

SECTION

LU

ENGINE LUBRICATION SYSTEM

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## PRECAUTIONS

### Precautions For Liquid Gasket

#### REMOVAL OF LIQUID GASKET SEALING

- After removing the mounting bolts and nuts, separate the mating surface using a seal cutter and remove the liquid gasket.

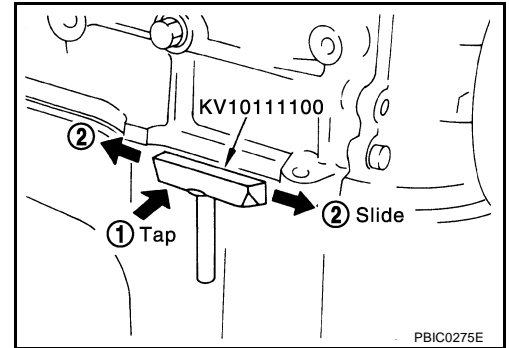
#### CAUTION:

Be careful not to damage the mating surfaces.

- In areas where the cutter is difficult to use, use a plastic hammer to lightly tap the areas where the liquid gasket is applied.

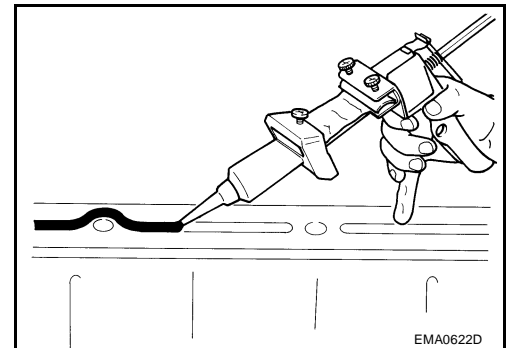
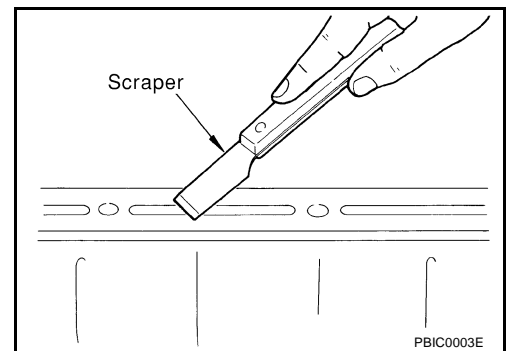
#### CAUTION:

If for some unavoidable reason a tool such as a flat-bladed screwdriver is used, be careful not to damage the mating surfaces.



#### LIQUID GASKET APPLICATION PROCEDURE

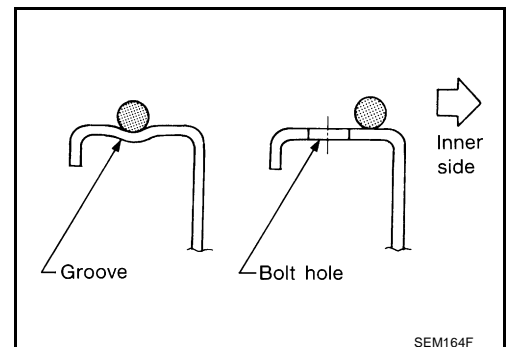
- Using a scraper, remove the old liquid gasket adhering to the gasket application surface and the mating surface.
- Remove the liquid gasket completely from the groove of the gasket application surface, mounting bolts, and bolt holes.
- Wipe the gasket application surface and the mating surface with white gasoline (lighting and heating use) to remove adhering moisture, grease and foreign materials.
- Attach the liquid gasket to the tube presser.
- Use **Genuine Liquid Gasket or equivalent.**
- Apply the gasket without breaks to the specified location with the specified dimensions.
- If there is a groove for the liquid gasket application, apply the gasket to the groove.



- As for the bolt holes, normally apply the gasket inside the holes. Occasionally, it should be applied outside the holes. Make sure to read the text of service manual.
- Within five minutes of gasket application, install the mating component.
- If the liquid gasket protrudes, wipe it off immediately.
- Do not retighten after installation.
- After 30 minutes or more have passed from the installation, fill the engine oil and coolant.

#### CAUTION:

If there are additional specific instructions in the service manual, observe them.



# PREPARATION

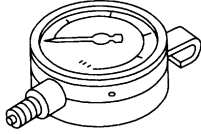
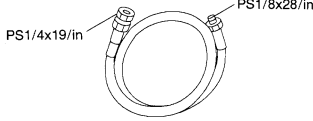
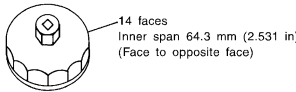
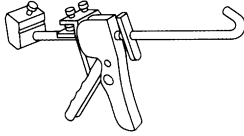
[QG]

PFP:00002

EBS00GR1

## PREPARATION

### Special Service Tools

Tool number Tool name	Description
ST25051001 Oil pressure gauge	Measuring oil pressure <b>Maximum measuring range:</b> <b>2,452 kPa (24.5 bar, 25 kg/cm<sup>2</sup> , 356 psi)</b>
 S-NT050	
ST25052000 Hose	Adapting oil pressure gauge to cylinder block
 S-NT559	
KV10115801 Oil filter wrench	Removing oil filter
 S-NT772	
WS39930000 Tube presser	Pressing the tube of liquid gasket
 S-NT052	

# LUBRICATION SYSTEM

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## LUBRICATION SYSTEM

### Lubrication Circuit

EBS00GR2

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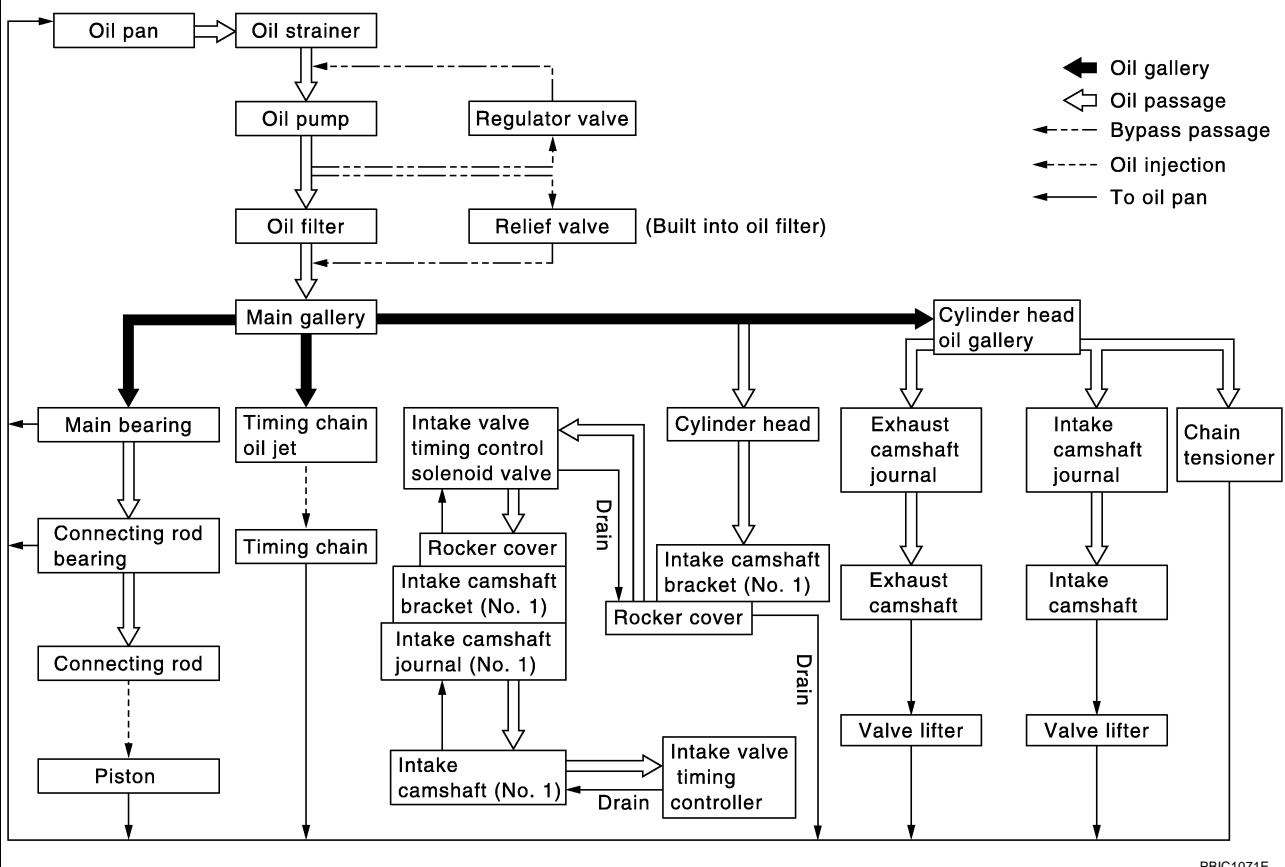
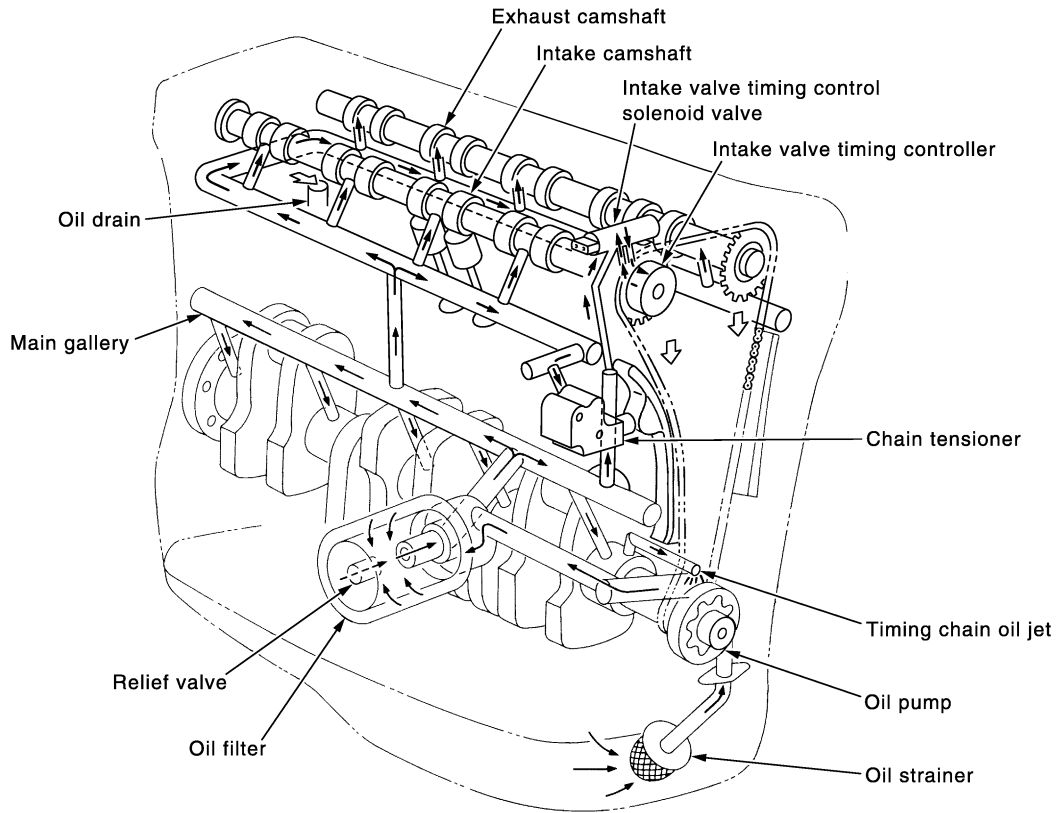
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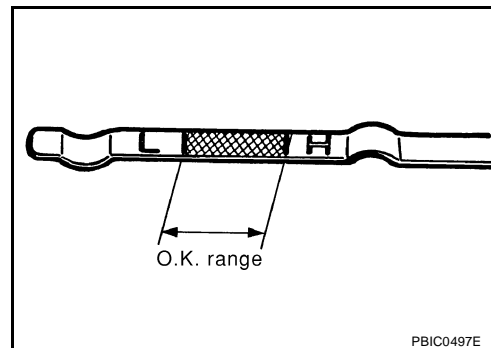
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## ENGINE OIL

## Inspection

## OIL LEVEL AND APPEARANCE

- Before starting the engine, 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 shown in the figure.
- If it is out of range, adjust it.
- Check the oil for white turbidity or remarkable contamination.
- If the oil becomes turbid and white, it is highly probable that it is contaminated with coolant. Find the cause and repair.



