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SECTION LU

ENGINE LUBRICATION SYSTEM

CONTENTS

PRECAUTIONS	2	OIL COOLER	10	F
Precautions for Liquid Gasket	2	Removal and Installation	10	
REMOVAL OF LIQUID GASKET SEALING	2	REMOVAL	10	G
LIQUID GASKET APPLICATION PROCEDURE	2	INSPECTION AFTER REMOVAL	10	
PREPARATION	3	INSTALLATION	11	H
Special Service Tools	3	INSPECTION AFTER INSTALLATION	11	
Commercial Service Tools	3	OIL PUMP	12	I
LUBRICATION SYSTEM	4	Removal and Installation	12	J
Lubrication Circuit	4	REMOVAL	12	
System Drawing	5	INSTALLATION	12	K
ENGINE OIL	6	Disassembly and Assembly	12	
Inspection	6	DISASSEMBLY	12	L
OIL LEVEL	6	INSPECTION AFTER DISASSEMBLY	12	
OIL APPEARANCE	6	ASSEMBLY	13	M
OIL LEAKAGE	6	SERVICE DATA AND SPECIFICATIONS (SDS)	14	
OIL PRESSURE CHECK	6	Standard and Limit	14	
Changing Engine Oil	8	OIL PRESSURE	14	
OIL FILTER	9	OIL PUMP	14	
Removal and Installation	9	REGULATOR VALVE	14	
REMOVAL	9	OIL CAPACITY	14	
INSTALLATION	9	Tightening Torque	14	

PRECAUTIONS

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PRECAUTIONS

Precautions for Liquid Gasket REMOVAL OF LIQUID GASKET SEALING

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

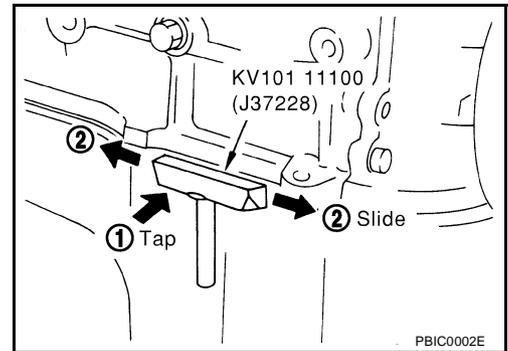
CAUTION:

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 area where the liquid gasket is applied.

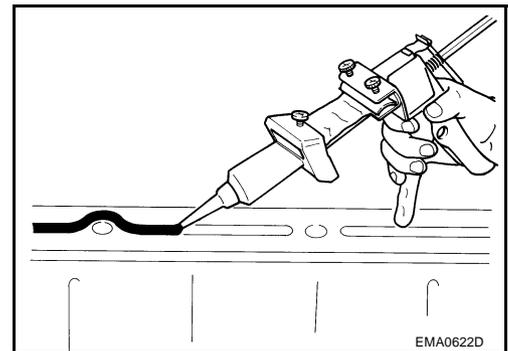
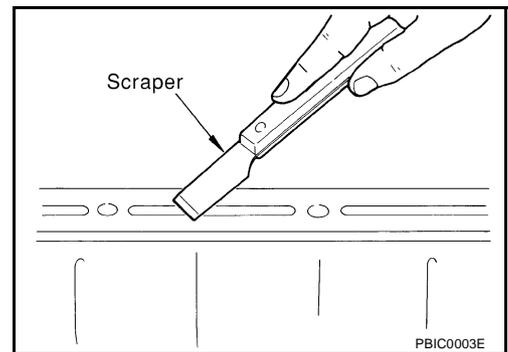
CAUTION:

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

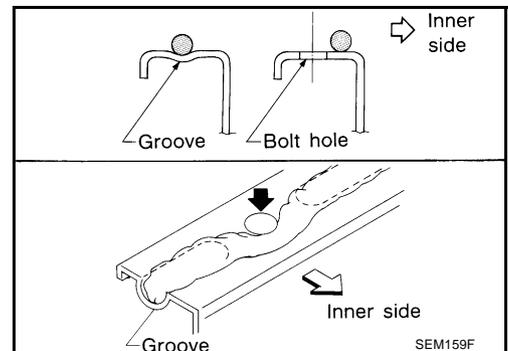
- Using a scraper, remove the old liquid gasket adhering to the gasket application surface and the mating surface.
 - Remove the liquid gasket completely from the groove of the gasket application surface, mounting bolts, and bolt holes.
- Wipe the gasket application surface and the mating surface with white gasoline (lighting and heating use) to remove adhering moisture, grease and foreign materials.
- Attach the liquid gasket tube to the tube presser.
Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-47. "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"](#).
- Apply the liquid 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 engine coolant.

