# 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!**

**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.

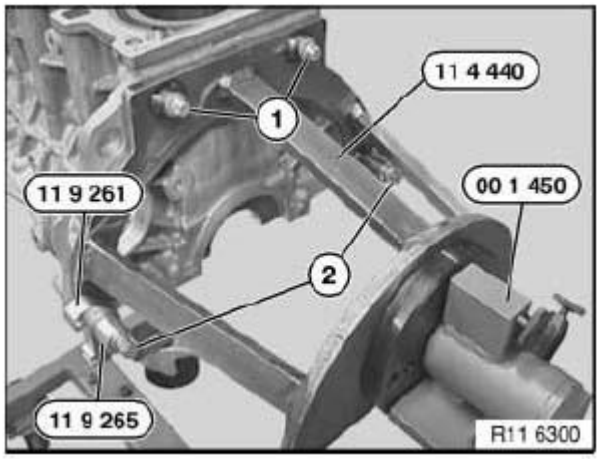


**Fig. 3: Identifying Special Tool (11 9 261), (11 9 265), (11 4 440),(00 1 450), Steel Bolts And Aluminium Bolts**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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.**

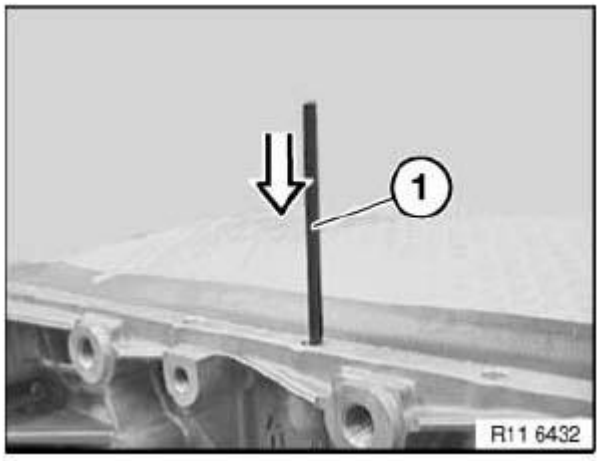


**Fig. 14: Identifying Mounting Mandrel**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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**

*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.**

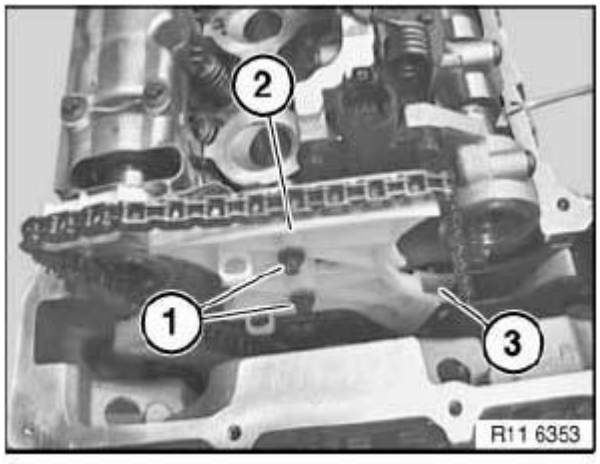


**Fig. 40: Identifying Engine Timing Chain Module, Junction And Screws**

**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.

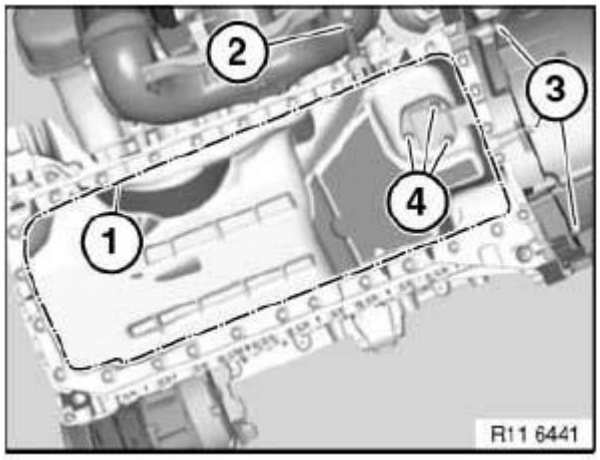


**Fig. 64: Identifying Oil Level Sensor, Return Hose, Retaining Screws And Bolts**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.**

