

ENGINE LUBRICATION & COOLING SYSTEMS

SECTION LC

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EC

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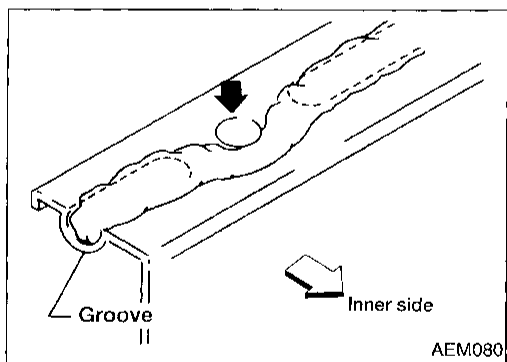
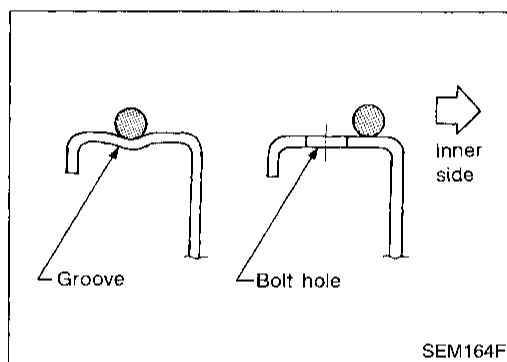
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Supplemental Restraint System (SRS) "AIR BAG"

The Supplemental Restraint System "Air Bag", used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and in the instrument panel on the passenger side), a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **RS 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 dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses are covered with yellow insulation just before the harness connector for easy identification.



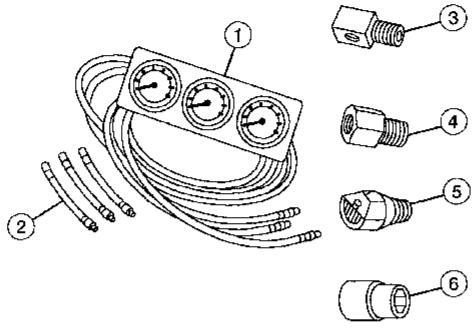
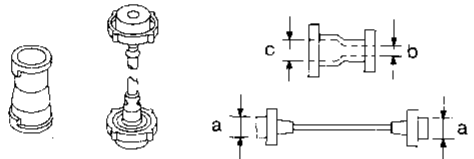
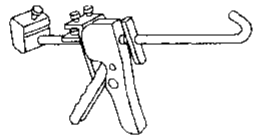
Liquid Gasket Application Procedure

- a. Use a scraper to remove all traces of old liquid gasket from mating surfaces and grooves. Also, completely clean any oil from these areas.
- b. Apply a continuous bead of liquid gasket to mating surfaces. (Use Genuine RTV silicone sealant Part No. 999MP-A7007, Three Bond TB1207D or equivalent.)
 - For oil pan, be sure liquid gasket diameter is 3.5 to 4.5 mm (0.138 to 0.177 in).
 - For areas except oil pan, be sure liquid gasket diameter is 2.0 to 3.0 mm (0.079 to 0.118 in).
- c. Apply liquid gasket around the inner side of bolt holes (unless otherwise specified).
- d. Assembly should be done within 5 minutes after coating.
- e. Wait at least 30 minutes before refilling engine oil and engine coolant.

PRECAUTIONS AND PREPARATION

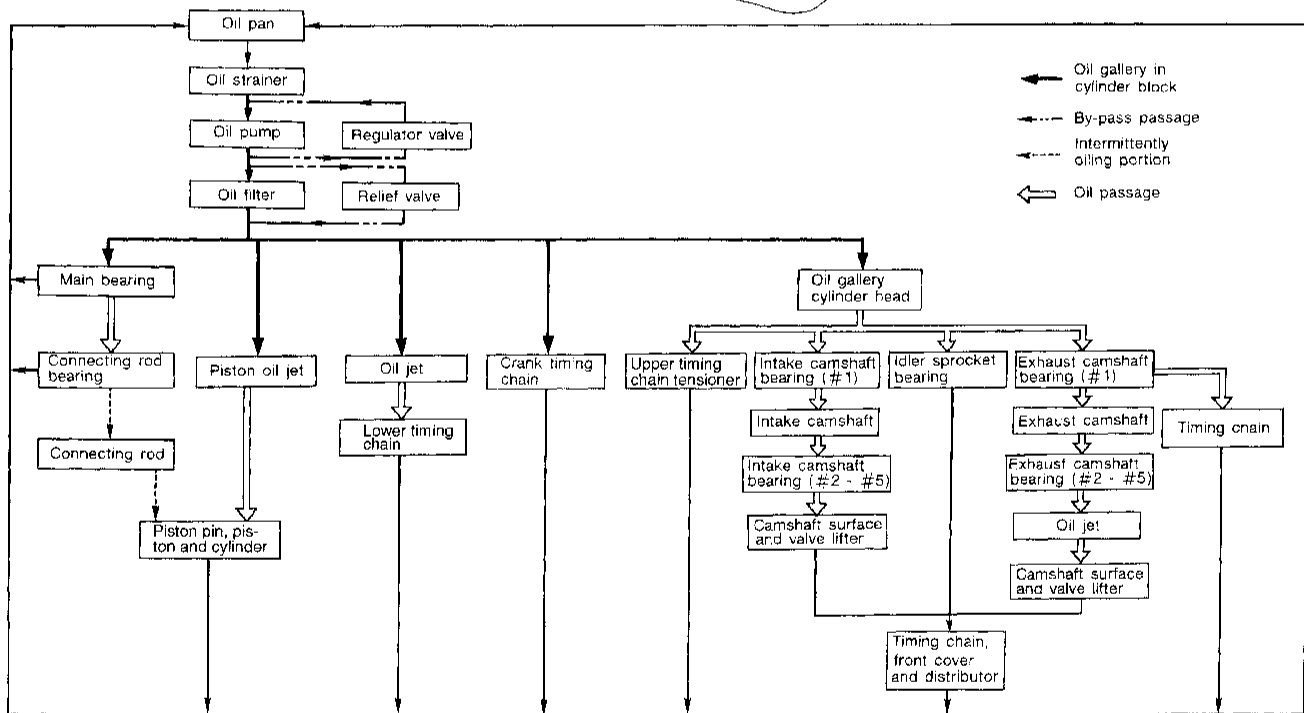
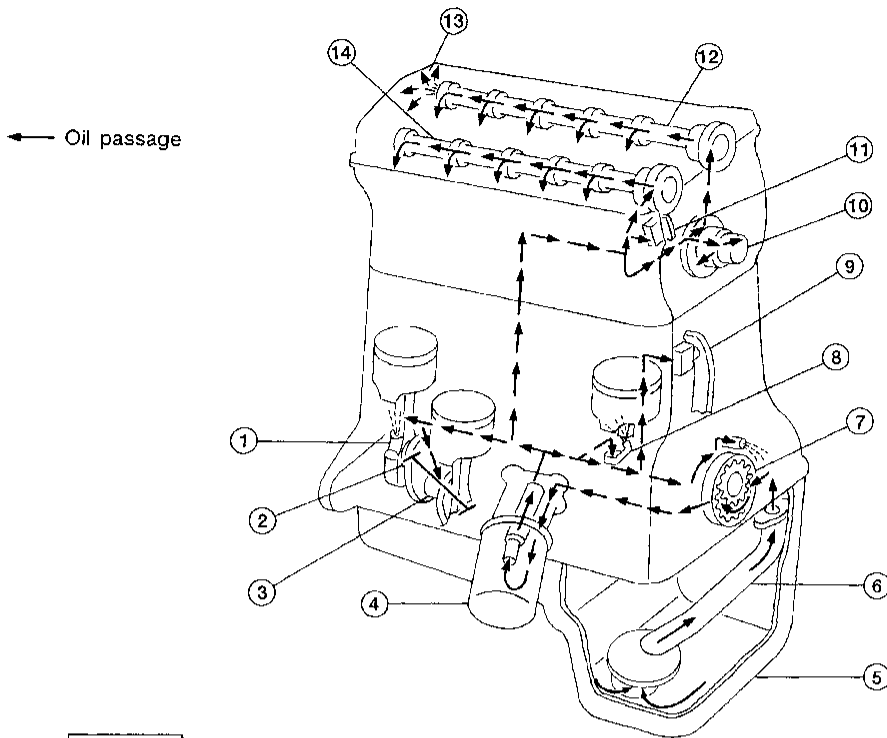
Special Service Tools

