SECTION LU
ENGINE LUBRICATION SYSTEM

CONTENTS

PRECAUTION

PRECAUTIONS

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

INFOID:0000000006750529

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.**

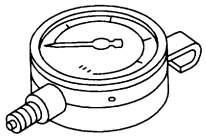
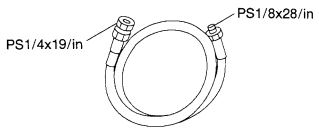
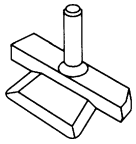
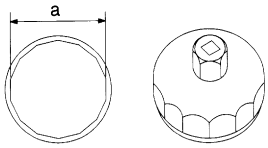
PREPARATION

PREPARATION

Special Service Tool

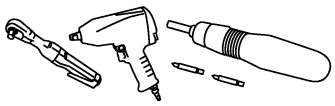
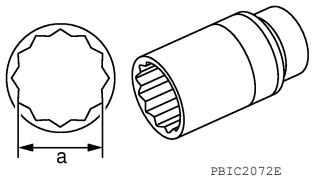
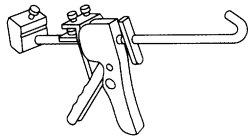
INFOID:0000000006750532

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

Tool number (Kent-Moore No.) Tool name	Description
ST25051001 (J-25695-1) Oil pressure gauge  S-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 cylinder block
KV10111100 (J-37228) Seal cutter  NT046	Removing steel oil pan and rear timing chain case
KV10115801 (J-38956) Oil filter wrench  S-NT375	Removing and installing oil filter **a: 64.3 mm (2.531 in)**

Commercial Service Tool

INFOID:0000000006750533

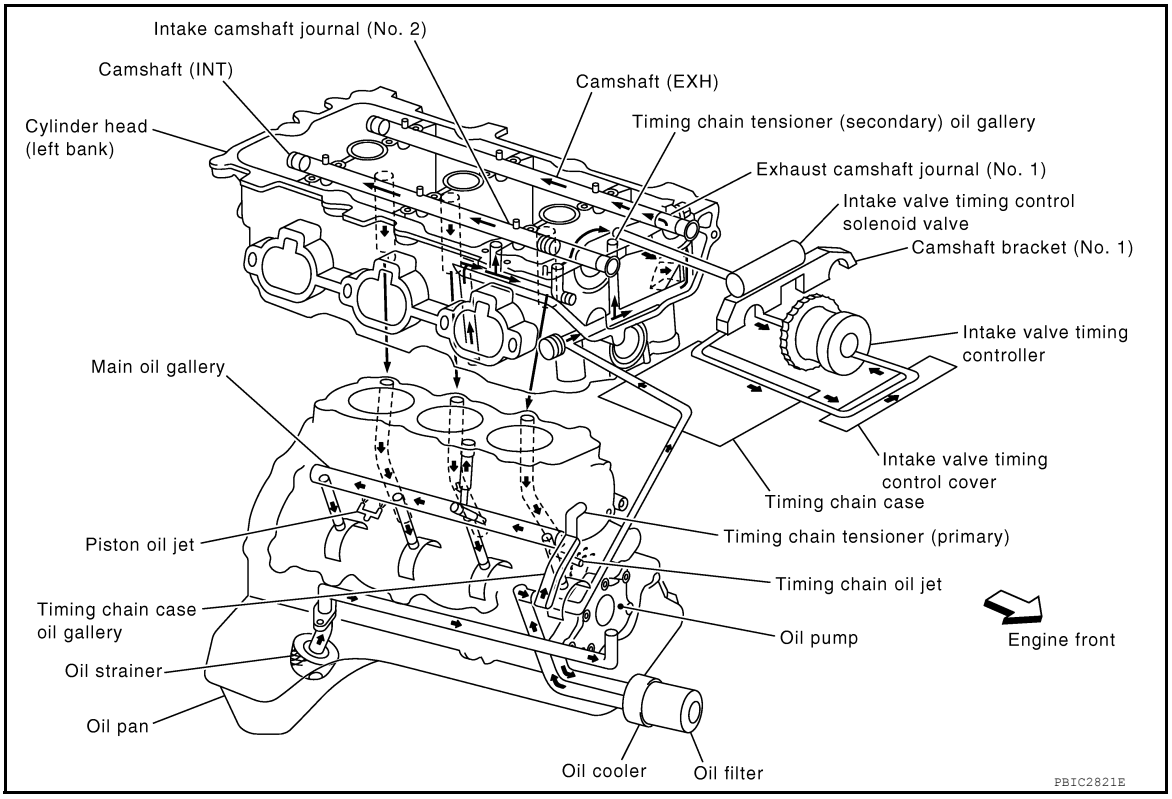
Tool name	Description
Power tool  PIIB1407E	Loosening nuts, screws and bolts
Deep socket  PBIC2072E	Removing and installing oil pressure switch **a: 24 mm (0.94 in)**
Tube presser  S-NT052	Pressing the tube of liquid gasket

SYSTEM DESCRIPTION

LUBRICATION SYSTEM

Lubrication Circuit

INFOID:0000000006750534



System Chart

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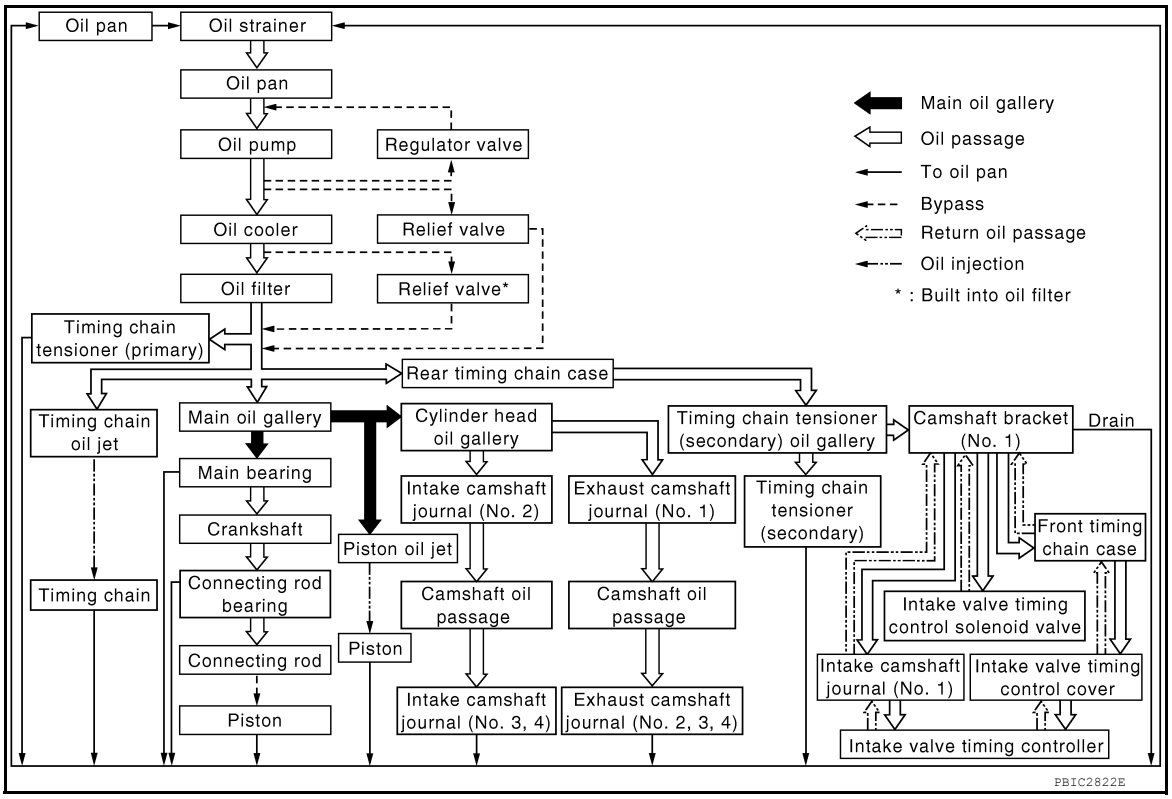


PERIODIC MAINTENANCE

ENGINE OIL

Inspection

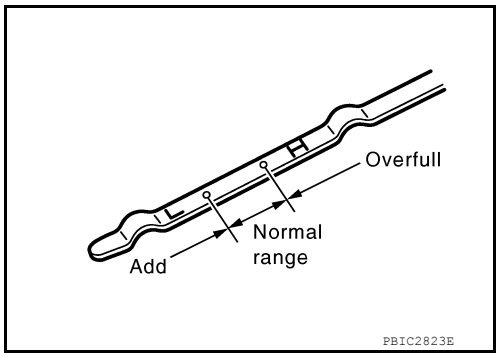
INFOID:0000000006750536

OIL LEVEL

- Before starting the engine make sure the vehicle is parked on a flat and level surface, then check the oil level. If the engine is already running, turn it off and allow 10 minutes before checking.
- Pull out oil level gauge and wipe clean.
- Insert oil level gauge.
- Check that the oil level is within the low (L) and high (H) range as indicated on the dipstick.
- If the engine oil level is out of range, add oil as necessary. Refer to MA-14, "Engine Oil Recommendation".