CAUTION:

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



PREPARATION

PREPARATION

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Special Service Tools

ABS002XA

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
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

ABS002XB

Tool name	Description
Deep socket	Removing and installing oil pressure switch Deep socket 27 mm (1.06 in)
Power tools	Loosening nuts and bolts

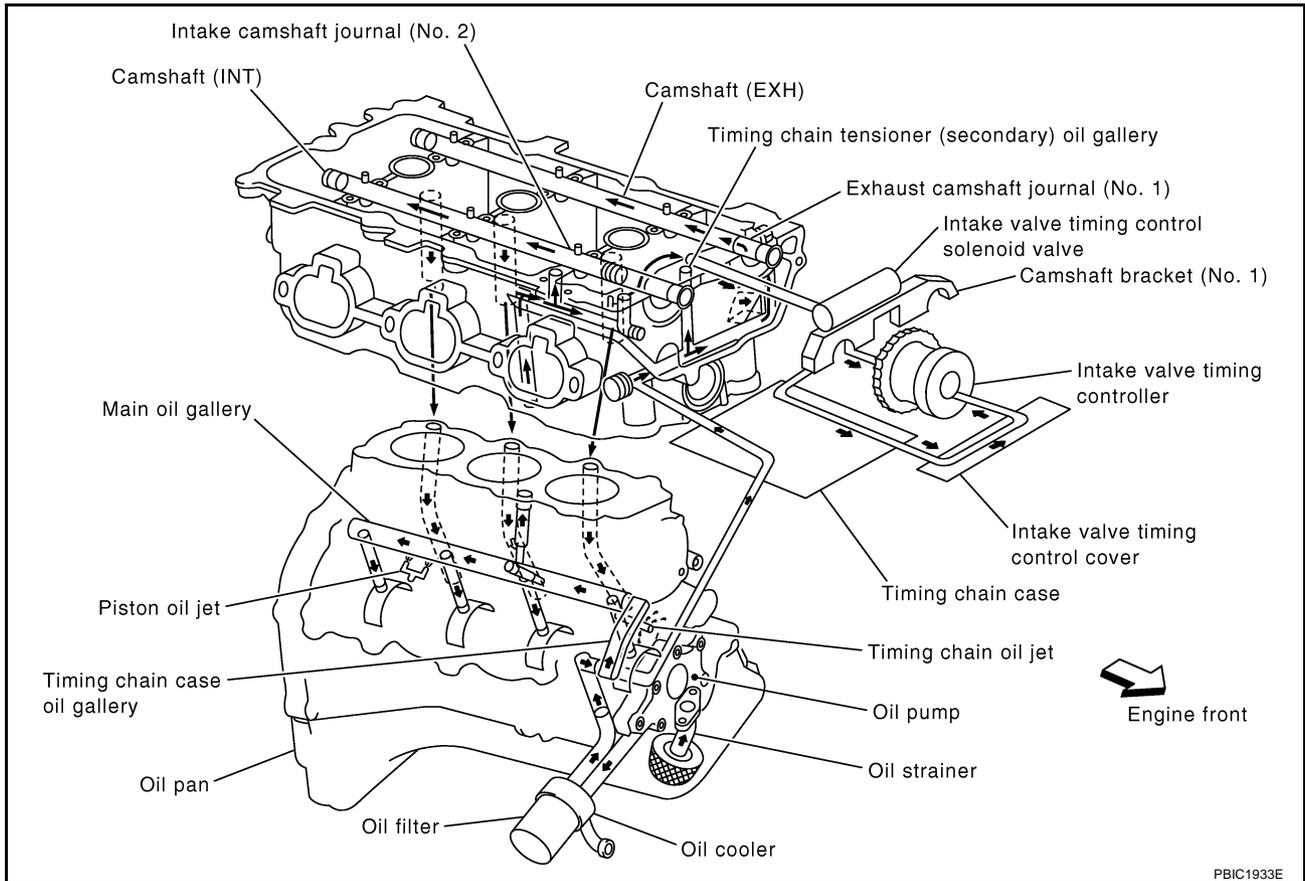
LUBRICATION SYSTEM

LUBRICATION SYSTEM

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Lubrication Circuit

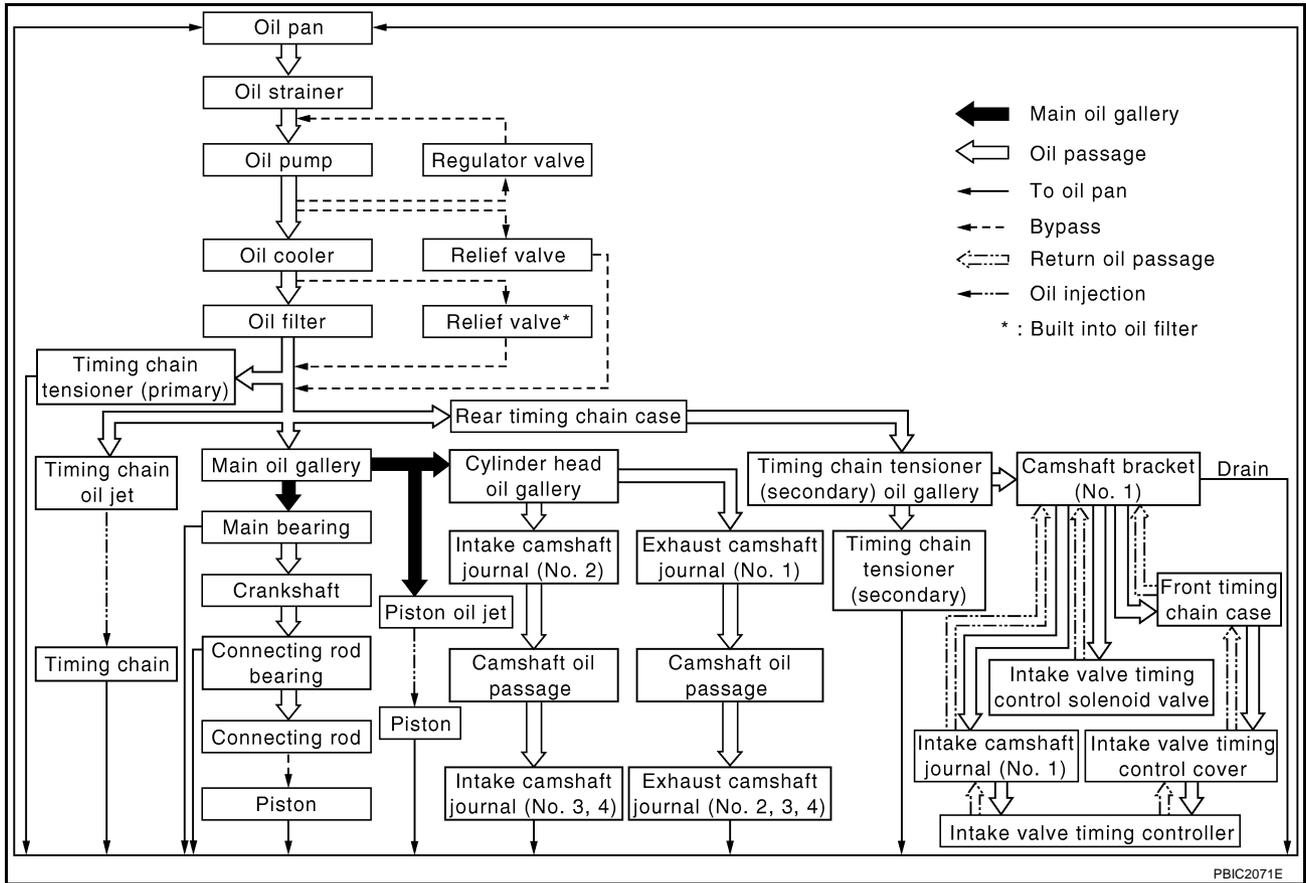
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LUBRICATION SYSTEM

