

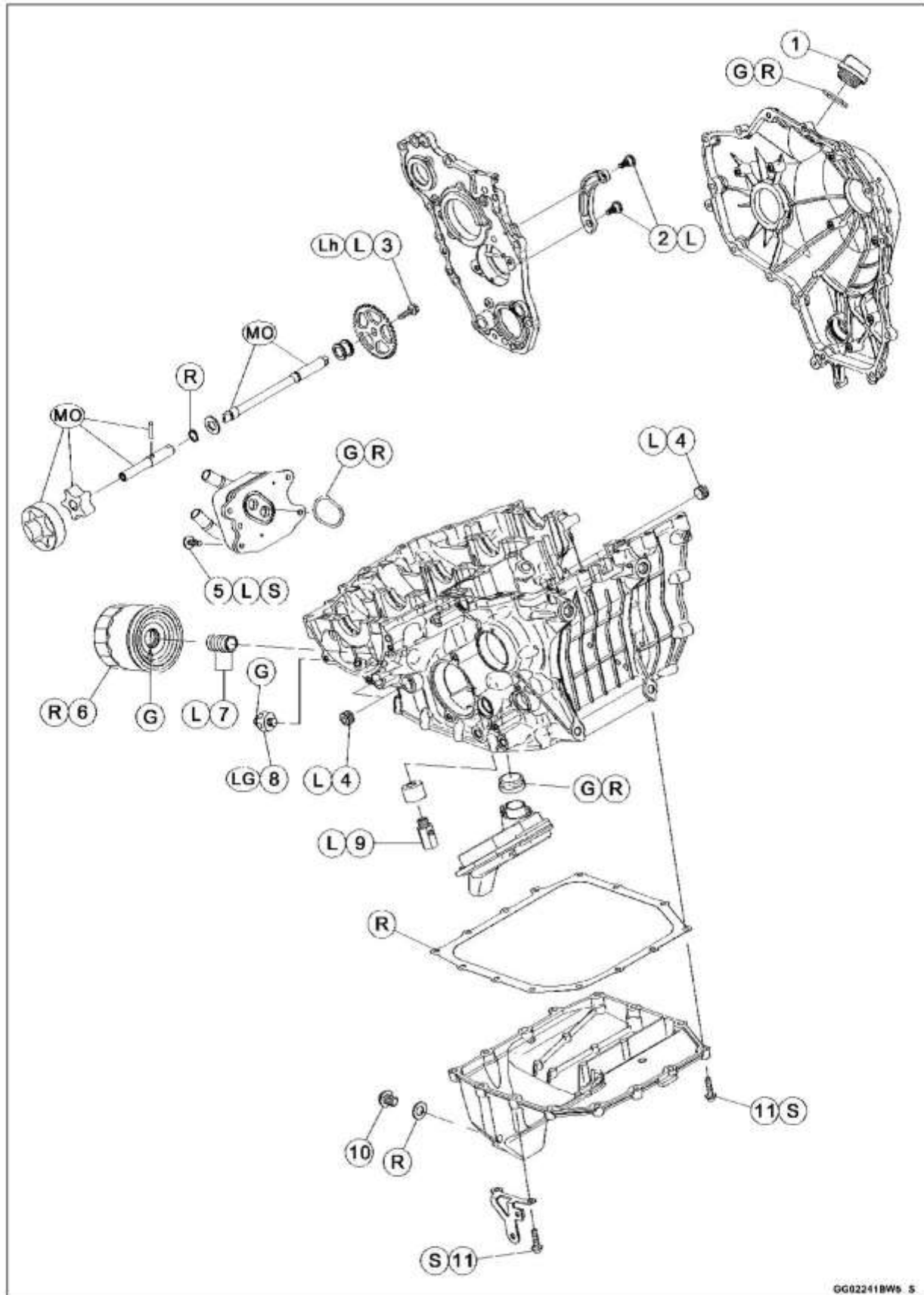
Engine Lubrication System

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7-2 ENGINE LUBRICATION SYSTEM

Exploded View



ENGINE LUBRICATION SYSTEM 7-3

Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Filler Plug	Hand-tighten	–	–	
2	Oil Pump Drive Chain Guide Bolts	10	1.0	89 in·lb	L
3	Oil Pump Driven Gear Bolt	10	1.0	89 in·lb	L, Lh
4	Oil Passage Plugs	20	2.0	15	L
5	Oil Cooler Bolts	15	1.5	11	L, S
6	Oil Filter	17	1.7	13	G, R
7	Oil Filter Pipe	35	3.6	26	L
8	Oil Pressure Switch	15	1.5	11	LG
9	Oil Pressure Relief Valve	15	1.5	11	L
10	Engine Oil Drain Bolt	25	2.5	18	
11	Oil Pan Bolts	10	1.0	89 in·lb	S

G: Apply grease.

