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# SECTION LU

## ENGINE LUBRICATION SYSTEM

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# PRECAUTIONS

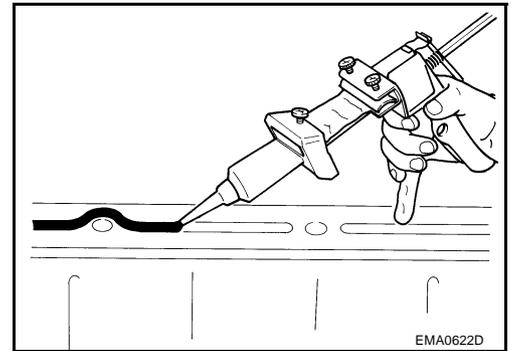
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## PRECAUTIONS

### Precautions for Liquid Gasket LIQUID GASKET APPLICATION PROCEDURE

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1. Remove the old liquid gasket adhering to the gasket application surface and the mating surface.
2. Wipe the gasket application surface and the mating surface with white gasoline (lighting and heating use) to remove adhering moisture, grease and foreign materials.
3. Attach the liquid gasket tube to the tube presser.  
**Use Genuine Thread Sealant or equivalent. Refer to [GI-47](#), "[RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS](#)".**
4. Apply the liquid gasket without breaks to the specified location with the specified dimensions.



- Within five minutes of gasket application, install the mating component.
- If the liquid gasket protrudes, wipe it off immediately.
- Do not retighten after the installation.
- After 30 minutes or more have passed from the installation, fill the engine oil and engine coolant.

# PREPARATION

## PREPARATION

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### Special Service Tools

ABS00008

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
ST25051001 (J25695-1) Oil pressure gauge	Measuring oil pressure <b>Maximum measuring range: 2,452 kPa (25 kg/cm<sup>2</sup> , 356 psi)</b>
ST25052000 (J25695-2) Hose	Adapting oil pressure gauge to upper oil pan
KV10115801 (J38956) Oil filter wrench	Removing oil filter <b>a : 64.3 mm (2.531 in)</b>
WS39930000 ( — ) Tube presser	Pressing the tube of liquid gasket

### Commercial Service Tools

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Tool name	Description
Deep socket	Removing and installing oil pressure switch Deep socket 24 mm (0.94 in)
Power tools	Loosening nuts and bolts

