

ENGINE LUBRICATION & COOLING SYSTEMS

SECTION **LC**

GI

MA

EM

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EC

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PRECAUTIONS

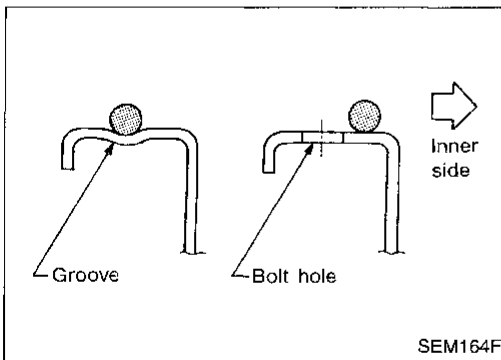


Supplemental Restraint System (SRS) "AIR BAG"

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 on 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.

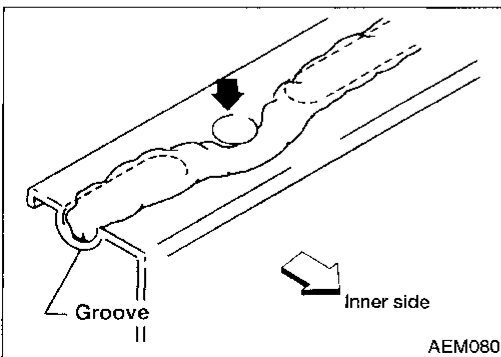
WARNING:

- 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 should 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 either just before the harness connectors or on the complete harness, for easy identification.



Liquid Gasket Application Procedure

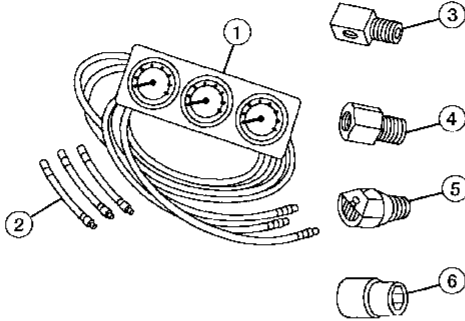
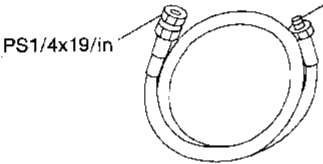
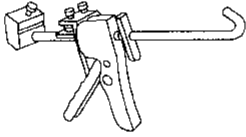
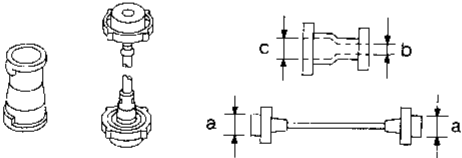
- Use a scraper to remove old liquid gasket from mating surfaces and grooves. Also, completely clean any oil from these areas.
- Apply a continuous bead of liquid gasket to mating surfaces. Use Genuine RTV Silicone Sealant Part No. 999 MP-A7007, Three Bond TB1207D or equivalent.
 - For oil pan, be sure 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).
- Apply liquid gasket around the inner side of bolt holes (unless otherwise specified).
- Assembly should be done within 5 minutes after coating.
- Wait at least 30 minutes before refilling engine oil and engine coolant.



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 style="text-align: right;">Measuring oil pressure</p> <p style="text-align: right;">Maximum measuring range: 1,379 kPa (14 kg/cm², 200 psi)</p> <p>AAT896</p>
ST25052000 (J25695-2) Hose	 <p style="text-align: right;">Adapting oil pressure gauge to cylinder block</p> <p>NT559</p>
WS39930000 (—) Tube presser	 <p style="text-align: right;">Pressing the tube of liquid gasket</p> <p>NT052</p>
EG17650301 (J33984-A) Radiator cap tester adapter	 <p style="text-align: right;">Adapting radiator cap tester to radiator neck</p> <p style="text-align: right;">a: 28 (1.10) dia. b: 31.4 (1.236) dia. c: 41.3 (1.626) dia. Unit: mm (in)</p> <p>NT564</p>

