

A

# SECTION LU

## ENGINE LUBRICATION SYSTEM

C

### CONTENTS

D

E

<b>SERVICE INFORMATION</b> .....	2		F
<b>PRECAUTIONS</b> .....	2	Inspection .....	8
Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TEN- SIONER" .....	2	Changing Engine Oil .....	9
Precaution for Liquid Gasket .....	2	<b>OIL FILTER</b> .....	10
<b>PREPARATION</b> .....	4	Removal and Installation .....	10
Special Service Tool .....	4	<b>OIL PUMP</b> .....	12
Commercial Service Tool .....	4	Removal and Installation .....	12
<b>LUBRICATION SYSTEM</b> .....	6	Disassembly and Assembly .....	13
Lubrication Circuit .....	6	<b>OIL COOLER</b> .....	16
Schematic .....	7	Removal and Installation .....	16
<b>ENGINE OIL</b> .....	8	<b>SERVICE DATA AND SPECIFICATIONS (SDS)</b> .....	18
		Standard and Limit .....	18

G

H

I

J

K

L

M

N

O

P

# PRECAUTIONS

< SERVICE INFORMATION >

## SERVICE INFORMATION

### PRECAUTIONS

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

INFOID:000000001717129

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 seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the SRS 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 SRS 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.

#### Precaution for Liquid Gasket

INFOID:000000001717130

#### REMOVAL OF LIQUID GASKET SEALING

- After removing the bolts and nuts, separate the mating surface and remove the sealant using Tool.

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

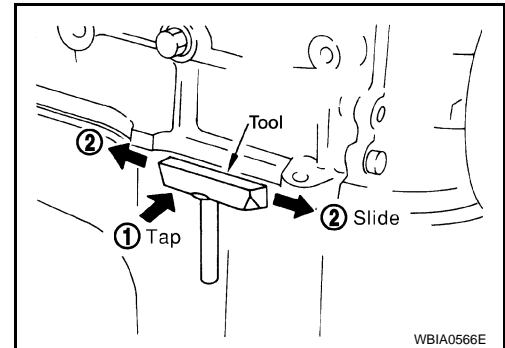
#### **CAUTION:**

**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 to slide (2) it in the areas where the sealant is applied.

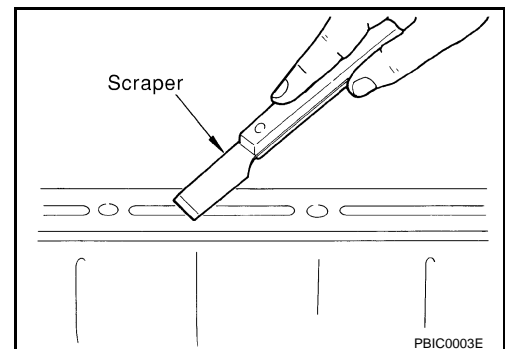
#### **CAUTION:**

**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

1. Using a scraper, remove the old sealant adhering to the mating surface.
  - Remove the sealant completely from the groove, bolts, and bolt holes.
2. Thoroughly clean the mating surface removing any adhering moisture, grease and foreign material.



3. Attach the sealant tube to the Tool.

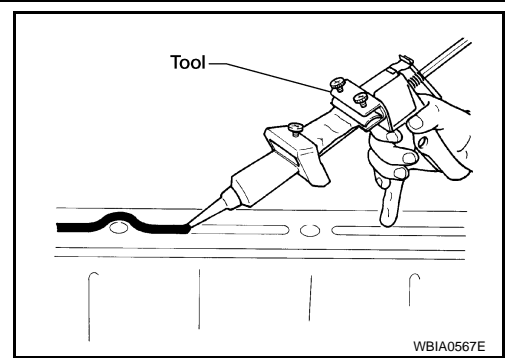
**Tool number** : WS39930000 ( — )

- Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-42](#).

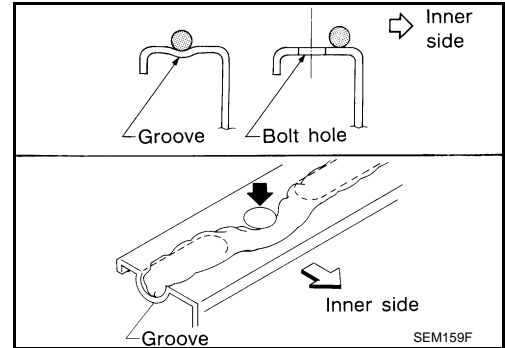
# PRECAUTIONS

## < SERVICE INFORMATION >

4. Apply the sealant without breaks to the specified location with the specified dimensions using Tool.
  - 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. Occasionally, it should be applied outside the holes. Make sure to read the text of service manual.
- Within five minutes of 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 proper oil and coolant. Refer to [MA-11](#).