L: Apply a non-permanent locking agent.

LG: Apply liquid gasket.

Lh: Left-hand Threads.

MO: Apply molybdenum disulfide oil solution.

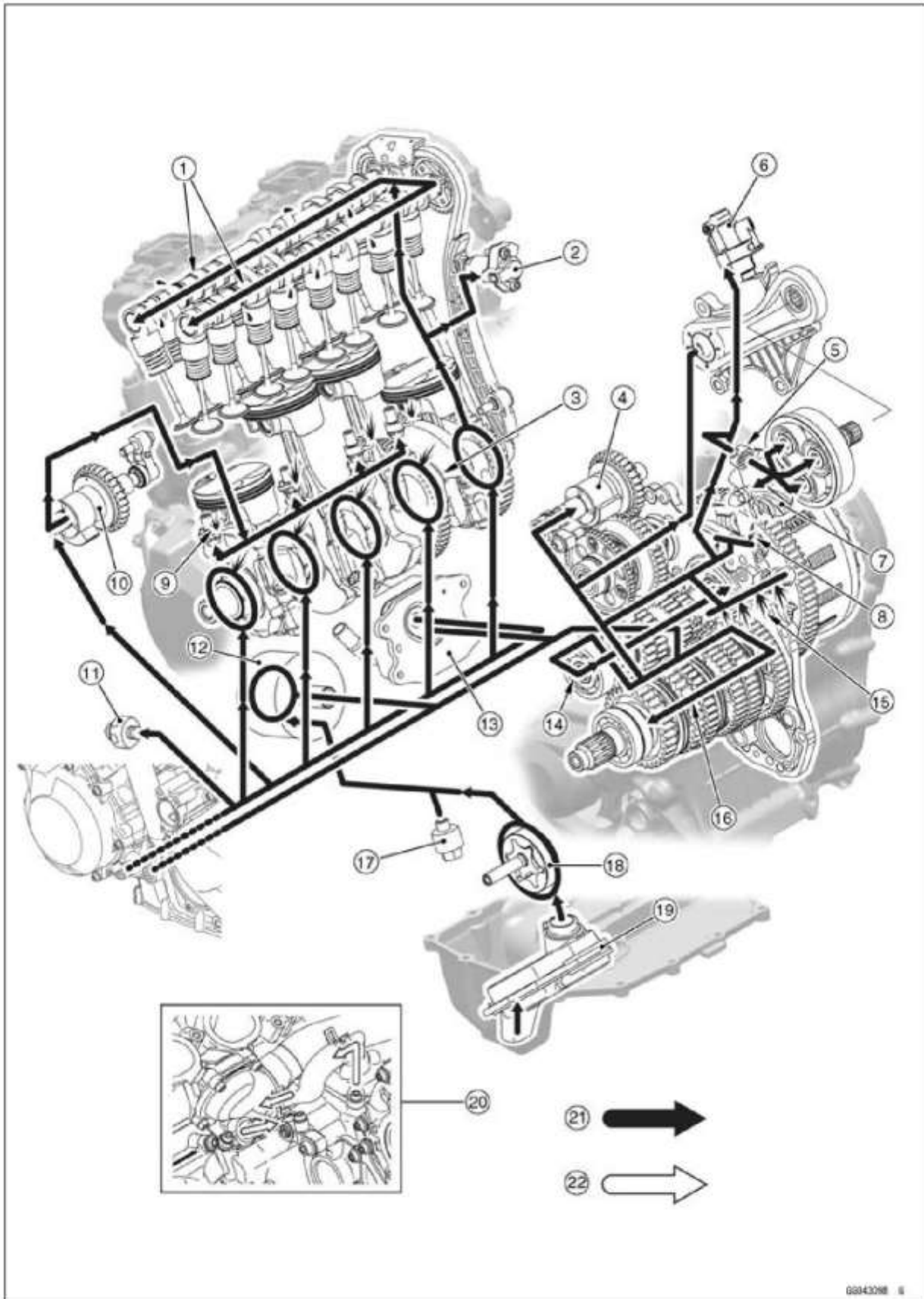
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)

R: Replacement Parts

S: Follow the specified tightening sequence.

