

4. LUBRICATION SYSTEM

LUBRICATION SYSTEM DIAGRAM4-2

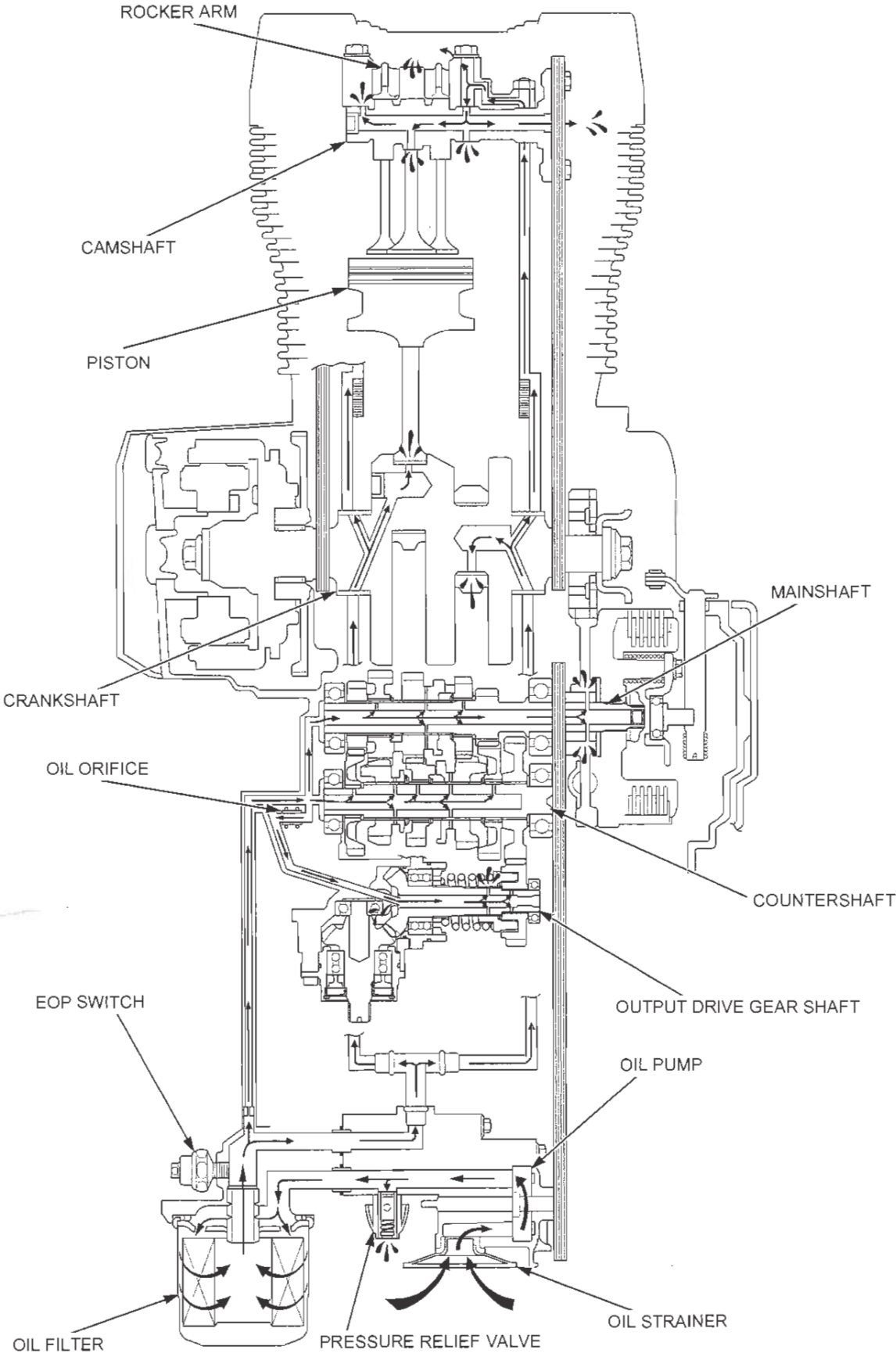
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LUBRICATION SYSTEM DIAGRAM



SERVICE INFORMATION

GENERAL

⚠ CAUTION

Used engine oil may cause skin cancer if repeatedly left in contact with the skin for prolonged periods. Although this is unlikely unless you handle used oil on a daily basis, it is still advisable to thoroughly wash your hands with soap and water as soon as possible after handling used oil.