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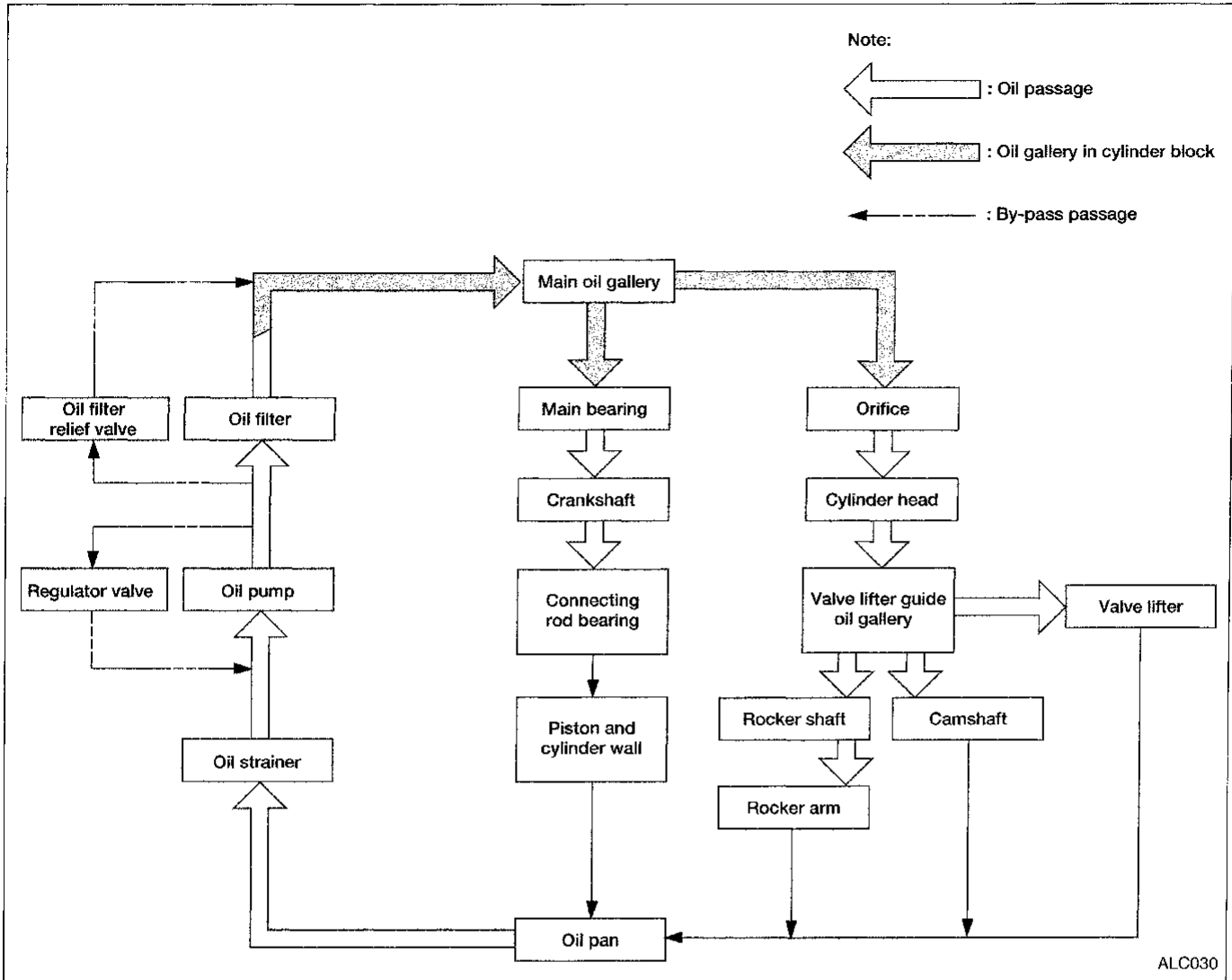
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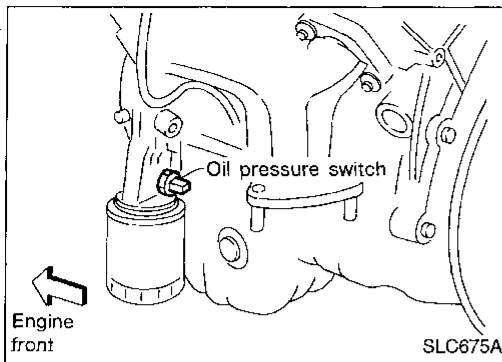
DX

ENGINE LUBRICATION SYSTEM

Lubrication Circuit



ENGINE LUBRICATION SYSTEM



Oil Pressure Check

WARNING:

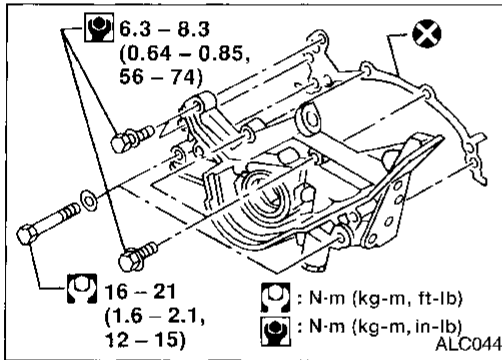
- Be careful not to burn yourself, as the engine and oil may be hot.
- Put selector lever in Park "P" position.

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 rpm	Approximate discharge pressure kPa (kg/cm ² , psi)
Idle speed	More than 118 (1.2, 17)
3,200	392 - 481 (4.0 - 4.9, 57 - 70)

