

# Engine Lubrication System

## Precautions

### Precautions for Engine Oil

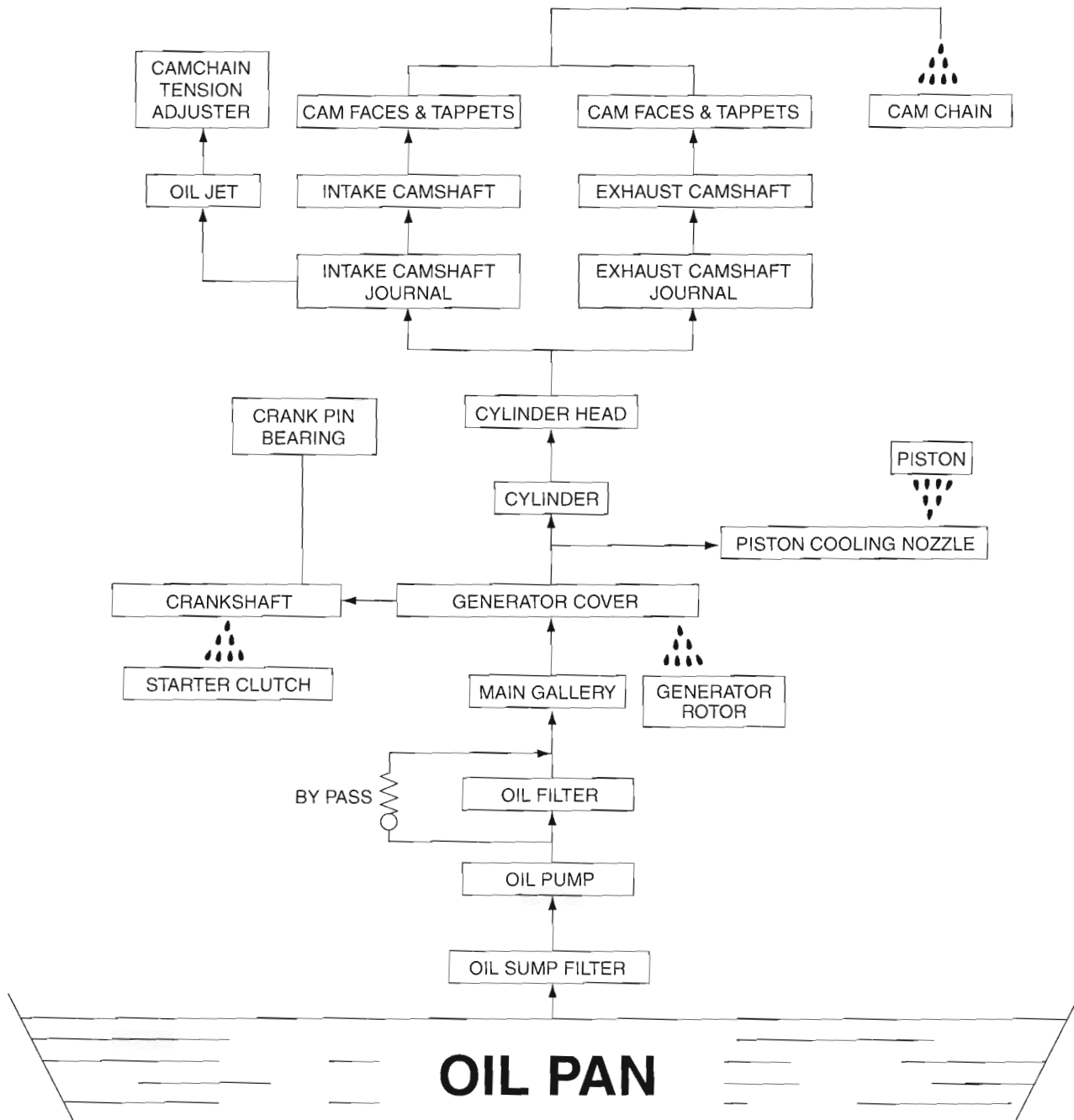
Refer to "Fuel / Oil / Engine Coolant Recommendation in Section 0A (Page0A-3)".

