SECTION CO
ENGINE COOLING SYSTEM

CONTENTS

PRECAUTIONS

PFP:00001

Precautions For Liquid Gasket

EBS00OJI

REMOVAL OF LIQUID GASKET SEALING

- After removing the mounting bolts and nuts, separate the mating surface using a seal cutter and remove the liquid gasket.

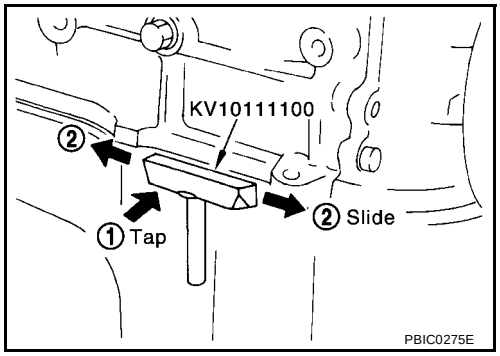
CAUTION:

Be careful not to damage the mating surfaces.

- In areas where the seal cutter is difficult to use, use a plastic hammer to lightly tap the gasket area.

CAUTION:

If for some unavoidable reason a tool such as a flat-bladed screwdriver is used, be careful not to damage the mating surfaces.

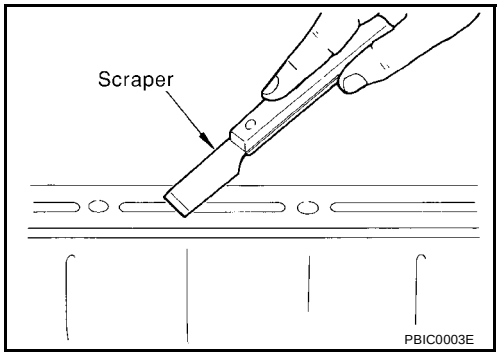


LIQUID GASKET APPLICATION PROCEDURE

1. Using a scraper, remove the old liquid gasket adhering to the gasket application surface and the mating surface.

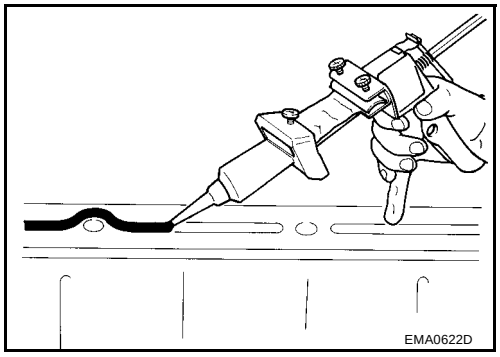
- Remove the liquid gasket completely from the groove of the gasket application surface, mounting bolts and bolt holes.

2. Wipe the gasket application surface and the mating surface with white gasoline (lighting and heating use) to remove adhering moisture, grease and foreign materials.
3. Attach the liquid gasket to the tube presser.
   Use Genuine Liquid Gasket or equivalent.



4. Apply the gasket without breaks to the specified location with the specified dimensions.

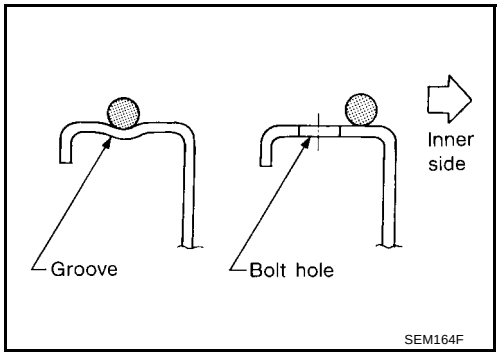
- If there is a groove for the liquid gasket application, apply the gasket to the groove.



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

CAUTION:

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

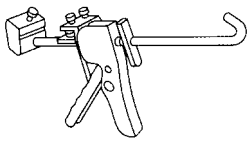
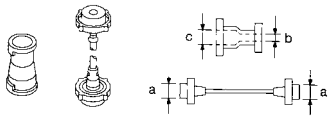
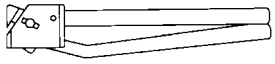


PREPARATION

PFP:00002

Special Service Tools

EBS00OJJ

Tool number Tool name	Description
WS39930000 Tube presser  S-NT052	Pressing the tube of liquid gasket
EG17650301 Radiator cap tester adapter  S-NT564	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)
KV99103510 Radiator plate pliers A  S-NT224	Installing radiator upper and lower tanks
KV99103520 Radiator plate pliers B  S-NT225	Removing radiator upper and lower tanks

OVERHEATING CAUSE ANALYSIS

PFP:00012

Troubleshooting Chart

EBS00OIR

	Symptom		Check items	
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	Worn or loose drive belt	—
		Thermostat stuck closed	—	
		Damaged fins	Dust contamination or paper clogging	
			Mechanical damage	
		Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)	
	Reduced air flow	Cooling fan does not operate	Fan assembly	—
		High resistance to fan rotation		
		Damaged fan blades		
	Damaged radiator shroud	—	—	—
	Improper coolant mixture ratio	—	—	—
	Poor coolant quality	—	Coolant viscosity	—
	Insufficient coolant	Coolant leaks	Cooling hose	Loose clamp
				Cracked hose
			Water pump	Poor sealing
			Radiator cap	Loose
				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
				Cylinder head gasket deterioration

OVERHEATING CAUSE ANALYSIS

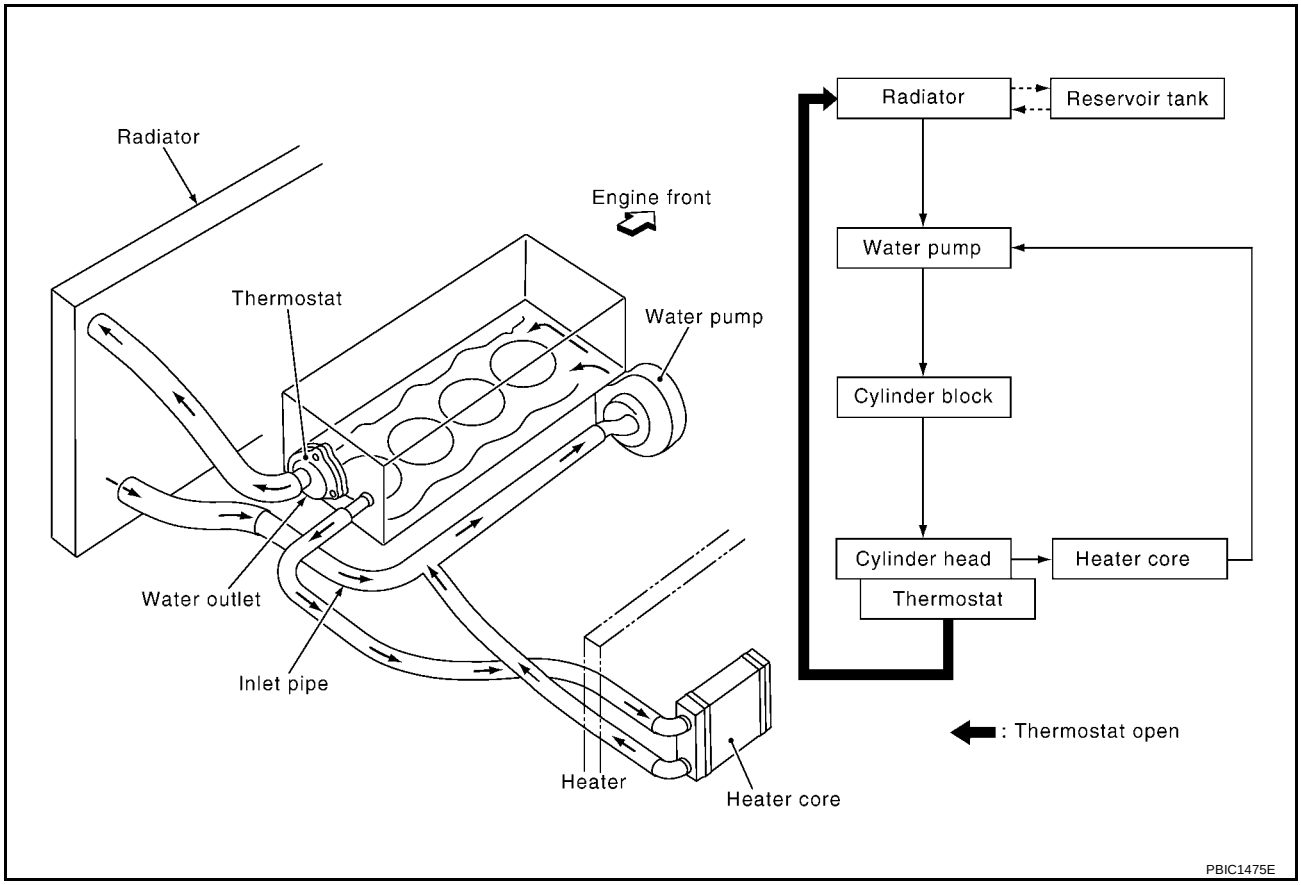
	Symptom		Check items	
Except cooling system parts malfunction	—	Overload on engine	Abusive driving	High engine rpm under no load
				Driving in low gear for extended time
				Driving at extremely high speed
			Powertrain system malfunction	—
			Installed improper size wheels and tires	
			Dragging brakes	
			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	Blocked air flow	
		Installed large fog lamp		

COOLING SYSTEM

PFP:21020

Cooling Circuit

EBS00OIS



ENGINE COOLANT

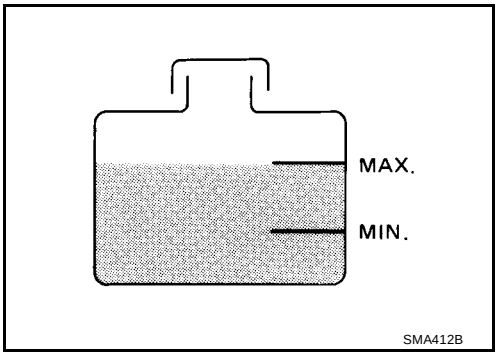
PFP:KQ100

Inspection

EBS00OJK

LEVEL CHECK

- Check if the reservoir tank coolant level is within MIN to MAX when engine is cool.
- Drain or refill coolant when it is too much or too little.



