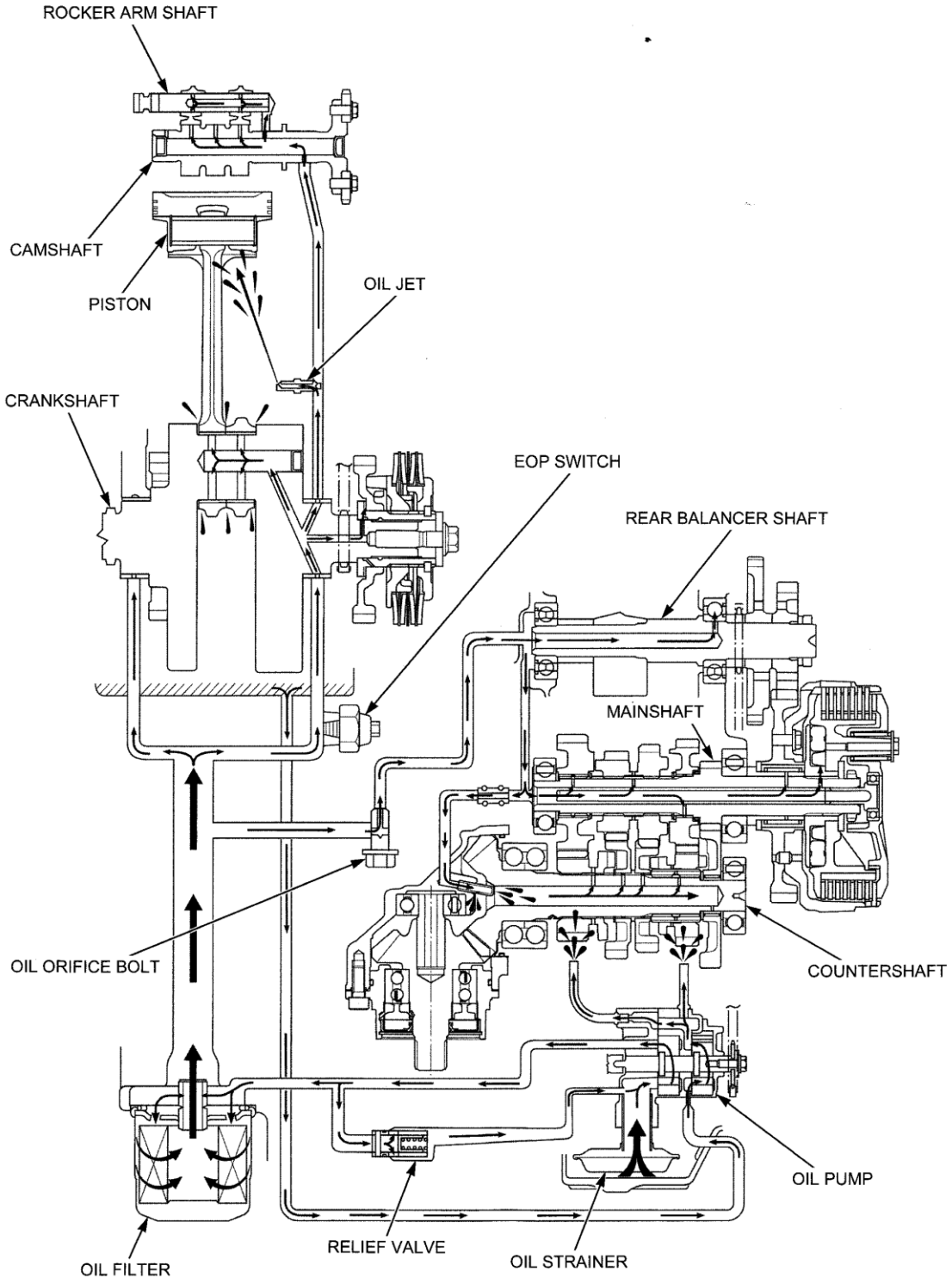
5. LUBRICATION SYSTEM

5

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.

