

ENGINE LUBRICATION SYSTEM

CONTENTS

	<b>HR16DE</b>				
<b>PRECAUTION</b>	.....	2			
<b>PRECAUTIONS</b>	.....	2			
Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"	.....	2			
Precaution for Liquid Gasket	.....	2			
<b>PREPARATION</b>	.....	4			
<b>PREPARATION</b>	.....	4			
Special Service Tools	.....	4			
Commercial Service Tools	.....	4			
<b>SYSTEM DESCRIPTION</b>	.....	6			
<b>DESCRIPTION</b>	.....	6			
Engine Lubrication System	.....	6			
Engine Lubrication System Schematic	.....	7			
<b>PERIODIC MAINTENANCE</b>	.....	8			
<b>ENGINE OIL</b>	.....	8			
Inspection	.....	8			
	Draining	.....	9		
	Refilling	.....	9		
<b>OIL FILTER</b>	.....	11			
Removal and Installation	.....	11			
Inspection	.....	11			
<b>REMOVAL AND INSTALLATION</b>	.....	13			
<b>OIL PUMP</b>	.....	13			
Exploded View	.....	13			
Removal and Installation	.....	13			
<b>OIL COOLER</b>	.....	15			
Exploded View	.....	15			
Removal and Installation	.....	15			
<b>SERVICE DATA AND SPECIFICATIONS (SDS)</b>	.....	17			
<b>SERVICE DATA AND SPECIFICATIONS (SDS)</b>	.....	17			
Periodical Maintenance Specification	.....	17			
Engine Oil Pressure	.....	17			

< PRECAUTION >

# PRECAUTION

## PRECAUTIONS

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

INFOID:000000009269691

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 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 3 minutes before performing any service.

### Precaution for Liquid Gasket

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#### REMOVAL OF LIQUID GASKET

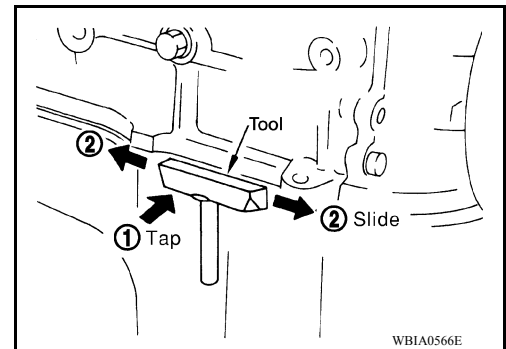
- After removing the bolts and nuts, separate the mating surface and remove the old liquid gasket using Tool.

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

**CAUTION:**

**Do not damage the mating surfaces.**

- Tap the seal cutter to insert it (1).
- In areas where the Tool is difficult to use, lightly tap to slide it (2).



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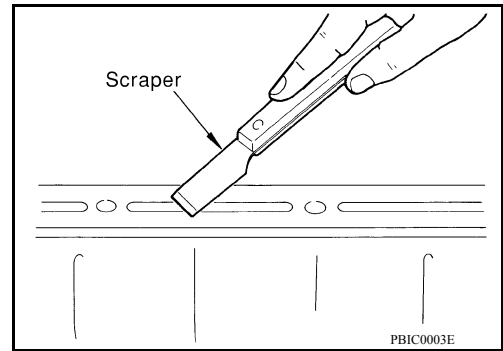
#### LIQUID GASKET APPLICATION PROCEDURE

# PRECAUTIONS

[HR16DE]

## < PRECAUTION >

1. Remove the old liquid gasket adhering to the gasket application surface and the mating surface using suitable tool.
  - Remove the 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 material.

