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SECTION LU

ENGINE LUBRICATION SYSTEM

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PRECAUTION

PRECAUTIONS

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

INFOID:000000012602079

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. 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, it is recommended that all maintenance and repair be performed by an authorized NISSAN/INFINITI dealer.
- Improper repair, 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 or batteries, and wait at least three minutes before performing any service.

Precaution for Liquid Gasket

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REMOVAL OF LIQUID GASKET SEALING

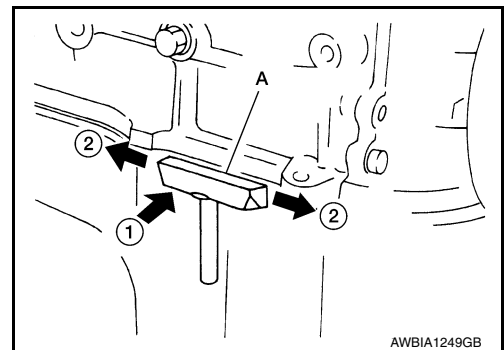
CAUTION:

Do not damage the mating surfaces.

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

Tool Number (A) : KV10111100 (J-37228)

- In areas where the cutter is difficult to use, use a plastic hammer to lightly tap (1) the cutter where the liquid gasket is applied. Use a plastic hammer to slide (2) the cutter by tapping on the side.



LIQUID GASKET APPLICATION PROCEDURE

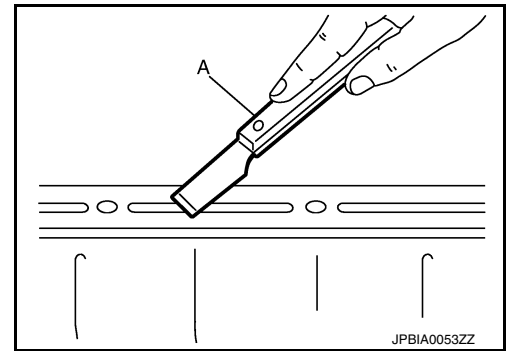
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PRECAUTIONS

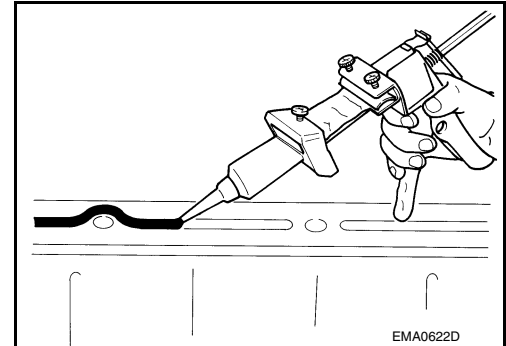
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< PRECAUTION >

1. Using suitable tool (A), remove old liquid gasket adhering to the liquid gasket application surface and the mating surface.
 - 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 the suitable tool.
Use Genuine Silicone RTV Sealant, or equivalent. Refer to [GI-21, "Recommended Chemical Products and Sealants"](#).
4. Apply liquid gasket without gaps to the specified location according to the specified dimensions.
 - If there is a groove for liquid gasket application, apply liquid gasket to the groove.

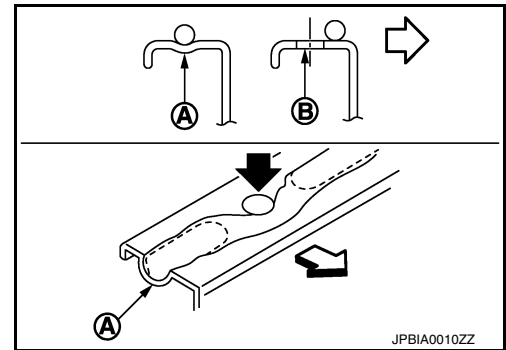


- As for bolt holes (B), normally apply liquid gasket inside the holes. Occasionally, it should be applied outside the holes. Check to read the text of this manual.

(A) : Groove

⇐ : Inside

- Within five minutes of liquid gasket application, install the mating component.
- If liquid gasket protrudes, wipe it off immediately.
- Do not retighten bolts or nuts after the installation.
- After 30 minutes or more have passed from the installation, fill engine oil and engine coolant. Refer to [LU-10, "Changing Engine Oil"](#) and [CO-11, "Changing Engine Coolant"](#).



CAUTION:

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

PREPARATION

< PREPARATION >

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PREPARATION

PREPARATION

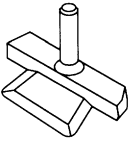
Special Service Tools

INFOID:0000000012602081

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The actual shape of the tools may differ from those illustrated here.

Tool number (TechMate No.) Tool name	Description
KV10111100 (J-37228) Seal cutter  NT046	Removing oil pan (lower) etc.

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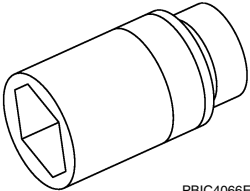
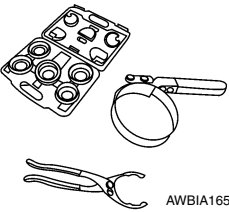
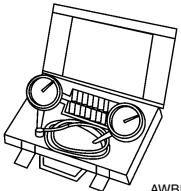
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Commercial Service Tools

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Tool name	Description
Deep socket  PBIC4066E	Removing and installing oil pressure sensor 27 mm (1.06 in)
Oil filter wrench assortment  AWBIA1656ZZ	Removing oil filter
Oil pressure kit  AWBIA1657ZZ	Measuring oil pressure. Comes with adapter and hose. Designed to be used for both static and on road testing.

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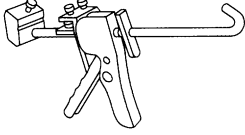

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PREPARATION

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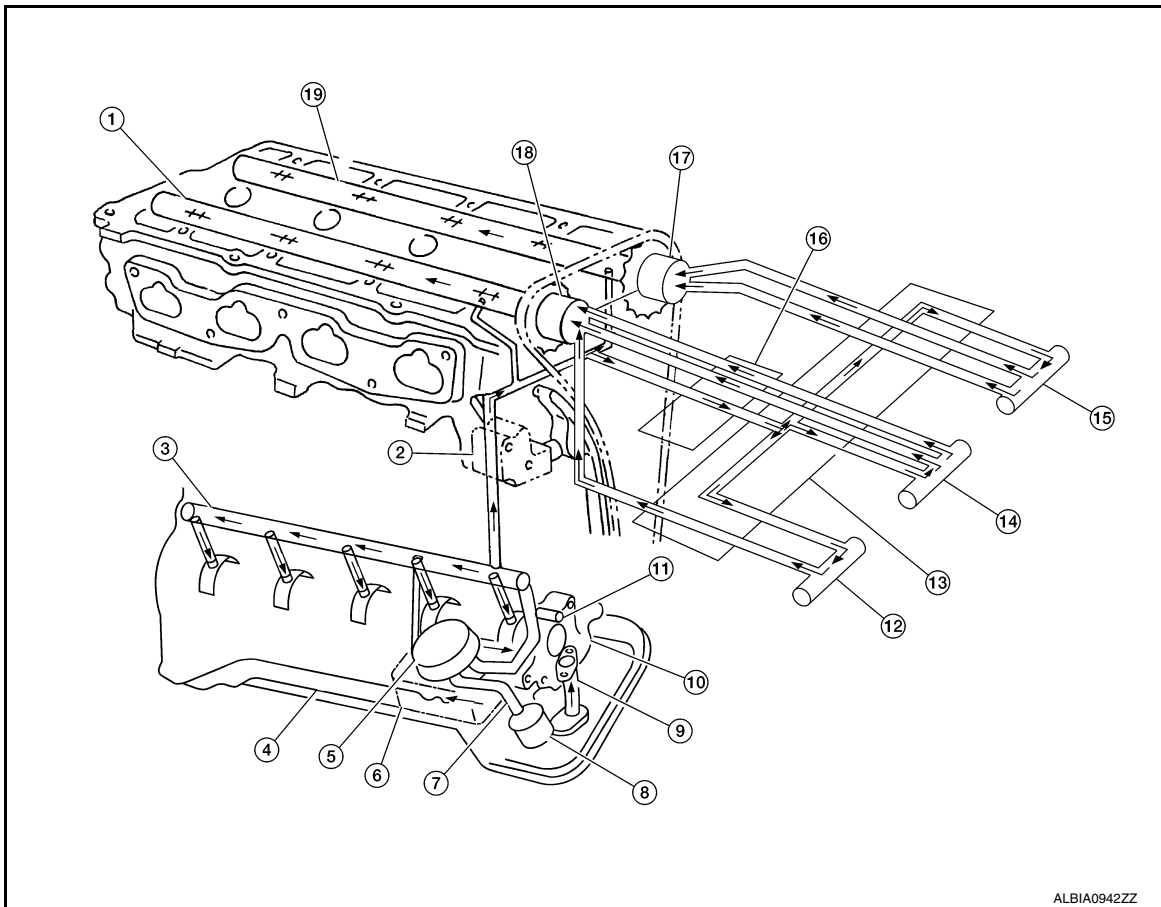
Tool name	Description
<p>Tube presser</p>  <p>NT052</p>	<p>Pressing the tube of liquid gasket</p>
<p>Power tool</p>  <p>PIIB1407E</p>	<p>Loosening nuts, screws and bolts</p>

SYSTEM DESCRIPTION

LUBRICATION SYSTEM

Lubrication Circuit

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- | | | |
|---------------------------------------|---|--|
| 1. Camshaft (INT) | 2. Chain tensioner | 3. Main gallery |
| 4. Oil pan | 5. Oil cooler | 6. Balancer unit |
| 7. Oil pan oil gallery | 8. Oil filter (with relief valve) | 9. Oil Strainer |
| 10. Oil pump | 11. Timing chain and balancer unit timing chain oil jet | 12. Intake valve timing intermediate lock-control solenoid valve |
| 13. Intake valve timing control cover | 14. Intake valve timing control solenoid valve | 15. Exhaust valve timing control solenoid valve |
| 16. Front cover | 17. Exhaust valve timing controller | 18. Intake valve timing controller |
| 19. Camshaft (EXH) | | |