A

LU

C

D

E

F

G

H

I

J

K

L

M

N

O

P

# PREPARATION

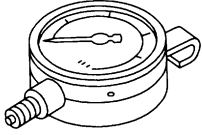
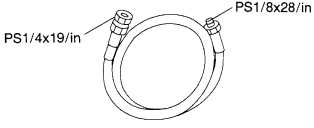

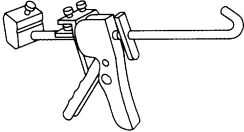
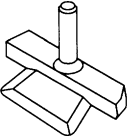
< SERVICE INFORMATION >

## PREPARATION

### Special Service Tool

INFOID:000000001717131

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

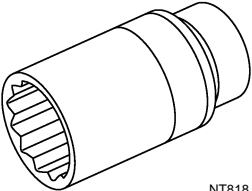
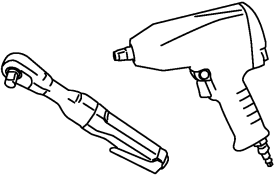
Tool number (Kent-Moore No.) Tool name	Description
ST25051001 (J-25695-1) Oil pressure gauge   <p style="text-align: center;">NT050</p>	Measuring oil pressure <b>Maximum measuring range: 2,452 kPa (25 kg-cm<sup>2</sup>, 356 psi)</b>
ST25052000 (J-25695-2) Hose   <p style="text-align: center;">S-NT559</p>	Adapting oil pressure gauge to upper oil pan
KV10115801 (J-38956) Oil filter wrench   <p style="text-align: center;">S-NT772</p>	Removing and installing oil filter
WS39930000 ( — ) Tube presser   <p style="text-align: center;">NT052</p>	Pressing the tube of liquid gasket
KV10111100 (J-37228) Seal cutter   <p style="text-align: center;">NT046</p>	Removing steel oil pan and rear timing chain case

### Commercial Service Tool

INFOID:000000001717132

# PREPARATION

## < SERVICE INFORMATION >

Tool name	Description
<p>Deep socket</p>  <p>NT818</p>	<p>Removing and installing oil pressure switch Deep socket size 26 mm, 3/8 drive</p>
<p>Power tools</p>  <p>PBIC0190E</p>	<p>Loosening nuts and bolts</p>

