SECTION CO
ENGINE COOLING SYSTEM

CONTENTS

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PRECAUTIONS

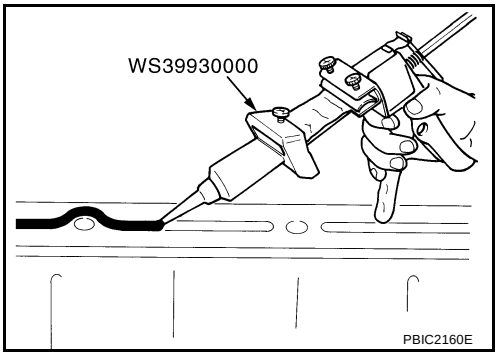
PFP:00001

Precautions for Liquid Gasket

EBS00MRX

LIQUID GASKET APPLICATION PROCEDURE

1. Remove old liquid gasket adhering to the liquid gasket application surface and the mating surface.
   - Remove liquid gasket completely from the liquid gasket application surface, mounting bolts, and bolt holes.
2. Wipe the liquid gasket application surface and the mating surface with white gasoline (lighting and heating use) to remove adhering moisture, grease and foreign materials.
3. Attach liquid gasket tube to the tube presser (special service tool).
   Use Genuine Liquid Gasket or equivalent.
   - Within five minutes of liquid gasket application, install the mating component.
   - If liquid gasket protrudes, wipe it off immediately.
   - Do not retighten mounting bolts or nuts after the installation.
   - Wait 30 minutes or more after installation before refilling engine oil and engine coolant.

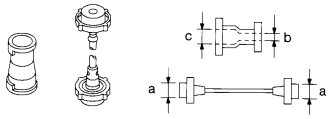
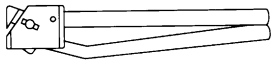
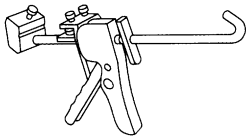


PREPARATION

PFP:00002

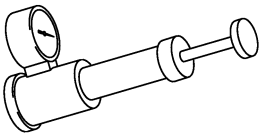
Special Service Tools

EBS00KOC

Tool number Tool name	Description
EG17650301 Radiator cap tester adapter  S-NT564	Adapting radiator cap tester to radiator cap and 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
WS39930000 Tube presser  S-NT052	Pressing the tube of liquid gasket

Commercial Service Tools

EBS011T8

Tool name	Description
Radiator cap tester  PBIC1982E	Checking radiator and radiator cap

OVERHEATING CAUSE ANALYSIS

PFP:00012

Troubleshooting Chart

EBS00KOD

	Symptom		Check items	
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	Worn or loose drive belt	—
		Thermostat and water control valve stuck closed	—	
		Damaged fins	Dust contamination or paper clogging	
			Physical 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 engine coolant mixture ratio	—	—	—
	Poor engine coolant quality	—	Engine coolant viscosity	—
	Insufficient engine coolant	Engine 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

