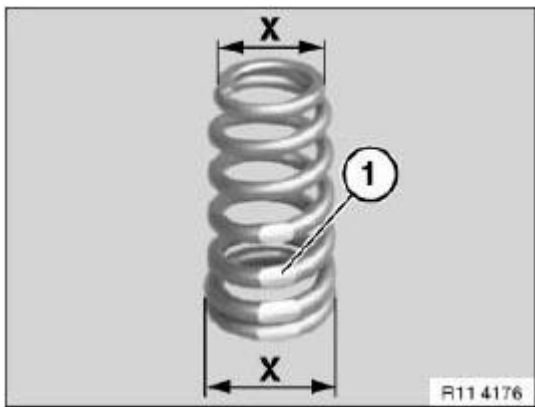
**IMPORTANT:** Incorrect installation possible.

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.

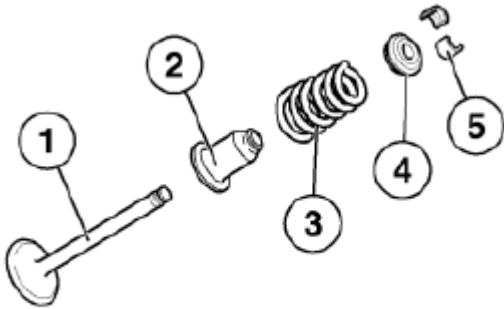
Install valve spring so that larger diameter points to spring plate at bottom.



**Fig. 479: Identifying Color Marking On Valve Spring**  
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement:

1. Valve
2. Valve stem seal with spring plate, bottom
3. Valve spring
4. Top plate spring
5. Valve tapers



R11 4170

**Fig. 480: Identifying Valve Components**  
Courtesy of BMW OF NORTH AMERICA, INC.

## 11 34 560 REPLACING ALL VALVE STEM SEALS (N62)

**Special tools required:**

- 11 1 380 . See **ENGINE- SPECIAL TOOLS** .
- 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** .



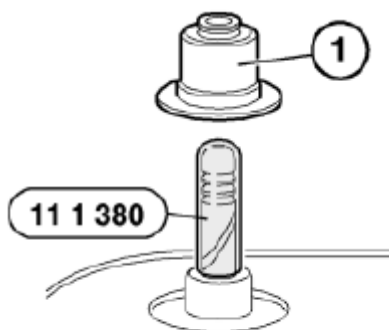
**Fig. 481: Identifying Special Tool (11 6 370) On Valve Stem Seal**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Lubricate valve stem with oil and insert valve.

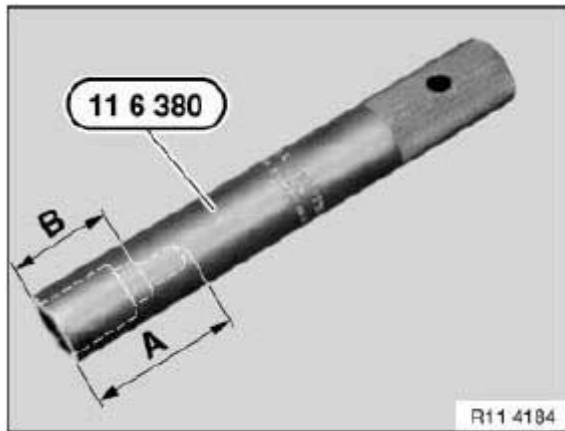
Fit special tool **11 1 380**.

Coat new valve stem seal (1) with oil and install.



**Fig. 482: Identifying Valve Stem Seal And Special Tool (11 1 380)**  
Courtesy of BMW OF NORTH AMERICA, INC.

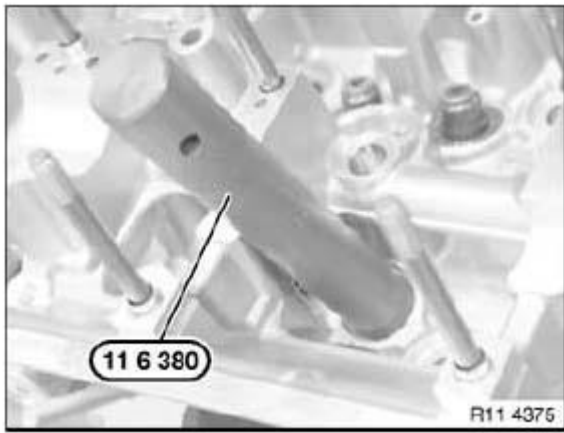
**NOTE:** For use on the N62 engine, special tool 11 6 380 must be remachined in accordance with the illustration with a 6.2 mm dia. drill bit to a depth of A = approx. 45 mm.  
This modification has already been taken into account for reordering.



**Fig. 483: 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. 484: Identifying Special Tool (11 6 380) On Valve Stem Seal**

Courtesy of BMW OF NORTH AMERICA, INC.

## 11 34 715 REPLACING ALL VALVE SPRINGS (N62)

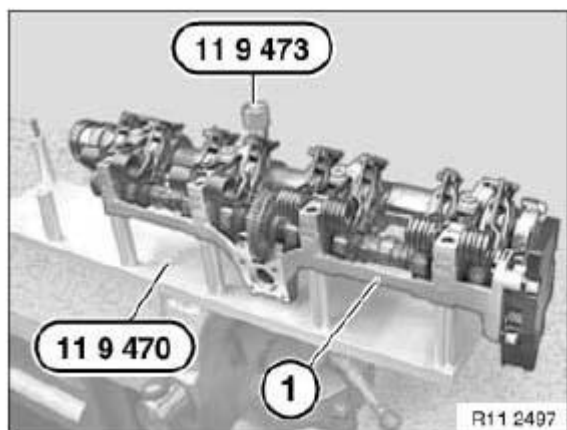
### Special tools required:

- **11 0 346** . See ENGINE- SPECIAL TOOLS .
- **11 9 470**

(cylinder head removed)

Preliminary tasks are described in **Disassembling and assembling cylinder head**.

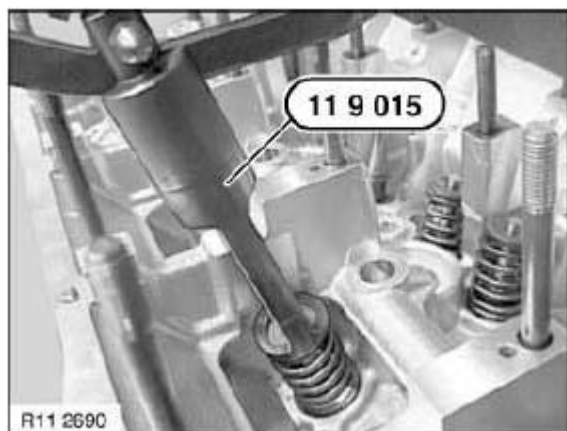
Remove bearing bracket (1) with inlet camshaft and stow in special tool **11 9 470**. The procedure is described in the section **Removing and installing inlet camshaft** .



**Fig. 485: Identifying Special Tool (11 9 470) And (11 9 473)**  
Courtesy of BMW OF NORTH AMERICA, INC.

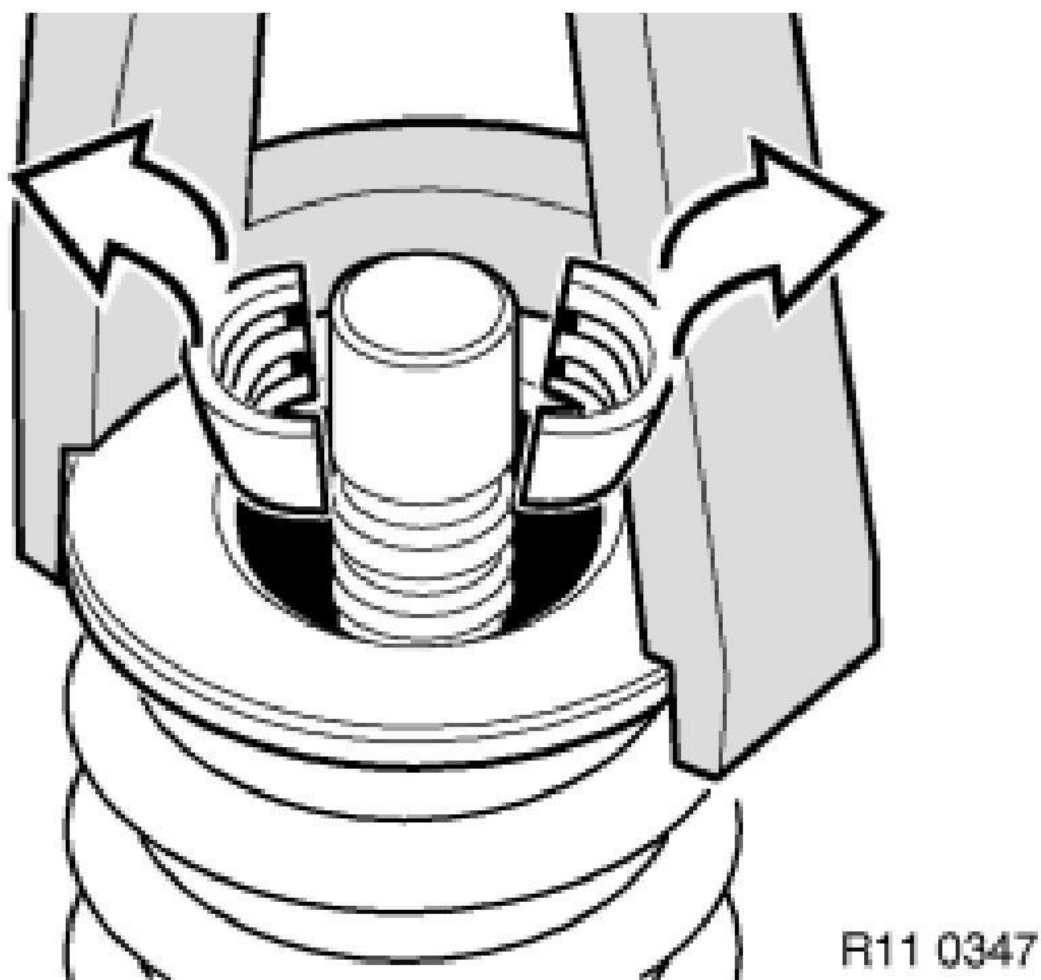
Remove exhaust camshaft.

Align special tool **11 0 346** in direction of valve shaft.



**Fig. 486: Identifying Special Tool (11 0 346) On Valve Shaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

Press down valve spring on spring cap, top, and remove valve keys.



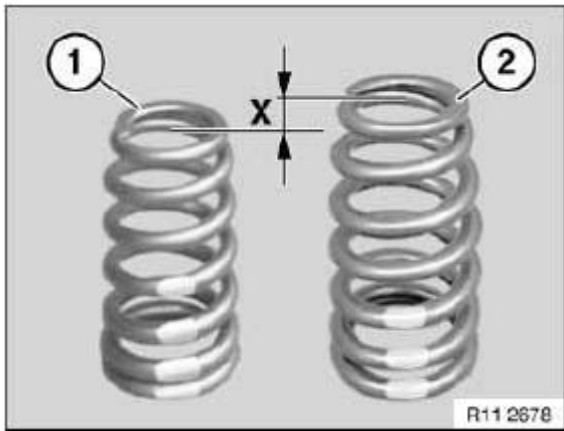
R11 0347

**Fig. 487: Removing Valve Keys**

Courtesy of BMW OF NORTH AMERICA, INC.

**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.



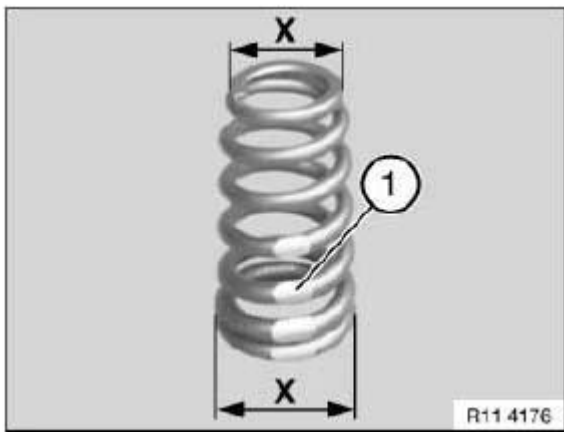
**Fig. 488: Identifying Valve Springs Of Inlet Valves And Exhaust Valves**  
Courtesy of BMW OF NORTH AMERICA, INC.

- 1) Valve springs of inlet valves
- 2) Valve springs of exhaust valves

**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.**

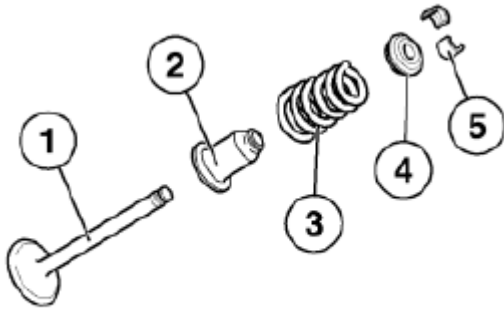


**Fig. 489: Identifying Color Coding On Lower End Of Valve Spring**  
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement:

1. Valve
2. Valve stem seal with spring plate, bottom

3. Valve spring
4. Top plate spring
5. Valve tapers



R11 4170

**Fig. 490: Identifying Valve Components**  
Courtesy of BMW OF NORTH AMERICA, INC.

### 11 34 715 REPLACING ALL VALVE SPRINGS (N62TU)

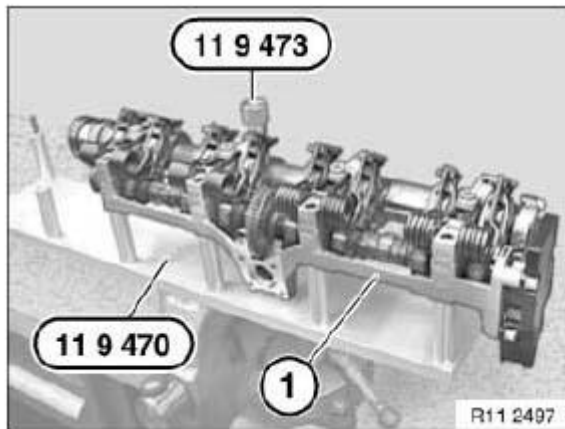
#### Special tools required:

- 11 0 346 . See ENGINE- SPECIAL TOOLS .
- 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. The procedure is described in the section **Removing and installing inlet camshaft** .



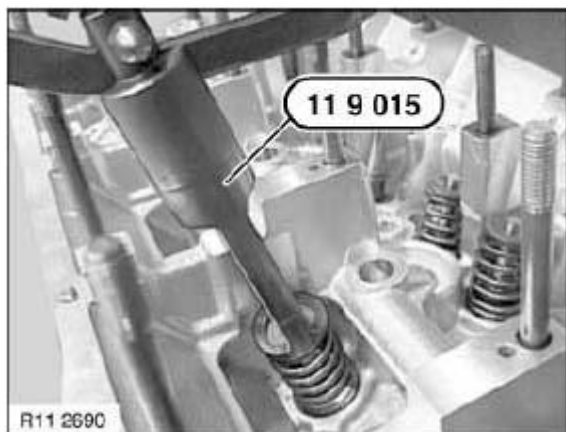
**Fig. 491: Identifying Special Tool (11 9 470) And (11 9 473)**



**Courtesy of BMW OF NORTH AMERICA, INC.**

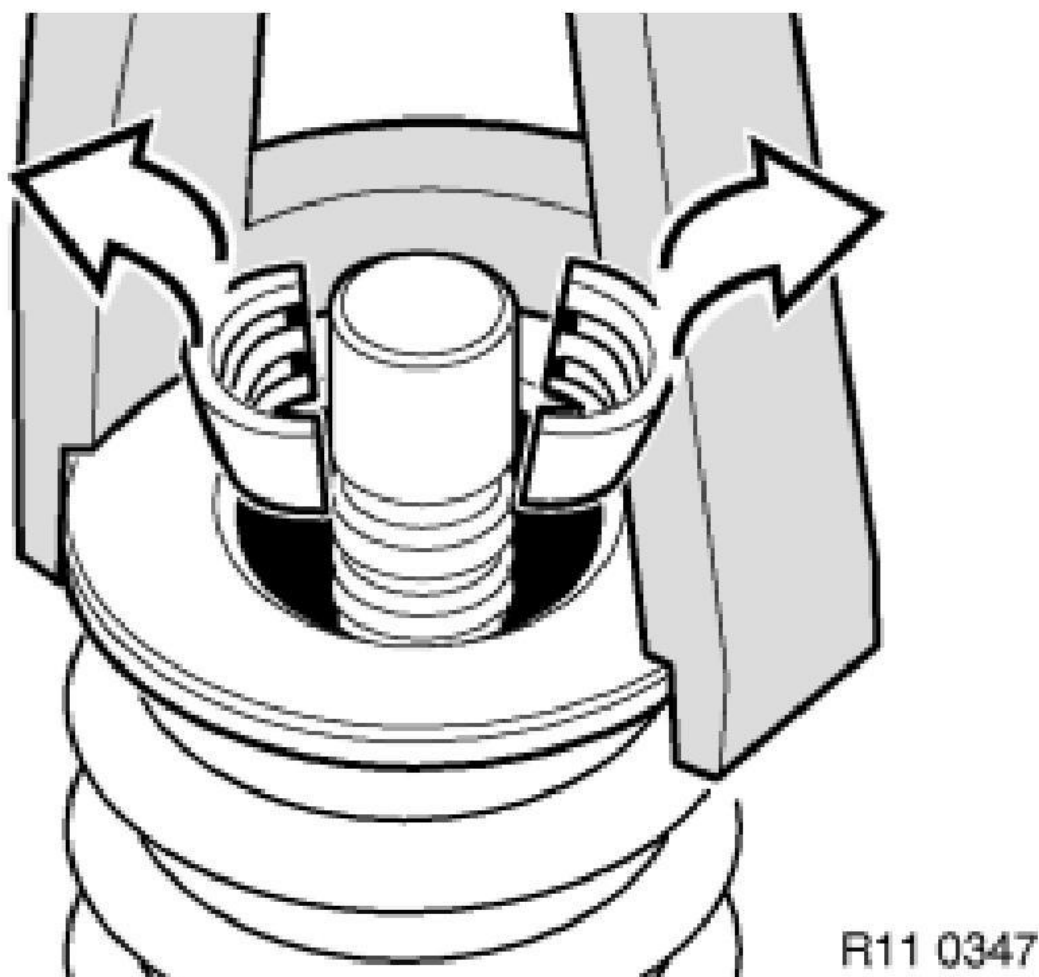
Remove exhaust camshaft.

Align special tool **11 0 346** in direction of valve shaft.



**Fig. 492: Identifying Special Tool (11 0 346) On Valve Shaft**  
**Courtesy of BMW OF NORTH AMERICA, INC.**

Press down valve spring on spring cap, top, and remove valve keys.



**Fig. 493: Removing Valve Keys**

Courtesy of BMW OF NORTH AMERICA, INC.

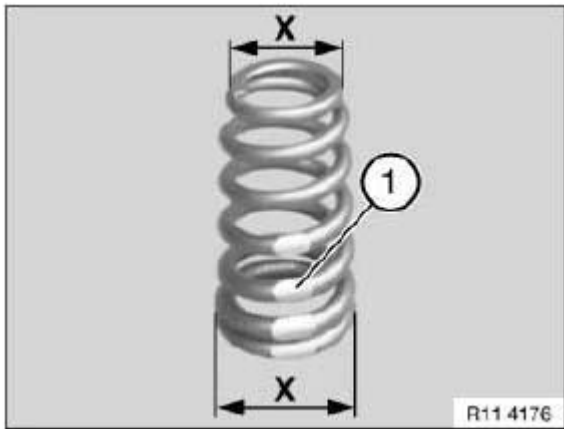
**IMPORTANT: Incorrect installation possible.**

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.

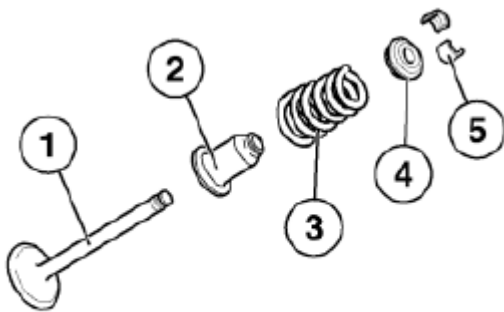
Install valve spring so that larger diameter points to spring plate at bottom.



**Fig. 494: Identifying Color Coding 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. 495: Identifying Valve Components**  
 Courtesy of BMW OF NORTH AMERICA, INC.

## VARIABLE CAMSHAFT TIMING

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

Special tools required:

- 11 9 190 . See ENGINE- SPECIAL TOOLS .

- 11 9 461
- 11 9 462

(cylinder bank 5 to 8)

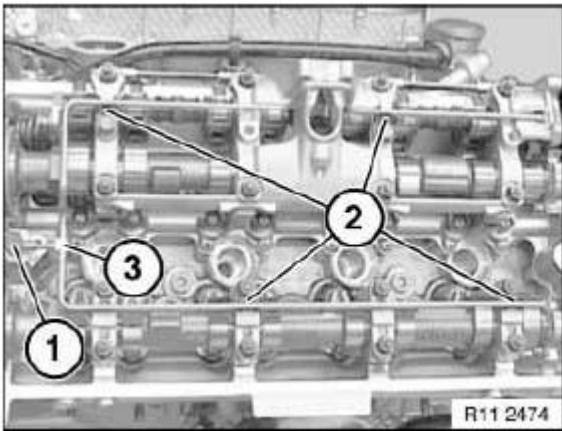
*Necessary preliminary tasks:*

- Remove servomotor for left eccentric shaft.
- Remove left cylinder head cover .

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

Release screw (1).

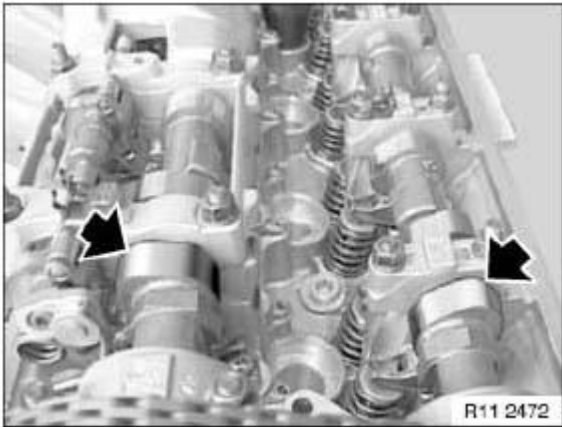
Unclip oil line (3) from retainers (2) and remove.



**Fig. 496: 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.

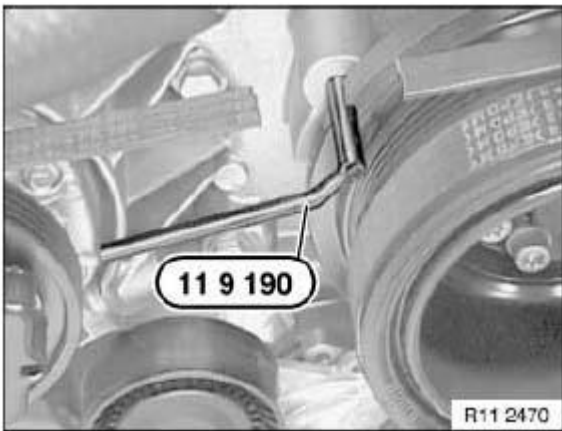
**NOTE:** With 1st cylinder in firing TDC position, cams of inlet and exhaust camshafts at 5th cylinder point upwards at an angle as shown in illustration.



**Fig. 497: Locating Cams Of Inlet And Exhaust Camshafts At 5th Cylinder Point**  
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. 498: Identifying Special Tool (11 9 190)**  
Courtesy of BMW OF NORTH AMERICA, INC.

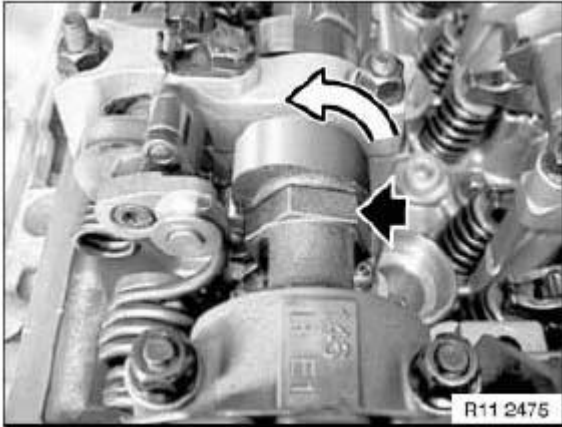
**IMPORTANT:** When the engine is shut down, the inlet and exhaust adjustment unit is normally locked in its initial position. The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the adjustment 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.



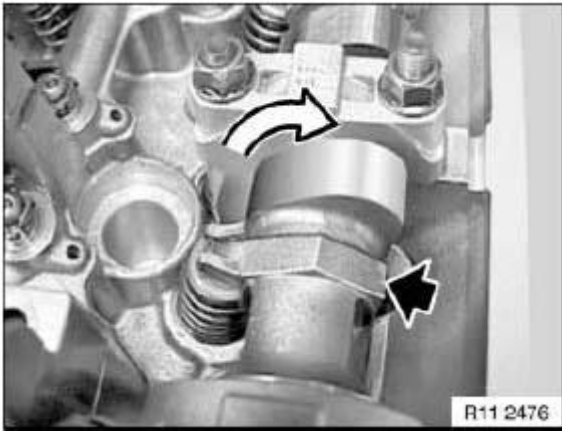
**Fig. 499: Locating Hexagon Head Of Inlet Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.



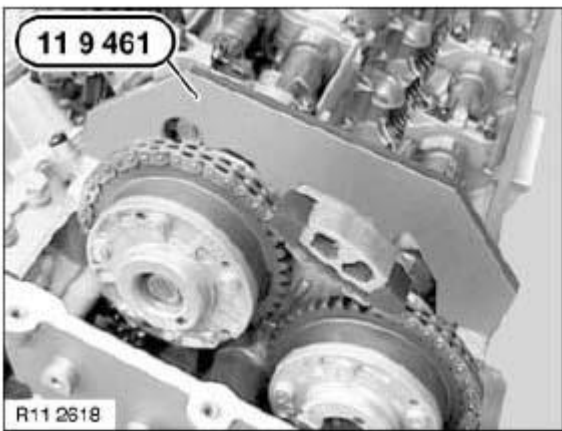
**Fig. 500: Locating Hexagon Head Of Exhaust Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

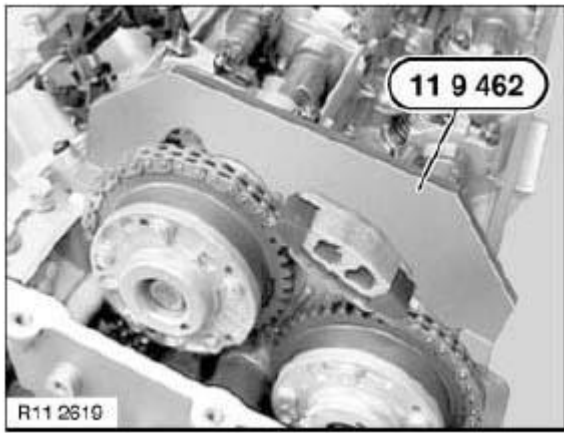


**Fig. 501: Placing Special Tool (11 9 461) On Inlet Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

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. 502: Placing Special Tool (11 9 462) On Exhaust Camshaft**  
 Courtesy of BMW OF NORTH AMERICA, INC.

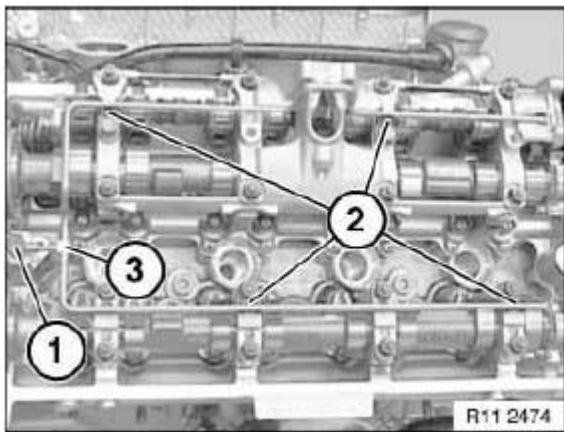
Remove all special tools.

**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. 503: Identifying 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 . See ENGINE- SPECIAL TOOLS .
- 11 9 461
- 11 9 462

(cylinder bank 1 to 4)

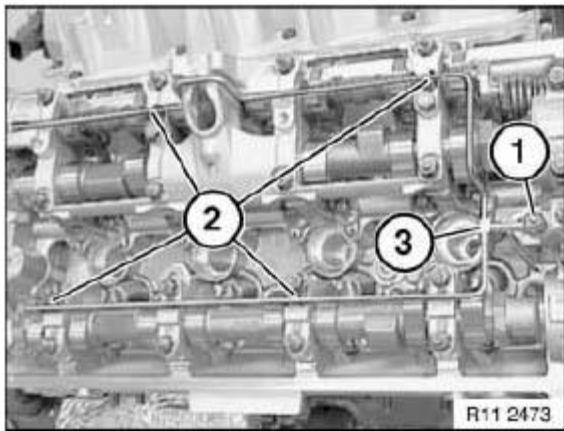
*Necessary preliminary tasks:*

- 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 . See 17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N62, N62TU)

**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. 504: Identifying Oil Line And 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.

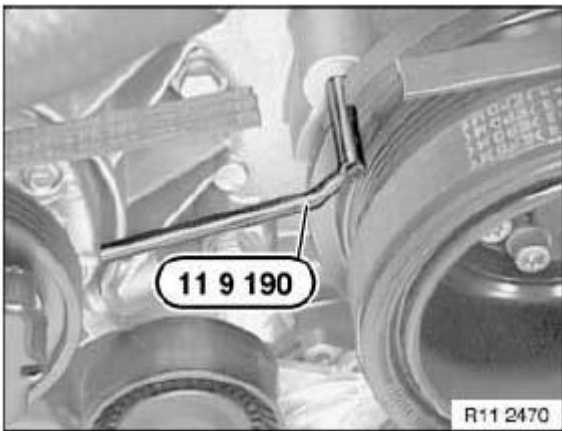
Cam of inlet camshaft points downwards at an angle:



**Fig. 505: Locating Inlet And Exhaust Camshaft**  
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. 506: Identifying Special Tool (11 9 190)**  
Courtesy of BMW OF NORTH AMERICA, INC.

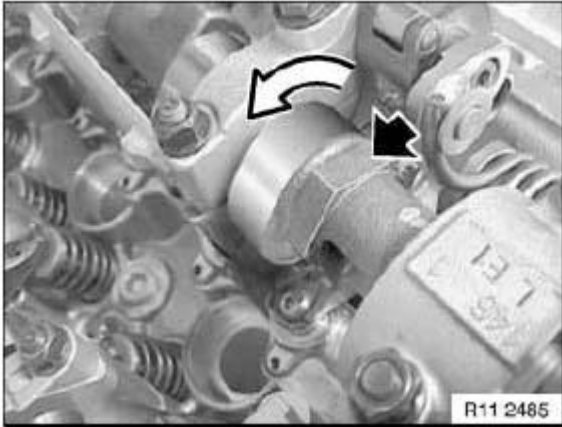
**IMPORTANT:** When the engine is shut down, the inlet and exhaust adjustment unit is normally locked in its initial position. The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the adjustment 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.



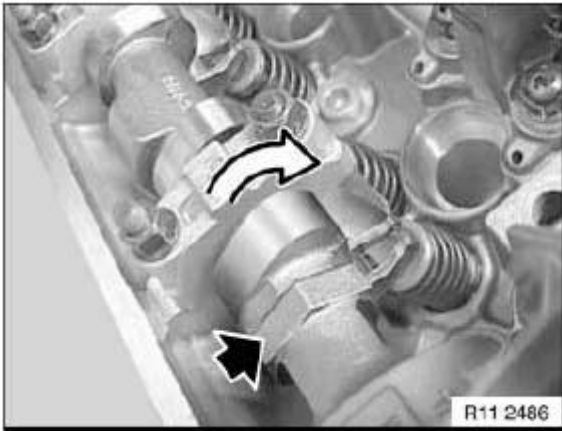
**Fig. 507: Locating Hexagon Head Of Inlet Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.

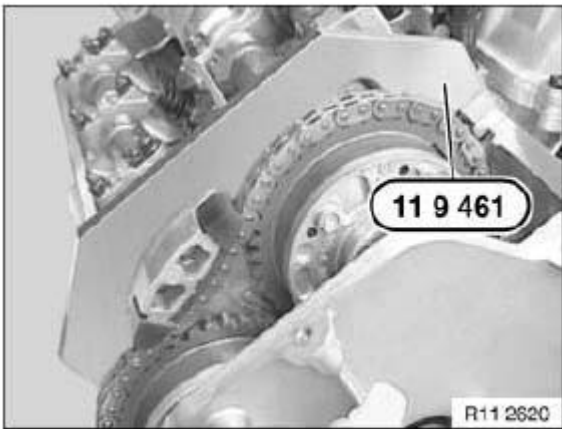


**Fig. 508: Locating Hexagon Head Of Exhaust Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

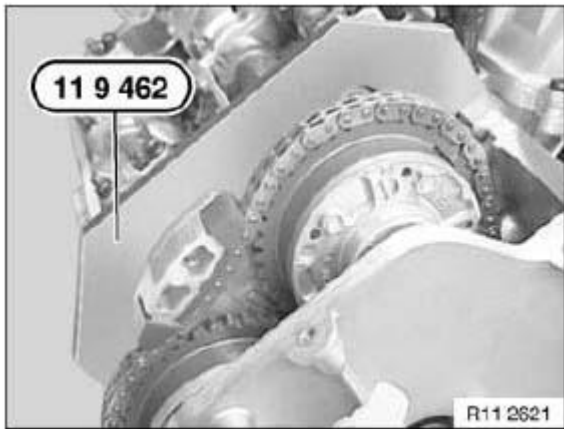


**Fig. 509: Identifying Special Tool (11 9 461) On Inlet Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

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. 510: Identifying Special Tool (11 9 462) On Exhaust Camshaft**  
 Courtesy of BMW OF NORTH AMERICA, INC.