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

6. Install oil pressure switch with sealant.



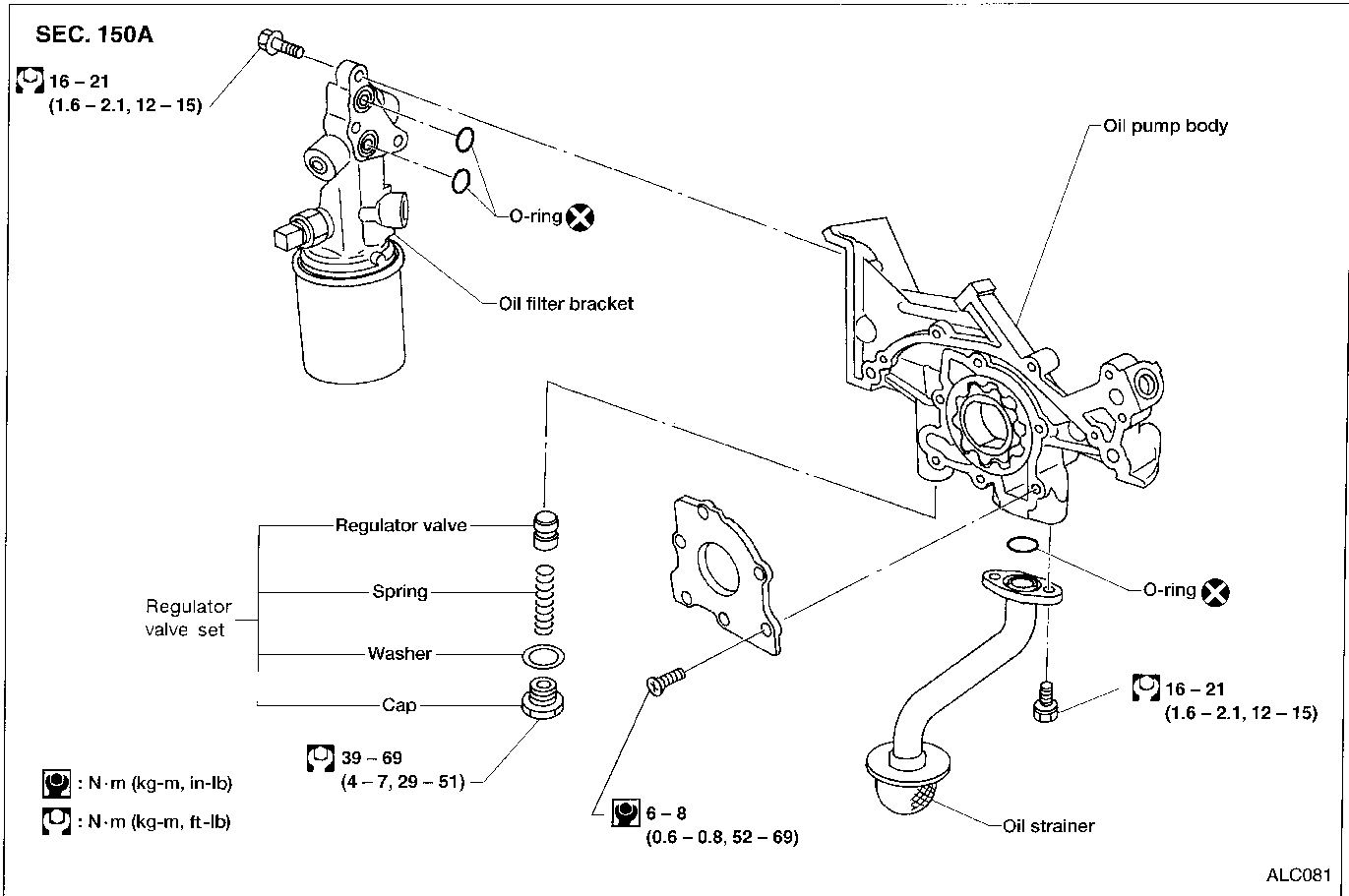
Oil Pump

REMOVAL

1. Drain engine oil.
2. Remove oil pan. Refer to EM section ("Removal", "OIL PAN").
3. After removing oil pan, install center member assembly and engine mounting insulator bolts and nuts.
4. Remove timing belt. Refer to EM section ("Removal", "TIMING BELT").
5. Remove timing belt tensioner.
6. Remove crankshaft sprocket and timing belt plate.
7. Remove oil pump assembly and gasket.

ENGINE LUBRICATION SYSTEM

Oil Pump (Cont'd) DISASSEMBLY AND ASSEMBLY



ENGINE LUBRICATION SYSTEM

Oil Pump (Cont'd)

OIL PUMP INSPECTION

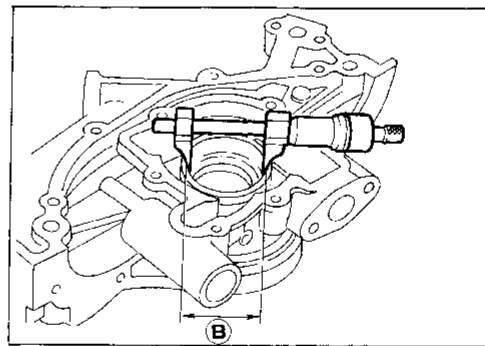
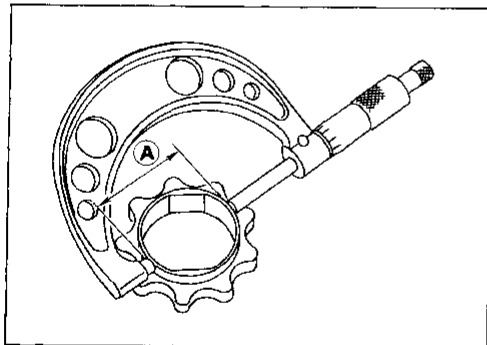
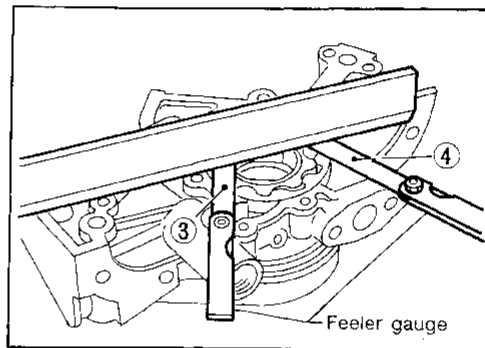
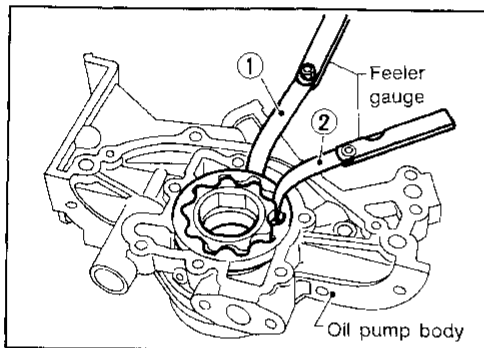
Using a feeler gauge, check the following clearances:

Standard clearance:

Unit: mm (in)

Body to outer gear radial clearance (1)	0.114 - 0.200 (0.0045 - 0.0079)
Inner gear to outer gear tip clearance (2)	Below 0.18 (0.0071)
Body to inner gear clearance (3)	0.05 - 0.09 (0.0020 - 0.0035)
Body to outer gear axial clearance (4)	0.05 - 0.11 (0.0020 - 0.0043)
Inner gear to brazed portion of housing 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) or (5) exceed the limit, replace front cover assembly.



