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SECTION LU

ENGINE LUBRICATION SYSTEM

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PRECAUTIONS

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EBS000B7

PRECAUTIONS

Precautions for Liquid Gasket REMOVAL OF LIQUID GASKET SEALING

- After removing the bolts and nuts, separate the mating surface using Tool and remove the liquid gasket sealing.

Tool number : KV10111100 (J-37228)

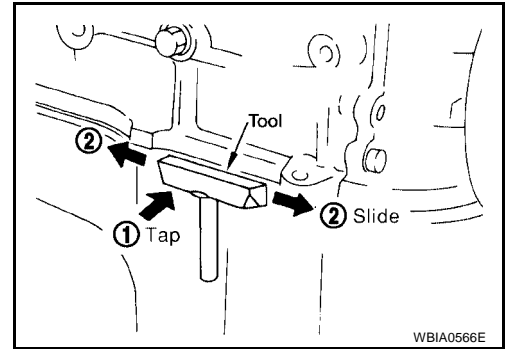
CAUTION:

Be careful not to damage the mating surfaces.

- In areas where the Tool is difficult to use, use a plastic hammer to lightly tap (1) the Tool where the Silicone RTV Sealant is applied. Use a plastic hammer to slide the Tool (2) by tapping on the side.

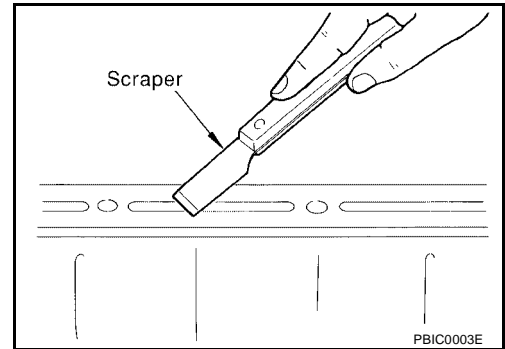
CAUTION:

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 Silicone RTV Sealant adhering to the gasket application surface and the mating surface.
 - Remove the sealant completely from the groove of the gasket application surface, bolts, and bolt holes.
- Thoroughly clean the gasket application surface and the mating surface and remove adhering moisture, grease and foreign materials.
- Attach the sealant tube to the tube presser.

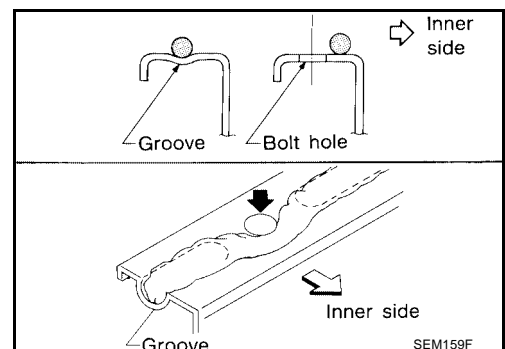
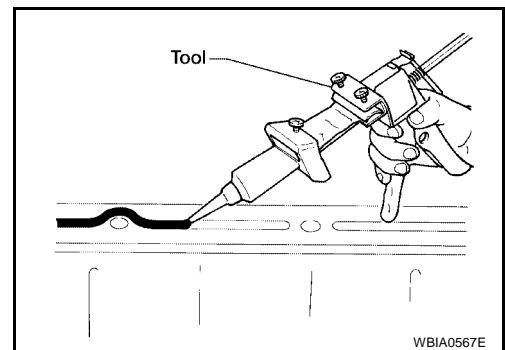


- Use Genuine Silicone RTV Sealant or equivalent. Refer to [GI-43, "Recommended Chemical Products and Sealants"](#).

- Apply the sealant using Tool without breaks to the specified location.

Tool number : WS39930000 (—)

- If there is a groove for the sealant application, apply the sealant to the groove.
- As for the bolt holes, normally apply the sealant inside the holes. If specified, it should be applied outside the holes. Make sure to read the text of this manual.
- Within five minutes of the sealant application, install the mating component.
- If the sealant protrudes, wipe it off immediately.
- Do not retighten after the installation.
- After 30 minutes or more have passed from the installation, fill the engine with the specified oil and coolant. Refer to [MA-9, "Fluids and Lubricants"](#).



CAUTION:

Follow all specific instructions in this manual.

PREPARATION

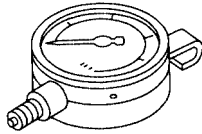
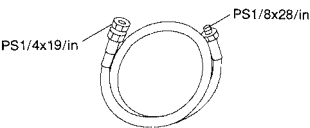
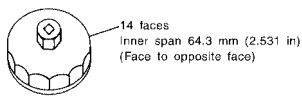
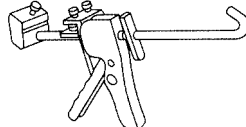
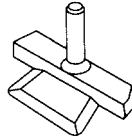
PREPARATION

