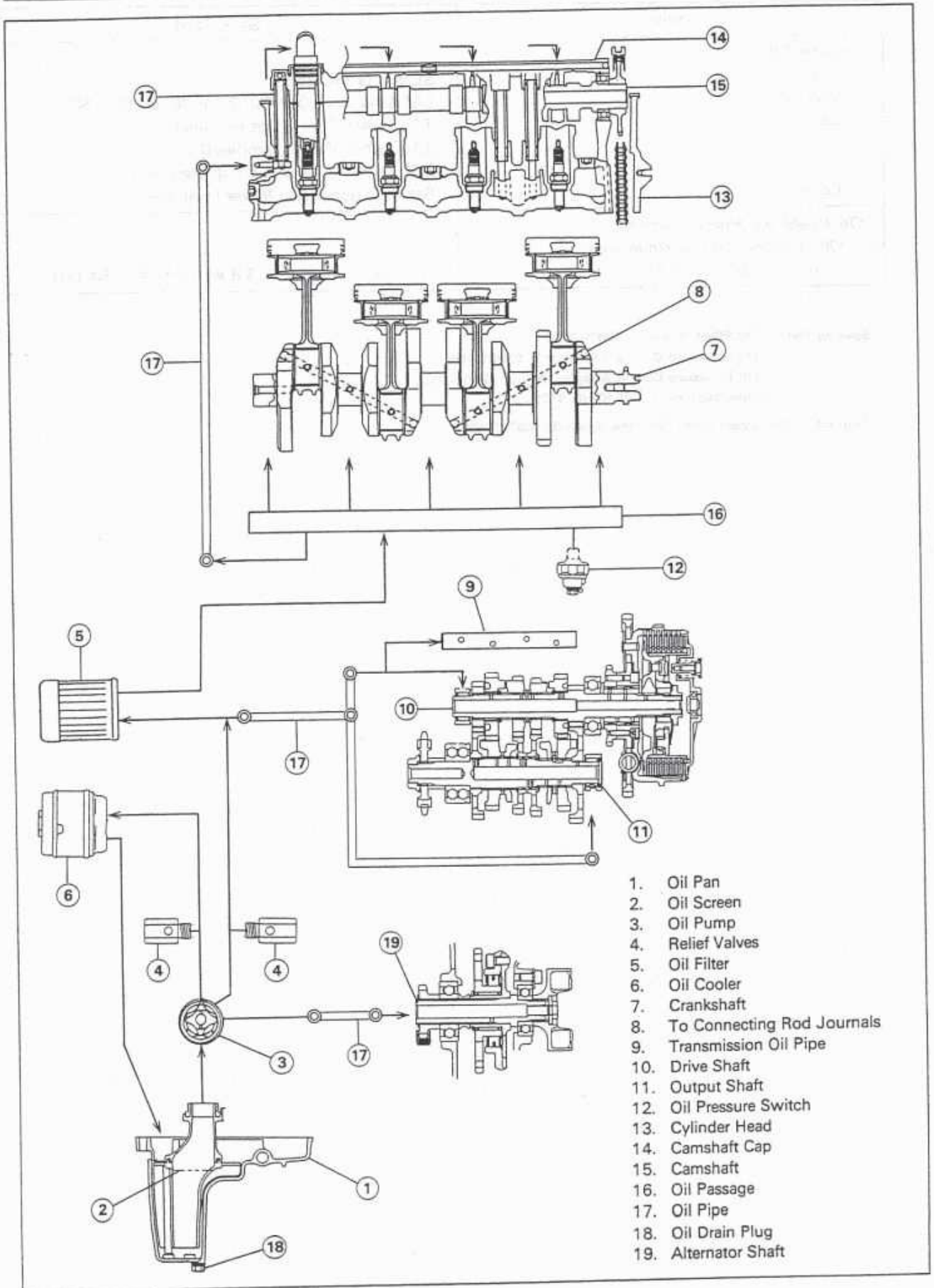


Engine Lubrication System

Table of Contents

Exploded View	6-2
Engine Oil Flow Chart.....	6-3
Specifications	6-4
Engine Oil and Oil Filter.....	6-5
Oil Level Inspection	6-5
Engine Oil Change.....	6-5
Oil Filter Change	6-6
Oil Cooler.....	6-7
Oil Cooler Removal.....	6-7
Oil Cooler Installation	6-7
Oil Pan	6-8
Oil Pan Removal	6-8
Oil Pan Installation.....	6-8
Oil Pump.....	6-9
Oil Pump Removal.....	6-9
Oil Pump Installation	6-9
Oil Pressure Measurement.....	6-10
Oil Pressure Measurement.....	6-10
Relief Valve.....	6-11
Relief Valve Inspection	6-11