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	
(J34301-C) Oil pressure gauge set ① (J34301-1) Oil pressure gauge ② (J34301-2) Hoses ③ (J34298) Adapter ④ (J34282-1) Adapter ⑤ (790-301-1230-A) 60° adapter ⑥ (J34301-15) Square socket	 <p>AAT896</p>	Measuring oil pressure Maximum measuring range: 1,379 kPa (14 kg/cm ² , 200 psi)
EG17650301 (J33984-A) Radiator cap tester adapter	 <p>NT564</p>	Adapting radiator cap tester to radiator filler neck a: 28 (1.10) dia. b: 31.4 (1.236) dia. c: 41.3 (1.626) dia. Unit: mm (in)
WS39930000 (—) Tube presser	 <p>NT052</p>	Pressing the tube of liquid gasket

ENGINE LUBRICATION SYSTEM

Lubrication Circuit



ALC067

- ① Connecting rod
- ② Connecting rod bearing
- ③ Main bearing
- ④ Oil filter
- ⑤ Oil pan

- ⑥ Oil strainer
- ⑦ Oil pump
- ⑧ Piston oil jet
- ⑨ Timing chain tensioner
- ⑩ Idler sprocket

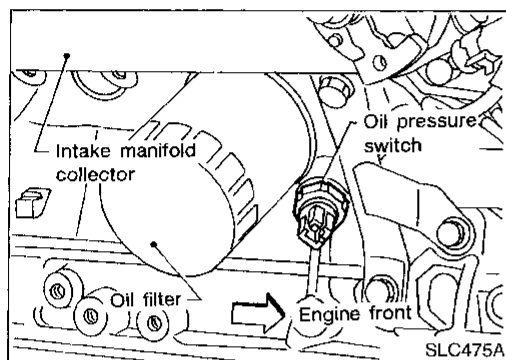
- ⑪ Upper timing chain tensioner
- ⑫ Exhaust camshaft
- ⑬ Camshaft oil jet
- ⑭ Intake camshaft

ENGINE LUBRICATION SYSTEM

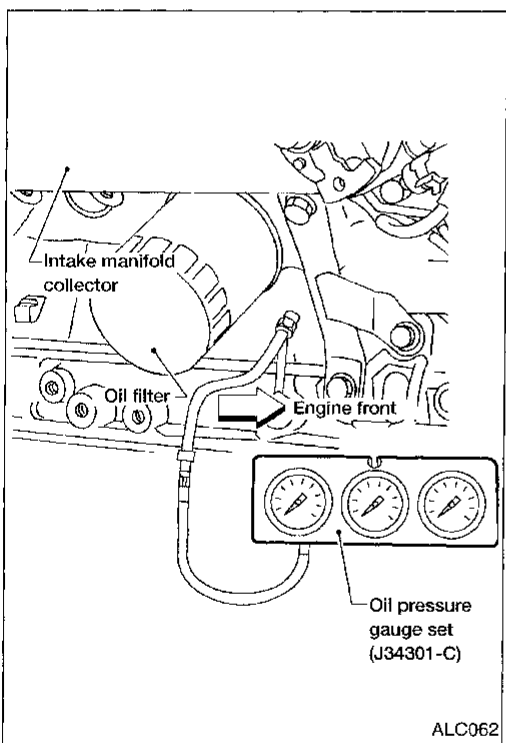
Oil Pressure Check

WARNING:

- Be careful not to burn yourself, as the engine and oil may be hot.
- For M/T models, put gearshift lever in Neutral "N" position. For A/T models, put selector lever in Park "P" position.



1. Check oil level.
2. Remove oil pressure switch.

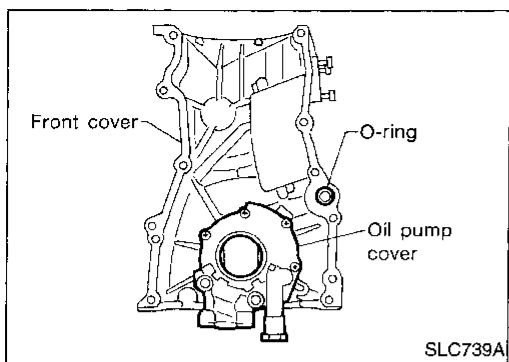


3. Install pressure gauge.
4. Start engine and warm it up to normal operating temperature.
5. Check oil pressure with engine running under no-load.

