

**ENGINE****Engine - Repair Instructions - N51, N52, N52K 6-Cylinder****00 ENGINE, GENERAL**

**NOTE:** Removal and installation procedures apply to 3-Series; 5-Series is similar.

**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.**

**11 00 REMOVING AND INSTALLING/REPLACING ACOUSTIC COVER (N52)****IMPORTANT: Aluminium-magnesium materials.**

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

**A magnesium crankcase requires aluminium screws/bolts exclusively.**

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

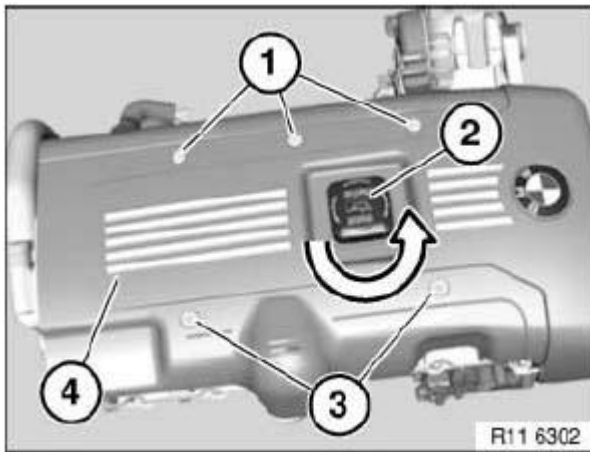
**The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.**

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

Unfasten screws (1 and 3).

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

Lift off acoustic cover (4)



**Fig. 1: Identifying Oil Cap, Acoustic Cover And Retaining Screws**  
**Courtesy of BMW OF NORTH AMERICA, INC.**

**E87, E90, E91:**

*Necessary preliminary tasks:*

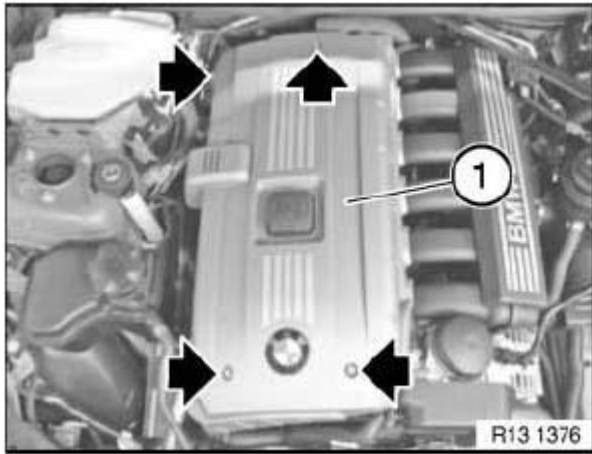
Remove **Microfilter Housing**

Unfasten screws.

For tightening torque refer to 11 12 7AZ in **11 12 CYLINDER HEAD WITH COVER** .

Remove acoustic cover.

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



**Fig. 2: Identifying Acoustic Cover And Mounting Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

## **11 ... MOUNTING ENGINE ON ASSEMBLY STAND (N52)**

**Special tools required:**

- 00 1 450
- 11 3 370
- 11 4 440
- 11 9 261
- 11 9 265

**IMPORTANT: Aluminium-magnesium materials.**

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

**A magnesium crankcase requires aluminium screws/bolts exclusively.**

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

**The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.**

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

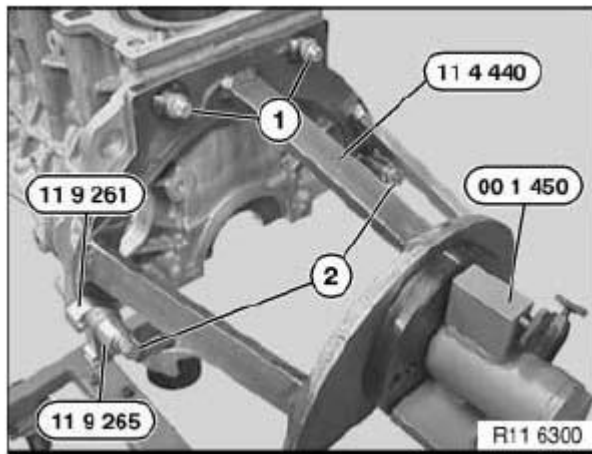
*Necessary preliminary tasks:*

- Remove **Engine**.

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

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

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



**Fig. 3: Identifying Special Tool (11 9 261), (11 9 265), (11 4 440), (00 1 450), Steel Bolts And Aluminium Bolts**

Courtesy of BMW OF NORTH AMERICA, INC.

#### 11 00 050 REMOVING AND INSTALLING ENGINE (N52)

**NOTE:** Following procedure is for 3-Series and 5-Series. Specific Z4 information is not available from manufacturer. It is suggested to use 3-Series information.

**Special tools required:**

- 11 0 020

**IMPORTANT: Aluminium-magnesium materials.**

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

**A magnesium crankcase requires aluminium screws/bolts exclusively.**

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

**The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.**

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

*Necessary preliminary tasks:*

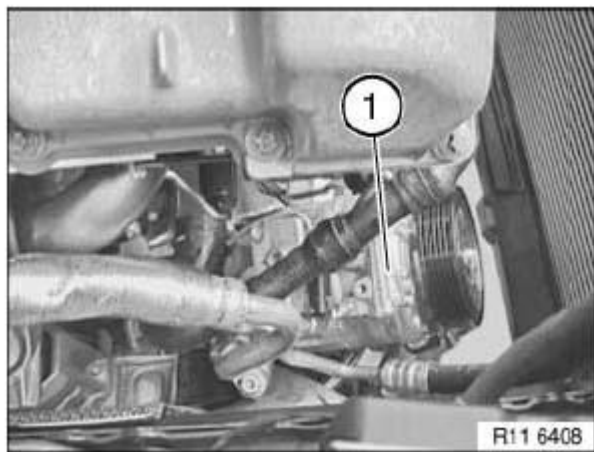
- Lift engine hood into **Assembly Position.**
- Remove exhaust system.
- Remove **Transmission.**
- Drain **Engine Oil.**
- Disconnect **Negative Battery Lead.**
- Remove **Air Cleaner Housing.**
- Remove fan cowl with electric fan.
- Remove **Radiator.**
- Remove **Water Pump.**
- Remove **Thermostat.**
- Detach **All Coolant Hoses** from engine.
- Remove **Left And Right Fresh Air Duct.**
- Remove **Intake Air Manifold.**
- Detach **Vacuum Line From Brake Booster.**
- Unfasten **Ignition Wiring Harness** and lay to one side.
- Unfasten **Engine Wiring Harness** and lay to one side.
- Remove **Fuel Injector Rail** and place to one side.

Release **A/C Compressor** (1) and set down on front axle carrier.

**IMPORTANT: A/C lines are pressurized.**

**Do not disconnect A/C lines.**

Do not disconnect coolant pipe from crankcase.



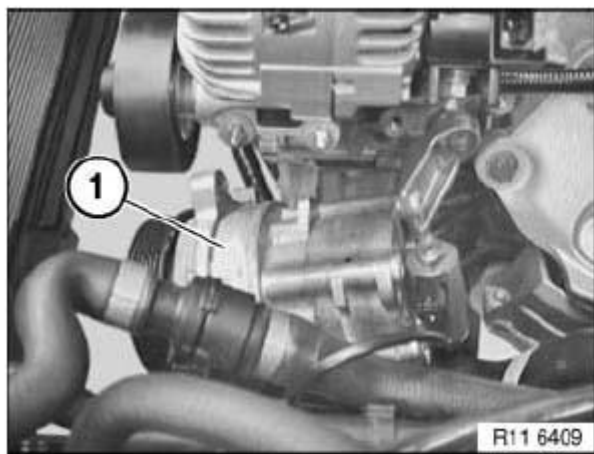
**Fig. 4: Identifying A/C Compressor**

Courtesy of BMW OF NORTH AMERICA, INC.

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

**NOTE:** Do not disconnect hydraulic lines.

If Dynamic Drive optional extra is fitted, release bracket.



**Fig. 5: Identifying Power Steering Pump**

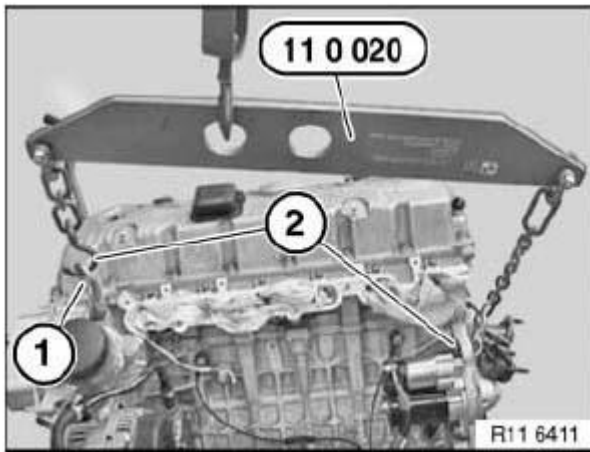
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in towing hook (1).

Suspend special tool 11 0 020 from engine crane.

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

Lift engine out with crane.

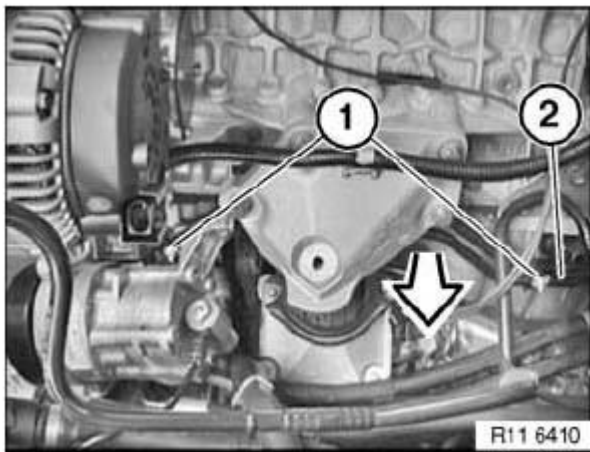


**Fig. 6: Identifying Special Tool (11 0 020), Towing Hook And Engine Mounting Eyelets**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** If automatic transmission optional extra is fitted: Raise engine approx. 10 cm.

Release screws (1).

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



**Fig. 7: Identifying Oil-Water Heat Exchanger Lines And Retaining Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

#### 11 00 610 REPAIRING THREADS ON MAGNESIUM ENGINE BLOCK

**IMPORTANT:** Any work on the magnesium that creates dust must not be carried out without

**suitable dust extraction apparatus in place.**

**Magnesium and water can react by forming magnesium hydroxide and hydrogen.**

**Do not use any emulsions containing water to lubricate the magnesium material.**

**Only engine oil may be used for lubrication.**

**IMPORTANT: Aluminium-magnesium materials.**

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

**A magnesium crankcase requires aluminium screws/bolts exclusively.**

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

**The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.**

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

Tape off parts to be cleaned (3) cleanly and protect against chips.

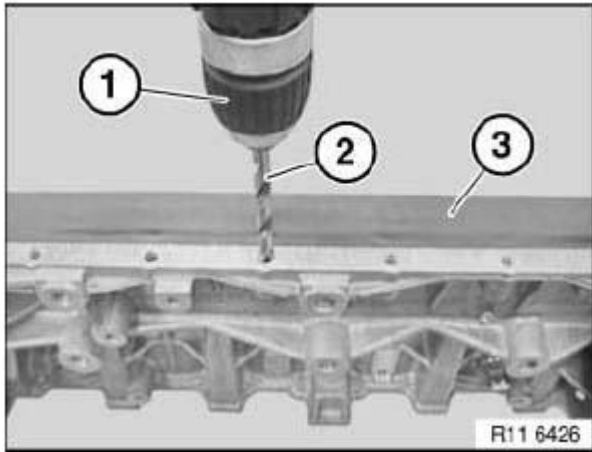
Use core drill bit (2) with hand drill (1).

*Installation:*

Ensure exact angularity to workpiece.

Blow out core bore cleanly.

No chips are permitted in the drilled hole.

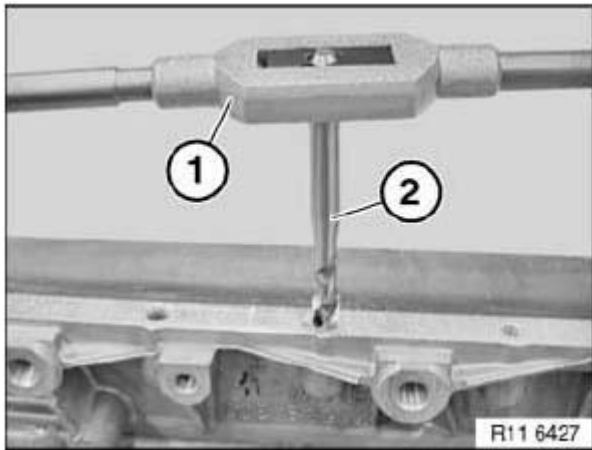


**Fig. 8: Identifying Core Drill Bit, Hand Drill And Clean Area**  
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in Helicoil drill bit (2) with die (1).

*Installation:*

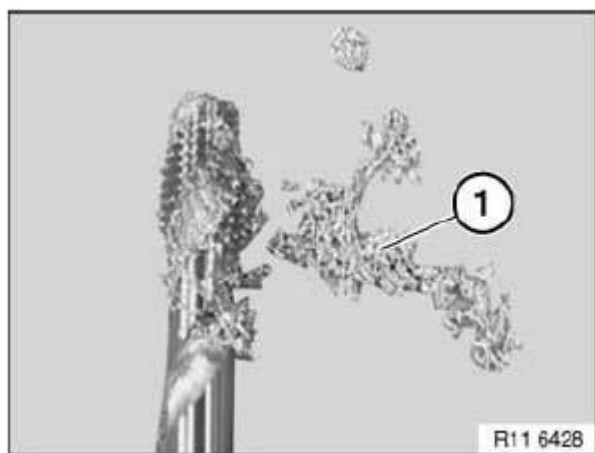
Ensure exact angularity to workpiece.



**Fig. 9: Identifying Helicoil Drill Bit And Die**  
Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT:** Do not allow chips (1) to come into contact with water.

**Danger of fire and explosion.**

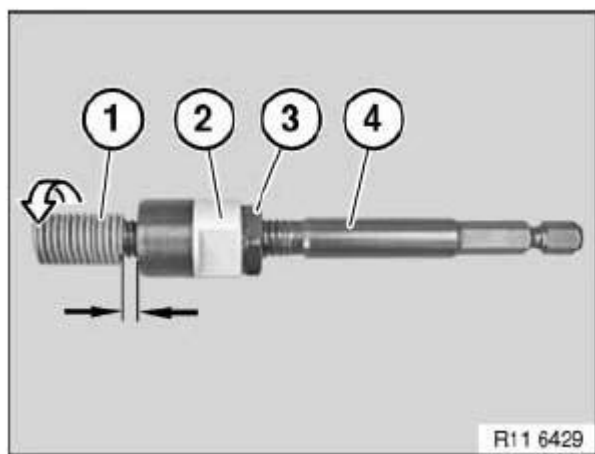


**Fig. 10: Identifying Magnesium Chips**  
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in aluminium Helicoil (1) by hand in direction of arrow as far as it will go.

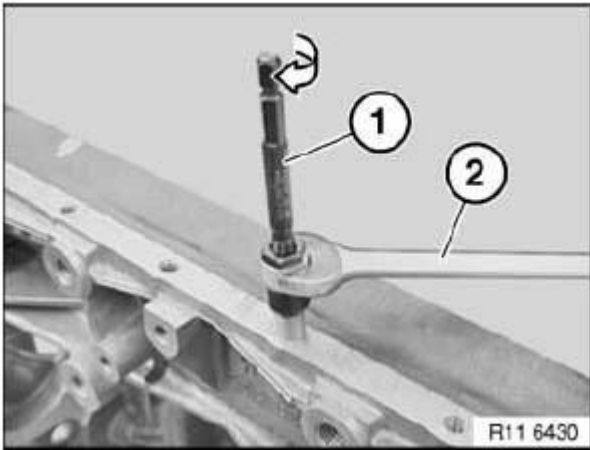
Adjust spacer (2) approx. 1 mm.

Secure spacer (2) with lock nut (3).



**Fig. 11: Identifying Spacer, Lock Nut, Helicoil-Plus And Helicoil**  
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in Helicoil-Plus (1) with preassembled aluminium Helicoil.



**Fig. 12: Identifying Helicoil-Plus**

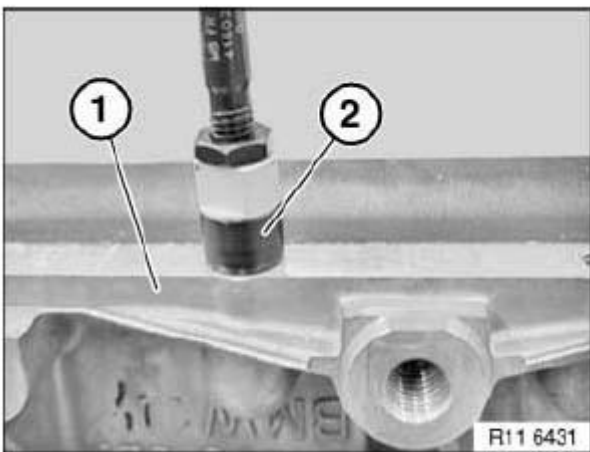
Courtesy of BMW OF NORTH AMERICA, INC.

Screw aluminium Helicoil into workpiece (1) as far as it will go.

Remove Helicoil-Plus (2) again after screwing in.

*Installation:*

Aluminium Helicoil remains in workpiece (1).

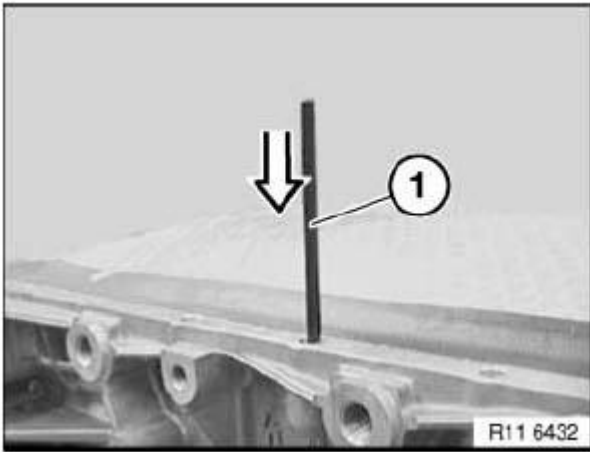


**Fig. 13: Identifying Helicoil-Plus And Workpiece**

Courtesy of BMW OF NORTH AMERICA, INC.

Break mounting hook off with mounting mandrel (1).

**NOTE:** Blow mounting hook out of pocket hole with compressed air.



**Fig. 14: Identifying Mounting Mandrel**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

#### **11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N52)**

**Special tools required:**

- 00 0 200
- 00 0 202
- 00 0 204
- 00 0 208
- 11 0 000

**WARNING: Danger of injury!**

**Observe following instructions relating to special tool:**

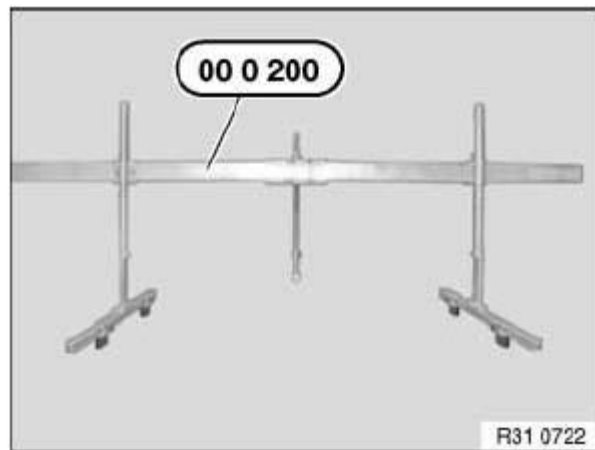
- 1. Prior to each use, check the special tools for defects, modifications and operational reliability.**
- 2. Damaged/modified special tools must not be used!**
- 3. No changes or modifications may be made to the special tools!**
- 4. Keep special tools dry, clean and free of grease.**

*Necessary preliminary tasks:*

- Secure **Engine Bonnet/Hood In Service Position**
- Remove **cowl panel cover**
- **Remove Both Tension Struts From Spring Strut Dome**
- Remove **Intake Filter Housing**

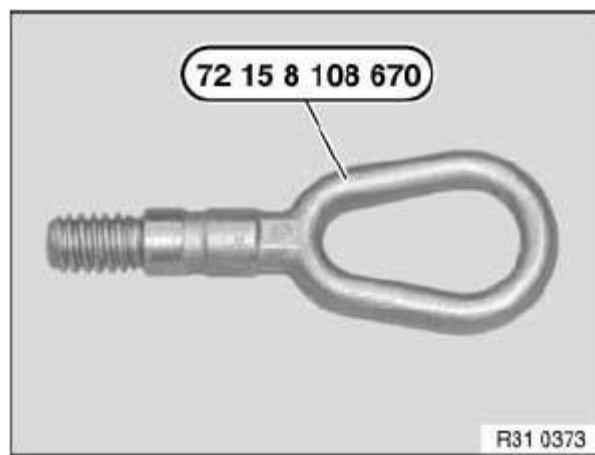
- Remove ignition coil cover

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



**Fig. 15: Identifying Special Tool (00 0 200)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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



**Fig. 16: Identifying Special Tool (72 15 8 108 670)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

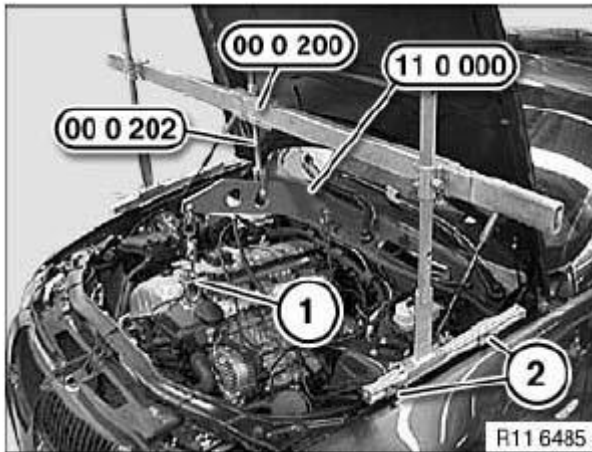
**IMPORTANT:** Risk of damage!

**With the aid of an assistant and the supports (2), place cross member 00 0 200 on the screw connections of the side panels.**

Screw in towing hook (1) and tighten down to approx. 30 Nm.

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

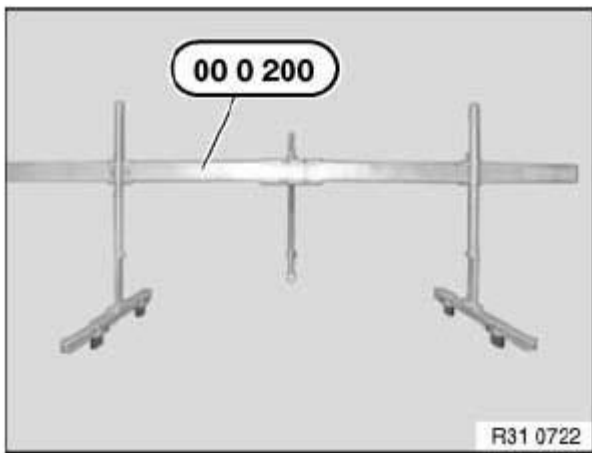
Fit suitable chains to special tool 11 0 000 and attach to towing hook (1) or engine lifting eye.



**Fig. 17: Identifying Special Tool (00 0 202), (00 0 200), (11 0 000), Towing Hook And Supports**  
Courtesy of BMW OF NORTH AMERICA, INC.

**WARNING: Danger of injury!**

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



**Fig. 18: Identifying Special Tool (00 0 200)**  
Courtesy of BMW OF NORTH AMERICA, INC.

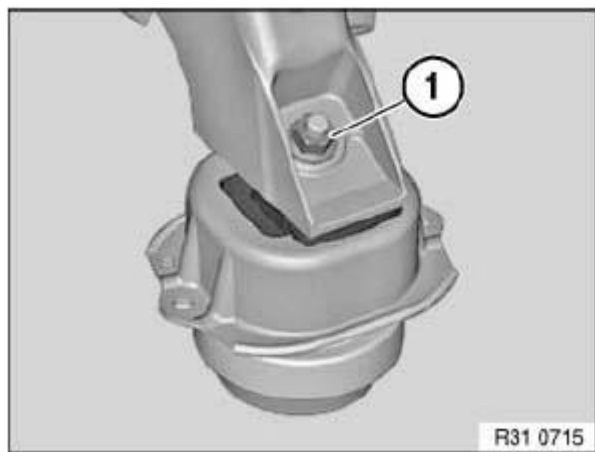
Unscrew nuts (1).

Raise engine approx. 10 mm with cross member.

*Installation:*

Replace self-locking nuts.

For tightening torque refer to 22 11 2AZ in **22 11 ENGINE SUSPENSION** .



**Fig. 19: Identifying Self-Locking Nuts**

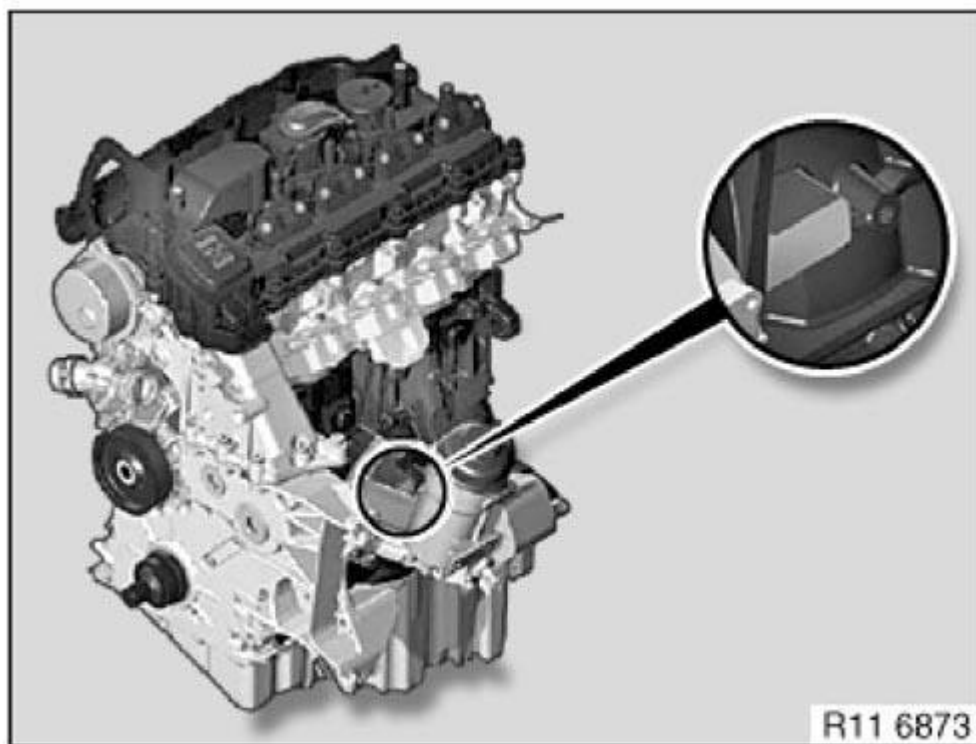
Courtesy of BMW OF NORTH AMERICA, INC.

## **ENGINE IDENTIFICATION**

Drive in engine numbers at marked surface with impact tool.

M47 / M47TU / M47T2

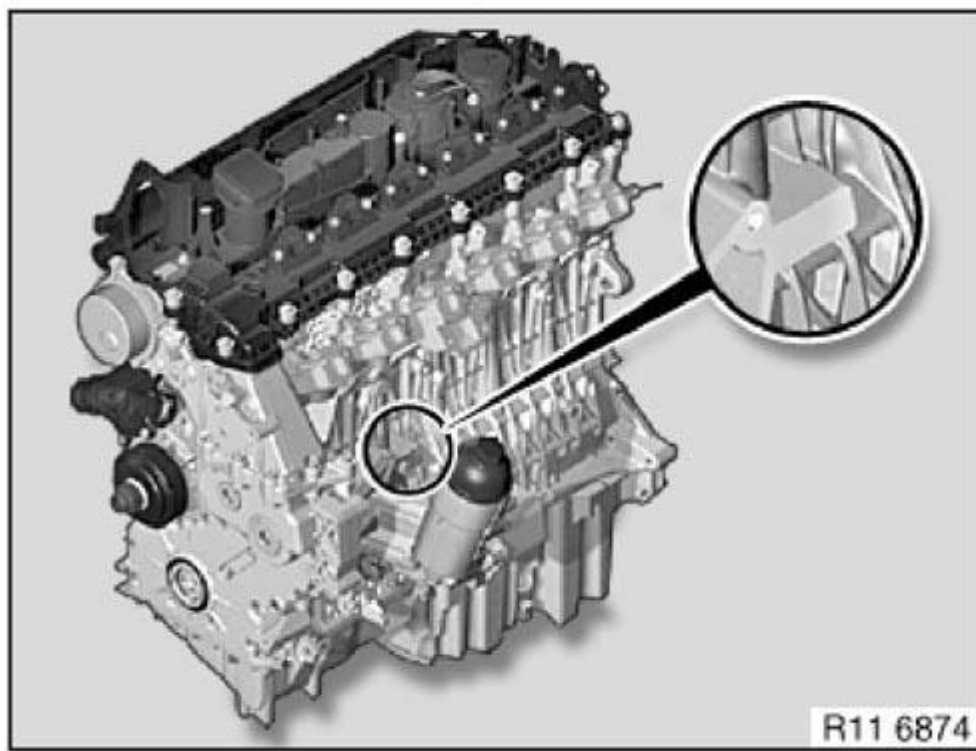
## M47 / M47TU / M47T2



**Fig. 20: Identifying Engine Identification Numbers - M47 / M47TU / M47T2**  
Courtesy of BMW OF NORTH AMERICA, INC.

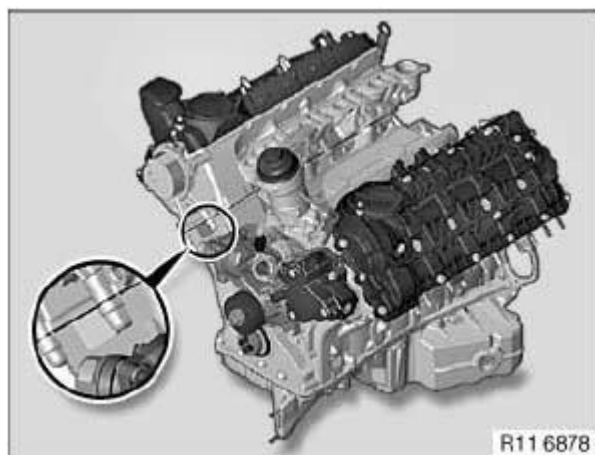
M57 / M57TU / M57T2

## M57 / M57TU / M57T2



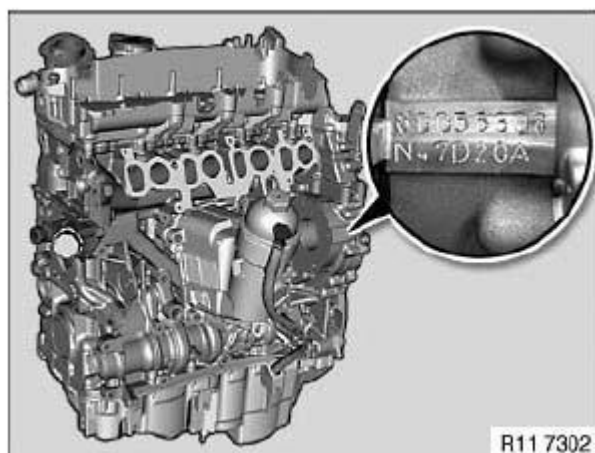
**Fig. 21: Identifying Engine Identification Numbers - M57 / M57TU / M57T2**  
Courtesy of BMW OF NORTH AMERICA, INC.

## M67 / M67TU



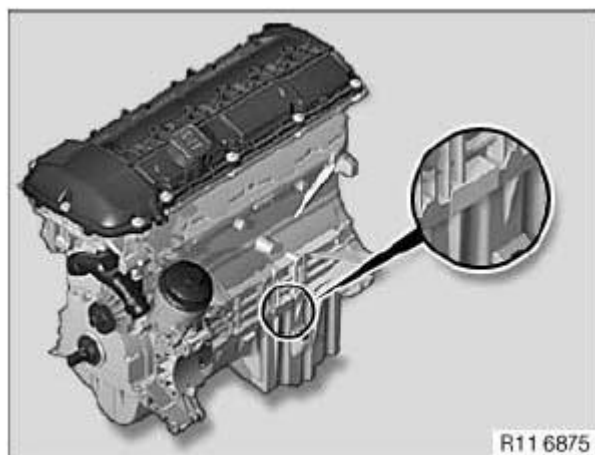
**Fig. 22: Identifying Engine Identification Numbers - M67 / M67TU**  
Courtesy of BMW OF NORTH AMERICA, INC.

## N47



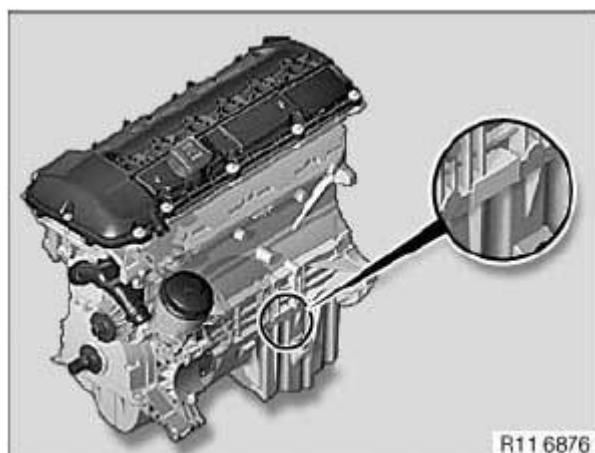
**Fig. 23: Identifying Engine Identification Numbers - N47**  
Courtesy of BMW OF NORTH AMERICA, INC.

M52 / M52TU



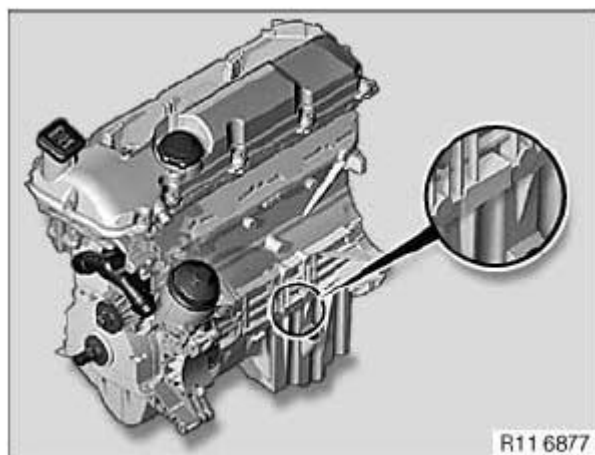
**Fig. 24: Identifying Engine Identification Numbers - M52 / M52TU**  
Courtesy of BMW OF NORTH AMERICA, INC.

M54



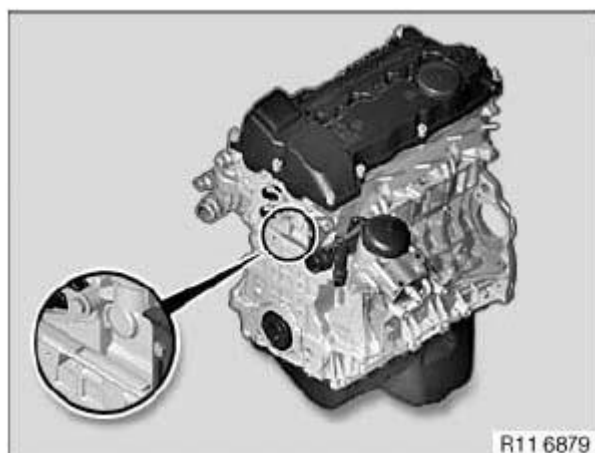
**Fig. 25: Identifying Engine Identification Numbers - M54**  
Courtesy of BMW OF NORTH AMERICA, INC.

M56



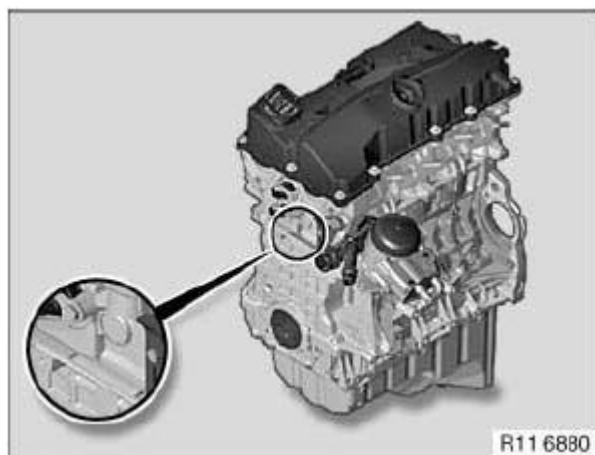
**Fig. 26: Identifying Engine Identification Numbers - M56**  
Courtesy of BMW OF NORTH AMERICA, INC.

N40 / N45



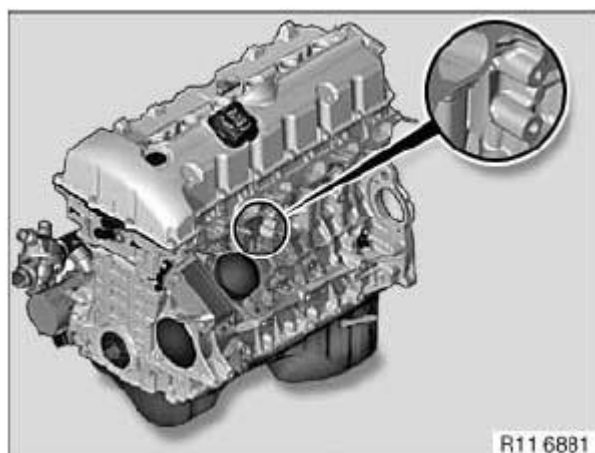
**Fig. 27: Identifying Engine Identification Numbers - N40 / N45**  
Courtesy of BMW OF NORTH AMERICA, INC.

N42 / N46 / N46T



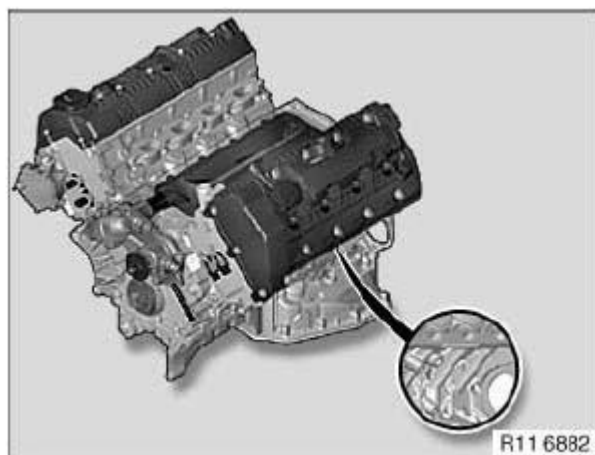
**Fig. 28: Identifying Engine Identification Numbers - N42 / N46 / N46T**  
Courtesy of BMW OF NORTH AMERICA, INC.

N51 / N52 / N52K / N53 / N54



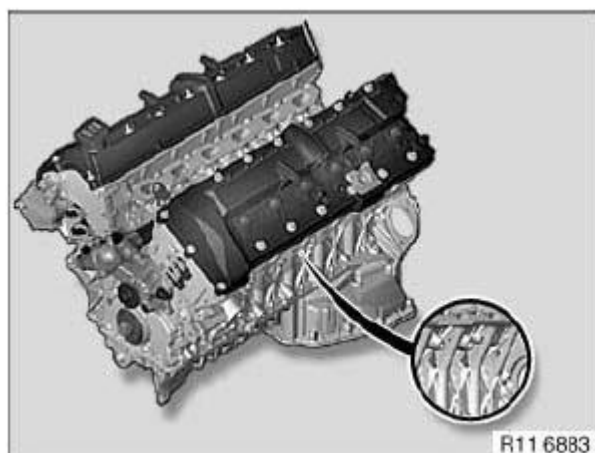
**Fig. 29: Identifying Engine Identification Numbers - N51 / N52 / N52K / N53 / N54**  
Courtesy of BMW OF NORTH AMERICA, INC.

N62



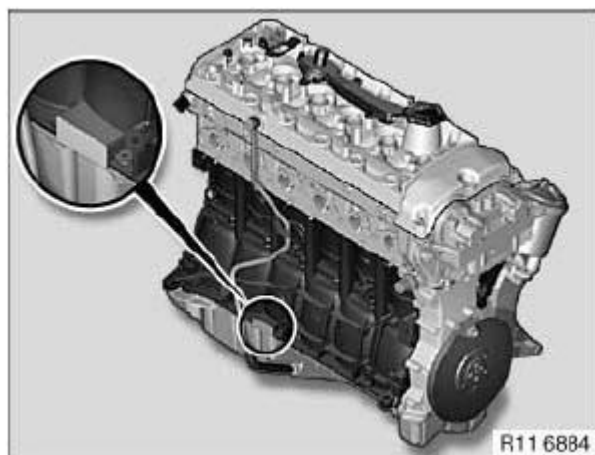
**Fig. 30: Identifying Engine Identification Numbers - N62**  
Courtesy of BMW OF NORTH AMERICA, INC.

N73



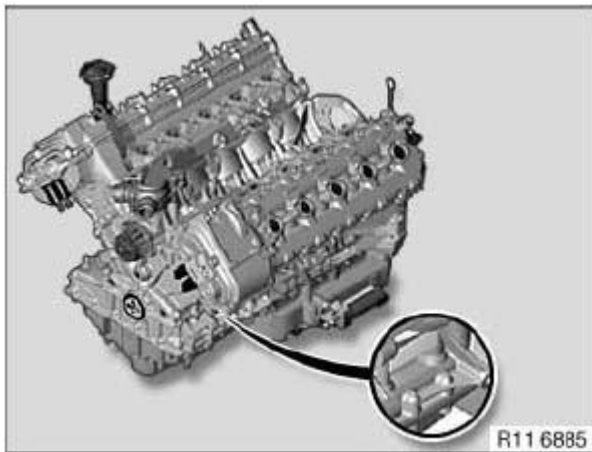
**Fig. 31: Identifying Engine Identification Numbers - N73**  
Courtesy of BMW OF NORTH AMERICA, INC.

S54



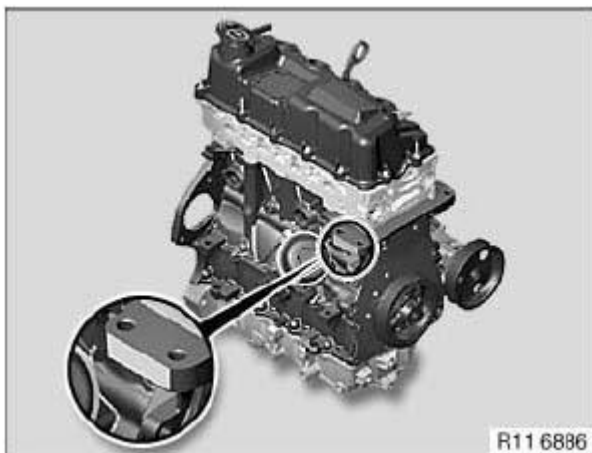
**Fig. 32: Identifying Engine Identification Numbers - S54**  
Courtesy of BMW OF NORTH AMERICA, INC.

S85



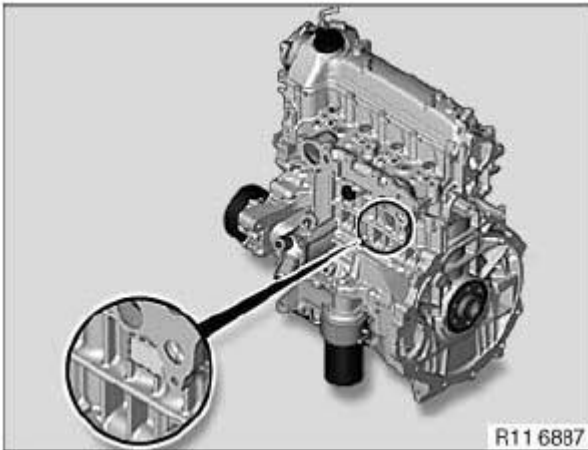
**Fig. 33: Identifying Engine Identification Numbers - S85**  
Courtesy of BMW OF NORTH AMERICA, INC.

W10 / W11



**Fig. 34: Identifying Engine Identification Numbers - W10 / W11**  
Courtesy of BMW OF NORTH AMERICA, INC.

W17



**Fig. 35: Identifying Engine Identification Numbers - W17**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

#### **MOUNTING ENGINE ON ASSEMBLY STAND (N52)**

##### **Special tools required:**

- 00 1 450
- 11 3 370
- 11 4 440
- 11 9 261
- 11 9 265

##### **IMPORTANT: Aluminium-magnesium materials.**

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

**A magnesium crankcase requires aluminium screws/bolts exclusively.**

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

**The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.**

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

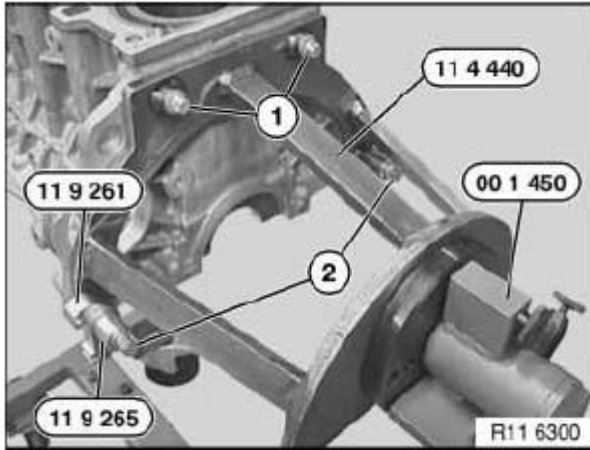
##### ***Necessary preliminary tasks:***

- Remove **Engine**.