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Special Service Tools

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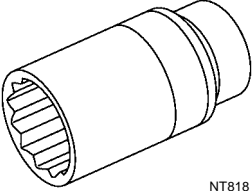
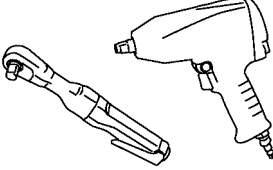
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
ST25051001 (J25695-1) Oil pressure gauge	 <p>NT050</p> Measuring oil pressure Maximum measuring range: 2,452 kPa (25 kg-cm² , 356 psi)
ST25052000 (J25695-2) Hose	 <p>S-NT559</p> Adapting oil pressure gauge to upper oil pan
KV10115801 (J38956) Oil filter wrench	 <p>S-NT772</p> Removing and installing oil filter
WS39930000 (—) Tube presser	 <p>NT052</p> Pressing the tube of liquid gasket
KV10111100 (J-37228) Seal cutter	 <p>NT046</p> Removing steel oil pan and rear timing chain case

Commercial Service Tool

EBS00JBE

PREPARATION

Tool name	Description
<p data-bbox="159 197 293 224">Deep socket</p>  <p data-bbox="850 401 896 420">NT818</p>	<p data-bbox="1013 197 1446 254">Removing and installing oil pressure switch Deep socket size 26 mm, 3/8 drive</p>
<p data-bbox="159 432 285 459">Power tools</p>  <p data-bbox="850 632 922 651">PBIC0190E</p>	<p data-bbox="1013 432 1263 459">Loosening nuts and bolts</p>

