

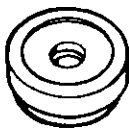
Engine Lubrication

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Special Tools

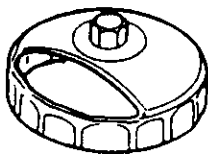
Ref. No.	Tool Number	Description	Qty	Page Reference
①	07746 - 0010400	Attachment, 52 x 55 mm	1	8-14
②	07749 - 0010000	Driver	1	8-14
③	07912 - 6110001	Oil Filter Wrench	1	8-8



①



②



③

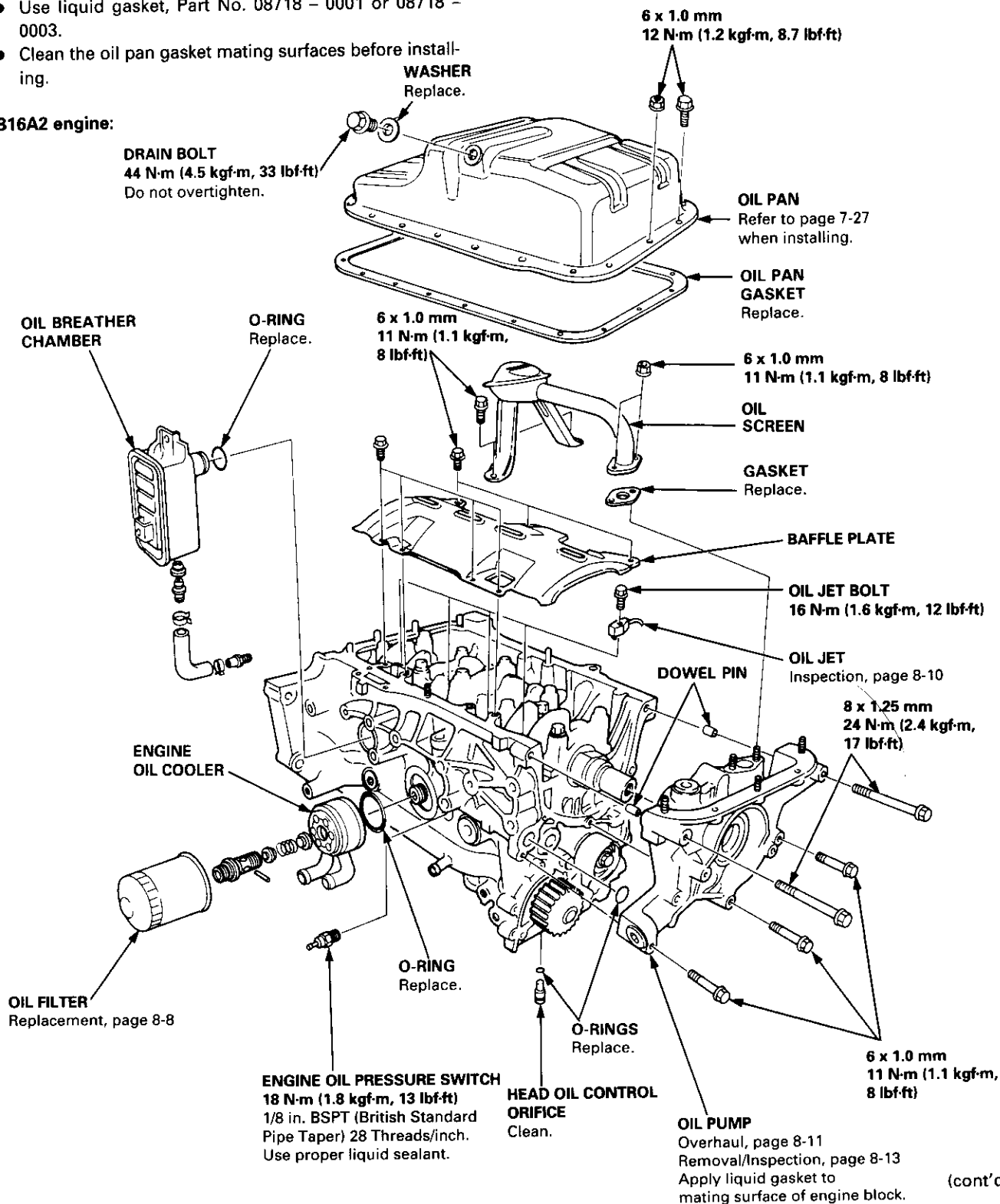


NOTE:

- Use new O-rings when reassembling.
- Apply oil to O-rings before installation.
- Use liquid gasket, Part No. 08718 - 0001 or 08718 - 0003.
- Clean the oil pan gasket mating surfaces before installing.

CAUTION: Do not overtighten the drain bolt.

B16A2 engine:



(cont'd)

Illustrated Index

(cont'd)

NOTE:

- Use new O-rings when reassembling.
- Apply oil to O-rings before installation.
- Use liquid gasket, Part No. 08718 - 0001 or 08718 - 0003.
- Clean the oil pan gasket mating surfaces before installing.
- Apply liquid gasket to the recesses of the oil pan gasket (see page 7-27).

CAUTION: Do not overtighten the drain bolt.

