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# SECTION LU

## ENGINE LUBRICATION SYSTEM

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# PRECAUTIONS

< PRECAUTION >

## PRECAUTION

### PRECAUTIONS

#### Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:000000009135560

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes dual stage front air bag modules. The SRS system may only deploy one front air bag, depending on the severity of a collision and whether the front passenger seat is occupied. Information necessary to service the system safely is included in the SR and SB section of this Service Manual.

#### **WARNING:**

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SR section.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

#### PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

#### **WARNING:**

- When working near the Airbag Diagnosis Sensor Unit or other Airbag System sensors with the Ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the Ignition OFF, disconnect the battery, and wait at least three minutes before performing any service.

#### Precaution for Liquid Gasket

INFOID:000000009135561

#### REMOVAL OF LIQUID GASKET

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

**Tool number** : KV10111100 (J-37228)

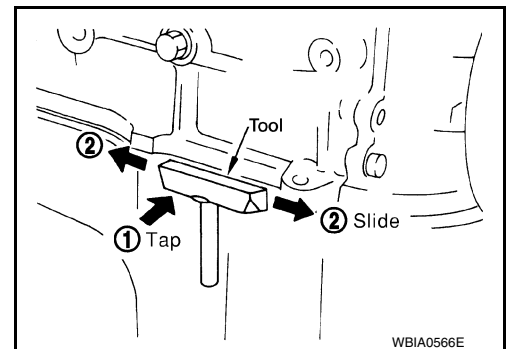
#### **CAUTION:**

**Be careful not to damage the mating surfaces.**

- Tap (1) Tool to insert it, and then slide it (2) by tapping on the side as shown.
- In areas where Tool is difficult to use, use plastic hammer to lightly tap the parts, to remove it.

#### **CAUTION:**

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



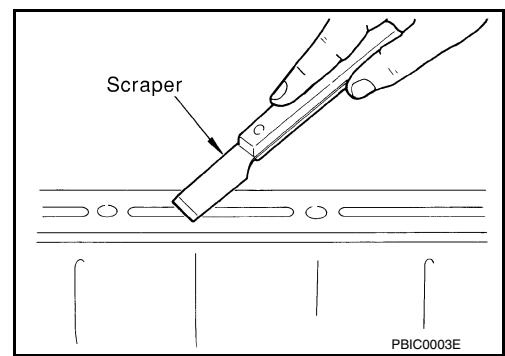
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#### LIQUID GASKET APPLICATION PROCEDURE

# PRECAUTIONS

## < PRECAUTION >

1. Remove old liquid gasket adhering to the liquid gasket application surface and the mating surface, using Scraper.
  - Remove liquid gasket completely from the groove of the liquid gasket application surface, bolts, and bolt holes.
2. Thoroughly clean the mating surfaces and remove adhering moisture, grease and foreign materials.

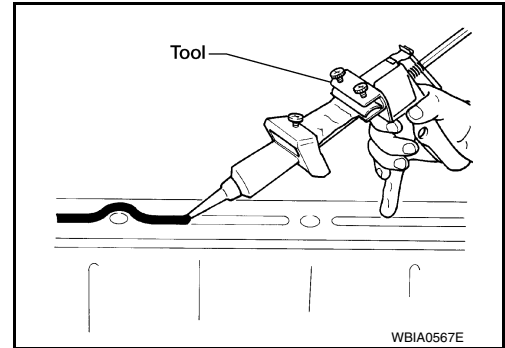


3. Attach liquid gasket tube to Tool.

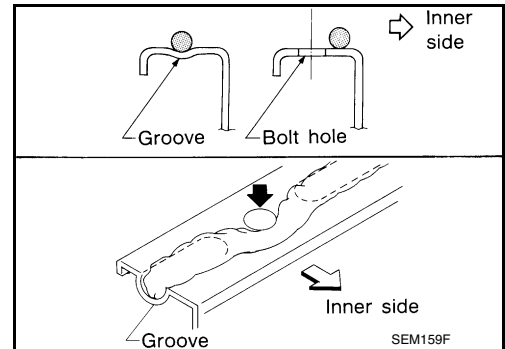
**Tool number** : WS39930000 ( — )

**Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-22, "Recommended Chemical Products and Sealants"](#).**

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



- As for the bolt holes, normally apply liquid 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 liquid gasket application, install the mating component.
- If liquid gasket protrudes, wipe it off immediately.
- Do not retighten nuts or bolts after the installation.
- After 30 minutes or more have passed from the installation, fill engine oil and engine coolant.