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

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

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



**Fig. 36: Identifying Special Tool (11 9 261), (11 9 265), (11 4 440), (00 1 450), Steel Bolts And Aluminium Bolts**

Courtesy of BMW OF NORTH AMERICA, INC.

## 12 CYLINDER HEAD WITH COVER

### 11 12 000 REMOVING AND INSTALLING/SEALING CYLINDER HEAD COVER (N52)

**IMPORTANT: Aluminium-magnesium materials.**

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

**A magnesium crankcase requires aluminium screws/bolts exclusively.**

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

**The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.**

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

*Necessary preliminary tasks:*

- Remove acoustic cover.
- Remove rod-type ignition coils.
- Unclip wiring harness for fuel injectors.
- Remove **Tension Strut**.
- Remove **Clean Air Duct**.

Unlock and detach engine vent hose (1).

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

Release screws (3).

For tightening torque refer to 11 37 3AZ in **11 37 VARIABLE VALVE GEAR (N52)** .

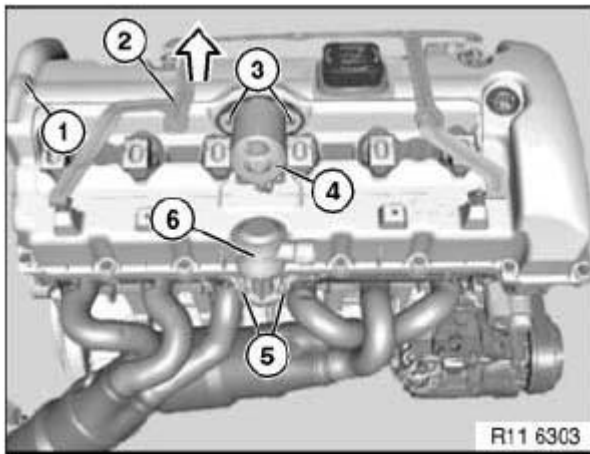
Remove servodrive (4) in direction of arrow.

If necessary, release nuts (5).

If necessary, remove secondary air valve (6).

Installation:

**Replace aluminium screws.**



**Fig. 37: Identifying Secondary Air Valve, Metal Bracket, Engine Vent Hose, Servodrive And Nuts**  
**Courtesy of BMW OF NORTH AMERICA, INC.**

Release screws in area (1).

*Installation:*

Replace aluminium screws.

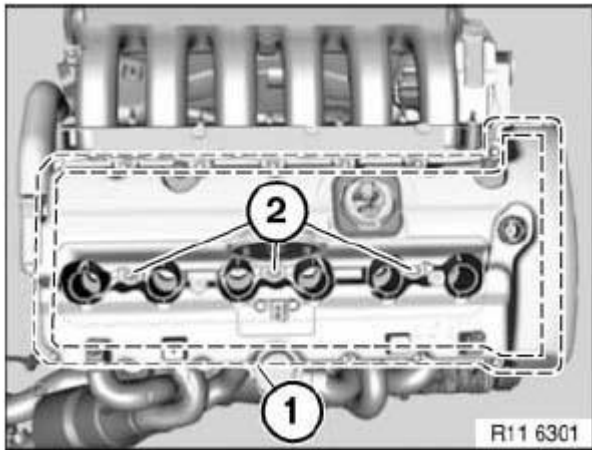
For tightening torque refer to **11 12 4AZ** .

Release screws (2).

For tightening torque refer to **11 12 4AZ** .

*Installation:*

**Replace aluminium screws.**



**Fig. 38: Identifying Aluminium Engine Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

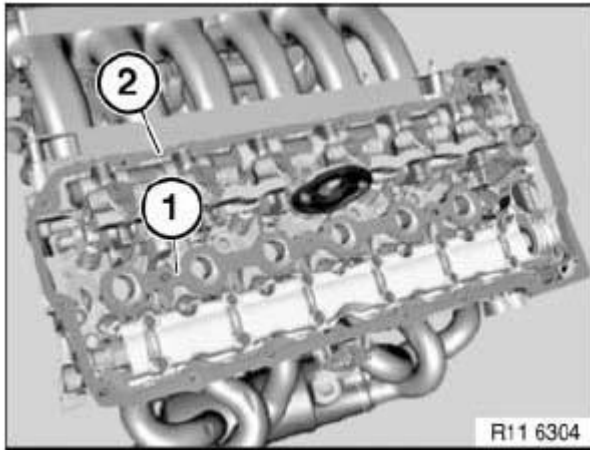
Replace seal (1).

Replace seal (2).

*Installation:*

Clean all sealing surfaces.

Do not clean sealing faces (1 and 2) with a metal cutting tool.



**Fig. 39: Identifying Engine Seals**

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

## 11 12 100 REMOVING AND INSTALLING CYLINDER HEAD (N52)

### Special tools required:

- 11 0 320
- 11 4 420
- 11 4 430
- 11 4 471
- 11 4 472
- 11 8 580

### IMPORTANT: Aluminium-magnesium materials.

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

**A magnesium crankcase requires aluminium screws/bolts exclusively.**

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

**The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.**

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

*Necessary preliminary tasks:*

- Remove Exhaust System.
- Drain Coolant
- Drain off Engine Oil.
- Remove both Exhaust Manifolds
- Remove Intake Air Manifold
- Detach coolant hoses from cylinder head
- Remove Inlet And Exhaust Adjustment Unit

**IMPORTANT: Fit new cylinder head screws.**

**Do not wash off bolt coating.**

**There must be no coolant, water or engine oil in the pocket holes.**

**Risk of corrosion and cracking!**

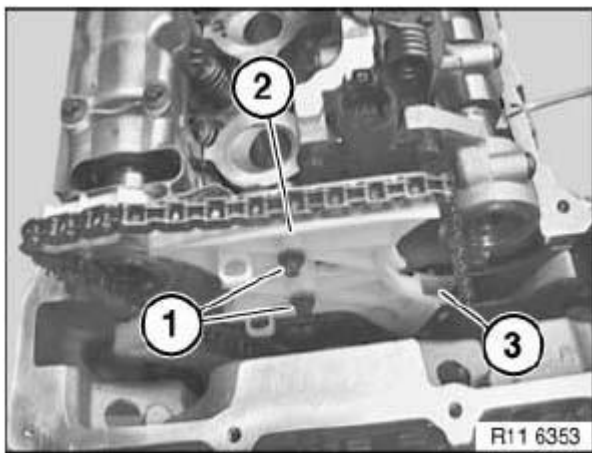
Release screws (1).

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

Set down timing chain.

**IMPORTANT: If the timing chain is stowed in the gearcase, the crankshaft must no longer be rotated.**

**This would cause the timing chain on the crankshaft sprocket wheel to jam or jump.**



**Fig. 40: Identifying Engine Timing Chain Module, Junction And Screws**

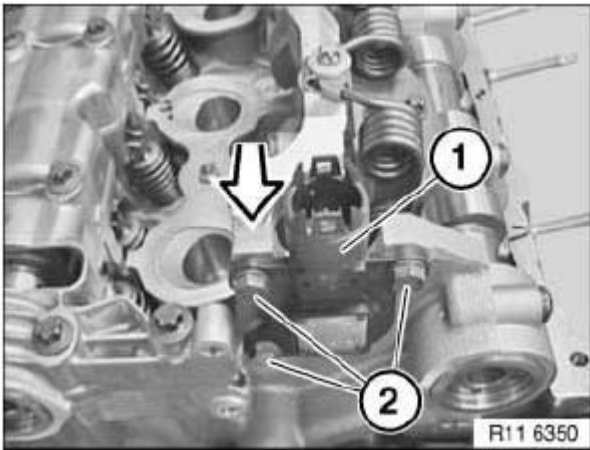
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

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

Release screws (2).

Remove eccentric shaft sensor (1) towards front.

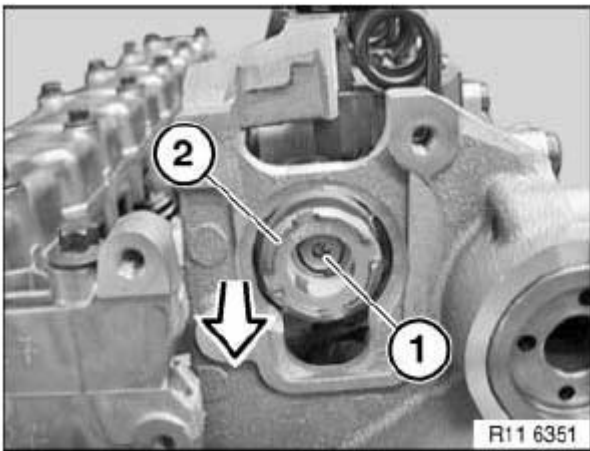


**Fig. 41: Identifying Eccentric Shaft Sensor And Mounting Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

Release screw (1).

Remove magnet wheel (2) towards front.

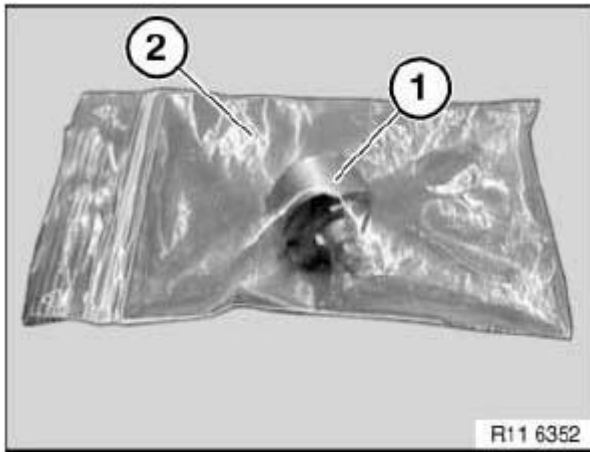


**Fig. 42: Identifying Magnet Wheel And Screw**

Courtesy of BMW OF NORTH AMERICA, INC.

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

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

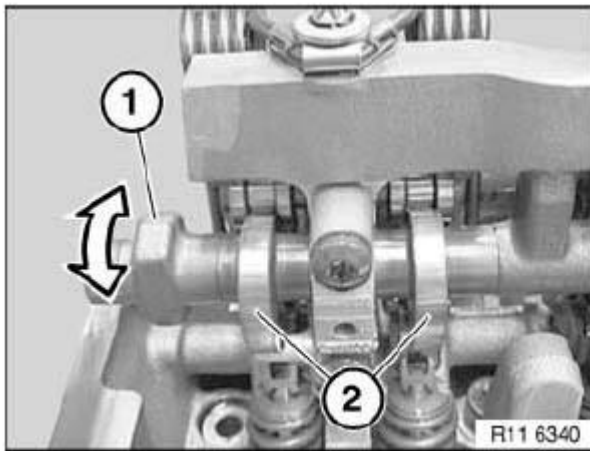


**Fig. 43: Identifying Magnet Wheel And Plastic Bag**  
Courtesy of BMW OF NORTH AMERICA, INC.

Pretension eccentric shaft (1) upwards in direction of arrow.

Remove stop screw between 1st and 2nd cylinders.

For tightening torque refer to 11 37 6AZ in 11 37 VARIABLE VALVE GEAR (N52) .



**Fig. 44: Identifying Eccentric Shaft Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

Release bolt (2).

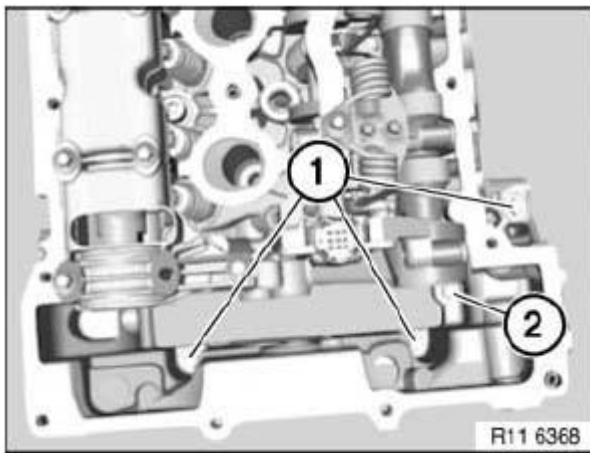
For tightening torque refer to 11 12 3AZ .

Release screws (1).

For tightening torque refer to 11 12 4AZ .

*Installation:*

**Replace aluminium screws.**



**Fig. 45: Identifying Engine Screws**

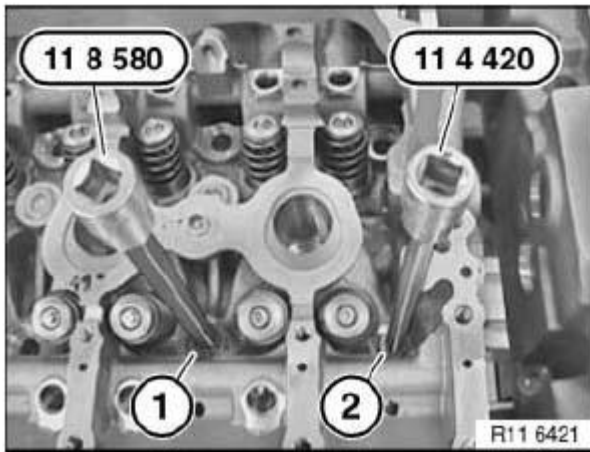
Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT:** Observe different bolt heads.

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

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

**NOTE:** Picture shows inlet and exhaust camshafts removed.



**Fig. 46: Identifying Special Tool (11 4 420) And (11 8 580)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

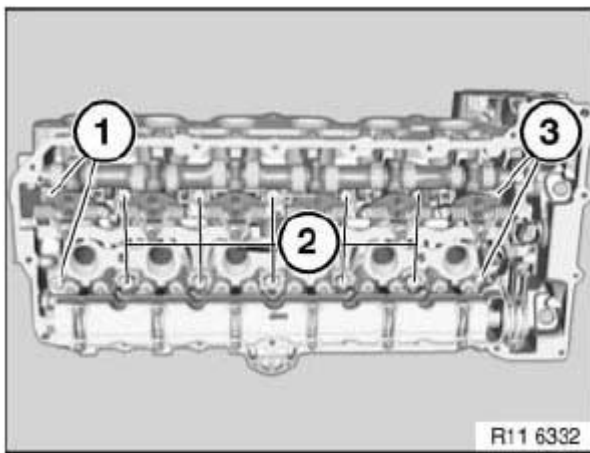
**IMPORTANT: Observe different M9 bolt lengths (1 and 3).**

Release M9 cylinder head bolts (1 and 3) with special tool 11 4 420.

For tightening torque refer to 11 12 2AZ in 11 12 CYLINDER HEAD WITH COVER .

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

For tightening torque refer to 11 12 1AZ in 11 12 CYLINDER HEAD WITH COVER .



**Fig. 47: Identifying Engine Cylinder Head Bolts**  
 Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: All cylinder head bolts (1, 2 and 3) must be replaced.**

**Jointing torque and angle of rotation must be observed without fail.**

**Risk of damage!**

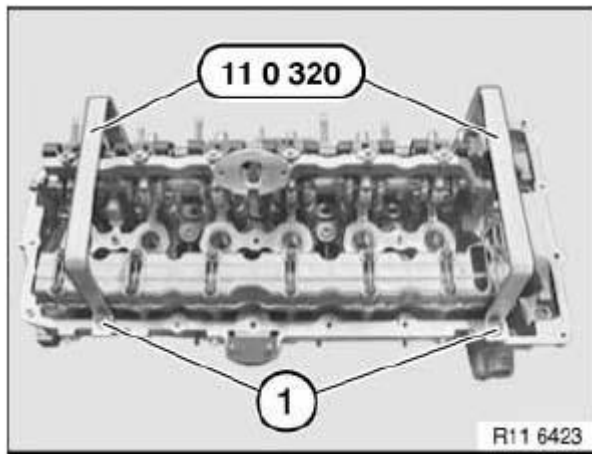
Secure special tool 11 0 320 with existing cylinder head cover bolts (1).

For tightening torque refer to 11 12 5AZ in 11 12 CYLINDER HEAD WITH COVER .

**IMPORTANT: Removing and install cylinder head with a second person helping.**

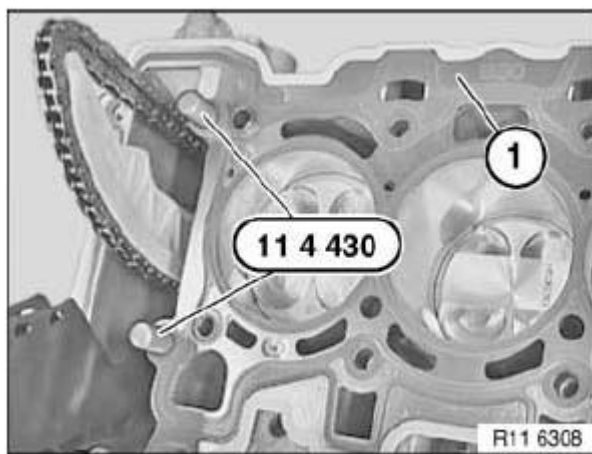
**Weight of cylinder head with add-on parts is approx. 40 kg.**

**Do not set cylinder head down on sealing face, risk of damage to valves.**



**Fig. 48: Identifying Special Tool (11 0 320) And Cylinder Head Cover Bolts**  
Courtesy of BMW OF NORTH AMERICA, INC.

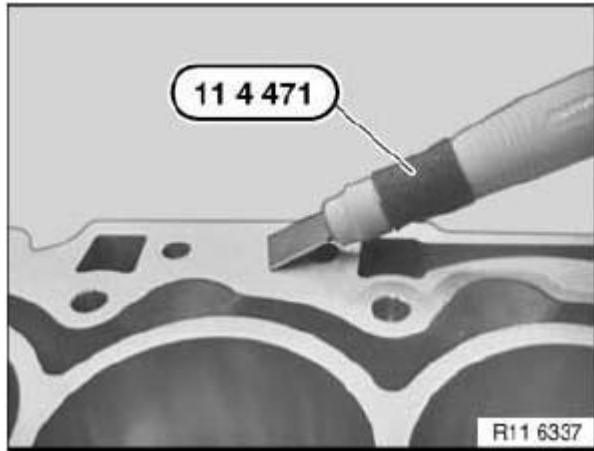
Insert special tool 11 4 430 into bores.



**Fig. 49: Identifying Special Tool (11 4 430)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

**IMPORTANT: Do not use any metal-cutting tools.**



**Fig. 50: Identifying Special Tool (11 4 471)**

Courtesy of BMW OF NORTH AMERICA, INC.

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

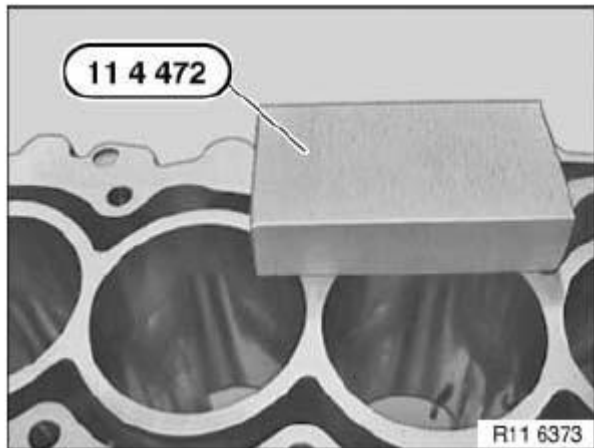
**IMPORTANT: Do not use any metal-cutting tools.**

**There must be no coolant, water or engine oil in the pocket holes.**

**Risk of corrosion and cracking!**

Clean all pocket holes.

Replace Cylinder Head Gasket.



**Fig. 51: Identifying Special Tool (11 4 472)**

Courtesy of BMW OF NORTH AMERICA, INC.

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

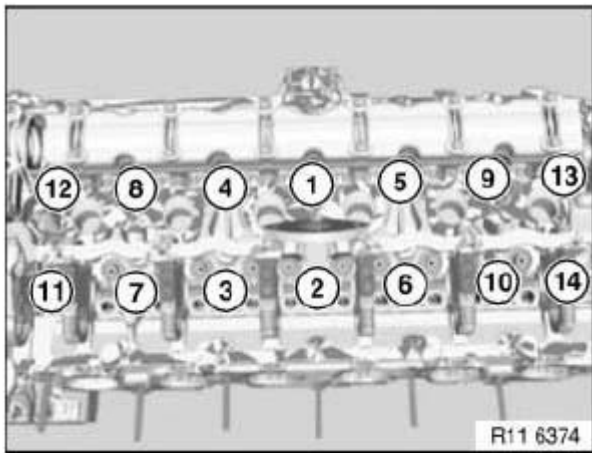
Fit new cylinder head screws.

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

For tightening torque refer to 11 12 1AZ in **11 12 CYLINDER HEAD WITH COVER** .

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

For tightening torque refer to 11 12 2AZ in **11 12 CYLINDER HEAD WITH COVER** .

**Fig. 52: Identifying Cylinder Head Bolt Tightening Sequence**

Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** Picture shows inlet and exhaust camshafts removed.

**Observe sequence for tightening cylinder head bolts without fail.**

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

Installation:

- Jointing torque:

All cylinder head bolts 1 to 14 to 30 Nm

- 1st angle of rotation:

All cylinder head bolts 1 to 14 to 90°

- 2nd angle of rotation:

**Only** cylinder head bolts 1 to 10 to 90°

- 3rd angle of rotation:

All cylinder head bolts 1 to 14 to 45°

Insert bolts (1).

For tightening torque refer to 11 12 3AZ in 11 12 CYLINDER HEAD WITH COVER .

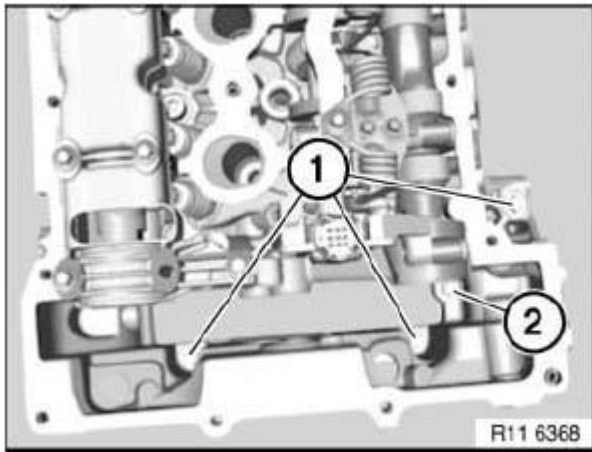
**IMPORTANT: Secure bolt (2) with a gripper against falling down.**

Insert bolt (2).

For tightening torque refer to 11 12 3AZ in 11 12 CYLINDER HEAD WITH COVER .

*Installation:*

**Replace aluminium screws.**



**Fig. 53: Identifying Engine Cylinder Head Bolts**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

## 11 12 101 REPLACING CYLINDER HEAD GASKET (N52)

**Special tools required:**

- 11 4 430
- 11 4 470

**IMPORTANT: Aluminium-magnesium materials.**

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

A magnesium crankcase requires aluminium screws/bolts exclusively.

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

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

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

*Necessary preliminary tasks:*

- Remove Cylinder Head.

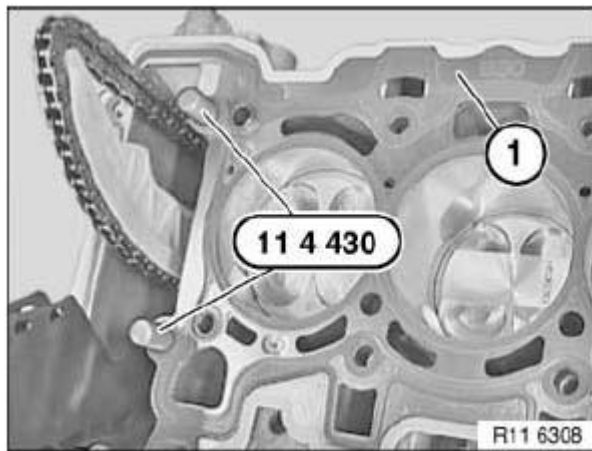
Insert special tool 11 4 430 into bores.

Remove head gasket.

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

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

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

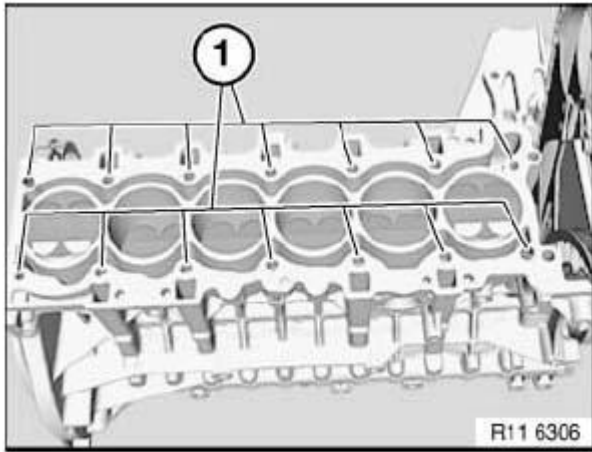


**Fig. 54: Identifying Special Tool (11 4 430) And Special Tool (11 4 430)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove remnants of oil and dirt from pocket holes (1).

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

**Do not use any metal-cutting tools.**

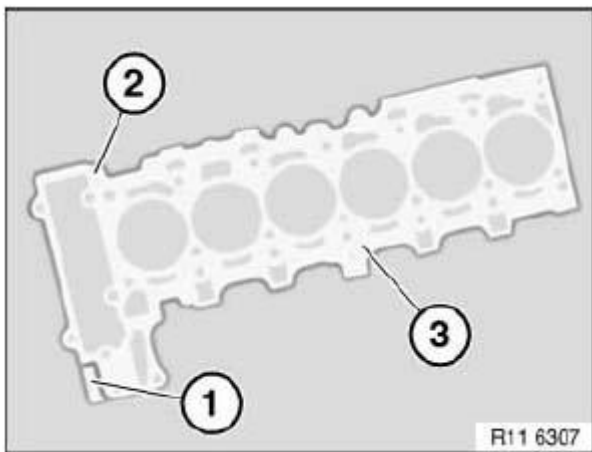


**Fig. 55: Identifying Engine Pocket Holes**  
Courtesy of BMW OF NORTH AMERICA, INC.

Identification (1) of head gasket.

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

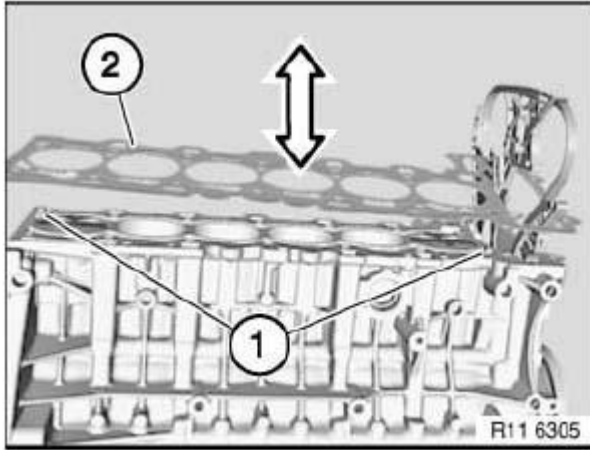
Gasket (3) is a sheet-metal gasket



**Fig. 56: Identifying Sheet-Metal Gasket, Rubber Coating And Head Gasket Identification**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

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



**Fig. 57: Identifying Head Gasket And Adapter Sleeves**  
 Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** Check cylinder head for Deviation From Flatness.

Check cylinder head for Water Leaks.

**Assemble engine.**

## 11 12 527 REMACHINING A VALVE SEAT - DISASSEMBLING CYLINDER HEAD (N52)

**Special tools required:**

- 00 5 380
- 11 9 001

*Necessary preliminary tasks:*

- Remove Cylinder Head.
- Remove Inlet Camshaft.
- Remove Exhaust Camshaft.
- Remove All Valves.

Place cylinder head on special tool 11 9 001.

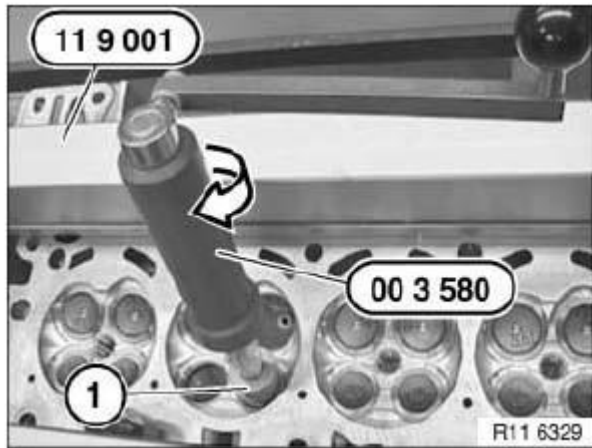
Inset pilot from special tool 00 5 380 5 mm into a valve stem.

Select a suitable valve seat milling cutter (1).

Turn the milling cutter clockwise while applying low pressure. When the milling operation is finished, perform a further 2 turns without applying pressure to the cutter.

**IMPORTANT:** If necessary, perform inner and outer seat corrections. See 11 12 CYLINDER HEAD WITH COVER N52 B25

Assemble engine.



**Fig. 58: Identifying Special Tools (11 9 001), (00 3 580) And Valve Seat Milling Cutter**  
Courtesy of BMW OF NORTH AMERICA, INC.

## 11 12 595 CHECKING A VALVE GUIDE FOR WEAR (N52)

*Necessary preliminary tasks:*

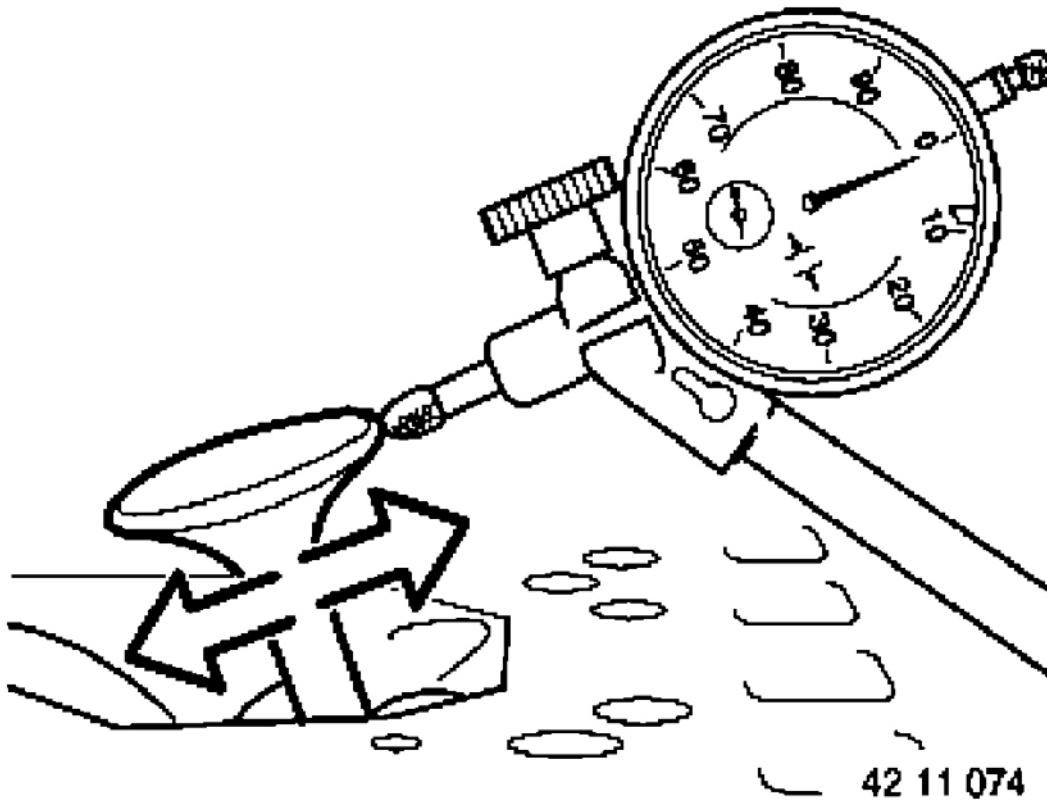
- Remove All Valve Springs.

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:** See illustration in Fig. 59.

Max. permissible tilt clearance 0.5 mm.



**Fig. 59: Measuring Tilt Clearance Using Dial Gauge**  
 Courtesy of BMW OF NORTH AMERICA, INC.

If the valve guide is outside the tolerance, the cylinder head must be replaced.

Assemble engine.

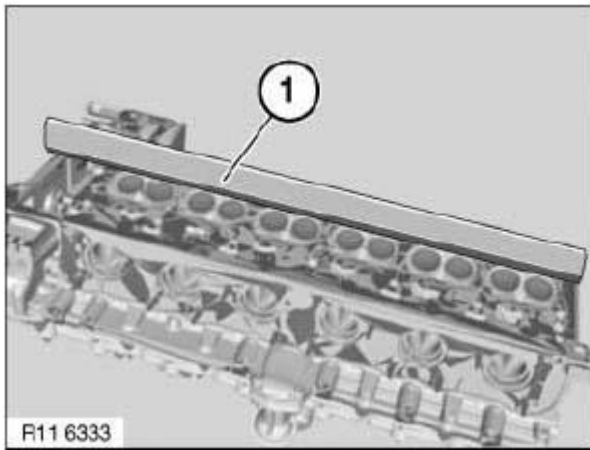
#### **11 12 719 RESURFACING CYLINDER HEAD SEALING FACE (N52)**

*Necessary preliminary tasks:*

- Remove **Cylinder Head**.
- Remove **Exhaust Camshaft**.
- Remove **Intermediate Lever** on inlet side.

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

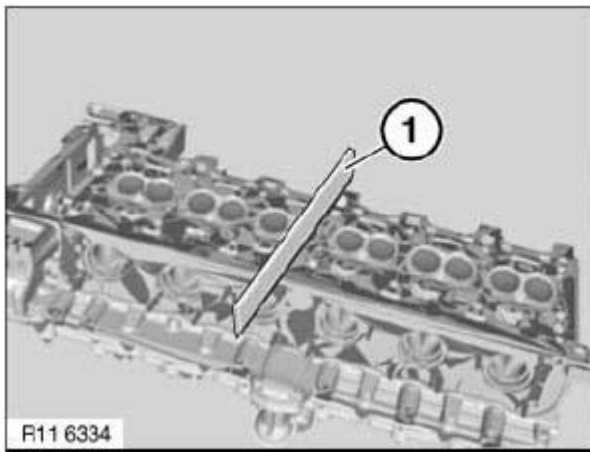
**NOTE:**        **Max. deviation from level (longitudinal) 0.10 mm**



**Fig. 60: Identifying Evenness Of Cylinder Head Sealing Faces Using Standard Straight-Edge**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

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



**Fig. 61: Identifying Evenness Of Cylinder Head Sealing Faces Using Standard Straight-Edge**  
Courtesy of BMW OF NORTH AMERICA, INC.

Check cylinder head for **Water Leaks.**

Assemble engine.

## 11 12 729 CHECKING CYLINDER HEAD FOR WATER LEAKS (N52)

**Special tools required:**

- 11 4 341
- 11 4 342

- 11 4 343

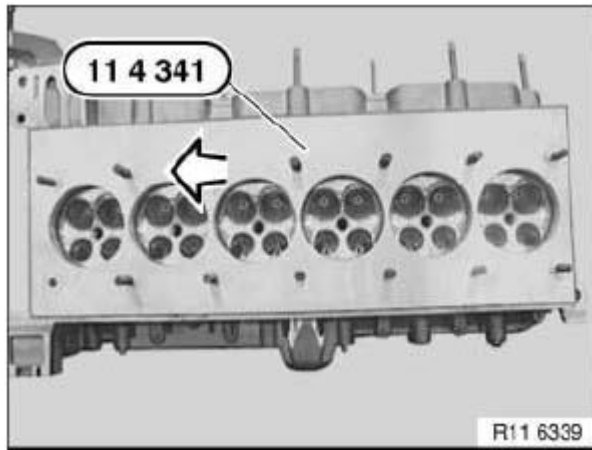
Necessary preliminary tasks:

- Remove Cylinder Head.
- Disassemble cylinder head.

Set up special tool 11 4 341 with existing cylinder head bolts.

*Installation:*

1 cyl is marked.



**Fig. 62: Identifying Special Tool (11 4 341)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 4 342, insert knurled screw (1) in direction of arrow.

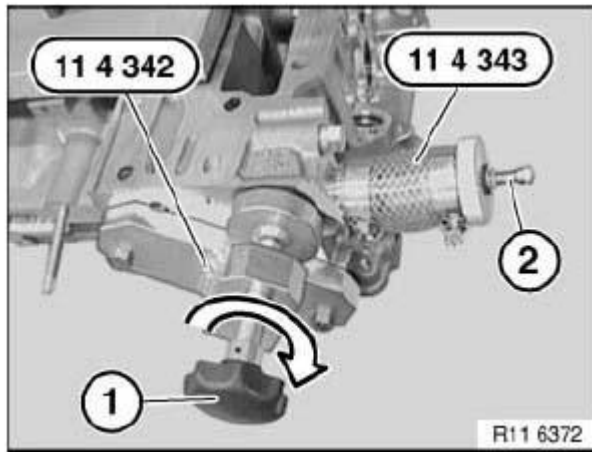
Sealing flange must rest flat.

Fit special tool 11 4 343.

**NOTE:** Compressed air at valve (2) must not exceed 3 bar.

Heat cylinder head to 60°.

Visually inspect for formation of bubbles.



**Fig. 63: Identifying Special Tool (11 4 342), (11 4 343), Knurled Screw And Valve**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

## 13 OIL SUMP

### 11 13 000 REMOVING AND INSTALLING, SEALING OR REPLACING OIL SUMP (N52)

**IMPORTANT: Aluminium-magnesium materials.**

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

**A magnesium crankcase requires aluminium screws/bolts exclusively.**

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

**The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.**

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

*Necessary preliminary tasks:*

- Remove engine splash guard.
- Secure engine in **Installation Position**.
- Lower **Front Axle**.

**NOTE:** The lines must be detached from the engine oil sump in the case of the optional extra automatic transmission; if necessary, detach vane pump and place to one

**side.**

Release bolts (3) on transmission.

Detach return hose (2).

Release screws along line (1).

For tightening torque refer to 11 13 1AZ in **11 13 OIL PAN (N52)** .

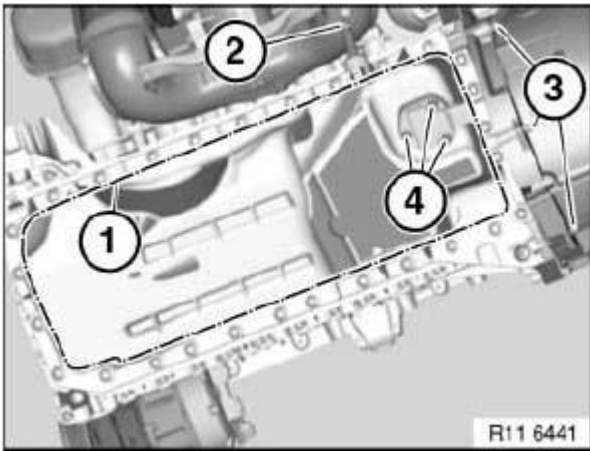
*Installation:*

**Replace aluminium screws.**

If necessary, release bolts (4), remove oil level sensor.

*Installation:*

Replace all seals.



**Fig. 64: Identifying Oil Level Sensor, Return Hose, Retaining Screws And Bolts**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

## **11 13 000 REMOVING AND INSTALLING, SEALING OR REPLACING OIL SUMP (N52) AWD**

**IMPORTANT: Aluminium-magnesium materials.**

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

**A magnesium crankcase requires aluminium screws/bolts exclusively.**

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

**The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.**

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

*Necessary preliminary tasks:*

- Remove engine splash guard.
- Secure engine in **Installation Position**.
- Lower **Front Axle**.
- Remove left drive shaft.
- Remove right drive shaft.
- Remove front axle differential.

**NOTE:**      **The lines must be detached from the engine oil sump in the case of the optional extra automatic transmission; if necessary, detach vane pump and place to one side.**

Release bolts (3) on transmission.

Detach return hose (2).

Release screws along line (1).

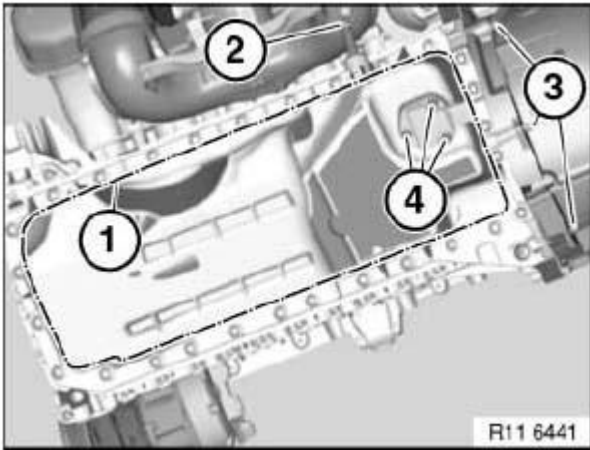
*Installation:*

**Replace aluminium screws.**

Replace all seals.

If necessary, release bolts (4), remove oil level sensor.

**NOTE:**      **Fig. 65 shows N52.**



**Fig. 65: Identifying Oil Level Sensor, Return Hose, Retaining Screws And Bolts**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

## 14 HOUSING COVER

### 11 14 005 REPLACING FRONT CRANKSHAFT RADIAL SEAL (N52)

#### Special tools required:

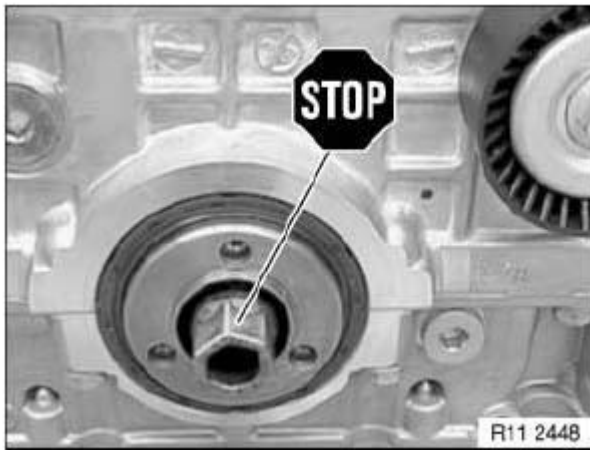
- 11 9 221
- 11 9 222
- 11 9 223
- 11 9 224
- 11 9 231
- 11 9 232
- 11 9 233

#### Necessary preliminary tasks:

- Remove Vibration Damper.

#### **IMPORTANT: Do not release central bolt.**

If the central bolt is released, the sprocket wheels of the timing chain and the oil pump will no longer be nonpositively connected to the crankshaft. The camshafts to the crankshaft can warp (**risk of damage**).



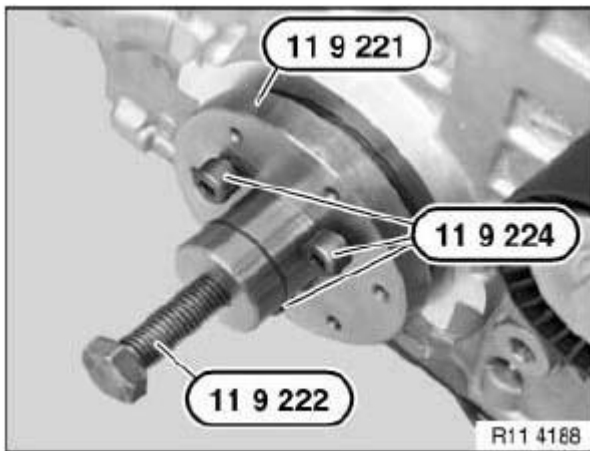
**Fig. 66: Identifying Central Bolt For Warning**  
Courtesy of BMW OF NORTH AMERICA, INC.

Turn back special tool 11 9 222.

Push special tool 11 9 221 onto crankshaft.

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

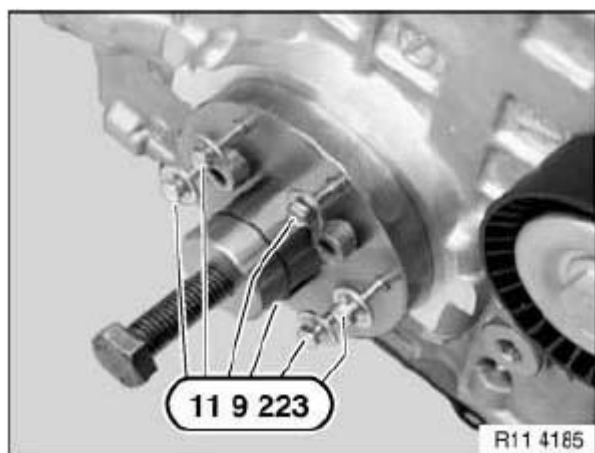
Insert screws (special tool 11 9 224) and tighten down to approx. 20 Nm.



**Fig. 67: Identifying Special Tool (11 9 224), (11 9 222) And (11 9 221)**  
Courtesy of BMW OF NORTH AMERICA, INC.

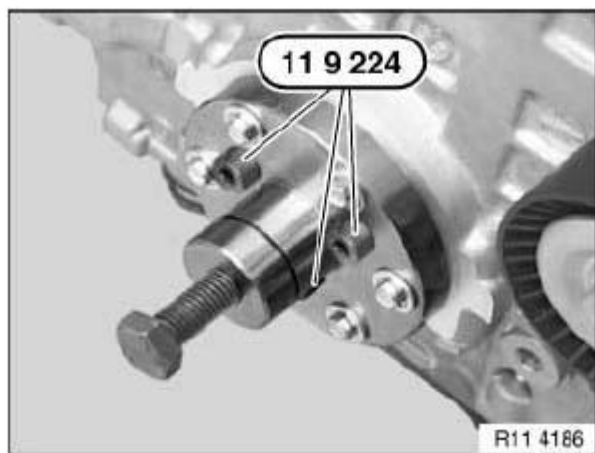
Insert screws (special tool 11 9 223) and screw in until they make contact without play.