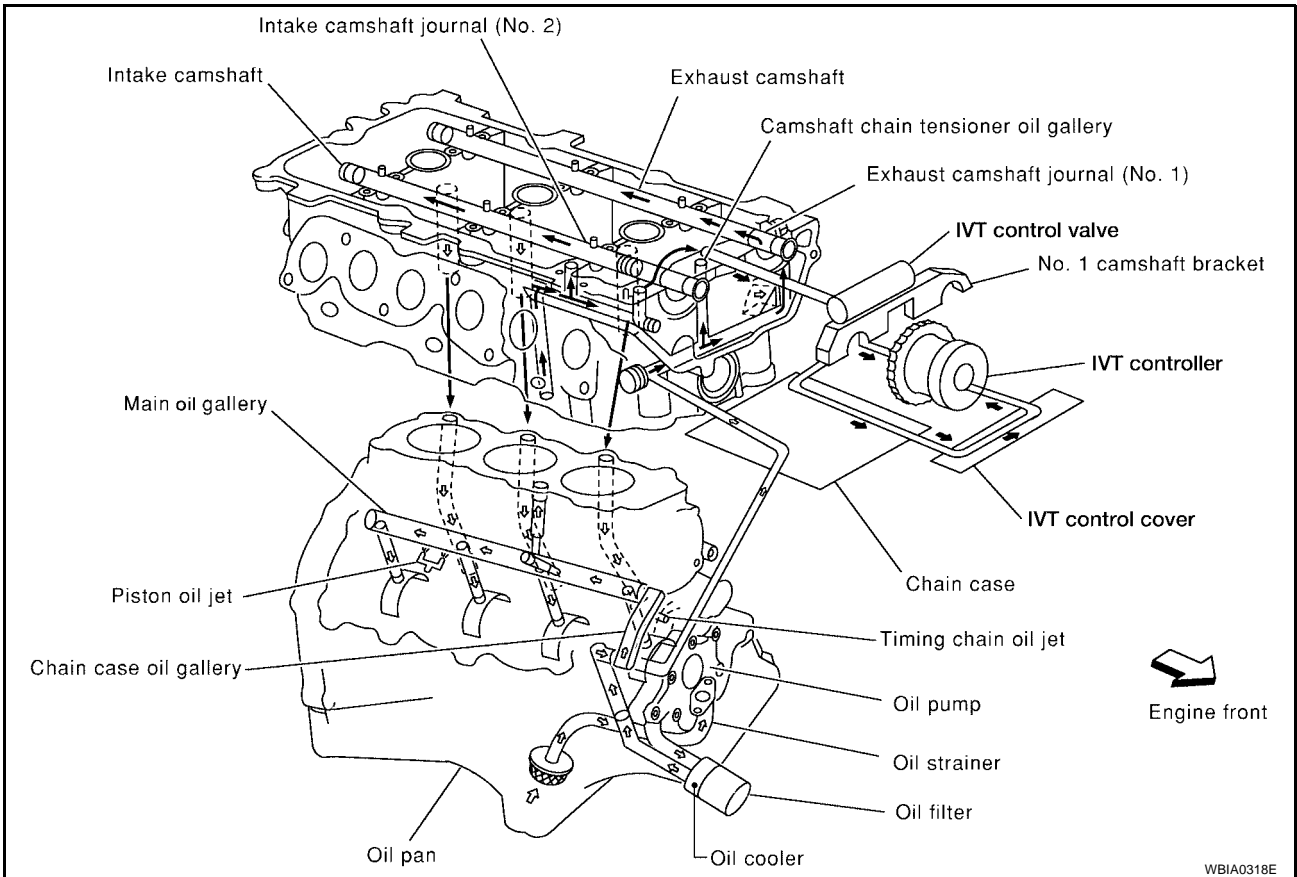
LUBRICATION SYSTEM

LUBRICATION SYSTEM

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Lubrication Circuit

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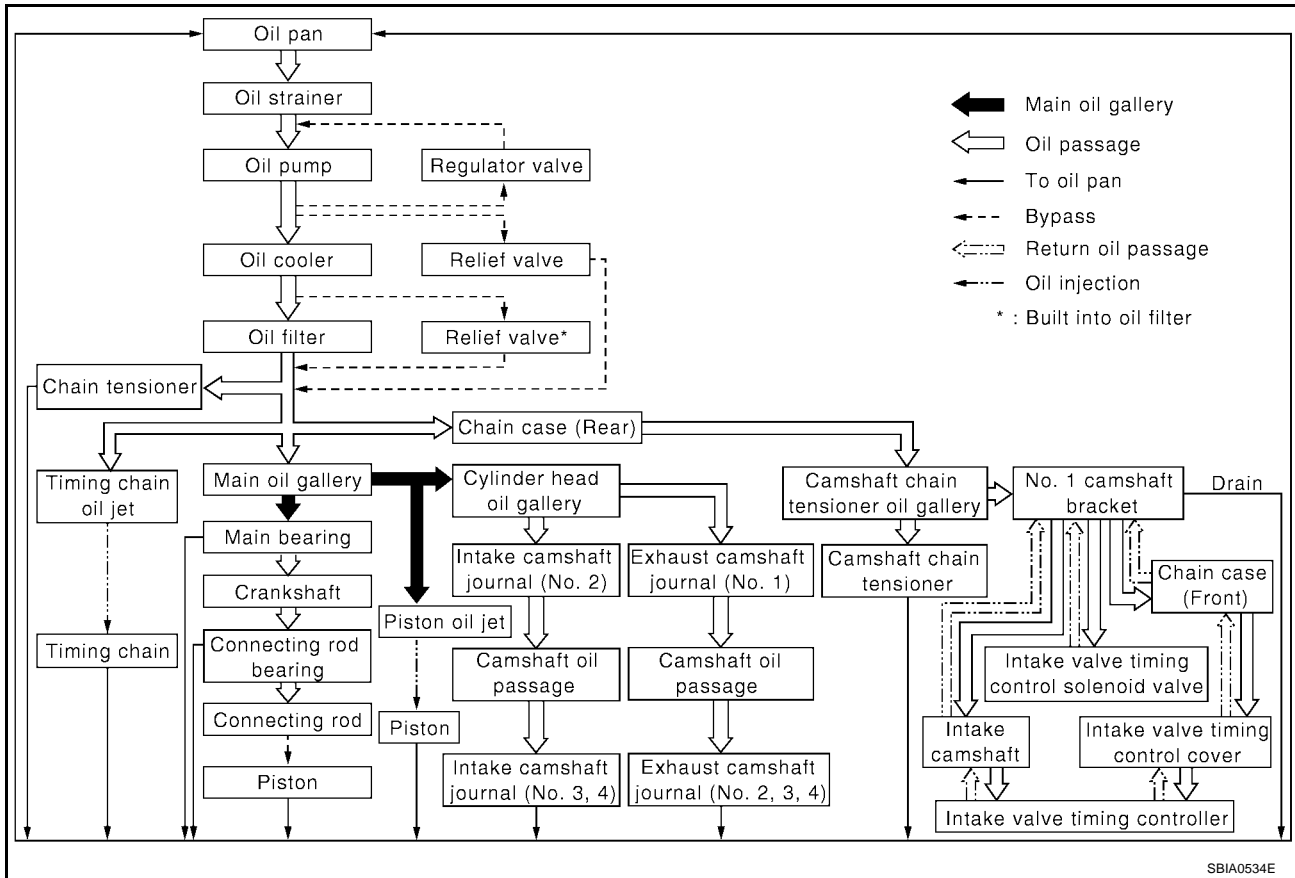
L

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LUBRICATION SYSTEM

System Drawing

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SBIA0534E

ENGINE OIL

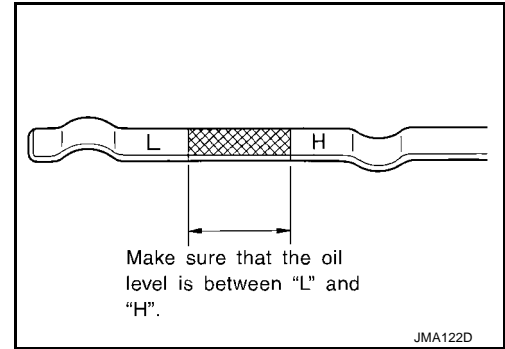
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EBS00JBH

ENGINE OIL

Inspection OIL LEVEL

- Before starting the engine make sure the vehicle is parked on a flat and level surface, then check the oil level. If the engine is already running, turn it off and allow 10 minutes before checking.
- Check that the oil level is within the low (L) and high (H) range as indicated on the dipstick.
- If the engine oil level is out of range, add oil as necessary. Refer to [MA-9, "RECOMMENDED FLUIDS AND LUBRICANTS"](#).