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## Schematic and Routing Diagram

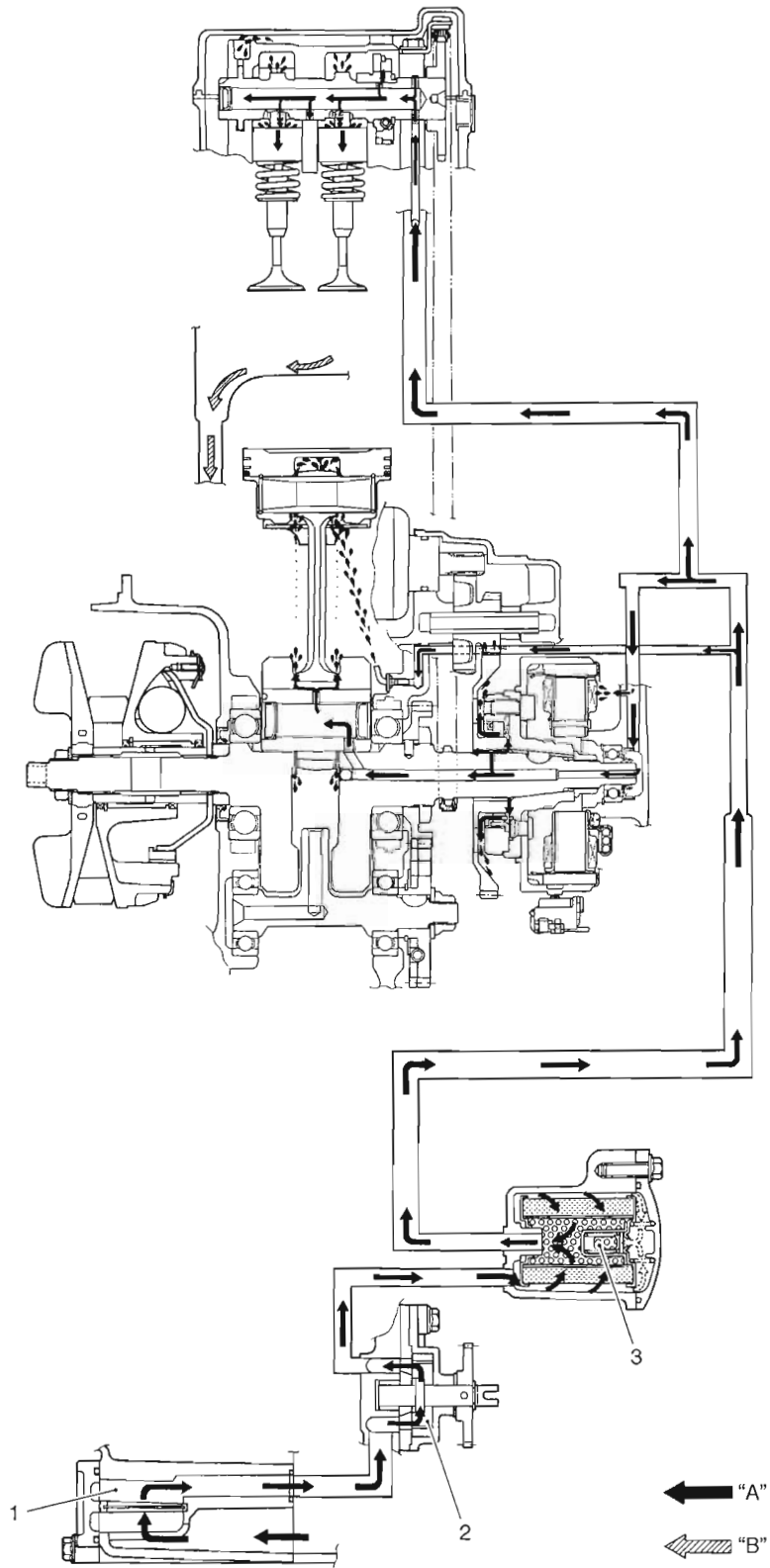
### Engine Lubrication System Chart Diagram

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Engine Lubrication Circuit Diagram

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1. Oil sump filter	3. Oil filter	"B": Returned oil
2. Oil pump	"A": Lubrication oil	

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## Diagnostic Information and Procedures

### Engine Lubrication Symptom Diagnosis

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Condition	Possible cause	Correction / Reference Item
<b>Engine overheats.</b> <i>(Defective engine internal parts)</i>	Not enough oil in the engine.	Add oil.
	Defective oil pump or clogged oil circuit.	Replace or clean.
	Use of incorrect engine oil.	Change.
<b>Exhaust smoke is dirty or thick</b>	Too much engine oil in the engine.	Check level and drain.