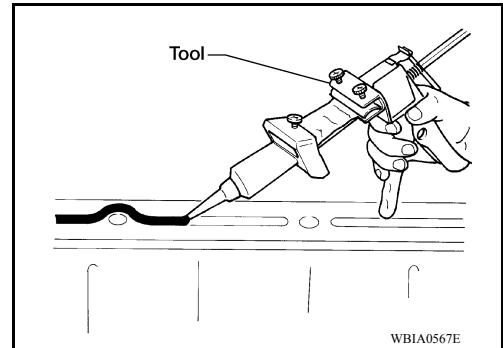


3. Attach the liquid gasket tube to the Tool.

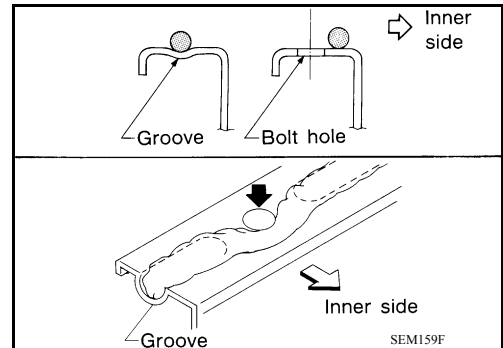
**Tool number : WS39930000 ( — )**

**Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-21, "Recommended Chemical Products and Sealants"](#).**

4. 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 liquid gasket to the groove.
- Normally apply the liquid gasket on the inside edge of the bolt holes. Also apply to the outside edge of the bolt holes when specified in the procedure.
- Within five minutes of liquid gasket application, install the mating component.
- If the liquid gasket protrudes, wipe it off immediately.
- Do not retighten after the installation.
- Wait 30 minutes or more after installation before refilling the engine with oil or 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 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 (J-25695-1) Oil pressure gauge	Measuring oil pressure <b>Maximum measuring range: 2,452 kPa (225 kg-cm<sup>2</sup>, 356 psi)</b>
ST25052000 (J-25695-2) Hose	Adapting oil pressure gauge to cylinder block
KV10115801 (J-38956) Oil filter wrench	Removing oil filter <b>a: 64.3 mm (2.531 in)</b>
KV10111100 (J-37228) Seal cutter	Removing steel oil pan and rear timing chain case
WS39930000 ( — ) Tube presser	Pressing the tube of liquid gasket

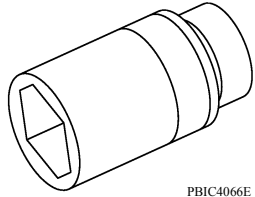

#### Commercial Service Tools

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# PREPARATION

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Tool name	Description
<p>Deep socket</p>  <p>PBIC4066E</p>	<p>Removing and installing oil pressure switch <b>27 mm (1.06 in)</b></p>
<p>Power tool</p>  <p>P11B1407E</p>	<p>Loosening nuts, screws and bolts</p>

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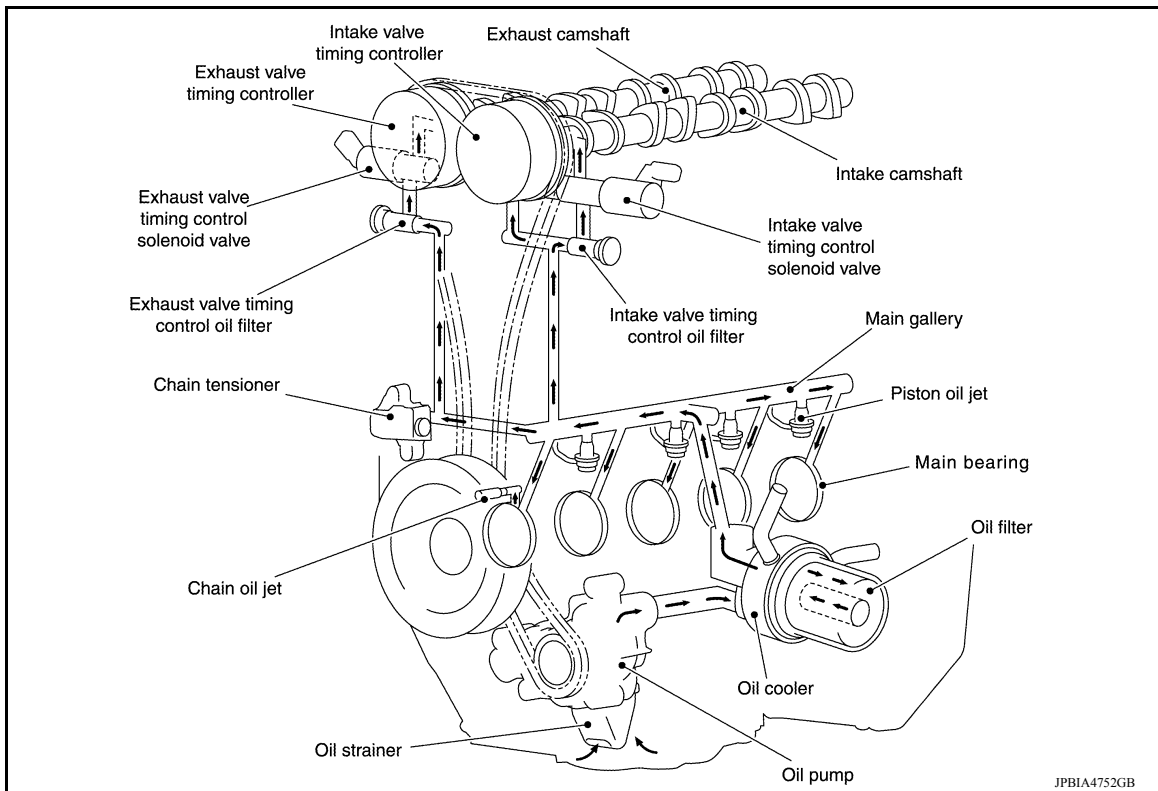
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# SYSTEM DESCRIPTION

