General

This repair group covers lubrication system troubleshooting as well as oil pan removal and oil pump replacement.

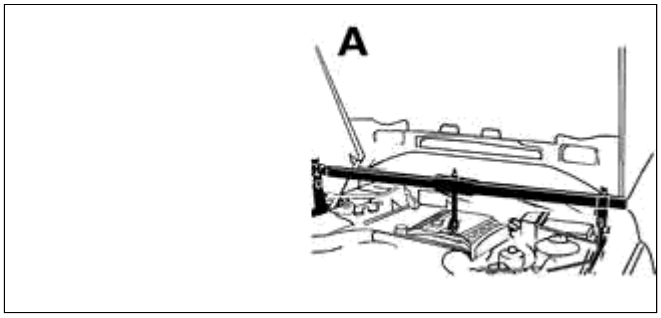
Special tools

The engine needs to be properly supported while the front suspension subframe is removed to access the lubrication system. If BMW special tools 00 0 200 / 00 0 208 are not available, a device to support the weight of the engine from above would be suitable.

A standard oil pressure gauge may be used for measuring oil pressure. If the BMW DIS tester system is to be used, a special adapter is needed.

Note:

Oil change procedure and oil filter replacement are covered in ⇒ 020 Maintenance



- Engine support bracket BMW 00 0 200/00 0 208

- Adapter for BMW oil pressure gauge BMW 11 4 050

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Engine lubrication

Oil pressure is generated by a gear-type pump bolted to the bottom of the engine block. The oil pump is chain driven off the front of the crankshaft.

Oil passages in the cylinder block and cylinder head connect the oil pump to components such as camshafts, crankshaft and valve lifters.

Engine oil capacity (includes filter replacement)	
Rear wheel drive	6.5 liters (6.9 qt.)
All wheel drive	7.5 liters (7.9 qt.)

Troubleshooting

The oil pressure warning system consists of an oil pressure switch mounted in the oil circuit and an instrument panel warning light. Other safety features include:

- Oil level warning system
- A filter bypass to provide lubrication should the oil filter become clogged
- An oil pump pressure relief valve to prevent excessive system pressure

CAUTION!

If the red oil pressure warning light comes on or flashes on while driving, always assume that the oil pressure is low.

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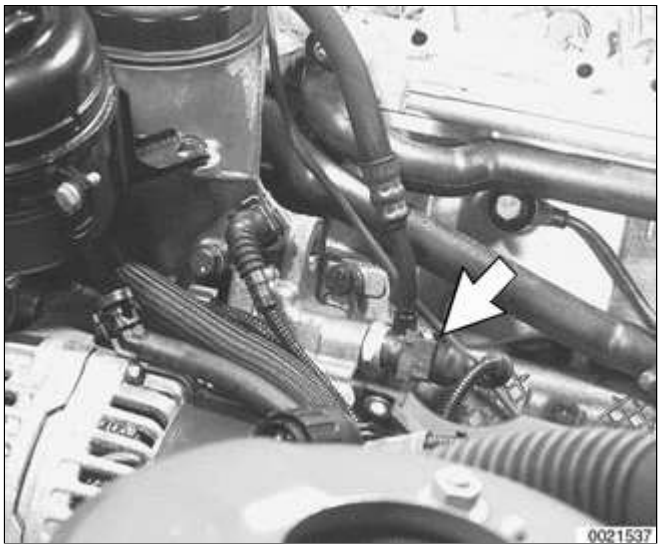
Oil pressure, checking

In some engines access to the oil pressure warning switch port may be extremely restricted.

- Unscrew oil filter cap in order to allow engine oil to drain back down into oil pan.



➢ Disconnect harness connector from oil pressure switch (**arrow**) and remove switch.

CAUTION!

Running the engine with the oil pressure switch disconnected may set a fault code (DTC).

Note:

- *Thoroughly clean around the oil pressure switch before removing it.*
- *Be prepared to catch leaking oil with a shop towel.*

Component location	
Oil pressure switch	base of oil filter housing

- Install pressure gauge in place of switch.
- With gauge installed, start engine and allow to reach operating temperature. Check oil pressure both cold and hot.

Note:

For the most accurate test results, the engine oil and filter should be new. The

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oil should be the correct grade.

Oil pressure	
Idle (minimum)	0.5 bar (7 psi)
Regulated pressure (elevated engine speed)	4.0 bar (59 psi)

- Remove pressure gauge and reinstall pressure switch.

Tightening torque	
Oil pressure switch to oil filter housing	27 Nm (20 ft-lb)

If testing shows low oil pressure, one or more of the following conditions may be indicated:

- Worn or faulty oil pump
- Worn or faulty engine bearings
- Severe engine wear

All of these conditions indicate the need for major repairs.

Oil pressure warning system, testing

When the ignition is turned on, the oil pressure warning light comes on. When the engine is started and the oil pressure rises slightly, the oil pressure switch opens and the warning light goes out. Make sure the oil level is correct before making tests.

- Turn ignition switch on.

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- Warning light on instrument panel must light up.

- Remove connector from oil pressure switch.

- Warning light on instrument panel must go out.

CAUTION!

Running the engine with the oil pressure switch disconnected may set a fault code (DTC).

Note:

If the light does not go out, the wiring to the switch is most likely grounded somewhere between the switch terminal and the warning light. See Electrical Wiring Diagrams at rear of manual for electrical schematics.

- If warning light does not light when ignition is on, remove connector from oil pressure switch and use a jumper wire to ground connector terminal to a clean metal surface.

Note:

If the warning light comes on, check the switch as described in the next step. If the warning light does not come on, the wiring to the instrument cluster or to the light itself is faulty.

- To test switch, connect an ohmmeter between terminal in switch body and ground. With engine off, there should be continuity. With engine running, oil pressure should open switch and there should be no continuity.

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Replace a faulty switch.

CAUTION!

Keep in mind that low oil pressure may be preventing the switch from turning the light out. If the light remains on while the engine is running, check the oil pressure as described earlier. Do not drive the car until the problem is corrected. The engine may be severely damaged.

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Oil Pan

The oil pan removal procedure requires that the engine be supported from above and the front suspension subframe be unbolted and lowered from the chassis.

Oil pan, removing and installing (rear wheel drive models)

- Raise car and place securely on jack stands.