## OIL LEAKAGE

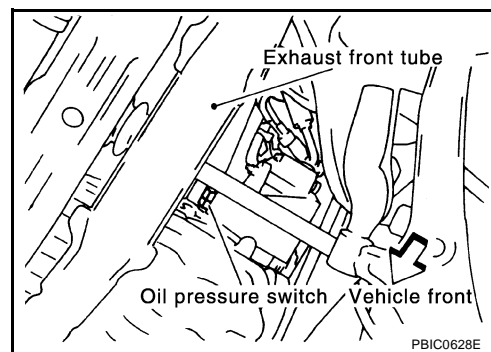
Check for oil leakage around the following area.

- Oil pan
- Oil pan drain plug
- Oil pressure switch
- Oil filter
- Front cover
- Cylinder head front cover
- Mating surface between cylinder block and cylinder head
- Mating surface between cylinder head and rocker cover

## OIL PRESSURE CHECK

**WARNING:**

- **Be careful not to burn yourself, as the engine oil is hot.**
  - **Oil pressure check should be done in "Parking position".**
1. Check the oil level.
  2. Remove intake manifold support (front).
  3. Remove the undercover.
  4. Remove the oil pressure switch to connect the oil pressure gauge.
  5. After warming up the engine, check that oil pressure corresponding to the engine speed is produced.



## Engine oil pressure [Oil temperature is 80 °C (176 °F)]

Engine speed (rpm)	Idle speed	2,000	6,000
Engine oil pressure kPa (bar, kg/cm <sup>2</sup> , psi)	Approx. 98 (0.98, 1.0, 14) or more	Approx. 294 (2.9, 3.0, 43) or more	Approx. 392 (3.9, 4.0, 57) or more

6. After checking, install the oil pressure switch as follows.
  - a. Remove old sealant adhering to the switch and engine.
  - b. Apply thread sealant.  
**Use Genuine Liquid Gasket or equivalent.**
  - c. Install oil pressure switch.

 : 12.3 - 17.2 N·m (1.3 - 1.7 kg-m, 9 - 12 ft-lb)

## Changing Engine Oil

### WARNING:

- Be careful not to burn yourself, as the engine oil is 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, 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 oil.
5. Install drain plug and refill with new engine oil.

Oil specification and viscosity:

- API grade SG, SH or SJ
- ILSAC grade GF-I or GF-II
- Refer to [MA-16, "RECOMMENDED FLUIDS AND LUBRICANTS"](#).


Oil capacity (Approximate):

Drain and refill	With oil filter change	Approximately 2.7 ℓ (2-3/8 Imp qt)
	Without oil filter change	Approximately 2.5 ℓ (2-1/4 Imp qt)
Dry engine (engine overhaul)		Approximately 3.1 ℓ (2-3/4 Imp qt)

### CAUTION:

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

**Oil pan drain plug:**

 : 29.4 - 39.2 N·m (3.0 - 3.9 kg-m, 22 - 28 ft-lb)

- 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.**

6. Warm up engine and check area around drain plug and oil filter for oil leakage.
7. Stop engine and wait for 10 minutes.
8. Check oil level. Refer to [LU-6, "Inspection"](#).

## OIL FILTER

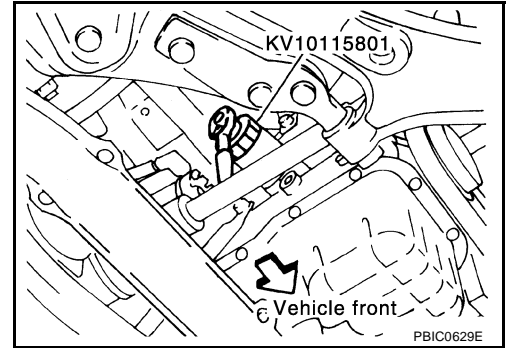
### Removal and Installation

#### REMOVAL

1. Open the oil filter installation/removal cover on the undercover.
2. Using an oil filter wrench (special service tool), remove the oil filter.

#### CAUTION:

- Be careful not to get burned when the engine and engine oil are 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.

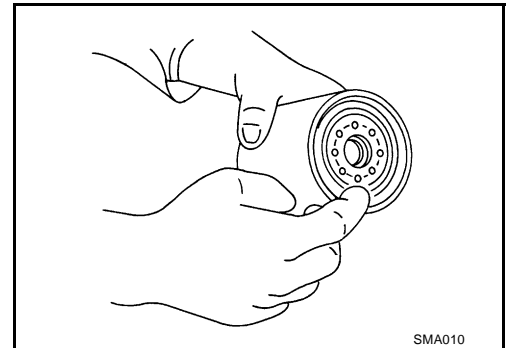


#### INSTALLATION

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

#### CAUTION:

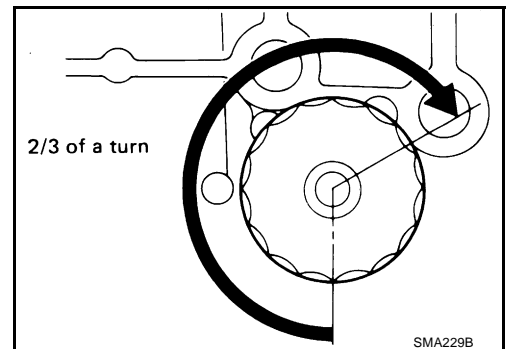
- The oil filter is provided with a relief valve.
- Use genuine NISSAN oil filter or the equivalent.



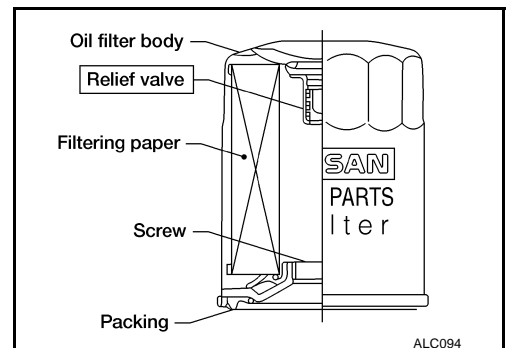
3. Screw the oil filter manually until it touches the installation surface, then tighten it by 2/3 turn.

#### Oil filter:

 :14.7 - 20.5 N·m (1.5 - 2.1 kg-m, 11 - 15 ft-lb)



4. After warming up the engine, check for engine oil leakage.
5. Check oil level and add engine oil. Refer to [LU-6, "ENGINE OIL"](#).

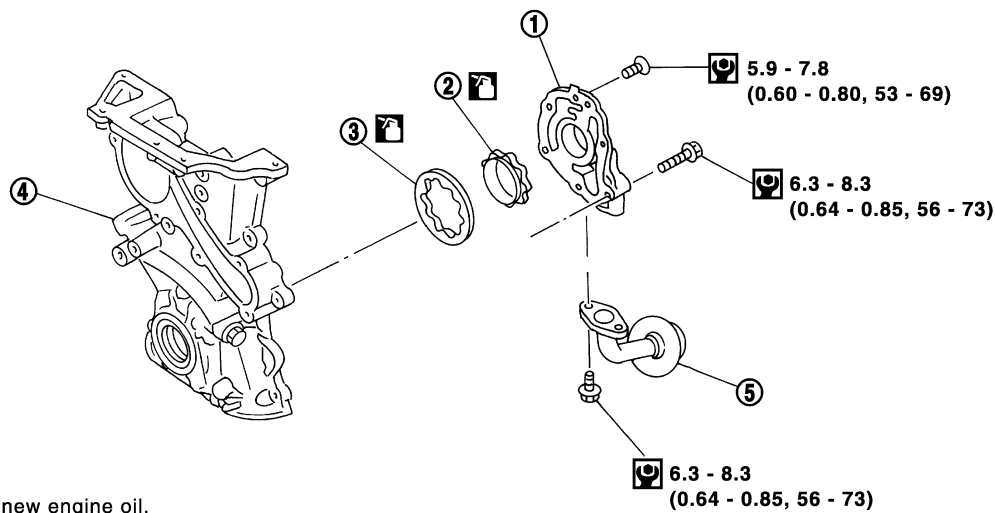




## OIL PUMP

## Removal and Installation

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**CAUTION:**

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

**REMOVAL**

- Remove front cover. Refer to [EM-52, "Removal and Installation"](#).

**INSTALLATION**

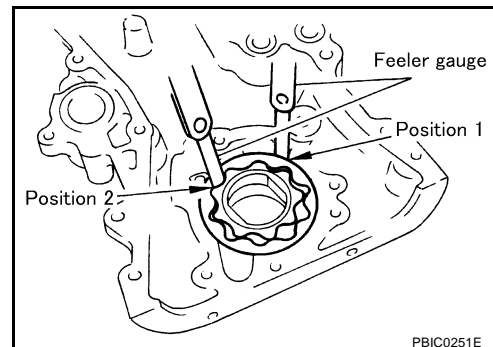
- Install in the reverse order of removal.

**Disassembly and Assembly****DISASSEMBLY**

- Remove oil pump cover.
- Remove inner rotor and outer rotor from front cover.

**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 - 0.210 mm (0.0045 - 0.0083 in)**  
 Tip clearance between inner rotor and outer rotor (position 2)  
**Standard : Below 0.180 mm (0.0071 in)**



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# OIL PUMP

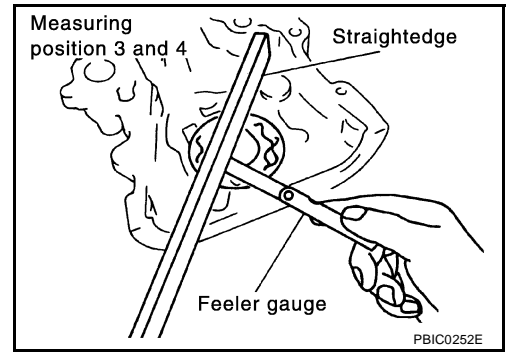
[QG]

- Measure clearance with feeler gauge and straightedge.  
Side clearance between inner rotor and oil pump body (position 3).

**Standard : 0.025 - 0.075 mm (0.0010 - 0.0030 in)**

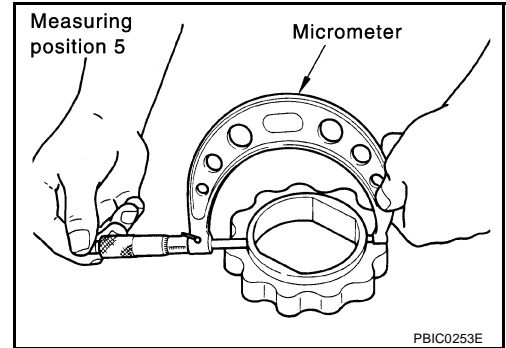
Side clearance between outer rotor and oil pump body (position 4).

**Standard : 0.025 - 0.075 mm (0.0010 - 0.0030 in)**



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

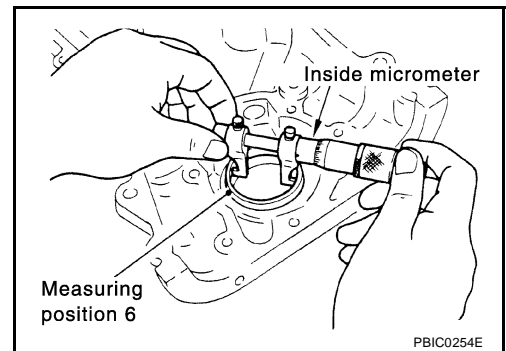
1. Measure the outer diameter of protruded portion of inner rotor (Position 5).