### **CAUTION:**

**If there are more specific instructions in the procedures contained in this manual concerning liquid gasket application, observe them.**

# PREPARATION

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## PREPARATION

### PREPARATION

#### Special Service Tool

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

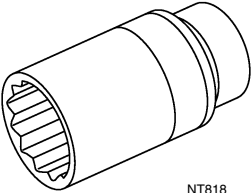
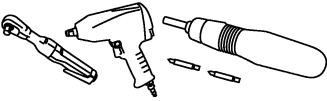
Tool number (Kent-Moore No.) Tool name	Description
ST25051001 (J-25695-1) Oil pressure gauge	Measuring oil pressure <b>Maximum measuring range: 2,452 kPa (25 kg-cm<sup>2</sup>, 356 psi)</b>
ST25052000 (J-25695-2) Hose	Adapting oil pressure gauge to upper oil pan
KV10115801 (J-38956) Oil filter wrench	Removing and installing oil filter
KV10111100 (J-37228) Seal cutter	Removing steel oil pan and rear timing chain case
WS39930000 ( — ) Tube presser	Pressing the tube of liquid gasket

#### Commercial Service Tool

INFOID:000000009135563

# PREPARATION

## < PREPARATION >

Tool name	Description
<p>Deep socket</p>  <p>NT818</p>	<p>Removing and installing oil pressure switch Deep socket 26 mm, 3/8 drive</p>
<p>Power tools</p>  <p>PIIB1407E</p>	<p>Loosening nuts, screws and bolts</p>

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# LUBRICATION SYSTEM

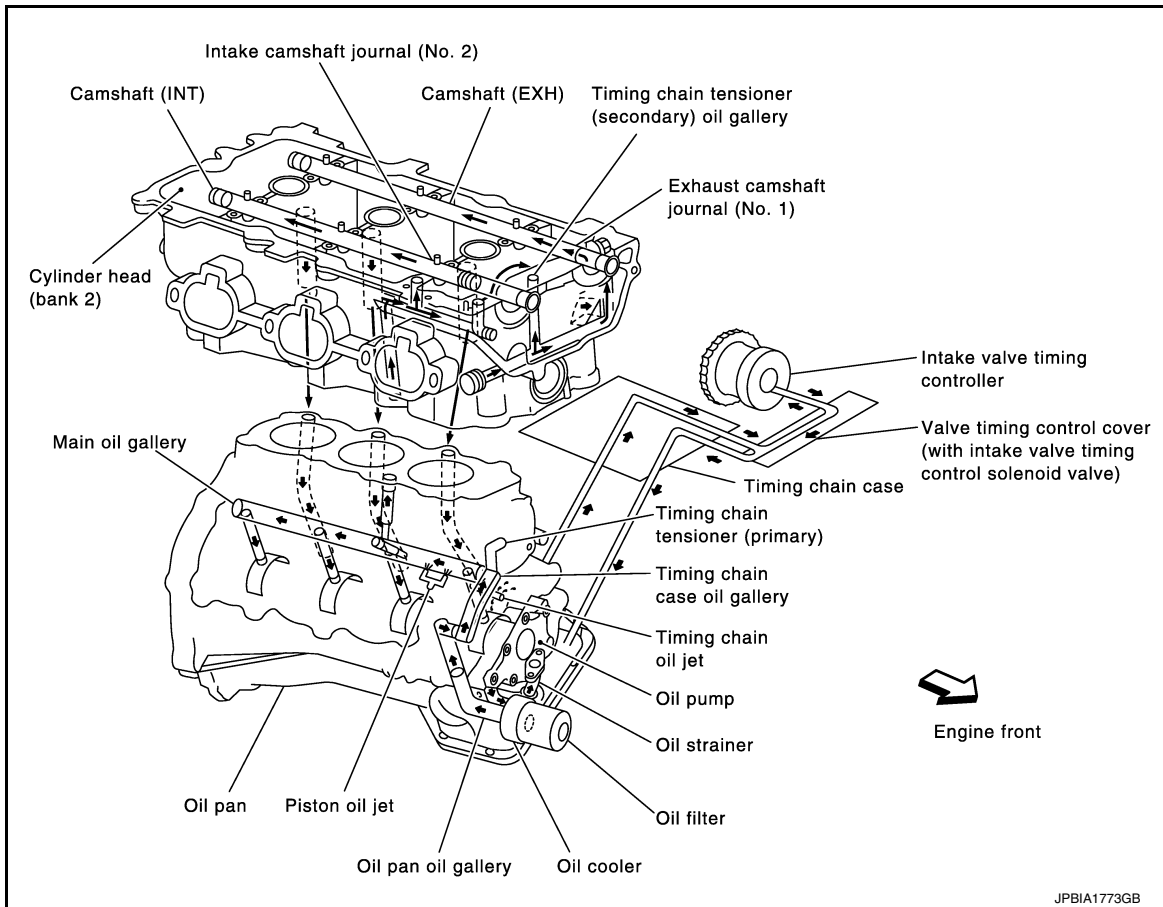
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## SYSTEM DESCRIPTION