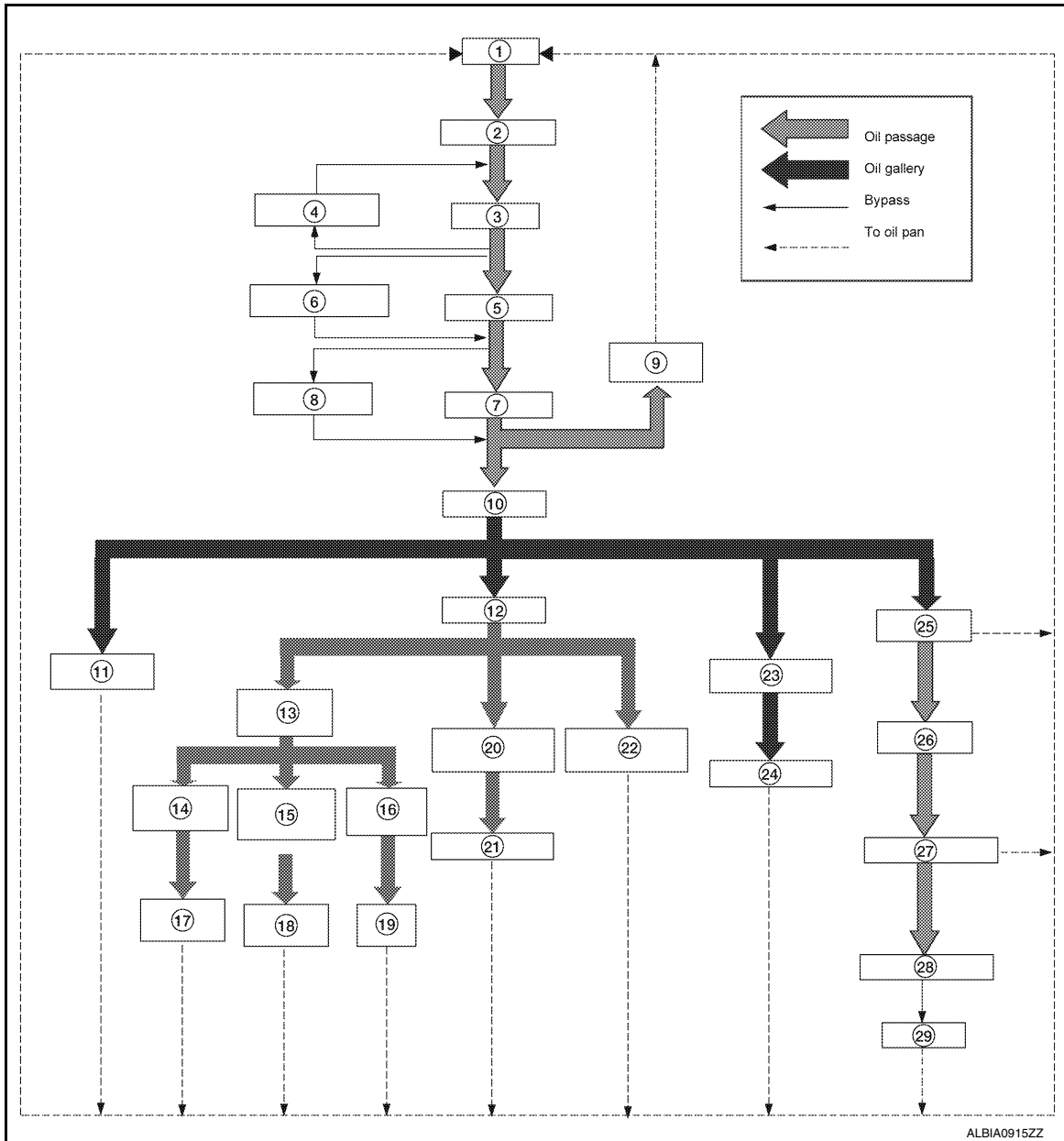
LUBRICATION SYSTEM

< SYSTEM DESCRIPTION >

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Schematic

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- | | | |
|---|--|--|
| 1. Oil pan | 2. Oil strainer | 3. Oil pump |
| 4. Regulator valve | 5. Oil filter | 6. Relief valve (Built in oil filter) |
| 7. Oil cooler | 8. Relief valve | 9. Chain oil jet |
| 10. Main gallery | 11. Piston oil jet | 12. Cylinder head |
| 13. Oil filter | 14. Intake valve timing intermediate lock control solenoid valve | 15. Intake valve timing control solenoid valve |
| 16. Exhaust valve timing control solenoid valve | 17. C-VTC intermediate | 18. C-VTC intake |
| 19. C-VTC exhaust | 20. Camshaft journal | 21. Camshaft |
| 22. Chain tensioner | 23. Balancer housing | 24. Balancershaft journal |
| 25. Main bearing | 26. Crankshaft | 27. Connecting rod bearing |
| 28. Connecting rod | 29. Piston | |

PERIODIC MAINTENANCE

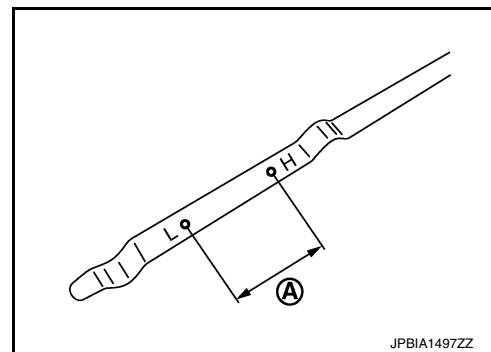
ENGINE OIL

Inspection

INFOID:000000012602085

OIL LEVEL

- Before starting the engine, check the oil level. If the engine is already started, stop it and allow 10 minutes before checking.
- Check that the oil level is within the range (A) as shown.
- 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 milky, it is highly probable that it is contaminated with engine coolant. Repair or replace damaged parts.

OIL LEAKS

Check for oil leaks around the following areas:

- Oil cooler
- Oil level gauge assembly O-ring
- Crankshaft position sensor
- Oil temperature sensor
- Camshaft position sensors
- Oil pan (upper and lower)
- Oil pan drain plug
- Oil pressure switch
- Oil filter
- Oil cooler
- Valve timing control cover and valve timing control solenoid valve
- Front cover
- Mating surface between cylinder block and cylinder head
- Mating surface between cylinder head and rocker cover
- Crankshaft oil seal (front and rear)
- Mating surface between cylinder block and lower cylinder block

OIL PRESSURE CHECK

WARNING:

- **Be careful not to burn yourself, as engine oil may be hot.**
 - **Put shift selector in the Park "P" position.**
1. Check engine oil level.
 2. Remove fender protector side cover (RH). Refer to [EXT-36, "FENDER PROTECTOR : Exploded View"](#).

ENGINE OIL

[QR25DE]

< PERIODIC MAINTENANCE >

3. Disconnect the harness connector from oil pressure switch. Remove oil pressure switch. Install suitable tools (A/B) to inspect oil pressure.

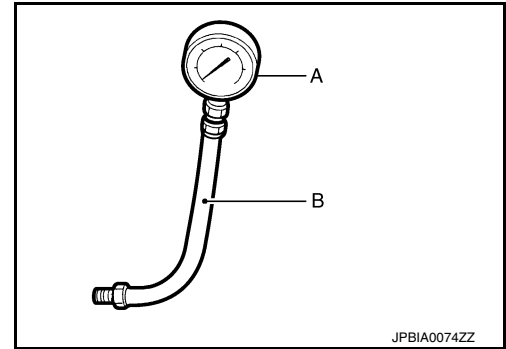
CAUTION:

Do not drop or shock oil pressure switch.

4. Start engine and warm it up to normal operating temperature.
5. Check oil pressure with engine running under no-load, using suitable tools (A/B).

NOTE:

- When engine oil temperature is low, engine oil pressure becomes high.
- If difference is extreme, check oil passage and oil pump for oil leaks.



Engine oil pressure : Refer to [LU-21, "Oil Pressure"](#).

6. After the inspections, install oil pressure switch as follows:
 - a. Remove old liquid gasket adhering to oil pressure switch.
 - b. Apply liquid gasket and tighten oil pressure switch to specification. Refer to [LU-3, "Precaution for Liquid Gasket"](#).

Use Genuine RTV Silicone Sealant or equivalent.

Oil pressure switch : Refer to [EM-91, "Exploded View"](#).

- c. After warming up engine, make sure there are no engine oil leaks.
7. Install fender protector side cover (RH). Refer to [EXT-36, "FENDER PROTECTOR : Exploded View"](#).
 8. Check engine oil level.

Changing Engine Oil

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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.**

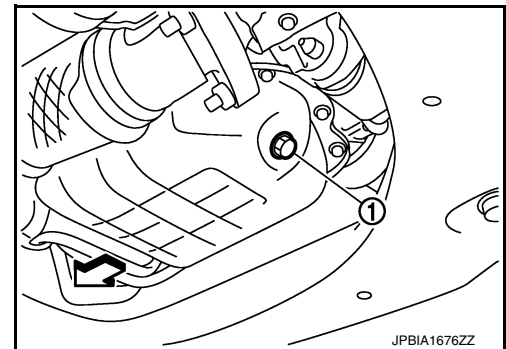
1. Position the vehicle so it is level on the hoist.
2. Warm up the engine and check for oil leaks from the engine.
3. Stop engine and wait for 10 minutes.
4. Remove the oil pan drain plug (1) and oil filler cap.

↔ : Front

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 : Refer to [MA-12, "Engine Oil Recommendation"](#).

Oil pan drain plug : Refer to [EM-36, "Exploded View"](#).



CAUTION:

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

ENGINE OIL

< PERIODIC MAINTENANCE >

[QR25DE]

8. Stop the engine and wait for 10 minutes.
9. Check the oil level using the oil level gauge.
CAUTION:
Do not overfill the engine with engine oil.