- This section covers service of the oil pump and oil jet.
- The oil pump has twin pump rotors; main and scavenging. The main rotors pick up oil from the transmission division of the crankcase and delivers it under pressure to the bearing and other important parts of the engine. The scavenge rotors draw oil from the crankshaft division of the crankcase and sends it to the transmission gears to lubricate and cool them.
- The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and may lead to death. Run the engine in an open area or with an exhaust evacuation system in an enclosed area.
- The crankcase must be separated to service the oil pump (page 13-7).
- The cylinder must be removed to service the oil jet (page 10-4).
- For EOP switch inspection (page 22-19)

SPECIFICATIONS

Unit: mm (in)

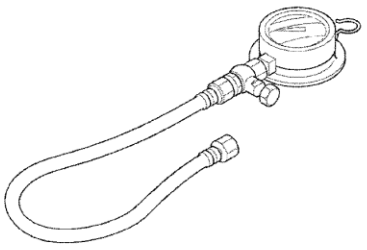
ITEM		STANDARD	SERVICE LIMIT
Engine oil capacity	At draining	3.5 liters (3.7 US qt, 3.1 Imp qt)	–
	At filter change	3.7 liters (3.9 US qt, 3.3 Imp qt)	–
	At disassembly	4.3 liters (4.5 US qt, 3.8 Imp qt)	–
Recommended engine oil		Pro Honda GN4 4-stroke oil (U.S.A. and Canada) or equivalent motor oil API service classification SG or Higher JASO T 903 standard: MA Viscosity: SAE 10W-30	–
Engine oil pressure at oil pressure switch at 5,000 rpm/ (80°C/176°F)		530 kPa (5.4 kgf/cm², 77 psi)	–
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	0.04 – 0.09 (0.002 – 0.004)	0.10 (0.004)

TORQUE VALUES

EOP switch	12 N·m (1.2 kgf·m, 9 lbf·ft)	Apply liquid sealant to the threads.
EOP switch terminal screw	2.2 N·m (0.2 kgf·m, 1.6 lbf·ft)	
Oil pump assembly bolt	13 N·m (1.3 kgf·m, 10 lbf·ft)	
Oil strainer bolt	13 N·m (1.3 kgf·m, 10 lbf·ft)	
Oil orifice bolt	14 N·m (1.4 kgf·m, 10 lbf·ft)	Apply engine oil to the threads and seating surface.

TOOL

Oil pressure gauge set
07506-3000001



or MT37H (Snap-On)
or equivalent commercially available in U.S.A.

TROUBLESHOOTING

Oil level too low, high oil consumption
- Normal oil consumption
- External oil leaks
- Worn piston ring
- Improperly installed piston ring
- Worn cylinder
- Faulty valve stem seal
- Worn valve guide
- Worn or damaged oil pump

Low oil pressure
- Oil pressure relief valve stuck open
- Oil level low
- Clogged oil strainer
- Clogged oil orifice
- Faulty oil pump
- Internal oil leaks
- Incorrect oil being used
- Worn or damaged oil pump

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 leaks

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 ring
- Improperly installed piston ring
- Worn cylinder
- Faulty valve stem seal
- Worn valve guide
- Faulty cylinder head gasket

Oil emulsification
- Faulty cylinder head gasket
- Leaky coolant passage
- Entry of water
- Faulty water pump mechanical seal

OIL PRESSURE CHECK

NOTE:

- The exhaust system becomes very hot and remains hot for some time after the engine is run. Wear insulated gloves or wait until the exhaust system have cooled before handling.

If the engine is cold, the pressure reading will be abnormally high.

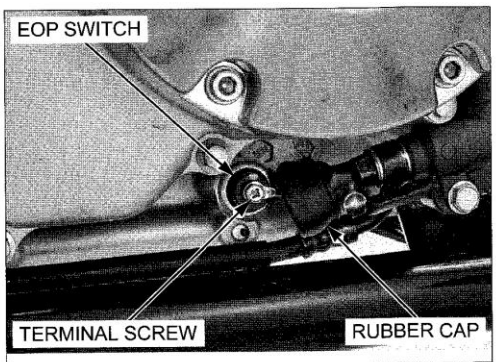
Check the engine oil level (page 4-12).

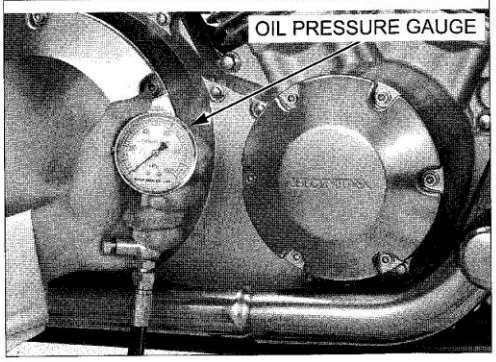
Remove the exhaust system (page 3-10).