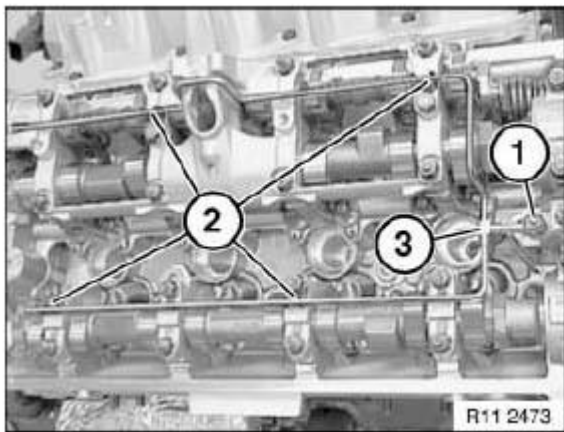
Remove all special tools.

**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. 511: Identifying Oil Line And 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 . See ENGINE- SPECIAL TOOLS .

- 11 9 460
- 11 9 461
- 11 9 462
- 11 9 463

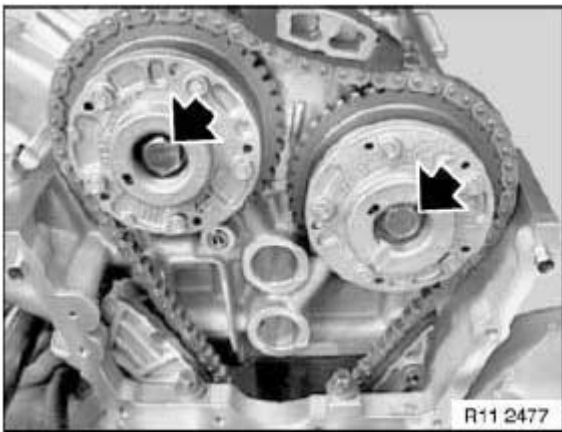
(cylinder bank 5 to 8)

*Necessary preliminary tasks:*

- Check camshaft timing on left side.
- Remove left timing case cover.

**NOTE:** When slackening screws, grip camshafts at hexagon head.

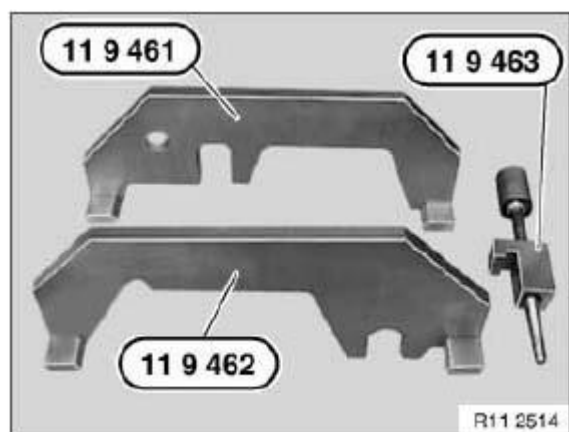
Slacken screws of exhaust and inlet adjustment unit.



**Fig. 512: Slacken screws of exhaust and inlet adjustment unit**  
Courtesy of BMW OF NORTH AMERICA, INC.

Get special tool kit 11 9 460 ready for securing camshafts.

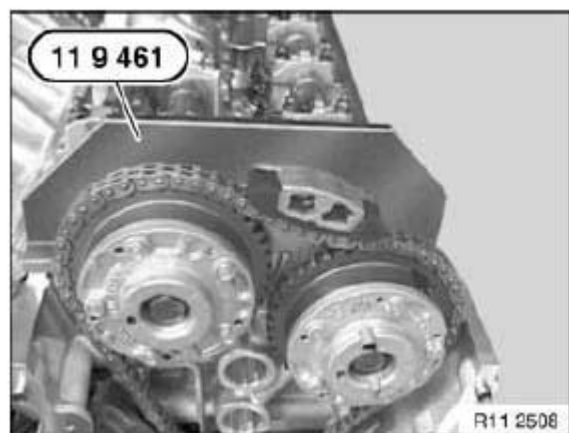
**NOTE:** Special tool 11 9 461 for securing inlet camshaft.  
Special tool 11 9 462 for securing exhaust camshaft.  
Special tool 11 9 463 (holder with screw).



**Fig. 513: Identifying Special Tools**

Courtesy of BMW OF NORTH AMERICA, INC.

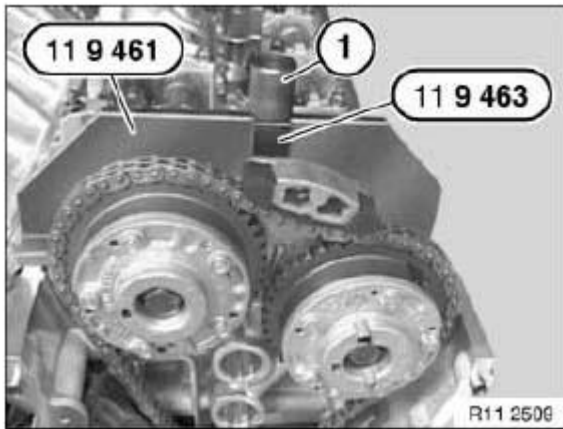
Place special tool **11 9 461** on inlet camshaft and align inlet camshaft so that special tool **11 9 461** rests without a gap on cylinder head.



**Fig. 514: Identifying Special Tool (11 9 461) On Inlet Camshaft**

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.

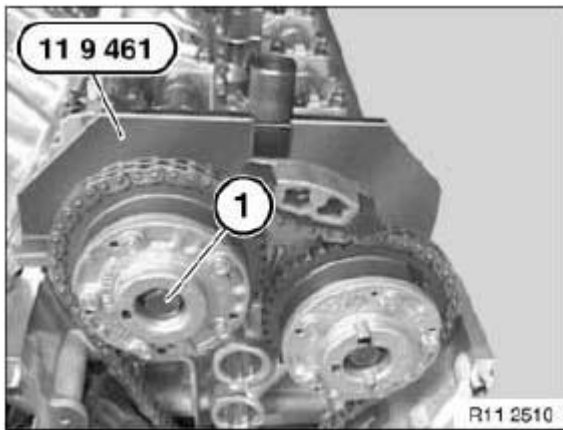


**Fig. 515: Identifying Special Tool (11 9 461) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** When tightening down screw (1), grip camshaft at hexagon head.

Tighten down screw (1) of inlet adjustment unit.

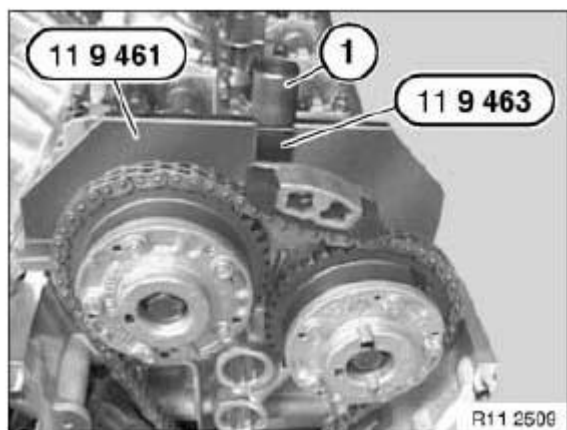
Tightening torque, see 11 36 16AZ in 11 36 VARIABLE CAMSHAFT CONTROL .



**Fig. 516: Identifying Special Tool (11 9 461) And Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

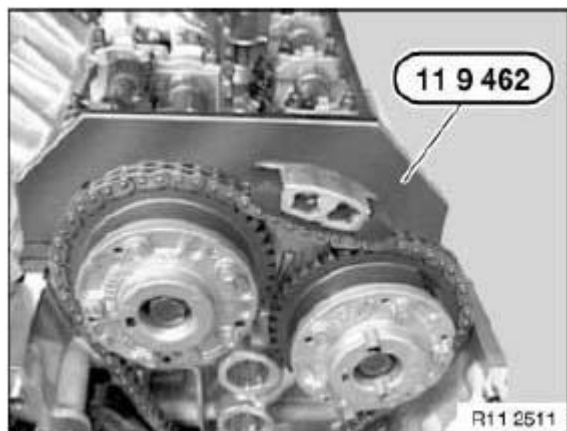
Release screw (1), remove special tools 11 9 463 and 11 9 461 from inlet camshaft.





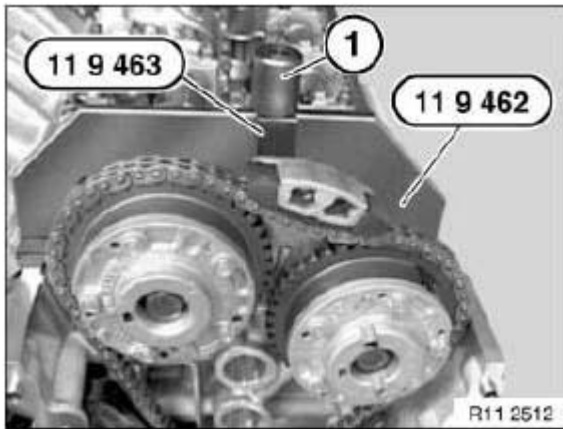
**Fig. 517: Identifying Special Tool (11 9 461) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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. 518: Identifying Special Tool (11 9 462) On Exhaust Camshaft**  
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.

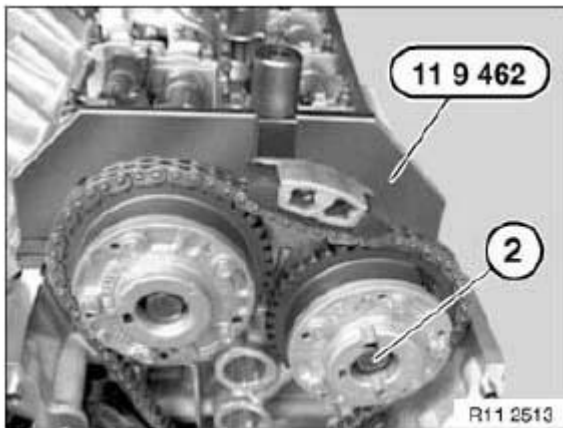


**Fig. 519: Identifying Special Tool (11 9 462) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** When tightening down screw (2), grip camshaft at hexagon head.

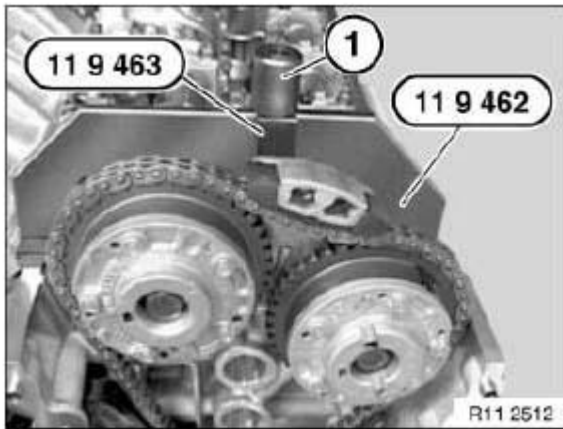
Tighten down screw (2) of exhaust adjustment unit.

Tightening torque, see 11 36 16AZ in 11 36 VARIABLE CAMSHAFT CONTROL .



**Fig. 520: Identifying Special Tool (11 9 462) And Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1), remove special tools 11 9 463 and 11 9 462 from exhaust camshaft.

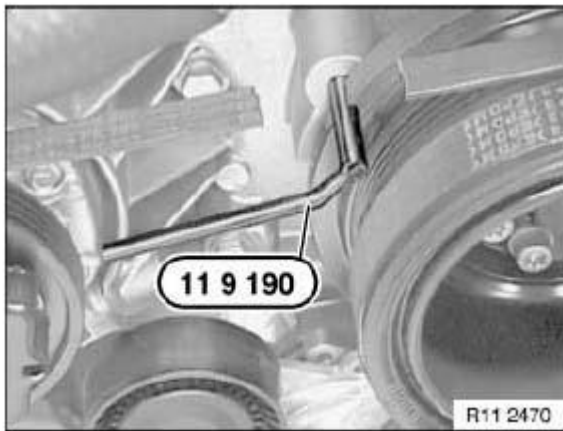


**Fig. 521: Identifying Special Tool (11 9 462) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.

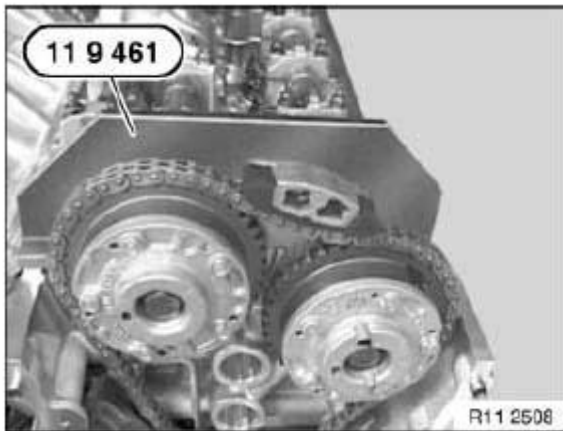


**Fig. 522: Identifying Special Tool (11 9 190)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.

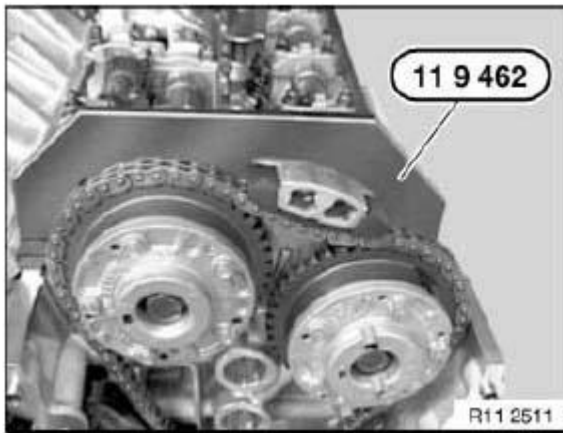
Remove special tool **11 9 461** from inlet camshaft.



**Fig. 523: Identifying Special Tool (11 9 461) On Inlet Camshaft**  
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. 524: Identifying Special Tool (11 9 462) On Exhaust Camshaft**  
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** . See **ENGINE- SPECIAL TOOLS** .
- **11 9 460**

- 11 9 461
- 11 9 462
- 11 9 463

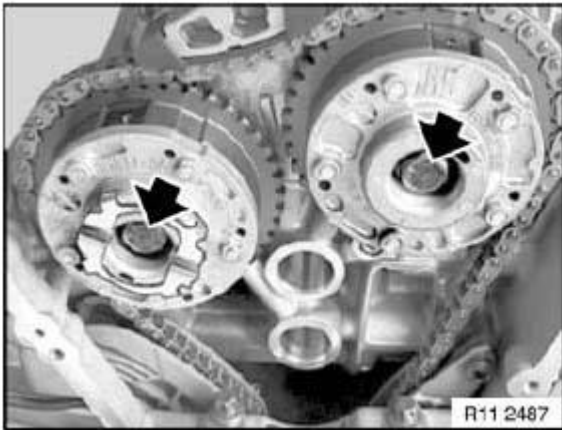
(cylinder bank 1 to 4)

*Necessary preliminary tasks:*

- Are described in checking camshaft timing on right side .
- Remove right timing case cover.

**NOTE:** When slackening screws, grip camshafts at hexagon head.

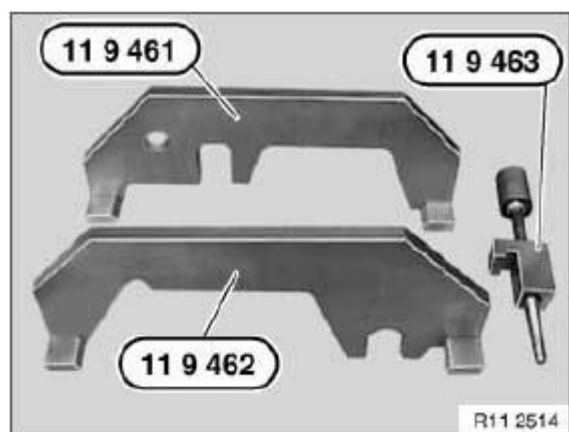
Slacken screws of exhaust and inlet adjustment unit.



**Fig. 525: Slacken screws of exhaust and inlet adjustment unit**  
Courtesy of BMW OF NORTH AMERICA, INC.

Get special tool kit 11 9 460 ready for securing camshafts.

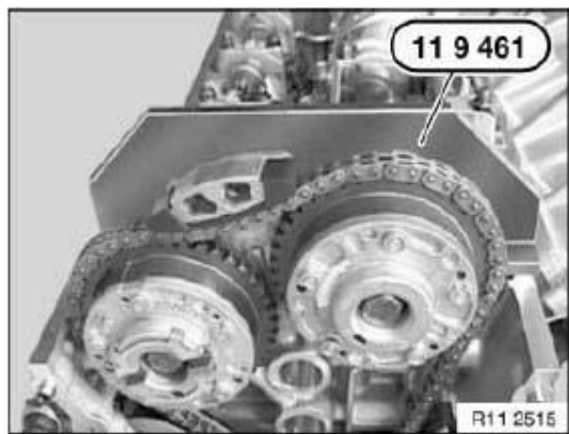
**NOTE:** Special tool 11 9 461 for securing inlet camshaft.  
Special tool 11 9 462 for securing exhaust camshaft.  
Special tool 11 9 463 (holder with screw).



**Fig. 526: Identifying Special Tools**

Courtesy of BMW OF NORTH AMERICA, INC.

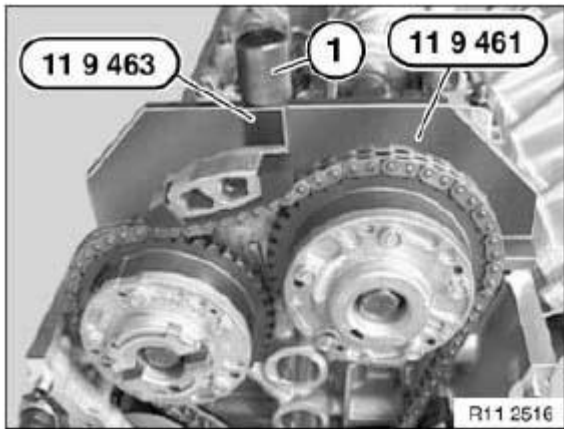
Place special tool **11 9 461** on inlet camshaft and align inlet camshaft so that special tool **11 9 461** rests without a gap on cylinder head.



**Fig. 527: Identifying Special Tool (11 9 461) On Inlet Camshaft**

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.

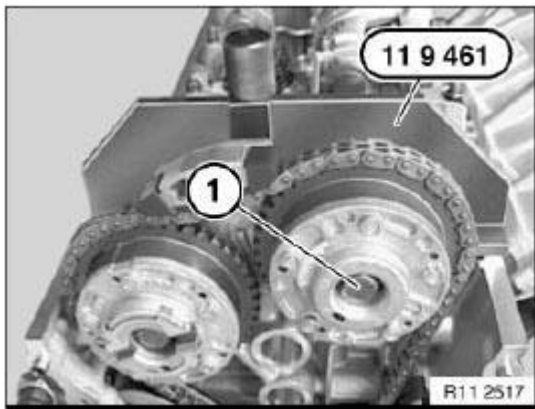


**Fig. 528: Identifying Special Tools (11 9 461) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** When tightening down screw (1), grip camshaft at hexagon head.

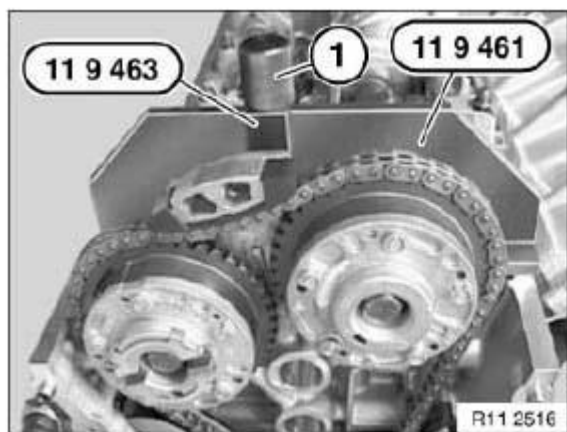
Tighten down screw (1) of inlet adjustment unit.

Tightening torque, see 11 36 16AZ in 11 36 VARIABLE CAMSHAFT CONTROL .



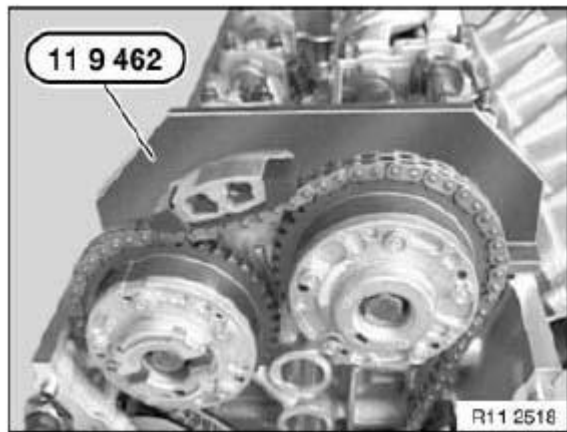
**Fig. 529: Identifying Inlet Adjustment Unit Screw With Special Tool (11 9 461)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1), remove special tools 11 9 463 and 11 9 461 from inlet camshaft.



**Fig. 530: Identifying Special Tools (11 9 461) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

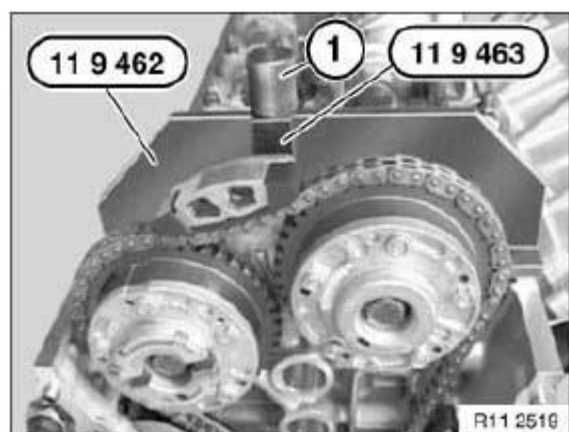
Place special tool **11 9 462** on exhaust camshaft and align exhaust camshaft so that special tool **11 9 462** rests without a gap on cylinder head.



**Fig. 531: Identifying Special Tool (11 9 462) On Exhaust Camshaft**  
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.



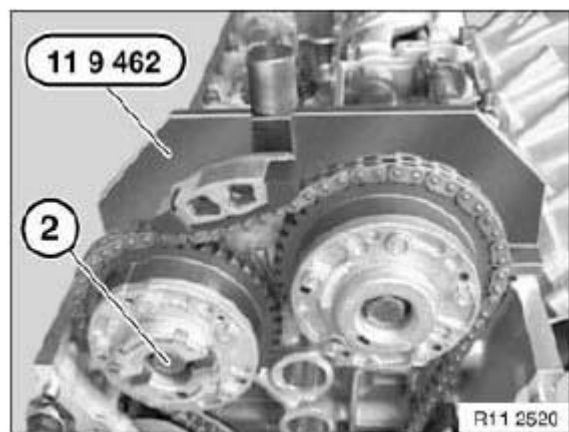


**Fig. 532: Identifying Special Tools (11 9 462) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** When tightening down screw (2), grip camshaft at hexagon head.

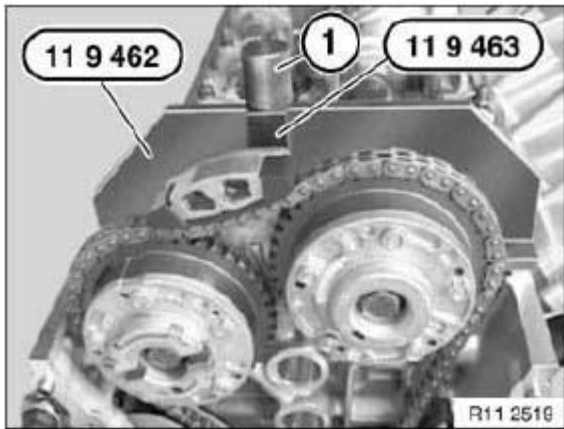
Tighten down screw (2) of exhaust adjustment unit.

Tightening torque, see 11 36 16AZ in 11 36 VARIABLE CAMSHAFT CONTROL .



**Fig. 533: Identifying Special Tools (11 9 462) And Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1), remove special tools 11 9 463 and 11 9 462 from exhaust camshaft.

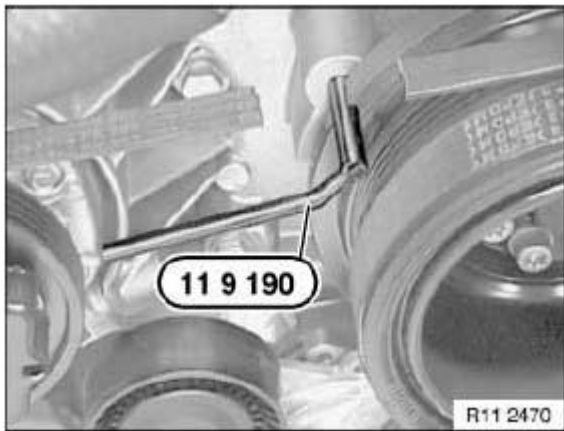


**Fig. 534: Identifying Special Tools (11 9 462) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.

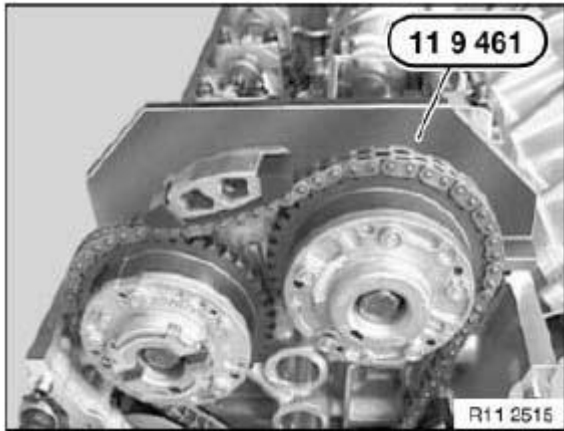


**Fig. 535: Identifying Special Tool (11 9 190)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.

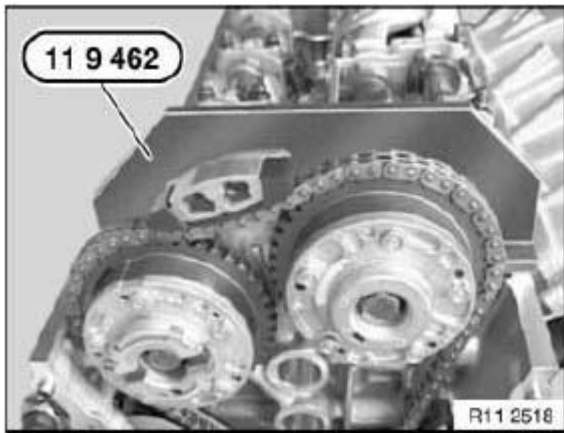
Remove special tool **11 9 461** from inlet camshaft.



**Fig. 536: Identifying Special Tool (11 9 461) On Inlet Camshaft**  
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. 537: Identifying Special Tool (11 9 462) On Exhaust Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

# **11 36 047 REMOVING AND INSTALLING/REPLACING INLET AND EXHAUST ADJUSTMENT UNITS ON LEFT SIDE (N62/N62TU)**

**Special tools required:**

- **11 9 190** . See **ENGINE- SPECIAL TOOLS** .

- 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. See 17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N62, N62TU) .
- Remove left timing case cover.

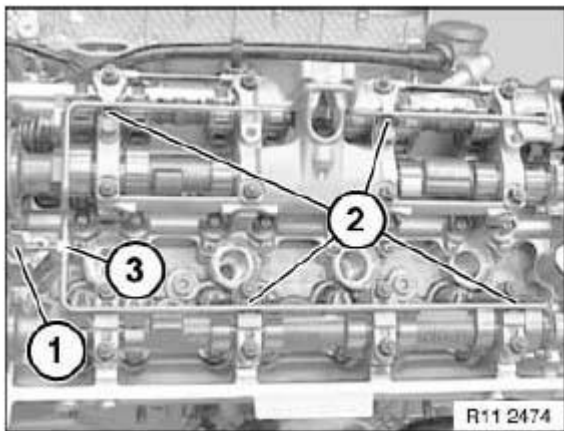
#### Removal:

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).

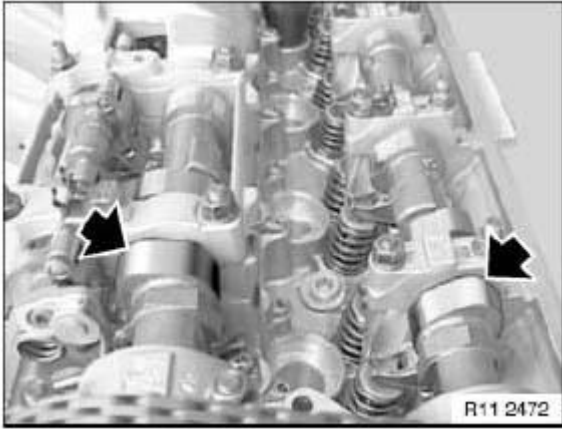
Unclip oil line (3) from retainers (2) and remove.



**Fig. 538: 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.

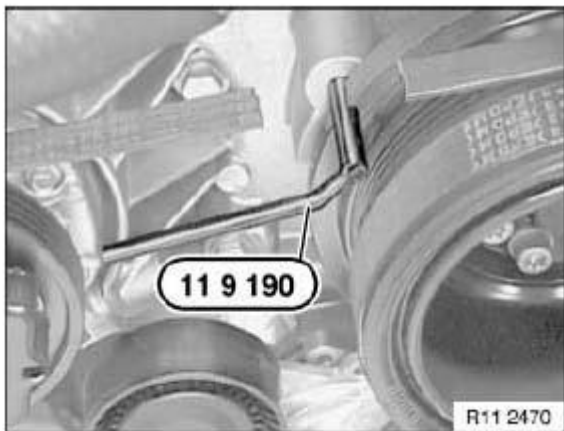
**NOTE:** With 1st cylinder in firing TDC position, cams of inlet and exhaust camshafts at 5th cylinder point upwards at an angle as shown in graphic.



**Fig. 539: Locating Cams Of Inlet And Exhaust Camshafts At 5th Cylinder Point**  
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. 540: 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

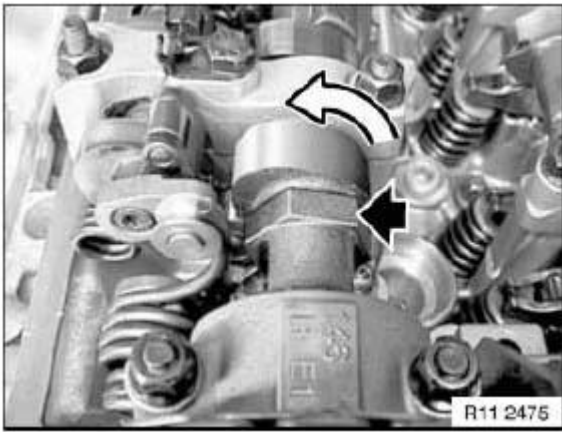
**locking of the adjustment unit and if necessary perform locking by rotating the camshafts.**

**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.



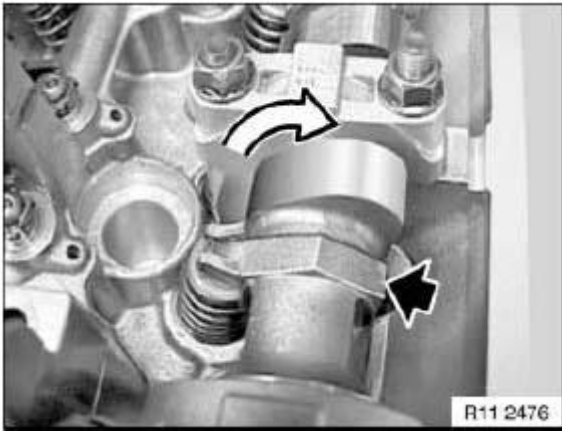
**Fig. 541: Locating Hexagon Head Of Inlet Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

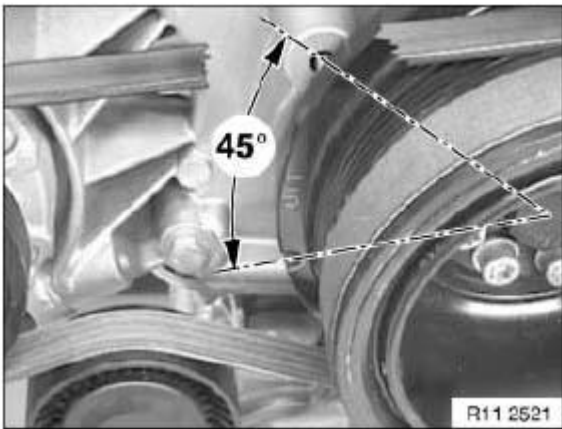


**Fig. 542: Locating Hexagon Head Of Exhaust Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

Remove special tool 11 9 190.

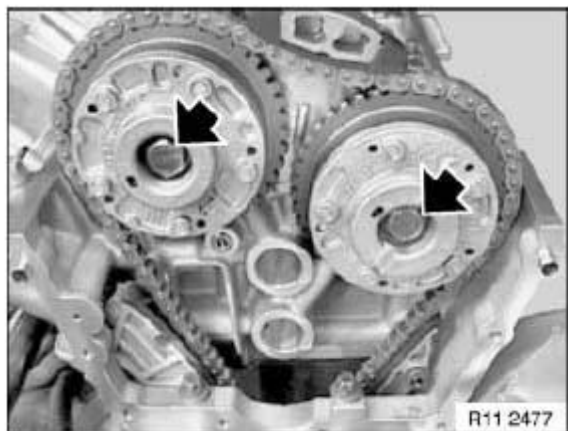
Crank engine at central bolt against direction of rotation to 45° before TDC position.



**Fig. 543: Identifying TDC Position Angle**  
Courtesy of BMW OF NORTH AMERICA, INC.

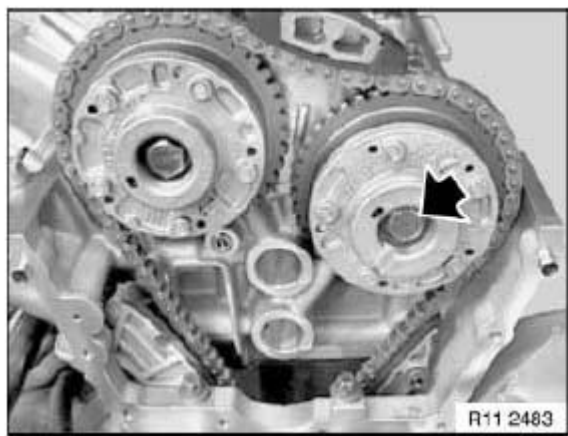
**NOTE:** When slackening screws, grip camshafts at hexagon head.