Engine speed rpm	Approximate discharge pressure kPa (kg/cm ² , psi)
Idle speed	More than 78 (0.8, 11)
3,000	412 - 481 (4.2 - 4.9, 60 - 70)

- If difference is extreme, check oil passage and oil pump for oil leaks.
6. Install oil pressure switch with sealant.

ENGINE LUBRICATION SYSTEM

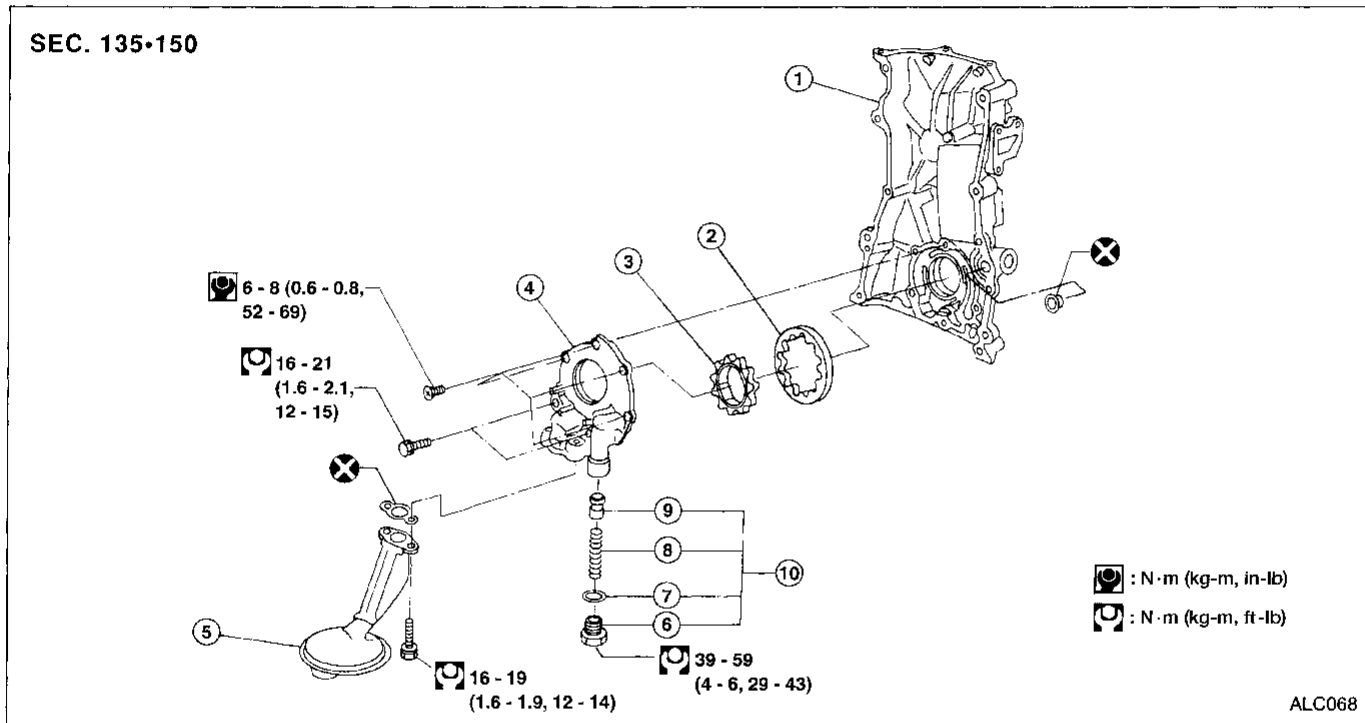


Oil Pump

REMOVAL

1. Remove front cover.
 2. Remove oil pump cover.
- Refer to EM section (“Removal”, “TIMING CHAIN”).

DISASSEMBLY AND ASSEMBLY



- | | | |
|------------------|----------------|----------------------------|
| ① Front cover | ⑤ Oil strainer | ⑧ Spring |
| ② Outer gear | ⑥ Cap | ⑨ Regulator valve |
| ③ Inner gear | ⑦ Washer | ⑩ Regulator valve assembly |
| ④ Oil pump cover | | |

ENGINE LUBRICATION SYSTEM

Oil Pump (Cont'd)

OIL PUMP INSPECTION

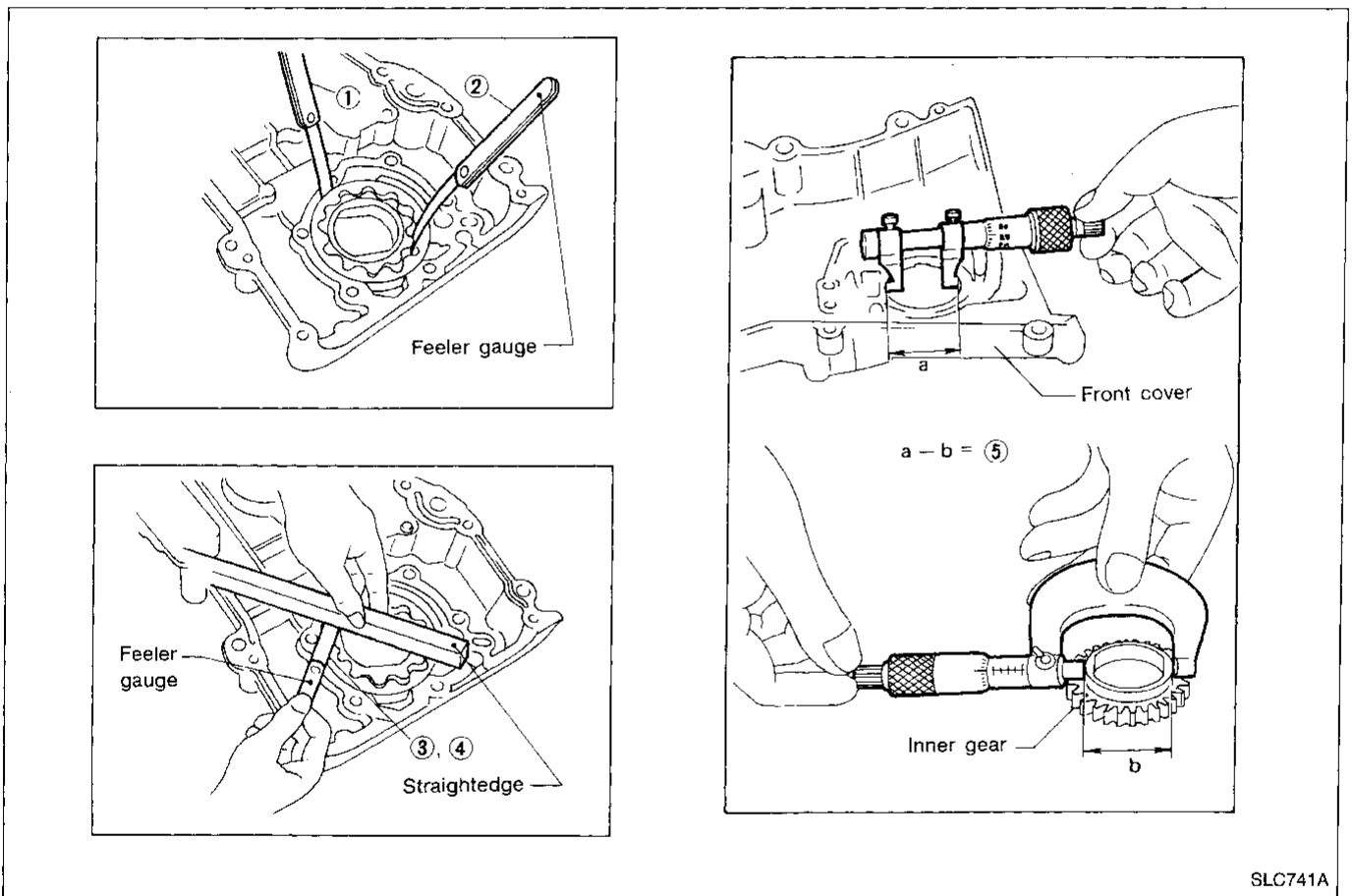
Using a feeler gauge, check the following clearances.