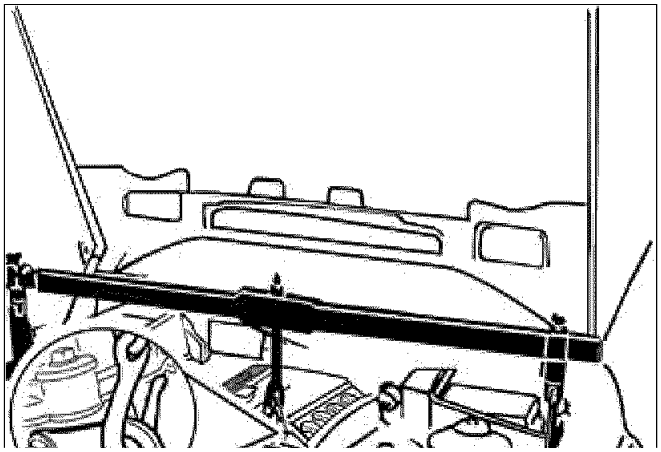
WARNING!

Make sure the car is stable and well supported at all times. Use a professional automotive lift or jack stands designed for the purpose. A floor jack is not adequate support.

- Remove splash shield from under engine.

- Drain engine oil as described in ⇒ 020 Maintenance

- Remove air filter housing complete with mass air flow sensor.



➢ Install engine lifting equipment at front engine lifting point and raise approximately 5 mm (inch) until engine weight is supported.

- On cars with automatic transmission, remove ATF cooler line brackets from oil pan and from transmission.

Note:

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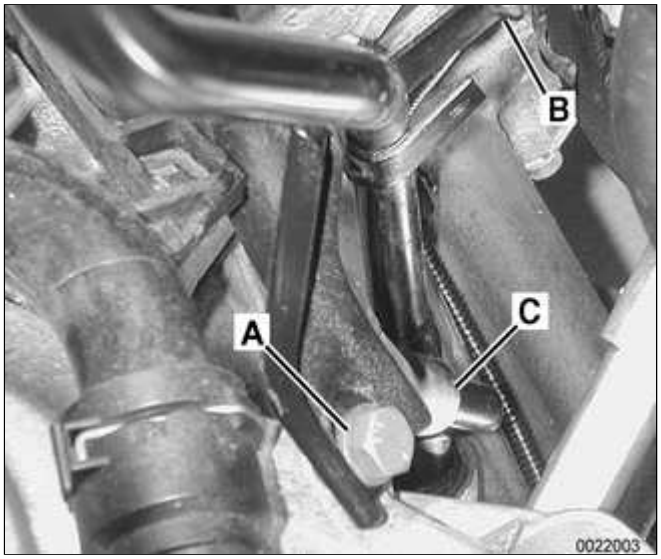
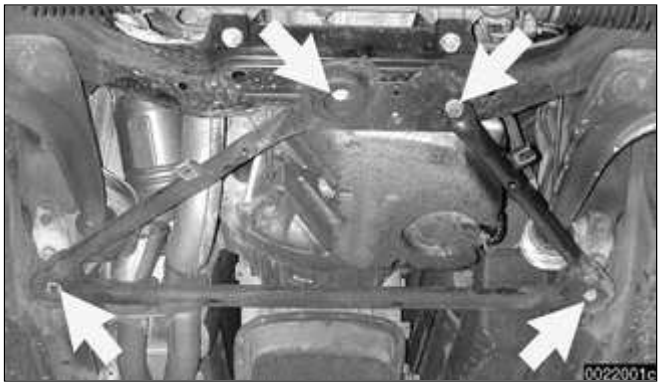
Place drain pan under lines to catch ATF drips.



- Remove oil dipstick guide tube:
  - Detach mounting bolt (**A**) from left engine mounting bracket.
  - Detach fuel lines and wiring harness brackets (**B**).
  - Disconnect oil separator hose (**C**) from base of guide tube and remove tube from oil pan.

Note:

The guide tube is sealed in the block using an O-ring. Check that the O-ring comes out with the tube.



- Working underneath car, remove bolts (**arrow**) and lower reinforcing brace between front suspension subframe and body.

Note:

Reinforcement consists of a triangulated bar for Sedan or Sport Wagon or a reinforced plate for Convertible or Coupe.

- Separate steering column shaft from steering rack at universal joint.

CAUTION!

In order to avoid the need for front-end realignment, do not unbolt power steering rack from suspension subframe.

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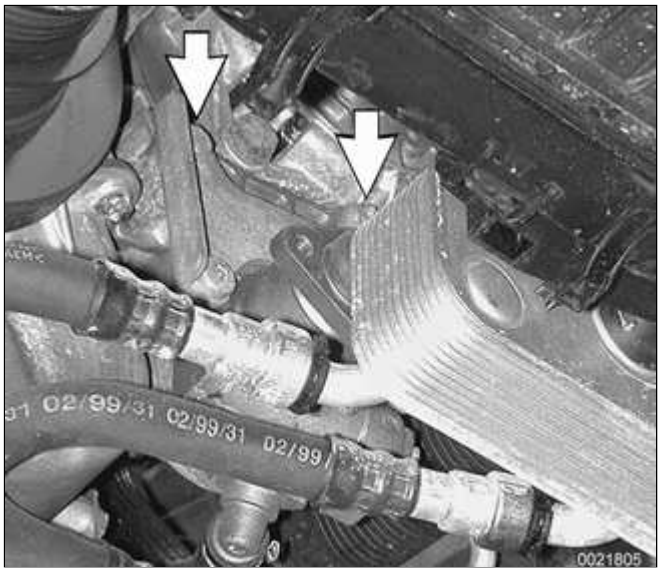
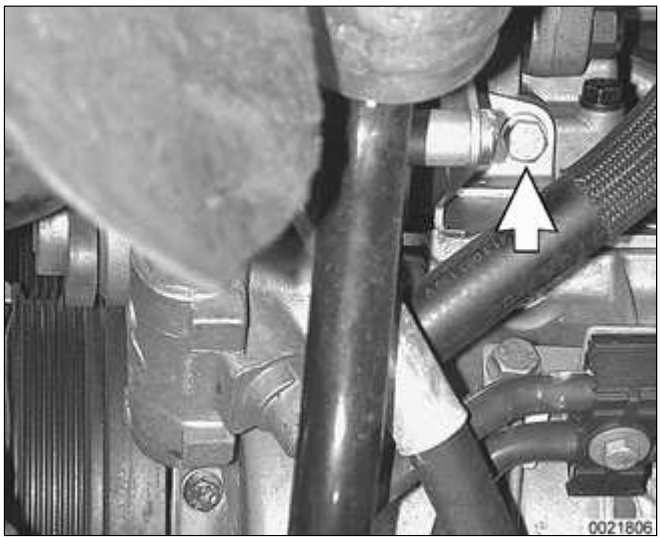


- Remove power steering pump pulley. Remove two mounting bolts from the front (**arrows**)

Note:

Do not detach power steering fluid lines from pump.