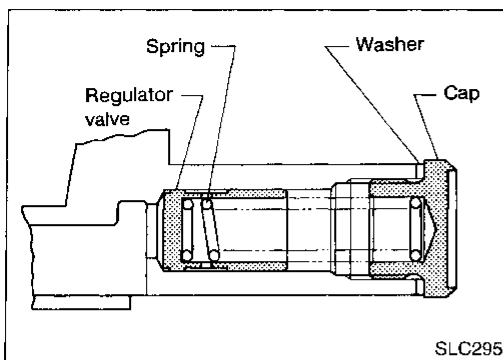
$$B - A = 5$$

SLC686A

ENGINE LUBRICATION SYSTEM

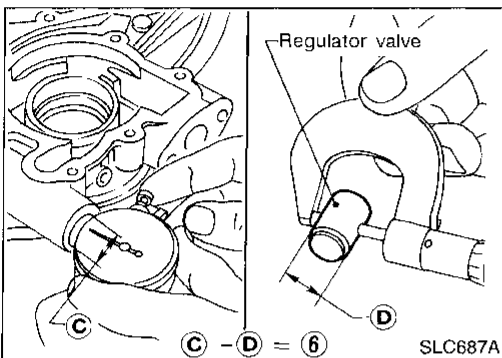
Oil Pump (Cont'd)

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.

If damaged, replace regulator valve set or oil pump assembly.



4. Check regulator valve to oil pump cover clearance.

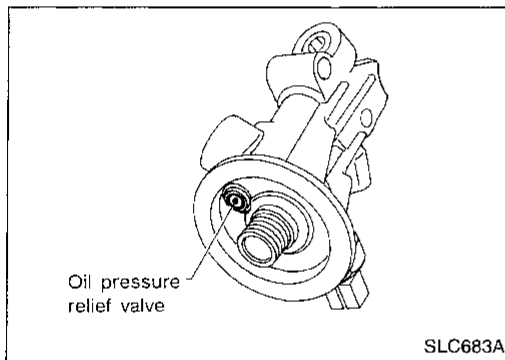
Clearance:

⑥ : 0.040 - 0.097 mm (0.0016 - 0.0038 in)

If it exceeds the limit, replace oil pump assembly.

OIL PRESSURE RELIEF VALVE INSPECTION

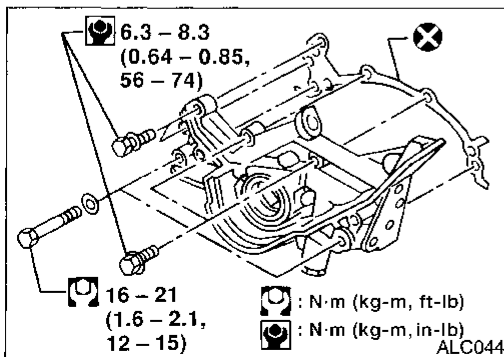
Inspect oil pressure relief valve for movement, cracks and breaks by pushing the ball. If replacement is necessary, remove valve by prying it out with a suitable tool. Install a new valve by tapping it in place.



INSTALLATION

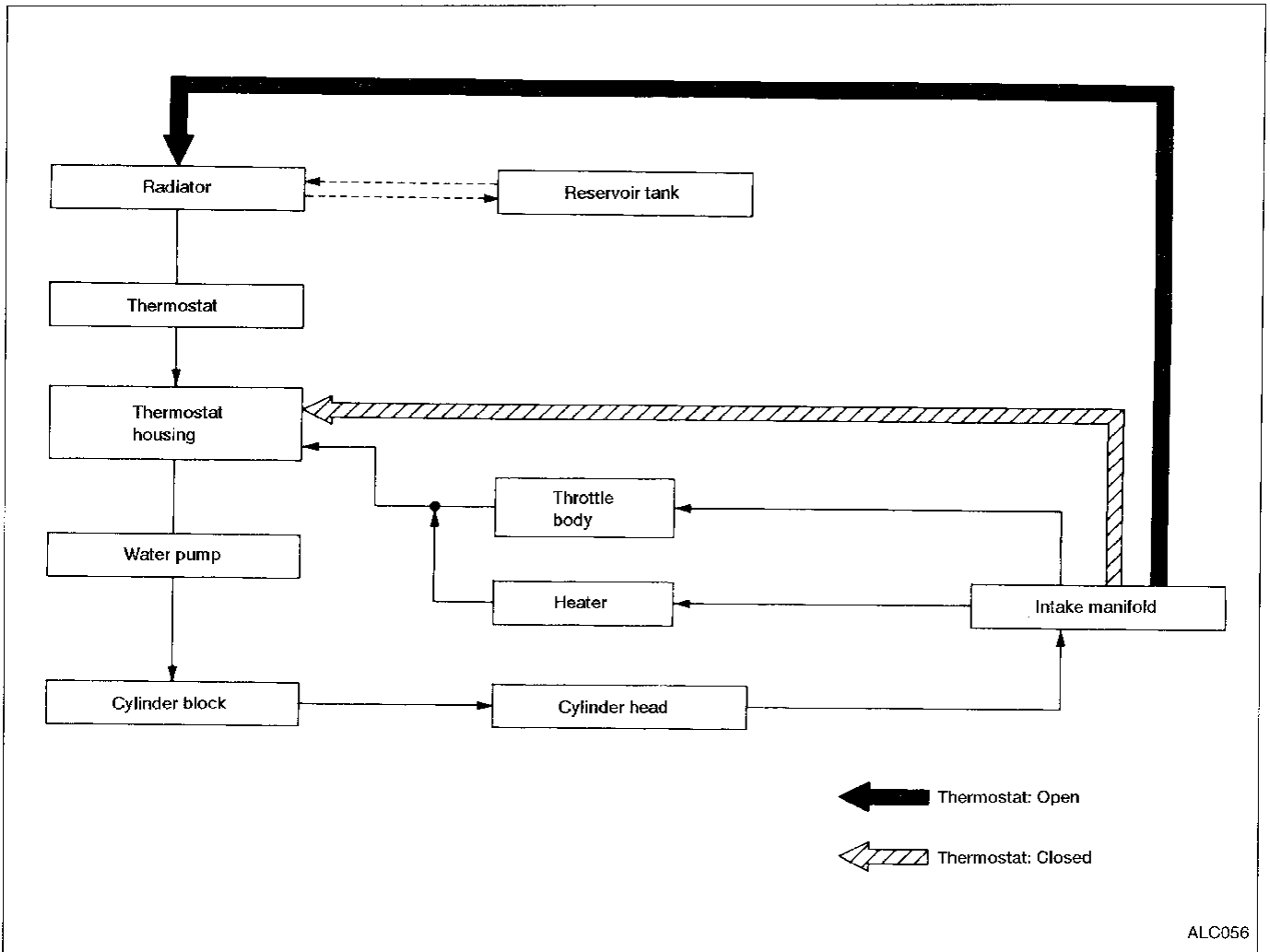
- Always replace oil seal and O-ring with new ones. Refer to EM section ("FRONT OIL SEAL", "Oil Seal Replacement").
- When installing oil pump, apply new engine oil to gears.
- Be sure that O-rings are properly fitted.