Engine Oil Flow Chart



1. Oil Pan
2. Oil Screen
3. Oil Pump
4. Relief Valves
5. Oil Filter
6. Oil Cooler
7. Crankshaft
8. To Connecting Rod Journals
9. Transmission Oil Pipe
10. Drive Shaft
11. Output Shaft
12. Oil Pressure Switch
13. Cylinder Head
14. Camshaft Cap
15. Camshaft
16. Oil Passage
17. Oil Pipe
18. Oil Drain Plug
19. Alternator Shaft

6-4 ENGINE LUBRICATION SYSTEM

Specifications

Item	Standard
Engine Oil: Grade Viscosity Capacity Level	SE, SF, or SG class SAE 10W-40, 10W-50, 20W-40, or 20W-50 3.0L (when filter is not removed) 3.1L (when filter is removed) 3.6L (when engine is completely dry) Between upper and lower level lines
Oil Pressure Measurement: Oil pressure @4,000 r/min(rpm), oil temp. 80°C(176°F)	314 ~ 373 kPa(3.2 ~ 3.8 kg/cm ² , 46 ~ 54 psi)

Special Tool – Oil Filter Wrench: 57001-1249

Oil Pressure Gauge, 10 kg/cm²: 57001-164

Oil Pressure Gauge Adapter, PT 1/8: 57001-1033

Bearing Driver Set: 57001-1129

Sealant – Kawasaki Bond (Silicone Sealant): 56019-120

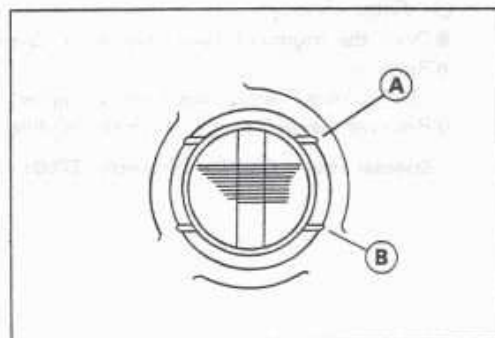
Engine Oil and Oil Filter

⚠ WARNING

Motorcycle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine or transmission seizure, accident, and injury.

Oil Level Inspection

- Check that the engine oil level is between the upper [A] and lower [B] levels in the gauge.

**NOTE**

- Situate the motorcycle so that it is perpendicular to the ground.
- If the motorcycle has just been used, wait several minutes for all the oil to drain down.
- If the oil has just been changed, start the engine and run it for several minutes at idle speed. This fills the oil filter with oil. Stop the engine, then wait several minutes until the oil settles.

CAUTION

Racing the engine before the oil reaches every part can cause engine seizure.

If the engine oil gets extremely low or if the oil pump or oil passages clog up or otherwise do not function properly, the oil pressure warning light will light. If this light stays on when the engine is running above idle speed, stop the engine immediately and find the cause.

Engine Oil Change

- Support the motorcycle perpendicular to the ground after warming up the engine.
- Remove the engine drain plug [A] to drain the oil.
- The oil in the oil filter can be drained by removing the filter (see Oil Filter Change).
- ★ Replace the drain plug gasket with a new one if it is damaged.
- Tighten the drain plug.

Torque – Engine Drain Plug: 20 N·m (2.0 kg·m, 14.5 ft·lb)

- Pour in the specified type and amount of oil.