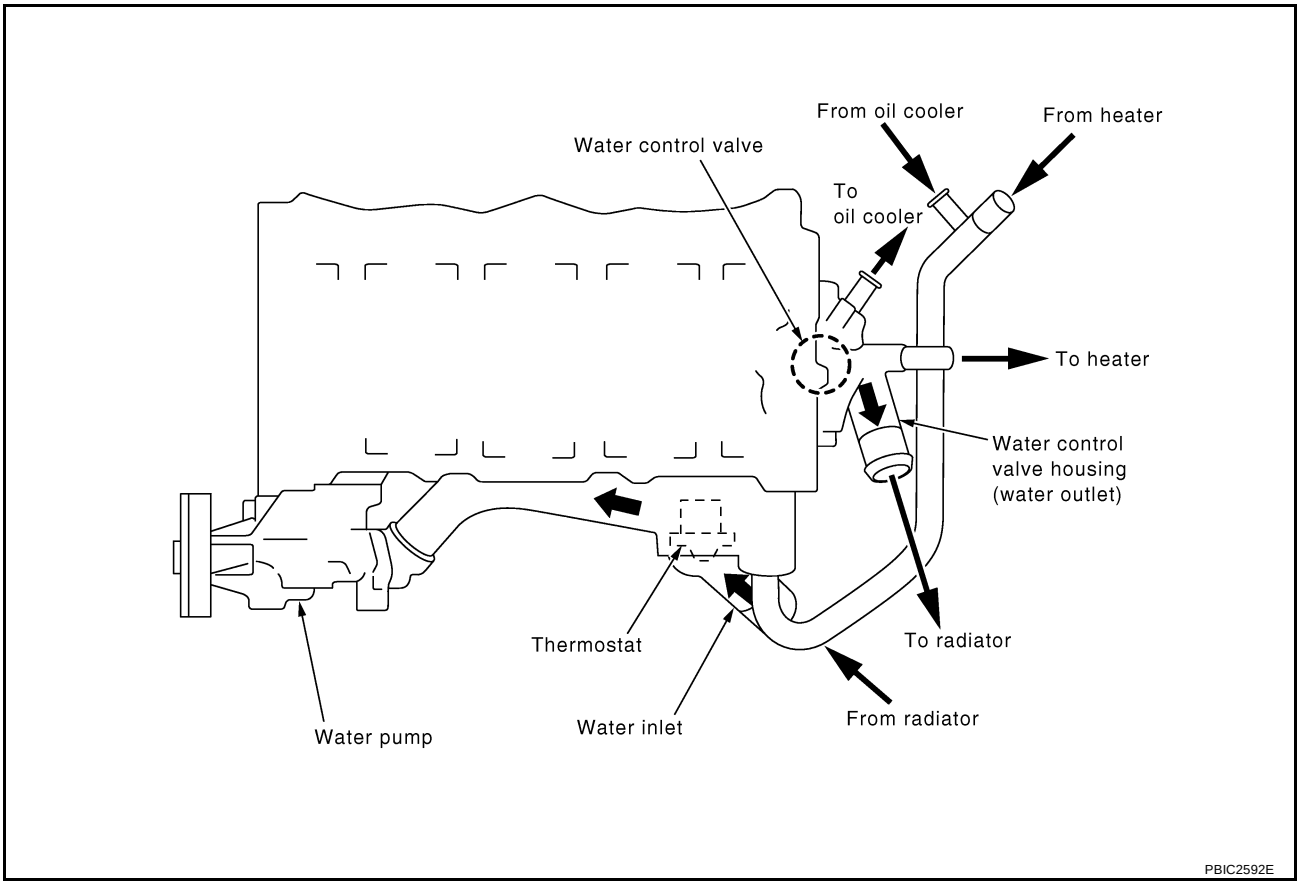
	Symptom		Check items	
Except cooling system parts malfunction	—	Overload on engine	Abusive driving	High engine rpm under no load
				Driving in low gear for extended time
				Driving at extremely high speed
			Power train system malfunction	—
			Installed improper size wheels and tires	
			Dragging brakes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