OIL APPEARANCE

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

OIL LEAKAGE

Check for oil leakage around the following areas:

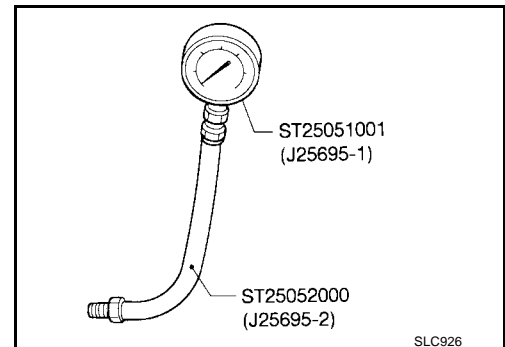
- Upper and lower oil pan
- Oil pan drain plug
- Oil pressure switch
- Oil filter
- Oil cooler
- Water pump cover
- Timing chain tensioner cover
- Intake valve timing (IVT) control cover
- Front cover
- Mating surface between cylinder block and cylinder head
- Mating surface between cylinder head and rocker cover
- Crankshaft oil seal (front and rear)

OIL PRESSURE CHECK

WARNING:

- **Be careful not to burn yourself, as engine oil may be hot.**
- **For M/T models, put the gearshift lever in the Neutral "N" position. For A/T models, put the selector lever in the Park "P" position.**

1. Check the engine oil level.
2. Disconnect the oil pressure switch harness connector.
3. Remove the oil pressure switch.
4. Install the pressure gauge.



5. Start the engine and warm it up to normal operating temperature.

ENGINE OIL

6. Check oil pressure with engine running under no-load.

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

CAUTION:

If the difference is extreme, check the oil passages and oil pump for leaks and blockages.

7. After the inspections, install the oil pressure switch as follows:

- a. Remove the old sealant adhering to switch and engine.
- b. Apply thread sealant and tighten the oil pressure switch to specification using Tool. Use Genuine High Performance Thread Sealant, or equivalent. Refer to [GI-43, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"](#) .

Oil pressure switch : 13 - 17 N·m (1.25 - 1.75 kg·m, 9 - 12 ft·lb)

Changing Engine Oil

EBS00/BI

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. Park the vehicle on a flat and level surface, then start the engine to warm up the oil.
 2. Check for oil leaks from the engine.
 3. Stop the engine and wait for 10 minutes.
 4. Remove the drain plug and oil filler cap.
 5. Drain the engine oil.
 6. Install the drain plug.

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)

- Refill the engine with the specified new engine oil. Refer to [MA-9, "RECOMMENDED FLUIDS AND LUBRICANTS"](#) .

Oil Capacity (Approximate)

Drain and refill	With oil filter change	4.2 ℓ (4 1/2 US qt, 3 3/4 Imp qt)
	Without oil filter change	4.0 ℓ (4 1/4 US qt, 3 1/2 Imp qt)
Dry engine (engine overhaul)		4.6 ℓ (4 7/8 US qt, 4 Imp qt)

CAUTION:

- **The refill capacity depends on the oil temperature and drain time. Use these specifications for reference only.**
 - **Always use the dipstick to determine when the proper amount of oil is in the engine.**
7. Warm up the engine and check the area around the drain plug and oil filter for oil leaks.
 8. Stop the engine and wait for 10 minutes.
 9. Check the oil level. Refer to [LU-7, "OIL LEVEL"](#) .

OIL FILTER

OIL FILTER

PF:15208

Removal and Installation

EBS00/BJ

REMOVAL

1. Remove the splash shield using power tool.
2. Remove the oil filter using Tool.

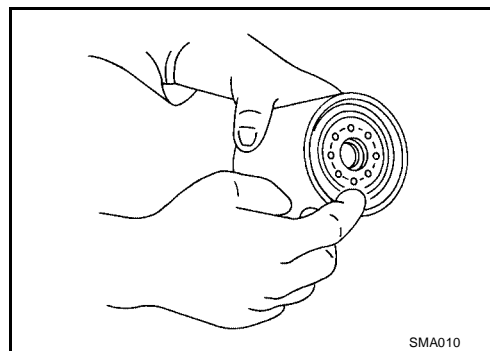
Tool : KV10115801 (J-38956)

CAUTION:

- The oil filter is provided with a relief valve. Use a 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

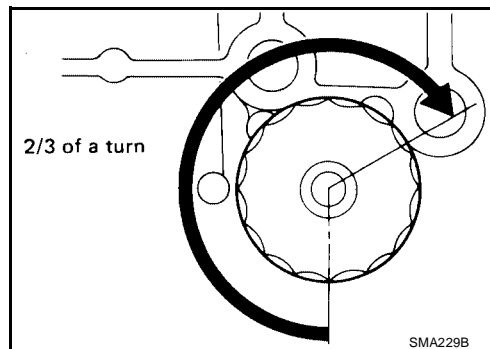
1. Remove any foreign material adhering to the oil filter installation surface on the oil cooler.
2. Apply engine oil to the oil seal contact surface of the new oil filter as shown.



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

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

Tool : KV10115801 (J-38956)



4. After warming up the engine, check for engine oil leakage.
5. Install the splash shield.
6. Check oil level and add engine oil as necessary. Refer to [LU-7, "ENGINE OIL"](#) .