LEAK CHECK

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

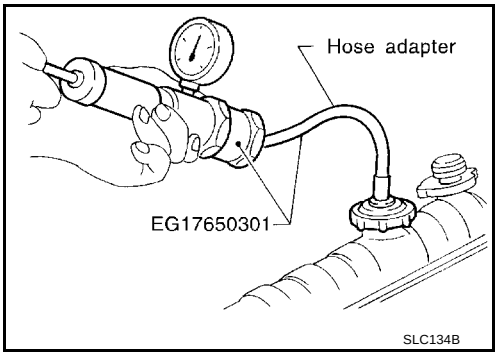
Testing pressure : 157 kPa (1.57 bar, 1.6 kg/cm^2 , 23 psi)

WARNING:

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

CAUTION:

Higher pressure than specified may cause radiator damage.



Changing Engine coolant

EBS00OIV

WARNING:

- **To avoid being scalded, never change the coolant when the engine is hot.**
- **Wrap a thick cloth around cap and carefully remove the cap. First, turn the cap a quarter of a turn to release built-up pressure. Then turn the cap all the way.**

DRAINING ENGINE COOLANT

1. Disconnect radiator lower hose and radiator cap.

CAUTION:

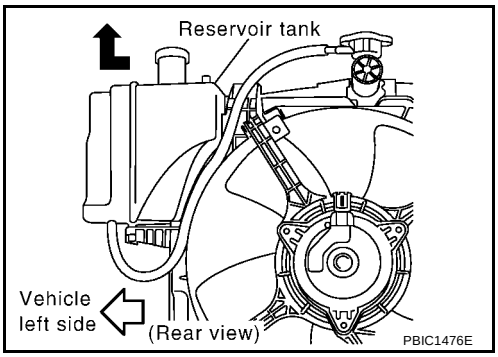
- **Make sure to drain when the engine coolant temperature is cold.**
- **Be careful not to allow coolant to contact drive belts.**

2. Remove reservoir tank and drain the engine coolant in the following procedures.

a. Move relay case in front of the battery.

b. Disconnect the reservoir tank from fan shroud to remove. With force applied in the left direction of vehicle, pull up reservoir tank.

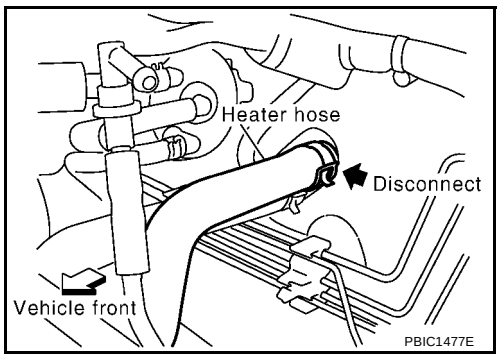
3. Check drain coolant for contaminants such as rust, corrosion or discoloration.
   If contaminated, flush engine cooling system. Refer to CO-9, "FLUSHING COOLING SYSTEM" .



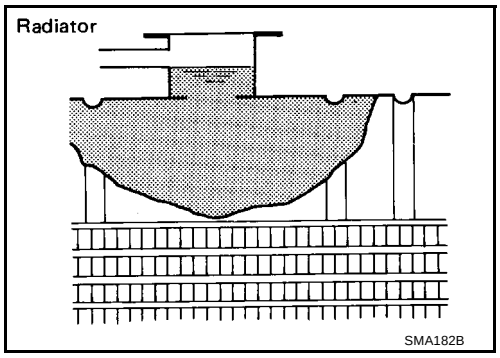
REFILLING ENGINE COOLANT

1. Install reservoir tank.
2. Connect radiator lower hose.

3. Disconnect heater hose (at heater hose outlet side: upper side) as shown in figure. Keep hose end at the same height as that of before removal.



4. Fill radiator and reservoir tank to specified level.
   - **Pour coolant slowly of less than 2 ℓ (1-3/4 Imp qt) a minute to allow air in system to escape.**
   - **When coolant from heater hose starts to drain, connect heater hose and continue to fill.**
   - **Use Genuine Nissan Anti-freeze Coolant or equivalent mixed with water (distilled or demineralized).**
     Refer to MA-12, "RECOMMENDED FLUIDS AND LUBRICANTS".



Engine coolant capacity (With reservoir tank):

Except M/T models with A/C

: Approx. 4.9 ℓ (4-3/8 Imp qt)

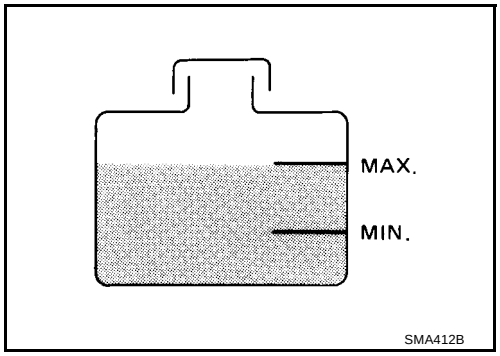
M/T models with A/C

: Approx. 5.3 ℓ (4-5/8 Imp qt)

Reservoir tank:

Except M/T models with A/C : 0.7 ℓ (5/8 Imp qt)

M/T models with A/C : 1.2 ℓ (1-1/8 Imp qt)



5. Warm up engine to normal operating temperature with radiator cap installed.
6. Warm up until thermostat opens. Keep warming at 3,000 rpm for approximately 10 minutes as guide.
   - For thermostat opening, touch radiator upper hose by hand to insure that water flow is hot.

   CAUTION:
   Be careful not to overheat.
7. Stop the engine.
8. After cooling engine [approximately 50°C (122 °F) or lower], remove radiator cap and check coolant level. If the level is low, fill up to the radiator neck again and repeat from step 5.
9. When the coolant level stabilizes, fill reservoir tank up to the “MAX” line.
10. Check cooling system for leaks with engine running.
11. Allow the engine to cool [approximately 50°C (122°F) or lower].
12. Start the engine. Perform the following cycle 3 times. Keep an engine speed of 1,000 rpm for approximately 30 seconds. Then increase it gradually to 3,000 rpm.
13. During the above step 12, make sure water flow sound is not heard from heater core.

- Sound may be noticeable at heater unit.