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

Remove the EOP switch.

Connect an oil pressure gauge attachment and gauge.





TOOLS:

Oil pressure gauge set	**07506-3000001 or MT37H (Snap-On) or equivalent commercially available in U.S.A.**
Oil pressure gauge attachment	**AT77 and MT26E3 (Snap-On) or equivalent commercially available in U.S.A.**

Install the exhaust system (page 3-17).

Start the engine and check the oil pressure at 5,000 rpm and 80°C (176°F).

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

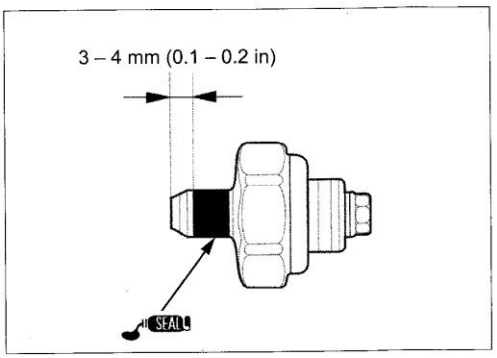
Stop the engine.

Remove the exhaust system (page 3-10).

Disconnect the oil pressure gauge and attachment.

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 install it.



Tighten the EOP switch to the specified torque.

TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)

Connect the EOP switch wire by installing the terminal screw.

Tighten the terminal screw to the specified torque.

TORQUE: 2.2 N·m (0.2 kgf·m, 1.6 lbf·ft)

Reposition the rubber cap securely.

Install the exhaust system (page 3-17).

Start the engine and 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 22-19).

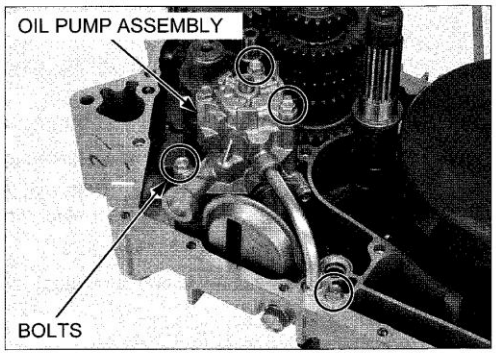
Check the engine oil level (page 4-12).

OIL PUMP/OIL STRAINER/PRESSURE RELIEF VALVE

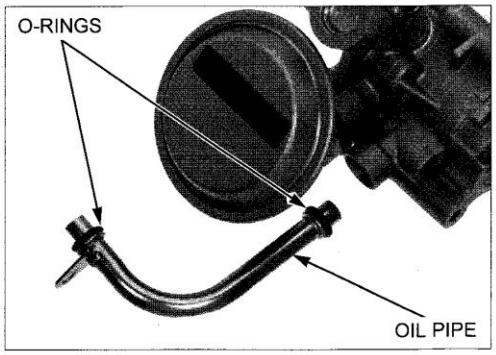
REMOVAL

Separate the crankcase (page 13-7).

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

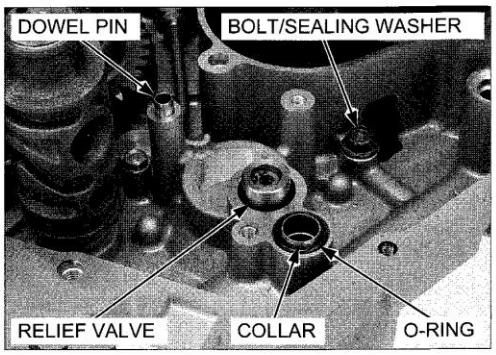


Remove the oil pipe and O-rings.

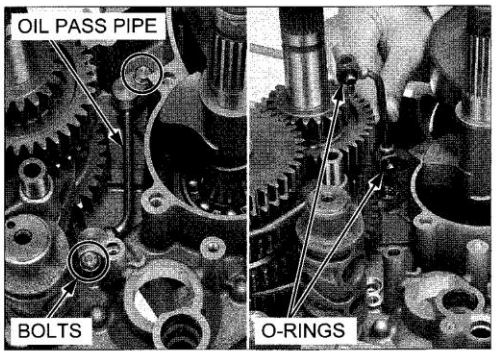


Remove the following:

- Dowel pin
- Oil joint collar
- O-ring
- Pressure relief valve
- Oil orifice bolt
- Sealing washer



Remove the bolts, oil pass pipe and O-rings.