2. Measure the inner diameter of oil pump body with inside micrometer (Position 6).

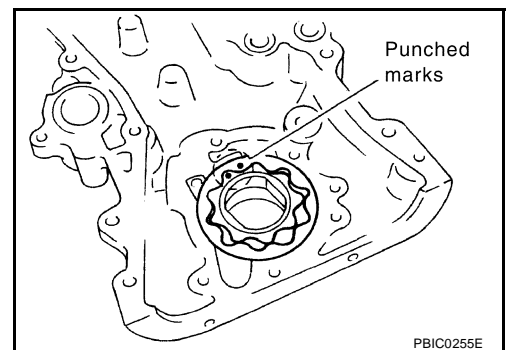
(Clearance) = (Inner diameter of oil pump body) – (Outer diameter of inner rotor)

**Standard : 0.045 - 0.095 mm (0.0018 - 0.0037 in)**



## ASSEMBLY

- Assemble in the reverse order of disassembly.
- Install the inner rotor and outer rotor with the punched marks on the oil pump cover side.



# SERVICE DATA AND SPECIFICATIONS (SDS)

[QG]

## SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

### Standard and Limit OIL PRESSURE

EBS00GR9

Engine speed rpm	Approximate discharge pressure kPa (bar, kg/cm <sup>2</sup> , psi)
Idle speed	Approx. 98 (0.98, 1.0, 14) or more
2,000	Approx. 294 (2.9, 3.0, 43) or more
6,000	Approx. 392 (3.9, 4.0, 57) or more

### OIL PUMP

Unit: mm (in)

Body to outer rotor radial clearance	0.114 - 0.210 (0.0045 - 0.0083)
Inner rotor to outer rotor tip clearance	Below 0.18 (0.0071)
Body to inner rotor axial clearance	0.025 - 0.075 (0.0010 - 0.0030)
Body to outer rotor axial clearance	0.025 - 0.075 (0.0010 - 0.0030)
Inner rotor to brazed portion of housing clearance	0.045 - 0.095 (0.0018 - 0.0037)

### OIL CAPACITY

Unit: ℓ (Imp qt)

With oil filter change	Approximately 2.7 (2-3/8)
Without oil filter change	Approximately 2.5 (2-1/4)
Dry engine (engine overhaul)	Approximately 3.1 (2-3/4)

### TIGHTENING TORQUE

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

Oil pressure switch	12.3 - 17.2 (1.3 - 1.7, 9 - 12)
Oil pan drain plug	29.4 - 39.2 (3.0 - 3.9, 22 - 28)
Oil filter body	14.7 - 20.5 (1.5 - 2.1, 11 - 15)
Regulator plug	39 - 59 (4.0 - 6.0, 29 - 43)

## PRECAUTIONS

### Precautions For Liquid Gasket

#### REMOVAL OF LIQUID GASKET SEALING

- After removing the mounting bolts and nuts, separate the mating surface using a seal cutter and remove the liquid gasket.

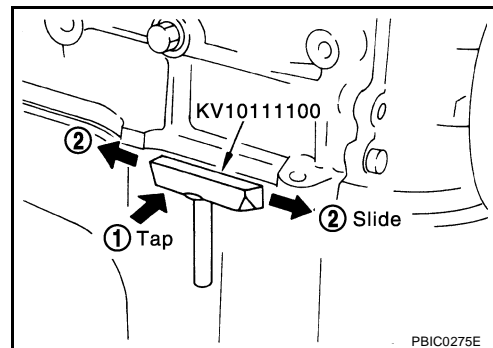
#### CAUTION:

Be careful not to damage the mating surfaces.

- In areas where the cutter is difficult to use, use a plastic hammer to lightly tap the areas where the liquid gasket is applied.

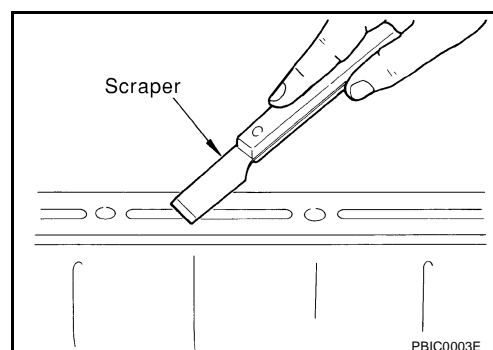
#### CAUTION:

If for some unavoidable reason a tool such as a flat-bladed screwdriver is used, be careful not to damage the mating surfaces.

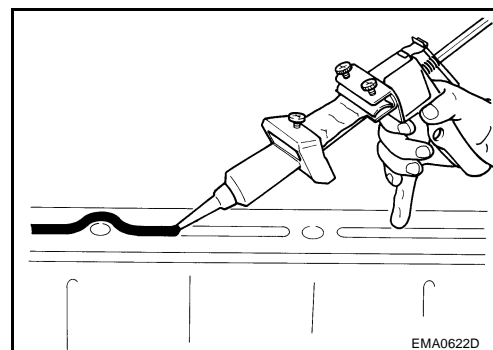


#### LIQUID GASKET APPLICATION PROCEDURE

- Using a scraper, remove the old liquid gasket adhering to the gasket application surface and the mating surface.
  - Remove the liquid gasket completely from the groove of the gasket application surface, mounting bolts, and bolt holes.
  - Wipe the gasket application surface and the mating surface with white gasoline (lighting and heating use) to remove adhering moisture, grease and foreign materials.
  - Attach the liquid gasket to the tube presser.
- Use Genuine Liquid Gasket or equivalent.**



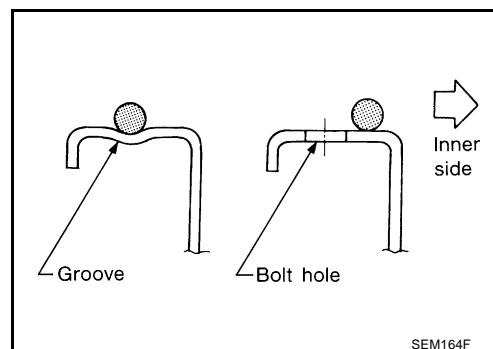
- Apply the gasket without breaks to the specified location with the specified dimensions.
- If there is a groove for the liquid gasket application, apply the gasket to the groove.



- As for the bolt holes, normally apply the gasket inside the holes. Occasionally, it should be applied outside the holes. Make sure to read the text of service manual.
- 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 coolant.

#### CAUTION:

If there are specific instructions in the service manual, observe them.



# PREPARATION

[QR]

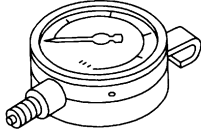
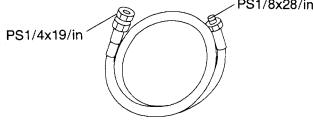
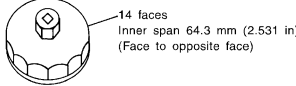
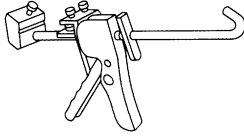
PFP:00002

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## PREPARATION

### Special Service Tools

EBS00GOJ

Tool number Tool name	Description	LU
ST25051001 Oil pressure gauge	 <p>S-NT050</p>	<p>Measuring oil pressure <b>Maximum measuring range:</b> <b>2,452 kPa (24.5 bar, 25 kg/cm<sup>2</sup> , 356 psi)</b></p> <p>C</p> <p>D</p>
ST25052000 Hose	 <p>S-NT559</p>	<p>Adapting oil pressure gauge to cylinder block</p> <p>E</p> <p>F</p>
KV10115801 Oil filter wrench	 <p>S-NT772</p>	<p>Removing oil filter</p> <p>G</p> <p>H</p>
WS39930000 Tube presser	 <p>S-NT052</p>	<p>Pressing the tube of liquid gasket</p> <p>I</p> <p>J</p> <p>K</p>

L

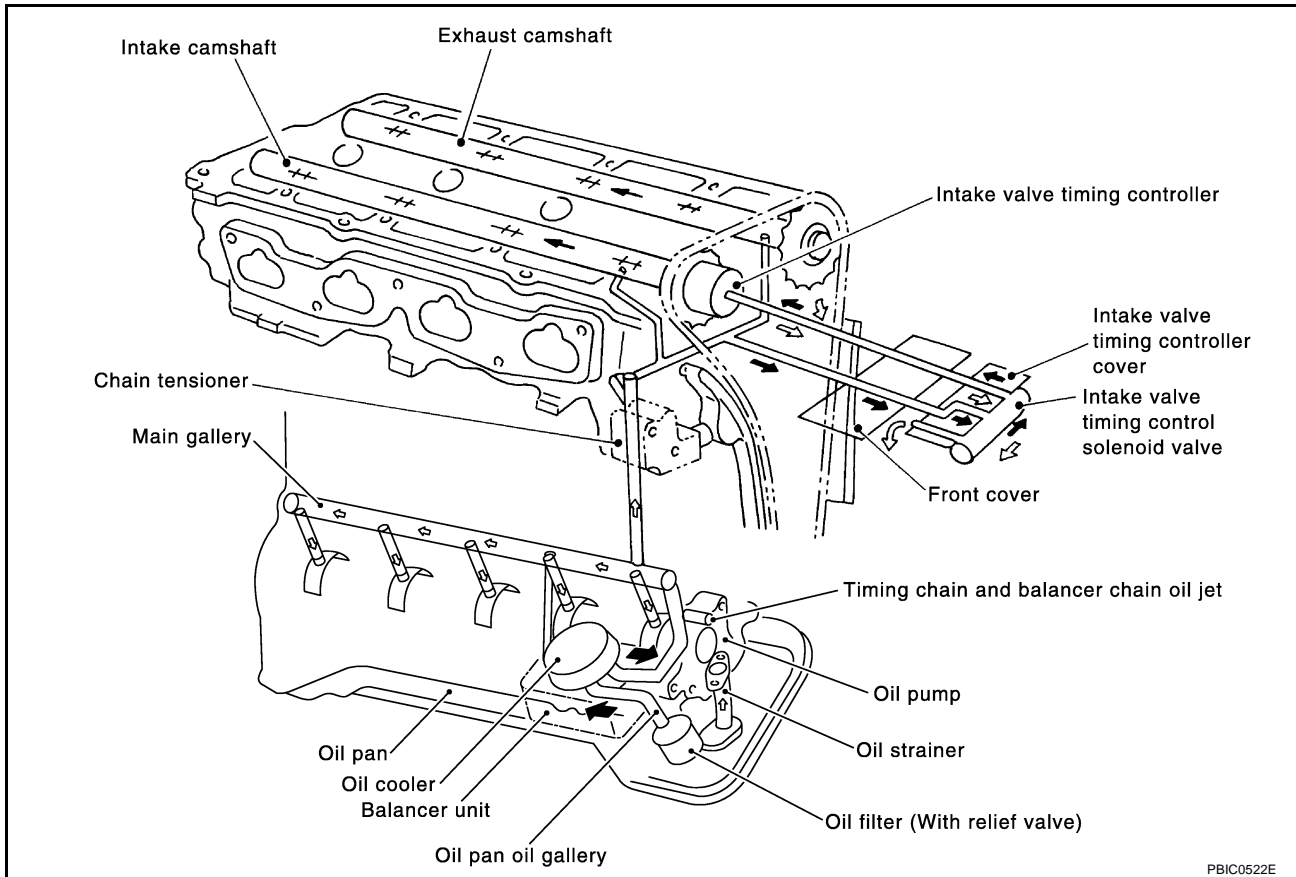
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## LUBRICATION SYSTEM