CAUTION:

Do not overfill the engine with oil.



OIL APPEARANCE

- Check the engine oil for a white, milky appearance or excessive contamination.
- If the engine oil is 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 pans (lower and upper)
- Oil pan drain plug
- Oil pressure switch
- Oil filter
- Oil cooler
- Water pump cover
- Chain tensioner cover
- Intake valve timing control cover and intake valve timing control solenoid valve
- Mating surface between cylinder block and cylinder head
- Mating surface between lower cylinder block and cylinder block
- 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 lower cylinder block
- Mating surface between rear timing chain case and oil pan (upper)
- Crankshaft oil seals (front and rear)
- Oil level gauge guide
- Camshaft position sensor (PHASE)

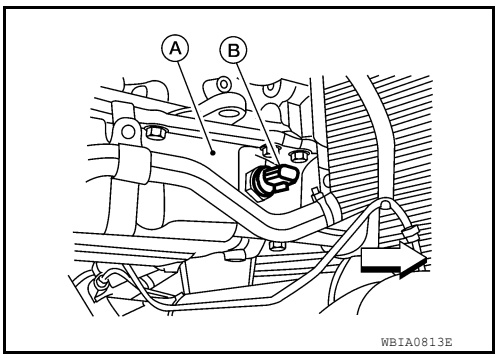
OIL PRESSURE CHECK

WARNING:

- **Be careful not to burn yourself, as the engine and engine oil may be hot.**
- **Put the A/T shift selector in the P (Park) position.**

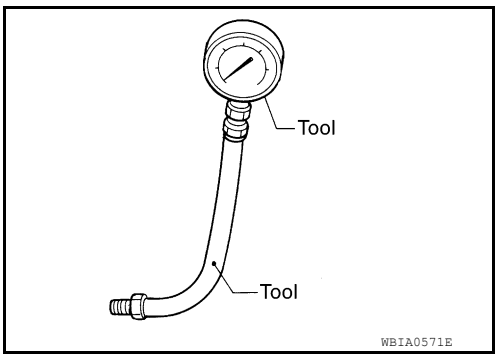
1. Check engine oil level. Refer to LU-7, "Inspection".
2. Remove front under cover using power tool. Refer to EXT-38, "Removal and Installation".

3. Disconnect the oil pressure switch (B) harness connector.
   - (A) Oil pan (upper)
   - ⇦: Front
4. Remove the oil pressure switch (B) using suitable tool.
   CAUTION:
   Do not drop or shock oil pressure switch.



5. Install Tools.

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



6. Start the engine and warm it up to normal operating temperature.
7. Check the engine oil pressure with engine running under no-load. Refer to LU-17, "Standard and Limit".
   CAUTION:
   If the difference between the measured pressure and the specification is extreme, check the oil passages and oil pump for leaks or blockages.
8. After the inspections, install oil pressure switch as follows:

a. Remove old liquid gasket adhering to oil pressure switch and engine.
b. Apply liquid gasket and tighten oil pressure switch to the specification.
   Use Genuine RTV Silicone Sealant or equivalent. Refer to GI-17, "Recommended Chemical Products and Sealants".

   Oil pressure switch torque : 14.7 N·m (1.5 kg-m, 11 ft-lb)

c. After warming up engine, make sure there are no oil leaks with the engine running.

9. Install front under cover. Refer to EXT-38, "Removal and Installation".

Changing Engine Oil

INFOID:0000000006750537

WARNING:
- **Be careful not to burn yourself, as the engine and 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.**

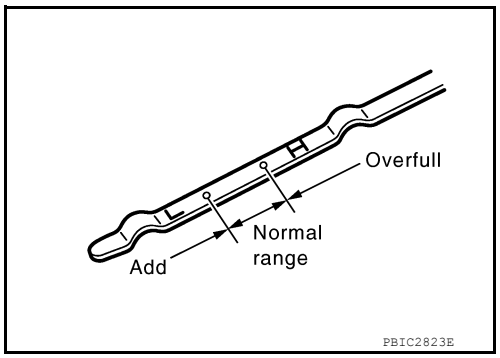
1. Warm up the engine, and check for oil leaks.
2. Stop the engine and wait for at least 10 minutes.
3. Loosen oil filler cap, then remove the oil drain plug.
4. Drain engine oil.
5. Install the oil drain plug with a new washer.
   CAUTION:
   - **Clean the oil drain plug and install with a new washer.**
   - **Do not reuse copper sealing washer.**

   Oil drain plug : Refer to EM-34, "Removal and Installation".

6. Refill the engine with new specified engine oil.
CAUTION:
- **The refill capacity depends on the engine oil temperature and drain time. Use these specifications for reference only.**
- **Always use the oil level gauge to determine when the proper amount of engine oil is in the engine.**

Oil grade and viscosity : Refer to MA-13, "Fluids and Lubricants".
Oil capacity : Refer to LU-33, "Standard and Limit".

7. Warm up the engine and check the area around the oil drain plug and oil filter for oil leaks.
8. Stop the engine and wait for 10 minutes.
9. Check the oil level using the oil level gauge as shown. Add oil as necessary and install the oil filler cap. Refer to LU-7, "Inspection".
CAUTION:
Do not overfill the engine with oil.



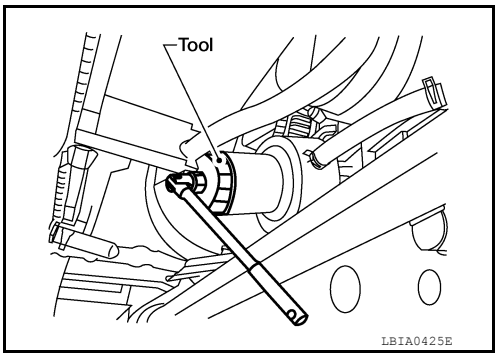
OIL FILTER

Removal and Installation

INFOID:0000000006750538

REMOVAL

1. Remove the front under cover using power tool. Refer to EXT-38, "Removal and Installation".
2. Drain engine oil. Refer to LU-8, "Changing Engine Oil".
3. Remove the oil filter using Tool as shown.

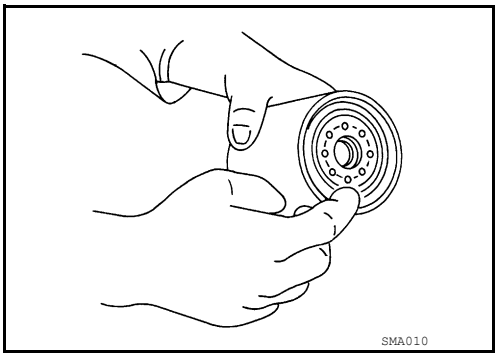


Tool number : KV10115801 (J-38956)

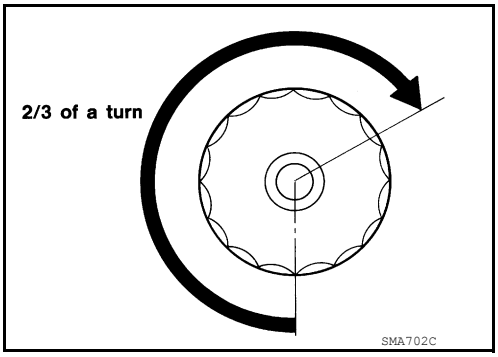
WARNING:
Be careful not to burn yourself, as the engine and engine oil may be hot.
CAUTION:
- **Oil filter is equipped with a pressure relief valve.**
- **Use Genuine NISSAN Oil Filter or equivalent.**
- **When removing, prepare a shop cloth to absorb any engine oil leaks or spills.**
- **Do not allow engine oil to adhere to drive belts.**
- **Completely wipe off engine oil that adheres to the engine and the vehicle.**

INSTALLATION

1. Remove foreign materials adhering to the oil filter seal mating surface.
2. Apply clean engine oil to the new oil filter seal as shown.



3. Screw on the oil filter manually until it touches the seal mating surface and then tighten it an additional 2/3 turn using Tool as shown; or to specification.



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

Tool number : KV10115801 (J-38956)

4. Refill engine with new engine oil. Refer to LU-8, "Changing Engine Oil".
5. Inspect the engine for oil leaks. Refer to LU-7, "Inspection".
6. Install the front under cover. Refer to EXT-38, "Removal and Installation".

INSPECTION AFTER INSTALLATION

1. Check the engine oil level. Refer to LU-7, "Inspection".
2. Start the engine and check for engine oil leaks.
3. Stop the engine and wait for 10 minutes.
4. Check the engine oil level and add engine oil as required.