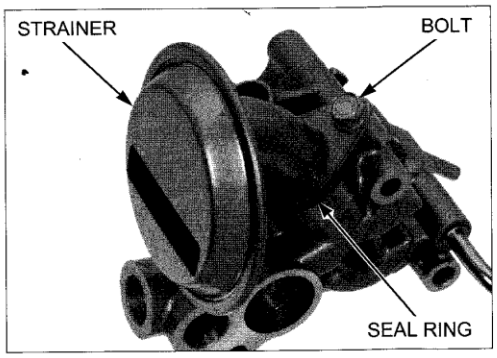


DISASSEMBLY

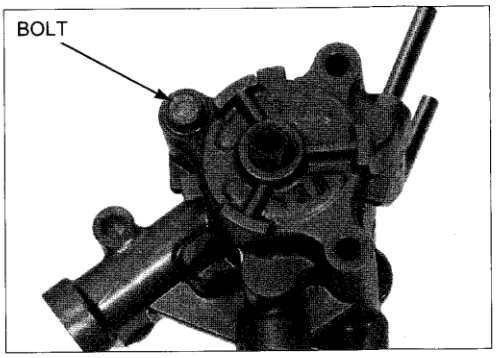
Remove the bolt, oil strainer and seal ring.

Check the oil strainer for damage or clogs. Clean the oil strainer screen.

Replace the oil strainer if necessary.

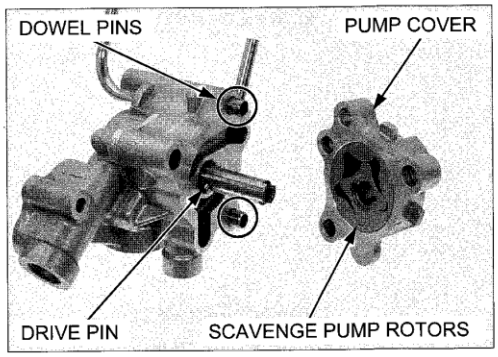


Remove the oil pump assembly bolt.



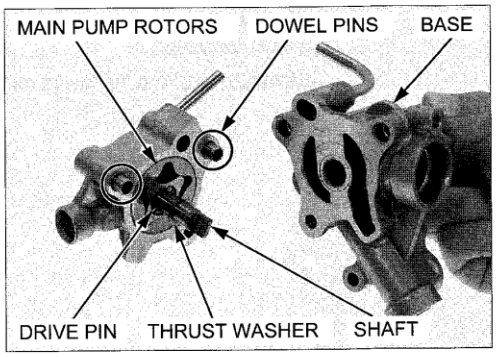
Remove the following:

- Oil pump cover
- Dowel pins
- Drive pin
- Scavenge pump inner and outer rotors



Remove the following:

- Oil pump base
- Dowel pins
- Thrust washer
- Pump shaft
- Drive pin
- Main pump inner and outer rotors



OIL PUMP INSPECTION

NOTE:

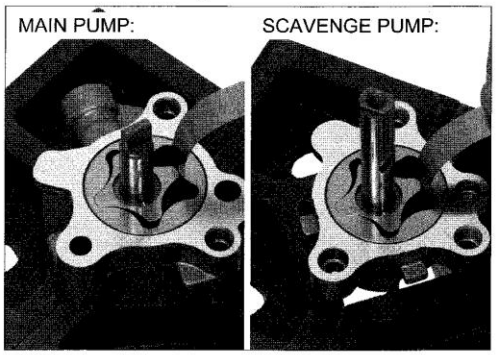
- Measure at several points and use the largest reading to compare the service limit.
- If any portion of the oil pump is worn beyond the specified service limits, replace the oil pump and oil pump cover as an assembly.

Temporarily assemble the inner rotor, outer rotor, drive pin and pump shaft into the pump body (main pump) or pump cover (scavenge pump).

TIP CLEARANCE

Measure the tip clearance for the main and scavenge pumps.