System Drawing

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ENGINE OIL

ENGINE OIL

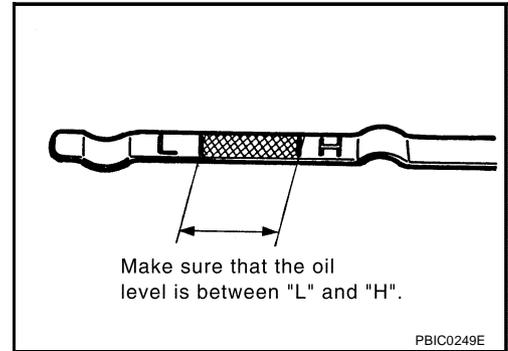
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Inspection OIL LEVEL

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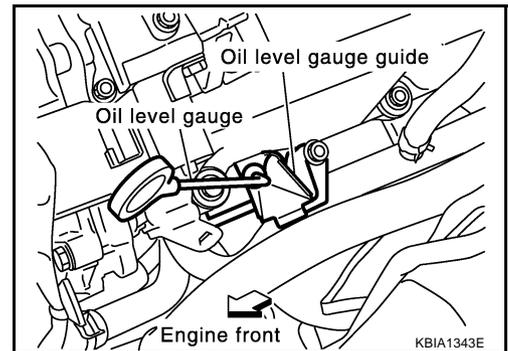
NOTE:

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



NOTE:

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



OIL APPEARANCE

- Check the oil for white turbidity or heavy contamination.
- If 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 pan
- Oil pan drain plug
- Oil pressure switch
- Oil filter
- Oil cooler
- Intake valve timing control cover and intake valve timing control solenoid valve
- Mating surface between cylinder block and cylinder head
- Mating surface between cylinder head and rocker cover
- Mating surface between front timing chain case and rear timing chain case
- Mating surface between rear timing chain case and cylinder block

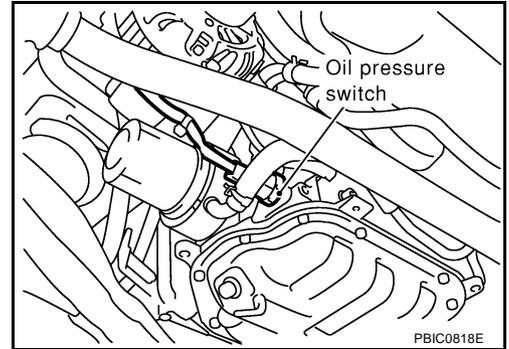
OIL PRESSURE CHECK

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 engine oil level. Refer to [LU-6, "Inspection"](#) .
 2. Remove undercover with power tool.

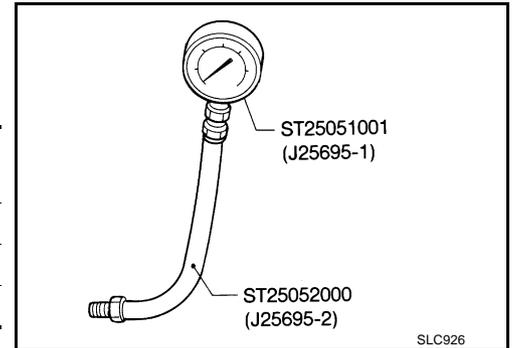
ENGINE OIL

3. Disconnect oil pressure switch harness connector.
4. Remove oil pressure switch.



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

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



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

8. After the inspections, install the oil pressure switch as follows:
 - a. Remove the old liquid gasket adhering to switch and engine.
 - b. Apply liquid gasket and tighten the oil pressure switch to specification.

Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-47. "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"](#).

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

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ENGINE OIL

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Changing Engine Oil

WARNING:

- Be careful not to burn yourself, as the engine oil may be hot.
 - Prolonged and repeated contact with used engine oil may cause skin cancer; try to avoid direct skin contact with used oil. If skin contact is made, wash thoroughly with soap or hand cleaner as soon as possible.
1. Warm up engine, and check for oil leakage from engine components. Refer to [LU-6, "OIL LEAKAGE"](#) .
 2. Stop engine and wait for 10 minutes.
 3. Remove drain plug and oil filler cap.
 4. Drain engine oil.
 5. Install drain plug and refill with new engine oil.

