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SECTION LU

ENGINE LUBRICATION SYSTEM

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PRECAUTIONS

PRECAUTIONS

PFP:00001

Precautions for Battery Service

NBS00018

Before disconnecting the battery, lower both the driver and passenger windows. This will prevent any interference between the window edge and the vehicle when the door is opened/closed. During normal operation, the window slightly raises and lowers automatically to prevent any window to vehicle interference. The automatic window function will not work with the battery disconnected.

Precautions for Liquid Gasket

NBS00019

LIQUID GASKET APPLICATION PROCEDURE

1. Removal old liquid gasket adhering to the liquid gasket application surface and the mating surface.
 - Remove liquid gasket completely from the liquid gasket application surface, mounting bolts, and bolt holes.
2. Wipe the liquid gasket application surface and the mating surface with white gasoline (lighting and heating use) to remove adhering moisture, grease and foreign materials.
3. Apply liquid gasket to the liquid gasket application surface.
Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"](#) .
 - Within five minutes of liquid gasket application, install the mating component.
 - If liquid gasket protrudes, wipe it off immediately.
 - Do not retighten mounting bolts or nuts after the installation.
 - After 30 minutes or more have passed from the installation, fill engine oil and engine coolant.

PREPARATION

PREPARATION

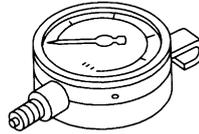
PF0:00002

Special Service Tools

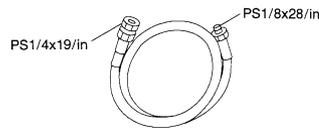
NBS0001A

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

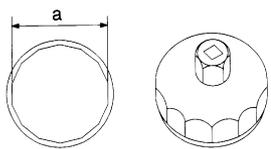
Tool number (Kent-Moore No.) Tool name	Description
ST25051001 (J25695-1) Oil pressure gauge	Measuring oil pressure Maximum measuring range: 2,452 kPa (25 kg/cm² , 356 psi)
ST25052000 (J25695-2) Hose	Adapting oil pressure gauge to oil pan (upper)
KV10115801 (J38956) Oil filter wrench	Removing oil filter a: 64.3 mm (2.531 in)



NT050



S-NT559

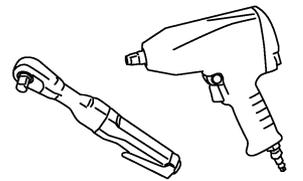


S-NT375

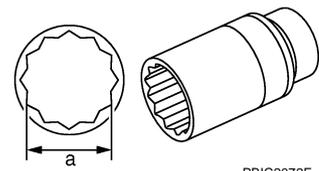
Commercial Service Tools

NBS0001B

Tool name	Description
Power tool	Loosening nuts and bolts
Deep socket	Removing and installing oil pressure sensor a: 24 mm (0.94 in)