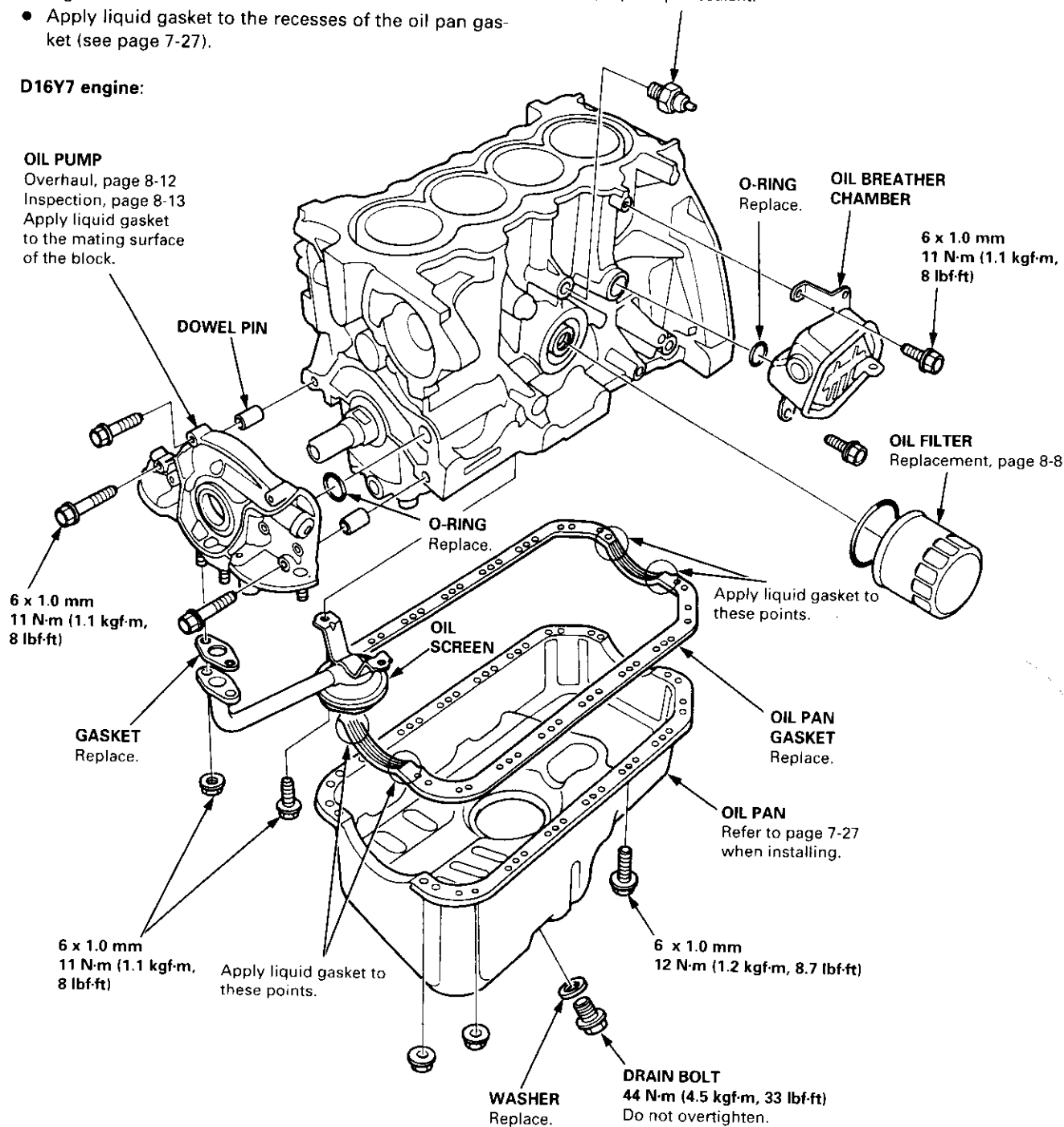
ENGINE OIL PRESSURE SWITCH

18 N·m (1.8 kgf·m, 13 lbf·ft)

1/8 in. BSPT (British Standard Pipe Taper)
28 threads/inch. Use proper liquid sealant.

OIL PUMP

Overhaul, page 8-12
Inspection, page 8-13
Apply liquid gasket to the mating surface of the block.