- Remove third power steering mounting bolt (**arrow**) and remove pump from its mounting bracket. Use stiff wire to suspend pump from chassis.

- Detach electrical harness connector (**arrow**) at oil level sensor.

- Loosen top engine mount fasteners (**arrow**).

Note:

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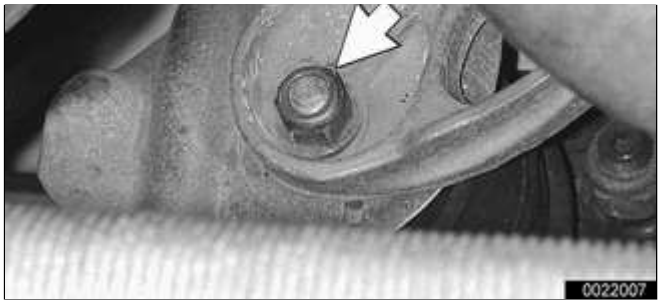

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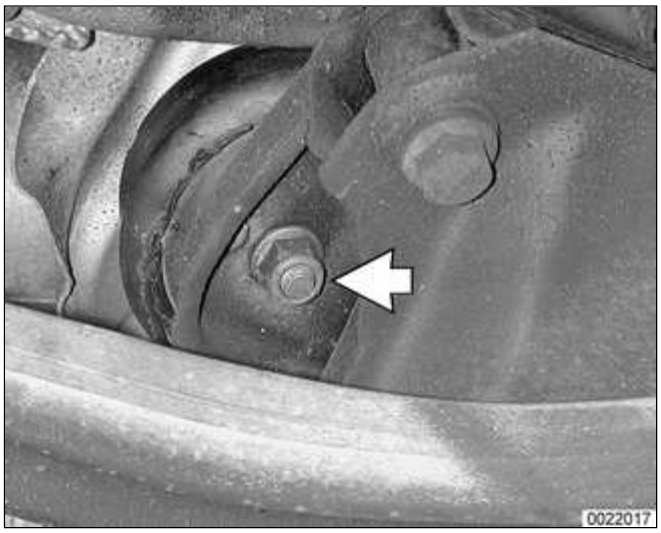
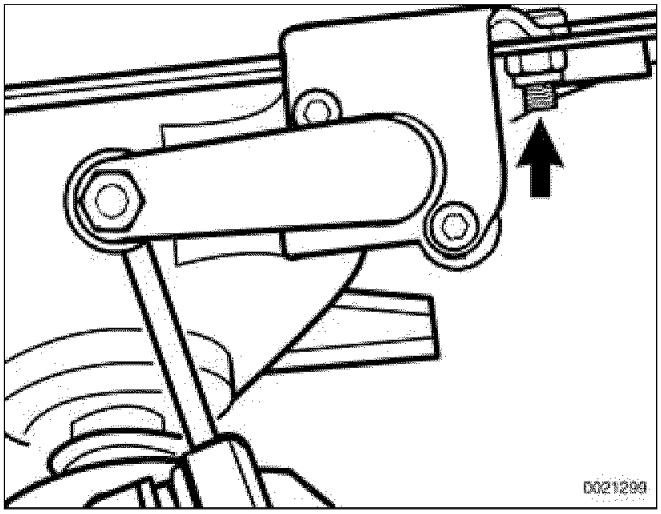


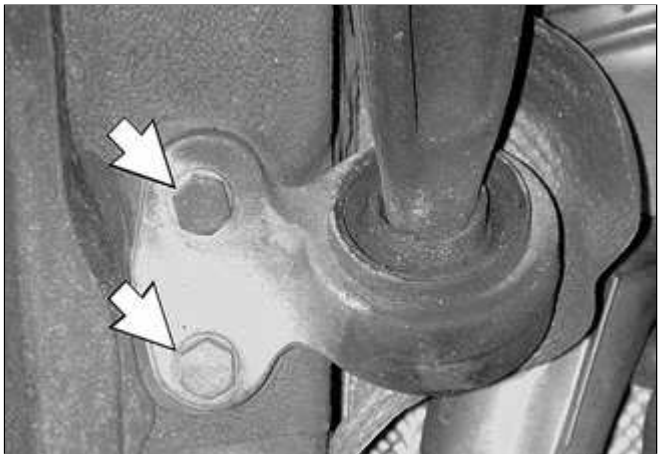
- Loosen lower engine mount fasteners (**arrows**).

Note:

Right side is shown in photo. Left is similar.



- If applicable, remove front ride level sensor mounting bolt (**arrow**) and lay sensor aside.



- Remove left and right front control arm bracket bolts (**arrows**) from frame rails.

Note:

Right side is shown in photo. Left is similar.

  - Detach left and right stabilizer bar anchors from frame rails.

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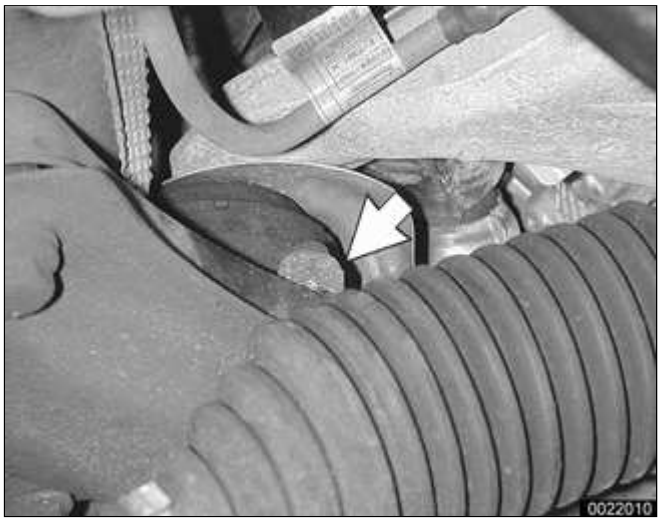
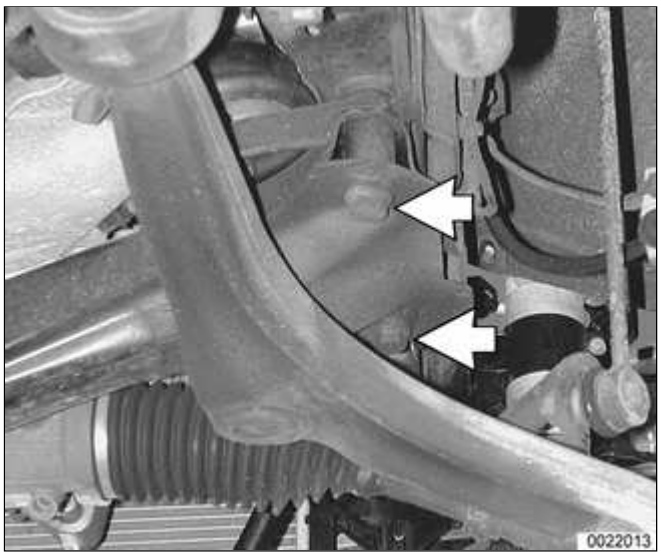


- Remove left control arm ball joint mounting nut (**arrow**) at front suspension subframe.
  - Drive ball joint out from subframe using soft hammer.
  - Push control arm aside.
  - Repeat for left side.