Slacken screws of exhaust and inlet adjustment unit.



**Fig. 544: Slacken screws of exhaust and inlet adjustment unit**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove screw on exhaust adjustment unit.

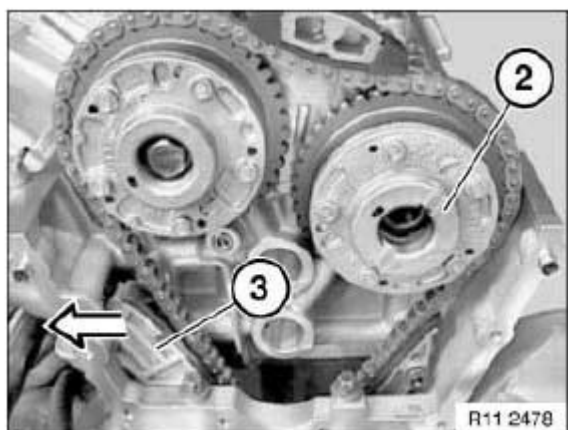


**Fig. 545: Locating Exhaust Adjustment Unit Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

Vigorously press back tensioner rail (3) several times to remove oil in chain tensioner.

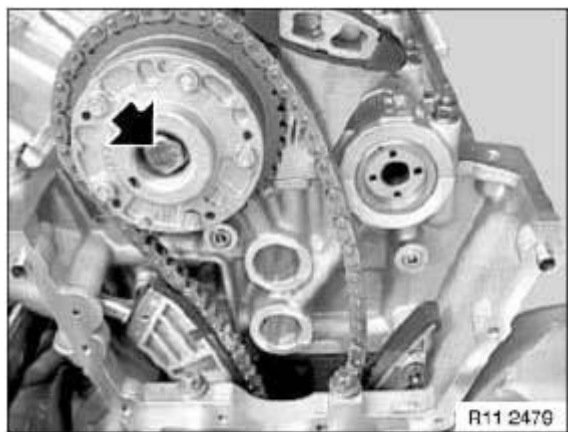
Feed out exhaust adjustment unit (2).





**Fig. 546: Pressing Back Tensioner Rail**  
Courtesy of BMW OF NORTH AMERICA, INC.

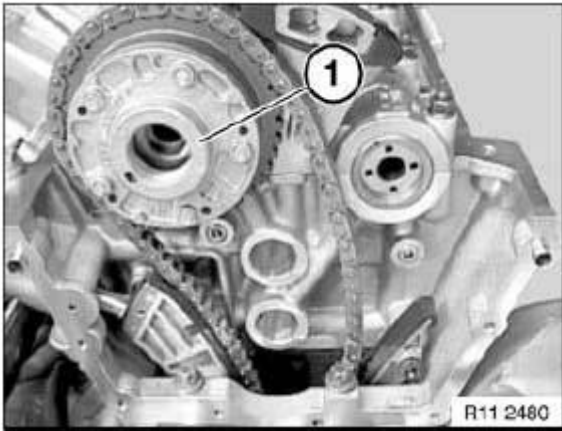
Remove screw on inlet adjustment unit.



**Fig. 547: 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. 548: Identifying Inlet Adjustment Unit**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Installation:**

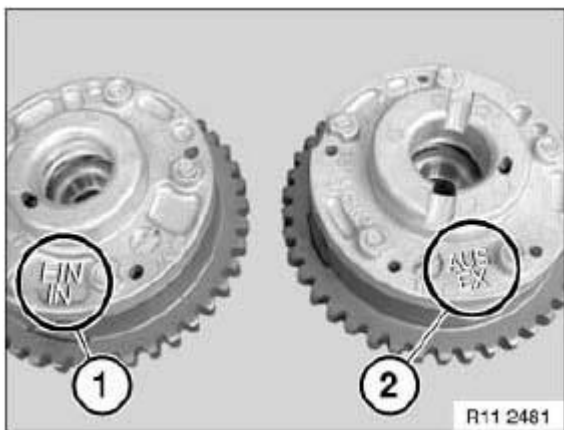
Installation of inlet and exhaust adjustment units is described separately from removal.

**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.

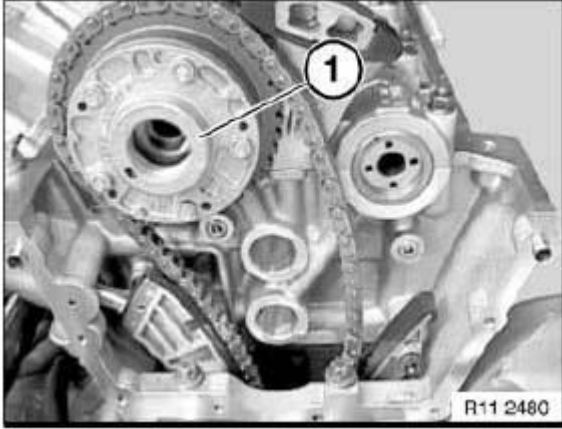


**Fig. 549: Identifying Marks EIN, IN And AUS, IN**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

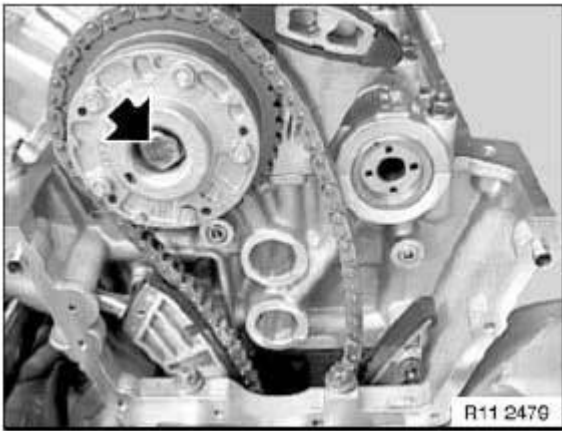


**Fig. 550: Identifying Inlet Adjustment Unit**  
Courtesy of BMW OF NORTH AMERICA, INC.

Replace screw.

Install screw on inlet adjustment unit.

Tighten screw without play and then slacken off again by half a turn.



**Fig. 551: Locating Inlet Adjustment Unit Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

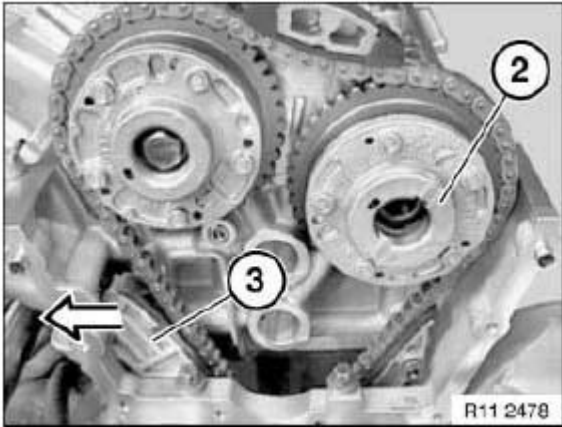
**NOTE:** Position of exhaust adjustment unit (2) to timing chain can be freely selected.

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. 552: Pressing Tensioner Rail And Fitting Exhaust Adjustment Unit Onto Exhaust Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Replace sealing ring.

Install chain tensioner and tighten down.

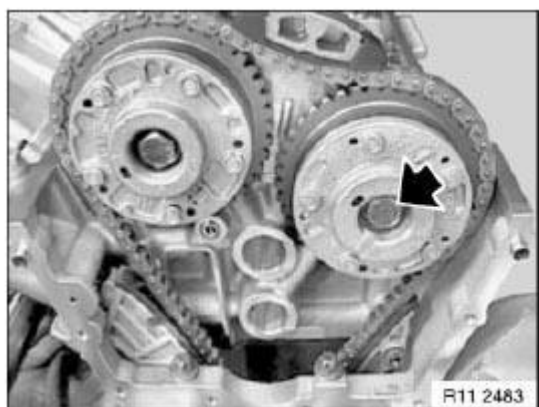
Tightening torque, see **11 31 8AZ** in CAMSHAFT .

Fit exhaust adjustment unit (2).

Replace screw.

Install screw on exhaust adjustment unit.

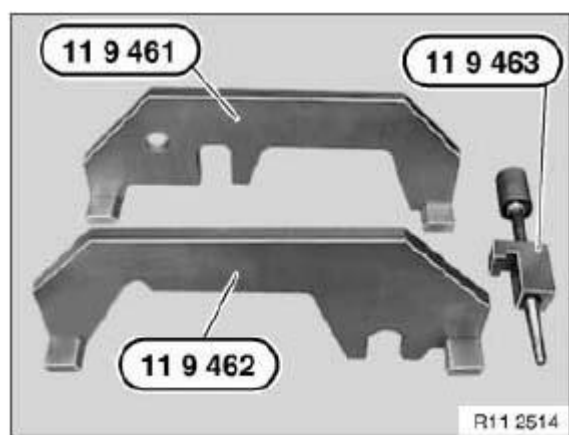
Tighten screw without play and then slacken off again by half a turn.



**Fig. 553: Locating 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).



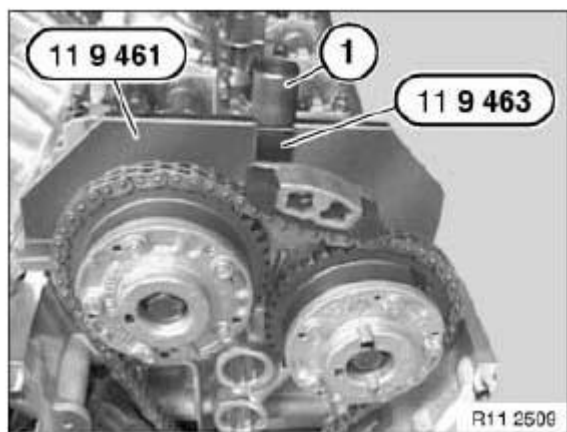
**Fig. 554: Identifying Special Tools**  
Courtesy of BMW OF NORTH AMERICA, INC.

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. 555: Identifying Special Tool (11 9 461) On Inlet Camshaft**  
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.

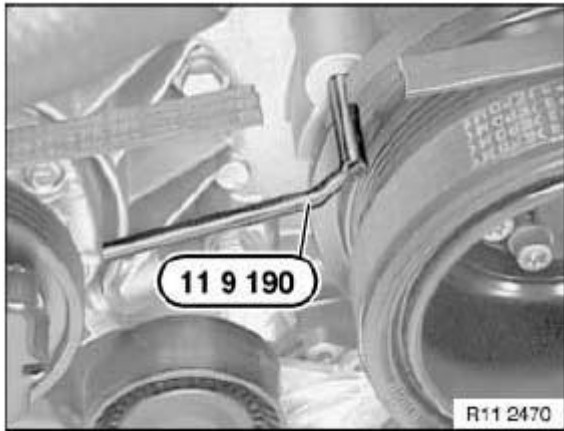


**Fig. 556: Identifying Special Tool (11 9 461) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.



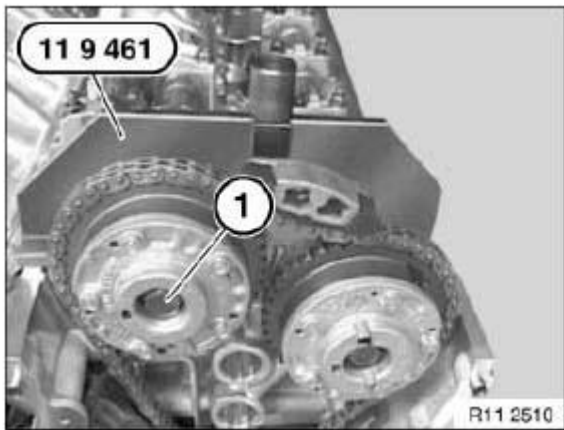
**Fig. 557: Identifying Special Tool (11 9 190)**

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.

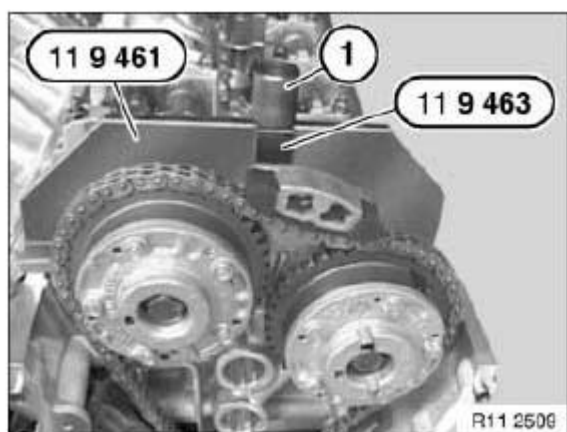
Tightening torque, see 11 36 16AZ in 11 36 VARIABLE CAMSHAFT CONTROL .



**Fig. 558: Identifying Special Tool (11 9 461) And Screw**

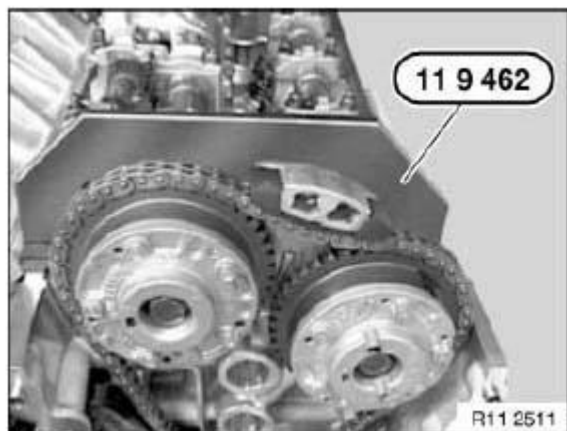
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove special tools 11 9 463 / 11 9 461 from inlet camshaft.



**Fig. 559: Identifying Special Tool (11 9 461) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

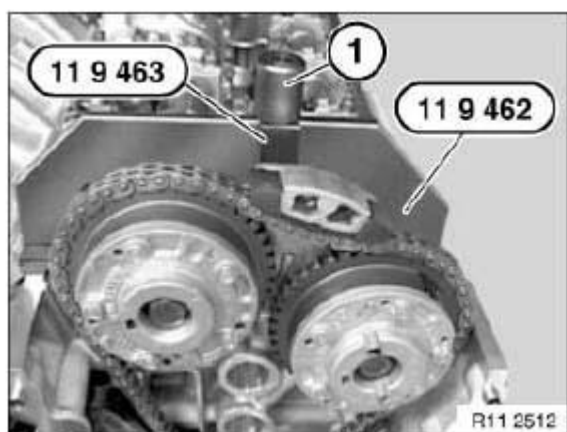
Place special tool **11 9 462** on exhaust camshaft and align exhaust camshaft so that special tool **11 9 462** rests without a gap on cylinder head.



**Fig. 560: Identifying Special Tool (11 9 462) On Exhaust Camshaft**  
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.



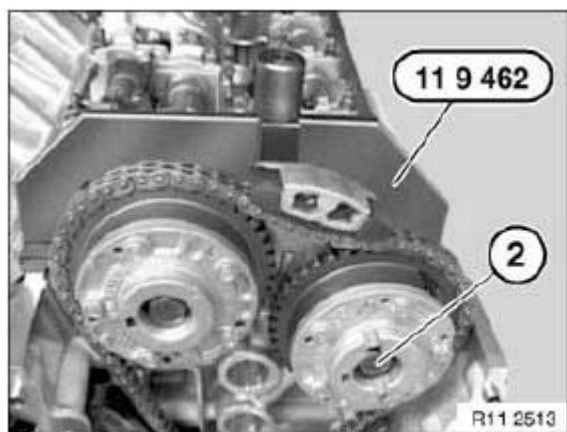


**Fig. 561: Identifying Special Tool (11 9 462) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** When tightening down screw (2), grip camshaft at hexagon head.

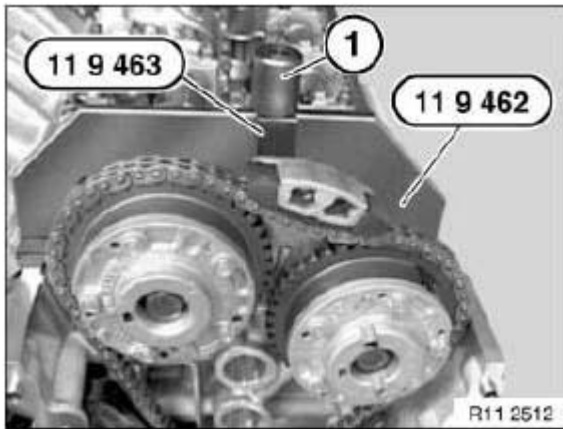
Tighten down screw (2) of exhaust adjustment unit.

Tightening torque, see 11 36 16AZ in 11 36 VARIABLE CAMSHAFT CONTROL .



**Fig. 562: Identifying Special Tool (11 9 462) And Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove special tools 11 9 463 / 11 9 462 from exhaust camshaft.

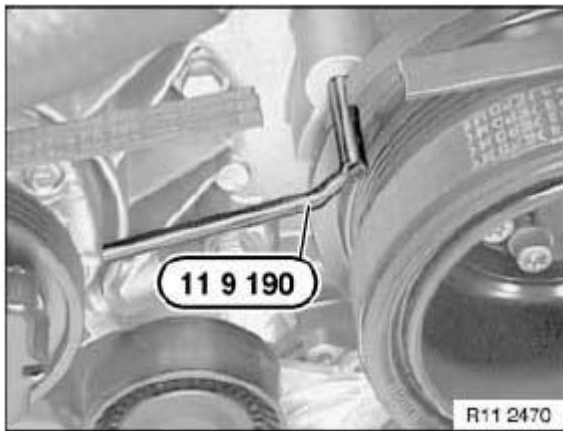


**Fig. 563: Identifying Special Tool (11 9 462) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.

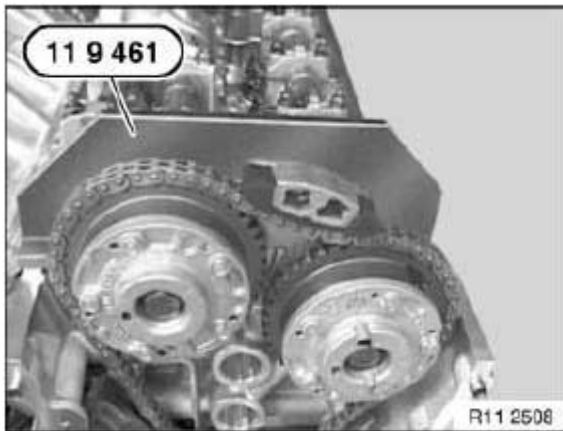


**Fig. 564: Identifying Special Tool (11 9 190)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.

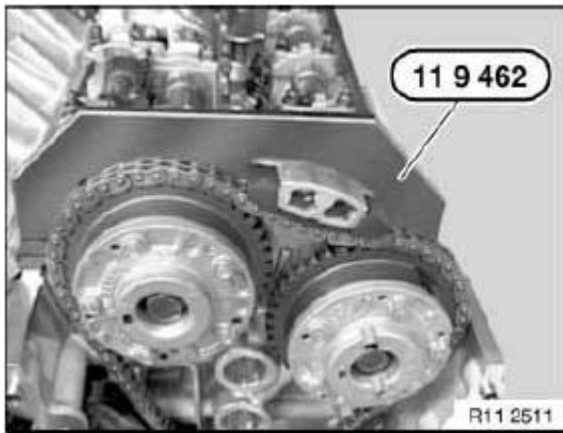
Remove special tool **11 9 461** from inlet camshaft.



**Fig. 565: Identifying Special Tool (11 9 461) On Inlet Camshaft**  
 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. 566: Identifying Special Tool (11 9 462) On Exhaust Camshaft**  
 Courtesy of BMW OF NORTH AMERICA, INC.

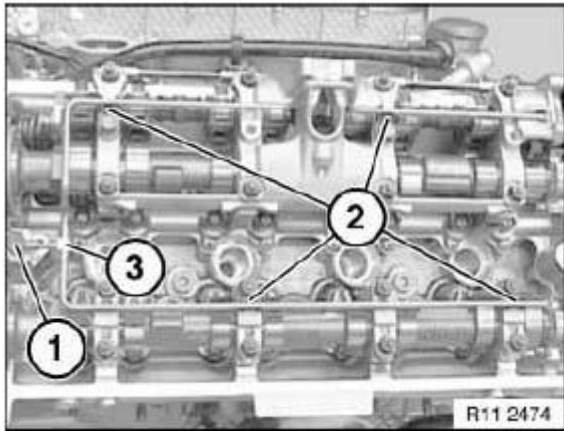
Remove all special tools.

**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. 567: 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 . See ENGINE- SPECIAL TOOLS .
- 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. See 17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N62, N62TU) .
- Remove right timing case cover.

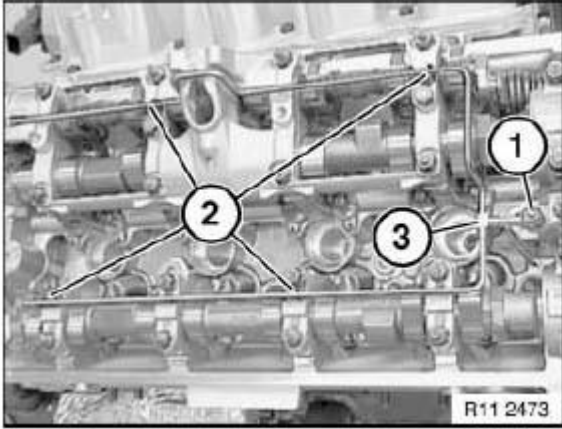
#### Removal:

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. 568: Identifying Oil Line And 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.

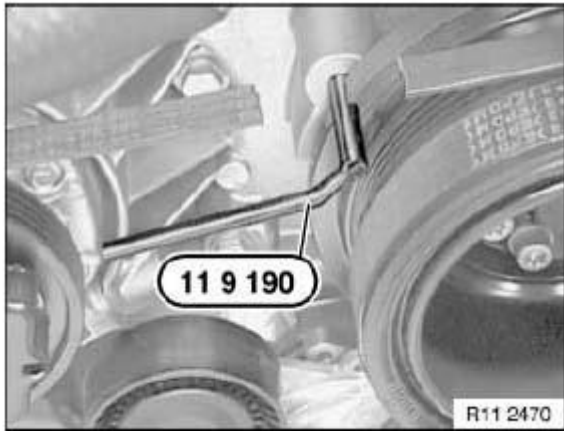
Cam of inlet camshaft points downwards at an angle.



**Fig. 569: Locating Inlet And Exhaust Camshaft**  
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. 570: Identifying Special Tool (11 9 190)**

Courtesy of BMW OF NORTH AMERICA, INC.

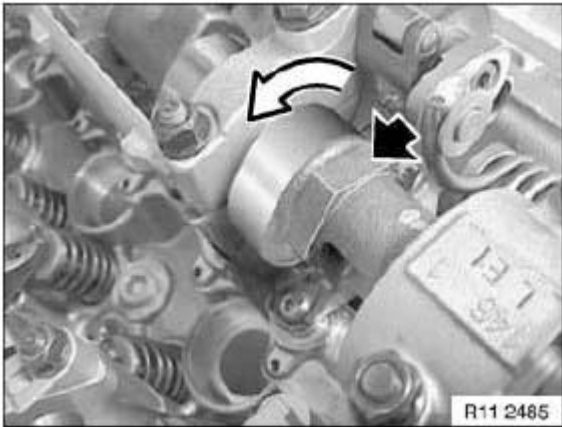
**IMPORTANT:** When the engine is shut down, the inlet and exhaust adjustment unit is normally locked in its initial position. The situation may arise in some individual cases where this initial position is not reached and the camshaft can continue to be rotated in the adjustment range of the adjustment 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.



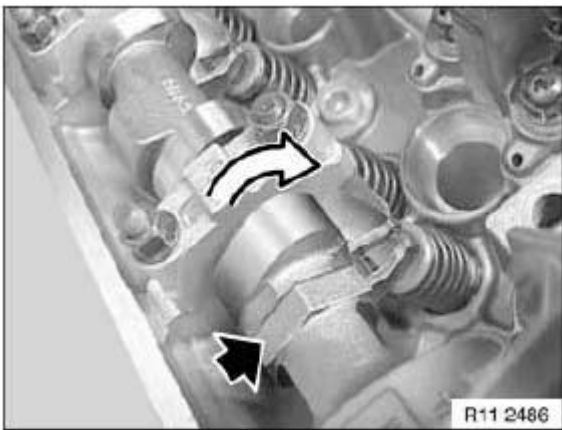
**Fig. 571: Locating Hexagon Head Of Inlet Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.

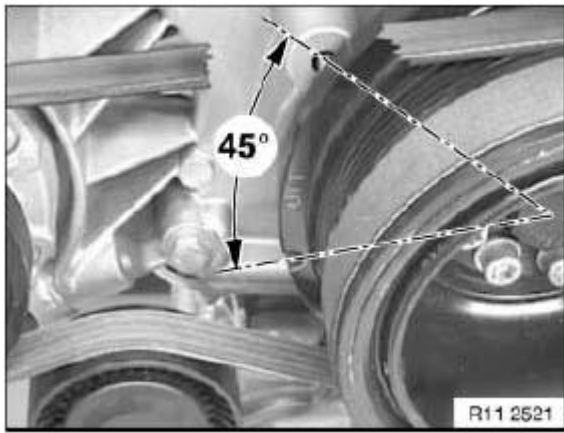


**Fig. 572: Locating Hexagon Head Of Exhaust Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

Remove special tool 11 9 190.

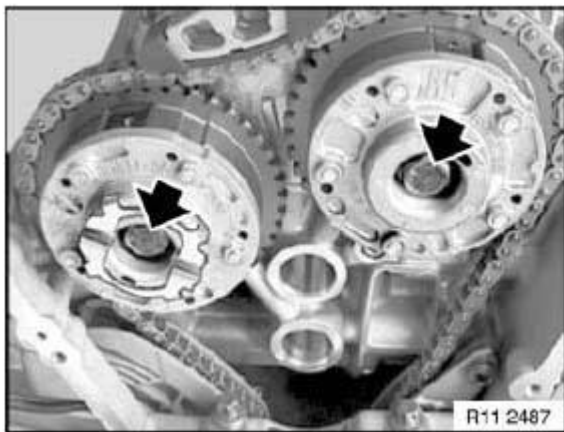
Crank engine at central bolt against direction of rotation to 45° before TDC position.



**Fig. 573: Identifying TDC Position Angle**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** When slackening screws, grip camshafts at hexagon head.

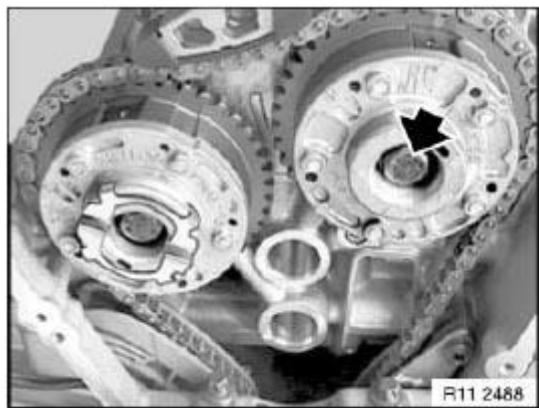
Slacken screws of exhaust and inlet adjustment unit.



**Fig. 574: Slacken screws of exhaust and inlet adjustment unit**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove screw on inlet adjustment unit.

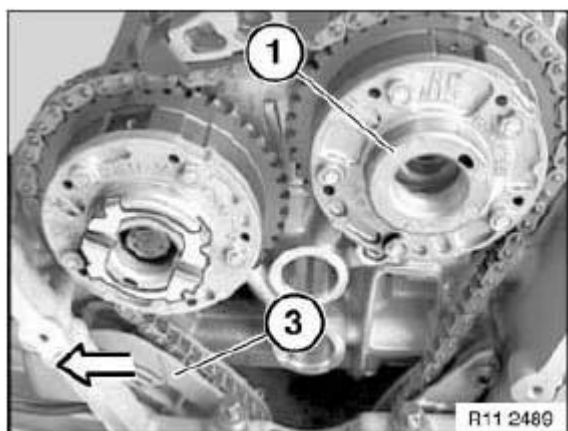




**Fig. 575: Locating Hexagon Head Of Exhaust Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

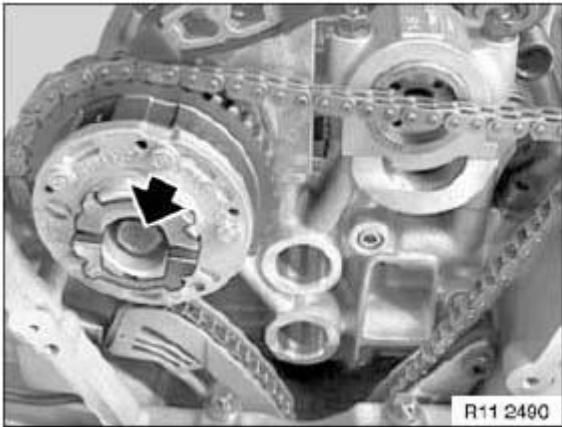
Vigorously press back tensioner rail (3) several times to remove oil in chain tensioner.

Feed out inlet adjustment unit (1).



**Fig. 576: Pressing Back Tensioner Rail**  
Courtesy of BMW OF NORTH AMERICA, INC.

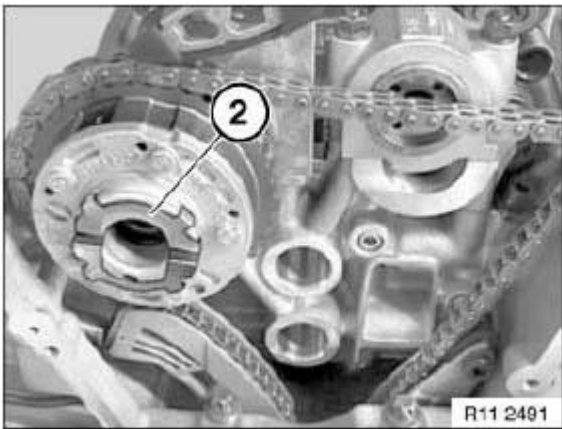
Remove screw on exhaust adjustment unit.



**Fig. 577: Locating 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. 578: Identifying Exhaust Adjustment Unit**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Installation:**

Installation of inlet and exhaust adjustment units is described separately from removal.

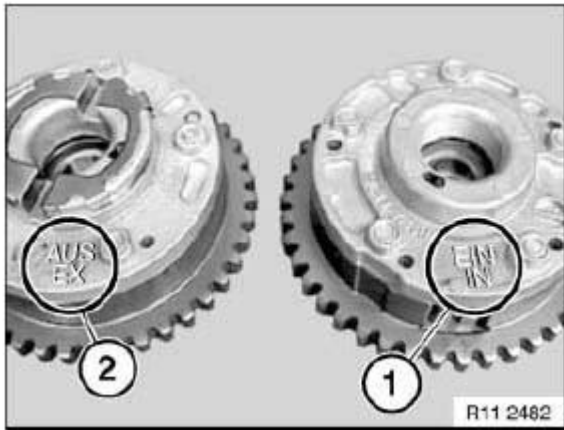
**IMPORTANT: Danger of mix-up:**

Inlet and exhaust adjustment units are different.

Mixing up the inlet and exhaust adjustment units will cause damage to the engine.

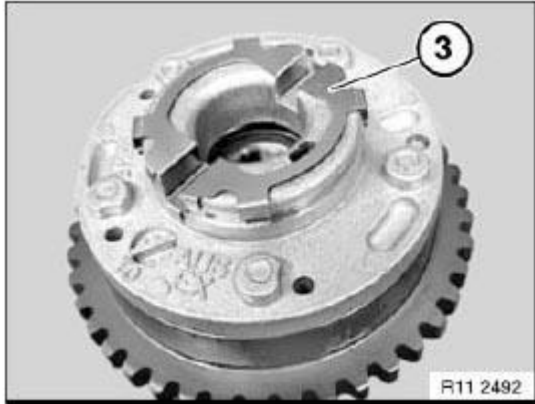
1. Inlet adjustment unit (1) is marked with EIN and IN.

2. Exhaust adjustment unit (2) is marked with AUS and EX.



**Fig. 579: Identifying Inlet Adjustment Unit With Mark EIN And IN And Exhaust Adjustment Unit With Mark AUS And EX**  
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.

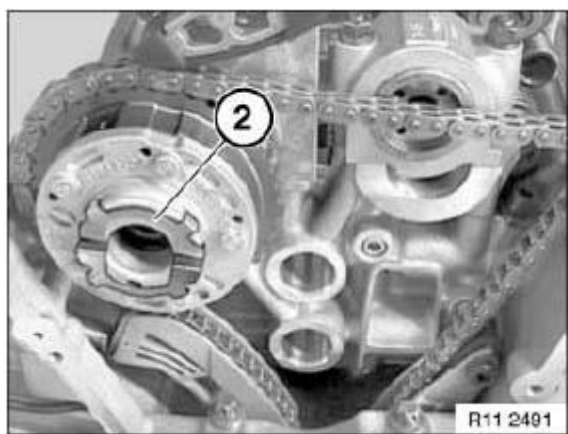


**Fig. 580: Identifying Metal Clip**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

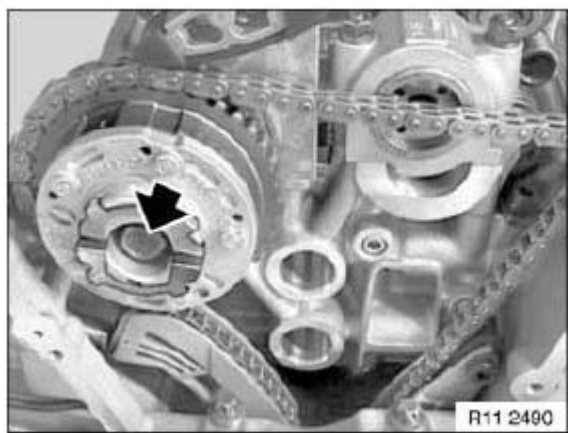


**Fig. 581: Identifying Exhaust Adjustment Unit**  
Courtesy of BMW OF NORTH AMERICA, INC.

Replace screw.

