SECTION LU
ENGINE LUBRICATION SYSTEM

CONTENTS

VQ37VHR

PRECAUTION

PRECAUTIONS

Precautions For Engine Service

INFOID:0000000011283021

DISCONNECTING FUEL PIPING

- Before starting work, check no fire or spark producing items are in the work area.
- Release fuel pressure before disconnecting and disassembly.
- After disconnecting pipes, plug openings to stop fuel leakage.

DRAINING ENGINE COOLANT

Drain engine coolant and engine oil when the engine is cooled.

INSPECTION, REPAIR AND REPLACEMENT

Before repairing or replacing, thoroughly inspect parts. Inspect new replacement parts in the same way, and replace if necessary.

REMOVAL AND DISASSEMBLY

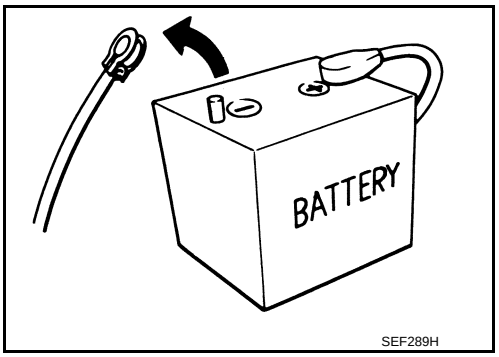
- When instructed to use SST, use specified tools. Always be careful to work safely, avoid forceful or uninstructed operations.
- Exercise maximum care to avoid damage to mating or sliding surfaces.
- Dowel pins are used for several parts alignment. When replacing and reassembling parts with dowel pins, check that dowel pins are installed in the original position.
- Must cover openings of engine system with a tape or equivalent, to seal out foreign materials.
- Mark and arrange disassembly parts in an organized way for easy troubleshooting and reassembly.
- When loosening nuts and bolts, as a basic rule, start with the one furthest outside, then the one diagonally opposite, and so on. If the order of loosening is specified, do exactly as specified. Power tools may be used in the step.

ASSEMBLY AND INSTALLATION

- Use torque wrench to tighten bolts or nuts to specification.
- When tightening nuts and bolts, as a basic rule, equally tighten in several different steps starting with the ones in center, then ones on inside and outside diagonally in this order. If the order of tightening is specified, do exactly as specified.
- Replace with new gasket, packing, oil seal or O-ring.
- Thoroughly wash, clean, and air-blow each part. Carefully check engine oil or engine coolant passages for any restriction and blockage.
- Avoid damaging sliding or mating surfaces. Completely remove foreign materials such as cloth lint or dust. Before assembly, oil sliding surfaces well.
- After disassembling, or exposing any internal engine parts, change engine oil and replace oil filter with a new one.
- Release air within route when refilling after draining engine coolant.
- After repairing, start the engine and increase engine speed to check engine coolant, fuel, engine oil, and exhaust gases for leakage.

Precautions for Removing Battery Terminal

INFOID:0000000011564785

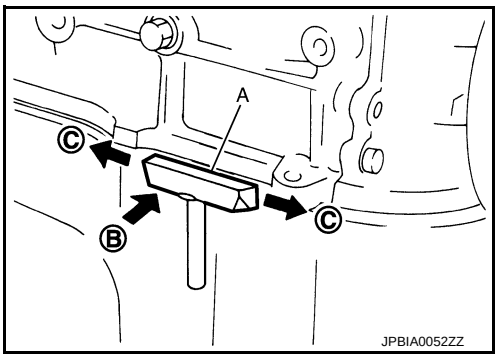


- When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.
  NOTE:
  ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.
- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.
  NOTE:
  If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.
- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.
  NOTE:
  The removal of 12V battery may cause a DTC detection error.

Liquid Gasket

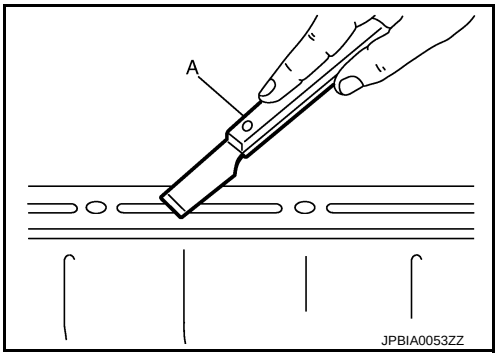
INFOID:0000000011283022

REMOVAL OF LIQUID GASKET SEALING

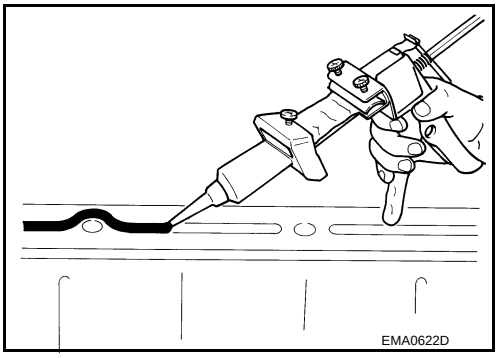


- After removing mounting nuts and bolts, separate the mating surface using the seal cutter [SST: KV10111100] (A) and remove old liquid gasket sealing.
  CAUTION:
  Never damage the mating surfaces.
- Tap the seal cutter [SST: KV10111100] to insert it Ⓑ, and then slide it Ⓒ by tapping on the side as shown in the figure.
- In areas where the seal cutter [SST: KV10111100] is difficult to use, lightly tap the parts using a plastic hammer to remove it.
  CAUTION:
  If for some unavoidable reason tool such as a screwdriver is used, be careful not to damage the mating surfaces.

LIQUID GASKET APPLICATION PROCEDURE



1. Using a scraper (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, mounting bolts, and bolt holes.
2. Wipe the liquid gasket application surface and the mating surface with white gasoline (lighting and heating use) to remove adhering moisture, grease and foreign materials.

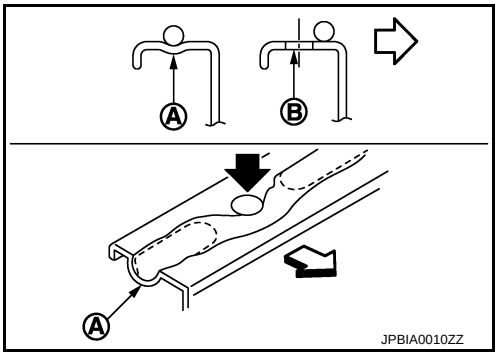


3. Attach liquid gasket tube to the tube presser (commercial service tool).
   Use Genuine Liquid Gasket or equivalent.
4. Apply liquid gasket without gaps to the specified location according to the specified dimensions.
   - If there is a groove for liquid gasket application, apply liquid gasket to the groove.

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

Ⓐ : Groove

⇦ : Inside



- Within five minutes of liquid gasket application, install the mating component.
- If liquid gasket protrudes, wipe it off immediately.
- Do not retighten mounting bolts or nuts 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.

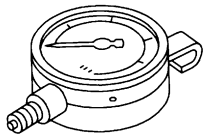
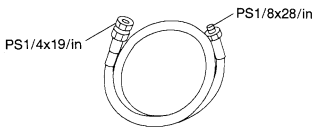
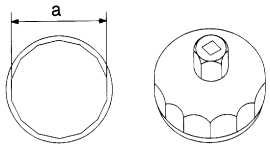
PREPARATION

PREPARATION

Special Service Tools

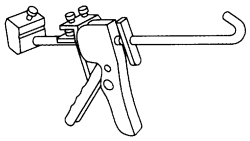
INFOID:0000000011283023

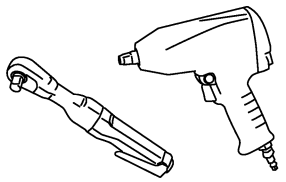
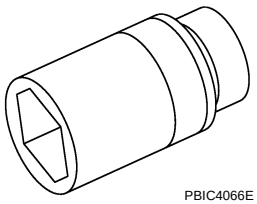
The actual shapes of TechMate tools may differ from those of special service tools illustrated here.