14. If water flow sound is heard, repeat from step 4 to 13.

- **Clean excess coolant from engine.**

FLUSHING COOLING SYSTEM

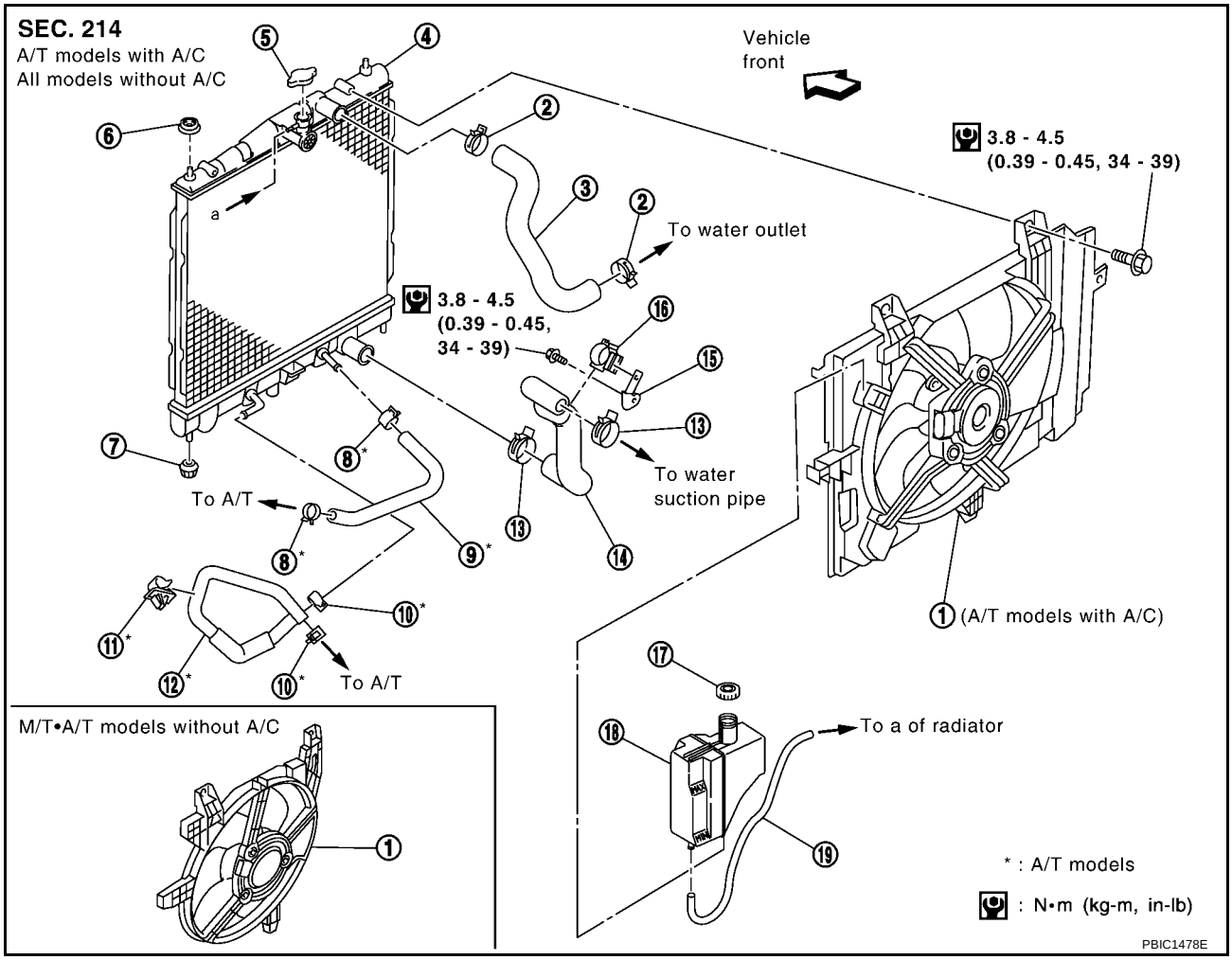
1. Fill radiator with water until water spills from the air relief hole, then close air relief plug. Fill radiator and reservoir tank with water and reinstall radiator cap.
2. Run engine and warm it up to normal operating temperature.
3. Rev engine two or three times under no-load.
4. Stop engine and wait until it cools down.
5. Drain water.
6. Repeat steps 1 through 5 until clear water begins to drain from radiator.

RADIATOR

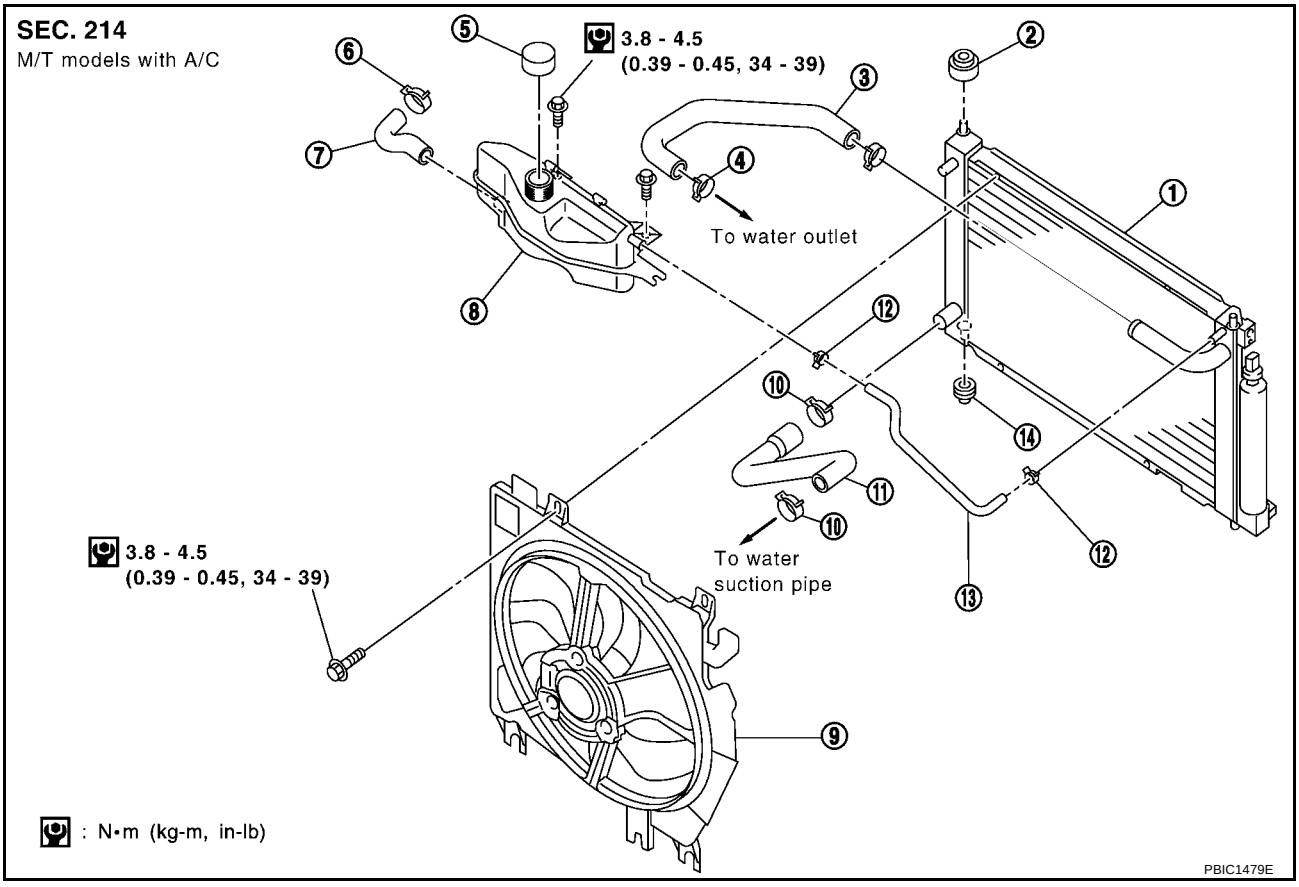
PFP:21400

Removal and Installation

EBS00OIW



1. Cooling fan assembly
2. Hose clamp
3. Radiator hose (upper)
4. Radiator
5. Radiator cap
6. Mounting rubber
7. Mounting rubber
8. Hose clamp (A/T models)
9. A/T oil cooler hose (A/T models)
10. Hose clamp (A/T models)
11. Hose clamp (A/T models)
12. A/T oil cooler hose (A/T models)
13. Hose clamp
14. Radiator hose (lower)
15. Bracket
16. Hose clamp
17. reservoir tank cap
18. Reservoir tank
19. Reservoir tank hose



1. Radiator
2. Mounting rubber
3. Radiator hose (upper)
4. Hose clamp
5. Reserve tank cap
6. Hose clamp
7. Reservoir tank hose
8. Reservoir tank
9. Cooling fan assembly
10. Hose clamp
11. Radiator hose (lower)
12. Hose clamp
13. Reservoir tank hose
14. Mounting rubber

REMOVAL

Operation Description: Remove radiator core support (lower), and pull out radiator and cooling fan assembly to the underside of vehicle.

1. Drain coolant. Refer to CO-7, "ENGINE COOLANT" .

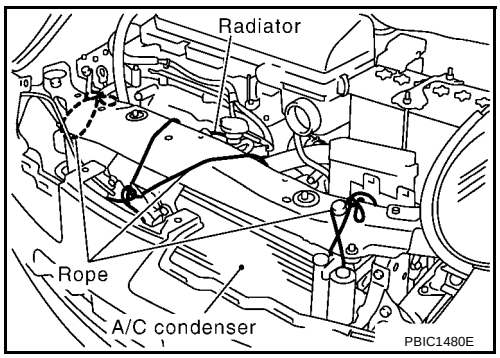
   CAUTION:
   Make sure to drain when the engine coolant temperature is cold.

   WARNING:
   Never remove the radiator cap when the engine is hot. Serious burns could occur from high pressure coolant escaping from the radiator.
2. Remove mounting bolts to make relay case movable.
3. Remove the following parts.
   - RH/LH front fender protector
   - RH/LH front grille; Refer to EI-9, "FRONT GRILLE" .
   - Air Duct; Refer to EM-14, "AIR CLEANER AND AIR DUCT" .
4. Remove radiator hose (upper) and (lower).
5. Remove A/T oil cooler hoses. (A/T models)

   CAUTION:
   Install plug to hoses and fluid pipes removed, and be sure to prevent fluid leak.

6. Fix with ropes so that A/C condenser and RH/LH upper mount units of radiator and cooling fan assembly are placed on radiator core support (upper).

CAUTION:
Taking parts strength into consideration, lift up at locations where damage may not occur.