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OIL FILTER

Removal and Installation

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REMOVAL

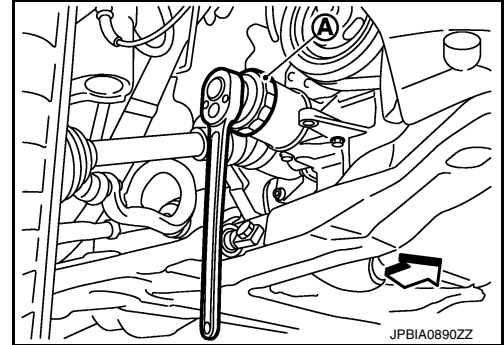
1. Remove fender protector side cover (RH). Refer to [EXT-36, "FENDER PROTECTOR : Exploded View"](#).
2. Drain engine oil. Refer to [LU-10, "Changing Engine Oil"](#).
3. Remove the oil filter using suitable tool (A).

WARNING:

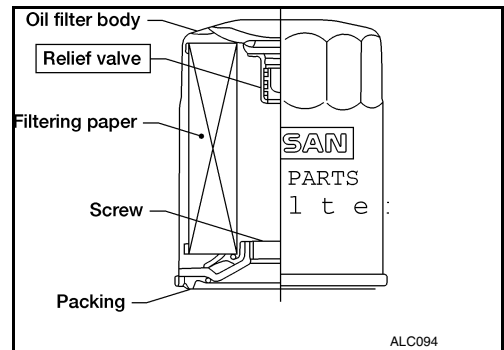
Be careful not to get burned, the engine and engine oil may be hot.

CAUTION:

- When removing, prepare a shop cloth to absorb any oil leaks 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.

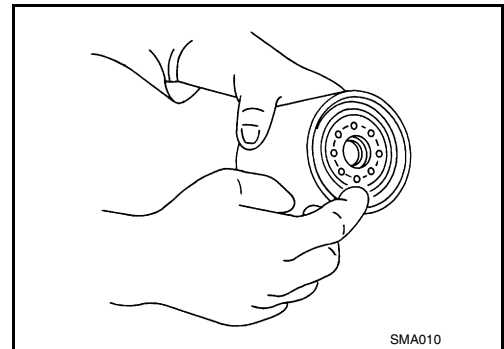


- The oil filter has a built in pressure relief valve. Use a Genuine NISSAN oil filter or equivalent.



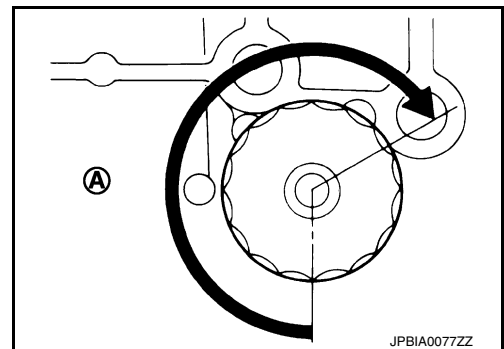
INSTALLATION

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.



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

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



4. Refill engine with new engine oil. Refer to [LU-10, "Changing Engine Oil"](#).

OIL FILTER

< PERIODIC MAINTENANCE >

[QR25DE]

5. After warming up the engine, check for engine oil leaks. Repair as necessary.
6. Install fender protector side cover (RH). Refer to [EXT-36, "FENDER PROTECTOR : Exploded View"](#).

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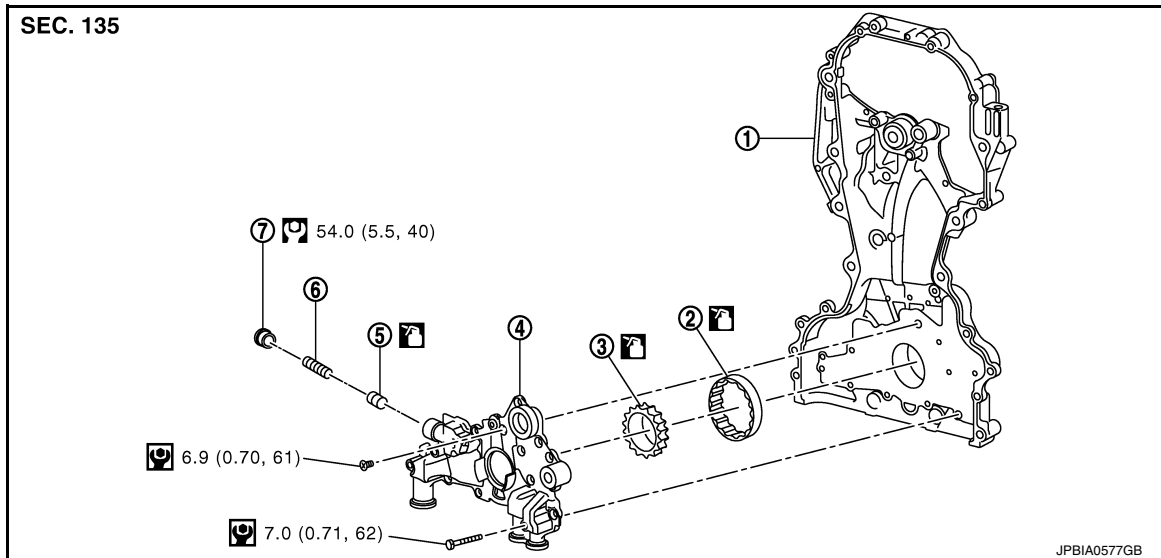
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REMOVAL AND INSTALLATION

OIL PUMP

Exploded View

INFOID:000000012602088



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|---------------------------------------|--------------------|---------------------------|
| 1. Front cover (Oil pump body united) | 2. Outer rotor | 3. Inner rotor |
| 4. Oil pump cover | 5. Regulator valve | 6. Regulator valve spring |
| 7. Regulator valve plug | | |

CAUTION:

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

Removal and Installation

INFOID:000000012602089

REMOVAL

Remove front cover. Refer to [EM-61, "Exploded View"](#).

NOTE:

Oil pump is built into front cover.

INSTALLATION

Installation is in the reverse order of removal.

- When installing, align crankshaft flat faces with inner rotor flat faces.

Disassembly and Assembly

INFOID:000000012602090

DISASSEMBLY

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

ASSEMBLY

Assembly is in the reverse order of disassembly.

OIL PUMP

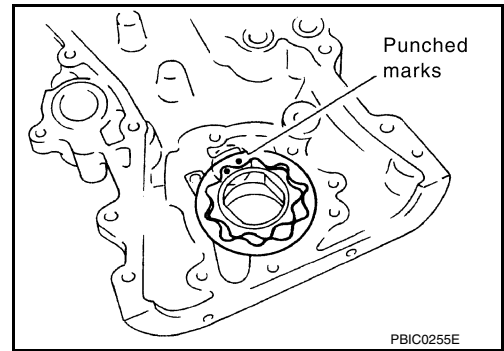
[QR25DE]

< REMOVAL AND INSTALLATION >

- Install the inner rotor and outer rotor with the punched marks on the oil pump cover side.

CAUTION:

Before assembly apply new engine oil to the parts specified.



Inspection

INFOID:000000012602091

INSPECTION AFTER DISASSEMBLY

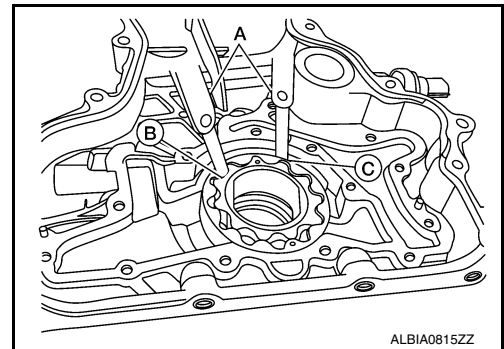
OIL PUMP CLEARANCE

- Measure the clearance with suitable tool (A).
- Clearance between outer rotor (B) and front cover (C)

Standard : Refer to [LU-21, "Oil Pump"](#).

- Tip clearance between inner rotor (C) and outer rotor (B)

Standard : Refer to [LU-21, "Oil Pump"](#).

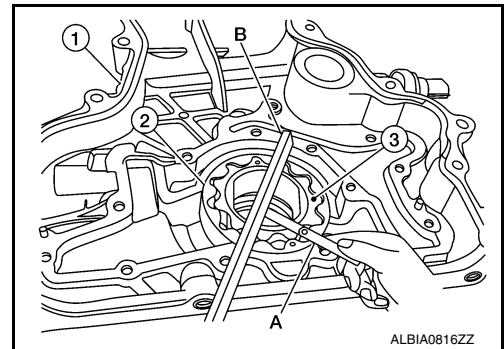


- Measure the clearance using suitable tools (A/B).
- Side clearance between inner rotor (3) and front cover (1)

Standard : Refer to [LU-21, "Oil Pump"](#).

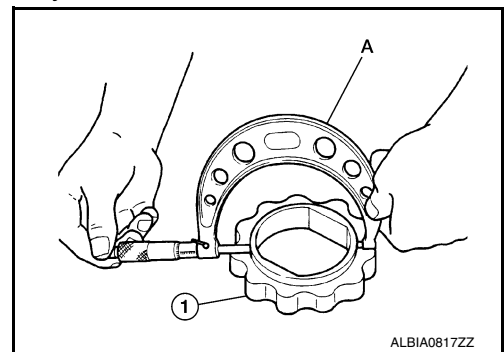
- Side clearance between outer rotor (2) and front cover (1)

Standard : Refer to [LU-21, "Oil Pump"](#).



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

- Measure the outer diameter of protruded portion of inner rotor (1) using suitable tool (A).

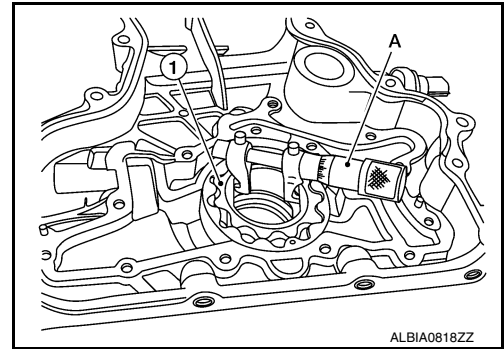


OIL PUMP

[QR25DE]

< REMOVAL AND INSTALLATION >

- Measure the inner diameter of inner rotor (1) using suitable tool (A).