- Support suspension subframe from below using appropriate jacking equipment. Remove subframe mounting bolts (**arrows**) and lower subframe as far as possible.

Note:

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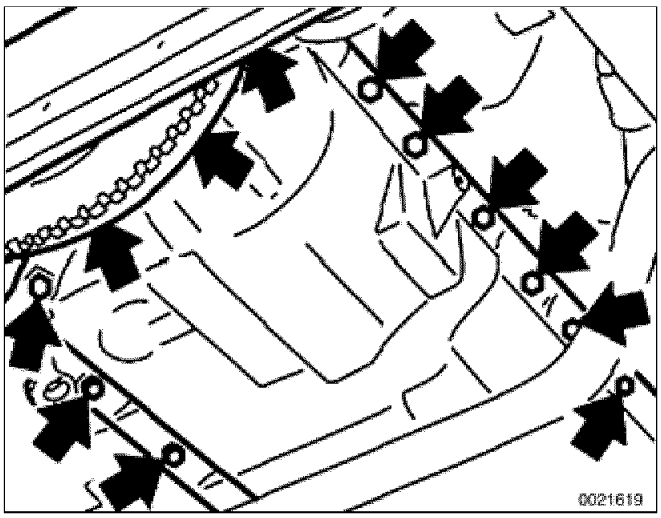

- Remove oil pan screws (**arrows**) at cylinder block and transmission bellhousing. Lower oil pan forward to remove.

CAUTION!

If the oil pan does not separate easily from the engine cylinder block, a few taps with a rubber mallet should break it free. Do not pry the oil pan loose.

- When installing oil pan:
  - Thoroughly clean all old gasket

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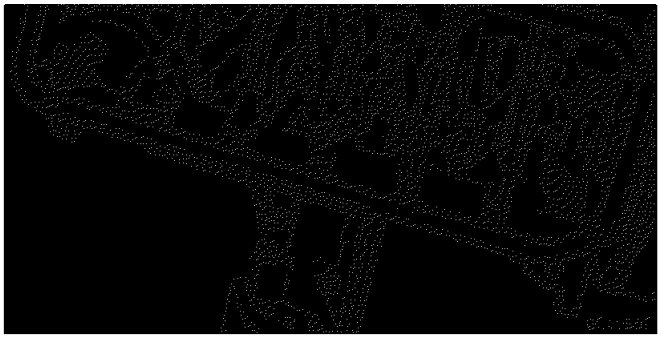

material from mating surfaces and use a new gasket.

- Apply a small amount of non-hardening sealer (3-Bond 1209® or equivalent) to oil pan gasket directly below joints (**arrows**) for end cover and front timing case cover. Apply a bead 3 mm wide by 2 mm high.

- Tighten oil pan bolts to cylinder block evenly all around.

- Tighten transmission bellhousing bolts last.

Tightening torque	
Oil drain plug to oil pan (M12)	25 Nm (18 ft-lb)
Oil pan to engine block	
M6, 8.8 grade	10 Nm (89 in-lb)
M6, 10.9 grade	12 Nm (106 in-lb)
Transmission bellhousing to oil pan	
M8 Allen	24 Nm (17 ft-lb)
M8 Torx	21 Nm (15 ft-lb)

- Remainder of installation is reverse of removal.

- Replace self-locking nuts when reinstalling front suspension components.

- Match up key ways while installing steering column shaft. See ⇒ 320 Steering and Wheel Alignment for more specific procedures.

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- Use new oil dipstick tube sealing O-ring.
- Fill engine with oil as described in ⇒ 020 Maintenance.
- After adding engine oil, start and run engine. Raise engine speed to 2,500 rpm until oil pressure warning lamp goes out (about 5 seconds).

Note:

BMW does not recommend a front end alignment following this procedure.

Tightening torques	
Control arm ball joint to suspension subframe	90 Nm (66 ft-lb)
Front subframe to frame rails (M12, use new bolts)	
8.8 grade	77 Nm (57 ft-lb)
10.9 grade	110 Nm (81 ft-lb)
12.9 grade	105 Nm (77 ft-lb)
Front end reinforcement to frame rails or suspension subframe (M10, use new bolts)	
Initial torque	59 Nm (44 ft-lb)
Torque angle	90° + 30°
Stabilizer bar to frame rail (M8 nut)	22 Nm (16 ft-lb)
Steering column universal joint clamping screw (M8 bolt, use new bolt)	22 Nm (16 ft-lb)

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Oil pan, removing and installing (all wheel drive models)

- Raise car and place securely on jack stands.

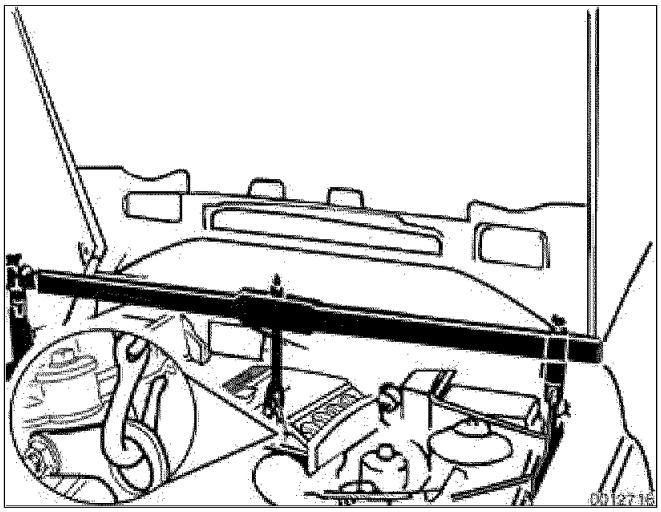
WARNING!

Make sure the car is stable and well supported at all times. Use a professional automotive lift or jack stands designed for the purpose. A floor jack is not adequate support.

- Remove splash shield from under engine.

- Drain engine oil as described in ⇒ 020 Maintenance

- Remove air filter housing complete with mass air flow sensor.



➢ Install engine lifting equipment at front engine lifting point and raise approximately 5 mm (inch) until engine weight is supported.

- Remove fuel line clamping brackets from oil pan.