REMOVAL AND INSTALLATION

OIL COOLER

Exploded View

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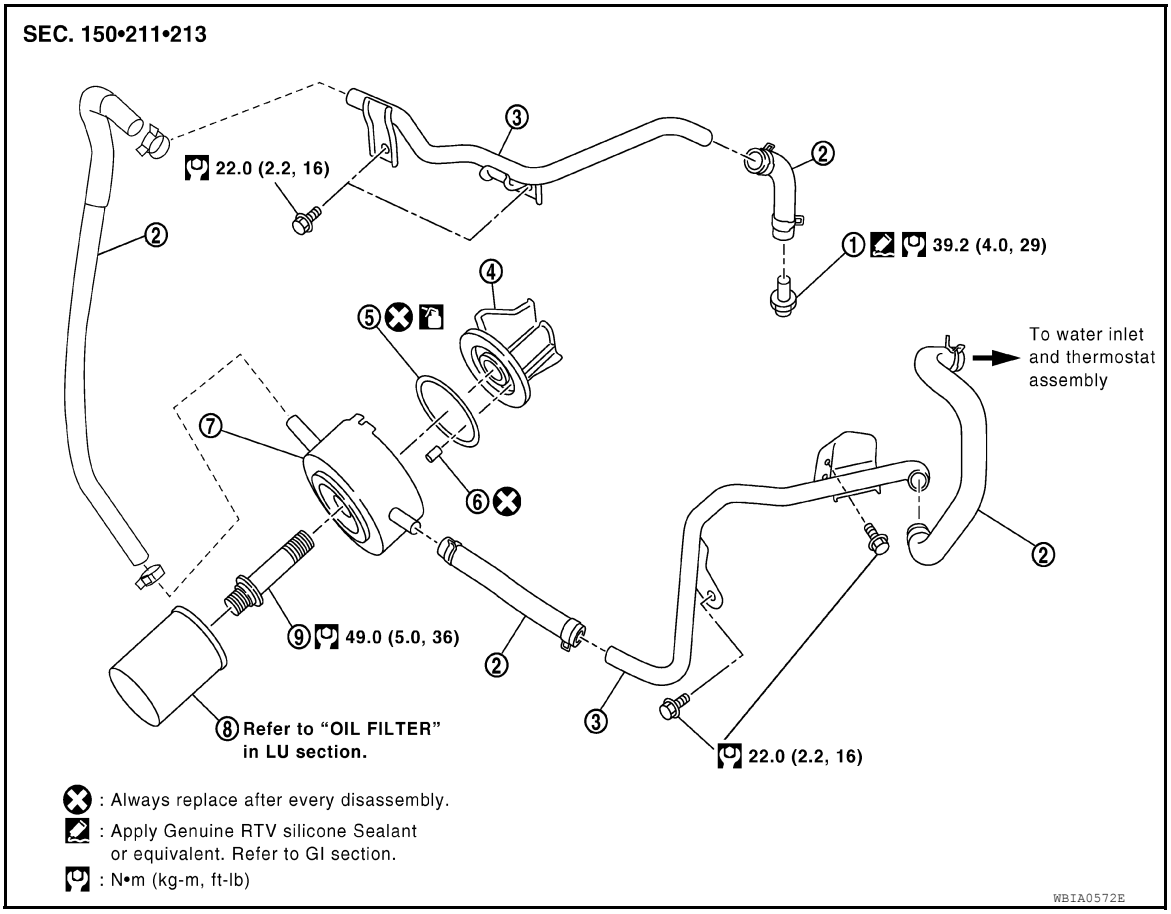


1. Water connector
2. Water hose
3. Water pipe
4. Oil pan (upper) front side
5. O-ring
6. Relief valve
7. Oil cooler
8. Oil filter
9. Connector bolt

Removal and Installation

INFOID:0000000006750540

WARNING:
- **Be careful not to burn yourself, as the engine oil and engine coolant may be hot.**
- **Do not remove the radiator cap when the engine is hot. Serious burns could occur from high pressure engine coolant escaping from the radiator.**

CAUTION:
- **Do not spill engine coolant on the drive belt.**
- **Do not spill engine oil on rubber parts such as drive belts and engine mounting insulators.**

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

REMOVAL

1. Drain engine coolant from radiator. Refer to CO-12, "Changing Engine Coolant".
2. Remove front under cover using power tool. Refer to EXT-38, "Removal and Installation".
3. Disconnect water hoses from oil cooler.
   CAUTION:

- **Perform this step when engine is cold.**

4. Remove oil filter. Refer to LU-10, "Removal and Installation".
5. Remove connector bolt, and remove oil cooler and O-ring.
   CAUTION:
   - **Do not reuse O-ring.**

INSPECTION AFTER REMOVAL

Oil Cooler

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

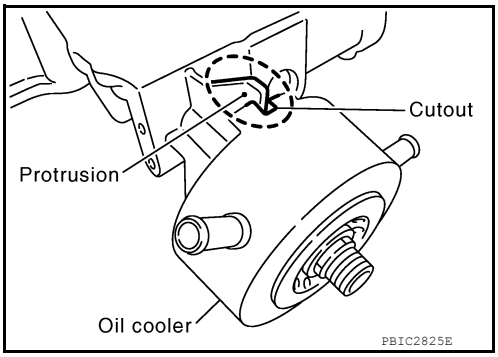
Relief Valve

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

INSTALLATION

Installation is in the reverse order of removal. Pay special attention to the following:

- Confirm that no foreign objects are adhering to the sealing surfaces of the oil cooler and oil pan (upper).
- Tighten connector bolt after aligning cutout on oil cooler with protrusion on oil pan (upper) side.
  CAUTION:
  Do not reuse O-ring.



INSPECTION AFTER INSTALLATION

- Before starting engine, check oil/fluid levels including engine coolant and engine oil. If less than required quantity, fill to the specified level. Refer to MA-13, "Fluids and Lubricants".
- Use procedure below to check for fuel leakage.
- Turn ignition switch ON (with engine stopped). With fuel pressure applied to fuel piping, check for fuel leakage at connection points.
- Start engine. With engine speed increased, check again for fuel leakage at connection points.
- Run engine to check for unusual noise and vibration.
  NOTE:
  If hydraulic pressure inside timing chain tensioner drops after removal and installation, slack in the guide may generate a pounding noise during and just after engine start. However, this is normal. Noise will stop after hydraulic pressure rises.
- Warm up engine thoroughly to make sure there is no leakage of fuel, exhaust gas, or any oils/fluids including engine oil and engine coolant.
- Bleed air from passages in lines and hoses, such as in cooling system.
- After cooling down engine, again check oil/fluid levels, including engine oil and engine coolant. Refill to specified level, if necessary.
- Summary of the inspection items:

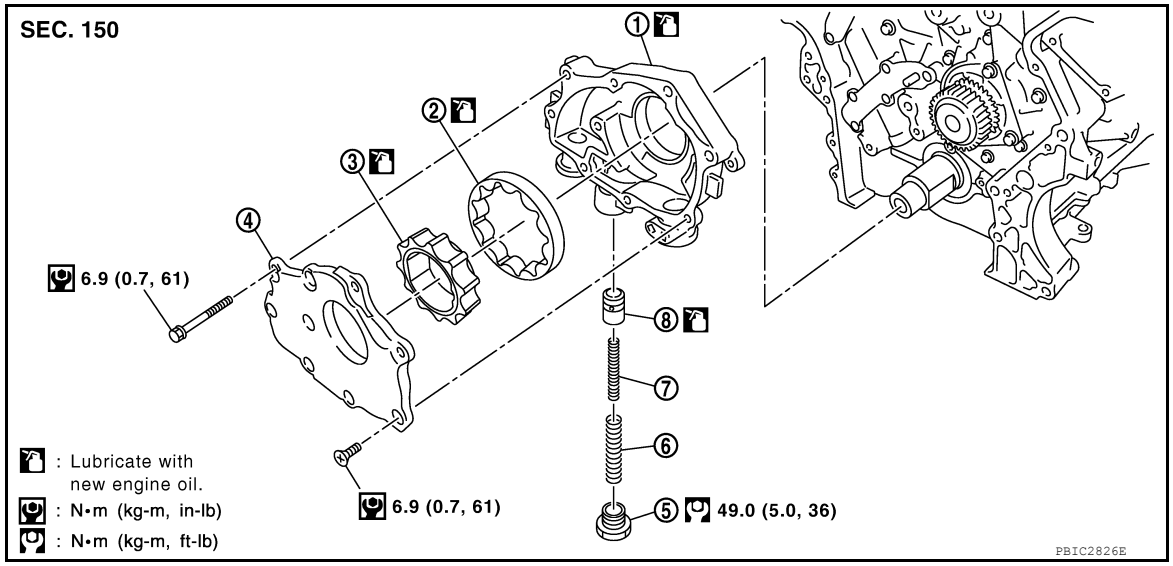
Item		Before starting engine	Engine running	After engine stopped
Engine coolant		Level	Leakage	Level
Engine oil		Level	Leakage	Level
Transmission/ transaxle fluid	A/T and CVT Models	Leakage	Level/Leakage	Leakage
	M/T Models	Level/Leakage	Leakage	Level/Leakage
Other oils and fluids*		Level	Leakage	Level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

*Power steering fluid, brake fluid, etc.