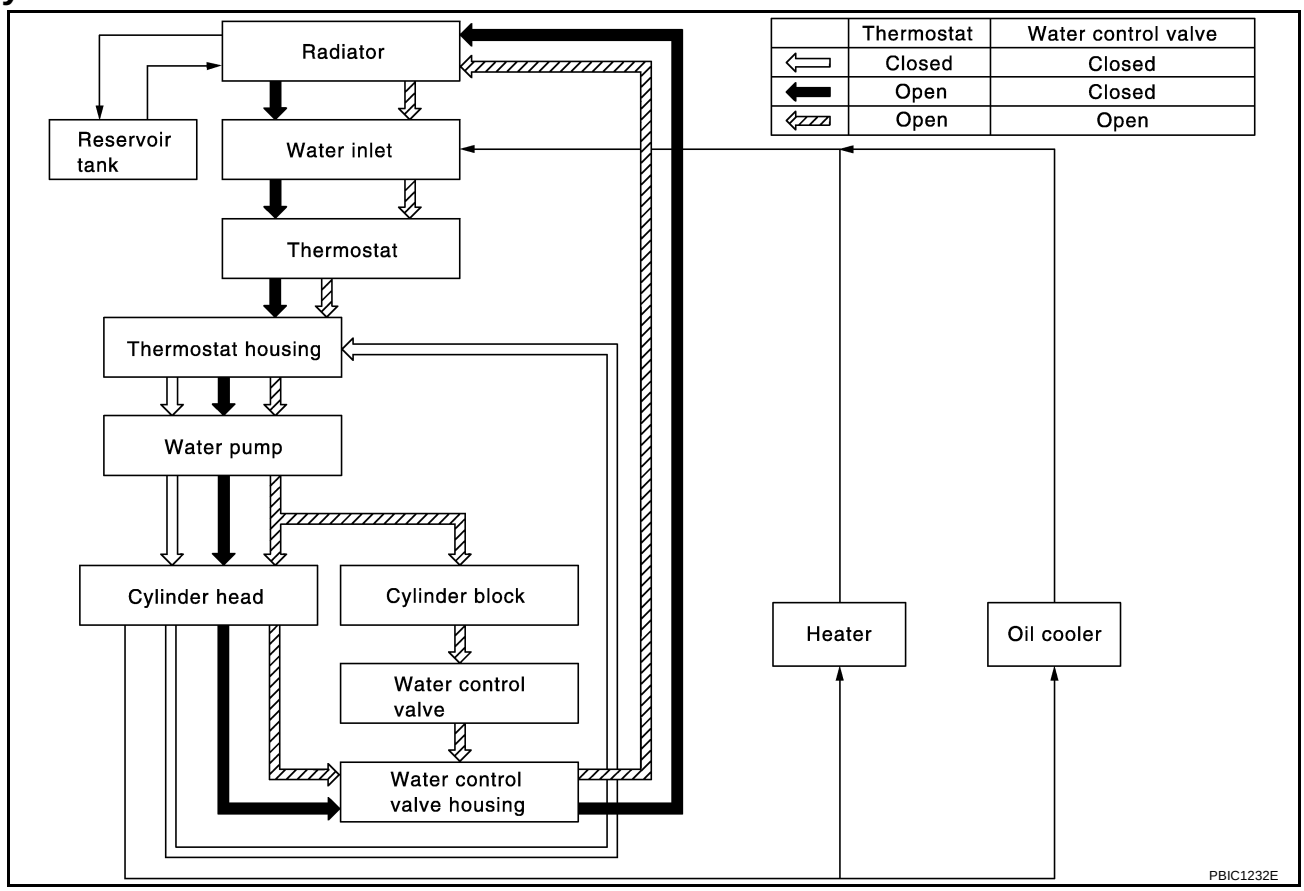
Cooling Circuit

EBS00KOE



System Chart

EBS00KOF



ENGINE COOLANT

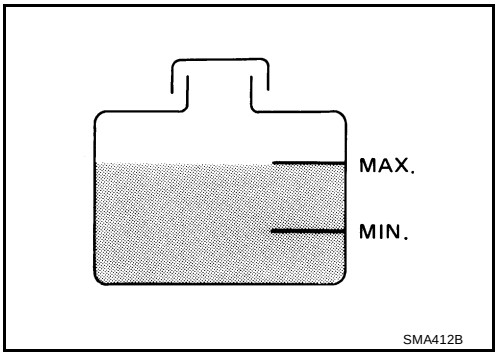
PFP:KQ100

Inspection

EBS00KOG

LEVEL CHECK

- Check if the reservoir tank engine coolant level is within “MIN” to “MAX” range when engine is cool.
- Adjust engine coolant level as necessary.

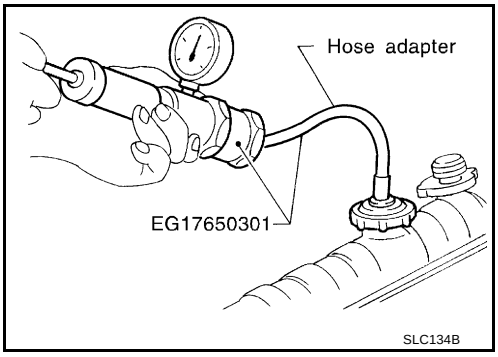


LEAK CHECK

- To check for leakage, apply pressure to the cooling system with a radiator cap tester (commercial service tool) and a radiator cap tester adapter (special service tool).

Testing pressure:

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



WARNING:

Do not remove radiator cap when engine is hot. Serious burns could occur from high-pressure engine coolant escaping from radiator.

CAUTION:

Higher test pressure than specified may cause radiator damage.

NOTE:

In a case that engine coolant decreases, replenish radiator with engine coolant.

- If anything is found, repair or replace damaged parts.

Changing Engine Coolant

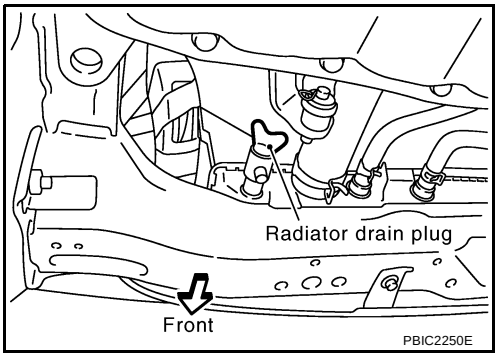
EBS00KOH

WARNING:

- **To avoid being scalded, do not change engine coolant when engine is hot.**
- **Wrap a thick cloth around radiator 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.**
- **Be careful not to allow engine coolant to contact drive belt.**

DRAINING ENGINE COOLANT

1. Remove RH and LH undercovers.
2. Open radiator drain plug at the bottom of radiator, and then remove radiator cap.



When drain all of engine coolant in the system, open water drain plug on cylinder block. Refer to EM-82, "CYLINDER BLOCK" .

3. Remove reservoir tank and drain engine coolant.

4. Check drained engine coolant for contaminants such as rust, corrosion or discoloration. If contaminated, flush the engine cooling system. Refer to CO-10, "FLUSHING COOLING SYSTEM" .