- (Clearance) = (Inner rotor inner diameter) – (Oil pump inner rotor outer diameter)

Standard : Refer to [LU-21, "Oil Pump"](#).

- If measured/calculated values are out of the standard, replace front cover and oil pump assembly.

REGULATOR VALVE TO OIL PUMP COVER CLEARANCE

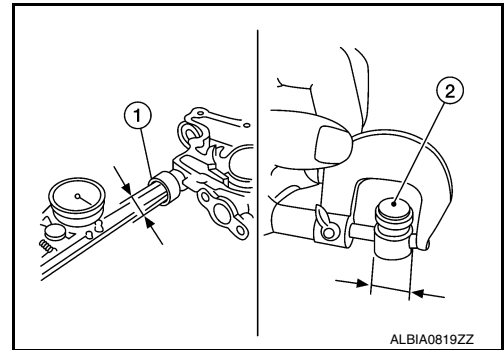
- (Clearance) = (Regulator valve hole (1) diameter) – (Regulator valve (2) outer diameter)

Standard : Refer to [LU-21, "Oil Pump"](#).

- If the calculated value is out of the standard, replace front cover and oil pump assembly.

CAUTION:

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



INSPECTION AFTER INSTALLATION

1. Check the engine oil level. Refer to [LU-9, "Inspection"](#).
2. Start the engine, and check that there is no leakage of engine oil.
3. Stop the engine and wait for 10 minutes.
4. Check the engine oil level and adjust the level. Refer to [LU-9, "Inspection"](#).

OIL COOLER

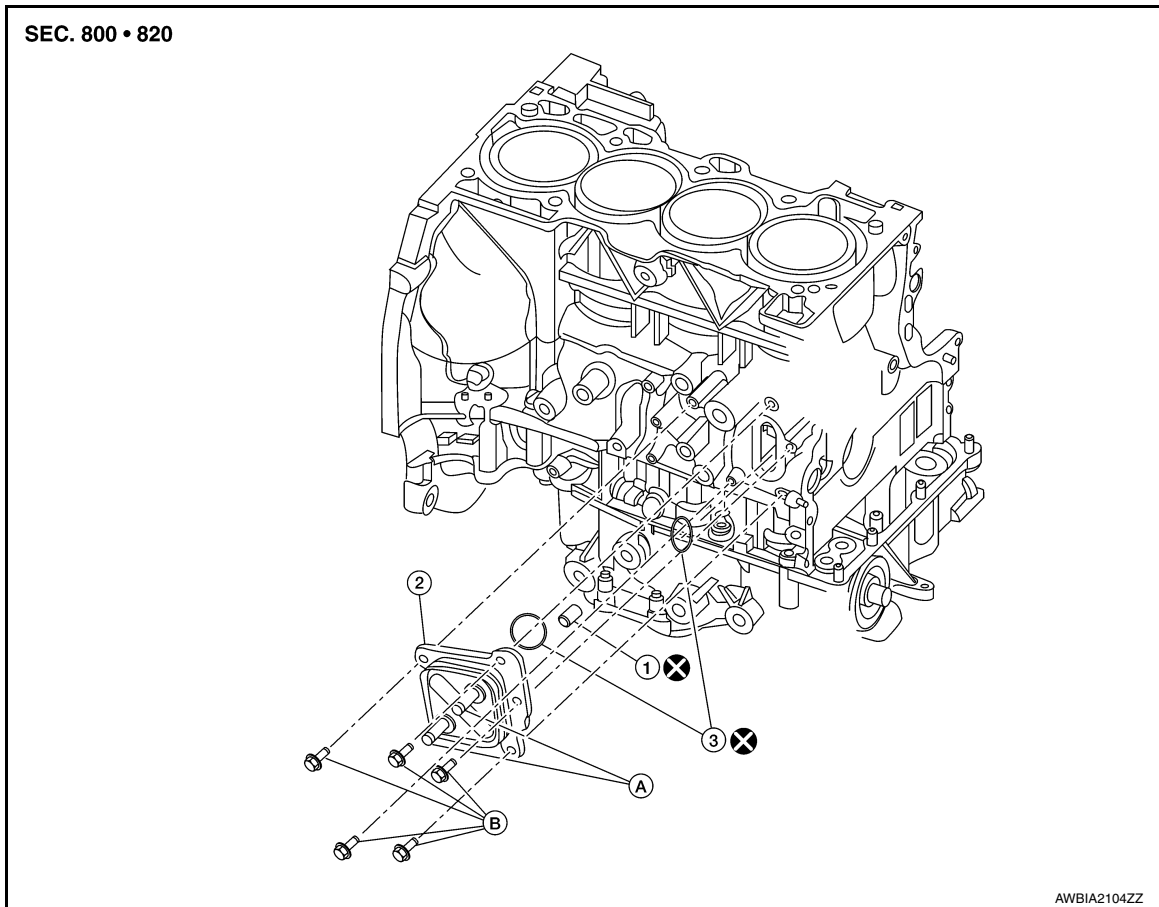
< REMOVAL AND INSTALLATION >

[QR25DE]

OIL COOLER

Exploded View

INFOID:000000012602092



- | | | |
|------------------|--------------------------|-----------|
| 1. Relief valve | 2. Oil cooler | 3. O-ring |
| A. To water hose | B. Refer to INSTALLATION | |

Removal and Installation

INFOID:000000012602093

WARNING:

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

NOTE:

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

REMOVAL

1. Remove front wheel and tire (RH) using power tool. Refer to [WT-54, "Adjustment"](#).
2. Remove fender protector (RH). Refer to [EXT-36, "FENDER PROTECTOR : Removal and Installation"](#).
3. Drain engine coolant by removing water drain plug on cylinder block and radiator drain plug. Refer to [CO-11, "Changing Engine Coolant"](#).
4. Disconnect hoses from the oil cooler.
5. Remove oil cooler bolts in reverse numerical order.
6. Remove oil cooler.
7. Remove relief valve and O-rings.

INSTALLATION

Installation is in the reverse order of removal.

CAUTION:

OIL COOLER

< REMOVAL AND INSTALLATION >

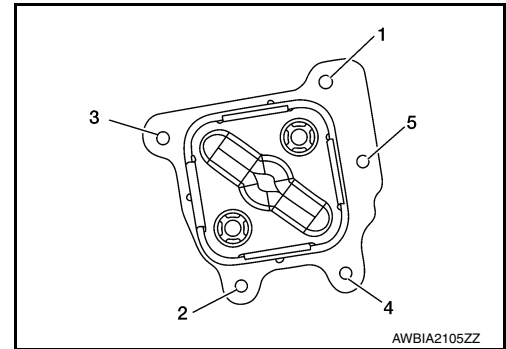
[QR25DE]

- Do not reuse relief valve.
- Do not reuse O-ring.

NOTE:

Tighten oil cooler bolts to specification in sequence as shown:

Oil cooler bolts : 9 N·m (0.9 kg-m, 80 in-lb)



INFOID:000000012602094

Inspection

INSPECTION AFTER REMOVAL

Oil Cooler

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

INSPECTION AFTER INSTALLATION

1. Check the engine oil level and the engine coolant level and add engine oil and engine coolant. Refer to [CO-9, "System Inspection"](#) and [LU-9, "Inspection"](#).
2. Start the engine, and check that there are no leaks of engine oil or engine coolant.
3. Stop the engine and wait for 10 minutes.
4. Check the engine oil level and the engine coolant level again. Refer to [CO-9, "System Inspection"](#) and [LU-9, "Inspection"](#).