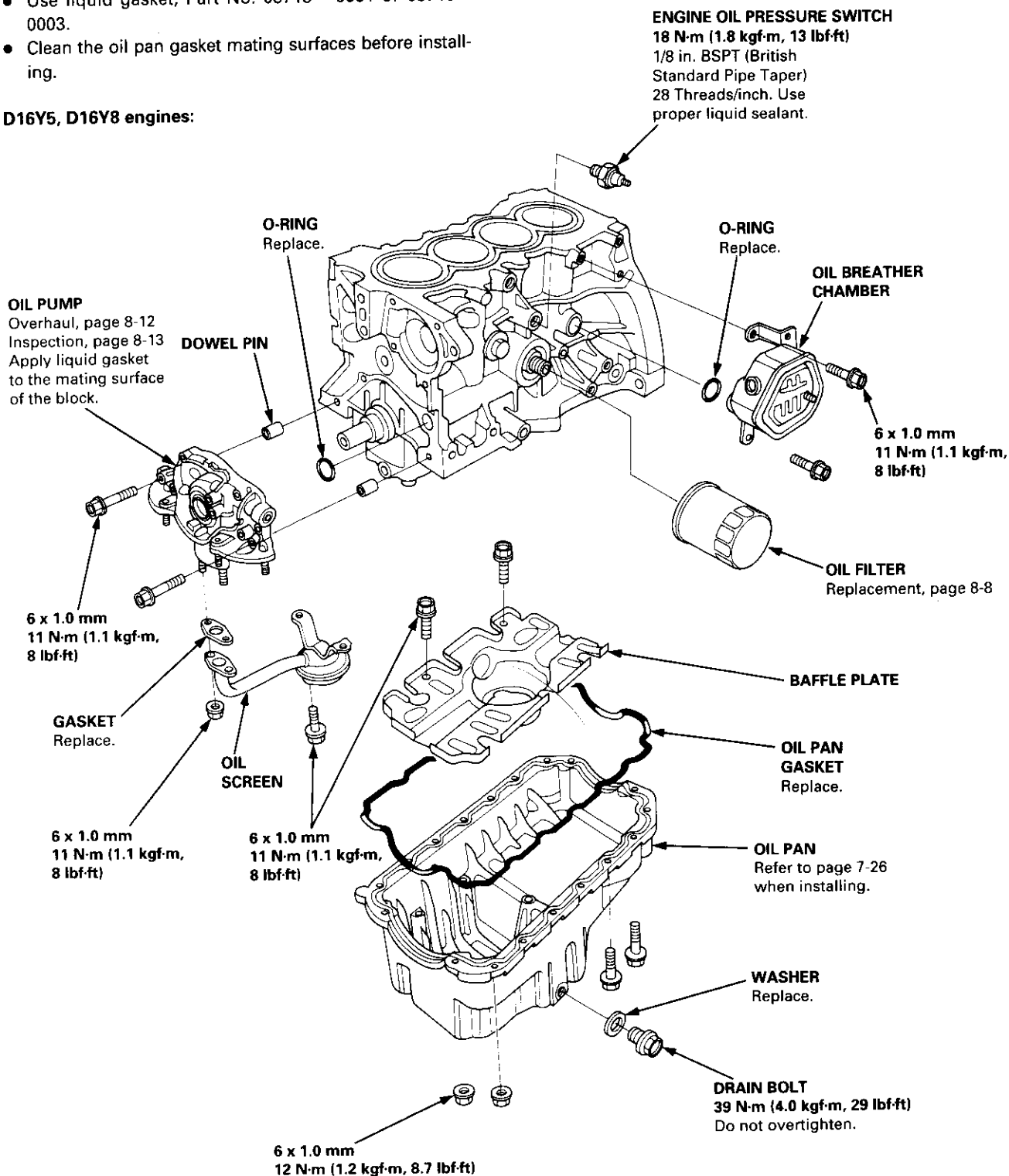


NOTE:

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- Apply oil to O-rings before installation.
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- Clean the oil pan gasket mating surfaces before installing.

CAUTION: Do not overtighten the drain bolt.

D16Y5, D16Y8 engines:



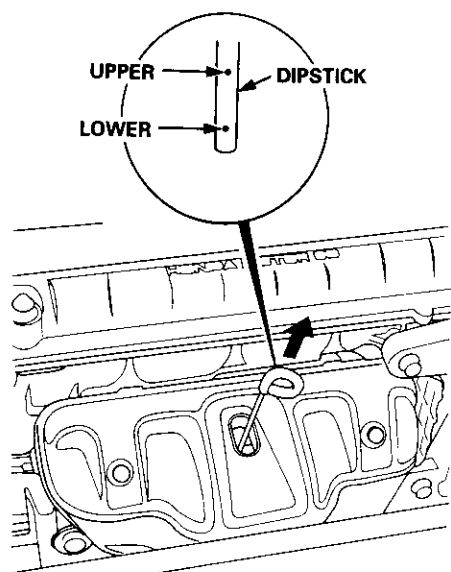
Engine Oil

Inspection

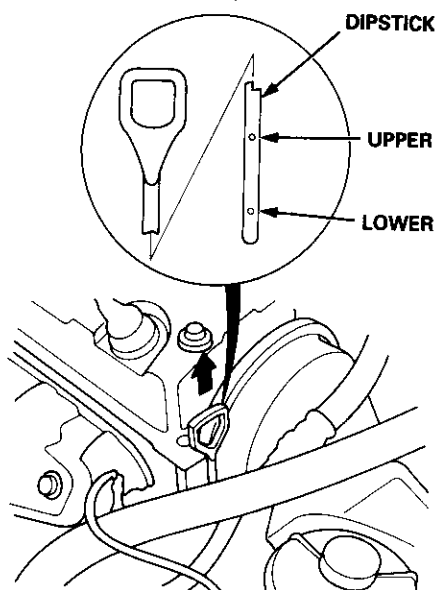
1. Park the vehicle on level ground, and turn off the engine. Allow the oil a few minutes to drain back into the oil pan so the dipstick will show the actual level.
2. Make certain that the oil level indicated on the dipstick is between the upper and lower marks.
3. If the level has dropped close to the lower mark, add oil until it reaches the upper mark.

CAUTION: Insert the dipstick carefully to avoid bending it.

B16A2 engine:



D16Y5, D16Y7, D16Y8 engines:

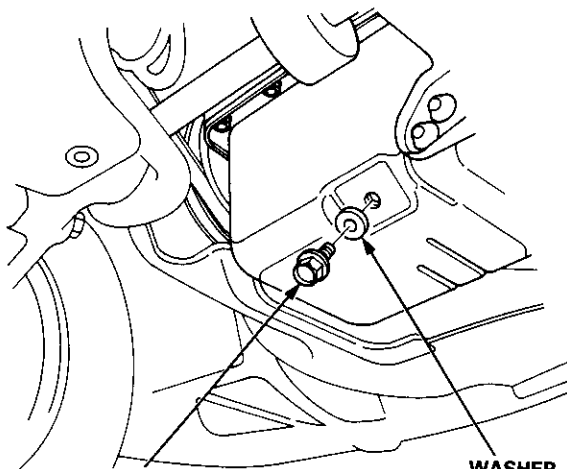


Replacement

CAUTION: Remove the drain bolt carefully while the engine is hot; the hot oil may cause scalding.

1. Warm up the engine.
2. Drain the engine oil.

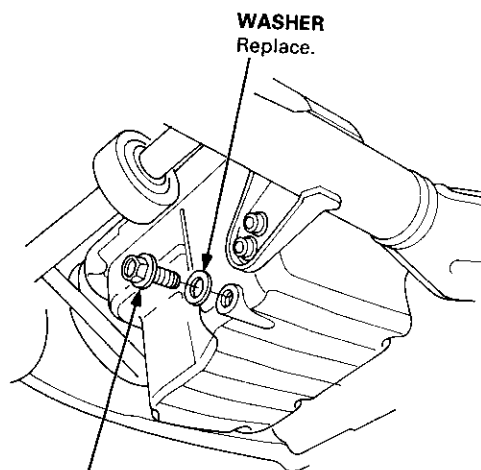
B16A2, D16Y7 engines:



DRAIN BOLT
44 N·m (4.5 kgf·m, 33 lbf·ft)
Do not overtighten.

WASHER
Replace.