- The crankcase must be separated to service the oil pump.
- When removing and installing the oil pump, use care not to allow dust or dirt to enter the engine.
- If any portion of the oil pump is worn beyond the specified service limits, replace the oil pump as an assembly.
- After the oil pump has been installed, check that oil pressure is correct.
- For engine oil level check (page 3-11).
- For engine oil and filter change (page 3-12).
- For oil pressure indicator inspection (page 21-20).

SPECIFICATIONS

| ITEM | | STANDARD | SERVICE LIMIT |
|----------------------------|----------------------|--|---------------|
| Engine oil capacity | At draining | 2.5 liters (2.6 US qt, 2.2 Imp qt) | — |
| | At oil filter change | 2.6 liters (2.7 US qt, 2.3 Imp qt) | — |
| | At disassembly | 3.2 liters (3.4 US qt, 2.8 Imp qt) | — |
| Recommended engine oil | | Pro Honda GN4 4-stroke oil (U.S.A. and Canada) or an equivalent API service classification: SG or higher (except oils labeled as energy conserving on the circular API service label) Viscosity: SAE 10W-30 JASO T 903 standard: MA | — |
| Oil pressure at EOP switch | | 530 kPa (5.4 kgf/cm ² , 77 psi) at 5,000 rpm/(80°C/176°F) | — |
| Oil pump rotor | Tip clearance | 0.15 (0.006) | 0.20 (0.008) |
| | Body clearance | 0.15 – 0.21 (0.006 – 0.008) | 0.35 (0.014) |
| | Side clearance | 0.02 – 0.08 (0.001 – 0.003) | 0.10 (0.004) |

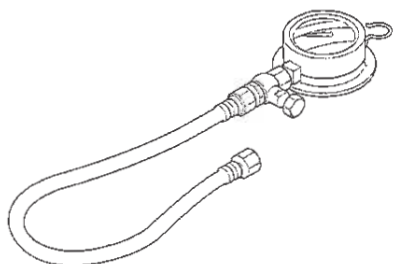
TORQUE VALUES

| | | |
|---------------------------|---------------------------------|------------------------------|
| EOP switch | 12 N·m (1.2 kgf·m, 9 lbf·ft) | Apply sealant to the threads |
| EOP switch terminal screw | 1.9 N·m (0.2 kgf·m, 1.4 lbf·ft) | |
| Oil pump assembly bolt | 13 N·m (1.3 kgf·m, 10 lbf·ft) | |

LUBRICATION SYSTEM

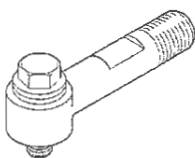
TOOLS

Oil pressure gauge set
07506-3000001



or equivalent commercially available

Oil pressure gauge attachment
07510-4220100



or equivalent commercially available

TROUBLESHOOTING

Oil level too low

- Oil consumption
- External oil leak
- Worn piston rings
- Improperly installed piston rings
- Worn cylinders
- Worn stem seals
- Worn valve guide

Low oil pressure

- Oil level low
- Clogged oil strainer
- Faulty oil pump
- Internal oil leak
- Incorrect oil being used

No oil pressure

- Oil level too low
- Oil pressure relief valve stuck open
- Broken oil pump drive chain
- Broken oil pump drive and/or driven sprocket
- Damaged oil pump
- Internal oil leak

High oil pressure

- Oil pressure relief valve stuck closed
- Clogged oil gallery or metering orifice
- Incorrect oil being used