Install screw on exhaust adjustment unit.

Tighten screw without play and then slacken off again by half a turn.



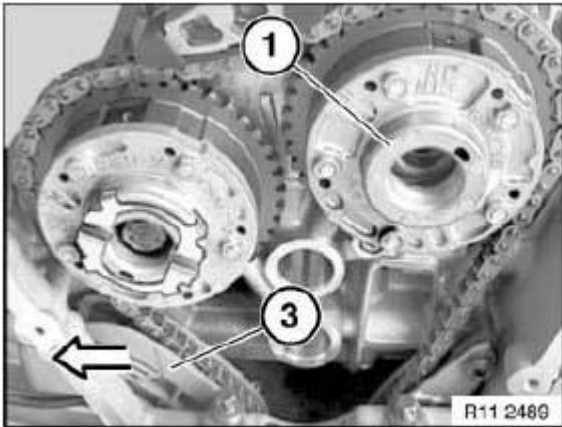
**Fig. 582: Locating Exhaust Adjustment Unit Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.



**Fig. 583: Pressing Back Tensioner Rail**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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, see 11 31 8AZ in CAMSHAFT .

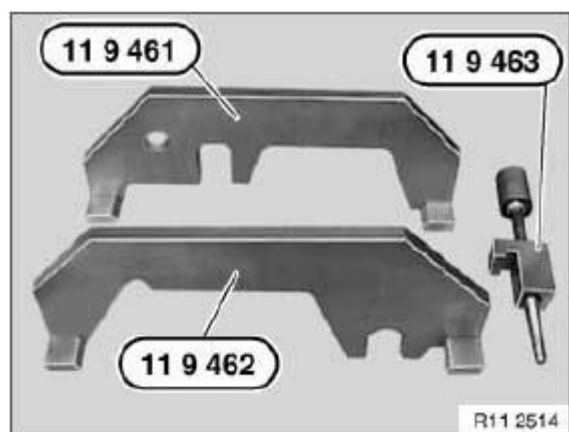
Tighten screw on inlet adjustment unit without play and then slacken off again by a half turn.



**Fig. 584: Locating Inlet Adjustment Unit Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

Get special tool kit 11 9 460 ready for securing camshafts.

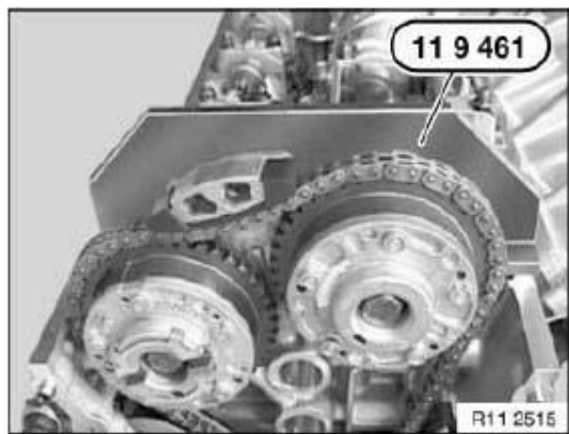
**NOTE:** Special tool 11 9 461 for securing inlet camshaft.  
Special tool 11 9 462 for securing exhaust camshaft.  
Special tool 11 9 463 (holder with screw).



**Fig. 585: Identifying Special Tools**

Courtesy of BMW OF NORTH AMERICA, INC.

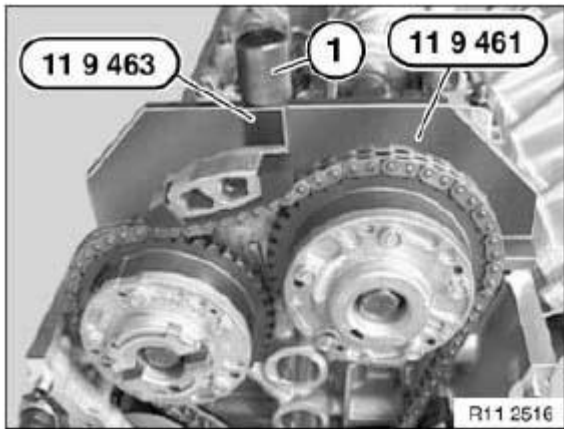
Place special tool **11 9 461** on inlet camshaft and align inlet camshaft so that special tool **11 9 461** rests without a gap on cylinder head.



**Fig. 586: Identifying Special Tool (11 9 461) On Inlet Camshaft**

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.

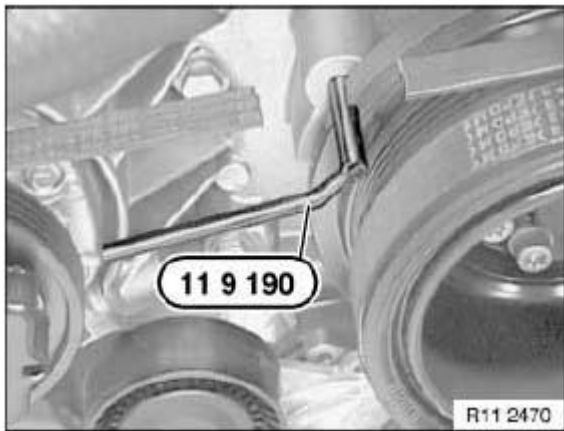


**Fig. 587: Identifying Special Tools (11 9 461) And (11 9 463)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Make sure screws of inlet and exhaust adjustment units have been slackened off.**

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.

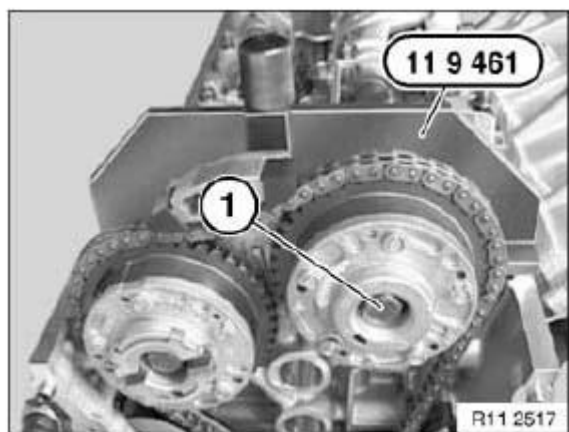


**Fig. 588: Identifying Special Tool (11 9 190)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE: When tightening down screw (1), grip camshaft at hexagon head.**

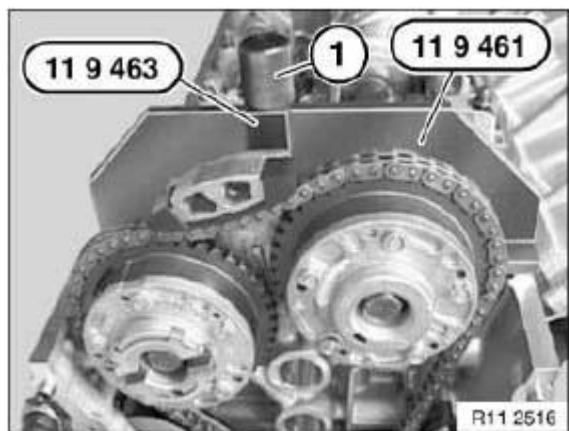
Tighten down screw (1) of inlet adjustment unit.

Tightening torque, see **11 36 16AZ** in **11 36 VARIABLE CAMSHAFT CONTROL** .



**Fig. 589: Identifying Special Tools (11 9 461) And 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. 590: Identifying Special Tools (11 9 461) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

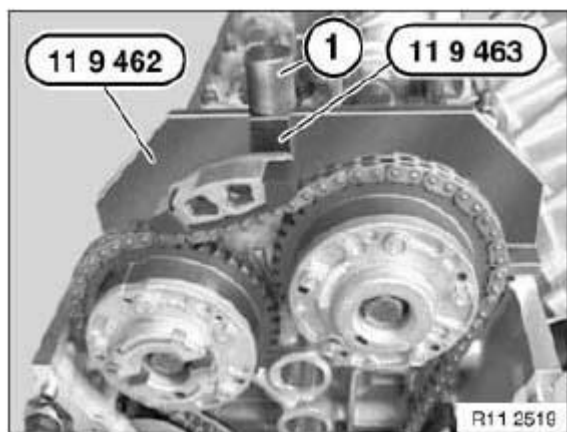
Place special tool 11 9 462 on exhaust camshaft and align exhaust camshaft so that special tool 11 9 462 rests without a gap on cylinder head.





**Fig. 591: Identifying Special Tool (11 9 462) On Exhaust Camshaft**  
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.

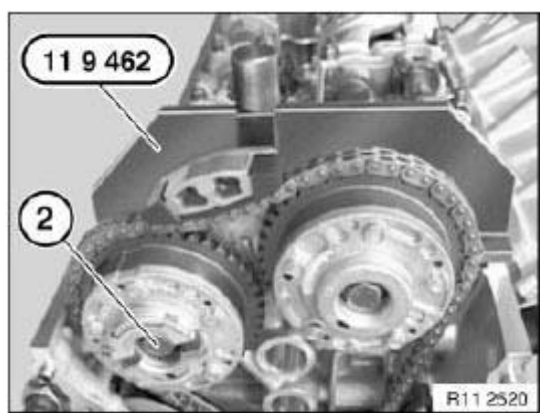


**Fig. 592: Identifying Special Tools (11 9 462) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** When tightening down screw (2), grip camshaft at hexagon head.

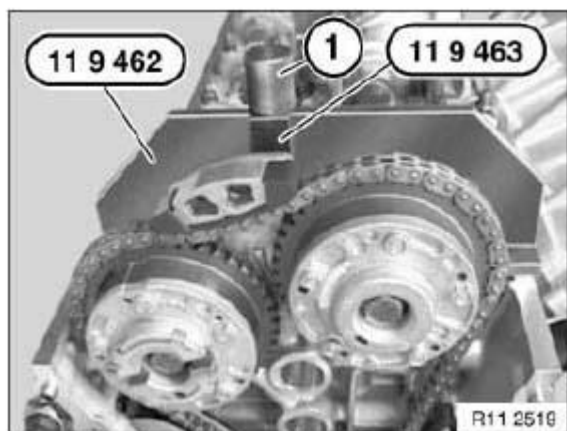
Tighten down screw (2) of exhaust adjustment unit.

Tightening torque, see **11 36 16AZ** in **11 36 VARIABLE CAMSHAFT CONTROL** .



**Fig. 593: Identifying Special Tools (11 9 462) And Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove special tools **11 9 463** /**11 9 462** from exhaust camshaft.

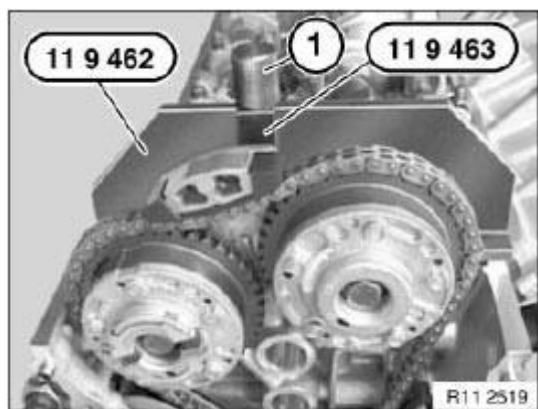


**Fig. 594: Identifying Special Tool (11 9 462) And (11 9 463)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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. 595: 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.

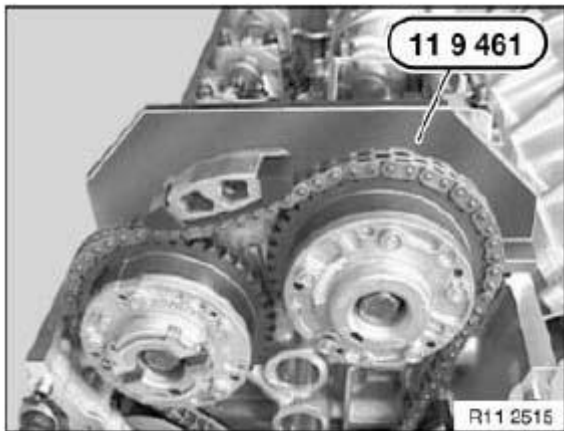
**NOTE:** The timing is correctly adjusted when special tool 11 9 461 rests flat on the cylinder head or protrudes by up to 0.5 mm to the exhaust side.



**Fig. 596: Identifying Special Tool (11 9 461) On Inlet Camshaft**

Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 11 9 462 on exhaust camshaft and check timing.



**Fig. 597: Identifying Special Tool (11 9 461) On Inlet Camshaft**  
 Courtesy of BMW OF NORTH AMERICA, INC.

**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. 598: Identifying Special Tool (11 9 462) On Exhaust Camshaft**  
 Courtesy of BMW OF NORTH AMERICA, INC.

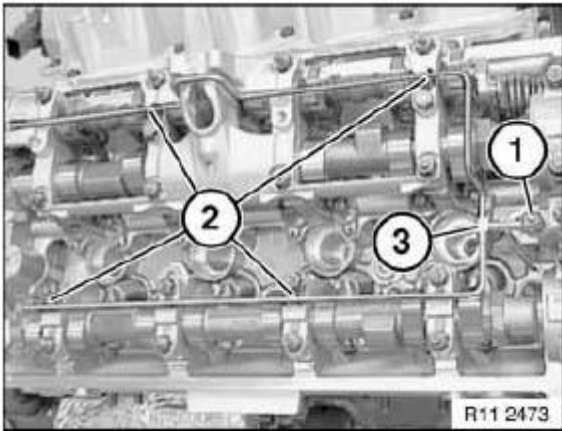
Remove all special tools.

**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. 599: Identifying Oil Line And 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.

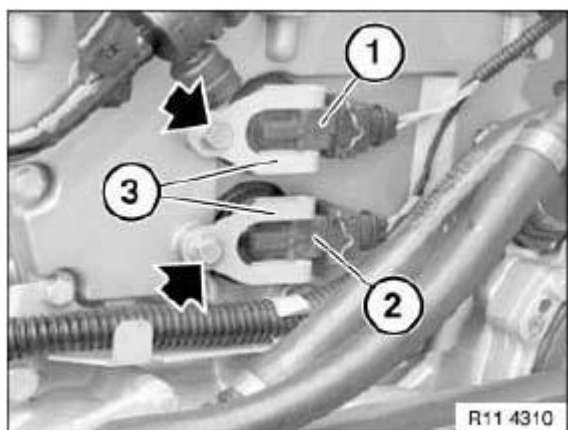
Unlock plug of solenoid valves (1 and 2) and disconnect.

Release screws and remove holder (3).

Pull out solenoid valves (1 and 2).

*Installation:*

Check holder (3) for deformation; replace if necessary.

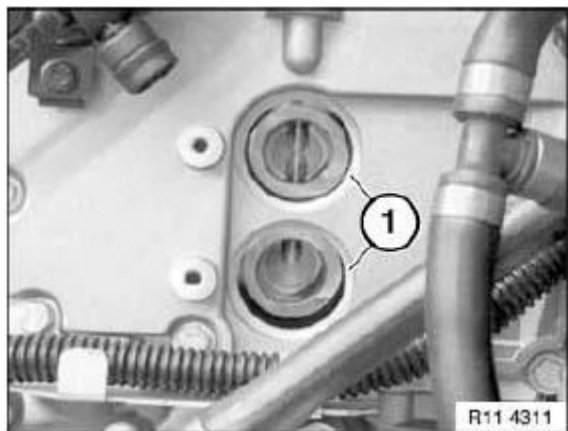


**Fig. 600: Locating Holder Screws**

Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Clean sealing faces (1) on cylinder head.

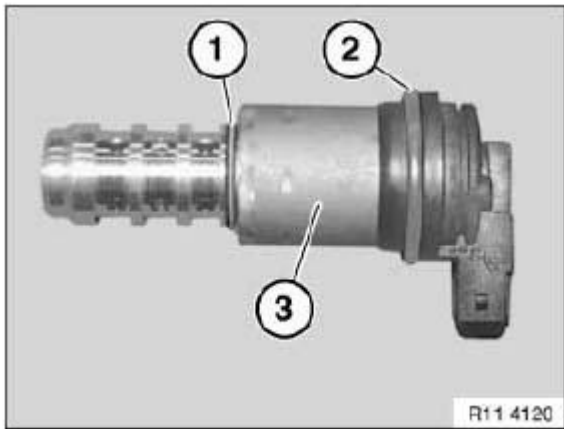


**Fig. 601: Identifying Sealing Faces On Cylinder Head**

Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Replace O-rings (1 and 2) on solenoid valve (3) and lubricate.



**Fig. 602: Identifying O-Rings On Solenoid Valve**  
Courtesy of BMW OF NORTH AMERICA, INC.

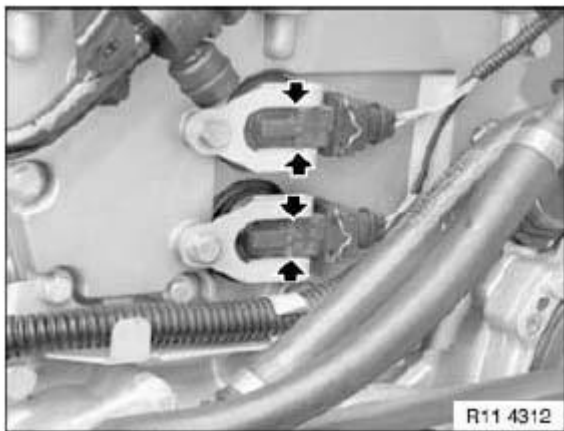
*Installation:*

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.



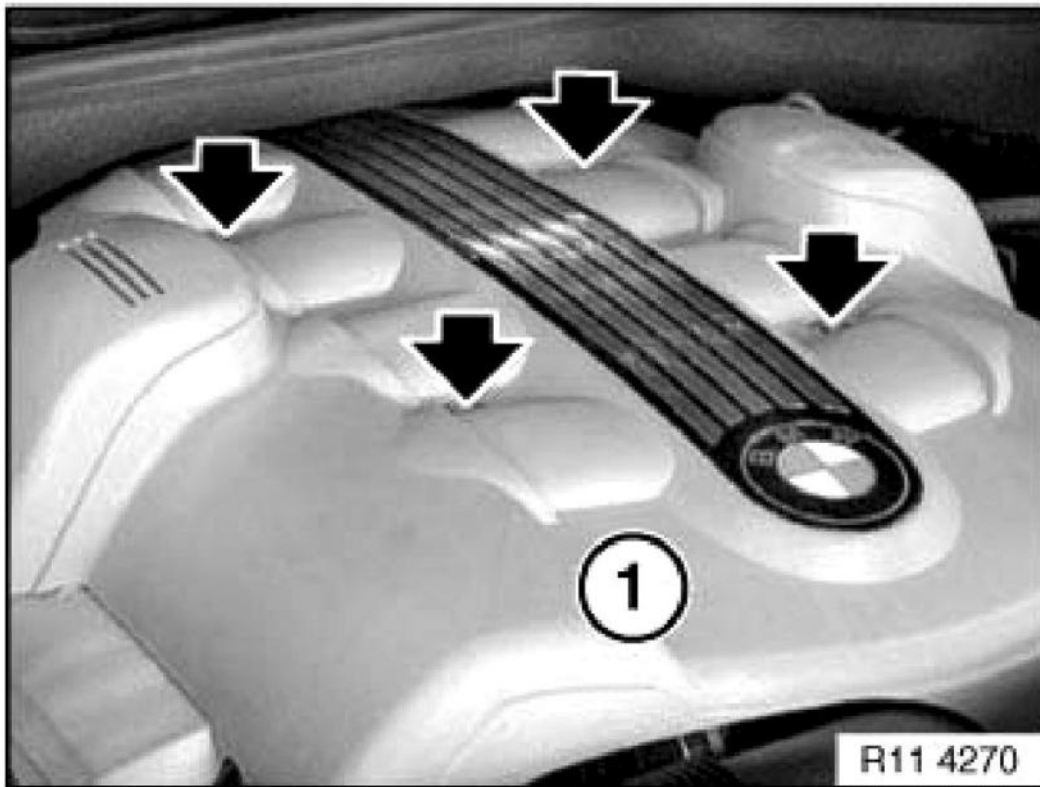
**Fig. 603: Locating Solenoid Valve Holder Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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
- Unfasten **acoustic cover** screws. Raise cover and remove toward front. Remove **acoustic cover**



**Fig. 604: Identifying Acoustic Cover**  
Courtesy of BMW OF NORTH AMERICA, INC.

- Remove **design cover**
- Remove **upper section of intake filter housing with air-mass flow sensor and intake hose**. See **13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING**

**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.

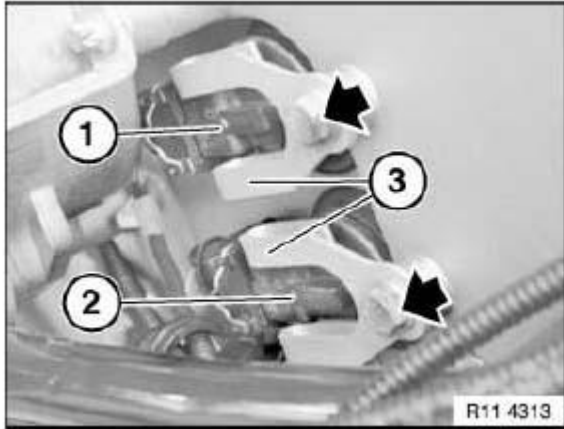
Release screws and remove holder (3).

Pull out solenoid valves (1 and 2).



*Installation:*

Check holder (3) for deformation; replace if necessary.

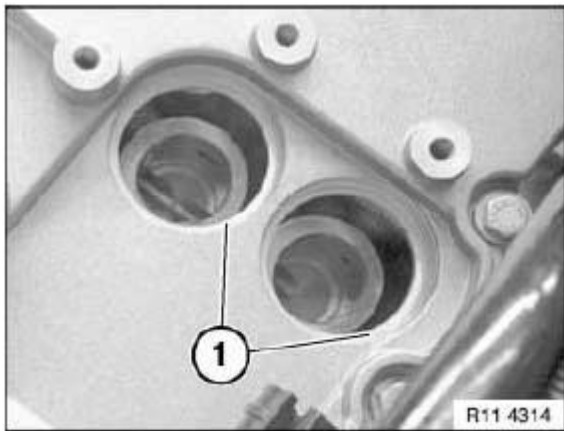


**Fig. 605: Locating Holder Screws**

Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Clean sealing faces (1) on cylinder head.

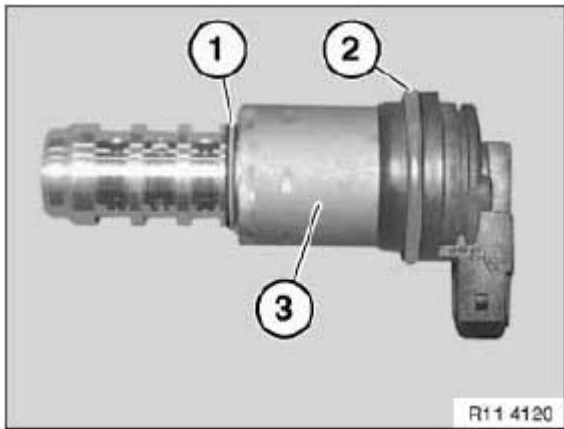


**Fig. 606: Identifying Sealing Faces On Cylinder Head**

Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Replace O-rings (1 and 2) on solenoid valve (3) and lubricate.



**Fig. 607: Identifying O-Rings On Solenoid Valve**  
Courtesy of BMW OF NORTH AMERICA, INC.

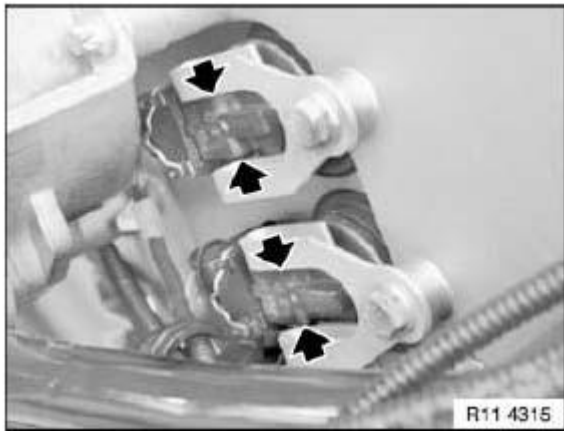
*Installation:*

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. 608: Locating Holders Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

## 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. See 12 13 511 REPLACING IGNITION COIL (N62TU).
- Remove spark plugs on cylinder bank 5 to 8. See 12 12 011 REPLACING ALL SPARK PLUGS (N62, N62TU).
- 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.

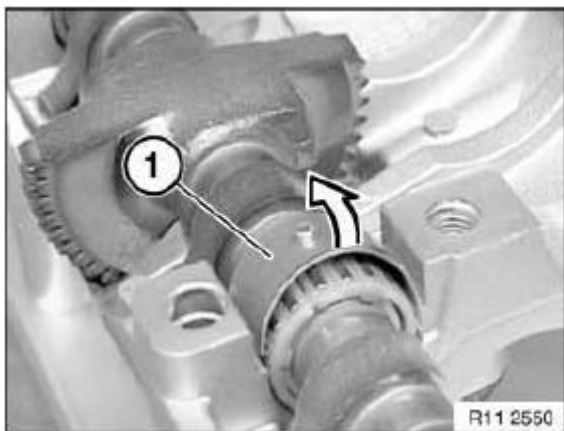
**IMPORTANT:** Note installation direction of eccentric shafts.

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.

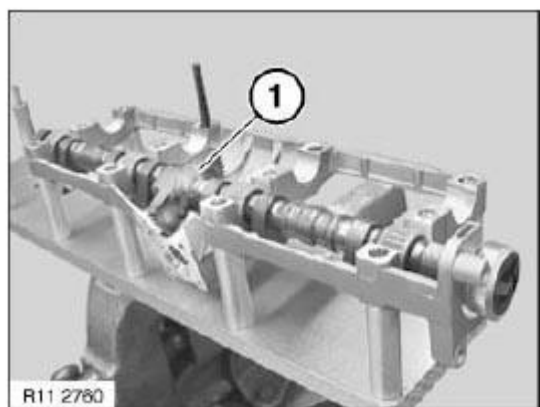
Carefully tilt bearing shell (1) to one side and simultaneously remove towards top.



**Fig. 609: Tilting Bearing Shell**

Courtesy of BMW OF NORTH AMERICA, INC.

Lift out eccentric shaft (1).

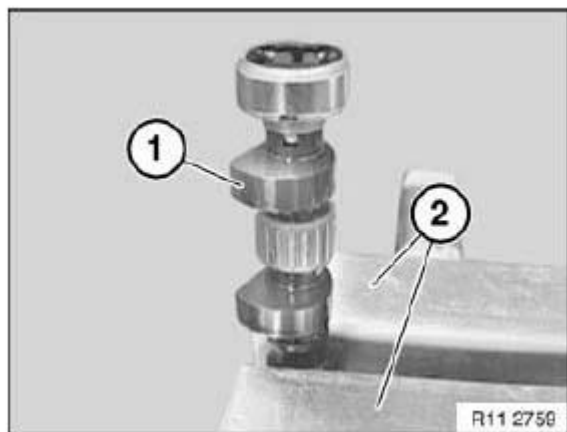


**Fig. 610: Identifying Eccentric Shaft**

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.



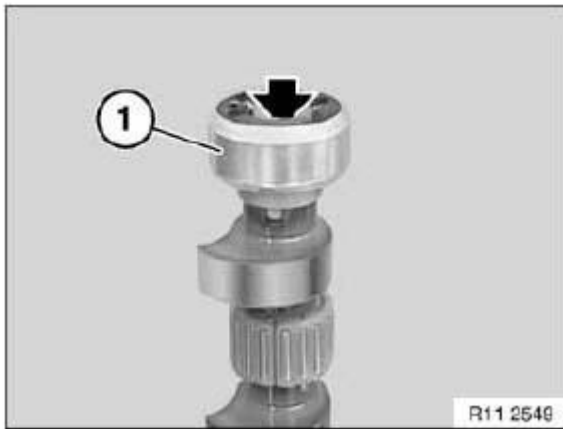
**Fig. 611: Identifying Eccentric Shaft And Jaws**

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. 612: Identifying Magnet Wheel**

Courtesy of BMW OF NORTH AMERICA, INC.

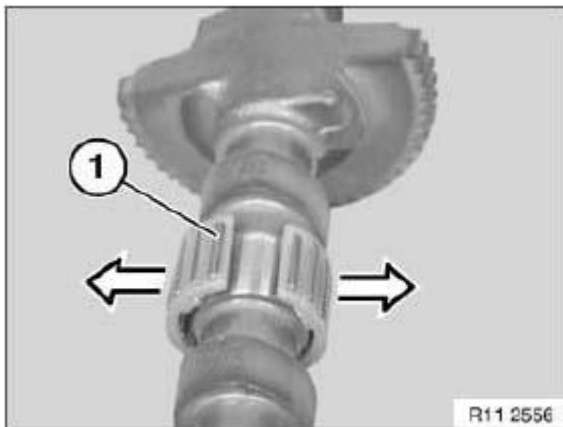
**NOTE:** Magnet wheel (1) is extremely magnetic.

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.

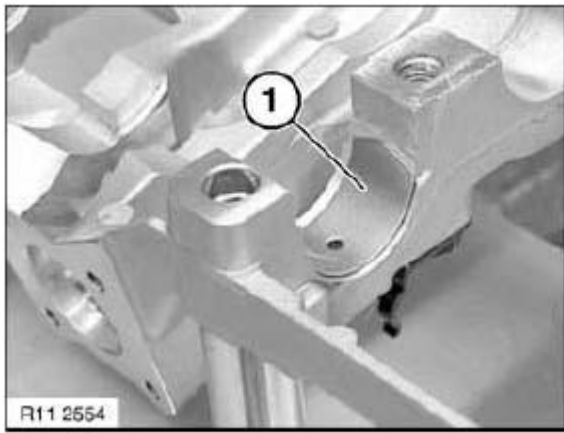


**Fig. 613: Pressing Needle Bearings**

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. 614: Identifying Bearing Shell**

Courtesy of BMW OF NORTH AMERICA, INC.

### Installation

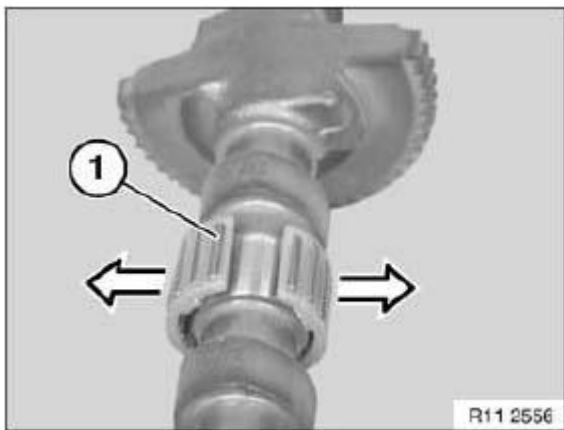
Installation of eccentric shaft is described separately from removal.

**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. 615: Pressing 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.

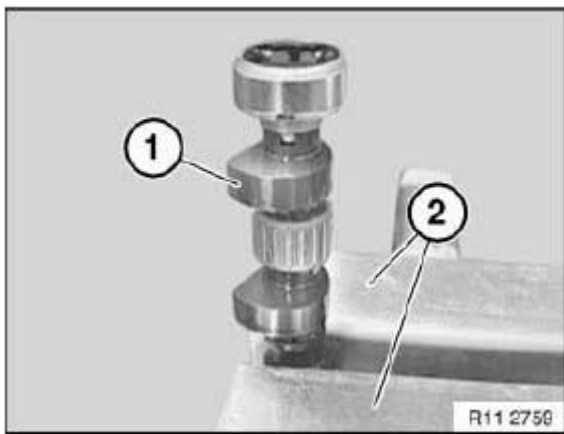
**IMPORTANT:** Note installation direction of eccentric shafts.

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. 616: Identifying Eccentric Shaft And Jaws**  
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.

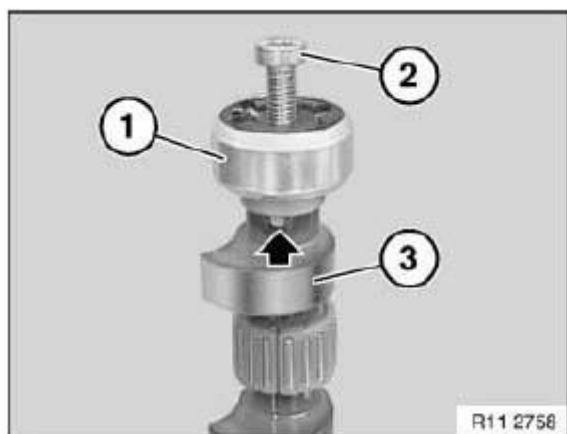
The unmachined surface on the eccentric points to the left.

Secure magnet wheel (1) with lug in eccentric shaft groove.

**IMPORTANT:** Only install original antimagnetic screw (2).

Insert screw (2) and tighten down.

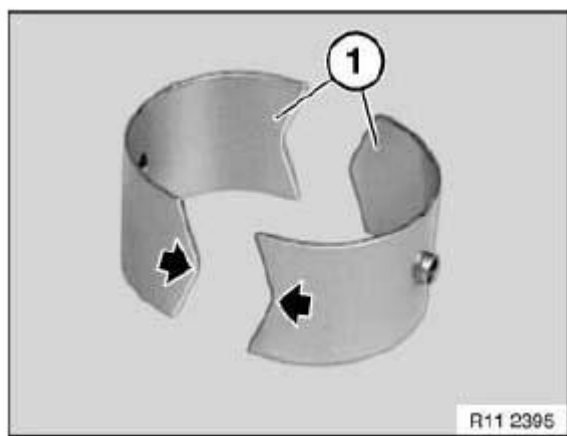
Tightening torque, see **11 37 1AZ** in **11 37 VARIABLE VALVE GEAR**.