7-4 ENGINE LUBRICATION SYSTEM

Engine Oil Flow Chart



Engine Oil Flow Chart

1. Camshaft Oil Passage
2. Camshaft Chain Tensioner
3. Crankshaft Oil Passage
4. Rear Balancer
5. Supercharger Oil Filter
6. Supercharger Chain Tensioner
7. Supercharger Impeller
8. Supercharger Chain Oil Jet
9. Piston Oil Jet
10. Front Balancer
11. Oil Pressure Switch
12. Oil Filter
13. Oil Cooler
14. Input Shaft Oil Passage
15. Transmission Oil Jet
16. Output Shaft Oil Passage
17. Oil Pressure Relief Valve
18. Oil Pump
19. Oil Screen
20. Blowby Gas Flow
21. Engine Oil
22. Blowby Gas

7-6 ENGINE LUBRICATION SYSTEM

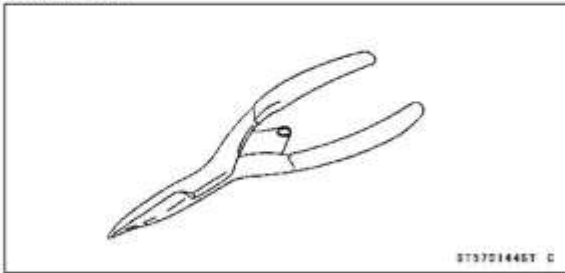
Specifications

Item	Standard
Engine Oil Type Viscosity Capacity Level	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2 SAE 10W-40 3.5 L (3.7 US qt) (When filter is not removed.) 4.3 L (4.5 US qt) (When filter is removed.) 4.7 L (5.0 US qt) (When engine is completely dry.) Between upper and lower level lines (Wait several minutes after idling or running)
Oil Pressure Measurement Oil Pressure	199.8 ~ 259.4 kPa (2.04 ~ 2.65 kgf/cm ² , 28.97 ~ 37.61 psi) @4 000 r/min (rpm), Oil Temperature 50°C (122°F)

Special Tools and Sealants

Outside Circlip Pliers:

57001-144



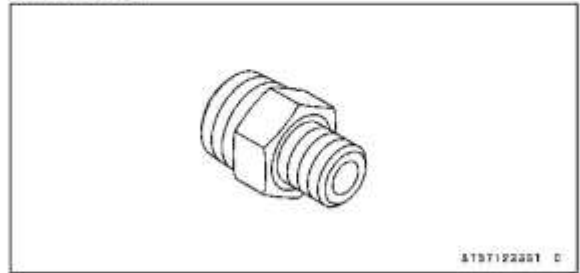
Oil Pressure Gauge, 10 kgf/cm²:

57001-164



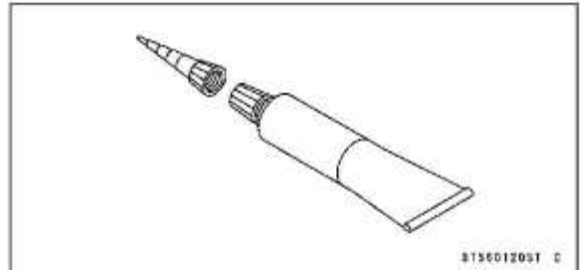
Oil Pressure Gauge Adapter, PT3/8:

57001-1233



Liquid Gasket, TB1211:

56019-120



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Engine Oil and Oil Filter

WARNING

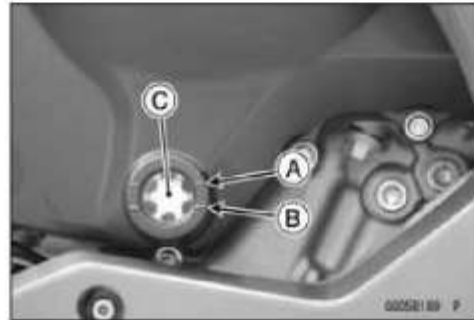
Vehicle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine seizure, accident, and injury. Check the oil level before each use and change the oil and filter according to the periodic maintenance chart.

Oil Level Inspection

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

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.



NOTICE

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 indicator will light. If it stays on when the engine is running above idle speed, stop the engine immediately and find the cause.

- ★ If the oil level is too high, remove the excess oil, using a syringe or some other suitable device.
- ★ If the oil level is too low, add the correct amount of oil through the oil filler opening. Use the same type and make of oil that is already in the engine.

NOTE

- If the engine oil type and make are unknown, use any brand of the specified oil to top off the level in preference to running the engine with the oil level low. Then at your earliest convenience, change the oil completely.