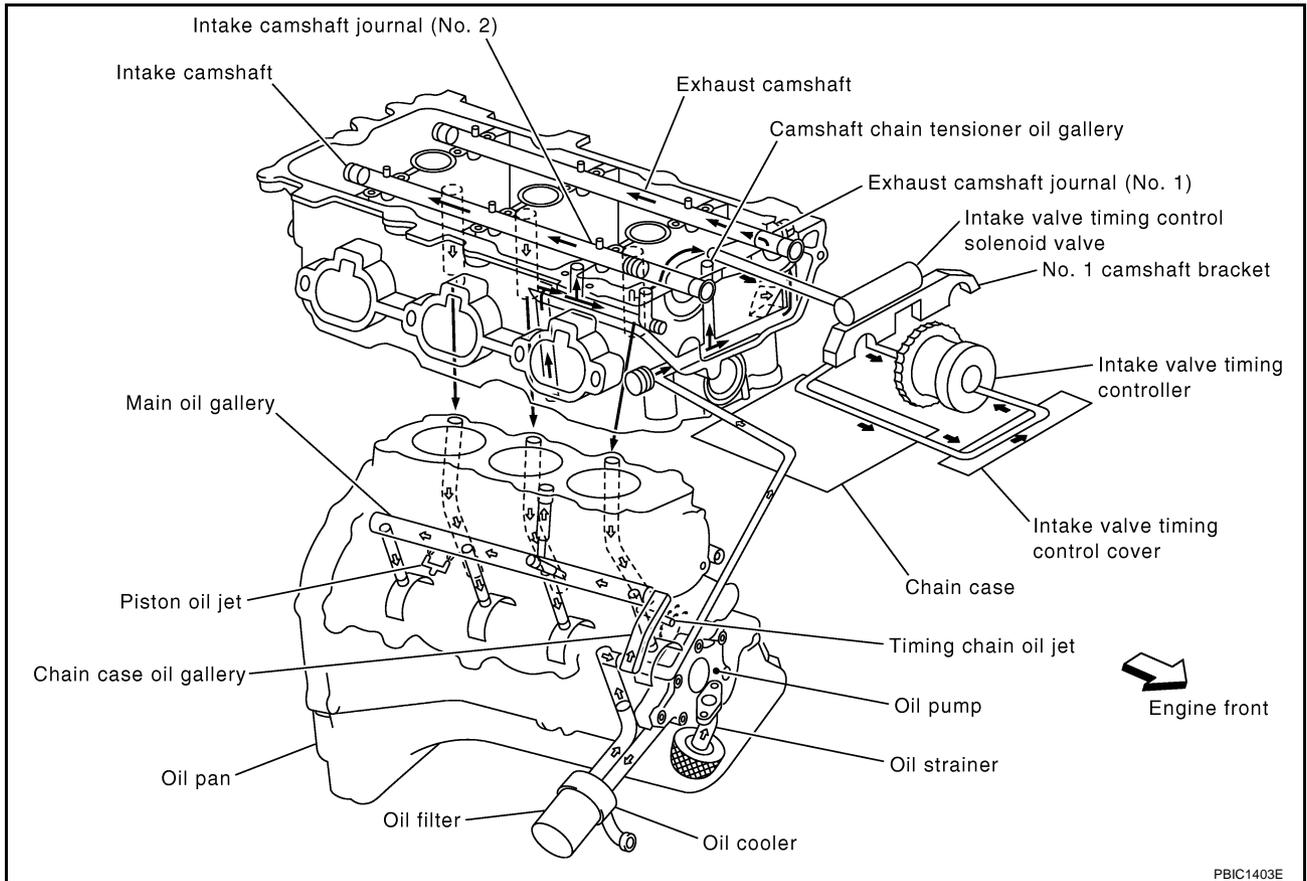
# LUBRICATION SYSTEM

## LUBRICATION SYSTEM

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### Lubrication Circuit

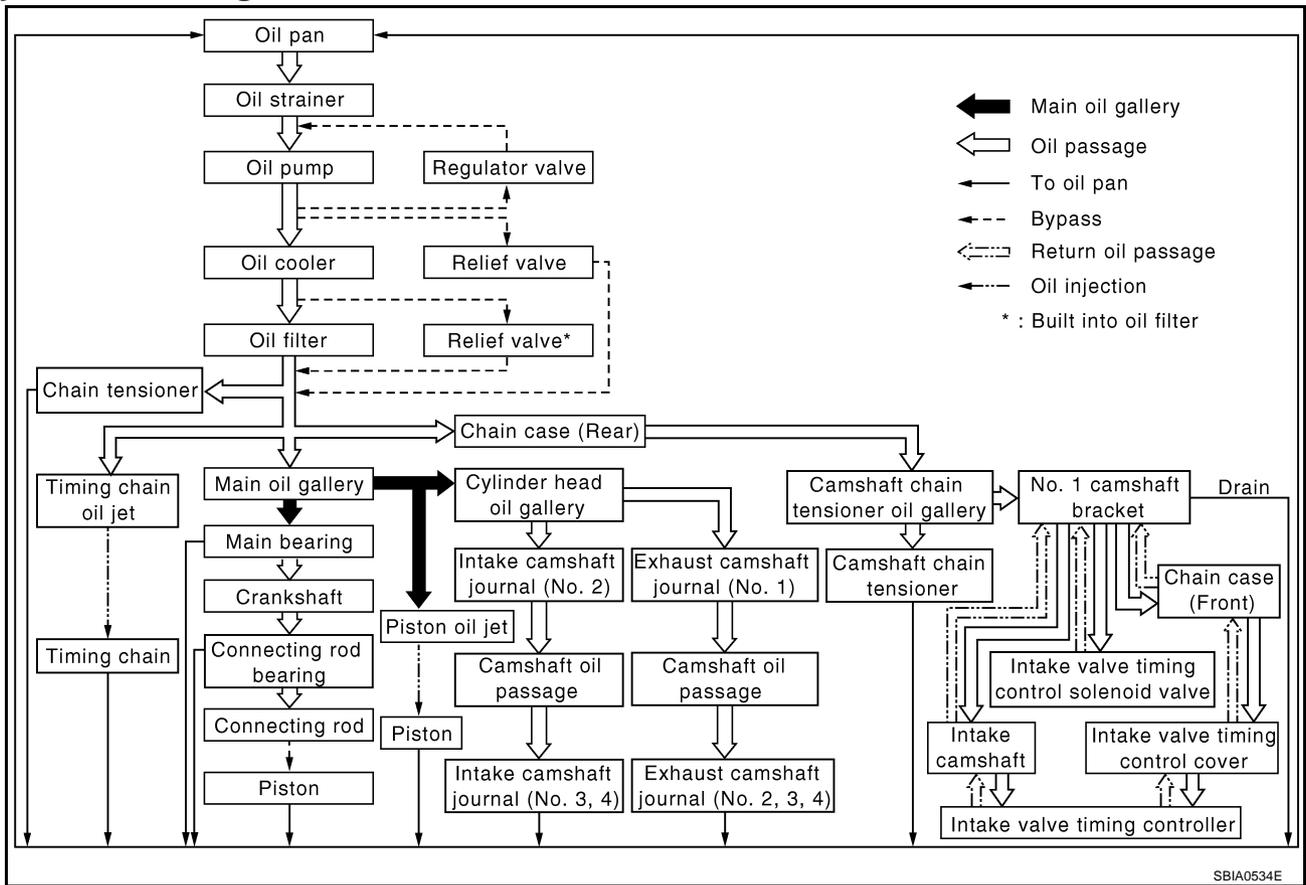
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# LUBRICATION SYSTEM

