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SECTION LU

ENGINE LUBRICATION SYSTEM

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|---|---|

< PRECAUTION >

PRECAUTION

PRECAUTIONS

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

INFOID:000000005806073

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.

Precautions For High-Voltage System

INFOID:000000005441595

Refer to [GI-24, "Precautions For High-Voltage System"](#).

Precaution for Liquid Gasket

INFOID:000000005441597

REMOVAL OF LIQUID GASKET SEALING

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

Tool number : KV10111100 (J-37228)

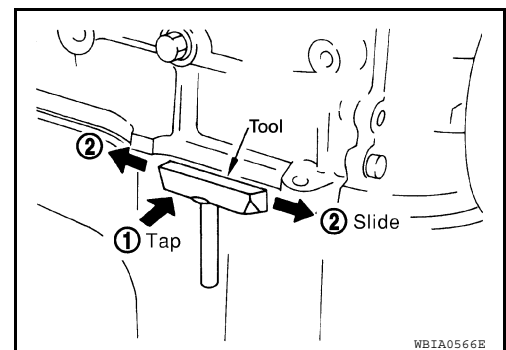
CAUTION:

Be careful not to damage the mating surfaces.

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

CAUTION:

If for some unavoidable reason suitable tool such as screw-driver is used, be careful not to damage the mating surfaces.



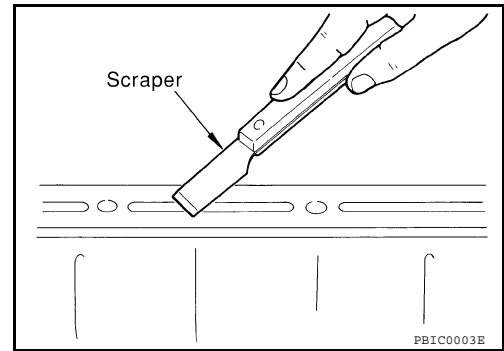
LIQUID GASKET APPLICATION PROCEDURE

PRECAUTIONS

[QR25DE]

< PRECAUTION >

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

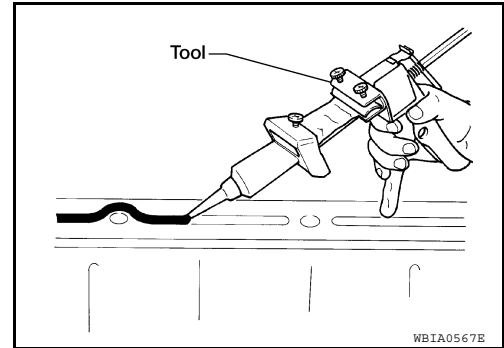


3. Attach liquid gasket tube to Tool.

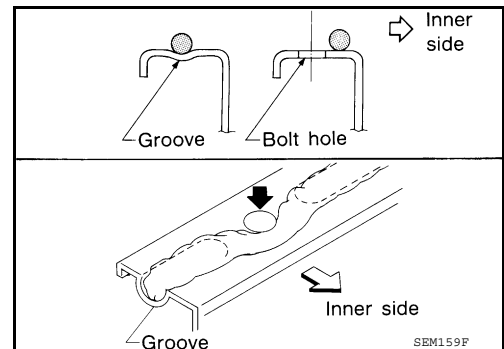
Tool number : WS39930000 (—)

Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-15, "Recommended Chemical Products and Sealants"](#).

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



- As for the bolt holes, normally apply liquid gasket inside the holes. Occasionally, it should be applied outside the holes. Make sure to read the text of service manual.
- Within five minutes of liquid gasket application, install the mating component.
- If liquid gasket protrudes, wipe it off immediately.
- Do not retighten nuts or bolts after the installation.
- After 30 minutes or more have passed from the installation, fill engine oil and engine coolant.



CAUTION:

If there are specific instructions in this manual, observe them.