*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.**

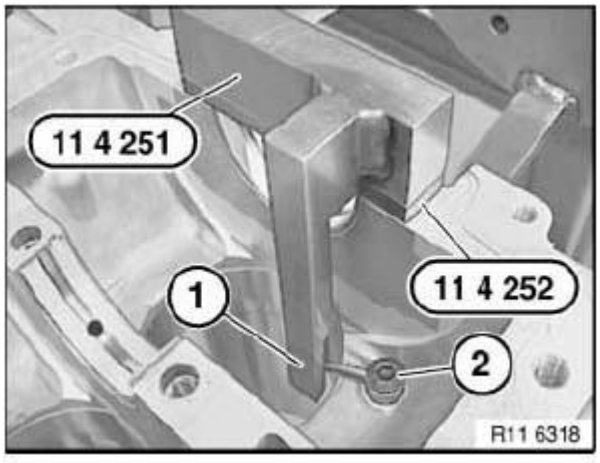


**Fig. 110: Identifying Special Tool (11 4 251) And (11 4 252)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Remove bearing shells (2) and (3).

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

**Observe Bearing Classification.**

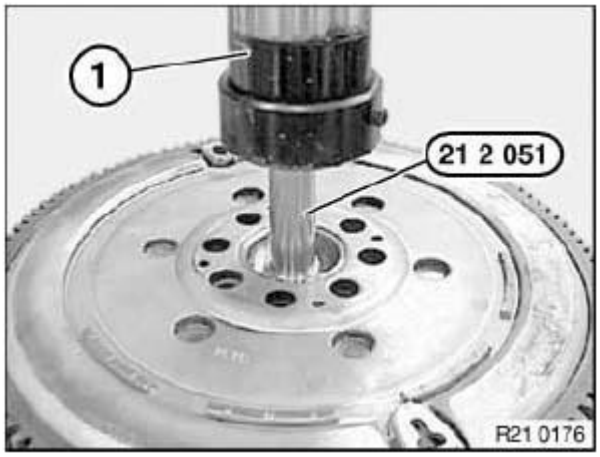


**Fig. 119: Identifying Special Tool (21 2 051) And Hydraulic Press**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.**

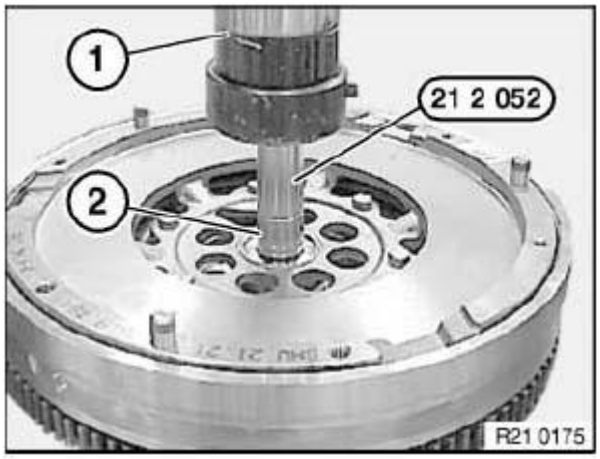


**Fig. 120: Identifying Special Tool (21 2 052), Roller Bearing And Hydraulic Press**
**Courtesy of BMW OF NORTH AMERICA, INC.**