Engine Oil

Grade: SE, SF or SG class
Viscosity: SAE 10W40, 10W50, 20W40, or 20W50
Amount: 3.0 L (when filter is not removed)
 3.1 L (when filter is removed)
 3.6 L (when engine is completely dry)

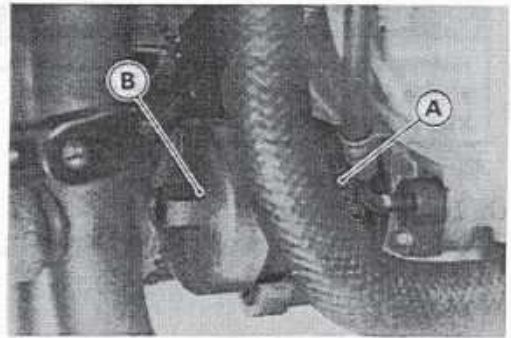


6-6 ENGINE LUBRICATION SYSTEM

Oil Filter Change

- Drain the engine oil (see Engine Oil Change).
- Remove:
 - Left Lower Fairing (see Frame chapter)
- Remove the oil filter [A] with the oil filter wrench [B].

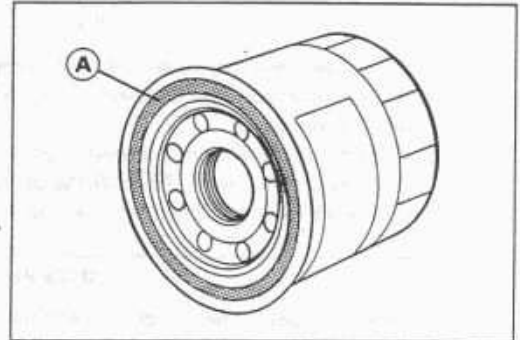
Special Tool – Oil Filter Wrench: 57001-1249



- Replace the filter with a new one.
- Apply grease to the gasket [A] before installation.
- Tighten the filter with the oil filter wrench or with hands about $\frac{3}{4}$ turns after the gasket contacts the mounting surface of the engine.

Torque – Oil Filter: 9.8 N-m (1.0 kg-m, 87 in-lb) or Hand-tight

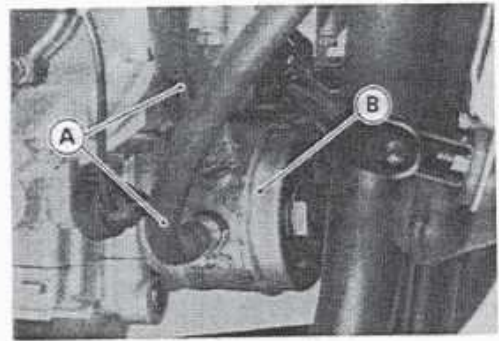
- Pour in the specified type and amount of oil (see Engine Oil Change).



Oil Cooler

Oil Cooler Removal

- Drain:
 - Engine Oil (see Engine Oil Change)
 - Coolant (see Cooling System chapter)
- Remove the oil cooler hoses [A] from the oil cooler [B].

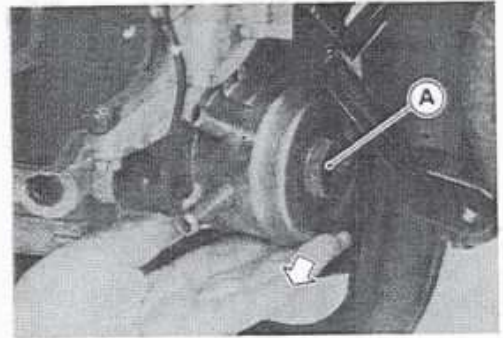


- Unscrew the oil cooler bolt [A] from the crankcase.

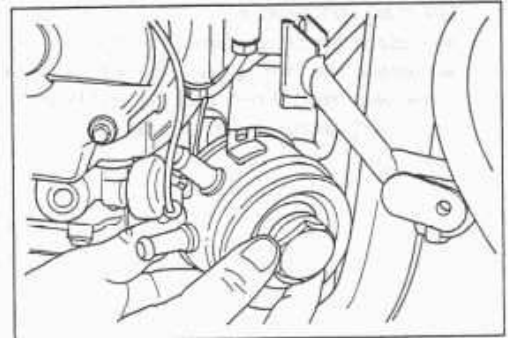
NOTE

○ Do not remove the bolt from the oil cooler body.

- Move the front part of the oil cooler and bolt to the right.

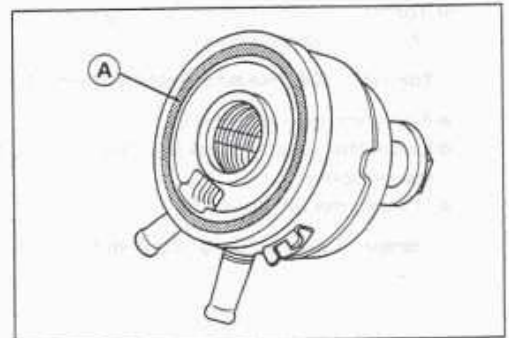


- Remove the oil cooler with the oil cooler bolt.