A

**LU**

C

D

E

F

G

H

I

J

K

L

M

N

O

P

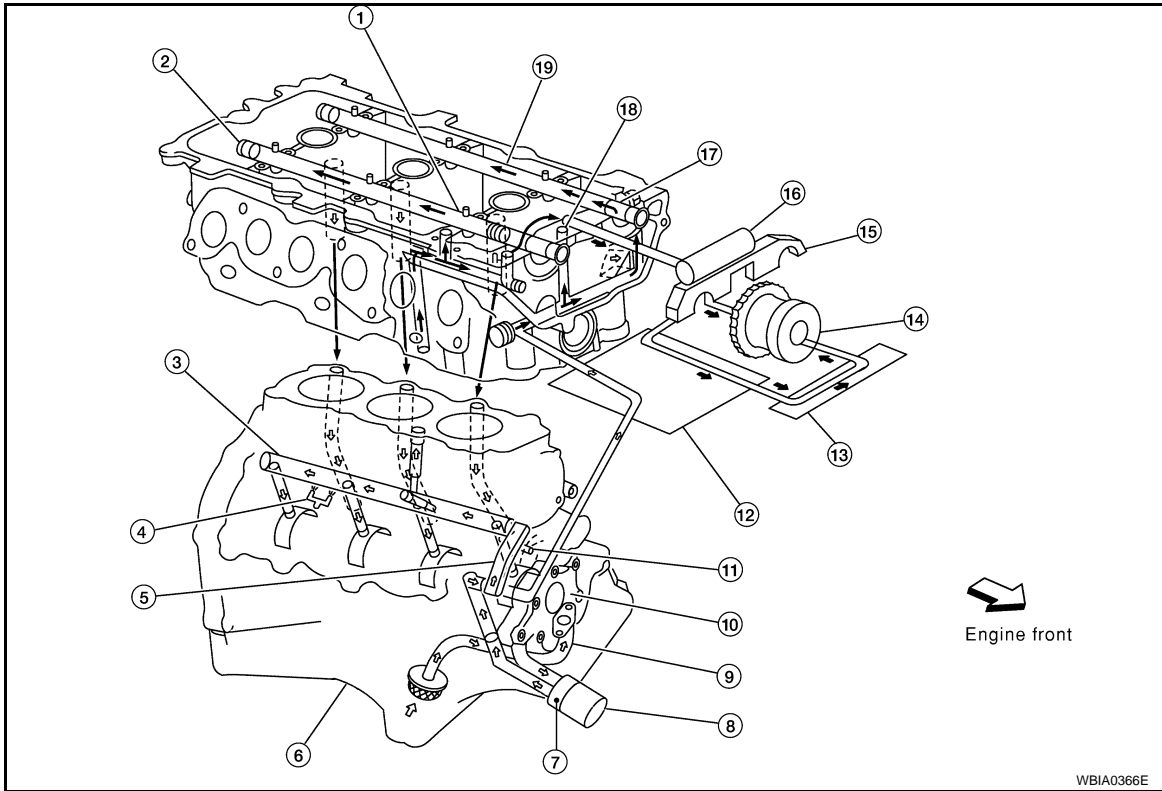
# LUBRICATION SYSTEM

< SERVICE INFORMATION >

## LUBRICATION SYSTEM

### Lubrication Circuit

INFOID:000000001717133



WBIA0366E

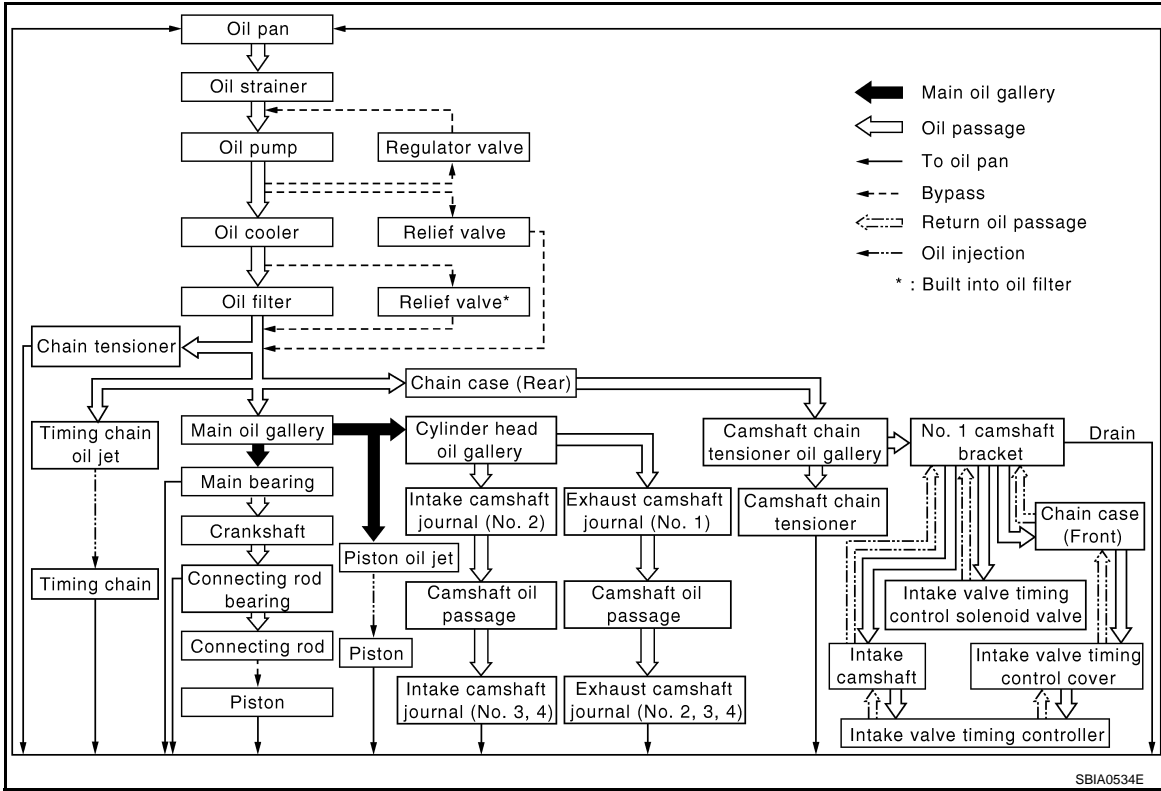
- |                                    |                                      |  |
|------------------------------------|--------------------------------------|--|
| 1. Intake camshaft journal (No. 2) | 2. Intake camshaft                   | 3. Main oil gallery                      |
| 4. Piston oil jet                  | 5. Chain case oil gallery            | 6. Oil pan                               |
| 7. Oil cooler                      | 8. Oil filter                        | 9. Oil strainer                          |
| 10. Oil pump                       | 11. Timing chain oil jet             | 12. Chain case                           |
| 13. IVT control cover              | 14. IVT controller                   | 15. No. 1 camshaft bracket               |
| 16. IVT control solenoid valve     | 17. Exhaust camshaft journal (No. 1) | 18. Camshaft chain tensioner oil gallery |
| 19. Exhaust camshaft               |                                      |  |

# LUBRICATION SYSTEM

< SERVICE INFORMATION >

## Schematic

INFOID:000000001717134



A

LU

C

D

E

F

G

H

I

J

K

L

M

N

O

P

# ENGINE OIL

< SERVICE INFORMATION >

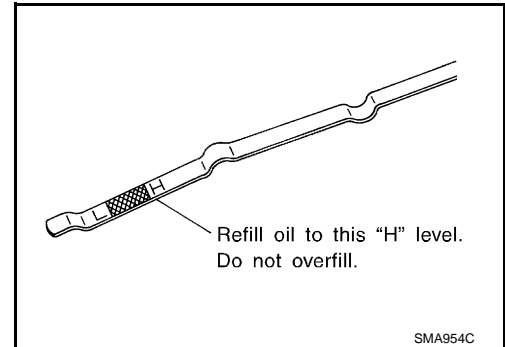
## ENGINE OIL

### Inspection

INFOID:000000001717135

#### ENGINE 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 five 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-11](#).