## DESCRIPTION

### Engine Lubrication System

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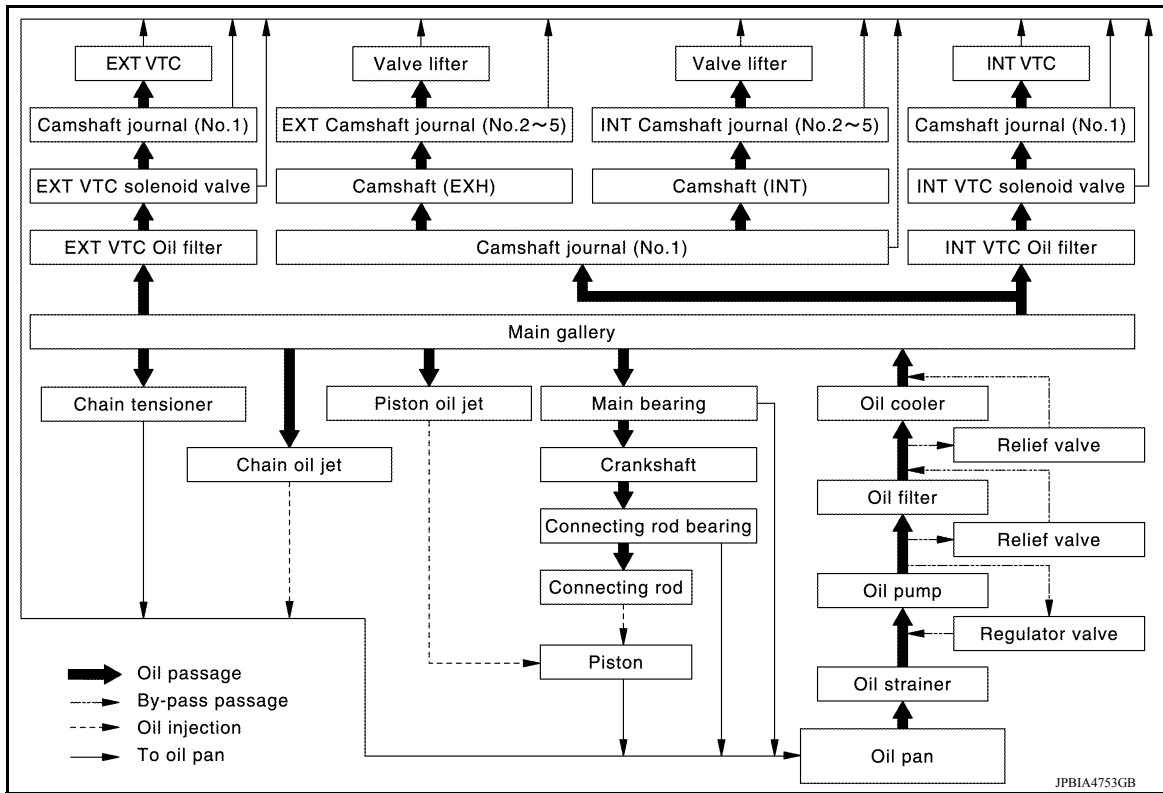
# DESCRIPTION

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## Engine Lubrication System Schematic

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## PERIODIC MAINTENANCE

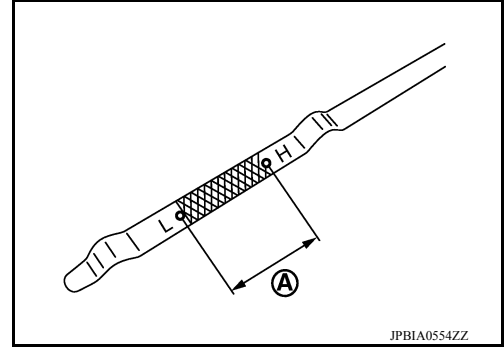
### ENGINE OIL

#### Inspection

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#### ENGINE OIL LEVEL

1. Park vehicle on a level surface, wait 10 minutes before checking the engine oil level.
2. Pull out oil level gauge and wipe it clean.
3. Insert oil level gauge and make sure the engine oil level is within the range (A) as shown.
4. If it is out of range, adjust it.