### LUBRICATION SYSTEM

#### Lubrication Circuit

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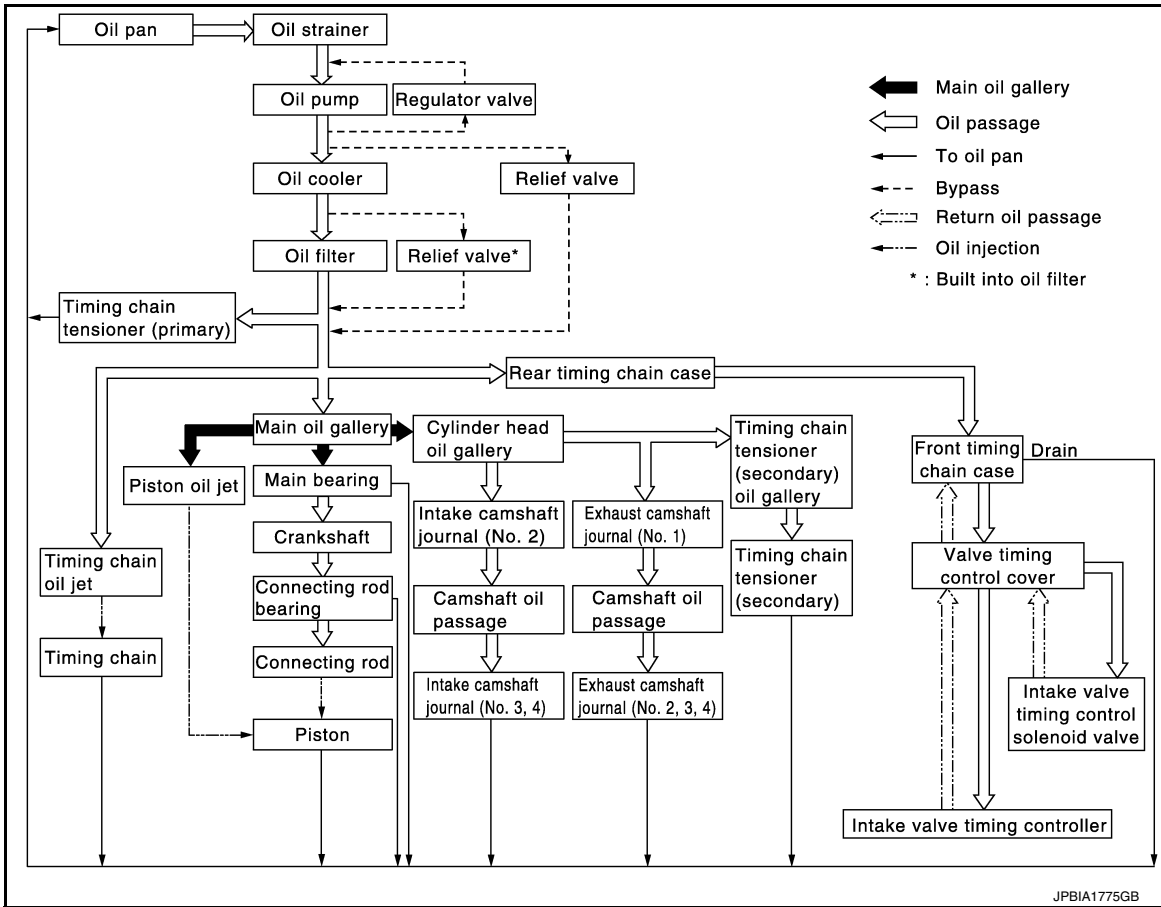


# LUBRICATION SYSTEM

< SYSTEM DESCRIPTION >

## Schematic

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# ENGINE OIL

< PERIODIC MAINTENANCE >

## PERIODIC MAINTENANCE

### ENGINE OIL

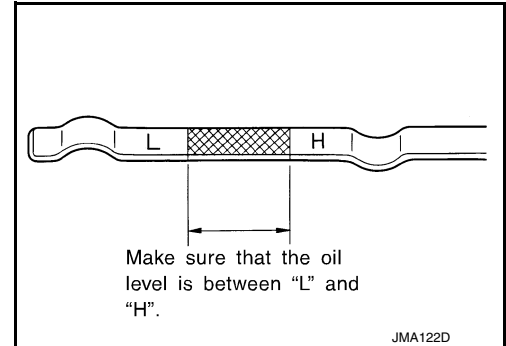
#### Inspection

INFOID:000000009135566

#### ENGINE OIL LEVEL

##### NOTE:

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



#### ENGINE OIL APPEARANCE

- Check engine oil for white milky appearance or excessive contamination.
- If engine oil becomes milky, it is highly probable that it is contaminated with engine coolant. Repair or replace damaged parts.