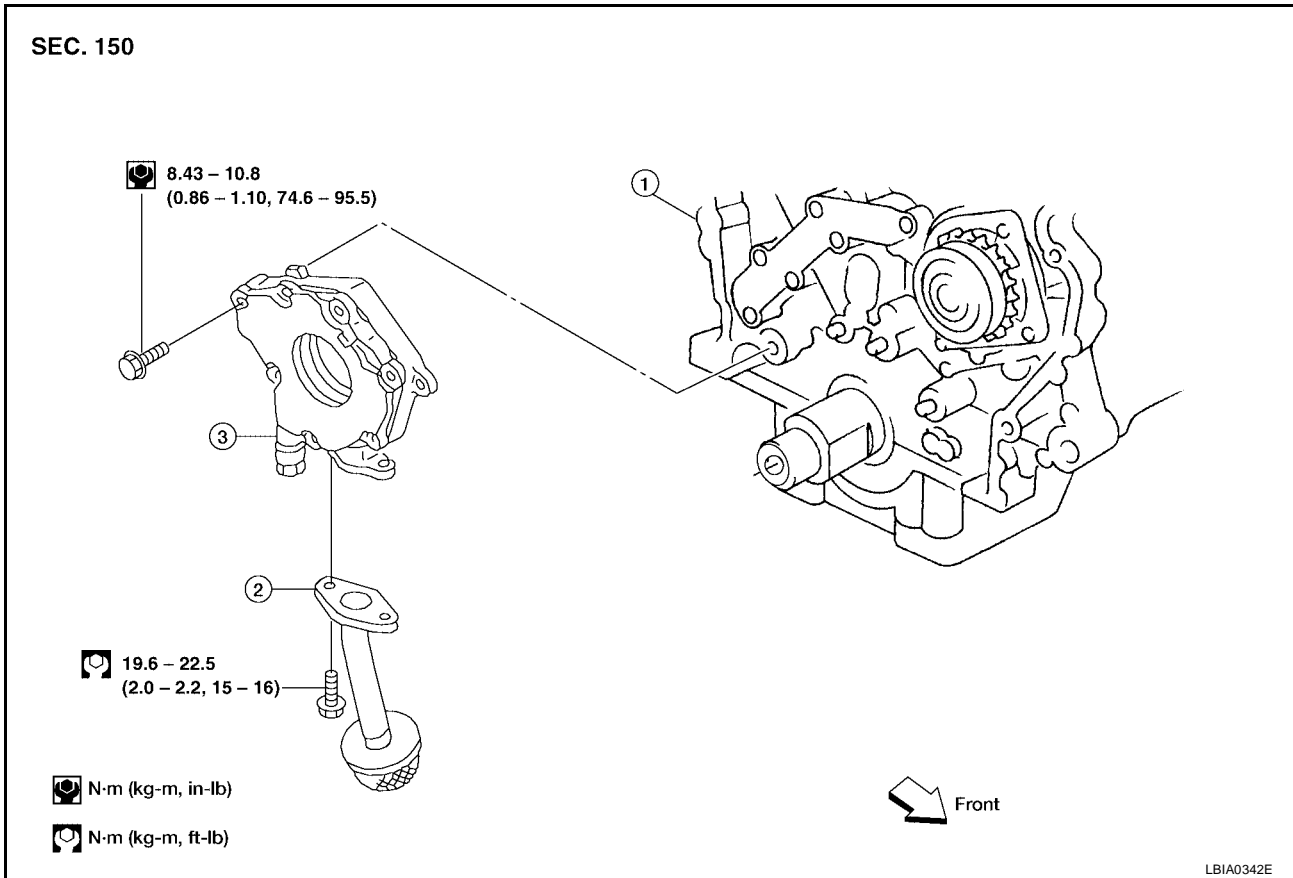
OIL PUMP

OIL PUMP

PF15010

Removal and Installation

EBS00JBK



1. Engine block

2. Oil strainer

3. Oil pump

REMOVAL

1. Remove the timing chain. Refer to [EM-58, "Removal and Installation"](#).
2. Remove the oil strainer.
3. Remove the oil pump.