Oil contamination

- Oil or filter not changed often enough
- Worn piston rings

Oil emulsification

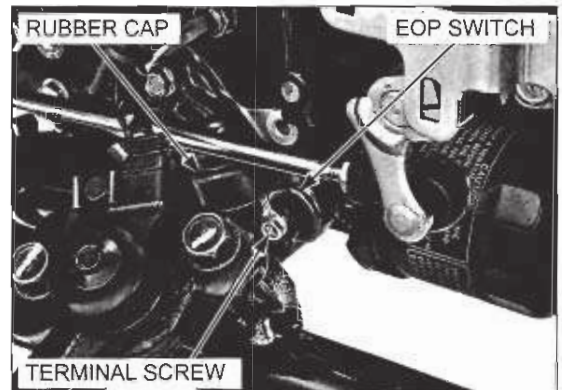
- Blown cylinder head gasket
- Leaky coolant passage
- Entry of water

OIL PRESSURE INSPECTION

Remove the left crankcase rear cover (page 2-4).

If the engine is cold, the pressure reading will be abnormally high. Warm up the engine to normal operating temperature before starting this test. Stop the engine.

Remove the rubber cap and disconnect the EOP switch wire by removing the terminal screw.



Remove the EOP switch and connect an oil pressure gauge attachment and gauge to the EOP switch hole.

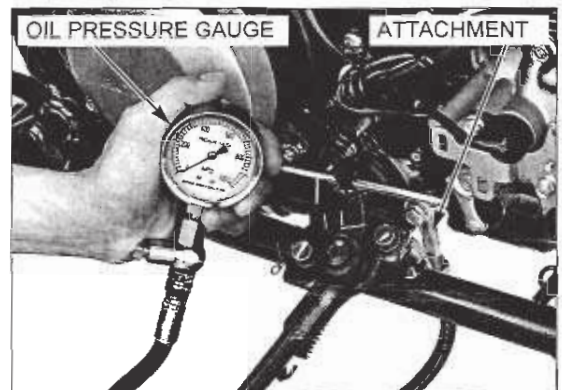
TOOLS:

Oil pressure gauge set

07506-3000001
or equivalent commercially available
(Snap-On MT37A Gauge set)

Oil pressure gauge attachment

07510-4220100
or equivalent commercially available
(Snap-On AT77AH Oil Pressure Adaptor)



Check the oil level and add the recommended engine oil if necessary (page 3-11).

Start the engine and check the oil pressure at 5,000 rpm.

OIL PRESSURE:

530 kPa (5.4 kgf/cm², 77 psi) at 5,000 rpm (80°C/176°F)

Stop the engine.

Do not apply sealant to the thread head 3 – 4 mm (0.1 – 0.2 in).

Apply liquid sealant (Three Bond 1207B or equivalent) to the EOP switch threads as shown and tighten it to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

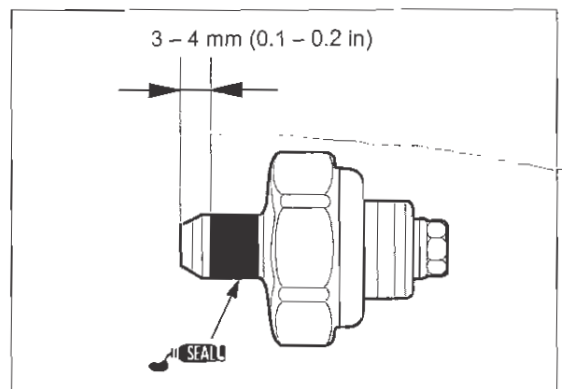
Connect the EOP switch wire and tighten the terminal screw to the specified torque.

TORQUE: 1.9 N·m (0.2 kgf·m, 1.4 lbf·ft)

Install the rubber cap.

Start the engine.

Check that the oil pressure indicator turns off after 1 or 2 seconds. If the oil pressure indicator stays on, stop the engine immediately and determine the cause (page 21-20).