REFILLING ENGINE COOLANT

1. Install reservoir tank, and radiator drain plug.

   CAUTION:

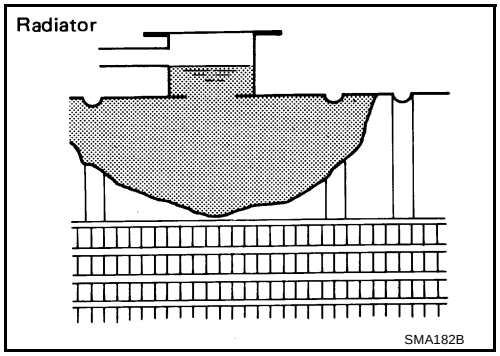
   Be sure to clean radiator drain plug and install with new O-ring.

- **If water drain plug on cylinder block is removed, close and tighten it. Refer to EM-82, "CYLINDER BLOCK" .**

2. Fill radiator and reservoir tank to specified level.
   - **Pour engine coolant through engine coolant filler neck slowly of less than 2 ℓ (1-3/4 lmp qt) a minute to allow air in system to escape.**
   - **Use Genuine Nissan Anti-freeze Coolant or equivalent mixed with water (distilled or demineralized). Refer to MA-17, "RECOMMENDED FLUIDS AND LUBRICANTS".**

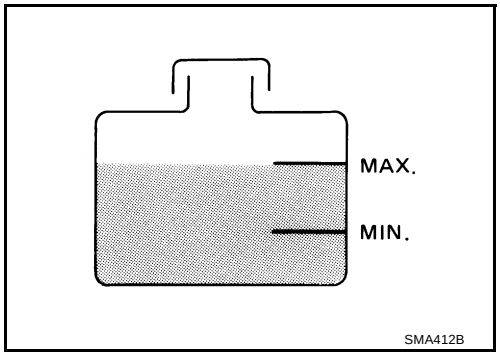
   Engine coolant capacity
   (with reservoir tank at “MAX” level)

   : Approx. 7.1 ℓ (6-1/4 lmp qt)



   Reservoir tank capacity (at “MAX” level)

   : 0.6 ℓ (1/2 lmp qt)



3. Warm up engine to normal operating temperature with radiator cap installed.
4. Run engine at 3,000 rpm for 10 seconds and return to idle speed.
   - Repeat two or three times.

   CAUTION:

   Watch water temperature gauge so as not to overheat the engine.
5. Stop engine and cool down to less than approximately 50°C (122°F).
   - Cool down using a fan to reduce the time.
   - If necessary, refill radiator up to filler neck with engine coolant.
6. Refill reservoir tank to “MAX” level line with engine coolant.
7. Repeat steps 2 through 5 two or more times with radiator cap installed until engine coolant level no longer drops.
8. Check cooling system for leaks with engine running.
9. Warm up engine, and check for sound of engine coolant flow while running engine from idle up to 3,000 rpm with heater temperature controller set at several position between “COOL” and “WARM”.
   - Sound may be noticeable at heater unit.
10. Repeat step 9 three times.
11. If sound is heard, bleed air from cooling system by repeating steps 2 through 5 until engine coolant level no longer drops.
    - **Clean excess engine coolant from engine.**

FLUSHING COOLING SYSTEM

1. Fill radiator and reservoir tank with water and reinstall radiator cap.
2. Run engine and warm it up to normal operating temperature.