OIL PUMP

Exploded View

INFOID:0000000006750541



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

Removal and Installation

INFOID:0000000006750542

REMOVAL

1. Disconnect the battery negative terminal. Refer to PG-90, "Removal and Installation".
2. Remove the air duct and resonator assembly and the air cleaner case (upper). Refer to EM-24, "Exploded View".
3. Remove timing chain, (primary) only. Refer to EM-61, "Removal and Installation".
4. Remove oil pan (upper). Refer to EM-34, "Removal and Installation".
5. Remove the oil pump assembly.

INSTALLATION

Installation is in the reverse order of removal.

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

INSPECTION AFTER INSTALLATION

- Before starting engine, check oil/fluid levels including engine coolant and engine oil. If less than required quantity, fill to the specified level. Refer to MA-13, "Fluids and Lubricants".
- Use procedure below to check for fuel leakage.
- Turn ignition switch ON (with engine stopped). With fuel pressure applied to fuel piping, check for fuel leakage at connection points.
- Start engine. With engine speed increased, check again for fuel leakage at connection points.
- Run engine to check for unusual noise and vibration.

NOTE:

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

- Warm up engine thoroughly to make sure there is no leakage of fuel, exhaust gas, or any oils/fluids including engine oil and engine coolant.
- Bleed air from passages in lines and hoses in cooling system. Refer to CO-12, "Changing Engine Coolant".
- After cooling down engine, again check oil/fluid levels, including engine oil and engine coolant. Refill to specified level, if necessary.

• Summary of the inspection items:

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

*Power steering fluid, brake fluid, etc.

UNIT DISASSEMBLY AND ASSEMBLY

OIL PUMP

Disassembly and Assembly

INFOID:0000000006750543

DISASSEMBLY

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

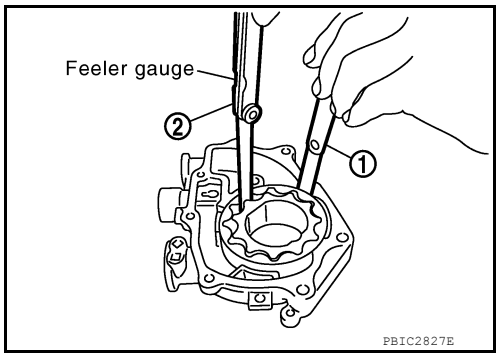
INSPECTION AFTER DISASSEMBLY

Clearance of Oil Pump Parts

- Measure radial clearance using a suitable tool.

Body to outer rotor (position 1)
Refer to: LU-17, "Standard and Limit"

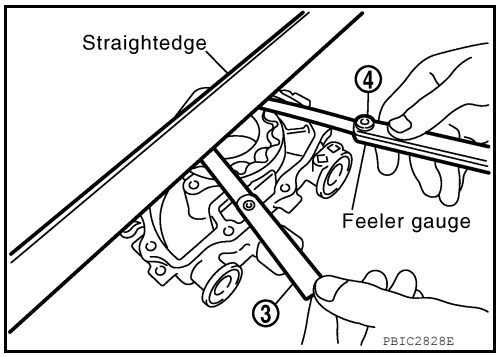
Inner rotor to outer rotor tip (position 2)
Refer to: LU-17, "Standard and Limit"



- Measure side clearance using suitable tools.

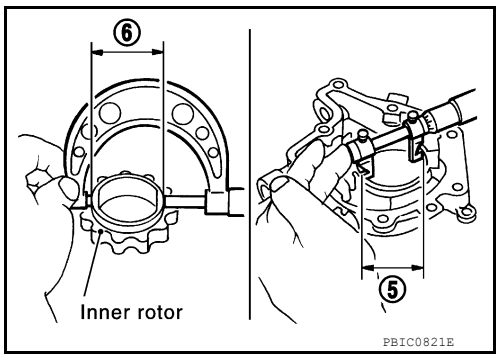
Body to inner rotor (position 3)
Refer to: LU-17, "Standard and Limit"

Body to outer rotor (position 4)
Refer to: LU-17, "Standard and Limit"



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

1. Measure the inner diameter of oil pump body to brazed portion (position 5) using suitable tool.
2. Measure the outer diameter of protruded portion of inner rotor (position 6) using suitable tool.



3. Calculate the clearance using the following formula.
   - (Clearance) = (Inner diameter of oil pump body) - (Outer diameter of inner rotor)

Inner rotor to brazed portion of housing
Refer to: LU-17, "Standard and Limit"

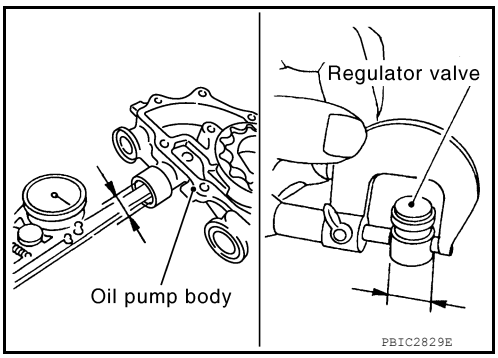
Regulator Valve Clearance

Check regulator valve to oil pump cover clearance using the following formula.

- (Clearance) = D_1 (Valve hole diameter) - D_2 (Outer Diameter of valve)

Regulator valve to oil pump cover

Refer to: LU-17, "Standard and Limit"



CAUTION:

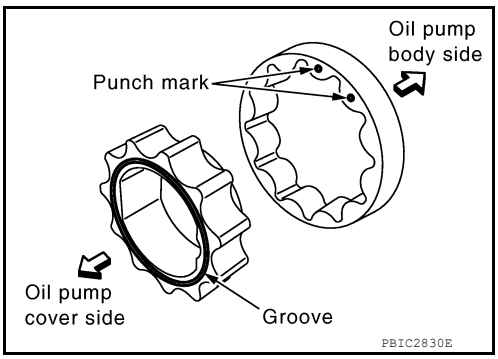
- **Coat regulator valve with engine oil.**
- **Check that it falls smoothly into the regulator valve hole by its own weight.**

ASSEMBLY

Assembly is in the reverse order of disassembly.

NOTE:

- Install oil pump inner rotor with the groove facing the oil pump cover side.
- Install the oil pump outer rotor with the punch mark facing the oil pump cover side.



SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Standard and Limit

INFOID:0000000006750544

OIL PRESSURE

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

Engine speed	Approximate discharge oil pressure*
600 rpm (idle speed)	More than 98 (1.0, 14)
2,000 rpm	More than 294 (3.0, 43)
6,000 rpm	More than 392 (4.0, 56.8)

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

OIL PUMP

Unit: mm (in)

Body to outer rotor	0.120 - 0.195 (0.0047 - 0.0077)
Inner rotor to outer rotor tip	0.060 - 0.160 (0.0024 - 0.0063)
Body to inner rotor	0.030 - 0.070 (0.0012 - 0.0028)
Body to outer rotor	0.050 - 0.090 (0.0020 - 0.0035)
Inner rotor to brazed portion of housing	0.045 - 0.091 (0.0018 - 0.0036)

REGULATOR VALVE

Unit: mm (in)

Regulator valve to oil pump cover	0.025 - 0.070 (0.0010 - 0.0028)

ENGINE OIL CAPACITY (APPROXIMATE)

Unit: ℓ (US qt, Imp qt)

Drain and refill	With oil filter change	5.1 (5-3/8, 4-1/2)
	Without oil filter change	4.8 (5-1/8, 4-1/4)
	Dry engine (Overhaul)	6.3 (6-5/8, 5-1/2)

PRECAUTION

PRECAUTIONS

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

INFOID:0000000006750545

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.**

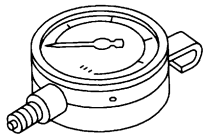
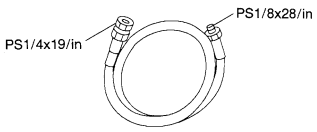
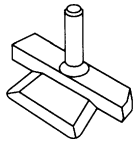
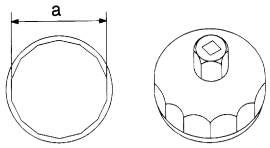
PREPARATION

PREPARATION

Special Service Tool

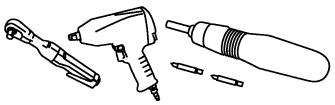
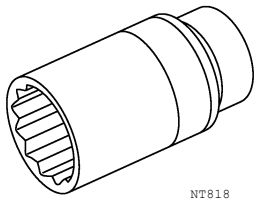
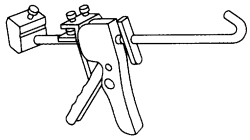
INFOID:0000000006750547