PREPARATION

< PREPARATION >

[QR25DE]

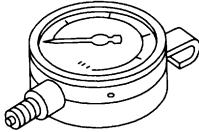
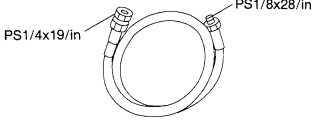

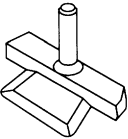
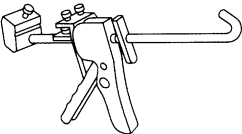
PREPARATION

PREPARATION

Special Service Tool

INFOID:000000005441598

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

| Tool number (Kent Moore No.) Tool name | Description |
|--|---|
| ST25051001 (J-25695-1) Oil pressure gauge <div style="text-align: center;">  <p>S-NT050</p> </div> | Measuring oil pressure Maximum measuring range: 2,452 kPa (25 kg/cm², 356 psi) |
| ST25052000 (J-25695-2) Hose <div style="text-align: center;">  <p>S-NT559</p> </div> | Adapting oil pressure gauge to cylinder block |
| KV10115801 (J-38956) Oil filter wrench <div style="text-align: center;">  <p>14 faces Inner span 64.3 mm (2.531 in) (Face to opposite face)</p> <p>S-NT772</p> </div> | Removing and installing oil filter |
| KV10111100 (J-37228) Seal cutter <div style="text-align: center;">  <p>S-NT046</p> </div> | Removing steel oil pan and rear timing chain case |
| WS39930000 (—) Tube presser <div style="text-align: center;">  <p>S-NT052</p> </div> | Pressing the tube of liquid gasket |

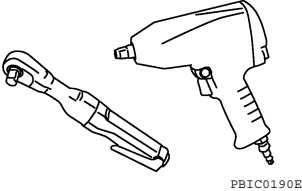
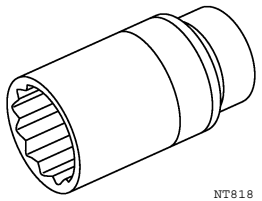
Commercial Service Tool

INFOID:000000005441599

PREPARATION

< PREPARATION >

[QR25DE]

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

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LUBRICATION SYSTEM

< FUNCTION DIAGNOSIS >

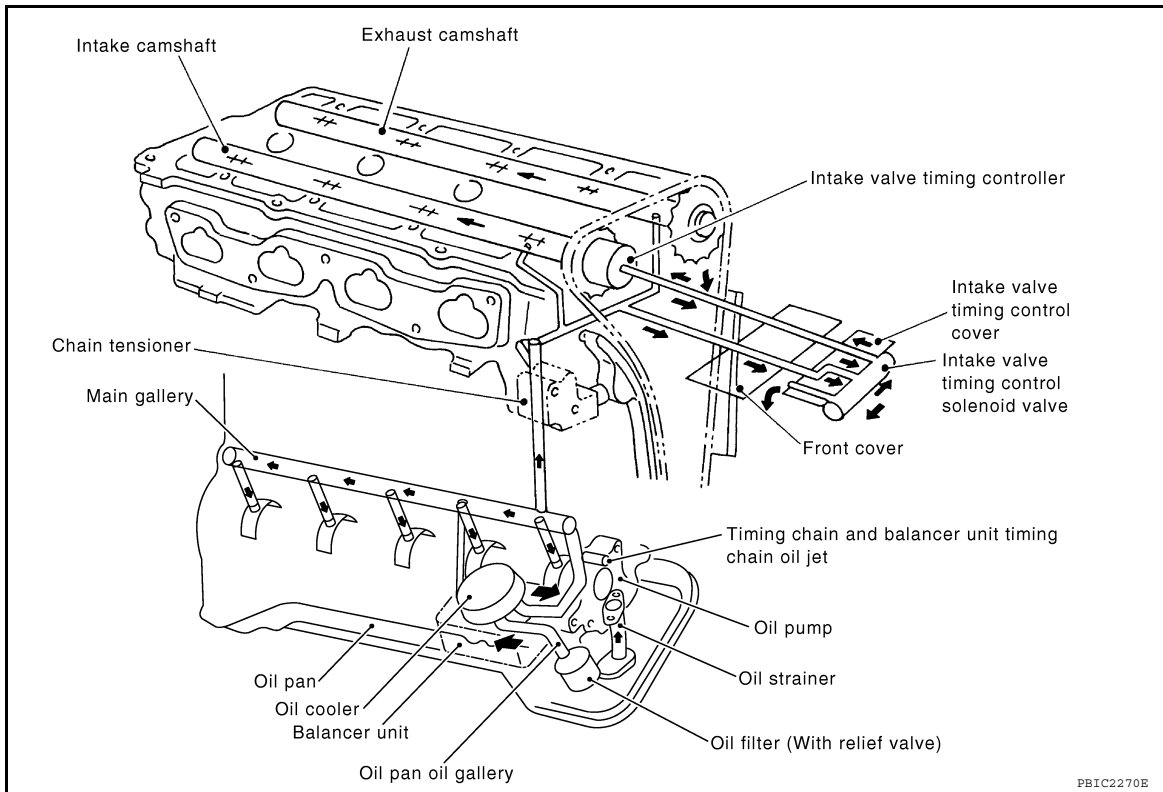
[QR25DE]