PFP:15010

### Lubrication Circuit

EBS00GOK

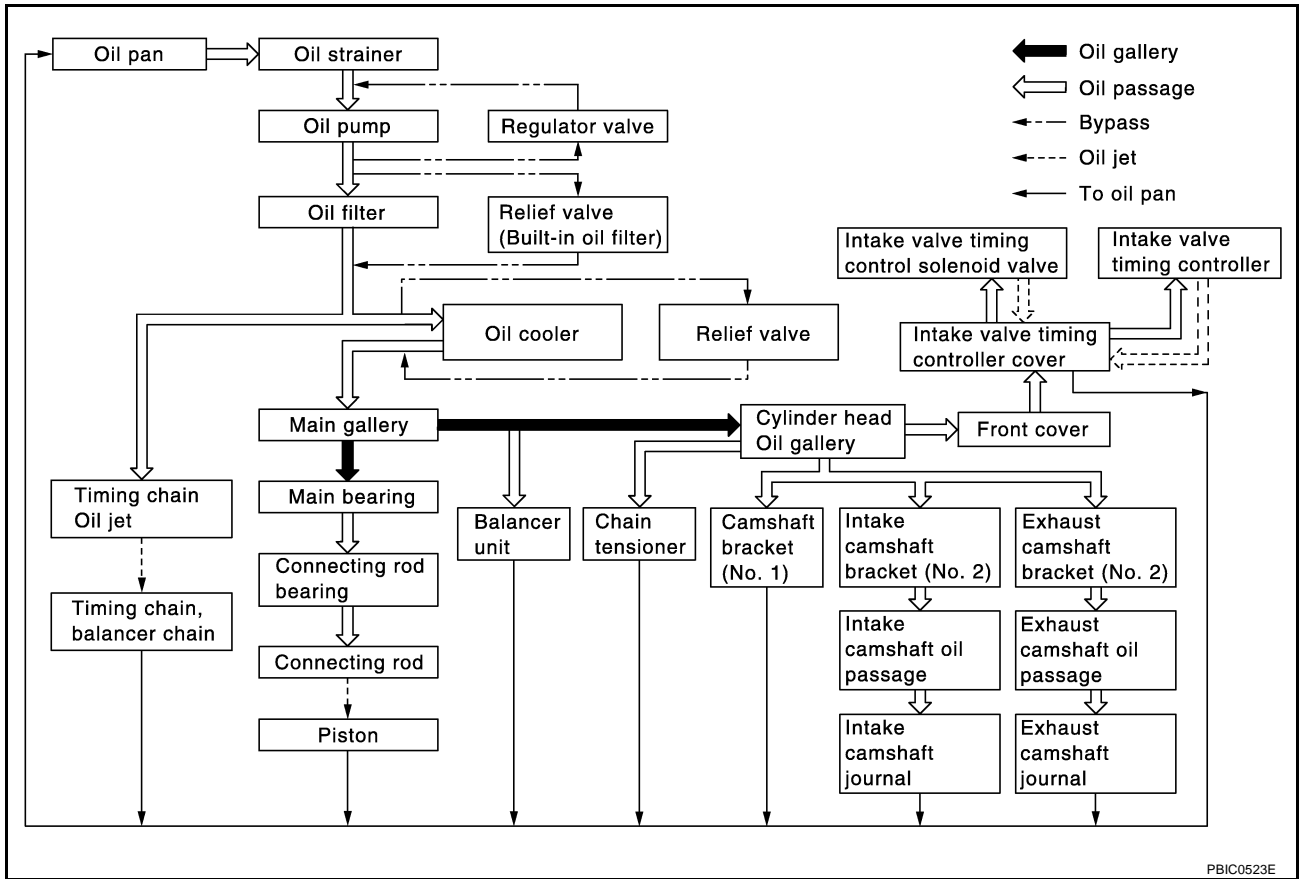


# LUBRICATION SYSTEM

[QR]

## System Drawing

EBS00GOL



## ENGINE OIL

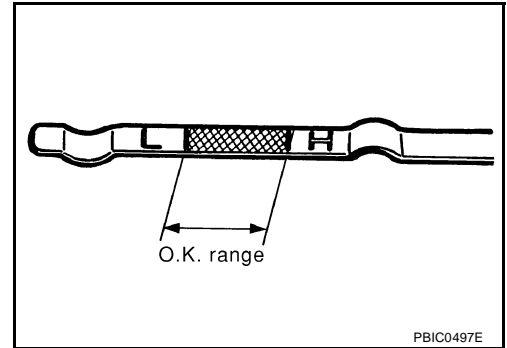
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### Inspection

#### OIL LEVEL AND APPEARANCE

EBS00GOM

- Before starting the engine, 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 shown in the figure.
- If it is out of range, adjust it.
- Check the oil for white turbidity or remarkable contamination.
- If the oil becomes turbid and white, it is highly probable that it is contaminated with coolant. Find the cause and repair.



#### OIL LEAKAGE

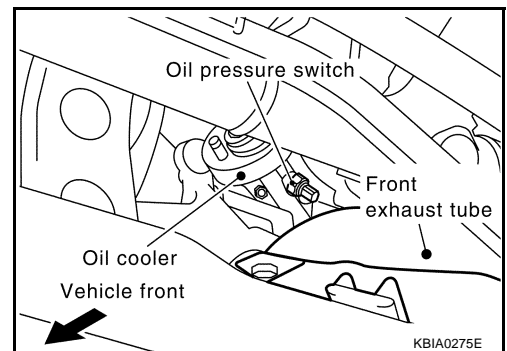
Check for oil leakage around the following area.

- Oil pan
- Oil pan drain plug
- Oil pressure switch
- Oil filter
- Intake valve timing control cover
- Front cover
- Mating surface between cylinder block and cylinder head
- Mating surface between cylinder head and rocker cover
- Crankshaft oil seal

#### OIL PRESSURE CHECK

##### **WARNING:**

- **Be careful not to burn yourself, as the engine oil is hot.**
  - **Oil pressure check should be done in "Parking position".**
1. Check the oil level.
  2. Remove the undercover.
  3. Remove the oil pressure switch to connect the oil pressure gauge.
  4. After warming up the engine, check that oil pressure corresponding to the engine speed is produced.



#### Engine oil pressure [Oil temperature is 80 °C (176 °F)]

Engine speed (rpm)	Idle speed	2,000	6,000
Engine oil pressure kPa (bar, kg/cm <sup>2</sup> , psi)	Approx. 98 (0.98, 1.0, 14) or more	Approx. 294 (2.9, 3.0, 43) or more	Approx. 392 (3.9, 4.0, 57) or more

5. After checking, install the oil pressure switch as follows.
  - a. Remove old sealant adhering to the switch and engine.
  - b. Apply thread sealant.  
**Use Genuine Liquid Gasket or equivalent.**
  - c. Install oil pressure switch.

: 12.3 - 17.2 N·m (1.3 - 1.7 kg-m, 9 - 12 ft-lb)



Changing Engine Oil

WARNING:

- Be careful not to burn yourself, as the engine oil is 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, 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 oil and refill with new engine oil.

Oil specification and viscosity:

- API grade SG, SH or SJ
- ILSAC grade GF-I or GF-II
- Refer to [MA-16, "RECOMMENDED FLUIDS AND LUBRICANTS"](#) .


Oil capacity (Approximate):

Drain and refill	With oil filter change	3.9 ℓ (3-3/8 Imp qt)
	Without oil filter change	3.5 ℓ (3-1/8 Imp qt)
Dry engine (engine overhaul)		4.5 ℓ (4 Imp qt)

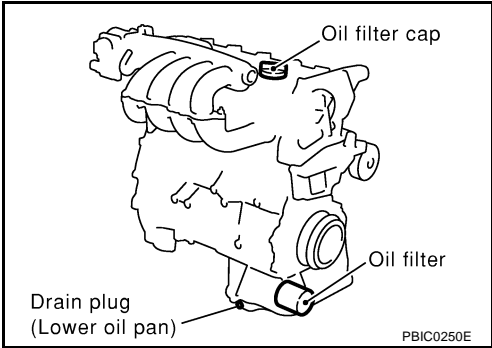
CAUTION:

- 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)

- 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.
5. Warm up engine and check area around drain plug and oil filter for oil leakage.
  6. Stop engine and wait for 10 minutes.
  7. Check oil level. Refer to [LU-16, "Inspection"](#) .



## OIL FILTER

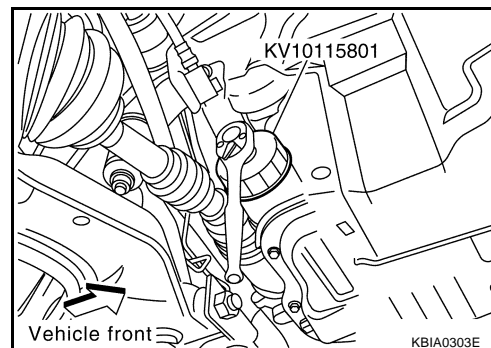
## Removal and Installation

## REMOVAL

1. Open the oil filter installation/removal cover on the undercover.
2. Using an oil filter wrench (special service tool), remove the oil filter.

**CAUTION:**

- Be careful not to get burned when the engine and engine oil are 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.

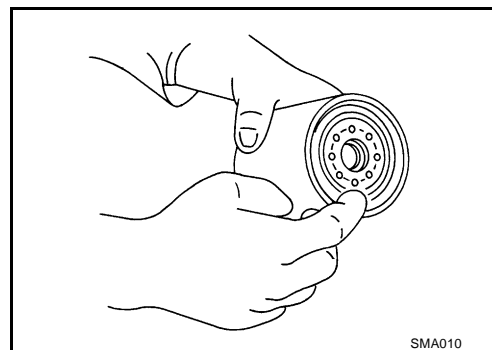


## INSTALLATION

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


**CAUTION:**

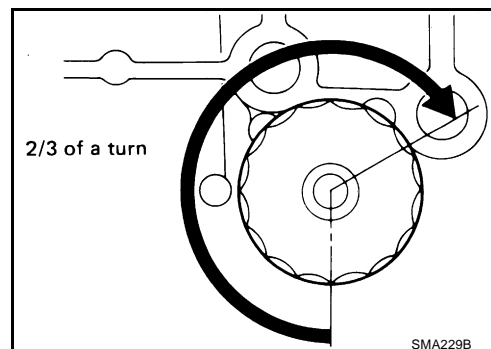
- The oil filter is provided with a relief valve.
- Use genuine NISSAN oil filter or the equivalent.



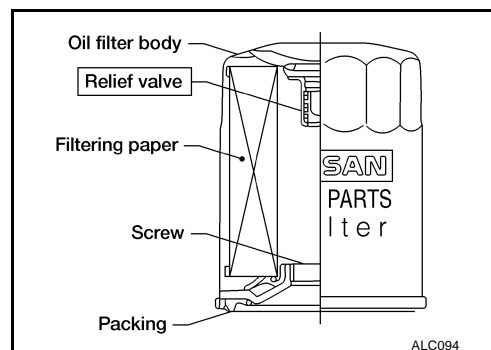
3. Screw the oil filter manually until it touches the installation surface, then tighten it by 2/3 turn.

**Oil filter:**

 : 14.7 - 20.5 N·m (1.5 - 2.1 kg-m, 11 - 15 ft-lb)



4. After warming up the engine, check for engine oil leakage.
5. Check oil level and add engine oil. Refer to [LU-16, "ENGINE OIL"](#)

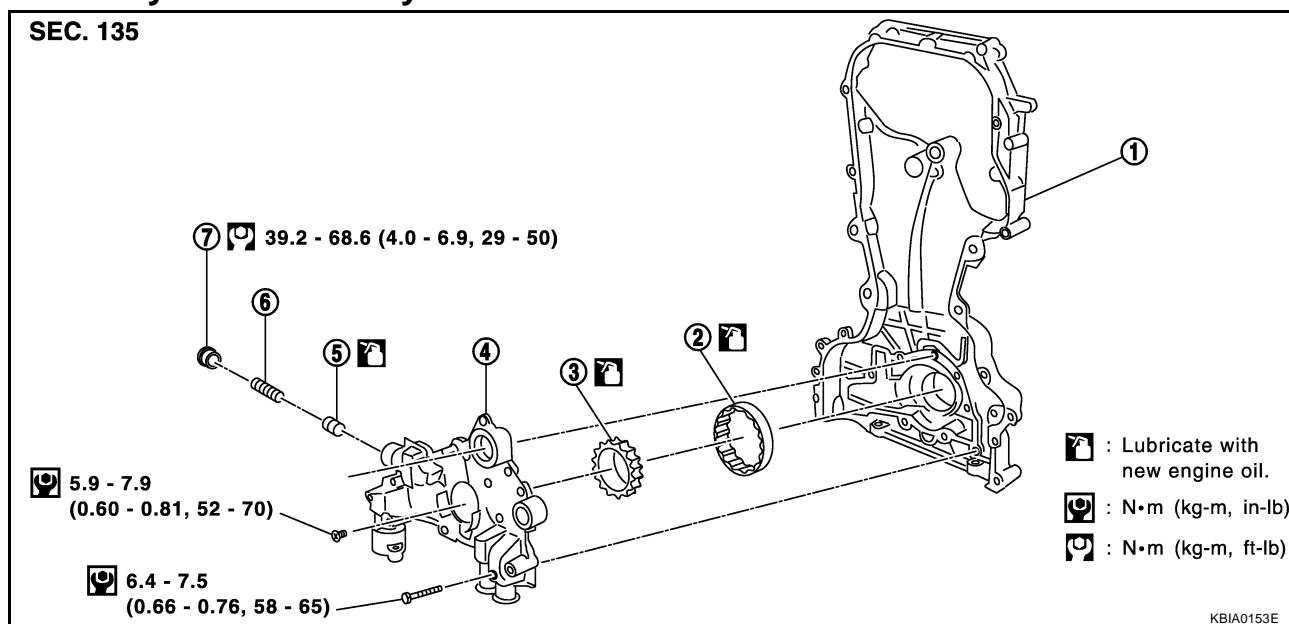


## OIL PUMP

## Removal and Installation

- Remove front cover. Refer to TIMING CHAIN, [EM-150, "Removal and Installation"](#).