#### ENGINE OIL LEAKS

Check for engine oil leaks around the following areas:

- Oil pan
- Oil pan drain plug
- Oil pressure switch
- Oil filter
- Oil cooler
- IVT cover
- Front cover
- Mating surface between cylinder block and cylinder head
- Mating surface between cylinder head and rocker cover
- Crank oil seal (front and rear)

#### ENGINE OIL PRESSURE CHECK

##### WARNING:

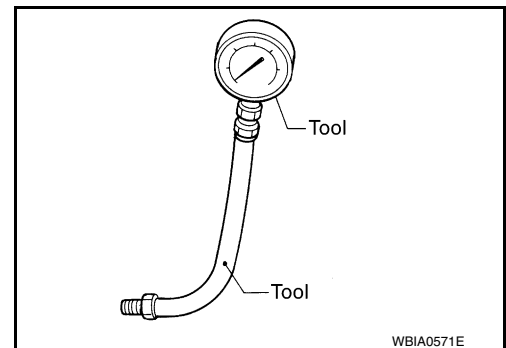
- **Be careful not to burn yourself, as engine oil may be hot.**
- **Put the CVT shift selector in the Park "P" position.**

1. Check the engine oil level. Refer to OIL LEVEL.
2. Remove engine under cover. Refer to [EXT-16. "Exploded View"](#).
3. Disconnect oil pressure switch harness connector at the oil pressure switch. Remove oil pressure switch using suitable tool and install Tools.

##### CAUTION:

**Do not drop or shock oil pressure switch.**

**Tool numbers** : ST25051001 (J-25695-1)  
: ST25052000 (J-25695-2)



4. Start the engine and warm it up to normal operating temperature.
5. Check engine oil pressure with engine running under no-load, using Tool.  
**If difference is extreme, check engine oil passages and oil pump for engine oil leaks.**



# ENGINE OIL

## < PERIODIC MAINTENANCE >

6. After the inspections, install the oil pressure switch using suitable tool as follows:
  - a. Remove the old sealant adhering to oil pressure switch and engine.
  - b. Apply thread sealant and tighten the oil pressure switch to specification.  
**Use Genuine High Performance Thread Sealant, or equivalent. Refer to [GI-22, "Recommended Chemical Products and Sealants"](#).**

**Oil pressure switch** : [EM-36, "Exploded View"](#)

- c. After warming up engine, make sure there are no engine oil leaks.
7. Install engine under cover. Refer to [EXT-16, "Exploded View"](#).

## Changing Engine Oil

INFOID:000000009135567

### **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. Position the vehicle so it is level on the hoist.
2. Warm up the engine and check for engine oil leaks.
3. Stop engine and wait for 10 minutes.
4. Remove the oil pan drain plug and oil filler cap.
5. Drain the engine oil.
6. Install the oil pan drain plug with a new washer and refill the engine with new engine oil.

**Oil specification and viscosity** : For North America, refer to [MA-15, "FOR USA AND CANADA : Engine Oil Recommendation"](#). For Mexico, refer to [MA-17, "FOR MEXICO : SAE Viscosity Number"](#).

**Oil pan drain plug** : 34.3 N·m (3.5 kg-m, 25 ft-lb)

### **CAUTION:**

- **Be sure to clean the oil pan drain plug and install with a new washer.**
  - **The refill capacity depends on the engine oil temperature and drain time. Use the specifications for reference only. Always use the dipstick to determine when the proper amount of engine oil is in the engine.**
7. Warm up the engine and check around the oil pan drain plug and oil filter for oil leaks.
  8. Stop engine and wait for 10 minutes.
  9. Check the engine oil level using the dipstick.

### **CAUTION:**

**Do not overfill the engine with engine oil.**

# OIL FILTER

< PERIODIC MAINTENANCE >

## OIL FILTER

### Removal and Installation

INFOID:000000009135568

#### REMOVAL

1. Drain engine oil. Refer to [LU-9, "Changing Engine Oil"](#).
2. Remove front fender protector side cover RH. Refer to [EXT-28, "FENDER PROTECTOR : Exploded View"](#).
3. Remove the oil filter using Tool (A) as shown.