1. Install oil pump assembly with new gasket.
2. Install timing belt plate and crankshaft sprocket.
3. Install timing belt tensioner.
4. Install timing belt. Refer to EM section ("Installation", "TIMING BELT").
5. Install oil pan. Refer to EM section ("Installation", "OIL PAN").
6. Fill engine with new engine oil. Refer to MA section ("Changing Engine Oil", "ENGINE MAINTENANCE").



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)

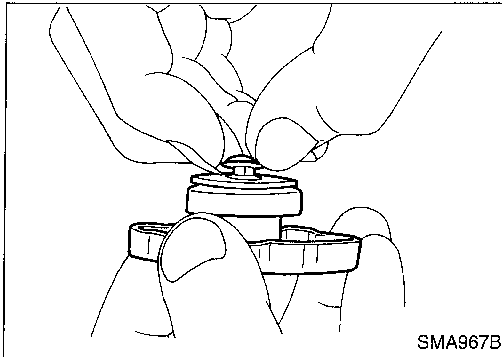
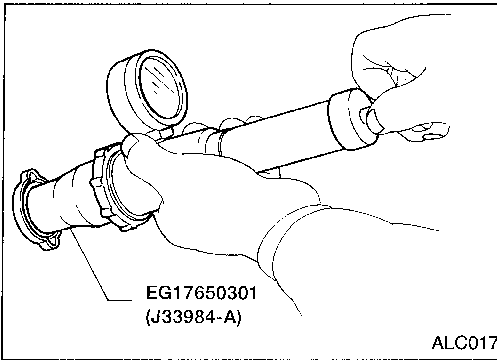
CHECKING RADIATOR CAP

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

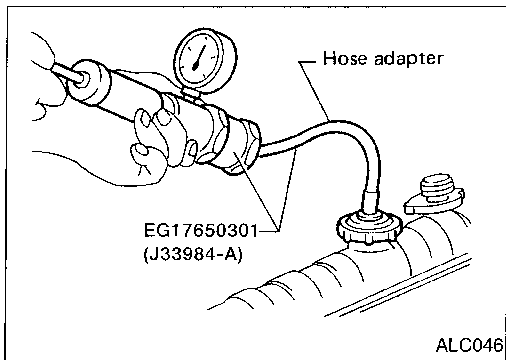
Radiator cap relief pressure:

81.4 - 108.9 kPa

(0.83 - 1.11 kg/cm², 11.8 - 15.8 psi)



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



CHECKING COOLING SYSTEM FOR LEAKS

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

Testing pressure:

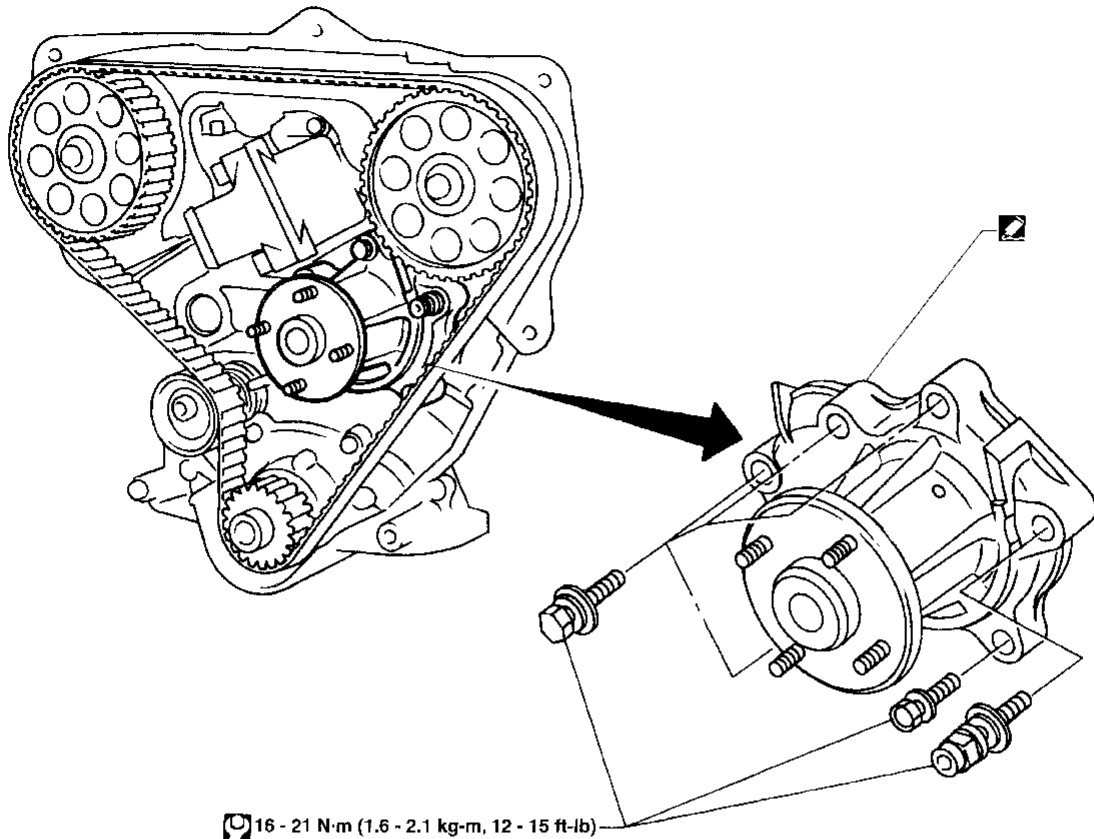
157 kPa (1.6 kg/cm², 23 psi)