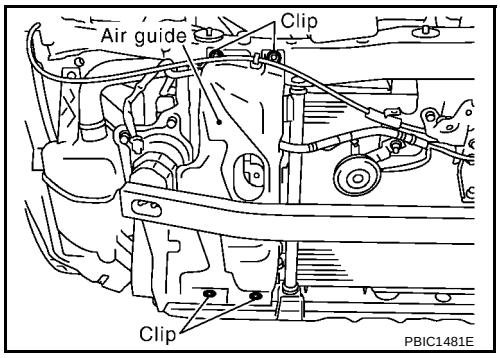
Remove radiator core support (lower) with the following procedures.

a. Remove air guide upper clips at radiator right side.

NOTE:
In figure, bumper fascia is omitted for explanation.

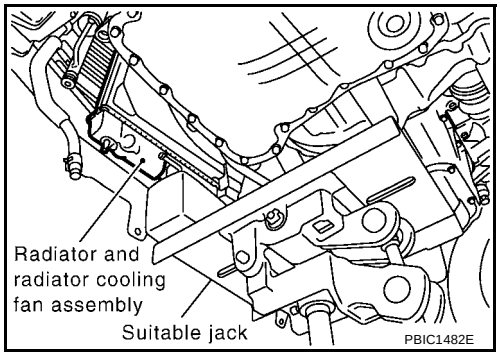
b. Remove radiator core support (lower) mounting bolts (RH/LH). Refer to BL-11, "RADIATOR CORE SUPPORT" .

c. Remove air guide lower clips and remove radiator core support (lower).

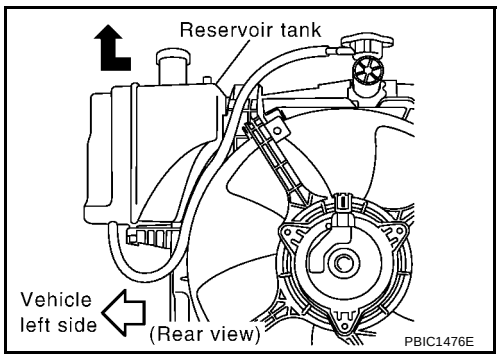


7. Loosen ropes, and pull out radiator and cooling fan assembly to the underside of vehicle, supporting the bottom with suitable jack.

CAUTION:
Be careful not to damage radiator core and A/C condenser core.



8. Remove reservoir tank.
   - Disconnect the reservoir tank from fan shroud to remove. With force applied in the left direction of vehicle, pull up reservoir tank.



9. Remove cooling fan assembly from radiator.

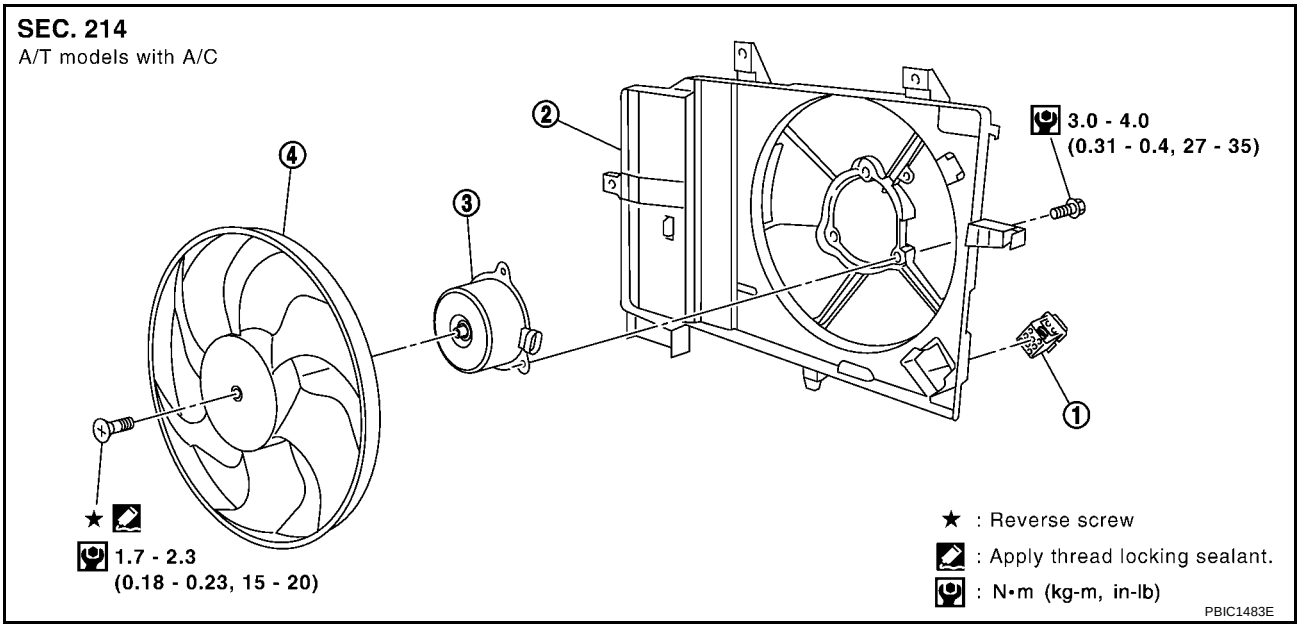
INSTALLATION

Install in the reverse order of removal which being careful of the following.

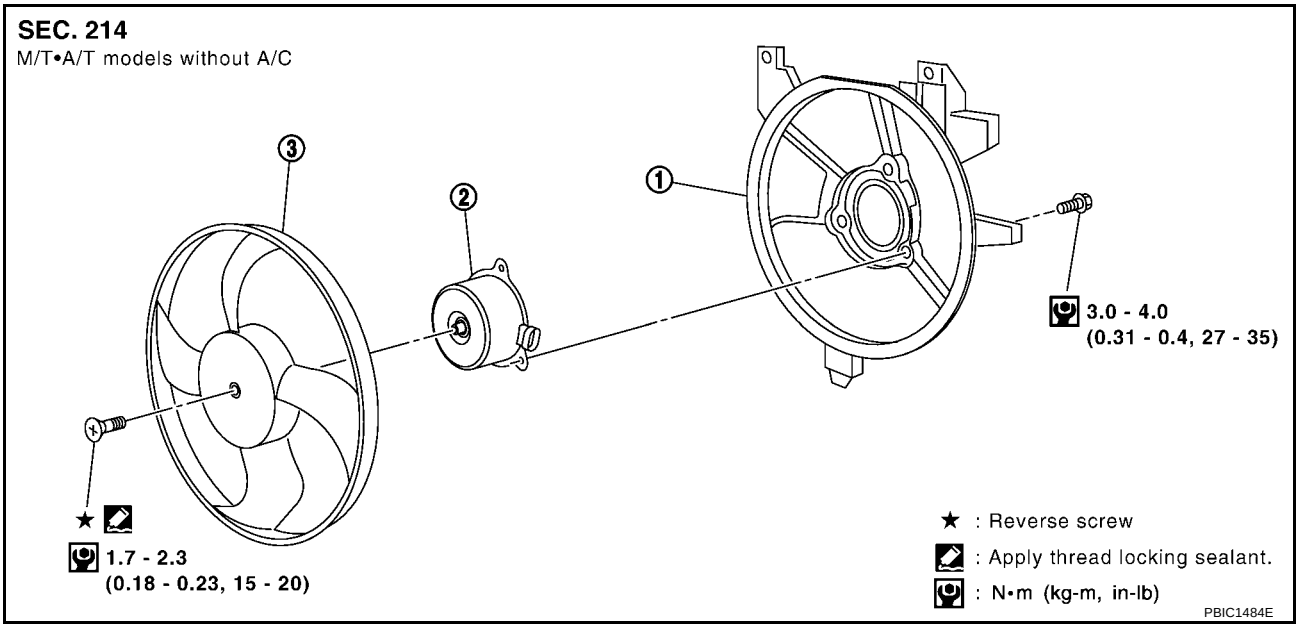
- When installing radiator core support (lower), make sure upper and lower mount units of radiator and A/C condenser are fitted in mounting holes of radiator core support (upper/lower).