Oil specification and viscosity:

- API Certification Mark
- API grade SG/SH, Energy Conserving I & II or API grade SJ or SL, Energy Conserving
- ILSAC grade GF-I, GF-II & GF-III

Refer to [MA-9, "RECOMMENDED FLUIDS AND LUBRICANTS"](#) for further detail.

Oil capacity (Approximate):

Unit: ℓ (US qt, Imp qt)

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

CAUTION:

- Be sure to clean drain plug and install with new washer.
- When filling oil, do not pull out oil level gauge.

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.
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

OIL FILTER

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Removal and Installation

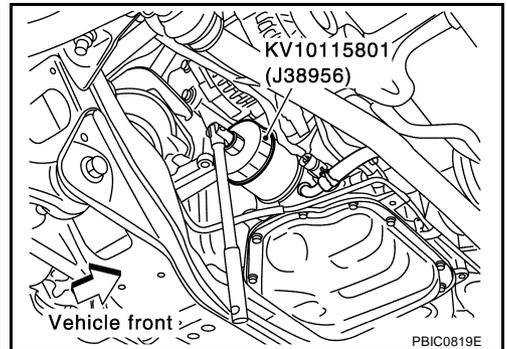
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REMOVAL

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

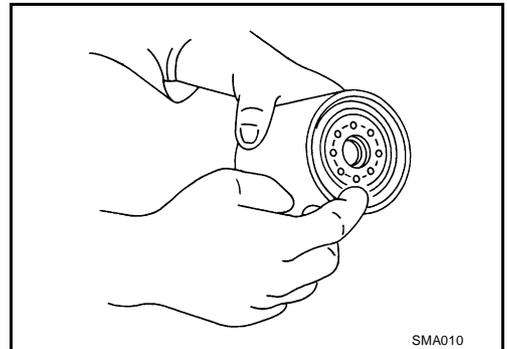
CAUTION:

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



INSTALLATION

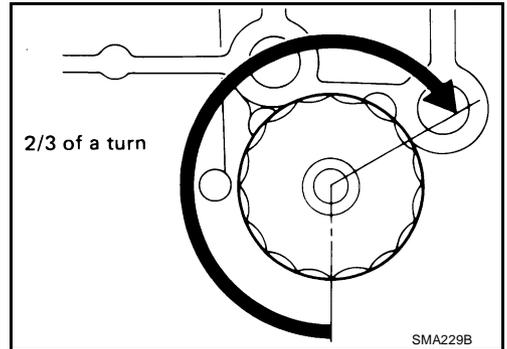
1. Remove foreign materials adhering to the oil filter installation surface.
2. Apply engine oil to the oil seal contact surface of the new oil filter.



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

Oil filter:

 : 14.7 - 20.5 N·m (1.5 - 2.1 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"](#).