Standard clearance:

Unit: mm (in)

Body to outer gear radial clearance ①	.....	0.114 - 0.20 (0.0045 - 0.0079)
Inner gear to outer gear tip clearance ②	.....	0.04 - 0.18 (0.0016 - 0.0071)
Cover to inner gear clearance ③	.....	0.05 - 0.09 (0.0020 - 0.0035)
Cover to outer gear axial clearance ④	.....	0.05 - 0.11 (0.0020 - 0.0043)
Inner gear to brazed portion clearance ⑤	..	0.045 - 0.091 (0.0018 - 0.0036)

- If the tip clearance (②) exceeds the limit, replace gear set.
- If body to gear clearances (①, ③, ④, ⑤) exceed the limit, replace front cover assembly.

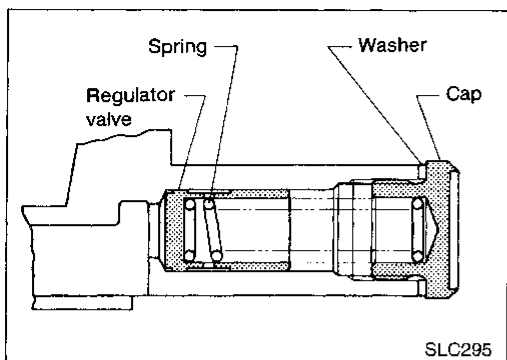


ENGINE LUBRICATION SYSTEM

Oil Pump (Cont'd)

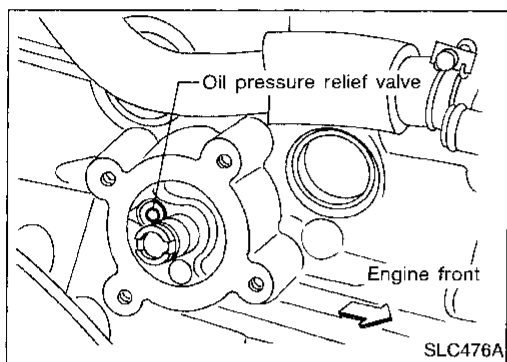
REGULATOR VALVE INSPECTION

1. Visually inspect components for wear and damage.
 2. Check oil pressure regulator valve sliding surface and valve spring.
 3. Coat regulator valve with engine oil. Check that it falls smoothly into the valve hole by its own weight.
- **Replace regulator valve set or oil pump assembly, if damaged.**



