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SECTION LU

ENGINE LUBRICATION SYSTEM

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PRECAUTIONS

PRECAUTIONS

PF0:00001

Precautions for Liquid Gasket LIQUID GASKET APPLICATION PROCEDURE

ABS00994

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-47, "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

PFP:00002

Special Service Tools

ABS00010

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 upper oil pan (upper)
KV10115801 (J38956) Oil filter wrench	Removing oil filter a: 64.3 mm (2.531 in)
WS39930000 (—) Tube presser	Pressing the tube of liquid gasket

Commercial Service Tools

ABS00011

Tool name	Description
Deep socket	Removing and installing oil pressure switch (2WD model) a: 26 mm (1.02 in)
Power tool	Loosening bolts and nuts

LUBRICATION SYSTEM

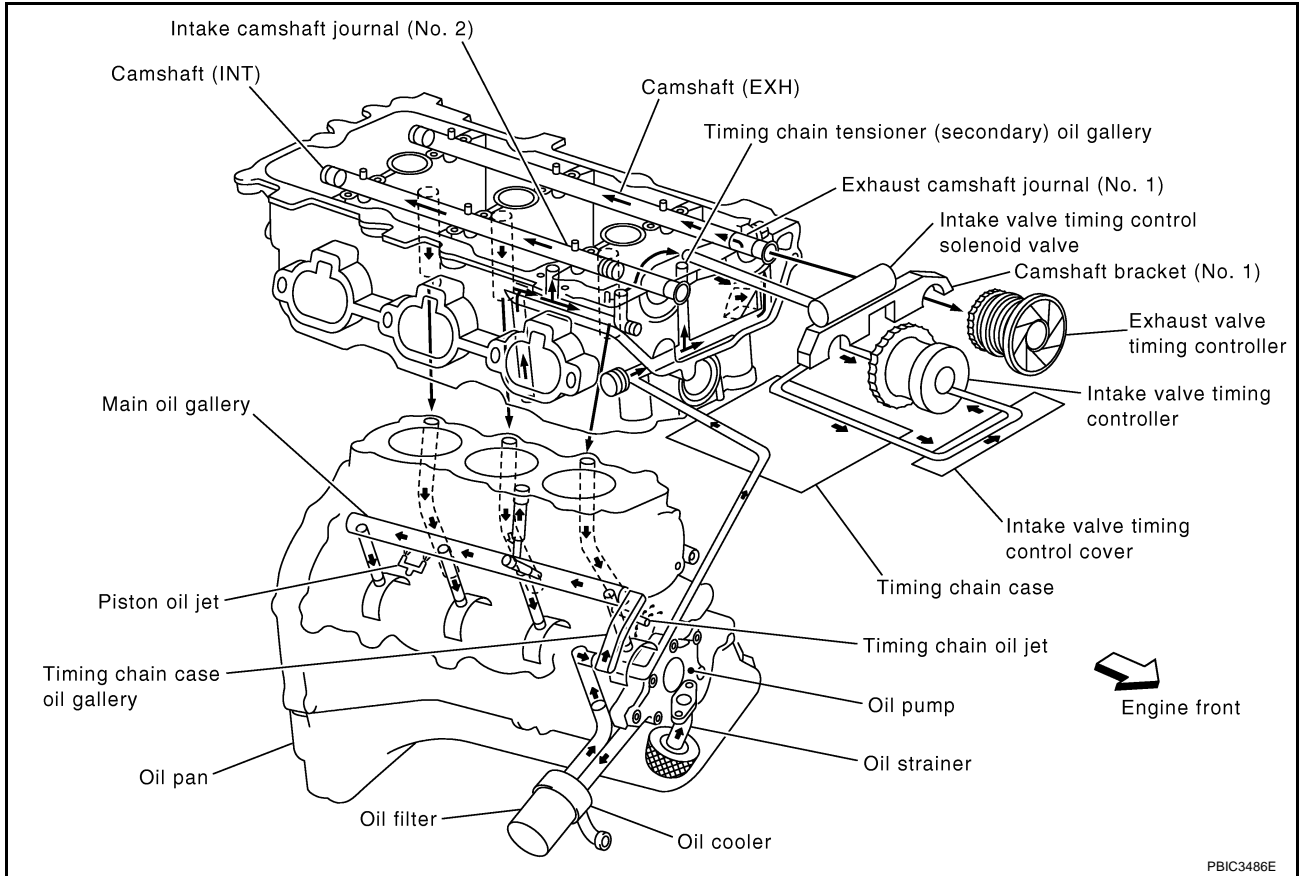
LUBRICATION SYSTEM

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Lubrication Circuit

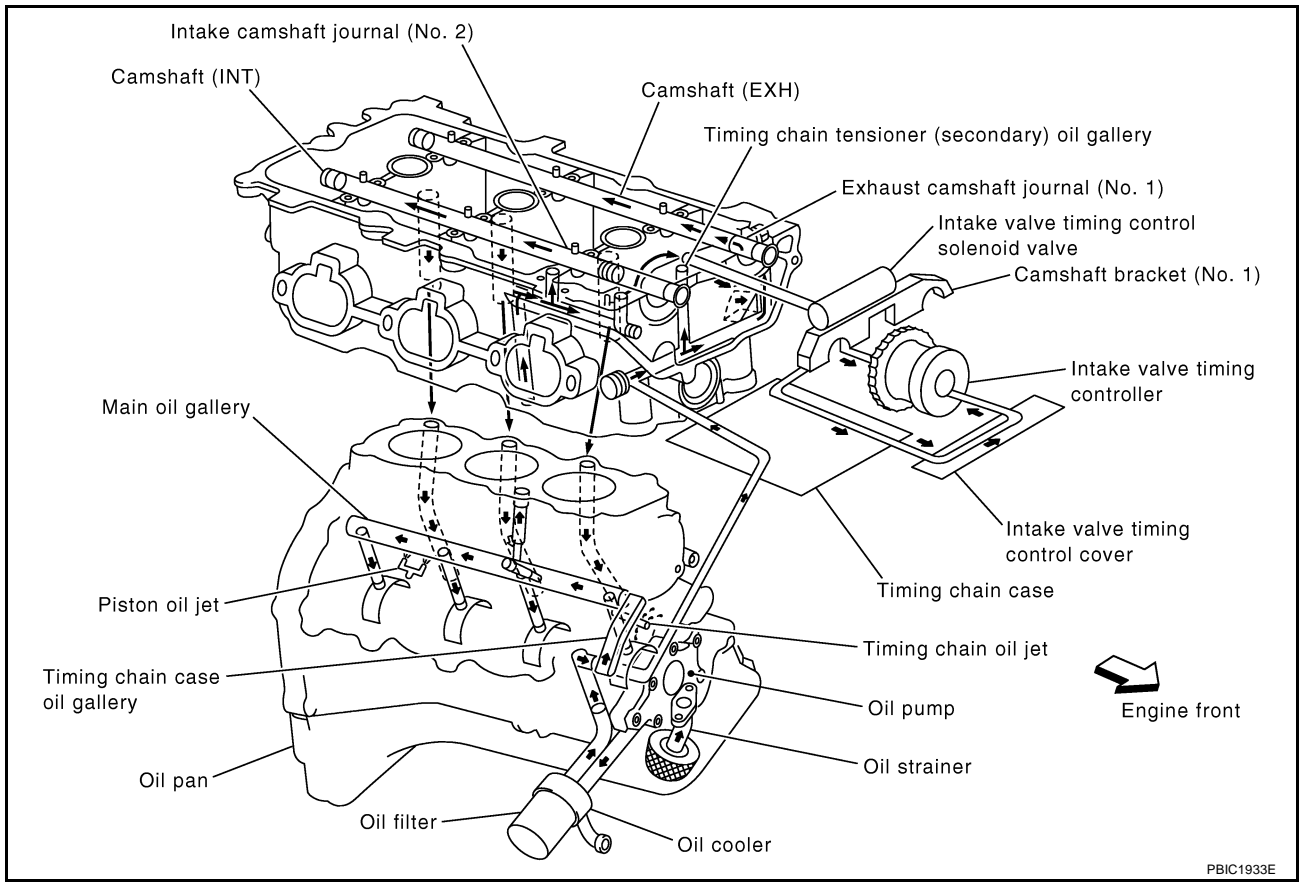
ABS00995

M/T Model



LUBRICATION SYSTEM

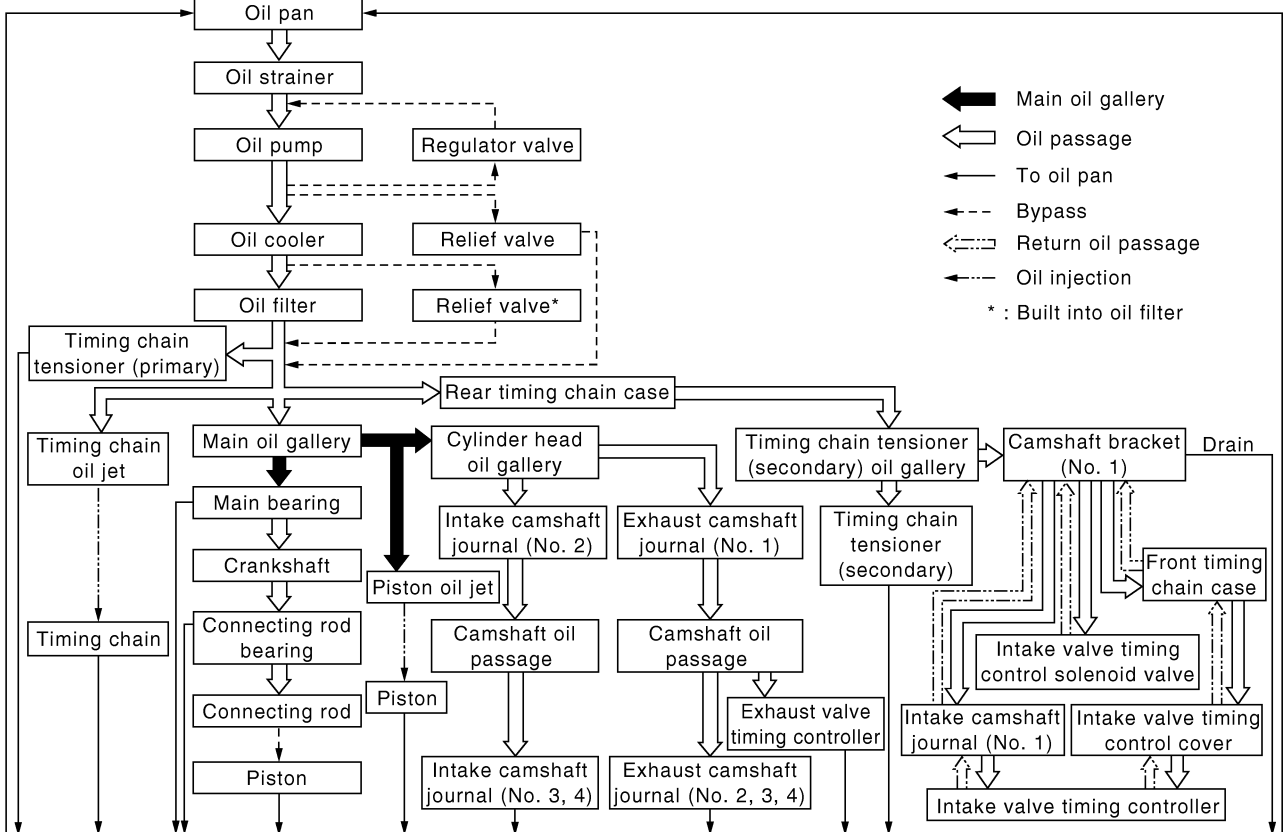
A/T Model



System Chart

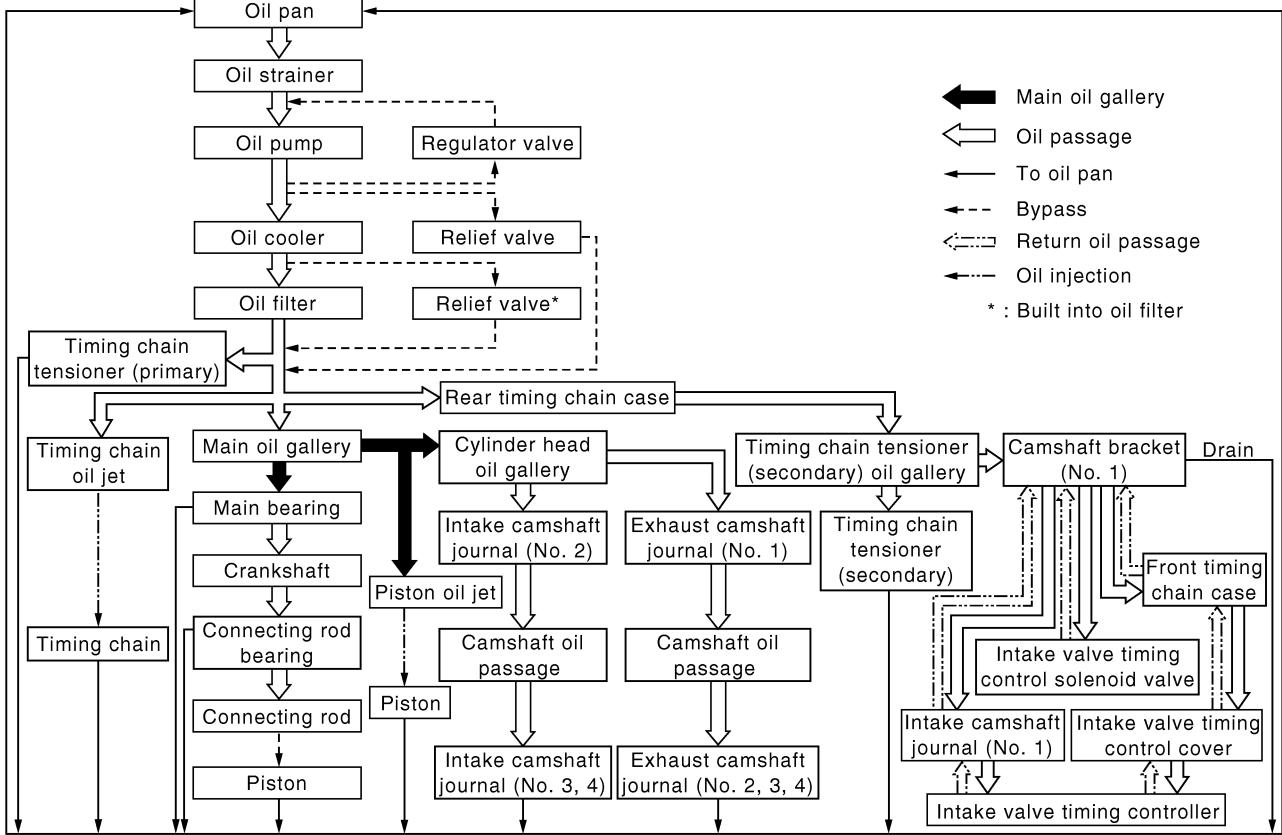
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M/T Model



LUBRICATION SYSTEM

A/T Model



PBIC2071E

ENGINE OIL

PFP:KLA92

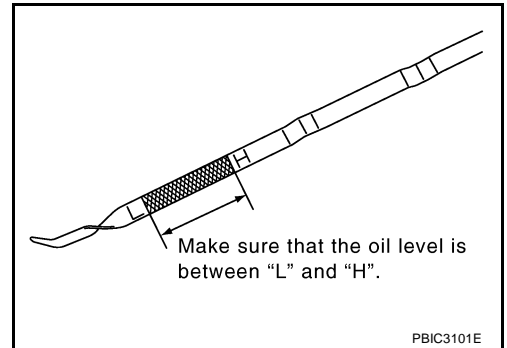
Inspection OIL LEVEL

ABS00997

NOTE:

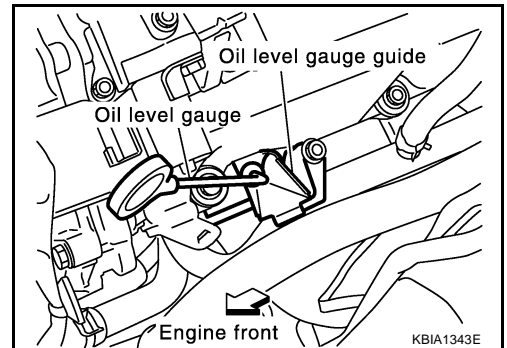
Before starting engine, put vehicle horizontally and check the oil level. If engine is already started, stop it and allow 10 minutes before checking.

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



NOTE:

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



OIL APPEARANCE

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

OIL LEAKAGE

Check for oil leakage around the following areas:

- Oil pans (lower and upper)
- Oil pan drain plug
- Oil pressure switch
- Oil filter
- Oil cooler
- Water pump cover
- Chain tensioner cover
- Intake valve timing control solenoid valve
- Intake valve timing control cover (A/T models)
- Valve timing control cover (M/T models)
- 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

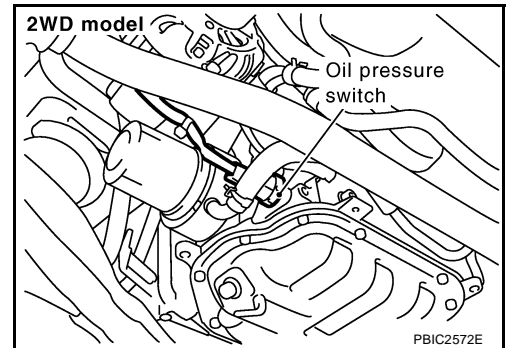
ENGINE OIL

- Crankshaft oil seals (front and rear)
- Camshaft position sensor (PHASE)

