

## Engine Lubrication Description

From the main gallery, oil flow is directed through either drilled internal passages or by splash method to those surfaces requiring lubrication.

## Engine Oil Lubrication Chart

The diagram illustrates the oil lubrication system of an engine. At the bottom is the **OIL PAN**. Oil is drawn up through an **OIL STRAINER** to the **OIL PUMP**, then through an **OIL FILTER** to the **CYLINDER HEAD**. The **OIL PUMP** also features an **OIL RELIEF VALVE**. The **CYLINDER HEAD** directs oil into the **MAIN GALLERY**. The **MAIN GALLERY** distributes oil to the **OIL PRESSURE SWITCH**, **No.1 CRANK JOURNAL**, **No.2 CRANK JOURNAL**, **No.3 CRANK JOURNAL**, **No.4 CRANK JOURNAL**, and **No.5 CRANK JOURNAL**. These journals are connected to **No.1 CRANK PIN**, **No.2 CRANK PIN**, **No.3 CRANK PIN**, **No.4 CRANK PIN**, and **No.5 CRANK PIN** respectively, which are then connected to **No.1 PISTON**, **No.2 PISTON**, **No.3 PISTON**, and **No.4 PISTON**. The **MAIN GALLERY** also feeds into the **CHAIN TENSIONER**. The **CYLINDER HEAD** also feeds into the **CAMSHAFT LOWER HOUSING**, which in turn feeds into the **EX • CAM SHAFT**. The **EX • CAM SHAFT** is connected to **No.1 JOURNAL**, **No.2 JOURNAL**, **No.3 JOURNAL**, **No.4 JOURNAL**, and **No.5 JOURNAL**, which are then connected to **No.1 CAM FACE**, **No.2 CAM FACE**, **No.3 CAM FACE**, **No.4 CAM FACE**, and **No.5 CAM FACE** respectively. The **CHAIN TENSIONER** also feeds into the **IN • CAM SHAFT**, which is connected to **No.1 JOURNAL**, **No.2 JOURNAL**, **No.3 JOURNAL**, **No.4 JOURNAL**, and **No.5 JOURNAL**, which are then connected to **No.1 CAM FACE**, **No.2 CAM FACE**, **No.3 CAM FACE**, **No.4 CAM FACE**, and **No.5 CAM FACE** respectively. Dashed lines indicate return paths for oil from the cam faces, pistons, and chain tensioner back to the oil pan.

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## Diagnostic Information and Procedures

### Oil Pressure Check

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Refer to "Oil Pressure Check" in Section 0B (Page 0B-19).

### Oil Change Reminder System

CENDG2111504002

Refer to "Oil Change Reminder System Description" in Section 1A (Page 1A-14).

### Low Oil Pressure Caution System

CENDG2111504003

Refer to "Caution System Description" in Section 1A (Page 1A-7).

### Powerhead Lubrication System Diagnosis

CENDG2111504004

Condition	Possible cause	Correction / Reference Item
<b>Low oil pressure</b>	Clogged oil filter.	<i>Replace.</i>
	Leakage from oil passages.	<i>Repair or replace.</i>
	Defective oil pump.	<i>Replace.</i>
	Defective oil pressure regulator.	<i>Replace.</i>
	Damaged O-ring.	<i>Replace.</i>
	Combination of above items.	<i>Repair or replace.</i>
<b>High oil pressure</b>	Using an engine oil of too high viscosity.	<i>Replace.</i>
	Clogged oil passage.	<i>Clean or replace.</i>
	Clogged oil pressure regulator.	<i>Replace.</i>
	Combination of above items.	<i>Repair or replace</i>

## Service Instructions

### Oil Pump Removal and Installation

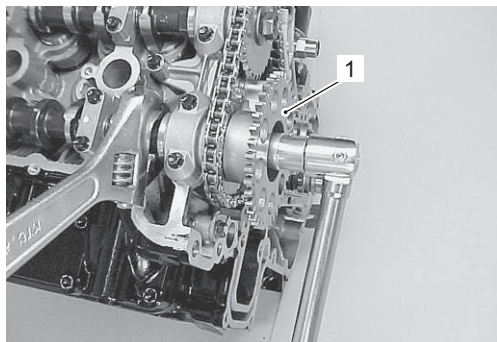
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#### Removal

- 1) Remove the power unit.  
Refer to "Power Unit Removal and Installation" in Section 1D (Page 1D-10).