D16Y5, D16Y8 engines:



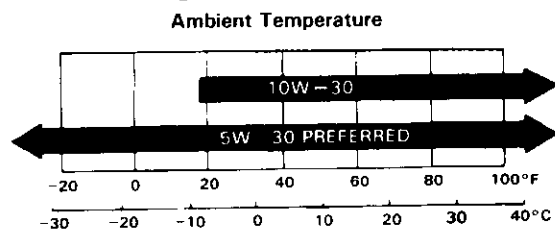
DRAIN BOLT
39 N·m (4.0 kgf·m, 29 lbf·ft)
Do not overtighten.



3. Reinstall the drain bolt with a new washer, and refill the engine with the recommended oil.

Requirement	API Service Grade: Use an "Energy Conserving" SJ grade oil or an "Energy Conserving II" SH grade oil, SAE 5W - 30 preferred. You can also use an oil that bears the API CERTIFICATION mark.
Capacity	<p>B16A2 engine: 3.7 l (3.9 US qt, 3.3 Imp qt) at oil change. 4.0 l (4.2 US qt, 3.5 Imp qt) at oil change, including filter. 4.8 l (5.1 US qt, 4.2 Imp qt) after engine overhaul.</p> <p>D16Y7 engine: 3.6 l (3.8 US qt, 3.2 Imp qt) at change, including filter. 3.3 l (3.5 US qt, 2.9 Imp qt) at change, without filter. 4.3 l (4.5 US qt, 3.8 Imp qt) after engine overhaul.</p> <p>D16Y5, D16Y8 engines: 3.3 l (3.5 US qt, 2.9 Imp qt) at change, including filter. 3.0 l (3.2 US qt, 2.6 Imp qt) at change, without filter. 3.7 l (3.9 US qt, 3.3 Imp qt) after engine overhaul.</p>
Change	<p>Every 7,500 miles (12,000 km) or 12 months (Normal Conditions). Every 3,750 miles (6,000 km) or 6 months (Severe Conditions).</p>

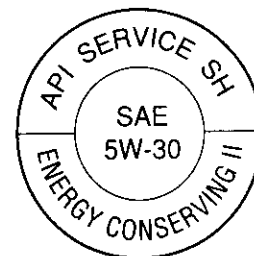
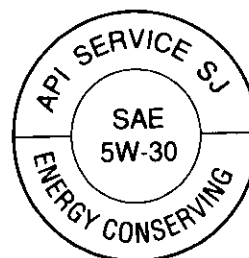
NOTE: Under normal conditions, the oil filter should be replaced at every other oil change. Under severe conditions, the oil filter should be replaced at each oil change. The numbers in the middle of the API Service label tell you the oil's SAE viscosity or weight. Select the oil for your car according to this chart:



An oil with a viscosity of 5W - 30 is preferred for improved fuel economy and year-round protection in the car. You may use a 10W - 30 oil if the climate in your area is limited to the temperature range shown on the chart.



API CERTIFICATION MARK



API SERVICE LABEL

4. Run the engine for more than three minutes, then check for oil leakage.

Oil Filter

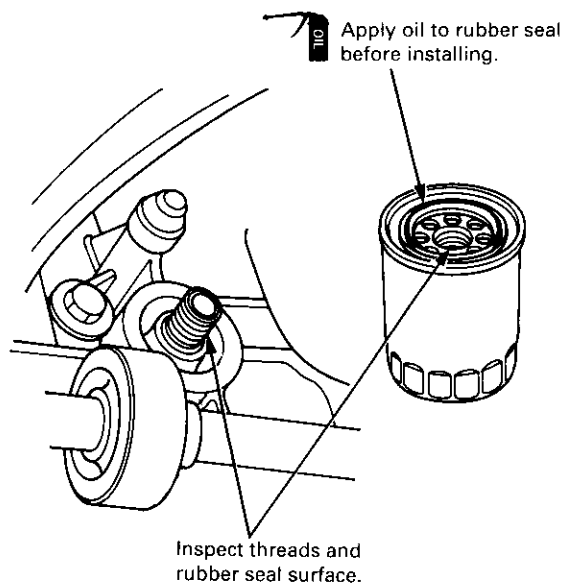
Replacement

⚠ WARNING

- After the engine has been run, the exhaust pipe will be hot; be careful when working around the exhaust pipe.
- Be careful when loosening the drain bolt while the engine is hot. Burns can result because the oil temperature is very high.

1. Remove the oil filter with the oil filter wrench.
2. Inspect the threads and rubber seal on the new filter. Wipe off the seat on the engine block, then apply a light coat of oil to the new filter's rubber seal.

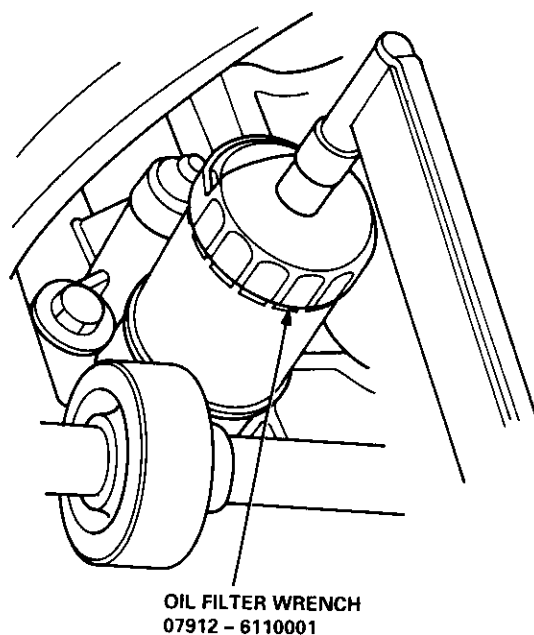
NOTE: Use only filters with a built-in bypass system.



3. Install the oil filter by hand.
4. After the rubber seal seats, tighten the oil filter clockwise with the oil filter wrench.

Tighten: 7/8 turn clockwise.