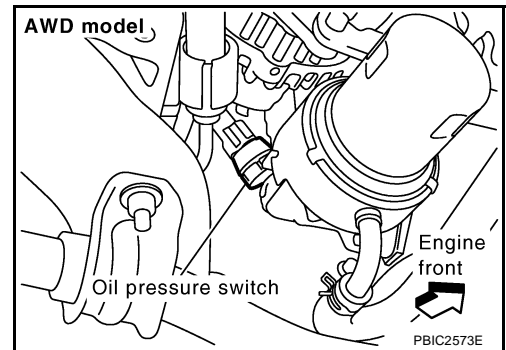
OIL PRESSURE CHECK

WARNING:

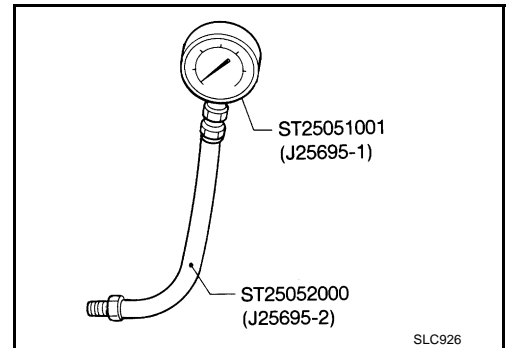
- Be careful not to burn yourself, as engine oil may be hot.
 - Oil pressure check should be done in “Neutral position” (M/T models) or “Parking position” (A/T models).
1. Check oil level. Refer to [LU-7, "OIL LEVEL"](#) .
 2. Remove undercover with power tool.
 3. Disconnect oil pressure switch harness connector.



4. Remove oil pressure switch.



5. Install oil pressure gauge and hose [SST].



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

NOTE:


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

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

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

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

ENGINE OIL

- 8. After the inspections, install oil pressure switch as follows:
 - a. Remove the old liquid gasket adhering to oil pressure switch and engine. A
 - b. Apply thread sealant and tighten oil pressure switch to specification.
Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-47, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"](#) . LU
 - : **14.8 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. C

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ENGINE OIL

ABS00998

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 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-7, "OIL LEAKAGE"](#).
 2. Stop 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-31, "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	4.7 (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 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.
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-7, "OIL LEVEL"](#).

OIL FILTER

OIL FILTER

PF15208

Removal and Installation REMOVAL

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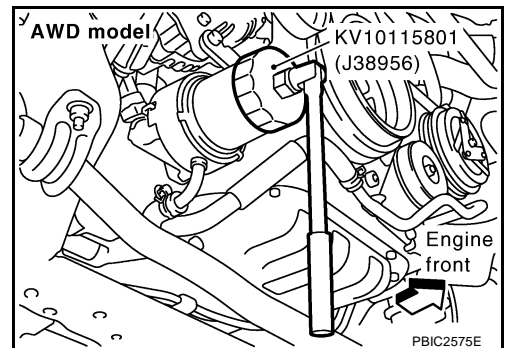
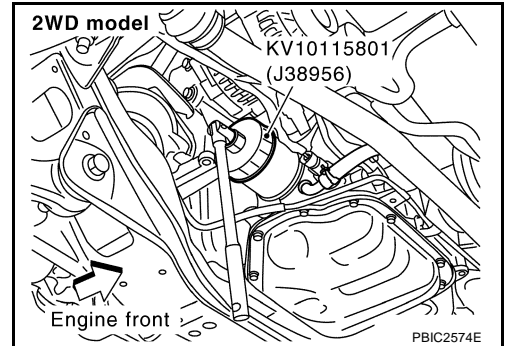
WARNING:

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

1. Remove undercover with power tool.
2. Using oil filter wrench [SST], remove oil filter.

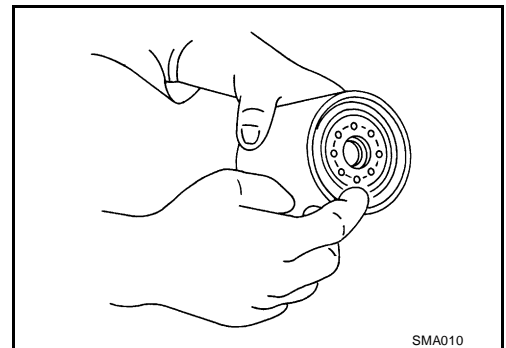
CAUTION:

- 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 the engine and the vehicle.



INSTALLATION

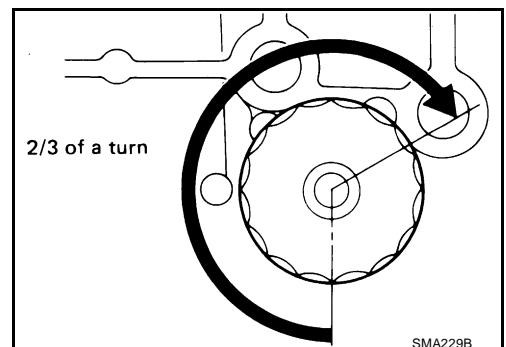
1. Remove foreign materials adhering to oil filter installation surface.
2. Apply engine oil to the oil seal contact surface of new oil filter.



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

Oil filter:

: 17.6 N·m (1.8 kg·m, 13 ft·lb)



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OIL FILTER

INSPECTION AFTER INSTALLATION

1. Check the engine oil level. Refer to [LU-7, "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-7, "ENGINE OIL"](#) .