Disassembly and Assembly of Cooling Fan

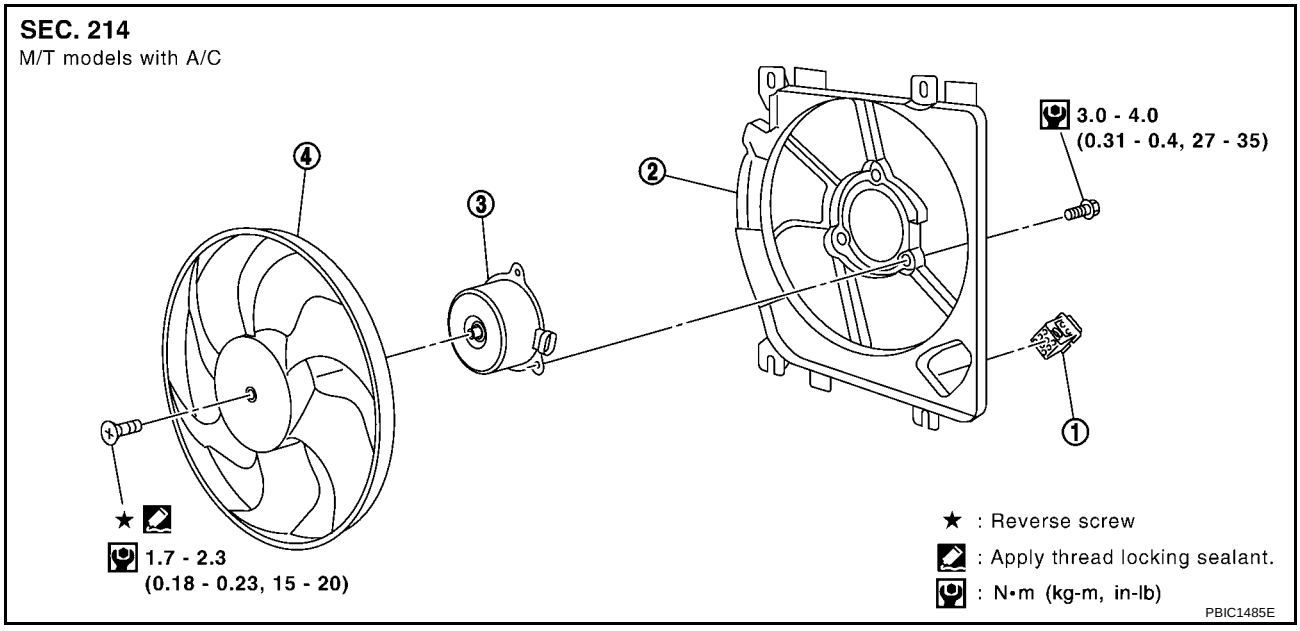
EBS00OIY



1. Resistor
2. Fan shroud
3. Fan motor
4. Fan



1. Fan shroud
2. Fan motor
3. Fan



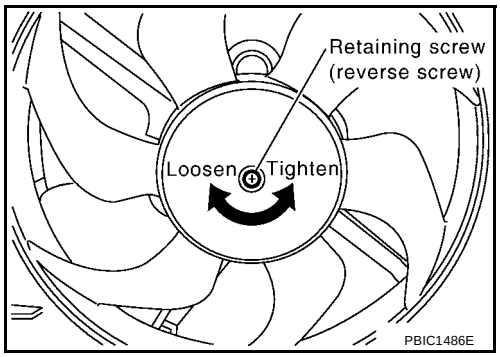
1. Resistor
2. Fan shroud
3. Fan motor
4. Fan

DISASSEMBLY

1. Remove fan.

   CAUTION:
   Reverse screw are used for the fan attachment screw.When removing or attaching, turn the screw the opposite way as for a normal screw.

2. Remove fan motor from fan shroud.



ASSEMBLY

Assemble cooling fan in the reverse order of disassembly.

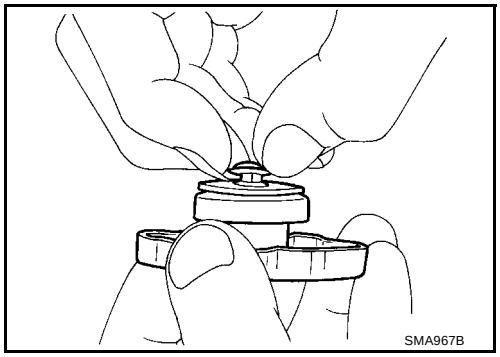
- Apply thread locking sealant and tighten screw to assemble the fan.

Checking Radiator Cap

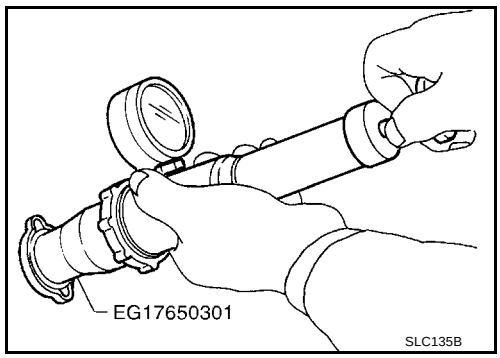
EBS00OSD

1. Pull the negative-pressure valve to open it and check that it closes completely when released.

- Check that there is no dirt or damage on the valve seat of the radiator cap negative-pressure valve.
- Check that there are no unusual conditions in the opening and closing conditions of the negative-pressure valve.



2. Check radiator cap relief pressure.



Standard :

78 - 98 kPa (0.78 - 0.98 bar, 0.8 - 1.0 kg/cm^2 , 11 - 14 psi)

Limit :

59 kPa (0.59 bar, 0.6 kg/cm^2 , 9 psi)

- When connecting the radiator cap to the tester, apply water or engine coolant to the cap seal part.
- Replace the radiator cap if there is an unusual conditions in the negative-pressure valve, or if the open-valve pressure is outside of the standard values.

Checking Radiator

EBS00OSE

Check radiator for mud or clogging. If necessary, clean radiator as follows.

- Be careful not to bend or damage the radiator fins.
- When radiator is cleaned without removal, remove all surrounding parts such as cooling fan, fan shroud and horns. Then tape the harness and connectors to prevent water from entering.

1. Apply water by hose to the back side of the radiator core vertically downwards.
2. Apply water again to all radiator core surface once per minute.
3. Stop washing if any stains no longer flow out from the radiator.
4. Blow air into the back side of radiator core vertically downwards.

- Use compressed air lower than 490 kPa (4.9 bar, 5 kg/cm^2 , 71 psi) and keep distance more than 30 cm (11.8 in).

5. Blow air again into all the radiator core surface once per minute until no water sprays out.

Checking Cooling System Hoses

EBS00OSF

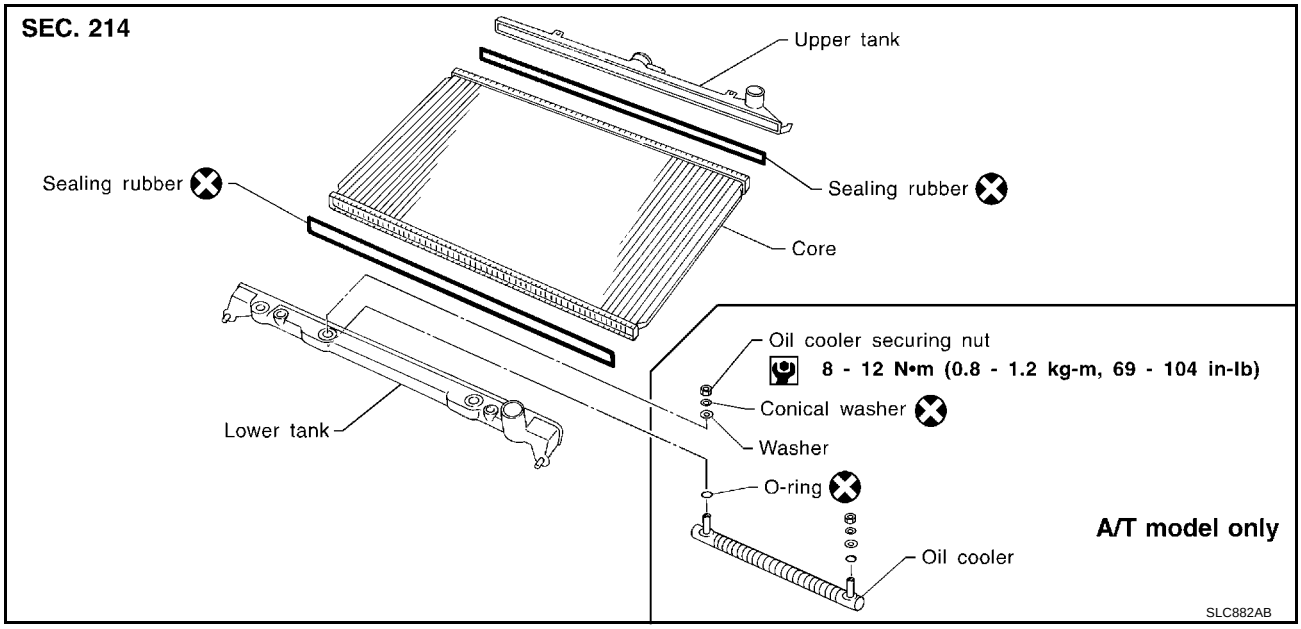
Check hoses for improper attachment, leaks, cracks, damage, loose connections, chaffing and deterioration.