### Oil Pressure Check

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Check the engine oil pressure periodically. This will give a good indication of the condition of the moving parts.

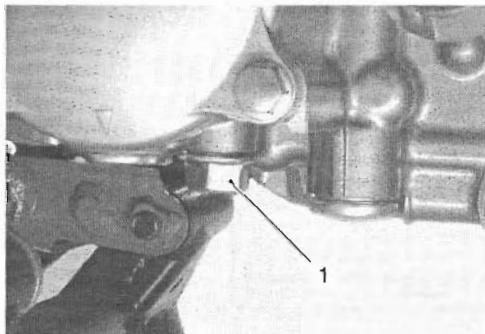
#### NOTE

Before checking the oil pressure, check the following.

- Oil level (Refer to "Engine Oil and Filter Change in Section 0B (Page0B-9)")
- Oil leaks (If leak is found, repair it.)
- Oil quality (If oil is discolored or deteriorated, replace it.)

Check the oil pressure in the following procedures:

- 1) Remove the main oil gallery plug (1).

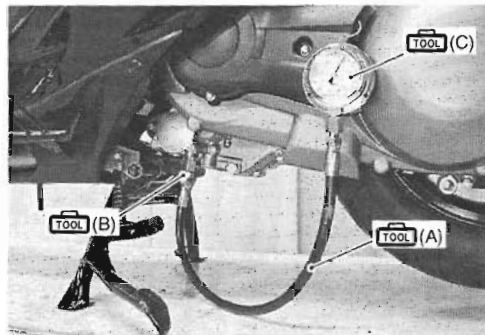


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- 2) Install the oil pressure gauge and attachment to the main oil gallery.

#### Special tool

- (A): 09915-74521 (Oil pressure gauge hose)
- (B): 09915-74570 (Oil pressure gauge attachment)
- (C): 09915-77331 (Meter (for high pressure))



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- 3) Warm up the engine as follows:  
 Summer: 10 min at 2 000 r/min  
 Winter: 20 min at 2 000 r/min
- 4) After warm up, increase the engine speed to 3 000 r/min (Observe the tachometer), and read the oil pressure gauge.  
 If the oil pressure is lower or higher than the specification, the following causes may be considered.

#### Oil pressure specification

Above 30 kPa (0.3 kgf/cm<sup>2</sup>, 4.27 psi) at 3 000 r/min, oil temp. at 60 °C (86 °F)

Below 110 kPa (11.0 kgf/cm<sup>2</sup>, 15.64 psi) at 3 000 r/min, oil temp. at 60 °C (86 °F)

High oil pressure	Low oil pressure
<ul style="list-style-type: none"> <li>• Engine oil viscosity is too high</li> <li>• Clogged oil passage</li> <li>• Combination of the above items</li> </ul>	<ul style="list-style-type: none"> <li>• Clogged oil filter</li> <li>• Oil leakage from the oil passage</li> <li>• Damaged O-ring</li> <li>• Defective oil pump</li> <li>• Combination of the above items</li> </ul>

5) Stop the engine and remove the oil pressure gauge and attachment.

6) Reinstall the main oil gallery plug and tighten it to the specified torque.

**⚠ CAUTION**

**Use a new gasket to prevent oil leakage.**

**Tightening torque**

**Main oil gallery plug: 16 N·m (1.6 kgf-m, 11.5 lb-ft)**

7) Check the engine oil level. Refer to "Engine Oil and Filter Change in Section 0B (Page0B-9)".

## Repair Instructions

### Engine Oil and Filter Replacement

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Refer to "Engine Oil and Filter Change in Section 0B (Page0B-9)".

### Oil Sump Filter Removal and Installation

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#### Removal

- 1) Dismount the engine. Refer to "Engine Assembly Removal and Installation in Section 1D (Page1D-6)".
- 2) Separate the crankcase. Refer to "Engine Bottom Side Disassembly in Section 1D (Page1D-37)".
- 3) Remove the oil sump filter from the left crankcase. Refer to "Engine Bottom Side Disassembly in Section 1D (Page1D-37)".