FUNCTION DIAGNOSIS

LUBRICATION SYSTEM

Lubrication Circuit

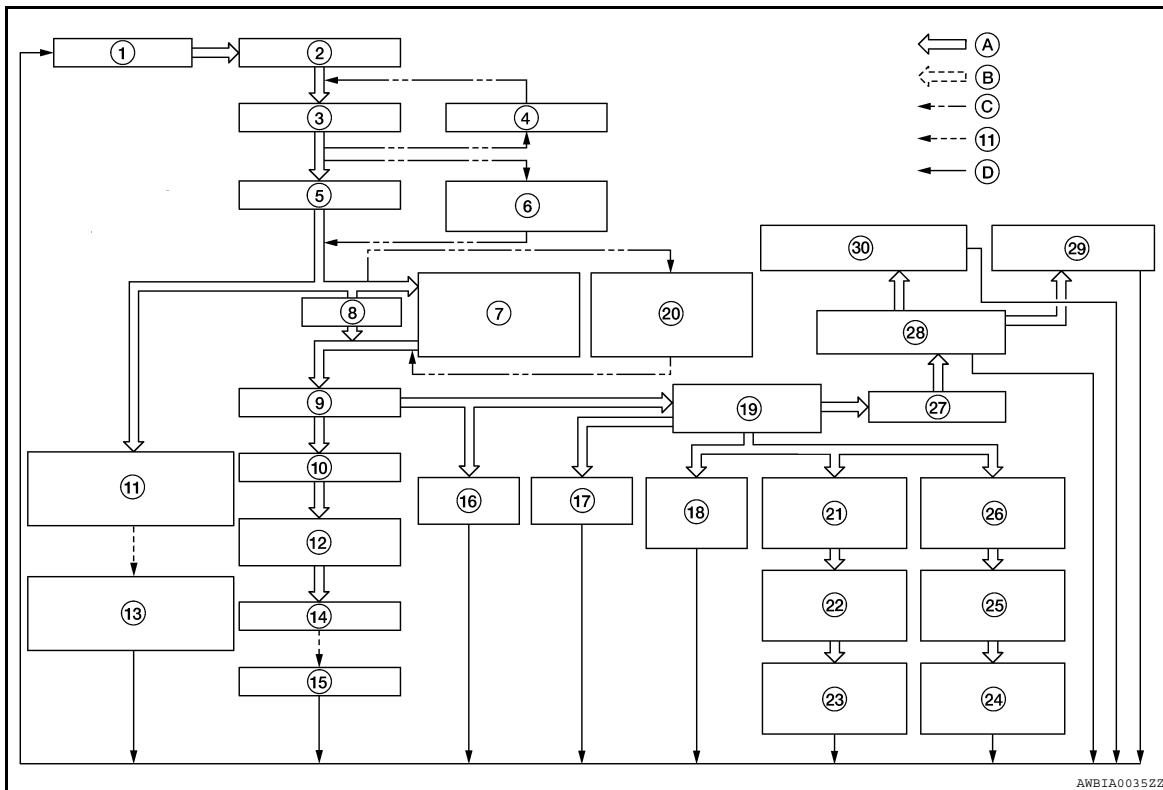
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PBIC2270E

Schematic

INFOID:000000005441601



AWBIA0035Z2

LUBRICATION SYSTEM

< FUNCTION DIAGNOSIS >

[QR25DE]

| | | | |
|---|---|--|-----------|
| 1. Oil pan | 2. Oil strainer | 3. Oil pump | A |
| 4. Regulator valve | 5. Oil filter | 6. Relief valve (Built in oil filter) | |
| 7. Oil cooler | 8. Bypass | 9. Main gallery | |
| 10. Main bearing | 11. Timing chain and balancer unit timing chain oil jet | 12. Connecting rod bearing | LU |
| 13. Timing chain and balancer unit timing chain | 14. Connecting rod | 15. Piston | |
| 16. Balancer unit | 17. Chain tensioner | 18. Camshaft bracket (No.1) | C |
| 19. Cylinder head oil gallery | 20. Relief valve | 21. Intake camshaft bracket (No.2) | |
| 22. Intake camshaft oil passage | 23. Intake camshaft journal | 24. Exhaust camshaft journal | D |
| 25. Exhaust camshaft oil passage | 26. Exhaust camshaft bracket (No.2) | 27. Front cover | |
| 28. Intake valve timing control cover | 29. Intake valve timing controller | 30. Intake valve timing control solenoid valve | |
| A. Oil passage | B. Return oil passage | C. Bypass | E |
| D. To oil pan | | | |