## System Drawing

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# ENGINE OIL

## ENGINE OIL

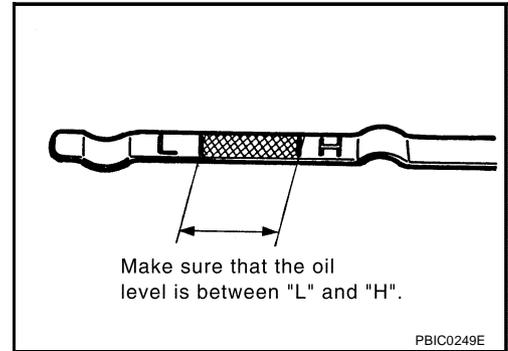
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### Inspection OIL LEVEL

ABS000QC

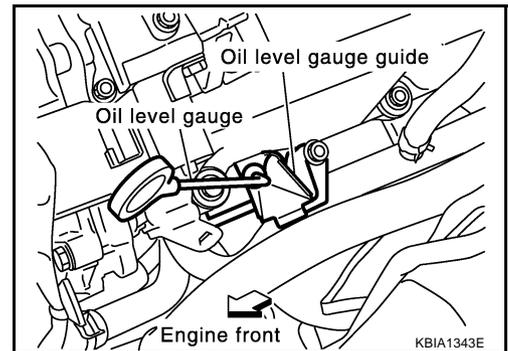
#### NOTE:

- Before starting the engine, put vehicle horizontally and check the oil level. If the engine is already started, stop it and allow 10 minutes before checking.
- Check that the oil level is within the range as indicated on the dipstick.
- If it is out of range, add oil as necessary.



#### NOTE:

When checking oil level, insert level gauge with its tip aligned with oil level gauge guide on cylinder head. (In figure, air cleaner case and air duct are removed.)



### OIL APPEARANCE

- Check the oil for white turbidity or heavy contamination.
- If the oil becomes turbid and white, it is highly probable that it is contaminated with engine coolant.

### OIL LEAKAGE

Check for oil leakage around the following areas:

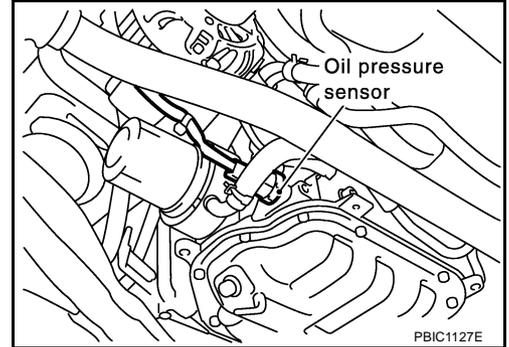
- Oil pan
- Oil pan drain plug
- Oil pressure sensor
- Oil filter
- Oil cooler
- Intake valve timing control cover and intake valve timing control solenoid valve
- Mating surface between cylinder block and cylinder head
- Mating surface between cylinder head and rocker cover
- Mating surface between front timing chain case and rear timing chain case
- Mating surface between rear timing chain case and cylinder block

# ENGINE OIL

## OIL PRESSURE CHECK

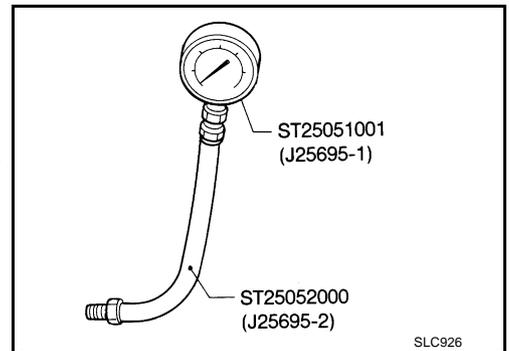
### WARNING:

- Be careful not to burn yourself, as engine oil may be hot.
  - Put the selector lever in the “N” or Park “P” position.
1. Check oil level. Refer to [LU-6, "Inspection"](#).
  2. Remove undercover with power tool.
  3. Disconnect oil pressure sensor harness connector.
  4. Remove oil pressure sensor.