OIL PRESSURE RELIEF VALVE INSPECTION

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



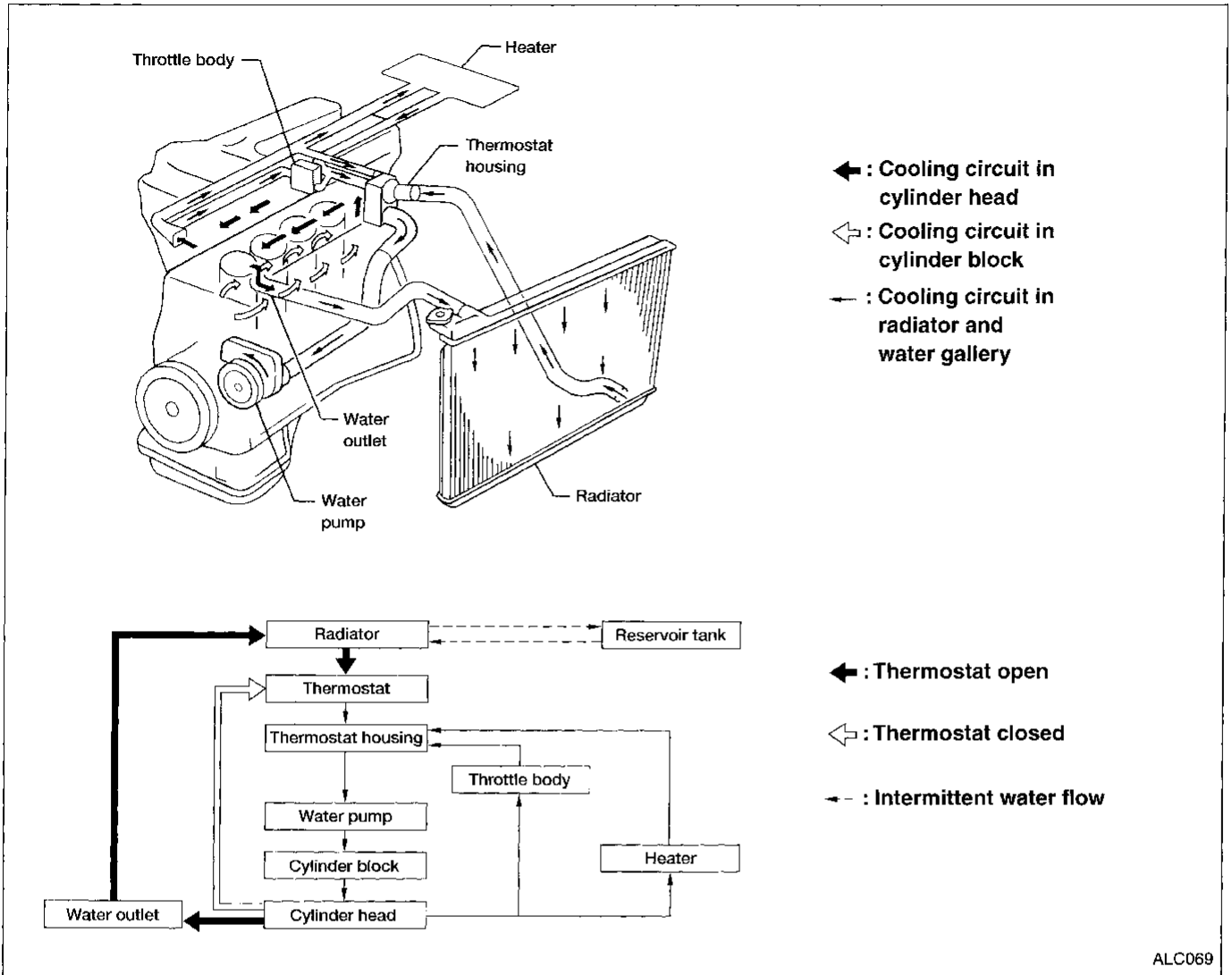
INSTALLATION

Install in the reverse order of removal.

- **Always replace oil seals and gaskets with new ones. Refer to EM section ("OIL SEAL REPLACEMENT").**
- **When installing oil pump, apply engine oil to inner and outer gears.**
- **Use a scraper to remove old liquid gasket from mating surface of front cover.**
- **Also remove traces of liquid gasket from mating surface of cylinder block.**

ENGINE COOLING SYSTEM

Cooling Circuit



System Check

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could occur from high pressure coolant escaping from the radiator.

Wrap a thick cloth around the cap. Slowly turn it a quarter turn to allow built-up pressure to escape. Carefully remove the cap by turning it all the way.

CHECKING COOLING SYSTEM HOSES

Check hoses for the following:

- Improper attachment
- Leaks
- Cracks
- Damage
- Chafing
- Deterioration

ENGINE COOLING SYSTEM

System Check (Cont'd)

CHECKING COOLING SYSTEM FOR LEAKS

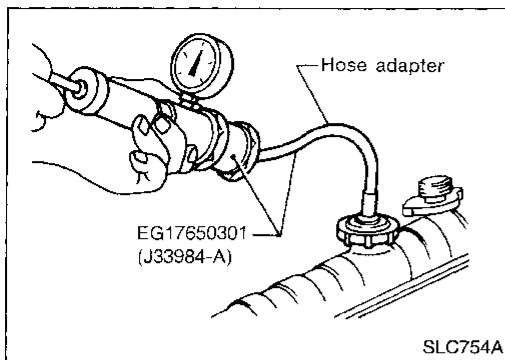
To check for leakage, apply pressure to the cooling system with a tester.

Testing pressure:

157 kPa (1.6 kg/cm², 23 psi)

CAUTION:

Higher pressure than specified may cause radiator damage.



CHECKING RADIATOR CAP

To check radiator cap, apply pressure to cap with a tester.

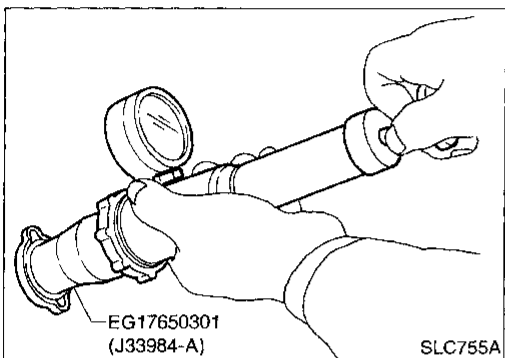
Radiator cap relief pressure:

Standard

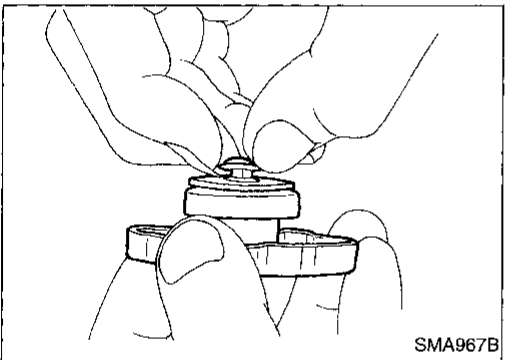
78 - 98 kPa (0.8 - 1.0 kg/cm², 11 - 14 psi)

Limit

59 - 98 kPa (0.6 - 1.0 kg/cm², 9 - 14 psi)