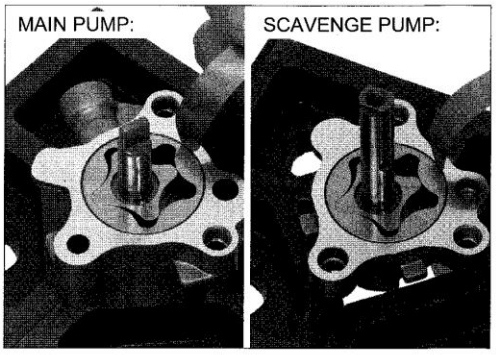
SERVICE LIMIT: 0.20 mm (0.008 in)



BODY CLEARANCE

Measure the pump body clearance for the main and scavenge pumps.

SERVICE LIMIT: 0.35 mm (0.014 in)

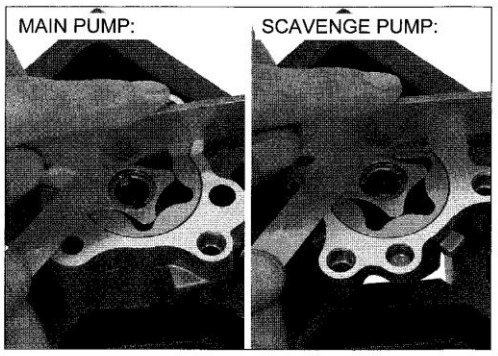


SIDE CLEARANCE

Remove the pump shaft and drive pin.

Measure the pump side clearance for the main and scavenge pumps.

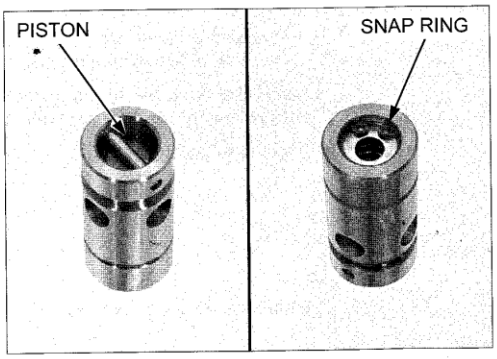
SERVICE LIMIT: 0.10 mm (0.004 in)



PRESSURE RELIEF VALVE INSPECTION

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

Disassemble the relief valve by removing the snap ring.



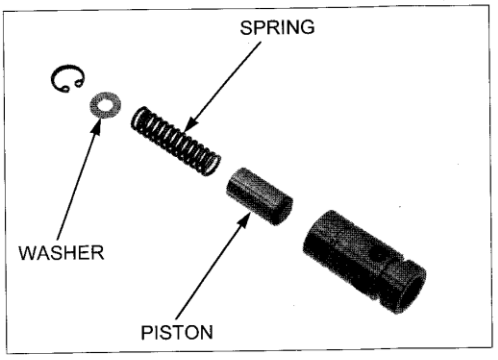
Remove the washer, spring and piston.

Check the piston for wear, sticking or damage.
Check the spring for fatigue or damage.

Assemble the relief valve in the reverse order of disassembly.

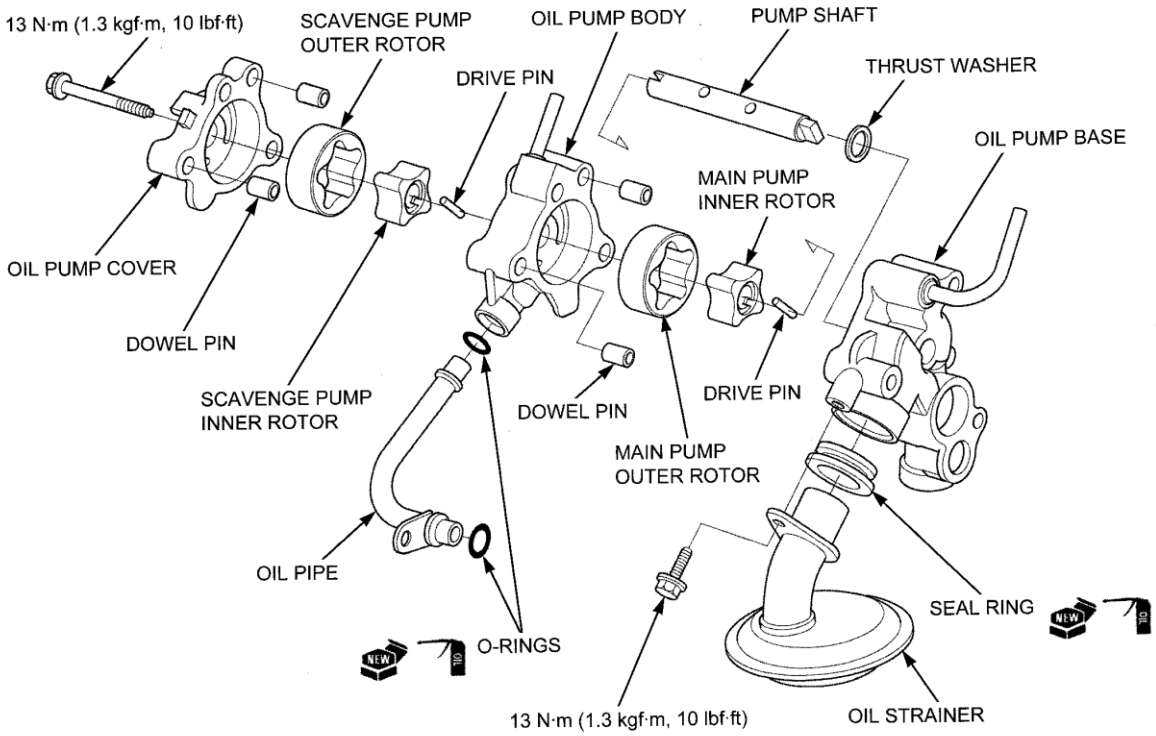
NOTE:

- Install the snap ring with the chamfered edges facing the thrust load side.
- Make sure the snap ring is seated in the groove.



ASSEMBLY

Dip all parts in clean engine oil.



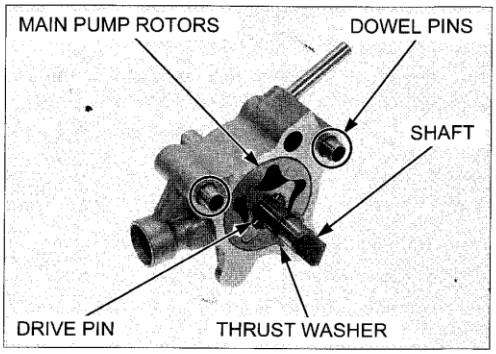
Install the main pump rotors and dowel pins to the pump body.

NOTE:

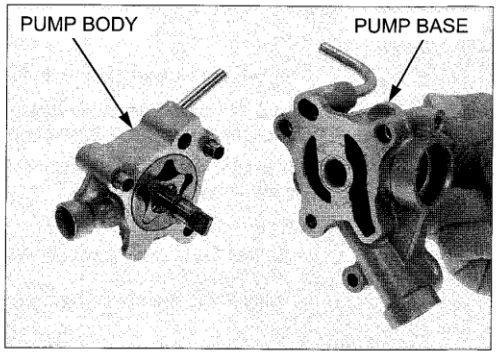
- Install the inner rotor with the groove side facing the outside of the oil pump body.

Install the drive pin to the pump shaft and install them while aligning the drive pin with the inner rotor groove.

Install the thrust washer.



Install the oil pump base to the oil pump body.

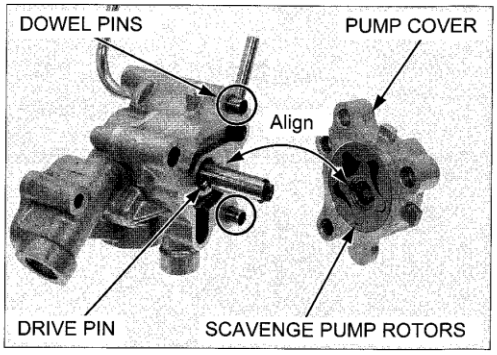


Install the scavenge pump rotors to the oil pump cover.

NOTE:

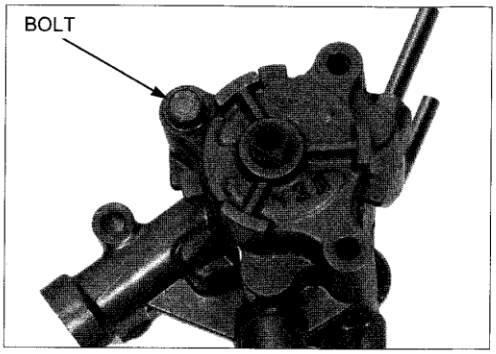
- Install the inner rotor with the groove side facing the outside of the oil pump cover.

Install the dowel pins to the oil pump base.
Install the drive pin to the pump shaft and install the oil pump cover while aligning the drive pin with the inner rotor groove.