5. Install oil pressure gauge (special service tool) and hose (special service tool).
6. Start engine and warm it up to normal operating temperature.
7. Check oil pressure with engine running under no-load.

Engine speed rpm	Approximate discharge pressure kPa (kg/cm <sup>2</sup> , psi)
Idle speed	More than 98 (1.0, 14)
2,000	More than 294 (3.0, 43)
6,000	More than 392 (4.0, 57)



If difference is extreme, check oil passage and oil pump for oil leaks.

8. After the inspections, install the oil pressure sensor as follows:
  - a. Remove the old liquid gasket adhering to sensor and engine.
  - b. Apply liquid gasket and tighten the oil pressure sensor to specification. Use Genuine Thread Sealant or equivalent. Refer to [MA-11, "RECOMMENDED FLUIDS AND LUBRICANTS"](#).

 : 12.3 - 17.2 N-m (1.25 - 1.75 kg-m, 9 - 12 ft-lb)

# ENGINE OIL

ABS000QD

## Changing Engine Oil

### WARNING:

- Be careful not to burn yourself, as the engine oil may be hot.
  - Prolonged and repeated contact with used engine oil may cause skin cancer; try to avoid direct skin contact with used oil. If skin contact is made, wash thoroughly with soap or hand cleaner as soon as possible.
1. Warm up engine, put vehicle horizontally and check for oil leakage from engine components.
  2. Stop engine and wait for 10 minutes.
  3. Remove drain plug and oil filler cap.
  4. Drain engine oil.
  5. Install drain plug.

### CAUTION:

- Be sure to clean drain plug and install with new washer.

### Oil pan drain plug:

 : 29.4 - 39.2 N·m (3.0 - 4.0 kg·m, 22 - 28 ft·lb)

6. Refill with new engine oil.

### Oil specification and viscosity:

Refer to [MA-11, "RECOMMENDED FLUIDS AND LUBRICANTS"](#) .

### Oil capacity (Approximate):

Unit: ℓ (US qt, Imp qt)

Drain and refill	With oil filter change	4.7 (5, 4-1/8)
	Without oil filter change	4.4 (4-5/8, 3-7/8)
Dry engine (Overhaul)		5.4 (5-3/4, 4-3/4)

### CAUTION:

- When filling oil, do not pull out oil level gauge.
  - The refill capacity depends on the oil temperature and drain time. Use these specifications for reference only.
  - Always use the dipstick to determine when the proper amount of oil is in the engine.
7. Warm up engine and check area around drain plug and oil filter for oil leakage.
  8. Stop engine and wait for 10 minutes.
  9. Check oil level. Refer to [LU-6, "Inspection"](#) .

# OIL FILTER

## OIL FILTER

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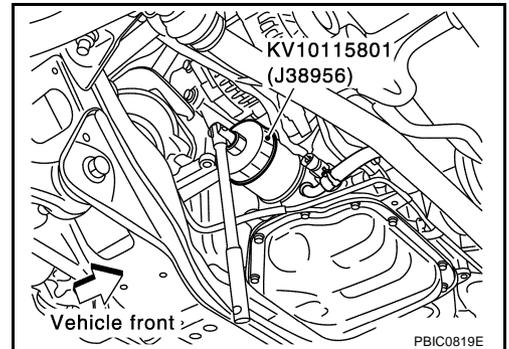
### Removal and Installation

#### REMOVAL

1. Remove undercover with power tool.
2. Using an oil filter wrench (special service tool), remove the oil filter.

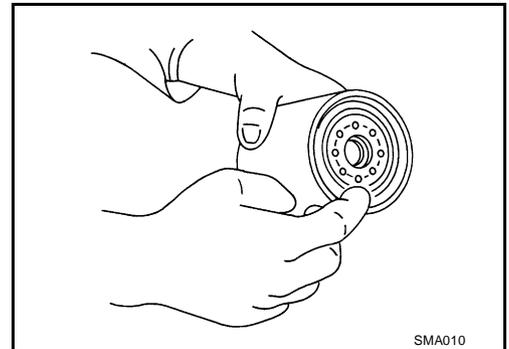
#### CAUTION:

- The oil filter is provided with a relief valve. Use genuine NISSAN oil filter or equivalent.
- Be careful not to get burned, the engine oil may be hot.
- When removing, prepare a shop cloth to absorb any oil leakage or spillage.
- Do not allow engine oil to adhere to the drive belts.
- Completely wipe off any oil that adheres to the engine and the vehicle.