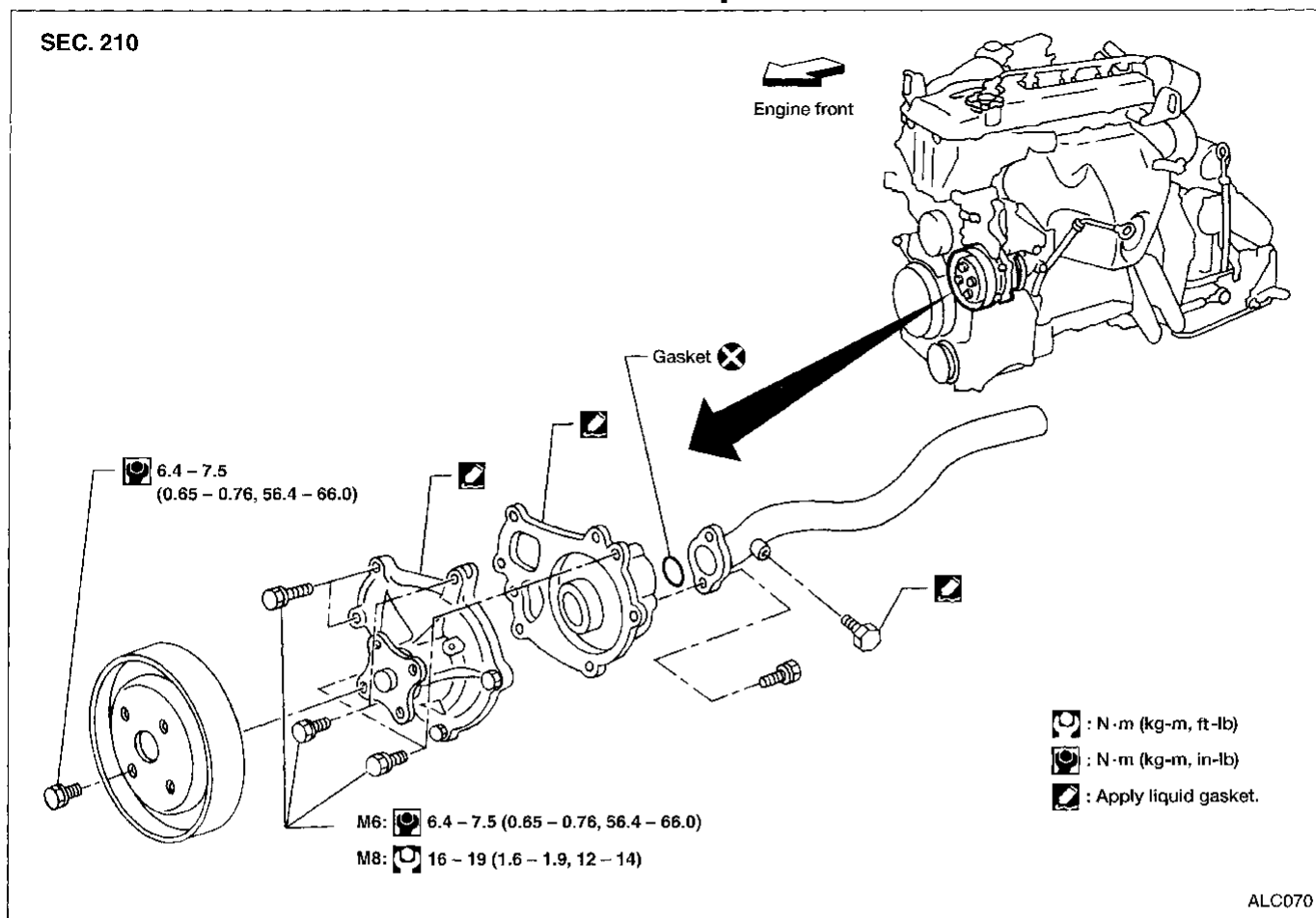


Pull the negative pressure valve to open it. Check that it closes completely when released.



ENGINE COOLING SYSTEM

Water Pump



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CAUTION:

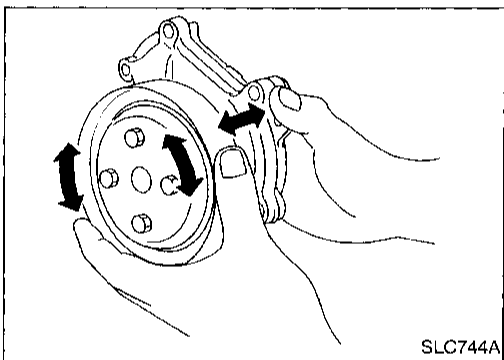
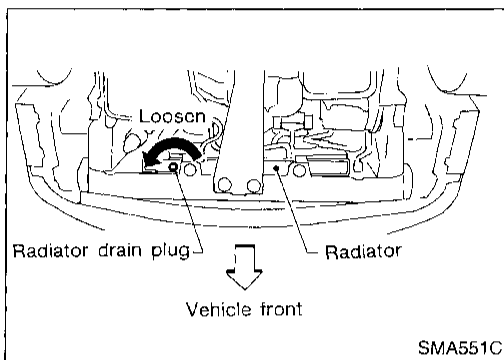
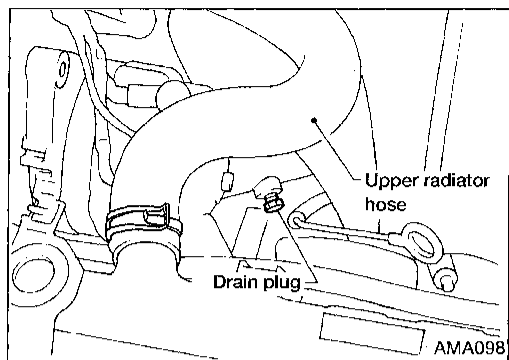
- When removing water pump assembly, be careful not to get coolant on drive belt.
- Water pump cannot be disassembled and should be replaced as a unit.
- After installing water pump, connect hose and clamp securely, then check for leaks using radiator cap pressure tester.

ENGINE COOLING SYSTEM

Water Pump (Cont'd)

REMOVAL

1. Drain coolant from drain plug on water pipe and radiator. Refer to MA section ("Changing Engine Coolant").
2. Remove right lower splash cover.
3. Remove generator and air conditioner compressor.
4. Remove two bolts from coolant tube (rear of water pump).
5. Remove water pump assembly.

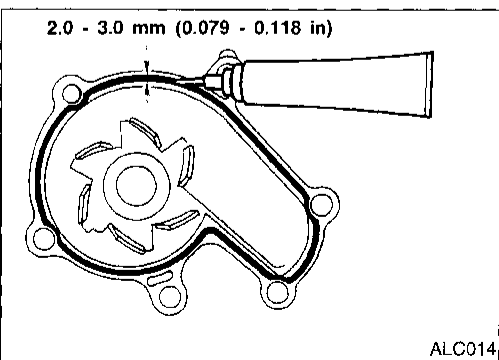
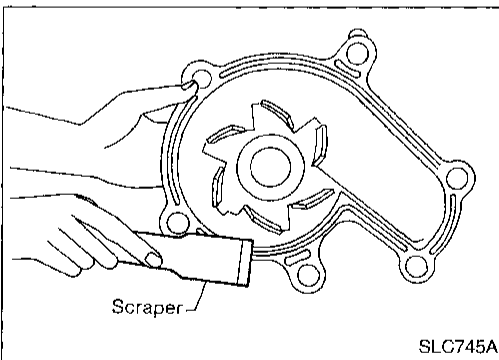


INSPECTION

- Check body assembly for rust or corrosion.
- Check for rough operation due to excessive end play.