- On cars with automatic transmission, remove ATF cooler line brackets from oil pan and from transmission.

Note:

Place drain pan under lines to catch ATF drips.

➢ Remove oil dipstick guide tube:

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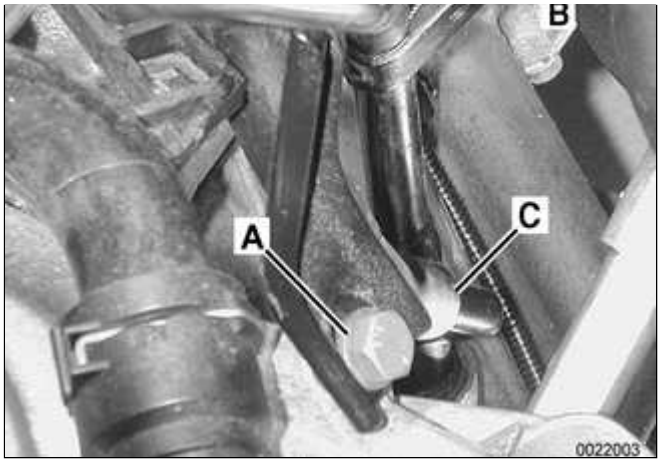
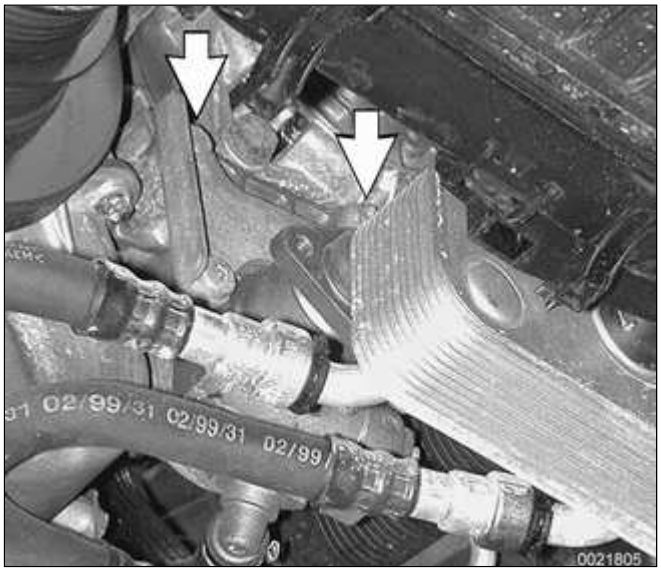


- Detach mounting bolt (**A**) from left engine mounting bracket.
- Detach fuel lines and wiring harness brackets (**B**).
- Disconnect oil separator hose (**C**) from base of guide tube and remove tube from oil pan.

Note:

The guide tube is sealed in the block using an O-ring. Check that the O-ring comes out with the tube.

➢ Separate steering column shaft from steering rack at universal joint. Point wheels straight ahead before disconnecting shaft from rack. See ⇒ 320 Steering and Wheel Alignment.



➢ Remove power steering pump pulley. Remove two mounting bolts from the front (**arrows**).

Note:

Do not detach power steering fluid lines from pump.

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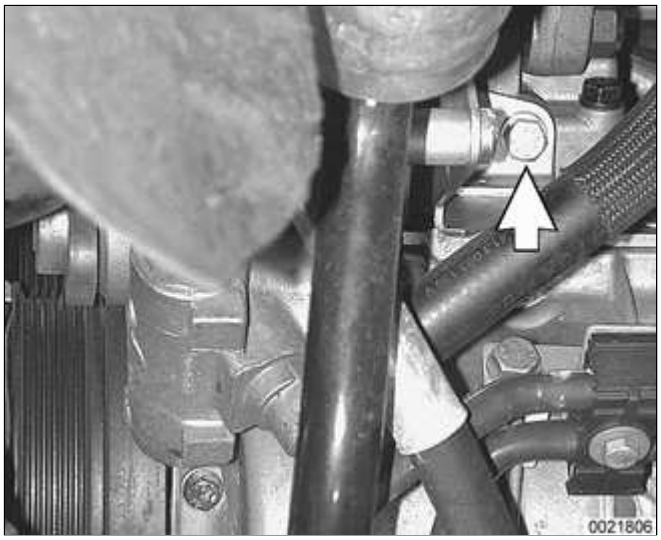
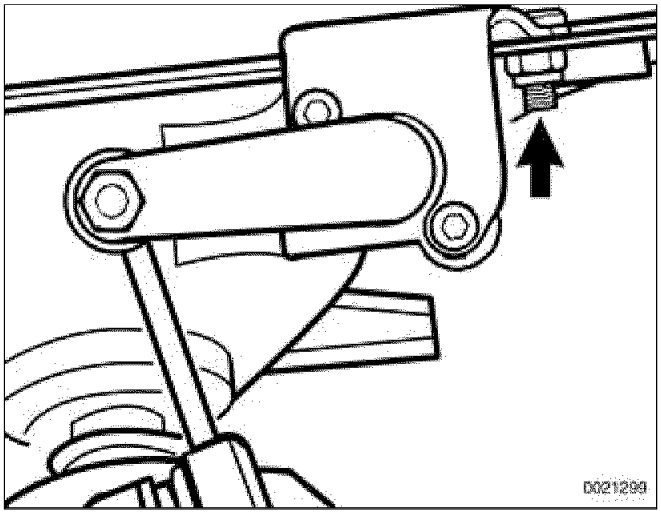


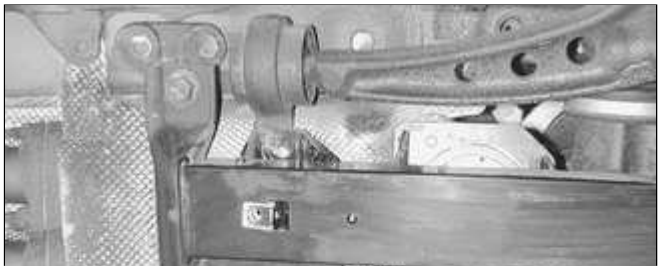
- Remove third power steering mounting bolt (**arrow**) and remove pump from its mounting bracket. Use stiff wire to suspend pump from chassis.

- Detach electrical harness connector at oil level sensor.

  - Remove lower engine mount fasteners.



- If applicable, remove front ride level sensor mounting bolt (**arrow**) and lay sensor aside.



- Working at rear right corner of front subframe, unhook heatshield from subframe (**arrow**).

  - Detach stabilizer bar anchors from frame rails.