**Fig. 617: Securing Magnet Wheel With Lug In Eccentric Shaft Groove**  
**Courtesy of BMW OF NORTH AMERICA, INC.**

**NOTE:** Replace bearing shells (1) of needle bearings.

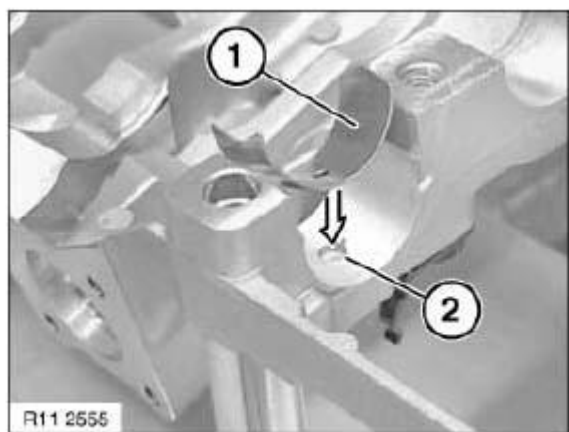
**IMPORTANT: Bearing shells (1) must be installed in such a way that ends of bearing shells (1) face each other as shown in illustration.**



**Fig. 618: Identifying Bearing Shells Of Needle Bearings**  
**Courtesy of BMW OF NORTH AMERICA, INC.**

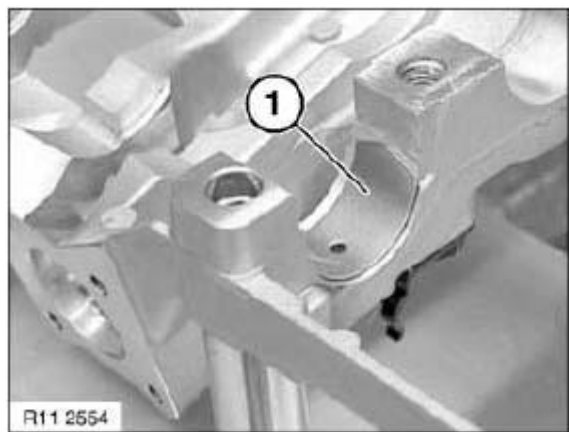
Insert bearing shells (1) into bearing bracket so that it is secured in bore (2).





**Fig. 619: Inserting Bearing Shells Into Bearing Bracket**  
Courtesy of BMW OF NORTH AMERICA, INC.

Lubricate bearing shells (1) with engine oil.

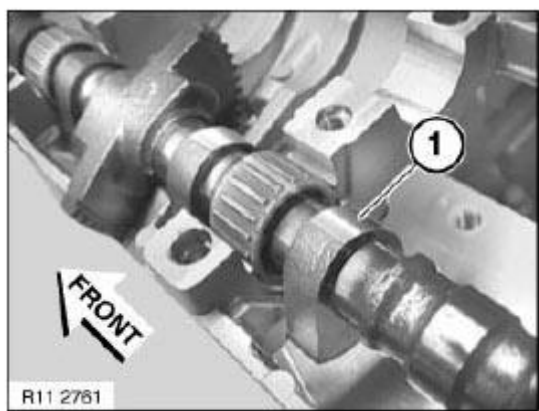


**Fig. 620: Identifying Bearing Shell**  
Courtesy of BMW OF NORTH AMERICA, INC.

Cylinder bank 5 to 8:

**IMPORTANT:** The machined curvature (1) of the eccentric points inwards.

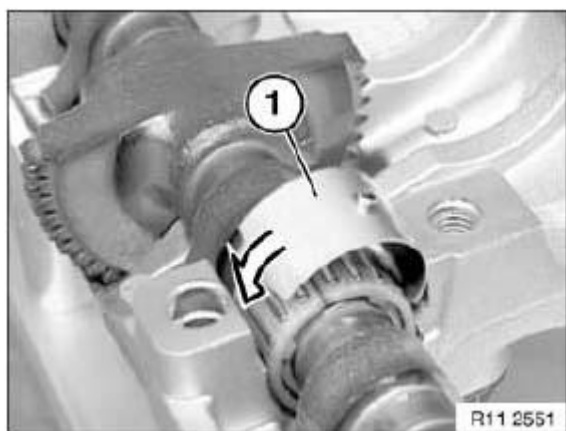
Install eccentric shaft as shown in graphic.



**Fig. 621: Identifying Machined Curvature**  
Courtesy of BMW OF NORTH AMERICA, INC.

Lubricate bearing shells (1) with engine oil.

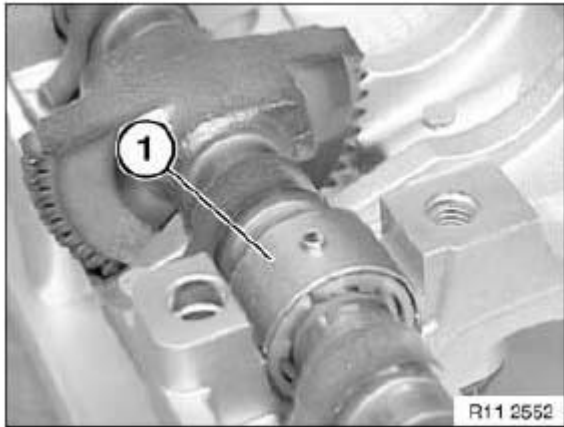
Install bearing shells (1).



**Fig. 622: 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. 623: Identifying Bearing Shells**

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 10/03 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.

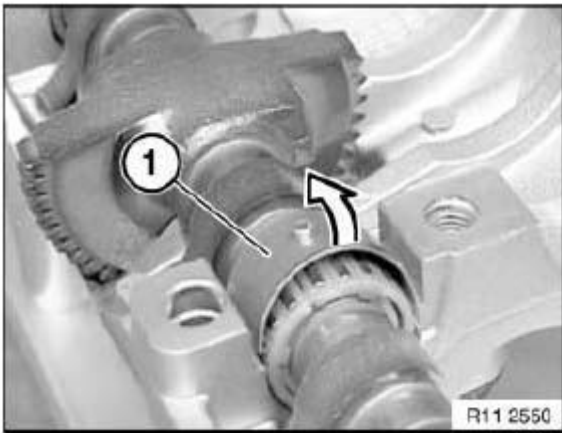
*Incorrect assembly will result in engine damage.*

**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.

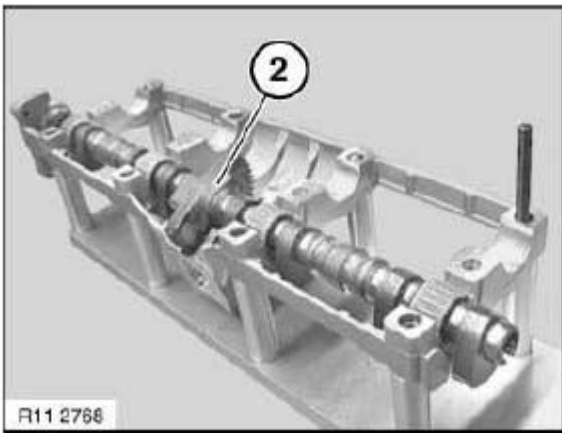
Carefully tilt bearing shell (1) to one side and simultaneously remove towards top.



**Fig. 624: Tilting Bearing Shell**

Courtesy of BMW OF NORTH AMERICA, INC.

Lift out eccentric shaft (2).

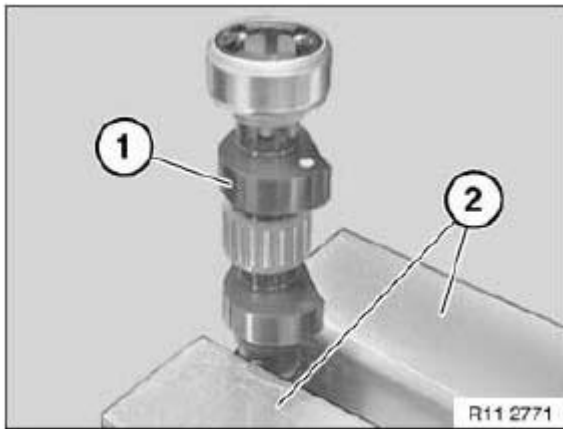


**Fig. 625: Identifying Eccentric Shaft**

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. 626: Clamping Eccentric Shaft 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.

**NOTE: Magnet wheel (1) is extremely magnetic.**

After removal, place magnet wheel in a plastic bag to protect it against metal chips.

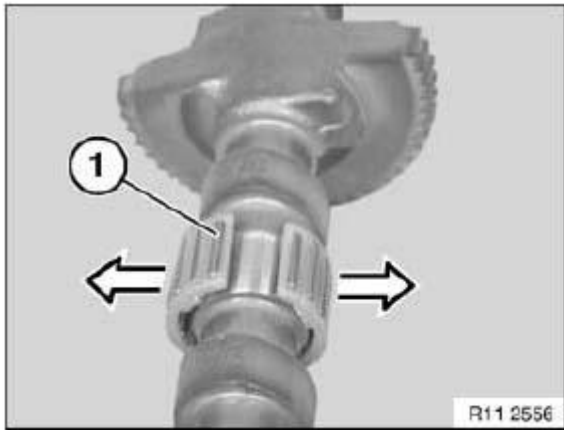
Release screw and remove magnet wheel (1).



**Fig. 627: Removing Magnet Wheel**  
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.

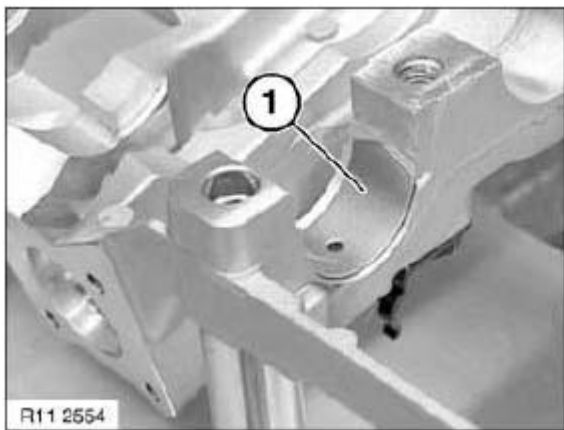


**Fig. 628: Pressing Needle Bearings**

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. 629: Identifying Bearing Shell**

Courtesy of BMW OF NORTH AMERICA, INC.

#### Installation:

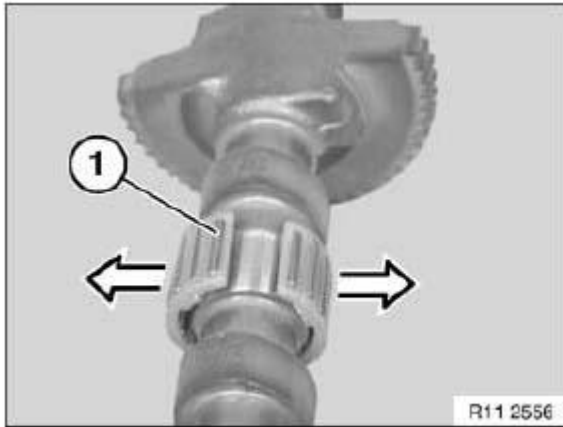
Installation of eccentric shaft is described separately from removal.

**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. 630: Pressing 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.

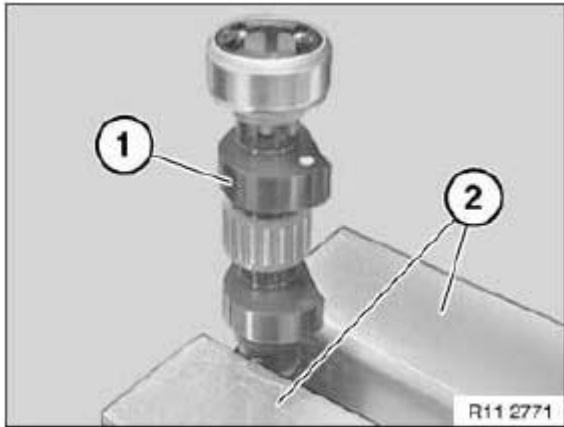
**IMPORTANT:** Note installation direction of eccentric shafts.

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. 631: Clamping Eccentric Shaft With Protective Jaws 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.

**IMPORTANT: Only install original antimagnetic screw (2).**

Insert screw (2) and tighten down.



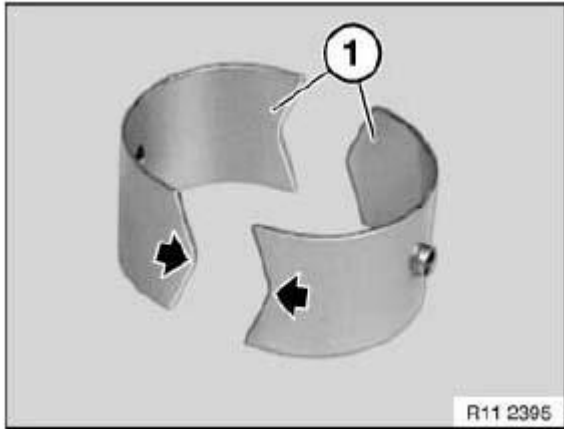
**Fig. 632: Securing Magnet Wheel With Lug In Eccentric Shaft Groove**  
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque, see **11 37 1AZ** in **11 37 VARIABLE VALVE GEAR** .



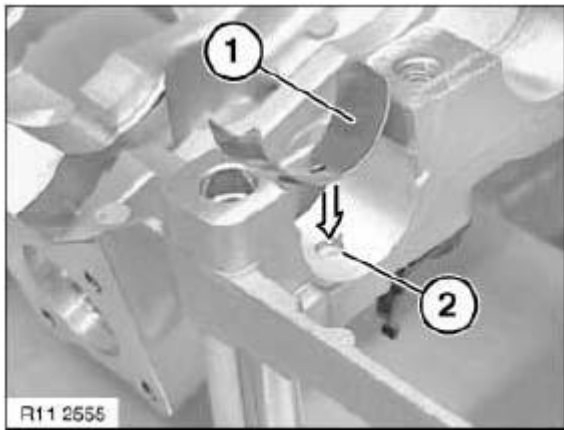
**NOTE:** Replace bearing shells (1) of needle bearings.

**IMPORTANT:** Bearing shells (1) must be installed in such a way that ends of bearing shells (1) face each other as shown in illustration.



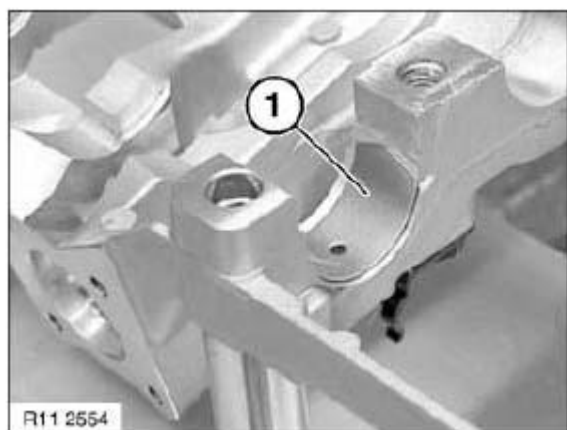
**Fig. 633: Identifying Bearing Shells Of Needle Bearings**  
Courtesy of BMW OF NORTH AMERICA, INC.

Insert bearing shells (1) into bearing bracket so that it is secured in bore (2).



**Fig. 634: Inserting Bearing Shells Into Bearing Bracket**  
Courtesy of BMW OF NORTH AMERICA, INC.

Lubricate bearing shells (1) with engine oil.



**Fig. 635: Identifying Bearing Shell**

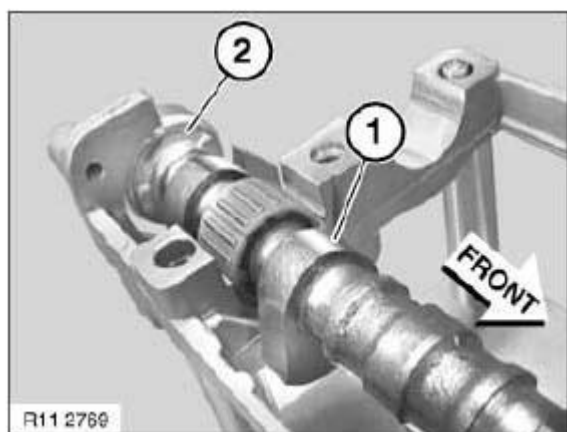
Courtesy of BMW OF NORTH AMERICA, INC.

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.

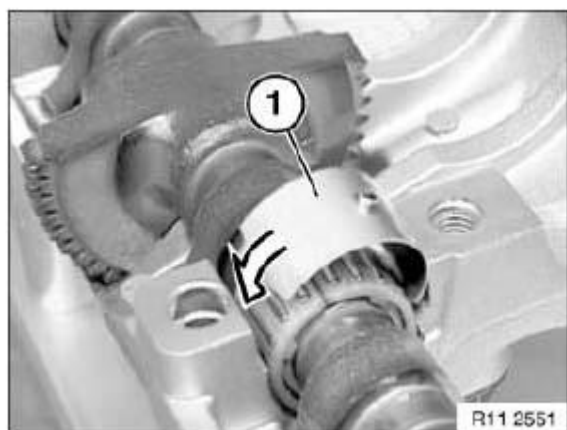


**Fig. 636: Installing Eccentric Shaft**

Courtesy of BMW OF NORTH AMERICA, INC.

Lubricate bearing shells (1) with engine oil.

Install bearing shells (1).

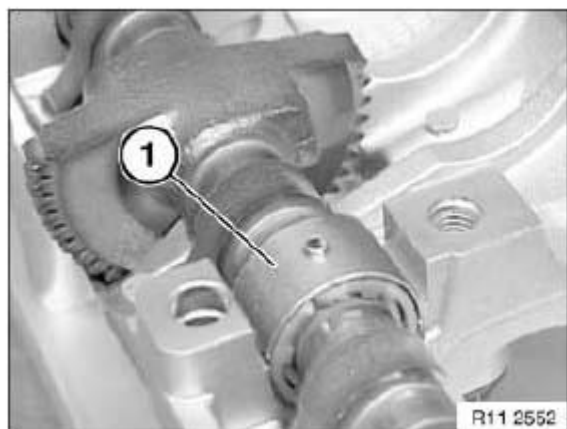


**Fig. 637: Installing Bearing Shells**

Courtesy of BMW OF NORTH AMERICA, INC.

Bearing shells (1) must snap audibly into place.

Check correct position of bearing shells (1).



**Fig. 638: Identifying Bearing Shells**

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 . See ENGINE- SPECIAL TOOLS .
- 11 9 472

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

(cylinder bank 5 to 8)

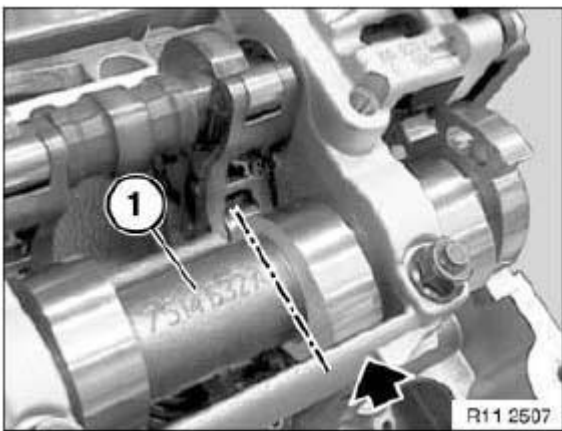
Removal of intermediate levers is described separately from installation.

*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.

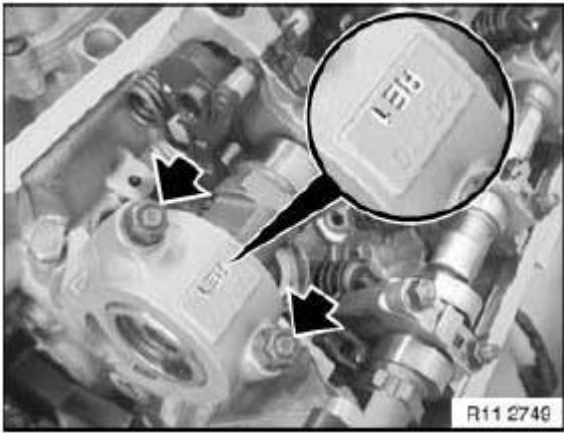


**Fig. 639: Identifying Camshaft Lettering On 8th Cylinder Point**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

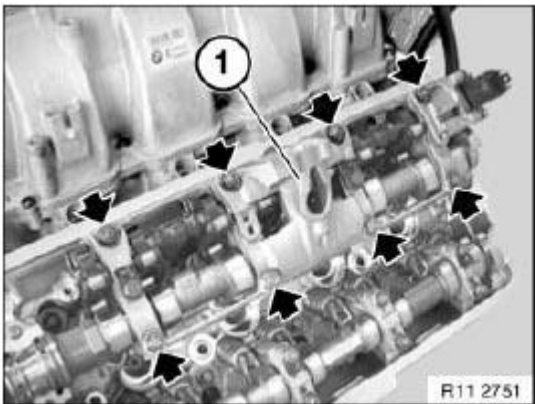
**NOTE:** Bearing caps of inlet camshaft are marked on cylinder bank 5 to 8 with R E1 to R E5 from inlet side.

Release nuts and remove bearing cap R E1.



**Fig. 640: Identifying Nuts And Bearing Cap R E1**  
Courtesy of BMW OF NORTH AMERICA, INC.

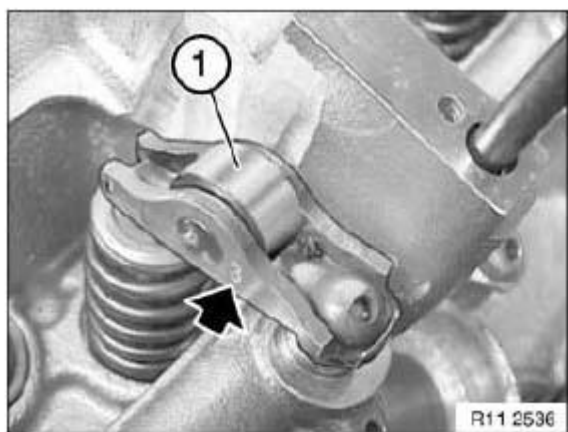
Release 8 nuts of bearing bracket (1) from outside to inside.



**Fig. 641: Locating Bearing Bracket Nuts**  
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. 642: Identifying Rocker Arm**

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.

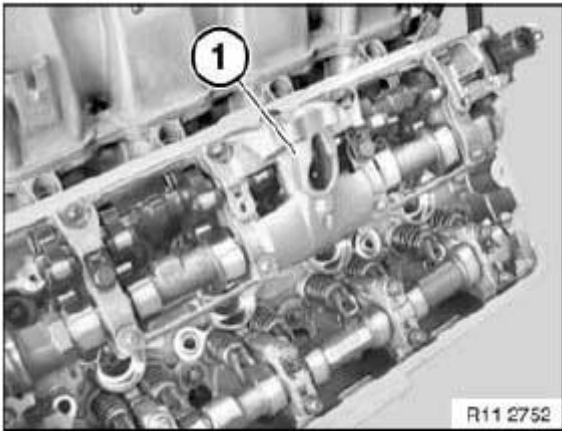


**Fig. 643: Identifying Special Tool (11 9 470)**

Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Do not tilt bearing bracket (1).**

Carefully lift out bearing bracket (1).

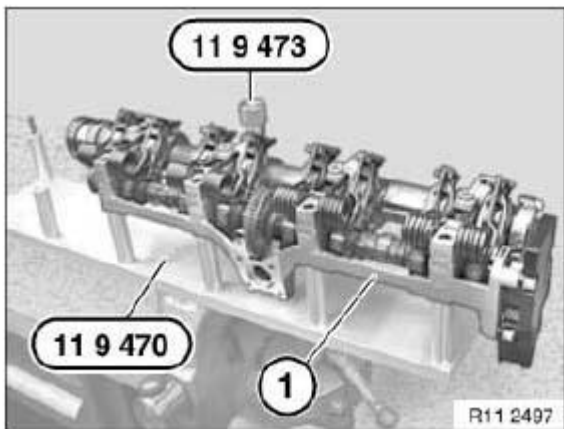


**Fig. 644: Identifying Bearing Bracket**

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** ).

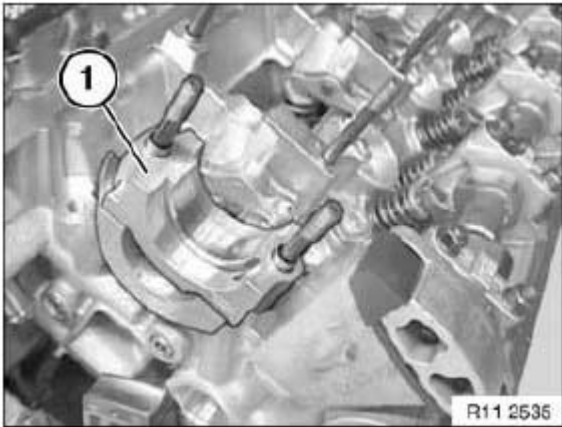


**Fig. 645: Identifying Special Tool (11 9 470) And (11 9 473)**

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.

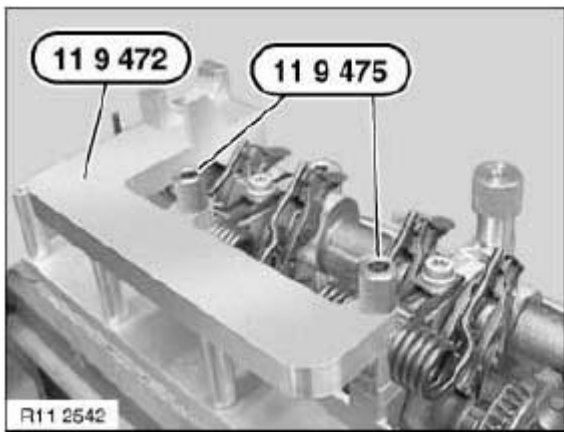


**Fig. 646: Identifying Lower Section Of Bearing Bracket**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

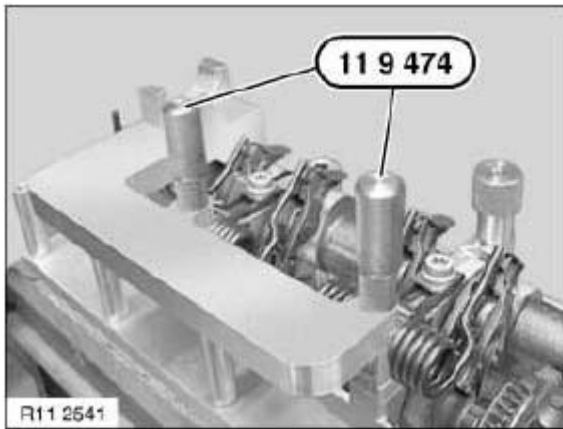
Fit special tool **11 9 472** and secure with special tool **11 9 475**.



**Fig. 647: Identifying Special Tool (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. 648: Identifying Special Tool (11 9 474)**

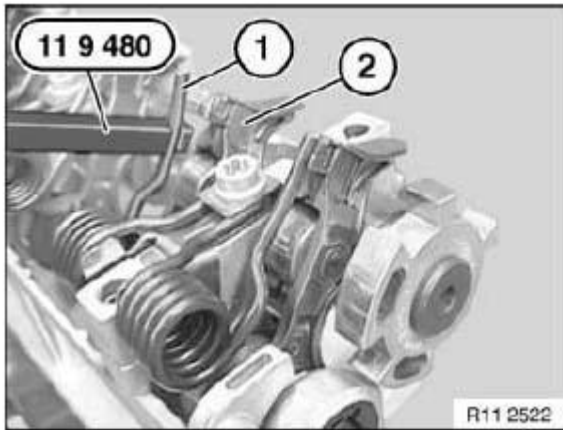
Courtesy of BMW OF NORTH AMERICA, INC.

**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.

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

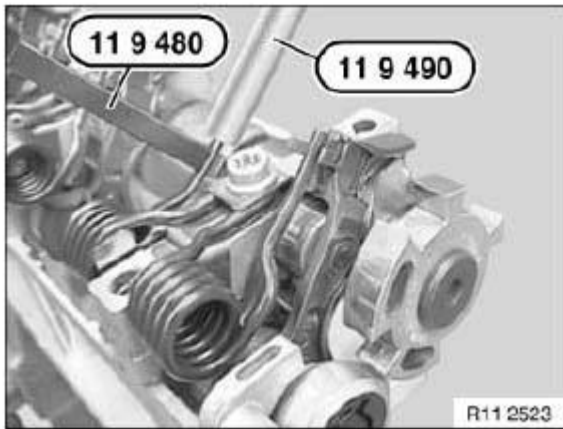


**Fig. 649: Identifying Special Tool (11 9 480) And Torsion Spring**

Courtesy of BMW OF NORTH AMERICA, INC.

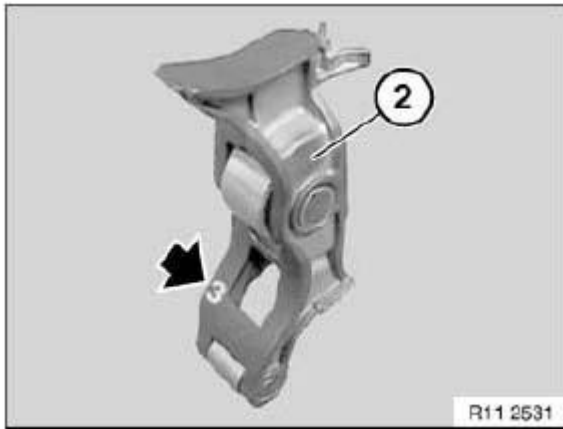
Attach special tool 11 9 490 to end of torsion spring.

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



**Fig. 650: 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.

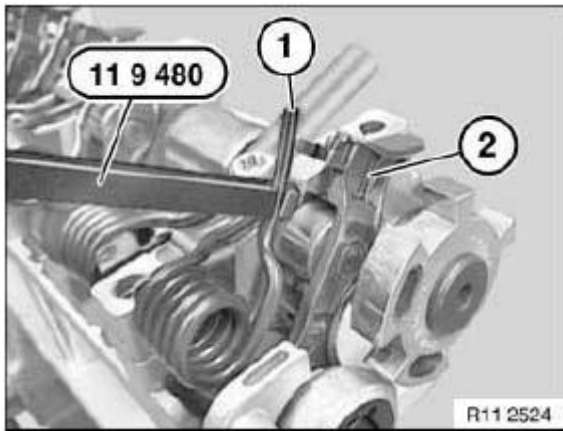


**Fig. 651: Identifying Intermediate Levers**  
Courtesy of BMW OF NORTH AMERICA, INC.

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.

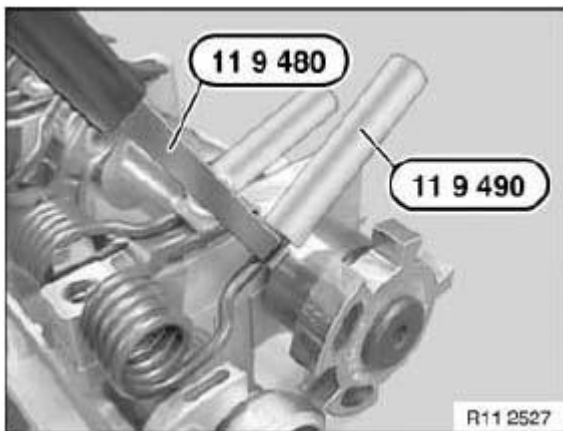
**IMPORTANT:** Keep holding torsion spring (1) with special tool 11 9 480.



**Fig. 652: Identifying Special Tool (11 9 480) 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. 653: Identifying Special Tool (11 9 480) And (11 9 490)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

#### **Installation:**

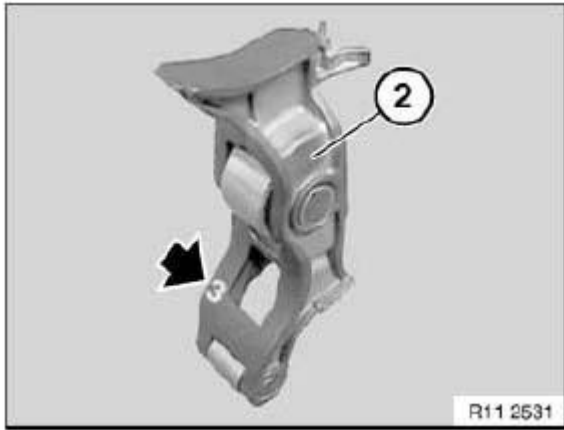
Installation of intermediate levers is described separately from removal.

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.**

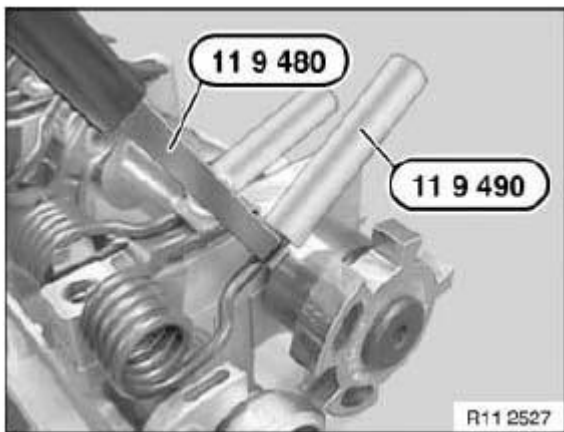
Lubricate all sliding surfaces on intermediate lever (2) with engine oil.



**Fig. 654: Identifying 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.

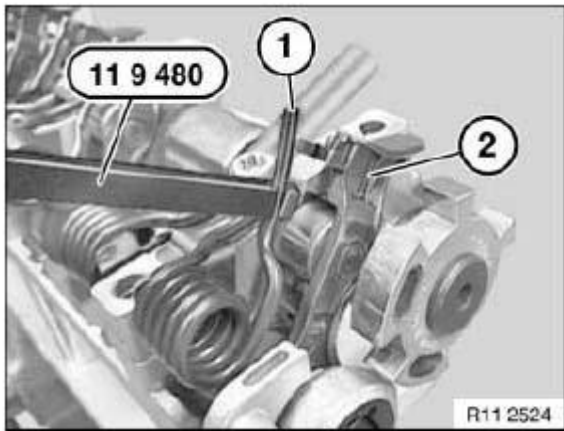


**Fig. 655: Identifying Special Tool (11 9 480) And (11 9 490)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

Install intermediate lever (2) from above.