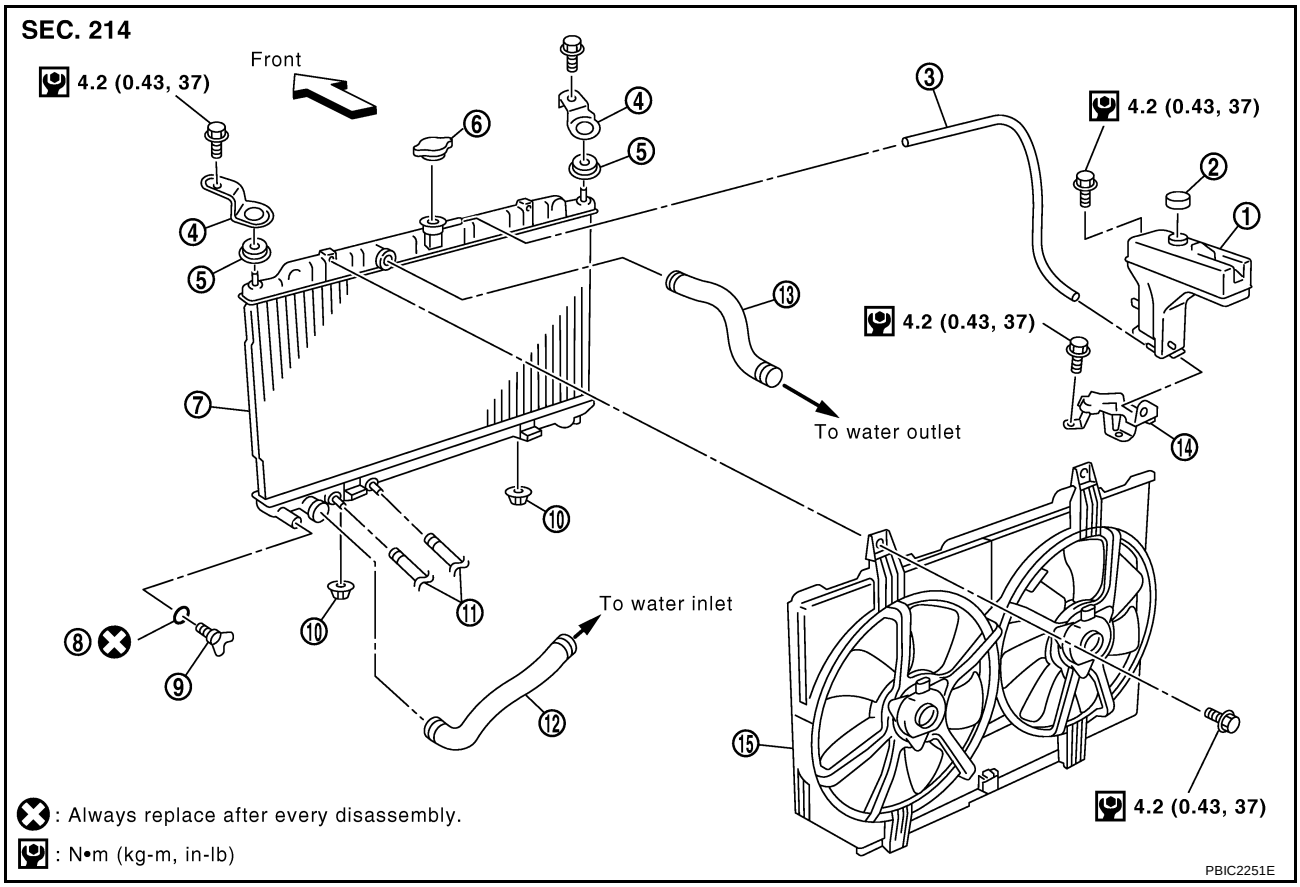
3. Rev engine two or three times under no-load.
4. Stop engine and wait until it cools down.
5. Drain water from the system. Refer to CO-9, "DRAINING ENGINE COOLANT" .
6. Repeat steps 1 through 5 until clear water begins to drain from radiator.

RADIATOR

PFP:21400

Removal and Installation

EBS00KOI



1. Reservoir tank	2. Reservoir tank cap	3. Reservoir tank hose
4. Radiator mounting bracket	5. Mounting rubber (upper)	6. Radiator cap
7. Radiator	8. O-ring	9. Radiator drain plug
10. Mounting rubber (lower)	11. A/T fluid cooler hose	12. Radiator hose (lower)
13. Radiator hose (upper)	14. Bracket	15. Radiator cooling fan assembly

WARNING:

Do not remove radiator cap when the engine is hot. Serious burns could occur from high-pressure engine coolant escaping from radiator. Wrap a thick cloth around the cap. Slowly turn it a quarter of a turn to release built-up pressure. Carefully remove radiator cap by turning it all the way.

REMOVAL

1. Remove RH and LH undercovers.
2. Drain engine coolant. Refer to CO-9, "Changing Engine Coolant" .

   CAUTION:
   - **Perform this step when engine is cold.**
   - **Do not spill engine coolant on drive belt.**
3. Remove air duct (inlet) and air duct assembly. Refer to EM-15, "AIR CLEANER AND AIR DUCT" .
4. Disconnect harness connector from fan motor, and move it aside.
5. Disconnect radiator hoses (upper and lower).
6. Remove A/T fluid cooler hoses. (A/T models)
   - Install blind plug to avoid leakage of A/T fluid.
7. Remove radiator mounting brackets.
8. Remove radiator and radiator cooling fan assembly.

   CAUTION:

   Do not damage or scratch radiator core when removing.

INSTALLATION

Install in the reverse order of removal.

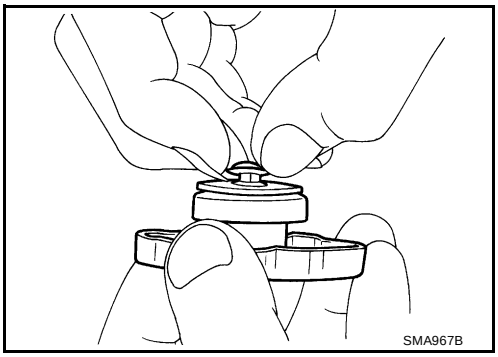
INSPECTION AFTER INSTALLATION

- Check for leaks of engine coolant using a radiator cap tester adapter (special service tool: EG17650301) and a radiator cap tester (commercial service tool). Refer to CO-9, "LEAK CHECK" .
- Start and warm up engine. Visually check if there is no leaks of engine coolant and A/T fluid (A/T models).