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ON-VEHICLE MAINTENANCE

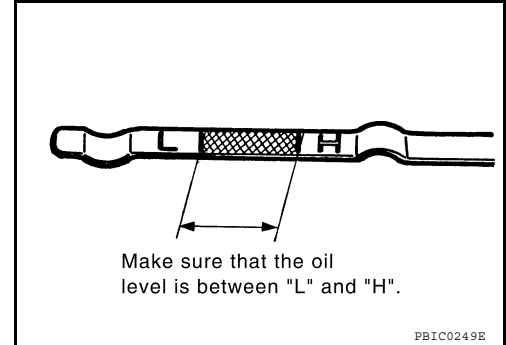
ENGINE OIL

Inspection

INFOID:000000005441602

OIL LEVEL

- Before turning the Hybrid System ON, check the oil level. If the Hybrid System is already ON, turn OFF the Hybrid System and allow 10 minutes before checking.
- Check that the oil level is within the range on the dipstick.
- If it is out of range, add oil as necessary. Refer to [LU-8. "Inspection"](#).



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 LEAKAGE

Check for oil leakage around the following areas:

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

OIL PRESSURE CHECK

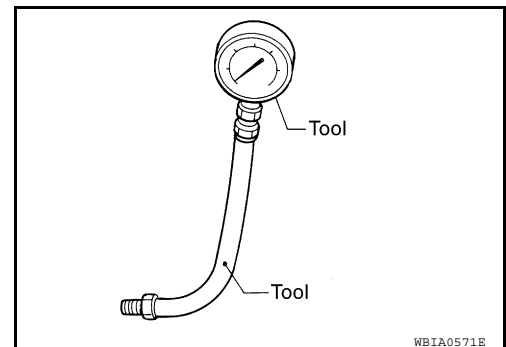
WARNING:

- **Be careful not to burn yourself, as engine oil may be hot.**
 - **Put the CVT shift selector in the Park "P" position.**
1. Check engine oil level. Refer to [LU-8. "Inspection"](#).
 2. Remove engine under cover. Refer to [EXT-13. "Removal and Installation"](#).
 3. Disconnect oil pressure switch harness connector at oil pressure switch. Remove oil pressure switch and install Tools.

CAUTION:

Do not drop or shock oil pressure switch.

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



4. Turn Hybrid System ON and warm the engine up to normal operating temperature.
5. Check oil pressure with Hybrid System ON and engine running under no-load, using Tool. Refer to [LU-17. "Oil Pressure"](#).

If difference is extreme, check oil passage and oil pump for oil leaks.

NOTE:

ENGINE OIL

< ON-VEHICLE MAINTENANCE >

[QR25DE]

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 adhering to oil pressure switch and oil cooler.
 - b. Apply liquid gasket and tighten oil pressure switch to the specification.

Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-15, "Recommended Chemical Products and Sealants"](#).

Oil pressure switch torque : 14.8 N·m (1.5 kg·m, 11 ft·lb)

- c. With the Hybrid System ON and after warming up engine, make sure there are no engine oil leaks with engine running.

Changing Engine Oil

INFOID:000000005441603

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. Turn Hybrid System ON and warm up the engine, and check for oil leaks from the engine.
3. Turn Hybrid System OFF and wait for 10 minutes.
4. Remove the oil pan drain plug and oil filler cap.
5. Drain the engine oil.
6. Install the oil pan drain plug with a new washer and refill the engine with new engine oil.

CAUTION:

- **Be sure to clean the 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 dipstick to determine when the proper amount of oil is in the engine.**

Oil specification and viscosity : Refer to [MA-11, "Engine Oil Recommendation"](#)

Oil pan drain plug : Refer to [EM-32, "Removal and Installation \(Upper Oil Pan\)"](#)

7. Turn Hybrid System ON and warm up the engine and check the area around the drain plug and oil filter for oil leakage.
8. Turn the Hybrid System OFF and wait for 10 minutes.
9. Check the oil level using the dipstick.

CAUTION:

Do not overfill the engine with engine oil.

OIL FILTER

< ON-VEHICLE MAINTENANCE >

[QR25DE]

OIL FILTER

Removal and Installation

INFOID:000000005441604

REMOVAL

1. Drain engine oil. Refer to [LU-9, "Changing Engine Oil"](#).
2. Remove fender protector side cover RH. Refer to [EXT-19, "Removal and Installation"](#).
3. Remove the oil filter using Tool.