Oil Cooler Installation

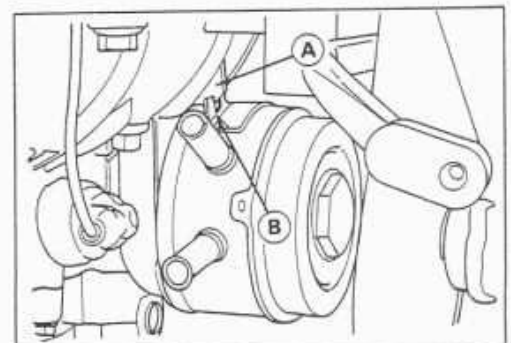
- Installation is the reverse of removal. Note the following.
- Apply grease to the O-ring [A] before installation.
- Apply engine oil to the oil cooler bolt, and install the oil cooler with the bolt.



- Install the oil cooler so that the crankcase rib [A] fits the slot [B] of the oil cooler.
- Tighten the oil cooler bolt.

Torque – Oil Cooler Bolt: 49 N-m (5.0 kg-m, 36 ft-lb)

- Pour:
 - Engine Oil (see Engine Oil Change)
 - Coolant (see Cooling System chapter)



6-8 ENGINE LUBRICATION SYSTEM

Oil Pan

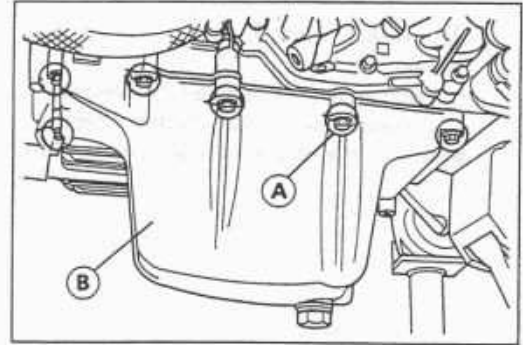
Oil Pan Removal

● Drain:

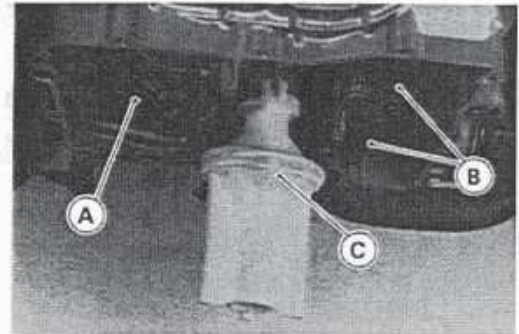
- Engine Oil (see Engine Oil Change)
- Coolant (see Cooling System chapter)

● Remove:

- Radiator (see Cooling System chapter)
- Muffler (see Engine Top End chapter)
- Oil Pan Bolts [A]
- Oil Pan [B]

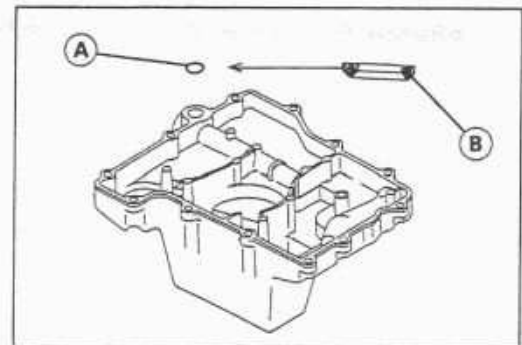


- Remove the oil pipe [A], oil pressure relief valves [B] and oil screen [C] as necessary.



Oil Pan Installation

- Replace the oil pan gasket with a new one.
- Replace the O-ring [A] with a new one if it is damaged. The O-ring between the oil pan and the crankcase must be installed with the flat side [B] facing the crankcase.