Tool number (TechMate No.) Tool name	Description
ST25051001 (J-25695-1) Oil pressure gauge  NT050	Measuring oil pressure **Maximum measuring range: 2,452 kPa (25 kg/cm^2, 356 psi)**
ST25052000 (J-25695-2) Hose  S-NT559	Adapting oil pressure gauge to oil pan (upper)
KV10115801 (J-38956) Oil filter wrench  S-NT375	Removing and installing oil filter **a: 64.3 mm (2.531 in)**

Commercial Service Tools

INFOID:0000000011283024

Tool name	Description
Tube presser  NT052	Pressing tube of liquid gasket

Tool name	Description
Power tools  PBIC0190E	Loosening nuts and bolts
Deep socket  PBIC4066E	Removing and installing oil pressure switch **27 mm (1.06 in)**

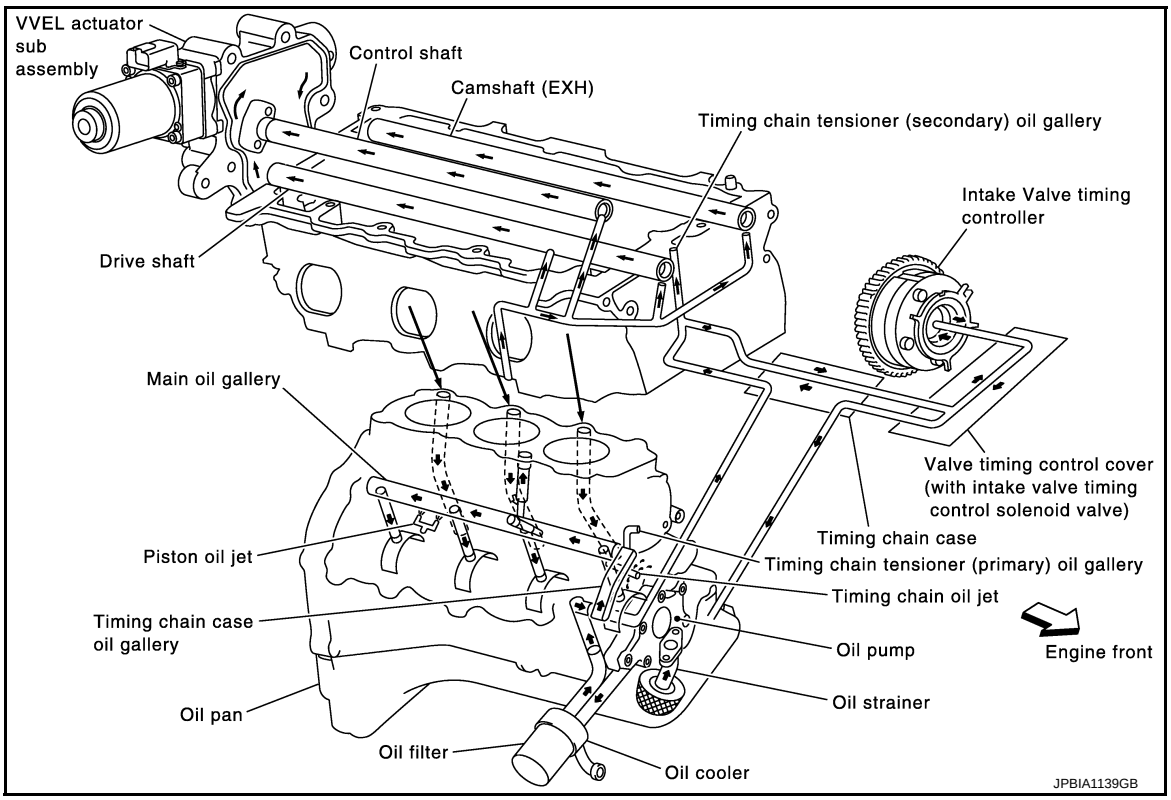
SYSTEM DESCRIPTION

DESCRIPTION

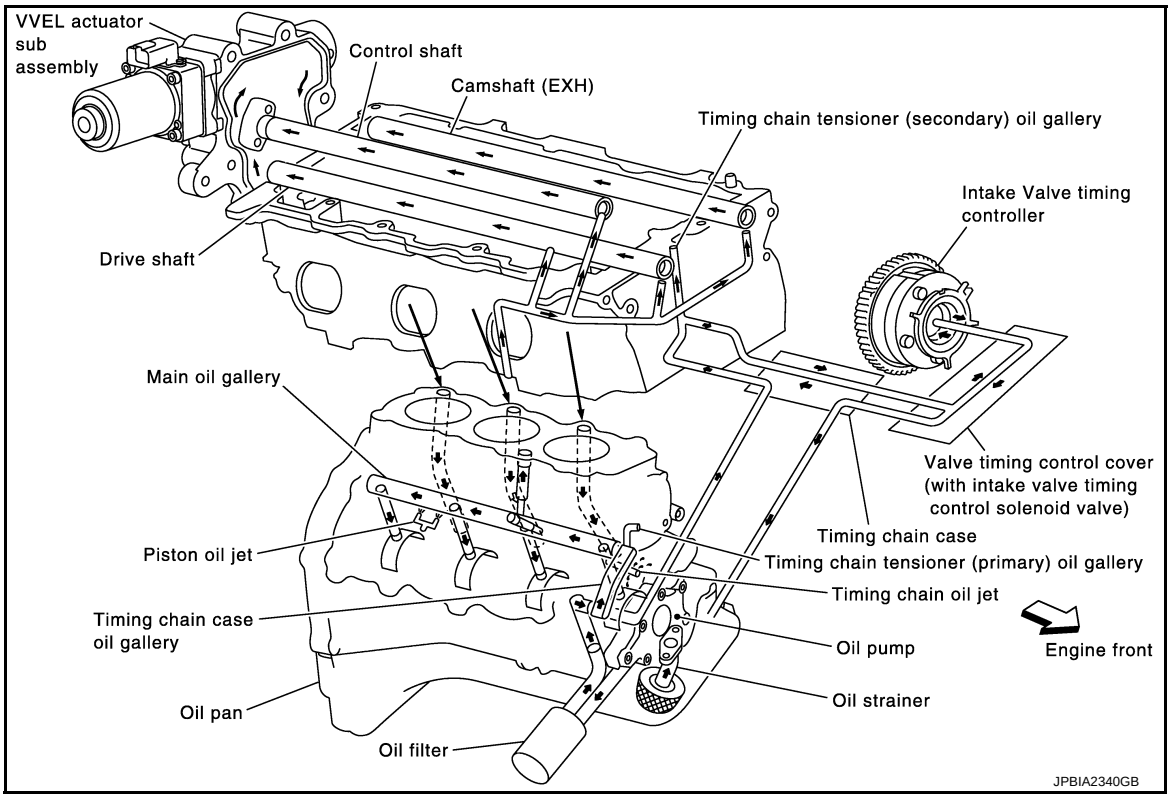
Engine Lubrication System

INFOID:0000000011283025

WITH OIL COOLER MODELS



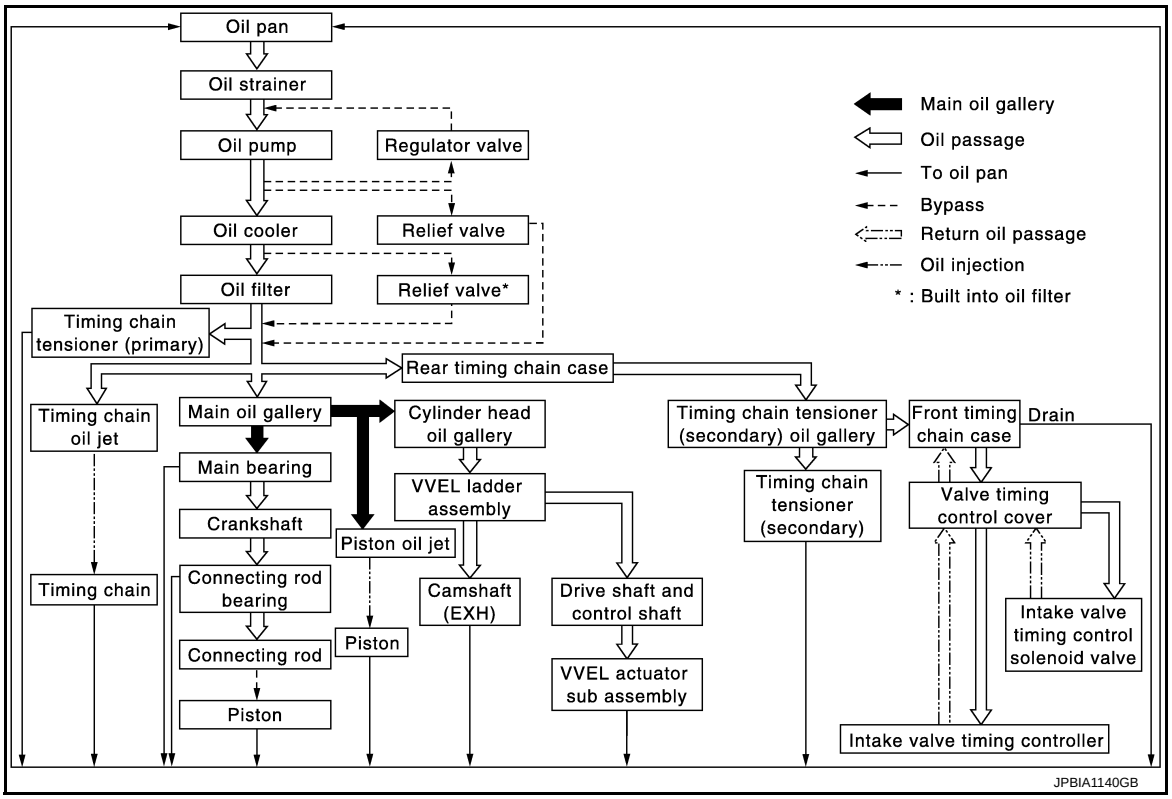
WITHOUT OIL COOLER MODELS



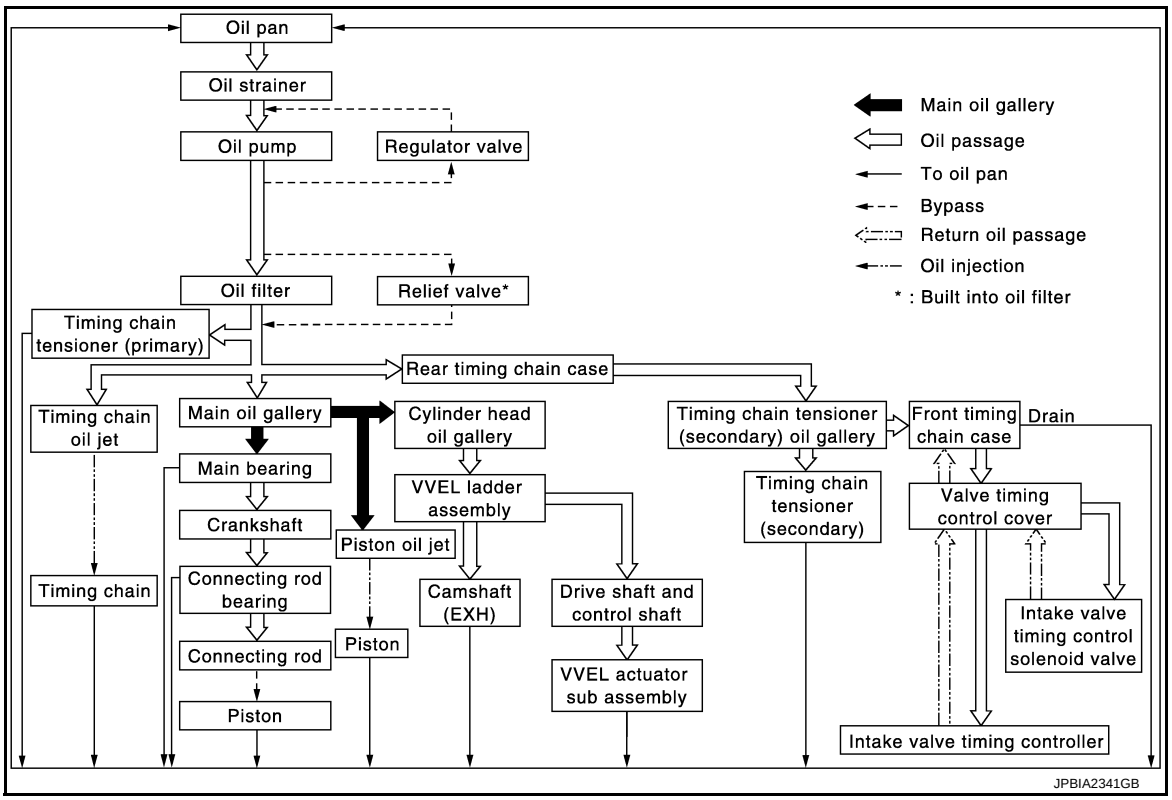
Engine Lubrication System Schematic

INFOID:0000000011283026

WITH OIL COOLER MODELS



WITHOUT OIL COOLER MODELS



PERIODIC MAINTENANCE

ENGINE OIL

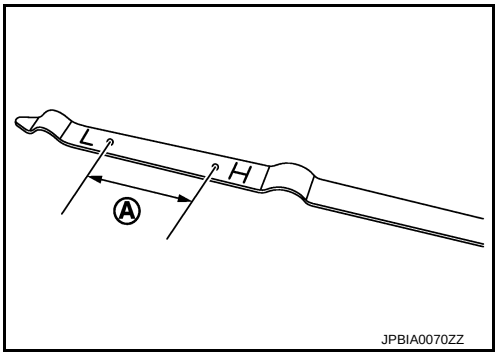
Inspection

INFOID:0000000011283027

ENGINE OIL LEVEL

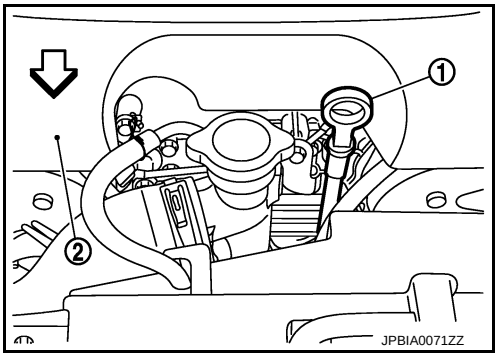
NOTE:
Before starting engine, put vehicle horizontally and check the engine oil level. If engine is already started, stop it and allow 10 minutes before checking.

1. Pull out oil level gauge and wipe it clean.
2. Insert oil level gauge and check the engine oil level is within the range Ⓐ shown in the figure.
3. If it is out of range, adjust it.



NOTE:
When checking the engine oil level, insert oil level gauge ① with its tip aligned with oil level gauge guide.