#### ENGINE OIL APPEARANCE

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

#### ENGINE OIL LEAKS

Check for engine oil leakage around the following areas:

- Oil pan (upper and lower)
- Oil pan drain plug
- Oil pressure sensor
- Oil filter
- Oil cooler
- Oil level sensor
- Engine oil temperature sensor
- Intake valve timing control solenoid valve
- Exhaust valve timing control solenoid valve
- Mating surface between front cover and rocker cover
- Mating surface between cylinder block and cylinder head
- Mating surface between cylinder head and rocker cover
- Crankshaft oil seals (front and rear)
- Front cover

#### OIL PRESSURE CHECK

##### WARNING:

- **Be careful not to get burned, as engine oil may be hot.**
- **For engine oil pressure check, the transaxle should be in P (Park) (A/T and CVT models) or N (Neutral) (M/T models), and apply the parking brake securely.**

1. Check engine oil level.



# ENGINE OIL

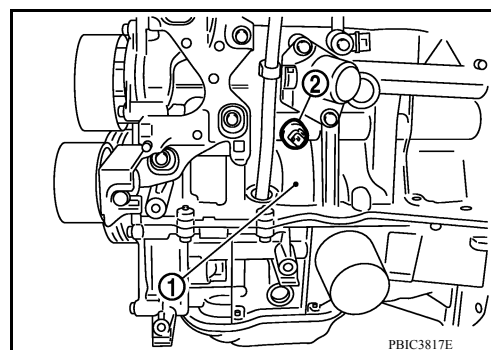
< PERIODIC MAINTENANCE >

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2. Disconnect harness connector at oil pressure sensor (2), and remove oil pressure sensor (2) from the cylinder block (1) using suitable tool.

**CAUTION:**

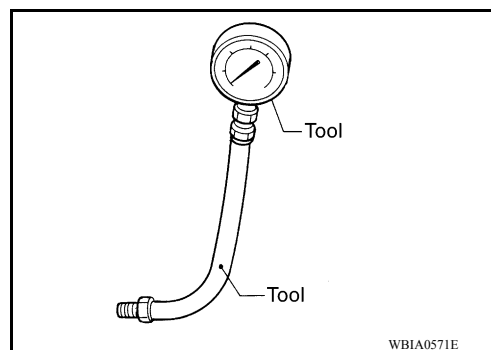
**Do not drop or shock oil pressure switch.**



3. Install oil pressure gauge and hose.

**Tool number** : ST25051001 (J-25695-1)

: ST25052000 (J-25695-2)



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

**NOTE:**

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

6. After the inspections, install oil pressure switch as follows:
  - a. Remove old liquid gasket from the oil pressure switch and engine.
  - b. Apply liquid gasket and tighten oil pressure sensor to specification.  
**Use Genuine Silicone RTV Sealant or equivalent.** Refer to [GI-21, "Recommended Chemical Products and Sealants"](#).

**Oil pressure sensor torque** : Refer to [EM-94, "Exploded View"](#).

- c. Check engine oil level.
- d. After warming up engine, make sure there are no engine oil leaks.

## Draining

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**WARNING:**

- Be careful not to get burned, as 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 the engine, park the vehicle on a level surface and check for engine oil leaks. Refer to [LU-8, "Inspection"](#).
  2. Stop the engine and wait for 10 minutes.
  3. Loosen oil filler cap.
  4. Remove drain plug and then drain engine oil.

## Refilling

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1. Install drain plug with new copper sealing washer. Refer to [EM-33, "Exploded View"](#).  
**CAUTION:**
  - Be sure to clean drain plug and install new copper sealing washer.

- Do not reuse copper sealing washer.

2. Refill with new engine oil.

Engine oil capacity and viscosity : Refer to [MA-12, "Fluids and Lubricants"](#).

**CAUTION:**

- The refill capacity depends on the engine oil temperature and drain time. Use these specifications for reference only.
  - Always use oil level gauge to determine the proper amount of engine oil in the engine.
3. Warm up engine and check area around drain plug and oil filter for engine oil leaks. Repair as necessary.
4. Stop engine and wait for 10 minutes.
5. Check the engine oil level. Refer to [LU-8, "Inspection"](#).

## OIL FILTER

## Removal and Installation

INFOID:00000009269700

## REMOVAL

1. Remove engine under cover. Refer to [EXT-19, "Removal and Installation"](#).
2. Drain engine oil. Refer to [LU-9, "Draining"](#).
3. Remove oil filter using Tool (A).  
⇐: Front

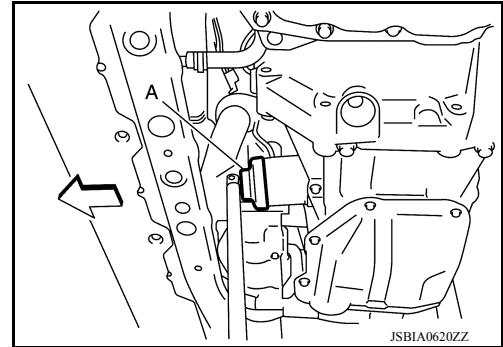
**Tool number** : KV10115801 (J-38956)

**WARNING:**

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

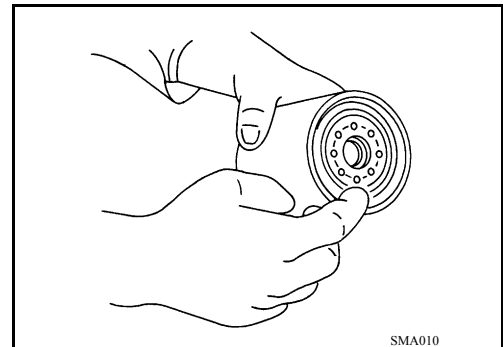
**CAUTION:**

- When removing, prepare a shop cloth to absorb engine oil leaks and spills.
- Do not spill engine oil on drive belt.
- Completely wipe off any engine oil that spills on engine and vehicle.
- Oil filter is provided with relief valve. Use Genuine NISSAN oil filter or equivalent.