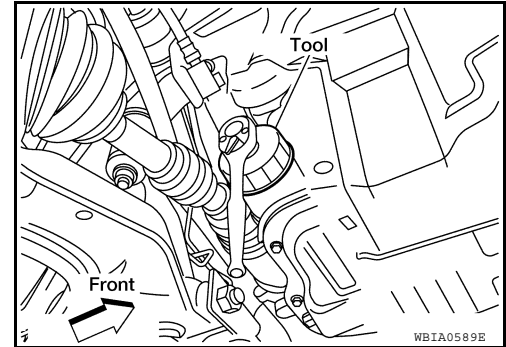
Tool number : KV10115801 (J-38956)

WARNING:

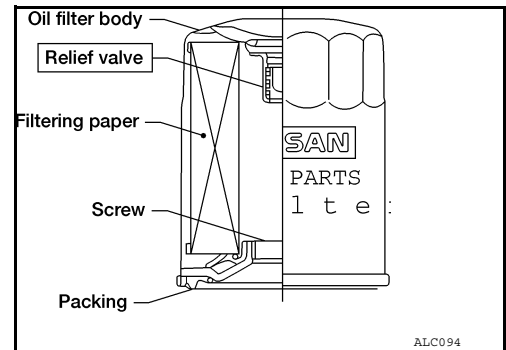
- Be careful not to get burned when the engine and engine oil are hot.

CAUTION:

- When removing, prepare a shop cloth to absorb any oil leakage or spillage.
- Do not allow engine oil to adhere to the drive belts.
- Completely wipe off any oil that adheres to the engine and the vehicle.

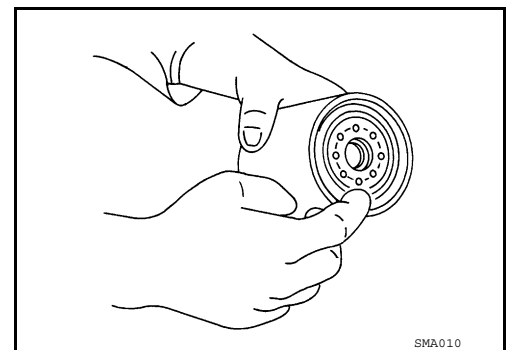


- The oil filter has a built in pressure relief valve. Use a genuine NISSAN oil filter or equivalent



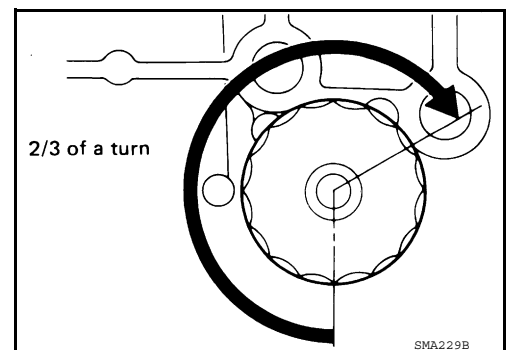
INSTALLATION

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 : 18.0 N-m (1.8 kg-m, 13 ft-lb)



OIL FILTER

< ON-VEHICLE MAINTENANCE >

[QR25DE]

4. Refill engine with new engine oil. Refer to [LU-9. "Changing Engine Oil"](#).
5. Turn the Hybrid System ON and after warming up the engine, check for oil leaks.
6. Install fender protector side cover RH. Refer to [EXT-19. "Removal and Installation"](#).