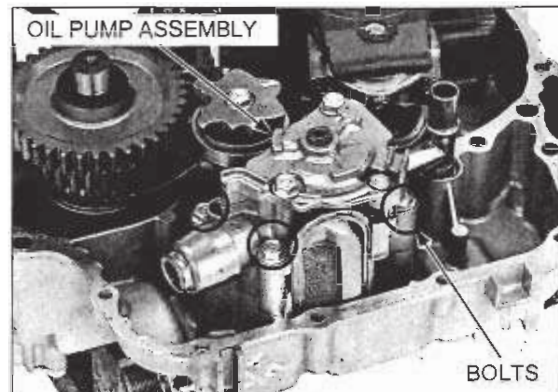
LUBRICATION SYSTEM

OIL PUMP

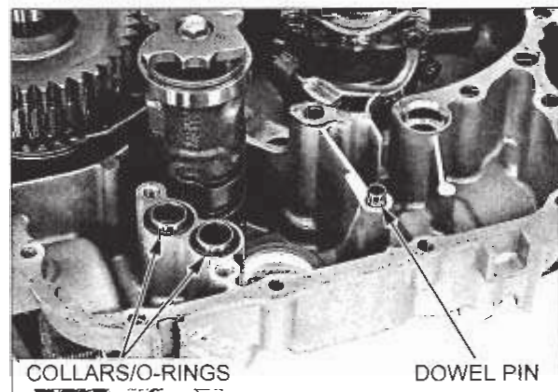
REMOVAL

Separate the crankcase (page 12-9).

Remove the bolts and oil pump assembly from the left crankcase.



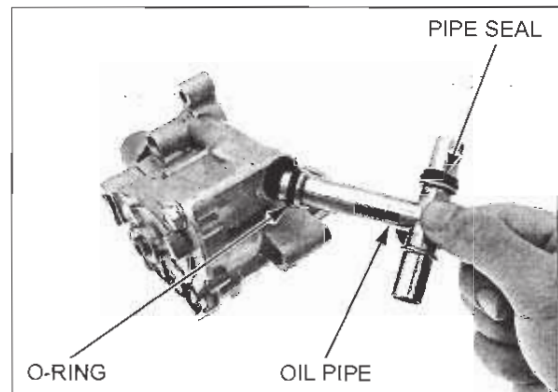
Remove the dowel pin, collars and O-rings.



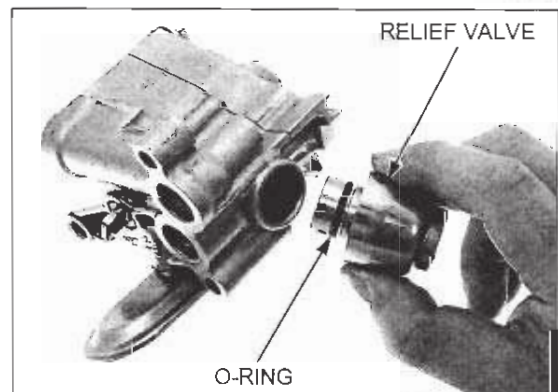
DISASSEMBLY

OIL PUMP BODY

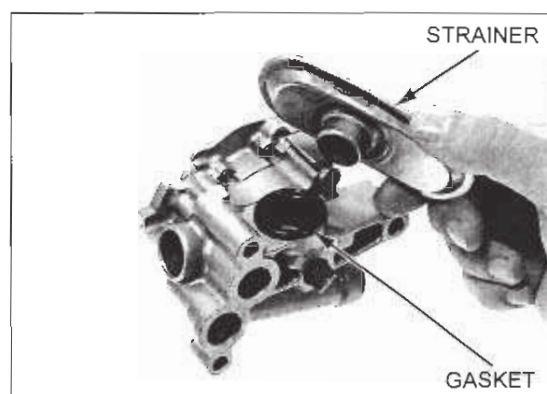
Remove the oil pipe, oil pipe seal and O-ring.



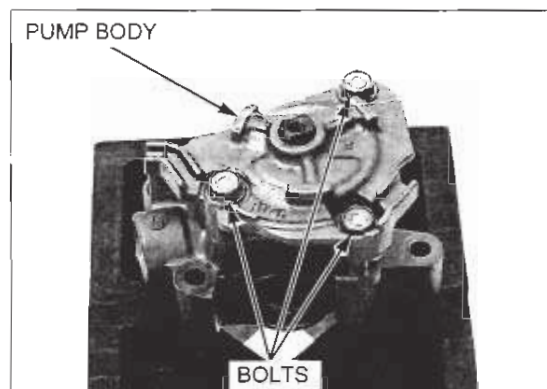
Remove the pressure relief valve and O-ring.