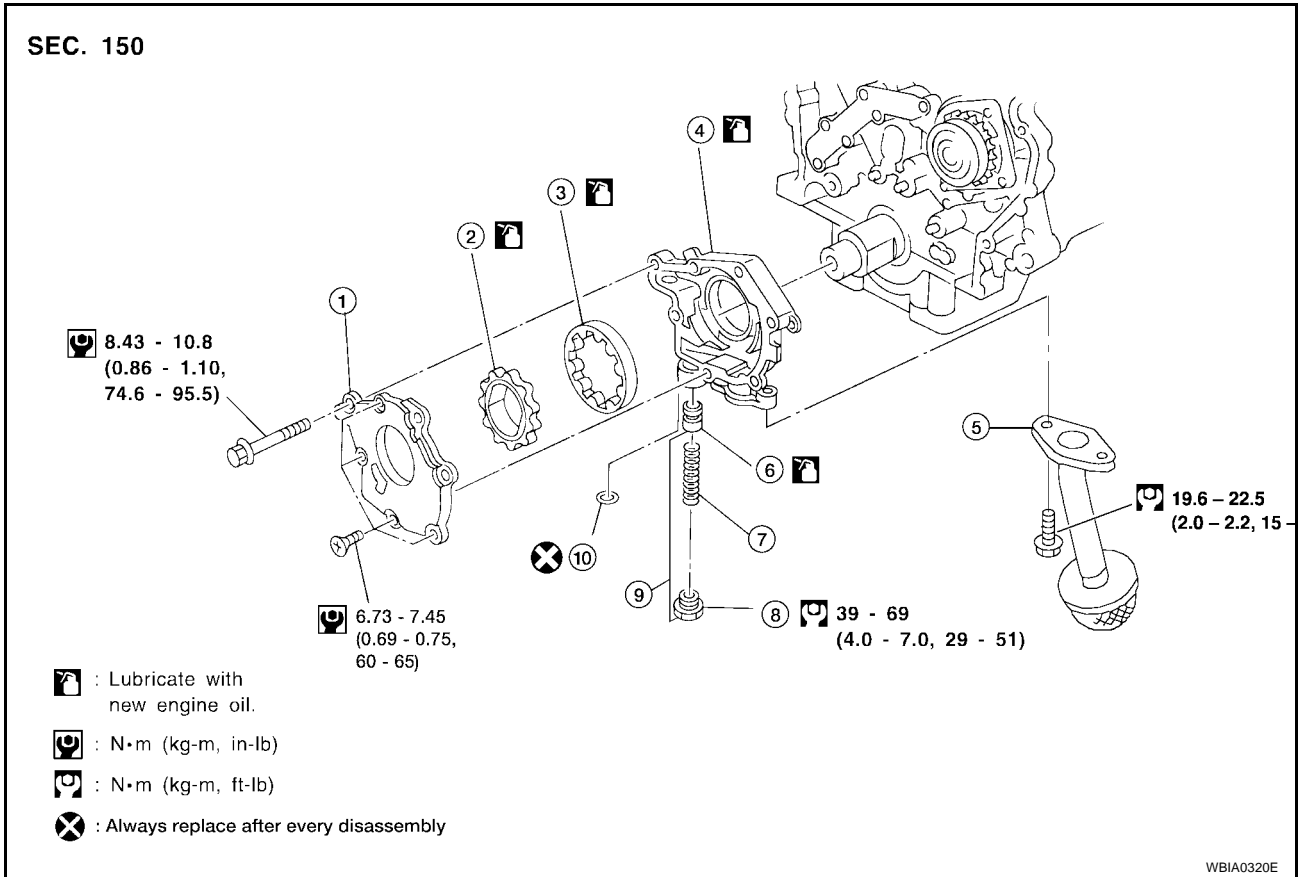
INSTALLATION

Installation is in the reverse order of removal.

OIL PUMP

Disassembly and Assembly

EBS00JBL

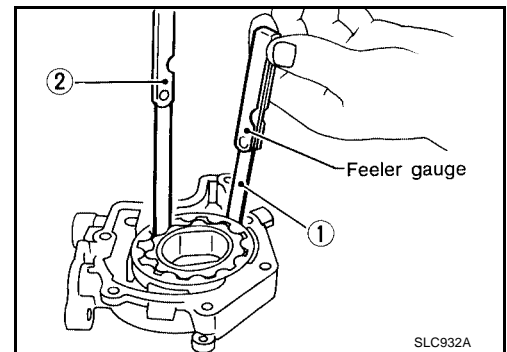


- | | | |
|---------------------|-------------------|--------------------------------------|
| 1. Oil pump cover | 2. Inner rotor | 3. Outer rotor |
| 4. Oil pump housing | 5. Oil strainer | 6. Regulator valve |
| 7. Regulator spring | 8. Regulator plug | 9. Regulator valve set (6, 7, and 8) |
| 10. O-ring | | |

INSPECTION AFTER DISASSEMBLY

Clearance of Oil Pump Parts

- Measure the rotor clearance with a feeler gauge as shown.
 - Clearance between outer rotor and oil pump body (position 1).
Position 1 : 0.114 - 0.200 mm (0.0045 - 0.0079 in)
 - Tip clearance between inner rotor and outer rotor (position 2).
Position 2 : less than 0.180 mm (0.0071 in)



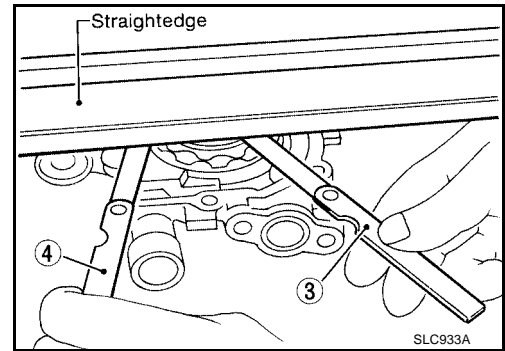
OIL PUMP

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

Position 3 : 0.030 - 0.070 mm (0.0012 - 0.0028 in)