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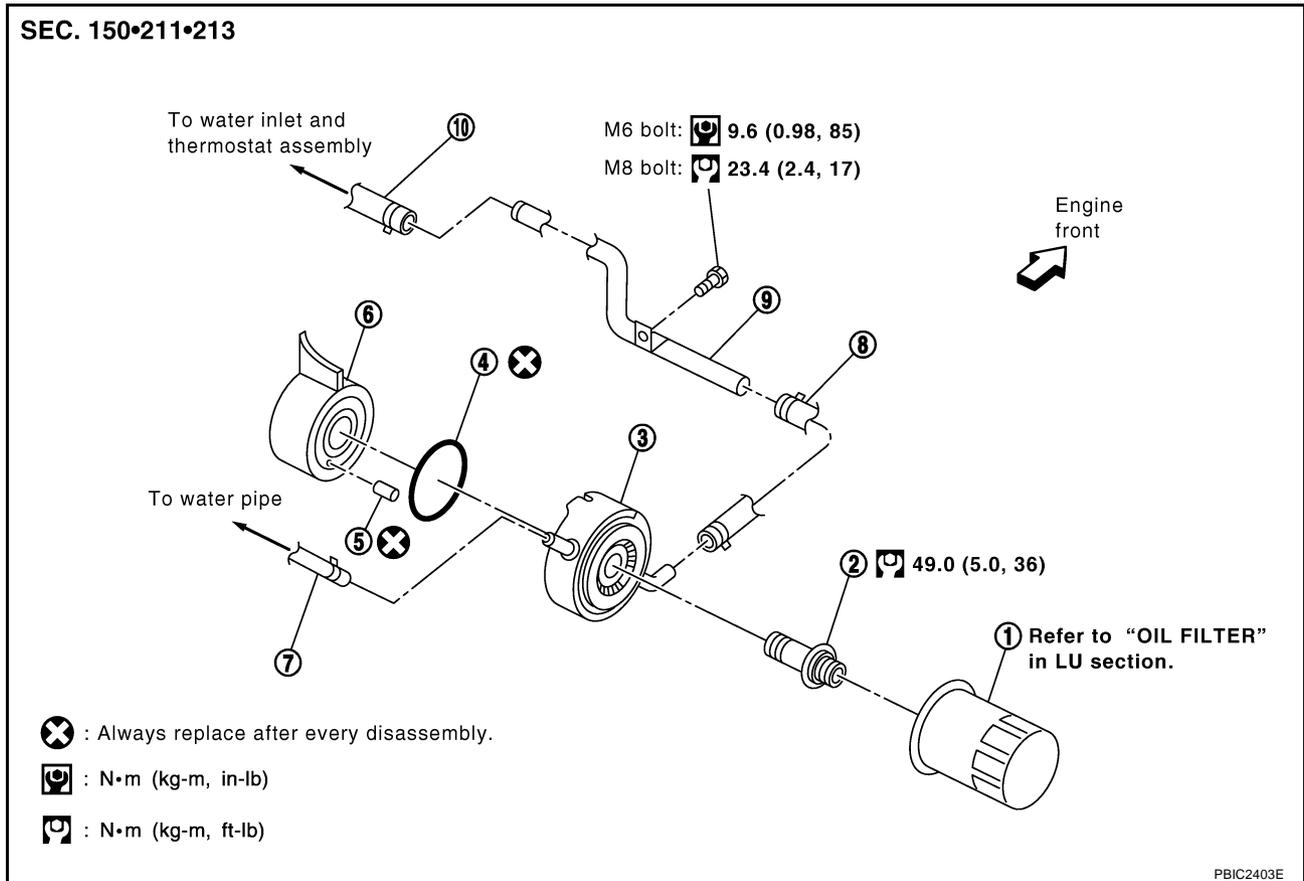
OIL COOLER

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OIL COOLER

Removal and Installation

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

REMOVAL

1. Remove undercover with power tool.
 2. Remove oil filter. Refer to [LU-9, "OIL FILTER"](#).
- CAUTION:**
Do not spill engine oil on the drive belts.
3. Disconnect water hoses from oil cooler, pinching hoses near oil cooler to prevent engine coolant spill out.
- CAUTION:**
Do not spill engine coolant on the drive belts.
4. Remove connector bolt, and remove oil cooler.

INSPECTION AFTER REMOVAL

Oil Cooler

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

Relief Valve

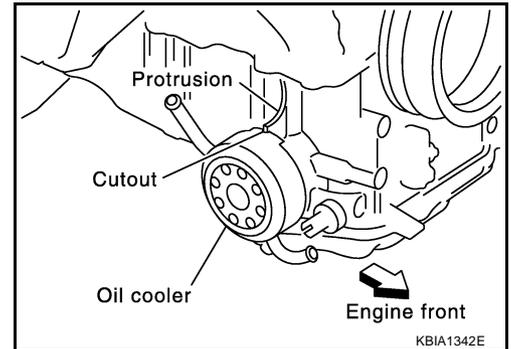
Check relief valve for movement, cracks and breaks by pushing the ball. If replacement is necessary, remove relief valve by prying it out with suitable tool. Install a new relief valve in place by tapping it.