**IMPORTANT:** Do *not* overload special tool 11 9 223 (metal screws).



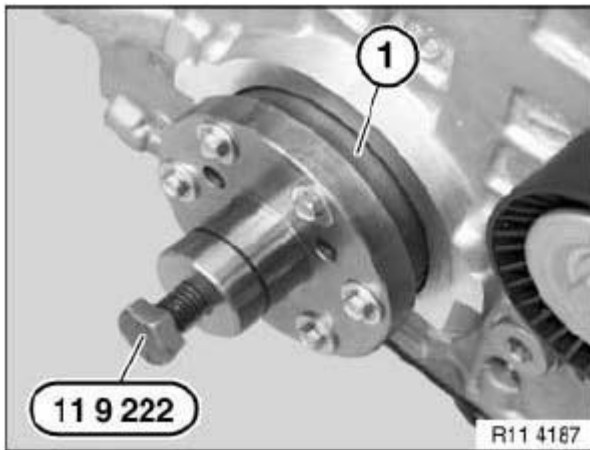
**Fig. 68: Identifying Special Tool (11 9 223) And Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove screws (special tool 11 9 224).



**Fig. 69: Identifying Special Tool (11 9 224) And Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screw (special tool 11 9 222) carefully and slowly and withdraw radial seal (1).

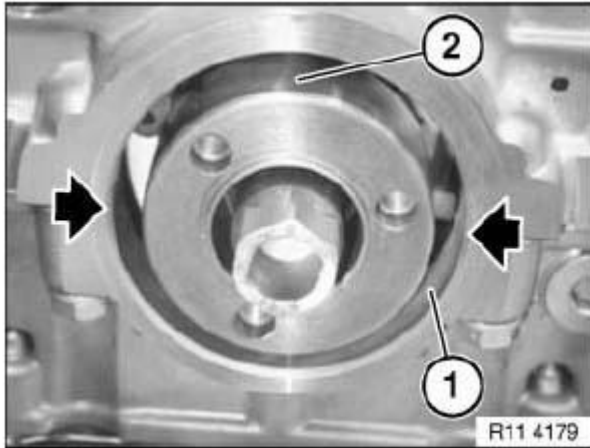


**Fig. 70: Identifying Special Tool (11 9 222) And Radial Seal**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

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

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



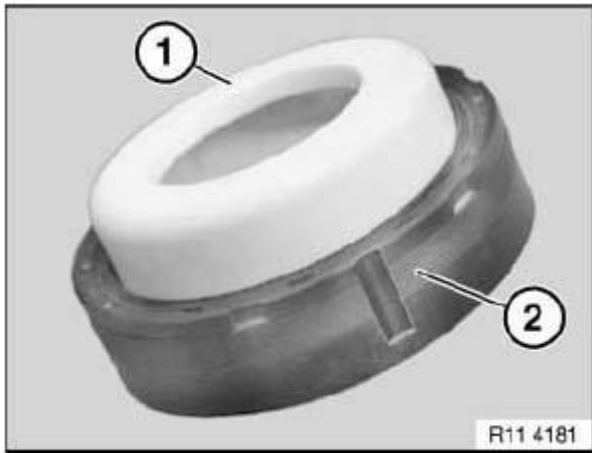
**Fig. 71: Identifying Shaft Seal And Radial Shaft Seal Running Surface**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

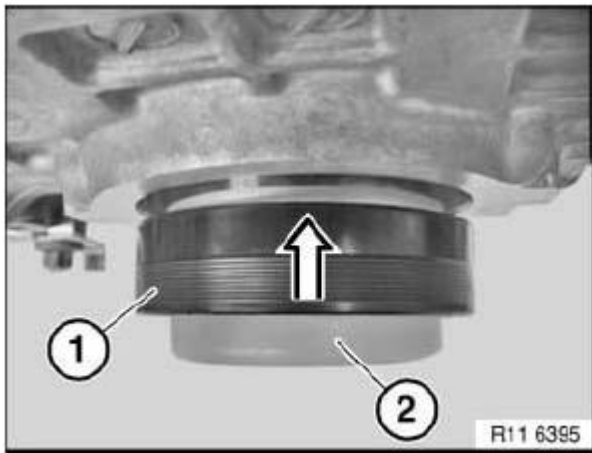
**Radial seal (2) has a groove on both left and right sides.**

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



**Fig. 72: Identifying Radial Seal And Support Sleeves**  
Courtesy of BMW OF NORTH AMERICA, INC.

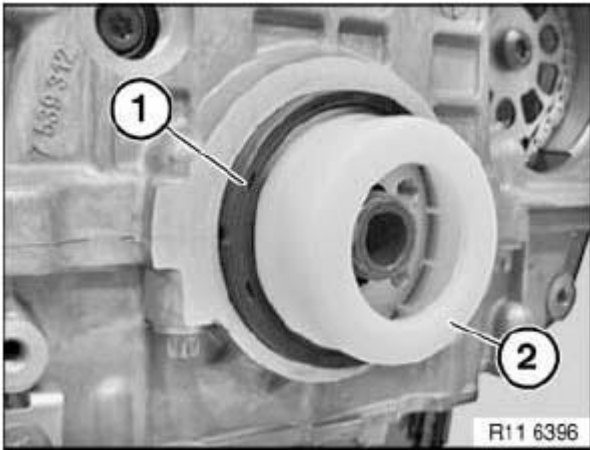
Attach support bushing (2) with radial shaft seal (1). Push on radial shaft seal (1) in direction of arrow.



**Fig. 73: Identifying Radial Shaft Seal And Support Bushing**  
Courtesy of BMW OF NORTH AMERICA, INC.

Pay attention to opening on radial shaft seal (1) on left and right.

Remove support bushing (2).



**Fig. 74: Identifying Radial Shaft Seal And Bushing**  
Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT:** The following text describes installation and sealing between the engine block and radial seal.

The engine block will not be leakproof at the outside of the radial seal if you fail to comply with the individual work steps and the work sequence.

**NOTE:** The required parts are available from the BMW Parts Service (EPC).

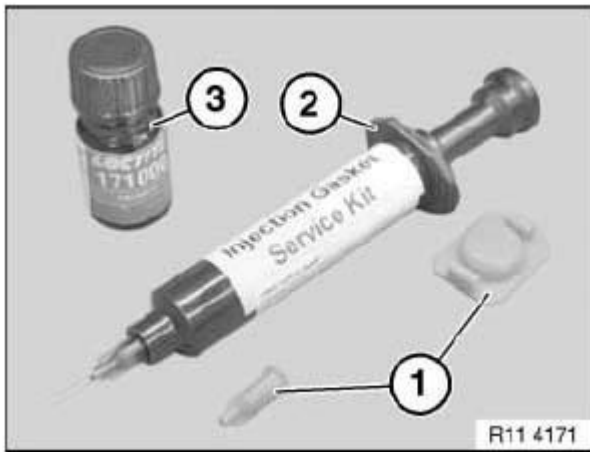
Remove screw caps (1) from injector (2).

Screw on metering needle.

Insert piston for pressing out.

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

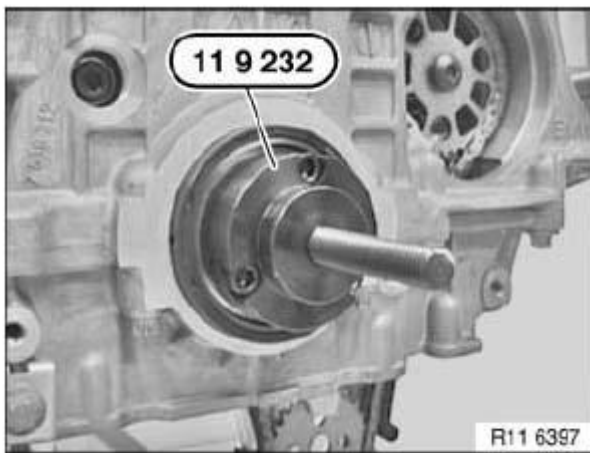
Bottle (3) contains the primer Loctite, manufacturer's number 171000.



**Fig. 75: Identifying Screw Caps, Injector And Loctite Sealing Compound (128357)**  
Courtesy of BMW OF NORTH AMERICA, INC.

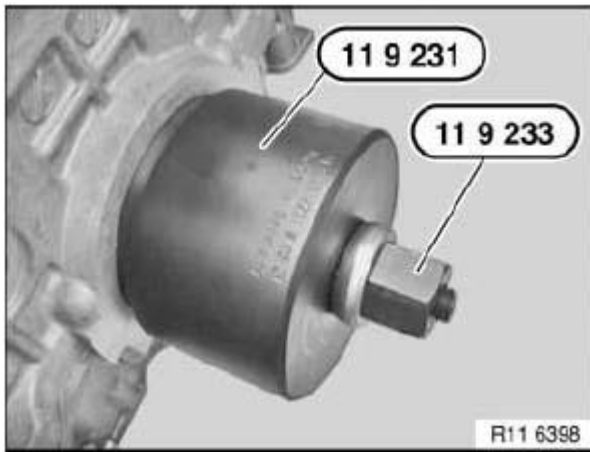
Fit special tool 11 9 232.

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



**Fig. 76: Identifying Special Tool (11 9 232)**  
Courtesy of BMW OF NORTH AMERICA, INC.

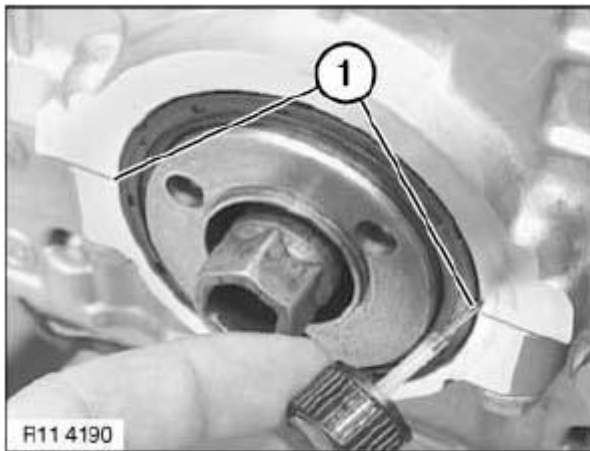
Draw in radial shaft seal with special tool 11 9 231 in conjunction with special tool 11 9 233 until flush.



**Fig. 77: Identifying Special Tool (11 9 231) And (11 9 233)**  
Courtesy of BMW OF NORTH AMERICA, INC.

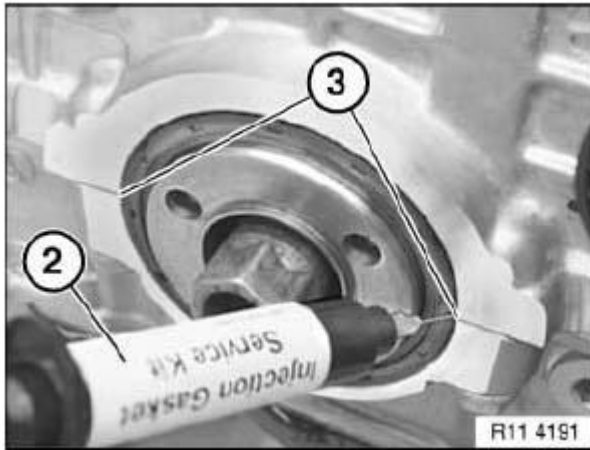
Before filling with sealing compound:

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



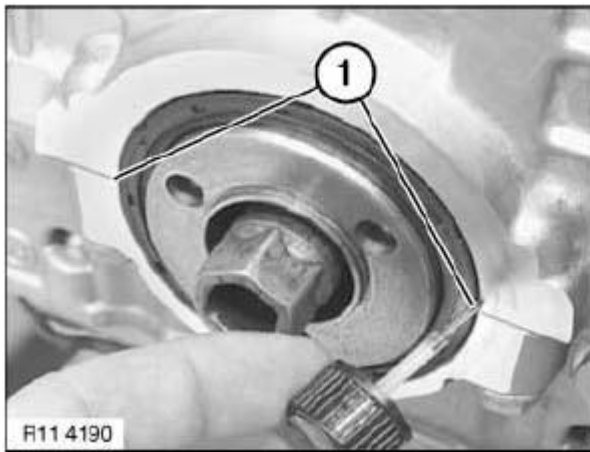
**Fig. 78: Identifying Radial Shaft Seal Groove**  
Courtesy of BMW OF NORTH AMERICA, INC.

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



**Fig. 79: Identifying Radial Shaft Seal Groove And Loctite Injector**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** Loctite primer, manufacturer's number 171000, binds the Loctite sealing compound, manufacturer's number 128357, and prevents leakage. Coat surface of sealing compound in both grooves (1) with Loctite primer, manufacturer's number 171000.



**Fig. 80: Identifying Radial Shaft Seal Groove**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

#### 11 14 010 REPLACING VACUUM PUMP SEALING COVER (N52)

**Special tools required:**

- 11 4 361
- 11 4 362

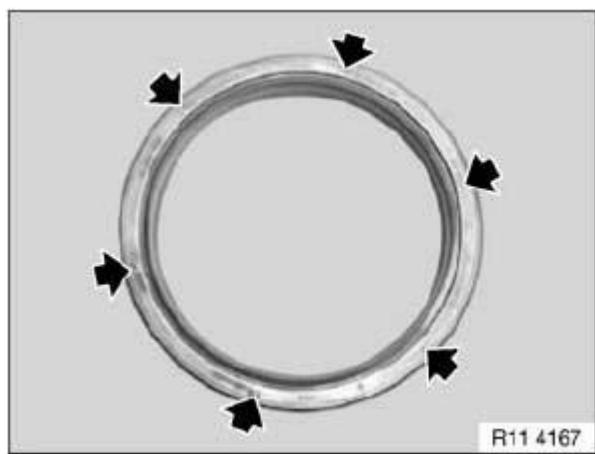
- 11 4 363
- 11 4 364
- 11 9 200

*Necessary preliminary tasks:*

- Remove fan cowl.
- Remove Alternator Drive Belt.
- Remove Tensioner For Drive Belt.

**NOTE:** Procedure is identical to that for radial shaft seal.

**Expose removal openings on sealing cover.**

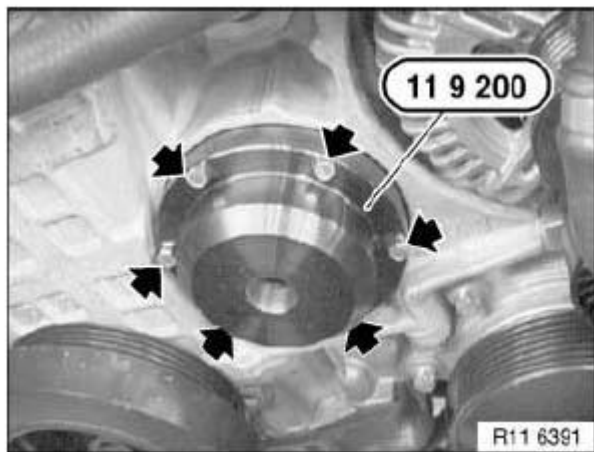


**Fig. 81: Identifying Radial Shaft Seal**  
Courtesy of BMW OF NORTH AMERICA, INC.

Convert special tool 11 9 200 (see **Fig. 82**).

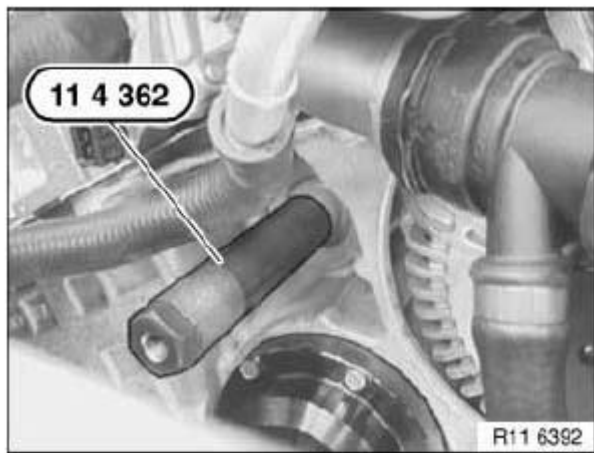
Screw special tool 11 9 200 onto end cover.

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



**Fig. 82: Identifying Special Tool (11 9 200)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 11 4 362.



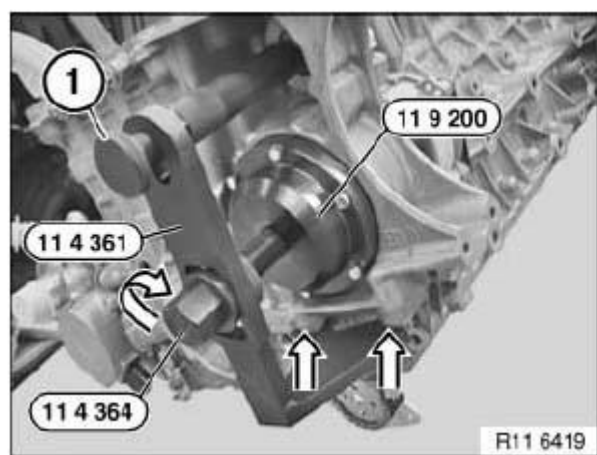
**Fig. 83: Identifying Special Tool (11 4 362)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 11 4 361 to Bedplate screw connection (see arrow in **Fig. 84**).

Secure with knurled screw (1).

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

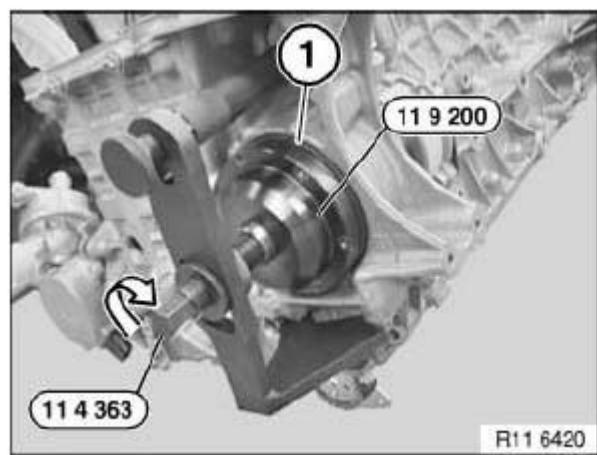
**NOTE:** For purposes of clarity, illustrations show alternator and servo pump.



**Fig. 84: Identifying Special Tool (11 4 361), (11 4 364), (11 9 200) And Knurled Screw**  
 Courtesy of BMW OF NORTH AMERICA, INC.

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

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



**Fig. 85: Identifying Special Tool (11 4 363), (11 9 200) And New Sealing Cover**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

## 11 14 151 REPLACING CRANKSHAFT RADIAL SEAL (N52)

### Special tools required:

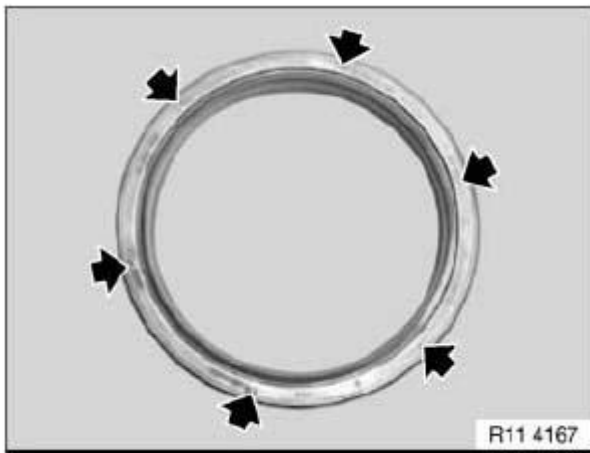
- 11 9 181
- 11 9 182
- 11 9 183

- 11 9 184
- 11 9 200

*Necessary preliminary tasks:*

- Remove Transmission.
- Remove Flywheel.

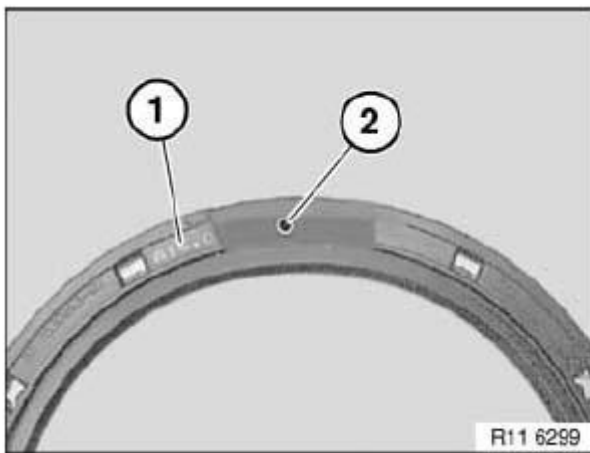
**NOTE:** Radial seal has six removal openings for removal with special tool 11 9 200.



**Fig. 86: Identifying Radial Seal**

Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** If necessary, remove rubber coating (1) on top side of radial seal and expose a removal opening (2) (see Fig. 87).

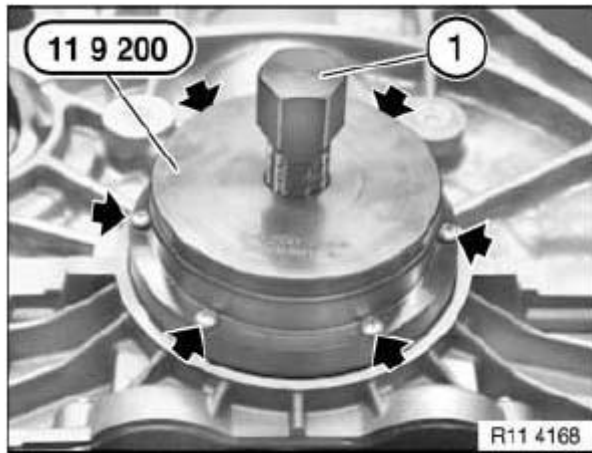


**Fig. 87: Identifying Radial Seal Rubber Coating And Removal Opening**

Courtesy of BMW OF NORTH AMERICA, INC.

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

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

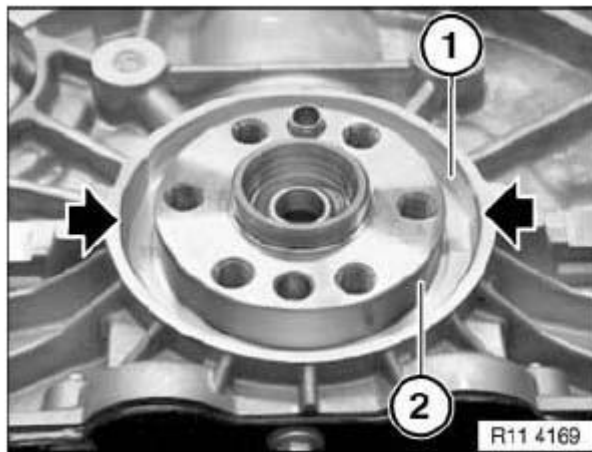


**Fig. 88: Identifying Special Tool (11 9 200) And Crankshaft Radial Seal Spindle**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

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

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



**Fig. 89: Identifying Radial Shaft Sealing And Running Surface**  
Courtesy of BMW OF NORTH AMERICA, INC.

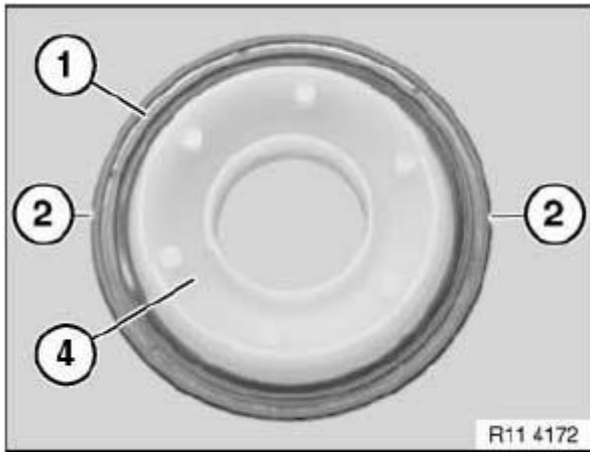
**NOTE:** Support sleeve (4) is supplied with radial shaft seal (1).

When radial shaft seal (1) is installed, only support sleeve (4) may be used as a

slip sleeve.

Radial shaft seal (1) has a groove (2) on both left and right sides.

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



**Fig. 90: Identifying Radial Shaft Seal, Groove And Sleeve**  
Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT:** The seal between the engine block and radial seal is described below.

The engine block will not be leakproof at the outside of the radial seal if you fail to comply with the individual work steps and the work sequence.

**NOTE:** The required parts are available from the BMW Parts Service (EPC).

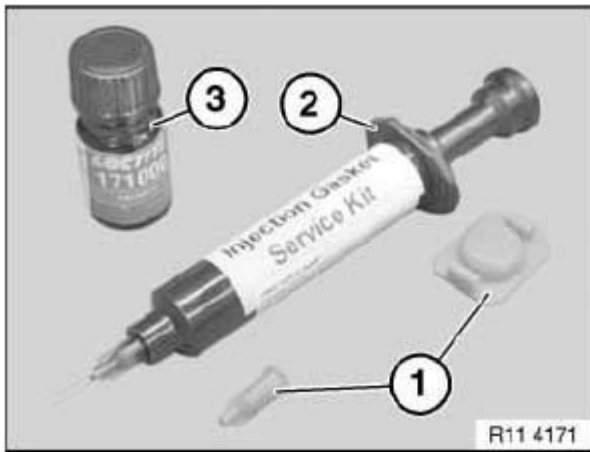
Remove screw caps (1) from injector (2).

Screw on metering needle.

Insert piston for pressing out.

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

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



**Fig. 91: Identifying Screw Caps, Injector And Bottle Of Loctite (171000)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

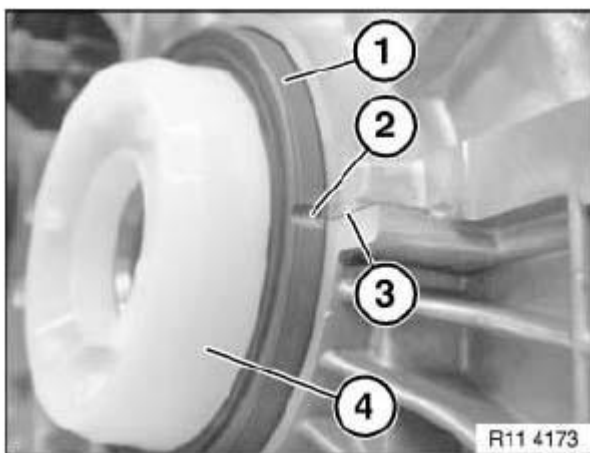
Fit support sleeve (4) with radial shaft seal (1) on crankshaft.

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

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

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

Carefully remove support sleeve (4).

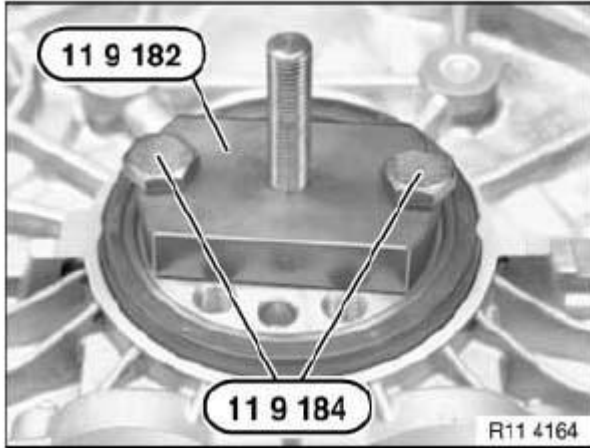


**Fig. 92: Identifying Support Sleeve, Radial Shaft Seal, Groove And Housing Partition**  
 Courtesy of BMW OF NORTH AMERICA, INC.

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

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

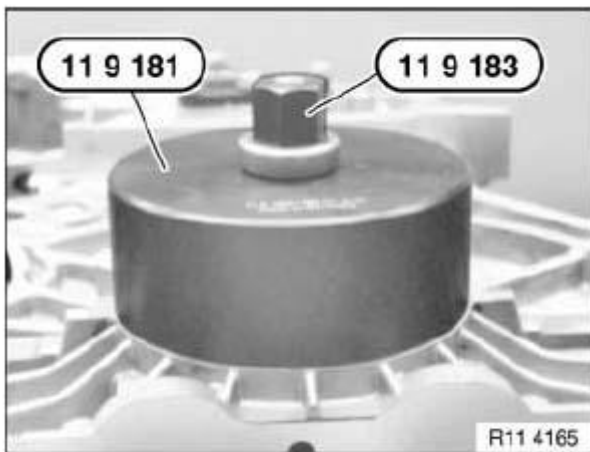
Fit spacer ring (1) on preassembled radial shaft seal



**Fig. 93: Identifying Special Tool (11 9 182) And (11 9 184)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in radial shaft seal with special tool 11 9 181 in conjunction with special tool 11 9 183 until flush.

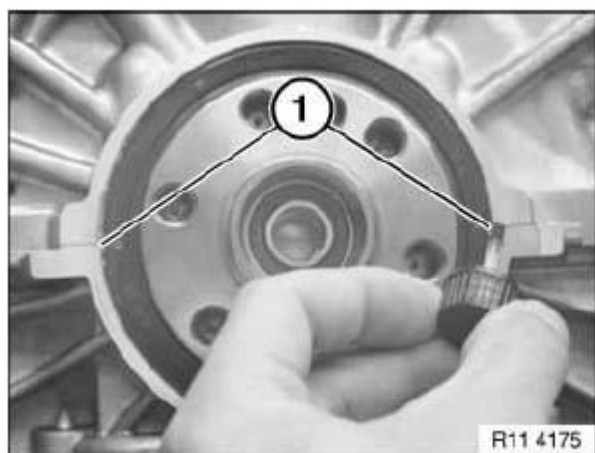
Then remove spacer ring again.



**Fig. 94: Identifying Special Tool (11 9 181) And (11 9 183)**  
Courtesy of BMW OF NORTH AMERICA, INC.

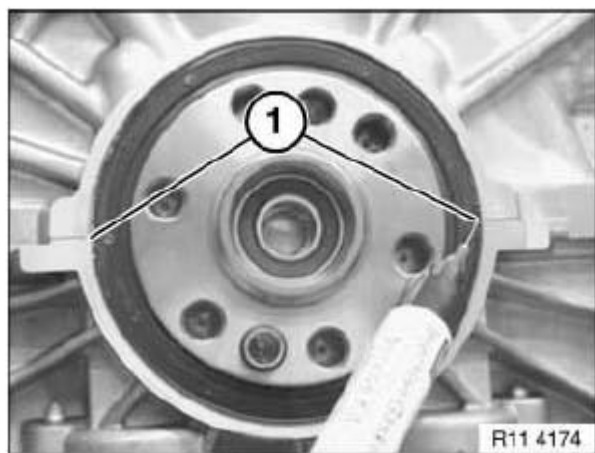
Before filling with sealing compound:

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



**Fig. 95: Using Loctite Sealing Compound (171000) On Groove (1 of 3)**  
Courtesy of BMW OF NORTH AMERICA, INC.

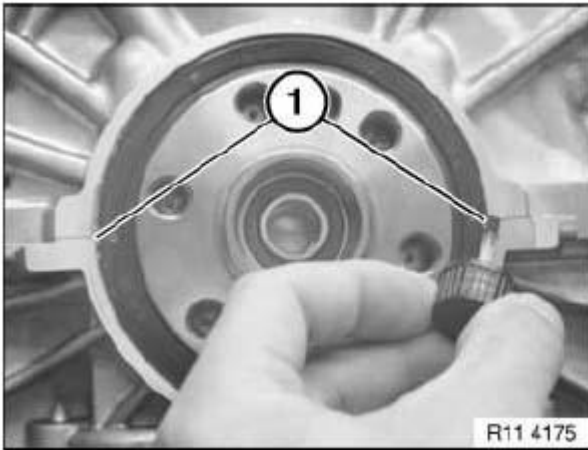
Fill both grooves (1) flush with Loctite sealing compound, manufacturer's number 128357.



**Fig. 96: Using Loctite Sealing Compound (171000) On Groove (2 Of 3)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

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



**Fig. 97: Using Loctite Sealing Compound (171000) On Groove (3 Of 3)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

## 21 CRANKSHAFT WITH BEARING

### 11 21 500 REPLACING CRANKSHAFT (N52)

Special tools required:

- 00 2 510
- 00 9 120
- 11 4 370
- 11 4 440
- 11 9 360

**IMPORTANT: Aluminium-magnesium materials.**

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

**A magnesium crankcase requires aluminium screws/bolts exclusively.**

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

**The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.**

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

*Necessary preliminary tasks:*

- Remove **Engine.**
- Mount engine on **Assembly Stand.**
- Remove **Vibration Damper.**
- Removing **Oil Pan.**
- Remove **Oil Pump.**
- Remove **Triangular Drive** for oil pump.
- Remove **Timing Chain Module.**
- Remove **Cylinder Head.**
- Remove **Flywheel.**
- Remove all **Pistons.**

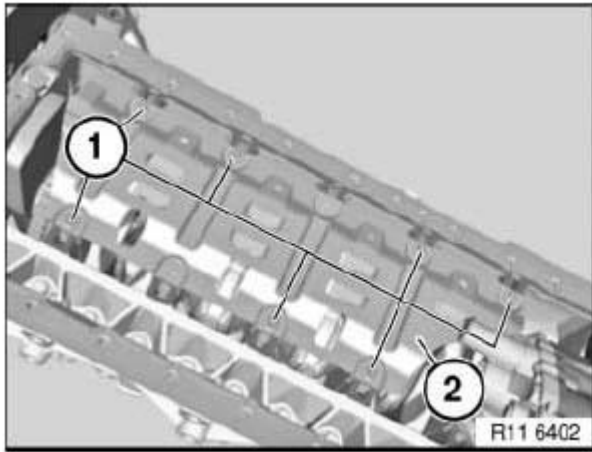
Release screws (1).

For tightening torque refer to 11 13 5AZ in **11 13 OIL PAN (N52)** .

*Installation:*

**Replace aluminium screws.**

Remove oil deflector (2).



**Fig. 98: Identifying Oil Deflector And Mounting Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

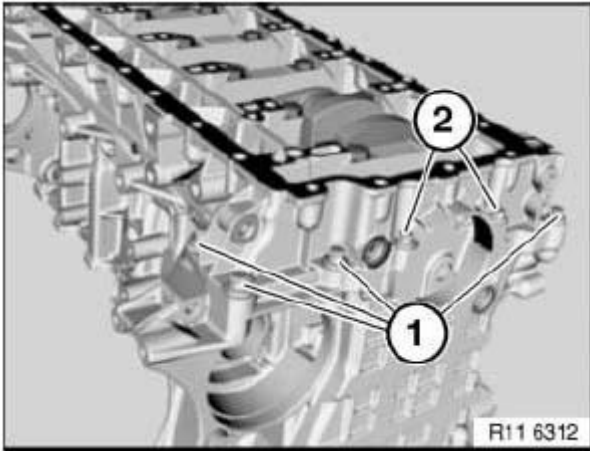
For tightening torque refer to 11 11 2AZ in **11 11 ENGINE BLOCK (N52)** .

Release screws (2).

For tightening torque refer to 11 11 3AZ in 11 11 ENGINE BLOCK (N52) .

*Installation:*

**Replace aluminium screws.**



**Fig. 99: Identifying Engine Screws**

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

For tightening torque refer to 11 11 2AZ in 11 11 ENGINE BLOCK (N52) .

Release screws (2).

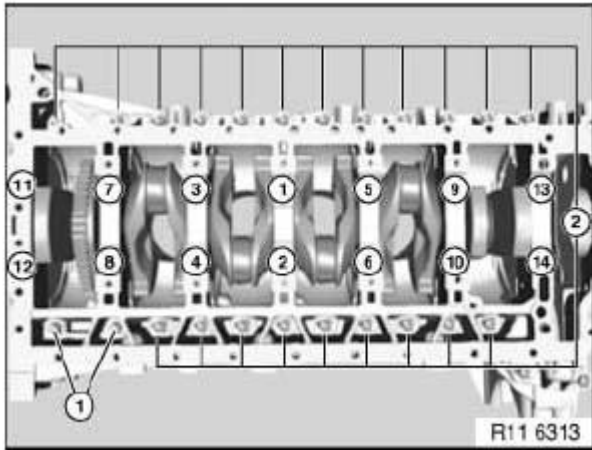
For tightening torque refer to 11 11 4AZ in 11 11 ENGINE BLOCK (N52) .

*Installation:*

**Replace aluminium screws.**

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

For tightening torque refer to 11 11 1AZ in 11 11 ENGINE BLOCK (N52) .



**Fig. 100: Identifying Tightening Sequence Of Crankshaft Screws**  
 Courtesy of BMW OF NORTH AMERICA, INC.

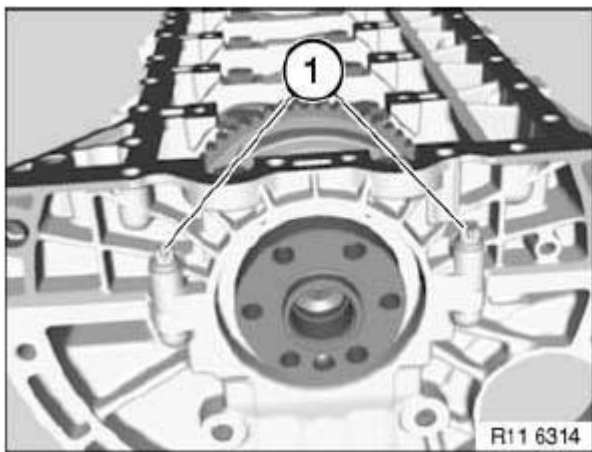
Release screws (1).

For tightening torque refer to 11 11 3AZ in 11 11 ENGINE BLOCK (N52) .

*Installation:*

**Replace aluminium screws.**

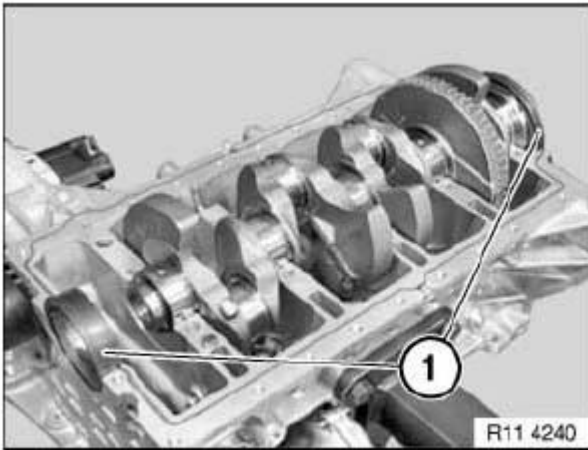
Lift out bedplate.



**Fig. 101: Identifying Radial Shaft Mounting Screws**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove both radial shaft seals (1).

**NOTE:** Illustrations show N46.



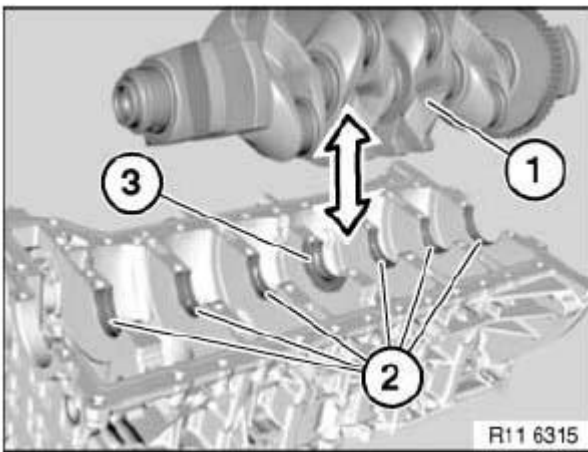
**Fig. 102: Identifying Radial Shaft Seals**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove **Main Bearing Shells** (2 and 3), replace if necessary.

Remove and install crankshaft (1) in direction of arrow.

**IMPORTANT: Remove crankshaft with aid of a second person.**

**Weight of crankshaft approx. 23 kg.**



**Fig. 103: Identifying Main Bearing Shells And Crankshaft**  
 Courtesy of BMW OF NORTH AMERICA, INC.

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

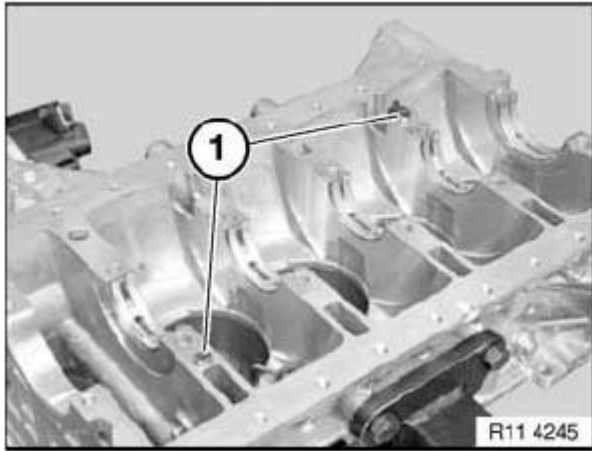
Reinstall crankshaft.

*Installation:*

Lubricate all bearing points with engine oil.

Clean all sealing surfaces.

**NOTE:** Illustrations show N46.



**Fig. 104: Identifying Crankshaft Guide Sleeves**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

For tightening torque refer to 11 11 1AZ in **11 11 ENGINE BLOCK (N52)** .

Tighten screws (2) from inside outwards.

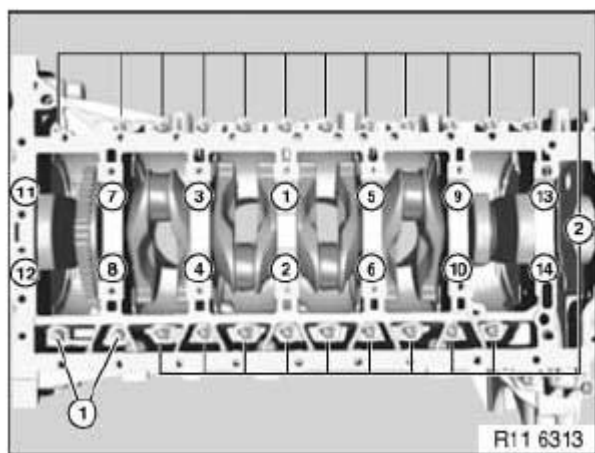
For tightening torque refer to 11 11 4AZ in **11 11 ENGINE BLOCK (N52)** .

Tighten screws (1).

For tightening torque refer to 11 11 2AZ in **11 11 ENGINE BLOCK (N52)** .

*Installation:*

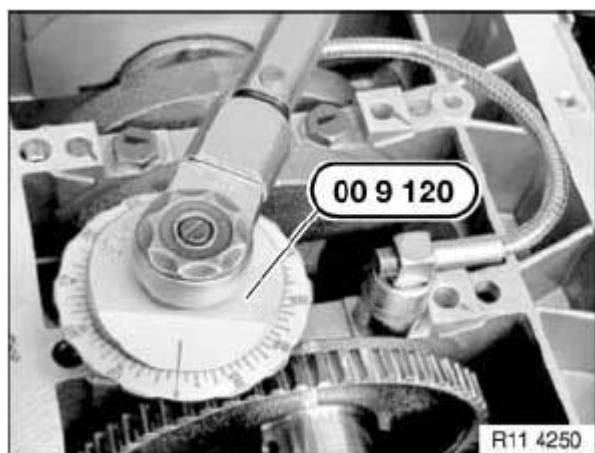
**Replace aluminium screws.**



**Fig. 105: Identifying Tightening Sequence Of Crankshaft Screws**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Tighten aluminium screws exclusively with special tool 00 9 120.

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



**Fig. 106: Identifying Special Tool (00 9 120)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

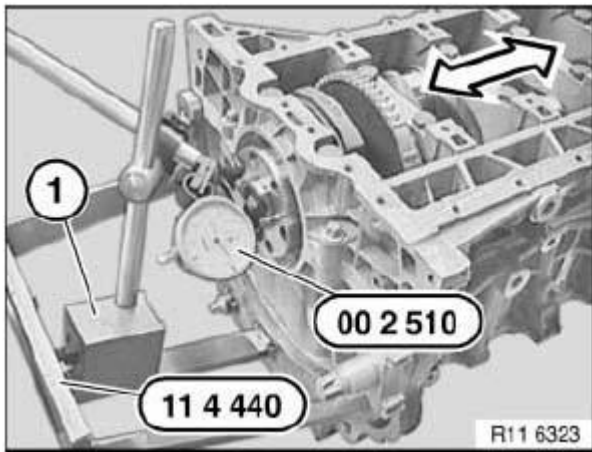
Set up stand with magnetic base on special tool 11 4 440.

Set up special tool 00 2 510 on stand.

Position special tool 00 2 510 on crankshaft.

Move crankshaft in direction of arrow.

Determine **Bearing Play.**

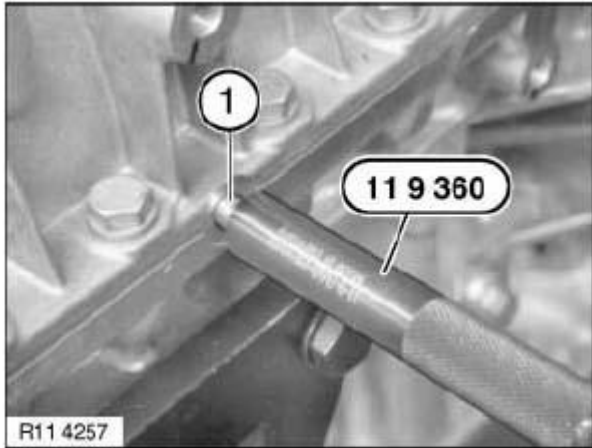


**Fig. 107: Identifying Special Tool (00 2 510) And (11 4 440)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

*Installation:*

Always replace nozzles (1).



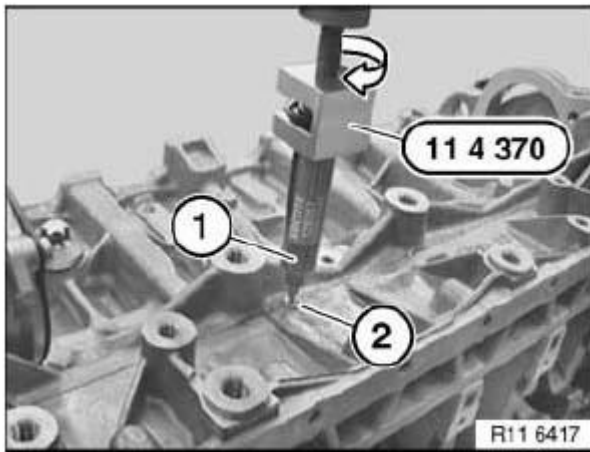
**Fig. 108: Identifying Special Tool (11 9 360) And Crankcase Nozzle**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

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

Screw on nozzle for injecting sealing compound.