Checking Radiator Cap

EBS00KOK

1. Pull negative-pressure valve to open it and make sure that it closes completely when released.
   - Make sure that there is no dirt or damage on the valve seat of radiator cap negative-pressure valve.
   - Make sure that there are no unusualness in the opening and closing conditions of negative-pressure valve.



2. Check radiator cap relief pressure.

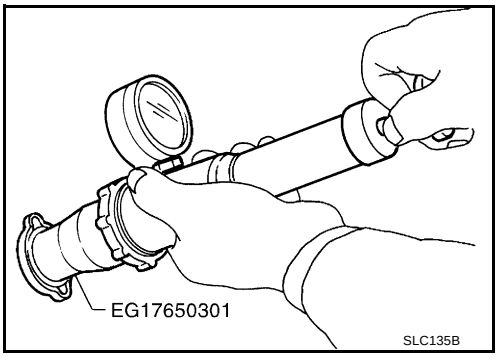
   Standard:

   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 radiator cap to radiator cap tester (commercial service tool) and radiator cap tester adapter (special service tool), apply engine coolant to radiator cap seal surface.
   - Replace radiator cap if there is an unusualness in negative-pressure valve, or if the relief pressure falls below the limit.



Checking Radiator

EBS00KOL

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

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

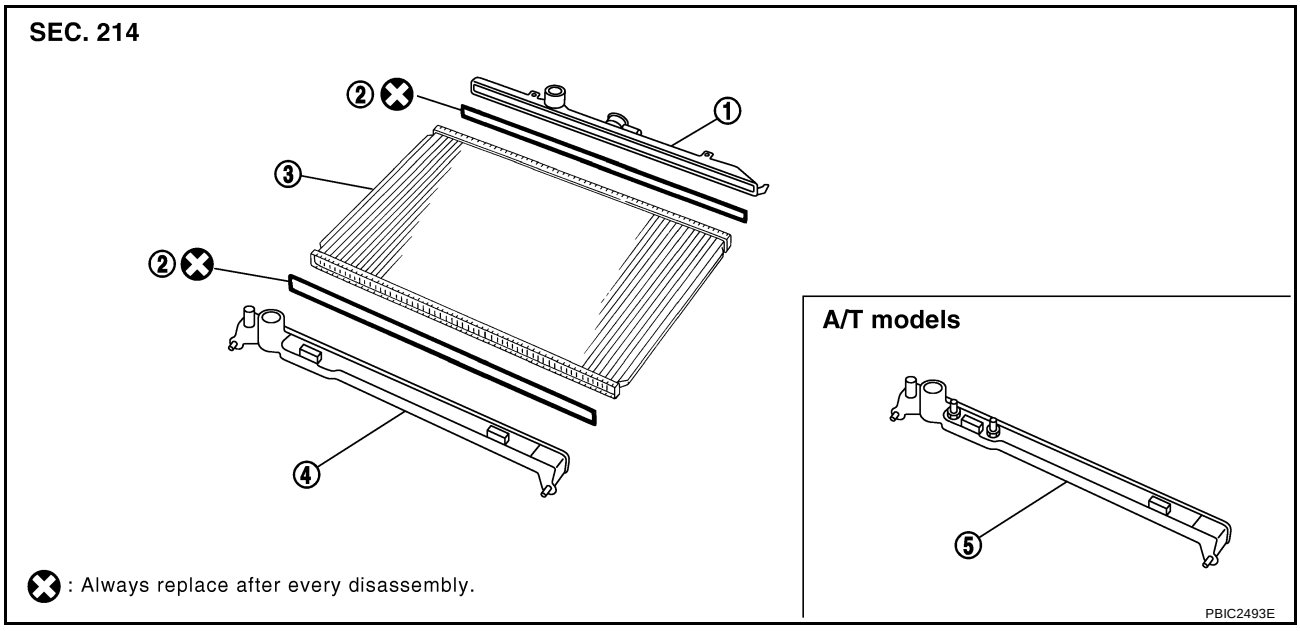
1. Apply water by hose to the back side of the radiator core vertically downward.
2. Apply water again to all radiator core surface once per minute.
3. Stop washing if any stains no longer flow out from the radiator.
4. Blow air into the back side of radiator core vertically downward.
   - Use compressed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

RADIATOR (ALUMINUM TYPE)

PFP:21460

Disassembly and Assembly

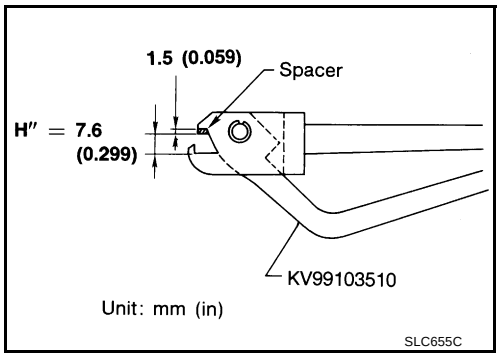
EBS00KOM



1. Upper tank
2. Sealing rubber
3. Core
4. Lower tank
5. Lower tank (with A/T fluid cooler)

PREPARATION

1. Attach the spacer to the tip of radiator plate pliers A (special service tool).
   Spacer specification: 1.5 mm (0.059 in) thick × 18 mm (0.71 in) wide × 8.5 mm (0.335 in) long.