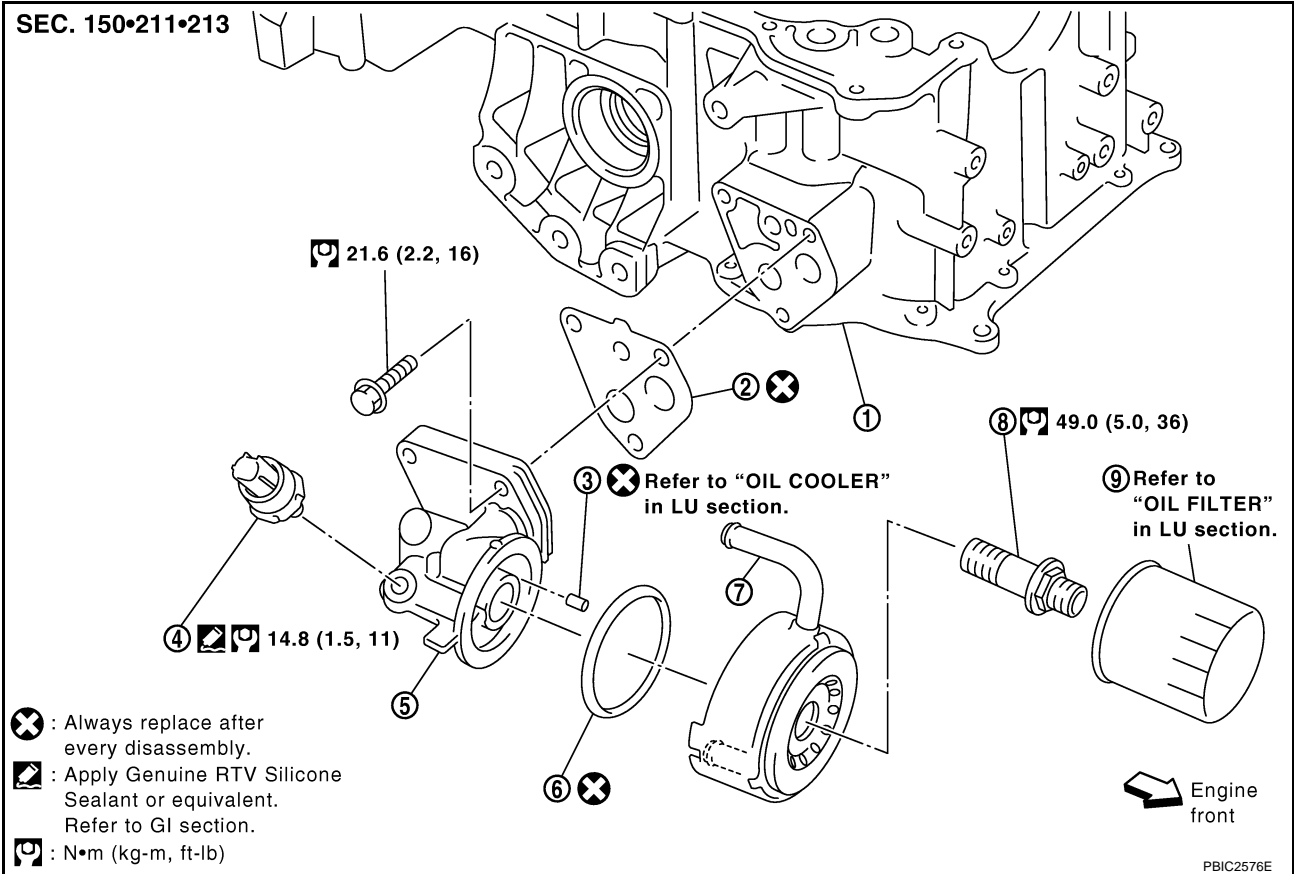
OIL FILTER BRACKET (AWD)

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OIL FILTER BRACKET (AWD)

Components

ABS00FNA



- | | | |
|------------------------|-----------------------|-----------------|
| 1. Oil pan (upper) | 2. Gasket | 3. Relief valve |
| 4. Oil pressure switch | 5. Oil filter bracket | 6. O-ring |
| 7. Oil cooler | 8. Connector bolt | 9. Oil filter |

Removal and Installation

ABS00A7W

WARNING:

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

REMOVAL

1. Remove front undercover with power tool.
2. Remove oil filter. Refer to [LU-11, "OIL FILTER"](#).
3. Disconnect water hoses from oil cooler while pinching water hoses near oil cooler to prevent engine coolant spilling.

CAUTION:

- Perform this step when engine is cold.
- Do not spill engine coolant on drive belts.

4. Remove connector bolt, and remove oil cooler.

CAUTION:

Do not spill engine oil to rubber parts such as drive belts and engine mounting insulator.

5. Disconnect oil pressure switch harness connector.
6. Remove oil filter bracket from oil pan (upper).
7. Remove oil pressure switch from oil filter bracket.

OIL FILTER BRACKET (AWD)

INSTALLATION

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

- Install oil pressure switch as follows:
 - Remove old liquid gasket adhering to oil pressure switch and oil filter bracket.
 - Apply thread sealant and install oil pressure switch.
Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-47, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"](#) .
- Make sure that no foreign objects are adhering to the installation surfaces of oil cooler, oil filter bracket and oil pan (upper).
- Align cutout on oil cooler with protrusion on oil filter bracket. Refer to [LU-17, "AWD Model"](#) .

INSPECTION AFTER INSTALLATION

1. Check the engine oil level and the engine coolant level, and adjust engine oil and engine coolant. Refer to [LU-7, "ENGINE OIL"](#) and [CO-10, "ENGINE COOLANT"](#) .
2. Start engine, and make sure that there is no leak of engine oil and engine coolant.
3. Stop engine and wait for 10 minutes.
4. Check the engine oil level and engine coolant level again. Refer to [LU-7, "ENGINE OIL"](#) and [CO-10, "ENGINE COOLANT"](#) .

OIL COOLER

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OIL COOLER

Components (2WD Model)