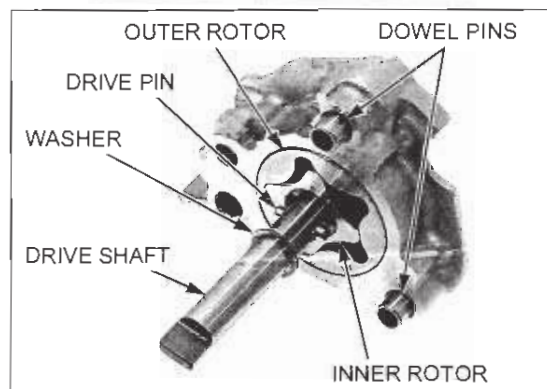
Remove the oil strainer and gasket.



Remove the assembly bolts and pump body from the pump cover.



Remove the dowel pins.
Remove the washer, drive shaft, drive pin, inner and outer rotors.

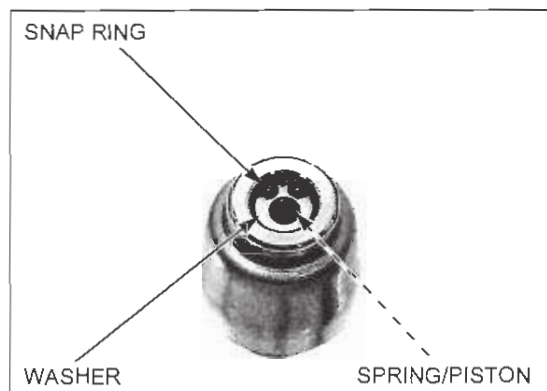


PRESSURE RELIEF VALVE

Check the operation of the pressure relief valve by pushing on the piston.

The snap ring is under spring pressure. Use care when removing it and wear eye and face protection. Be careful not to lose the disassembled parts.

Remove the snap ring, washer, spring and piston from the pressure relief valve body.



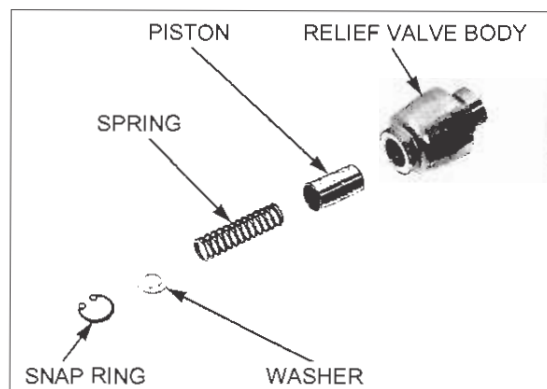
LUBRICATION SYSTEM

Check the piston for wear, sticking or damage.
Check the valve spring for wear or fatigue.
Check the relief valve body for clogging or damage.

Clean all parts and assemble the relief valve in the reverse order of disassembly.

NOTE:

- Install the snap ring with the chamfered edge facing the thrust load side.
- Do not reuse worn snap ring which could easily spin in the groove.
- Check that the snap ring is seated in the groove.



INSPECTION

NOTE:

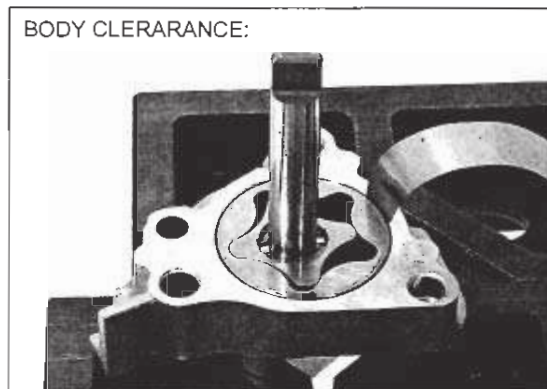
Measure each clearance at several points and use the largest reading to compare the service limit.

BODY CLEARANCE

Temporarily assemble the inner rotor, outer rotor, drive pin and pump shaft into the pump body.