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

Tool number (Kent-Moore No.) Tool name	Description
ST25051001 (J-25695-1) Oil pressure gauge  S-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 cylinder block
KV10111100 (J-37228) Seal cutter  NT046	Removing steel oil pan and rear timing chain case
KV10115801 (J-38956) Oil filter wrench  S-NT375	Removing and installing oil filter **a: 64.3 mm (2.531 in)**

Commercial Service Tool

INFOID:0000000006750548

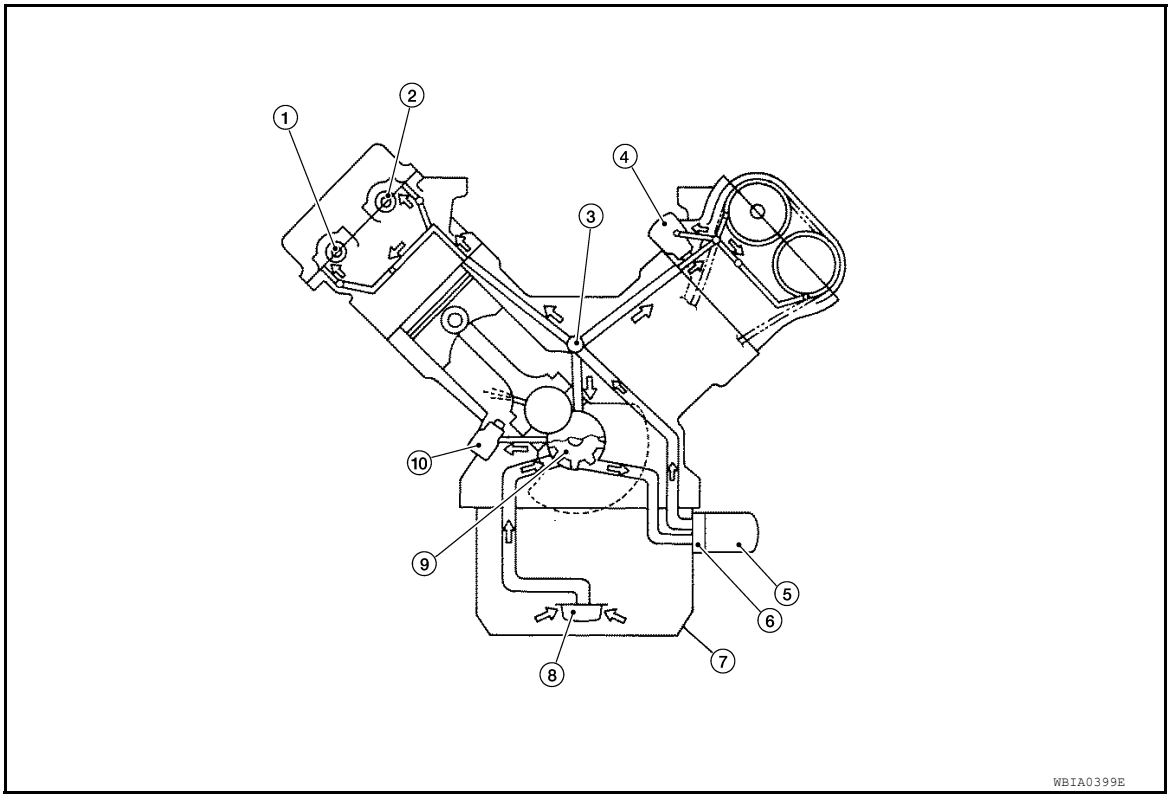
Tool name	Description
Power tool  PIIB1407E	Loosening nuts, screws, and bolts.
Deep socket  NT818	Removing and installing oil pressure switch Deep socket 26 mm
Tube presser  S-NT052	Pressing the tube of liquid gasket

SYSTEM DESCRIPTION

LUBRICATION SYSTEM

Lubrication Circuit

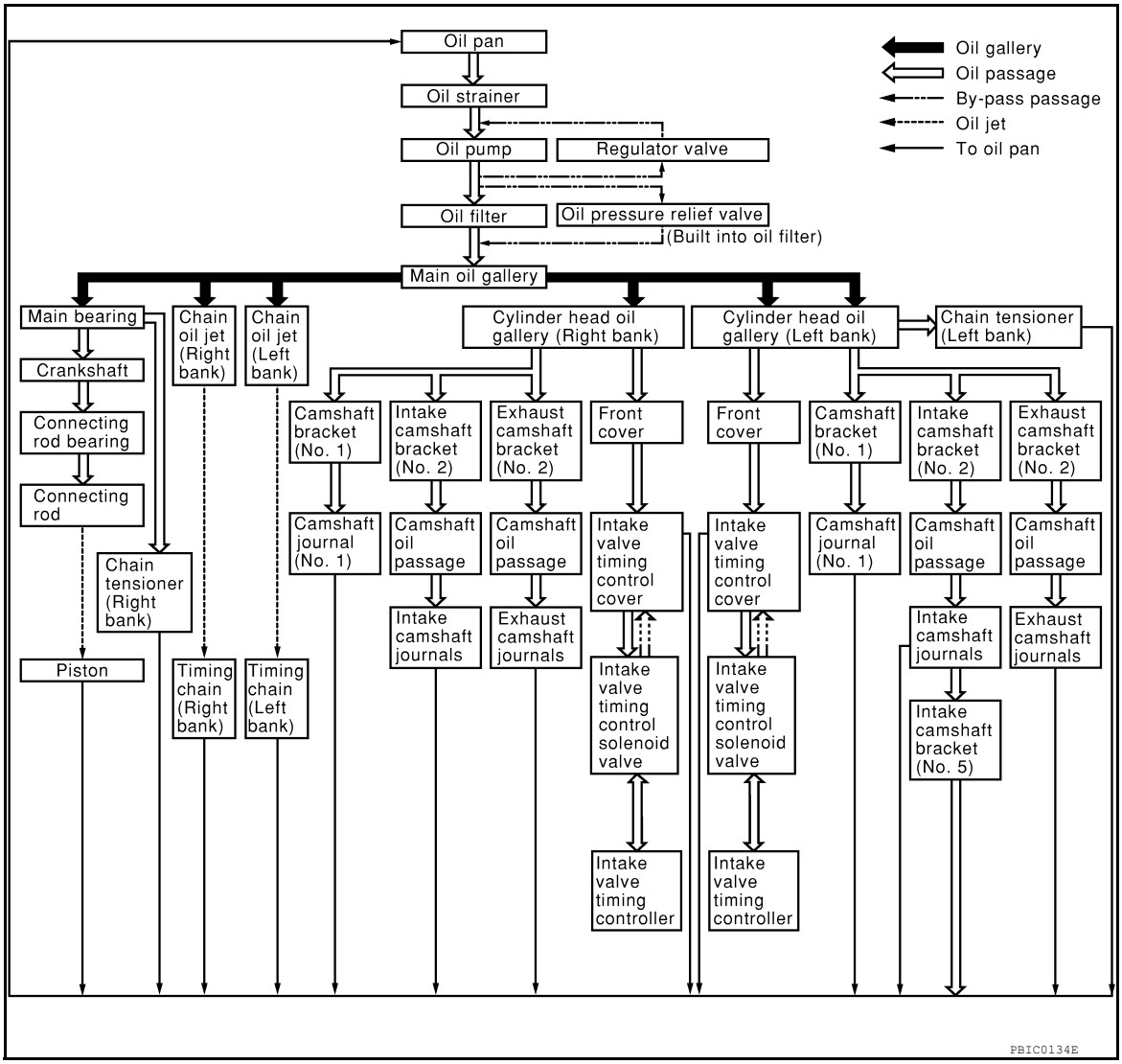
INFOID:0000000006750549



1. Exhaust camshaft
2. Intake camshaft
3. Main oil galley
4. Chain tensioner (Left bank)
5. Oil filter
6. Oil cooler
7. Oil pan
8. Oil strainer
9. Oil pump
10. Chain tensioner (Right bank)

Schematic

INFOID:0000000006750550



PERIODIC MAINTENANCE

ENGINE OIL

Inspection

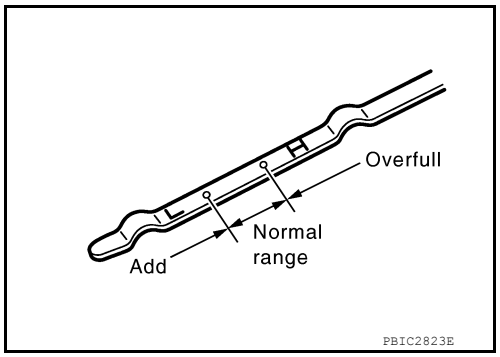
INFOID:0000000006750551

OIL LEVEL

- Before starting the engine make sure the vehicle is parked on a flat and level surface, then check the oil level. If the engine is already running, turn it off and allow 10 minutes before checking.
- Pull out oil level gauge and wipe clean.
- Insert oil level gauge.
- Check that the oil level is within the low (L) and high (H) range as indicated on the dipstick.
- If the engine oil level is out of range, add oil as necessary. Refer to MA-14, "Engine Oil Recommendation".