② : Engine cover
⇦ : Engine front



ENGINE OIL APPEARANCE

- Check engine oil for white turbidity or heavy contamination.
- If engine oil becomes turbid and white, it is highly probable that it is contaminated with engine coolant. Repair or replace damaged parts.

ENGINE OIL LEAKAGE

Check for engine oil leakage around the following areas:

- Oil pans (upper and lower)
- Oil pan drain plug
- Oil pressure switch
- Oil temperature sensor
- Oil filter
- Oil filter bracket
- Oil cooler
- Valve timing control cover
- Mating surface between cylinder head and rocker cover
- Mating surface between front timing chain case and rear timing chain case
- Mating surface between rear timing chain case and cylinder head
- Mating surface between rear timing chain case and cylinder block
- Mating surface between rear timing chain case and oil pan (upper)
- Mating surface between cylinder block and cylinder head
- Mating surface between lower cylinder block and cylinder block
- Crankshaft oil seals (front and rear)

• Camshaft position sensor (PHASE) and exhaust valve timing control position sensor

OIL PRESSURE CHECK

WARNING:

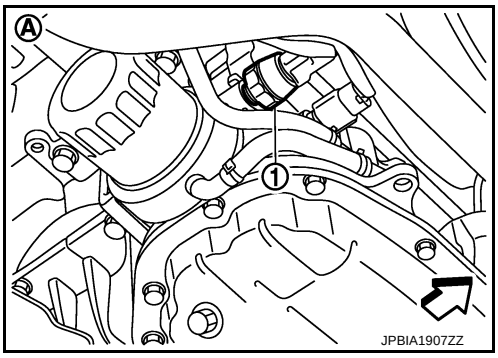
- **Never get burn yourself, as engine oil may be hot.**
- **Oil pressure check should be done in “Parking position”.**

1. Check the engine oil level.
2. Remove front under cover using a power tool. Refer to EXT-33, "FRONT UNDER COVER : Exploded View".
3. Disconnect harness connector at oil pressure switch, and remove oil pressure switch using deep socket (commercial service tool).
   CAUTION:
   Never drop or shock oil pressure switch.