OIL COOLER

INSTALLATION

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

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



INSPECTION AFTER INSTALLATION

- Start the engine, and check there is no leak of engine oil or engine coolant.
- Bleed air in the cooling system. Refer to [CO-10, "REFILLING ENGINE COOLANT"](#) .
- Check level of engine oil and engine coolant, and add engine oil and engine coolant. Refer to [LU-6, "ENGINE OIL"](#) and [CO-9, "ENGINE COOLANT"](#) .

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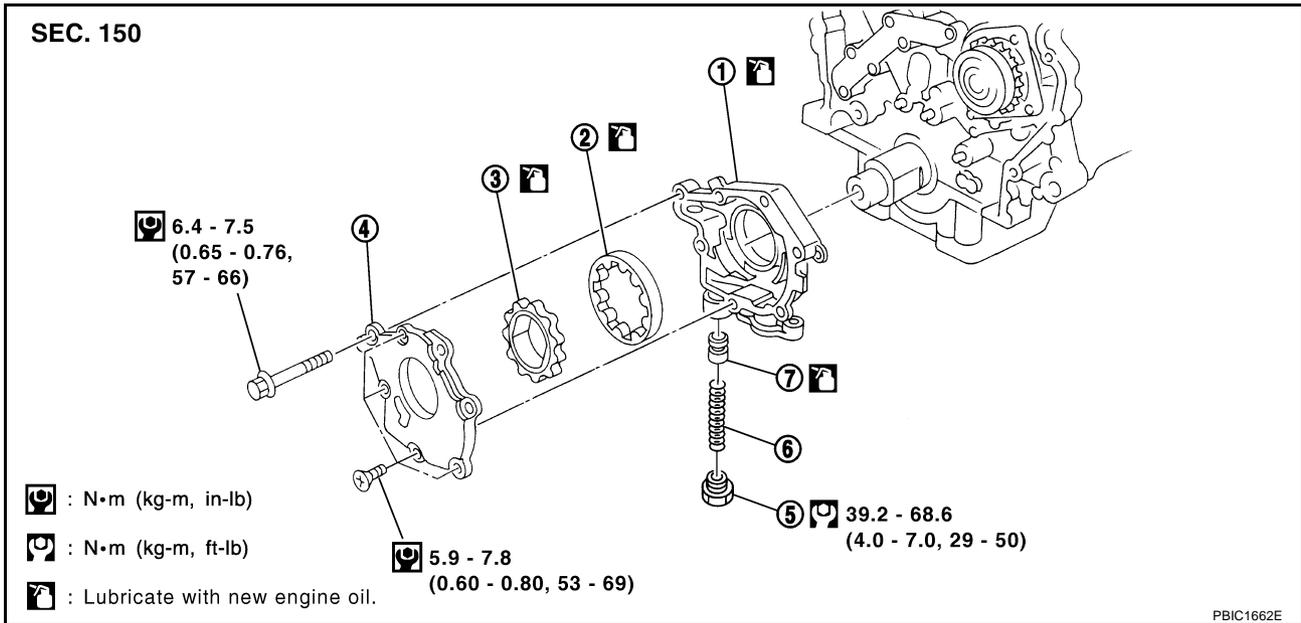
OIL PUMP

OIL PUMP

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Removal and Installation

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

CAUTION:

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

REMOVAL

1. Remove front timing chain case and timing chain (primary). Refer to [EM-50, "TIMING CHAIN"](#).
2. Remove oil pump assembly.

INSTALLATION

1. Install in the reverse order of removal paying attention to the following:
 - When installing, align crankshaft flat faces with inner rotor flat faces.