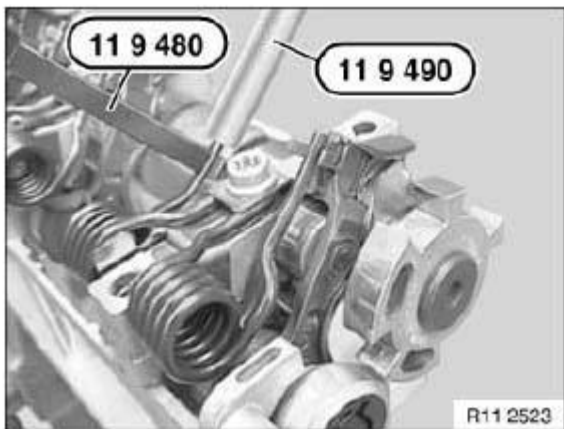
Insert end of torsion spring (1) into guide on intermediate lever (2).



**Fig. 656: Identifying Special Tool (11 9 480) 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**.

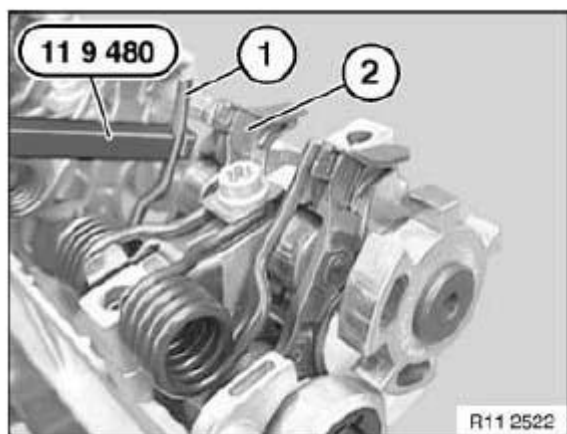


**Fig. 657: Identifying Special Tool (11 9 480) And (11 9 490)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

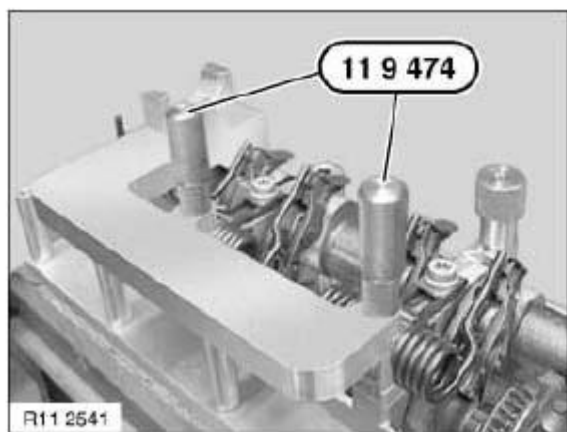
Install intermediate lever (2) from above.

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



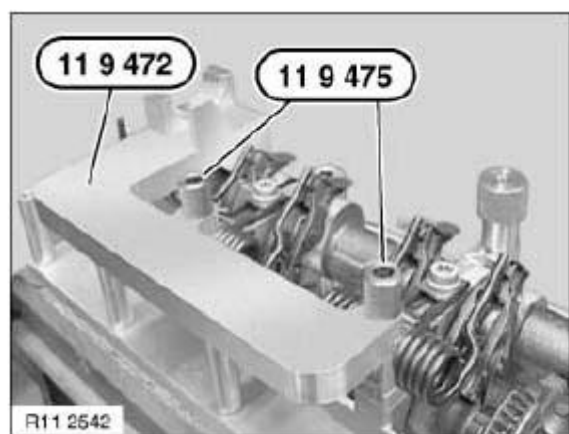
**Fig. 658: Identifying Special Tool (11 9 480) And Torsion Spring**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 474 .



**Fig. 659: Identifying Special Tool (11 9 474)**  
Courtesy of BMW OF NORTH AMERICA, INC.

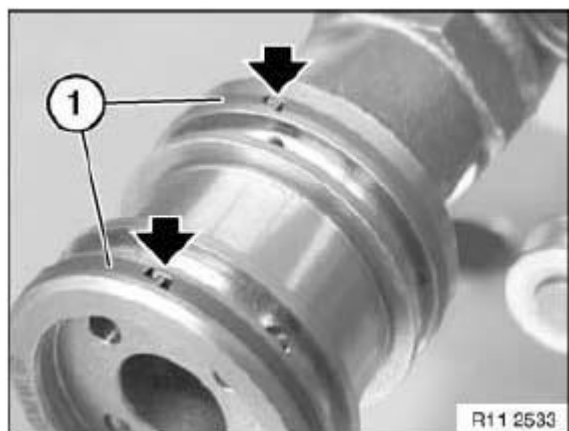
Remove special tools 11 9 472 and special tools 11 9 475 .



**Fig. 660: Identifying Special Tool (11 9 472) And (11 9 475)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Ends of compression rings (1) point upwards.

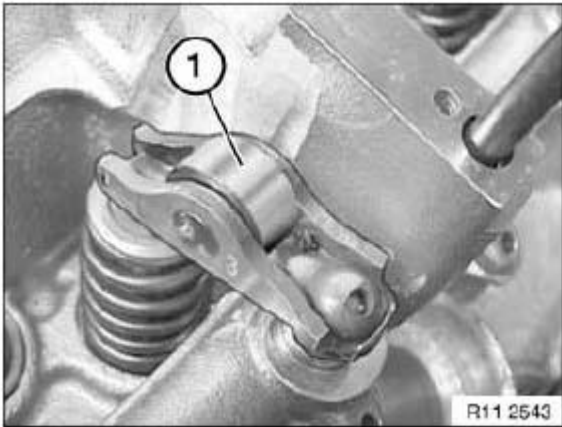
Make sure compression rings (1) are engaged at ends.



**Fig. 661: 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.

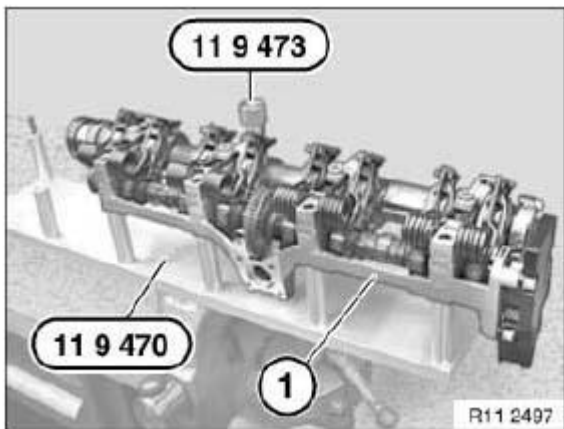


**Fig. 662: Identifying Rocker Arm**

Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 473 .

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



**Fig. 663: Identifying Special Tool (11 9 470) And (11 9 473)**

Courtesy of BMW OF NORTH AMERICA, INC.

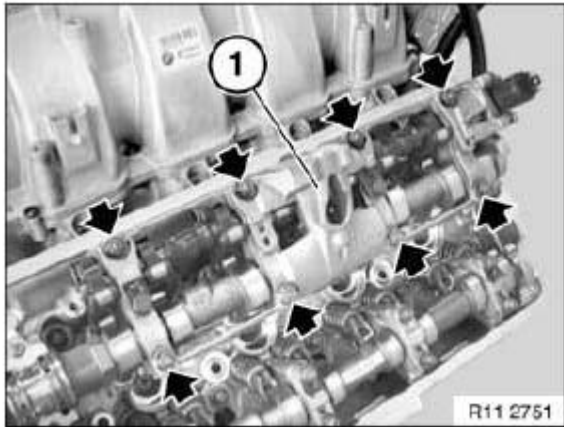
**IMPORTANT: Do not tilt bearing bracket (1).**

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. 664: Locating Bearing Bracket Nuts**  
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down nuts from inside to outside.

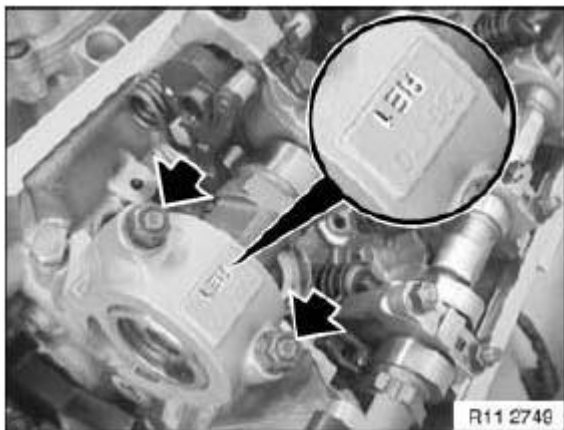
Tightening torque, see 11 31 1AZ in CAMSHAFT .

**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.

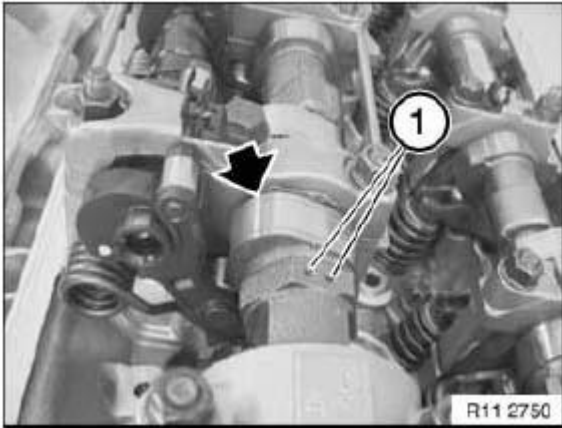
Tightening torque, see 11 31 1AZ in CAMSHAFT .



**Fig. 665: Identifying Nuts And Bearing Cap R E1**  
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. 666: Identifying Hexagon Drive Of Inlet 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.

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 . See ENGINE- SPECIAL TOOLS .
- 11 9 472
- 11 9 473
- 11 9 474
- 11 9 475
- 11 9 480
- 11 9 490

(cylinder bank 1 to 4)

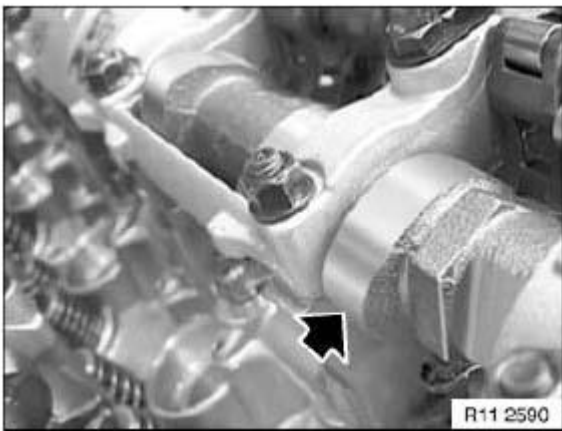
Removal of intermediate levers is described separately from installation.

*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.

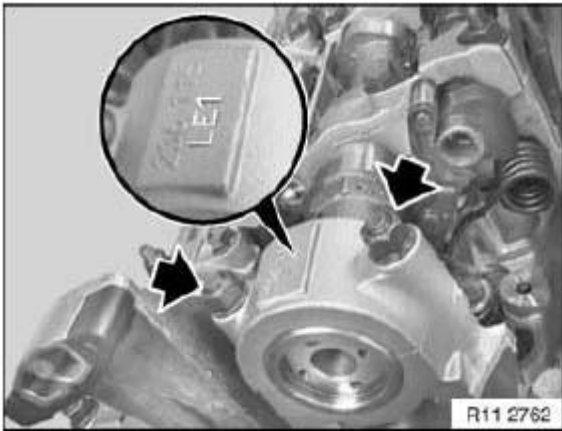


**Fig. 667: Locating Inlet Camshaft Lobe**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

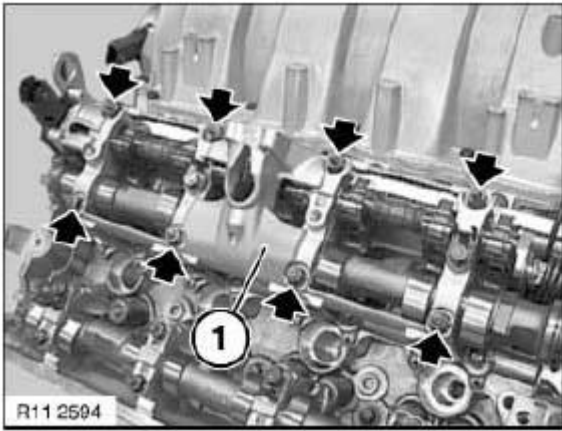
**NOTE:** Bearing caps of inlet camshaft are marked on cylinder bank 1 to 4 with L E1 to L E5 from inlet side.

Release nuts and remove bearing cap L E1.



**Fig. 668: Identifying Bearing Cap L E1**  
 Courtesy of BMW OF NORTH AMERICA, INC.

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



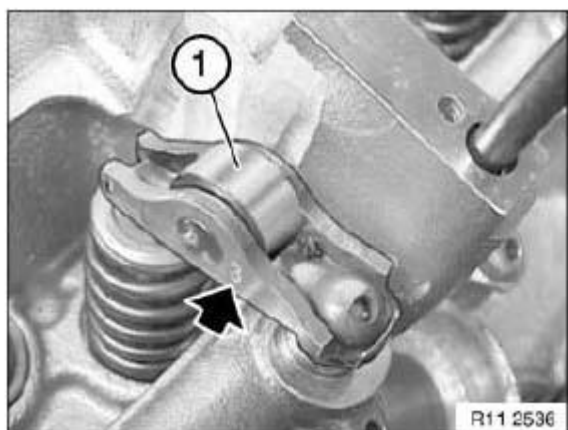
**Fig. 669: Locating Bearing Bracket Nuts**  
 Courtesy of BMW OF NORTH AMERICA, INC.

**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.

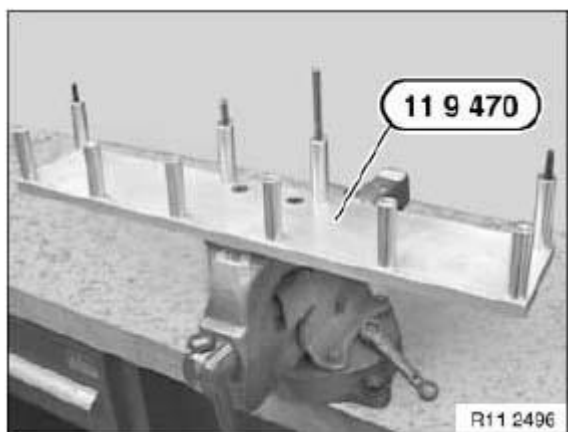
When replacing rocker arms (1) on inlet side: install rocker arms of the same tolerance class in the same position.



**Fig. 670: Identifying Rocker Arm**

Courtesy of BMW OF NORTH AMERICA, INC.

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

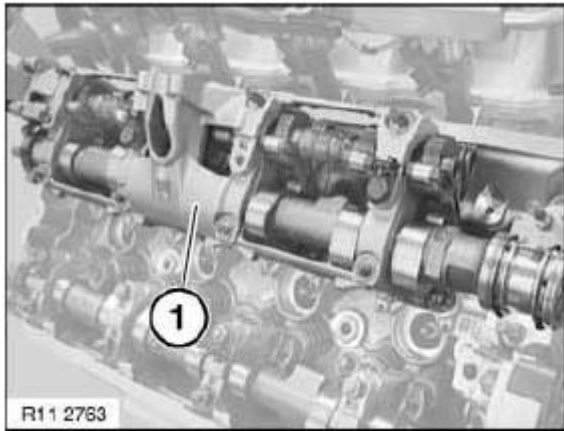


**Fig. 671: Identifying Special Tool (11 9 470)**

Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Do not tilt bearing bracket (1).**

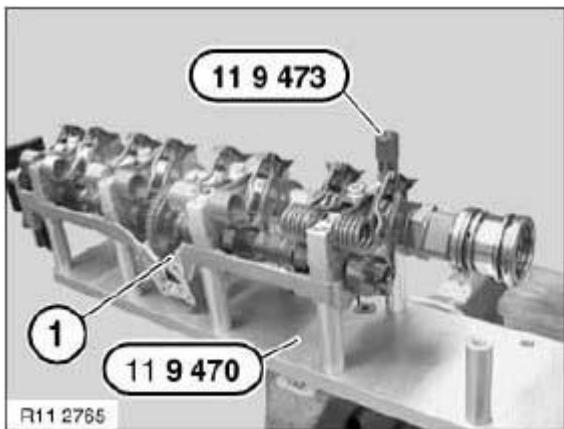
Carefully lift out bearing bracket (1).



**Fig. 672: 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**.

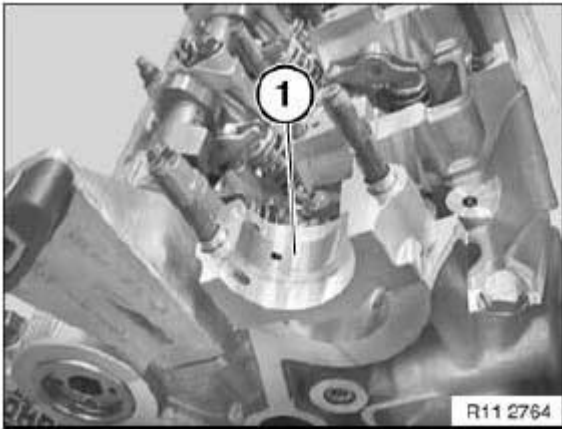
Secure bearing bracket (1) with a nut (special tool **11 9 473** ).



**Fig. 673: Identifying Special Tool (11 9 470) And (11 9 473)**  
Courtesy of BMW OF NORTH AMERICA, INC.

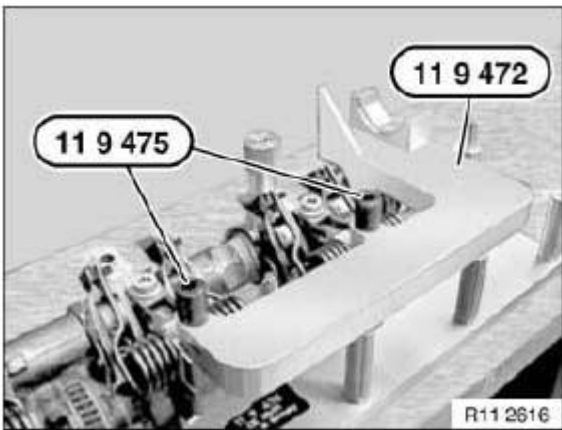
**IMPORTANT:** The lower section of the bearing bracket (1) is machined with the cylinder head and must not be mixed up.

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



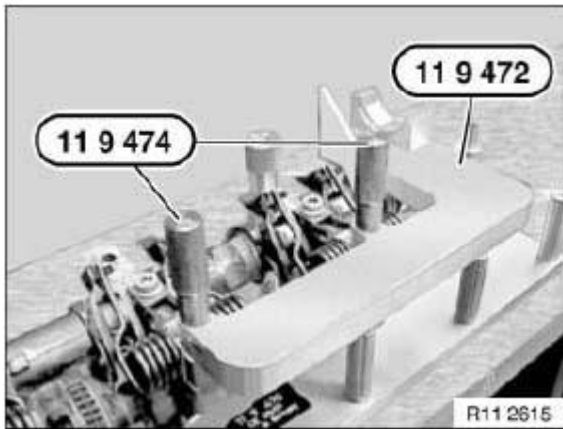
**Fig. 674: Identifying Lower Section Of Bearing Bracket**  
Courtesy of BMW OF NORTH AMERICA, INC.

**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. 675: Identifying Special Tools (11 9 472) And (11 9 472)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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



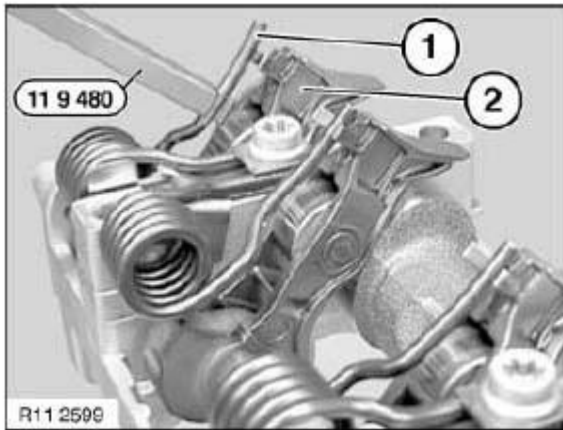
**Fig. 676: Identifying Special Tools (11 9 472) And (11 9 474)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

**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.

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

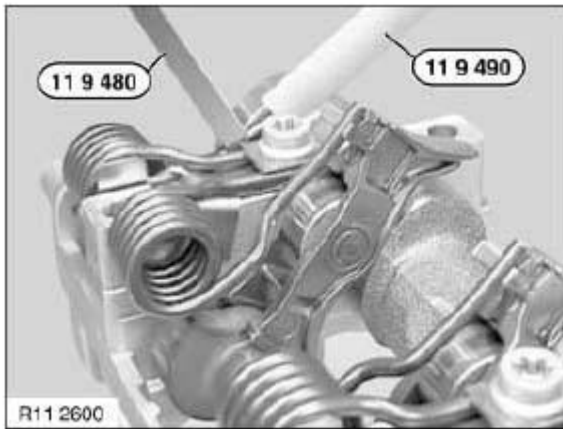


**Fig. 677: Identifying Special Tools (11 9 480) And Torsion Spring**  
 Courtesy of BMW OF NORTH AMERICA, INC.

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

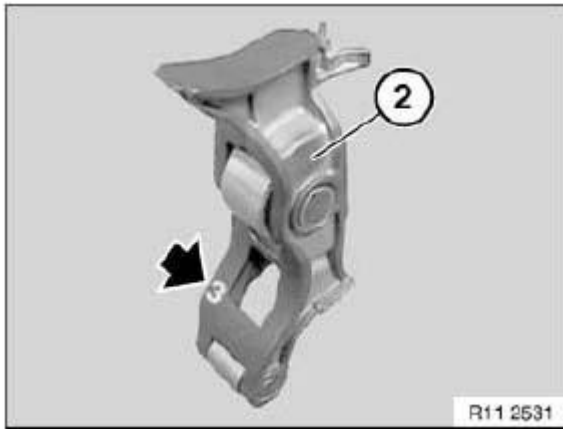
Support end of torsion spring protected with special tool 11 9 490 on inlet camshaft.





**Fig. 678: Identifying Special Tools (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.

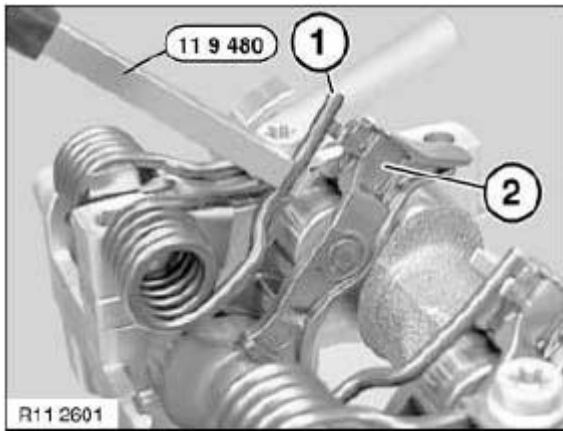


**Fig. 679: Identifying Intermediate Levers**  
 Courtesy of BMW OF NORTH AMERICA, INC.

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.

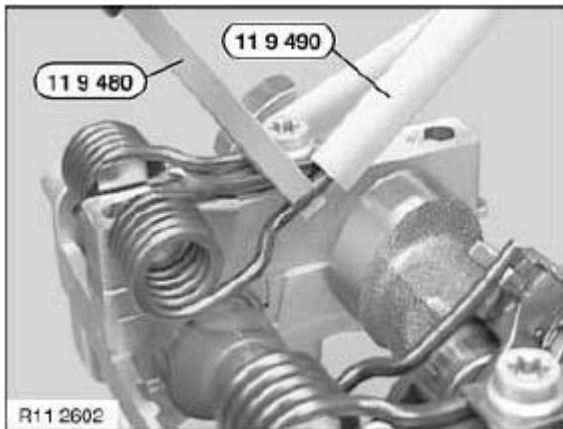
**IMPORTANT:** Keep holding torsion spring (1) with special tool 11 9 480.



**Fig. 680: Identifying 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. 681: Identifying Special Tool (11 9 480) And (11 9 490)**  
Courtesy of BMW OF NORTH AMERICA, INC.

### Installation

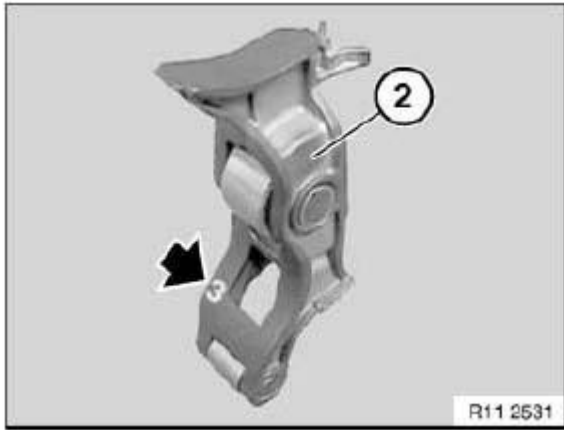
Removal of intermediate levers is described separately from installation.

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.**

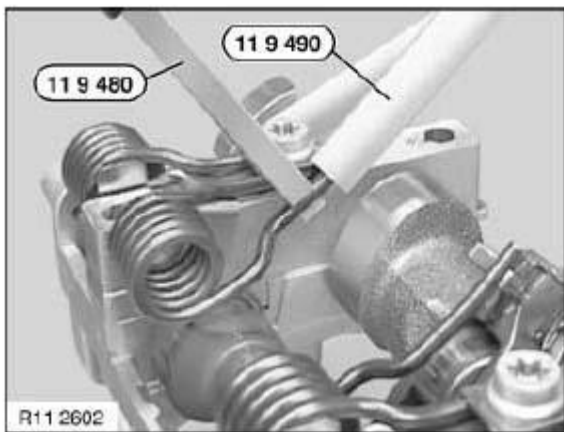
Lubricate all sliding surfaces on intermediate lever (2) with engine oil.



**Fig. 682: Identifying 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.

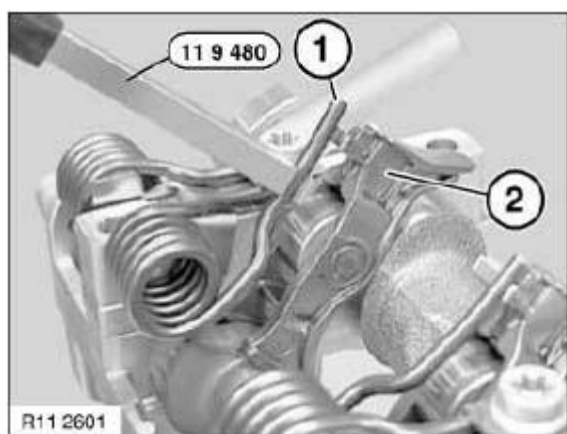


**Fig. 683: Identifying Special Tool (11 9 480) And (11 9 490)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

Install intermediate lever (2) from above.

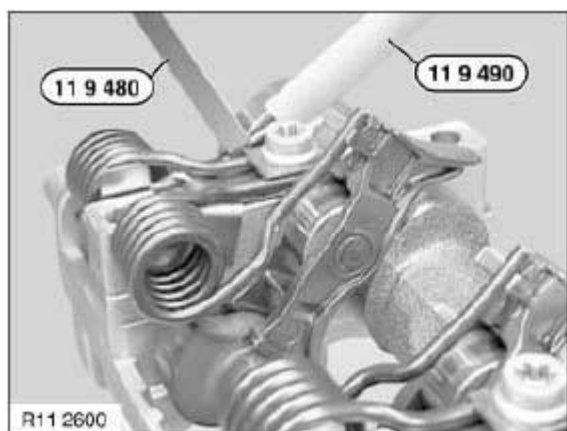
Insert end of torsion spring (1) into guide on intermediate lever (2).



**Fig. 684: Identifying 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**.

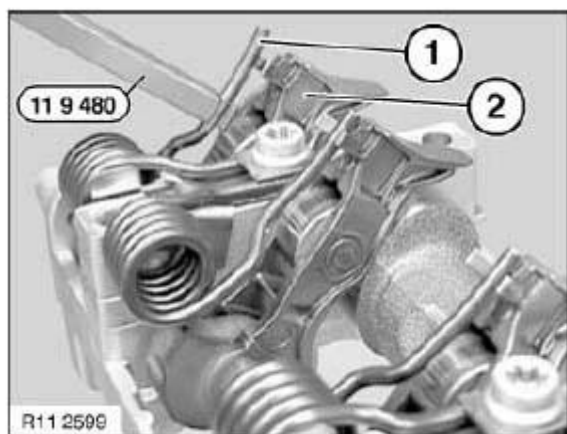


**Fig. 685: Identifying Special Tools (11 9 480) And (11 9 490)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

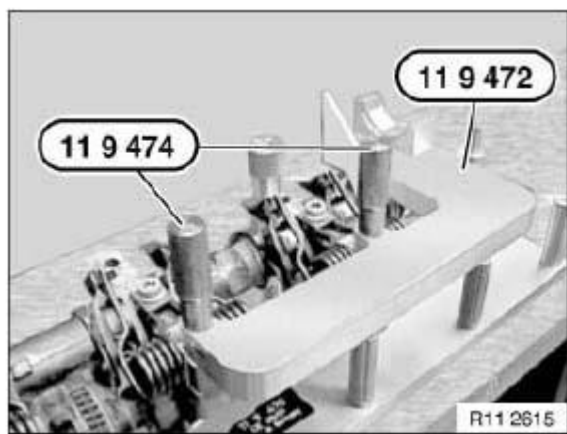
Install intermediate lever (2) from above.

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



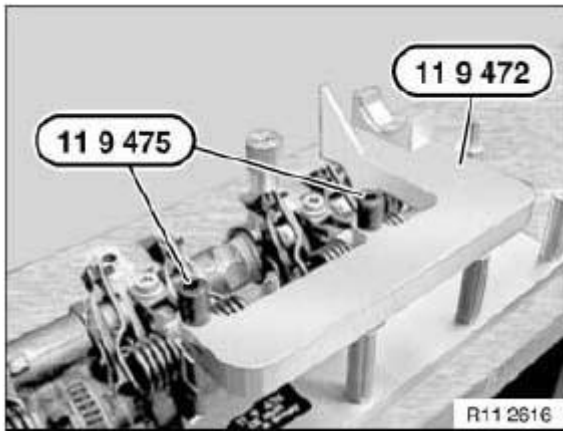
**Fig. 686: Identifying Special Tools (11 9 480) And Torsion Spring**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 474 .



**Fig. 687: Identifying Special Tools (11 9 472) And (11 9 474)**  
Courtesy of BMW OF NORTH AMERICA, INC.

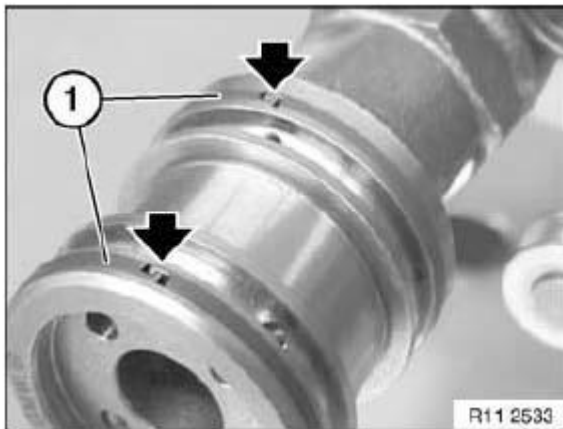
Remove special tools 11 9 472 and special tools 11 9 475 .



**Fig. 688: Identifying Special Tools (11 9 472) And (11 9 472)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Ends of compression rings (1) point upwards.

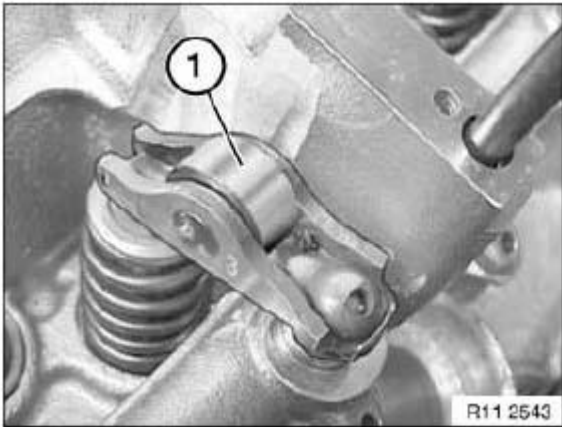
Make sure compression rings (1) are engaged at ends.



**Fig. 689: 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.

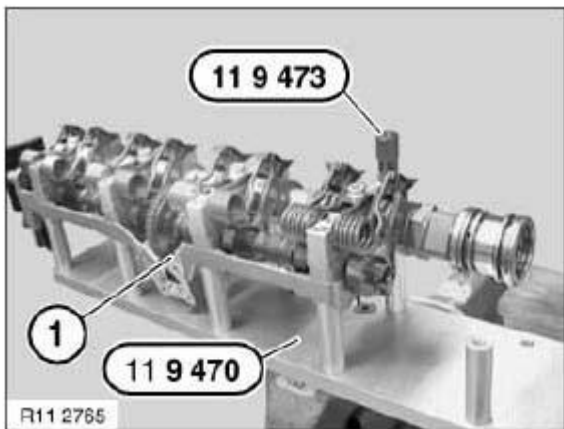


**Fig. 690: Identifying Rocker Arm**

Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 11 9 473 .

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



**Fig. 691: Identifying Special Tool (11 9 470) And (11 9 473)**

Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Do not tilt bearing bracket (1).**

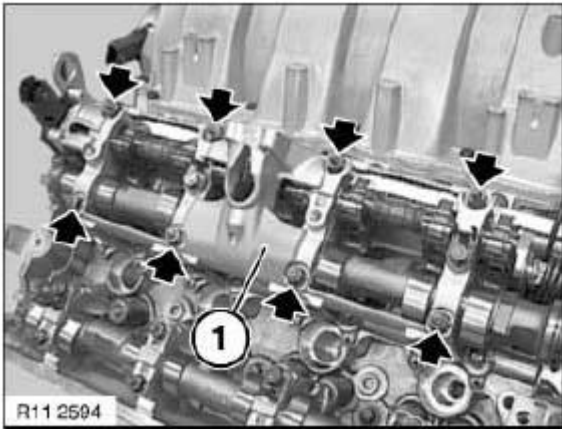
Lower bearing bracket (1) from above and carefully bring into contact with cylinder head.

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, see 11 31 1AZ in CAMSHAFT .