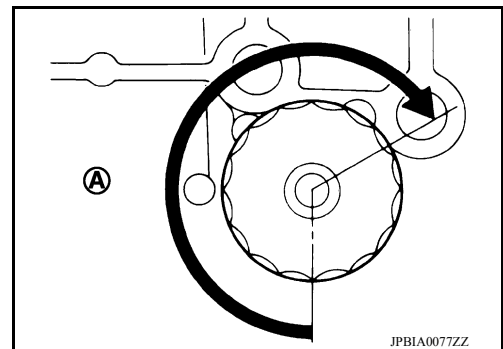
## INSTALLATION

1. Remove foreign materials adhering to the oil filter installation surface.
2. Apply new 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 (A), or tighten to specification.

**Oil filter** : 17.7 N·m (1.8 kg-m, 13 ft-lb)



4. Refill engine with new engine oil. Refer to [LU-9, "Refilling"](#).
5. Install engine under cover. Refer to [EXT-19, "Removal and Installation"](#).

## Inspection

INFOID:00000009269701

## INSPECTION AFTER INSTALLATION

1. Check the engine oil level. Refer to [LU-8, "Inspection"](#).
2. Start the engine and ensure there are no engine oil leaks.
3. Stop the engine and wait for 10 minutes.

## OIL FILTER

< PERIODIC MAINTENANCE >

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- 
4. Check the engine oil level and adjust as necessary. Refer to [LU-8. "Inspection"](#).

# OIL PUMP

< REMOVAL AND INSTALLATION >

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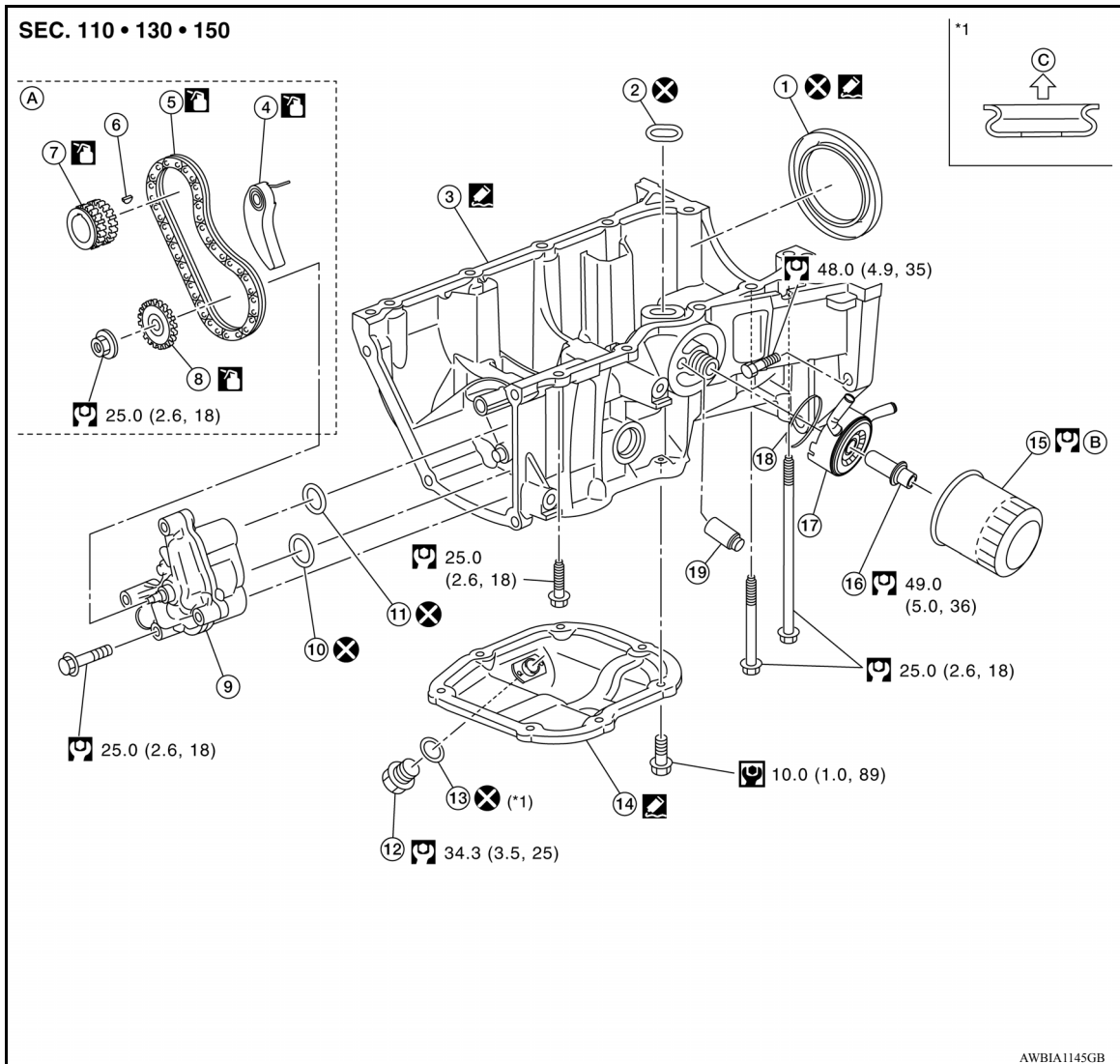
## REMOVAL AND INSTALLATION