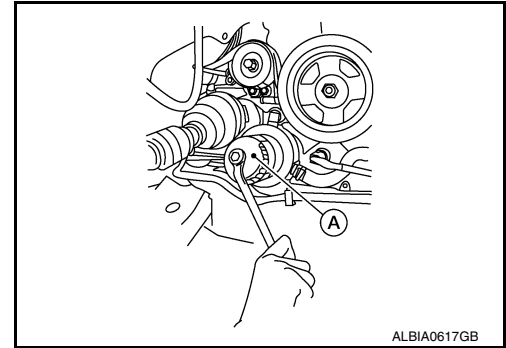
**Tool number : KV10115801 (J-38956)**

#### **WARNING:**

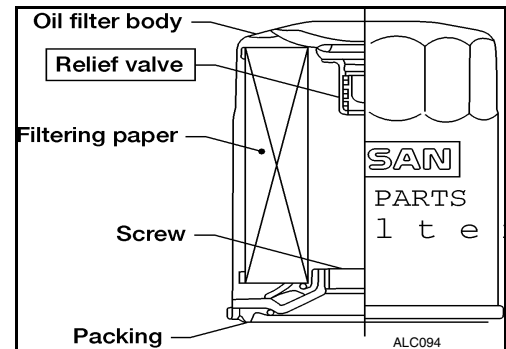
Be careful not to burn yourself, as the engine oil may be hot.

#### **CAUTION:**

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



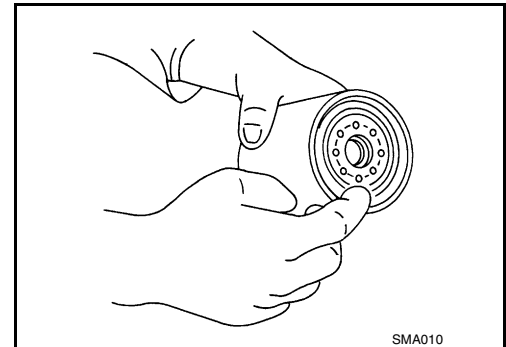
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#### INSTALLATION

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



SMA010

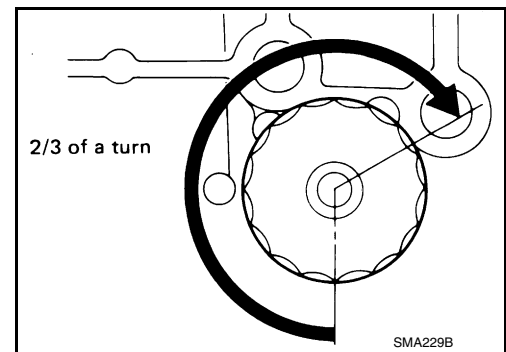
## OIL FILTER

### < PERIODIC MAINTENANCE >

3. Screw the oil filter manually until it touches the installation surface, then tighten it by turning another 2/3 turn or tighten to specification using Tool.

**Oil filter** : 18.0 N·m (1.8 kg-m, 13 ft-lb)

**Tool number** : KV10115801 (J-38956)



4. Refill the engine with new engine oil. Refer to [LU-9, "Changing Engine Oil"](#).
5. Check the engine oil level and add engine oil as necessary. Refer to [LU-8, "Inspection"](#).
6. After warming up the engine, check for engine oil leaks.
7. Install front fender protector side cover RH. Refer to [EXT-28, "FENDER PROTECTOR : Exploded View"](#).

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# OIL PUMP

< REMOVAL AND INSTALLATION >

## REMOVAL AND INSTALLATION

### OIL PUMP

#### Removal and Installation

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#### REMOVAL

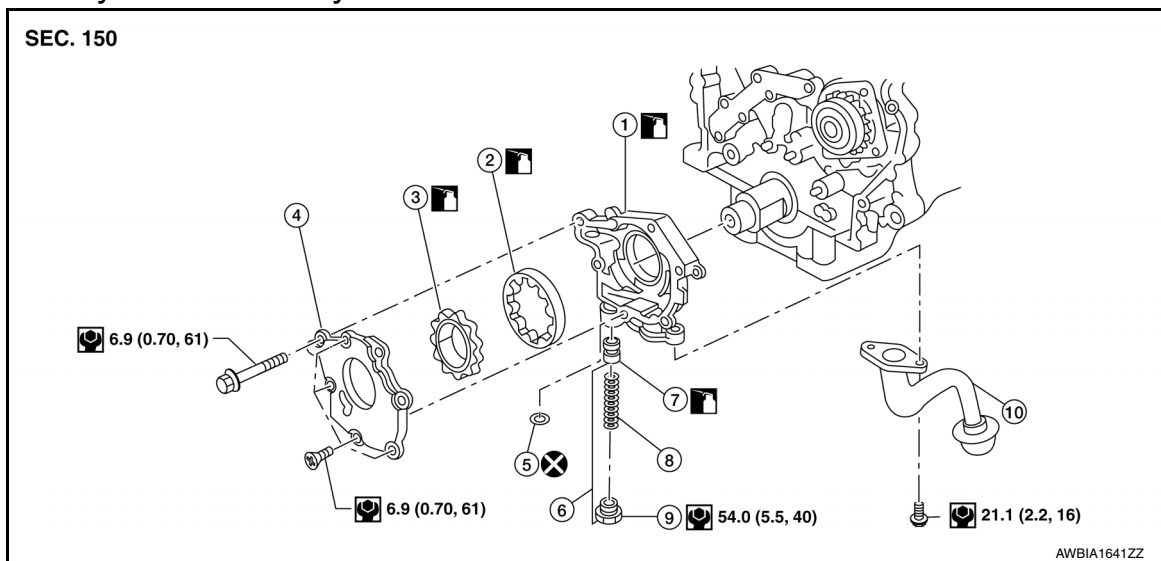
1. Remove the engine from the vehicle. Refer to [EM-102. "FWD : Removal and Installation"](#) (FWD) or [EM-107. "AWD : Removal and Installation"](#) (AWD).
2. Remove the upper oil pan. Refer to [EM-37. "Removal and Installation \(Upper Oil Pan\)"](#).
3. Remove the timing chain. Refer to [EM-62. "Removal and Installation"](#).
4. Remove oil pump assembly.