**Fig. 692: Locating Bearing Bracket Nuts**

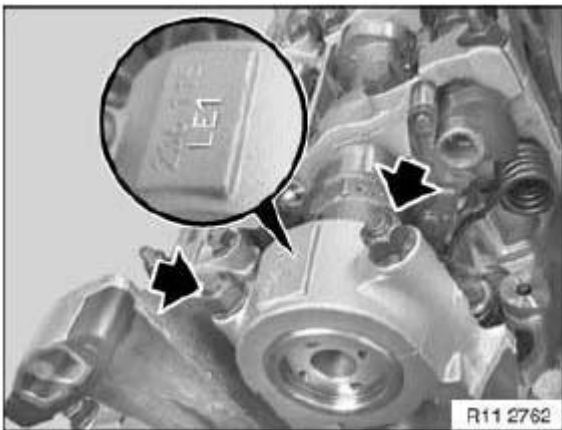
Courtesy of BMW OF NORTH AMERICA, INC.

**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, see 11 31 1AZ in CAMSHAFT .



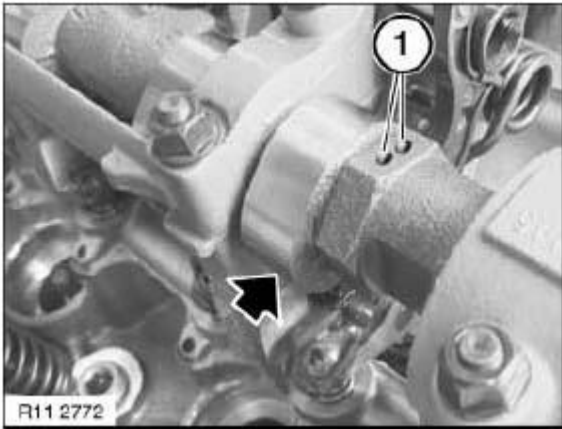
**Fig. 693: Identifying Bearing Cap L E1**

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. 694: Identifying Hexagon Drive Of Inlet Camshaft**  
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.

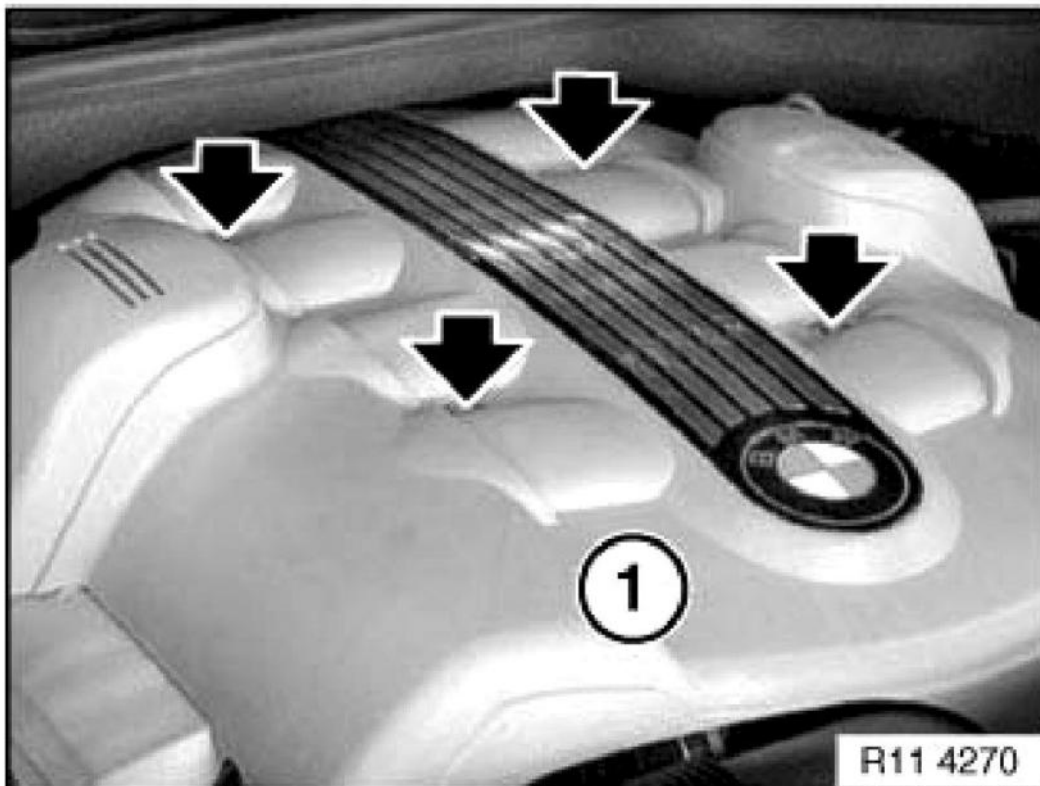
#### **11 37 022 REMOVING AND INSTALLING/REPLACING SERVOMOTOR FOR LEFT ECCENTRIC SHAFT (N62/N62TU)**

**IMPORTANT: Follow instructions issued by diagnosis tester.**  
**Risk of damage to intermediate shaft.**

**(cylinder bank 5 to 8)**

*Necessary preliminary tasks:*

- Connect diagnosis tester.
- Unfasten **acoustic cover** screws. Raise cover and remove toward front. Remove acoustic cover

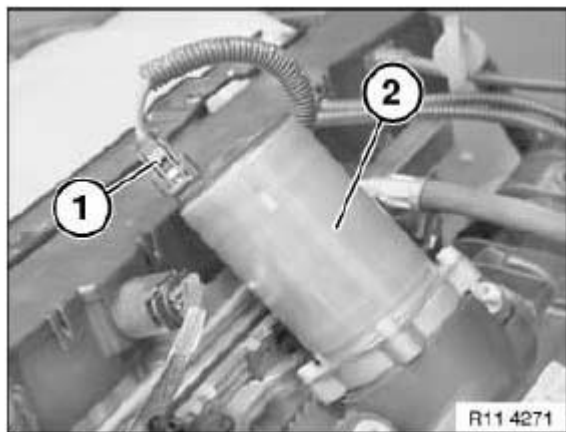


**Fig. 695: Identifying Acoustic Cover**  
Courtesy of BMW OF NORTH AMERICA, INC.

- Remove ignition coil cover

**IMPORTANT: Follow instructions issued by diagnosis tester.**

Unlock plug (1) on servomotor (2) and disconnect.

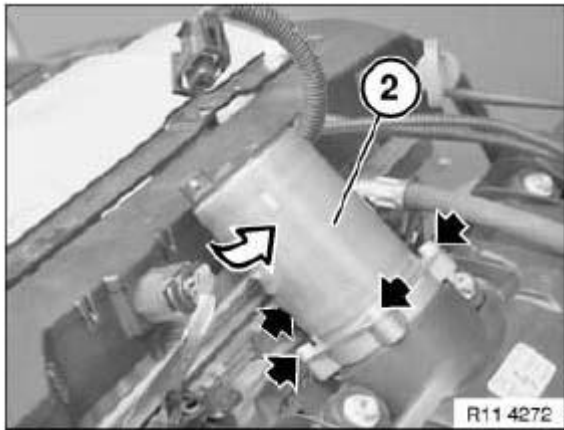


**Fig. 696: Identifying Plug And Servomotor**

Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws.

Rotate servomotor (2) until no longer engaged in spline teeth of eccentric shaft.



**Fig. 697: Rotating Servomotor**

Courtesy of BMW OF NORTH AMERICA, INC.

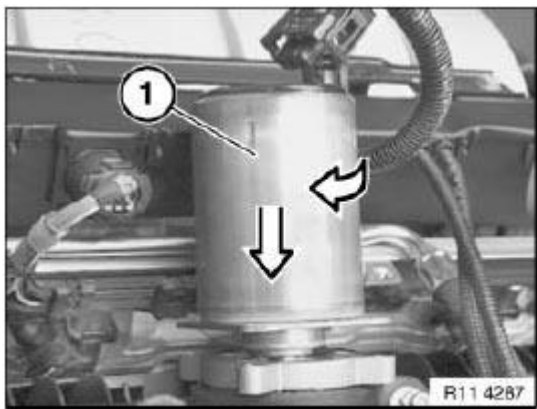
*Installation:*

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. 698: Rotating Servomotor**

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)**

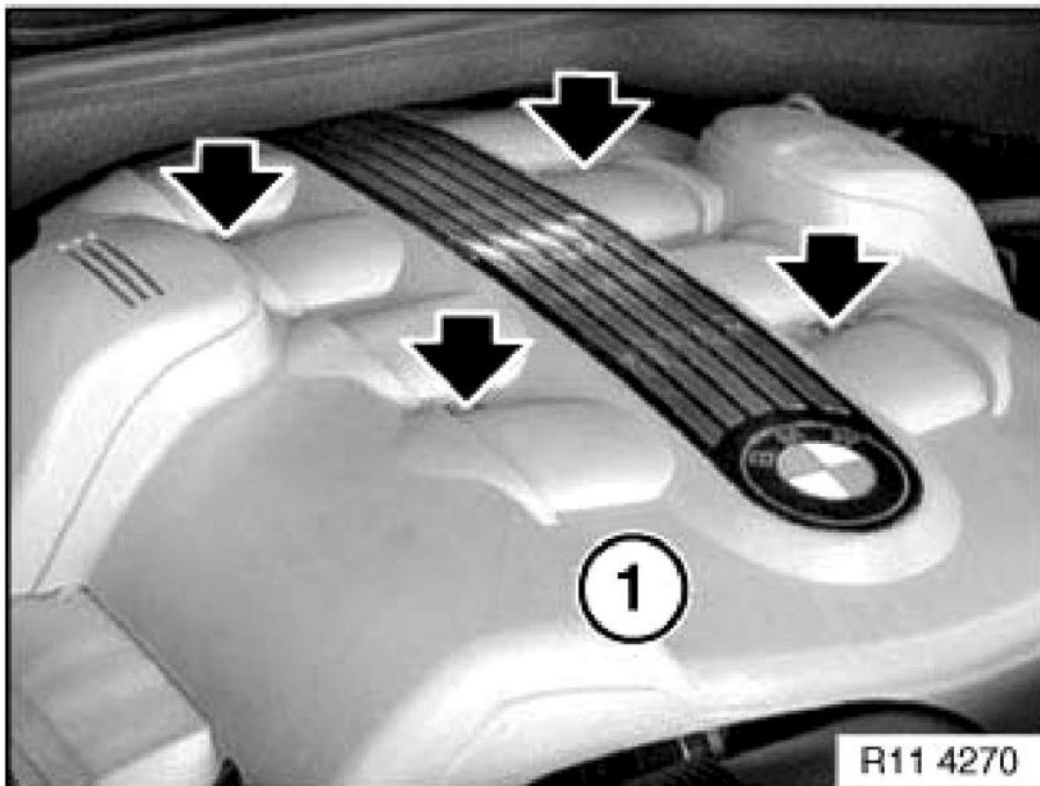
**IMPORTANT: Follow instructions issued by diagnosis tester.**

**Risk of damage to intermediate shaft.**

**(cylinder bank 1 to 4)**

*Necessary preliminary tasks:*

- Connect diagnosis tester
- Unfasten **acoustic cover** screws. Raise cover and remove toward front. Remove acoustic cover

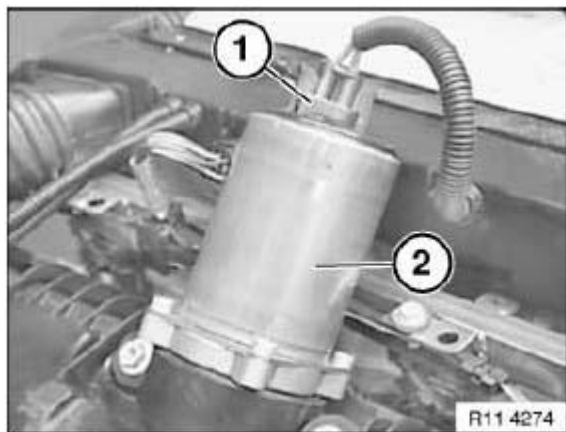


**Fig. 699: Identifying Acoustic Cover**  
Courtesy of BMW OF NORTH AMERICA, INC.

- Remove ignition coil cover

**IMPORTANT: Follow instructions issued by diagnosis tester.**

Unlock plug (1) on servomotor (2) and disconnect.

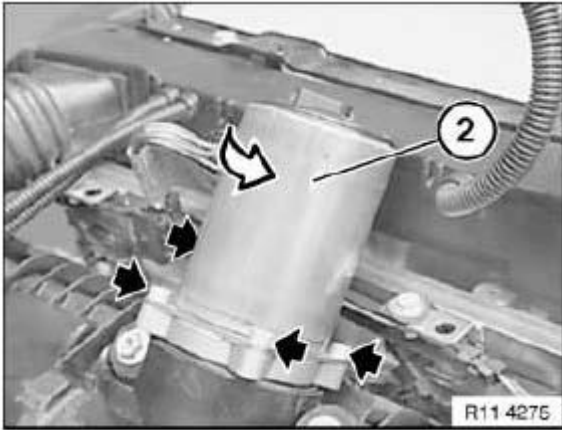


**Fig. 700: Identifying Plug And Servomotor**

Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws.

Rotate servomotor (2) until no longer engaged in spline teeth of eccentric shaft.



**Fig. 701: Rotating Servomotor**

Courtesy of BMW OF NORTH AMERICA, INC.

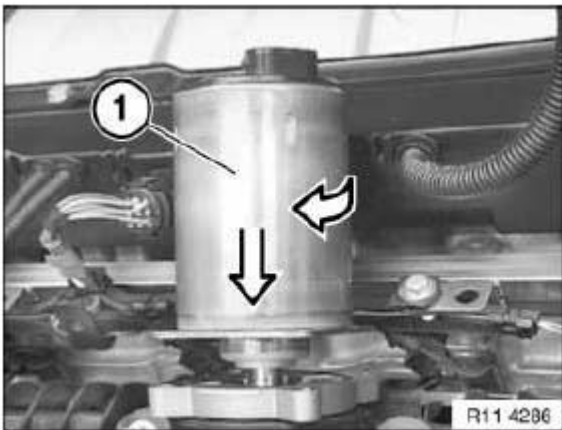
*Installation:*

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. 702: Installing Servomotor**

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)**

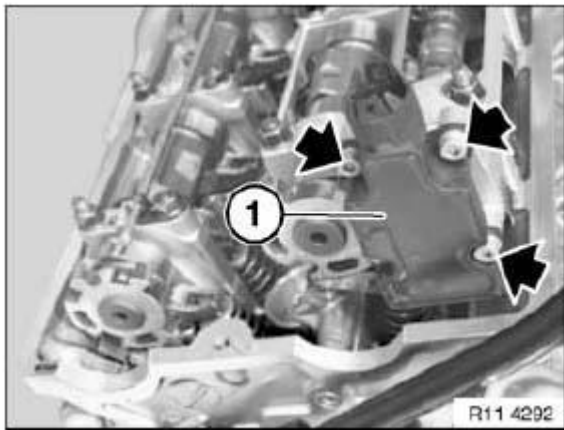
**(cylinder bank 5 to 8)**

*Necessary preliminary tasks:*

- Remove left cylinder head cover

Unfasten screws.

Remove eccentric shaft sensor (1).



**Fig. 703: Locating Eccentric Shaft Sensor Screws**  
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)

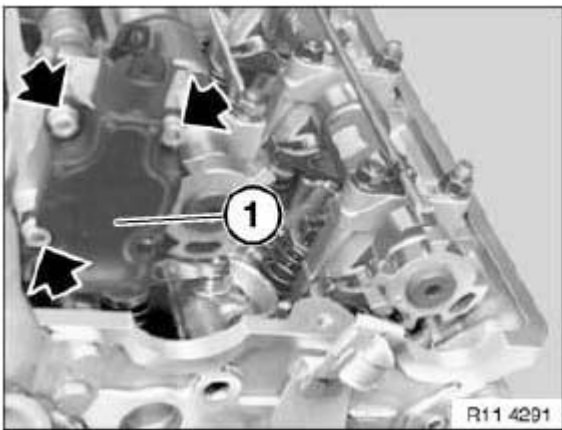
(cylinder bank 1 to 4)

*Necessary preliminary tasks:*

- Remove right cylinder head cover.

Unfasten screws.

Remove eccentric shaft sensor (1).



**Fig. 704: Locating Eccentric Shaft Sensor Screws**  
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. See 12 00... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY**



Disconnect battery.

**CAUTION:** Follow instructions for REMOVING AND INSTALLING CONTROL UNITS .

Observe following instructions before replacing control unit:

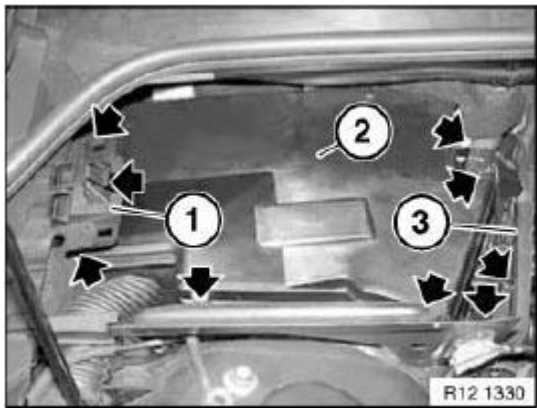
**Program control unit CONTROL UNIT .**

**Remove right fresh air duct.**

Release screw and remove holder (1).

Release screws and remove cover (2) from control unit box.

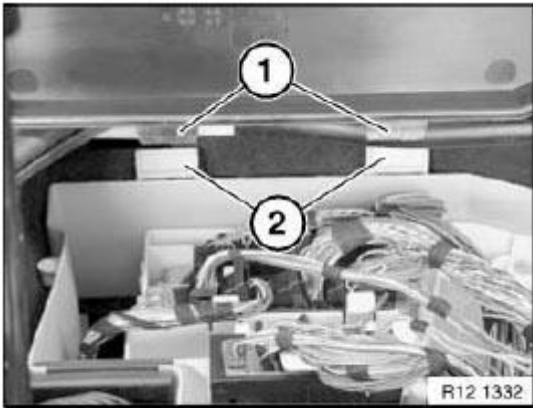
**NOTE:** Release screws on seal (3) only when removing wiring harness.



**Fig. 705: Identifying Holder, Cover And Seal**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Insert tabs (1) in openings (2) and close cover.

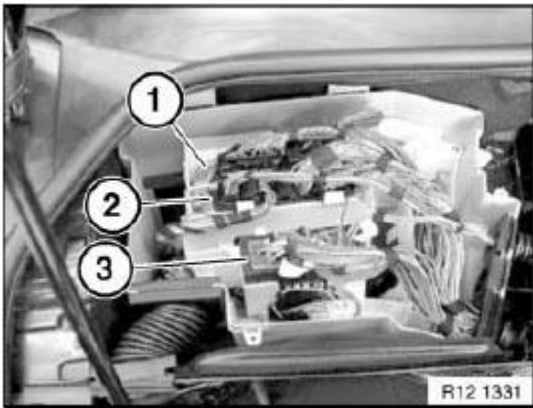


**Fig. 706: Inserting Tabs In Openings**

Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach plug connections on Valvetronic control unit (1).

Remove Valvetronic control unit (1).



**Fig. 707: 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.

## OIL SUPPLY

### 11 40 000 CHECKING ENGINE OIL PRESSURE

Special tools required:

- 11 4 050 . See ENGINE- SPECIAL TOOLS .

- 13 3 061 . See **FUEL SYSTEM - SPECIAL TOOLS**
- 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.

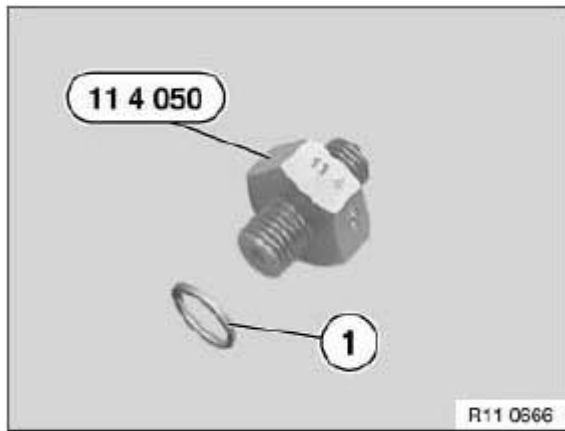
**NOTE:** A small amount of oil will emerge when the oil pressure switch is removed.  
Have a cleaning cloth ready.  
Make sure no oil runs onto belt drive.  
Remove any remnants of oil immediately with cleaning cloth.

Remove oil pressure switch.

*Installation:*

**Tightening torque, see 12 61 1AZ in ENGINE ELECTRICAL SYSTEM - TIGHTENING TORQUES .**

Install special tool 11 4 050 with sealing ring (1) in place of oil pressure switch.



**Fig. 708: Identifying Special Tool (11 4 050) With Sealing Ring**  
Courtesy of BMW OF NORTH AMERICA, INC.

#### **Check engine oil pressure with DIS Tester**

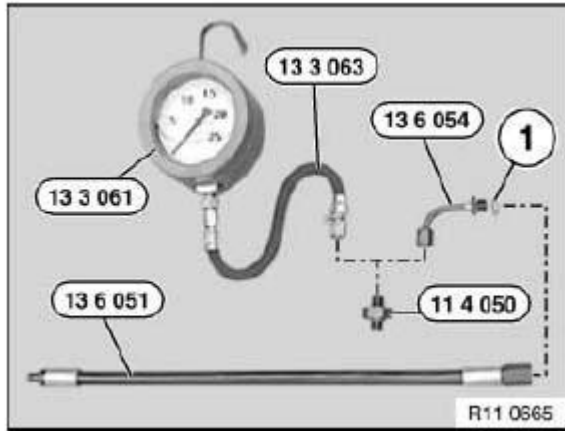
Attach special tool **13 6 054** with sealing ring (1) and special tool **13 6 051** and connect to DIS Tester.

#### **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.** See ENGINE - TECHNICAL DATA (N62TU) .



**Fig. 709: Checking Engine Oil Pressure**  
Courtesy of BMW OF NORTH AMERICA, INC.

## OIL PUMP WITH FILTER AND DRIVE

### 11 41 000 REMOVING AND INSTALLING/REPLACING OIL PUMP (N62)

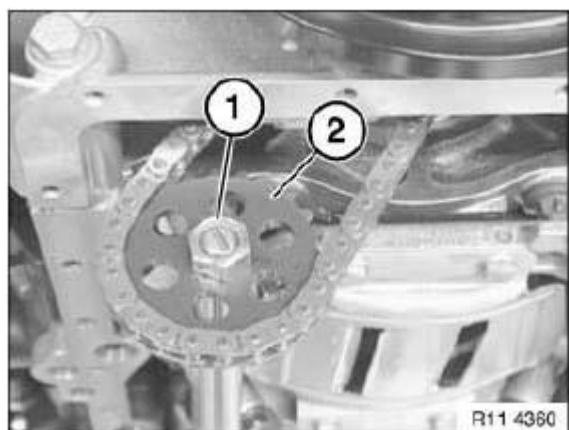
*Necessary preliminary tasks:*

- **Drain engine oil** . See 00 00 610 ENGINE OIL SERVICE (N62/N62TU) .
- **Remove upper oil sump section.**
- **Remove reinforcement plate.** See 31 10 010 REMOVING AND INSTALLING/REPLACING REINFORCEMENT PLATE .

Unscrew nut (1).

**Tightening torque,** see 11 41 4AZ in 11 41 OIL PUMP WITH STRAINER AND DRIVE .

Remove oil pump sprocket wheel (2).



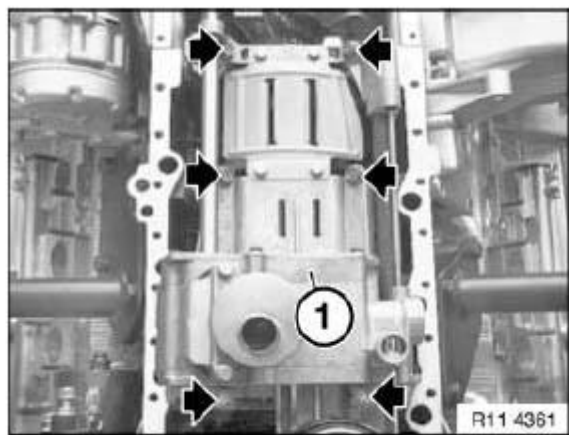
**Fig. 710: Identifying Oil Pump Sprocket Wheel With Nut**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws, remove oil pump (1) with aid of a second person.

*Installation:*

Replace screws.

**Tightening torque, see 11 41 2AZ in 11 41 OIL PUMP WITH STRAINER AND DRIVE .**

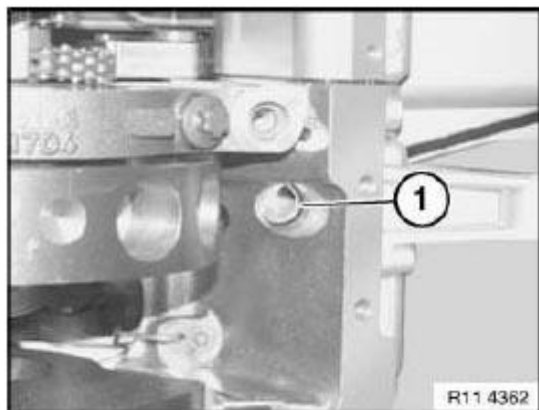


**Fig. 711: Locating Oil Pump Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Replace sealing ring (1).

Apply light coat of oil to sealing ring (1).



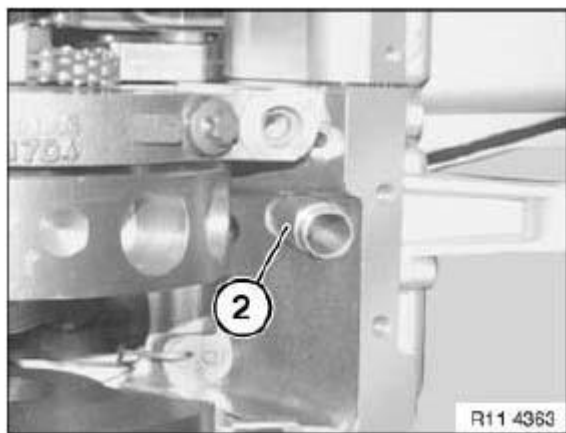
**Fig. 712: Identifying Sealing Ring**

Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Insert oil line (2) in crankcase.

Do not damage sealing ring.



**Fig. 713: Identifying Oil Line**

Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Replace sealing ring (1).

Apply light coat of oil to sealing ring (1).

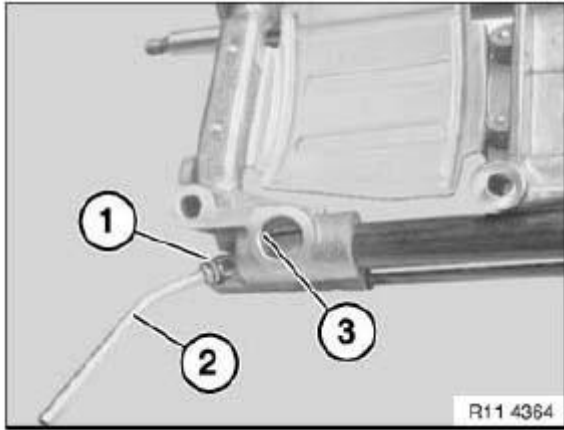
Insert oil line (2) in bore hole in oil pump.

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. 714: Identifying Sealing Ring And Oil Line**  
Courtesy of BMW OF NORTH AMERICA, INC.

Install oil pump with aid of a second person.

Assemble engine.

## 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. . See 00 00 610 ENGINE OIL SERVICE (N62/N62TU) .

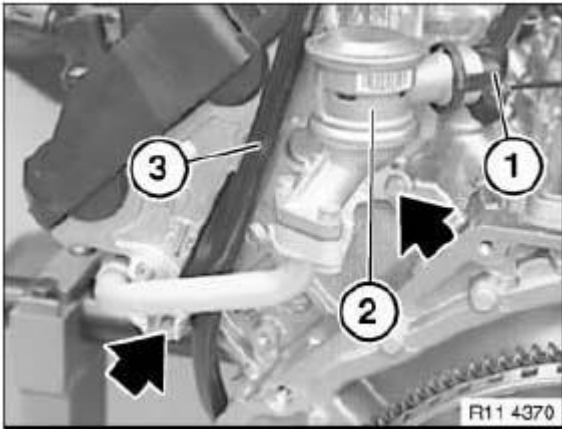
**NOTE:** For purposes of clarity, this work step is shown on the engine after it has been removed.

Unlock and detach vacuum line (1).

Release screws and remove check valve (2).

Remove guide tube (3) upwards.

*Installation:*



**Fig. 715: Identifying Vacuum Line, Check Valve And Guide Tube**  
 Courtesy of BMW OF NORTH AMERICA, INC.

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.

## 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**. See 17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N62, N62TU)
- Remove **electric fan** . See 17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N62, N62TU)
- Remove alternator drive belt.

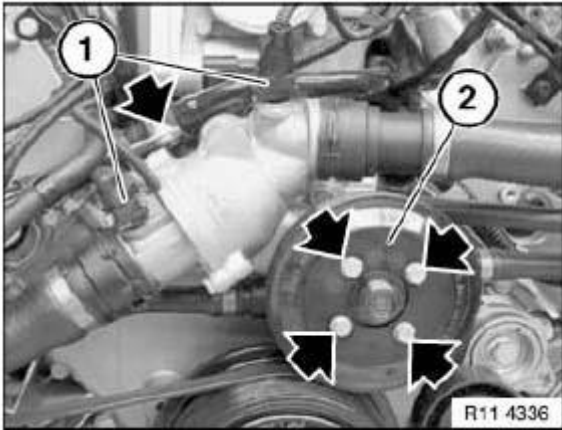
Unlock and detach plug connections (1).



Release screw and remove vacuum line holder.

Unlock and detach all coolant hoses on water pump.

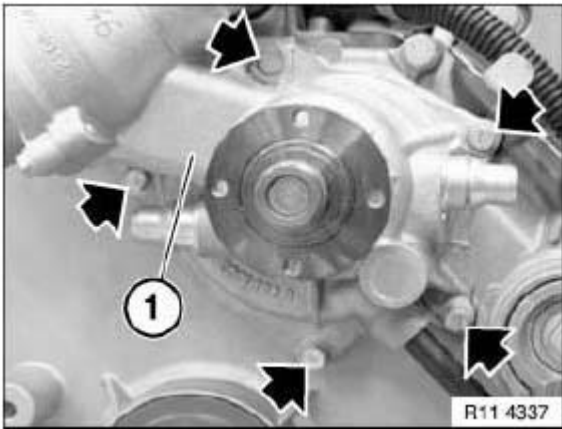
Release screws and remove belt pulley (2).



**Fig. 716: Identifying Plug Connection And Belt Pulley**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **vibration damper**.

Release screws and remove water pump (1).

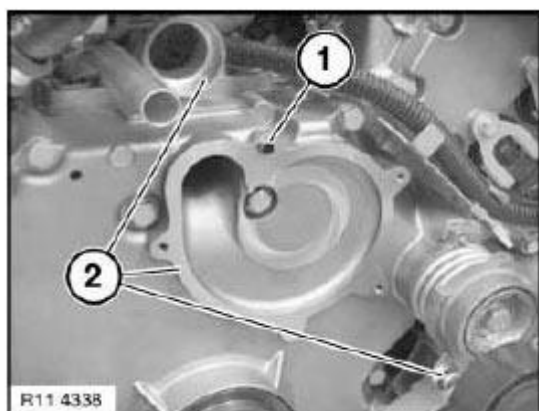


**Fig. 717: Locating Water Pump Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Check adapter sleeve (1) for correct seating and damage; replace if necessary.

Clean sealing faces (2).

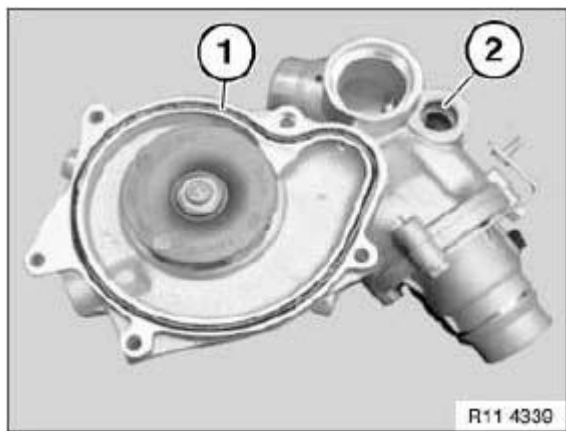


**Fig. 718: Identifying Adapter Sleeve And Sealing Faces**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Clean sealing surfaces.

Replace sealing rings (1 and 2).

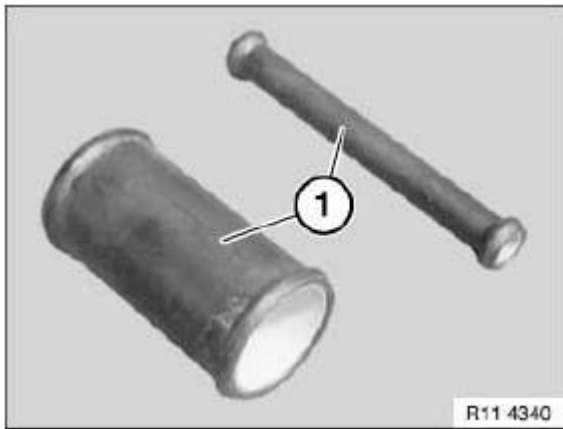


**Fig. 719: Identifying Sealing Rings**  
Courtesy of BMW OF NORTH AMERICA, INC.

*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. 720: 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. See 17 00 039 VENTING COOLING SYSTEM AND CHECKING FOR LEAKS (N62, N62TU) .

## FAN

### 11 52 020 REMOVING AND INSTALLING OR REPLACING FAN CLUTCH (N62)

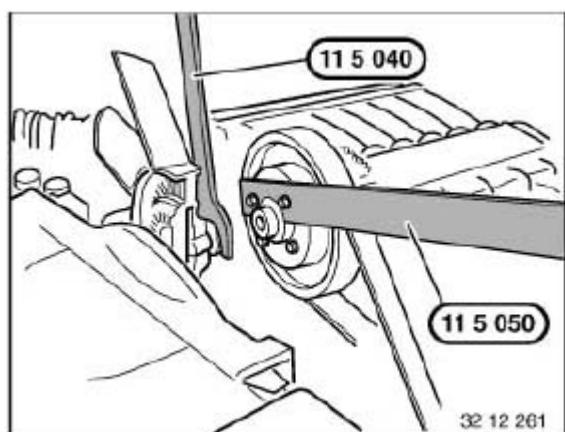
Special tools required:

- 11 5 040 . See ENGINE- SPECIAL TOOLS .
- 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.