### OIL PUMP

#### Exploded View

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- |  |                                   |                                   |
|--|-----------------------------------|-----------------------------------|
| 1. Rear oil seal                                       | 2. O-ring                         | 3. Oil pan (upper)                |
| 4. Oil pump chain tensioner (for oil pump drive chain) | 5. Oil pump drive chain           | 6. Crankshaft key                 |
| 7. Crankshaft sprocket                                 | 8. Oil pump sprocket              | 9. Oil pump                       |
| 10. O-ring   | 11. O-ring                        | 12. Oil pan drain plug            |
| 13. Drain plug washer                                  | 14. Oil pan (lower)               | 15. Oil filter                    |
| 16. Connector bolt                                     | 17. Oil cooler                    | 18. O-ring                        |
| 19. Relief valve                                       | A. Refer to <a href="#">EM-47</a> | B. Refer to <a href="#">LU-11</a> |
| C. Oil pan (lower) side                                |                                   |                                   |

### Removal and Installation

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#### REMOVAL

1. Drain engine oil. Refer to [LU-9, "Draining"](#).
2. Remove timing chain and oil pump drive chain. Refer to [EM-47, "Removal and Installation"](#).

# OIL PUMP

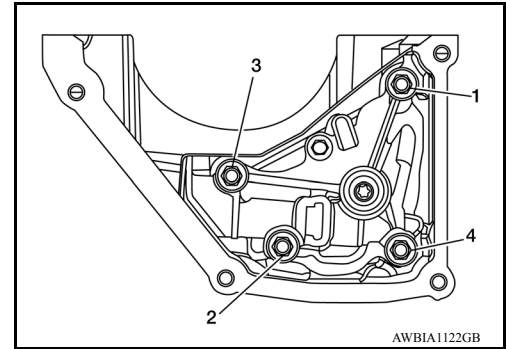
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## < REMOVAL AND INSTALLATION >

3. Loosen the oil pump bolts in the reverse order as shown.
4. Remove oil pump and O-rings.

**CAUTION:**

- Do not reuse O-rings.
- Do not disassemble oil pump.



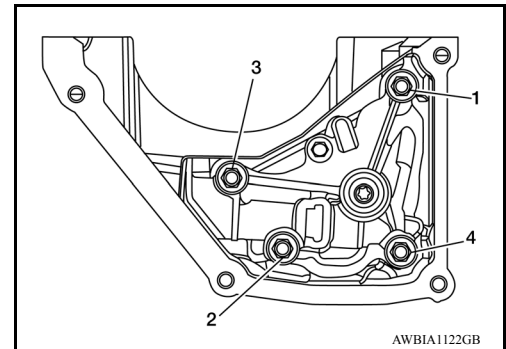
## INSTALLATION

1. Install new O-rings on the oil pan (upper) before installing the oil pump. Refer to [LU-13, "Exploded View"](#).

**CAUTION:**

**Do not reuse O-rings.**

2. Install the oil pump.
3. Tighten the oil pump bolts to specification in the order shown.
4. Install timing chain and oil pump drive chain. Refer to [EM-47, "Removal and Installation"](#).



## INSPECTION AFTER INSTALLATION

- Before starting engine, check oil/fluid levels, including engine coolant and engine oil. If less than required quantity, fill to the specified level. Refer to [MA-12, "Fluids and Lubricants"](#).
- Use procedure below to check for fuel leakage.
- Turn ignition switch ON (with engine stopped). With fuel pressure applied to fuel piping, check for fuel leakage at connection points.
- Start engine. With engine speed increased, check again for fuel leakage at connection points.
- Run engine to check for unusual noise and vibration.