PBIC0190E



PBIC2072E

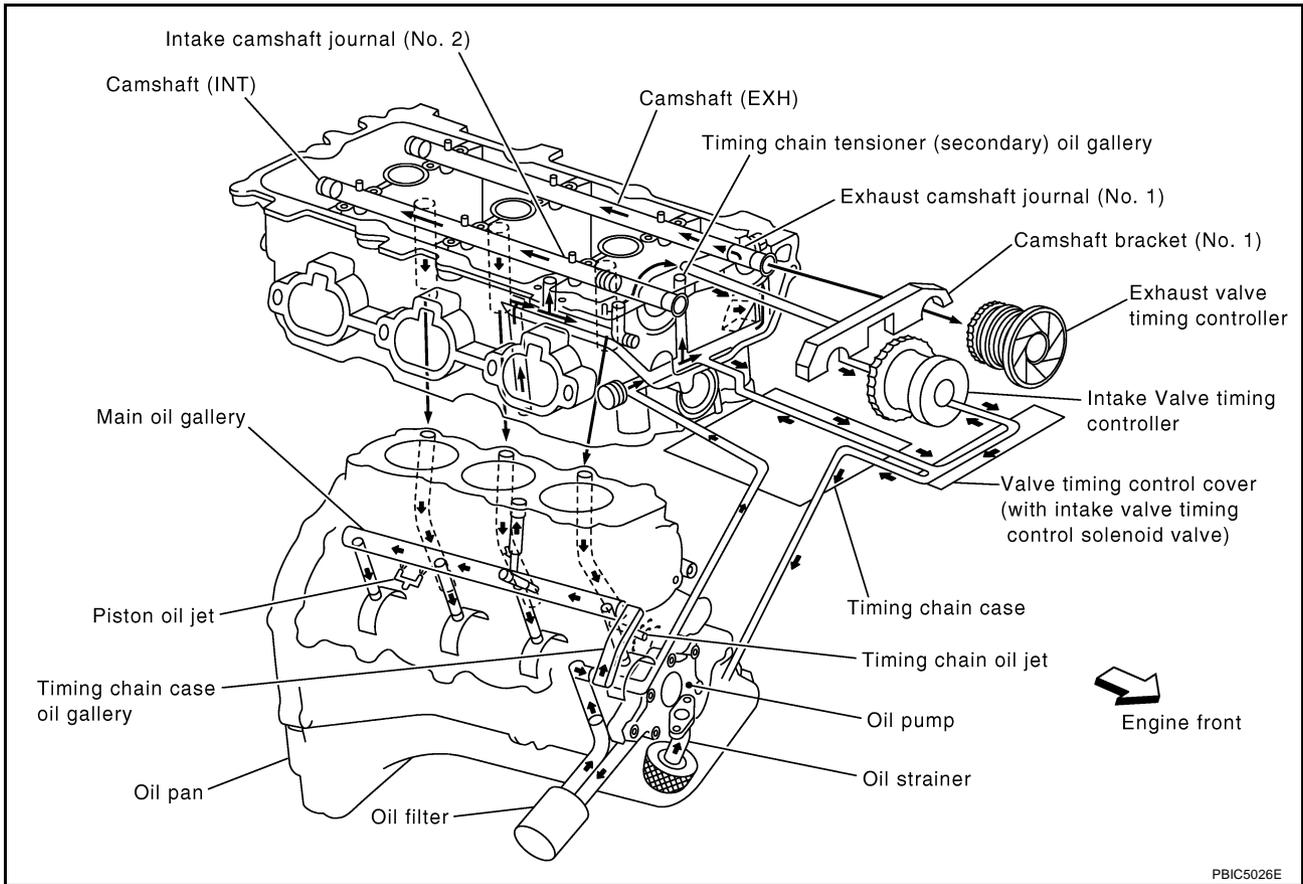
LUBRICATION SYSTEM

LUBRICATION SYSTEM

PFP:15010

Lubrication Circuit

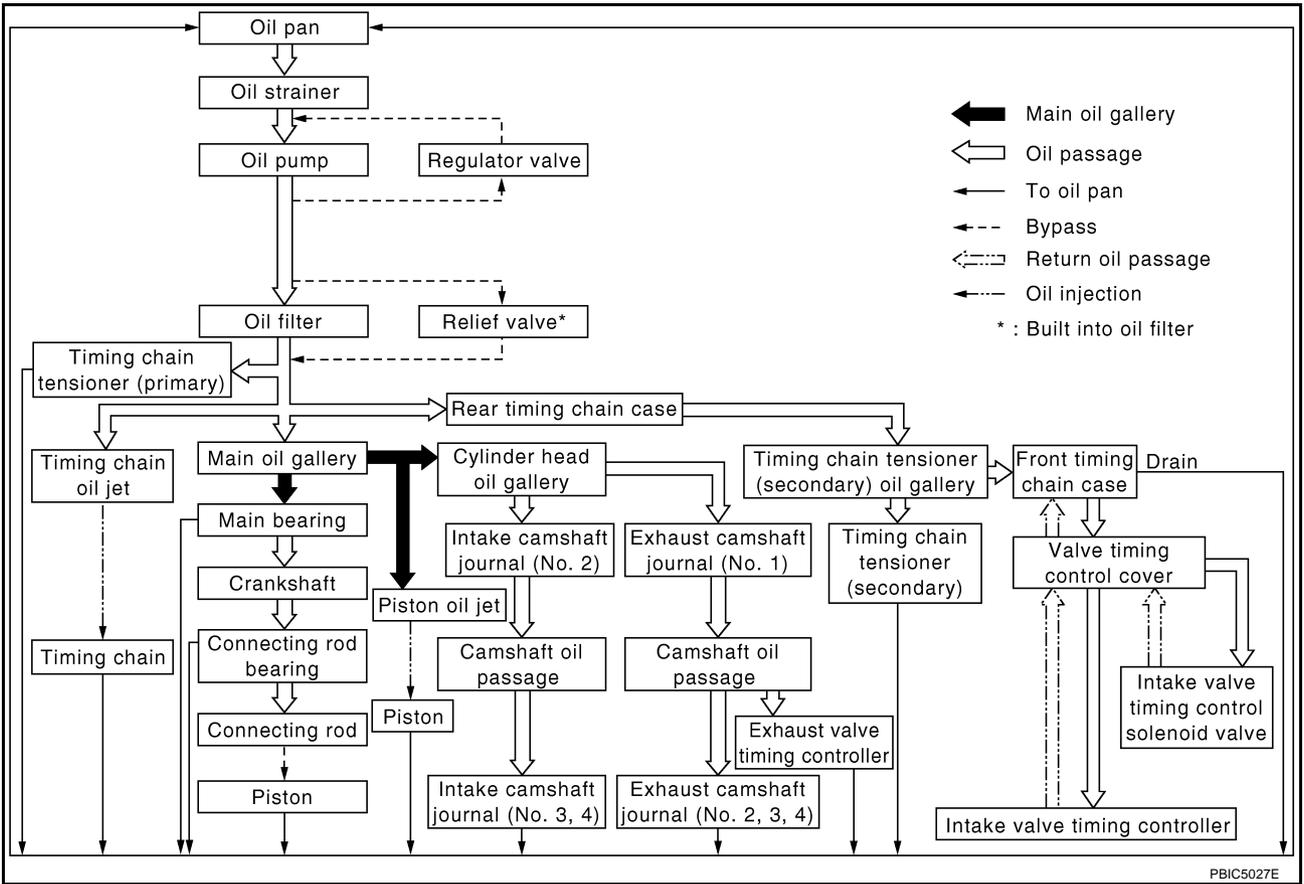
NBS0001C



LUBRICATION SYSTEM

System Chart

NBS0001D



A
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 I
 J
 K
 L
 M

ENGINE OIL

ENGINE OIL

PPF:KLA92

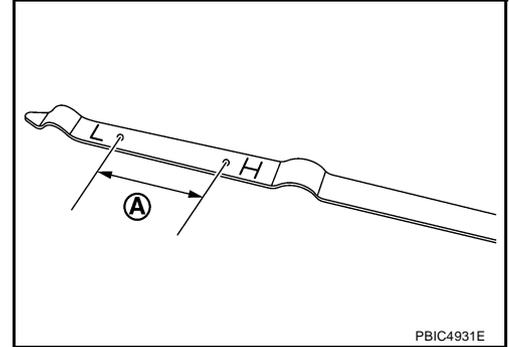
Inspection ENGINE OIL LEVEL

NBS0001E

NOTE:

Before starting engine, put vehicle horizontally and check the engine oil level. If engine is already started, stop it and allow 10 minutes before checking.

1. Pull out oil level gauge and wipe it clean.
2. Insert oil level gauge and make sure the engine oil level is within the range (A) shown in the figure.
3. If it is out of range, adjust it.

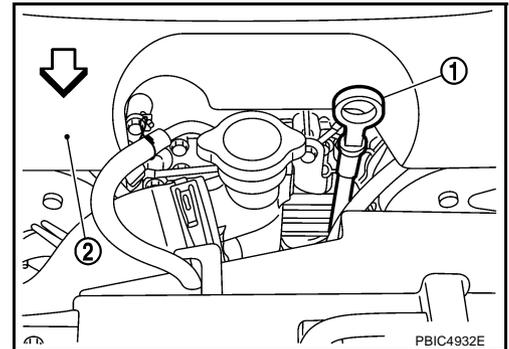


NOTE:

When checking oil level, insert oil level gauge (1) with its tip aligned with oil level gauge guide on cylinder head.

2 : Engine cover

↶ : Engine front



ENGINE OIL APPEARANCE

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

ENGINE OIL LEAKAGE

Check for oil leakage around the following areas:

- Oil pans (lower and upper)
- Oil pan drain plug
- Oil pressure sensor
- Oil filter
- Valve timing control cover
- 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 head
- Mating surface between rear timing chain case and cylinder block
- Mating surface between rear timing chain case and oil pan (upper)
- Mating surface between cylinder block and cylinder head
- Mating surface between lower cylinder block and cylinder block
- Crankshaft oil seals (front and rear)
- Camshaft position sensor and exhaust valve timing control position sensor.