Engine Oil Change

- Refer to the Engine Oil Change ([see Engine Oil Change\(2-40\)](#)).

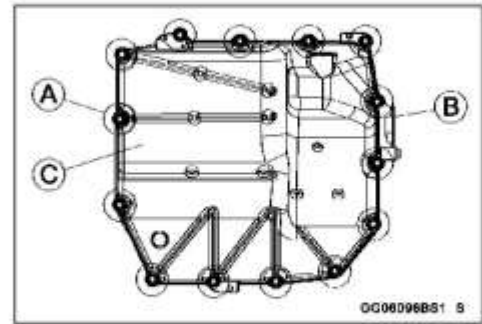
Oil Filter Replacement

- Refer to the Oil Filter Replacement ([see Oil Filter Replacement\(2-41\)](#)).

Oil Pan

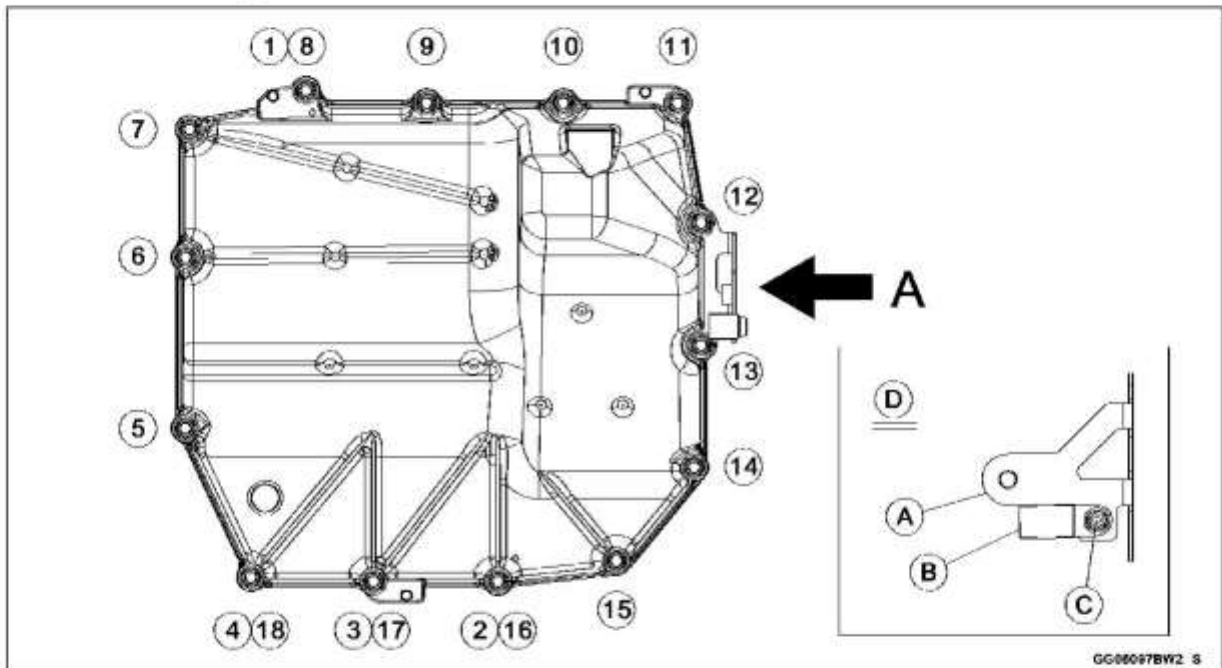
Oil Pan Removal

- Drain the engine oil (see Engine Oil Change(2-40)).
- Remove:
 - Exhaust Pipe (see Exhaust Pipe Removal(5-38))
 - Oil Pan Bolts [A]
 - Bracket [B]
 - Oil Pan [C]
 - Oil Pan Gasket
- Remove the following part if necessary.
 - Oil Screen (see Oil Screen Removal(7-10))



Oil Pan Installation

- Install the following part if removed.
 - Oil Screen (see Oil Screen Installation(7-10))
- Replace the oil pan gasket with a new one.
- Install:
 - Oil Pan Gasket
 - Oil Pan
 - Bracket [A]
- Tighten the oil pan bolts following sequence [1 ~ 18].
 - Torque - Oil Pan Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)**
- Install the clamp [B] and bolt [C], if removed.
 - Viewed from A [D]



- Install the removed parts.