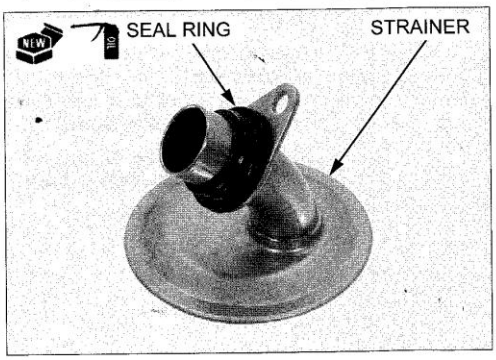
Install and tighten the oil pump assembly bolt to the specified torque.

TORQUE: 13 N·m (1.3 kgf·m, 10 lbf·ft)



Apply engine oil to a new seal ring entire surface and install it to the oil strainer as shown.

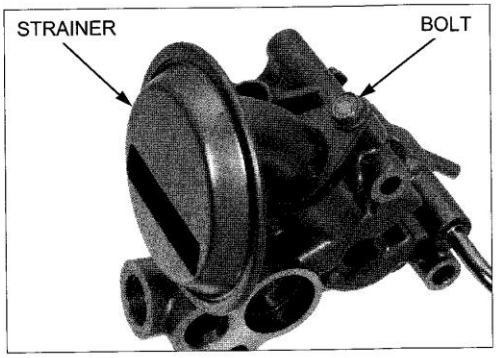
NOTE:
- Make sure the seal ring is installed properly.



Install the oil strainer onto the oil pump.

Install and tighten the bolt to the specified torque.

TORQUE: 13 N·m (1.3 kgf·m, 10 lbf·ft)

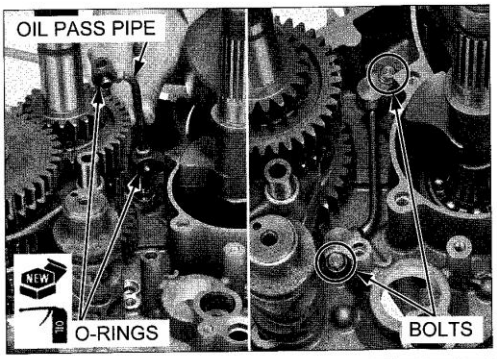


INSTALLATION

Apply engine oil to new O-rings and install them onto the oil pass pipe.

Install the oil pass pipe onto the left crankcase.

Install and tighten the bolts.

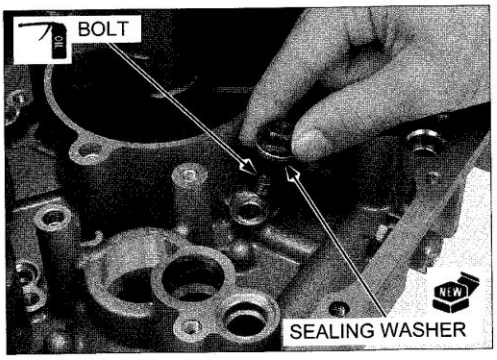


Clean the oil orifice bolt with compressed air.

Apply engine oil to the oil orifice bolt threads and seating surface.

Install the oil orifice bolt and new sealing washer. Tighten the bolt to the specified torque.

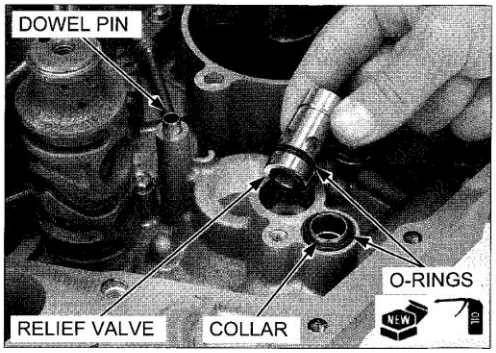
TORQUE: 14 N·m (1.4 kgf·m, 10 lbf·ft)



Install the dowel pin and oil joint collar.

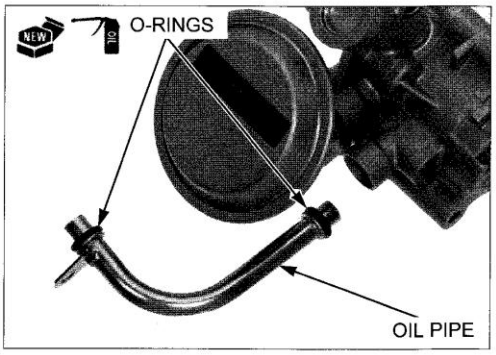
Apply engine oil to a new O-ring and install it onto the oil joint collar.
Apply engine oil to a new O-ring and install it to the pressure relief valve groove.