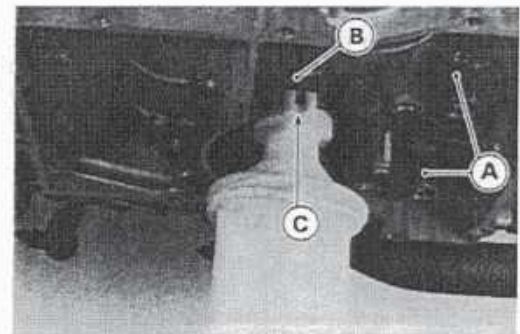


- Apply a non-permanent locking agent to the threads of the relief valves [A], and tighten them.

Torque – Oil Pressure Relief Valves: 15 N-m (1.5 kg-m, 11.0 ft-lb)

- Apply engine oil to the O-rings on the oil pipes.
- Install the oil screen so that the crankcase rib [B] fits the slot [C] of the oil screen.
- Tighten the oil pan bolts.

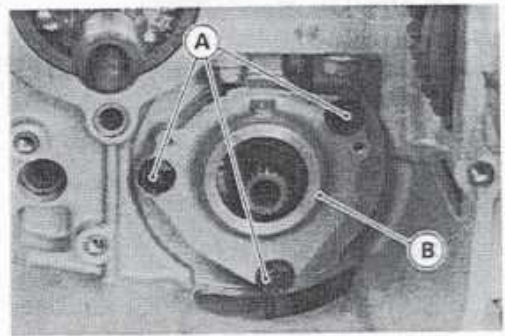
Torque – Oil Pan Bolts: 9.8 N-m (1.0 kg-m, 87 in-lb)



Oil Pump

Oil Pump Removal

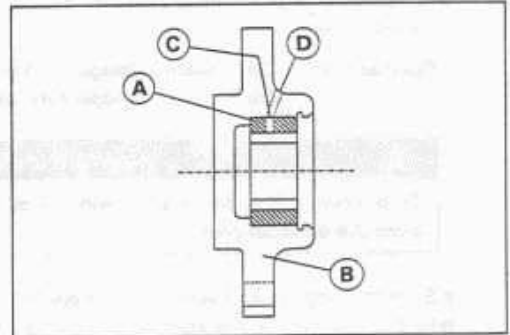
- Drain the engine oil (see Engine Oil Change)
- Remove:
 - Right Lower Fairing (see Frame chapter)
 - Clutch (see Clutch chapter)
 - Alternator Chain (see Crankshaft/Transmission)
 - Oil Pump Bolts [A]
 - Oil Pump Assembly [B]



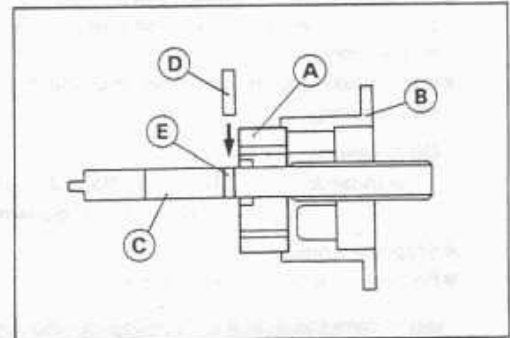
Oil Pump Installation

- When pressing the needle bearing [A] into the pump cover [B], align the $\Phi 2.5$ mm hole [C] in the bearing with the $\Phi 3.0$ mm hole [D] in the cover.

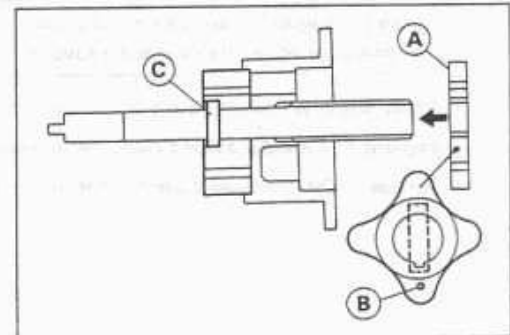
Special Tool – Bearing Driver Set: 57001-1129



- Install the main rotor [A] and the pump body [B] onto the pump shaft [C].
- Install the pin [D] into the pin hole [E].