#### NOTE

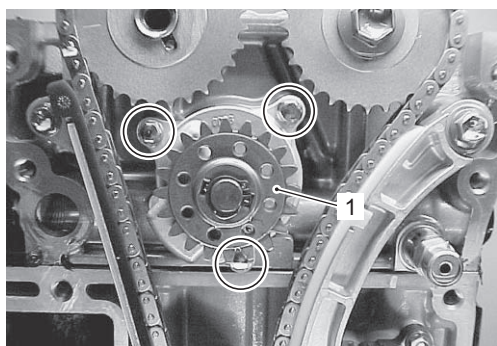
Hold camshaft by placing a wrench on hexagon area of camshaft.



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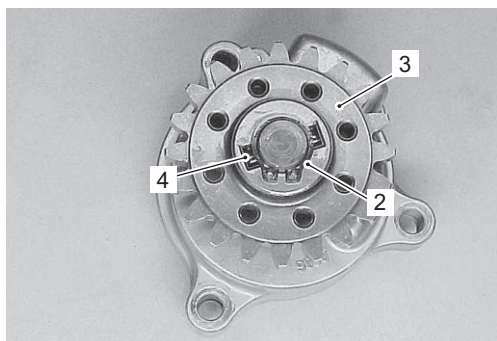
1. Oil pump drive sprocket

- 2) Remove bolt securing oil pump drive sprocket to camshaft, then remove oil pump drive sprocket.
- 3) Remove three bolts and oil pump assembly (1).



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- 4) Remove circlip (2), driven sprocket (3), pin (4) and washer.

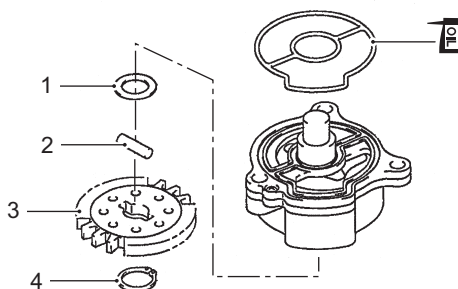


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#### Installation

Installation is reverse order of removal with special attention to the following steps.

- Assemble washer (1), pin (2), driven sprocket (3) and circlip (4) to oil pump shaft.



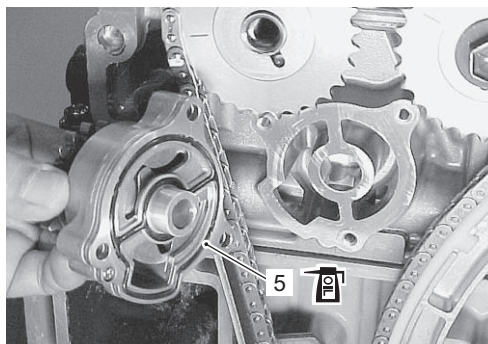
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- Apply engine oil to seal ring (5), then install seal ring to oil pump body.

#### NOTICE

A previously-used seal ring may leak, resulting in engine damage.

Do not re-use the seal ring once removed.  
Always use a new seal ring.

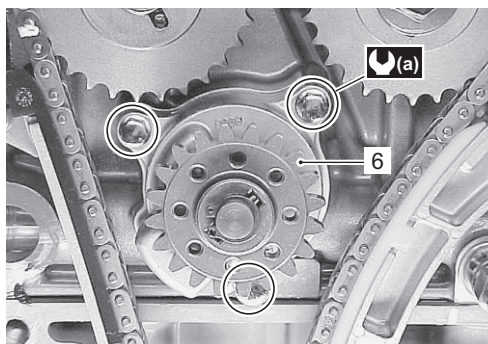


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- Install oil pump (6) to cylinder head block, then tighten three bolts securely.