#### ENGINE OIL APPEARANCE

- Check engine oil for white milky 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 LEAKAGE

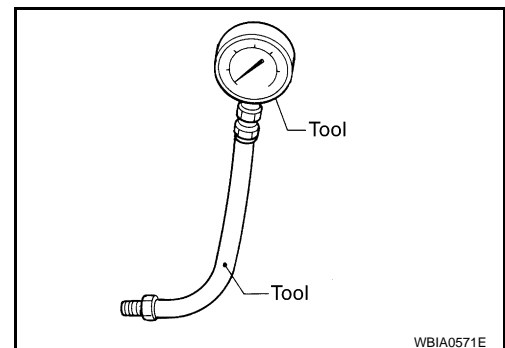
Check for oil leakage around the following areas:

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

#### ENGINE OIL PRESSURE CHECK

##### **WARNING:**

- **Be careful not to burn yourself, as engine oil may be hot.**
  - **Put the selector lever in the Park "P" position.**
1. Check the oil level. Refer to [LU-8, "Inspection"](#).
  2. Disconnect the oil pressure sensor harness connector.
  3. Remove the oil pressure sensor.
  4. Install Tools.



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



# ENGINE OIL

## < SERVICE INFORMATION >

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 <sup>2</sup> , 14 psi)
2,000 rpm	294 kPa (3.0 kg/cm <sup>2</sup> , 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 sensor as follows:
  - a. Remove the old sealant adhering to sensor and engine.
  - b. Apply thread sealant and tighten the oil pressure sensor to specification using Tool.
    - Use Genuine High Performance Thread Sealant, or equivalent. Refer to [GI-42](#).

**Oil pressure sensor : 14.8 N-m (1.5 kg-m, 11 ft-lb)**

## Changing Engine Oil

INFOID:000000001717136

**WARNING:**

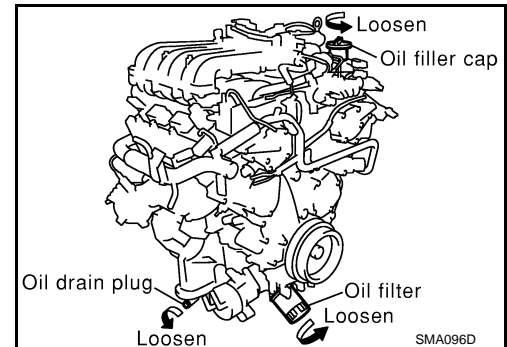
- Be careful not to burn yourself, as the engine oil is hot.
- Prolonged and repeated contact with used engine oil may cause skin cancer; try to avoid direct skin contact with used oil. If skin contact is made, wash thoroughly with soap or hand cleaner as soon as possible.

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 oil drain plug and oil filler cap.
5. Drain the engine oil.
6. Install the oil drain plug.

**Oil pan drain plug : Refer to [EM-29](#) .**

**CAUTION:**

- Clean the drain plug and install using a new washer.

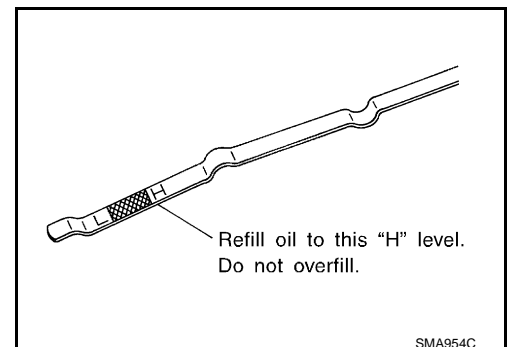


7. Refill the engine with new engine oil. Refer to [MA-11](#) .

**CAUTION:**

- The refill oil 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.

8. Warm up the engine and check the oil drain plug and oil filter for oil leaks.
9. Stop engine and wait at least 10 minutes.
10. Check engine oil level. Refer to [LU-8, "Inspection"](#) .



# OIL FILTER

< SERVICE INFORMATION >

## OIL FILTER

### Removal and Installation

INFOID:000000001717137

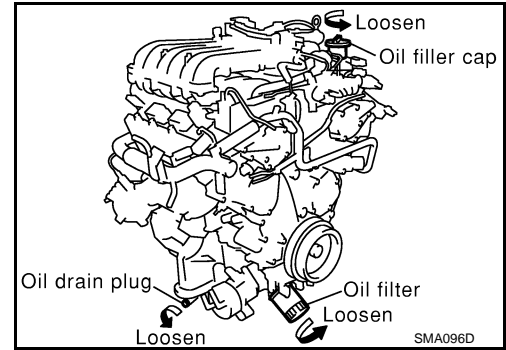
#### REMOVAL

1. Remove the RH splash shield.
2. Remove the oil filter using Tool.

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

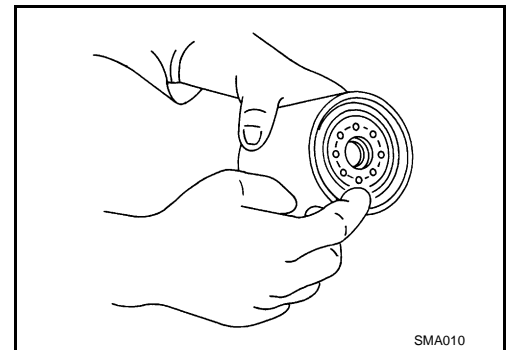
#### CAUTION:

- The oil filter is equipped with a relief valve. Use a Genuine NISSAN oil filter.
- Be careful not to get burned when the engine and engine oil are hot.
- When removing the oil filter, use a shop cloth to absorb any oil leaks or spills.
- 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

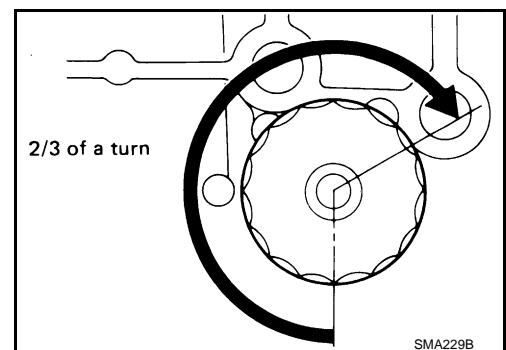
1. Remove any foreign material adhering to the oil filter installation surface on the oil cooler.
2. Apply engine oil to the oil seal contact surface of the new oil filter as shown.



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

**Oil filter : 17.6 N·m (1.8 kg-m, 13 lb-ft)**

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

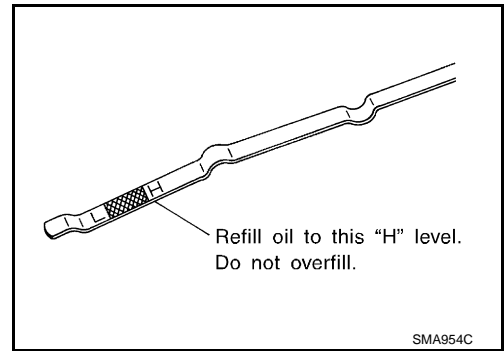


4. After warming up the engine, check for engine oil leaks.
5. Install the RH splash shield.

# OIL FILTER

## < SERVICE INFORMATION >

6. Check engine oil level and add engine oil as necessary. Refer to [LU-8, "Inspection"](#).



A

LU

C

D

E

F

G

H

I

J

K

L

M

N

O

P

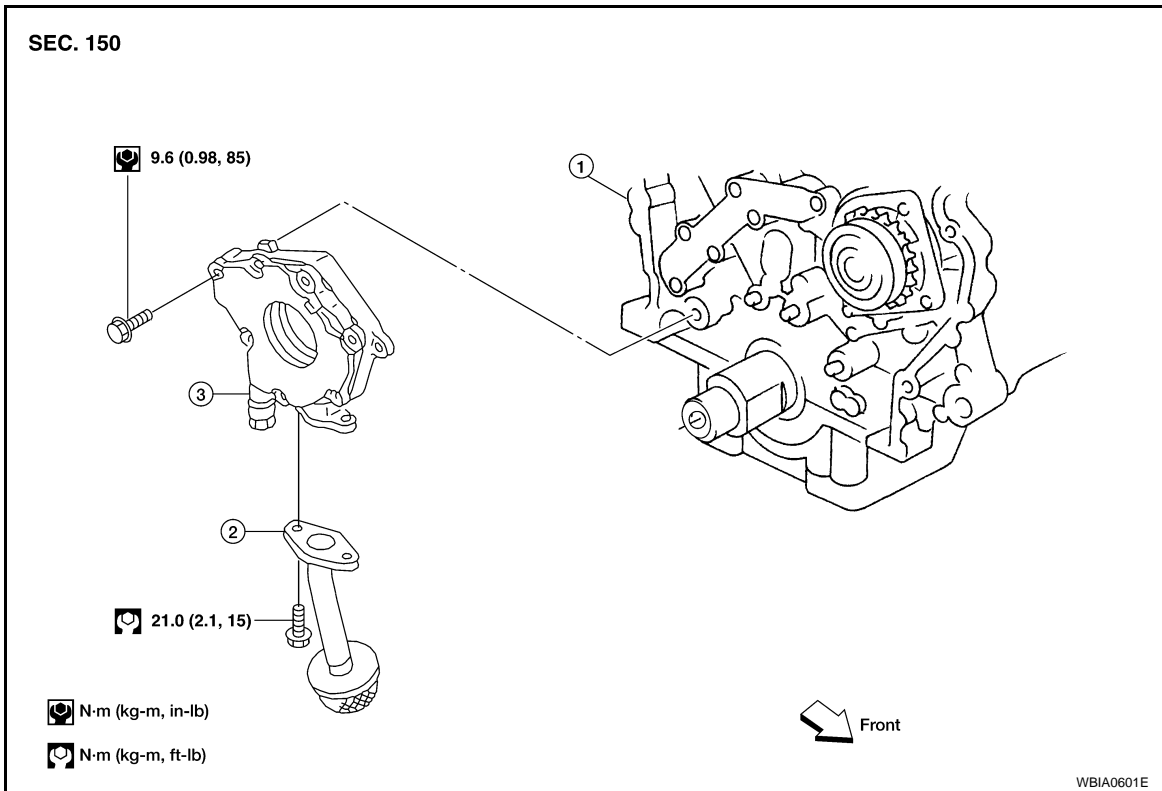
# OIL PUMP

< SERVICE INFORMATION >

## OIL PUMP

### Removal and Installation

INFOID:000000001717138



1. Cylinder block

2. Oil strainer

3. Oil pump

### REMOVAL

1. Remove the engine. Refer to [EM-110. "Removal and Installation"](#).
2. Remove the timing chain. Refer to [EM-54. "Removal and Installation"](#).
3. Remove the oil strainer.
4. Remove the oil pump.