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ON-VEHICLE REPAIR

OIL PUMP

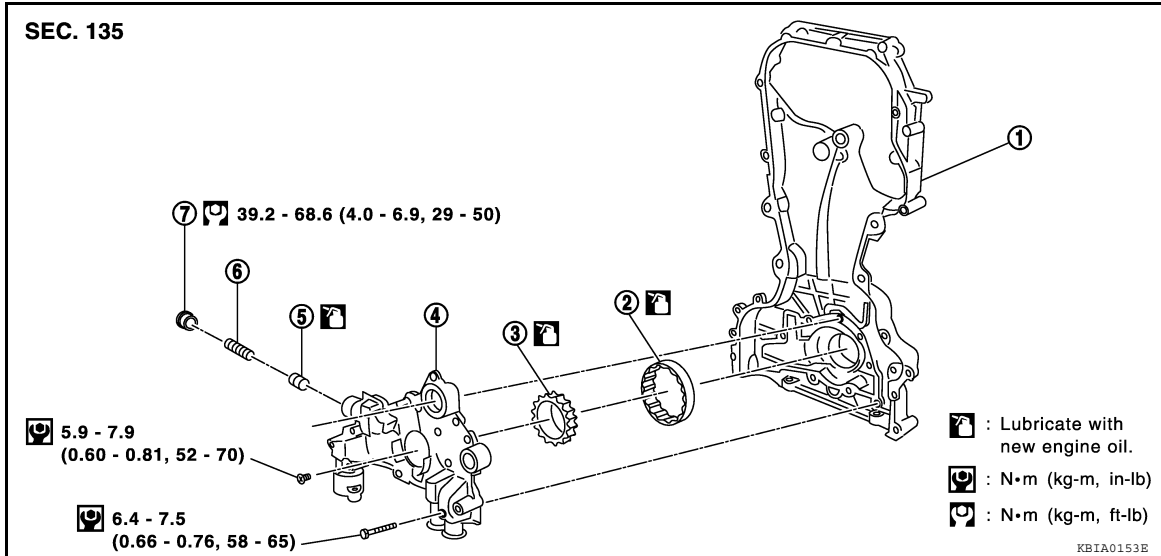
Removal and Installation

INFOID:000000005441605

The oil pump is part of the front cover, for removal and installation of the oil pump it is necessary to remove and install the front cover. Refer to [EM-51. "Removal and Installation"](#).

Disassembly and Assembly

INFOID:000000005441606



- | | | |
|-------------------|--------------------|----------------|
| 1. Front cover | 2. Outer rotor | 3. Inner rotor |
| 4. Oil pump cover | 5. Regulator valve | 6. Spring |
| 7. Regulator plug | | |

CAUTION:

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

DISASSEMBLY

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

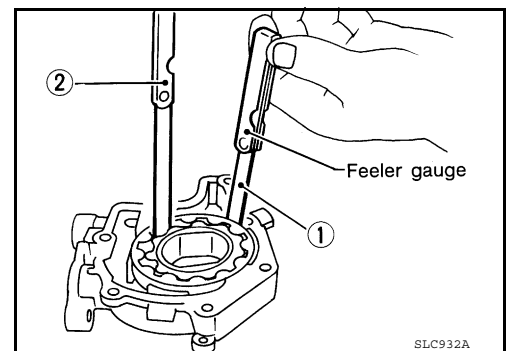
INSPECTION AFTER DISASSEMBLY

Measure the clearance of the oil pump parts to check they are within specification.

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

Standard : 0.114 - 0.179 mm (0.0045 - 0.0070 in)
 - Tip clearance between inner rotor and outer rotor (position 2).

Standard : 0.170 - 0.220 mm (0.0067 - 0.0087 in)



OIL PUMP

[QR25DE]

< ON-VEHICLE REPAIR >

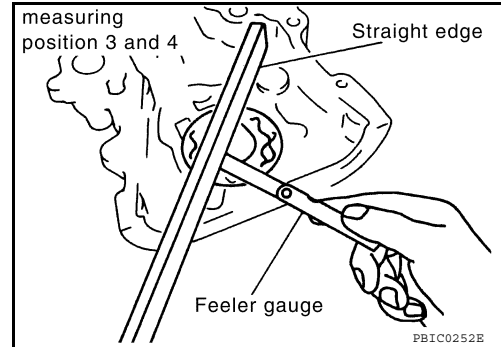
2. Measure clearance with feeler gauge and straightedge as follows:

- Side clearance between inner rotor and oil pump body (position 3).

Standard : 0.030 - 0.070 mm (0.0012 - 0.0028 in)

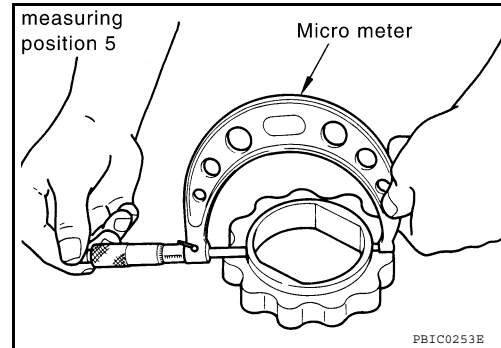
- Side clearance between outer rotor and oil pump body (position 4).