## Disassembly and Assembly



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

**CAUTION:**

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

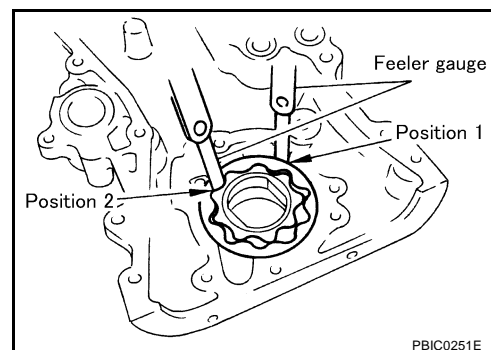
## DISASSEMBLY

- Remove oil pump cover.
- Remove inner rotor and outer rotor from front cover.
- After removing regulator plug, remove regulator spring and regulator valve.

## 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 - 0.179 mm (0.0045 - 0.0070 in)**  
Tip clearance between inner rotor and outer rotor (position 2)  
**Standard : Below 0.220 mm (0.0087 in)**



# OIL PUMP

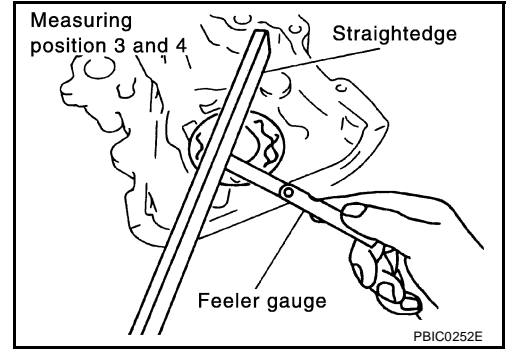
[QR]

- Measure clearance with feeler gauge and straightedge.  
Side clearance between inner rotor and oil pump body (position 3).

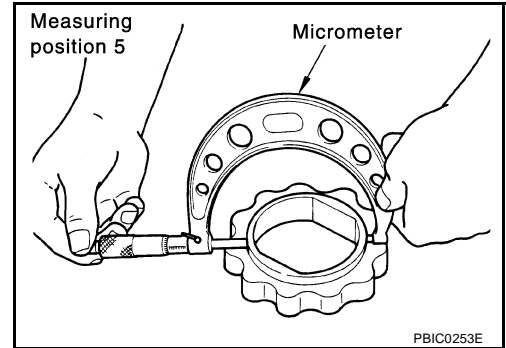
**Standard : 0.030 - 0.070 mm (0.0012 - 0.0028 in)**

Side clearance between outer rotor and oil pump body (position 4).

**Standard : 0.060 - 0.110 mm (0.0024 - 0.0043 in)**

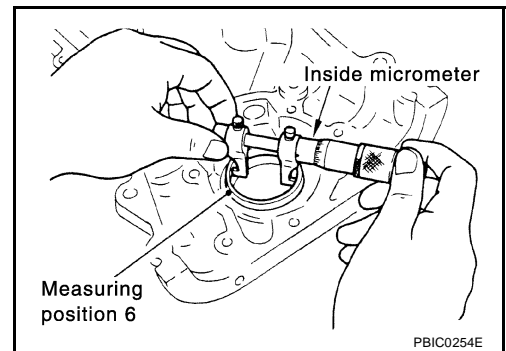


- Calculate the clearance between inner rotor and oil pump body as follows.
- Measure the outer diameter of protruded portion of inner rotor (Position 5).



- Measure the inner diameter of oil pump body with inside micrometer (Position 6).  
(Clearance) = (Inner diameter of oil pump body) – (Outer diameter of inner rotor)

**Standard : 0.035 - 0.070 mm (0.0014 - 0.0028 in)**



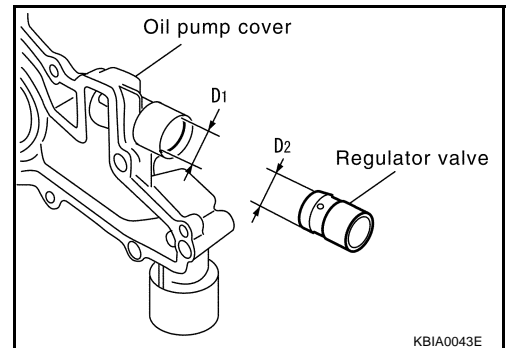
## Regulator Valve Clearance

(Clearance) = D1 (Valve hole diameter) – D2 (Outer diameter of valve)

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

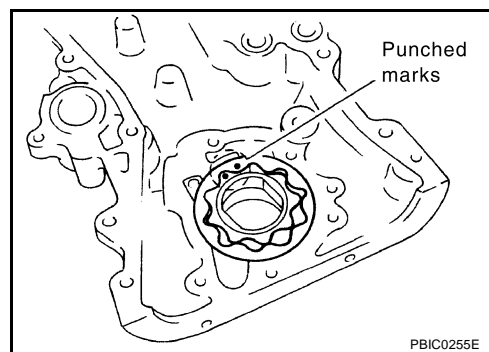
### CAUTION:

- Coat regulator valve with engine oil.
- Check that it falls smoothly into the valve hole by its own weight.



**ASSEMBLY**

- Assemble in the reverse order of disassembly.
- Install the inner rotor and outer rotor with the punched marks on the oil pump cover side.



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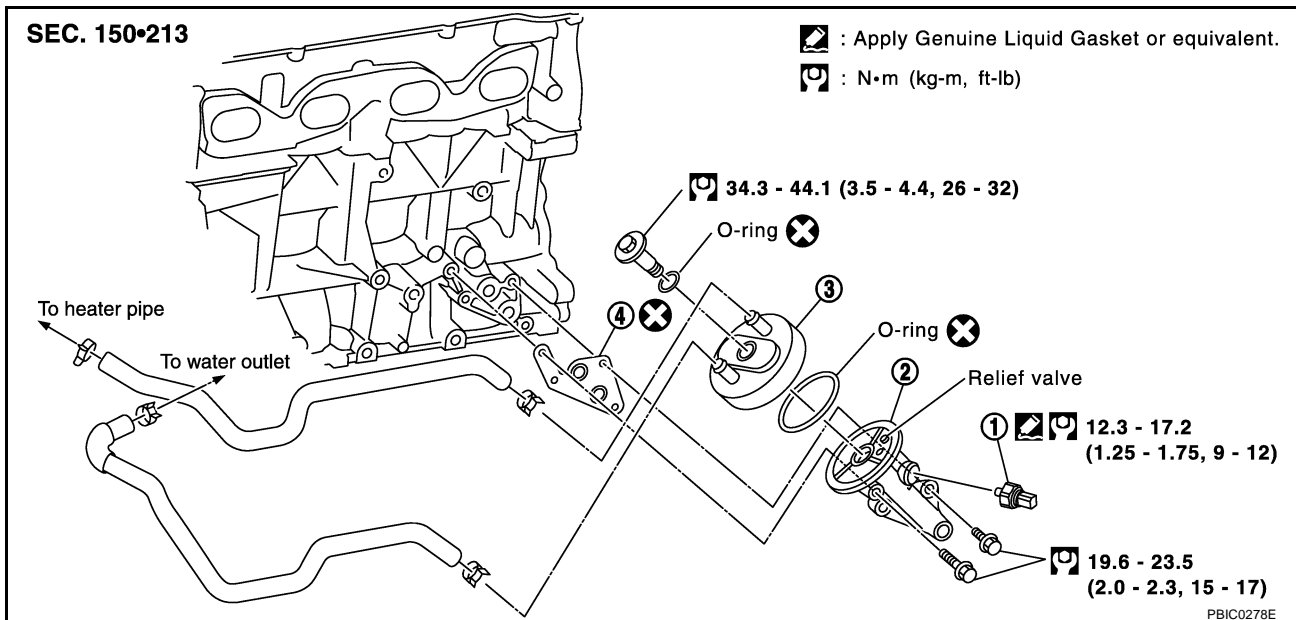
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## OIL COOLER

## Removal and Installation



1. Oil pressure switch
4. Gasket

2. Oil cooler bracket

3. Oil cooler

**WARNING:**

- Be careful not to get burned when the engine and engine oil are hot.

**CAUTION:**

- When removing oil cooler, prepare a shop cloth to absorb any oil leakage or spillage.
- Completely wipe off any oil that adheres to the engine and the vehicle.

**REMOVAL**

1. Remove front RH wheel and engine room right side cover.
2. Drain coolant by removing cylinder block drain plug and radiator drain cock. Refer to [MA-20, "DRAINING ENGINE COOLANT"](#).
3. Paint a mating mark at the oil cooler and oil cooler bracket.

**INSPECTION****Oil Cooler**

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

**Oil Pressure Relief Valve**

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

**INSTALLATION**

Installation is in the reverse order of removal.

# SERVICE DATA AND SPECIFICATIONS (SDS)

[QR]

## SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

### Standard and Limit OIL PRESSURE

EBS00GOS

Engine speed rpm	Approximate discharge pressure kPa (bar, kg/cm <sup>2</sup> , psi)
Idle speed	Approx. 98 (0.98, 1.0, 14) or more
2,000	Approx. 294 (2.9, 3.0, 43) or more
6,000	Approx. 392 (3.9, 4.0, 57) or more

### OIL PUMP

Unit: mm (in)

Body to outer rotor radial clearance	0.114 - 0.179 (0.0045 - 0.0070)
Inner rotor to outer rotor tip clearance	Below 0.220 (0.0087)
Body to inner rotor axial clearance	0.030 - 0.070 (0.0012 - 0.0028)
Body to outer rotor axial clearance	0.060 - 0.110 (0.0024 - 0.0043)
Inner rotor to brazed portion of housing clearance	0.035 - 0.070 (0.0014 - 0.0028)

### REGULATOR VALVE

Unit: mm (in)

Regulator valve to oil pump cover clearance	0.040 - 0.097 (0.0016 - 0.0038)
---	---------------------------------

### OIL CAPACITY

Unit: ℓ (Imp qt)

With oil filter change	Approximately 3.9 (3-3/8)
Without oil filter change	Approximately 3.5 (3-1/8)
Dry engine (engine overhaul)	Approximately 4.5 (4)

### TIGHTENING TORQUE

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

Oil pressure switch	12.3 - 17.2 (1.3 - 1.7, 9 - 12)
Oil pan drain plug	29.4 - 39.2 (3.0 - 4.0, 22 - 28)
Oil filter body	14.7 - 20.5 (1.5 - 2.1, 11 - 15)
Oil pump assembly	6.4 - 7.5 (0.66 - 0.76, 57 - 66)*
Oil pump cover	5.9 - 7.9 (0.60 - 0.81, 52 - 70)*
Regulator plug	39.2 - 68.6 (4.0 - 7.0, 29 - 50)

## PRECAUTIONS

### Precautions For Liquid Gasket

#### REMOVAL OF LIQUID GASKET SEALING

- After removing the mounting bolts and nuts, separate the mating surface using a seal cutter and remove the liquid gasket.