### INSTALLATION

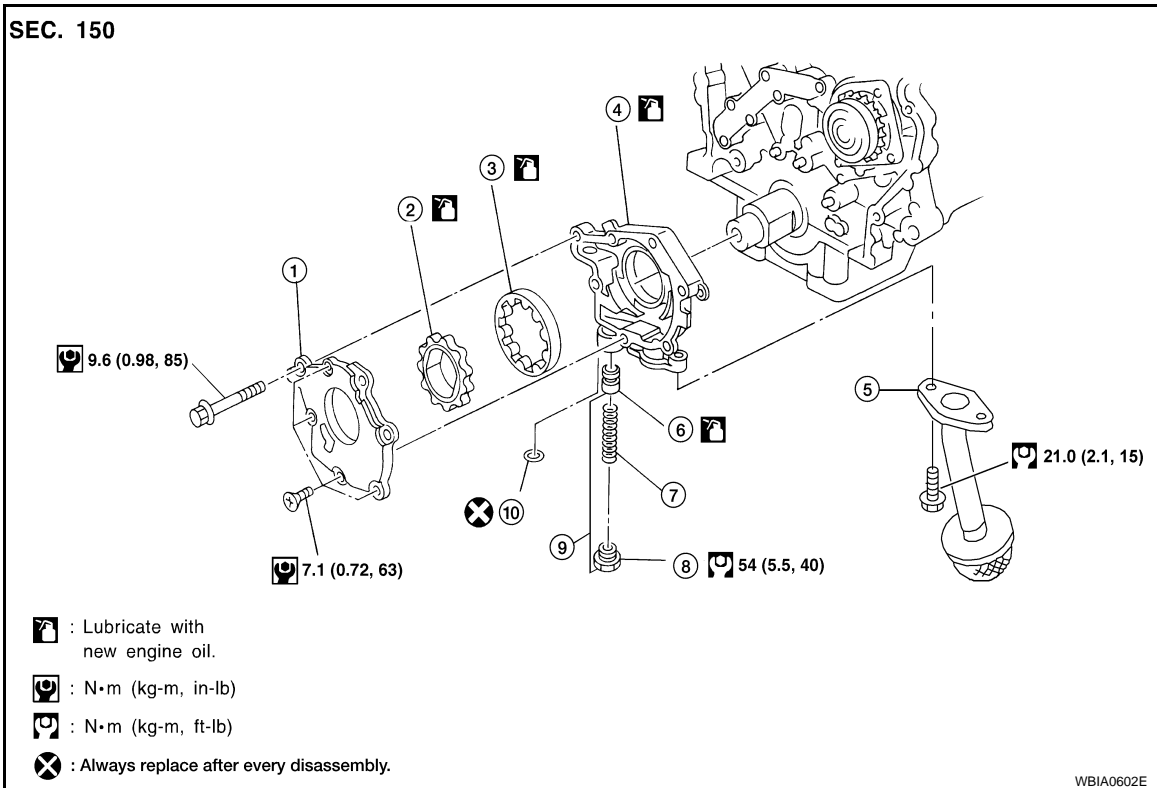
Installation is in the reverse order of removal.

# OIL PUMP

< SERVICE INFORMATION >

## Disassembly and Assembly

INFOID:000000001717139



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

### DISASSEMBLY

- Remove oil pump cover.
- Remove oil pump inner rotor and oil pump outer rotor from oil pump body.
- Remove the regulator valve plug, regulator valve spring and regulator valve.