Install the pressure relief valve into the left crankcase with its O-ring side facing down.



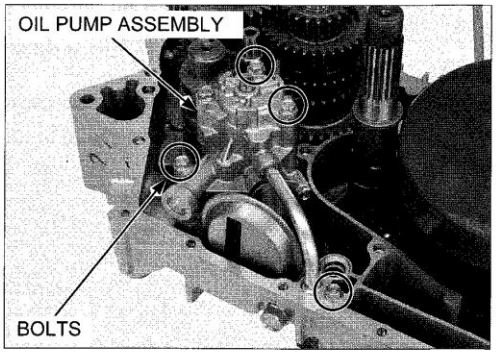
Apply engine oil to new O-rings and install them to the oil pipe.

Install the oil pipe into the oil pump.



Install the oil pump assembly onto the left crankcase. Install and tighten the mounting bolts.

Assemble the crankcase (page 13-28).



OIL JET

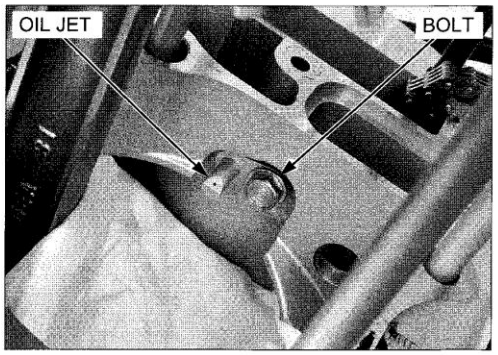
REMOVAL/INSPECTION

NOTE:
- The front and rear oil jet service procedures are the same.

Remove the cylinder (page 10-4).

Remove the bolt and oil jet.

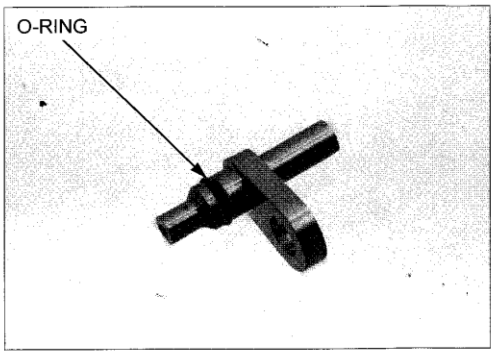
Place the clean shop towel at the opening of the crankcase to prevent the oil jet and bolt from falling into the crankcase.



Remove the O-ring.

Check the oil jet for damage or clogs.
Blow out the oil jet with compressed air.

Replace the oil jet if necessary.

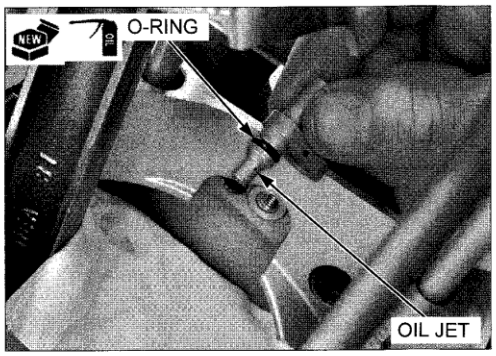


INSTALLATION

Apply engine oil to a new O-ring and install it to the oil jet groove.

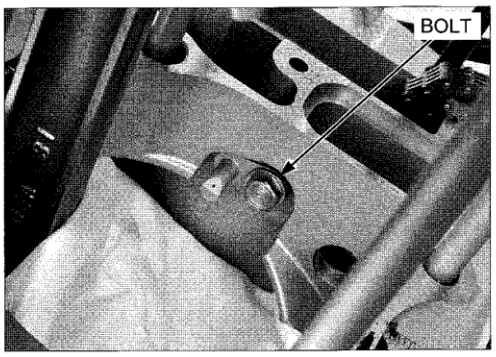
Place the clean shop towel at the opening of the crankcase to prevent the oil jet and bolt from falling into the crankcase.

Install the oil jet into the crankcase.



Install and tighten the bolt.

Install the cylinder (page 10-10).



MEMO