Tightening torque: 22 N·m (2.2 kgf·m, 16 lbf·ft)

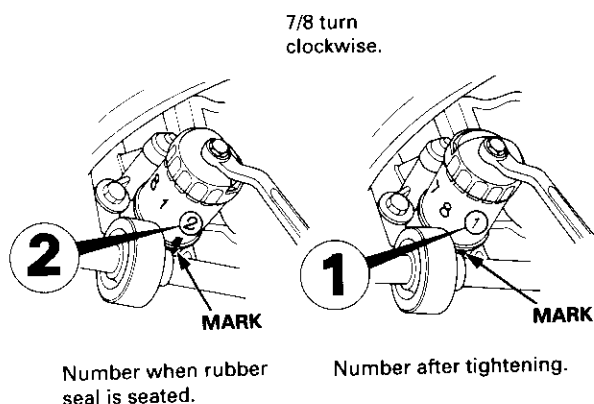




Testing

Use this procedure to tighten the filter if eight numbers (1 to 8) are printed on the surface of the filter.

- 1) Make a mark on the oil filter base under the number that shows at the bottom of the filter when the rubber seal is seated.
- 2) Tighten the filter by turning it clockwise seven numbers from the marked point. For example, if a mark is made under the number 2 when the rubber seal is seated, the filter should be tightened until the number 1 comes up to the marked point.



Number when rubber seal is seated	1	2	3	4	5	6	7	8
Number after tightening	8	1	2	3	4	5	6	7

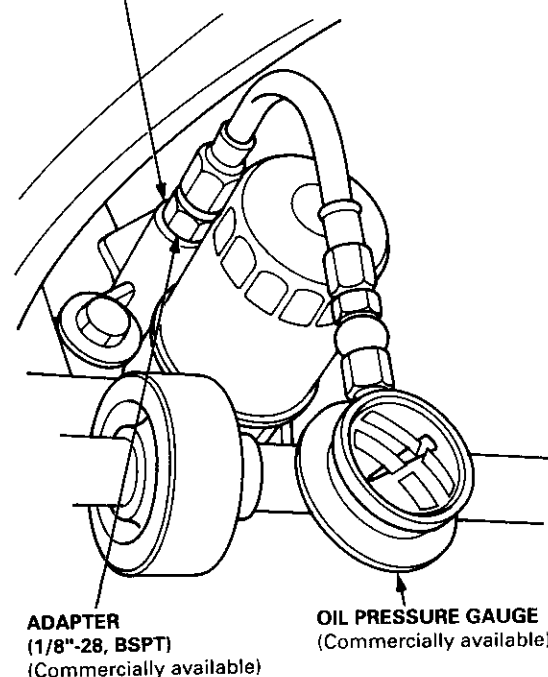
CAUTION: Using any procedure other than those shown could result in serious engine damage due to oil leakage.

5. After installation, fill the engine with oil up to the specified level, run the engine for more than three minutes, then check for oil leakage.

If the oil pressure warning light stays on with the engine running, check the engine oil level. If the oil level is correct:

1. Connect a tachometer.
2. Remove the engine oil pressure switch, and install an oil pressure gauge.

ENGINE OIL PRESSURE SWITCH MOUNTING HOLE



3. Start the engine. Shut it off immediately if the gauge registers no oil pressure. Repair the problem before continuing.
4. Allow the engine to reach operating temperature (fan comes on at least twice). The pressure should be:

Engine Oil Temperature: 176°F (80°C)

Engine Oil Pressure:

At Idle: 69 kPa (0.7 kgf/cm², 10 psi)
minimum

At 3,000 rpm: 340 kPa (3.5 kgf/cm², 50 psi)
minimum

- If the oil pressure is within specifications, replace the oil pressure switch and recheck.
- If the oil pressure is NOT within specifications, inspect the oil pump (see page 8-10).

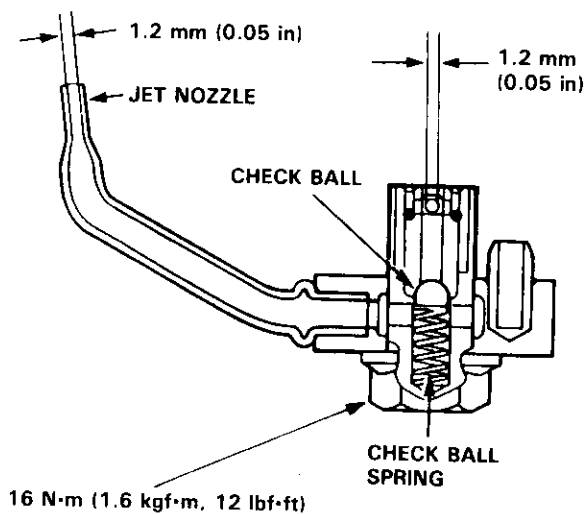
Oil Jet (B16A2 engine)

Inspection

1. Remove the oil jet (see page 8-3) and inspect it as follows.

- Make sure that a 1.1 mm (0.04 in) diameter drill will go through the nozzle hole (1.2 mm (0.05 in) diameter).
- Insert the other end of the same 1.1 mm (0.04 in) drill into the oil intake (1.2 mm (0.05 in) diameter).
Make sure the check ball moves smoothly and has a stroke of approximately 4.0 mm (0.16 in).
- Check the oil jet operation with an air nozzle. It should take at least 200 kPa (2.0 kgf/cm², 28 psi) to unseat the check ball.

NOTE: Replace the oil jet assembly if the nozzle is damaged or bent.