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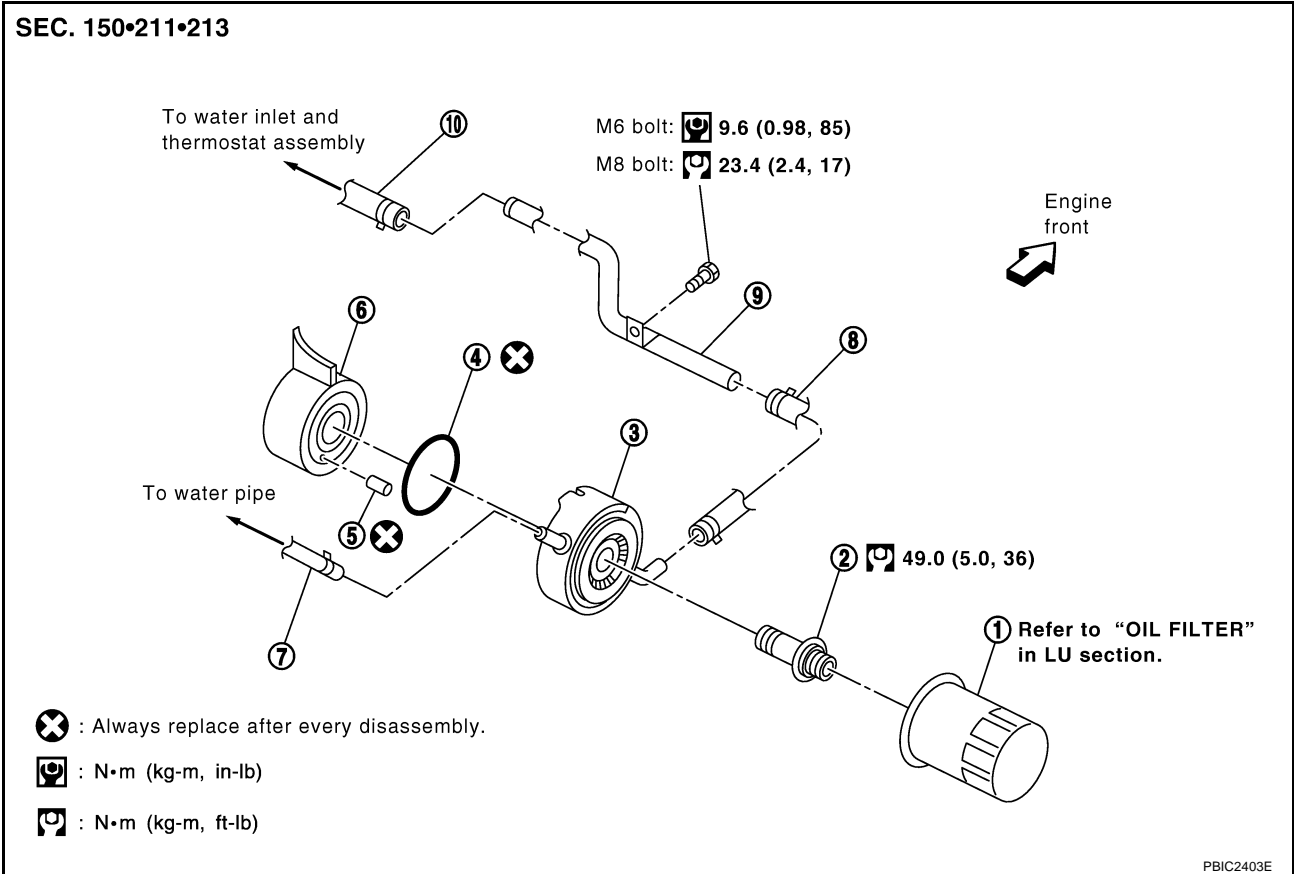
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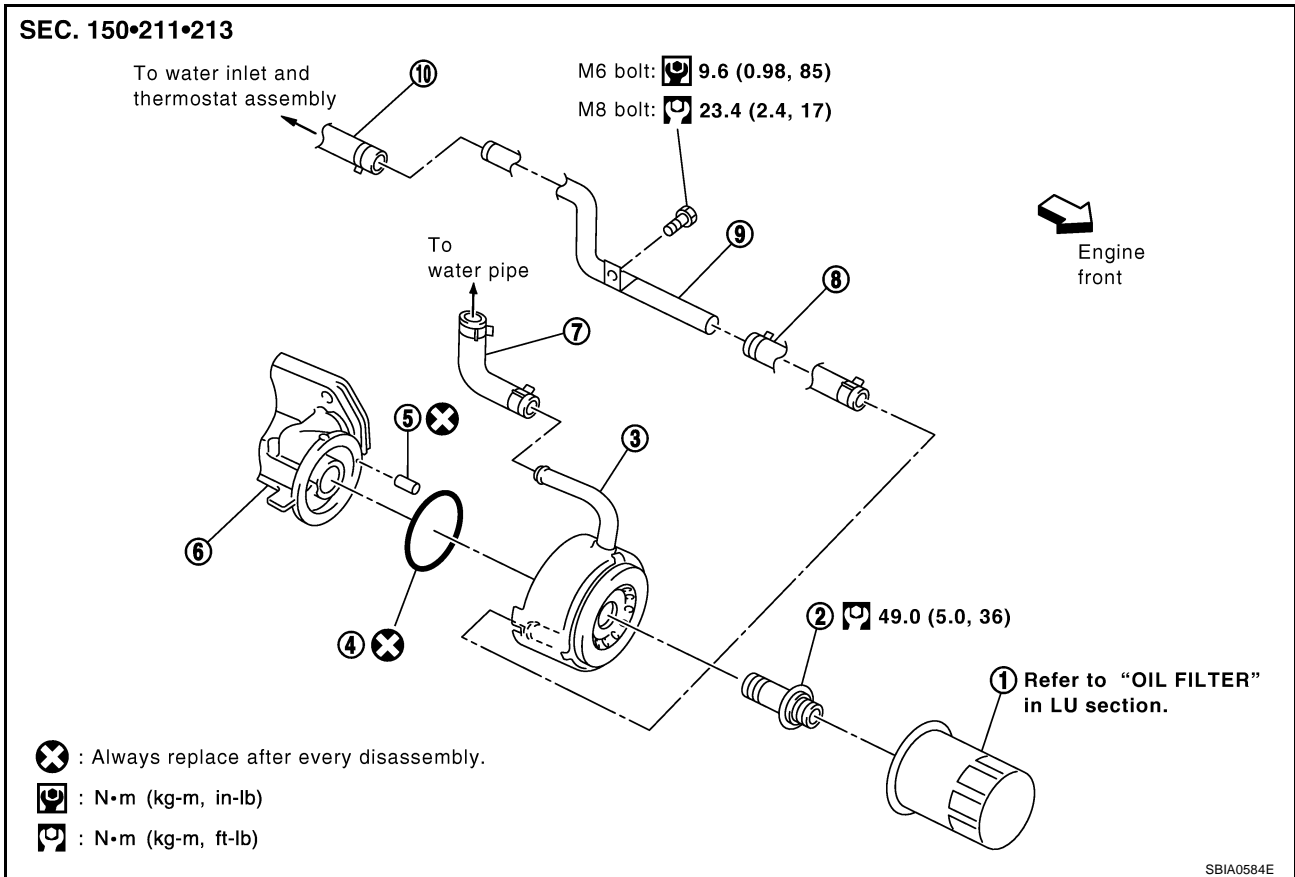