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

Position 4 : 0.050 - 0.110 mm (0.0020 - 0.0043 in)



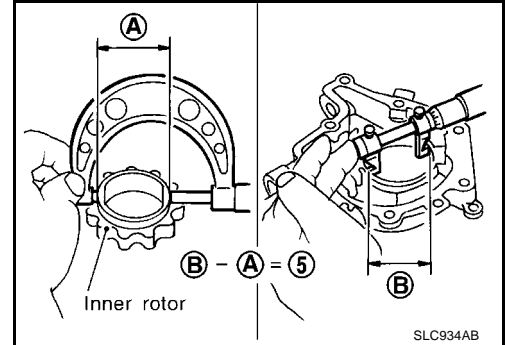
- Calculate the clearance between inner rotor and oil pump body as follows.

- Measure the outer diameter of protruded portion of inner rotor (position A).

- Measure the inner diameter of oil pump body with inside micrometer (position B).

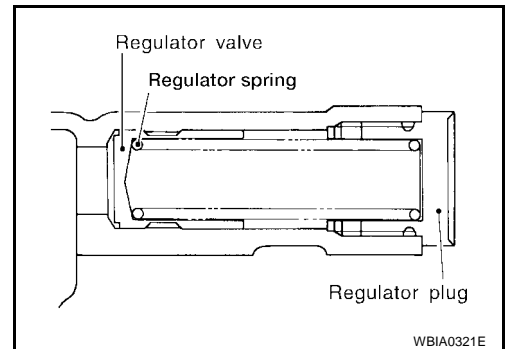
- Clearance 5 = (inner diameter of oil pump body B) – (outer diameter of inner rotor A).

Clearance 5 : 0.045 - 0.091 mm (0.0018 - 0.0036 in)



Regulator Valve

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



Regulator Valve Clearance

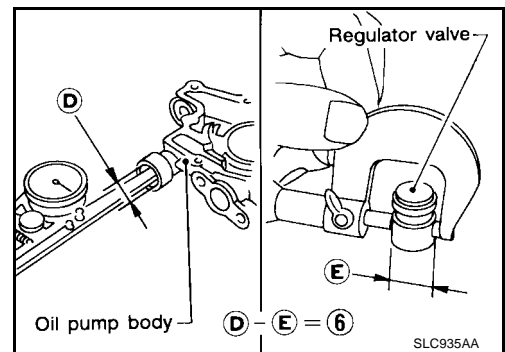
- Clearance 6 = (regulator valve hole diameter D) – (outer regulator valve diameter E).

- If the calculated clearance 6 exceeds the standard, replace the oil pump body.

Clearance 6 : 0.040 - 0.097 mm (0.0016 - 0.0038 in)

CAUTION:

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

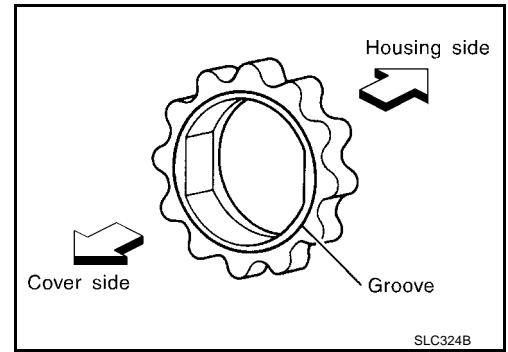


OIL PUMP

ASSEMBLY

Assembly is in the reverse order of disassembly.

- Assemble the inner rotor and outer rotor with the punch marks on the oil pump cover side.