- 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.**

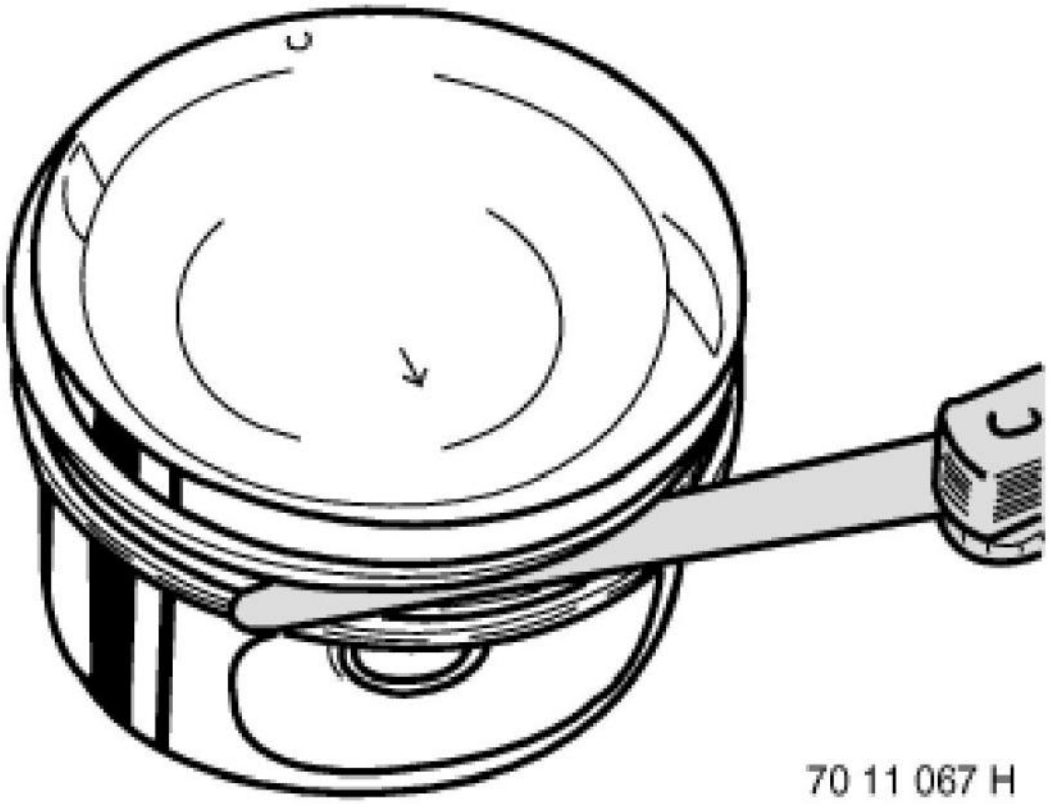


**Fig. 150: Measuring Axial Clearance Of Piston Rings In Piston Ring Groove**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.**

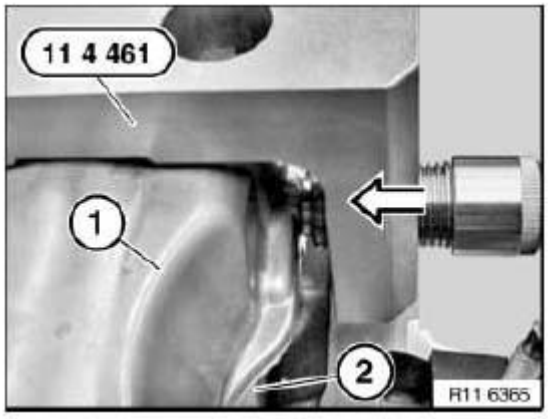


**Fig. 181: Identifying Special Tool (11 4 461), Lower Bearing Bank And Upper Bearing Bank**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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. 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.

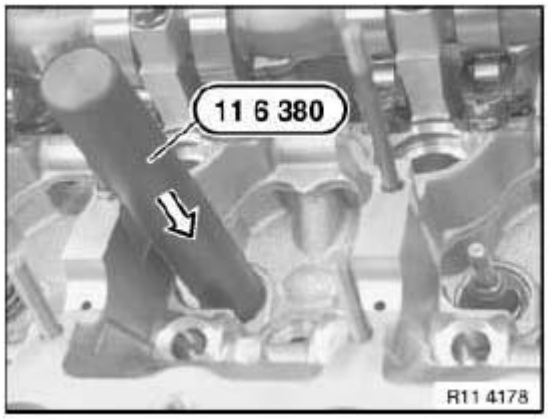


**Fig. 217: Identifying Special Tool (11 6 380)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.

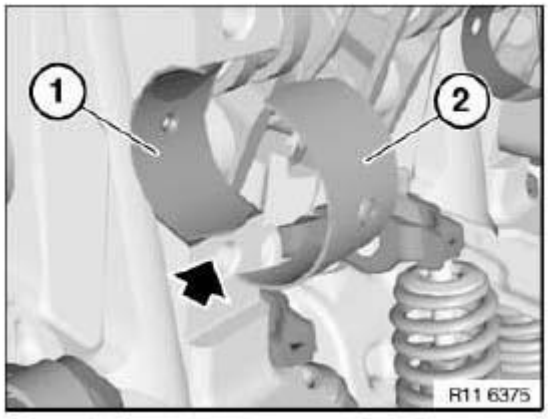


**Fig. 235: Identifying Bearing Shell Installation Orientation**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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)** .