### INSPECTION AFTER DISASSEMBLY

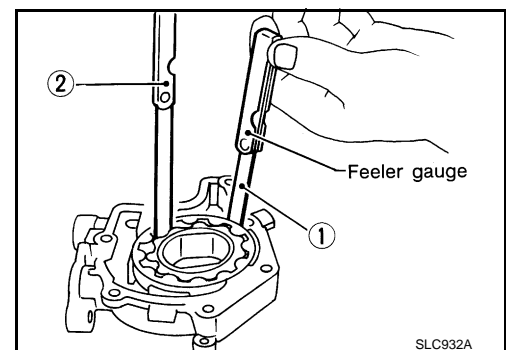
#### Clearance of Oil Pump Parts

- 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

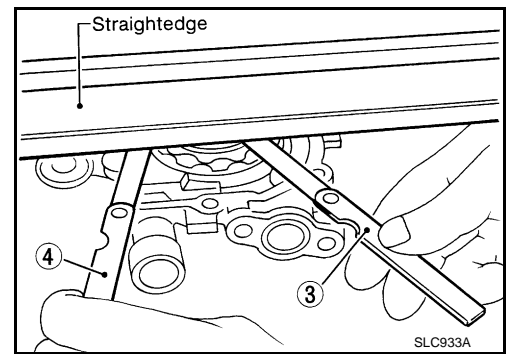
## < SERVICE INFORMATION >

- 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)**

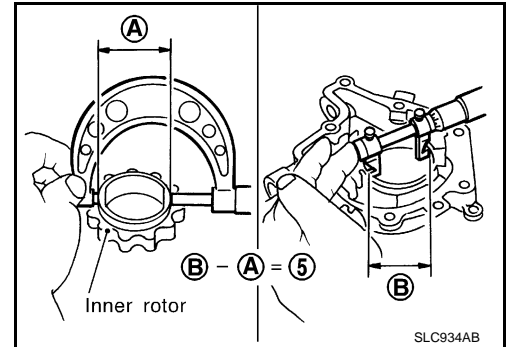
- Side clearance is between the outer rotor and the oil pump body (position 4).

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



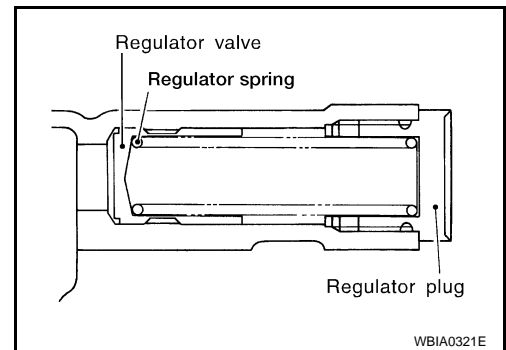
- Calculate the clearance between inner rotor and oil pump body as follows.
- Measure the outer diameter of protruded portion of inner rotor (position A).
- Measure the inner diameter of oil pump body with inside micrometer (position B).
- Clearance 5 = (inner diameter of oil pump body B) – (outer diameter 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 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.



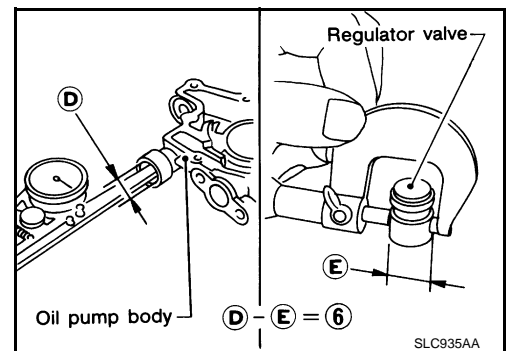
## Regulator Valve to Oil Pump Body Clearance

- 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.



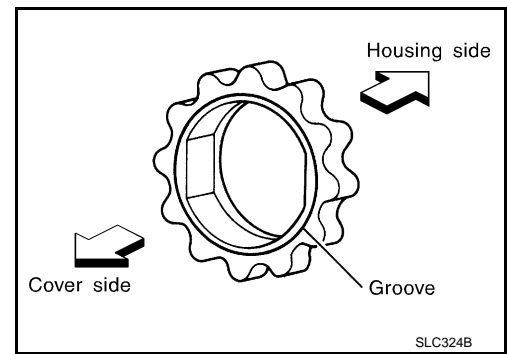
## ASSEMBLY

# OIL PUMP

## < SERVICE INFORMATION >

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.