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Oil Screen

Oil Screen Removal

- Remove:
 - Oil Pan (see Oil Pan Removal(7-9))
 - Oil Screen [A]

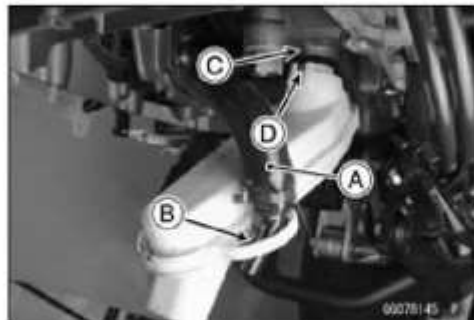


Oil Screen Installation

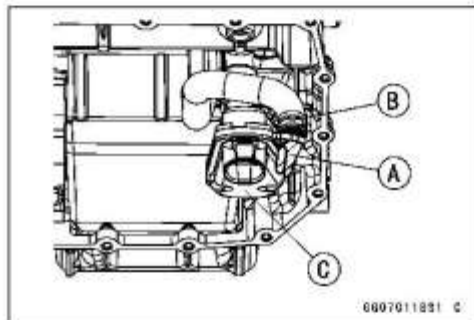
- Clean the oil screen (see Oil Screen Cleaning(7-11)).
- Replace the O-ring [A] with a new one, and install it.
- Apply grease to the O-ring.



- Run the breather hose [A] in to the hole [B].
- Install the oil screen so that the crankcase rib [C] fits to the notch [D] of the oil screen.



- When installing the oil pipe [A], install it and clamp [B] so that the knob of the clamp faces to the front side.
 - Oil Screen [C]
- Install the removed parts.



Oil Screen

Oil Screen Cleaning

- Remove the oil screen (see Oil Screen Removal(7-10)).
- Clean the oil screen with a high flash-point solvent from the inside [A] to the outside (from the clean side to the dirty side), and remove the particles stuck.
- Blow away the particles by applying compressed air from the inside to the outside (from the clean side to the dirty side).

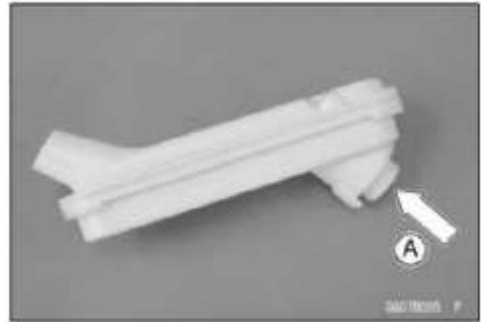
⚠ WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the screen in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the screen.

NOTE

○ While cleaning the screen, check for any metal particles that might indicate internal engine damage.

- Check the screens carefully for any damage.
- ★ If the screen is damaged, replace the oil screen.



7-12 ENGINE LUBRICATION SYSTEM

Oil Pressure Relief Valve

Oil Pressure Relief Valve Removal

- Remove:
 - Oil Screen (see Oil Screen Removal(7-10))
 - Oil Pressure Relief Valve [A]
 - Oil Pressure Relief Valve Cover [B]



Oil Pressure Relief Valve Installation

- Apply a non-permanent locking agent to the threads of the oil pressure relief valve.
- Install the oil pressure relief valve cover.
- Tighten:
 - Torque - Oil Pressure Relief Valve: 15 N·m (1.5 kgf·m, 11 ft·lb)
- Install the oil screen (see Oil Screen Installation(7-10)).

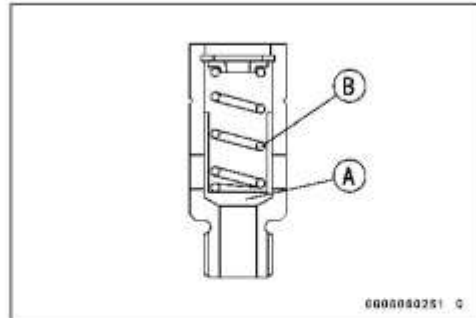
Oil Pressure Relief Valve Inspection

- 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

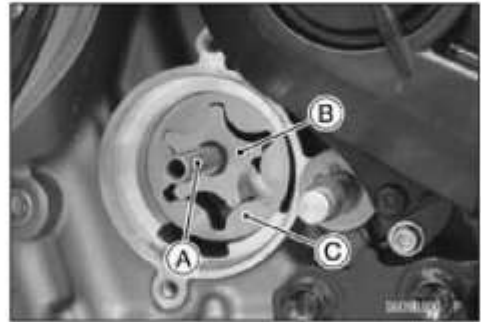
Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the oil pressure relief valve in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the oil pressure relief valve.