RADIATOR (ALUMINUM TYPE)

PFP:21460

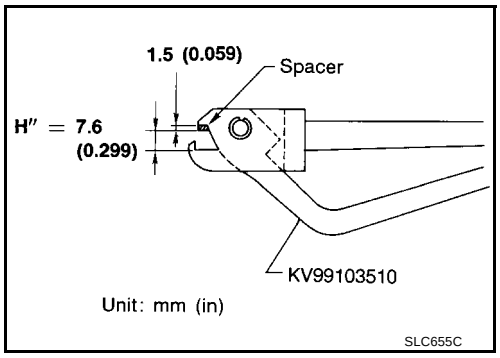
Disassembly and Assembly

EBS00OJ0



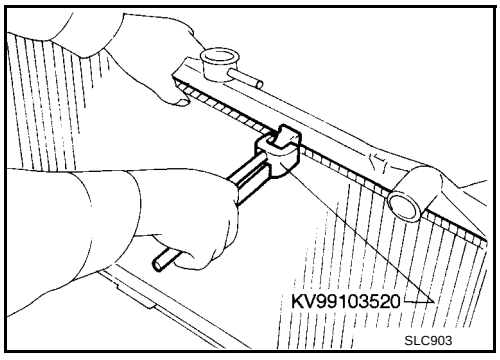
PREPARATION

1. Attach the spacer to the tip of the radiator plate pliers A. Spacer specification: 1.5 mm (0.059 in) thick x 18 mm (0.71 in) wide x 8.5 mm (0.335 in) long.
2. Make sure that when radiator plate pliers A are closed dimension H″ is approx. 7.6 mm (0.299 in).
3. Adjust dimension H″ with the spacer, if necessary.



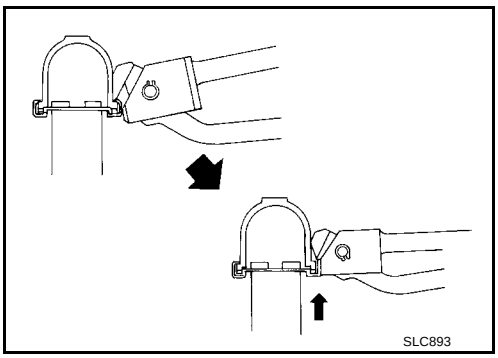
DISASSEMBLY

1. Remove tank with Tool.



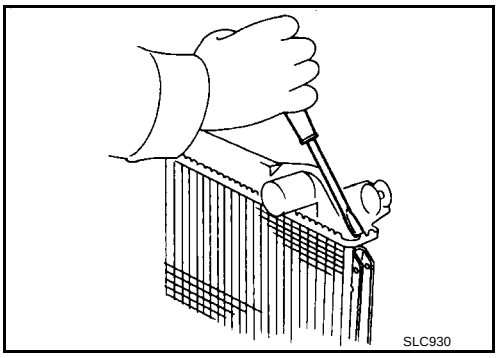
- Grip the crimped edge and bend it upwards so that Tool slips off.

Do not bend excessively.

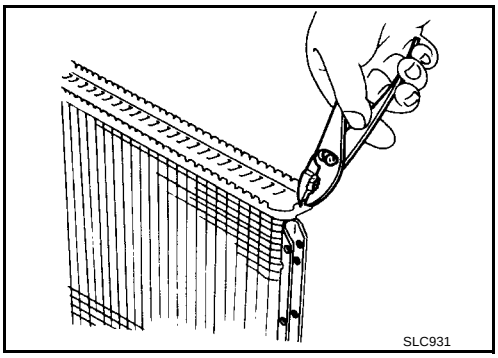


- In areas where Tool cannot be used, use a screwdriver to bend the edge up.

Be careful not to damage tank.



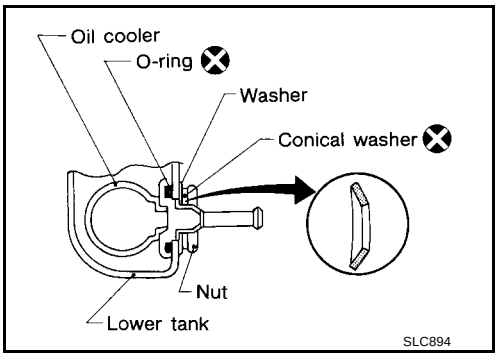
2. Make sure the edge stands straight up.
3. Remove oil cooler from tank. (A/T model only)



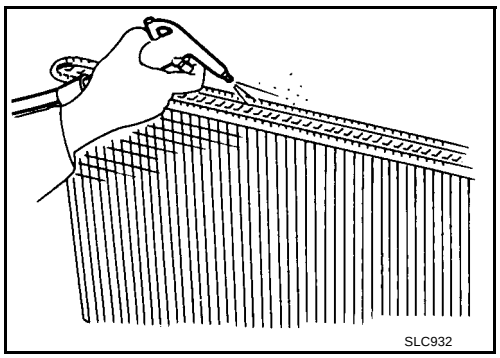
ASSEMBLY

1. Install oil cooler. (A/T model only)

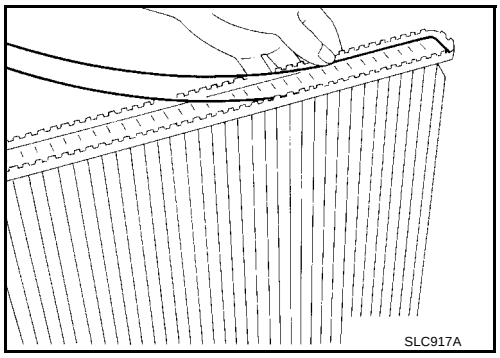
Pay attention to direction of conical washer.



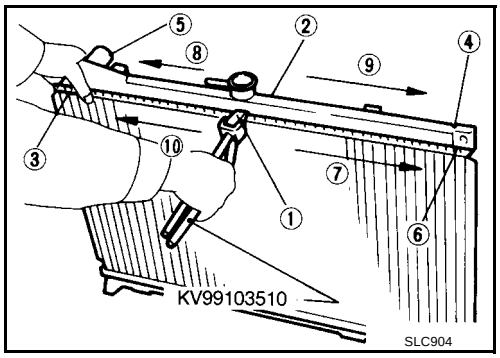
2. Clean contact portion of tank.

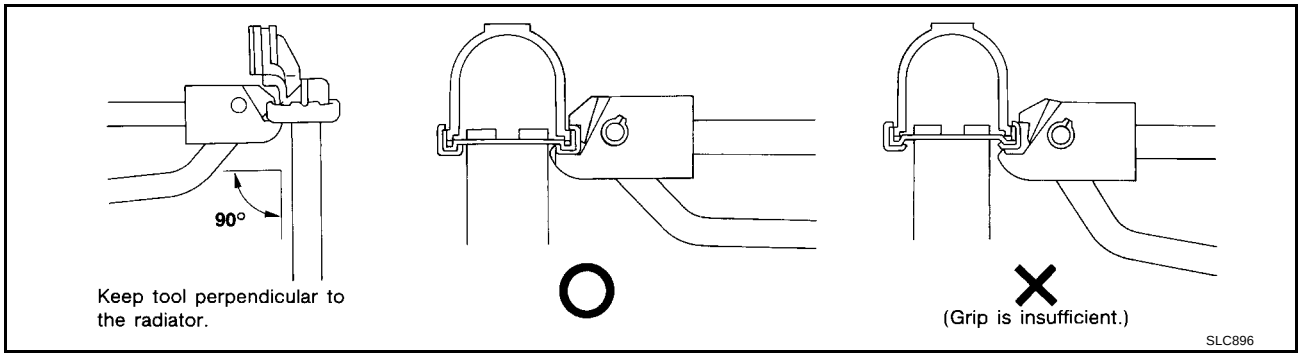


3. Install sealing rubber.
Push it in with fingers.
Be careful not to twist sealing rubber.

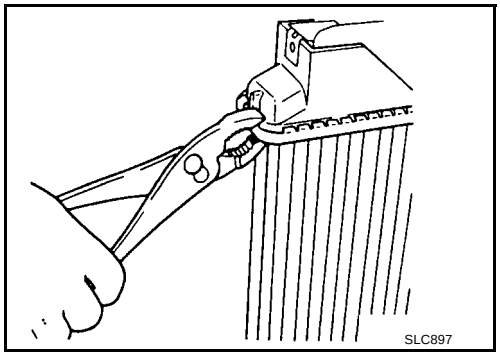


4. Caulk tank in specified sequence with Tool.



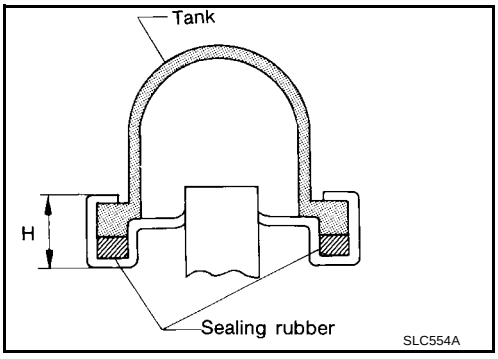


- Use pliers in the locations where Tool cannot be used.



5. Make sure that the rim is completely crimped down.

Standard height "H" : 8.0 - 8.4 mm (0.315 - 0.331 in)



6. Confirm that there is no leakage.

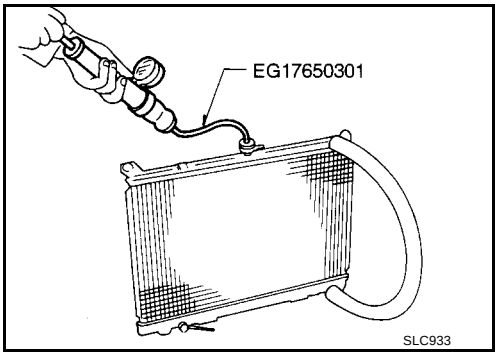
Refer to CO-7, "Inspection" .