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



**Fig. 109: Identifying Special Tool (11 4 370)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Replace radial shaft seal at **Front**.

Replace radial shaft seal at **Rear**.

Assemble engine.

## 11 21 531 REPLACING ALL CRANKSHAFT MAIN BEARINGS (N52)

### Special tools required:

- 00 2 590
- 11 4 251
- 11 4 252
- 11 4 470

### IMPORTANT: Aluminium-magnesium materials.

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

**A magnesium crankcase requires aluminium screws/bolts exclusively.**

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

**The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.**

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

*Necessary preliminary tasks:*

- Remove **Crankshaft**.

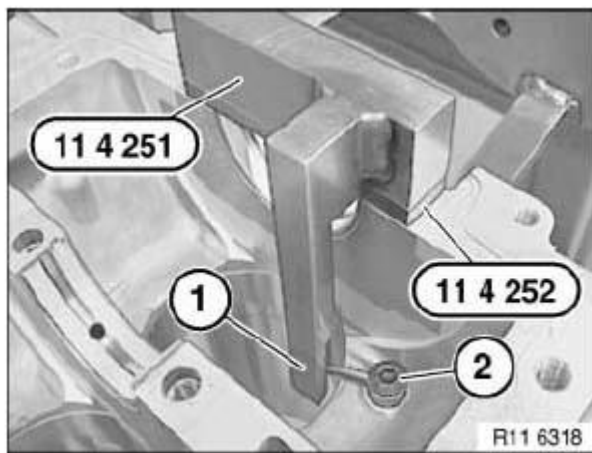
**Check setting of oil spray nozzles, adjusting if necessary:**

Attach special tool 11 4 251 to screw connection on main bearing.

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

For tightening torque refer to 11 11 5AZ in **11 11 ENGINE BLOCK (N52)** .

**NOTE:**        **See Fig. 110.**

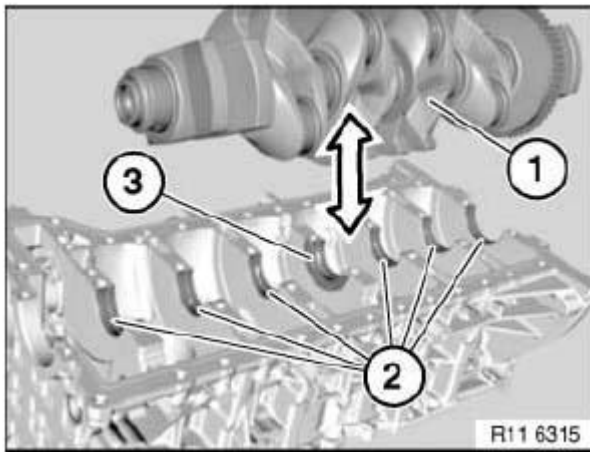


**Fig. 110: Identifying Special Tool (11 4 251) And (11 4 252)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bearing shells (2) and (3).

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

**Observe Bearing Classification.**

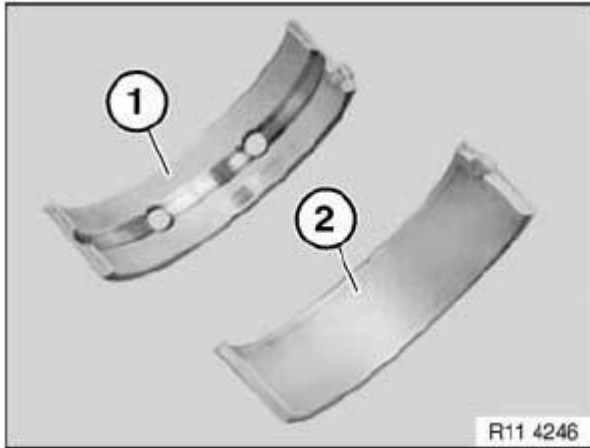


**Fig. 111: Identifying Bearing Shells And Crankshaft**  
 Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

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

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



**Fig. 112: Identifying Bearing Shell With And Without Lubricant Groove**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Surface (1) for identification.

Seven-digit part number (2).

Bearing classification (3) of crankshaft as per table (values 1 to 3).

Reworking (4) as per table (main bearing).

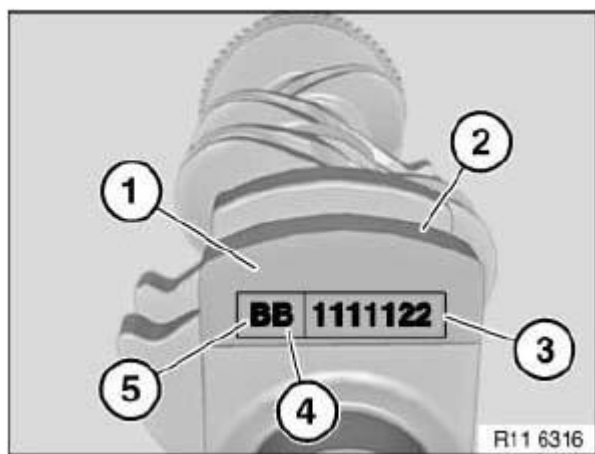
B= build date 1 (-0.25mm).

B= build date 2 (-0.50mm).

Reworking (5) as per table (lift bearing).

B= construction stage 1 (-0.25mm).

C = construction stage 2 (-0.50mm)

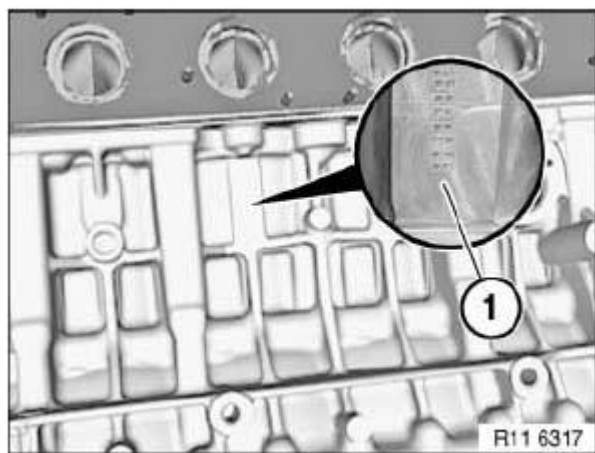


**Fig. 113: Identifying Bearing Classification Tag**  
Courtesy of BMW OF NORTH AMERICA, INC.

Bearing classification (1) in crankcase as per table (values of A/B/C).

*Installation:*

When all the letters and number code have been determined, the bearing shell colour must be allocated, see **BEARING SPECIFICATION** table.



**Fig. 114: Identifying Bearing Classification In Crankcase**

Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT:** Engine damage will result if a small bearing play is determined.

The colour combination Yellow and Red must not be fitted.

Possible colour combinations, see **BEARING SPECIFICATION**.**BEARING SPECIFICATION**

|                         |                        |                        |
|-------------------------|------------------------|------------------------|
| (A1) Bedplate / Yellow  | (B1) Bedplate / Yellow | (C1) Bedplate / Green  |
| (A1) Crankcase / Yellow | (B1) Crankcase / Green | (C1) Crankcase / Green |
| (A2) Bedplate / Green   | (B2) Bedplate / Green  | (C2) Bedplate / Green  |
| (A2) Crankcase / Yellow | (B2) Crankcase / Green | (C2) Crankcase / Red   |
| (A3) Bedplate / Green   | (B3) Bedplate / Red    | (C3) Bedplate / Red    |
| (A3) Crankcase / Green  | (B3) Crankcase / Green | (C3) Crankcase / Red   |

Insert all bearing shells (2 and 3).

**IMPORTANT:** Clean sealing surfaces.**Do not clean sealing faces with a metal-cutting tool.**

Clean sealing faces with special tool 11 4 470 only.

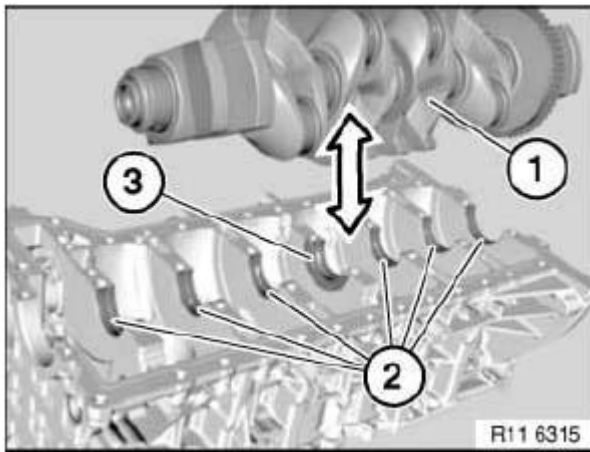
Determine bearing play with special tool 00 2 590.

*Installation:*

All measuring points must be free from oil and grease.

Use used screws to determine bearing play.

Set up **Bedplate** with bearing shells.



**Fig. 115: Identifying Bearing Shells And Crankshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bedplate.

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

Crankshaft bearing clearance radial.

*Installation:*

Remove plastic thread.

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



**Fig. 116: Identifying Crankshaft Bearing Clearance Radial**  
Courtesy of BMW OF NORTH AMERICA, INC.

Install **Bedplate**.

Assemble engine.

## **22 FLYWHEEL**

### **11 22 500 REMOVING AND INSTALLING OR REPLACING FLYWHEEL (N52)**

**Special tools required:**

- 11 4 180
- 11 9 260
- 11 9 265

**IMPORTANT: Aluminium-magnesium materials.**

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

**A magnesium crankcase requires aluminium screws/bolts exclusively.**

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

**The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.**

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

*Necessary preliminary tasks:*

- Remove **Transmission.**
- Remove **Clutch.**

Block flywheel (1) with special tool 11 9 260, use an old transmission screw for this purpose.

*Installation:*

**Replace aluminium screws.**

Unfasten flywheel screws.

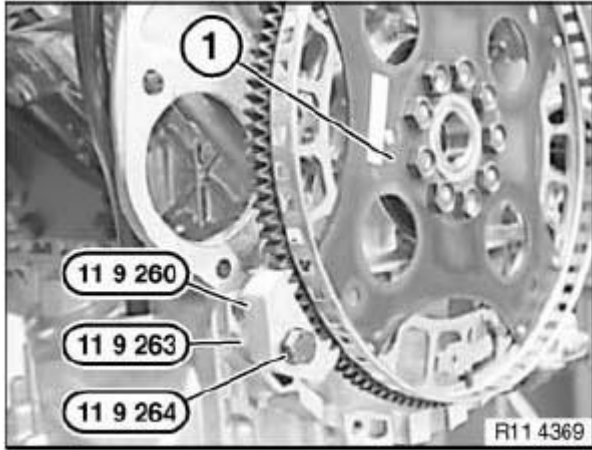
For tightening torque refer to 11 22 1AZ in **11 22 FLYWHEEL (N52)** .

*Installation:*

Flywheel (1) is secured with an alignment pin.

Fit new flywheel screws.

Clean crankshaft thread for flywheel screws.



**Fig. 117: Identifying Special Tools (11 9 260), (11 9 263), (11 9 264) And Flywheel**  
Courtesy of BMW OF NORTH AMERICA, INC.

Secure flywheel with an old transmission screw (1) and special tools 11 9 260 and 11 9 265.

*Installation:*

**Replace aluminium screws.**

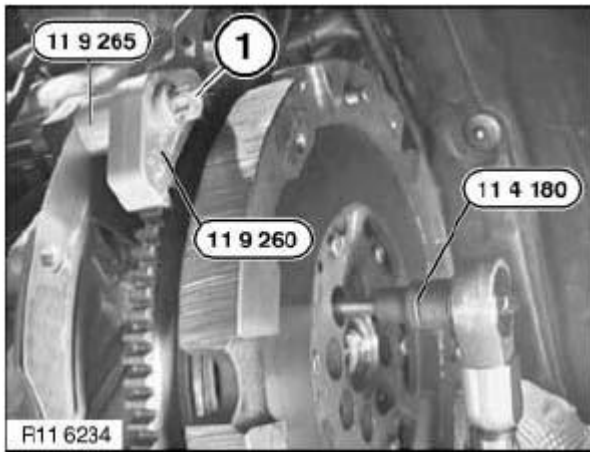
Release flywheel screws with special tool 11 4 180.

*Installation:*

Flywheel is secured with a dowel pin.

Fit new flywheel screws.

For tightening torque refer to 11 22 2AZ in **11 22 FLYWHEEL (N52)** .



**Fig. 118: Identifying Special Tools (11 9 265), (11 9 260), (11 4 180) And Flywheel Transmission Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

#### **11 22 513 REPLACING ROLLER BEARING FOR DUALMASS FLYWHEEL**

##### **Special tools required:**

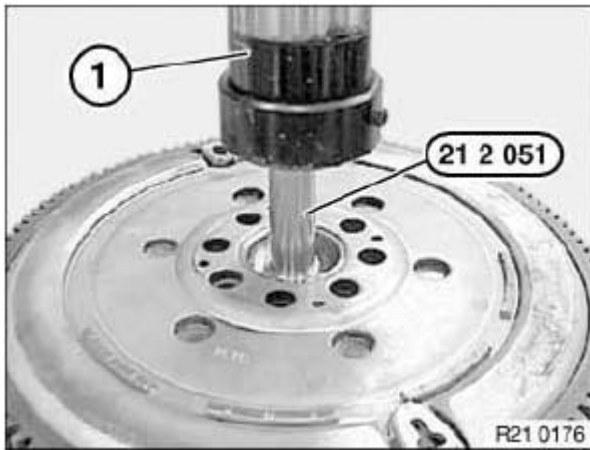
- 21 2 051
- 21 2 052

**NOTE:** Flywheel removed!

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

**IMPORTANT: Risk of damage:**

**Roller bearing must not be driven out.**



**Fig. 119: Identifying Special Tool (21 2 051) And Hydraulic Press**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

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

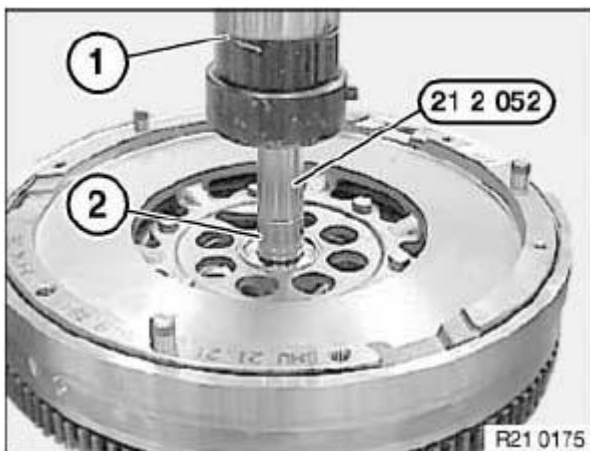
**IMPORTANT: Risk of damage:**

**Observe press-in instruction:**

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

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

**Max. 15000N during entire press-in procedure.**



**Fig. 120: Identifying Special Tool (21 2 052), Roller Bearing And Hydraulic Press**  
Courtesy of BMW OF NORTH AMERICA, INC.

**11 22 513 REPLACING ROLLER BEARING FOR DUALMASS FLYWHEEL WITH HYDRAULIC PRESS****Special tools required:**

- 00 5 500
- 11 2 010
- 11 2 343
- 11 2 350

**NOTE:**      **Flywheel removed!**

Position special tool 11 2 010 in roller bearing.

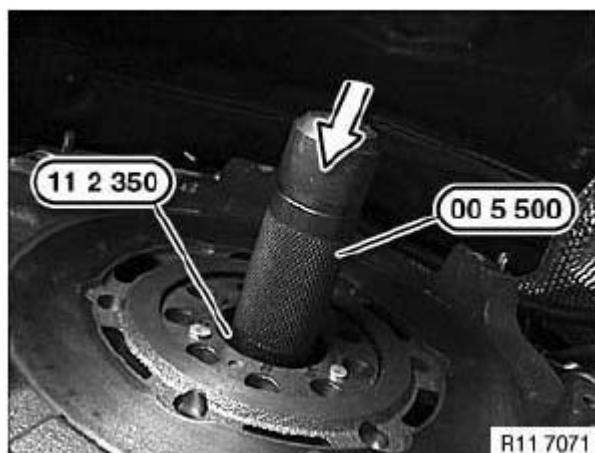
Twist out roller bearing with special tool 11 2 343.



**Fig. 121: Identifying Special Tool (11 2 010) And (11 2 343)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble special tools 11 2 350 and 00 5 500.

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



**Fig. 122: Identifying Special Tool (11 2 350) And (00 5 500)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

## 11 22 513 REPLACING ROLLER BEARING FOR DUALMASS FLYWHEEL MANUALLY

### Special tools required:

- 00 5 500
- 11 2 010
- 11 2 343
- 11 2 350

**NOTE:**      Flywheel removed!

Position special tool 11 2 010 in roller bearing.

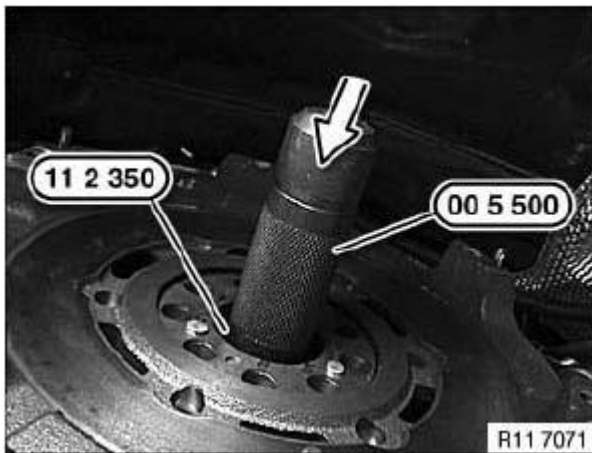
Twist out roller bearing with special tool 11 2 343.



**Fig. 123: Identifying Special Tool (11 2 010) And (11 2 343)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble special tools 11 2 350 and 00 5 500.

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



**Fig. 124: Identifying Special Tool (11 2 350) And (00 5 500)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

## 23 VIBRATION DAMPER

### 11 23 010 REMOVING AND INSTALLING OR REPLACING VIBRATION DAMPER (N52)

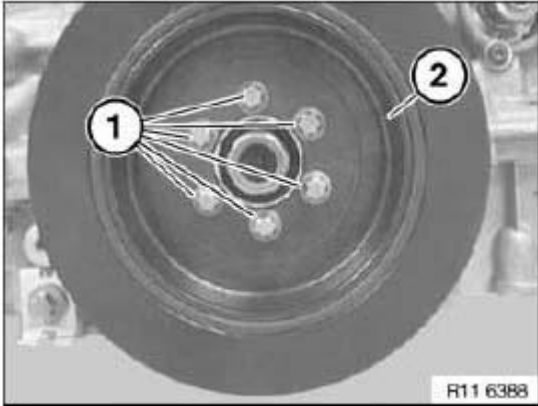
*Necessary preliminary tasks:*

- Detach **Front Underbody Protection.**
- Remove **Drive Belt.**

Release screws (1).

For tightening torque refer to 11 23 1AZ in **11 23 VIBRATION DAMPER (N52)** .

Remove vibration damper (2). **Vibration Damper**



**Fig. 125: Identifying Vibration Damper And Mounting Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

## 24 CONNECTING ROD WITH BEARING

### 11 24 571 REPLACING ALL CONNECTING ROD BEARINGS (N52)

Special tools required:

- 00 2 590
- 00 9 120

**IMPORTANT:** All crank pins are connected with the crankshaft.

**Modified procedure; the bearing shell colours are the same at the top and bottom.**

**Blue / Red bearing shell colours are no longer used in combination.**

*Necessary preliminary tasks:*

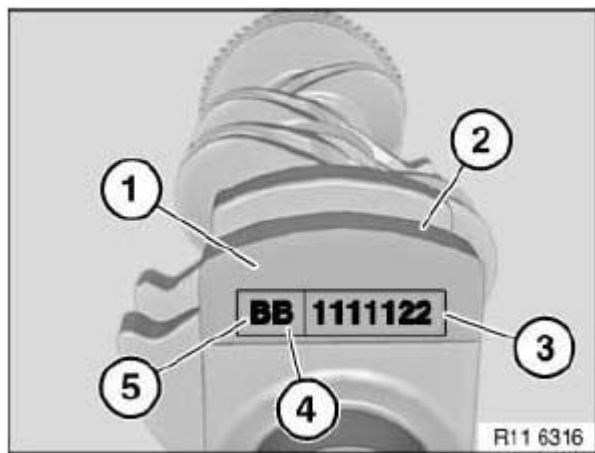
- Remove all **Pistons**.

**IMPORTANT:** **Note Grinding Stages On Crankshaft.**

Reworking (5) as per table (lift bearing).

B = construction stage 1 (- 0.25 mm)

C = construction stage 2 (- 0.50 mm)



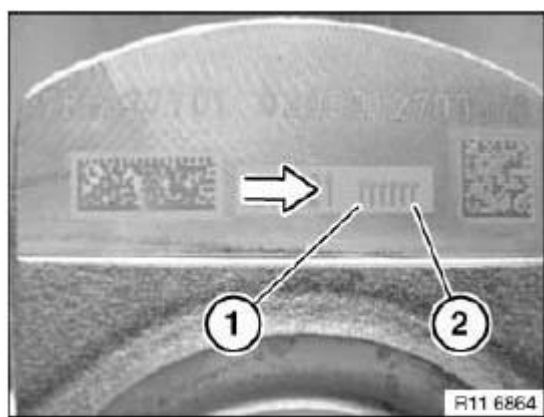
**Fig. 126: Identifying Bearing Identification Tag**  
Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: All crankshaft crank pins are classified.**

Possible classifications per connecting rod at top and bottom:

r: Red

b: Blue



**Fig. 127: Identifying Crankshaft Crank Pins**  
Courtesy of BMW OF NORTH AMERICA, INC.

Only one colour may be fitted per big end and connecting rod shank.

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

*Example:*

Possible classification: rbbrrb.

Cylinder classification Red.

1:

Cylinder classification Blue.

2:

Cylinder classification Blue.

3:

Cylinder classification Red.

4:

Cylinder classification Red.

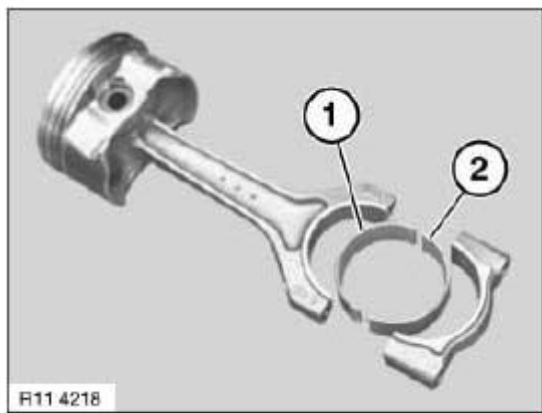
5:

Cylinder classification Blue.

6:

Install new conrod bearing shells.

In each case insert only one colour of bearing shell (1 and 2) for each conrod.



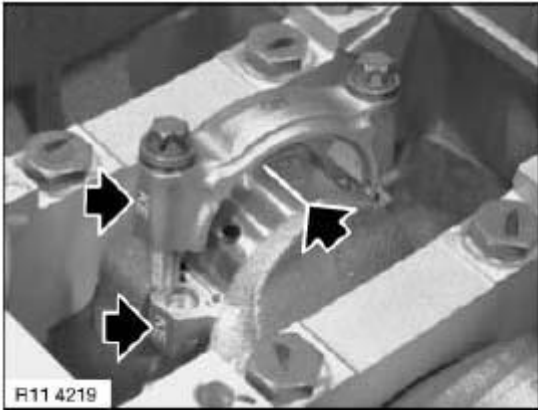
**Fig. 128: Identifying Connecting Rod Bearing Shells**  
Courtesy of BMW OF NORTH AMERICA, INC.

Check conrod bearing clearance.

Piston in BDC position.

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

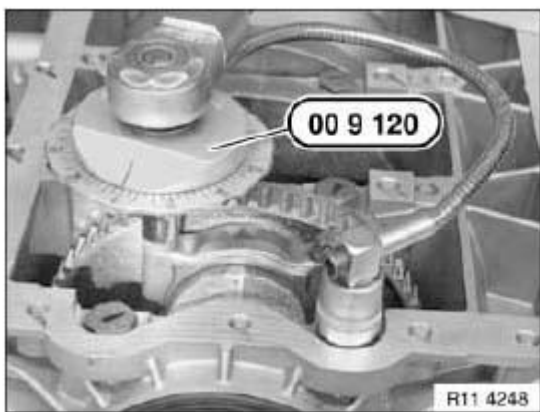
Fit bearing cap so that pairing letters match up.



**Fig. 129: Locating Conrod Bearing Clearance**  
Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Do not distort conrods or crankshaft.**

Use the old conrod bolts to check conrod clearance. Tighten down conrod bolts with special tool 00 9 120. For tightening torque refer to 11 24 1AZ in **11 24 CONNECTING RODS AND BEARINGS (N52)**.



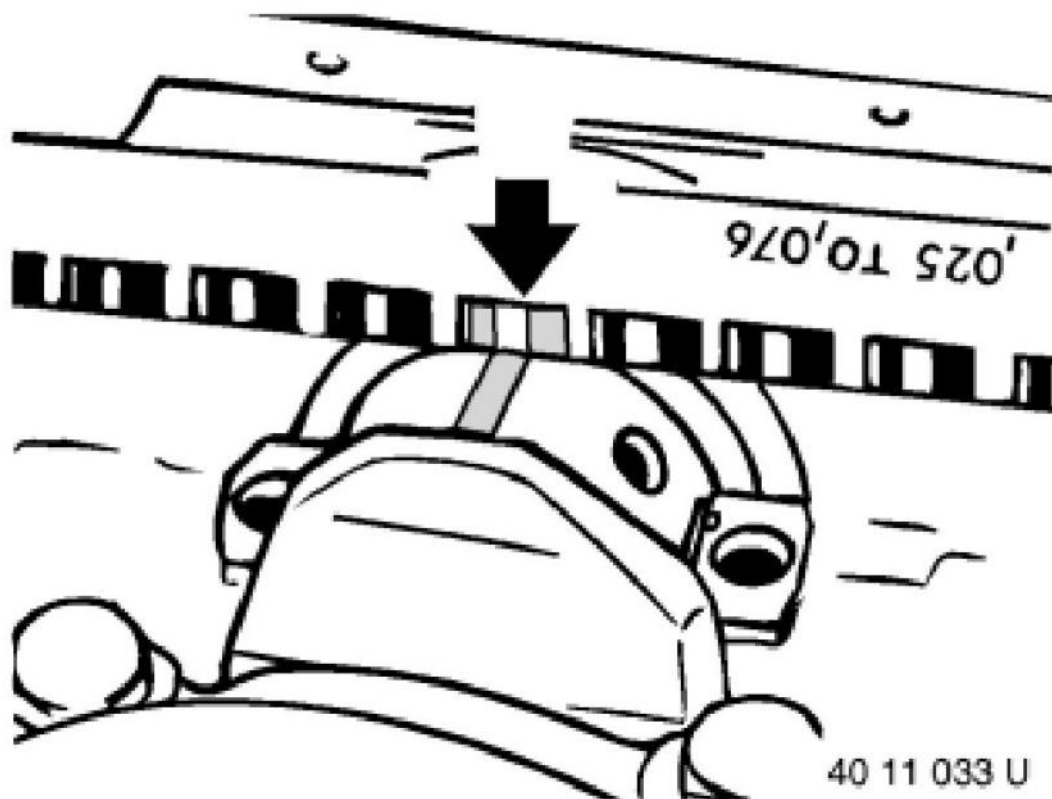
**Fig. 130: Identifying Special Tool (00 9 120)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bearing cap. Read off bearing clearance at width of crushed plastic thread with aid of measuring scale.

**Conrod Bearing Clearance.**

- Remove plastic thread.
- Coat crankshaft and bearing shells with oil.
- Install new conrod bolts and tighten down with special tool 00 9 120.

For tightening torque refer to 11 24 1AZ in **11 24 CONNECTING RODS AND BEARINGS (N52)**.



**Fig. 131: Checking Connecting Rod Bearing Clearance With Measuring Scale**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

## **25 PISTON WITH RING AND PIN**

### **11 25 530 REMOVING AND INSTALLING/REPLACING ALL PISTONS (N52)**

**Special tools required:**

- 00 9 120
- 11 4 491

- 11 4 492
- 11 4 493
- 11 6 241
- 11 6 261
- 11 8 330
- 11 9 493
- 11 9 494

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

**IMPORTANT:** If pistons, conrods and bearing shells are reused, they must be reinstalled in the same places.

Individual conrod replacement is not permitted; they are classified according to weight categories.

Conrods and conrod bearing caps are denoted with the same pairing letters; mixing them up will result in engine damage.

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

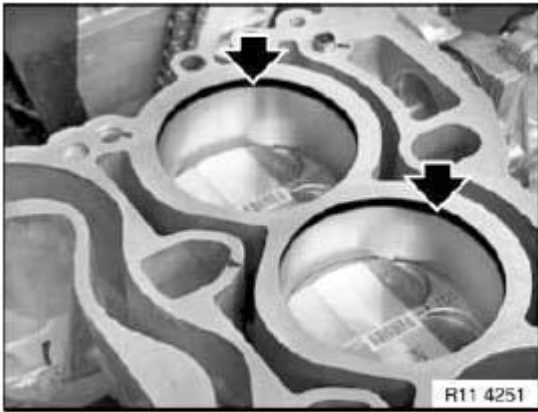
*Necessary preliminary tasks:*

- Remove **Engine.**
- Mount engine on **Assembly Stand.**
- Remove **Intake Air Manifold.**
- Remove **Cylinder Head.**
- Remove **Engine Oil Sump.**
- Remove **Oil Pump.**

**NOTE:** In event of heavy oil carbon residue:

Carefully remove oil carbon residue from cylinder wall.

**NOTE:** Illustrations show N46.

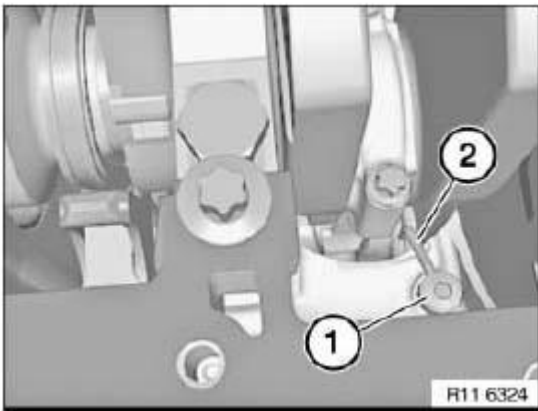


**Fig. 132: Identifying Engine Cylinder Wall**  
Courtesy of BMW OF NORTH AMERICA, INC.

Do **not** release screw (1).

**Oil Spray Nozzle** (2) must not be maladjusted or bent.

If necessary, **Readjust** (risk of damage).



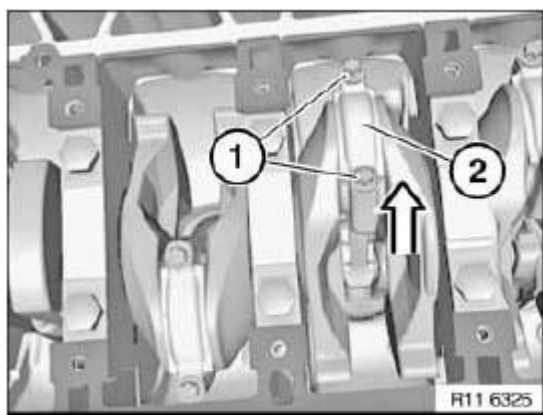
**Fig. 133: Identifying Oil Spray Nozzle And Mounting Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release conrod bolts (1).

For tightening torque refer to 11 24 1AZ in **11 24 CONNECTING RODS AND BEARINGS (N52)** .

Remove conrod bearing cap (2) in direction of arrow.

**IMPORTANT:** Conrods and conrod bearing caps are denoted with the same pairing letters; mixing them up will result in engine damage.

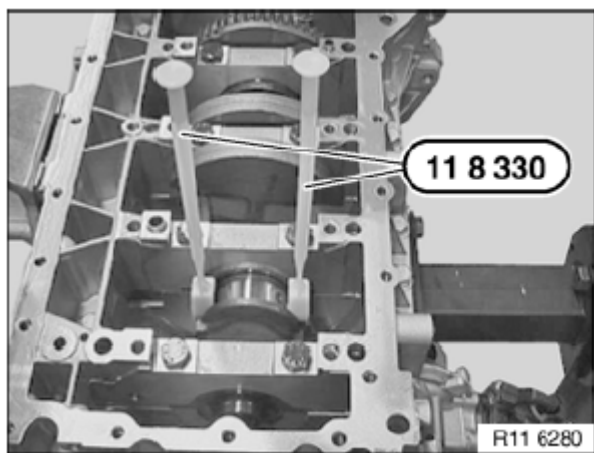


**Fig. 134: Identifying Connecting Rod Bearing Cap And Bolts**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 11 8 330 in conrod big end.

Press out conrod and piston to cylinder head side.

**IMPORTANT: Risk of damage to oil spray nozzle.**

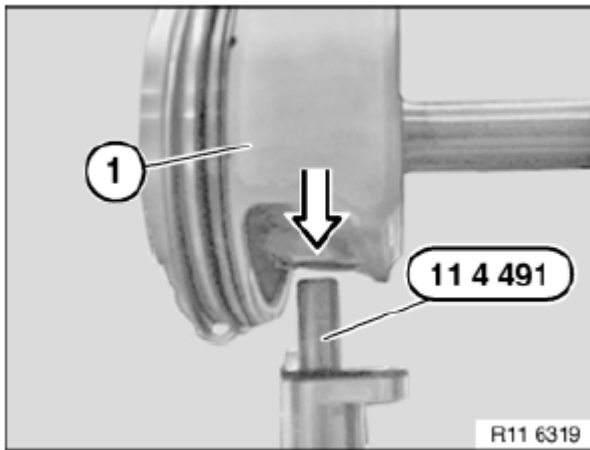


**Fig. 135: Identifying Special Tool (11 8 330)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

*Preliminary work:*

Clamp special tool 11 4 491 in a vice.

Secure piston (1) with conrod to special tool 11 4 491.

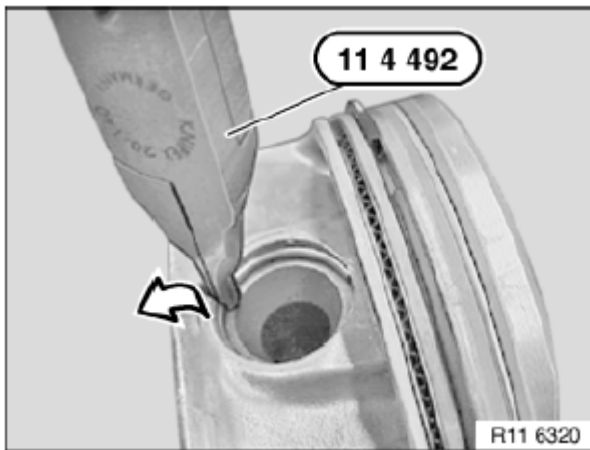


**Fig. 136: Identifying Special Tool (11 4 491) And Piston**  
Courtesy of BMW OF NORTH AMERICA, INC.

**WARNING:** Protective goggles must be worn for the next work step.

**WARNING:** Protective goggles must be worn.

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



**Fig. 137: Identifying Special Tool (11 4 492)**  
Courtesy of BMW OF NORTH AMERICA, INC.

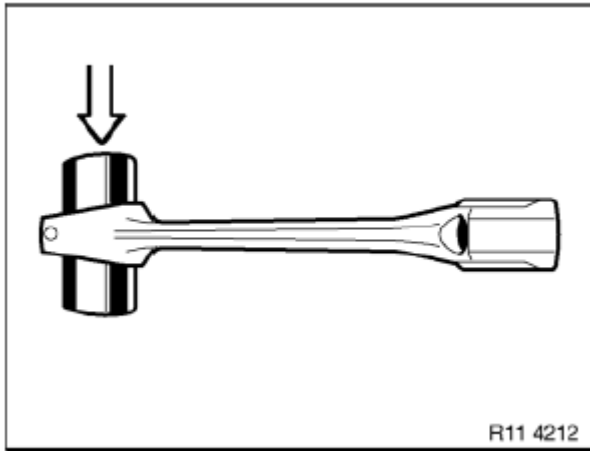
If necessary, replace connecting rods.

**IMPORTANT:** Connecting rods are divided into weight categories and are only available as a set.

**Old and new connecting rods must not be installed in mixed combinations.**

*Installation:*

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

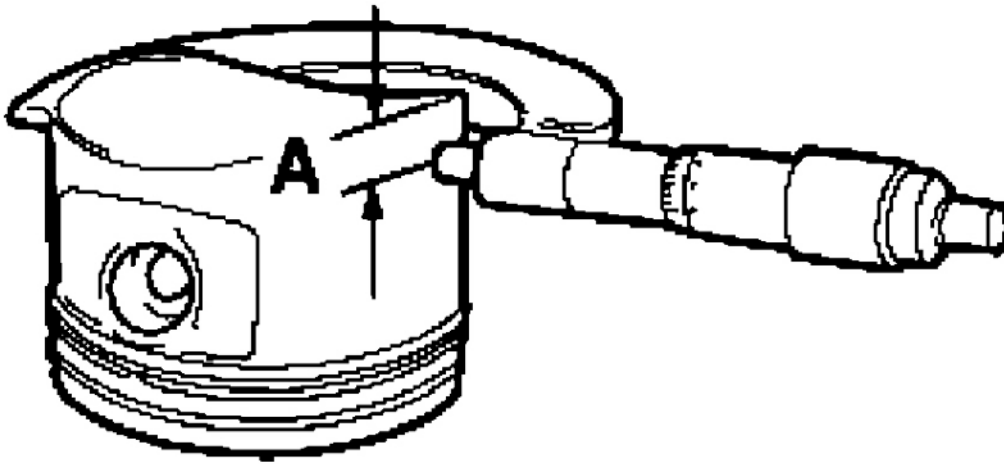


**Fig. 138: Identifying Piston Pin In Connecting Rod**  
Courtesy of BMW OF NORTH AMERICA, INC.

Measure piston installation clearance:

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

Piston diameter at measuring point A.

**88 11 051 U****Fig. 139: Measuring Piston Clearance****Courtesy of BMW OF NORTH AMERICA, INC.**

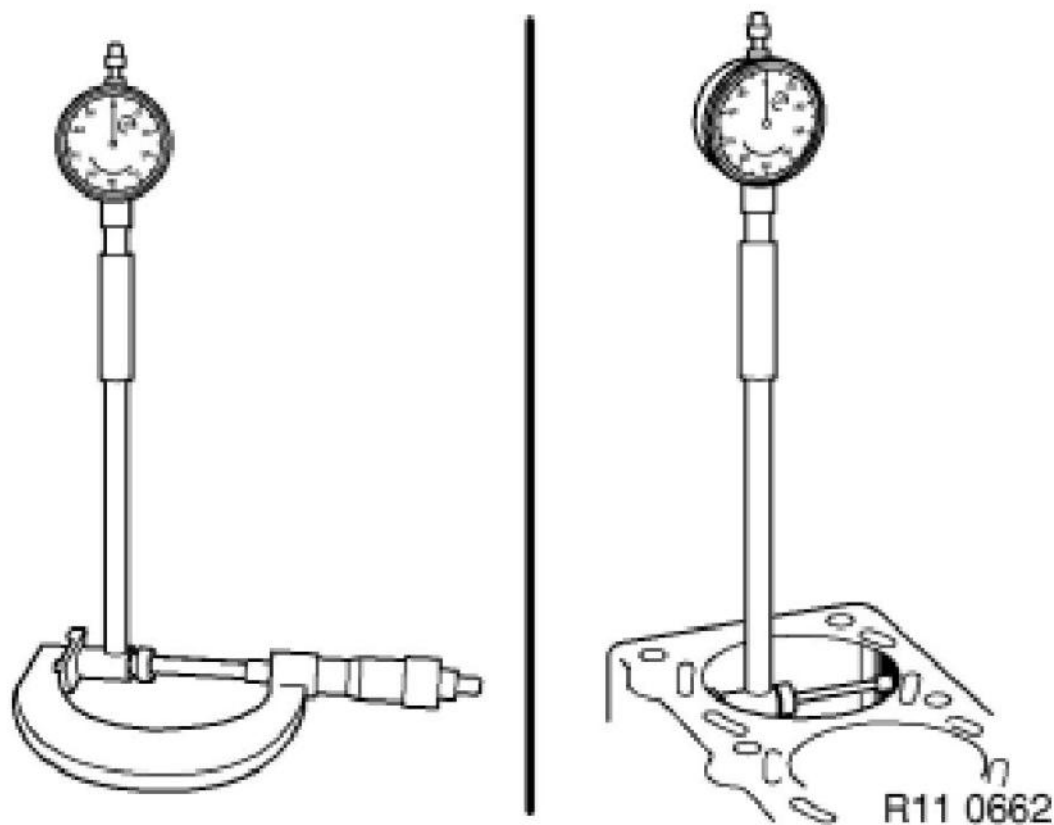
Adjust micrometer to cylinder bore of engine block. Set internal caliper on micrometer to zero. Measure bottom, center and top of cylinder bore in direction of travel and direction of engine rotation.

Diameter of cylinder bore.

Piston installation clearance.

**Total Permissible Wear Tolerance.**

If necessary, replace piston.

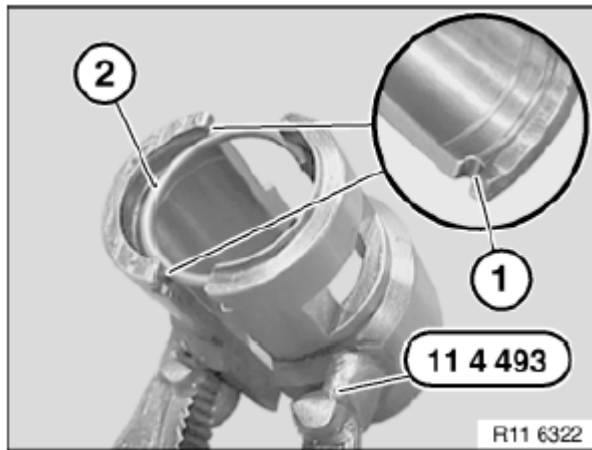


**Fig. 140: Measuring Diameter Of Cylinder Bore Of Engine Block**  
Courtesy of BMW OF NORTH AMERICA, INC.

**WARNING: Protective goggles must be worn.**

Insert piston circlip (2) into groove (1) of special tool 11 4 493.

Bring piston circlip into assembly position.



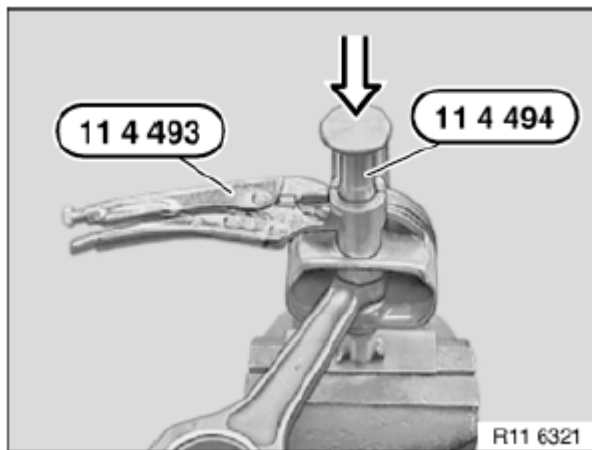
**Fig. 141: Identifying Special Tool (11 4 493), Piston Circlip And Groove**  
Courtesy of BMW OF NORTH AMERICA, INC.

**WARNING: Protective goggles must be worn.**

Guide lug and cutout on special tool 11 9 493 must point to the piston crown; only then can special tool 11 9 494 be correctly fitted.

When special tools 11 9 493 and 11 9 494 are correctly positioned, the piston pin circlip must be driven in with a plastic hammer in the direction of the arrow.

**NOTE:** See **Fig. 142.**



**Fig. 142: Identifying Special Tool (11 4 493) And (11 4 494)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** B 30.

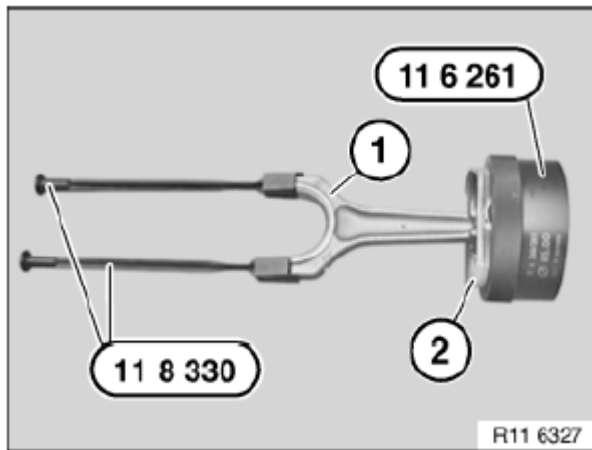
Install all **Piston Rings.**

Install all **Bearing Shells.**

Coat piston and piston rings with oil.

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

Attach special tool 11 8 330 in conrod (1).



**Fig. 143: Identifying Special Tool (11 8 330), (11 6 261), Piston And Conrod**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Check protective lugs (1) on special tool 11 8 330 for correct position and damage.

**NOTE: B 25.**

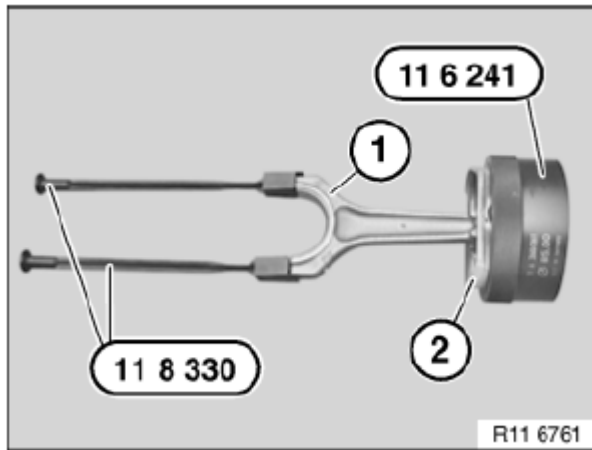
Install all **Piston Rings.**

Install all **Bearing Shells.**

Coat piston and piston rings with oil.