ENGINE OIL PRESSURE CONTROL SOLENOID VALVE

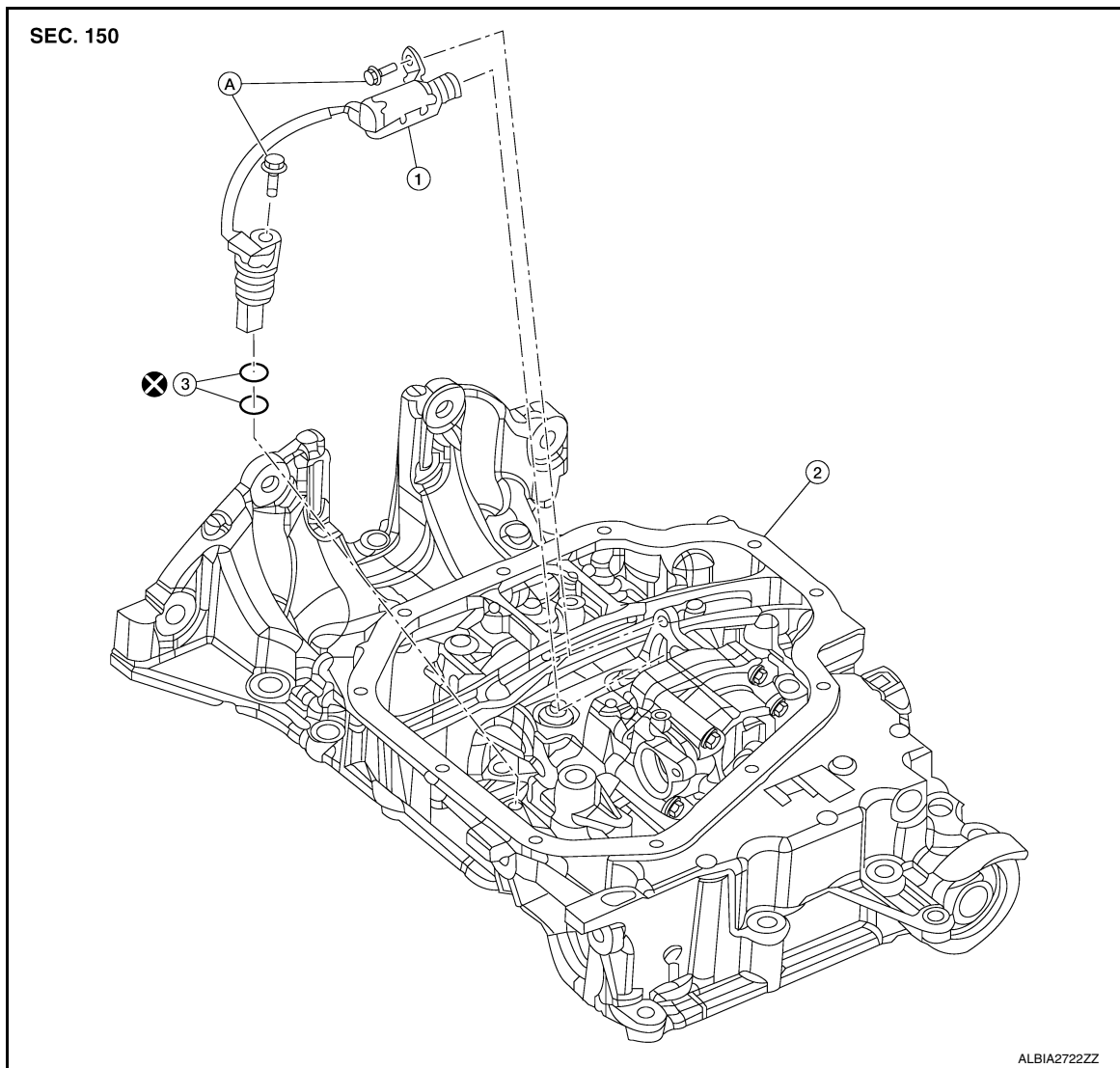
< REMOVAL AND INSTALLATION >

[QR25DE]

ENGINE OIL PRESSURE CONTROL SOLENOID VALVE

Exploded View

INFOID:000000013187569



- 1. Engine oil pressure control solenoid valve
- 2. Oil pan (upper)
- 3. O-rings
- A. Refer to INSTALLATION

Removal and Installation

INFOID:000000013187570

NOTE:

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

REMOVAL

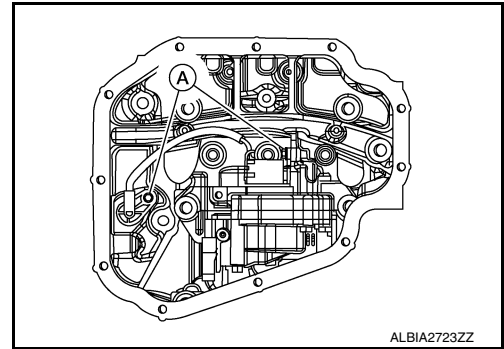
1. Remove oil pan (lower) and oil strainer. Refer to [EM-36, "Removal and Installation"](#).

ENGINE OIL PRESSURE CONTROL SOLENOID VALVE

[QR25DE]

< REMOVAL AND INSTALLATION >

2. Remove bolts (A) from engine oil pressure control solenoid valve.



3. Disconnect the harness connector from engine oil pressure control solenoid valve.
4. Remove engine oil pressure control solenoid valve.

CAUTION:

Do not reuse O-rings.

INSTALLATION

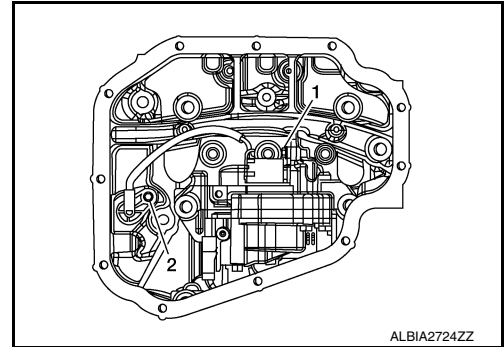
Installation is in the reverse order of removal.

- Tighten engine oil pressure control solenoid valve bolts to specification in sequence as shown.

Bolts : 9 N·m (0.9 kg-m, 80 in-lb)

CAUTION:

- Do not reuse O-rings.
- Ensure engine oil pressure control solenoid valve O-ring sealing surface is free from dents or flaws.
- Apply clean engine oil to O-rings.
- Ensure engine oil pressure control solenoid valve harness is pushed to baffle side to avoid interference with upper oil pan and oil strainer.



SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[QR25DE]

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Oil Pressure

INFOID:0000000012602095

Unit: kPa (kg/cm², psi)

Engine speed	Approximate discharge oil pressure*
600 rpm	98 (0.98, 1.0, 14)
2,000 rpm	294 (2.94, 3.0, 43)
6,000 rpm	392 (3.92, 4.0, 57)

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

Oil Pump

INFOID:0000000012602096

Unit: mm (in)

Clearance between outer rotor and oil pump body	0.114 - 0.179 (0.0045 - 0.0070)
Tip clearance between inner rotor and outer rotor	0.170 - 0.220 (0.0067 - 0.0087)
Side clearance between inner rotor and oil pump body	0.030 - 0.070 (0.0012 - 0.0028)
Side clearance between outer rotor and oil pump body	0.060 - 0.110 (0.0024 - 0.0043)
Inner rotor to brazed portion of housing clearance	0.035 - 0.070 (0.0014 - 0.0028)

Regulator Valve

INFOID:0000000012602097

Unit: mm (in)

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

Oil Capacity

INFOID:0000000012602098

Unit: ℓ (US qt, Imp qt)

Drain and refill	With oil filter change	Approximately 4.6 (4-7/8, 4)
	Without oil filter change	Approximately 4.3 (4-1/2, 3-3/4)
Dry engine (engine overhaul)		Approximately 5.3 (5-5/8, 4-5/8)

PRECAUTION

PRECAUTIONS

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

INFOID:000000012602099

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. 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, it is recommended that all maintenance and repair be performed by an authorized NISSAN/INFINITI dealer.
- Improper repair, 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 or batteries, and wait at least three minutes before performing any service.

Precaution for Liquid Gasket

INFOID:000000012602100

REMOVAL OF LIQUID GASKET SEALING

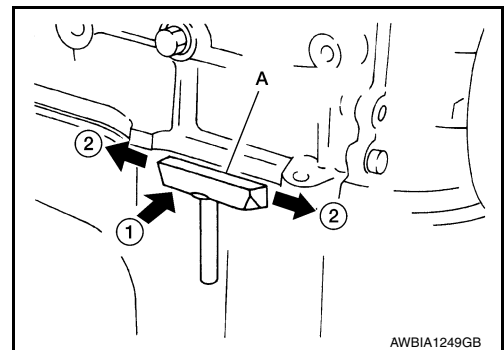
CAUTION:

Do not damage the mating surfaces.

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

Tool Number (A) : KV10111100 (J-37228)

- In areas where the cutter is difficult to use, use a plastic hammer to lightly tap (1) the cutter where the liquid gasket is applied. Use a plastic hammer to slide (2) the cutter by tapping on the side.



AWBIA1249GB

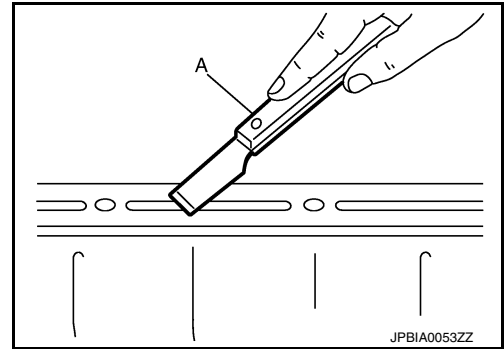
LIQUID GASKET APPLICATION PROCEDURE

PRECAUTIONS

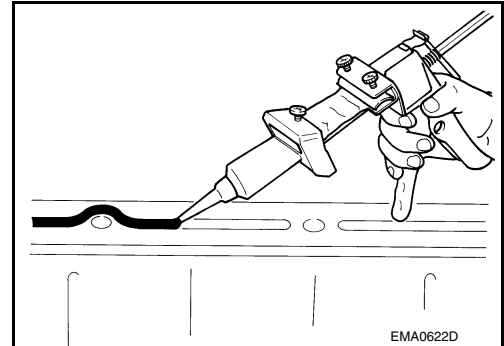
[VQ35DE]

< PRECAUTION >

1. Using suitable tool (A), remove old liquid gasket adhering to the liquid gasket application surface and the mating surface.
 - 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 the suitable tool.
Use Genuine Silicone RTV Sealant, or equivalent. Refer to GI-21. "Recommended Chemical Products and Sealants".
4. Apply liquid gasket without gaps to the specified location according to the specified dimensions.
 - If there is a groove for liquid gasket application, apply liquid gasket to the groove.

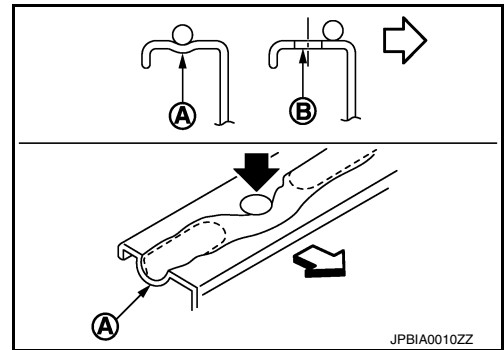


- As for bolt holes (B), normally apply liquid gasket inside the holes. Occasionally, it should be applied outside the holes. Check to read the text of this manual.

(A) : Groove

⇐ : Inside

- Within five minutes of liquid gasket application, install the mating component.
- If liquid gasket protrudes, wipe it off immediately.
- Do not retighten bolts or nuts after the installation.
- After 30 minutes or more have passed from the installation, fill engine oil and engine coolant. Refer to [LU-29. "Changing Engine Oil"](#) and [CO-35. "Changing Engine Coolant"](#).



CAUTION:

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

PREPARATION

< PREPARATION >

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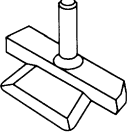
PREPARATION

PREPARATION

Special Service Tools

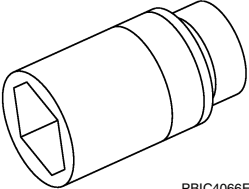
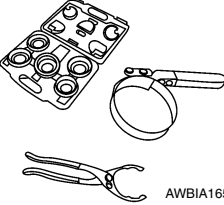
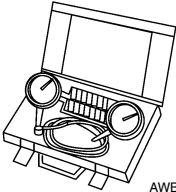
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The actual shape of the tools may differ from those illustrated here.