ENGINE OIL

OIL PRESSURE CHECK

WARNING:

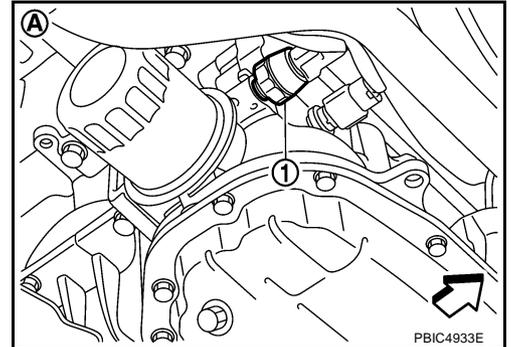
- Be careful not to burn yourself, as engine oil may be hot.
- Oil pressure check should be done in “Neutral position” (M/T models) or “Parking position” (A/T models).

1. Check the engine oil level. Refer to [LU-6, "ENGINE OIL LEVEL"](#).
2. Remove undercover with power tool.
3. Disconnect harness connector at oil pressure sensor, and remove oil pressure sensor using deep socket (commercial service tool).

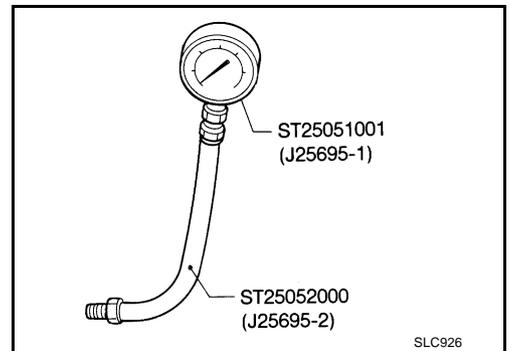
CAUTION:

Do not drop or shock oil pressure sensor.

- 1 : Oil pressure switch
- A : 2WD
- ↶ : Engine front



4. Install the oil pressure gauge (SST) and hose (SST).



5. Start the engine and warm it up to normal operating temperature.
6. Check the engine oil pressure with engine running under no-load.

NOTE:

When the engine oil temperature is low, the engine oil pressure becomes high.

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

kPa (kg/cm², psi)

Engine speed	Approximate discharge pressure
Idle speed	More than 98 (1.0, 14)
2,000 rpm	More than 294 (3.0, 43)

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

7. After the inspections, install oil pressure sensor as follows:
 - a. Remove old liquid gasket adhering to oil presser sensor and the mating surface.
 - b. Apply liquid gasket and tighten oil pressure sensor to the specification.
Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"](#).

: 14.7 N·m (1.5 kg-m, 11 ft-lb)

- c. After warming up engine, make sure there is no leakage of engine oil with running engine.

Changing Engine Oil

NBS0001F

WARNING:

- Be careful not to burn yourself, as engine oil may be hot.

ENGINE OIL

- **Prolonged and repeated contact with used engine oil may cause skin cancer. Try to avoid direct skin contact with used engine 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. Refer to [LU-6, "ENGINE OIL LEAKAGE"](#) .
 2. Stop the engine and wait for 10 minutes.
 3. Loosen oil filler cap and then remove drain plug.
 4. Drain engine oil.
 5. Install drain plug with new washer. Refer to [EM-26, "OIL PAN AND OIL STRAINER"](#) .

CAUTION:

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

Oil pan drain plug:

: **34.3 N·m (3.5 kg·m, 25 ft·lb)**

6. Refill with new engine oil.
Engine oil specification and viscosity:
 Refer to [MA-11, "RECOMMENDED FLUIDS AND LUBRICANTS"](#) .

Engine oil capacity (Approximate):

Unit: ℓ (US qt, Imp qt)

Drain and refill	With oil filter change	4.9 (5-1/8, 4-1/4)
	Without oil filter change	4.6 (4-7/8, 4)
Dry engine (Overhaul)		5.5 (5-3/4, 4-7/8)

CAUTION:

- **When filling engine oil, do not pull out oil level gauge.**
 - **The refill capacity depends on the engine oil temperature and drain time. Use these specifications for reference only.**
 - **Always use oil level gauge to determine the proper amount of engine oil 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 the engine oil level. Refer to [LU-6, "ENGINE OIL LEVEL"](#) .