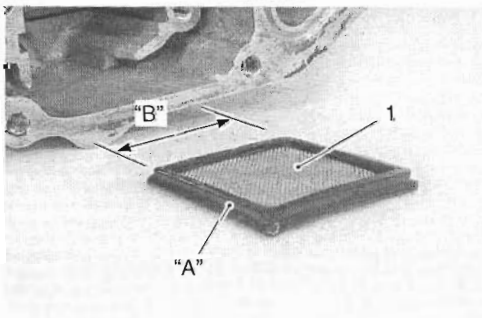
#### Installation

Install the oil sump filter in the reverse order of removal. Pay attention to the following points:

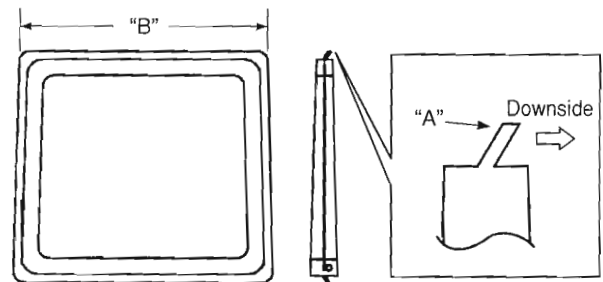
- Install the oil sump filter (1).

**⚠ CAUTION**

- The lip "A" of the oil sump filter should be positioned downward.
- The shorter side "B" of the oil sump filter should be positioned inside.



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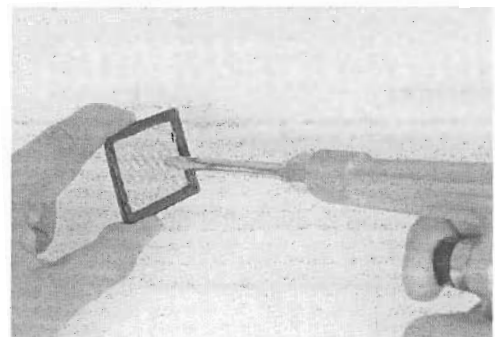
"A": Lip "B": Shorter side

### Oil Sump Filter Cleaning

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Clean the oil sump filter in the following procedures:

- 1) Remove the oil sump filter. Refer to "Oil Sump Filter Removal and Installation (Page1E-4)".
- 2) Clean the oil sump filter using compressed air.



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- 3) Install the oil sump filter. Refer to "Oil Sump Filter Removal and Installation (Page1E-4)".

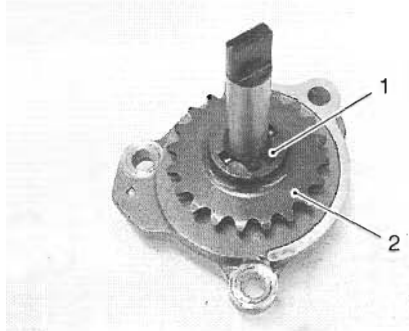
## 1E-5 Engine Lubrication System:

### Oil Pump Removal and Installation

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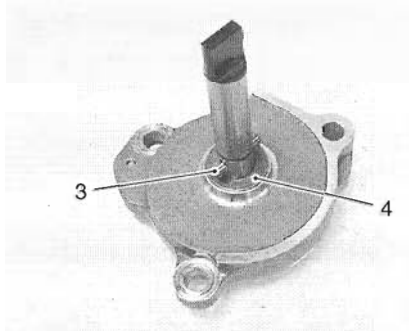
#### Removal

- 1) Dismount the engine. Refer to "Engine Assembly Removal and Installation in Section 1D (Page1D-6)".
- 2) Separate the crankcase. Refer to "Engine Bottom Side Disassembly in Section 1D (Page1D-37)".
- 3) Remove the oil pump assembly from the left crankcase. Refer to "Engine Bottom Side Disassembly in Section 1D (Page1D-37)".
- 4) Remove the snap ring (1) and oil pump drain driven gear (2).



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- 5) Remove the pin (3) and washer (4).



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#### ⚠ CAUTION

- Do not attempt to disassemble the oil pump.
- The oil pump is available only as an assembly.

#### Installation

Install the oil pump in the reverse order of removal. Pay attention to the following point:

- Tighten the oil pump mounting bolts to the specified torque.

#### Tightening torque

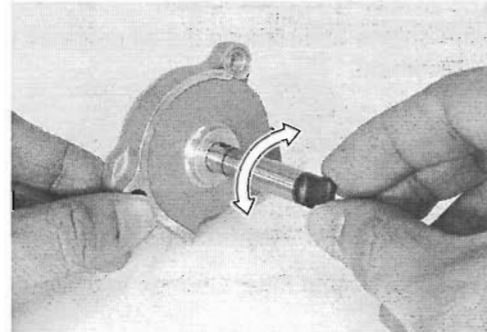
Oil pump mounting bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

### Oil Pump Inspection

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Inspect the oil pump in the following procedures:

- 1) Remove the oil pump. Refer to "Oil Pump Removal and Installation (Page1E-5)".
- 2) Rotate the oil pump shaft by hand and check that it moves smoothly. If it does not move smoothly, replace the oil pump with a new one.