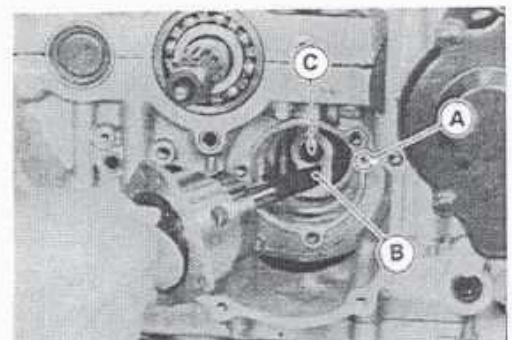


- Install the subrotor [A] so that the mark [B] on the subrotor aligns with the pin [C].



- Be sure to install the pin [A].
- Turn the oil pump shaft so that the pump shaft projection [B] fits the slot [C] in the end of the water pump shaft.
- Install the pump cover.
- Apply a non-permanent locking agent to the threads of the oil pump bolts, and tighten them.

Torque – Oil Pump Bolts: 12 N-m (1.2 kg-m, 104 in-lb)



6-10 ENGINE LUBRICATION SYSTEM

Oil Pressure Measurement

Oil Pressure Measurement

- Remove:
 - Right Lower Fairing (see Frame chapter)
 - Oil Pressure Switch [A]

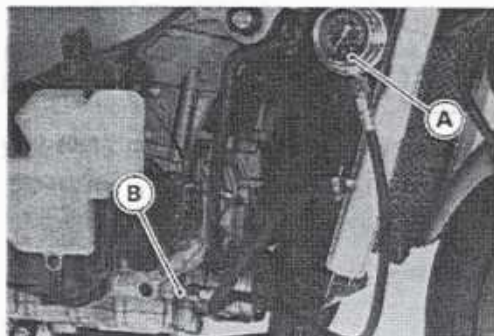


- Attach the oil pressure gauge [A] and adapter [B] to the oil pressure switch hole.

Special Tool – Oil Pressure Gauge, 10 kg/cm²: 57001-164
Oil Pressure Gauge Adapter, PT 1/4: 57001-1033

⚠WARNING

To prevent a fire, be sure to keep the oil pressure gauge hose away from the exhaust pipe.



- Start the engine and warm up the engine.
- Run the engine at the specified speed, and read the oil pressure gauge.
- ★ If the oil pressure is much lower than the standard, check the oil pump, oil pump relief valve, and/or crankshaft bearing insert wear immediately.
- ★ If the reading is much higher than the standard, check the oil passages for clogging.

Oil Pressure

Standard: 314 ~ 373 kPa (3.2 ~ 3.8 kg/cm², 46 ~ 54 psi @4000 r/min (rpm), oil temp. 80°C (176°F))

- Stop the engine.
- Remove the oil pressure gauge and adapter.

⚠WARNING

Take care against burns from hot engine oil that will drain through the oil passage when the plug is removed.

- Apply silicone sealant to the oil pressure switch, and tighten it.

Sealant – Kawasaki Bond (Silicone Sealant): 56019-120

Torque – Oil Pressure Switch: 15 N-m (1.5 kg-m, 11.0 ft-lb)

Relief Valve

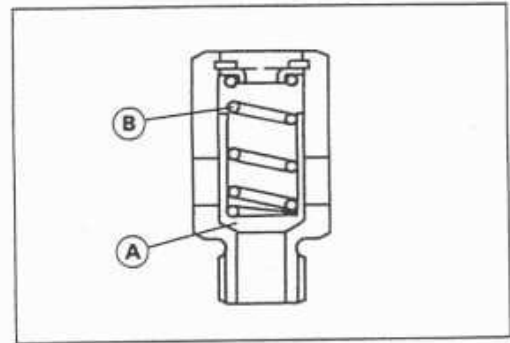
Relief Valve Inspection

- Remove the relief valve (see Oil Pan Removal).
- Check to see if the valve [A] slides smoothly when pushing it in with a wooden or other soft rod, and see if it comes back to its seat by spring [B] pressure.

NOTE

○ *Inspect the valve in its assembled state. Disassembly and assembly may change the valve performance.*

- ★ If any rough spots are found during above inspection, wash the valve clean with a high-flash point solvent and blow out any foreign particles that may be in the valve with compressed air.



⚠ WARNING

Clean the relief valve in a well-ventilated area, and take care that there is no spark or flame anywhere near the working area. Because of the danger of highly flammable liquids, do not use gasoline or low-flash point solvent.

- ★ If cleaning does not solve the problem, replace the relief valve as an assembly. The relief valve is precision made with no allowance for replacement of individual parts.