OIL FILTER

OIL FILTER

PFP:15208

Removal and Installation

NBS0001G

REMOVAL

WARNING:

Be careful not to get burned when engine and engine oil may be hot.

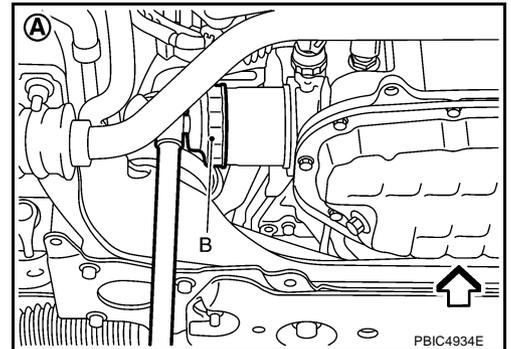
CAUTION:

- Oil filter is provided with relief valve. Use Genuine NISSAN Oil Filter or equivalent.
- When removing, prepare a shop cloth to absorb any engine oil leakage or spillage.
- Do not allow engine oil to adhere to drive belts.
- Completely wipe off any engine oil that adheres to engine and vehicle.

1. Remove undercover with power tool.
2. Using oil filter wrench [SST: KV10115801(J38956)] (B), remove oil filter.

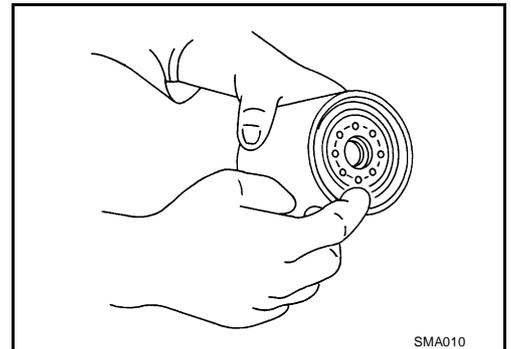
A : 2WD

⇐ : Engine front



INSTALLATION

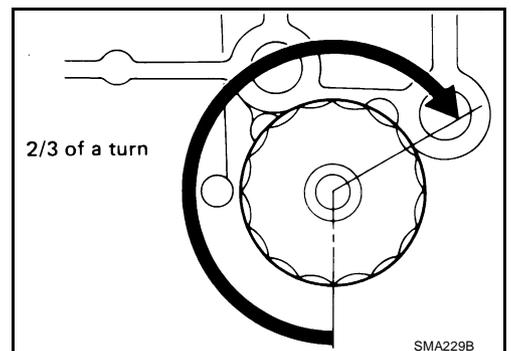
1. Remove foreign materials adhering to oil filter installation surface.
2. Apply engine oil to the oil seal contact surface of new oil filter.



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

Oil filter:

: 17.7 N·m (1.8 kg·m, 13 ft·lb)



INSPECTION AFTER INSTALLATION

1. Check the engine oil level. Refer to [LU-6, "ENGINE OIL"](#).
2. Start engine, and check there is no leaks of engine oil.
3. Stop engine and wait for 10 minutes.
4. Check the engine oil level and adjust engine oil. Refer to [LU-6, "ENGINE OIL"](#).