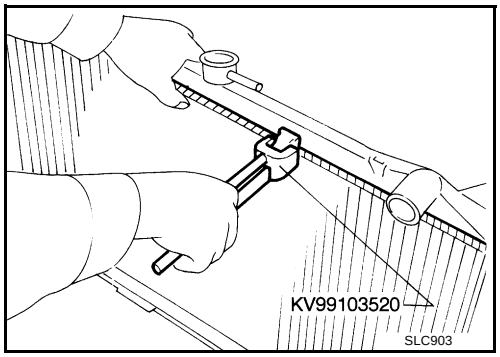
2. Make sure that when radiator plate pliers A (special service tool) are closed dimension H″ is approx. 7.6 mm (0.299 in).
3. Adjust dimension H″ with the spacer thickness, if necessary.

DISASSEMBLY

1. Remove upper and lower tanks with a radiator plate pliers B (special service tool).

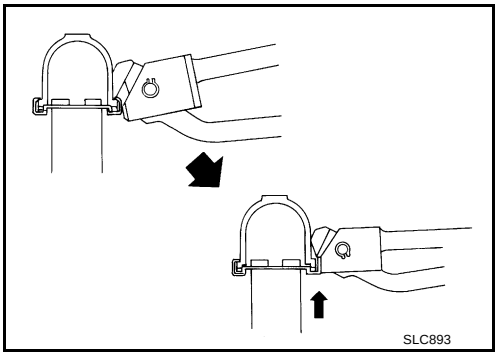
   CAUTION:
   Do not disassemble lower tank and A/T fluid cooler. (A/T models)

   NOTE:
   Lower tank and A/T fluid cooler from a single part are handled as an assembly. (A/T models)



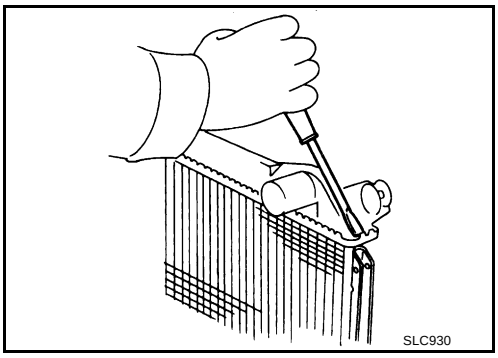
- Grip the crimped edge and bend it upwards so that radiator plate pliers B slips off.

  CAUTION:
  Do not bend excessively.

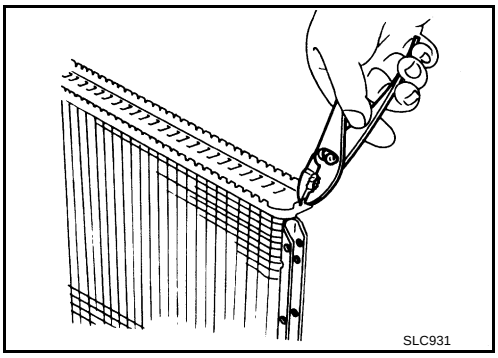


- In areas where radiator plate pliers B cannot be used, use screwdriver to bend the edge up.

  CAUTION:
  Be careful not to damage tank.