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

Attach special tool 11 8 330 in conrod (1).



**Fig. 144: Identifying Special Tool (11 8 330), (11 6 241), Piston And Conrod**  
 Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Check protective lugs (1) on special tool 11 8 330 for correct position and damage.

Insert piston with conrod in cylinder.

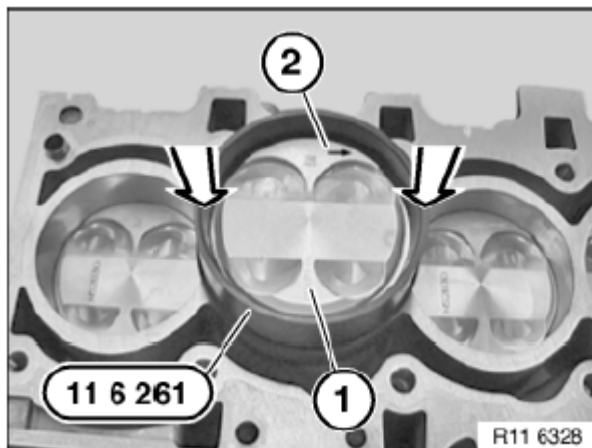
**IMPORTANT: Risk of damage to oil spray nozzle.**

**Danger of piston ring failure.**

**Press in piston with finger pressure only, do not drive in (see arrows in [Fig. 145](#)).**

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

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

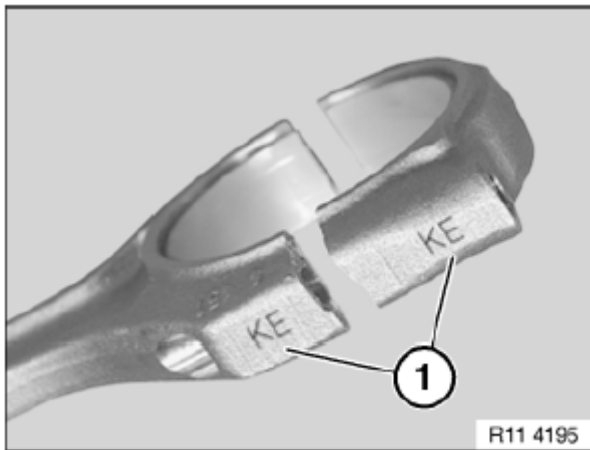


**Fig. 145: Identifying Special Tools (11 6 261) And Piston**

Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT:** Conrod and conrod bearing cap are identified with pairing letters (1) and must not be mixed up.

Mixing them up or incorrectly fitting the conrod bearing cap on the big end will result in engine damage.

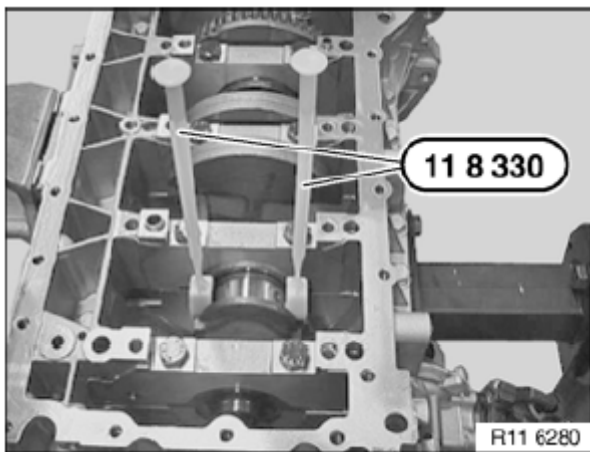
**Fig. 146: Identifying Conrod Bearing Cap Pairing Letters**

Courtesy of BMW OF NORTH AMERICA, INC.

Apply a light coat of oil to crank pin.

Assemble conrod and crank pin.

Detach special tool 11 8 330.

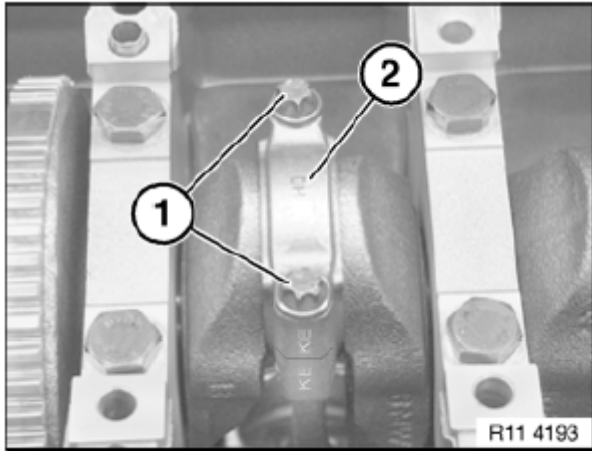
**Fig. 147: Identifying Special Tool (11 8 330)**

Courtesy of BMW OF NORTH AMERICA, INC.

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

Install new conrod bolts (1).

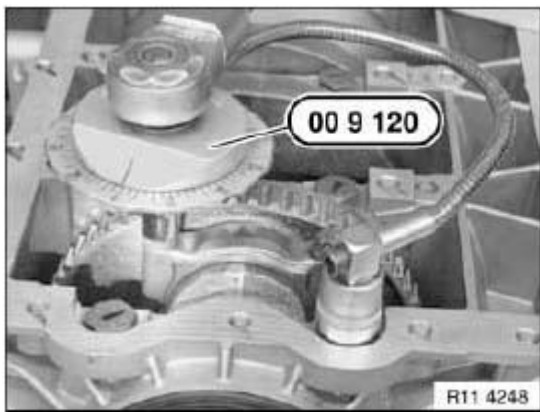
For tightening torque refer to 11 24 1AZ in **11 24 CONNECTING RODS AND BEARINGS (N52)** .



**Fig. 148: Identifying Conrod Bearing Caps And Bolts**  
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust torsion angle of conrod with special tool 00 9 120 (see **Fig. 149**).

For tightening torque refer to 11 24 1AZ in **11 24 CONNECTING RODS AND BEARINGS (N52)**



**Fig. 149: Identifying Special Tool (00 9 120)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

## **11 25 671 REPLACING PISTON RINGS ON ALL PISTONS (N52)**

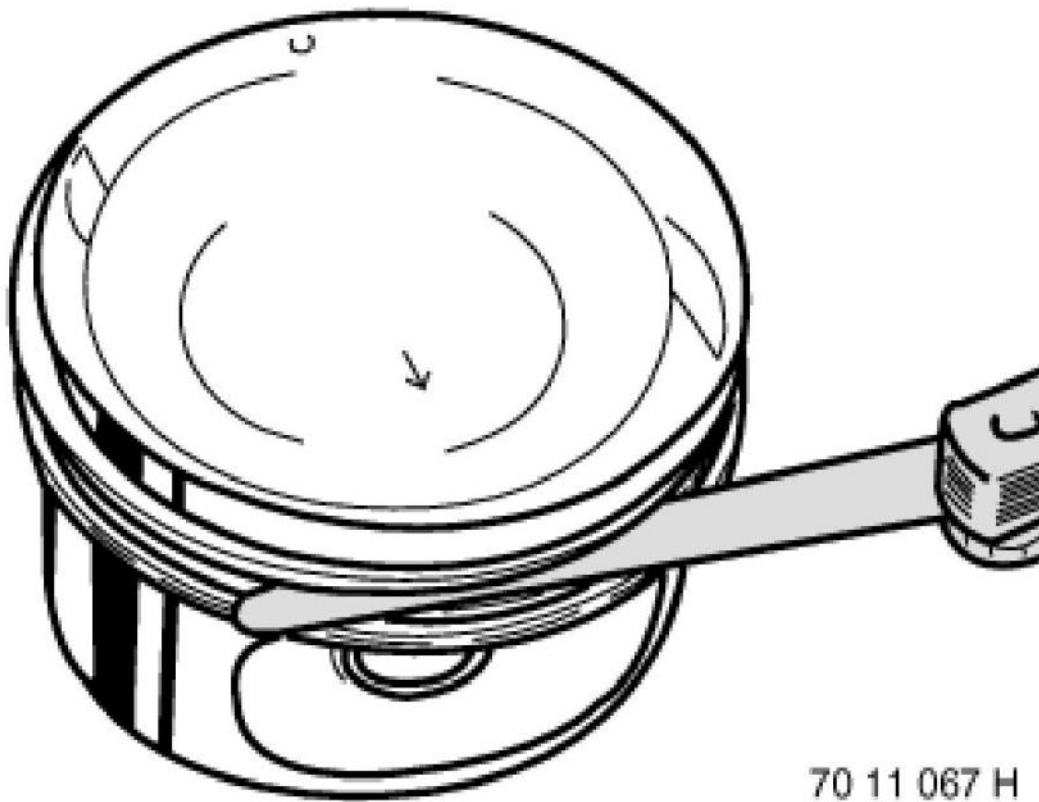
*Necessary preliminary tasks:*

- Remove all **Pistons**.

Measuring axial clearance of piston rings in piston ring groove.

**Technical Data.**

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



**Fig. 150: Measuring Axial Clearance Of Piston Rings In Piston Ring Groove**  
Courtesy of BMW OF NORTH AMERICA, INC.

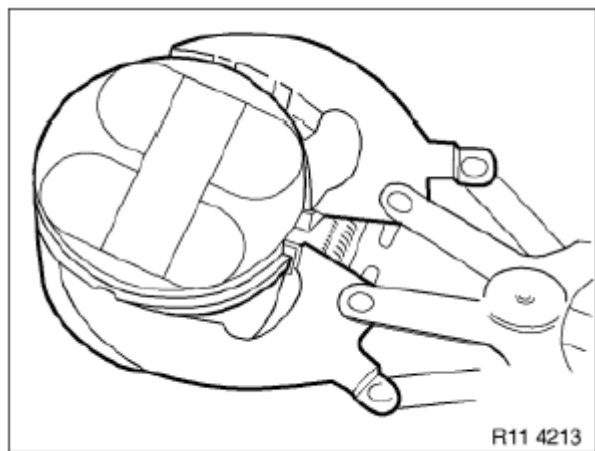
Remove compression ring and stepped ring upwards with piston ring pliers.

Oil scraper ring comprises two steel band rings and a support spring.

**NOTE:** Oil scraper ring cannot be removed with piston ring pliers.

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

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

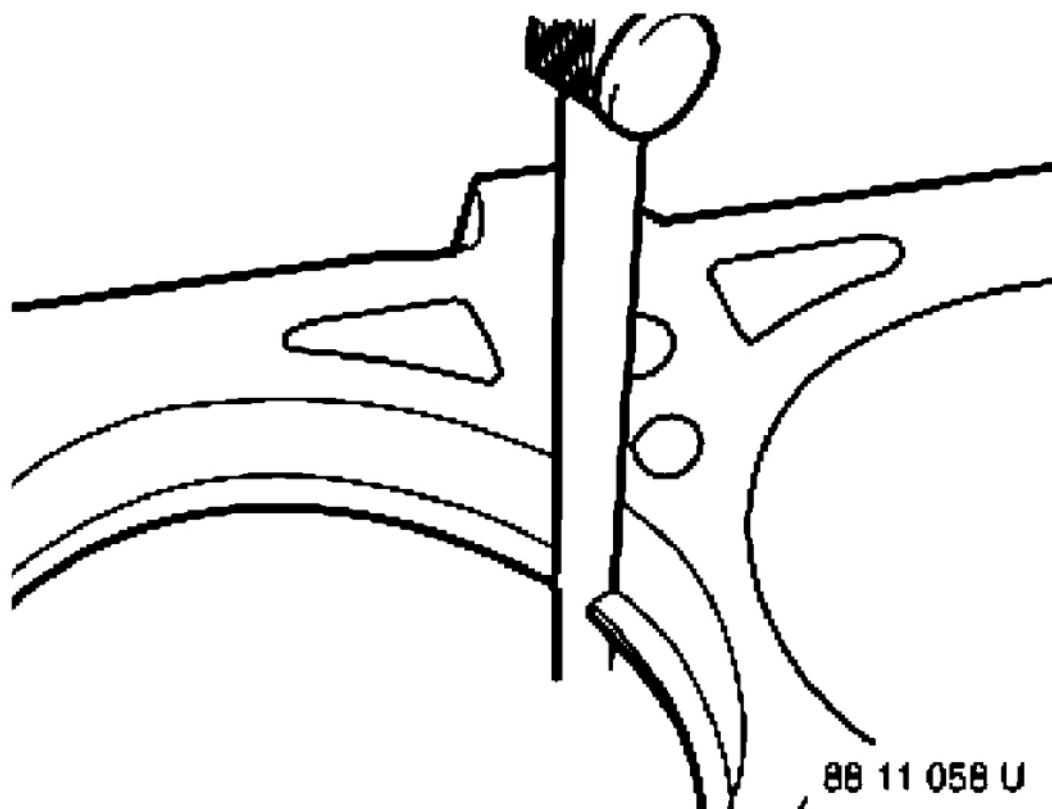


**Fig. 151: Identifying Compression Ring With Piston Ring Pliers**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

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

Determine **Gap** with a feeler gauge.



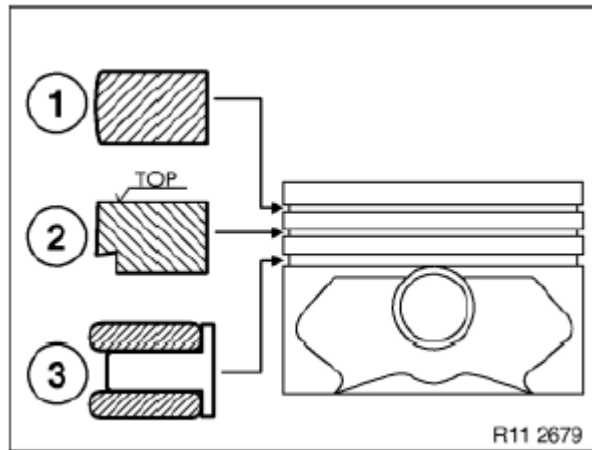
**Fig. 152: Checking Piston Ring Gap With Feeler Gauge**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** Schematic representation of piston rings.

*Installation:*

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

1. Plain compression ring
2. Stepped compression ring "Top"
3. Two-part oil scraper ring

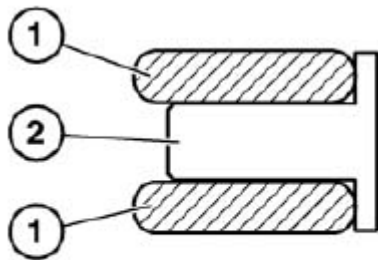


**Fig. 153: Identifying Piston Rings Components And Position**  
 Courtesy of BMW OF NORTH AMERICA, INC.

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

*Installation:*

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

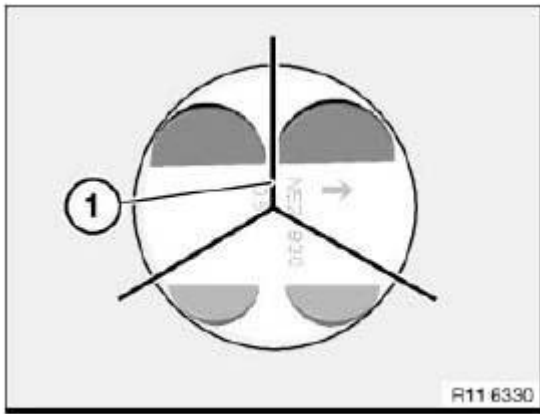


R11 2680

**Fig. 154: Identifying Piston Support Spring And Steel Band Rings**  
 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 Fig. 155.



**Fig. 155: Identifying Offset Contact Points Of Piston Rings**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

## 28 V-RIBBED BELT WITH TENSIONER

### 11 28 010 REPLACING ALTERNATOR DRIVE BELT (N52)

Special tools required:

- 11 3 340

**IMPORTANT: Aluminium-magnesium materials.**

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

**A magnesium crankcase requires aluminium screws/bolts exclusively.**

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

**The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.**

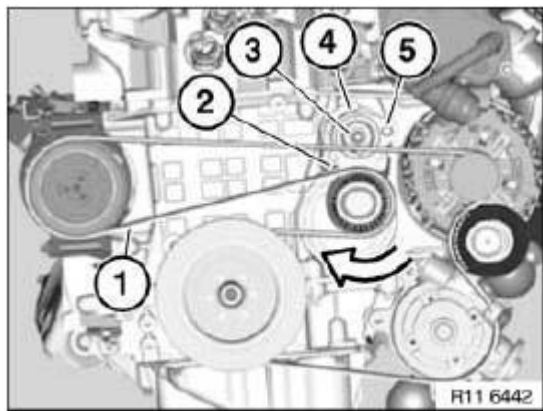
**Jointing torque and angle of rotation must be observed without fail (risk of damage ).**

*Necessary preliminary tasks:*

- Remove fan cowl.
- Mark the direction of rotation of the drive belt if it is to be reused.

Turn belt tensioner (4) in direction of arrow until bore (2) is flush on housing.

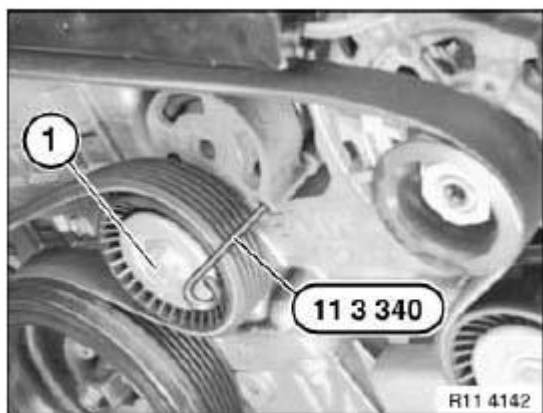
Hold belt tensioner (4) under tension.



**Fig. 156: Identifying Belt Tensioner And Bore**  
Courtesy of BMW OF NORTH AMERICA, INC.

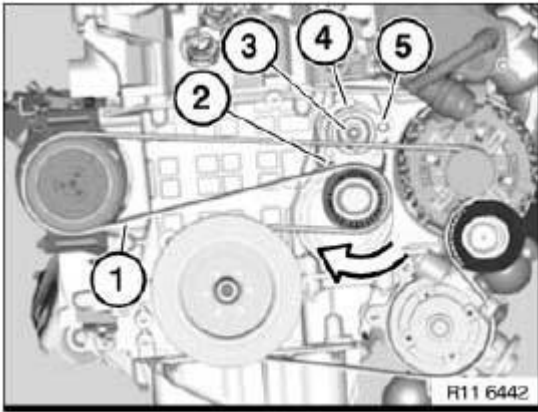
Secure belt tensioner with special tool 11 3 340.

**NOTE:** Illustration N42.



**Fig. 157: Identifying Special Tool (11 3 340) And Belt Tensioner**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove drive belt (1) towards top.



**Fig. 158: Identifying Drive Belt And Tensioner**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

*Installation:*

Check that drive belt for is in correct installation position - **risk of damage**.

**11 28 020 REPLACING ALTERNATOR DRIVE BELT TENSIONER (N52)**

**Special tools required:**

- 11 3 340

**IMPORTANT: Aluminium-magnesium materials.**

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

**A magnesium crankcase requires aluminium screws/bolts exclusively.**

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

**The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.**

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

*Necessary preliminary tasks:*

- Remove **Drive Belt**.

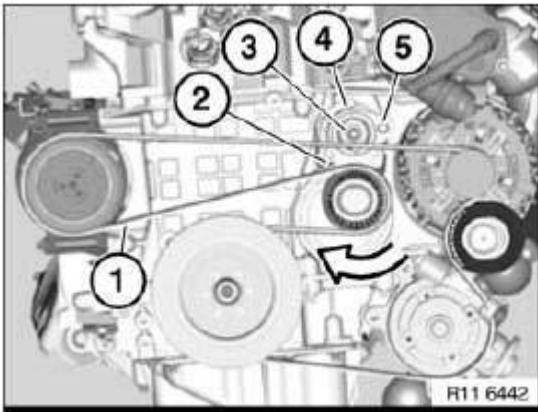
Remove special tool 11 3 340.

Release screw (3).

For tightening torque refer to 11 28 1AZ in **28 V-RIBBED BELT WITH TENSION AND DEFLECTION ELEMENT** .

*Installation:*

**Replace aluminium screws.**



**Fig. 159: Identifying Belt Tensioner, Screw And Belt Drive**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

## 31 CAMSHAFT

### 11 31 005 CHECKING CAMSHAFT TIMING

**Special tools required:**

- 11 0 300
- 11 4 281
- 11 4 282
- 11 4 283

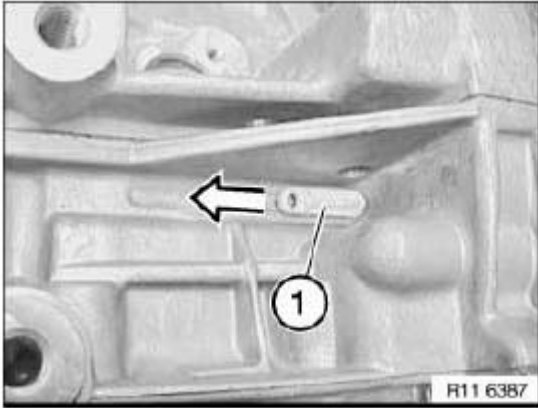
*Necessary preliminary tasks:*

- Remove **Cylinder Head Cover**.
- Remove front splash guard.

Remove fastener (1) in direction of arrow.

*Installation:*

Install fastener (1) with bore facing outwards.



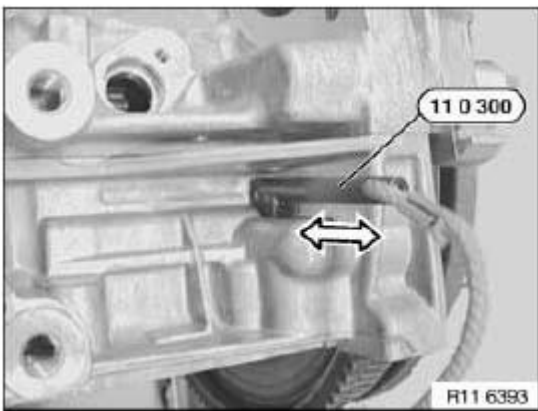
**Fig. 160: Identifying Crankshaft Fastener**  
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate crankshaft at central bolt into TDC position.

Slide in special tool 11 0 300 in direction of arrow and block crankshaft.

**IMPORTANT:** On engines with automatic transmissions, there is shortly before the special tool bore for the TDC position a large bore which can be confused with the special tool bore.

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

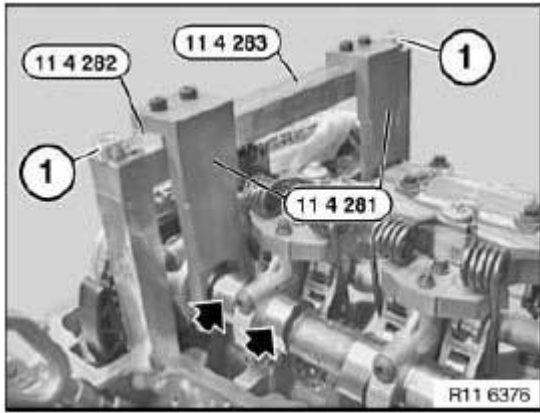


**Fig. 161: Identifying Special Tool (11 0 300)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 283 on cylinder head with screws (1).

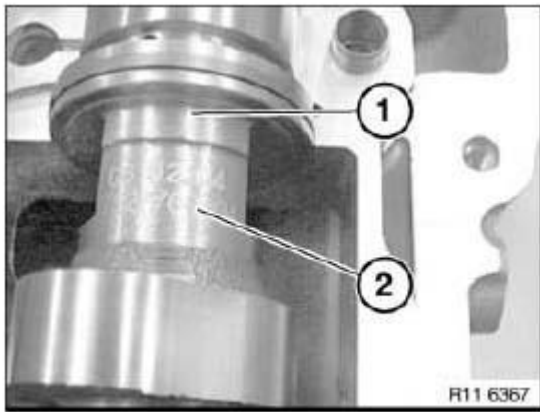
**NOTE:** Fit special tool 11 4 282 underneath on inlet side.

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



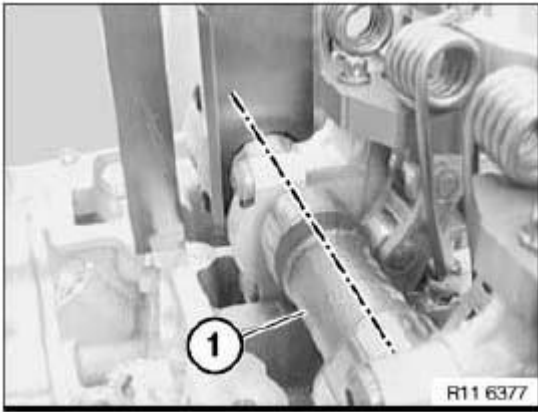
**Fig. 162: Identifying Special Tool (11 4 281), (11 4 282), (11 4 283) And Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

The timings are correct when the part number (2) can be read from above on the camshafts (1).



**Fig. 163: Identifying Inlet Camshaft And Part Number Position**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

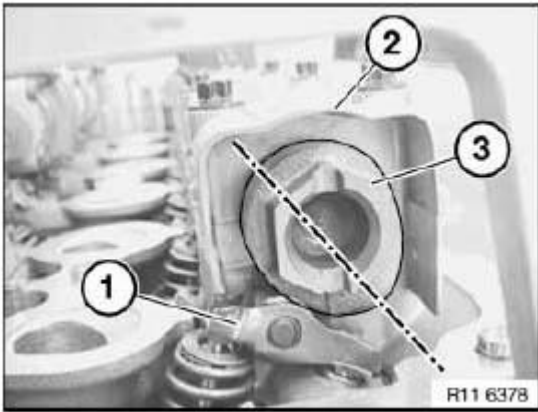


**Fig. 164: Identifying Inlet Camshaft TDC Position**  
 Courtesy of BMW OF NORTH AMERICA, INC.

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

Roller cam follower (1) is not actuated.

**NOTE:** If the timing is checked while the engine is installed, the position of the camshaft can only be checked with a mirror.



**Fig. 165: Identifying Roller Cam Follower And Exhaust Camshaft**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

## 11 31 025 REMOVING AND INSTALLING/REPLACING INLET CAMSHAFT (N52)

**Special tools required:**

- 11 4 281
- 11 4 481

**IMPORTANT: Aluminium-magnesium materials.**

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

**A magnesium crankcase requires aluminium screws/bolts exclusively.**

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

**The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.**

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

*Necessary preliminary tasks:*

- Remove **Cylinder Head Cover**.
- Remove **Adjusting Unit** for inlet camshaft.
- Remove **Intermediate Lever**.
- Adjust **Valve Timing**.

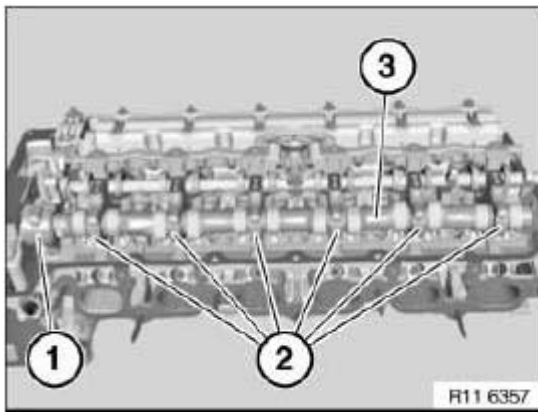
Bearing cap (1) is a thrust bearing.

Release screws of bearing caps (1 and 2).

Set all bearing caps down in special tool 11 4 481 in a tidy and orderly fashion.

All bearing caps are identified from 1 to 6.

For tightening torque refer to 11 31 1AZ in **11 31 CAMSHAFT (N52)** .



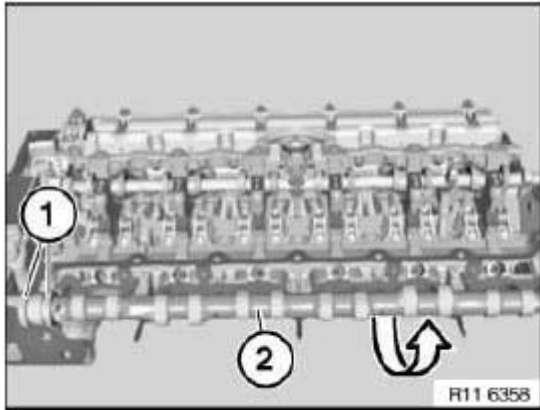
**Fig. 166: Identifying Thrust Bearing Screws And Cap**  
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out camshaft (2).

*Installation:*

Clean all bearing points and lubricate with oil.

Check plain compression rings (1) for damage and replace if necessary.



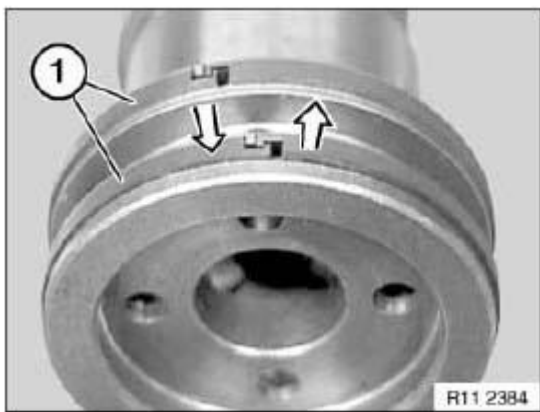
**Fig. 167: Identifying Camshaft And Compression Rings**  
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace plain compression rings (1).

The plain compression rings have catches at the joint.

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

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



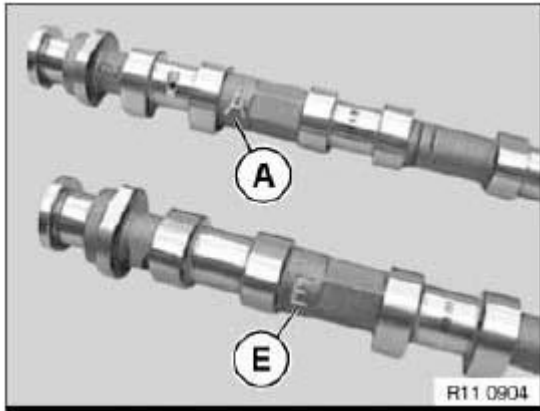
**Fig. 168: Identifying Compression Rings**  
Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Both camshafts have different identifications.**

**Mixing up the two camshafts will result in engine damage.**

A Exhaust camshaft.

E Inlet camshaft.

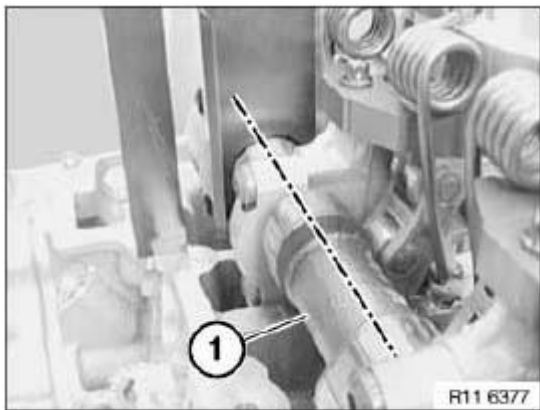


**Fig. 169: Identifying Exhaust Camshaft And Inlet Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

Insert camshaft (1) so that part number on twin surface points upwards.

Position inlet camshaft (1) so that cams point upwards at an angle.

Attach special tool 11 4 281 to twin surface.



**Fig. 170: Identifying Inlet Camshaft Position**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

**11 31 028 REMOVING AND INSTALLING / REPLACING EXHAUST CAMSHAFT (N52)****Special tools required:**

- 00 9 120
- 11 4 350
- 11 4 461
- 11 4 462
- 11 4 463
- 11 9 000

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

**Risk of damage!**

The upper and lower bearing banks must be pretensioned with a total of six special tools 11 4 461.

*Necessary preliminary tasks:*

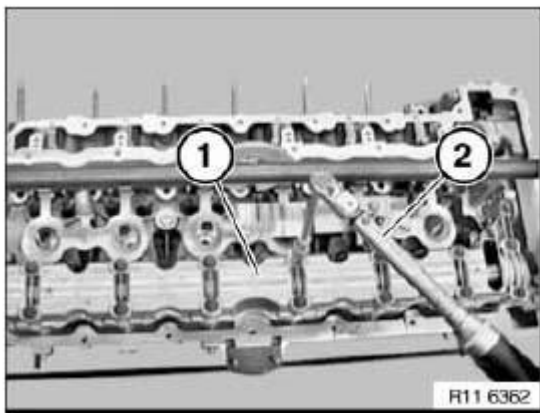
- Remove Cylinder Head Cover.
- Remove exhaust adjusting unit for exhaust camshaft.
- Adjust Valve Timing.

Release bearing cap screw connections from outside inwards.

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

Remove upper bearing bank (1).

Remove exhaust camshaft from lower bearing bank.



**Fig. 171: Identifying Upper Bearing Bank**

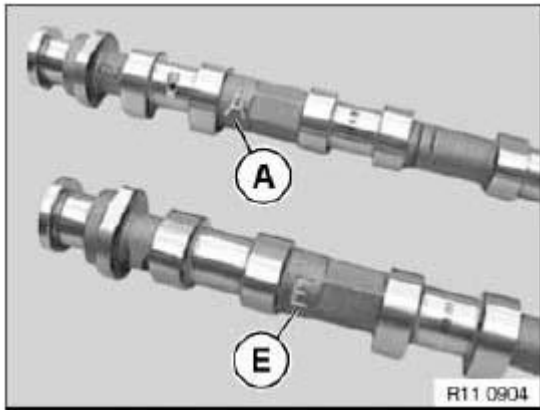
Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Both camshafts have different identifications.**

**Mixing up the two camshafts will result in engine damage.**

A Exhaust camshaft.

E Inlet camshaft.



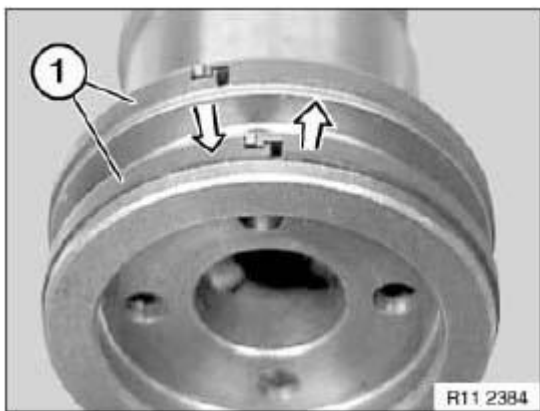
**Fig. 172: Identifying Exhaust Camshaft And Inlet Camshaft**  
Courtesy of BMW OF NORTH AMERICA, INC.

Check plain compression rings (1) for damage and replace if necessary.

Plain compression rings (1) are engaged at joint.

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

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



**Fig. 173: Identifying Plain Compression Rings**

Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Removal on engine:**

Set engine to firing TDC at 1st cylinder.

Removed cylinder head:

When using special tool 11 9 000, it will be necessary to remove the aluminium profile insert.

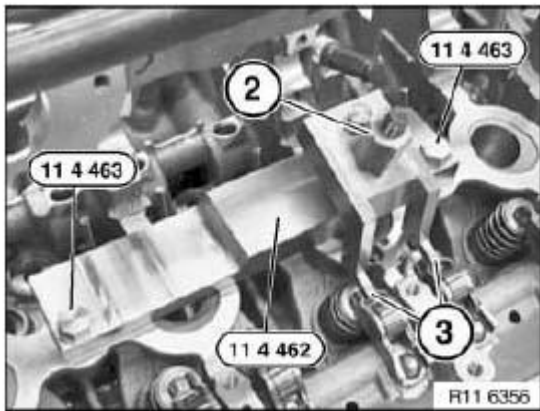
**Installing camshaft bearing bank:**

Pre-install special tool 11 4 462 on cylinder 2.

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

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

Press down roller rocker arms (3) on 2nd cylinder with spindle nut (2) of special tool 11 4 462.

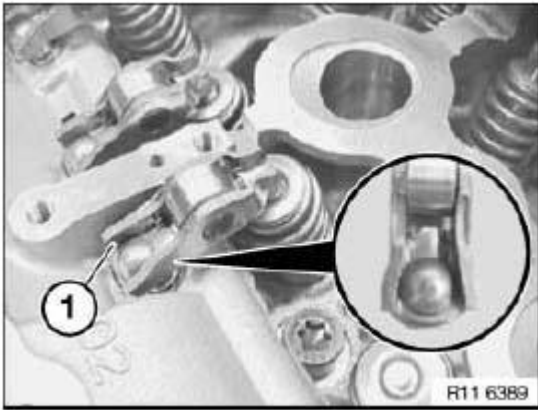


**Fig. 174: Identifying Special Tools (11 4 463), (11 4 462), Roller Rocker Arms And Cylinder**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Before installing exhaust camshaft, make sure roller rocker arm is correctly seated HVCA element and valve.

Refer to Removing and installing roller rocker arms.



**Fig. 175: Identifying Rocker Arms Position**

Courtesy of BMW OF NORTH AMERICA, INC.

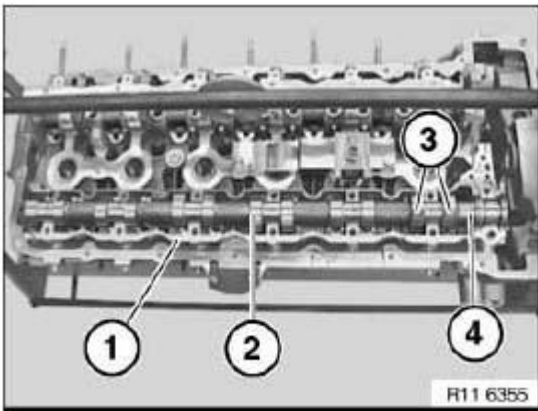
Position lower bearing bank (1) with exhaust camshaft (2) on roller rocker arms.

Align exhaust camshaft (2).

Cylinders 2 and 4 are at overlap.

Cams (3) on 1st cylinder point upwards at an angle.

Part number (4) on dihedron points upwards.

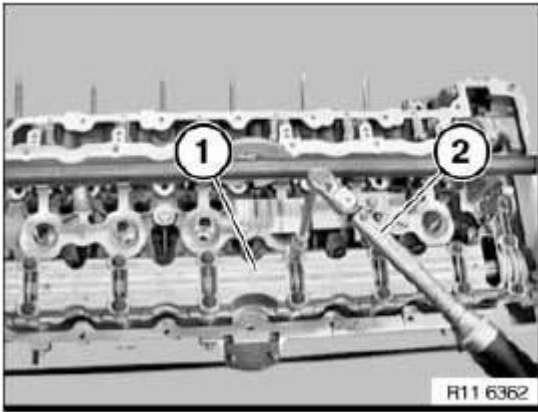


**Fig. 176: Identifying Lower Bearing Bank, Camshaft, Exhaust Camshaft, Cams And Part Number**

Courtesy of BMW OF NORTH AMERICA, INC.

Join exhaust camshaft to lower and upper bearing banks (1) with torque wrench (2) from inside outwards to **8 Nm**.

Release all screws of bearing bank (1) from outside inwards by 90°.

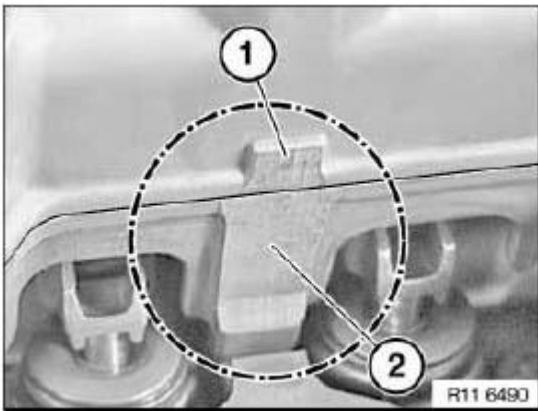


**Fig. 177: Identifying Lower, Upper Bearing Banks And Torque Wrench**  
 Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Lower and upper bearing banks must be aligned to each other at ground surfaces (1 and 2).

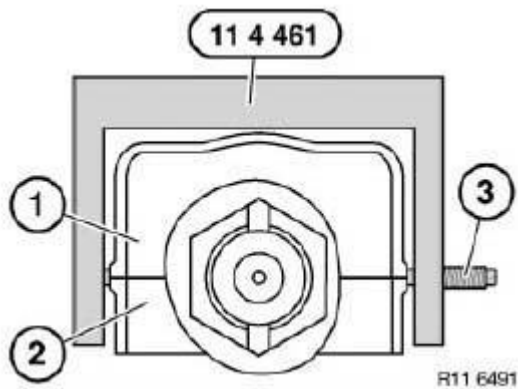
Bring thrust piece and legs of special tool 11 4 461 into contact at milled surfaces.



**Fig. 178: Aligning Mark Of Lower Bearing Bank And Upper Bearing Banks**  
 Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** Schematic depiction of special tool 11 4 461 at lower bearing bank (1) and upper bearing bank (2).

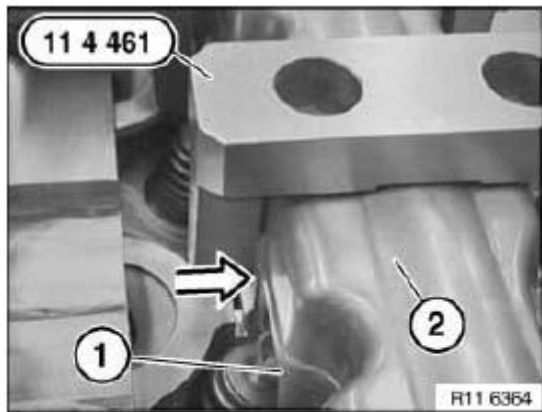
**IMPORTANT:** Tighten screw (3) on thrust piece to 2 Nm.



**Fig. 179: Identifying Special Tool (11 4 461), Lower Bearing Bank And Upper Bearing Bank**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 4 461 over screw connection of bearing banks.

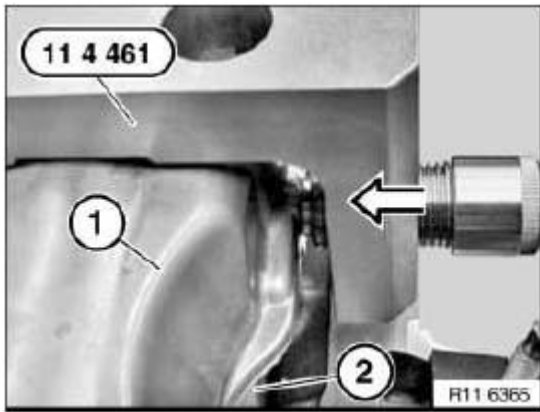
Make sure that legs come into exact contact on ground surfaces, lower bearing bank (1) and upper bearing bank (2).



**Fig. 180: Identifying Special Tool (11 4 461, Lower Bearing Bank And Upper Bearing Bank)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Initially tighten screw of special tool 11 4 461 to ground surfaces of lower bearing bank (1) and upper bearing bank (2).

**IMPORTANT: Tighten screws on thrust piece to 2 Nm.**



**Fig. 181: Identifying Special Tool (11 4 461), Lower Bearing Bank And Upper Bearing Bank**  
 Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Set special tool 11 4 350 to 2 Nm.**

Pretension all special tools 11 4 461 with special tool 11 4 350 only.

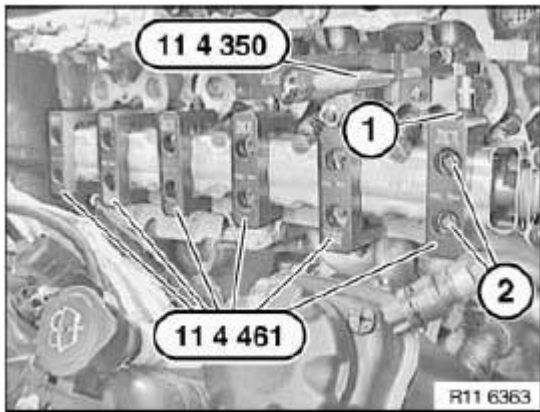


**Fig. 182: Identifying Torque Wrench**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tools 11 4 461 with screw (1) to inside of cylinder head.

On cylinder 2 mount special tool 11 4 461 with screw (1) facing outwards.

Position special tools 11 4 461 so that screw connections (2) of bearing bank are easily accessible.

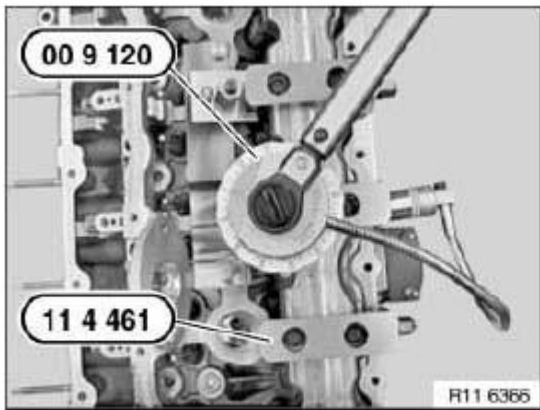


**Fig. 183: Identifying Special Tools (11 4 461), (11 4 350), Screw And Connections**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Tighten lower and upper bearing banks with special tool 00 9 120.

For tightening torque refer to 11 31 1AZ in 11 31 CAMSHAFT (N52) .

**IMPORTANT: Remove special tool 11 4 461 only when camshaft screw connection is completed.**



**Fig. 184: Identifying Special Tools (11 4 461) And (00 9 120)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

### 11 31 051 REPLACING TIMING CHAIN (N52)

**Special tools required:**

- 11 0 300
- 11 4 280

- 11 4 360
- 11 4 362
- 11 5 200
- 11 9 280

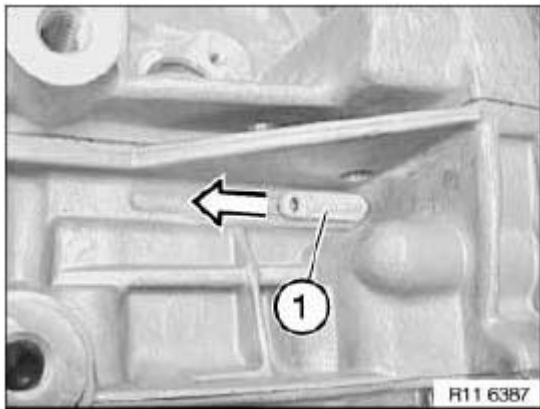
*Necessary preliminary tasks:*

- Remove **Cylinder Head Cover**.
- Remove all spark plugs.
- Remove **Chain Tensioner**.
- Remove **Radial Shaft Seal** at front.
- Remove **Belt Tensioner**.
- Remove **Vibration Damper**.