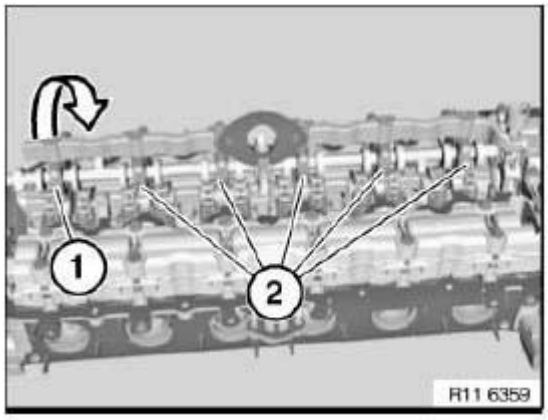


**Fig. 236: Identifying Bearing Caps And Bearing Cap Number**
**Courtesy of BMW OF NORTH AMERICA, INC.**

Assemble engine.

**11 37 010 REMOVING AND INSTALLING/REPLACING INTERMEDIATE LEVERS (N52)**

**Special tools required:**

- 11 4 270
- 11 4 450

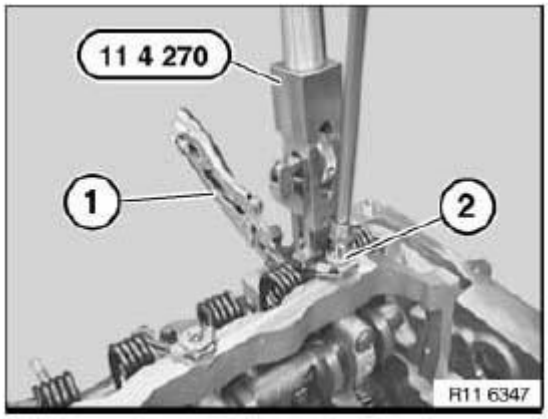


**Fig. 254: Identifying Special Tool (11 4 270) And Steel Screw**
**Courtesy of BMW OF NORTH AMERICA, INC.**

At cylinder no. 3, adjust oil nozzle (2) exactly so that oil spray (3) points precisely towards spline teeth.

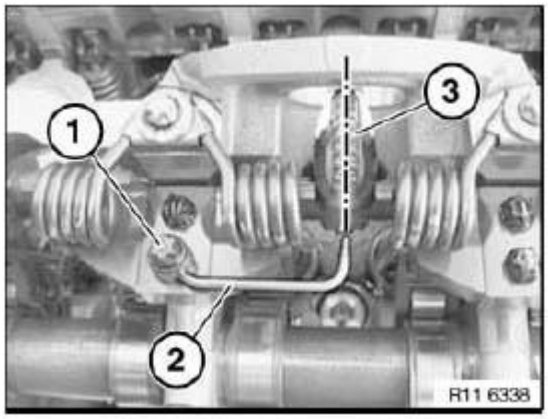


**Fig. 255: Identifying Oil Spray And Oil Nozzle**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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.**

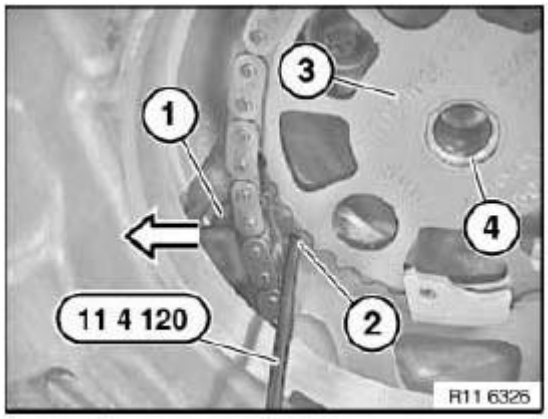


**Fig. 269: Identifying Special Tool (11 4 120), Sprocket Wheel, Chain Tensioner And Vacuum Pump**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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)** .

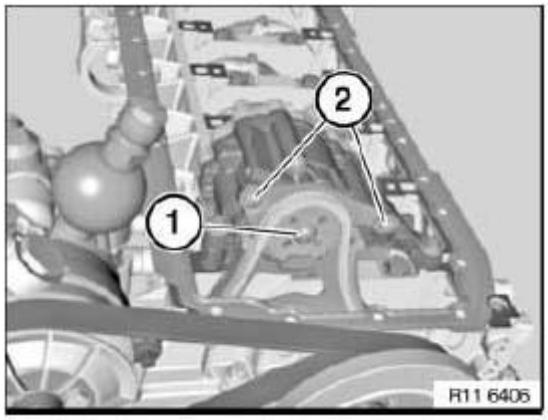


**Fig. 270: Identifying Bolt On Sprocket Wheel**
**Courtesy of BMW OF NORTH AMERICA, INC.**

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).