- | | | |
|----------------|-------------------|-------------------------------|
| 1. Oil filter | 2. Connector bolt | 3. Oil cooler |
| 4. O-ring | 5. Relief valve | 6. Oil pan (upper) right side |
| 7. Water hose | 8. Water hose | 9. Water pipe |
| 10. Water hose | | |

OIL COOLER

ABS00FNC

Components (AWD Model)



- | | | |
|----------------|-------------------|-----------------------|
| 1. Oil filter | 2. Connector bolt | 3. Oil cooler |
| 4. O-ring | 5. Relief valve | 6. Oil filter bracket |
| 7. Water hose | 8. Water hose | 9. Water pipe |
| 10. Water hose | | |

Removal and Installation

ABS0099A

WARNING:

Be careful not to get burn yourself, as engine oil and engine coolant may be hot.

REMOVAL

NOTE:

When removing oil cooler only, step 2 is unnecessary.

1. Remove undercover with power tool.
2. Drain engine coolant from radiator and cylinder block. Refer to [CO-10, "Changing Engine Coolant"](#) and [EM-150, "CYLINDER BLOCK"](#).

NOTE:

Perform this step when removing water pipes.

3. Remove oil filter. Refer to [LU-11, "OIL FILTER"](#).

CAUTION:

Do not spill engine oil on drive belts.

4. Disconnect water hoses from oil cooler.
 - When removing oil cooler only, pinching water hoses near oil cooler to prevent engine coolant spilling.

CAUTION:

- Perform this step when engine is cold.
- Do not spill engine coolant on the drive belts.

5. Remove connector bolt, and remove oil cooler.

OIL COOLER

CAUTION:

Do not spill engine oil to rubber parts such as drive belts and engine mounting insulator.

6. Remove water pipes, as necessary.

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

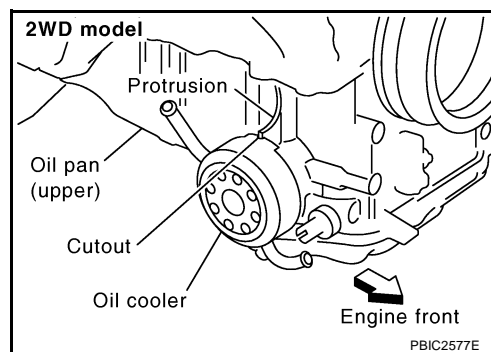
Check relief valve for movement, cracks and breaks by pushing the ball. If replacement is necessary, remove relief valve by prying it out with suitable tool. Install a new relief valve in place by tapping it.

INSTALLATION

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

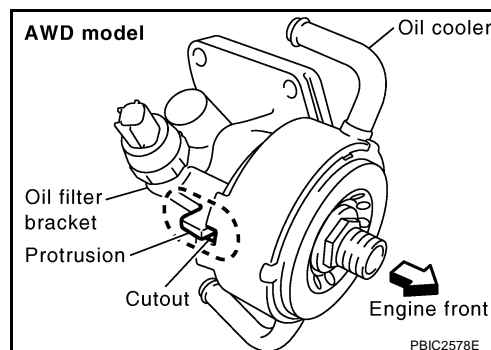
2WD Model

- Make sure that no foreign objects are adhering to the installation surfaces of oil cooler and oil pan (upper).
- Align cutout on oil cooler with protrusion on oil pan (upper) side, and tighten connector bolt.



AWD Model

- Make sure that no foreign objects are adhering to the installation surfaces of oil cooler and oil pan (upper).
- Align cutout on oil cooler with protrusion on oil filter bracket side, and tighten connector bolt.



INSPECTION AFTER INSTALLATION

1. Check the engine oil level and engine coolant level, and adjust engine oil and engine coolant. Refer to [LU-7, "ENGINE OIL"](#) and [CO-10, "ENGINE COOLANT"](#).
2. Start engine, and make sure that there is no leaks of engine oil or engine coolant.
3. Stop engine and wait for 10 minutes.
4. Check the engine oil level and the engine coolant level again. Refer to [LU-7, "ENGINE OIL"](#) and [CO-10, "ENGINE COOLANT"](#).