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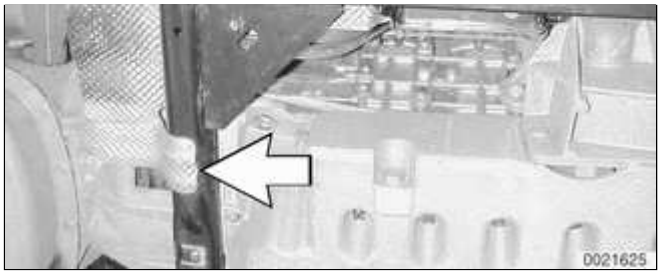
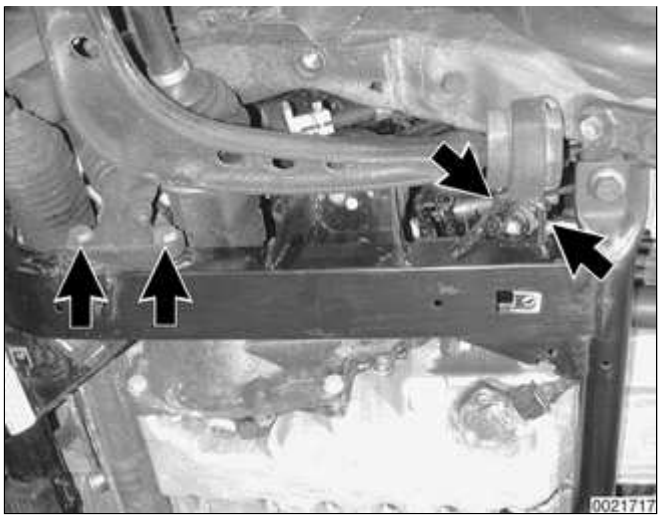
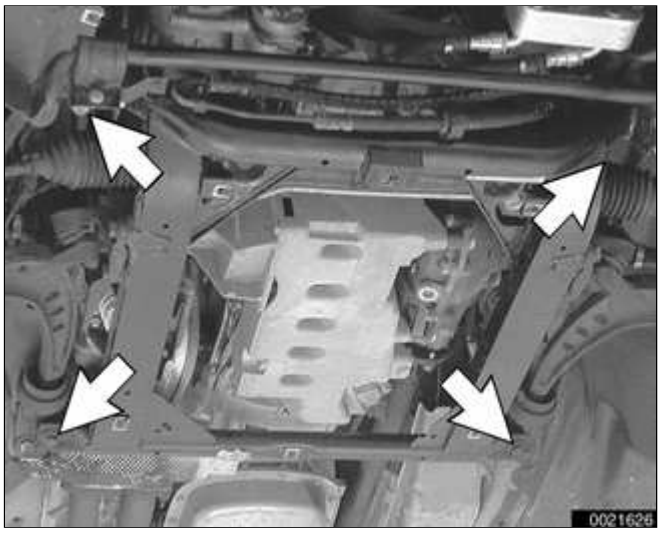




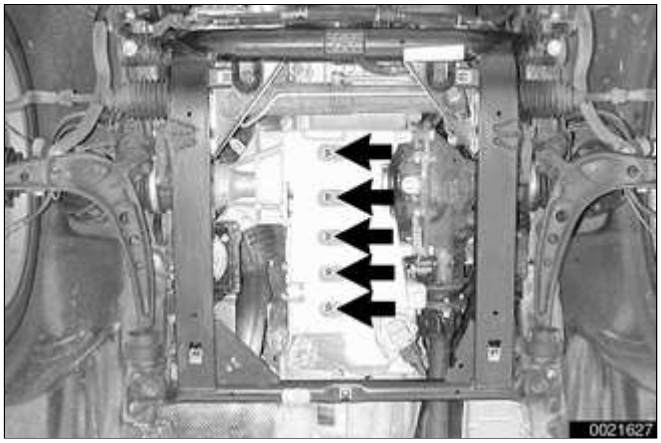
- Remove control arm rear bracket and ball joint mounting bolts (**arrows**) from subframe.
  - Remove control arms and front drive axles as described in ⇒ 310 Front Suspension.
  - Remove front differential and right axle inner bearing pedestal as described in ⇒ 311 Front Axle Final Drive.



- Support subframe while removing four mounting bolts (**arrows**).

CAUTION!

Lower subframe as far as possible without damaging power steering lines. Make sure it is adequately supported throughout the remainder of this procedure.



- Remove oil pan:
  - Remove bellhousing bolts from oil pan.
  - Remove all oil pan periphery bolts.
  - Remove center oil pan bolts (**arrows**).

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- Lower oil pan to remove.

CAUTION!

If the oil pan does not separate easily from the engine cylinder block, a few taps with a rubber mallet should break it free. Do not pry the oil pan loose.

- When reinstalling oil pan:

- Thoroughly clean all old gasket material from mating surfaces and use a new gasket.

- Apply a small amount of non-hardening sealer (3-Bond 1209® or equivalent) to oil pan gasket directly below joints for end cover and front timing case cover. Apply a bead 3 mm wide by 2 mm high.

- Tighten oil pan bolts to cylinder block evenly all around.

- Tighten transmission bellhousing bolts last.

Tightening torque	
Oil drain plug to oil pan (M12)	25 Nm (18 ft-lb)
Oil pan to engine block	
M6, 8.8 grade	10 Nm (89 in-lb)
M6, 10.9 grade	12 Nm (106 in-lb)
M8, 8.8 grade	22 Nm (16 ft-lb)
Transmission bellhousing to oil pan	
M8 Allen	24 Nm (17 ft-lb)

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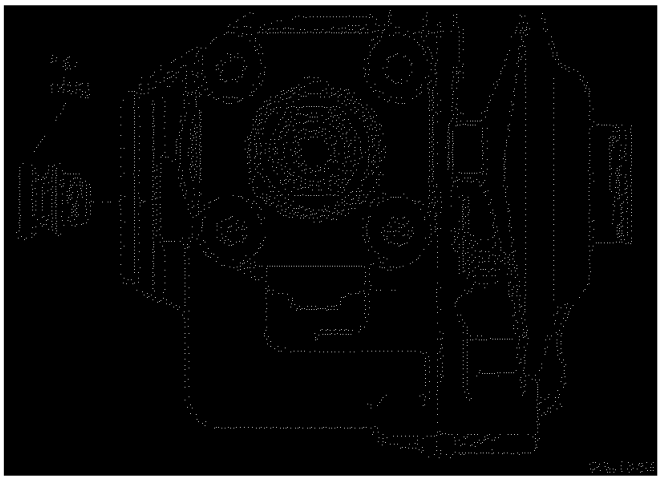
Tightening torque	
M8 Torx	21 Nm (15 ft-lb)



- Reinstall front differential and right axle inner bearing pedestal. See ⇒ 311 Front Axle Final Drive.