INSTALLATION

1. Use a scraper to remove old liquid gasket from water pump and water pump cover.
 - **Also remove traces of liquid gasket from mating surface of cylinder block.**

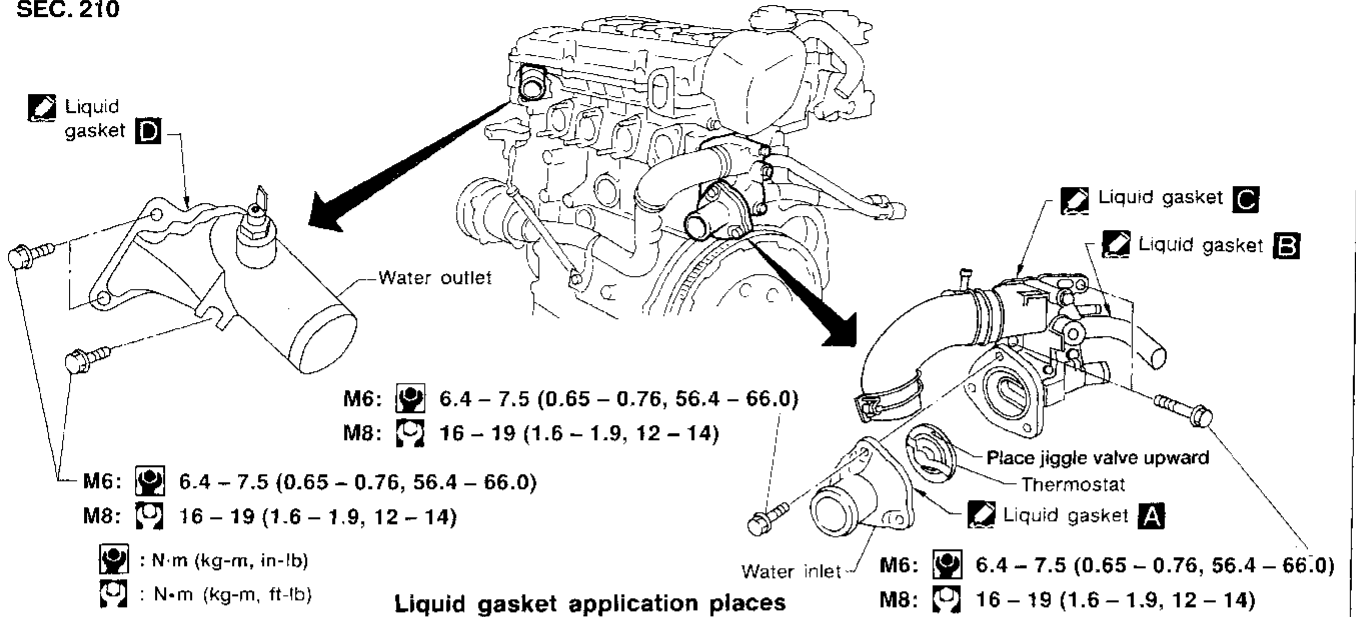


2. Apply a continuous bead of liquid gasket to mating surface of water pump and water pump cover (cylinder block side).
 - **Use Genuine RTV silicone sealant Part No. 999MP-A7007, Three Bond TB1207D or equivalent.**

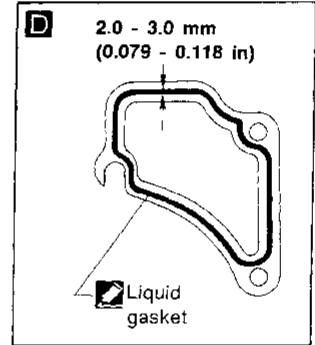
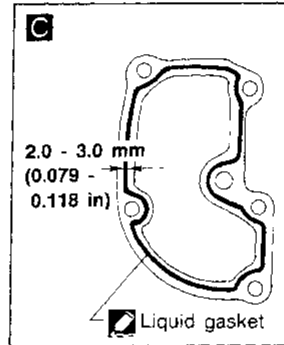
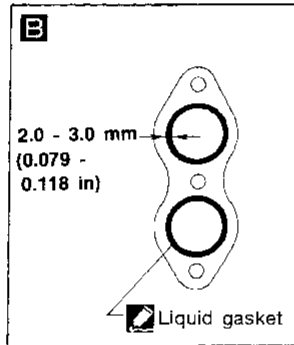
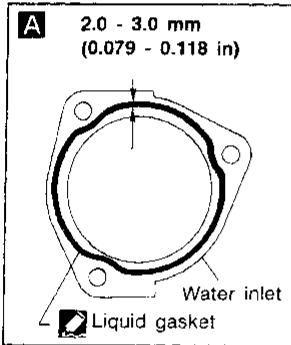
When filling radiator with coolant, refer to MA section ("Changing Engine Coolant", "ENGINE MAINTENANCE"). When installing drive belts, refer to MA section ("Checking Drive Belts", "ENGINE MAINTENANCE").

Thermostat

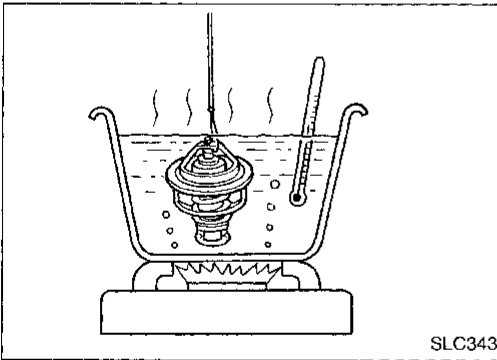
SEC. 210



Liquid gasket application places



ALC071

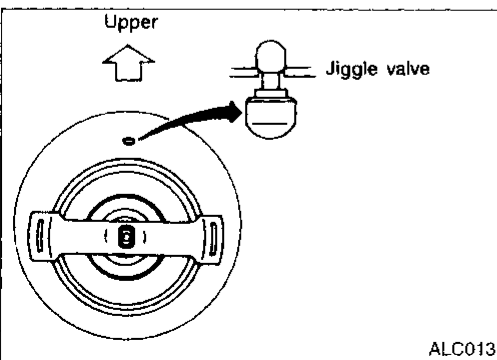


Be careful not to spill coolant over engine compartment. Use a rag to absorb coolant.

INSPECTION

1. Check valve seating condition at normal room temperatures. It should seat tightly.
2. Check valve opening temperature and valve lift.