CAUTION:

Higher pressure than specified may cause radiator damage.

Water Pump

SEC.210A



 : Use Genuine RTV silicone sealant Part No.999MP-A7007,
Three Bond TB1207D or equivalent

ALC079

CAUTION:

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

REMOVAL

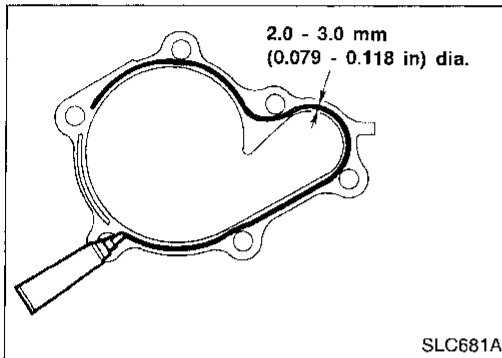
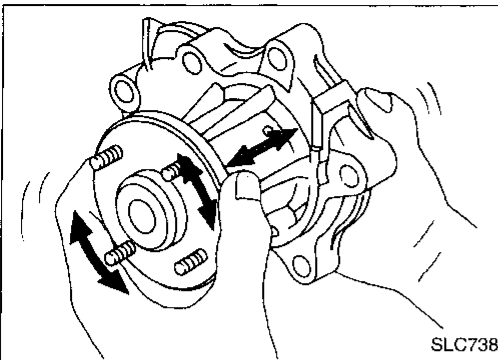
1. Drain coolant from radiator and cylinder block. Refer to MA section, ("Changing Engine Coolant", "ENGINE MAINTENANCE").
2. Remove drive belts.
3. Remove crank pulley.
4. Remove timing belt covers.
5. Remove water pump.

ENGINE COOLING SYSTEM

Water Pump (Cont'd)