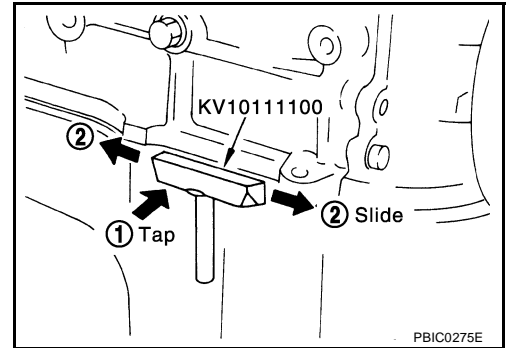
#### CAUTION:

Be careful not to damage the mating surfaces.

- In areas where the cutter is difficult to use, use a plastic hammer to lightly tap the areas where the liquid gasket is applied.

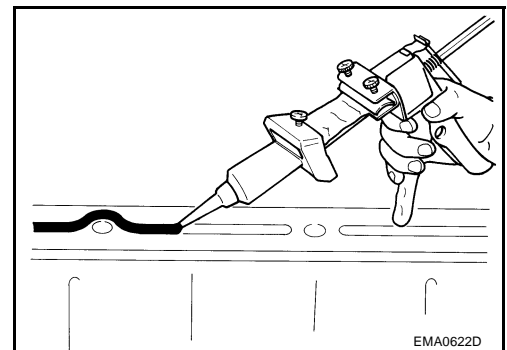
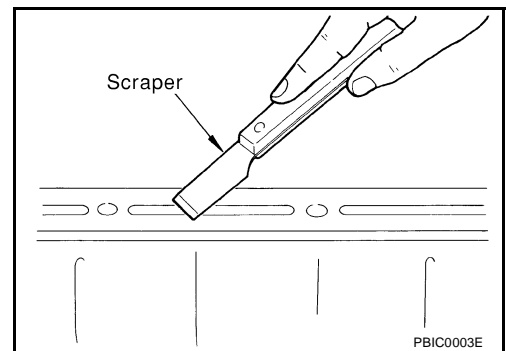
#### CAUTION:

If for some unavoidable reason a tool such as a flat-bladed screwdriver is used, be careful not to damage the mating surfaces.



#### LIQUID GASKET APPLICATION PROCEDURE

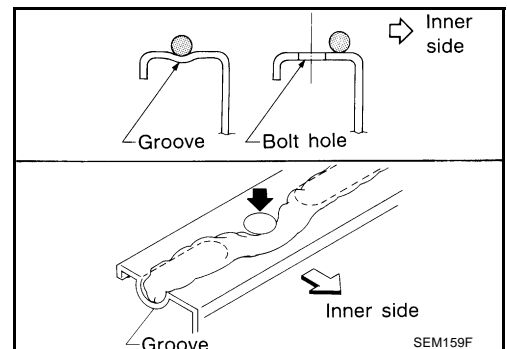
- Using a scraper, remove the old liquid gasket adhering to the gasket application surface and the mating surface.
  - Remove the liquid gasket completely from the groove of the gasket application surface, mounting bolts, and bolt holes.
  - Wipe the gasket application surface and the mating surface with white gasoline (lighting and heating use) to remove adhering moisture, grease and foreign materials.
  - Attach the liquid gasket to the tube presser.
- Use Genuine Liquid Gasket or equivalent.**
- Apply the gasket without breaks to the specified location with the specified dimensions.
  - If there is a groove for the liquid gasket application, apply the gasket to the groove.



- As for the bolt holes, normally apply the gasket inside the holes. Occasionally, it should be applied outside the holes. Make sure to read this service manual.
- 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 coolant.

#### CAUTION:

If there are specific instructions in this service manual, observe them.





# PREPARATION

[YD]

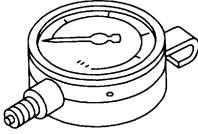
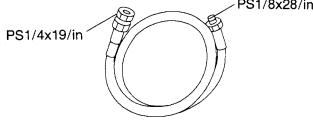
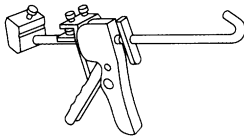
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## PREPARATION

### Special Service Tools

EBS00GSU

Tool number Tool name	Description	LU
ST25051001 Oil pressure gauge	 <p>S-NT050</p>	<p>Measuring oil pressure <b>Maximum measuring range:</b> <b>2,452 kPa (25 kg/cm2, 356 psi)</b></p> <p>C</p> <p>D</p>
ST25052000 Hose	 <p>S-NT559</p>	<p>Adapting oil pressure gauge to cylinder block</p> <p>E</p> <p>F</p>
WS39930000 Tube presser	 <p>S-NT052</p>	<p>Pressing the tube of liquid gasket</p> <p>G</p> <p>H</p>

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# LUBRICATION SYSTEM

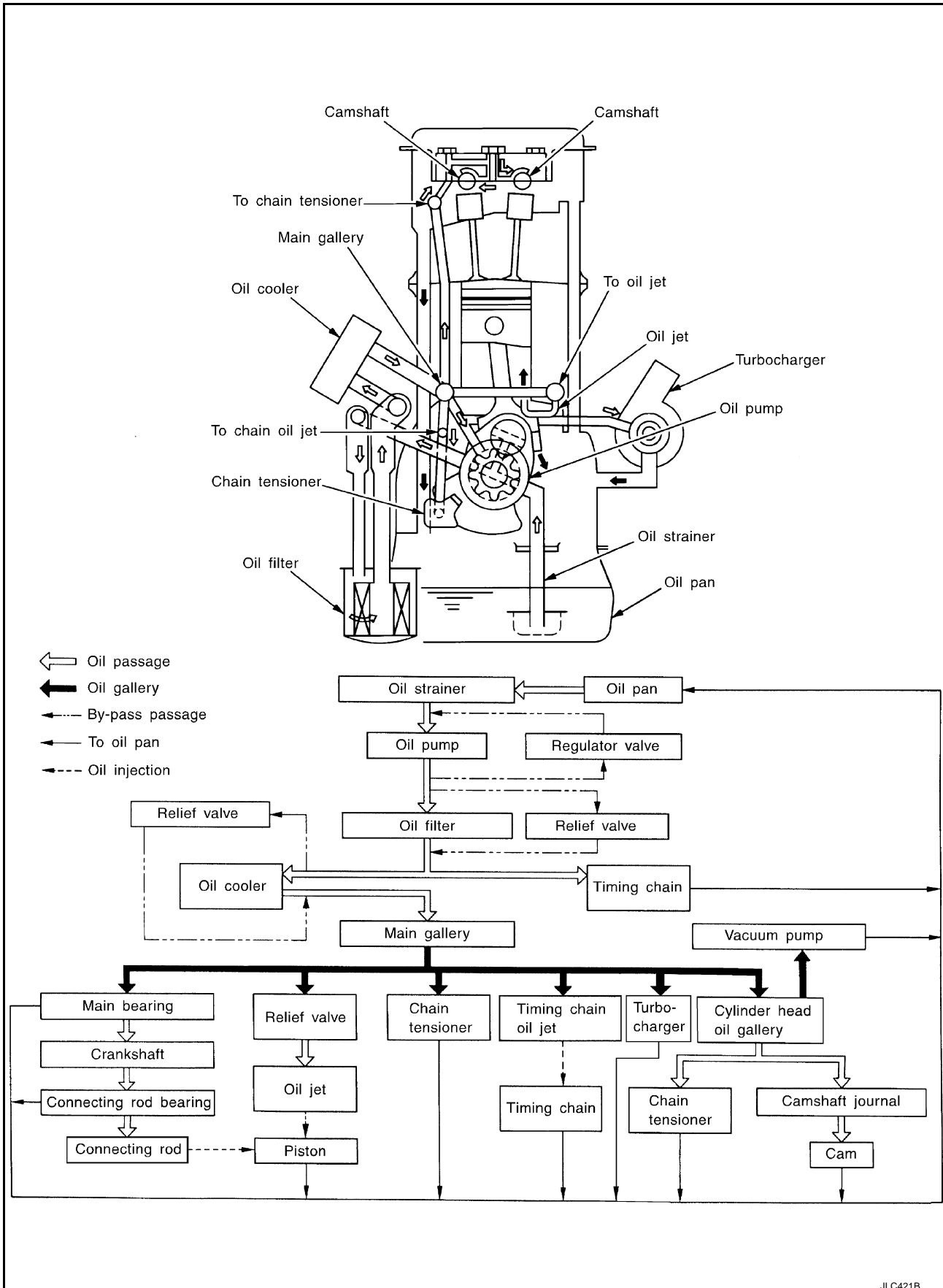
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## LUBRICATION SYSTEM

PFP:15010

### Lubrication Circuit

EBS00GSV



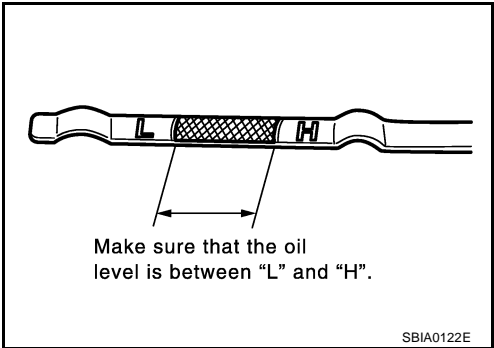
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ENGINE OIL

Inspection

OIL LEVEL AND MUDDINESS

- Before starting the engine, check the oil level placing vehicle horizontally. If the engine is already started, stop it and allow 10 minutes before checking.
- Check that the oil level is within the range shown in the figure.
- If it is out of range, adjust it.
- Check the oil for white turbidity or remarkable contamination.
- If the oil becomes turbid and white, it is highly probable that it is contaminated with coolant. Find the cause and repair.



OIL LEAKAGE

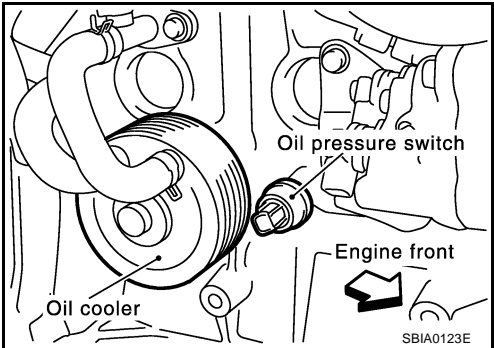
Check for oil leakage around the following area.

- Oil pan
- Oil pan drain plug
- Oil pressure switch
- Oil filter bracket
- Vacuum pump
- Cylinder head rear cover assembly
- Chain case
- Oil pump housing
- Mating surface between cylinder block and cylinder head
- Mating surface between cylinder head and rocker cover
- Oil cooler
- Crankshaft oil seals

OIL PRESSURE CHECK

**WARNING:**

- **Be careful not to burn yourself, as the engine oil is hot.**
  - **Oil pressure check should be done in Neutral “N” position.**
1. Check the oil level. Refer to [LU-27, "OIL LEVEL AND MUDDINESS"](#)
  2. Remove the undercover.
  3. Remove the oil pressure switch to connect the oil pressure gauge.
  4. After warming up the engine, check that oil pressure corresponding to the engine speed is produced.



Engine oil pressure [Oil temperature is 80 °C (176 °F)]

Engine speed (rpm)	Idle speed	2,000	4,000
Engine oil pressure kPa (bar, kg/cm <sup>2</sup> , psi)	Approx. 140 (1.40, 1.43, 20.3) or more	Approx. 270 (2.69, 2.75, 39.1) or more	Approx. 430 (4.29, 4.38, 62.3) or more

5. After checking, install the oil pressure switch as follows.
  - a. Remove old sealant adhering to the switch and engine.
  - b. Apply thread sealant.  
**Use Genuine Liquid Gasket or equivalent.**

## Oil pressure switch:

 : 13 - 17 N·m (1.4 - 1.7 kg-m, 10 - 12 ft-lb)

6. Start engine and check for oil leakage.

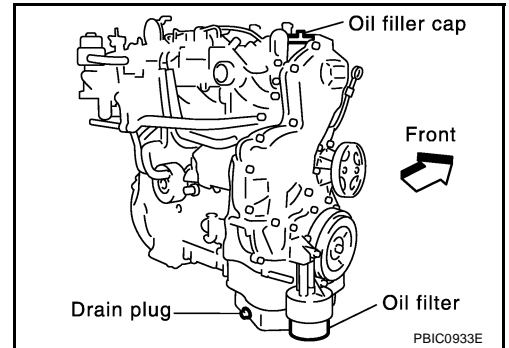
## Changing Engine Oil

EBS00GSX

### WARNING:

- Be careful not to burn yourself, as the engine oil is 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. Put vehicle horizontally.
2. Warm up engine, and check for oil leakage from engine components.
3. Stop engine and wait for 10 minutes.
4. Remove drain plug and oil filler cap.