Tool number (TechMate No.) Tool name	Description
KV10111100 (J-37228) Seal cutter  NT046	Removing oil pan (lower) etc.

Commercial Service Tools

INFOID:0000000012602102

Tool name	Description
Deep socket  PBIC4066E	Removing and installing oil pressure sensor 27 mm (1.06 in)
Oil filter wrench assortment  AWBIA1656ZZ	Removing oil filter
Oil pressure kit  AWBIA1657ZZ	Measuring oil pressure. Comes with adapter and hose. Designed to be used for both static and on road testing.

PREPARATION

< PREPARATION >

[VQ35DE]

Tool name	Description
<p>Tube presser</p> <div> </div> <p>NT052</p>	<p>Pressing the tube of liquid gasket</p>
<p>Power tool</p> <div> </div> <p>PIIB1407E</p>	<p>Loosening nuts, screws and bolts</p>

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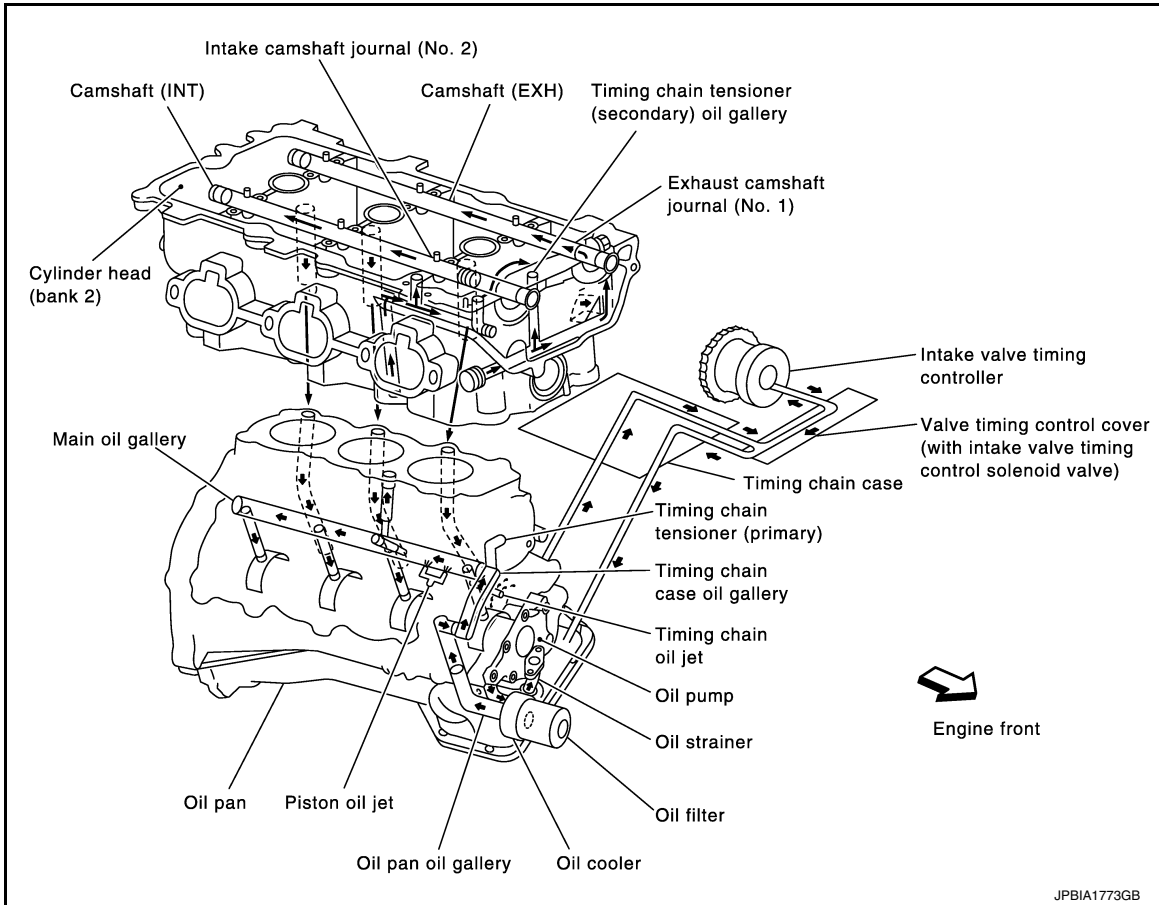
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SYSTEM DESCRIPTION

LUBRICATION SYSTEM

Lubrication Circuit

INFOID:000000012602103



JPBIA1773GB

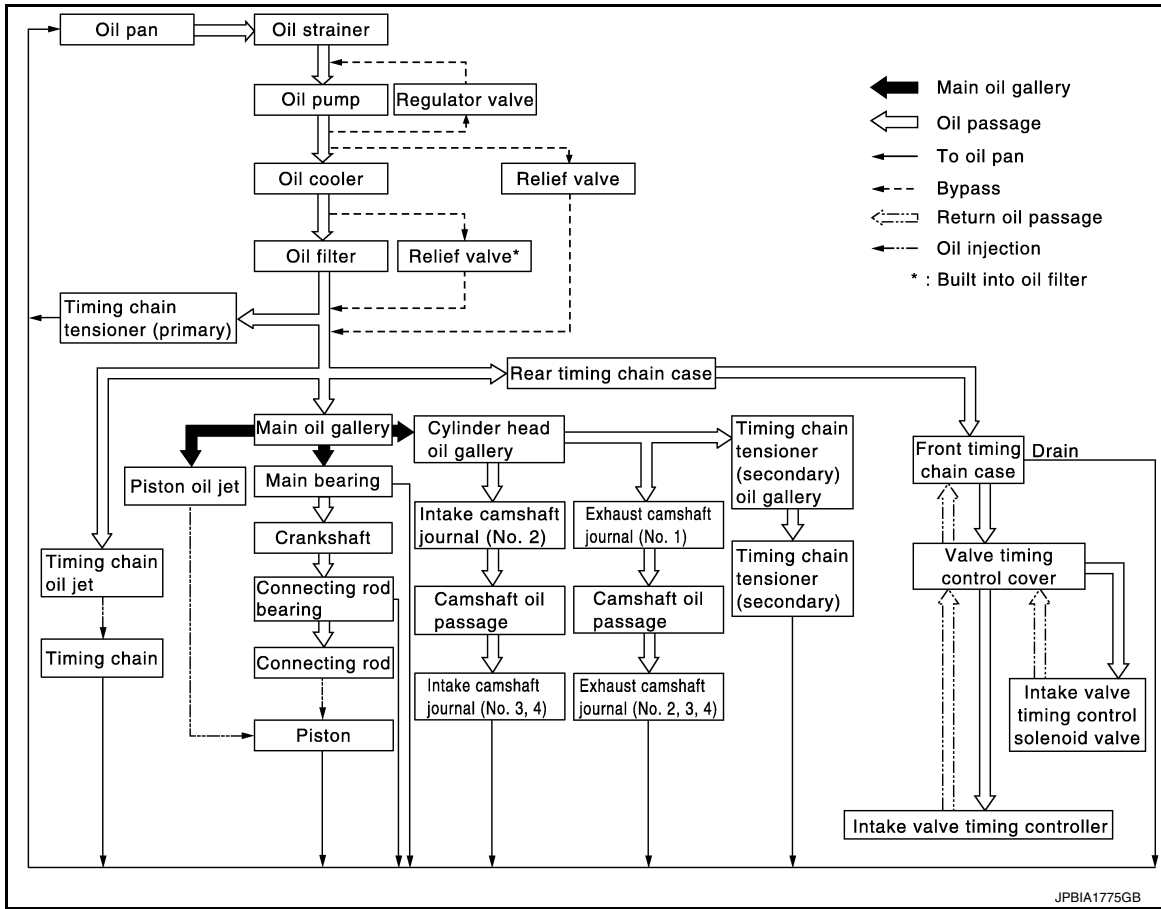
LUBRICATION SYSTEM

< SYSTEM DESCRIPTION >

[VQ35DE]

Schematic

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PERIODIC MAINTENANCE

ENGINE OIL

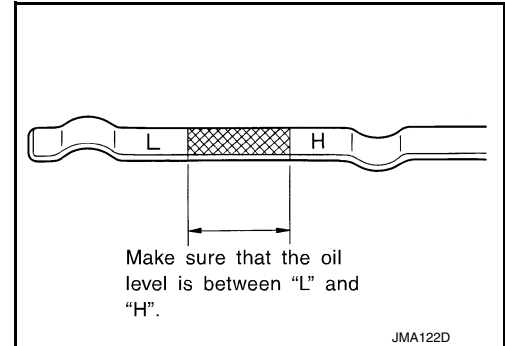
Inspection

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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
- Intake valve timing control cover
- Front timing chain cover
- Mating surface between cylinder block and cylinder head
- Mating surface between cylinder head and rocker cover
- Front oil seal
- Rear oil seal

ENGINE OIL PRESSURE CHECK

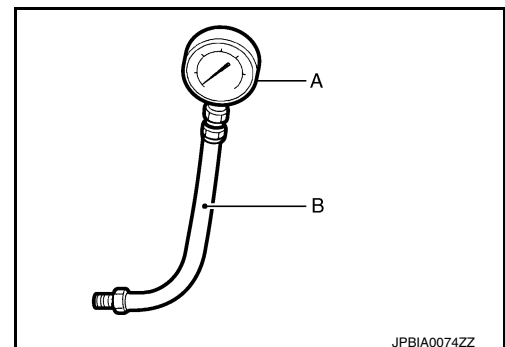
WARNING:

- **Be careful not to burn yourself, as engine oil may be hot.**
- **When checking engine oil pressure, shift selector position should be "P", and apply parking brake securely.**

1. Check the engine oil level. Refer to ENGINE OIL LEVEL.
2. Remove fender protector side cover. Refer to [EXT-36. "FENDER PROTECTOR : Exploded View"](#).
3. Disconnect the harness connector from the oil pressure switch. Remove oil pressure switch using suitable tool and install suitable tools (A/B).