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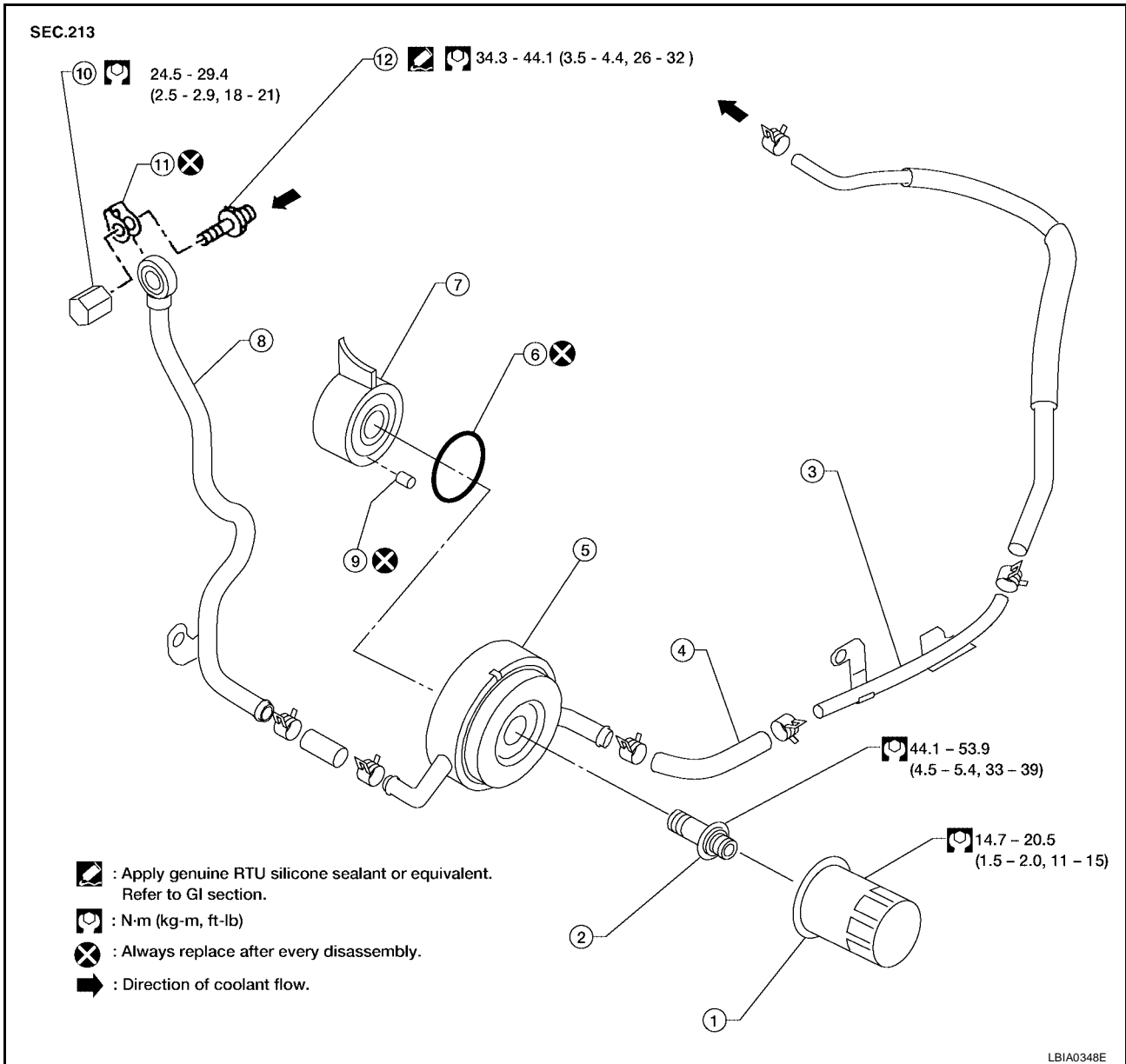
OIL COOLER

PF2:21305

OIL COOLER

Removal and Installation

EBS00JBM



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|-------------------|--------------------|---------------------|
| 1. Oil filter | 2. Oil cooler bolt | 3. Oil inlet pipe |
| 4. Oil inlet hose | 5. Oil cooler | 6. O-ring |
| 7. Oil pan | 8. Oil outlet pipe | 9. Relief valve |
| 10. Drain plug | 11. Copper gasket | 12. Water connector |

REMOVAL

1. Drain the engine oil. Refer to [MA-16, "Changing Engine Oil"](#).
2. Drain the engine coolant. Refer to [MA-14, "DRAINING ENGINE COOLANT"](#).
3. Remove the oil filter. Refer to [LU-9, "Removal and Installation"](#).
4. Remove the wheel and tire. Refer to [WT-4, "Removal"](#).
5. Remove the splash shield using power tool.
6. Disconnect the coolant hoses from the oil cooler.

CAUTION:

Do not spill coolant on the drive belt.

7. Remove the oil cooler from the upper oil pan.

OIL COOLER

INSPECTION AFTER REMOVAL

Oil Cooler

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

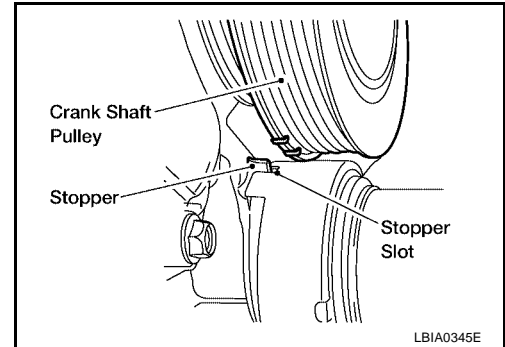
Relief Valve

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

INSTALLATION

Installation is in the reverse order of removal.

- When installing the oil cooler, align the oil cooler stopper slot with the oil cooler stopper on the oil pan.



INSPECTION AFTER INSTALLATION

Start the engine and while it is running check for any oil or coolant leaks.

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SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00100

Standard and Limit OIL PRESSURE

EBS00JBN

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

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 PUMP

Unit: mm (in)

Body to outer rotor radial clearance	0.114 - 0.200 (0.0045 - 0.0079)
Inner rotor to outer rotor tip clearance	Below 0.18 (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)

OIL CAPACITY (APPROXIMATE)

Drain and refill	With oil filter change	4.2 ℓ (4 1/2 US qt, 3 3/4 Imp qt)
	Without oil filter change	4.0 ℓ (4 1/4 US qt, 3 1/2 Imp qt)
Dry engine (engine overhaul)		4.6 ℓ (4 7/8 US qt, 4 Imp qt)