#### Tightening torque

Oil pump bolt (a): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)

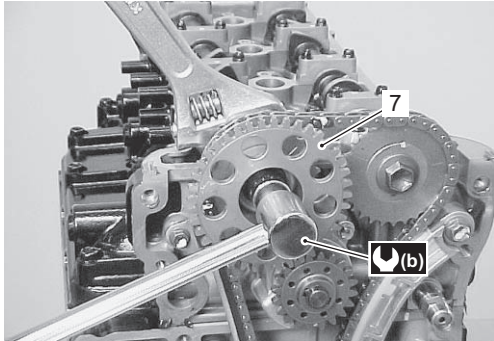


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- Install oil pump drive sprocket (7) and tighten bolt securely.

**Tightening torque**

**Oil pump drive sprocket bolt (b): 78 N·m (7.8 kgf-m, 56.5 lbf-ft)**



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**Inspection Oil Pump Component Parts**

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**Oil Pump****NOTICE**

**Disassembling the oil pump can lead to troubles.**

**The oil pump is a nonrepairable component. Do not attempt to disassemble the oil pump. It must be replaced as a complete unit if it is defective.**

Inspect outer/inner rotors and oil pump body for wear or other damage. Replace if necessary.

**Seal Ring**

Inspect of seal ring for nick, cut or wear.

**Drive / Driven Sprocket**

Inspect teeth of sprocket for wear or other damage. Replace if necessary.



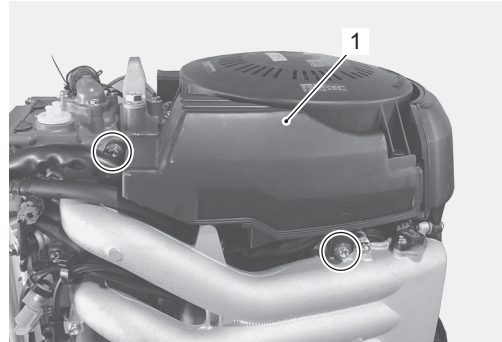
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**Oil Pressure Switch Removal and Installation**

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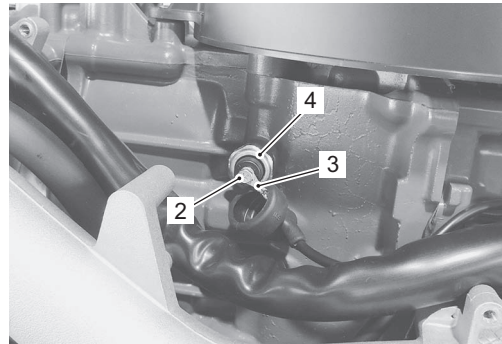
**Removal**

- 1) Remove the bolts and air duct (1).



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- 2) Loosen screw (2) and disconnect blue lead wire (3) from oil pressure switch (4).



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- 3) Remove oil pressure switch from cylinder block.

**Installation**

Installation is reverse order of removal with special attention to the following steps.

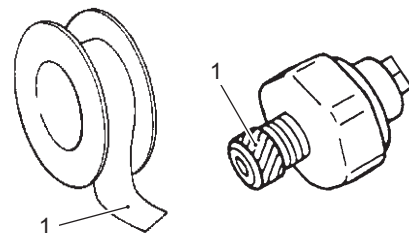
- Before installing oil pressure switch, wrap screw threads with sealing tape (1), then tighten switch to specified torque.

**NOTE**

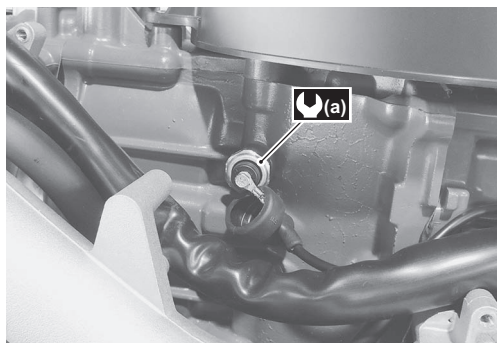
**Cut off any excess sealing tape from switch threads before installation.**

**Tightening torque**

**Oil pressure switch (a): 13 N·m (1.3 kgf-m, 9.5 lbf-ft)**



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- Start engine and check oil pressure switch for oil leakage.  
Reseal switch if oil leakage is found.
- Cover the oil pressure switch with the cap.