  - Fill differential to lower edge of fill plug.

Tightening torques	
Fill or drain plug to front differential	65 Nm (48 ft-lb)
Front differential to oil pan (M10)	45 Nm (33 ft-lb)

- Reinstall front axles, control arms and front steering arms as described in ⇒ 310 Front Suspension.

Note:

- *Be sure to replace seals on differential output flanges.*

- *Replace self-locking fasteners when reinstalling front suspension components.*

Tightening torques	
Control arm ball joint bracket to subframe	
M12 bolt	77 Nm (57 ft-lb)
Control arm mounting bracket to subframe	
M10 bolt (always replace)	59 Nm (44 ft-lb)

- When reattaching engine to subframe, be sure that left engine mount locating

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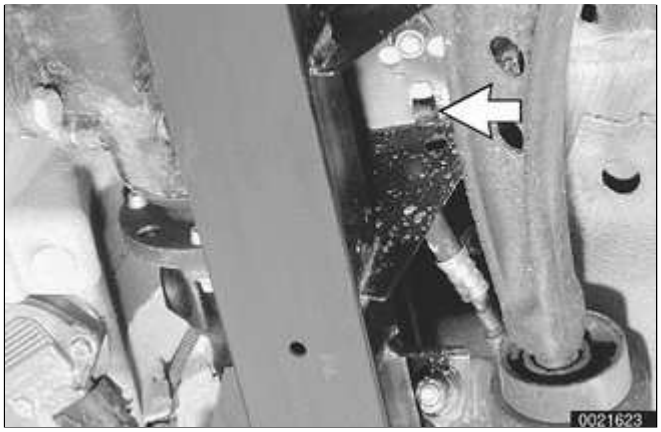

tab (**arrow**) is seated correctly in subframe slot.

Tightening torques	
Engine mount to subframe	
M10 self-locking nut	45 Nm (33 ft-lb)
Front of subframe to frame rail (M12 bolt, always replace)	
8.8 grade	77 Nm (57 ft-lb)
10.9 grade	110 Nm (81 ft-lb)
12.9 grade	105 Nm (77 ft-lb)
Rear of subframe to mounting adapter	
M12 bolt (always replace)	110 Nm (81 ft-lb)

- Remainder of installation is reverse of removal.

- Match up key ways while installing steering column shaft. See ⇒ 320 Steering and Wheel Alignment for more specific procedures.

- Use new oil dipstick tube sealing O-ring.

- Fill engine with oil as described in ⇒ 020 Maintenance.

- After adding engine oil, start and run engine. Raise engine speed to 2,500 rpm until oil pressure warning lamp goes out (about 5 seconds).

Note:

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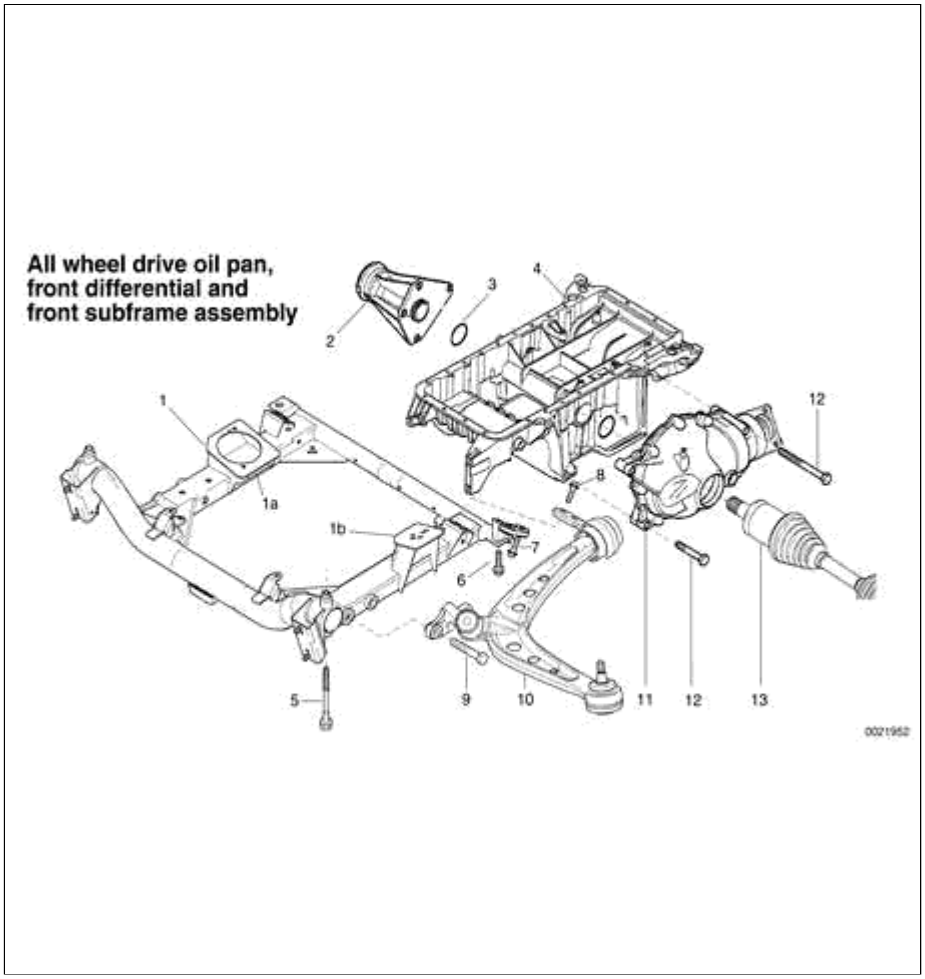
Be sure to align the front end after this procedure.