CAUTION:

Do not overfill the engine with oil.



OIL APPEARANCE

- Check the engine oil for a white, milky appearance or excessive contamination.
- If the engine oil is 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 pans (lower and upper)
- Oil pan drain plug
- Oil pressure switch
- Oil filter
- Oil cooler
- Water pump cover
- Chain tensioner cover
- Intake valve timing control cover and intake valve timing control solenoid valve
- Mating surface between cylinder block and cylinder head
- Mating surface of front cover to cylinder head and cylinder block
- Crankshaft oil seals (front and rear)
- Oil level gauge guide
- Camshaft position sensor (PHASE)

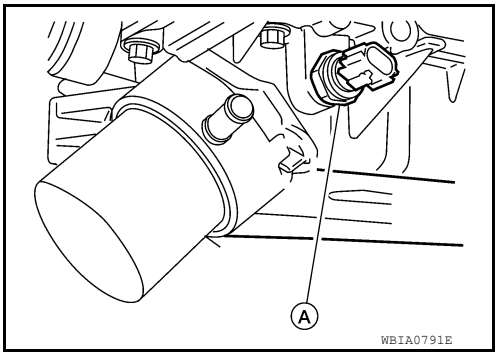
OIL PRESSURE CHECK

WARNING:

- **Be careful not to burn yourself, as engine oil may be hot.**
- **Put the A/T shift selector in the P (Park) position.**

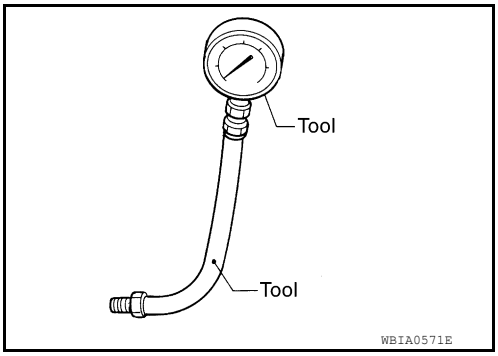
1. Check the engine oil level. Refer to LU-23, "Inspection".
2. Remove front under cover using power tool. Refer to EXT-38, "Removal and Installation".
3. Disconnect the oil pressure switch harness connector.

4. Remove the oil pressure switch (A) using suitable tool.
CAUTION:
Do not drop or shock oil pressure switch.



5. Install Tools.

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



6. Start the engine and warm it up to normal operating temperature.
7. Check the engine oil pressure with engine running under no-load. Refer to LU-33, "Standard and Limit".

CAUTION:
If the difference between the measured pressure and the specification is extreme check the oil passages and oil pump for leaks or blockages.

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

a. Remove old liquid gasket adhering to oil pressure switch and engine.

b. Apply liquid gasket and tighten oil pressure switch to the specification.
Use Genuine RTV Silicone Sealant or equivalent. Refer to GI-17, "Recommended Chemical Products and Sealants".

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

c. After warming up engine, make sure there are no oil leaks with the engine running.

9. Install front under cover. Refer to EXT-38, "Removal and Installation".

Changing Engine Oil

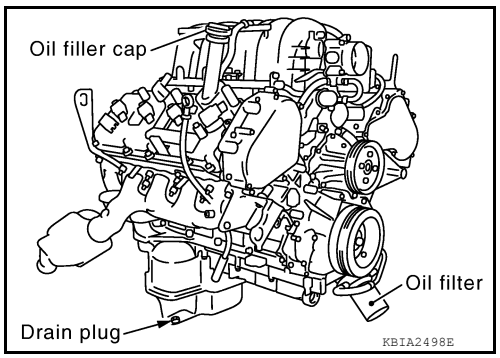
INFOID:0000000006750552

WARNING:
- **Be careful not to burn yourself, as the engine and 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 any oil leaks.
2. Stop engine and wait for 10 minutes.

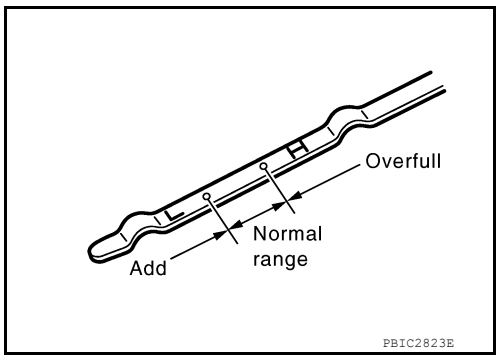
3. Loosen oil filler cap, then remove oil drain plug.
4. Drain engine oil.
5. Install the oil drain plug with a new washer.
   CAUTION:
   - **Clean the oil drain plug and install with a new washer.**
   - **Do not reuse copper sealing washer.**

   Oil drain plug : **Refer to EM-172, "Exploded View"**



6. Refill the engine with new specified engine oil.
   CAUTION:
   - **The refill capacity depends on the engine oil temperature and drain time. Use these specifications for reference only.**
   - **Always use the oil level gauge to determine when the proper amount of engine oil is in the engine.**

   Oil grade and viscosity : **Refer to MA-13, "Fluids and Lubricants".**
   Oil capacity : **Refer to LU-33, "Standard and Limit".**
7. Warm up the engine and check the area around the oil drain plug and oil filter for oil leaks.
8. Stop engine and wait for 10 minutes.
9. Check the oil level using the dipstick as shown. Add oil as necessary and install the oil filler cap. Refer to LU-23, "Inspection".
   CAUTION:
   Do not overfill the engine with oil.



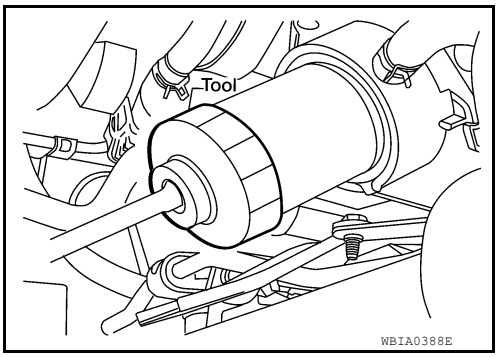
OIL FILTER

Removal and Installation

INFOID:0000000006750553

REMOVAL

1. Remove the front under cover using power tool. Refer to EXT-38, "Removal and Installation".
2. Drain the engine oil. Refer to LU-24, "Changing Engine Oil".
3. Remove the oil filter using Tool as shown.

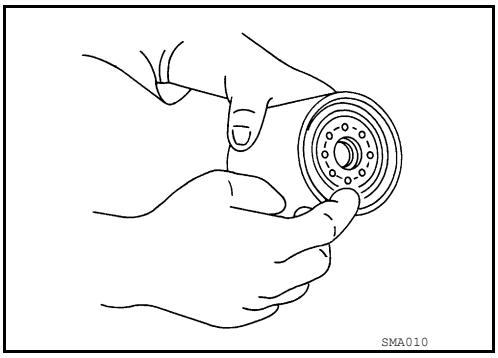


Tool number : KV10115801 (J-38956)

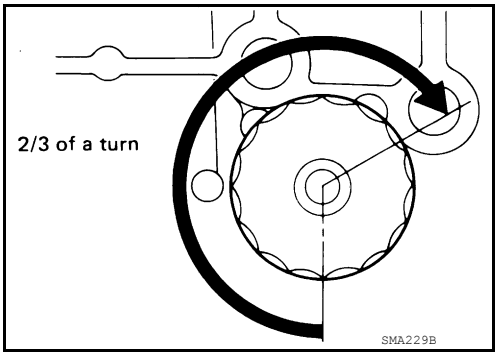
WARNING:
Be careful not to burn yourself, as the engine and engine oil may be hot.
CAUTION:
- **The oil filter is provided with a pressure relief valve.**
- **Use Genuine NISSAN oil filter or equivalent.**
- **When removing, prepare a shop cloth to absorb any engine oil leaks or spills.**
- **Do not allow engine oil to adhere to the drive belts.**
- **Completely wipe off engine oil that adheres to the engine and the vehicle.**

INSTALLATION

1. Remove foreign materials adhering to the oil filter seal mating surface.
2. Apply clean engine oil to the new oil filter seal as shown.



3. Screw on the oil filter manually until it touches the seal mating surface and then tighten it an additional 2/3 turn using Tool as shown; or to specification.