#### INSTALLATION

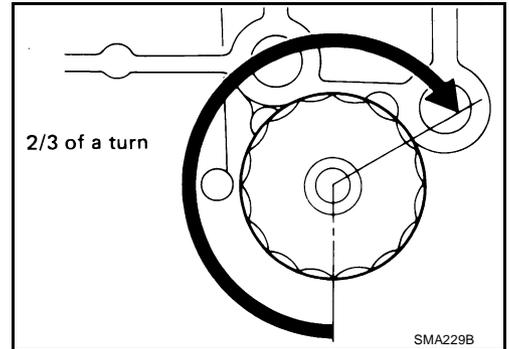
1. Remove foreign materials adhering to the oil filter installation surface.
2. Apply engine oil to the oil seal contact surface of the new oil filter.



3. Screw the oil filter manually until it touches the installation surface, then tighten it by 2/3 turn. Or tighten to specification.

#### Oil filter:

 : 14.7 - 20.5 N·m (1.5 - 2.0 kg·m, 11 - 15 ft·lb)



#### INSPECTION AFTER INSTALLATION

1. Start the engine and check for engine oil leakage.
2. Check oil level and add engine oil. Refer to [LU-6, "ENGINE OIL"](#).

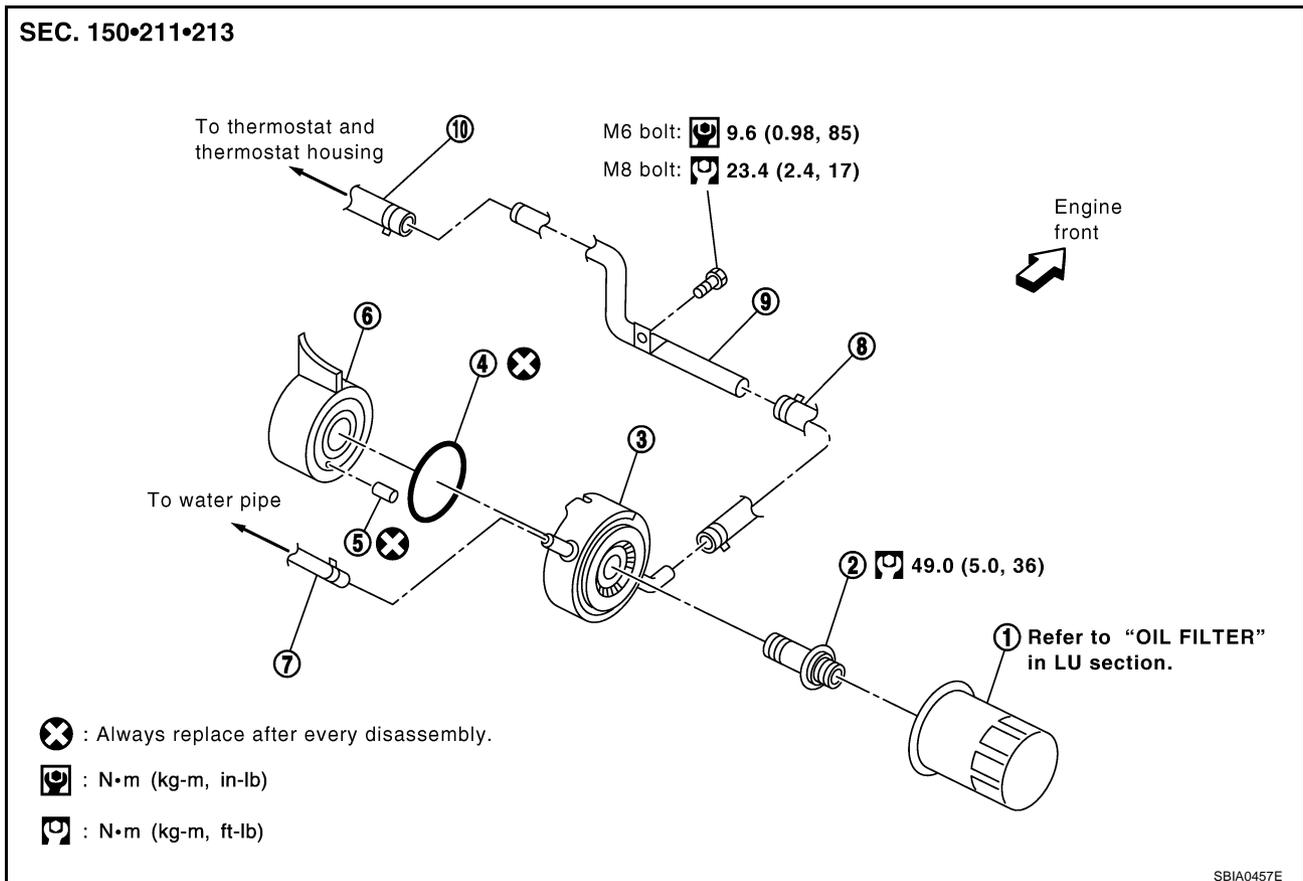
# OIL COOLER

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## OIL COOLER

### Removal and Installation

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- |                |                   |                               |
|----------------|-------------------|-------------------------------|
| 1. Oil filter  | 2. Connector bolt | 3. Oil cooler                 |
| 4. O-ring      | 5. Relief valve   | 6. Oil pan (upper) right side |
| 7. Water hose  | 8. Water hose     | 9. Water pipe                 |
| 10. Water hose |                   |                               |

### REMOVAL

1. Remove undercover with power tool.
2. Drain engine coolant. Refer to [CO-8, "Changing Engine Coolant"](#).