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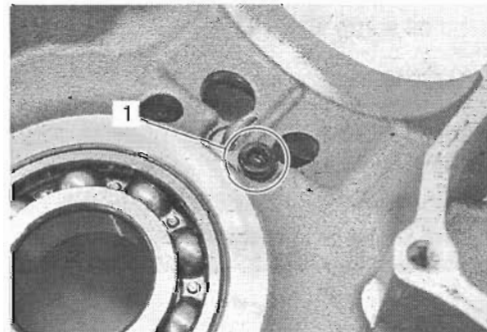
- 3) Install the oil pump in the reverse order of removal. Refer to "Oil Pump Removal and Installation (Page1E-5)".

### Piston Cooling Nozzle Removal and Installation

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#### Removal

- 1) Dismount the engine. Refer to "Engine Assembly Removal and Installation in Section 1D (Page1D-6)".
- 2) Separate the crankcase. Refer to "Engine Bottom Side Disassembly in Section 1D (Page1D-37)".
- 3) Remove the piston cooling nozzle (1) from the right crankcase.



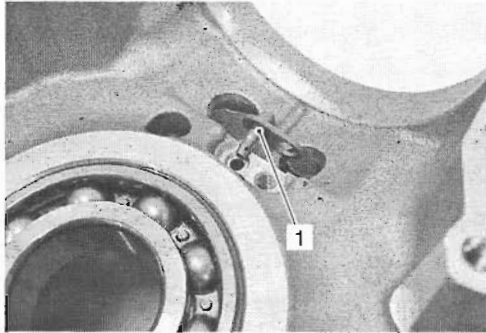
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**Installation**

Install the piston cooling nozzle in the reverse order of removal. Pay attention to the following point:

**NOTE**

**Before installing, replace the O-ring (1) with a new one and coat the O-ring with engine oil.**



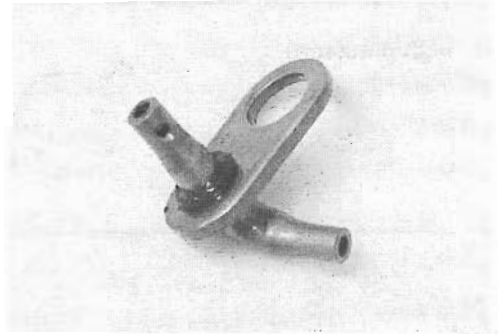
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**Piston Cooling Nozzle Inspection**

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Inspect the piston cooling nozzle in the following procedures:

- 1) Remove the piston cooling nozzle. Refer to "Piston Cooling Nozzle Removal and Installation (Page1E-5)".
- 2) Inspect the piston cooling nozzle for clogging. If it is clogged, clean its oil passage with a proper wire or compressed air.



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- 3) Install the piston cooling nozzle. Refer to "Piston Cooling Nozzle Removal and Installation (Page1E-5)".

**Specifications**

**Service Data**

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**Oil Pump**

Item	Standard	Limit
Oil pressure (at 60 °C, 140 °F)	Above 30 kPa (0.3 kgf/cm <sup>2</sup> , 4.27 psi) Below 110 kPa (1.1 kgf/cm <sup>2</sup> , 15.64 psi) at 3 000 r/min	—

**Tightening Torque Specifications**

B705H21507002

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb·ft	
Main oil gallery plug	16	1.6	11.5	☞(Page1E-4)
Oil pump mounting bolt	10	1.0	7.0	☞(Page1E-5)


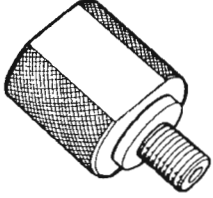
**Reference:**

For the tightening torque of fastener not specified in this section, refer to "Tightening Torque Specifications in Section 0C (Page0C-7)".

## Special Tools and Equipment

### Special Tool

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<p>09915-74521 Oil pressure gauge hose ☞ (Page1E-3)</p> 	<p>09915-74570 Oil pressure gauge attachment ☞ (Page1E-3)</p> 
<p>09915-77331 Meter (for high pressure) ☞ (Page1E-3)</p> 