2. Mounting torque is critical. Be very precise when installing.

Torque: 16 N·m (1.6 kgf·m, 12 lbf·ft)



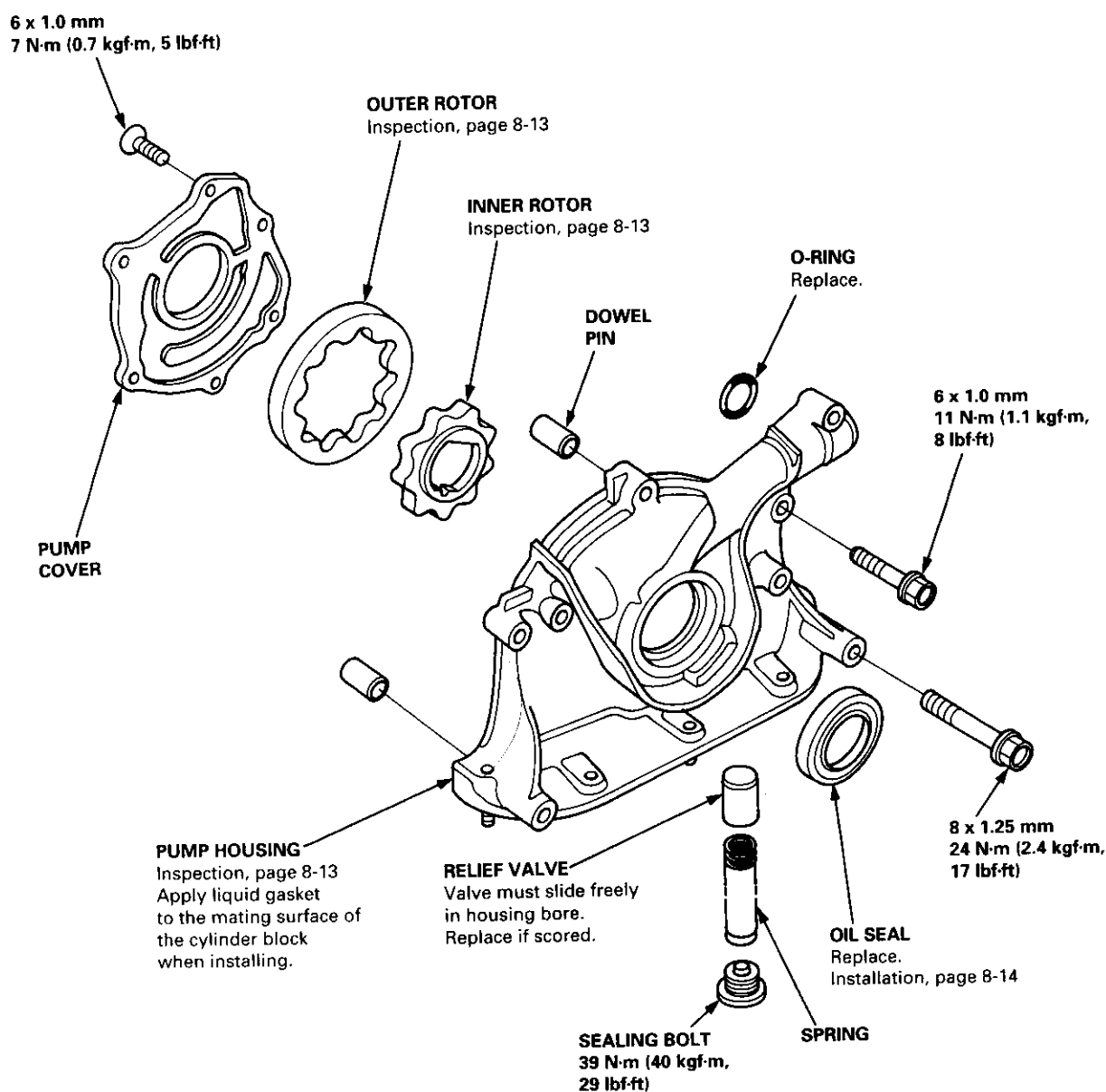
Oil Pump

Overhaul

NOTE:

- Use new O-rings when reassembling.
- Apply oil to O-rings before installation.
- Use liquid gasket, Part No. 08718 - 0001 or 08718 - 0003.
- The rotors must be installed to the same direction in order.
- After reassembly, check that the rotors move without binding.

B16A2 engine:



(cont'd)