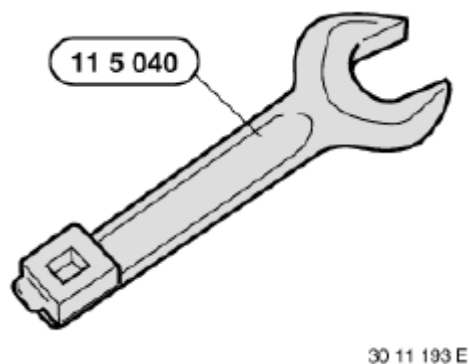
**Fig. 721: Removing Nut From Water Pump Using Special Tool (11 5 040) And (11 5 050)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**Installation:**

Tighten down fan impeller using special tool 11 5 040.

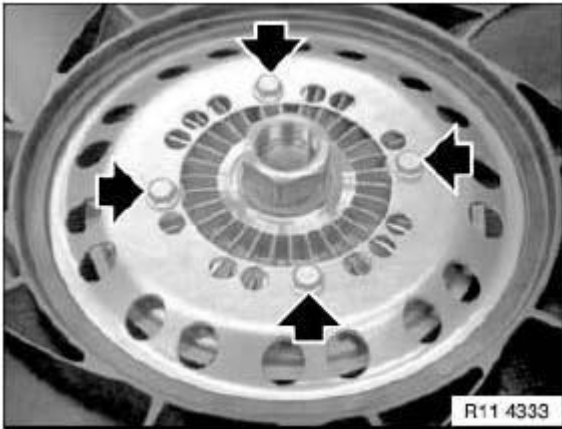
Tightening torque 40 Nm.

**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. 722: Identifying Special Tool (11 5 040)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws, detach fan from fan clutch.



**Fig. 723: Locating Fan Clutch Screws**

Courtesy of BMW OF NORTH AMERICA, INC.

## THERMOSTAT AND CONNECTOR

### 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:*

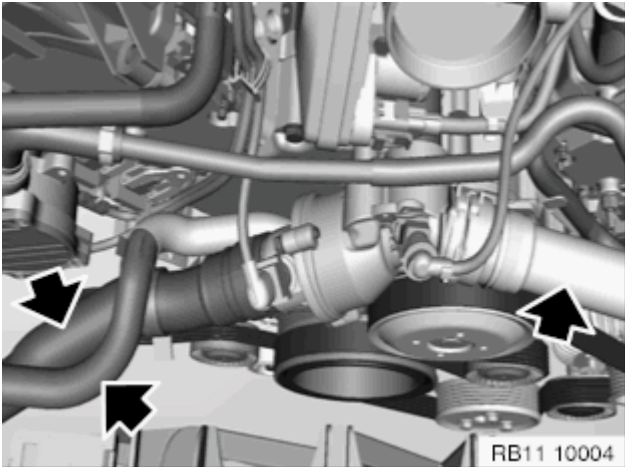
Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

Follow instructions for working on cooling system. See 17 00... INSTRUCTIONS FOR WORKING ON COOLING SYSTEM.

Remove FRONT UNDERBODY PROTECTION.

Disconnect coolant hoses (arrows) from thermostat using grips.



**Fig. 724: Identifying Coolant Hoses**

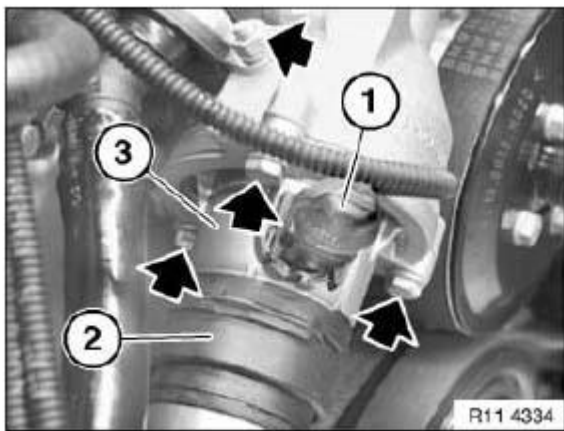
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) and remove.

Unlock and detach water hose (2).

Unfasten nut.

Release screws and remove coolant thermostat (3).



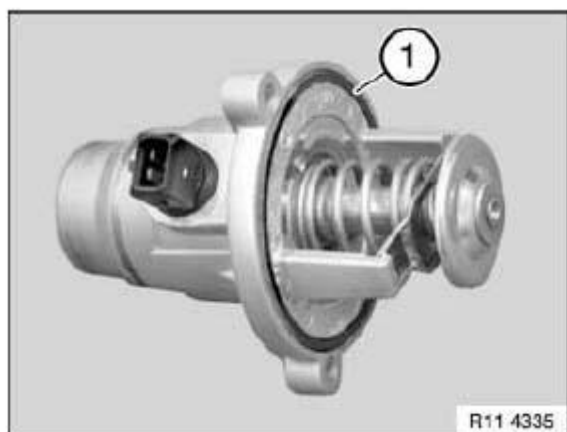
**Fig. 725: Identifying Plug, Water Hose And Coolant Thermostat**

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).



**Fig. 726: Identifying Sealing Ring**

Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

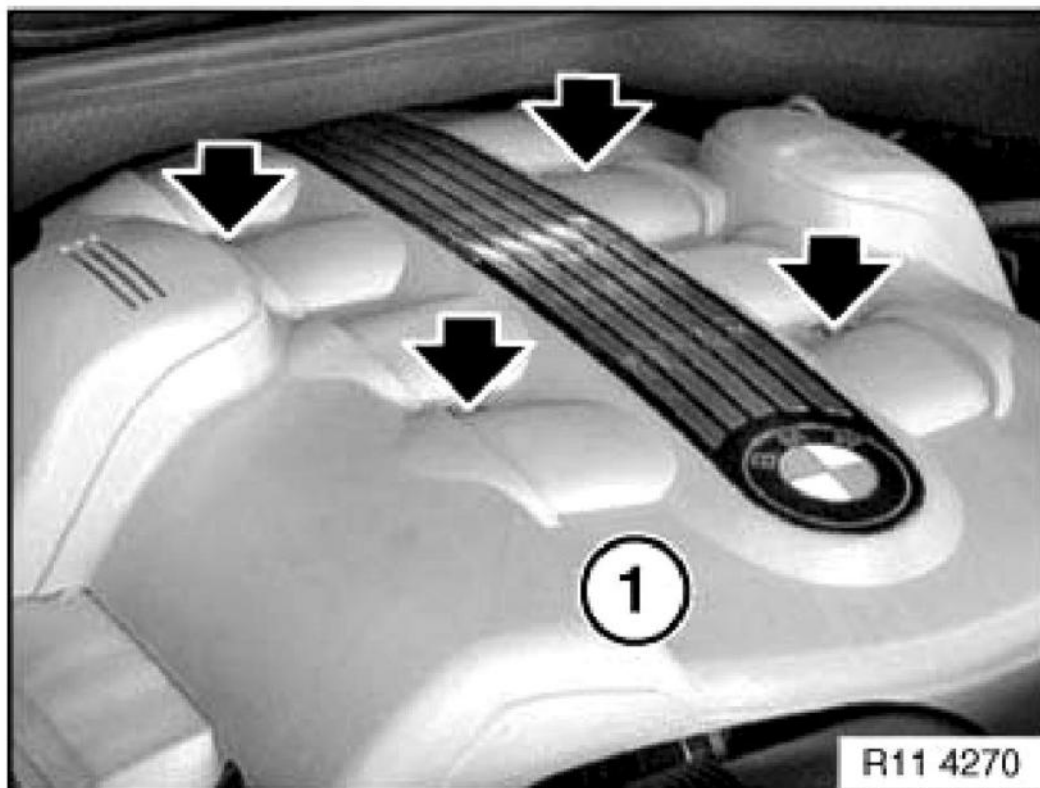
**Top up coolant.**

**Vent cooling system and check for leaks. See 17 00 039 VENTING COOLING SYSTEM AND CHECKING FOR LEAKS (N62, N62TU) .**

## **INTAKE MANIFOLD**

### **11 61 050 REMOVING AND INSTALLING INTAKE AIR MANIFOLD (N62)**

Unfasten **acoustic cover** screws. Raise cover and remove toward front. **Remove acoustic cover.**



**Fig. 727: Identifying Acoustic Cover**

Courtesy of BMW OF NORTH AMERICA, INC.

Remove design cover.

**Remove center of bulkhead.**

**Remove intake hose.**

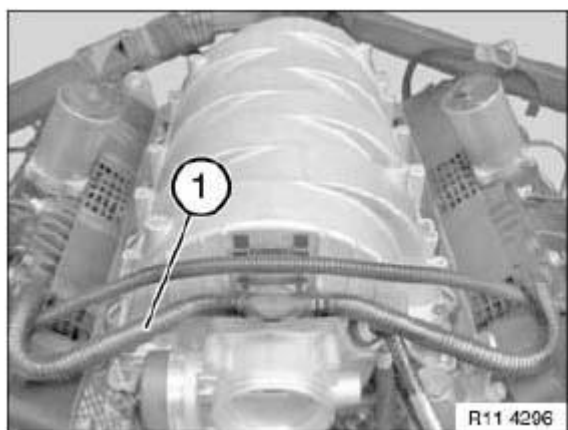
**Remove injection pipe.** See **13 53 240 REPLACING COMPLETE INJECTION PIPE (N62, N62TU)** .

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.





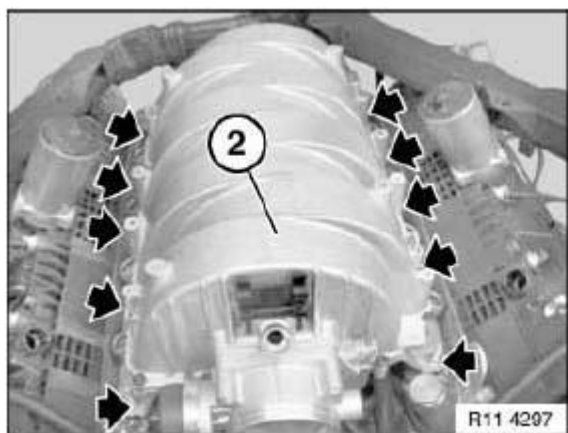
**Fig. 728: Identifying Vent Hose**

Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws.

Tightening torque 11 61 1AZ. See **11 61 INTAKE MANIFOLD** .

Remove intake air manifold (2) upwards with aid of a second person.

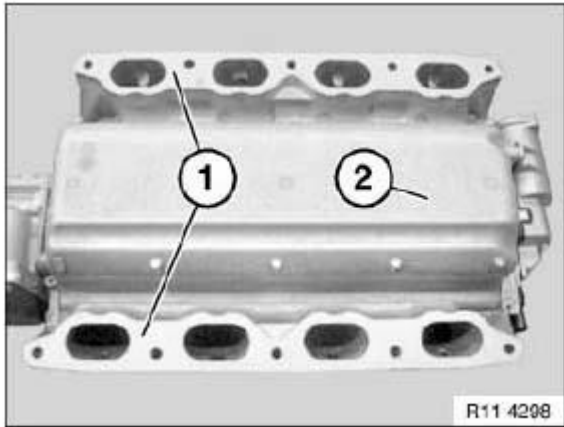


**Fig. 729: Locating Intake Air Manifold Screws**

Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Clean sealing faces (1) on intake air manifold (2).

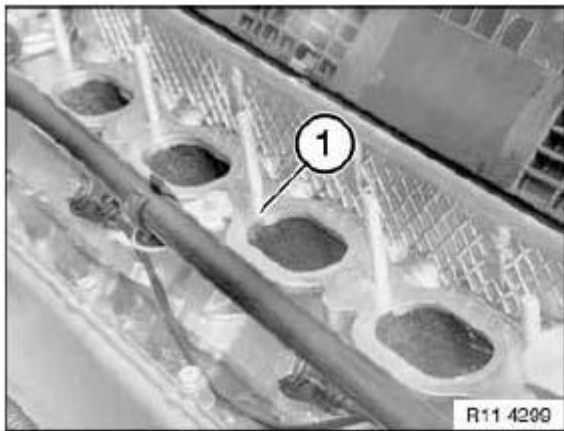


**Fig. 730: Identifying Sealing Faces And Intake Air Manifold**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Clean sealing face (1) on left and right.

Replace gasket on left and right.



**Fig. 731: Identifying Cylinder Head Sealing Face**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check air intake system for leaks.

## 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

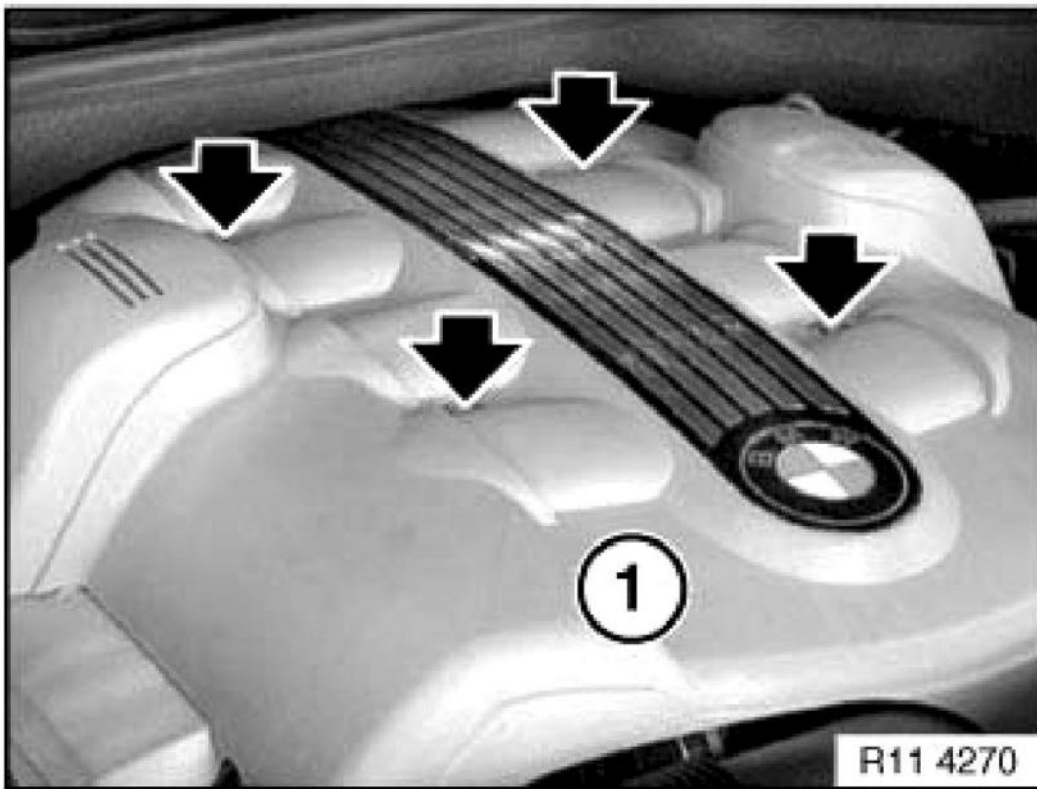
**booster.**

*Installation location:*

Vacuum pump is fitted on cylinder head 1 to 4 at front on exhaust camshaft.

Remove **design cover**.

Unfasten **acoustic cover** screws. Raise cover and remove toward front. Remove **acoustic cover**.



**Fig. 732: Identifying Acoustic Cover**

Courtesy of BMW OF NORTH AMERICA, INC.

Remove intake hose with air-mass flow sensor and upper section of intake filter housing. . See 13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING

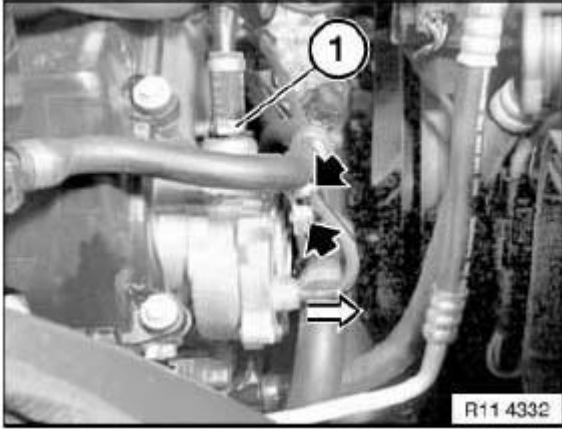
**IMPORTANT: Installation:**

**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.

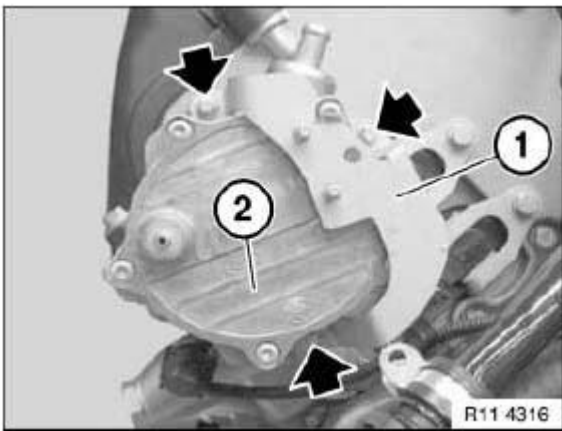


**Fig. 733: Opening Hose Clip And Pulling Off Vacuum Line**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and remove holder (1).

Remove vacuum pump (2).

Tightening torque 10 Nm.

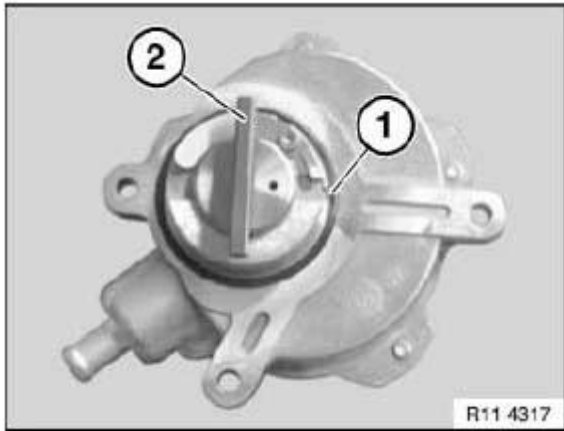


**Fig. 734: Identifying Holder And Vacuum Pump**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Replace sealing ring (1) and secure with grease.

Drive (2) must be rotated into correct position prior to installation.



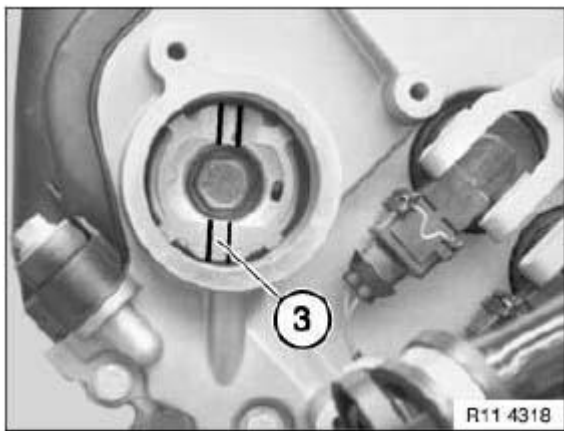
**Fig. 735: Identifying Sealing Ring And Drive**  
 Courtesy of BMW OF NORTH AMERICA, INC.

*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. 736: Aligning Vacuum Pump Drive To Groove On Exhaust Camshaft**  
 Courtesy of BMW OF NORTH AMERICA, INC.

## AIR PUMP LINES AND CONNECTOR

### 11 72 000 REMOVING AND INSTALLING/REPLACING AIR PUMP (N62)

Remove upper section of intake filter housing. See **13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING**

Release retaining screws on coolant expansion tank. See **17 11 000 REMOVING AND INSTALLING RADIATOR (N62)**

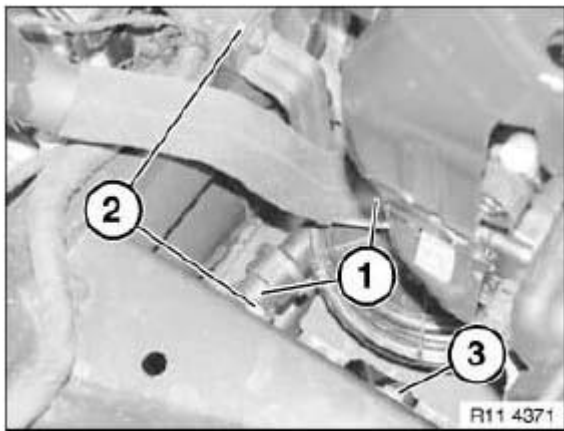
**Remove suction filter housing.**

**Remove raw air housing.**

Unlock and disconnect pressure and suction lines (1).

Loosen screws (2).

Loosen screw (3).



**Fig. 737: Identifying Suction Lines And Screws**  
**Courtesy of BMW OF NORTH AMERICA, INC.**

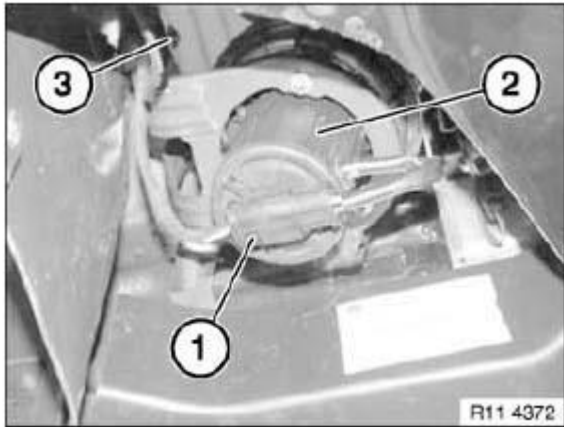
Remove front splash guard.

Remove trim panel at bottom right.

Unlock plug (1) and remove.

Unscrew bolt (3).

Remove air pump (2).

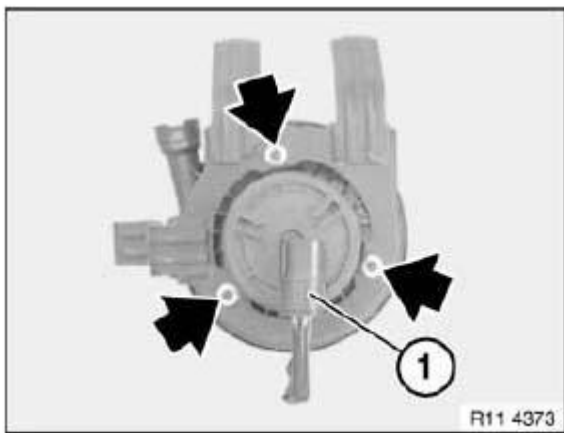


**Fig. 738: Identifying Air Pump, Plug And Bolt**  
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts.

Unclip plug (1).

Remove holder from air pump.



**Fig. 739: Locating Air Pump Nuts With Plug**  
Courtesy of BMW OF NORTH AMERICA, INC.

## EMISSION CONTROL OXYGEN SENSOR

### 11 78 530 REPLACING LEFT OXYGEN CONTROL SENSOR (N62/N62TU)

Special tools required:

- 11 7 030 . See ENGINE- SPECIAL TOOLS .
- 11 9 150

(cylinder bank 5 to 8)

*Necessary preliminary tasks:*

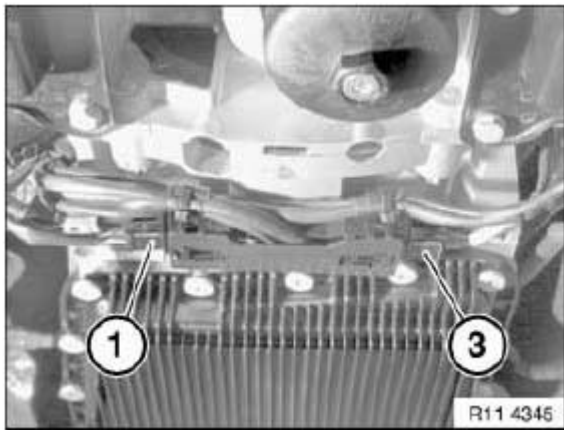
- Switch off ignition.
- Remove reinforcement plate. See **31 10 010 REMOVING AND INSTALLING/REPLACING REINFORCEMENT PLATE** .

**WARNING: Scalding hazard!**

**Only perform this task on an engine that has cooled down.**

Unlock and detach plug connection (3).

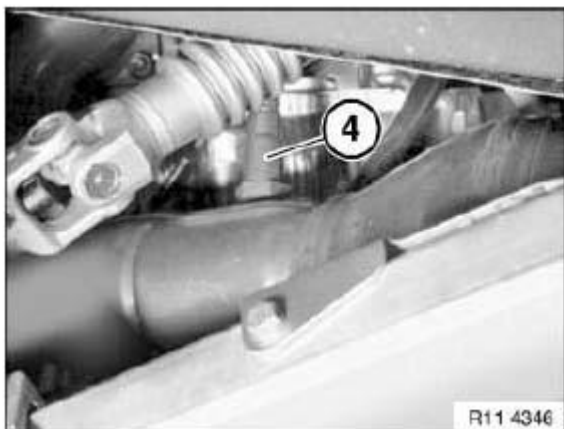
Unclip control sensor cable.



**Fig. 740: 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. 741: 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.

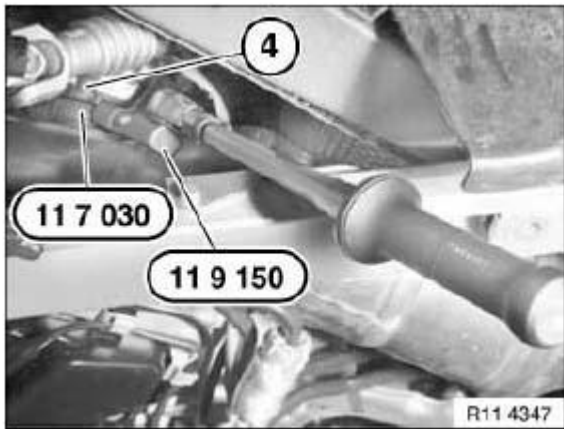
*Installation:*

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, see **11 78 1AZ** in **11 78 EMISSIONS-CONTROL, LAMBDA OXYGEN SENSOR**.

Pay attention to cable routing of control sensor.

**Fig. 742: Tightening Control Sensor With 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:*

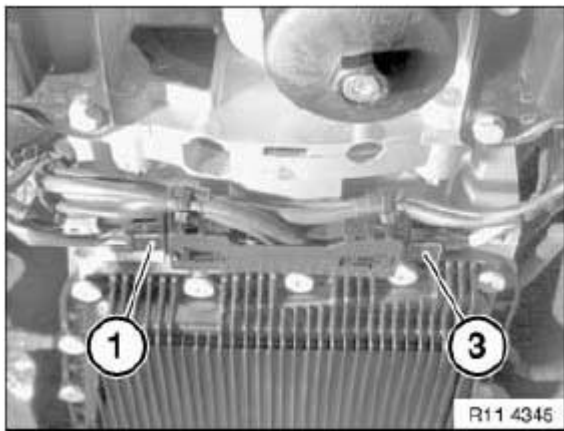
- Switch off ignition.
- Remove reinforcement plate. See **31 10 010 REMOVING AND INSTALLING/REPLACING REINFORCEMENT PLATE** .

**WARNING: Scalding hazard!**

**Only perform this task on an engine that has cooled down.**

Release plug connector (1) and pull off.

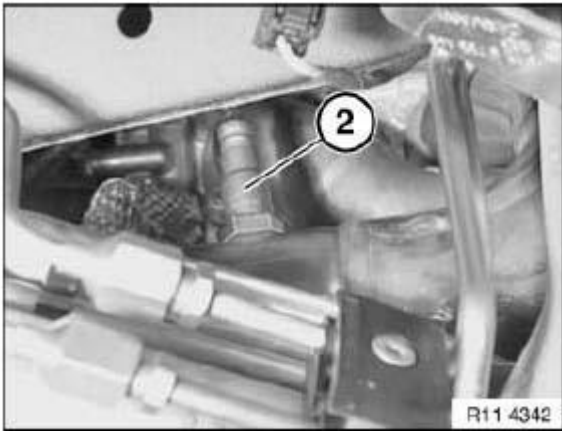
Unclip control sensor cable.



**Fig. 743: Identifying Plug Connection**

Courtesy of BMW OF NORTH AMERICA, INC.

Release control sensor (2) with special tool 11 7 030.



**Fig. 744: 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.

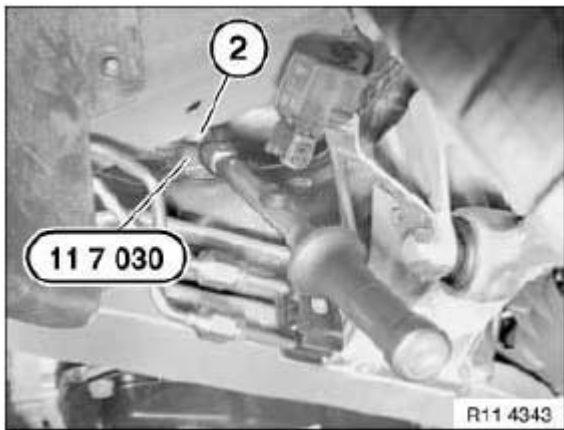
Oxygen sensor section projecting into exhaust system branch must not be cleaned or come into contact with lubricant.

*Installation:*

Tighten down control sensor (2) with special tool **11 7 030**.

Tightening torque, see **11 78 1AZ**, in **11 78 EMISSIONS-CONTROL, LAMBDA OXYGEN SENSOR** .

Pay attention to cable routing of control sensor.



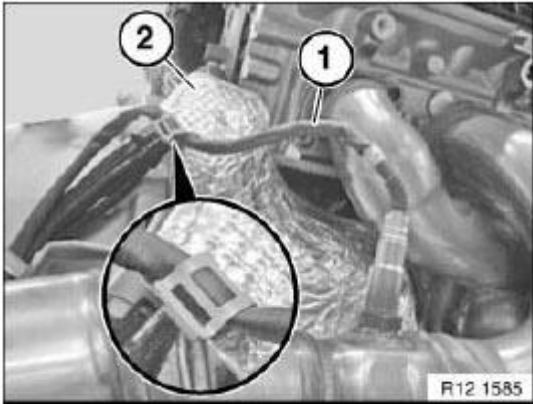
**Fig. 745: Tightening Control Sensor With Special Tool (11 7 030)**

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. 746: Identifying Heat Shield And Wiring Harness**  
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 . See **ENGINE- SPECIAL TOOLS** .

**(cylinder bank 5 to 8)**

*Necessary preliminary tasks:*

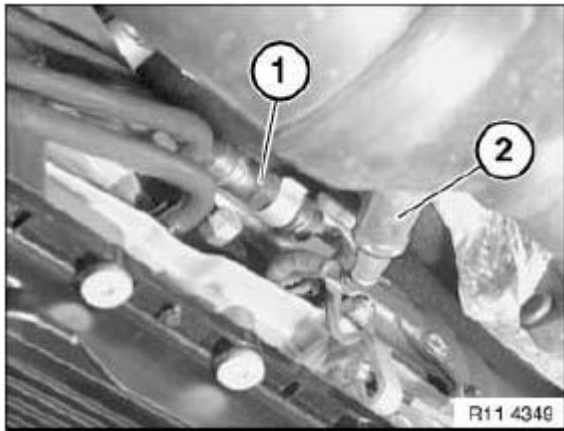
- Switch off ignition.
- Remove **REAR UNDERBODY PROTECTION** .

**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. 747: 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, see **11 78 1AZ** in **11 78 EMISSIONS-CONTROL, LAMBDA OXYGEN SENSOR** .

Pay attention to cable routing of monitor sensor.



**Fig. 748: Tightening Monitor Sensor With Special Tool (11 7 030)**  
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** . See ENGINE- SPECIAL TOOLS .

**(cylinder bank 1 to 4)**

*Necessary preliminary tasks:*

- Switch off ignition
- Remove REAR UNDERBODY PROTECTION .

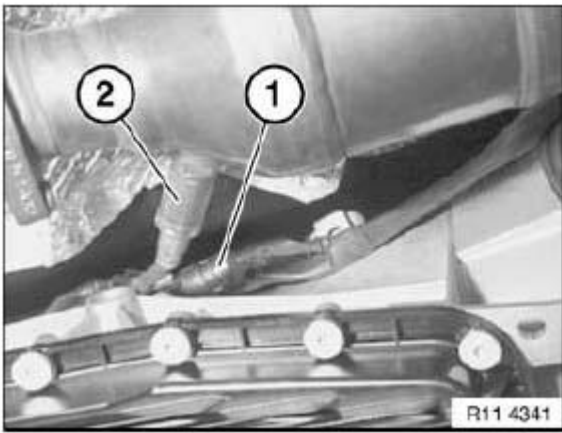
**WARNING: Scalding hazard!**

**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. 749: 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.

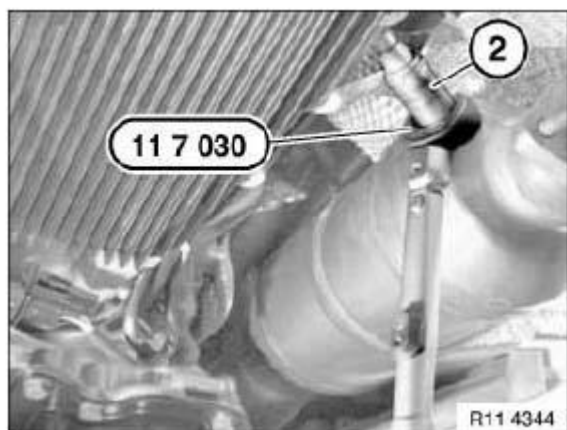
Oxygen sensor section projecting into exhaust system branch must not be cleaned or come into contact with lubricant.

*Installation:*

Tighten down monitor sensor (2) with special tool **11 7 030**.

Tightening torque, see **11 78 1AZ** in **11 78 EMISSIONS-CONTROL, LAMBDA OXYGEN SENSOR** .

Pay attention to cable routing of monitor sensor.



**Fig. 750: Tightening Monitor Sensor With Special Tool (11 7 030)**  
**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.