#### INSTALLATION

Installation is in the reverse order of removal.

#### Disassembly and Assembly

INFOID:000000009135570



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

#### CAUTION:

Before assembly, apply new engine oil to the parts as shown.

#### DISASSEMBLY

1. Remove the oil pump cover.
2. Remove inner rotor and outer rotor from oil pump housing.

#### CAUTION:

The outer rotor has directional vanes in relation to the rotation of the oil pump shaft. Note the outer rotor vane direction for assembly.

3. Remove oil strainer from oil pump housing.
4. After removing regulator plug, remove spring and regulator valve.

#### INSPECTION AFTER DISASSEMBLY

Clearance of Oil Pump Parts

# OIL PUMP

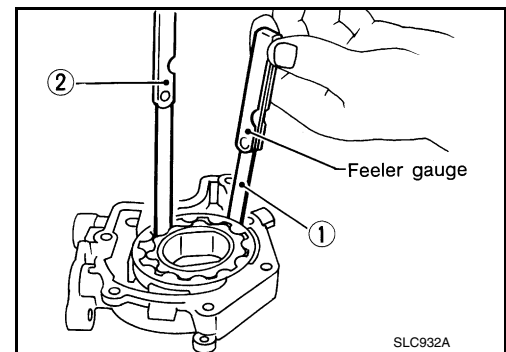
## < REMOVAL AND INSTALLATION >

- Measure clearance with feeler gauge.
- Clearance between outer rotor and oil pump body (position 1).

**Standard** : [LU-17, "Oil Pump"](#)

- Tip clearance between inner rotor and outer rotor (position 2).

**Standard** : [LU-17, "Oil Pump"](#)

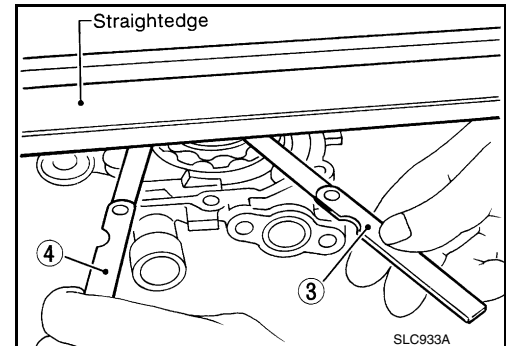


- Measure clearance with feeler gauge and straightedge.
- Side clearance between inner rotor and oil pump body (position 3).

**Standard** : [LU-17, "Oil Pump"](#)

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

**Standard** : [LU-17, "Oil Pump"](#)

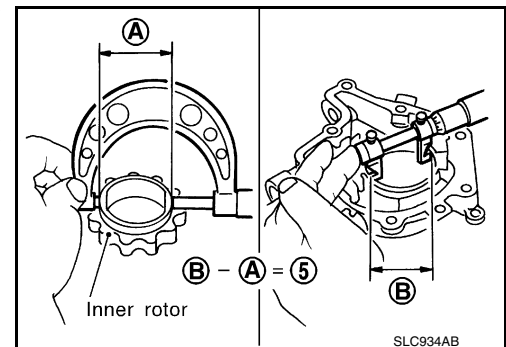


- Calculate the clearance between inner rotor and oil pump body as follows:

1. Measure the outer diameter of protruded portion of inner rotor (position A).
2. 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)

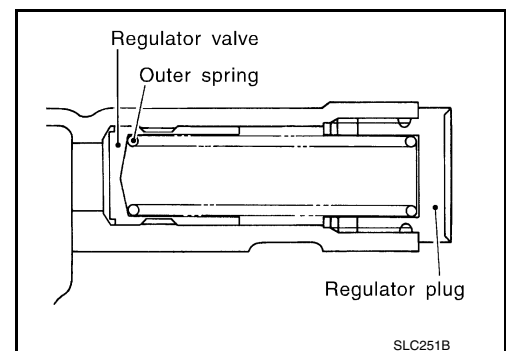
**Standard** : [LU-17, "Oil Pump"](#)