Remove fastener (1) in direction of arrow.

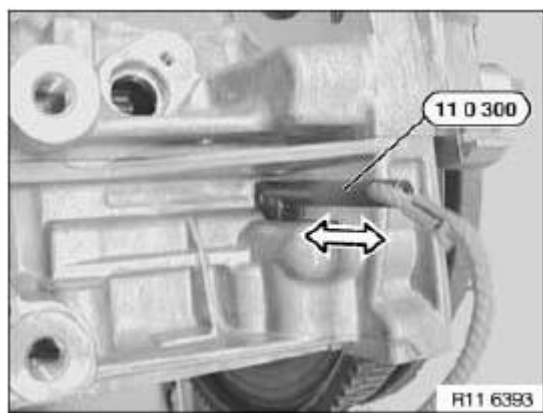
*Installation:*

Install fastener (1) with bore facing outwards.



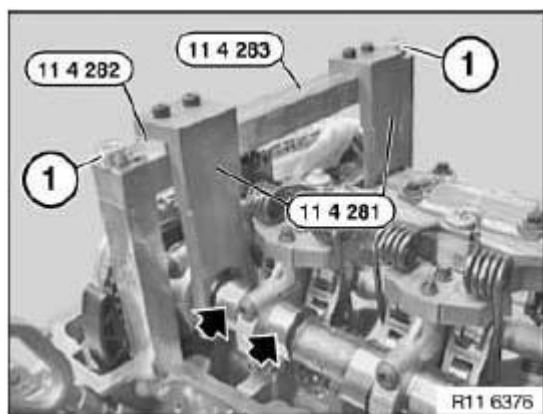
**Fig. 185: Identifying Fastener Directions**  
Courtesy of BMW OF NORTH AMERICA, INC.

Secure crankshaft during entire repair operation with special tool 11 0 300.



**Fig. 186: Identifying Special Tool (11 0 300)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Do not remove special tool 11 4 280.



**Fig. 187: Identifying Special Tool (11 4 281), (11 4 282), (11 4 283) And Screws**  
 Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT:** Do not remove special tool 11 0 300 to release central bolt (1).

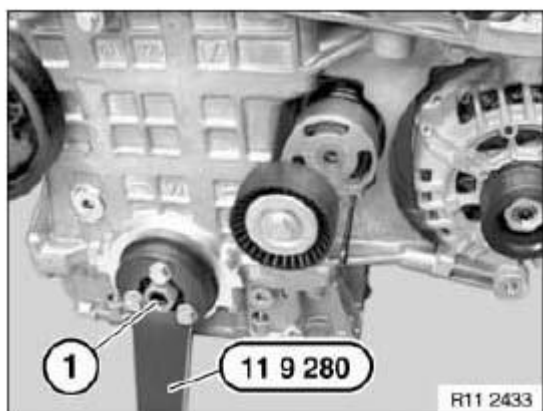
**Employ a *second* person for gripping when releasing central bolt (1).**

Mount special tool 11 9 280 on hub for vibration damper.

Release central bolt (1).

For tightening torque refer to 11 21 1AZ **11 21 CRANKSHAFT AND BEARINGS (N52)** .

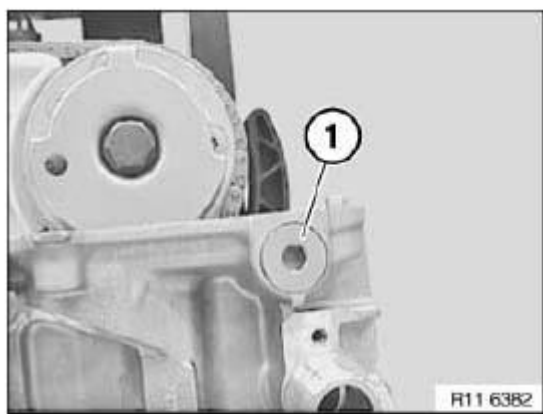
Remove central bolt with hub towards front.



**Fig. 188: Identifying Special Tool (11 9 280) And Central Bolt**  
Courtesy of BMW OF NORTH AMERICA, INC.

Open plug (1).

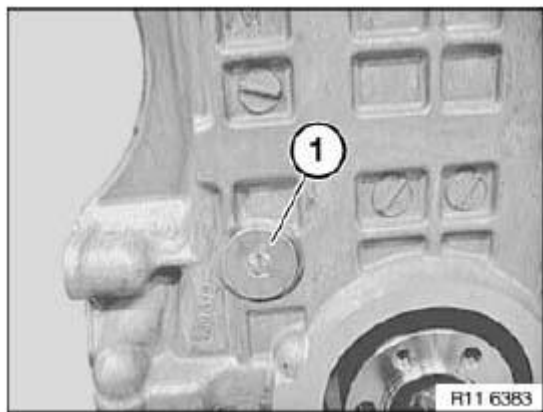
For tightening torque refer to 11 31 6AZ in 11 31 CAMSHAFT (N52) .



**Fig. 189: Identifying Engine Plug**  
Courtesy of BMW OF NORTH AMERICA, INC.

Open plug (1).

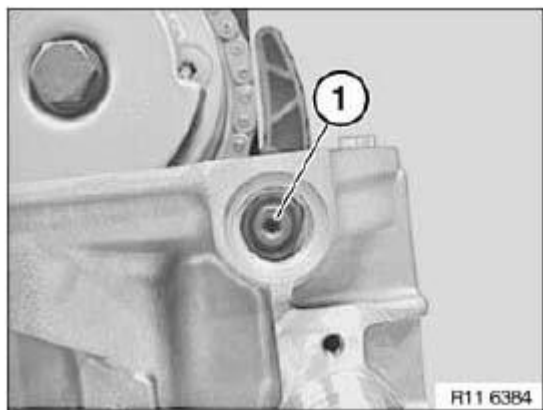
For tightening torque refer to 11 31 6AZ in 11 31 CAMSHAFT (N52) .



**Fig. 190: Identifying Engine Plug**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on chain drive at top.

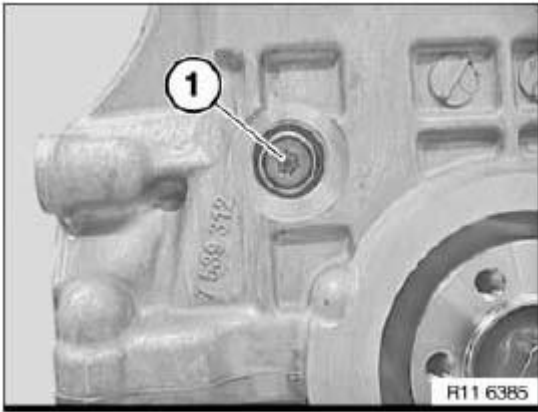
For tightening torque refer to 11 31 2AZ in 11 31 CAMSHAFT (N52) .



**Fig. 191: Identifying Screw On Chain Drive At Top**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on chain drive at bottom.

For tightening torque refer to 11 31 3AZ in 11 31 CAMSHAFT (N52) .



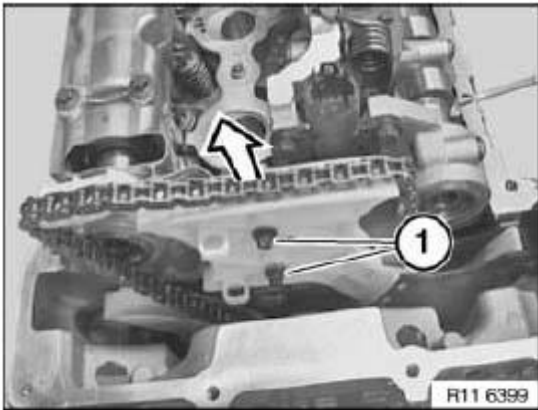
**Fig. 192: Identifying Screw On Chain Drive At Bottom**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove both adjusting units.

Release screws (1).

For tightening torque refer to 11 31 2AZ in **11 31 CAMSHAFT (N52)** .

Remove timing chain module with timing chain and sprocket wheel upwards in direction of arrow.

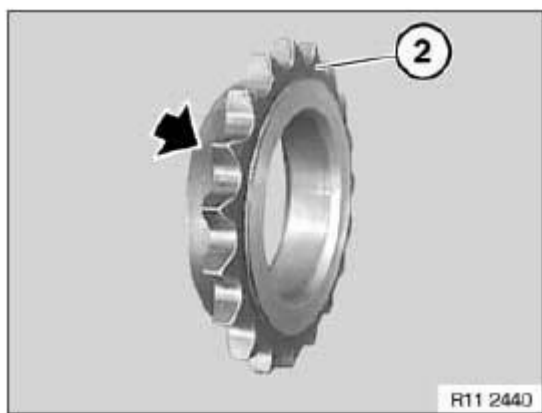


**Fig. 193: Identifying Timing Chain Module Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT:** Note installation direction of sprocket wheel (2).

Collar (see arrow in **Fig. 194**) on sprocket wheel (2) points to crankshaft.

**Incorrect assembly will result in engine damage.**



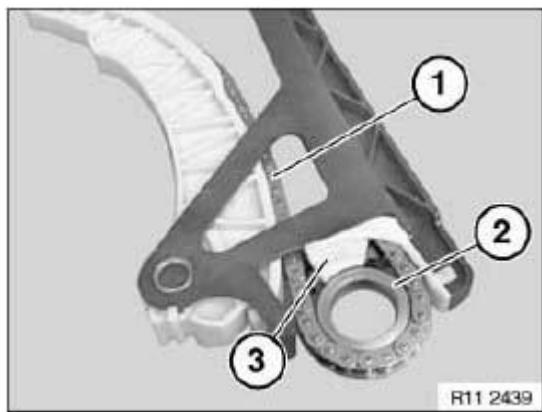
**Fig. 194: Identifying Collar On Sprocket Wheel**  
Courtesy of BMW OF NORTH AMERICA, INC.

Pull timing chain (1) upwards until sprocket wheel (2) engages chain guide (3).

Install timing chain (1) and sprocket wheel (2) in this position.

*Installation:*

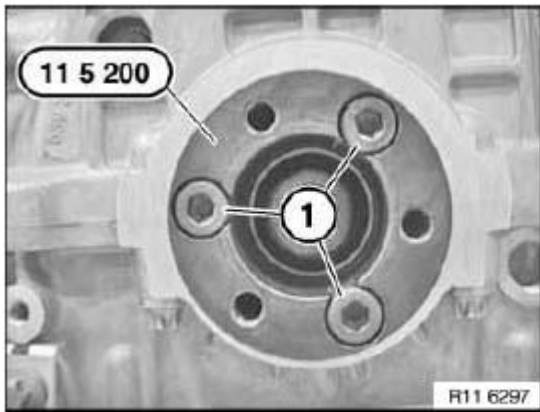
Always keep timing chain tensioned; it is possible for timing chain (1) to jam on chain module (3).



**Fig. 195: Identifying Timing Chain, Sprocket Wheel And Chain Guide**  
Courtesy of BMW OF NORTH AMERICA, INC.

Install hub with central bolt.

Tighten down special tool 11 5 200 with screws (1).



**Fig. 196: Identifying Special Tool (11 5 200) And Mounting Screws**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove belt tensioner.

Screw in special tool 11 4 360.

Mount special tool 11 9 280 on 11 5 200.

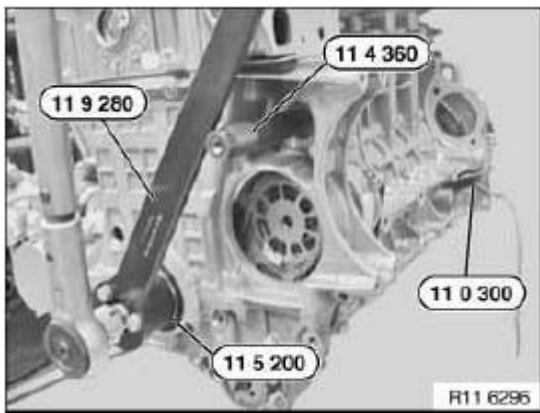
Support special tool 11 9 280 on special tool 11 4 362.

Special tool 11 0 300 secures crankshaft.

Tighten central bolt (1) to jointing torque.

For tightening torque refer to 11 21 1AZ in **11 21 CRANKSHAFT AND BEARINGS (N52)** .

Mark central bolt and hub with paint.

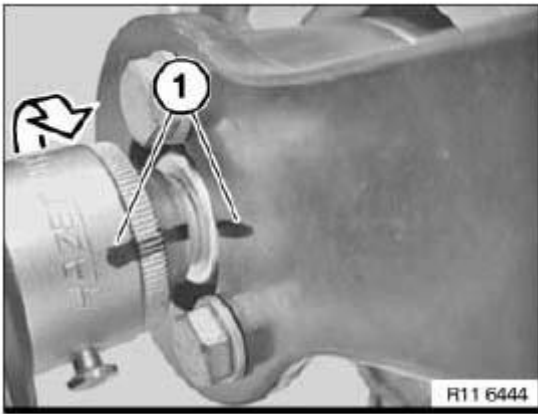


**Fig. 197: Identifying Special Tool (11 9 280), (11 5 200), (11 4 360) And (11 0 300)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Apply stroke of paint (1) for torsion angle tightening to tool.

See **Fig. 198**.

**IMPORTANT:** Do not remove tool from central bolt during torsion angle tightening - risk of damage.



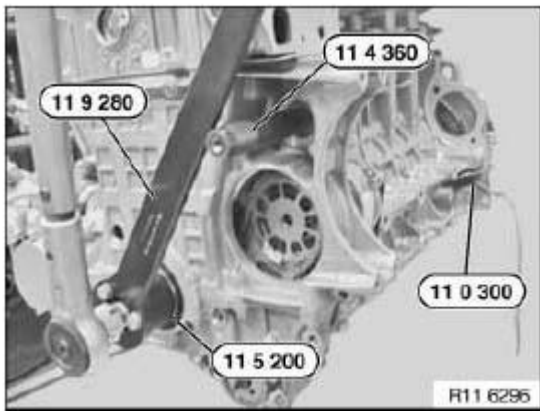
**Fig. 198: Identifying Torsion Angle**  
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten central bolt with two persons.

For tightening torque refer to 11 21 1AZ. in **11 21 CRANKSHAFT AND BEARINGS (N52)**

Install both **Adjusting Units**.

Install **Chain Tensioner**.



**Fig. 199: Identifying Special Tools (11 9 280), (11 5 200), (11 4 360) And (11 0 300)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine twice.

Check **Timing**.

Assemble engine.

### 11 31 090 INSTALLING AND REMOVING/REPLACING CHAIN TENSIONER PISTON (N52)

Release chain tensioner (1).

For tightening torque refer to 11 31 5AZ in **11 31 CAMSHAFT (N52)** .

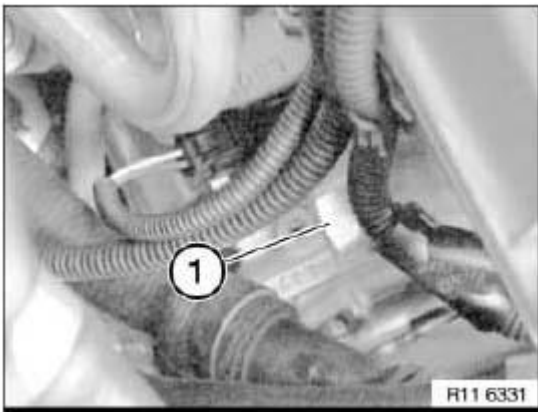
**IMPORTANT:** Have a cleaning cloth ready. A small quantity of engine oil will emerge after the screw connection has been released.

**Make sure no oil runs onto the belt drive.**

*Installation:*

No sealing ring is fitted during series-production assembly.

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



**Fig. 200: Identifying Chain Tensioner**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

Repeat procedure twice.



**Fig. 201: Identifying Chain Tensioner**

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

## 11 31 505 ADJUSTING CAMSHAFT TIMING (N52)

### Special tools required:

- 00 9 120
- 00 9 250
- 11 0 300
- 11 4 281
- 11 4 282
- 11 4 283
- 11 4 290
- 11 9 340

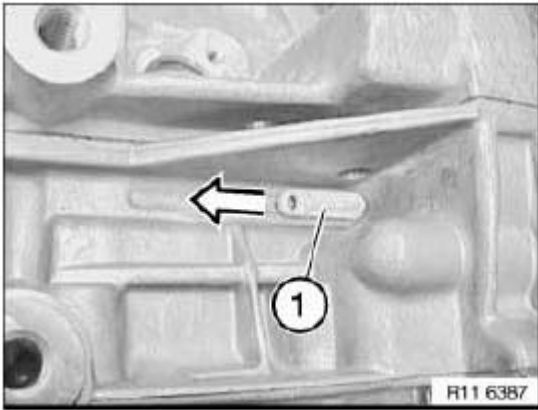
### *Necessary preliminary tasks:*

- Remove **Cylinder Head Cover**.

Remove fastener (1) in direction of arrow.

### *Installation:*

Install fastener (1) with bore facing outwards.



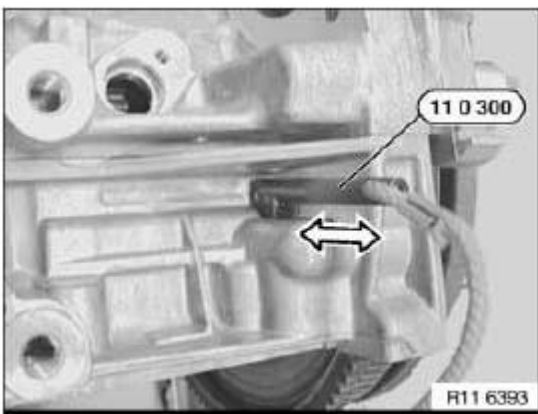
**Fig. 202: Identifying Engine Cover Fastener**  
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate crankshaft at central bolt into TDC position.

Slide in special tool 11 0 300 in direction of arrow and block crankshaft.

**IMPORTANT:** On engines with automatic transmissions, there is shortly before the special tool bore for the TDC position a large bore which can be confused with the special tool bore.

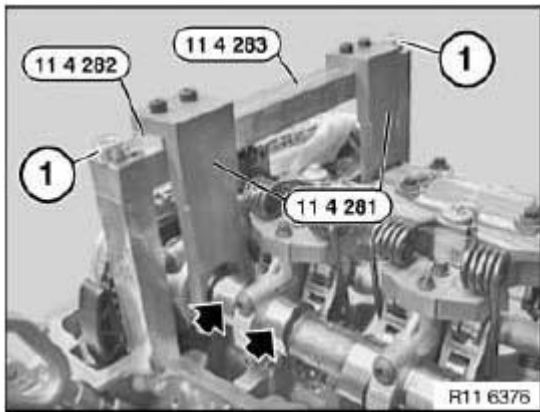
If the flywheel is secured in the correct bore with special tool 11 0 300, the engine can no longer be moved at the central bolt.



**Fig. 203: Identifying Special Tool (11 0 300)**  
Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT:** *Risk of damage!*

To open central bolt, mount special tools 11 4 283 11 4 281 and 11 4 282 on camshaft.

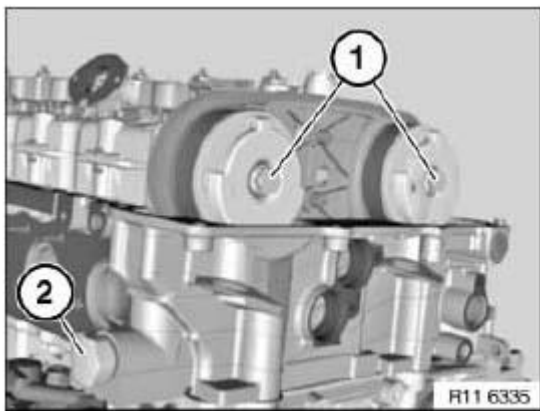


**Fig. 204: Identifying Special Tool (11 4 281), (11 4 282), (11 4 283) And Screws**  
 Courtesy of BMW OF NORTH AMERICA, INC.

To release central bolts (1), grip camshaft at hexagon head at rear.

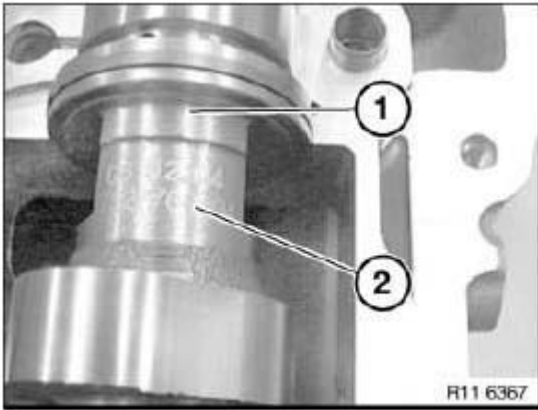
Release chain tensioner (2) (have a cleaning cloth ready).

**NOTE:** Illustrations in CAD do not show special tools.



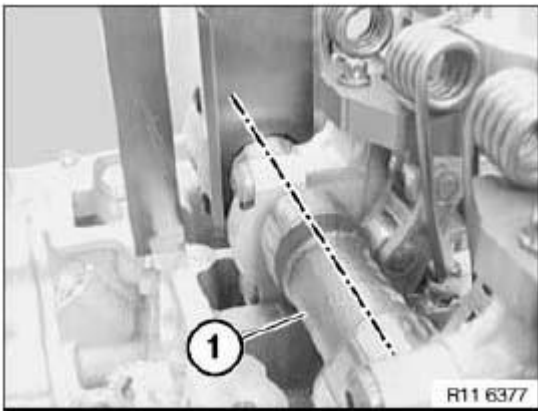
**Fig. 205: Identifying Central Bolts And Chain Tensioner**  
 Courtesy of BMW OF NORTH AMERICA, INC.

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



**Fig. 206: Identifying Inlet And Exhaust Camshafts Part Number**  
Courtesy of BMW OF NORTH AMERICA, INC.

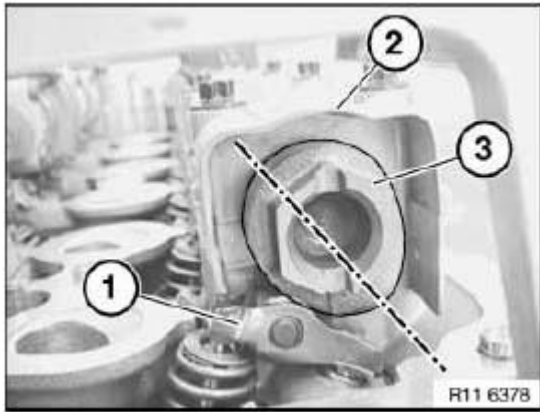
With 1st cylinder in firing TDC position, cams of inlet camshaft (1) point upwards at an angle.



**Fig. 207: Identifying Camshaft Angle**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

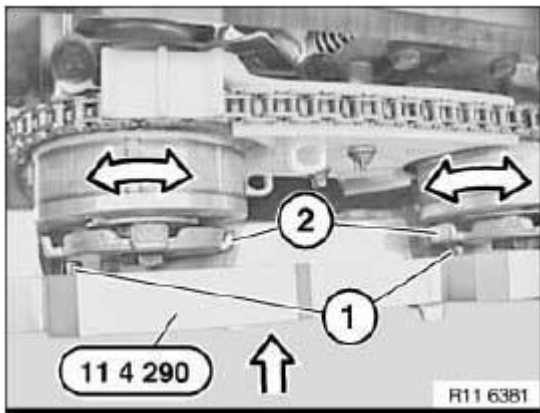
**NOTE:** If the timing is checked while the engine is installed, the position of the camshaft can only be checked with a mirror.



**Fig. 208: Identifying Camshaft Position**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

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



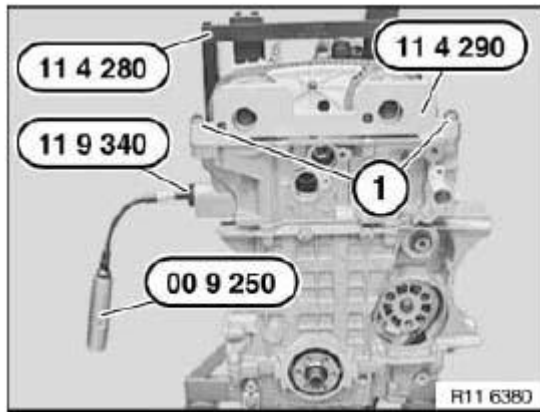
**Fig. 209: Identifying Special Tool (11 0 290), Sensor Gears And Locating Pins**  
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 290 with old cylinder head cover bolts (1).

Screw special tool 11 9 340 into cylinder head.

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

Tighten both central bolts of camshaft adjustment units with special tool 00 9 120. For tightening torque refer to 11 36 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL (N52)**.



**Fig. 210: Identifying Special Tool (11 4 280), (11 4 290), (11 9 340), (11 9 350) And Cover Bolts**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

### 33 ROCKER ARM WITH BEARING MOUNT/CAM FOLLOWERS

#### 11 33 050 REMOVING AND INSTALLING/REPLACING ALL ROCKER ARMS (N52)

Special tools required:

- 11 4 480

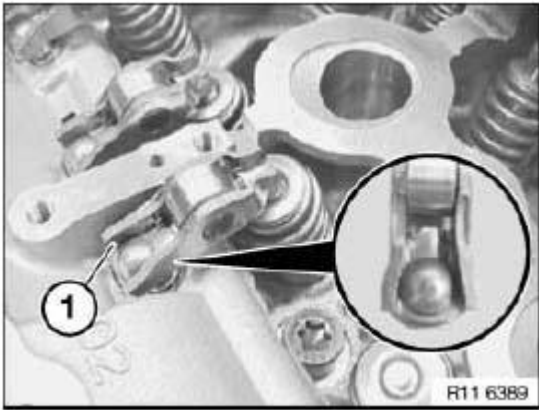
*Necessary preliminary tasks:*

- Remove Cylinder Head Cover.
- Remove Intermediate Lever.
- Remove Exhaust Camshaft.

**IMPORTANT:** Rocker arms (1) are divided into bearing categories.

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

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



**Fig. 211: Identifying Rocker Arms**

Courtesy of BMW OF NORTH AMERICA, INC.

Detach roller cam followers (1) from HVC element and remove.

Set all roller cam followers down in special tool 11 4 480 in a tidy and orderly fashion.

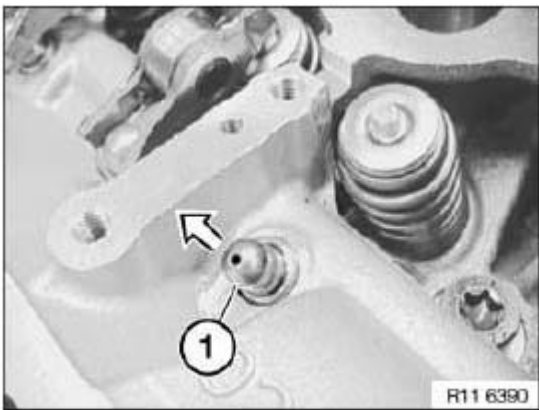
*Installation:*

Before installing exhaust camshaft and intermediate lever, make sure roller cam followers are correctly seated.

Remove HVC element in direction of arrow.

*Installation:*

If the HVC elements are to be reused, set them down in special tool 11 4 480 in a tidy and orderly fashion with the roller cam followers.



**Fig. 212: Identifying Roller Cam Followers**

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME; if necessary, readjust uniform mixture distribution.

## 34 VALVES WITH SPRINGS

### 11 34 552 REMOVING AND INSTALLING OR REPLACING ALL VALVES (N52)

#### Special tools required:

- 00 3 580
- 11 4 480

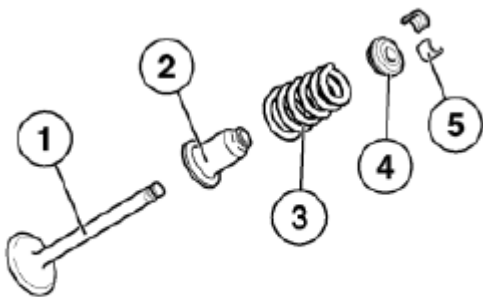
#### Necessary preliminary tasks:

- Remove Cylinder Head.
- Remove Intermediate Lever.
- Remove Eccentric Shaft.
- Remove Inlet Camshaft.
- Remove Exhaust Camshaft.
- Remove Roller Cam Follower.
- Remove Valve Springs.
- Remove Valve Stem Seals.

#### Arrangement:

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

If the valves are to be reused, set them down in special tool 11 4 480 in a tidy and orderly fashion.



R11 4170

**Fig. 213: Identifying Valve Assembly Components**

Courtesy of BMW OF NORTH AMERICA, INC.

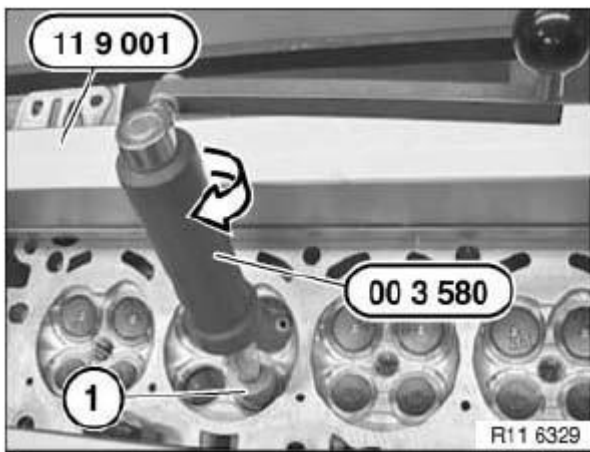
Then remachine valve seat if necessary.

All valves removed.

Use pilot no. 5.

Remachine valve seat with special tool 00 3 580.

Valve seat correction, see TECHNICAL DATA .



**Fig. 214: Identifying Special Tool (11 9 001) And (00 3 580)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME; if necessary, readjust uniform mixture distribution.

### **11 34 560 REPLACING ALL VALVE STEM SEALS (N52)**

**Special tools required:**

- 11 6 370
- 11 6 380

*Necessary preliminary tasks:*

- Remove Cylinder Head.
- Remove Intermediate Lever.
- Remove Eccentric Shaft.
- Remove Inlet Camshaft.

- Remove Exhaust Camshaft.
- Remove Roller Cam Follower.

*Installation:*

Insert all Valves.

Firmly press special tool 11 6 370 onto old valve stem seals.

Detach valve stem seal from valve stem by turning and simultaneously pulling special tool 11 6 370.

**NOTE:** Illustration N42.

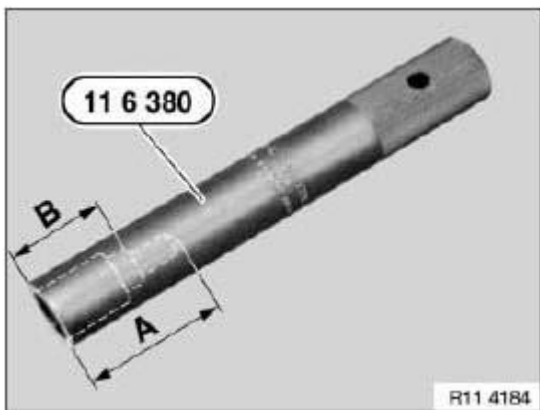


**Fig. 215: Identifying Special Tool (11 6 370)**

Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** For use on the N52 engine, special tool 11 6 380 must be remachined according to the sketch with a 10 mm dia. drill bit to a depth of B = approx. 23 mm.

This modification has already been taken into account for reordering.



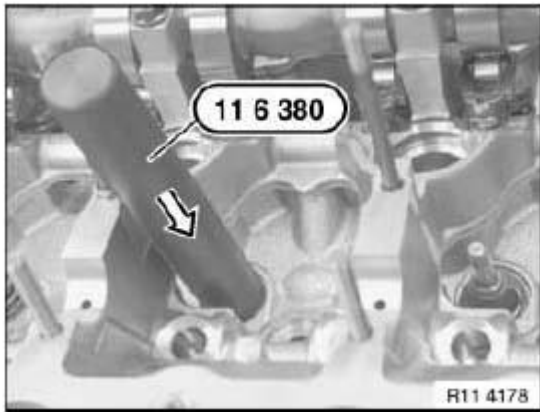
**Fig. 216: Identifying Special Tool (11 6 380)**

Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Fit the mounting sleeves (plastic sleeves) supplied in the spare part on the valve stem end. Lubricate mounting sleeve.

Press on valve stem seal by hand with special tool 11 6 380 as far as it will go.

**Fig. 217: Identifying Special Tool (11 6 380)**

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

**11 34 715 REPLACING ALL VALVE SPRINGS (N52)****Special tools required:**

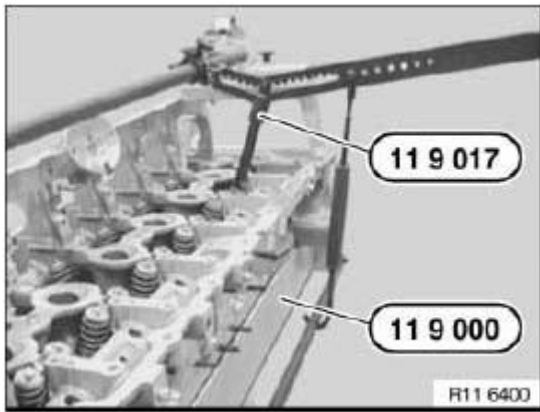
- 11 4 480
- 11 9 000
- 11 9 017

*Necessary preliminary tasks:*

- Remove **Cylinder Head Cover.**
- Remove **Exhaust Camshaft.**
- Remove **Intermediate Lever.**
- Remove **Inlet Camshaft.**
- Remove **Roller Cam Follower..**

Place cylinder head on special tool 11 9 000.

Press valve spring down on spring retainer with special tool 11 9 017.

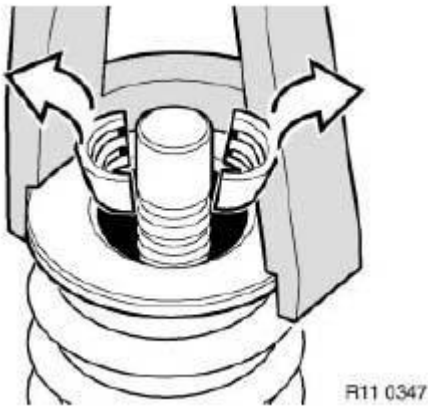


**Fig. 218: Identifying Special Tool (11 9 000) And (11 9 017)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove valve tapers with a magnet.

Remove valve spring and spring retainer.

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

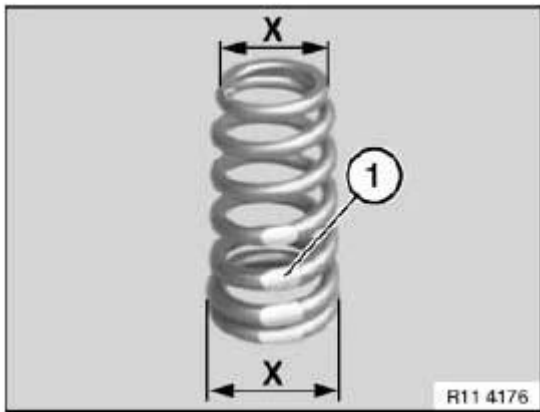


**Fig. 219: Identifying Valve Spring Cotter Pin**  
Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Incorrect installation possible.**  
**Incorrect installation will result in valve spring breakage.**

Color marking (1) is normally on lower end of valve spring.

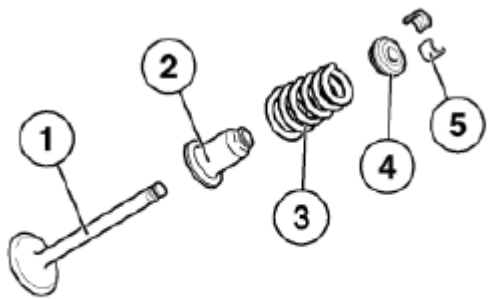
Only the diameter pointing to the spring retainer at the bottom is required for correct installation of the valve spring.



**Fig. 220: Identifying Valve Spring Color Marking**  
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



**Fig. 221: Identifying Valve Spring Assembly And Components**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME; if necessary, readjust uniform mixture distribution.

## 36 VARIABLE CAMSHAFT TIMING

### 11 36 046 REMOVING AND INSTALLING/REPLACING INLET AND EXHAUST ADJUSTMENT UNITS (N52)

**Special tools required:**

- 11 4 280
- 11 4 281
- 11 4 282
- 11 4 283

*Necessary preliminary tasks:*

- Remove Cylinder Head Cover.

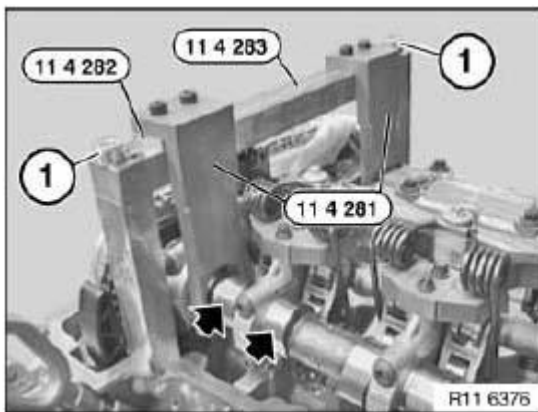
**IMPORTANT:** To open central bolts on adjustment units and camshafts.

**Fit special tool 11 4 280.**

Fit special tool 11 4 283 with screws (1).

Fit special tool 11 4 281 on special tool 11 4 283.

**IMPORTANT:** Special tool 11 4 282 must be fitted underneath on inlet camshaft.



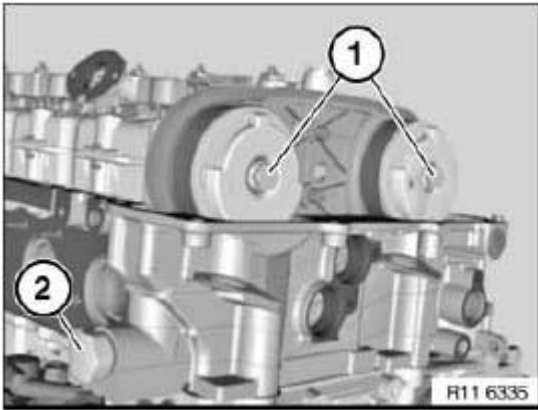
**Fig. 222: Identifying Special Tool (11 4 281), (11 4 282), (11 4 283) And Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release chain tensioner (2).

For tightening torque refer to 11 31 5AZ in 11 31 CAMSHAFT (N52) .

Release central bolt on inlet/exhaust adjustment units (1).

For tightening torque refer to 11 36 1AZ in 11 36 VARIABLE CAMSHAFT CONTROL (N52) .



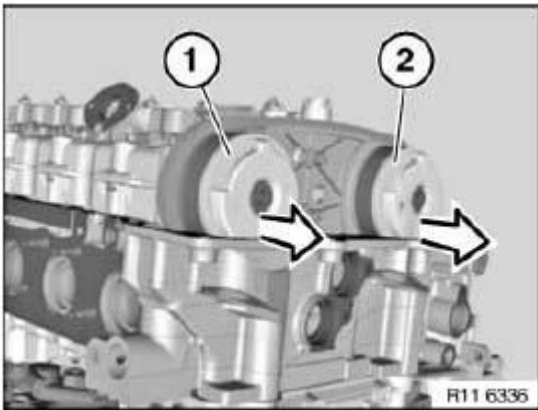
**Fig. 223: Identifying Engine Central Bolt And Chain Tensioner**  
Courtesy of BMW OF NORTH AMERICA, INC.

Detach exhaust adjustment unit (1) from exhaust camshaft.

Detach inlet adjustment unit (2) from inlet camshaft.

*Installation:*

To facilitate removal and installation of adjustment units, turn sensor gears at cutout downwards.



**Fig. 224: Identifying Engine Inlet And Exhaust Adjustment Unit**  
Courtesy of BMW OF NORTH AMERICA, INC.

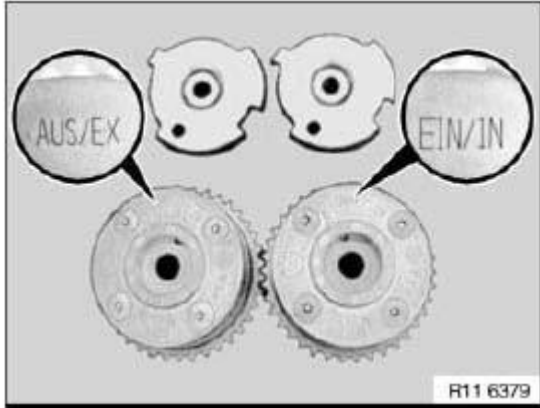
- IMPORTANT:**
- **Danger of mixing up adjustment units.**
  - **Mixing up the adjustment units will result in engine damage.**

The inlet and exhaust adjustment units are different.

VANOS is marked with AUS and EX for the exhaust camshaft.

VANOS is marked with EIN and IN for the inlet camshaft.

Sensor gears can be fitted alternatively.



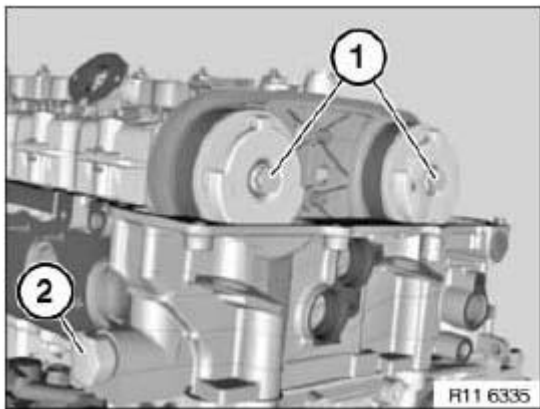
**Fig. 225: Identifying Inlet And Exhaust Camshaft Mark**  
Courtesy of BMW OF NORTH AMERICA, INC.

Fit both adjustment units on camshafts.

The installation position of the adjustment units can be freely selected.

Insert screws (1).

For tightening torque refer to 11 36 1AZ in **11 36 VARIABLE CAMSHAFT CONTROL (N52)** .

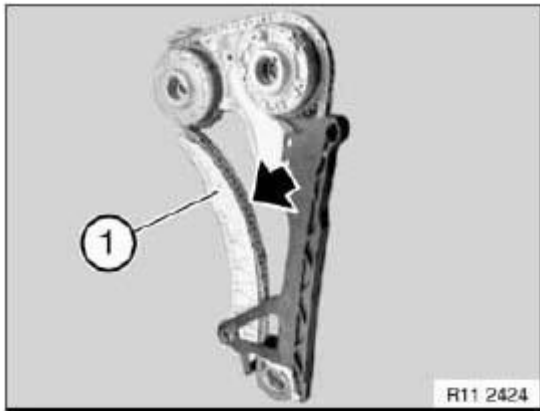


**Fig. 226: Identifying Central Screw And Chain Tensioner**  
Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Incorrect installation possible.**

Press clamping rail (1) by hand against timing chain and make sure timing chain is guided in clamping rail (1).

**NOTE:** Schematic representation on removed chain drive.



**Fig. 227: Identifying Clamping Rail**  
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust Valve Timing.

Fit Chain Tensioner.

Assemble engine.

#### 11 36 655 REMOVING AND INSTALLING/REPLACING BOTH SOLENOID VALVES (N52)

**IMPORTANT:** Always check that the solenoid valves are clean during removal and installation.

**Possible malfunction if valves are contaminated:**

- Rough running.
- OBD fault entry.
- Exhaust emission behavior.
- Low engine power.

*Necessary preliminary tasks:*

- Remove Acoustic Cover

Disconnect plug connection (1) for inlet solenoid valve (2).

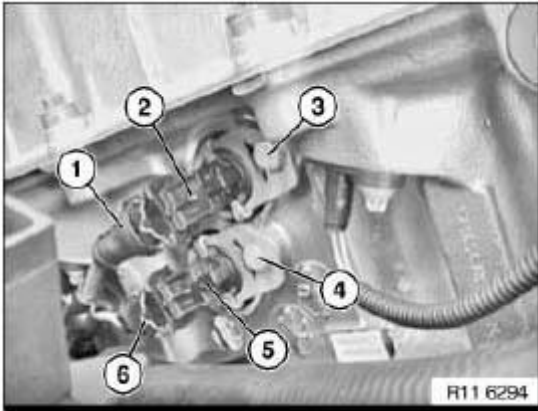
Unscrew bolt (3).

Remove inlet solenoid valve (2) with bracket towards front.

Disconnect plug connection (6) for exhaust solenoid valve (5).

Release screw (4).

Remove exhaust solenoid valve (5) with bracket towards front.



**Fig. 228: Identifying Inlet Solenoid Valve, Plug Connections, Exhaust Solenoid Valve, Screw And Bolt**  
Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT:** Risk of mixing up plug connections (1 and 6)

Assemble engine.

Check function of DME.

## 37 VARIABLE VALVE GEAR

### 11 37 005 REMOVING AND INSTALLING/REPLACING ECCENTRIC SHAFT (N52)

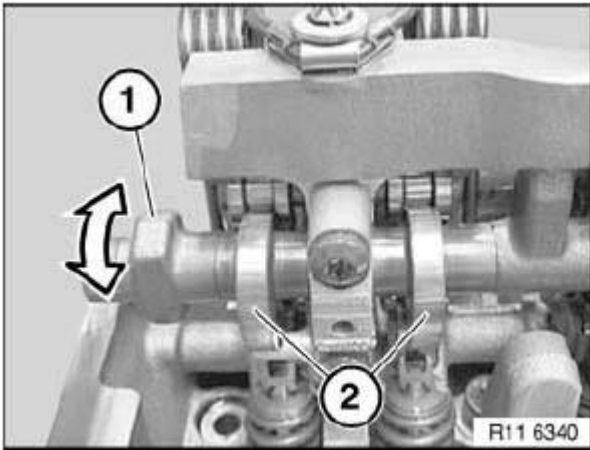
**Special tools required:**

- 11 4 481

*Necessary preliminary tasks:*

- Remove Cylinder Head Cover.
- Remove Intermediate Lever.