- ★If cleaning does not solve the problem, replace the oil pressure relief valve as an assembly.

Oil Pump

Oil Pump Removal

- Remove:
 - Water Pump (see [Water Pump Removal\(4-11\)](#))
 - Oil (Water) Pump Shaft [A] with Inner Rotor [B] and Pin Outer Rotor [C]

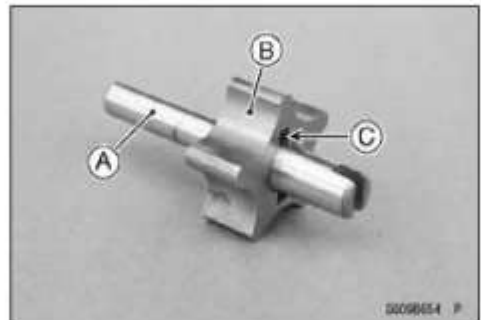


Oil Pump Installation

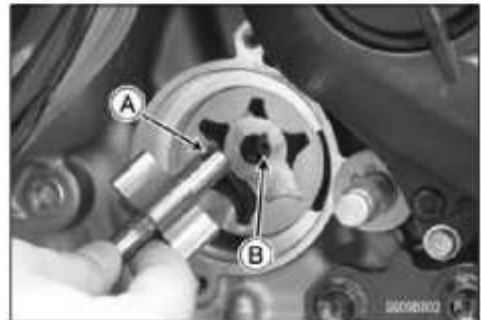
- Apply molybdenum disulfide oil solution to the outer rotor [A].
- Install the outer rotor into the crankcase.



- Apply molybdenum disulfide oil solution to the following parts.
 - Oil (Water) Pump Shaft [A]
 - Inner Rotor [B]
 - Pin [C]
- Assemble the pin, inner rotor and oil (water) pump shaft.



- Turn the pump shaft so that the slot [A] in its shaft fits onto the projection [B] of the oil pump driven gear shaft.
- Install the removed parts.



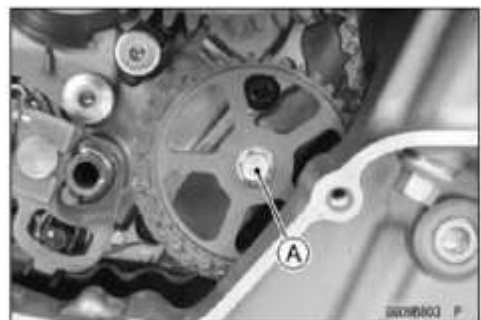
Oil Pump Driven Gear Removal

- Remove the clutch cover (see [Clutch Cover Removal\(6-14\)](#)).
- Loosen the oil pump driven gear bolt [A].

NOTE

○The oil pump driven gear bolt has a left-hand threads.

- Remove the clutch (see [Clutch Removal\(6-16\)](#)).



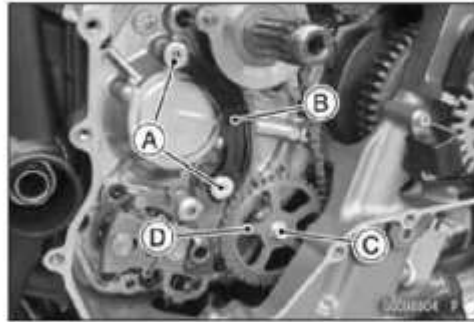
7-14 ENGINE LUBRICATION SYSTEM

Oil Pump

- Remove:
 - Oil Pump Drive Chain Guide Bolts [A]
 - Oil Pump Drive Chain Guide [B]
 - Oil Pump Driven Gear Bolt [C]
 - Oil Pump Driven Gear [D]
 - Spacer

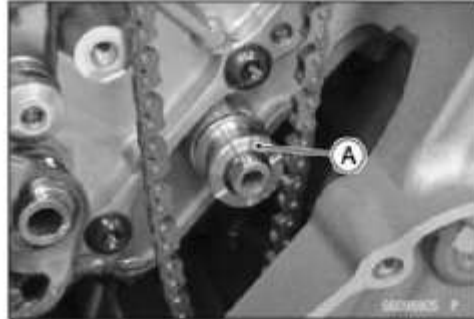
NOTE

○The oil pump driven gear bolt has a left-hand threads.



Oil Pump Driven Gear Installation

- Install the spacer [A].



- Align the groove [A] of the oil pump driven gear to the oil pump driven gear shaft to install the oil pump driven gear so that "OUT" letters [B] face outward.
- Apply a non-permanent locking agent to the threads of the oil pump driven gear bolt and temporarily tighten it.