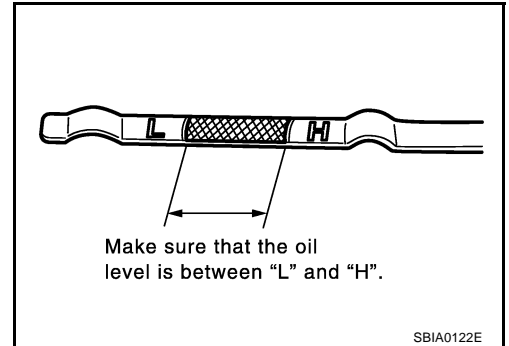
5. Drain oil and refill with new engine oil.

### Oil specification and viscosity:

- API grade CF- 4.
- Refer to [MA-16, "RECOMMENDED FLUIDS AND LUBRICANTS"](#).

### Oil capacity (Approximate):

Drain and refill	With oil filter change	5.2 ℓ (4-5/8 Imp qt)
	Without oil filter change	4.9 ℓ (4-3/8 Imp qt)
Dry engine (engine overhaul)		6.3 ℓ (5-1/2 Imp qt)




- 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.

### CAUTION:

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

## Oil pan drain plug:

 : 29 - 39 N·m (3.0 - 4.0 kg-m, 22 - 29 ft-lb)

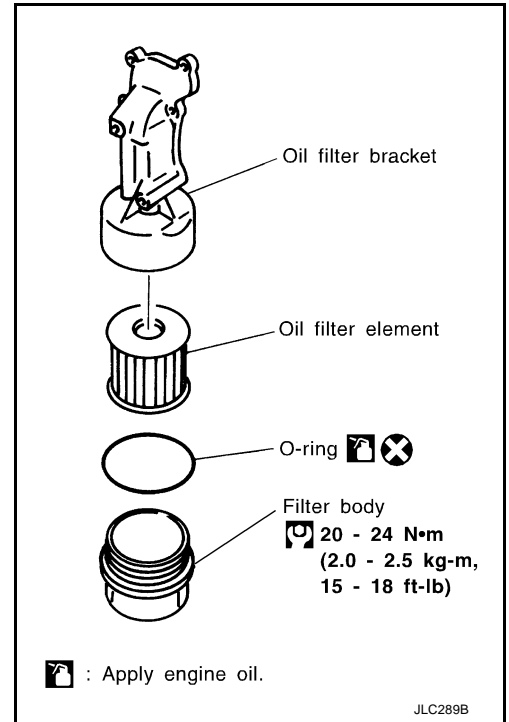
- The refill capacity depends on the oil temperature and drain time. Use these specifications for reference only.
- Always use the dipstick to determine when the proper amount of oil is in the engine.
6. Warm up engine and check area around drain plug and oil filter for oil leakage.
  7. Stop engine and wait for 10 minutes.
  8. Check oil level.

## OIL FILTER

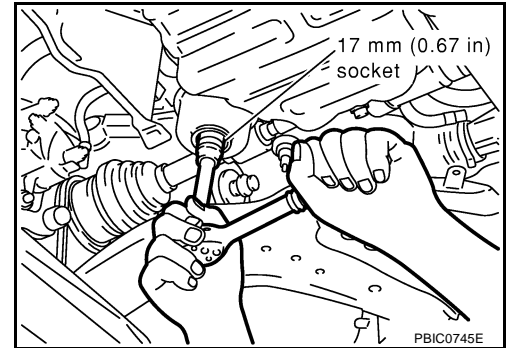
### Removal and Installation REMOVAL

#### CAUTION:

- Be careful not to get burned when the engine and engine oil are 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 adhere to the engine and the vehicle.



1. Using a socket wrench [plane-to-plane width: 17 mm (0.67 in)], loosen the filter body approximately four turns.



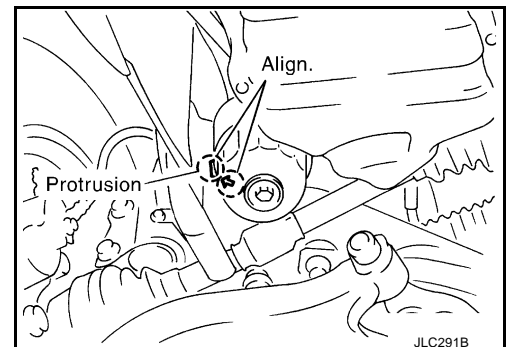
2. Drain the oil after matching the "DRAIN" arrow mark at the bottom of the filter body to the protrusion on the oil filter bracket.

- Catch the oil with a pan or cloth.

#### CAUTION:

- The drained oil flows over the right surface of the filter body.
- Completely wipe clean any engine oil remaining on the filter body or vehicle.

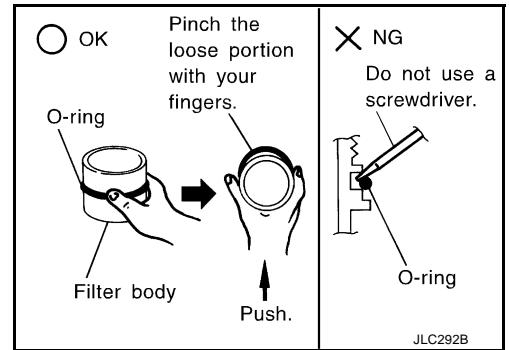
3. Remove the filter body, then remove the oil filter element.



4. Remove the O-ring from the filter body.
  - Push the O-ring in one direction, lift the slack part using fingers, and remove the O-ring from the filter body.

**CAUTION:**


**Do not use wires or flat-bladed screwdrivers etc. as they may cause damage to the filter body.**



## INSTALLATION

1. Completely remove all foreign objects adhering to the inside of the filter body or O-ring mounting area (body side and bracket side).
2. Install the oil filter element and O-ring to the filter body.
  - Push the oil filter element into the filter body completely.
3. Install the filter body to the oil filter bracket.

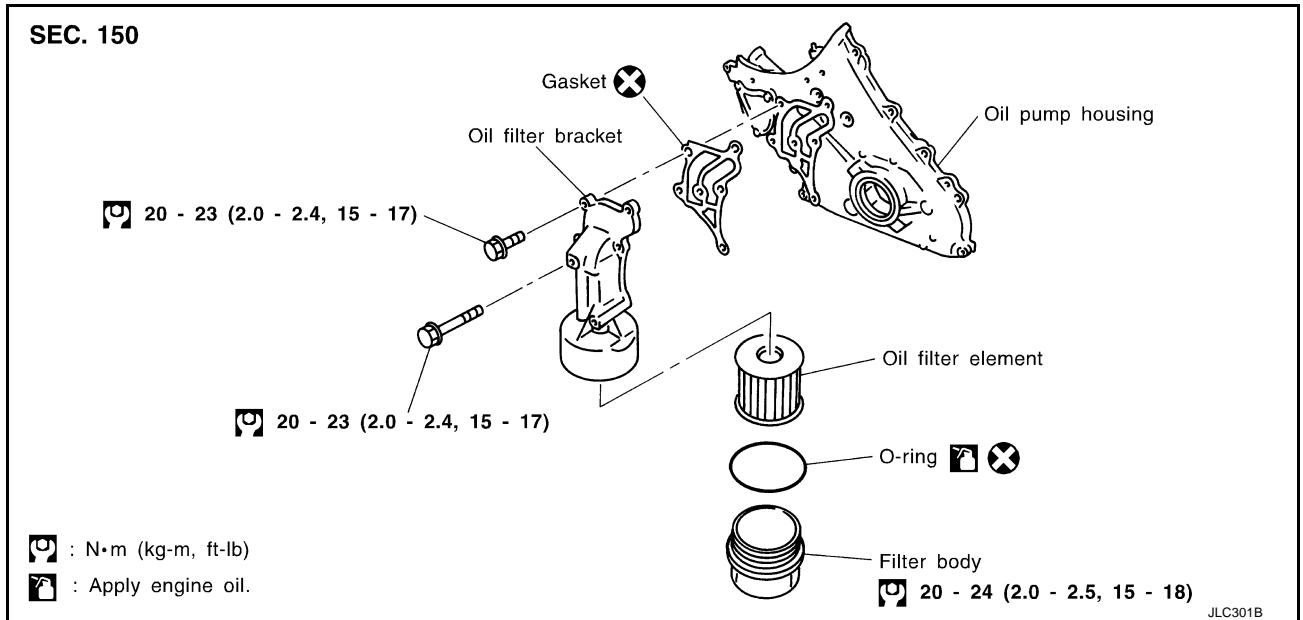
**Oil filter:**

 : 20 - 24 N·m (2.0 - 2.5 kg-m, 15 - 18 ft-lb)

4. After warming up the engine, check for engine oil leakage.
5. Check oil level and add engine oil. Refer to [LU-27, "ENGINE OIL"](#) .

## OIL FILTER BRACKET

## Removal and Installation



## REMOVAL

1. Remove the undercover.
2. Steer the front wheel to the right.
3. Remove the right splash cover.
4. Remove the oil filter bracket bolt. Refer to [LU-29, "OIL FILTER"](#) for cautions.

## INSTALLATION

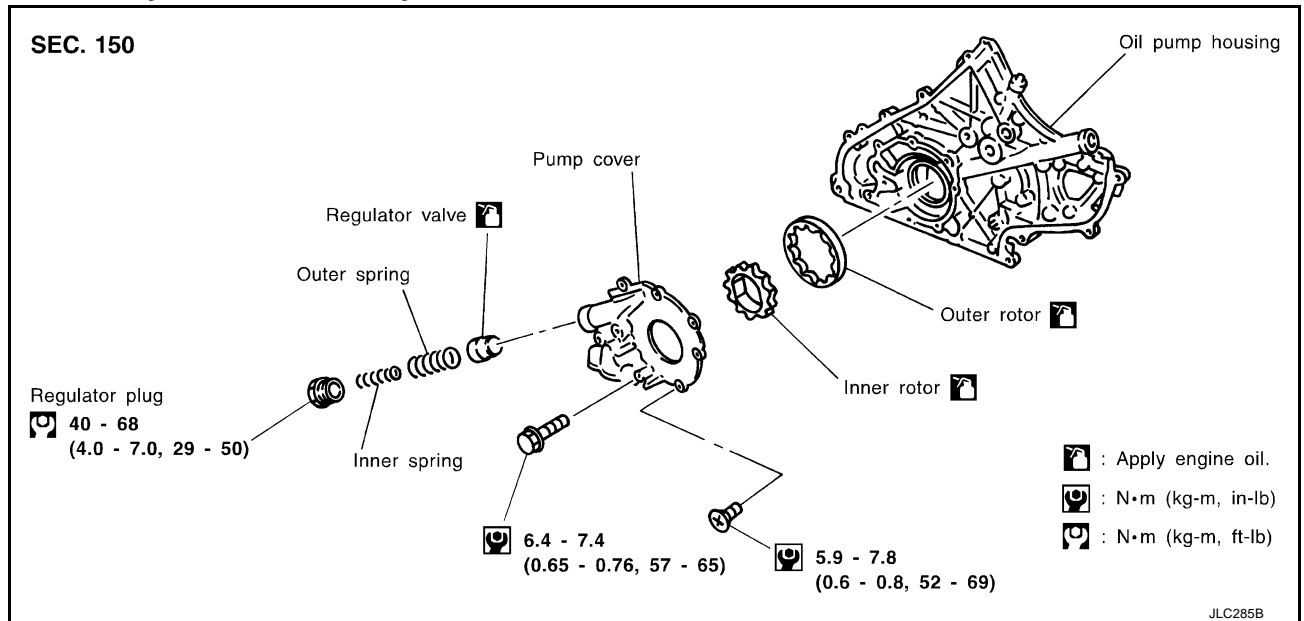
1. Install all removed parts in the reverse order of removal.
- Insert the top mounting bolt to the oil filter bracket beforehand, and set the oil filter bracket to the installation location.
  - After warming up the engine, check for engine oil leakage and oil level. Refer to [LU-27, "OIL LEVEL AND MUDDINESS"](#).