If necessary, move eccentric shaft (1) on twin surface to minimum lift (2).



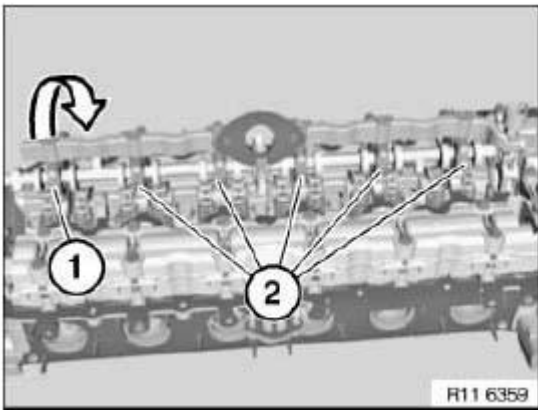
**Fig. 229: Identifying Eccentric Shaft And Lift**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws on bearing cap number (1).

Release screws on all bearing caps (2).

All bearing caps are identified with numbers; set caps down in special tool 11 4 481 in a tidy and orderly fashion.

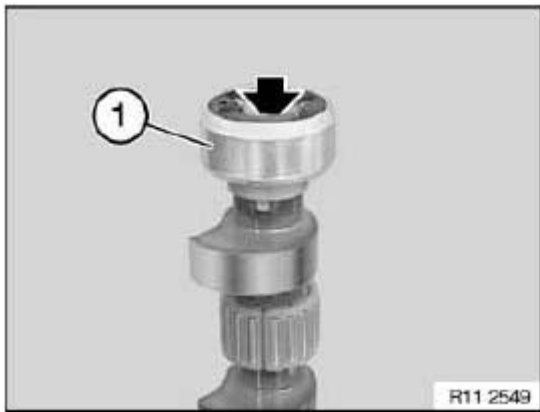
Remove intermediate shaft with a light tilting and rotating motion.



**Fig. 230: Identifying Bearing Cap And Number**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw and remove magnet wheel (1).

**IMPORTANT: Screw is not magnetic and is secured against falling out.**

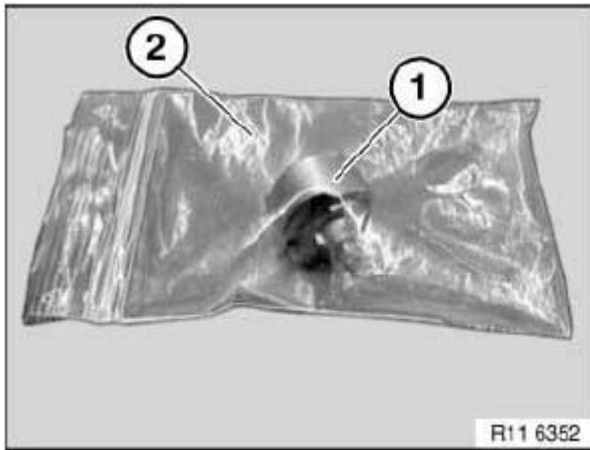


**Fig. 231: Identifying Magnet Wheel**

Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT:** Magnet wheel (1) is extremely magnetic.

After removing, protect magnet wheel (1) against metal chips by placing it in a plastic bag (2) with a seal.

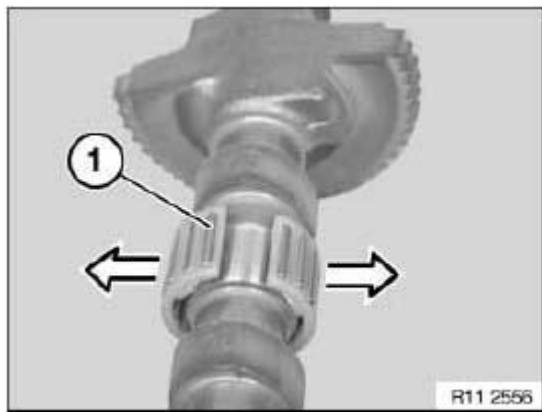


**Fig. 232: Identifying Magnet Wheel And Plastic Bag**

Courtesy of BMW OF NORTH AMERICA, INC.

Carefully press needle bearing (1) apart at split position only to such an extent that it can be removed from eccentric shaft.

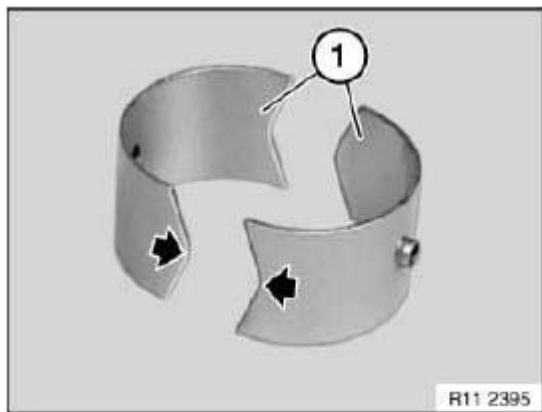
**IMPORTANT:** Needle bearing (1) can break very easily.



**Fig. 233: Identifying Needle Bearing**  
Courtesy of BMW OF NORTH AMERICA, INC.

Install bearing shells (1) in such a way that ends of bearing shells (1) face each other as shown in **Fig. 234**.

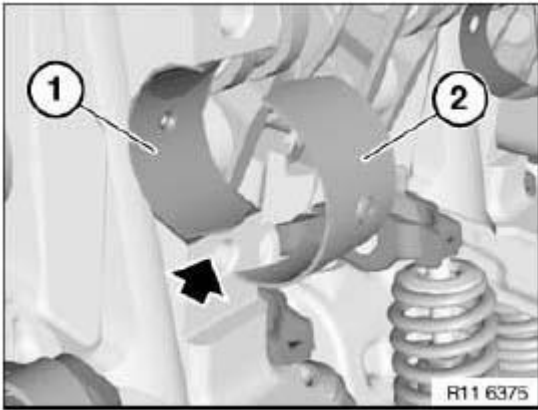
**NOTE:** Always replace bearing shells and needle bearings together.



**Fig. 234: Identifying Bearing Shells**  
Courtesy of BMW OF NORTH AMERICA, INC.

Install bearing shell (1) with tip facing down (see arrow in **Fig. 235**) in cylinder head.

Install bearing shell (2) with tip facing up in bearing cap.



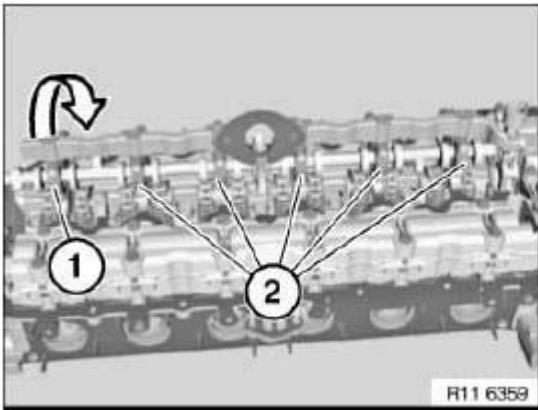
**Fig. 235: Identifying Bearing Shell Installation Orientation**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Install eccentric shaft and set to minimum lift.

Bearing cap number 6 (1) is provided with a stop.

All bearing caps (2) are identified with numbers from 1 to 5.

For tightening torque refer to 11 37 7AZ in **11 37 VARIABLE VALVE GEAR (N52)** .



**Fig. 236: Identifying Bearing Caps And Bearing Cap Number**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

### **11 37 010 REMOVING AND INSTALLING/REPLACING INTERMEDIATE LEVERS (N52)**

#### **Special tools required:**

- 11 4 270
- 11 4 450

- 11 4 481

**IMPORTANT: Aluminium-magnesium materials.**

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

A magnesium crankcase requires aluminium screws/bolts exclusively.

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

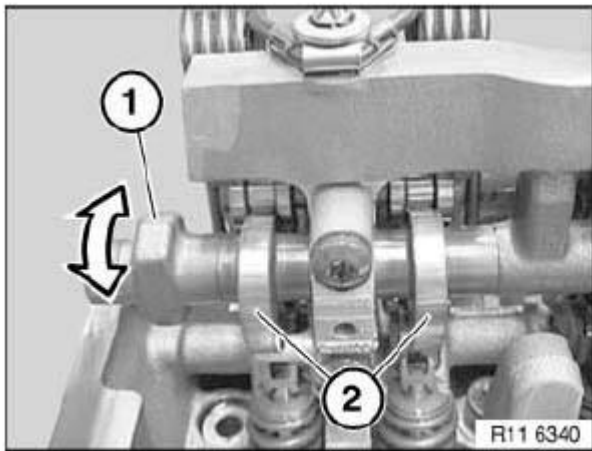
The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

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

*Necessary preliminary tasks:*

- Remove Cylinder Head Cover.

If necessary, set eccentric shaft (1) on twin surface to minimum lift (2).

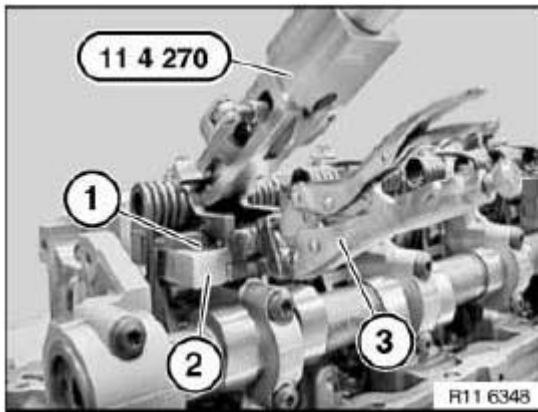


**Fig. 237: Identifying Eccentric Shaft And Lift**  
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 270 with gripping pliers (3) to guide block (2).

**IMPORTANT: Special tool 11 4 270 is only secured to guide block.**

Adjusting the gripping pliers (3) is not permitted (risk of damage) on special tool 11 4 270.



**Fig. 238: Identifying Special Tool (11 4 270), Gripping Pliers And Guide Block**  
 Courtesy of BMW OF NORTH AMERICA, INC.

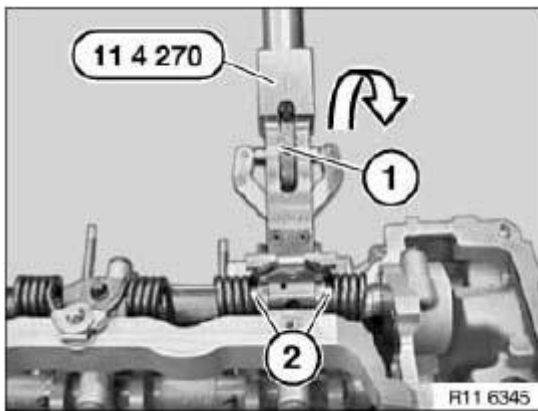
**NOTE:** The oil nozzle must be removed beforehand from cylinder no. 3.

**WARNING:** Risk of injury in event of incorrect use.

**IMPORTANT:** Incorrect handling risk of damage.

Secure both bearing pins (2) in return spring with knurled screw (1) on special tool 11 4 270.

Press special tool 11 4 270 in direction of arrow as far as it will go.



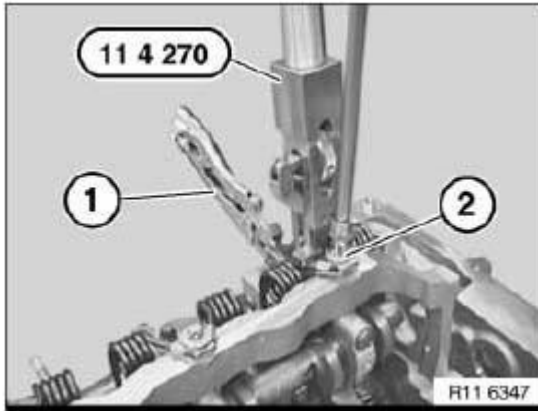
**Fig. 239: Identifying Special Tool (11 4 270), Screw And Bearing Pins**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Release steel screw (2).

To avoid jamming with screw (2) and return spring, it is necessary when releasing screw (2) to relieve the pretension on special tool 11 4 270 uniformly.

**IMPORTANT: Risk of damage to cylinder head thread.**

For tightening torque refer to 11 37 2AZ in 11 37 VARIABLE VALVE GEAR (N52) .



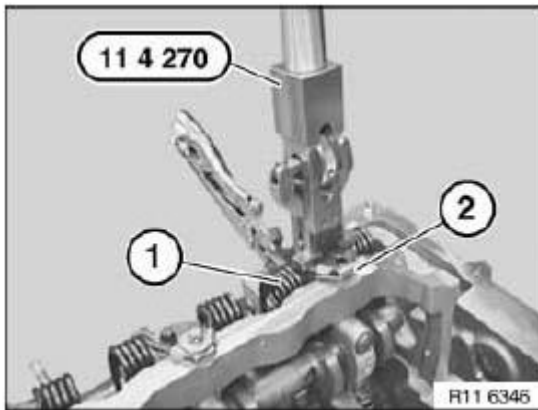
**Fig. 240: Identifying Special Tool (11 4 270) And Steel Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

Relieve tension on return spring (1) with special tool 11 4 270.

**NOTE:** Metal lug (2) cannot be disassembled and must not be removed.

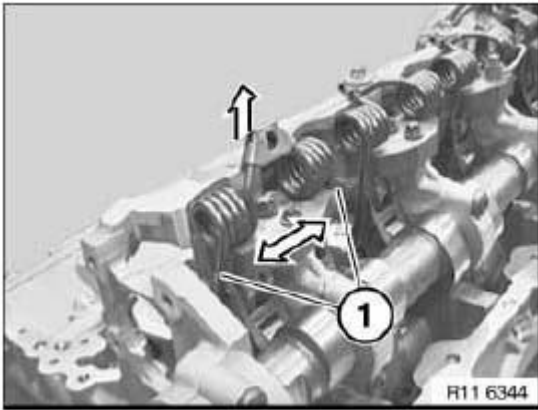
*Installation:*

Replace metal lug if tab washer is defective.



**Fig. 241: Identifying Special Tool (11 4 270), Return Spring And Metal Lug**  
Courtesy of BMW OF NORTH AMERICA, INC.

Press return spring apart at position (1) and remove towards top.



**Fig. 242: Identifying Return Spring**

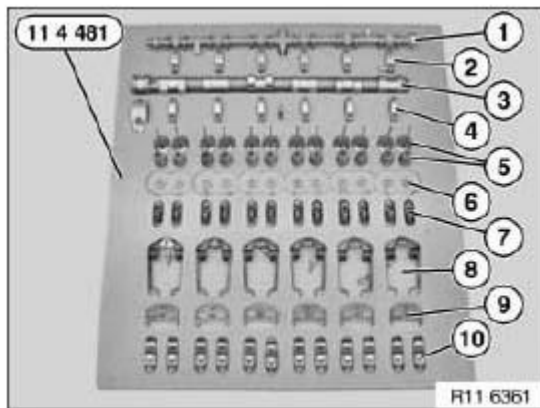
Courtesy of BMW OF NORTH AMERICA, INC.

**IMPORTANT: Uniform distribution must not be changed.**

**All components must be set down in a clean and orderly fashion.**

All components must be reinstalled in the same positions in an engine which has already been in use.

1. Eccentric shaft with bearing.
2. Bearing caps of eccentric shaft set out in order.
3. Inlet camshaft.
4. Bearing caps of inlet camshaft set out in order.
5. Inlet valves with valve springs.
6. Valve plates and valve tapers.
7. Roller cam followers with HVC element set out in order.
8. Return springs.
9. Guide blocks set out in order.
10. Intermediate levers set out in order.



**Fig. 243: Identifying Special Tool (11 4 481)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

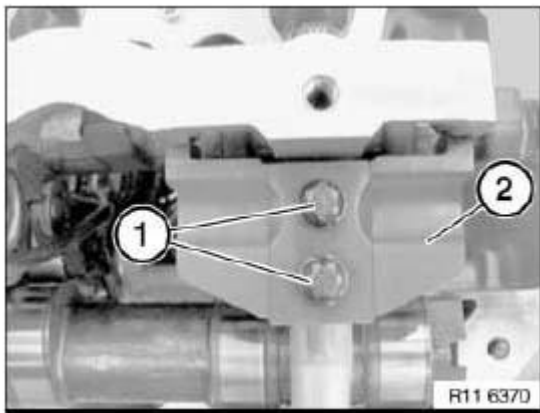
For tightening torque refer to 11 37 1AZ in **11 37 VARIABLE VALVE GEAR (N52)** .

Set down guide blocks (2) in special tool 11 4 481 in neat order.

*Installation:*

Mixing up the guide blocks may cause the engine to demonstrate idle fluctuations.

This will result in maladjustment of uniform distribution.

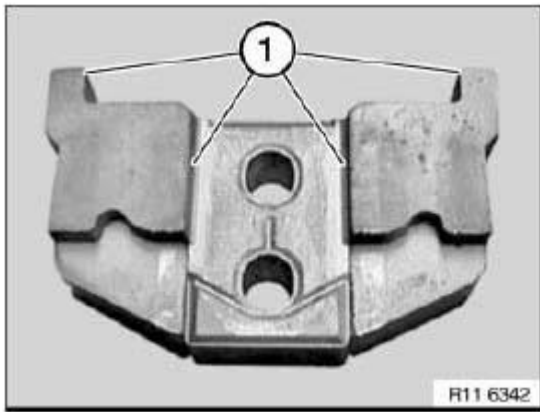


**Fig. 244: Identifying Guide Blocks And Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Contact surfaces (1) must be clean and oil-free.

Clean if necessary.



**Fig. 245: Identifying Guide Block Contact Surfaces**  
**Courtesy of BMW OF NORTH AMERICA, INC.**

Lift out intermediate levers (2).

Intermediate levers (2) set out in special tool 11 4 481 in order.

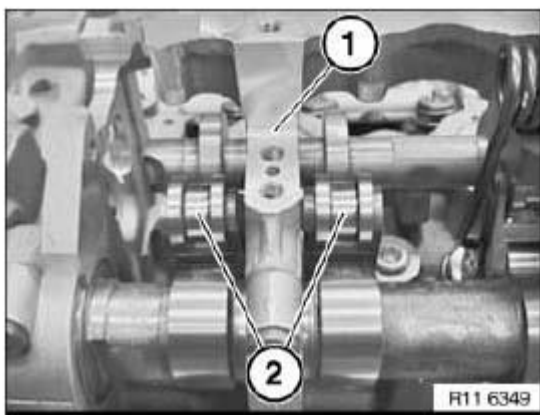
*Installation:*

Mixing up the intermediate levers may cause the engine to demonstrate RPM fluctuations.

*Installation:*

Contact surfaces (1) must be clean and oil-free.

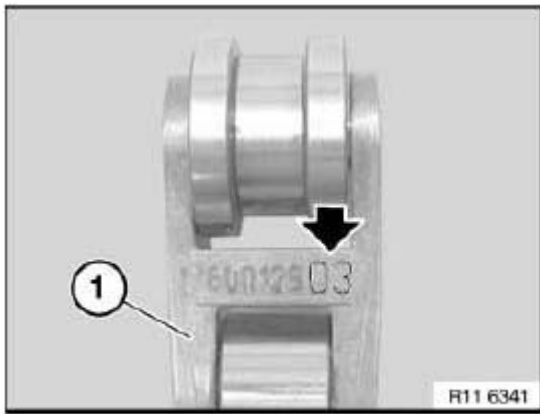
Clean if necessary.



**Fig. 246: Identifying Intermediate Levers And Contact Surfaces**  
**Courtesy of BMW OF NORTH AMERICA, INC.**

All intermediate levers (1) are classified.

Reinstall intermediate levers which have already been used in the same positions.

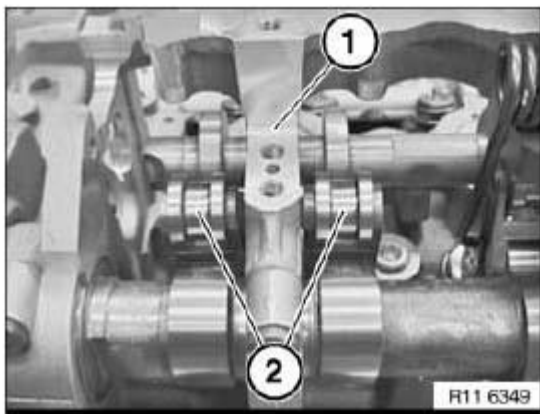


**Fig. 247: Identifying Intermediate Levers Classification Numbers**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Before reinstalling the intermediate levers, make sure the roller cam followers are correctly positioned (**risk of damage**).

Install intermediate levers (2).



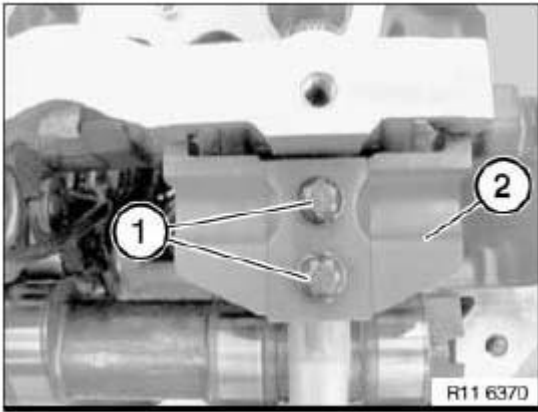
**Fig. 248: Identifying Intermediate Levers**  
Courtesy of BMW OF NORTH AMERICA, INC.

Fit guide block (2) cleanly into opening.

Tighten bolts (1) hand-tight.

Check both intermediate levers again to ensure correct installation position.

Release bolts (1) again by a 1/4 turn.



**Fig. 249: Identifying Guide Blocks And Bolts**  
Courtesy of BMW OF NORTH AMERICA, INC.

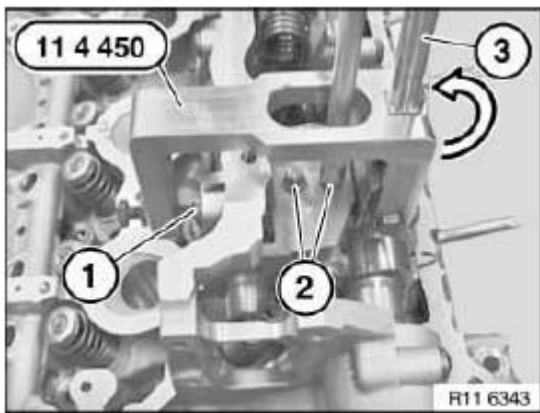
Secure special tool 11 4 450 to bolt connection (1) of eccentric shaft.

Turn eccentric lever (3) on special tool 11 4 450 in direction of arrow.

Guide block is now tensioned.

Secure bolts (2).

For tightening torque refer to 11 37 1AZ in **11 37 VARIABLE VALVE GEAR (N52)** .



**Fig. 250: Identifying Special Tool (11 4 450), Eccentric Lever, Bolt And Bolt Connection**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

At cylinder no. 3, the guide block can be pre-installed with one bolt (2) only.

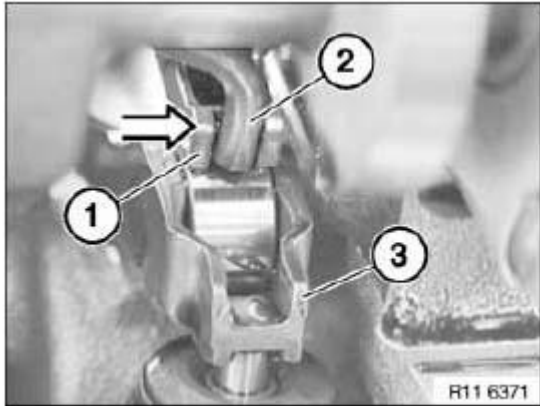
Fit oil pump only after retaining spring has been fitted.

Fit return spring on guide block.

*Installation:*

Insert return spring (2) in intermediate lever (1).

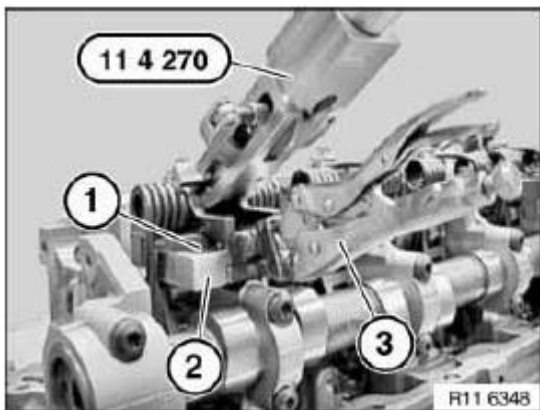
Check roller cam follow (3) again to ensure correct installation position.



**Fig. 251: Identifying Roller Cam Follow, Return Spring And Intermediate Lever**  
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 270 with gripping pliers (3) to guide block (1).

**IMPORTANT:** Special tool 11 4 270 is only secured to guide block.  
Adjusting the gripping pliers (3) is not permitted (risk of damage) on special tool 11 4 270.



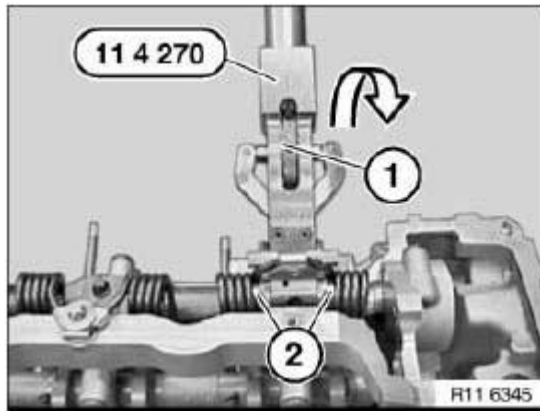
**Fig. 252: Identifying Special Tool (11 4 270) And Guide Block**  
Courtesy of BMW OF NORTH AMERICA, INC.

**WARNING:** Risk of injury in event of incorrect use.

**IMPORTANT: Incorrect handling risk of damage.**

Secure both bearing pins (2) in return spring with knurled screw (1) on special tool 11 4 270.

**IMPORTANT: Check return spring again on intermediate lever to ensure correct installation position.**



**Fig. 253: Identifying Special Tool (11 4 270), Bearing Pins And Knurled Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

Press special tool 11 4 270 in direction of arrow as far as it will go.

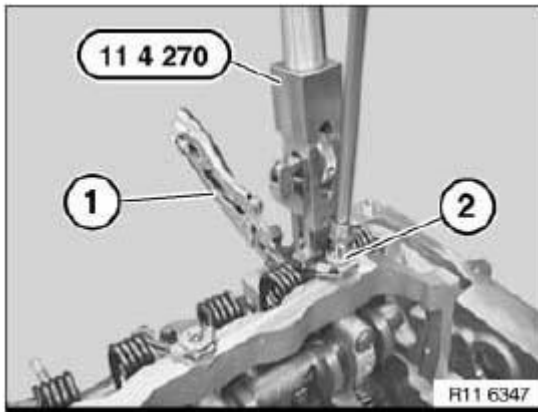
Insert steel screw (2).

To avoid jamming with screw (2) and return spring, it is necessary when inserting screw (2) to increase the pretension on special tool 11 4 270 uniformly.

**IMPORTANT: Risk of damage to cylinder head thread.**

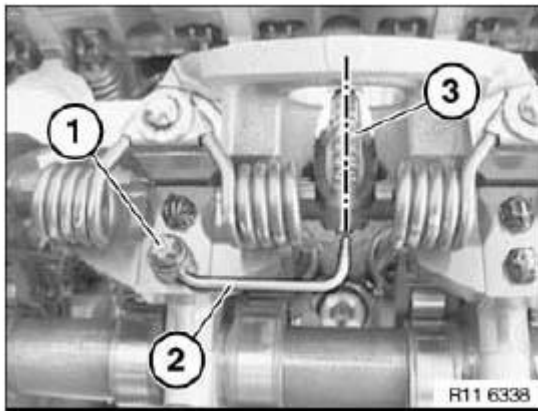
For tightening torque refer to 11 37 2AZ in 11 37 VARIABLE VALVE GEAR (N52) .

Remove special tool 11 4 270.



**Fig. 254: Identifying Special Tool (11 4 270) And Steel Screw**  
 Courtesy of BMW OF NORTH AMERICA, INC.

At cylinder no. 3, adjust oil nozzle (2) exactly so that oil spray (3) points precisely towards spline teeth.



**Fig. 255: Identifying Oil Spray And Oil Nozzle**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

### **11 37 020 REMOVING AND INSTALLING/REPLACING POSITIONING MOTOR FOR ECCENTRIC SHAFT (N52)**

**IMPORTANT: Aluminium-magnesium materials.**

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

**A magnesium crankcase requires aluminium screws/bolts exclusively.**

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

The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.

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

*Necessary preliminary tasks:*

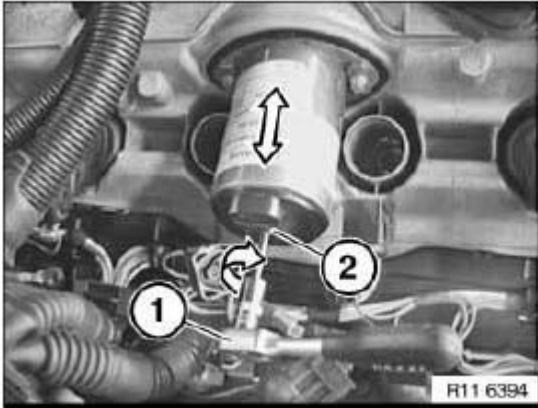
- Remove Acoustic Cover.
- Unfasten ignition wiring harness and lay to one side.
- Remove the two rod-type ignition coils next to electric motor.

**IMPORTANT:** The screw connection must not be released before the servodrive is in the service position.

**Risk of damage to intermediate shaft.**

Turn ratchet (1) with Allen key (2) clockwise in direction of arrow and relieve tension on intermediate shaft.

**NOTE:** Do not turn shaft (2) too far.



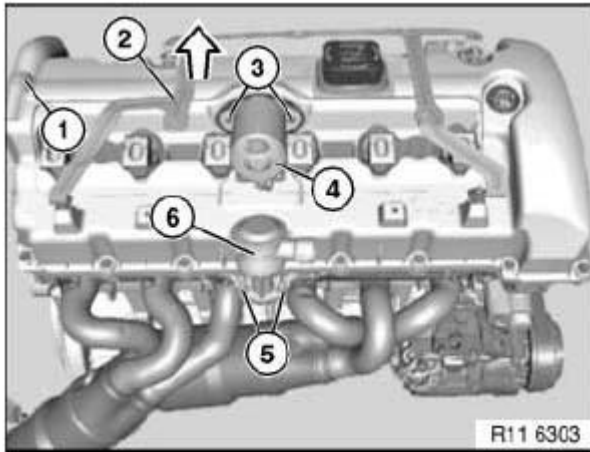
**Fig. 256: Turning Ratchet And Allen Key**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (3).

For tightening torque refer to 11 12 5AZ in 11 12 CYLINDER HEAD WITH COVER (N52) .

**NOTE:** Screw (4) is under servodrive.

Release screw (4).



**Fig. 257: Identifying Intermediate And Servodrive Mounting Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

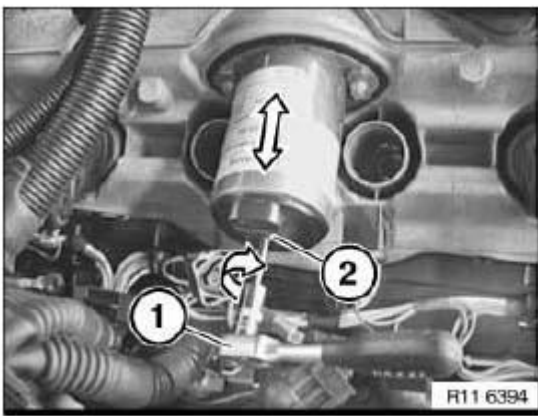
Turn servodrive with screw (2) counterclockwise in direction of arrow.

Servodrive can now be withdrawn in direction of arrow.

*Installation:*

All removed subassemblies are reinstalled in reverse sequence.

Screw in shaft (2) in counterclockwise direction until servodrive rests on flange of cylinder head cover.



**Fig. 258: Turning Servodrive With Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

**11 37 030 REMOVING AND INSTALLING/REPLACING ECCENTRIC SHAFT SENSOR (N52)**

*Necessary preliminary tasks:*

- Remove Cylinder Head Cover.

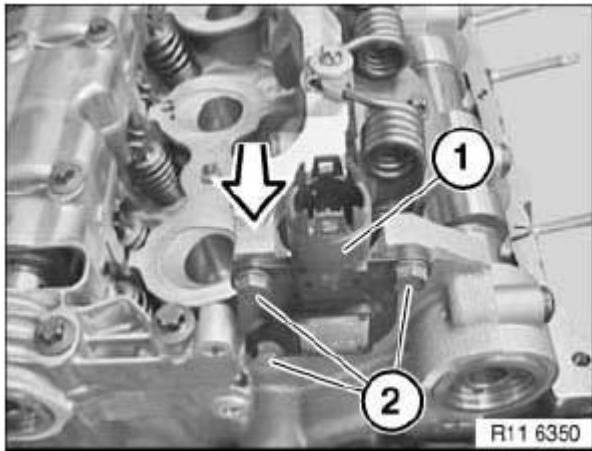
**IMPORTANT:** All bolts are secured against falling out, release bolts (2) on cylinder head only but do not unscrew fully.

**Bolts (2) can fall out.**

**Risk of damage to timing chain drive.**

Release screws (2).

Lift out sensor (1).



**Fig. 259: Identifying Cylinder Head Bolts And Eccentric Shaft Sensor**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** Illustrations show timing chain removed.

Assemble engine.

## 40 OIL SUPPLY

### 11 40 000 CHECKING ENGINE OIL PRESSURE (N52)

**Special tools required:**

- 11 4 050
- 13 3 061
- 13 3 063
- 13 6 051

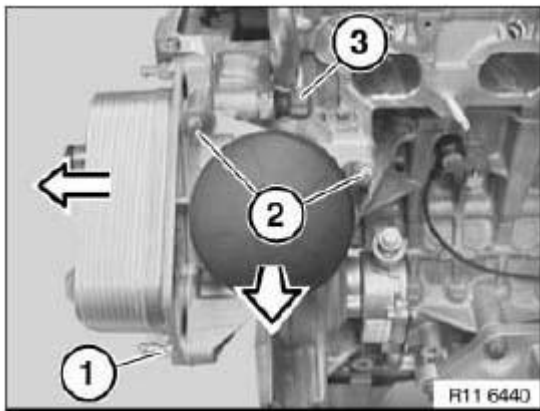
- 13 6 054

*Necessary preliminary tasks:*

- Remove Acoustic Cover.

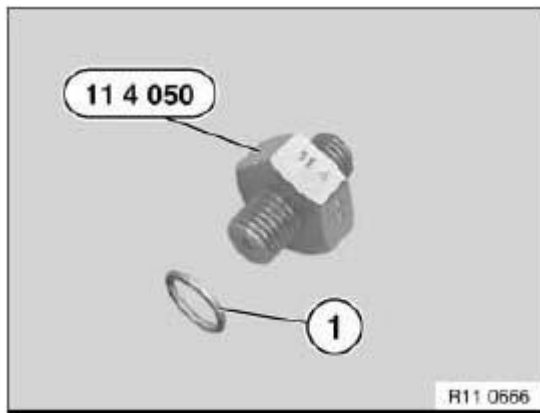
Disconnect plug connection on oil pressure switch (3)

Remove oil pressure switch (3).



**Fig. 260: Identifying Oil Pressure Switch**  
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 11 4 050 with sealing ring.



**Fig. 261: Identifying Special Tool (11 4 050) And Sealing Ring**  
Courtesy of BMW OF NORTH AMERICA, INC.

Check engine oil pressure with diagnosis tester.

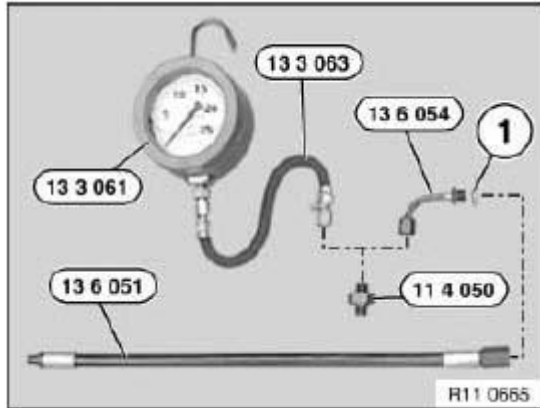
Connect special tools 13 6 054 and 13 6 051.

**Check engine oil pressure with pressure gauge.**

Connect special tools 13 3 063 and 13 3 061.

Start engine and check engine oil pressure.

Specified values. **11 41 OIL PUMP WITH STRAINER AND DRIVE N52 B25**



**Fig. 262: Identifying Special Tools (13 3 063), (13 6 054), (13 6 051), (11 4 050), (13 3 061) And Sealing Ring**

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

**41 OIL PUMP WITH FILTER AND DRIVE****11 41 000 REMOVING AND INSTALLING OIL PUMP (N52)**

*Necessary preliminary tasks:*

- Removing **Oil Pan**.

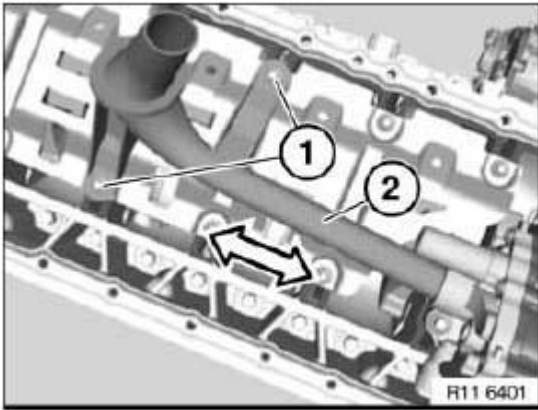
Release screws (1).

For tightening torque refer to 11 41 1AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE (N52)** .

*Installation:*

**Replace aluminium screws.**

Remove intake pipe (2) in direction of arrow.



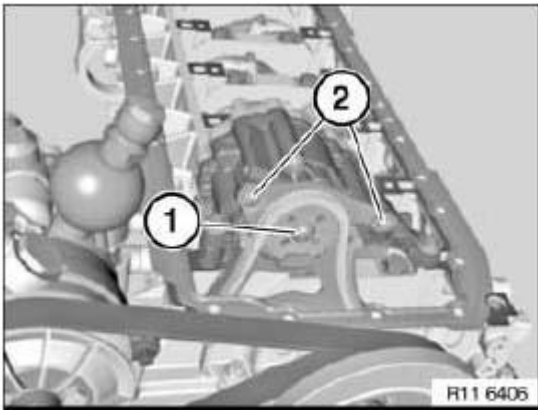
**Fig. 263: Identifying Intake Pipe And Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

For tightening torque refer to 11 41 4AZ in 11 41 OIL PUMP WITH STRAINER AND DRIVE (N52) .

Release screws (2).

For tightening torque refer to 11 41 3AZ in 11 41 OIL PUMP WITH STRAINER AND DRIVE (N52) .



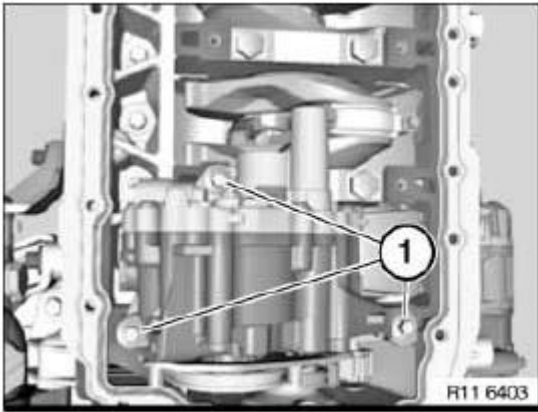
**Fig. 264: Identifying Oil Pump Mounting Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

For tightening torque refer to 11 41 2AZ in 11 41 OIL PUMP WITH STRAINER AND DRIVE (N52) .

*Installation:*

**Replace aluminium screws.**



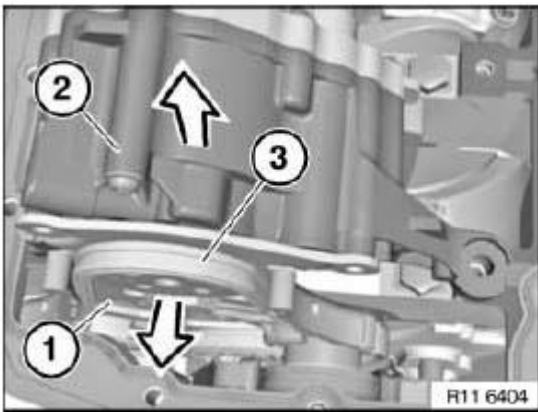
**Fig. 265: Identifying Oil Pump Mounting Screw**  
Courtesy of BMW OF NORTH AMERICA, INC.

Detach sprocket wheel (1) in direction of arrow.

**NOTE:** Timing chain (3) of triangular drive is pressed upwards by chain tensioner.

**Do not remove sprocket wheel.**

Remove oil pump (2) in direction of arrow.

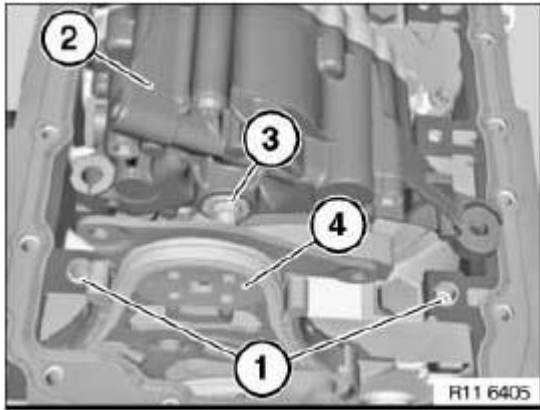


**Fig. 266: Identifying Oil Pump, Timing Chain And Sprocket Wheel**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

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

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



**Fig. 267: Identifying Spacer Bushings, Twin Surfaces And Oil Pump**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

#### **11 41 010 REMOVING AND INSTALLING/REPLACING CHAIN MODULE FOR OIL PUMP/VACUUM PUMP (N52)**

##### **Special tools required:**

- 11 0 290
- 11 0 300
- 11 4 120
- 11 4 280
- 11 4 360
- 11 4 362
- 11 4 440
- 11 5 200
- 11 9 280

##### **IMPORTANT: Aluminium-magnesium materials.**

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

**A magnesium crankcase requires aluminium screws/bolts exclusively.**

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

**The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.**

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

*Necessary preliminary tasks:*

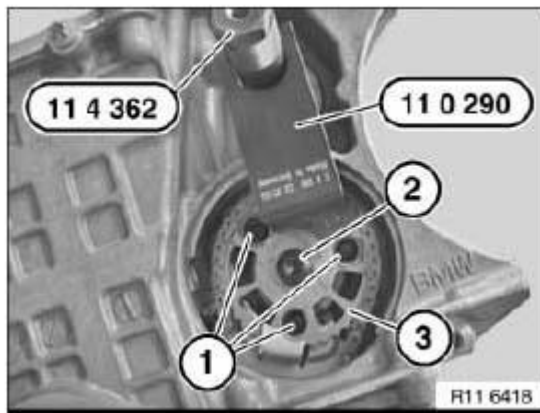
- Remove **Cylinder Head Cover**.
- Remove **Engine Oil Sump**.
- Remove **Drive Belt**.
- Remove **Tensioner** for drive belt.
- Remove **Vibration Damper** at front.
- Remove **Sealing Cover** for vacuum pump.

Turn sprocket wheel (3) at central bolt (crankshaft) into position.

Secure special tool 11 0 290 to sprocket wheel (3) and special tool 11 4 362.

Release screw (2).

For tightening torque refer to 11 66 2AZ in **11 66 VACUUM PUMP (N52)** .



**Fig. 268: Identifying Special Tool (11 0 290), (11 4 362), Crankshaft Sprocket Wheel And Mounting Screw**

Courtesy of BMW OF NORTH AMERICA, INC.

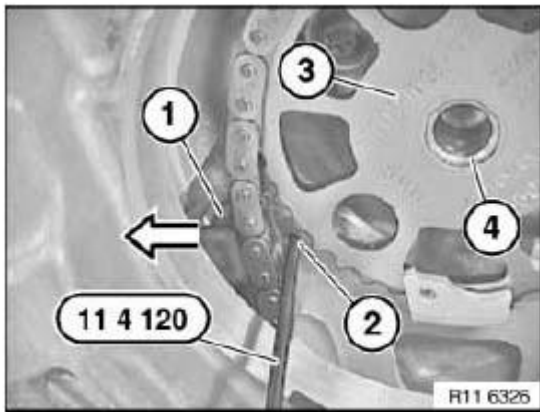
Press timing chain with chain tensioner (1) in direction of arrow.

Disconnect timing chain with special tool 11 4 120.

Feed out sprocket wheel (3) at hexagon head of vacuum pump (4).

*Installation:*

A lock pin is pre-installed if the triangular drive is replaced.



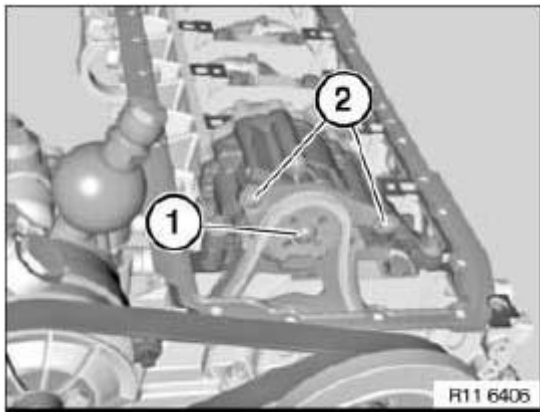
**Fig. 269: Identifying Special Tool (11 4 120), Sprocket Wheel, Chain Tensioner And Vacuum Pump**  
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1) on sprocket wheel.

For tightening torque refer to 11 41 4AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE (N52)** .

Release bolts (2).

For tightening torque refer to 11 41 3AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE (N52)** .