WITH OIL COOLER MODELS

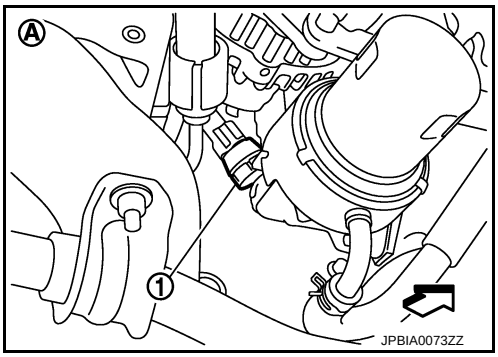
• 2WD models

① : Oil pressure switch
Ⓐ : Vehicle under view
⇦ : Engine front



• AWD models

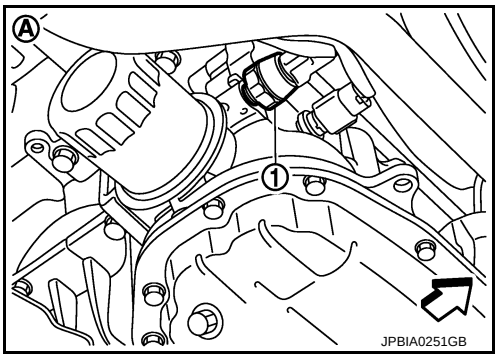
① : Oil pressure switch
Ⓐ : Vehicle under view
⇦ : Engine front



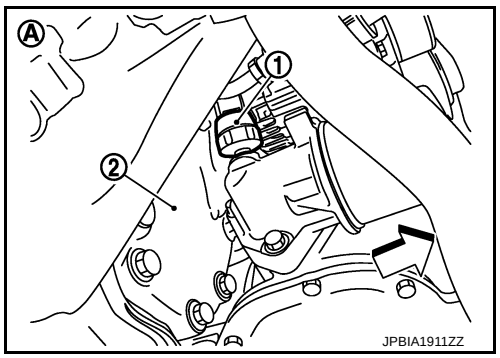
WITHOUT OIL COOLER MODELS

• 2WD models

① : Oil pressure switch
Ⓐ : Vehicle under view
⇦ : Engine front

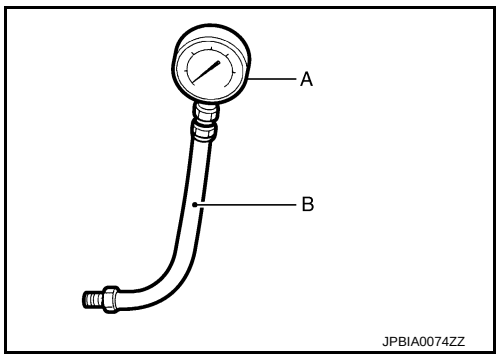


- AWD models



① : Oil pressure switch
② : Front final drive
Ⓐ : Vehicle under view
⇦ : Engine front

4. Install the oil pressure gauge [SST: ST25051001 (J-25695-1)] (A) and hose [SST: ST25052000 (J-25695-2)] (B).



5. Start the engine and warm it up to normal operating temperature.
6. Check the engine oil pressure with engine running under no-load.
NOTE:
When the engine oil temperature is low, the engine oil pressure becomes high.

Engine oil pressure : Refer to LU-26, "Engine Oil Pressure".

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

7. After the inspections, install oil pressure switch as follows:

a. Remove old liquid gasket adhering to oil pressure switch and the mating surface.
b. Apply liquid gasket and tighten oil pressure switch to the specification.
Use Genuine RTV Silicone Sealant or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".

Tightening torque
2WD models : Refer to EM-91, "2WD : Exploded View".
AWD models : Refer to LU-20, "Exploded View".

c. After warming up engine, check there is no leakage of engine oil with running engine.

Draining

INFOID:0000000011283028

WARNING:
- **Never get burn yourself, 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, and check for engine oil leakage from engine components. Refer to LU-9, "Inspection".
2. Stop the engine and wait for 10 minutes.
3. Loosen oil filler cap.
4. Remove bolts of front under cover rear side. (2WD models)
5. Fold the rear side of the front under cover forward, and fix it using a clip. (2WD models)
6. Remove drain plug and then drain engine oil.

Refilling

INFOID:0000000011283029

1. Install drain plug with new washer. Refer to EM-47, "2WD : Exploded View" (2WD) or EM-49, "AWD : Exploded View" (AWD).
   CAUTION:
   Be sure to clean drain plug and install with new washer.
2. Refill with new engine oil.
   Engine oil specification and viscosity: Refer to MA-10, "Fluids and Lubricants".

   Engine oil capacity : Refer to LU-26, "Periodical Maintenance Specification".

   CAUTION:
   - **When filling engine oil, do not pull out oil level gauge.**
   - **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 engine.**
3. Warm up the engine and check area around drain plug and oil filter for engine oil leakage.
4. Stop the engine and wait for 10 minutes.
5. Check the engine oil level. Refer to LU-9, "Inspection".

OIL FILTER

Removal and Installation

INFOID:0000000011283030

REMOVAL

CAUTION:

- **Oil filter is provided with relief valve. Use genuine NISSAN oil filter or equivalent.**
- **Never get burned when engine and engine oil may be hot.**
- **When removing, prepare a shop cloth to absorb any engine oil leakage or spillage.**
- **Never allow engine oil to adhere to drive belt.**
- **Completely wipe off any engine oil that adheres to engine and vehicle.**

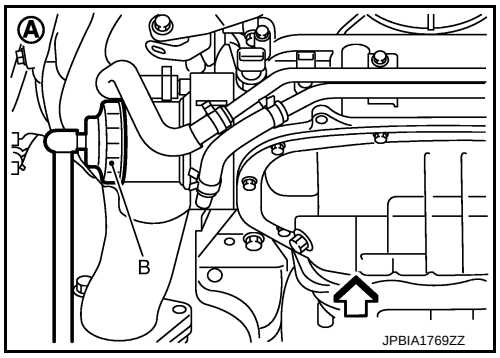
2WD models

1. Remove bolts of front under cover rear side.
2. Fold the rear side of the front under cover forward, and fix it using a clip.
3. Using oil filter wrench [SST: KV10115801 (J-38956)] (B), remove oil filter.

Ⓐ : The figure shows front under cover removed.

⇦ : Engine front

NOTE:
The figure shows models with oil cooler.



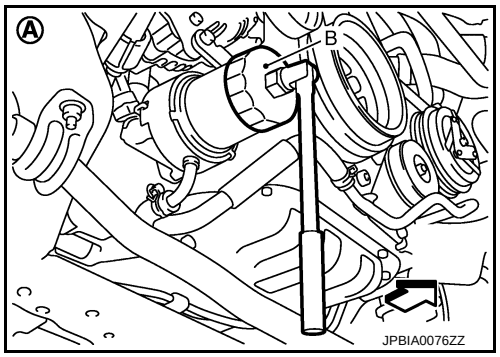
AWD models

1. Remove front under cover, using a power tool. Refer to EXT-33, "FRONT UNDER COVER : Exploded View".
2. Using oil filter wrench [SST: KV10115801 (J-38956)] (B), remove oil filter.

Ⓐ : The figure shows front under cover removed.

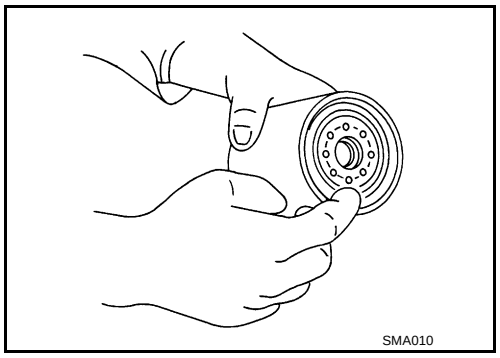
⇦ : Engine front

NOTE:
The figure shows models with oil cooler.