		Standard
Valve opening temperature	°C (°F)	76.5 (170)
Valve lift	mm/°C (in/°F)	More than 10/90 (0.39/194)



3. Then check if valve is closed at 5°C (9°F) below valve opening temperature.

INSTALLATION

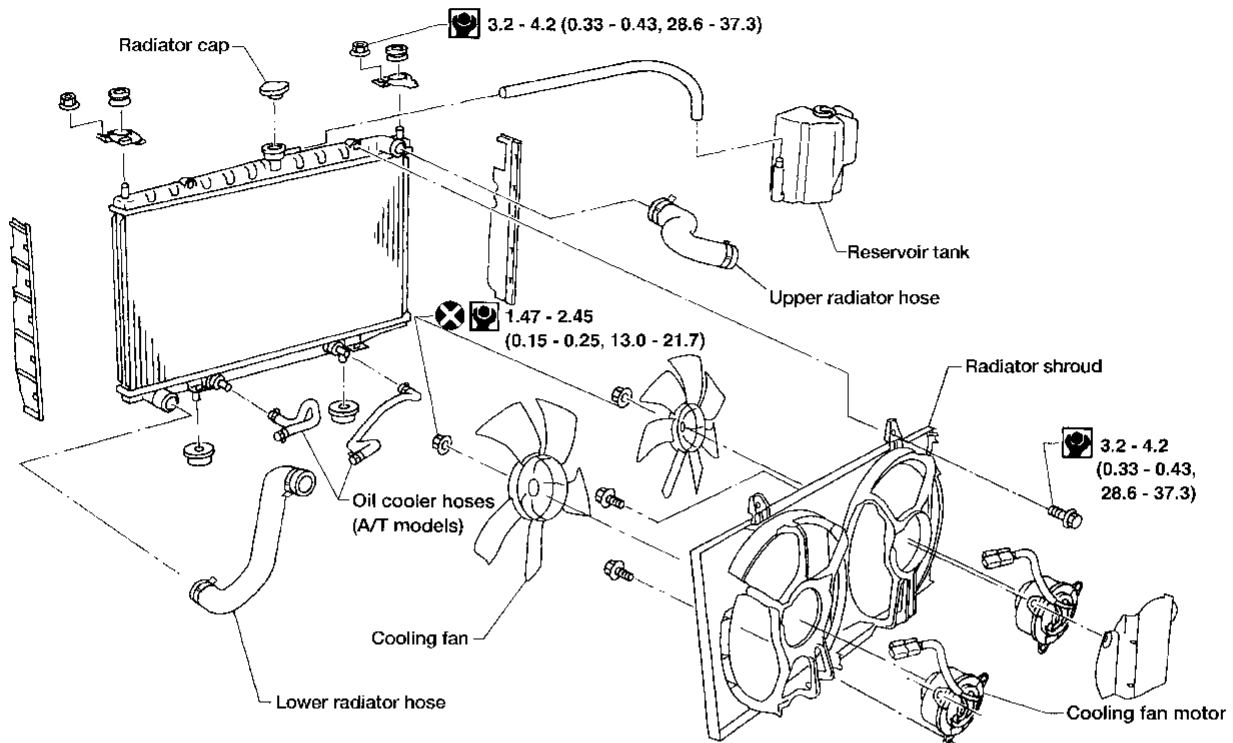
Install thermostat with jiggle valve or air bleeder at upper side.

- Apply a continuous bead of liquid gasket to mating surface of water inlet.
- After installation, run engine for a few minutes, and check for leaks.

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Radiator

SEC. 214



: N·m (kg-m, in-lb)

ALC072

Cooling fan control system

Cooling fans are controlled by the ECM (ECCS control module). For details, refer to EC section ("Overheat", "TROUBLE DIAGNOSIS FOR OVERHEAT").

Refilling engine coolant

For details on refilling engine coolant, refer to MA section ("Changing Engine Coolant").

ENGINE COOLING SYSTEM

Overheating Cause Analysis

	Symptom		Check items			
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	Worn or loose drive belt	—	GI	
		Thermostat stuck closed	—		MA	
		Damaged fins	Dust contamination or paper clogging		—	EM
			Mechanical damage			EM
	Reduced air flow	Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)	—	LC	
		Cooling fan does not operate	High resistance to fan rotation		—	EC
			Damaged fan blades			EC
	Damaged radiator shroud	—	—	—	FE	
	Improper coolant mixture ratio	—	—	—	FE	
	Poor coolant quality	—	—	—	FE	
	Insufficient coolant	Coolant leaks	Cooling hose	Loose clamp	—	CL
				Cracked hose		CL
			Water pump	Poor sealing	—	MT
			Radiator cap	Loose Poor sealing		AT
		Radiator	—	O-ring for damage, deterioration or improper fitting	—	FA
Cracked radiator tank				RA		
Cracked radiator core				FA		
Reservoir tank		—	Cracked reservoir tank	—	RA	
Overflowing reservoir tank	—	Exhaust gas leaks into cooling system	Cylinder head deterioration	—	BR	
			Cylinder head gasket deterioration		ST	
					RS	
Except cooling system parts malfunction	—	Overload on engine	Abusive driving	High engine rpm under no load	—	ST
				Driving in low gear for extended time		RS
				Driving at extremely high speed		BT
			Powertrain system malfunction	—		BT
			Installed improper size wheels and tires			HA
			Dragging brakes			EL
	Blocked or restricted air flow	—	Blocked radiator grille	Blocked bumper	—	BT
				Installed car brassiere		HA
				Mud contamination or paper clogging		EL
						IDX
Blocked radiator	—	—	EL			
Blocked condenser	—		EL			
Installed large fog lamp	—	—	—	IDX		

SERVICE DATA AND SPECIFICATIONS (SDS)

Engine Lubrication System

Oil pressure check

Engine speed	Approximate discharge pressure kPa (kg/cm ² , psi)
Idle speed	More than 78 (0.8, 11)
3,000 rpm	412 - 481 (4.2 - 4.9, 60 - 70)

Oil pump

Unit: mm (in)

Body to outer gear radial clearance	.....	0.114 - 0.20 (0.0045 - 0.0079)
Inner gear to outer gear tip clearance	.....	0.04 - 0.18 (0.0016 - 0.0071)
Cover to inner gear clearance	.....	0.05 - 0.09 (0.0020 - 0.0035)
Cover to outer gear axial clearance	.....	0.05 - 0.11 (0.0020 - 0.0043)
Inner gear to brazed portion clearance	.....	0.045 - 0.091 (0.0018 - 0.0036)

Engine Cooling System

Thermostat

Valve opening temperature	°C (°F)	76.5 (170)
Valve lift	mm/°C (in/°F)	More than 10/90 (0.39/194)

Radiator

Unit: kPa (kg/cm², psi)

Cap relief pressure		
Standard		78 - 98 (0.8 - 1.0, 11 - 14)
Limit		59 - 98 (0.6 - 1.0, 9 - 14)
Leakage test pressure		157 (1.6, 23)