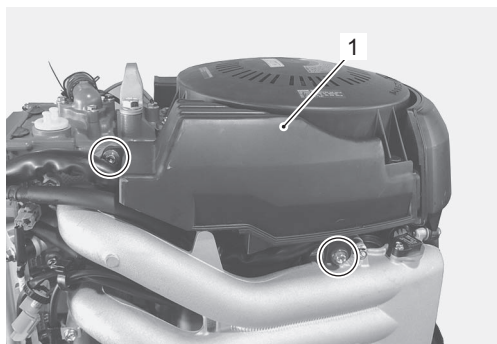
### Oil Pressure Switch Inspection

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#### NOTE

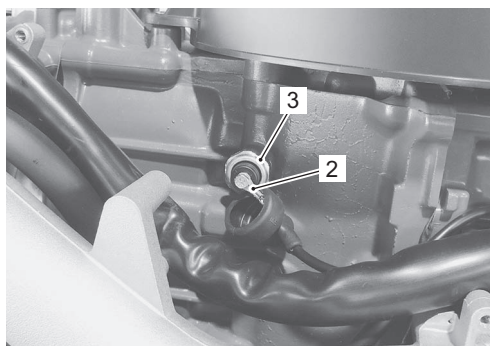
**Before checking the oil pressure switch, make sure the engine oil pressure is within specification.**

- 1) Remove the bolts and air duct (1).



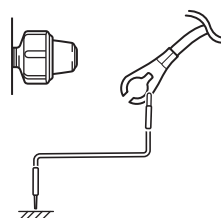
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- 2) Remove the blue lead wire (2) from oil pressure switch (3).



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- 3) Connect the oil pressure switch lead wire to engine body ground by using an appropriate jumper wire.



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#### NOTE

**You should remove oil pressure switch lead when perform the oil pressure switch inspection.**

**Then diagnostic code of oil pressure switch will be displayed while performing the inspection.**

**Connect the oil pressure switch lead wire to engine body ground by using an appropriate jumper wire before the engine starts (turning on the ignition switch).**

**So that the diagnostic code won't be displayed.**

**After the engine starts, disconnect the jumper wire from switch lead wire.**


#### NOTE

**For cancellation of the "self-diagnostic indication", refer to "Self-Diagnostic System Description" in Section 1A (Page 1A-9).**



- 4) After the engine starts, disconnect the jumper wire from switch lead wire.
- 5) Check the continuity between the switch terminal and engine body ground.

**Special tool**

 : 09930-99320 (Digital tester)

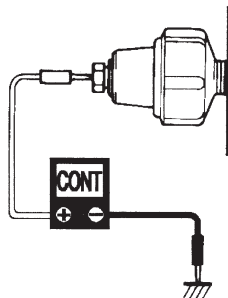
**Tester knob indication**

Continuity (  )

**Oil pressure switch continuity**

Engine running: Infinity

Engine stopped: Continuity



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- 6) If measurement exceeds specification, replace oil pressure switch.
- 7) After testing oil pressure switch, reinstall parts removed earlier.

**Oil Strainer Removal and Installation**

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**Removal**

Refer to "Engine Holder / Oil Pan / Driveshaft Housing / Mounts Disassembly" in Section 2A (Page 2A-6).

**Installation**

Refer to "Engine Holder / Oil Pan / Driveshaft Housing / Mounts Assembly" in Section 2A (Page 2A-8).

**Oil Strainer Related Parts Inspection**

CENDG2111506007

- Inspect oil strainer. Replace strainer if cracked, damaged or other abnormal conditions. If clog or obstruction, clean oil strainer.
- Check condition of O-rings. Replace O-ring if nicked, cut, worn or other abnormal condition.



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