INSTALLATION

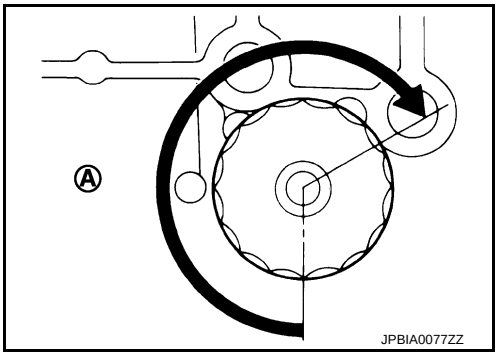
1. Remove foreign materials adhering to oil filter installation surface.
2. Apply engine oil to the oil seal contact surface of new oil filter.



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

Oil filter:

: 17.7 N·m (1.8 kg-m, 13 ft-lb)



Inspection

INFOID:0000000011283031

INSPECTION AFTER INSTALLATION

1. Check the engine oil level. Refer to LU-9, "Inspection".
2. Start the engine, and check there is no leak 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".

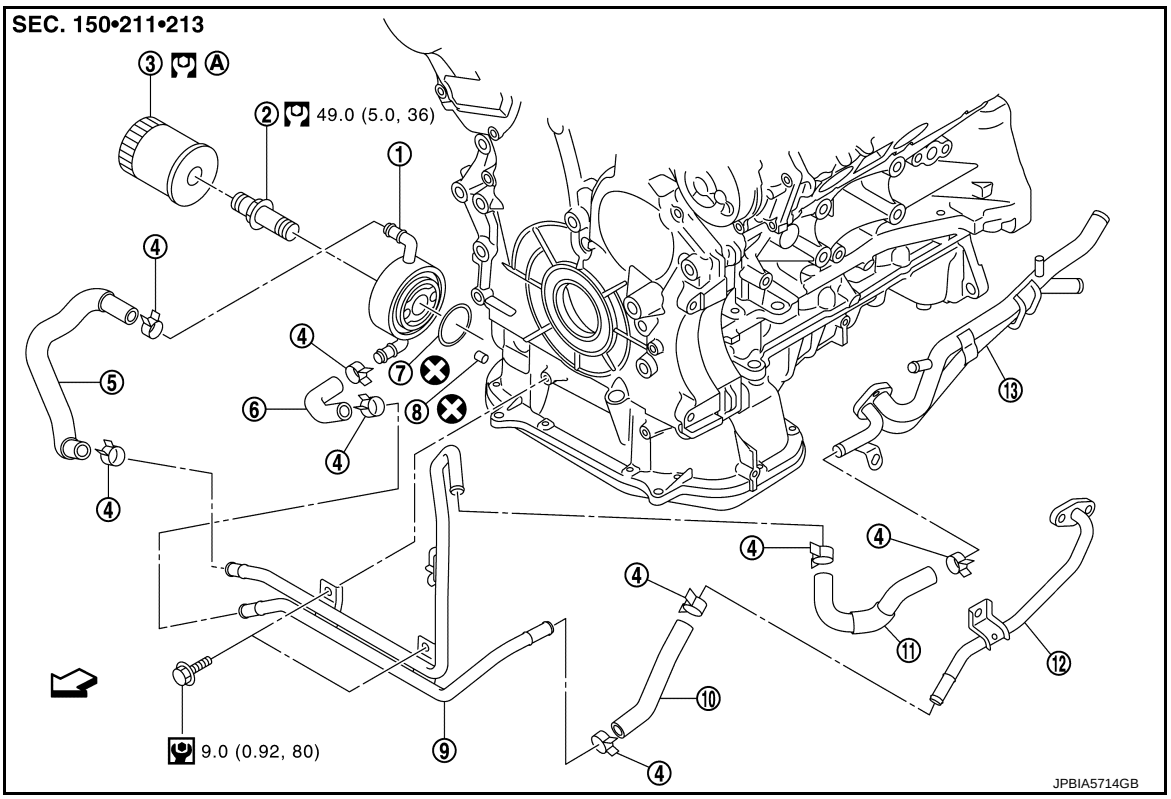
REMOVAL AND INSTALLATION

OIL COOLER

2WD

2WD : Exploded View

INFOID:0000000011283032



① Oil cooler	② Connector bolt	③ Oil filter
④ Clamp	⑤ Water hose	⑥ Water hose
⑦ O-ring	⑧ Relief valve	⑨ Water pipe
⑩ Water hose	⑪ Water hose	⑫ Water pipe
⑬ Heater pipe		
Ⓐ Refer to LU-13, "Removal and Installation"		
⇦ : Engine front		
: N·m (kg-m, ft-lb)		
: N·m (kg-m, in-lb)		
⊗ : Always replace after every disassembly.		

2WD : Removal and Installation

INFOID:0000000011283033

REMOVAL

WARNING:

Never get burn yourself, as engine oil and engine coolant may be hot.

NOTE:

When removing oil cooler only, step 2 is unnecessary.

1. Remove front under cover, using a power tool.
2. Drain engine coolant from radiator and cylinder block. Refer to CO-8, "Draining" and EM-89, "Setting".

NOTE:
Perform this step when removing water pipes.

3. Disconnect water hoses from oil cooler.
   - When removing oil cooler only, pinching water hoses near oil cooler to prevent engine coolant from spilling out.
   - Remaining engine coolant in piping will come out. Use a tray to collect it.

   CAUTION:
   - **Perform this step when the engine is cold.**
   - **Never spill engine coolant on drive belt.**
4. Using oil filter wrench [SST: KV10115801 (J-38956)], remove oil filter. Refer to LU-13, "Removal and Installation".

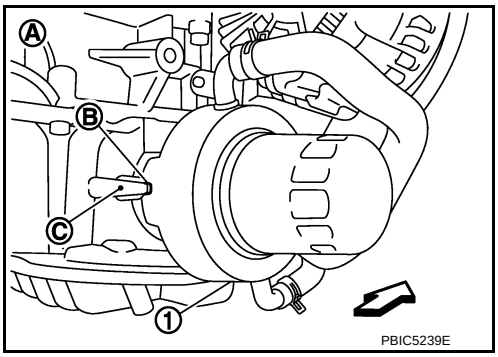
   CAUTION:
   Never spill engine oil on drive belt.
5. Remove connector bolt, and oil cooler.

   CAUTION:
   Never spill engine oil to rubber parts such as drive belt and engine mounting insulator.
6. Remove water pipes if necessary.

INSTALLATION

CAUTION:
Do not reuse O-rings.
Note the following, and install in the reverse order of removal.
- Check that no foreign objects are adhering to the installation planes of oil filter and oil cooler bracket.
- Align cutout on oil cooler with protrusion on oil pan side, and tighten connector bolt.

① : Oil cooler
Ⓐ : Engine right side
Ⓑ : Cutout
Ⓒ : Protrusion
⇦ : Engine front



2WD : Inspection

INFOID:0000000011283034

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.

Relief Valve
Check relief valve with the following procedure.
- Press steel ball of relief valve using a clean plastic stick. Check that valve moves smoothly and proper spring repulsion is felt.
- Replace relief valve, if necessary, with the following procedure.

- Remove the relief valve by prying using a screwdriver.

  CAUTION:
  Never damage the mounting hole.
- Press in the relief valve until it reaches a depth of 7 mm (0.28 in) from end surface of oil pan (upper) using approximately 10 mm (0.39 in) diameter drift.

  CAUTION:
  Carefully press in the relief valve by aligning its mounting hole side with the axle center so as not to cause deformation.