#### CAUTION:

- Do not spill engine coolant on the drive belt.
3. Remove oil filter. Refer to [LU-9, "OIL FILTER"](#).
  4. Remove water hoses from oil cooler.
    - Remaining engine coolant in piping will come out. Use a tray to collect it.
  5. Remove connector bolt, and remove oil cooler.

### INSPECTION AFTER REMOVAL

#### Oil Cooler

Check oil cooler for cracks. Check oil cooler for clogging by blowing through engine coolant inlet. If necessary, replace oil cooler.

#### Relief Valve

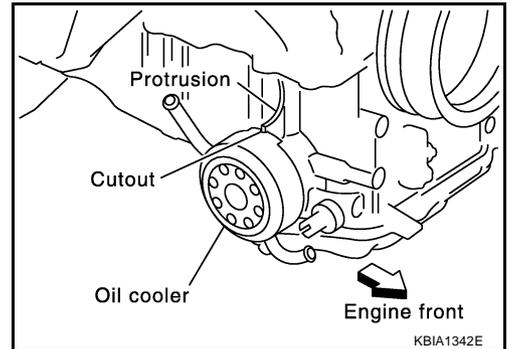
Inspect relief valve for movement, cracks and breaks by pushing the ball. If replacement is necessary, remove relief valve by prying it out with a suitable tool. Install a new relief valve in place by tapping it.

# OIL COOLER

## INSTALLATION

Install in the reverse order of removal paying attention to the following.

- Align cutout on oil cooler with protrusion on oil pan (upper) side, and tighten connector bolt.



## INSPECTION AFTER INSTALLATION

- Start the engine, and check there is no leak of engine oil or engine coolant.
- Check level of engine oil and engine coolant, and add engine oil and engine coolant. Refer to [LU-6, "ENGINE OIL"](#) and [CO-8, "ENGINE COOLANT"](#).

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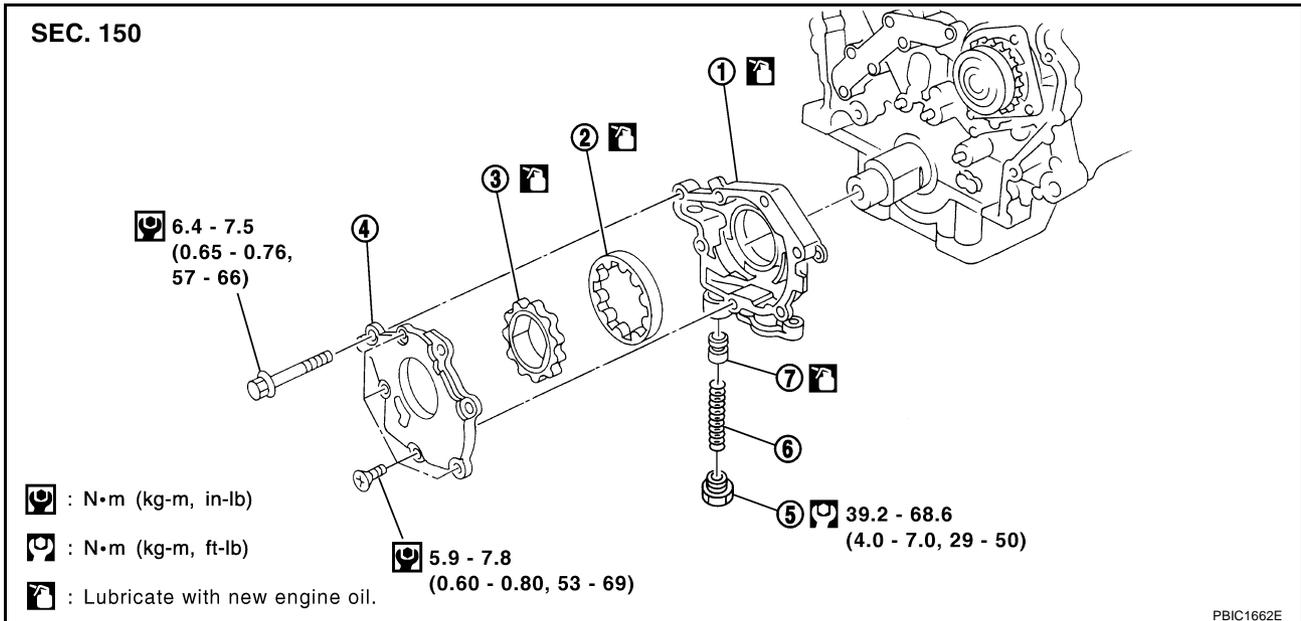
# OIL PUMP