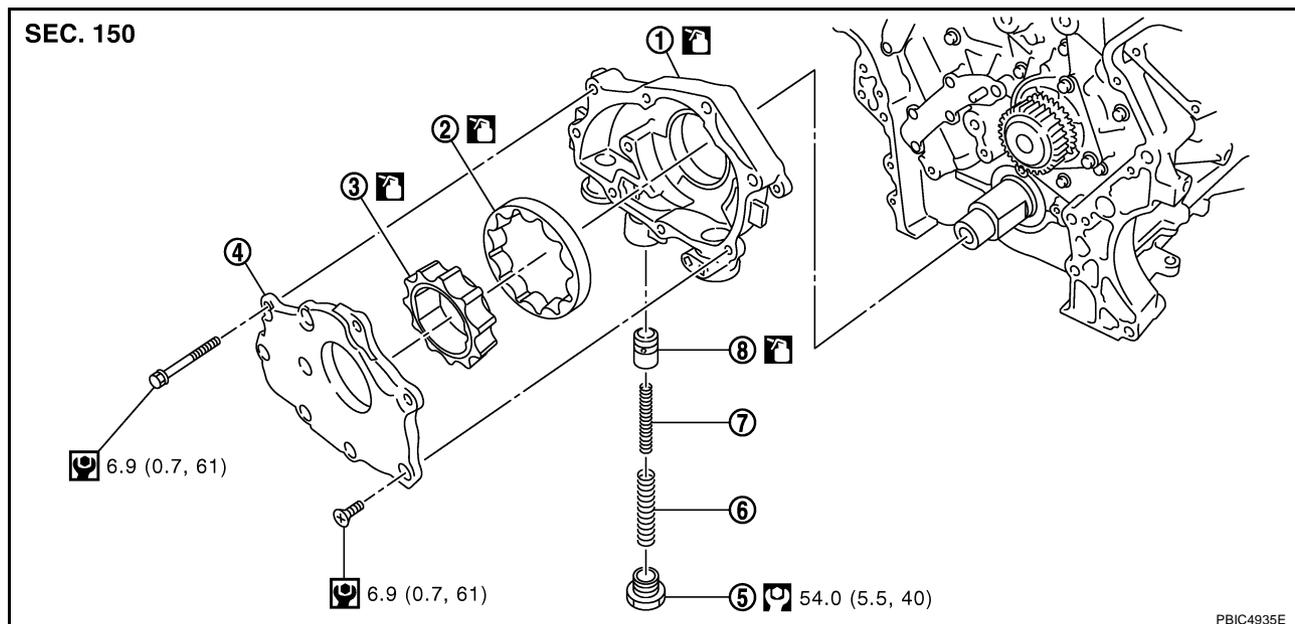
OIL PUMP

OIL PUMP

PFP:15010

Removal and Installation

NBS00011



- | | | |
|---------------------------|-------------------------|---------------------------|
| 1. Oil pump body | 2. Oil pump outer rotor | 3. Oil pump inner rotor |
| 4. Oil pump cover | 5. Regulator valve plug | 6. Regulator valve spring |
| 7. Regulator valve spring | 8. Regulator valve | |

- Refer to [GI-11, "Components"](#) for symbol marks in the figure.

REMOVAL

1. Remove oil pan (lower) 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-53, "TIMING CHAIN"](#).
3. Remove oil pump assembly.

INSTALLATION

CAUTION:

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

Note the following, and install in the reverse order of removal.

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

INSPECTION AFTER INSTALLATION

1. Check the engine oil level. Refer to [LU-6, "ENGINE OIL"](#).
2. Start engine, and check there is no leaks of engine oil.
3. Stop engine and wait for 10 minutes.
4. Check the engine oil level and adjust engine oil. Refer to [LU-6, "ENGINE OIL"](#).

Disassembly and Assembly

DISASSEMBLY

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

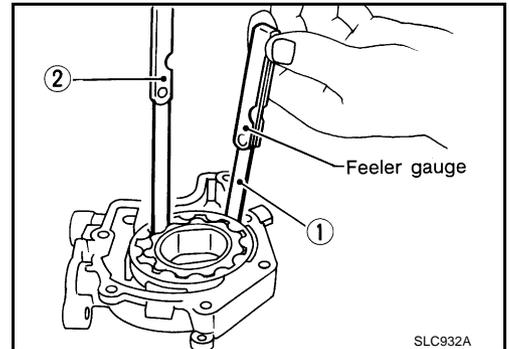
NBS0001J

OIL PUMP

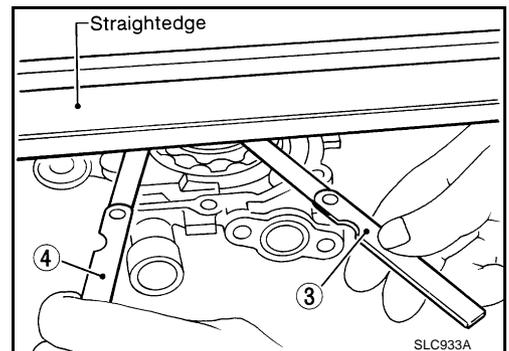
INSPECTION AFTER DISASSEMBLY

Oil Pump Clearance

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



- Measure the clearance with feeler gauge and straightedge.
 - Side clearance between oil pump inner rotor and oil pump body (Position "3")
Standard : 0.030 - 0.070 mm (0.0012 - 0.0028 in)
 - Side clearance between oil pump outer rotor and oil pump body (Position "4")
Standard : 0.030 - 0.090 mm (0.0012 - 0.0035 in)