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

Tool number : KV10115801 (J-38956)

4. Refill the engine with new engine oil. Refer to LU-24, "Changing Engine Oil".
5. Inspect the engine for oil leaks. Refer to LU-23, "Inspection".
6. Install the front under cover. Refer to EXT-38, "Removal and Installation".

INSPECTION AFTER INSTALLATION

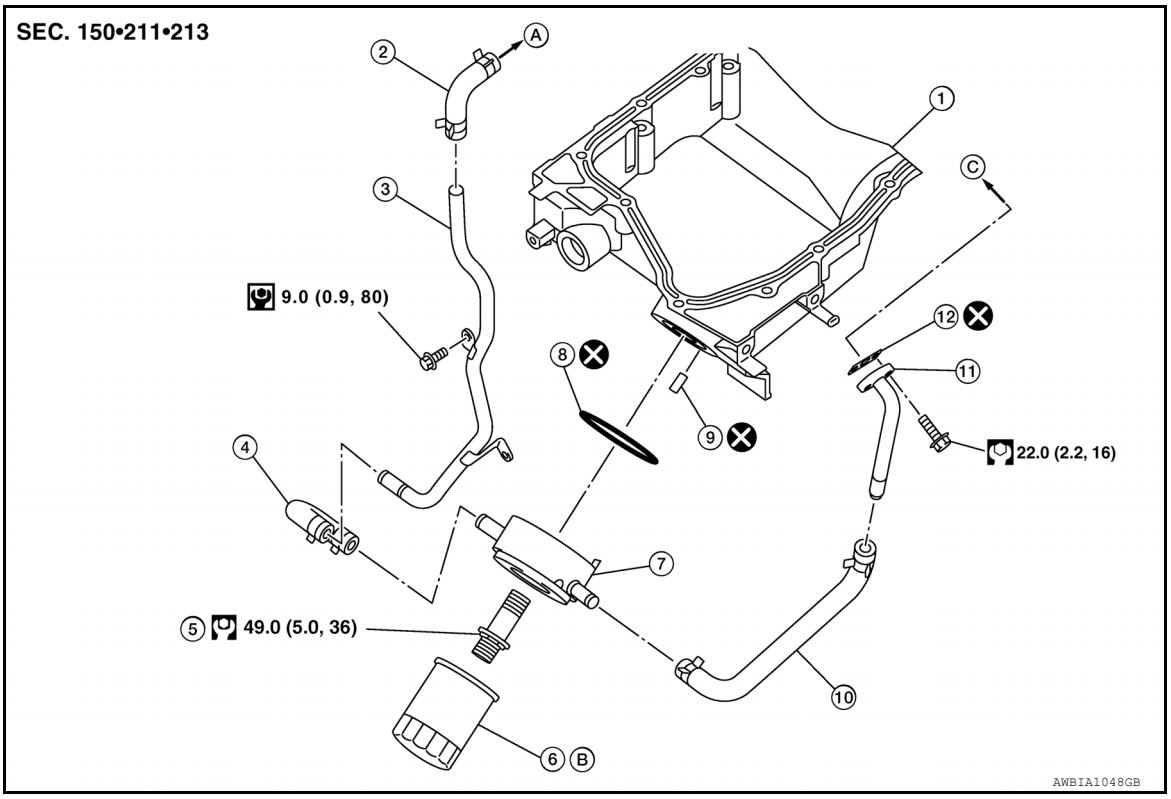
1. Check the engine oil level. Refer to LU-23, "Inspection".
2. Start the engine and check for engine oil leaks.
3. Stop the engine and wait for 10 minutes.
4. Check the engine oil level and add engine oil as required.

REMOVAL AND INSTALLATION

OIL COOLER

Exploded View

INFOID:0000000006750554



1. Oil pan (Upper)	2. Water hose	3. Water pipe
4. Water hose	5. Connector bolt	6. Oil filter
7. Oil cooler	8. O-ring	9. Relief valve
10. Water hose	11. Connector pipe	12. Gasket
A. To thermostat housing	B. Refer to LU-26	C. To cylinder block

Removal and Installation

INFOID:0000000006750555

WARNING:
- **Be careful not to burn yourself, as the engine oil and engine coolant may be hot.**
- **Do not remove the radiator cap when the engine is hot. Serious burns could occur from high pressure engine coolant escaping from the radiator.**

CAUTION:
- **Do not spill engine coolant on the drive belt.**
- **Do not spill engine oil on rubber parts such as drive belts and engine mounting insulator.**

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

REMOVAL

1. Drain engine coolant from the radiator. Refer to CO-44, "Changing Engine Coolant".
2. Remove front under cover using power tool. Refer to EXT-38, "Removal and Installation".
3. Disconnect water hoses from the oil cooler.
   CAUTION:
   Perform this step when engine is cold.
4. Remove oil filter. Refer to LU-26, "Removal and Installation".

5. Remove connector bolt, and remove oil cooler and O-ring.
   CAUTION:
   Do not reuse O-ring.

INSPECTION AFTER REMOVAL

Oil Cooler

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

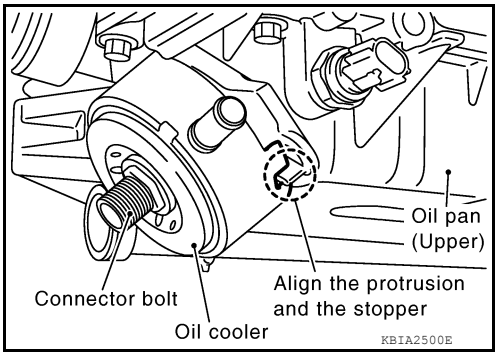
Relief Valve

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

INSTALLATION

Installation is in the reverse order of removal. Pay special attention to the following:
- Confirm that no foreign objects are adhering to the sealing surfaces of the oil cooler or oil pan.
- Tighten the connecting bolt after aligning the stopper on the oil pan side with protrusion of the oil cooler.

CAUTION:
Do not reuse O-ring.



INSPECTION AFTER INSTALLATION

- Before starting engine, check oil/fluid levels including engine coolant and engine oil. If less than required quantity, fill to the specified level. Refer to MA-13, "Fluids and Lubricants".
- Use procedure below to check for fuel leakage.
- Turn ignition switch ON (with engine stopped). With fuel pressure applied to fuel piping, check for fuel leakage at connection points.
- Start engine. With engine speed increased, check again for fuel leakage at connection points.
- Run engine to check for unusual noise and vibration.

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

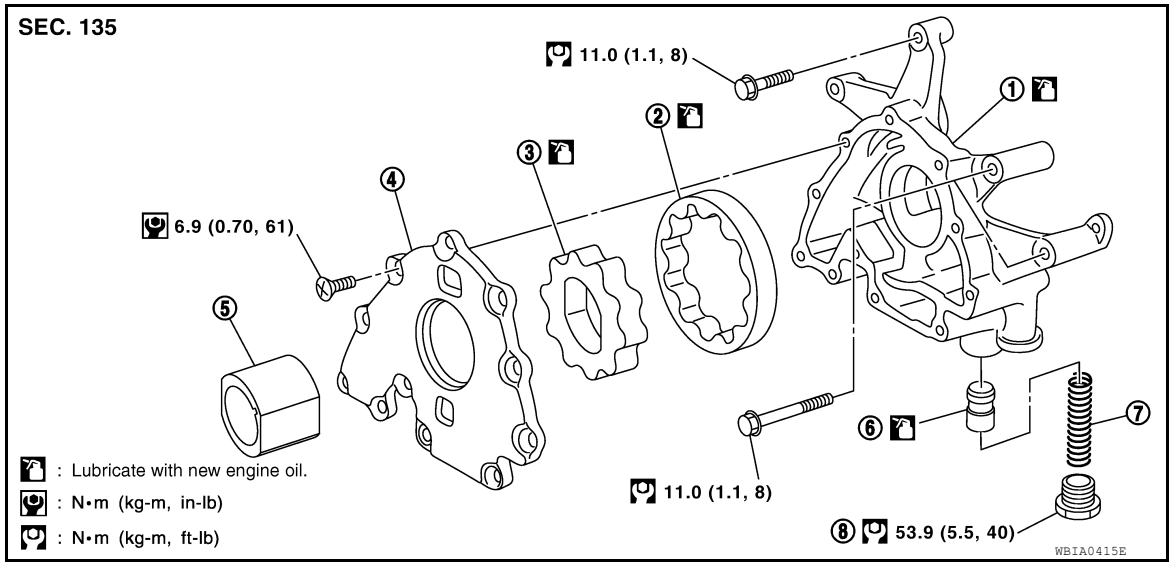
Item		Before starting engine	Engine running	After engine stopped
Engine coolant		Level	Leakage	Level
Engine oil		Level	Leakage	Level
Transmission/ transaxle fluid	A/T and CVT Models	Leakage	Level/Leakage	Leakage
	M/T Models	Level/Leakage	Leakage	Level/Leakage
Other oils and fluids*		Level	Leakage	Level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

*Power steering fluid, brake fluid, etc.