Disassembly and Assembly

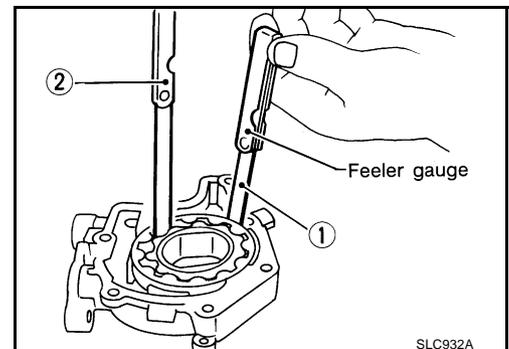
DISASSEMBLY

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

INSPECTION AFTER DISASSEMBLY

Clearance of Oil Pump Parts

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



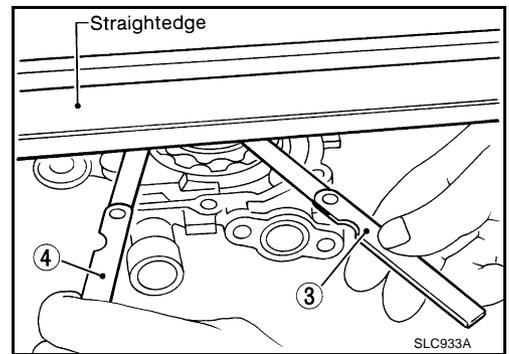
OIL PUMP

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

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

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

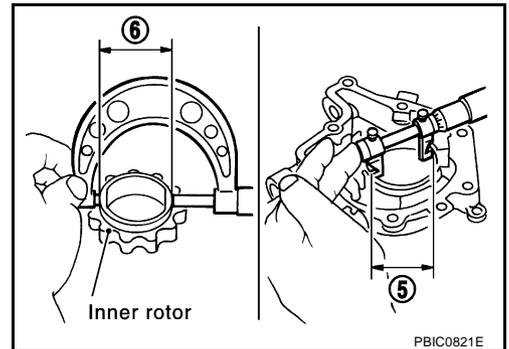
Standard : 0.050 - 0.110 mm (0.0020 - 0.0043 in)



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

- Measure the inner diameter of oil pump body with inside micrometer (Position 5)
- Measure the outer diameter of protruded portion of inner rotor (Position 6)
- (Clearance) = (Inner diameter of oil pump body) – (Outer diameter of inner rotor)

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



Regulator Valve Clearance

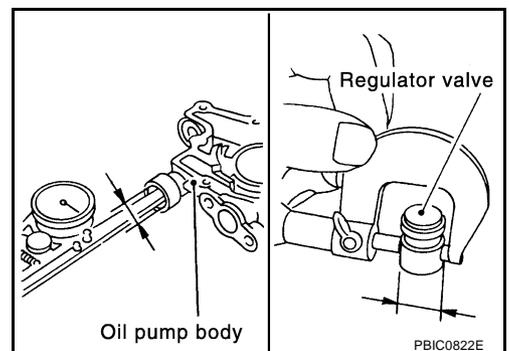
(Clearance) = (Valve hole diameter) – (Outer diameter of valve)

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

CAUTION:

Coat regulator valve with engine oil.

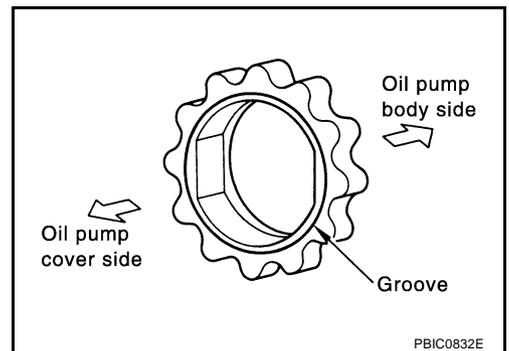
Check that it falls smoothly into the valve hole by its own weight.



ASSEMBLY

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

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



SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Standard and Limit OIL PRESSURE

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

OIL PUMP

Unit: mm (in)

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

REGULATOR VALVE

Unit: mm (in)

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

Unit: ℓ (US qt, Imp qt)

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

Tightening Torque

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

Oil pressure switch	12.3 - 17.2 (1.25 - 1.75, 10 - 12)
Oil pan drain plug	29.4 - 39.2 (3.0 - 4.0, 22 - 29)
Oil cooler connector bolt	49.0 (5.0, 36)
Water pipe	9.6 (0.98, 85)*
	23.4 (2.4, 17)
Oil pump body	6.4 - 7.5 (0.65 - 0.76, 57 - 66)*
Oil pump cover	5.9 - 7.8 (0.60 - 0.80, 53 - 69)*
Regulator valve plug	39.2 - 68.6 (4.0 - 7.0, 29 - 50)