INSPECTION

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



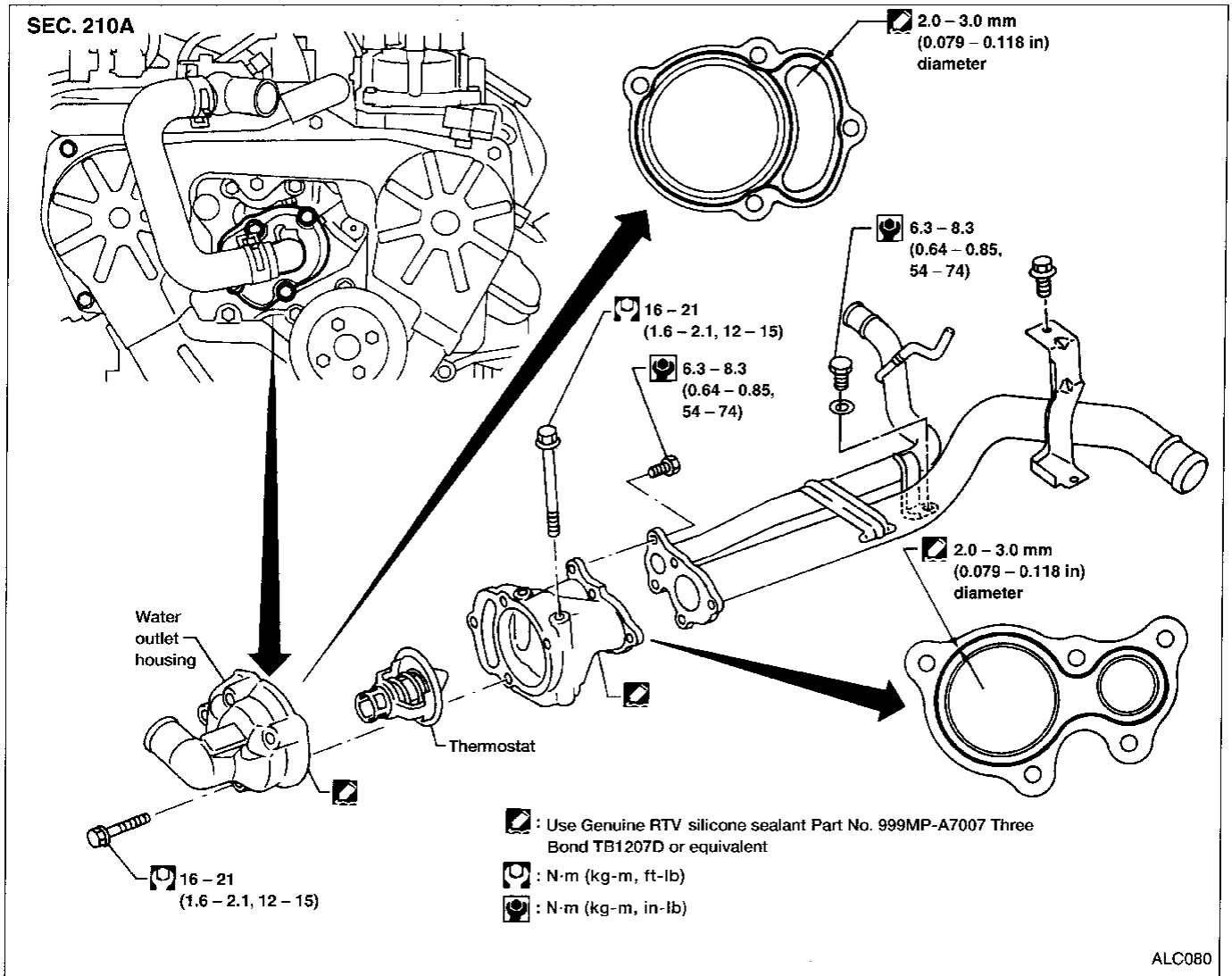
INSTALLATION

1. Use a scraper to remove old liquid gasket from water pump.
 - **Also remove old liquid gasket from mating surface of cylinder block.**
2. Apply a continuous bead of liquid gasket to mating surface of water pump.
Use Genuine RTV Silicone Sealant Part No. 999 MP-A7007, Three Bond TB1207-D or equivalent.
3. Install water pump.
4. Install remaining parts in reverse order of removal.

When installing drive belts, refer to MA section ("Checking Drive Belts", "ENGINE MAINTENANCE").

When filling radiator with coolant, refer to MA section ("Changing Engine Coolant", "ENGINE MAINTENANCE").

Thermostat



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

REMOVAL

1. Drain engine coolant. Refer to MA section ("Changing Engine Coolant", "ENGINE MAINTENANCE").
2. Remove water hose from water outlet housing.
3. Remove water outlet housing, then take out thermostat.

ENGINE COOLING SYSTEM

Thermostat (Cont'd)

INSPECTION

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

Valve opening temperature	°C (°F)	82 (180)
Valve lift	mm/°C (in/°F)	More than 10/90 (0.39/194)

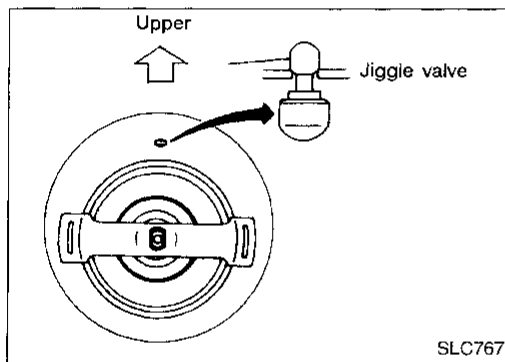
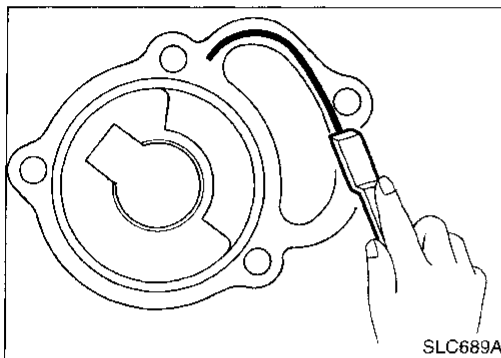
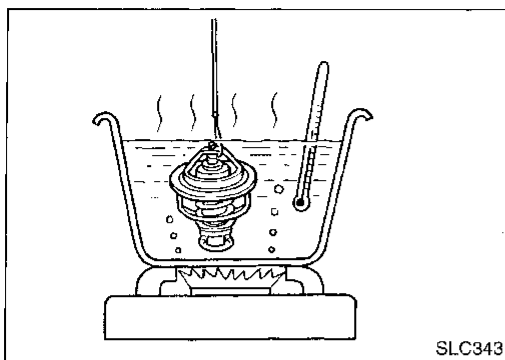
3. Then check if valve closes at 5°C (9°F) below valve opening temperature.

INSTALLATION

1. Use a scraper to remove old liquid gasket from water outlet housing.
2. Apply a continuous bead of liquid gasket to mating surface of water outlet housing.

Use Genuine RTV Silicone Sealant Part No. 999 MP-A7007, Three Bond TB1207-D or equivalent.

3. Install thermostat with jiggle valve or air bleeder at upper side.
 4. Install water outlet housing.
 5. Install water hose to water outlet housing.
 6. Refill engine coolant. Refer to MA section ("Changing Engine Coolant", "ENGINE MAINTENANCE").
- **After installation, run engine for a few minutes, and check for leaks.**