CAUTION:

Do not drop or shock oil pressure switch.



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

5. Check oil pressure with engine running under no-load, using suitable tool.

NOTE:

- When engine oil temperature is low, engine oil pressure becomes high.
- If difference is extreme, check oil passage and oil pump for oil leaks.

Engine oil pressure : Refer to [LU-37, "Oil Pressure"](#).

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-21, "Recommended Chemical Products and Sealants"](#).

Oil pressure switch : Refer to [EM-178, "Exploded View"](#).

- c. After warming up engine, make sure there are no engine oil leaks.
7. Install fender protector side cover. Refer to [EXT-36, "FENDER PROTECTOR : Exploded View"](#).

Changing Engine Oil

INFOID:000000012602106

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.**

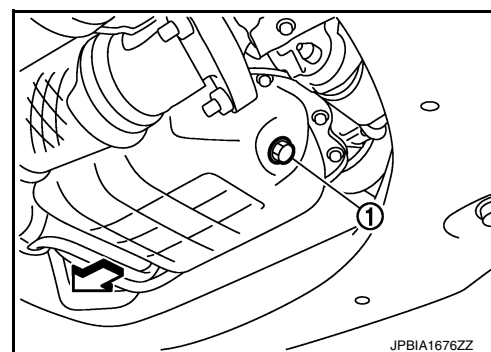
1. Position the vehicle so it is level on the hoist.
2. Warm up the engine and check for engine oil leaks from the engine.
3. Stop engine and wait for 10 minutes.
4. Remove the oil pan drain plug (1) and oil filler cap.

↔ : Front

5. Drain the engine oil.
6. Install the oil pan drain plug (1) with a new washer and refill the engine with new engine oil.

Oil specification and viscosity : Refer to [MA-12, "Engine Oil Recommendation"](#).

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 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 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 oil level gauge.

CAUTION:

Do not overfill the engine with engine oil.

OIL FILTER

Removal and Installation

INFOID:000000012602107

REMOVAL

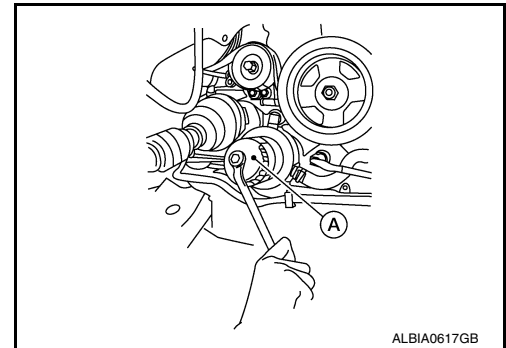
1. Drain engine oil. Refer to [LU-29, "Changing Engine Oil"](#).
2. Remove the fender protector side cover (RH). Refer to [EXT-36, "FENDER PROTECTOR : Exploded View"](#).
3. Remove the oil filter using suitable tool (A) as shown.

WARNING:

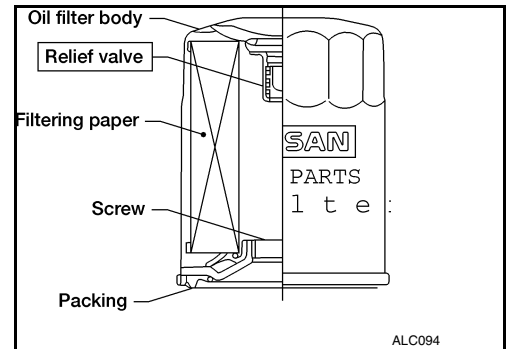
Be careful not to get burned, the engine and engine oil may be hot.

CAUTION:

- When removing, prepare a shop cloth to absorb any oil leaks 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.

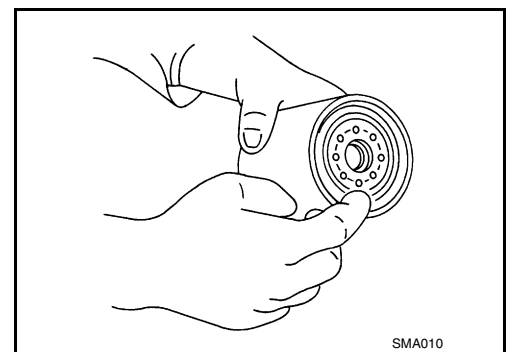


- The oil filter has a built in pressure relief valve. Use a Genuine NISSAN oil filter or equivalent.



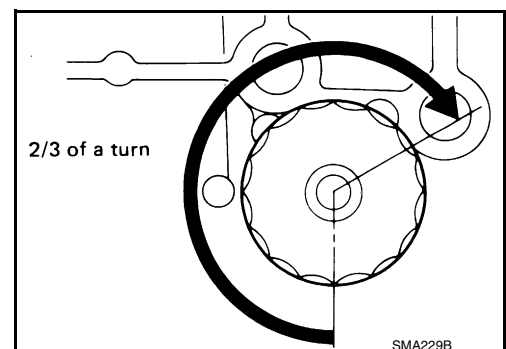
INSTALLATION

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.



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

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



OIL FILTER

< PERIODIC MAINTENANCE >

[VQ35DE]

4. Refill engine with new engine oil. Refer to [LU-29. "Changing Engine Oil"](#).
5. After warming up the engine, check for any engine oil leaks.
6. Install the fender protector side cover (RH). Refer to [EXT-36. "FENDER PROTECTOR : Exploded View"](#).

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OIL PUMP

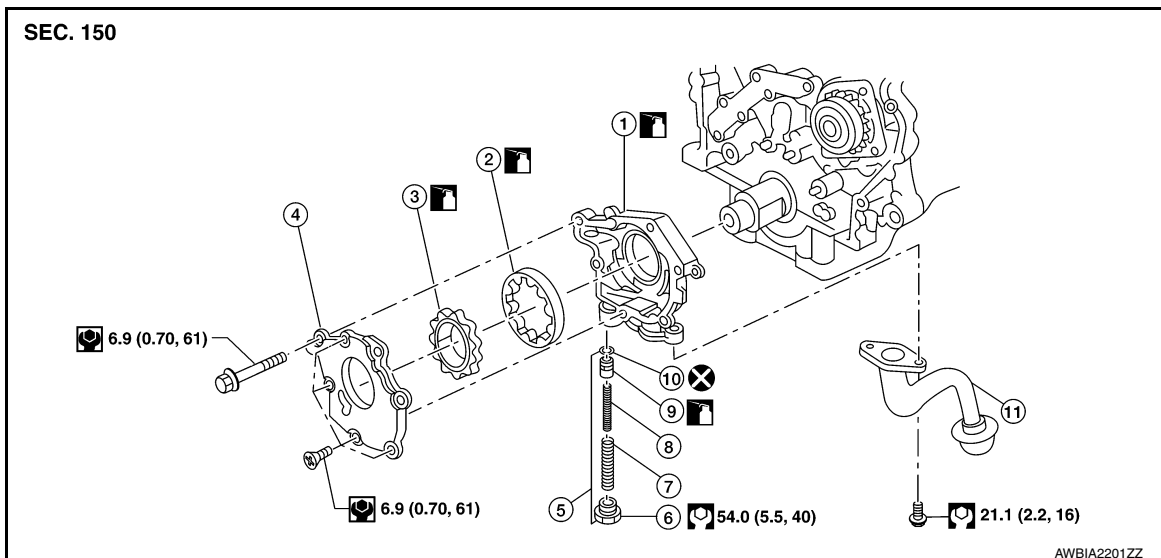
< REMOVAL AND INSTALLATION >

[VQ35DE]

REMOVAL AND INSTALLATION

OIL PUMP

Exploded View



- | | | |
|---------------------------|---------------------------|-------------------------|
| 1. Oil pump housing | 2. Oil pump outer rotor | 3. Oil pump inner rotor |
| 4. Oil pump cover | 5. Regulator valve set | 6. Regulator plug |
| 7. Regulator valve spring | 8. Regulator valve spring | 9. Regulator valve |
| 10. O-ring | 11. Oil strainer | |

Removal and Installation

INFOID:0000000012602109

REMOVAL

1. Remove the engine assembly from the vehicle. Refer to [EM-226, "Removal and Installation"](#).
2. Remove the upper oil pan. Refer to [EM-161, "Removal and Installation \(Upper Oil Pan\)"](#).
3. Remove the timing chain. Refer to [EM-187, "Removal and Installation"](#).
4. Remove oil pump assembly.

INSTALLATION

Installation is in the reverse order of removal.

- When installing, align crankshaft flat faces with inner rotor flat faces.

Disassembly and Assembly

INFOID:0000000012602110

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.

Assembly

CAUTION:

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

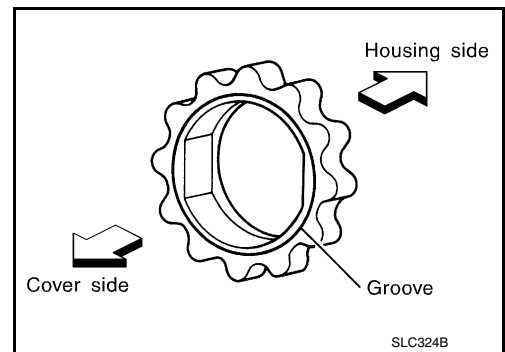
OIL PUMP

< REMOVAL AND INSTALLATION >

[VQ35DE]

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.



INFOID:000000012602111

Inspection

INSPECTION AFTER DISASSEMBLY

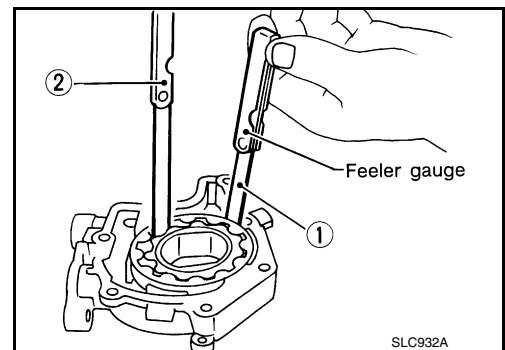
Clearance of Oil Pump Parts

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

Standard : Refer to [LU-37, "Oil Pump"](#).