Tightening torques	
Stabilizer bar to frame rail (M8 nut)	22 Nm (16 ft-lb)
Steering column universal joint clamping screw (M8 bolt, use new bolt)-	22 Nm (16 ft-lb)



All wheel drive oil pan, front differential and front subframe assembly

1 - Front subframe

1a - Right engine mounting point

1b - Left engine mounting point

2 - Right axle inner bearing pedestal

3 - Sealing O-ring

4 - Oil pan

5 - Bolt M12 (always replace) -

- 8.8 grade tighten to 77 Nm (57 ft-lb)
- 10.9 grade tighten to 110 Nm (81 ft-lb)

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- 12.9 grade tighten to 105 Nm (77 ft-lb)

6 - **Bolt M12 (always replace)**

- tighten to 110 Nm (81 ft-lb)

7 - **Bolt M10 (always replace)**

- tighten to 59 Nm (44 ft-lb)

8 - **Bolt M10 (always replace)**

- tighten to 59 Nm (44 ft-lb)

9 - **Bolt M12**

- tighten to 77 Nm (57 ft-lb)

10 - **Front control arm with ball joint and rear mounting bracket**

11 - **Front differential**

12 - **Bolt M10**

- tighten to 45 Nm (33 ft-lb)

13 - **Left front axle**

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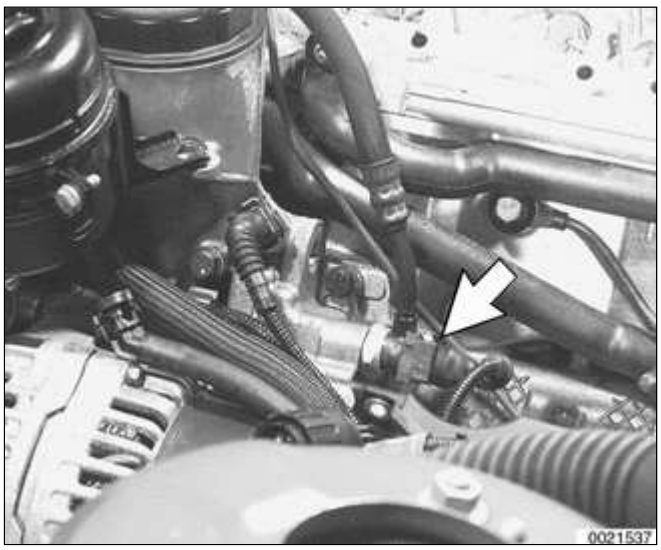
Component Replacement

Oil pressure warning switch



- The pressure warning switch is located under the intake manifold, in the rear of the oil filter housing.

Note:

Switch removal may require intake manifold removal.

Tightening torque	
Oil pressure switch to oil filter housing	27 Nm (20 ft-lb)

Oil level warning switch

- The oil level warning switch is located at the bottom of the engine oil pan.

Note:

Anytime the oil level warning switch is removed, be sure to replace the sealing O-ring between switch and oil pan.

Oil pump, removing and installing

Note:

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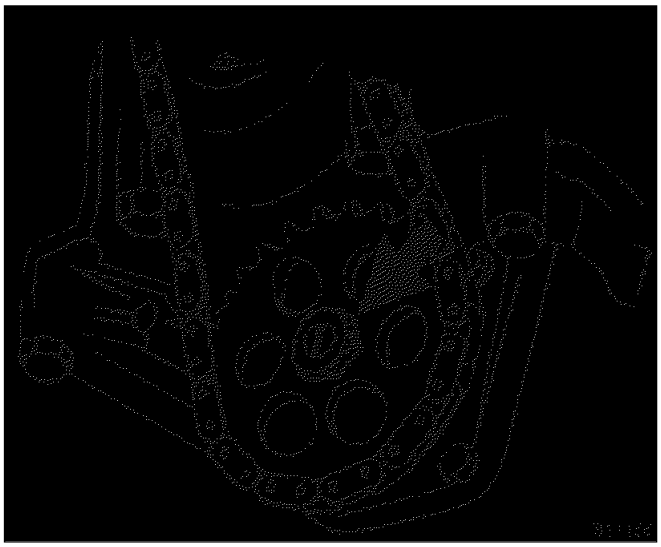
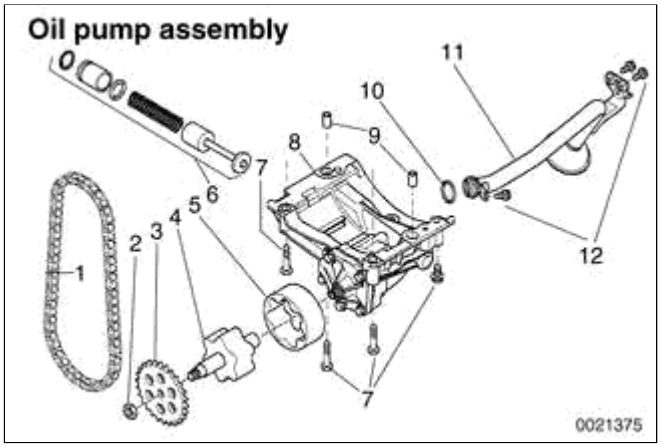
Oil pump removal requires lowering the front suspension subframe to remove the oil pan.

- Drain oil as described in ⇒ 020 Maintenance.

- Remove oil pan as described earlier.



➢ Remove oil pump sprocket mounting nut (left-hand thread) (**arrow**). Lift sprocket off together with drive chain.



➢ Remove mounting bolts from oil pump (**7**) and oil pump pickup tube (**12**). Withdraw pump.

1 - Drive chain

2 - Nut M10x1left-hand thread -tighten to 25 Nm (18 ft-lb)

3 - Oil pump sprocket

4 - Inner rotor

5 - Outer rotor

6 - Oil pressure relief valve assembly

7 - Bolt M8 -tighten to 22 Nm (16 ft-lb)

8 - Oil pump housing

9 - Locating dowels

10 - Sealing O-ring

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11 - Oil pick-up pipe

12 - Bolt M6 -tighten to 10 Nm (89 in-lb)

- On engines with integrated oil pump and oil scraper: Remove oil pump with scraper.

- On engines with separate oil pump and scraper:

- First remove mounting bolts and withdraw oil pump intake pipe.

- Remove oil pump mounting bolts. Remove oil pump assembly.

Note:

- *Note any spacers between pump and engine block.*

- *Note positions of locating dowels.*

- Remove cover from oil pump and check for wear or scoring. Spin oil pump shaft and check that gears turn smoothly. Replace pump if gears spin with difficulty or any wear is present.

- Installation is reverse of removal, noting the following:

- Align sprocket splines to oil pump shaft splines before tightening sprocket nut.

Tightening torques	
Oil drain plug to oil	25 Nm (18 ft-lb)

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Tightening torques	
pan (M12)	
Oil pan to engine block	
M6, 8.8 grade	10 Nm (89 in-lb)
M6, 10.9 grade	12 Nm (106 in-lb)
M8, 8.8 grade	22 Nm (16 ft-lb)
Oil pump to engine block (M8)	22 Nm (16 ft-lb)
Oil pump sprocket to oil pump shaft	
M10x1 left-hand thread	25 Nm (18 ft-lb)
Transmission bellhousing to oil pan	
M8 Allen	24 Nm (17 ft-lb)
M8 Torx	21 Nm (15 ft-lb)

Oil pump pressure relief valve

The oil pump pressure relief valve is held in the side of the oil pump with a circlip.

1 - Control plunger

2 - Spring

3 - Sealing O-ring

4 - Sleeve

5 - Circlip

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