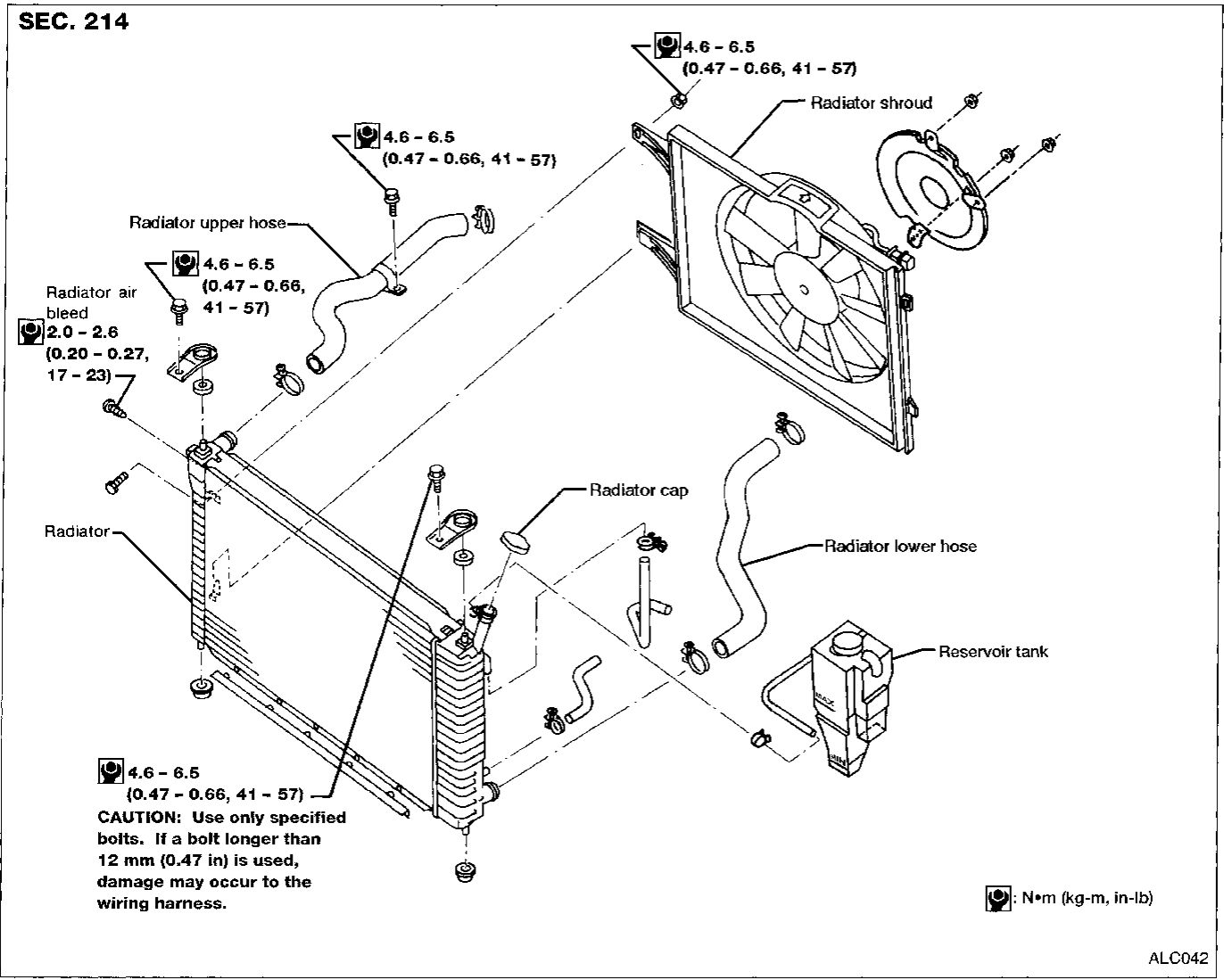
ENGINE COOLING SYSTEM

Radiator

REMOVAL AND INSTALLATION

- Radiators are manufactured with saw cuts in the upper and lower center supports. Do not replace radiators because they have saw cuts in them.
1. Remove under cover.
 2. Drain coolant from radiator.
 3. Disconnect radiator upper and lower hoses.
 4. Remove A/T oil cooler hoses.
 5. Disconnect reservoir tank hose.
 6. Remove right bolt from fuse box and position fuse box aside.
 7. Disconnect cooling fan harness connector.
 8. Remove radiator.
 9. After repairing or replacing radiator, install all parts in reverse order of removal.
 10. Fill radiator with engine coolant.
- Refer to MA section ("Changing Engine Coolant", "ENGINE MAINTENANCE").
 - Proper heater performance and engine cooling requires accurately following "REFILLING ENGINE COOLANT" procedure.

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Cooling Fan Control System

Cooling fan is controlled by the ECM.

For details, refer to EC section (“Cooling Fan”, “TROUBLE DIAGNOSIS FOR DTC P1900”).

ENGINE COOLING SYSTEM

Overheating Cause Analysis

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

SERVICE DATA AND SPECIFICATIONS (SDS)

Engine Lubrication System

Oil pressure check

Engine rpm	Approximate discharge pressure kPa (kg/cm ² , psi)
Idle speed	More than 118 (1.2, 17)
3,200	392 - 481 (4.0 - 4.9, 57 - 70)

Regulator valve inspection

Unit: mm (in)

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

Unit: mm (in)

Body to outer gear radial clearance	0.114 - 0.200 (0.0045 - 0.0079)
Inner gear to outer gear tip clearance	Below 0.18 (0.0071)
Body to inner gear clearance	0.05 - 0.09 (0.0020 - 0.0035)
Body to outer gear axial clearance	0.05 - 0.11 (0.0020 - 0.0043)
Inner gear to brazed portion of housing clearance	0.045 - 0.091 (0.0018 - 0.0036)

Engine Cooling System

Thermostat

Valve opening temperature	°C (°F)	82 (180)
Valve lift	mm/°C (in/°F)	More than 10/90 (0.39/194)

Radiator

Unit: kPa (kg/cm², psi)

Cap relief pressure	81.4 - 108.9 (0.83 - 1.11, 11.8 - 15.8)
Leakage test pressure	157 (1.6, 23)