## OIL PUMP

### Removal and Installation

- Remove oil pump housing. Refer to [EM-275, "PRIMARY TIMING CHAIN"](#).

### Disassembly and Assembly



### CAUTION:

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

### DISASSEMBLY

- Remove oil pump cover.
- Remove inner rotor and outer rotor from oil pump housing.
- After removing regulator plug, remove regulator spring and regulator valve.

### INSPECTION AFTER DISASSEMBLY

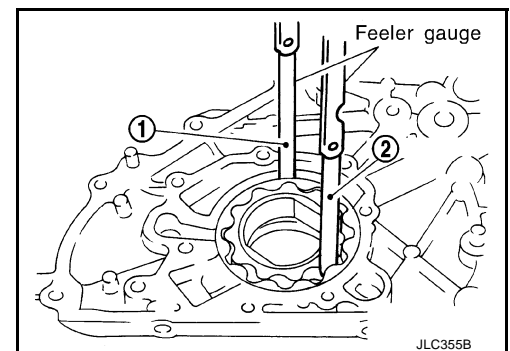
#### Clearance of Oil Pump Parts

- Measure clearance with feeler gauge.  
Clearance between outer rotor and oil pump housing (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 0.18 mm (0.0071in)**

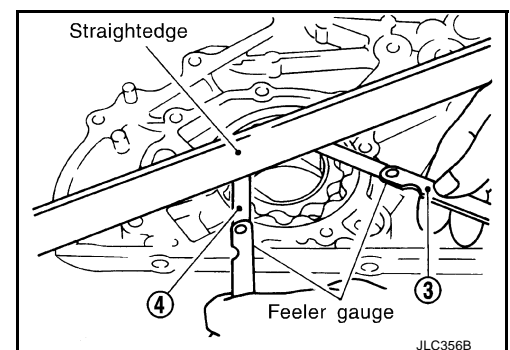


- Measure clearance with feeler gauge and straightedge.  
Side clearance between inner rotor and oil pump housing (position 3)

**Standard : 0.050 - 0.090 mm (0.0020 - 0.0035 in)**

Side clearance between outer rotor and oil pump housing (position 4)

**Standard : 0.030 - 0.190 mm (0.0012 - 0.0075 in)**

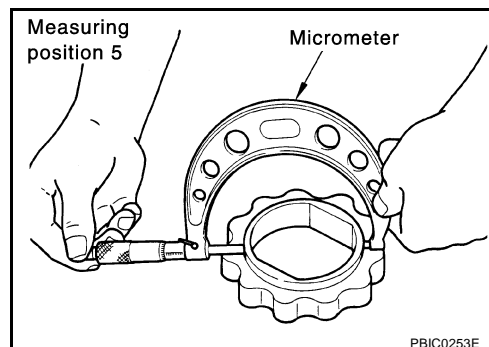




# OIL PUMP

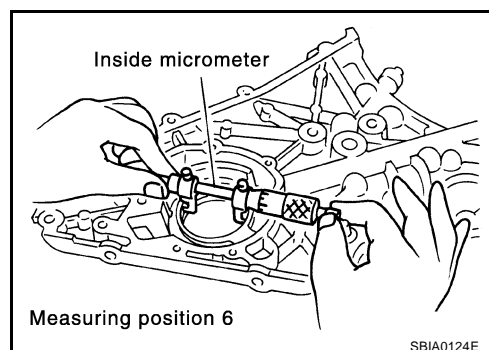
[YD]

- Calculate the clearance between inner rotor and oil pump housing as follows.
1. Measure the outer diameter of protruded portion of inner rotor (Position 5)



2. Measure the inner diameter of oil pump housing with inside micrometer (Position 6)  
 $(\text{Clearance}) = (\text{Inner diameter of oil pump housing}) - (\text{Outer diameter of inner rotor})$

**Standard : 0.045 - 0.091mm (0.0018 - 0.0036 in)**

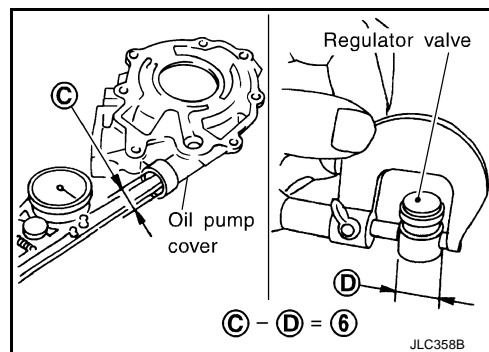


## Regulator Valve

1. Visually inspect components for wear and damage.
2. Check oil pressure regulator valve sliding surface and valve spring.
3. Coat regulator valve with engine oil. Check that it falls smoothly into the valve hole by its own weight.  
If damaged, replace regulator valve set or oil pump cover.
4. Check regulator valve to oil pump cover clearance.

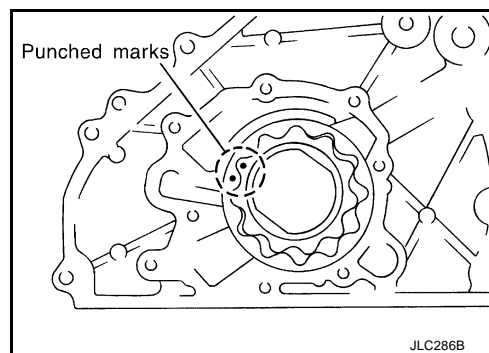
**Clearance 6 :**

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



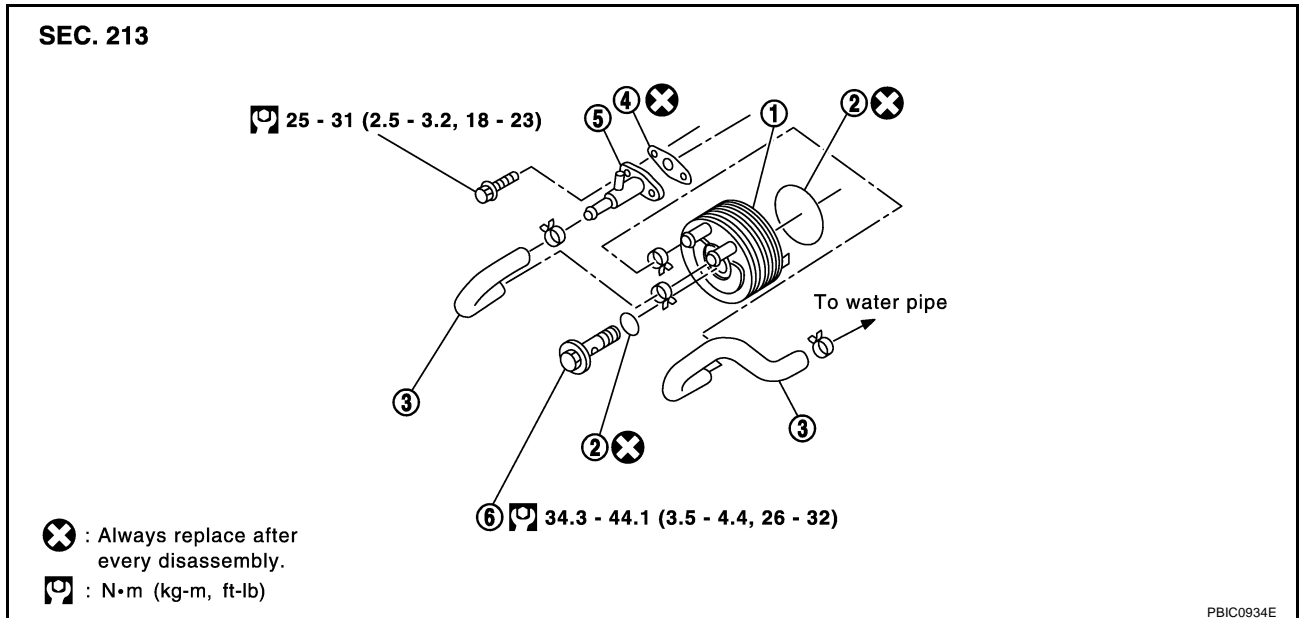
## ASSEMBLY

- Assemble in the reverse order of disassembly.
- Install the inner rotor and outer rotor with the punched marks on the oil pump cover side.



## OIL COOLER

### Removal and Installation



- |               |                         |                    |
|---------------|-------------------------|--------------------|
| 1. Oil cooler | 2. O-ring               | 3. Water hose      |
| 4. Gasket     | 5. Water hose connector | 6. Connecting bolt |

#### CAUTION:

- Be careful not to get burned when the engine and engine oil are hot.
- When removing, prepare a shop cloth to absorb any oil leakage or spillage.
- Completely wipe off any oil that adhere to the engine and the vehicle.

#### REMOVAL

1. Remove front RH wheel and engine side cover.
2. Remove the exhaust front tube.
3. Drain coolant by removing cylinder block drain plug and disconnecting radiator lower hose.

#### INSPECTION

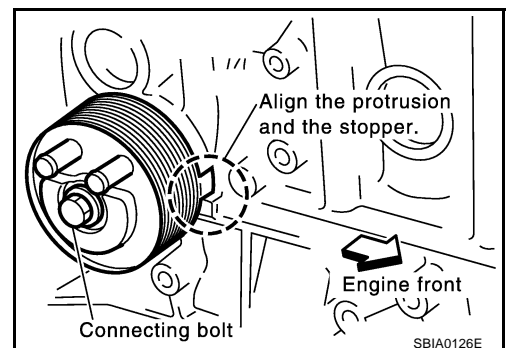
##### Oil Cooler

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

#### INSTALLATION

Installation is in reverse order of removal.

- Confirm that no foreign objects are adhering to the installation planes of the oil cooler and block.
- Tighten the connecting bolt after aligning the stopper on the cylinder block side with protrusion of the oil cooler.



# SERVICE DATA AND SPECIFICATIONS (SDS)

[YD]

## SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

### Standard and Limit OIL PRESSURE

EBS00GT3

Engine speed (rpm)	Approximate oil pressure kPa (bar, kg/cm <sup>2</sup> , psi)
Idle speed	More than 140 (1.40, 1.43, 20.3)
2,000	More than 270 (2.69, 2.75, 39.1)
4,000	More than 430 (4.29, 4.38, 62.3)

### 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 0.18 (0.0071)
Body to inner rotor axial clearance	0.050 - 0.090 (0.0020 - 0.0035)
Body to outer rotor axial clearance	0.030 - 0.190 (0.0012 - 0.0075)
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

Unit: ℓ · (Imp qt)

With oil filter change	Approximately 5.2 (4-5/8 Imp qt)
Without oil filter change	Approximately 4.9 (4-3/8 Imp qt)
Dry engine (engine overhaul)	Approximately 6.3 (5-1/2 Imp qt)

### Tightening Torque

EBS00GT4

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

Oil pressure switch	13 - 17 (1.4 - 1.7, 10 - 12)
Oil pan drain plug	29 - 39 (3.0 - 4.0, 22 - 29)
Oil filter bracket	20 - 23 (2.0 - 2.4, 15 - 17)
Oil filter body	20 - 24 (2.0 - 2.5, 15 - 18)
Oil pump assembly	6.4 - 7.4 (0.65 - 0.76, 57 - 65)*
Oil pump cover	5.9 - 7.8 (0.6 - 0.8, 52 - 69)*
Regulator plug	40 - 68 (4.0 - 7.0, 29 - 50)
Water hose connector for oil cooler	25 - 31 (2.5 - 3.2, 18 - 23)
Connecting bolt for oil cooler	34.3 - 44.1 (3.5 - 4.4, 26 - 32)