INSPECTION AFTER INSTALLATION

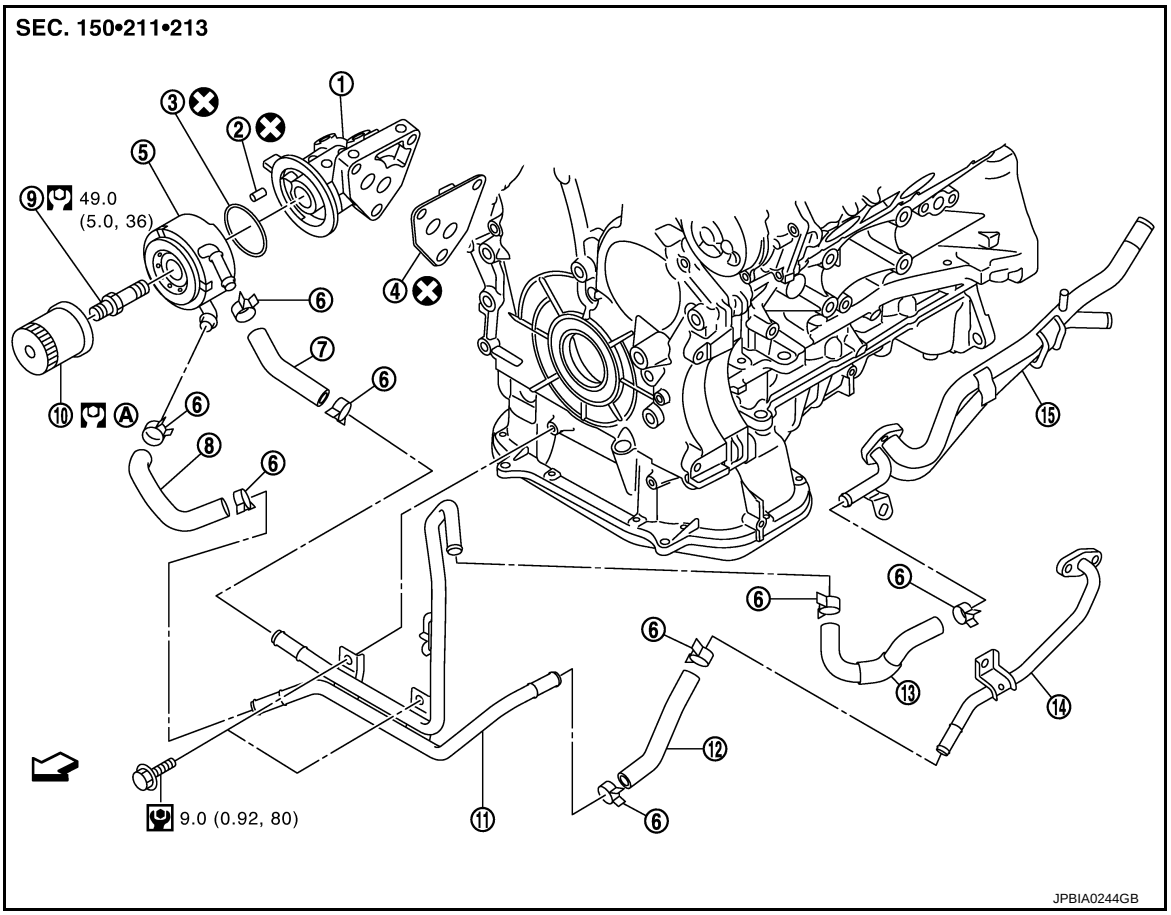
1. Check the engine oil level and the engine coolant level and add engine oil and engine coolant. Refer to LU-9, "Inspection" and CO-8, "Inspection".

2. Start the engine, and check there is no leakage 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-9, "Inspection" and CO-8, "Inspection".

AWD

AWD : Exploded View

INFOID:0000000011283035



① Oil filter bracket	② Relief valve	③ O-ring
④ Gasket	⑤ Oil cooler	⑥ Clamp
⑦ Water hose	⑧ Water hose	⑨ Connector bolt
⑩ Oil filter	⑪ Water pipe	⑫ Water hose
⑬ Water hose	⑭ Water pipe	⑮ Heater pipe
Ⓐ Refer to LU-13, "Removal and Installation"		
⇦ : Engine front		
: N·m (kg-m, ft-lb)		
: N·m (kg-m, in-lb)		
⊗ : Always replace after every disassembly.		

AWD : Removal and Installation

INFOID:0000000011283036

REMOVAL

WARNING:

Never get burn yourself, as engine oil and engine coolant may be hot.
NOTE:
When removing oil cooler only, step 2 is unnecessary.

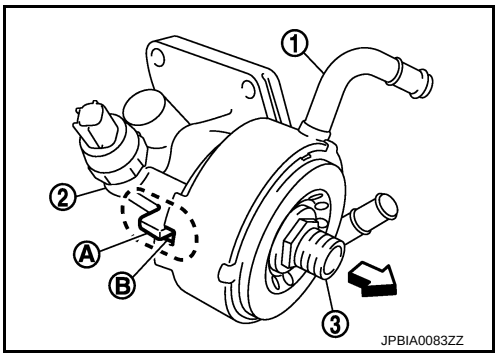
1. Remove front under cover, using a power tool.
2. Drain engine coolant from radiator and cylinder block. Refer to CO-8, "Draining" and EM-89, "Setting".
   NOTE:
   Perform this step when removing water pipes.
3. Disconnect water hoses from oil cooler.
   - When removing oil cooler only, pinching water hoses near oil cooler to prevent engine coolant from spilling out.
   - Remaining engine coolant in piping will come out. Use a tray to collect it.

   CAUTION:
   - **Perform this step when the engine is cold.**
   - **Never spill engine coolant on drive belts.**
4. Using oil filter wrench [SST: KV10115801], remove oil filter. Refer to LU-13, "Removal and Installation".
   CAUTION:
   Never spill engine oil on drive belts.
5. Remove connector bolt, and remove oil cooler.
   CAUTION:
   Never spill engine oil to rubber parts such as drive belts and engine mounting insulator.
6. Remove water pipes, as necessary.

INSTALLATION

CAUTION:
Do not reuse O-rings.
Note the following, and install in the reverse order of removal.
- Check that no foreign objects are adhering to the installation planes of oil filter and oil cooler bracket.
- Align cutout on oil cooler with protrusion on oil filter bracket side, and tighten connector bolt.

① : Oil cooler
② : Oil filter bracket
③ : Connector bolt
Ⓐ : Protrusion
Ⓑ : Cut out
⇦ : Engine front



AWD : Inspection

INFOID:0000000011283037

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.

Relief Valve
Check relief valve with the following procedure.
- Press steel ball of relief valve using a clean plastic stick. Check that valve moves smoothly and proper spring repulsion is felt.
- Replace relief valve, if necessary, with the following procedure.

- Remove the relief valve by prying using a screwdriver.
  CAUTION:
  Never damage the mounting hole.
- Press in the relief valve until it reaches a depth of 7 mm (0.28 in) from end surface of oil pan (upper) using approximately 10 mm (0.39 in) diameter drift.
  CAUTION:

Carefully press in the relief valve by aligning its mounting hole side with the axle center so as not to cause deformation.

INSPECTION AFTER INSTALLATION

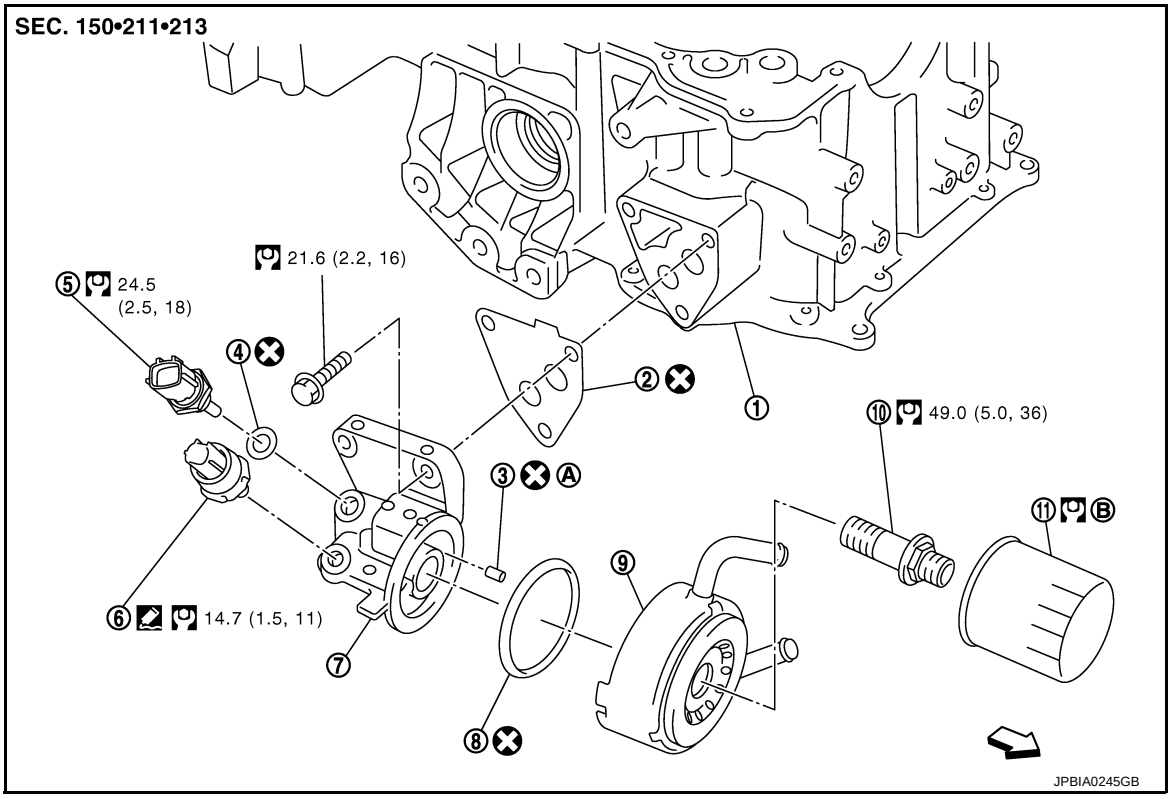
1. Check the engine oil level and the engine coolant level and add engine oil and engine coolant. Refer to LU-9, "Inspection" and CO-8, "Inspection".
2. Start the engine, and check there is no leakage of engine oil or engine coolant.
3. Stop the engine and wait for 10 minutes.
4. Check the engine oil level and the engine coolant level again. Refer to LU-9, "Inspection" and CO-8, "Inspection".