Standard : 0.060 - 0.110 mm (0.0024 - 0.0043 in)



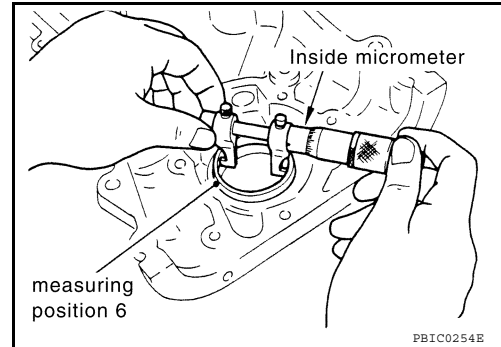
3. Calculate the clearance between inner rotor and oil pump body as follows:

- Measure the outer diameter of protruded portion of inner rotor (Position 5).



- Measure the inner diameter of oil pump body with inside micrometer (Position 6).
- (Clearance) = (Inner diameter of oil pump body) – (Outer diameter of inner rotor).

Standard : 0.035 - 0.070 mm (0.0014 - 0.0028 in)



4. Calculate regulator valve clearance as follows:

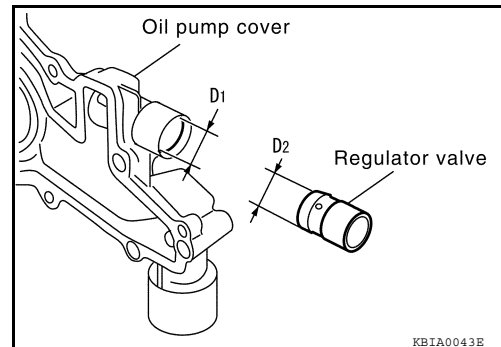
- (Clearance) = D1 (Valve hole diameter) – D2 (Outer diameter of valve)

Standard : 0.040 - 0.097 mm (0.0016 - 0.0038 in)

CAUTION:

Coat regulator valve with engine oil.

Check that it falls smoothly into the valve hole by its own weight.



ASSEMBLY

OIL PUMP

[QR25DE]

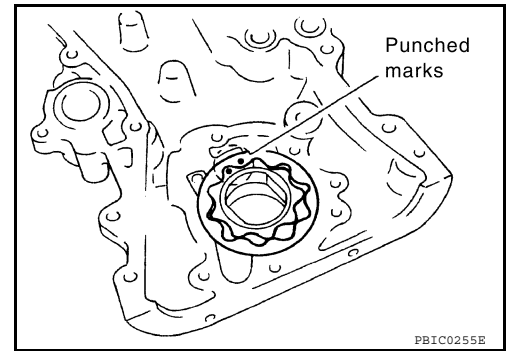
< ON-VEHICLE REPAIR >

Assembly is in the reverse order of disassembly.

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

CAUTION:

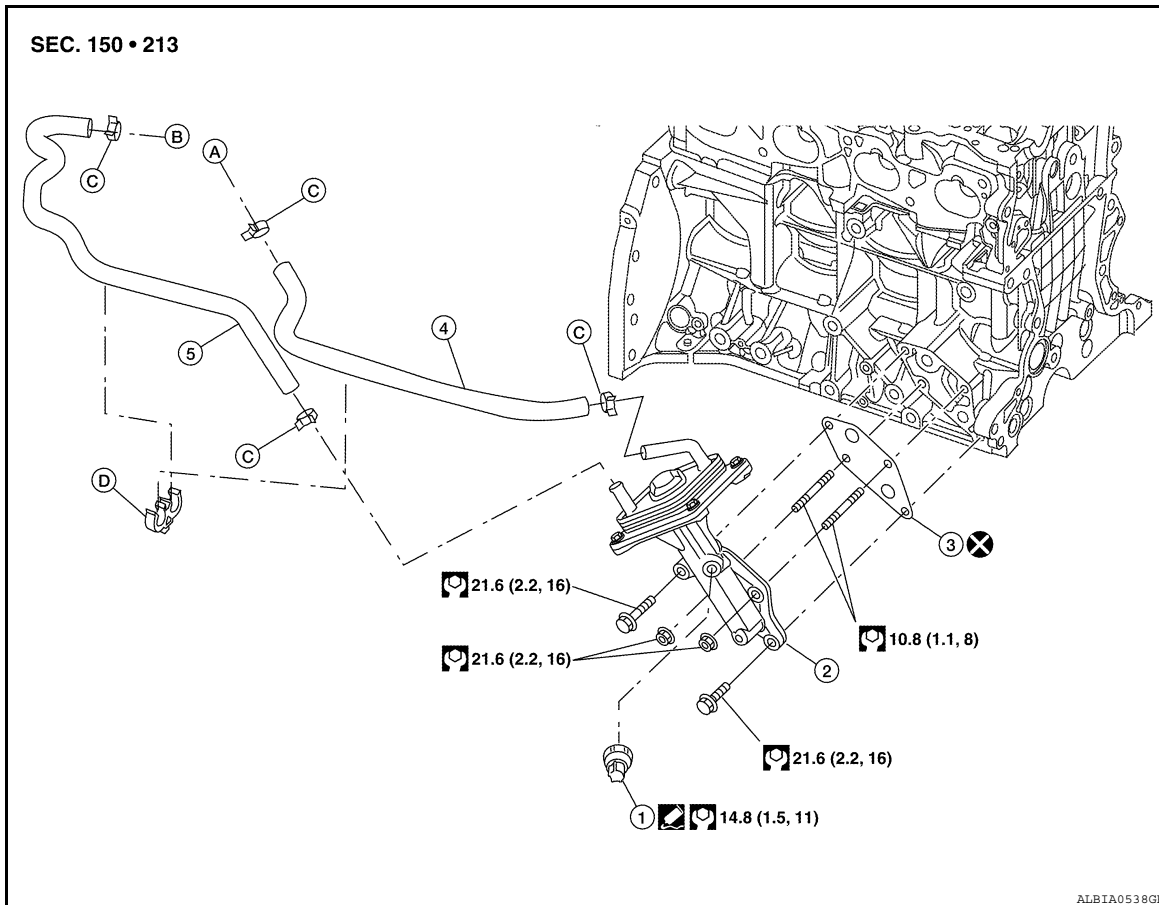
Before assembly, apply new engine oil to the parts as specified.