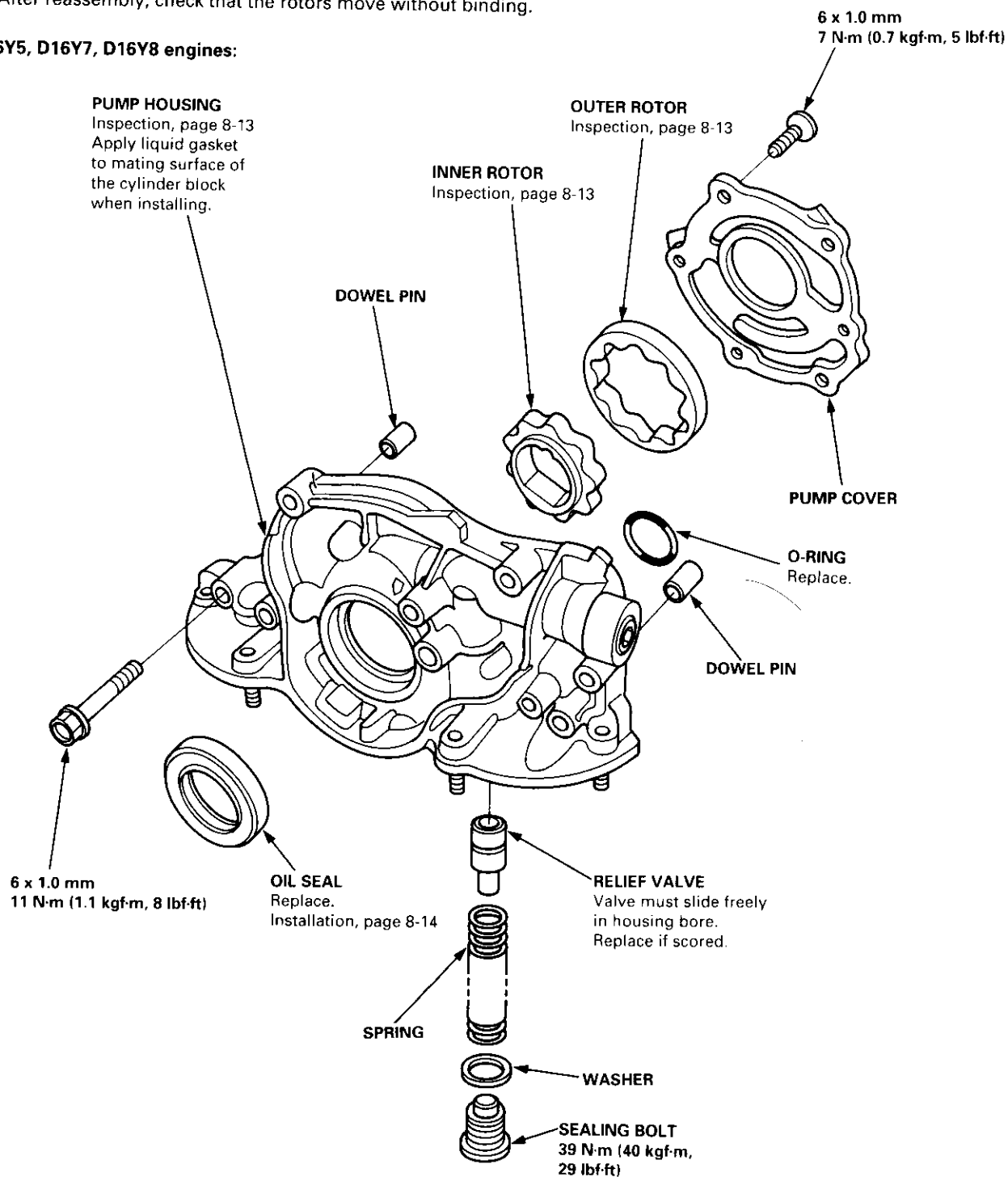
Oil Pump

Overhaul (cont'd)

NOTE:

- Use new O-rings when reassembling.
- Apply oil to O-rings before installation.
- Use liquid gasket, Part No. 08718 - 0001 or 08718 - 0003.
- The rotors must be installed to the same direction.
- After reassembly, check that the rotors move without binding.

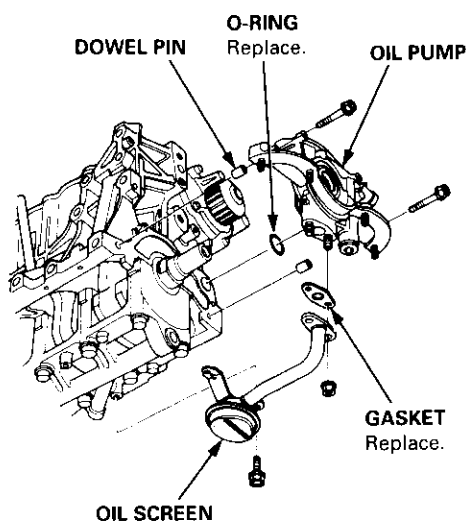
D16Y5, D16Y7, D16Y8 engines:





Removal/Inspection/Installation

1. Drain the engine oil.
2. Turn the crankshaft and align the white groove on the crankshaft pulley with the pointer on the lower cover.
3. Remove the cylinder head cover and upper cover.
4. Remove the power steering pump belt, air conditioner belt and the alternator belt.
5. Remove the crankshaft pulley and remove the lower cover.
6. Remove the timing belt.
7. Remove the drive pulley.
8. Remove the oil pan and oil screen.



9. Remove the oil pump.

10. Remove the screws from the pump housing, then separate the housing and cover.
11. Check the inner-to-outer rotor radial clearance on the pump rotor. If the inner-to-outer rotor clearance exceeds the service limit, replace the inner and outer rotors.

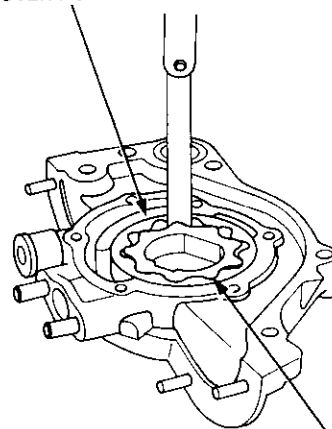
Inner Rotor-to-Outer Rotor Radial Clearance

Standard (New): B16A2 engine 0.04 – 0.16 mm
(0.002 – 0.006 in)

D16Y5, D16Y7, D16Y8 engines
0.02 – 0.14 mm (0.001 – 0.006 in)

Service Limit: 0.20 mm (0.008 in)

OUTER ROTOR



INNER ROTOR

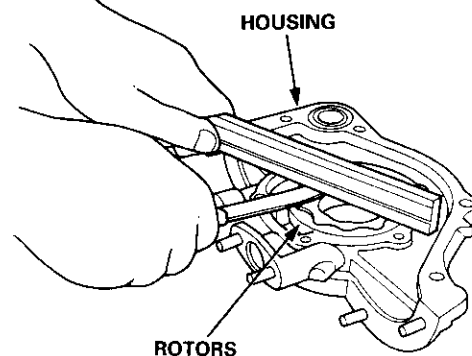
12. Check the housing-to-rotor axial clearance on the pump rotor. If the housing-to-rotor axial clearance exceeds the service limit, replace the set of inner and outer rotors and/or the pump housing.

Housing-to-Rotor Axial Clearance

Standard (New): B16A2 engine 0.02 – 0.07 mm
(0.001 – 0.003 in)

D16Y5, D16Y7, D16Y8 engines
0.03 – 0.08 mm (0.001 – 0.003 in)

Service Limit: 0.15 mm (0.006 in)



(cont'd)

Oil Pump

Removal/Inspection/Installation (cont'd)

13. Check the housing-to-outer rotor radial clearance. If the housing-to-outer rotor radial clearance exceeds the service limit, replace the set of inner and outer rotors and/or the pump housing.