NOTE

○The oil pump driven gear bolt has a left-hand threads.

- Apply a non-permanent locking agent to the threads of the oil pump drive chain guide bolts.
- Install the oil drive pump chain guide.
- Tighten:

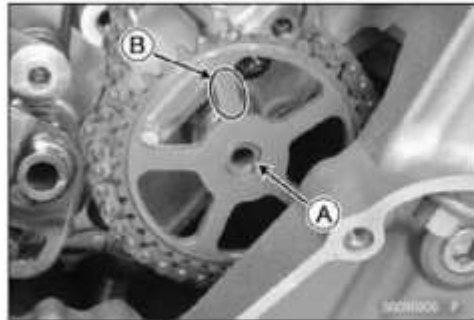
Torque - Oil Pump Drive Chain Guide Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)

- Install the clutch (see [Clutch Installation\(6-17\)](#)).
- Tighten:

Torque - Oil Pump Driven Gear Bolt: 10 N·m (1.0 kgf·m, 89 in·lb)

NOTE

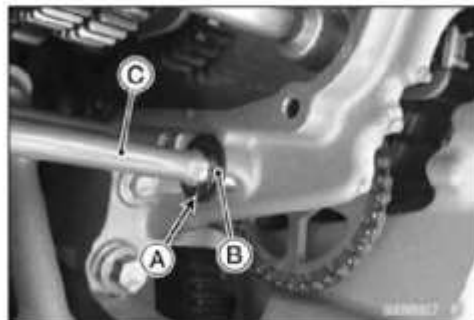
○The oil pump driven gear bolt has a left-hand threads.



Oil Pump Driven Gear Shaft Removal

- Remove:
 - Oil Pump Driven Gear (see [Oil Pump Driven Gear Removal\(7-13\)](#))
 - Oil Pan (see [Oil Pan Removal\(7-9\)](#))
 - Oil Screen (see [Oil Pressure Relief Valve Removal\(7-12\)](#))
 - Circlip [A]
 - Washer [B]
 - Oil Pump Driven Gear Shaft [C]

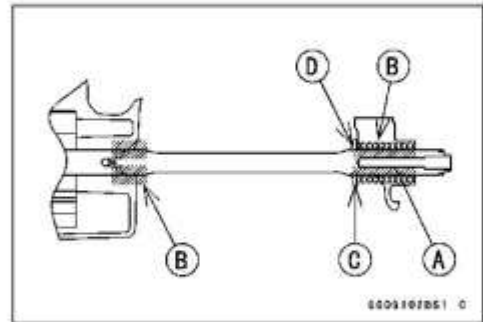
Special Tool - Outside Circlip Pliers: 57001-144



Oil Pump***Oil Pump Driven Gear Shaft Installation***

- Apply molybdenum disulfide grease [A] to the oil pump driven gear shaft.
- Apply molybdenum disulfide oil solution [B] to the crankcase.
- Install the oil pump driven gear shaft and washer [C].
- Install the new circlip [D] into the groove of the oil pump driven gear shaft.

Special Tool - Outside Circlip Pliers: 57001-144

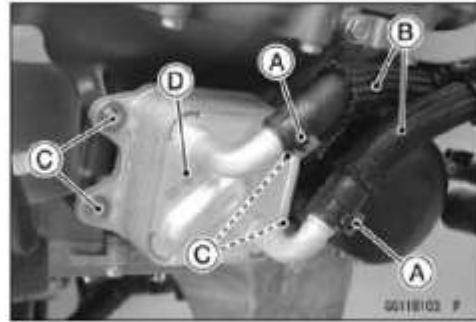


7-16 ENGINE LUBRICATION SYSTEM

Oil Cooler

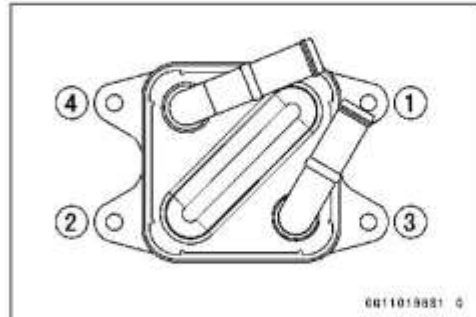
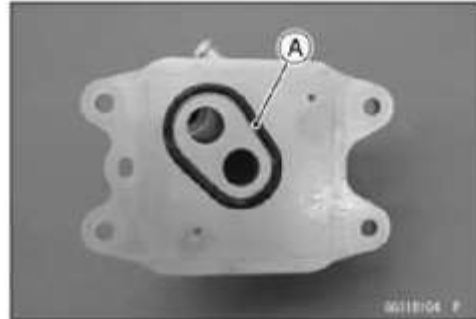
Oil Cooler Removal