**NOTE:**

If hydraulic pressure inside timing chain tensioner drops after removal and installation, slack in the guide may generate a pounding noise during and just after engine start. However, this is normal. Noise will stop after hydraulic pressure rises.

- Warm up engine thoroughly to make sure there is no leakage of fuel, exhaust gas, or any oils/fluids including engine oil and engine coolant.
- Bleed air from passages in lines and hoses, such as in cooling system.
- After cooling down engine, again check oil/fluid levels, including engine oil and engine coolant. Refill to specified level, if necessary.
- Summary of the inspection items:

Item		Before starting engine	Engine running	After engine stopped
Engine coolant		Level	Leakage	Level
Engine oil		Level	Leakage	Level
Transmission/ transaxle fluid	A/T and CVT Models	Leakage	Level/Leakage	Leakage
	M/T Models	Level/Leakage	Leakage	Level/Leakage
Other oils and fluids*		Level	Leakage	Level
Fuel		Leakage	Leakage	Leakage
Exhaust gas		—	Leakage	—

\*Power steering fluid, brake fluid, etc.

# OIL COOLER

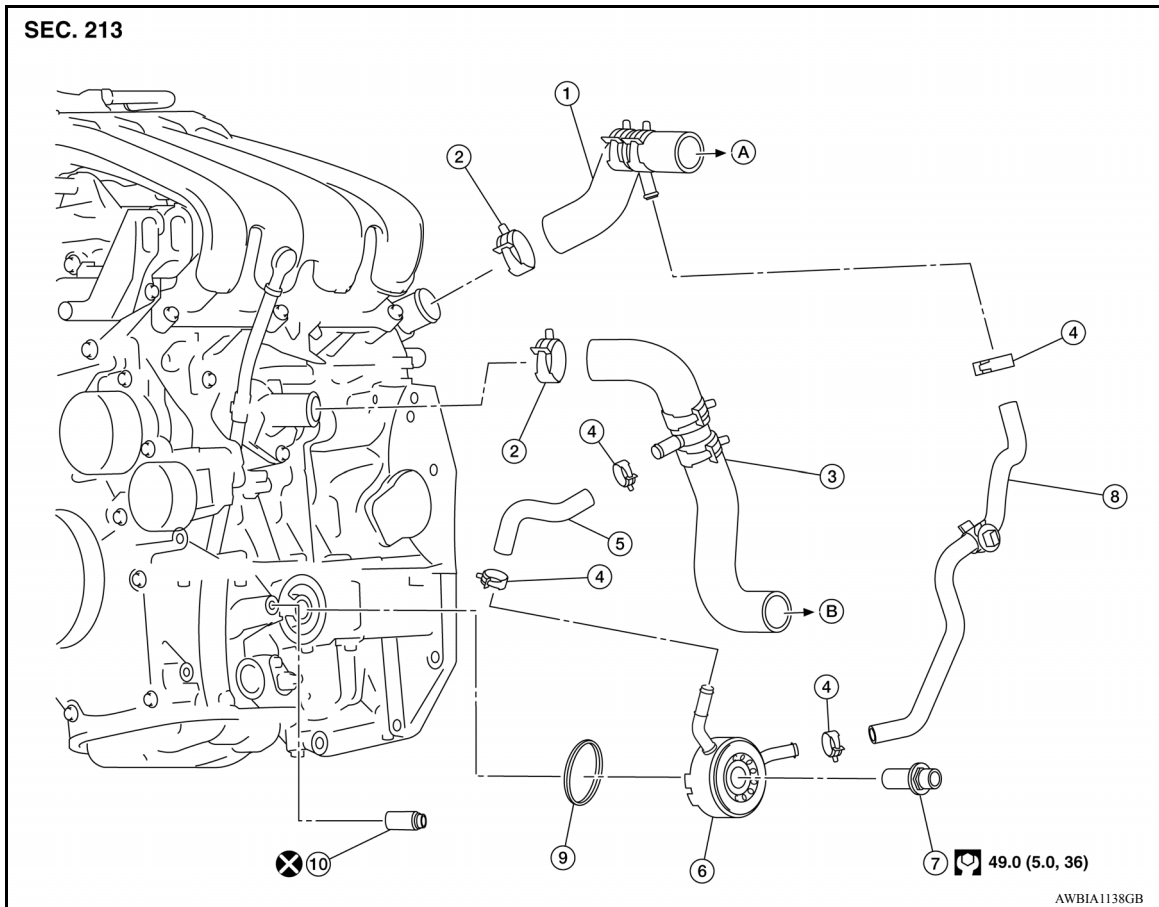
< REMOVAL AND INSTALLATION >

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## OIL COOLER

### Exploded View

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- |                             |                             |                          |
|-----------------------------|-----------------------------|--------------------------|
| 1. Radiator hose (upper)    | 2. Hose clamp               | 3. Radiator hose (lower) |
| 4. Hose clamp               | 5. Water hose               | 6. Oil cooler            |
| 7. Connector bolt           | 8. Water hose               | 9. O-ring                |
| A. To radiator (upper side) | B. To radiator (lower side) | 10. Relief valve         |