Housing-to-Outer Rotor Radial Clearance:

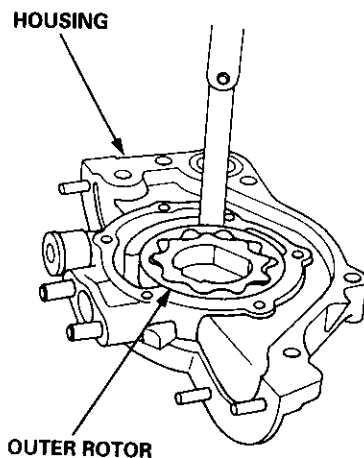
Standard (New): B16A2 engine 0.10 – 0.19 mm

(0.004 – 0.007 in)

D16Y5, D16Y7, D16Y8 engines

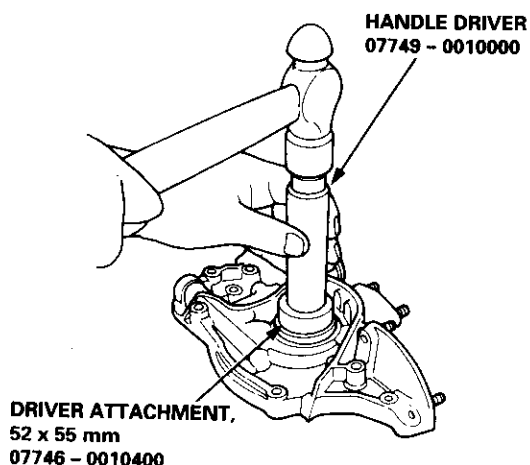
0.10 – 0.18 mm (0.004 – 0.007 in)

Service Limit: 0.20 mm (0.008 in)



14. Inspect both rotors and pump housing for scoring or other damage. Replace parts if necessary.
15. Remove the old oil seal from the oil pump.
16. Using the special tool, gently tap in the new oil seal until the driver bottoms against the pump.

NOTE: The oil seal alone can be replaced without removing the oil pump.

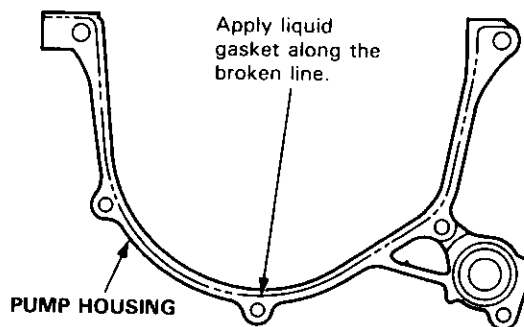


17. Reassemble the oil pump, applying thread lock to the pump housing screws.
18. Check that the oil pump turns freely.
19. Apply a light coat of oil to the seal lip.
20. Install the two dowel pins and new O-ring on the oil pump.
21. Apply liquid gasket to the cylinder block mating surface of the oil pump.

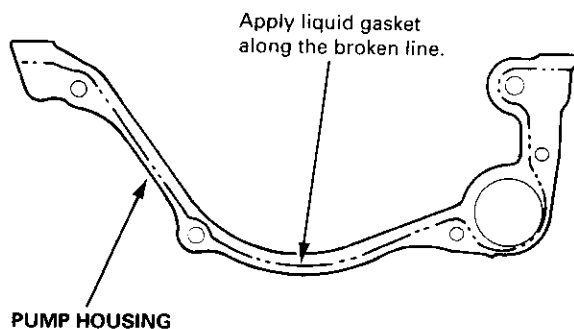
NOTE:

- Use liquid gasket, Part No. 08718 - 0001 or 08718 - 0003.
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Apply liquid gasket evenly, in a narrow bead centered on the mating surface.
- To prevent leakage of oil, apply liquid gasket to the inner threads of the bolt holes.
- Do not install the parts if five minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing the old residue.
- After assembly, wait at least 30 minutes before filling the engine with oil.

B16A2 engine:



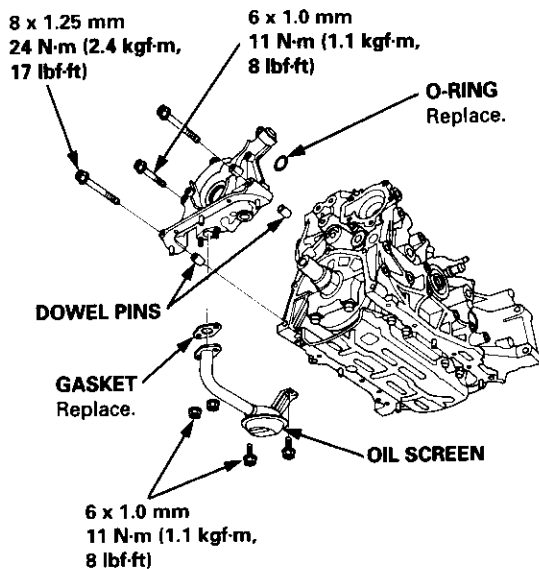
D16Y5, D16Y7, D16Y8 engines:



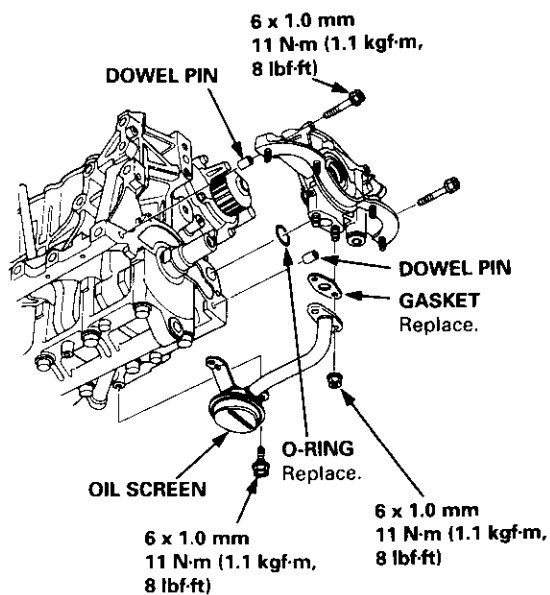


22. Install the oil pump on the cylinder block. Apply grease to the lip of the oil pump seal. Then, install the oil pump onto the crankshaft. When the pump is in place, clean any excess grease off the crankshaft and check that the oil seal lip is not distorted.

B16A2 engine:



D16Y5, D16Y7, D16Y8 engines:



23. Install the oil screen.

24. Install the oil pan (see pages 7-26 or 7-27).

NOTE: Clean the oil pan gasket mating surfaces.