A

LU

C

D

E

F

G

H

I

J

K

L

M

N

O

P

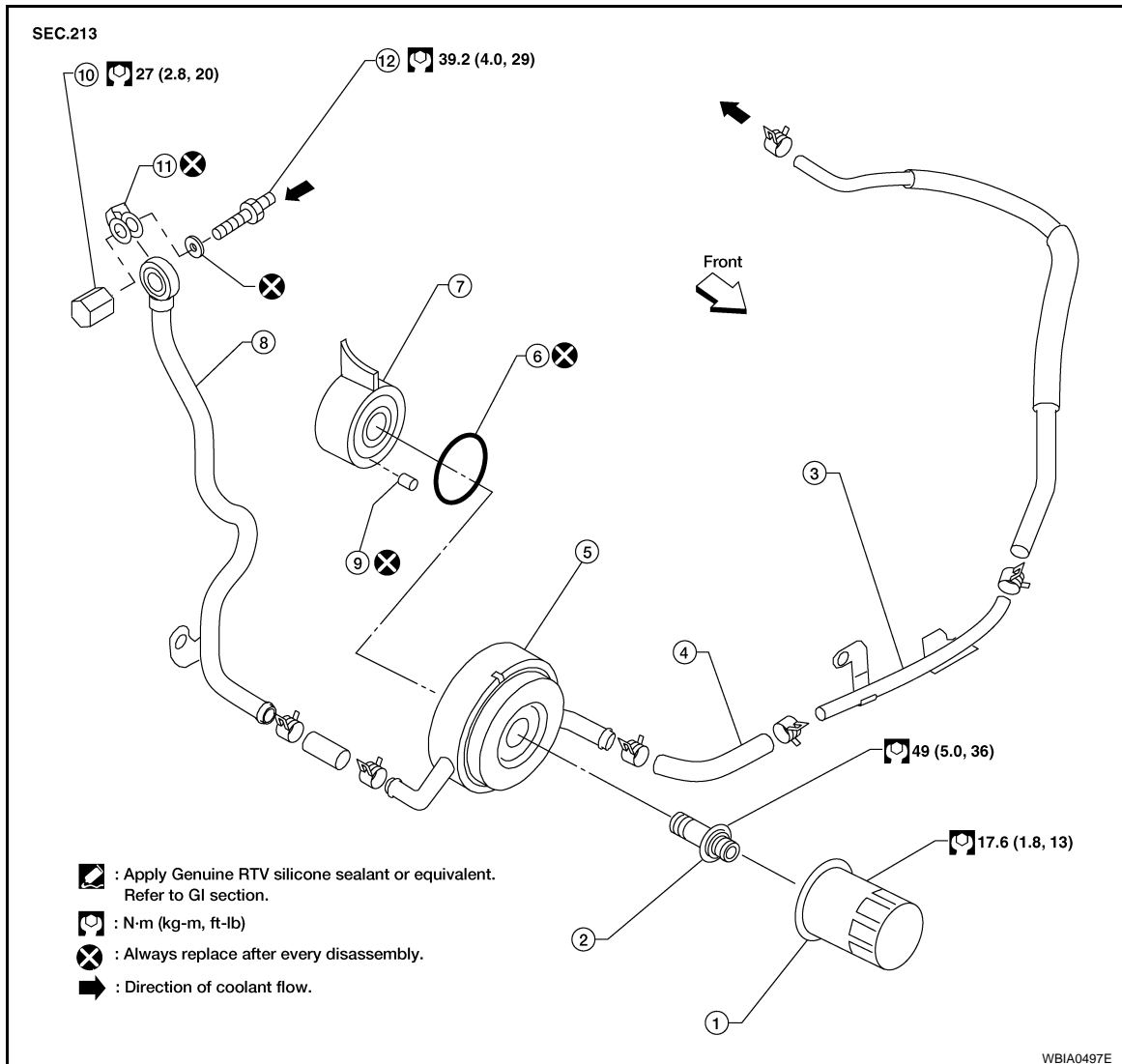
# OIL COOLER

< SERVICE INFORMATION >

## OIL COOLER

### Removal and Installation

INFOID:000000001717140



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

### REMOVAL

1. Drain the engine oil. Refer to [LU-9. "Changing Engine Oil"](#).
2. Drain the engine coolant. Refer to [CO-11. "Changing Engine Coolant"](#).
3. Remove the oil filter. Refer to [LU-10. "Removal and Installation"](#).
4. Remove the wheel and tire assembly using power tool.
5. Remove the splash shield.
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.

### INSPECTION AFTER REMOVAL



# OIL COOLER

## < SERVICE INFORMATION >

### Oil Cooler

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

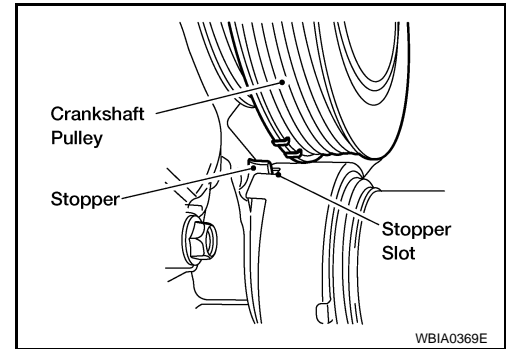
### Relief Valve

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 stopper slot with the stopper on the upper oil pan.
- Install the wheel and tire assembly. Refer to [WT-6. "Conventional Tire and Wheel"](#) for torque specification.



### INSPECTION AFTER INSTALLATION

1. Check level and add engine oil and engine coolant. Refer to [LU-8. "Inspection"](#) and [CO-10. "System Inspection"](#).
2. Start the engine and check that there are no leaks of engine oil or engine coolant.
3. Stop engine and wait for 10 minutes.
4. Check engine oil level and engine coolant level.

## SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE INFORMATION >

### SERVICE DATA AND SPECIFICATIONS (SDS)

#### Standard and Limit

INFOID:000000001717141

#### OIL PRESSURE

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

#### REGULATOR VALVE

Unit: mm (in)

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

#### OIL PUMP

Unit: mm (in)

Oil pump body to outer rotor radial clearance	0.114 - 0.200 (0.0045 - 0.0079)
Oil pump inner rotor to outer rotor tip clearance	Below 0.18 (0.0071)
Oil pump body to inner rotor axial clearance	0.030 - 0.070 (0.0012 - 0.0028)
Oil pump body to outer rotor axial clearance	0.050 - 0.110 (0.0020 - 0.0043)
Inner rotor outer diameter to oil pump body inner diameter clearance	0.045 - 0.091 (0.0018 - 0.0036)

#### OIL CAPACITY (APPROXIMATE)

Unit: ℓ (US qt, Imp qt)

Drain and refill	With oil filter change	4.0 (4 1/4, 3 1/2)
	Without oil filter change	3.7 (3 7/8, 3 1/4)
Dry engine (engine overhaul)		5.0 (5 1/4, 4 3/8)