- Drain:
 - Coolant (see [Coolant Change\(2-28\)](#))
 - Engine Oil (see [Engine Oil Change\(2-40\)](#))
- Remove the exhaust pipe (see [Exhaust Pipe Removal\(5-38\)](#)).
- Slide the clamps [A].
- Disconnect the water hoses [B].
- Remove:
 - Oil Cooler Bolts [C]
 - Oil Cooler [D]



Oil Cooler Installation

- Replace the O-ring [A] with a new one.
 - Apply grease to the O-ring and install it.
-
- Install the oil cooler.
 - Apply a non-permanent locking agent to the threads of the oil cooler bolts.
 - Tighten the oil cooler bolts following sequence [1 ~ 4].
 - **Torque - Oil Cooler Bolts: 15 N·m (1.5 kgf·m, 11 ft·lb)**
 - Run the water hoses correctly (see [Cable, Wire, and Hose Routing section \(18-2\)](#)).
 - Install the removed parts.



Oil Pressure Measurement

Oil Pressure Measurement

- Remove:
 - Right Lower Fairing (see Lower Fairing Removal(15-14))
 - Oil Passage Plug [A]
- Attach the adapter and gauge to the plug hole.

Special Tools - Oil Pressure Gauge, 10 kgf/cm²: 57001-164
Oil Pressure Gauge Adapter, PT3/8: 57001-1233



- Start the engine and warm up the engine.
- Run the engine at the specified speed, and read the oil pressure gauge.

Oil Pressure

Standard: 199.8 ~ 259.4 kPa (2.04 ~ 2.65 kgf/cm²,
 28.97 ~ 37.61 psi) @4 000 r/min (rpm), Oil
 temperature 50°C (122°F)

- ★ If the oil pressure is much lower than the standard, check the 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.
- Stop the engine.
- Remove the oil pressure gauge and adapter.

WARNING

Hot oil can cause severe burns. Beware of hot engine oil that will drain through the oil passage when the gauge adapter is removed.

- Apply a non-permanent locking agent to the oil passage plug, and tighten it.

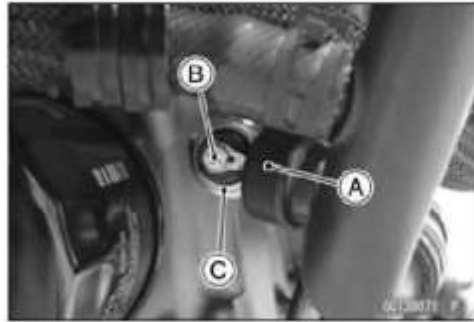
Torque - Oil Passage Plug: 20 N·m (2.0 kgf·m, 15 ft·lb)

7-18 ENGINE LUBRICATION SYSTEM

Oil Pressure Switch

Oil Pressure Switch Removal

- Drain the engine oil (see [Engine Oil Change\(2-40\)](#)).
- Remove the left lower fairing (see [Lower Fairing Removal\(15-14\)](#)).
- Slide the switch cover [A].
- Remove:
 - Switch Terminal Bolt [B]
 - Oil Pressure Switch [C]

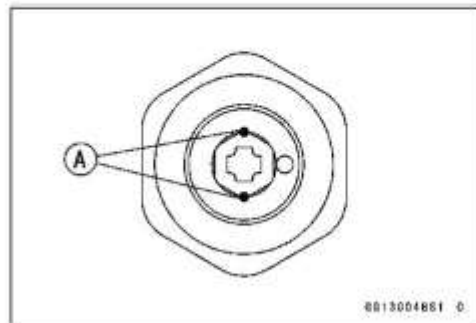


Oil Pressure Switch Installation

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
 - Apply liquid gasket to the threads of the oil pressure switch and tighten it.
- Sealant - Liquid Gasket, TB1211: 56019-120**
- Torque - Oil Pressure Switch: 15 N·m (1.5 kgf·m, 11 ft·lb)**
- Install the switch lead (see [Cable, Wire, and Hose Routing section \(18-2\)](#)).
 - Apply grease to the terminal.

NOTE

○Apply a small amount grease to the terminal so that grease should not close two breather holes [A] for switch diaphragm.



- Install the switch cover.
- Install the removed parts.