INSPECTION

1. Apply pressure with Tool.

Specified pressure value

: 157 kPa (1.57 bar, 1.6 kg/cm^2 , 23 psi)

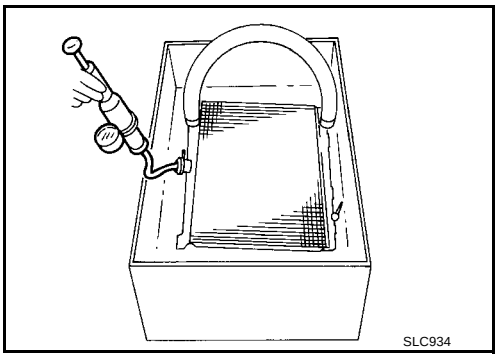


WARNING:

To prevent the risk of the hose coming undone while under pressure, securely fasten it down with a hose clamp.

Attach a hose to the oil cooler to seal its inlet and outlet. (A/T model only)

2. Check for leakage by soaking radiator in water container.

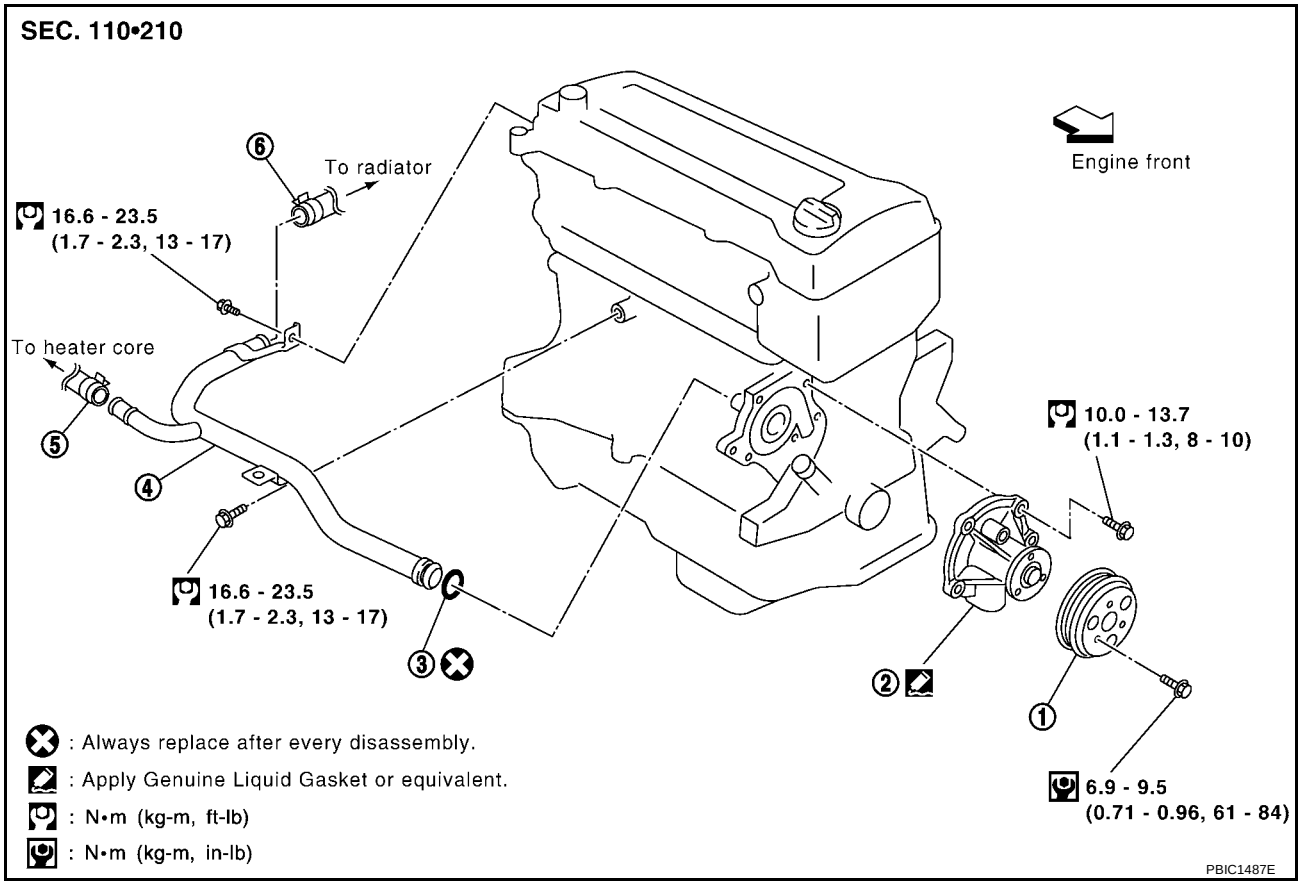


WATER PUMP

PFP:21020

Removal and Installation

EBS00OJ1



1. Water pump pulley
2. Water pump
3. O-ring
4. Water suction pipe
5. Heater hose
6. Radiator hose (lower)
7. Water hose

REMOVAL

1. Drain coolant. Refer to CO-7, "ENGINE COOLANT" .

   CAUTION:
   Make sure to drain when the engine coolant temperature is cold.

   WARNING:
   Never remove the radiator cap when the engine is hot. Serious burns could occur from high pressure coolant escaping from the radiator.
2. Remove drive belt from water pump pulley. Refer to EM-10, "DRIVE BELTS" .
3. Remove the water pump pulley.

   NOTE:
   To remove it easily, loosen water pump pulley mounting bolt, then water pump belt.
4. Remove water pump.
   - Place a piece of wood or something onto water pump, and tap it with a hammer. Disconnect liquid gasket to remove.
   - Coolant remaining in the engine is drained. Use tray to collect it.

   CAUTION:
   - **Handle the water pump vane so that it does not contact any other parts.**
   - **Water pump cannot be disassembled and should be replaced as a unit.**
5. Remove water suction pipe in the following procedures.

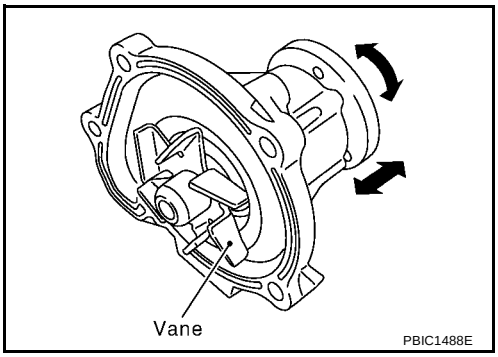
a. Remove air cleaner case assembly. Refer to EM-14, "AIR CLEANER AND AIR DUCT" .

b. Remove radiator hose (upper and lower), and heater hose.

c. Move harnesses around suction pipe.
d. Remove mounting bolts, and pull water suction pipe toward engine rear side.
   - Coolant remaining in the engine is drained. Use tray to collect it.

INSPECTION AFTER REMOVAL

- Visually check that there is no significant dirt or rusting on the water pump body and vane.
- Check that there is no looseness in the vane shaft, and that it turns smoothly when rotated by hand.
- If unusualness is found, replace the water pump.



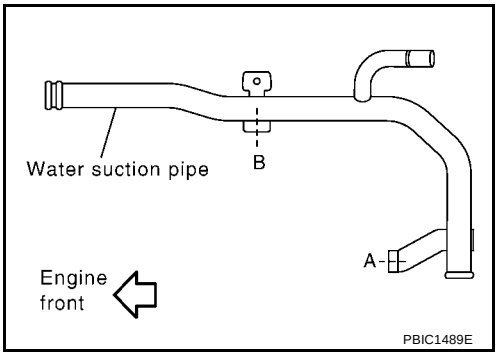
INSTALLATION

- Install in the reverse order of removal which being careful of the following.

Water Suction Pipe Installation

1. Apply neutral detergent on O-ring. Fit O-ring in the groove securely.
2. Tighten mounting bolts with the following procedures.

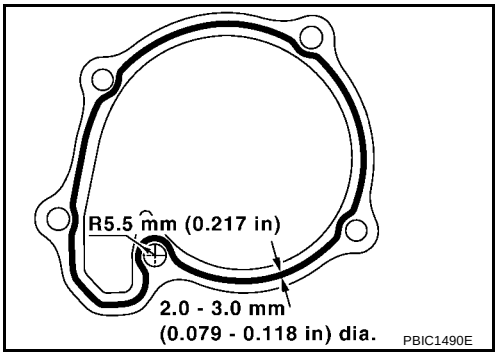
a. Temporarily tighten bolts in order: A to B.
b. Tighten bolts in order: B to A



Water Pump Installation

- Apply liquid gasket as shown in figure, and install.
  Use Genuine Liquid Gasket or equivalent.

  CAUTION:
  Wait at least 30 minutes after water pump installation. Refill coolant and start the engine.