## OIL PUMP

PF15010

### Removal and Installation

ABS000QG



1. Oil pump body
2. Outer rotor
3. Inner rotor
4. Oil pump cover
5. Regulator valve plug
6. Spring
7. Regulator valve

### CAUTION:

Before installation, apply new engine oil to the parts as instructed in the figure.

### REMOVAL

1. Remove oil pan and oil strainer. Refer to [EM-26, "OIL PAN AND OIL STRAINER"](#).
2. Remove front timing chain case and timing chain (primary). Refer to [EM-49, "TIMING CHAIN"](#).
3. Remove oil pump assembly.

### INSTALLATION

Install in the reverse order of removal paying attention to the following:

- When installing, align crankshaft flat faces with inner rotor flat faces.

### INSPECTION AFTER INSTALLATION

1. Start the engine and check for engine oil leakage.
2. Check oil level and add engine oil. Refer to [LU-6, "ENGINE OIL"](#).

### Disassembly and Assembly

#### DISASSEMBLY

1. Remove oil pump cover.
2. Remove inner rotor and outer rotor from oil pump body.
3. After removing regulator plug, remove regulator spring and regulator valve.

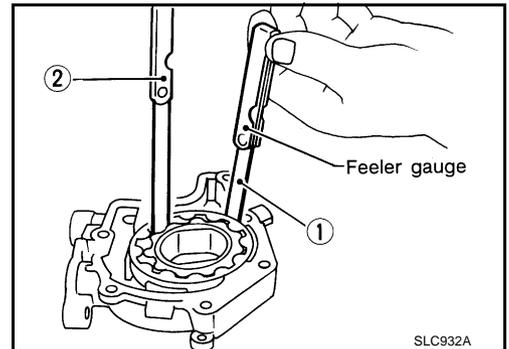
ABS000QH

# OIL PUMP

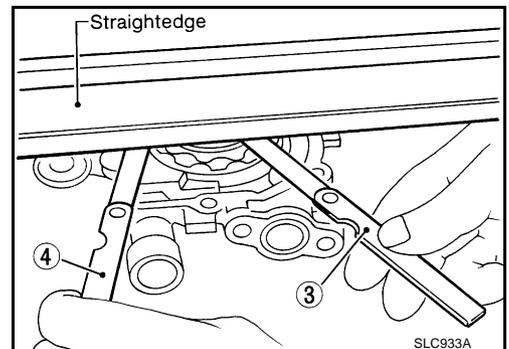
## INSPECTION AFTER DISASSEMBLY

### Clearance of Oil Pump Parts

- Measure clearance with feeler gauge.  
Clearance between outer rotor and oil pump body (position 1)  
**Standard : 0.114 - 0.260 mm (0.0045 - 0.0102 in)**
- Tip clearance between inner rotor and outer rotor (position 2)  
**Standard : Below 0.180 mm (0.0071in)**

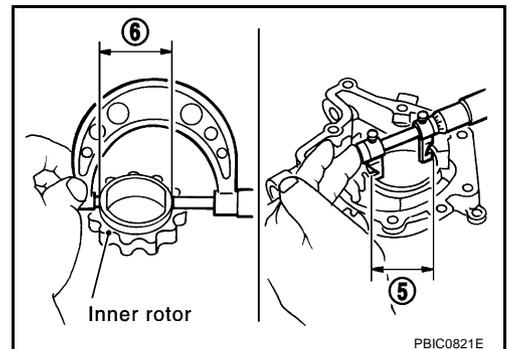


- Measure clearance with feeler gauge and straightedge.  
Side clearance between inner rotor and oil pump body (position 3)  
**Standard : 0.030 - 0.070 mm (0.0012 - 0.0028 in)**
- Side clearance between outer rotor and oil pump body (position 4)  
**Standard : 0.050 - 0.110 mm (0.0020 - 0.0043 in)**



Calculate the clearance between inner rotor and oil pump body as follows.