3. If out of specifications, replace oil pump assembly.



## 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 oil pump assembly.**



## Regulator Valve Clearance

# OIL PUMP

## < REMOVAL AND INSTALLATION >

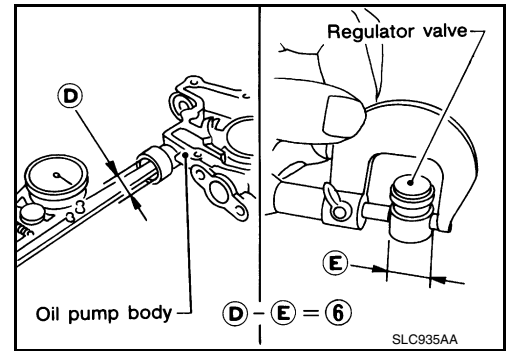
(Clearance 6) = D (Valve hole diameter) – E (Outer diameter of valve)

**Standard** : [LU-17, "Regulator Valve"](#)

If it exceeds the standard, replace the oil pump assembly.

### **CAUTION:**

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



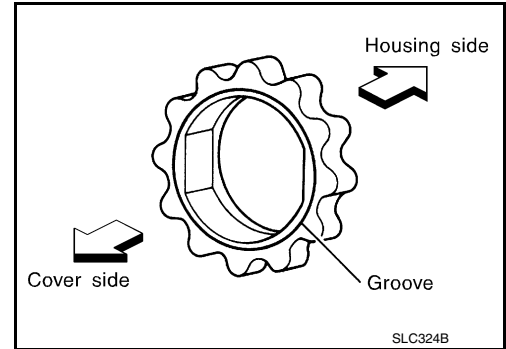
## Assembly

Assembly is in the reverse order of disassembly.

- Assemble the outer rotor in the correct vane orientation to rotation as noted during disassembly and the inner rotor with the groove on the oil pump cover side.

### **CAUTION:**

- Do not reuse O-ring.
- Before assembly apply new engine oil to the parts as specified.