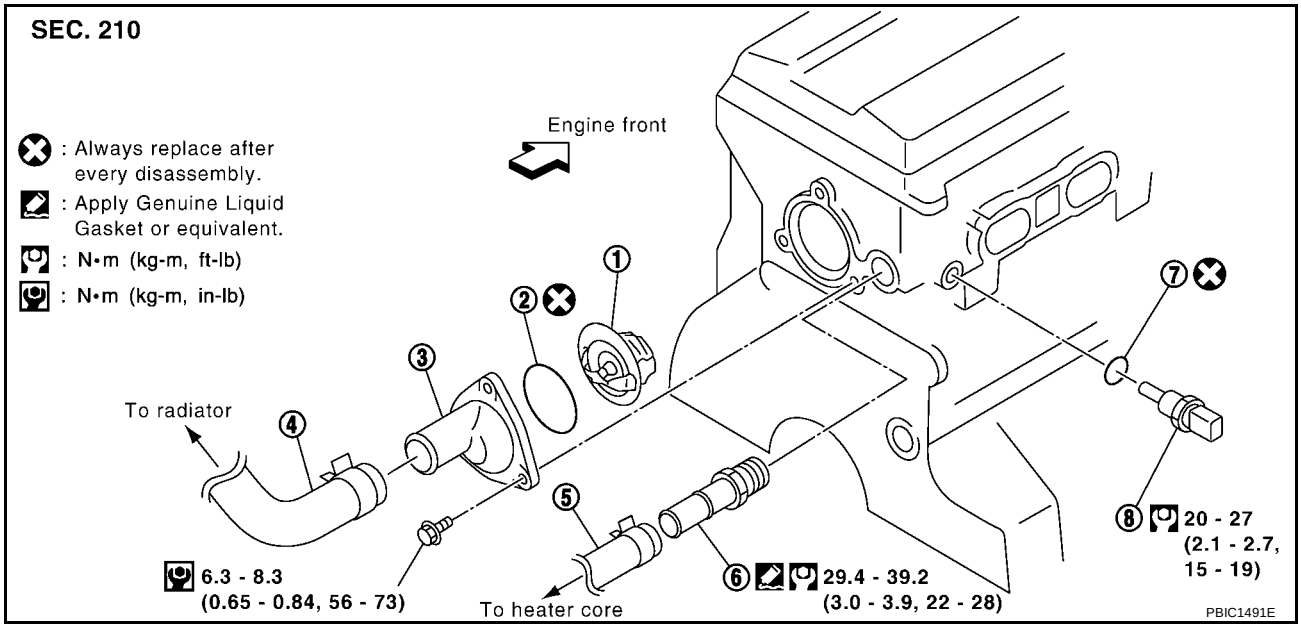


THERMOSTAT

PFP:21200

Removal and Installation

EBS00OJ2



1. Thermostat
2. Rubber ring
3. Water outlet
4. Radiator hose (upper)
5. Heater hose
6. Heater pipe
7. Copper washer
8. Engine coolant temperature sensor

REMOVAL

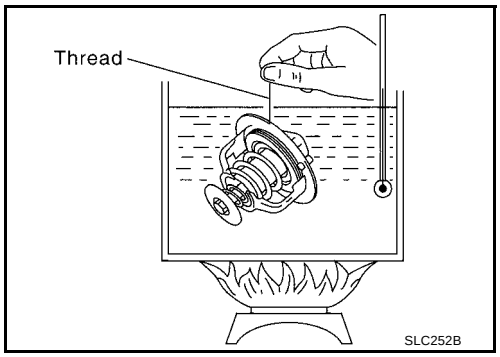
1. Drain engine coolant. Refer to CO-7, "ENGINE COOLANT" .

   CAUTION:
   Make sure to drain when the engine coolant temperature is cold.

   WARNING:
   Never remove the radiator cap when the engine is hot. Serious burns could occur from high pressure coolant escaping from the radiator.
2. Remove air duct and air cleaner body. Refer to EM-14, "AIR CLEANER AND AIR DUCT" .
3. Remove radiator hose (upper).
4. Remove water outlet and thermostat.
   - Coolant remaining in the engine is drained. Use tray to collect it.
5. Remove engine coolant temperature sensor if necessary.
6. Remove heater pipe if necessary.

INSPECTION AFTER REMOVAL

- Place a thread so that it is caught in the valves of the thermostat. Immerse fully in a container filled with water. Heat while stirring. (The example in the figure shows the thermostat.)
- The valve opening temperature is the temperature at which the valve opens and falls from the thread.
- Continue heating. Check the full-open lift amount.
- After checking the full-open lift amount, lower the water temperature and check the valve closing temperature.
- If the measured value is out of the standard value or unusual valve seating condition is found, replace the thermostat.



Standard values

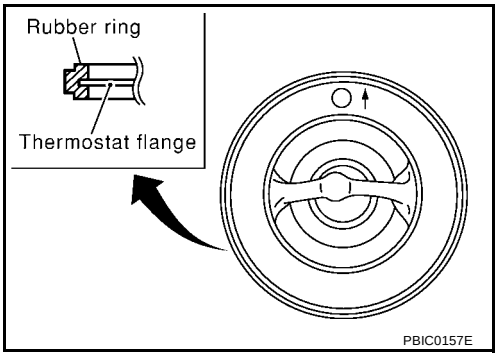
	Thermostat
Valve opening temperature	86.5 - 89.5°C (188 - 193°F)
Full-open lift amount	8 mm or more/ 101°C (0.31 in/ 214 °F)
Valve closing temperature	83°C (181°F)

INSTALLATION

Install in the reverse order of removal which being careful of the following.

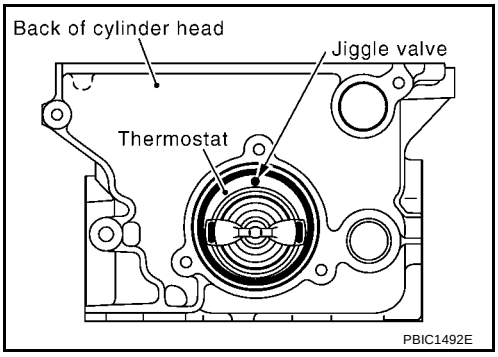
Installation of Thermostat

1. Install the thermostat with the whole circumference of each flange part fit securely inside the rubber ring.



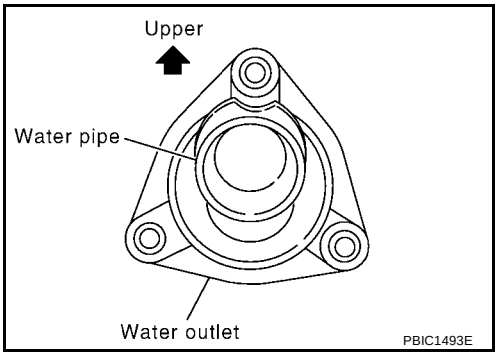
2. Install thermostat with jiggle valve facing the direction shown in the figure.

   NOTE:
   Care must be taken not to trap the thermostat jiggle valve.



Water Outlet Installation

- Install water pipe with it facing upward.
- Install thermostat in place.



Heater Pipe Installation

- Apply liquid gasket to the threads, and install.
  Use Genuine Liquid Gasket or equivalent.

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Standard and Limit

EBS00OJL

CAPACITY

Unit: ℓ (Imp qt)

Coolant capacity [With reservoir tank (MAX level)]	Except M/T models with A/C	Approximately 4.9 (4-3/8)
	M/T models with A/C	Approximately 5.3 (4-5/8)
Reservoir tank	Except M/T models with A/C	0.7 (5/8)
	M/T models with A/C	1.2 (1-1/8)

THERMOSTAT

Valve opening temperature	86.5 - 89.5°C (188 - 193°F)
Valve lift	8 mm or more/ 101°C (0.31 in/ 214°F)
Valve closing temperature	83°C (181°F)

RADIATOR

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

Cap relief pressure	Standard	78 - 98 (0.78 - 0.98, 0.8 - 1.0, 11 - 14)
	Limit	59 (0.59, 0.6, 9)
Leakage test pressure		157 (1.57, 1.6, 23)

Tightening Torque

EBS00OJ4

*1: Parts to be tightened in particular orders

Unit: N·m (kg-m, ft-lb)
Unit: N·m (kg-m, in-lb)*2

	Cooling fan assembly	3.8 - 4.5 (0.39 - 0.45, 34 - 39)*2
	Reservoir tank (M/T models with A/C)	3.8 - 4.5 (0.39 - 0.45, 34 - 39)*2
	Cooling fan motor	3.0 - 4.0 (0.31 - 0.40, 27 - 35)*2
	Cooling fan (reverse screw)	1.7 - 2.3 (0.18 - 0.23, 15 - 20)*2
	Water pump	10.0 - 13.7(1.1 - 1.3, 8 - 10)
	Water pump pulley	6.9 - 9.5 (0.71 - 0.96, 61 - 84)*2
*1	Water suction pipe	16.6 - 23.5 (1.7 - 2.3, 13 - 17)
	Water outlet	6.3 - 8.3 (0.65 - 0.84, 56 - 73)*2
	Heater pipe	29.4 - 39.2 (3.0 - 3.9, 22 - 28)
	Engine coolant temperature sensor	20 - 27(2.1 - 2.7, 15 - 19)