OIL FILTER BRACKET (AWD)

Exploded View

INFOID:0000000011283038

WITH OIL COOLER MODELS



①	Oil pan (upper)	②	Gasket	③	Relief valve
④	Washer	⑤	Oil temperature sensor	⑥	Oil pressure switch
⑦	Oil filter bracket	⑧	O-ring	⑨	Oil cooler
⑩	Connector bolt	⑪	Oil filter		
Ⓐ	Refer to LU-18, "AWD : Inspection"	Ⓑ	Refer to LU-13, "Removal and Installation"		

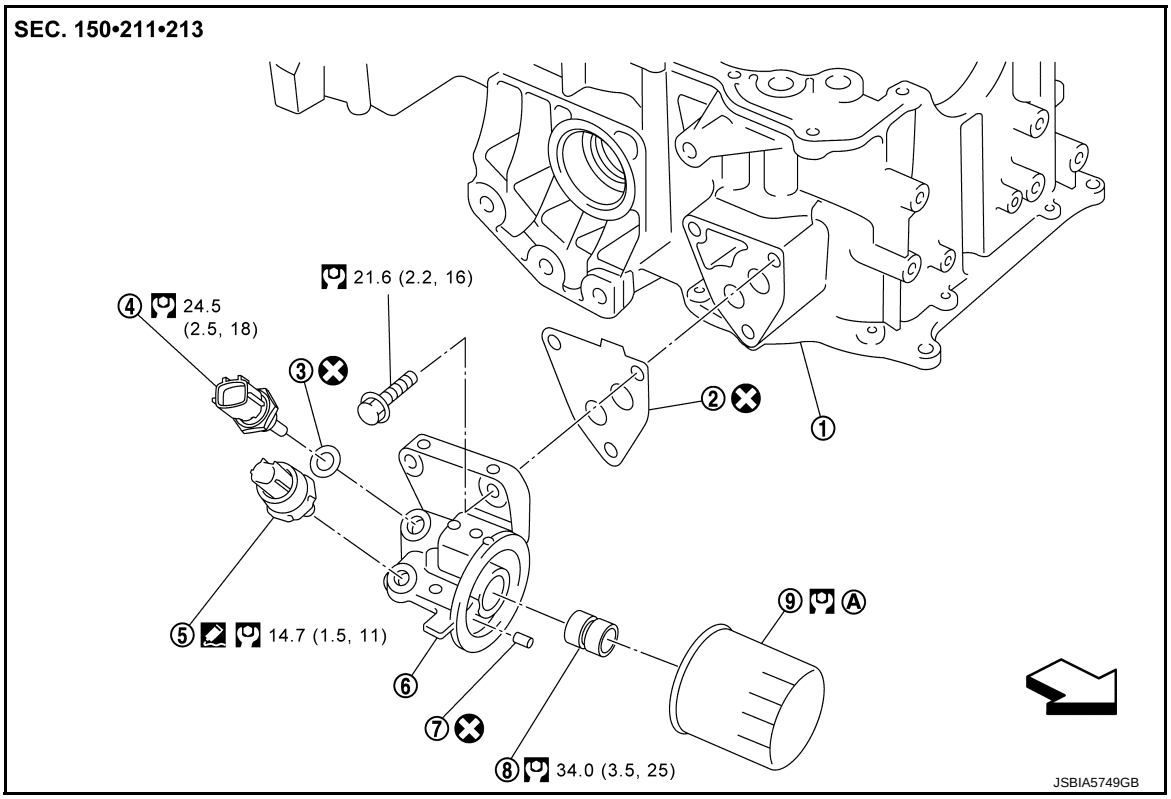
⇦ : Vehicle front

: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

: Sealing point

WITHOUT OIL COOLER MODELS



① Oil pan (upper)	② Gasket	③ Washer
④ Oil temperature sensor	⑤ Oil pressure switch	⑥ Oil filter bracket
⑦ Taper plug	⑧ Connector bolt	⑨ Oil filter
Ⓐ Refer to LU-13, "Removal and Installation"		

⇦ : Vehicle front

: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

: Sealing point

Removal and Installation

INFOID:0000000011283039

REMOVAL

WARNING:

Never get burn yourself, as engine oil may be hot.

1. Remove front under cover, using a power tool. Refer to EXT-35, "FRONT UNDER COVER : Removal and Installation".
2. Using the oil filter wrench [SST: KV10115801 (J-38956)], remove oil filter. Refer to LU-13, "Removal and Installation".
   CAUTION:
   Never spill engine oil on drive belt.
3. Remove connector bolt, and then oil cooler with water hoses connected.
4. Disconnect oil pressure switch harness connector and oil temperature sensor harness connector.
5. Remove oil filter bracket from oil pan (upper).
6. Remove oil pressure switch and oil temperature sensor from oil filter bracket.

INSTALLATION

Note the following, and install in the reverse order of removal.

- Install oil pressure switch as follows:
- Remove old liquid gasket adhering to oil filter bracket.
- Apply liquid gasket and install oil pressure switch.

Use Genuine RTV Silicone Sealant or equivalent. Refer to GI-22, "Recommended Chemical Products and Sealants".

Inspection

INFOID:0000000011283040

INSPECTION AFTER INSTALLATION

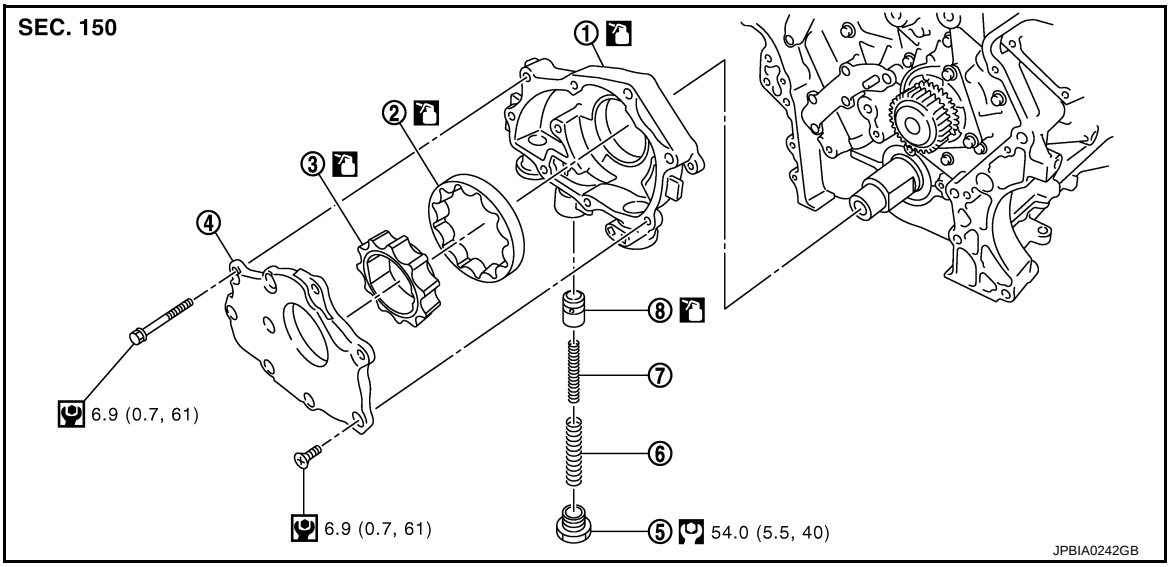
1. Check the engine oil level and add engine oil. Refer to LU-9, "Inspection".
2. Start the engine, and check there is no leakage of engine oil.
3. Stop the engine and wait for 10 minutes.
4. Check the engine oil level again. Refer to LU-9, "Inspection".