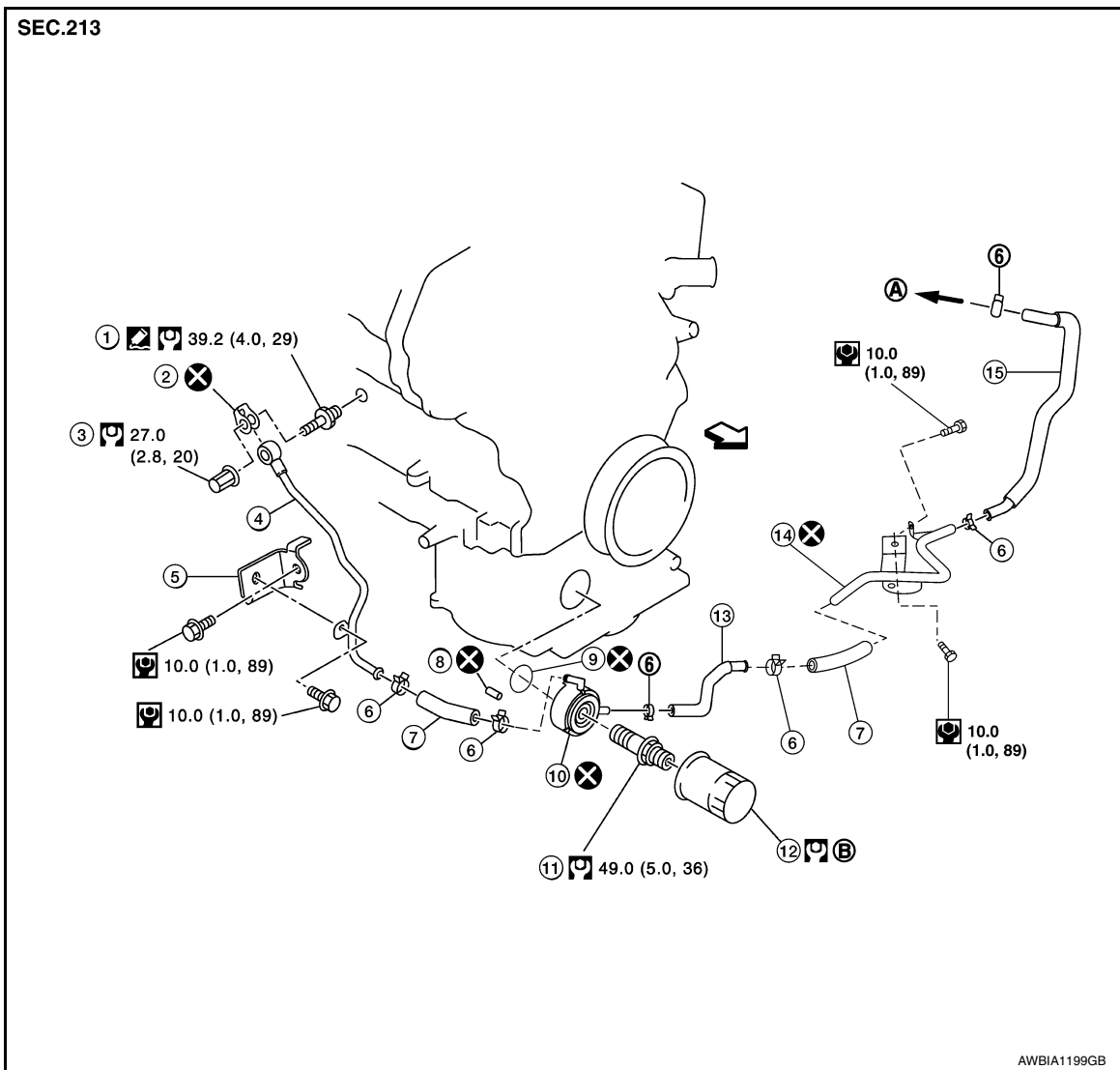
# OIL COOLER

< REMOVAL AND INSTALLATION >

## OIL COOLER


### Removal and Installation

INFOID:000000009135571



- |                       |   |                      |
|-----------------------|---|----------------------|
| 1. Connector bolt     | 2. Copper gasket  | 3. Water drain plug  |
| 4. Water pipe         | 5. Bracket  | 6. Clamp             |
| 7. Water hose         | 8. Relief valve   | 9. Oil cooler O-Ring |
| 10. Oil cooler        | 11. Connector bolt  | 12. Oil filter       |
| 13. Water hose        | 14. Water pipe  | 15. Water hose       |
| A. To water connector | B. Refer to <a href="#">LU-10. "Removal and Installation"</a> |                      |

← : Engine front

 Sealing point

#### WARNING:

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

#### CAUTION:

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

#### NOTE:

When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

# OIL COOLER

## < REMOVAL AND INSTALLATION >

---

### REMOVAL

1. Remove the engine under cover. Refer to [EXT-16, "Exploded View"](#).
2. Remove the RH wheel and tire using a power tool. Refer to [WT-53, "Adjustment"](#).
3. Remove the front fender protector side cover RH. Refer to [EXT-28, "FENDER PROTECTOR : Exploded View"](#).
4. Drain engine coolant. Refer to [CO-11, "Changing Engine Coolant"](#).  
**CAUTION:**  
**Do not spill engine coolant on the drive belt.**
5. Disconnect water hoses from oil cooler.
6. Remove the oil filter. Refer to [LU-10, "Removal and Installation"](#).
7. Remove oil cooler.

### INSPECTION AFTER REMOVAL

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

#### 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.

#### **CAUTION:**

- **Do not reuse O-ring.**
- **Do not reuse copper gasket.**
- **When installing the oil cooler, align the oil cooler slot with the stopper of the oil pan.**

### INSPECTION AFTER INSTALLATION

Start engine and check for engine oil and engine coolant leaks. Repair as necessary.



# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

### SERVICE DATA AND SPECIFICATIONS (SDS)

#### Oil Pressure

INFOID:000000009135572

Unit: kPa (kg/cm<sup>2</sup>, psi)

Engine speed	Approximate discharge engine oil pressure
600 rpm	98 or higher (1.0, 14)
2,000 rpm	294 (3.0, 42.6)
6,000 rpm	392 (4.0, 56.8)

#### Regulator Valve

INFOID:000000009135573

Unit: mm (in)

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

#### Oil Pump

INFOID:000000009135574

Unit: mm (in)

Oil pump body to outer rotor radial clearance	0.114 - 0.260 (0.0045 - 0.0102)
Inner rotor to outer rotor tip clearance	0.180 or below (0.0071)
Oil pump body to inner rotor side clearance	0.030 - 0.070 (0.0012 - 0.0028)
Oil pump body to outer rotor side clearance	0.050 - 0.110 (0.0020 - 0.0043)
Socket to spigot joint of oil pump body clearance	0.045 - 0.091 (0.0018 - 0.0036)

#### Oil Capacity

INFOID:000000009135575

Unit: ℓ (US qt, Imp qt)

Drain and refill	With engine oil filter change	Approximately 4.8 (5-1/8, 4-1/4)
	Without engine oil filter change	Approximately 4.5 (4-3/4, 4)
Dry engine (engine overhaul)		Approximately 5.1 (5-3/8, 4-1/2)