OIL PUMP

Exploded View

INFOID:0000000006750556



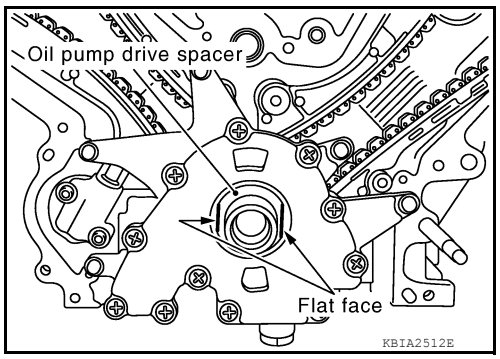
1. Oil pump body
2. Outer rotor
3. Inner rotor
4. Oil pump cover
5. Oil pump drive spacer
6. Regulator valve
7. Regulator spring
8. Regulator plug

Removal and Installation

INFOID:0000000006750557

REMOVAL

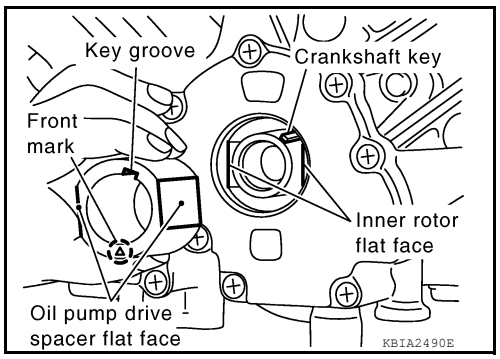
1. Remove the timing chain cover. Refer to EM-187, "Removal and Installation".
2. Remove the oil pump drive spacer.
3. Remove the oil pump.



INSTALLATION

Installation is in the reverse order of removal.

- When inserting the oil pump drive spacer, align the crankshaft key and the flat face of the inner rotor.
- If they are not aligned, rotate the oil pump inner rotor by hand.
- Make sure that each part is aligned and tap lightly until it reaches the end.



INSPECTION AFTER INSTALLATION

- Before starting engine, check oil/fluid levels including engine coolant and engine oil. If less than required quantity, fill to the specified level. Refer to MA-13, "Fluids and Lubricants".
- Use procedure below to check for fuel leakage.
- Turn ignition switch ON (with engine stopped). With fuel pressure applied to fuel piping, check for fuel leakage at connection points.
- Start engine. With engine speed increased, check again for fuel leakage at connection points.
- Run engine to check for unusual noise and vibration.

  NOTE:

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

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

*Power steering fluid, brake fluid, etc.

UNIT DISASSEMBLY AND ASSEMBLY

OIL PUMP

Disassembly and Assembly

INFOID:0000000006750558

DISASSEMBLY

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

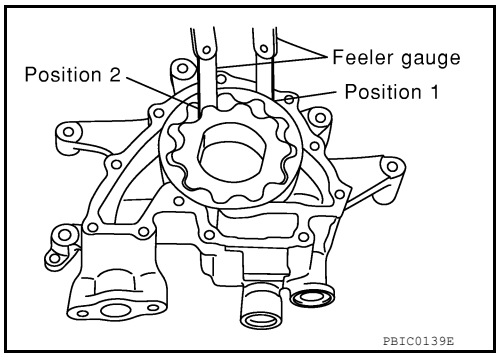
INSPECTION AFTER DISASSEMBLY

Clearance of Oil Pump Parts

- Measure radial clearance using a suitable tool.

Body to outer rotor (position 1)
Refer to LU-33, "Standard and Limit"

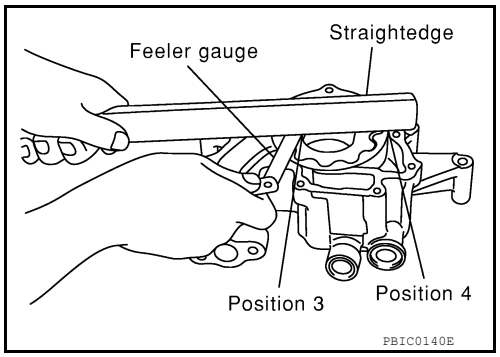
Inner rotor to outer rotor tip (position 2)
Refer to LU-33, "Standard and Limit"



- Measure side clearance using suitable tools.

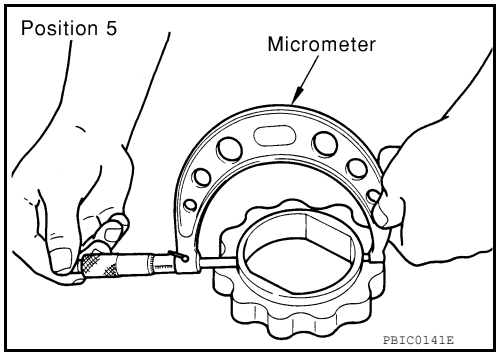
Body to inner rotor (position 3)
Refer to LU-33, "Standard and Limit"

Body to outer rotor (position 4)
Refer to LU-33, "Standard and Limit"

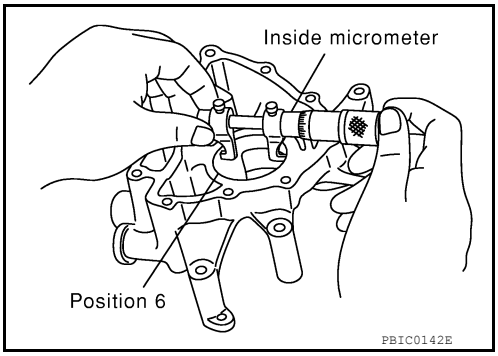


- Calculate the clearance between inner rotor and oil pump body as follows.

1. Measure the outer diameter of protruded portion of inner rotor (position 5) using suitable tool.



2. Measure the inner diameter of oil pump body to brazed portion (position 6) using suitable tool.



3. Calculate the clearance using the following formula.
   • (Clearance) = (Inner diameter of oil pump body) - (Outer diameter of inner rotor)

Inner rotor to brazed portion of housing

Refer to LU-33, "Standard and Limit"

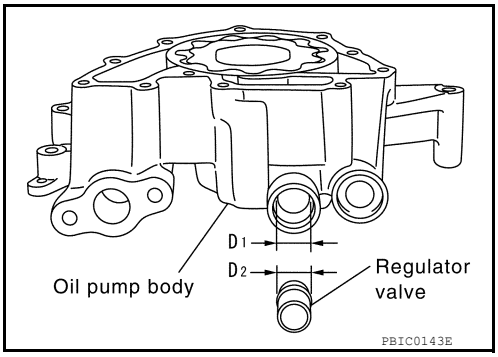
Regulator Valve Clearance

Check regulator valve to oil pump cover clearance using the following formula.

• (Clearance) = D_1 (Valve hole diameter) - D_2 (Outer Diameter of valve)

Regulator valve to oil pump cover

Refer to LU-33, "Standard and Limit"



CAUTION:

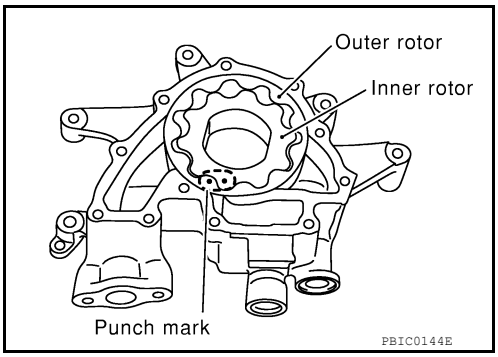
- **Coat regulator valve with engine oil.**
- **Check that it falls smoothly into the regulator valve hole by its own weight.**

ASSEMBLY

Assembly is in the reverse order of disassembly.

NOTE:

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



SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Standard and Limit

INFOID:0000000006750559

OIL PRESSURE

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

Engine speed	Approximate discharge oil pressure*
600 rpm	More than 98 (1.0, 14)
2,000 rpm	More than 294 (3.0, 43)
6,000 rpm	More than 392 (4.0, 56.8)

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

OIL PUMP

Unit: mm (in)

Body to outer rotor	0.114 - 0.200 (0.0045 - 0.0079)
Inner rotor to outer rotor tip	Maximum 0.180 (0.0071)
Body to inner rotor	0.030 - 0.070 (0.0012 - 0.0028)
Body to outer rotor	0.030 - 0.090 (0.0012 - 0.0035)
Inner rotor to brazed portion of housing	0.045 - 0.091 (0.0018 - 0.0036)

REGULATOR VALVE

Unit: mm (in)

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

ENGINE OIL CAPACITY (APPROXIMATE)

Unit: ℓ (US qt, Imp qt)

Drain and refill	With oil filter change	6.5 (6-7/8, 5-3/4)
	Without oil filter change	6.2 (6-1/2, 5-1/2)
	Dry engine (Overhaul)	7.6 (8, 6-3/4)