OIL COOLER

Removal and Installation

INFOID:000000005441607



- | | | |
|----------------------------|-----------------------|-----------------------------------|
| 1. Oil pressure switch | 2. Oil cooler | 3. Gasket |
| 4. Water hose (outlet) | 5. Water hose (inlet) | A. To water control valve housing |
| B. To heater pipe assembly | C. Hose clamp | D. Clip |

WARNING:

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

CAUTION:

- When removing the oil cooler, use a shop cloth to absorb any engine oil leaks or spills.
- Completely wipe off any engine oil that adhere to the engine and the vehicle.

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"](#).
CAUTION:
Do not spill coolant on the drive belt.
3. Remove front RH wheel and tire. Refer to [WT-60, "Adjustment"](#).
4. Remove fender protector side cover RH. Refer to [EXT-19, "Removal and Installation"](#).
5. Remove front exhaust tube. Refer to [EX-5, "Exploded View"](#).
6. Disconnect the oil pressure switch connector and remove the oil pressure switch.
CAUTION:
Do not drop or shock the oil pressure switch.
7. Disconnect the water hoses from the oil cooler.
NOTE:
For reference during installation, put matching marks on oil cooler hoses.

OIL COOLER

[QR25DE]

< ON-VEHICLE REPAIR >

8. Remove oil cooler bolts and oil cooler.
9. Remove oil cooler gasket.

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 assembly.

INSTALLATION

Installation is in the reverse order of removal.

- Remove any old liquid gasket adhering to the oil pressure switch and oil cooler before installing the oil pressure switch.

INSPECTION AFTER INSTALLATION

Turn the Hybrid System ON and start engine. Check that there are no engine oil or coolant leaks.

SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[QR25DE]

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Oil Pressure

INFOID:000000005441608

Unit: kPa (kg/cm², psi)

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

Oil Pump

INFOID:000000005441609

Unit: mm (in)

| | |
|--|---------------------------------|
| Body to outer rotor radial clearance | 0.114 - 0.179 (0.0045 - 0.0070) |
| Inner rotor to outer rotor tip clearance | 0.170 - 0.220 (0.0067 - 0.0087) |
| Body to inner rotor axial clearance | 0.030 - 0.070 (0.0012 - 0.0028) |
| Body to outer rotor axial clearance | 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:000000005441610

Unit: mm (in)

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

Oil Capacity

INFOID:000000005441611

Oil Capacity (Approximate)

Unit: ℓ (US qt, Imp qt)

| | | |
|------------------------------|---------------------------|--------------------|
| Drain and refill | With oil filter change | 4.6 (4 7/8, 4) |
| | Without oil filter change | 4.3 (4 1/2, 3 3/4) |
| Dry engine (engine overhaul) | | 5.4 (5 3/4, 4 3/4) |