## Removal and Installation

INFOID:000000009269705

### REMOVAL

#### NOTE:

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

1. Remove the engine under cover. Refer to [EXT-15, "Exploded View"](#).
2. Drain engine oil. Refer to [LU-9, "Draining"](#).
3. Drain engine coolant. Refer to [CO-8, "Draining Engine Coolant"](#).

#### CAUTION:

**Perform when engine is cold.**

4. Remove oil filter. Refer to [LU-11, "Removal and Installation"](#).
5. Remove water hoses from the oil cooler.
6. Remove oil cooler and O-ring.

#### CAUTION:

**Do not reuse O-rings.**

### INSPECTION AFTER REMOVAL

# OIL COOLER

[HR16DE]

## < REMOVAL AND INSTALLATION >

### Oil Cooler

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

### Relief Valve

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

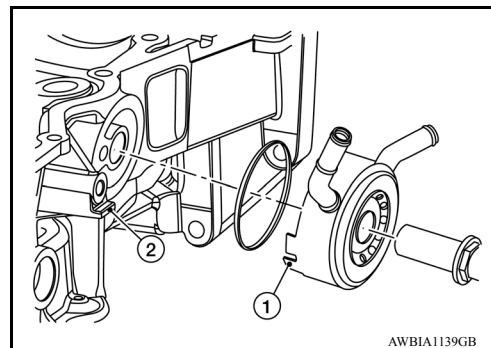
## INSTALLATION

Installation is in the reverse order of removal.

- Ensure that no foreign objects are adhering to the sealing surfaces of the oil cooler and oil pan (upper).
- Tighten connector bolt after aligning cutout (1) on oil cooler with protrusion (2) on oil pan (upper) side.

### CAUTION:

- Do not reuse O-ring.
- Replace relief valve if removed.



## INSPECTION AFTER INSTALLATION

- Before starting engine, check oil/fluid levels, including engine coolant and engine oil. If less than required quantity, fill to the specified level. Refer to [MA-12. "Fluids and Lubricants"](#).
- Use procedure below to check for fuel leakage.
- Turn ignition switch ON (with engine stopped). With fuel pressure applied to fuel piping, check for fuel leakage at connection points.
- Start engine. With engine speed increased, check again for fuel leakage at connection points.
- Run engine to check for unusual noise and vibration.

### NOTE:

- If hydraulic pressure inside timing chain tensioner drops after removal and installation, slack in the guide may generate a pounding noise during and just after engine start. However, this is normal. Noise will stop after hydraulic pressure rises.
- Warm up engine thoroughly to make sure there is no leakage of fuel, exhaust gas, or any oils/fluids including engine oil and engine coolant.
  - Bleed air from passages in lines and hoses, such as in cooling system.
  - After cooling down engine, again check oil/fluid levels, including engine oil and engine coolant. Refill to specified level, if necessary.
  - Summary of the inspection items:

Item		Before starting engine	Engine running	After engine stopped
Engine coolant		Level	Leakage	Level
Engine oil		Level	Leakage	Level
Transmission/ transaxle fluid	A/T and CVT Models	Leakage	Level/Leakage	Leakage
	M/T Models	Level/Leakage	Leakage	Level/Leakage
Other oils and fluids*		Level	Leakage	Level
Fuel		Leakage	Leakage	Leakage
Exhaust gas		—	Leakage	—

\*Power steering fluid, brake fluid, etc.



# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[HR16DE]

## SERVICE DATA AND SPECIFICATIONS (SDS)

### SERVICE DATA AND SPECIFICATIONS (SDS)

#### Periodical Maintenance Specification

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#### ENGINE OIL CAPACITY (APPROXIMATE)

Unit: ℓ (US qt, Imp qt)

Drain and refill	With oil filter change	3.5 (3 3/4, 3 1/8)
	Without oil filter change	3.2 (3 3/8, 2 7/8)
Dry engine (Overhaul)		3.5 (3 3/4, 3 1/8)

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#### Engine Oil Pressure

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

Engine Speed	Approximate discharge pressure*		
	M/T	A/T	CVT
600 rpm	More than 98 (1.0, 14.2)		
2,000 rpm	More than 294 (3.0, 42.6)		
6,000 rpm	More than 392 (4.0, 56.8)		

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\*: Engine oil temperature at 80°C (176°F).

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