Measure the body clearance.

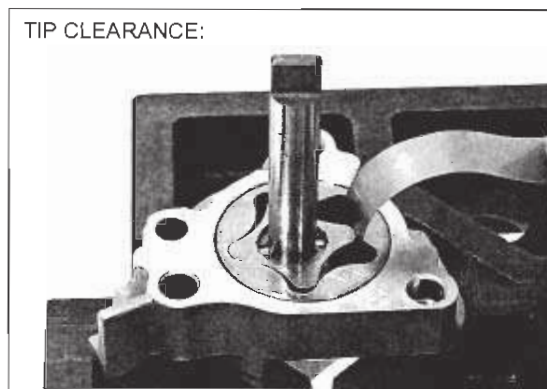
SERVICE LIMIT: 0.35 mm (0.014 in)



TIP CLEARANCE

Measure the tip clearance.

SERVICE LIMIT: 0.20 mm (0.008 in)

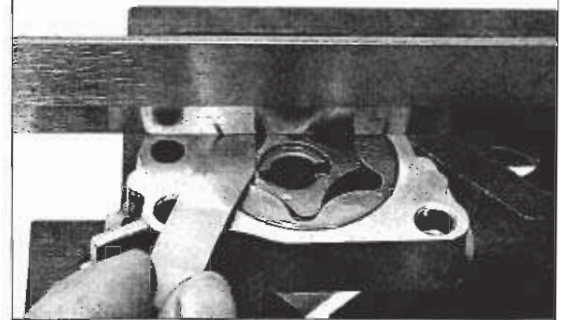


SIDE CLEARANCE

Measure the side clearance.

SERVICE LIMIT: 0.10 mm (0.004 in)

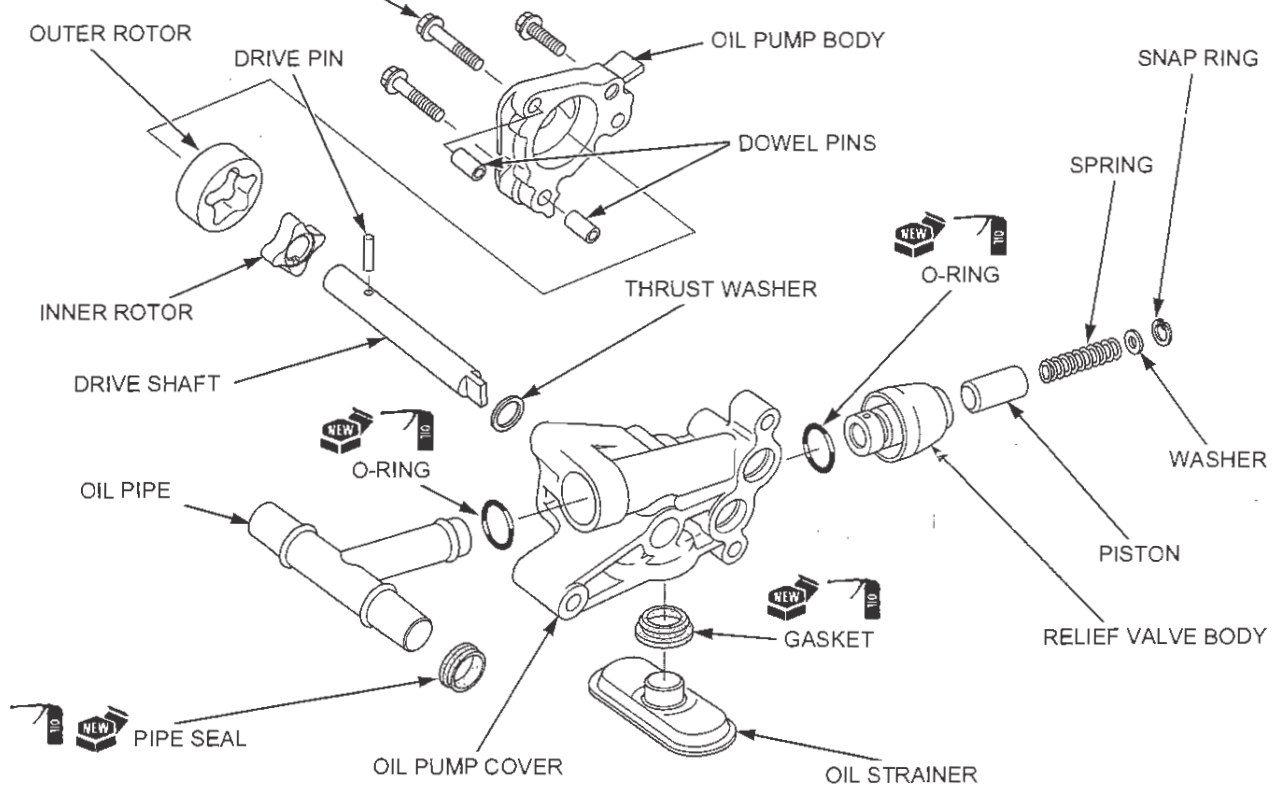
SIDE CLEARANCE:



OIL PUMP ASSEMBLY

Dip all parts in clean engine oil.

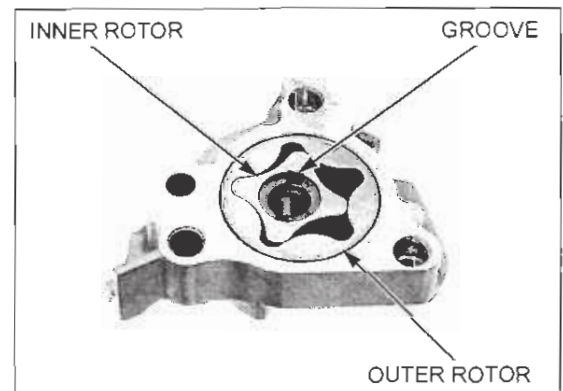
13 N·m (1.3 kgf·m, 10 lbf·ft)



Install the outer and inner rotors to the pump body.

NOTE:

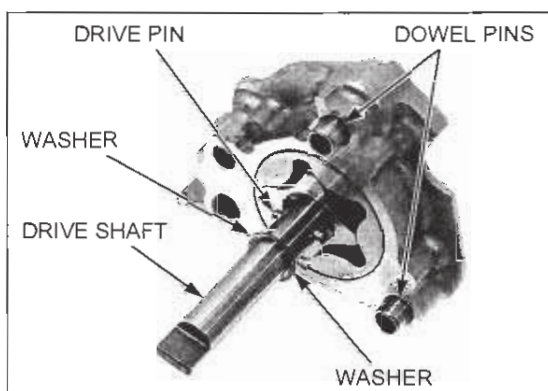
Install the inner rotor with the groove side facing the pump cover.



LUBRICATION SYSTEM

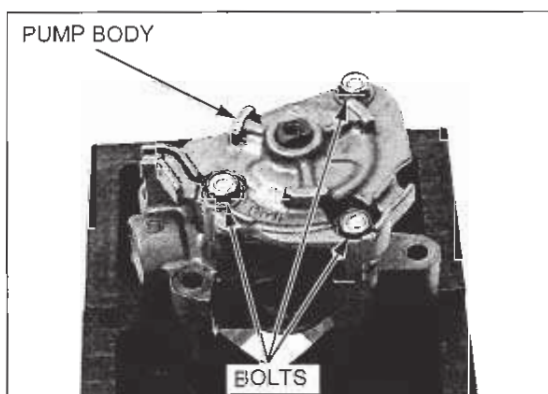
Install the drive shaft and drive pin by aligning the drive pin with the grooves in the inner rotor.

Place the washer into the inner rotor groove.
Install the dowel pins to the pump body.



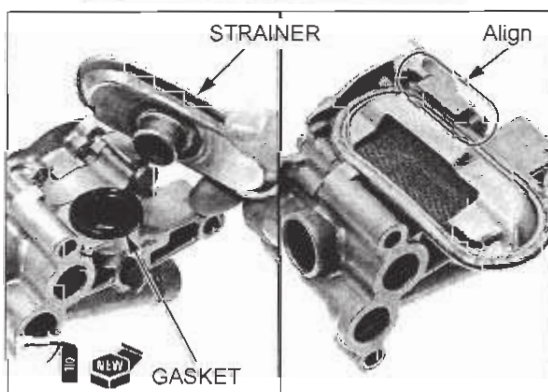
Install the pump cover on the pump body.
Install and tighten the assembly bolts to the specified torque.