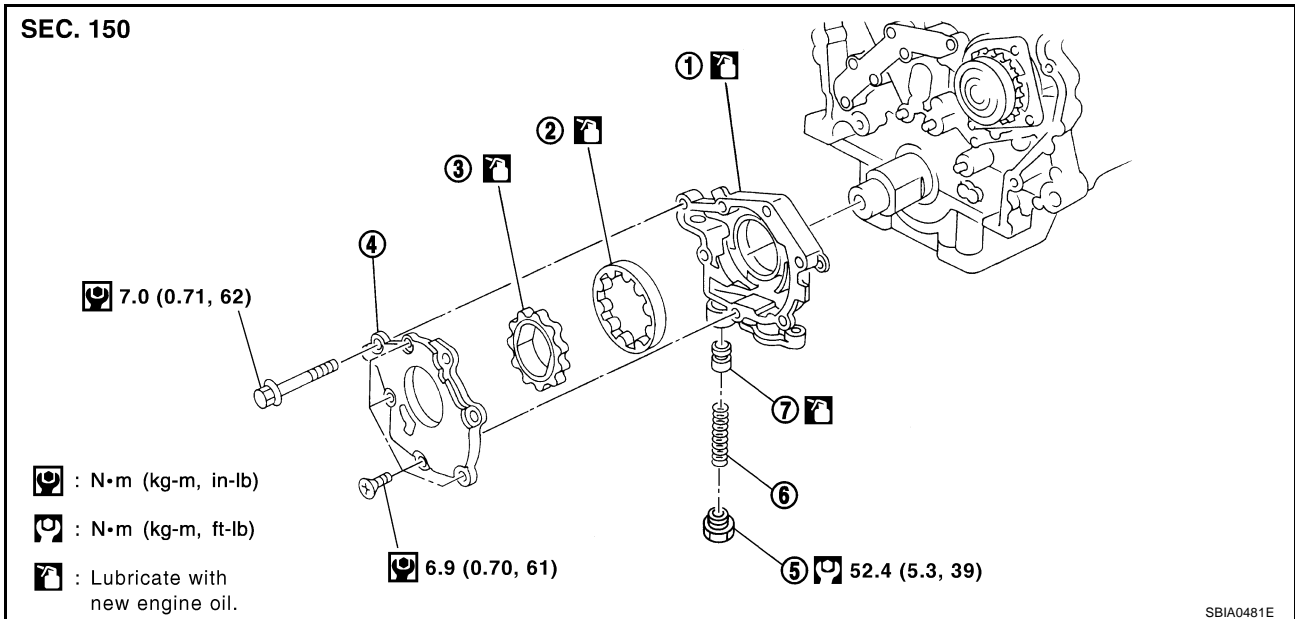
OIL PUMP

PF15010

OIL PUMP

Components

ABS00FND



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

Removal and Installation

REMOVAL

ABS0099B

1. Remove oil pans (lower and upper) and oil strainer. Refer to [EM-31, "OIL PAN AND OIL STRAINER"](#).
2. Remove front timing chain case and timing chain (primary). Refer to [EM-68, "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. After warming up engine, check for engine oil leakage.
2. Check the engine oil level and adjust engine oil. Refer to [LU-7, "ENGINE OIL"](#).

Disassembly and Assembly

DISASSEMBLY

ABS0099C

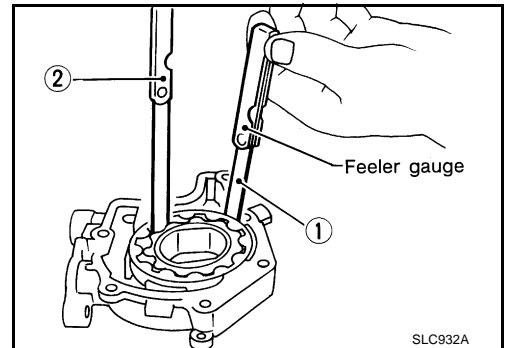
1. Remove oil pump cover.
2. Remove inner rotor and outer rotor from oil pump body.
3. After removing regulator plug, remove regulator spring and regulator valve.

OIL PUMP

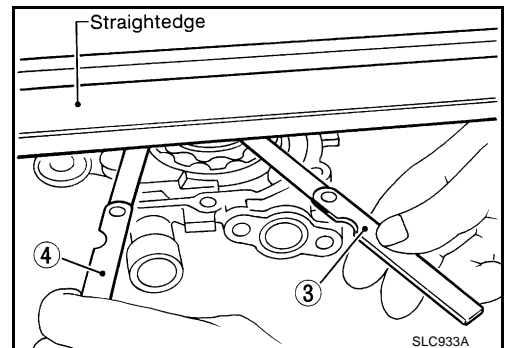
INSPECTION AFTER DISASSEMBLY

Clearance of Oil Pump Parts

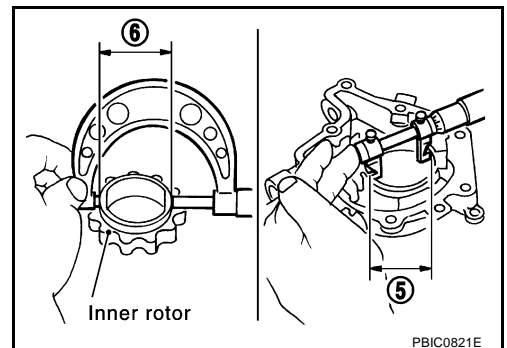
- Measure the clearance with feeler gauge.
 - Clearance between outer rotor and oil pump body (position 1)
Standard : 0.114 - 0.260 mm (0.0045 - 0.0102 in)
 - Tip clearance between inner rotor and outer rotor (position 2)
Standard : Below 0.180 mm (0.0071 in)



- Measure the 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 with micrometer (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)**
- If measured/calculated values are out of the standard, replace oil pump assembly.



Regulator Valve Clearance

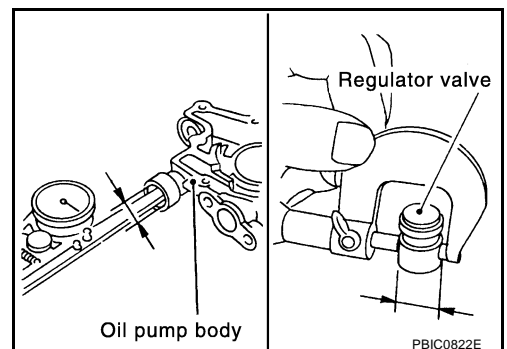
(Clearance) = (Valve hole diameter) – (Regulator valve outer diameter)

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

- If 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.

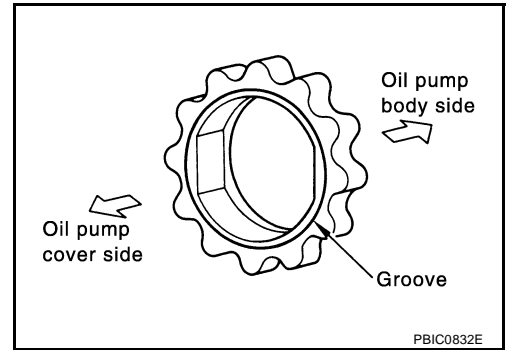


OIL PUMP

ASSEMBLY

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

- Install 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

ABS0099S

Engine speed rpm	Approximate discharge pressure* kPa (kg/cm ² , psi)
Idle speed	More than 98 (1.0, 14)
2,000	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	4.7 (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)

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 side clearance	0.030 - 0.070 (0.0012 - 0.0028)
Body to outer rotor side 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 body clearance	0.040 - 0.097 (0.0016 - 0.0038)
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SERVICE DATA AND SPECIFICATIONS (SDS)