- Measure the inner diameter of oil pump body with inside micrometer (Position 5)
  - Measure the outer diameter of protruded portion of inner rotor (Position 6)
  - (Clearance) = (Inner diameter of oil pump body) – (Outer diameter of inner rotor)
- Standard : 0.045 - 0.091 mm (0.0018 - 0.0036 in)**



### Regulator Valve Clearance

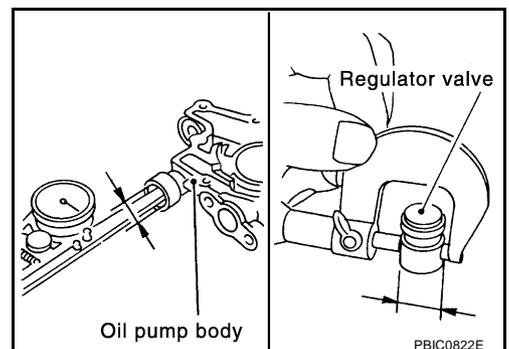
(Clearance) = (Valve hole diameter) – (Outer diameter of valve)

**Standard : 0.040 - 0.097 mm (0.0016 - 0.0038 in)**

### CAUTION:

Coat regulator valve with engine oil.

Check that it falls smoothly into the valve hole by its own weight.

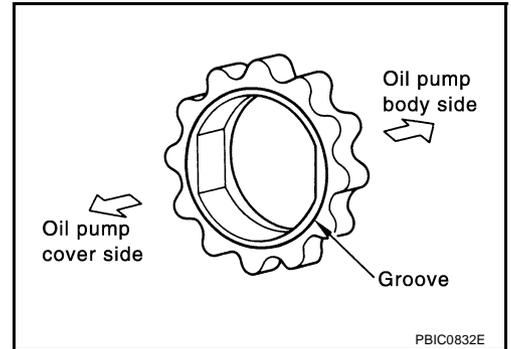


# OIL PUMP

## ASSEMBLY

Install in the reverse order of removal paying attention to the following.

- Install inner rotor with the groove faced to the oil pump cover side.



# SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

PPF:00030

### Standard and Limit OIL PRESSURE

ABS0000I

Engine speed rpm	Approximate discharge pressure kPa (kg/cm <sup>2</sup> , psi)
Idle speed	More than 98 (1.0, 14)
2,000	More than 294 (3.0, 43)
6,000	More than 392 (4.0, 57)

### OIL PUMP

Unit: mm (in)

Body to outer rotor radial clearance	0.114 - 0.260 (0.0045 - 0.0102)
Inner rotor to outer rotor tip clearance	Below 0.180 (0.0071)
Body to inner rotor axial clearance	0.030 - 0.070 (0.0012 - 0.0028)
Body to outer rotor axial clearance	0.050 - 0.110 (0.0020 - 0.0043)
Inner rotor to brazed portion of housing clearance	0.045 - 0.091 (0.0018 - 0.0036)

### REGULATOR VALVE

Unit: mm (in)

Regulator valve to oil pump cover clearance	0.040 - 0.097 (0.0016 - 0.0038)
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### OIL CAPACITY (APPROXIMATE)

Unit: ℓ (US qt, Imp qt)

With oil filter change	4.7 (5, 4-1/8)
Without oil filter change	4.4 (4-5/8, 3-7/8)
Dry engine (Overhaul)	5.4 (5-3/4, 4-3/4)

### Tightening Torque

ABS0000J

Unit: N·m (kg·m, ft·lb)  
Unit: N·m (kg·m, in·lb)\*

Oil pressure sensor	12.3 - 17.2 (1.25 - 1.75, 9 - 12)
Oil pan drain plug	29.4 - 39.2 (3.0 - 4.0, 22 - 28)
Oil cooler connector bolt	49.0 (5.0, 36)
Oil pump body	6.4 - 7.5 (0.65 - 0.76, 57 - 66)*
Oil pump cover	5.9 - 7.8 (0.60 - 0.80, 53 - 69)*
Regulator valve plug	39.2 - 68.6 (4.0 - 7.0, 29 - 50)

# SERVICE DATA AND SPECIFICATIONS (SDS)

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