TORQUE: 13 N·m (1.3 kgf·m, 10 lbf·ft)



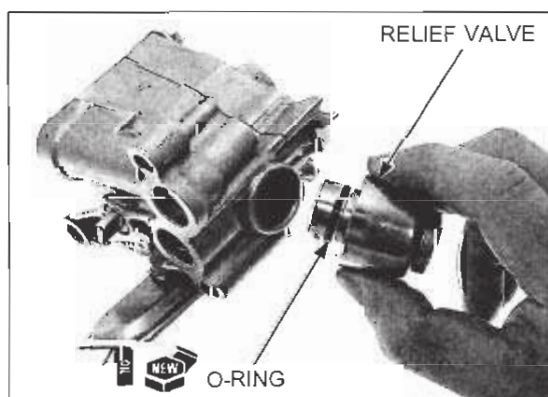
Clean the oil strainer.

Coat a new gasket with engine oil and install it to the pump body.
Install the oil strainer to the pump cover by aligning its side end with the groove on the pump cover.



Coat a new O-ring with engine oil and install it to the pressure relief valve.

Install the pressure relief valve into the pump cover.

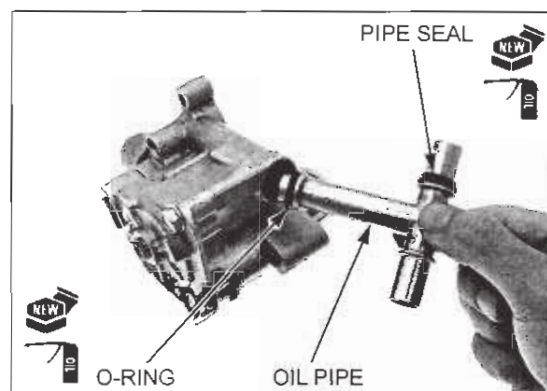


Coat a new oil pipe seal and new O-ring with engine oil, then install them to the oil pipe.

NOTE:

Install an O-ring with its tapered side facing out.

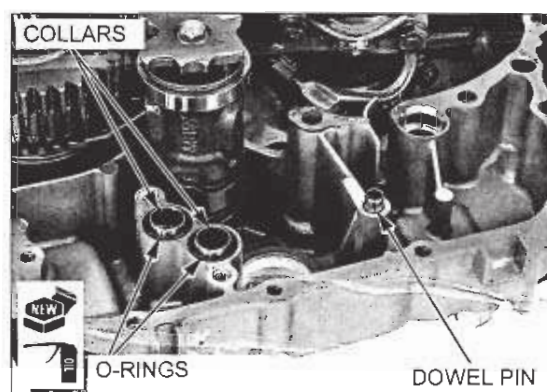
Install the oil pipe to the pump cover securely.



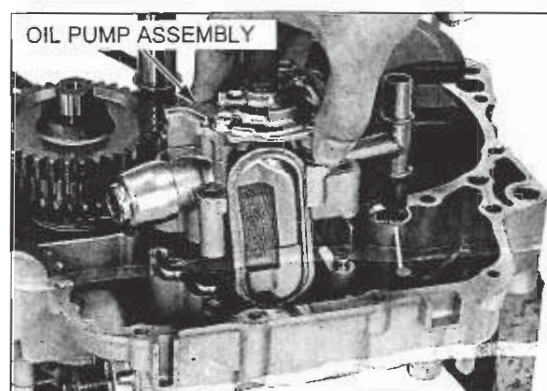
INSTALLATION

Install the dowel pin and collars.

Coat new O-rings with engine oil and install them.



Install the oil pump assembly into the crankcase securely.



Install and tighten the bolts securely.

Assemble the crankcase (page 12-49).

Check the oil pressure (page 4-5).