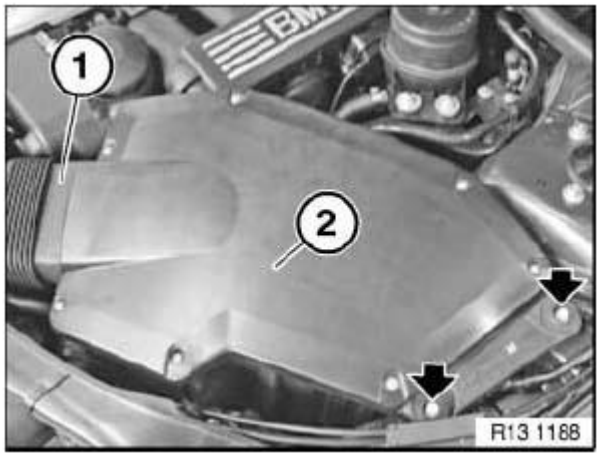


**Fig. 282: Identifying Filter Housing And Air Intake Hose (3-Series)**
**Courtesy of BMW OF NORTH AMERICA, INC.**

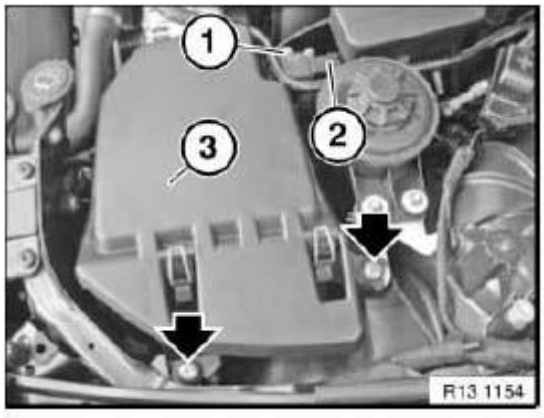


**Fig. 283: Identifying Plug And Filter Housing (5-Series)**

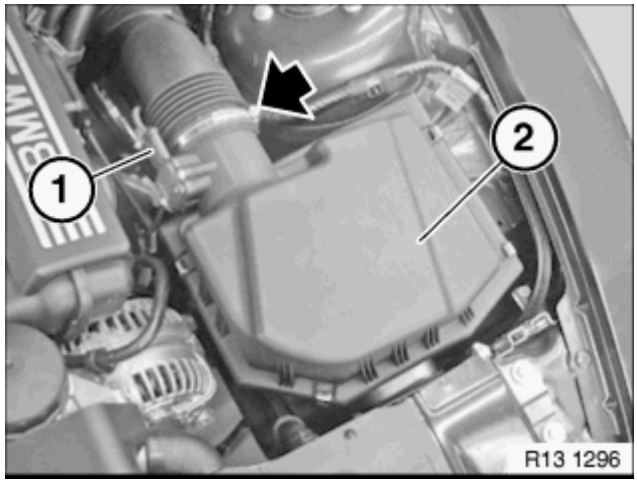


**Fig. 284: Removing Air Filter Housing (Z4)**

- Unfasten oil filter cover.

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.

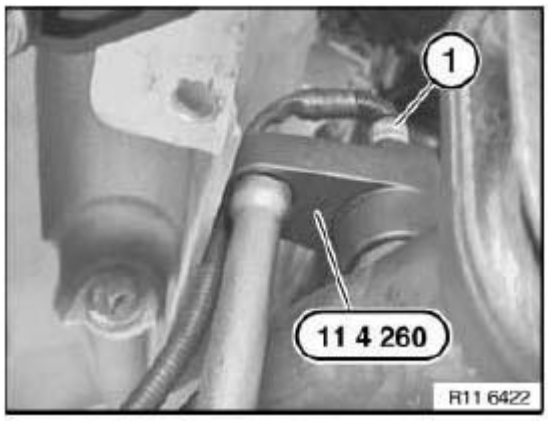


**Fig. 306: Identifying Special Tool (11 4 260) And Monitor Sensor**
**Courtesy of BMW OF NORTH AMERICA, INC.**

**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.