**Fig. 270: Identifying Bolt On Sprocket Wheel**  
Courtesy of BMW OF NORTH AMERICA, INC.

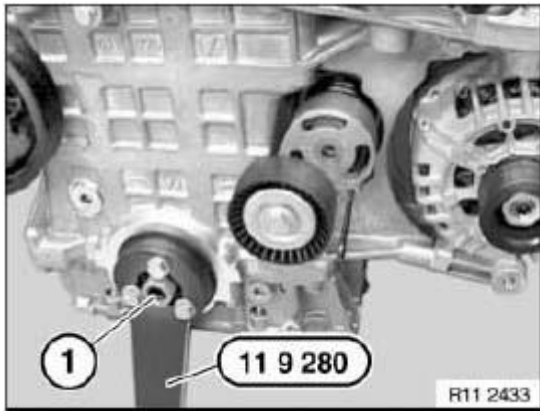
Secure **Crankshaft And Camshaft**.

Do **not** remove special tools 11 0 300 and 11 4 280.

Fit special tool 11 9 280.

Release central bolt (1).

**NOTE:** A second person is required.

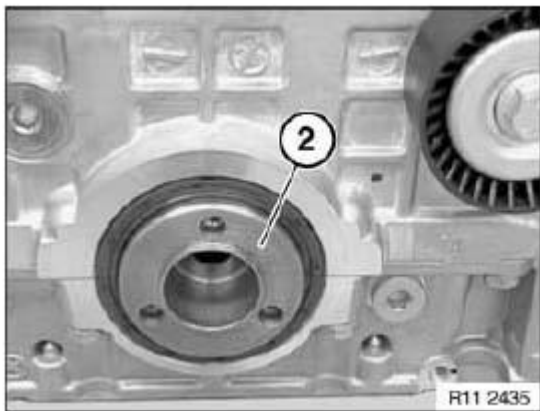


**Fig. 271: Identifying Special Tool (11 9 280) And Central Bolt**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove hub (2) towards front.

*Installation:*

Replace **Radial Seal** at front.



**Fig. 272: Identifying Radial Seal Hub**  
Courtesy of BMW OF NORTH AMERICA, INC.

Open screw plug on bedplate.

*Installation:*

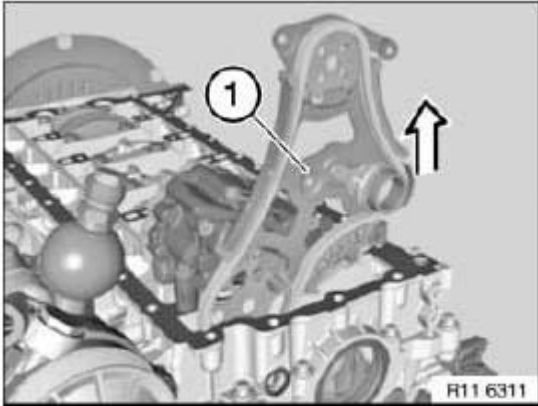
Replace seal.

Release bolt on triangular drive.

For tightening torque refer to 11 41 3AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE (N52)** .

*Installation:*

**Replace aluminium screws.**



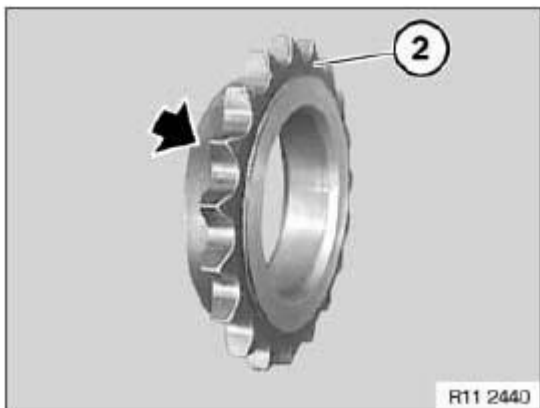
**Fig. 273: Identifying Triangular Drive**  
Courtesy of BMW OF NORTH AMERICA, INC.

Remove triangular drive (1) in direction of arrow.

**IMPORTANT:** Note installation direction of sprocket wheel (2).

**Collar on sprocket wheel (2) points to timing chain drive.**

**Incorrect assembly will result in engine damage.**



**Fig. 274: Identifying Collar On Sprocket Wheel**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** Procedure if engine is mounted on special tool 11 4 440.

Release screw (1).

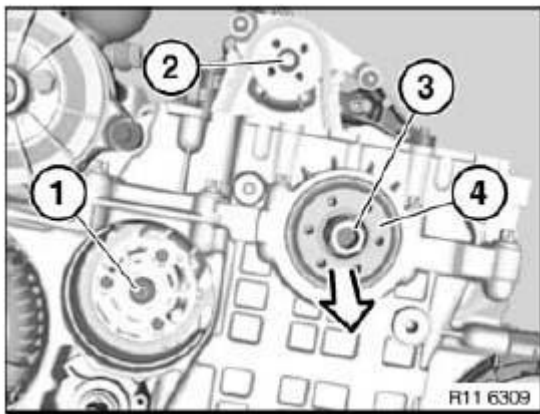
For tightening torque refer to 11 66 2AZ in **11 66 VACUUM PUMP (N52)** .

Release screw (2).

For tightening torque refer to 11 41 3AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE (N52)** .

Release screw (3).

For tightening torque refer to 11 21 1AZ in **11 21 CRANKSHAFT AND BEARINGS (N52)** .



**Fig. 275: Identifying Engine Screws And Hub**  
Courtesy of BMW OF NORTH AMERICA, INC.

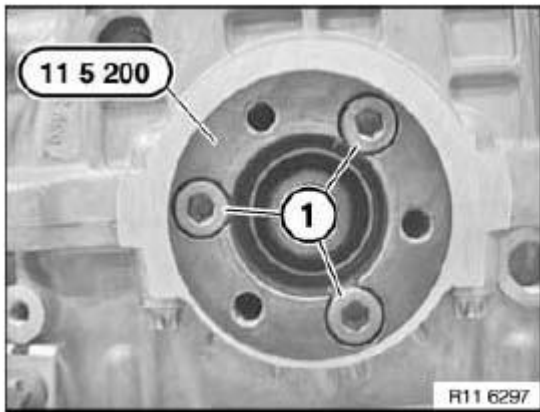
*Installation:*

Mark screw (3) with a coloured spot.

Remove hub (4) towards front.

Tighten down special tool 11 5 200 with screws (1) to hub.

Do **not** remove special tools 11 0 300 and 11 4 280.



**Fig. 276: Identifying Special Tool (11 5 200)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Remove **Belt Tensioner**.

Screw in special tool 11 4 360.

Mount special tool 11 9 280 on 11 5 200.

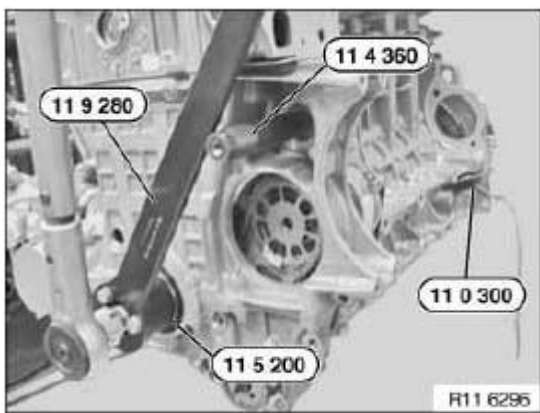
Support special tool 11 9 280 on special tool 11 4 360.

Special tool 11 0 300 secures crankshaft.

Tighten central bolt (1) to jointing torque.

For tightening torque refer to 11 21 1AZ in **11 21 CRANKSHAFT AND BEARINGS (N52)** .

Mark central bolt and hub with paint.

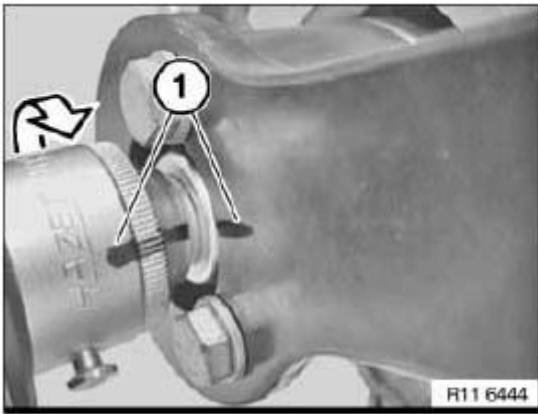


**Fig. 277: Identifying Special Tool (11 9 280), (11 5 200), (11 0 300) And (11 4 360)**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Apply stroke of paint (1) for torsion angle tightening to tool.

See **Fig. 278**.

**IMPORTANT:** Do not remove tool from central bolt during torsion angle tightening - *risk of damage*.



**Fig. 278: Identifying Stroke Of Paint For Torsion Angle Tightening**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Replace **Radial Seal** at front.

Assemble engine.

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

**IMPORTANT:** Aluminium-magnesium materials.

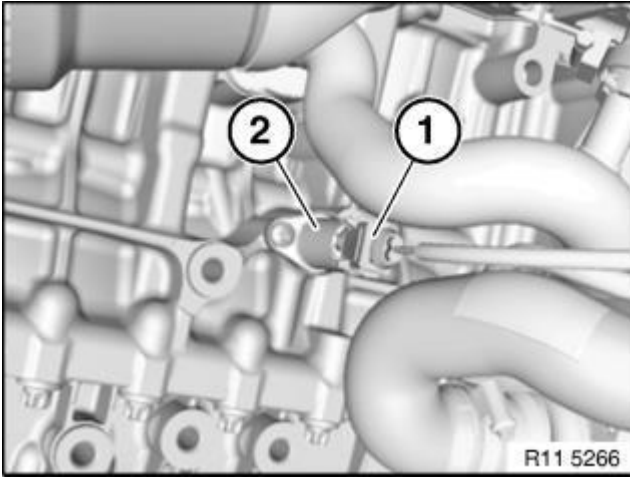
- No steel screws/bolts may be used due to the threat of electrochemical corrosion.
- A magnesium crankcase requires aluminium screws/bolts exclusively.
- Aluminium screws/bolts must be replaced each time they are released .
- Aluminium screws/bolts are permitted with and without colour coding (blue).
- For reliable identification: Aluminium screws/bolts are not magnetic
- Jointing torque and angle of rotation must be observed without fail (risk of damage) .

*Necessary preliminary tasks:*

- Have a cleaning cloth ready to catch escaping oil

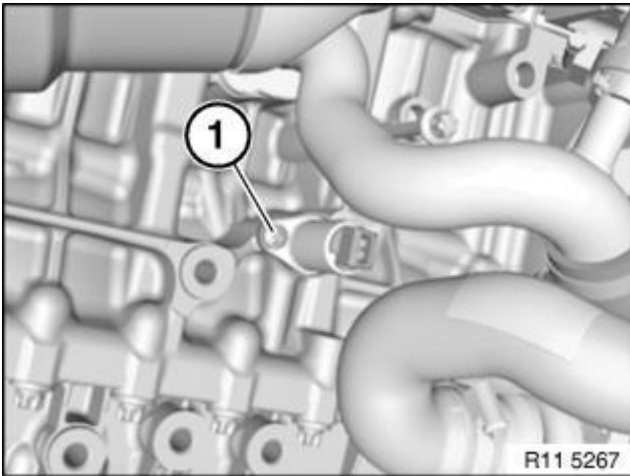
- Remove front underbody protection. See **51 47 490 REMOVING AND INSTALLING / REPLACING FRONT UNDERBODY PROTECTION** .

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



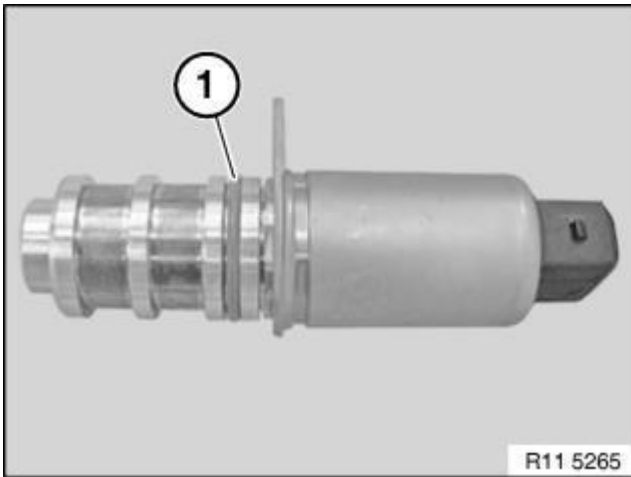
**Fig. 279: Detach Plug (1) From Hydraulic Valve (2)**  
Courtesy of BMW OF NORTH AMERICA, INC.

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



**Fig. 280: Release Screw (1) And Remove Hydraulic Valve (2)**  
Courtesy of BMW OF NORTH AMERICA, INC.

Replace O-ring (1).



**Fig. 281: Replace O-Ring (1)**

Courtesy of BMW OF NORTH AMERICA, INC.

## 42 OIL FILTER AND LINES

### 11 42 020 REMOVING AND INSTALLING/REPLACING FULL-FLOW OIL FILTER (N52)

**WARNING: Danger of scalding!**

**Only perform these tasks on an engine that has cooled down.**

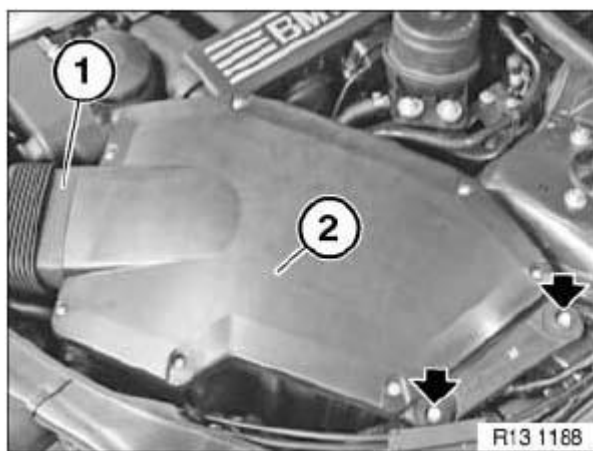
*Recycling:*

Catch and dispose of drained coolant.

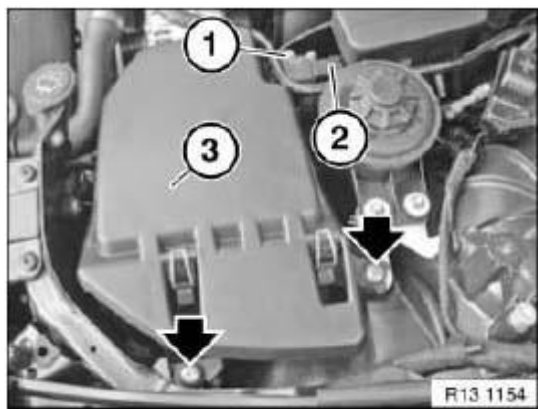
Observe country-specific waste-disposal regulations.

*Necessary preliminary tasks:*

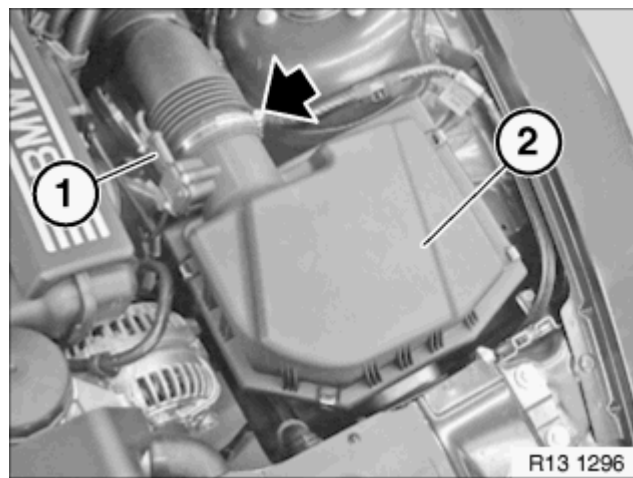
- Drain **Coolant** .
- If necessary, remove air filter housing. On 3-Series, detach air intake hose (1) and remove Intake filter housing (2). On 5-Series, release clamp (1) and detach air intake hose. Unlock plug (2) and remove. Unfasten screws. Remove intake filter housing (3) towards top. On Z4, Unlock plug (1) and remove. Release clamp and detach air intake hose. Detach intake filter housing (2) from bearing pins of rubber mounts and from intake duct and remove.



**Fig. 282: Identifying Filter Housing And Air Intake Hose (3-Series)**  
Courtesy of BMW OF NORTH AMERICA, INC.



**Fig. 283: Identifying Plug And Filter Housing (5-Series)**



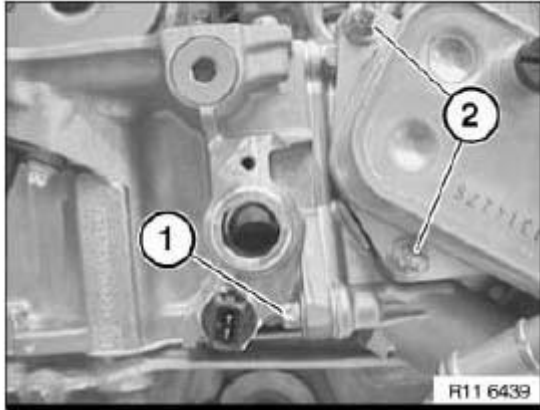
**Fig. 284: Removing Air Filter Housing (Z4)**

- Unfasten oil filter cover.

- Protect drive belt against dirt.

Release screw (1).

For tightening torque refer to 11 42 2AZ in **11 42 OIL FILTER AND PIPES (N52)** .



**Fig. 285: Identifying Screw (1 Of 2)**

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (2).

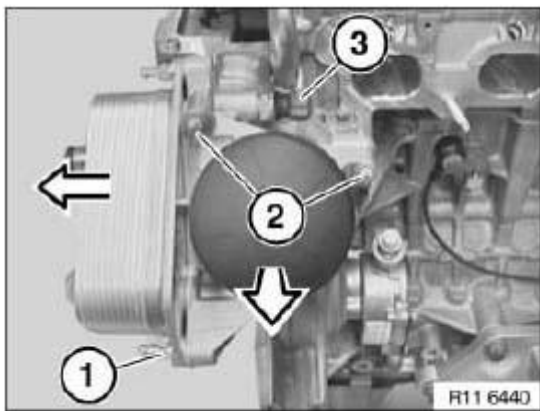
**NOTE:** Have cleaning cloth ready to catch residual oil.

For tightening torque refer to 11 42 2AZ in **11 42 OIL FILTER AND PIPES (N52)** .

*Installation:*

Replace all seals.

If necessary, replace filter element.



**Fig. 286: Identifying Oil Filter Mounting Screw**

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

**NOTE:** Protect drive belt against dirt.

*Installation:*

Venting instructions must be observed without fail.

## 44 OIL COOLER

### 11 44 000 REMOVING AND INSTALLING/REPLACING OIL-WATER HEAT EXCHANGER (N52)

**WARNING:** Danger of scalding!

**Only perform these tasks on an engine that has cooled down.**

*Recycling:*

Catch and dispose of drained coolant.

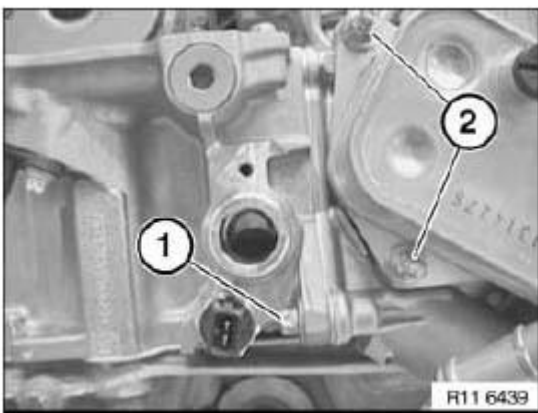
Observe country-specific waste-disposal regulations.

*Necessary preliminary tasks:*

- Detach coolant hoses.
- Pull off protective cap.

Release screws (2).

For tightening torque refer to 11 42 3AZ in 11 42 OIL FILTER AND PIPES (N52) .



**Fig. 287: Identifying Screw (1 Of 2)**

Courtesy of BMW OF NORTH AMERICA, INC.

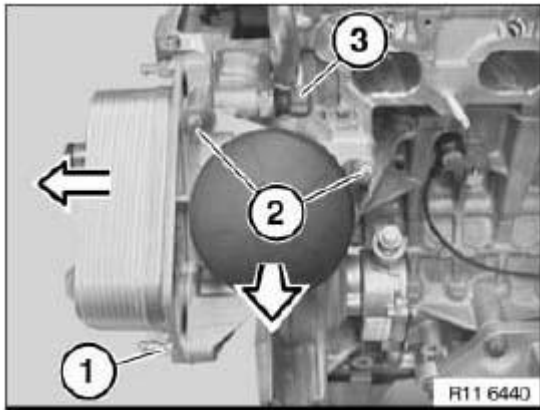
Release screw (1).

For tightening torque refer to 11 42 3AZ in **11 42 OIL FILTER AND PIPES (N52)** .

Remove heat exchanger in direction of arrow.

*Installation:*

Replace all seals.

**Fig. 288: Identifying Screw (2 Of 2)**

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

*Installation:*

**Venting Instructions** must be observed without fail.

Fill **Cooling System**.

## **51 WATER PUMP WITH DRIVE**

### **11 51 000 REMOVING AND INSTALLING/REPLACING WATER PUMP (N52)**

**WARNING: Danger of scalding!**

Only perform these tasks on an engine that has cooled down.

*Recycling:*

Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

**IMPORTANT: Aluminium-magnesium materials.**

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

**A magnesium crankcase requires aluminium screws/bolts exclusively.**

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

**The end faces of aluminium screws/bolts are painted blue for the purposes of reliable identification.**

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

If a water pump which has already been operated is reused, it must be filled immediately after being removed with coolant (mixture ratio 1:1 / water : coolant).

*Necessary preliminary tasks:*

- Remove **Coolant Thermostat.**

Disconnect water hose (1).

Disconnect plug connection (4).

Release screws (5).

*Installation:*

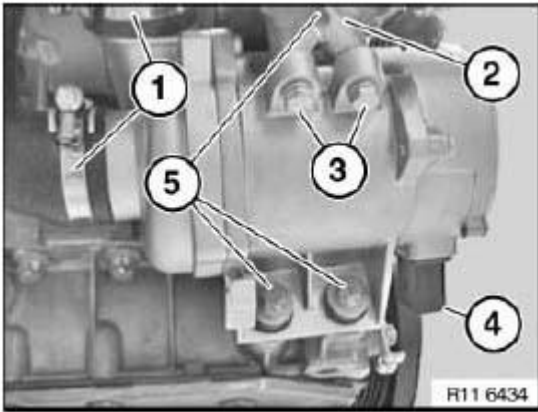
**Replace aluminium screws.**

For tightening torque refer to 11 51 1AZ in **11 51 WATER PUMP AND DRIVE (N52)** .

*Installation:*

If the water pump is to be reused, it must be mechanically rotated once (breakaway torque at impellers).

One water pump rotation will be sufficient.



**Fig. 289: Identifying Water Hose, Plug Connection And Screws**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

**Venting Instructions** must be observed without fail.

## 53 THERMOSTAT AND CONNECTING

### 11 53 000 REMOVING AND INSTALLING/REPLACING COOLANT THERMOSTAT (N52)

**WARNING: Danger of scalding!**

**Only perform these tasks on an engine that has cooled down.**

*Recycling:*

Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

*Necessary preliminary tasks:*

- Remove front splash guard.
- Drain **Coolant** from radiator.

Release hose clamp (1) and detach coolant hose.

Release hose clamp (2) and detach coolant hose.

Unlock and detach coolant hose (3).

Unlock and detach coolant hose (4).

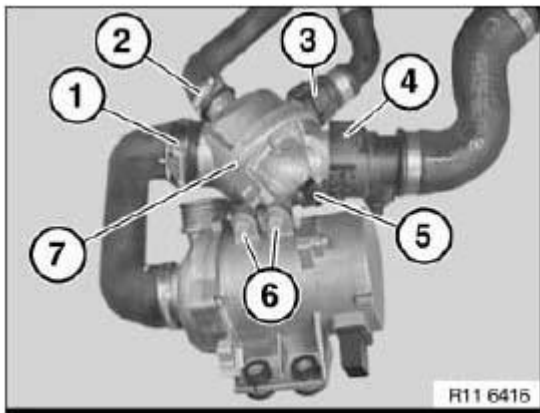
Disconnect plug connection (5).

Release screws (6).

For tightening torque refer to 11 53 1AZ in **11 53 THERMOSTAT AND CONNECTIONS (N52)** .

Remove coolant thermostat (7).

**NOTE:** Illustration shows coolant thermostat removed.



**Fig. 290: Identifying Coolant Thermostat, Hose Clamp, Screws, Plug Connection And Coolant Hose**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

#### **11 53 740 REMOVING AND INSTALLING/REPLACING WATER PIPE (N52)**

**WARNING: Danger of scalding!**

**Only perform these tasks on an engine that has cooled down.**

*Recycling:*

Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

*Necessary preliminary tasks:*

- Remove front splash guard.
- Drain **Coolant** from radiator.

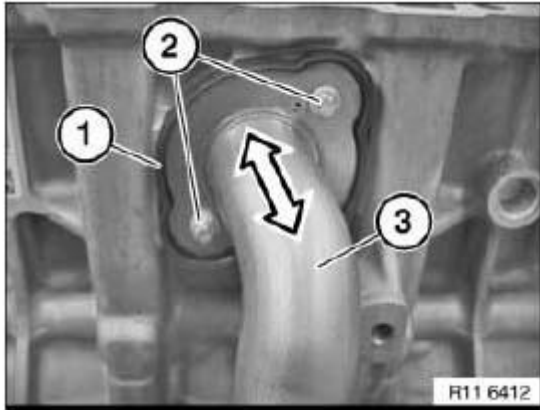
Release screws (2).

For tightening torque refer to 11 53 2AZ in **11 53 THERMOSTAT AND CONNECTIONS (N52)** .

Remove water pipe in direction of arrow.

*Installation:*

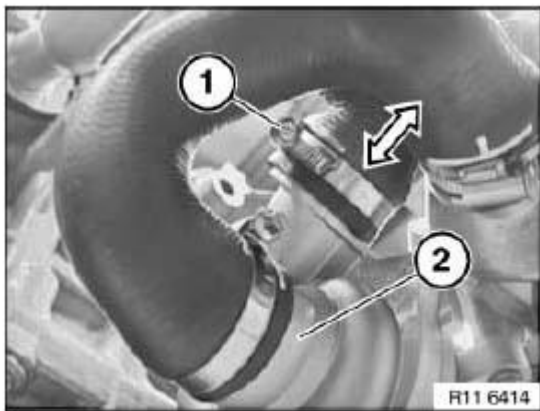
Seal (1) must not show any traces of damage; check and if necessary replace.



**Fig. 291: Identifying Water Pipe Mounting Screws And Seal**  
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten hose clip (1).

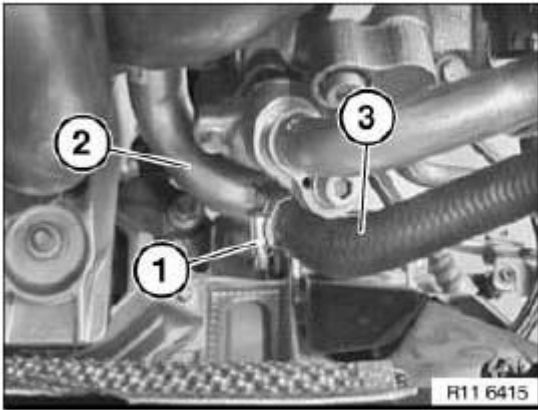
Detach water pipe in direction of arrow from water pump (2).



**Fig. 292: Identifying Water Pipe Hose Clip And Water Pump**  
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten hose clip (1).

Detach water hose (3) from water pipe (2).



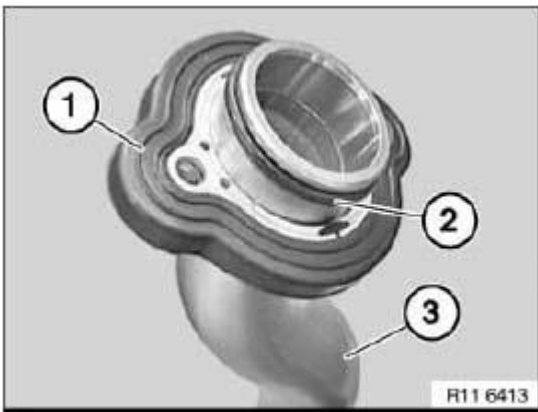
**Fig. 293: Identifying Water Hose, Water Pipe And Hose Clip**  
 Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Replace sealing ring (2).

Sealing lip (1) on water pipe (3) must not show any traces of damage.

If necessary, replace water pipe (2).



**Fig. 294: Identifying Sealing Lip On Water Pipe**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Vent **Cooling System** and check for leaks.

## 61 INTAKE MANIFOLD

### 11 61 050 REMOVING AND INSTALLING INTAKE AIR MANIFOLD (N52)

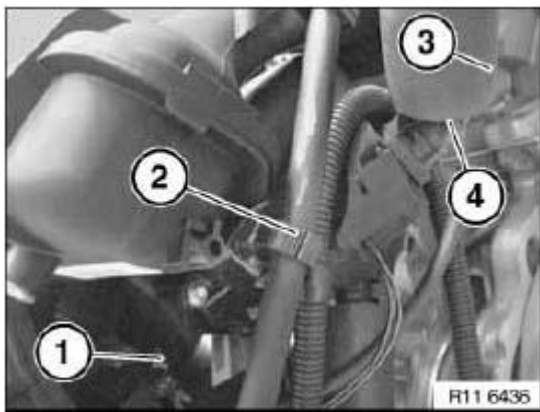
*Necessary preliminary tasks:*

- Remove **Tension Strut.**
- Remove **Suction Filter Housing.**
- Remove **Engine Cover.)**

Open holder (2).

Disconnect plug connection (1) under manifold.

Release both crankcase breathers (3).



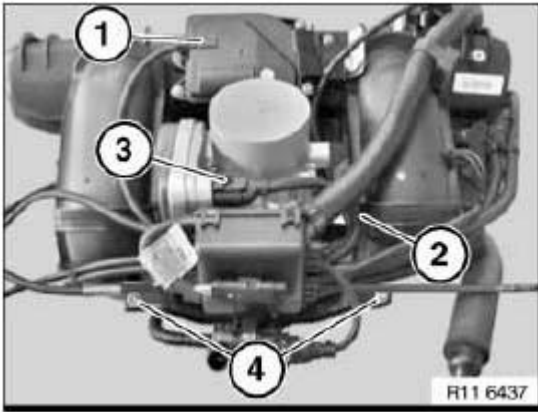
**Fig. 295: Identifying Plug Connection, Crankcase Breathers And Holders**  
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Disconnect plug connection (3).

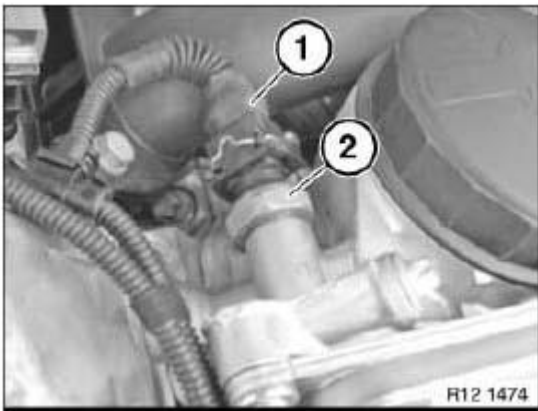
Release screws (4).

Detach engine wiring harness (2) from manifold and lay to one side.



**Fig. 296: Identifying Plug Connection And Engine Wiring Harness**  
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on oil pressure switch.



**Fig. 297: Identifying Plug Connections, Wiring Harness And Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

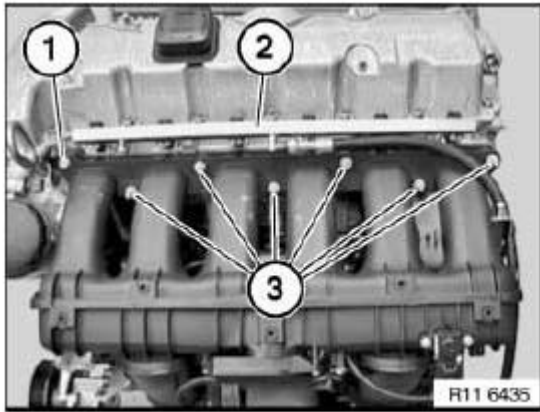
Release fuel rail (2) and lay to one side.

**NOTE:** Do not detach fuel line.

Release screw (1).

Unscrew nuts (3).

For tightening torque refer to 11 61 1AZ in **11 61 INTAKE MANIFOLD (N52)** .

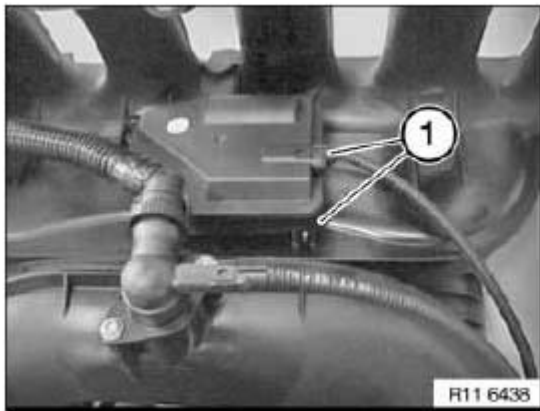


**Fig. 298: Identifying Fuel Rail And Mounting**  
Courtesy of BMW OF NORTH AMERICA, INC.

Raise intake manifold approx. 10 cm.

Disconnect plug connection (1) at bottom.

Release tank vent line behind throttle valve assembly.



**Fig. 299: Identifying Plug Connection At Bottom**  
Courtesy of BMW OF NORTH AMERICA, INC.

*Installation:*

Replace all seals.

Assemble engine.

## 62 EXHAUST MANIFOLD

**11 62 000 REMOVING AND INSTALLING, SEALING/REPLACING BOTH EXHAUST MANIFOLDS (N52)**

*Necessary preliminary tasks:*

- Remove engine splash guard.
- Remove reinforcement plate.
- Remove **Exhaust System**.
- Remove **Monitor Sensor** from cylinders 4 to 6.

Release all nuts (2).

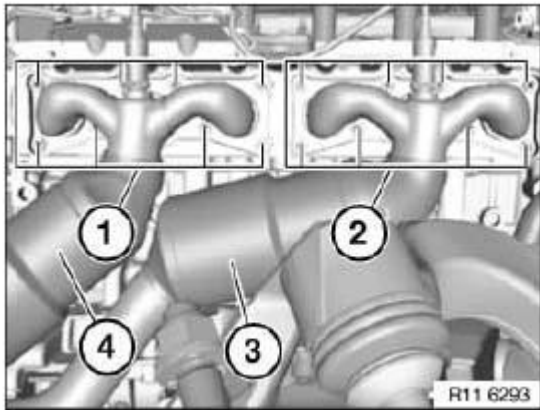
For tightening torque refer to 11 62 1AZ in **61 INTAKE MANIFOLD**.

Feed out exhaust manifold (3) downwards (cylinders 1 to 3)

Release all nuts (1).

For tightening torque refer to 11 62 1AZ in **61 INTAKE MANIFOLD**.

Feed out exhaust manifold (4) downwards (cylinders 4 to 6)



**Fig. 300: Identifying Exhaust Manifold Nuts**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

### **18 40 050 REMOVING AND INSTALLING/REPLACING FRONT EXHAUST MANIFOLD (N52/N52K/N51)**

*Necessary preliminary tasks:*

- Remove **Rear Exhaust Manifold**

**NOTE:** The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.

Remove **Control Sensor** from cylinders 1 to 3.

Remove **Monitor Sensor** from cylinders 1 to 3.

Unscrew nuts.

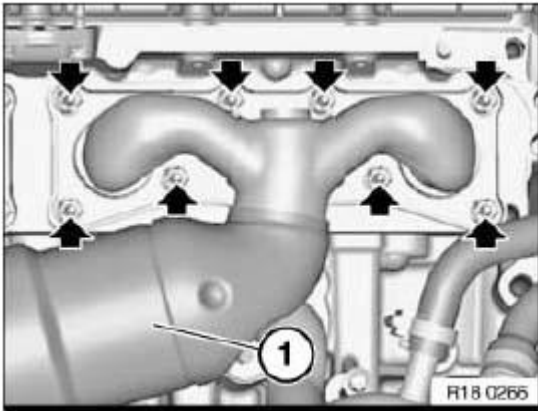
Remove exhaust manifold (1).

*Installation:*

Clean sealing faces and replace seals.

Replace nuts.

For tightening torque refer to 18 40 1AZ in **18 40 EXHAUST MANIFOLD**



**Fig. 301: Identifying Exhaust Manifold**  
Courtesy of BMW OF NORTH AMERICA, INC.

#### **18 40 060 REMOVING AND INSTALLING/REPLACING REAR EXHAUST MANIFOLD (N52/N52K/N51)**

**Necessary preliminary tasks:**

- Remove **Ignition Coil Cover**
- Remove **Coolant Expansion Tank**
- Remove **Underbody Protection**
- Remove complete **Exhaust System**.

**NOTE:** The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.

Remove **Control Sensor** from cylinders 4 to 6.

Remove **Monitor Sensor** from cylinders 4 to 6.

Unscrew nuts.

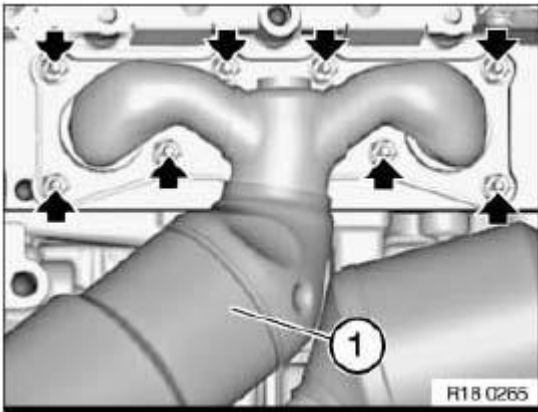
Remove exhaust manifold (1).

*Installation:*

Clean sealing faces and replace seals.

Replace nuts.

For tightening torque refer to 18 40 1AZ **18 40 EXHAUST MANIFOLD**



**Fig. 302: Identifying Exhaust Manifold And Nuts**  
Courtesy of BMW OF NORTH AMERICA, INC.

## 66 VACUUM PUMP

### 11 66 000 REMOVING AND INSTALLING/REPLACING VACUUM PUMP (N52)

**Special tools required:**

- 11 0 290
- 11 4 120
- 11 4 362

*Necessary preliminary tasks:*

- Remove **Drive Belt**.
- Remove **Tensioner** for drive belt.
- Remove **Sealing Cover** for vacuum pump.
- Remove **Intake Air Manifold**.

Rotate crankshaft at central bolt.

Turn sprocket wheel (3) until drilled holes and screws (1) match up.

Screw in special tool 11 4 362.

Secure special tool 11 0 290 in sprocket wheel (3) and to special tool 11 4 362.

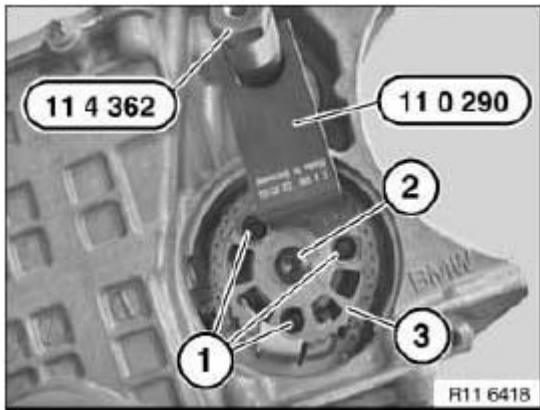
Release screw (2).

For tightening torque refer to 11 66 2AZ in **11 66 VACUUM PUMP (N52)** .

Release screws (1), secure against falling out.

For tightening torque refer to 11 66 1AZ in **11 66 VACUUM PUMP (N52)** .

Remove vacuum pump towards rear.



**Fig. 303: Identifying Special Tool (11 0 290), (11 4 362), Sprocket Wheel And Screws**  
Courtesy of BMW OF NORTH AMERICA, INC.

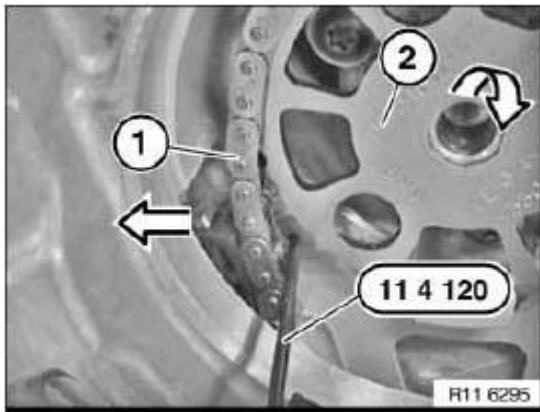
*Installation:*

Replace seal.

Press chain tensioner (1) with chain in direction of arrow.

Insert special tool 11 4 120.

Remove sprocket wheel (2) in direction of arrow.



**Fig. 304: Identifying Special Tool (11 4 120), Chain Tensioner And Sprocket Wheel**  
 Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

## 78 EMISSION CONTROL, OXYGEN SENSOR

### 11 78 513 REMOVING AND INSTALLING/REPLACING BOTH LAMBDA OXYGEN CONTROL SENSORS (N52)

#### Special tools required:

- 11 4 260

**WARNING: Scalding hazard!**

**Only perform these tasks after the exhaust system has cooled down.**

#### *Necessary preliminary tasks:*

- Remove Exhaust System.

#### *Installation:*

If an oxygen sensor is to be reused, only apply a thin and uniform coat of Never Seez Compound to thread.

The part of the oxygen control sensor which projects into the exhaust system branch (sensor ceramic) must not be cleaned or come into contact with lubricant.

Disconnect plug connection for lambda control sensor.

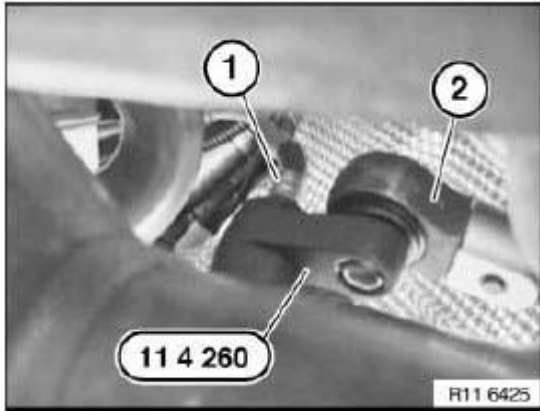
Detach oxygen sensor (1) from cylinders 4 to 6 with special tool 11 4 260.

Oxygen sensor at cylinders 1 to 3 is accessible from above without the exhaust system having to be removed.

Installation:

Cable colour black, cylinders 1 to 3.

Cable colour gray, cylinders 4 to 6.



**Fig. 305: Identifying Special Tool (11 4 260) And Oxygen Sensor**  
Courtesy of BMW OF NORTH AMERICA, INC.

For tightening torque refer to 11 78 1AZ in **11 78 EMISSIONS CONTROL, CONTROL SENSOR / MONITOR SENSOR (N52)** .

Assemble engine.

Check function of DME.

### **11 78 545 REMOVING AND INSTALLING/REPLACING BOTH LAMBDA OXYGEN MONITOR SENSORS (N52)**

**Special tools required:**

- 11 4 260

**WARNING: Scalding hazard!**

**Only perform these tasks after the exhaust system has cooled down.**

*Necessary preliminary tasks:*

- Remove engine splash guard.
- Remove **Exhaust System** .

*Installation:*

If an oxygen sensor is to be reused, only apply a thin and uniform coat of Never Seez Compound to thread.

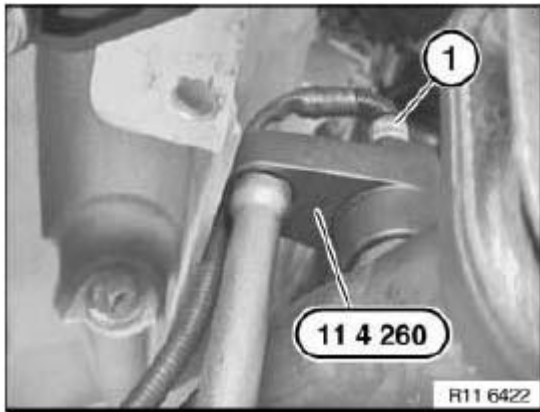
The part of the oxygen monitor sensor which projects into the exhaust system branch (sensor ceramic) must not be cleaned or come into contact with lubricant.

Disconnect plug connection for lambda monitor sensor. Release monitor sensor (1) with special tool 11 4 260.

For tightening torque refer to 11 78 1AZ in **11 78 EMISSIONS CONTROL, CONTROL SENSOR / MONITOR SENSOR (N52)** .

*Installation:*

Cable colour black, cylinders 1 to 3.



**Fig. 306: Identifying Special Tool (11 4 260) And Monitor Sensor**  
Courtesy of BMW OF NORTH AMERICA, INC.

**NOTE:** To remove the monitor sensor for cylinders 4 to 6, it is necessary to remove the exhaust system.

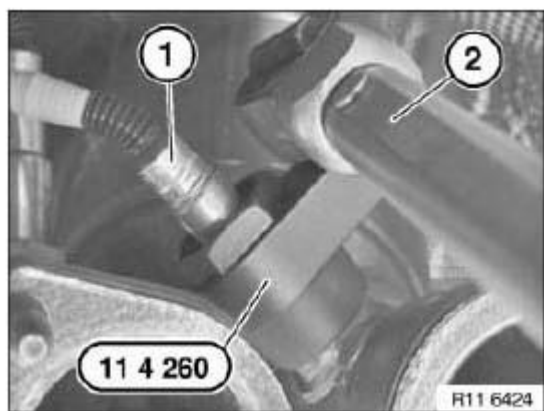
Disconnect plug connection for lambda **Monitor Sensor**.

Release monitor sensor (1) with special tool 11 4 260.

For tightening torque refer to 11 78 1AZ in **11 78 EMISSIONS CONTROL, CONTROL SENSOR / MONITOR SENSOR (N52)** .

*Installation:*

Cable colour gray, cylinders 4 to 6.



**Fig. 307: Identifying Special Tool (11 4 260) And Monitor Sensor**  
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.