UNIT DISASSEMBLY AND ASSEMBLY

OIL PUMP

Exploded View

INFOID:0000000011283041



① Oil pump body
② Oil pump outer rotor
③ Oil pump inner rotor
④ Oil pump cover
⑤ Regulator valve plug
⑥ Regulator valve spring
⑦ Regulator valve spring
⑧ Regulator valve

: N·m (kg-m, ft-lb)

: N·m (kg-m, in-lb)

: Should be lubricated with oil.

Removal and Installation

INFOID:0000000011283042

REMOVAL

1. Remove oil pan (lower). Refer to EM-49, "Removal and Installation".
2. Remove oil pan (upper) and oil strainer. Refer to EM-91, "2WD : Exploded View" (2WD models) or EM-95, "AWD : Exploded View" (AWD models).
3. Remove front timing chain case and timing chain (primary). Refer to EM-55, "Exploded View".
4. Remove oil pump assembly.

INSTALLATION

CAUTION:

Before installation, apply new engine oil to the parts as instructed in the figure.

Note the following, and install in the reverse order of removal.

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

Disassembly and Assembly

INFOID:0000000011283043

DISASSEMBLY

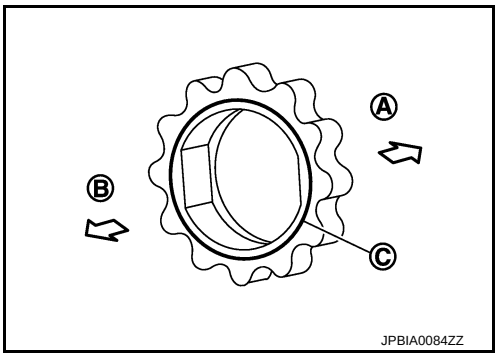
1. Remove oil pump cover.
2. Remove oil pump inner rotor and oil pump outer rotor from oil pump body.
3. After removing regulator valve plug, remove regulator valve spring and regulator valve.

ASSEMBLY

Note the following, and assemble in the reverse order of disassembly.

- Install oil pump inner rotor with the groove faced to oil pump cover side.

Ⓐ : Oil pump body side
Ⓑ : Oil pump cover side
Ⓒ : Groove



JPBIA0084ZZ

Inspection

INFOID:0000000011283044

INSPECTION AFTER DISASSEMBLY

Oil Pump Clearance

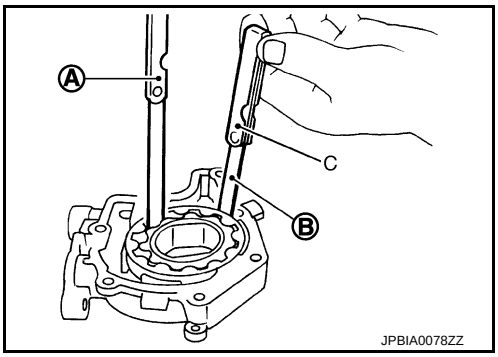
- Measure the clearance with feeler gauge (C).

- Clearance between oil pump outer rotor and oil pump body [position Ⓑ]

Standard : Refer to LU-26, "Oil Pump".

- Tip clearance between oil pump inner rotor and oil pump outer rotor [position Ⓐ]

Standard : Refer to LU-26, "Oil Pump".



JPBIA0078ZZ

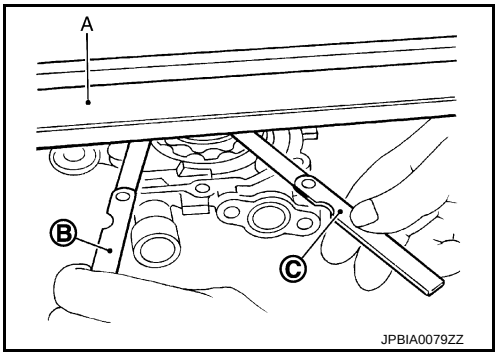
- Measure the clearance with feeler gauge and straightedge (A).

- Side clearance between oil pump inner rotor and oil pump body [position Ⓒ]

Standard : Refer to LU-26, "Oil Pump".

- Side clearance between oil pump outer rotor and oil pump body [position Ⓑ]

Standard : Refer to LU-26, "Oil Pump".



JPBIA0079ZZ

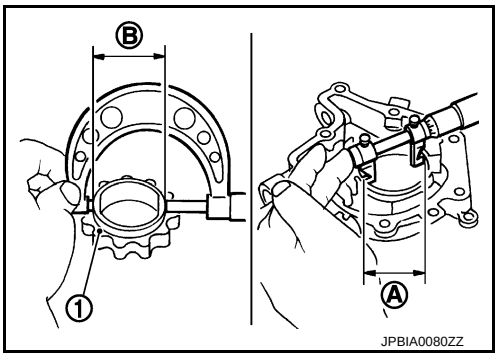
- Calculate the clearance between oil pump inner rotor and oil pump body as follows:

OIL PUMP BODY INNER DIAMETER

- Measure the inner diameter of oil pump body with inside micrometer. [position Ⓐ]

OIL PUMP INNER ROTOR OUTER DIAMETER

- Measure the outer diameter of protruded portion of oil pump inner rotor ① with micrometer. [position Ⓑ]



JPBIA0080ZZ

OIL PUMP INNER ROTOR TO OIL PUMP BODY CLEARANCE

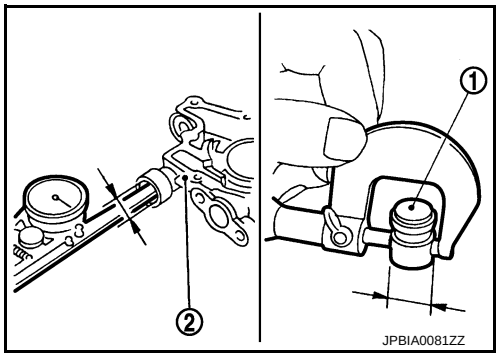
- (Clearance) = (Oil pump body inner diameter) – (Oil pump inner rotor outer diameter)

Standard : Refer to LU-26, "Oil Pump".

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

Regulator Valve Clearance

(Clearance) = (Regulator valve hole diameter) – (Regulator valve outer diameter)



① : Regulator valve

② : Oil pump body

Standard : Refer to LU-26, "Regulator Valve".

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

CAUTION:

- **Coat regulator valve with engine oil.**
- **Check 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 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".

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Periodical Maintenance Specification

INFOID:0000000011283045

ENGINE OIL CAPACITY (APPROXIMATE)

Unit: ℓ (US qt, Imp qt)

Drain and refill	With oil filter change	4.9 (5-1/8, 4-1/4)
	Without oil filter change	4.6 (4-7/8, 4)
Dry engine (Overhaul)		5.7 (6, 5)

Engine Oil Pressure

INFOID:0000000011283046

Unit: kPa (kg/cm^2, psi)

Engine speed	Approximate discharge pressure*
Idle speed	More than 98 (1.0, 14)
2,000 rpm	More than 294 (3.0, 43)

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

Oil Pump

INFOID:0000000011283047

Unit: mm (in)

Oil pump body to oil pump outer rotor radial clearance	0.114 - 0.260 (0.0045 - 0.0102)
Oil pump inner rotor to oil pump outer rotor tip clearance	Below 0.180 (0.0071)
Oil pump body to oil pump inner rotor axial clearance	0.030 - 0.070 (0.0012 - 0.0028)
Oil pump body to oil pump outer rotor axial clearance	0.030 - 0.090 (0.0012 - 0.0035)
Oil pump inner rotor to brazed portion of housing clearance	0.045 - 0.091 (0.0018 - 0.0036)

Regulator Valve

INFOID:0000000011283048

Unit: mm (in)

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