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

Standard : Refer to [LU-37, "Oil Pump"](#).

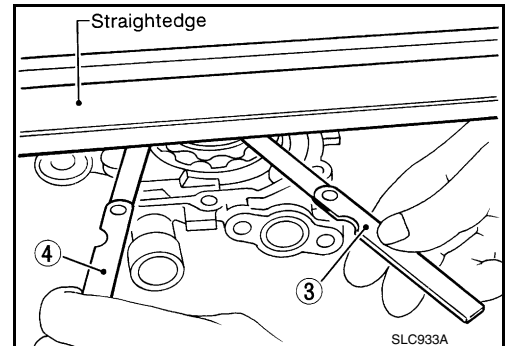


- Measure clearance with feeler gauge and straightedge.
- Side clearance between inner rotor and oil pump body (position 3).

Standard : Refer to [LU-37, "Oil Pump"](#).

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

Standard : Refer to [LU-37, "Oil Pump"](#).

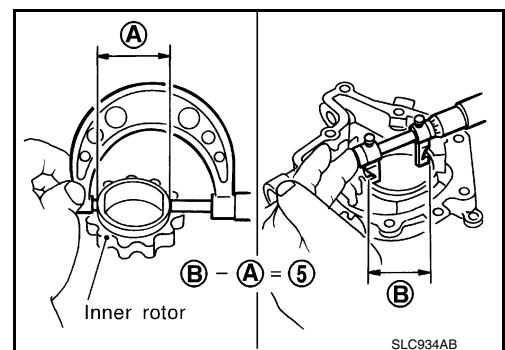


- Calculate the clearance between inner rotor and oil pump body as follows:

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 : Refer to [LU-37, "Oil Pump"](#).

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



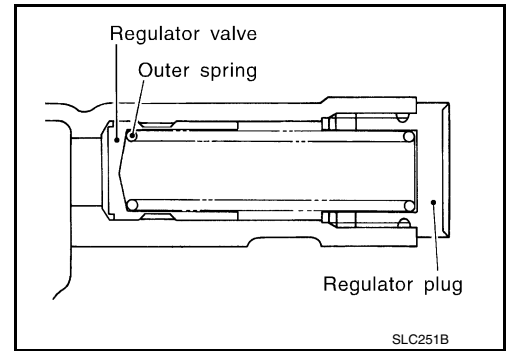
Regulator Valve

OIL PUMP

[VQ35DE]

< REMOVAL AND INSTALLATION >

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

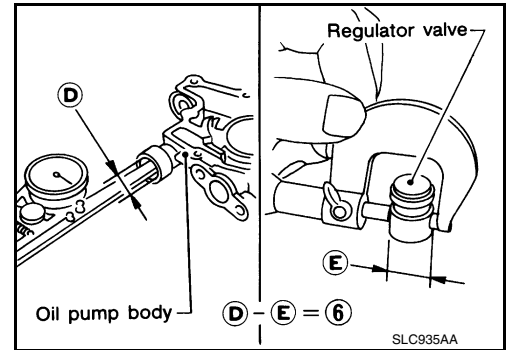
(Clearance 6) = D (Valve hole diameter) – E (Outer diameter of valve)

Standard : Refer to [LU-37, "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.



OIL COOLER

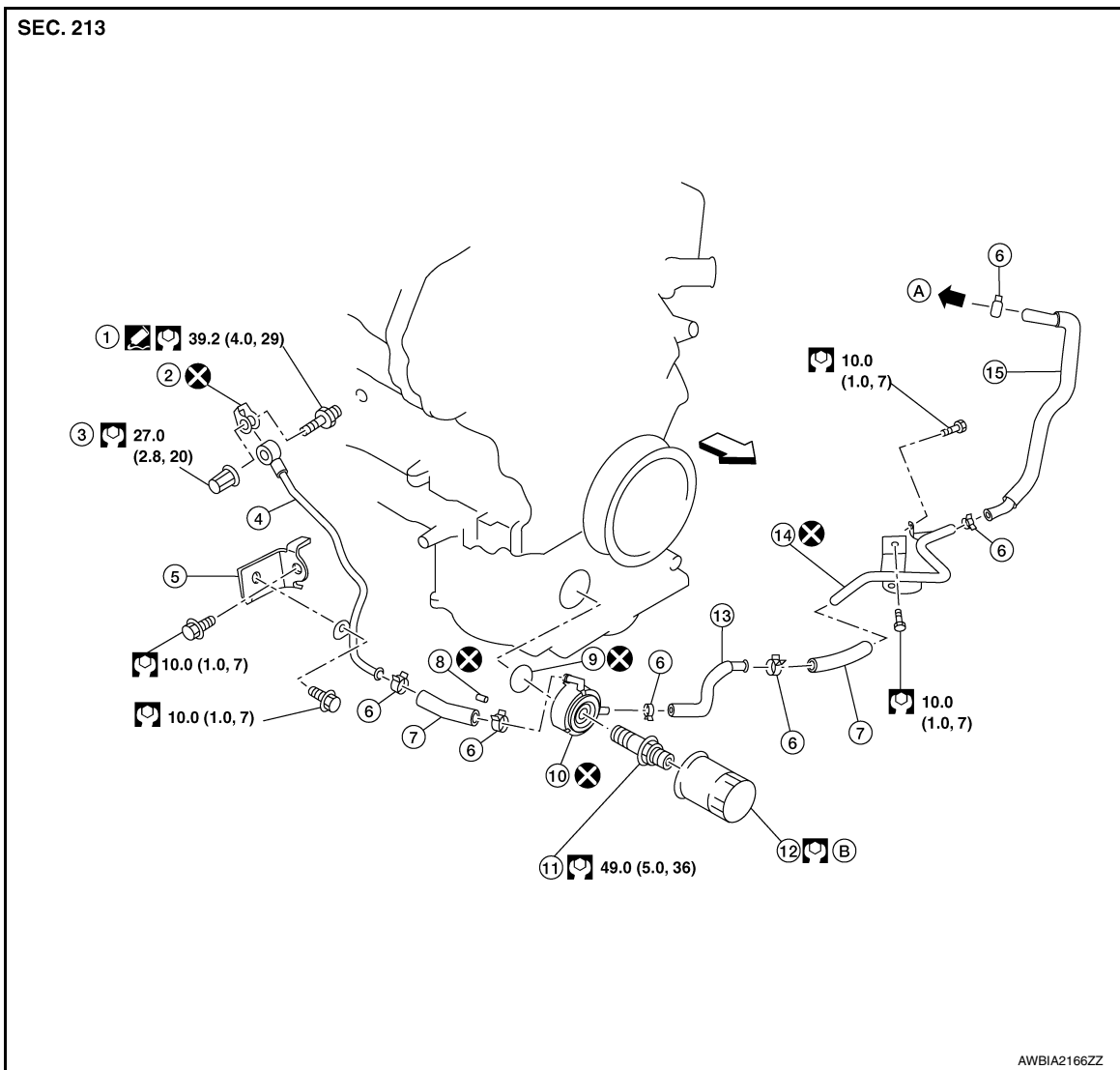
< REMOVAL AND INSTALLATION >

[VQ35DE]


OIL COOLER

Exploded View

INFOID:000000012602112



- | | | |
|-----------------------|---|----------------------|
| 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 LU-30. "Removal and Installation" | ↔ Engine front |

 Sealing point

Removal and Installation

INFOID:000000012602113

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:

OIL COOLER

[VQ35DE]

< REMOVAL AND INSTALLATION >

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

REMOVAL

1. Remove the engine under cover. Refer to [EXT-38, "FRONT UNDER COVER : Removal and Installation"](#).
2. Remove the front wheel and tire (RH) using power tool. Refer to [WT-52, "Inspection"](#).
3. Remove the front fender protector side cover (RH). Refer to [EXT-36, "FENDER PROTECTOR : Exploded View"](#).
4. Drain engine coolant. Refer to [CO-35, "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-30, "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

1. Check the engine oil level and the engine coolant level and add engine oil and engine coolant. Refer to [CO-33, "System Inspection"](#) and [LU-28, "Inspection"](#).
2. Start the engine, and check that there are no leaks of engine oil or engine coolant.
3. Stop the engine and wait for 10 minutes.
4. Check the engine oil level and the engine coolant level again. Refer to [LU-28, "Inspection"](#) and [CO-33, "System Inspection"](#).

SERVICE DATA AND SPECIFICATIONS (SDS)

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SERVICE DATA AND SPECIFICATIONS (SDS)

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Oil Pressure

INFOID:0000000012602114

Unit: kPa (kg/cm², psi)

Engine speed	Approximate discharge oil pressure*
Idle speed	98 (1.0, 14)
2,000 rpm	294 (3.0, 43)
6,000 rpm	392 (4.0, 57)

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

Oil Pump

INFOID:0000000012602115

Unit: mm (in)

Clearance between outer rotor and oil pump body	0.114 - 0.260 (0.0045 - 0.0102)
Tip clearance between inner rotor and outer rotor	At or below 0.180 (0.0071)
Side clearance between inner rotor and oil pump body	0.030 - 0.070 (0.0012 - 0.0028)
Side clearance between outer rotor and oil pump body	0.030 - 0.090 (0.0012 - 0.0035)
Clearance between inner rotor and oil pump body	0.045 - 0.091 (0.0018 - 0.0036)
Socket to side seal	0.010 - 0.060 (0.0004 - 0.0024)

Regulator Valve

INFOID:0000000012602116

Unit: mm (in)

Regulator valve to oil pump cover clearance	0.040 - 0.097 (0.0016 - 0.0038)
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Oil Capacity

INFOID:0000000012602117

Unit: ℓ (US qt, Imp qt)

Drain and refill	With oil filter change	4.8 (5-1/8, 4-1/4)
	Without oil filter change	4.5 (4-3/4, 4)
Dry engine (engine overhaul)		5.2 (5-1/2, 4-5/8)