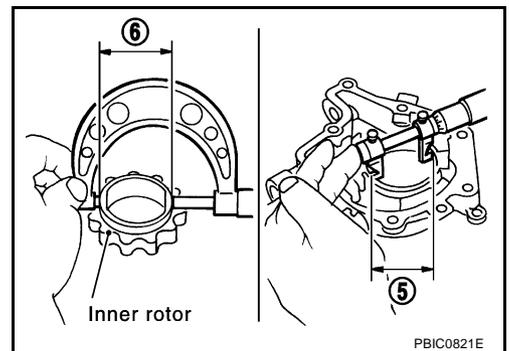
- Calculate the clearance between oil pump inner rotor and oil pump body as follows:

OIL PUMP BODY INNER DIAMETER

- Measure the inner diameter of oil pump body with inside micrometer. (Position "5")

OIL PUMP INNER ROTOR OUTER DIAMETER

- Measure the outer diameter of protruded portion of oil pump inner rotor with micrometer. (Position "6")



OIL PUMP INNER ROTOR TO OIL PUMP BODY CLEARANCE

- (Clearance) = (Oil pump body inner diameter) – (Oil pump inner rotor outer diameter)
Standard : 0.045 - 0.091 mm (0.0018 - 0.0036 in)
- If measured/calculated values are out of the standard, replace oil pump assembly.

OIL PUMP

Regulator Valve Clearance

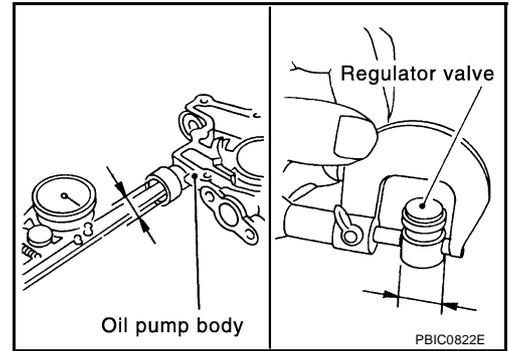
(Clearance) = (Valve hole diameter) – (Regulator valve outer diameter)

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

- If the calculated value is out of the standard, replace oil pump assembly.

CAUTION:

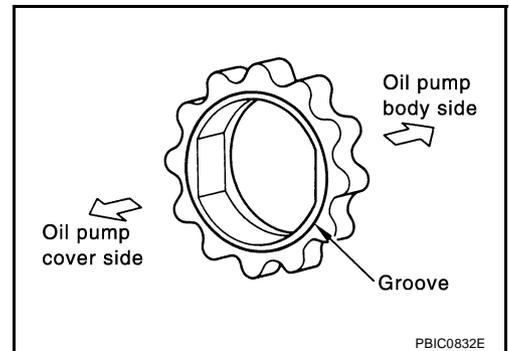
- Coat regulator valve with engine oil.
- Make sure that it falls smoothly into valve hole by its own weight.



ASSEMBLY

Note the following, and assemble in the reverse order of disassembly.

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



SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Standard and Limit OIL PRESSURE

NBS0001K

kPa (kg/cm² , psi)

Engine speed	Approximate discharge pressure*
Idle speed	More than 98 (1.0, 14)
2,000 rpm	More than 294 (3.0, 43)

*: Engine oil temperature at 80°C (176°F)

OIL CAPACITY (APPROXIMATE)

Unit: ℓ (US qt, Imp qt)

Drain and refill	With oil filter change	4.9 (5-1/8, 4-1/4)
	Without oil filter change	4.6 (4-7/8, 4)
Dry engine (Overhaul)		5.5 (5-3/4, 4-7/8)

OIL PUMP

Unit: mm (in)

Oil pump body to oil pump outer rotor radial clearance	0.114 - 0.260 (0.0045 - 0.0102)
Oil pump inner rotor to oil pump outer rotor tip clearance	Below 0.180 (0.0071)
Oil pump body to oil pump inner rotor side clearance	0.030 - 0.070 (0.0012 - 0.0028)
Oil pump body to oil pump outer rotor side clearance	0.030 - 0.090 (0.0012 - 0.0035)
Oil pump inner rotor to oil pump body clearance	0.045 - 0.091 (0.0018 - 0.0036)

REGULATOR VALVE

Unit: mm (in)

Regulator valve to oil pump body clearance	0.040 - 0.097 (0.0016 - 0.0038)
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SERVICE DATA AND SPECIFICATIONS (SDS)