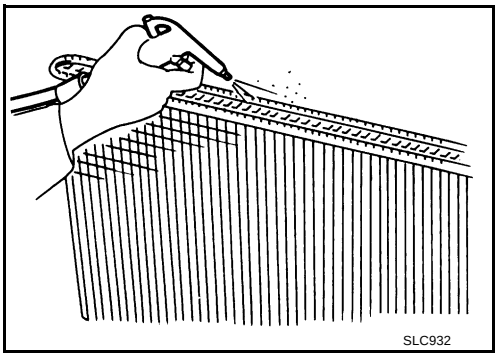


2. Remove sealing rubber.
3. Make sure the edge stands straight up.



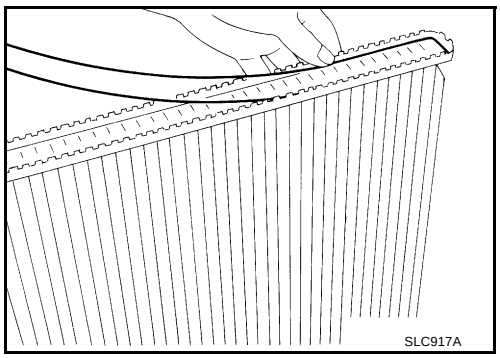
ASSEMBLY

1. Clean contact portion of tank.

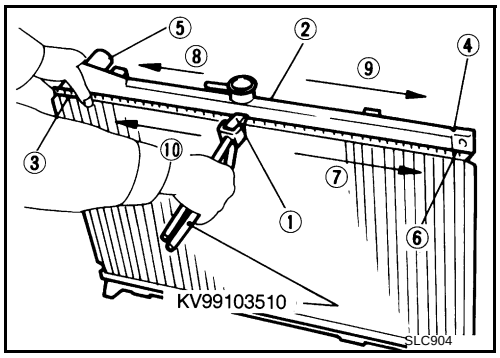


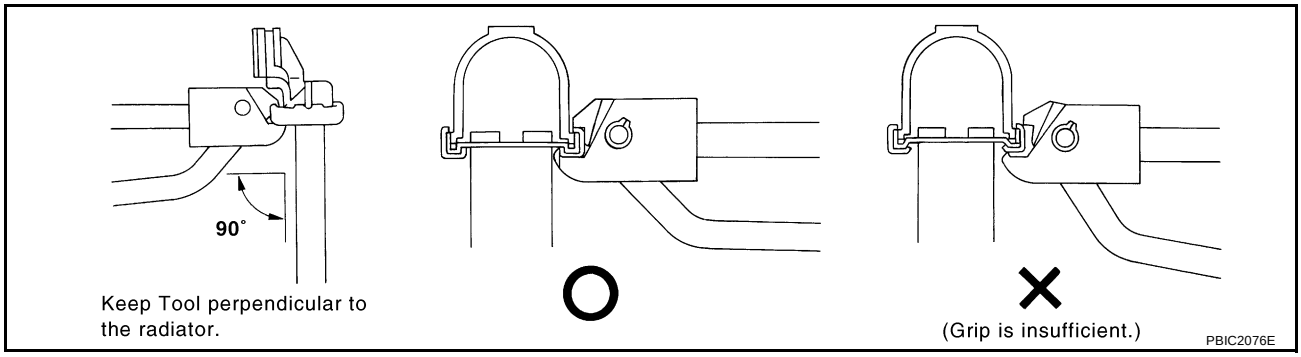
2. Install sealing rubber while pushing it in with fingers.

CAUTION:
Be careful not to twist sealing rubber.

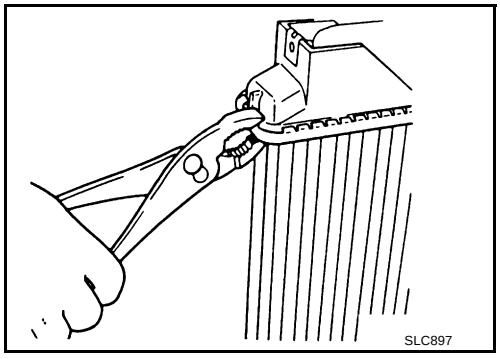


3. Caulk tank in numerical order as shown in the figure with radiator plate pliers A (special service tool).



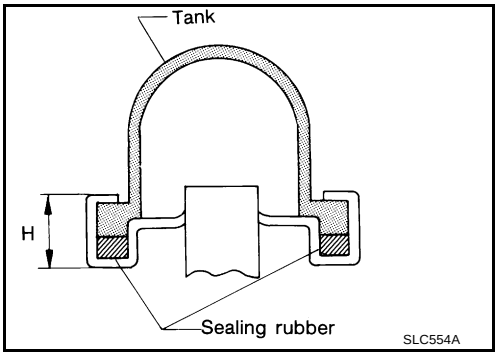


- Use pliers in the locations where plate pliers A cannot be used.



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

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



5. Make sure that there is no leakage.
Refer to CO-17, "INSPECTION" .

INSPECTION

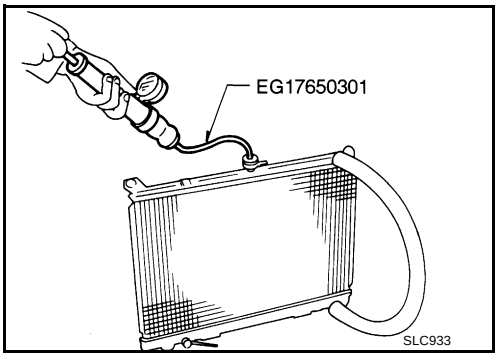
1. Apply pressure with radiator cap tester adapter (special service tool) and radiator cap tester (commercial service tool).

Testing pressure

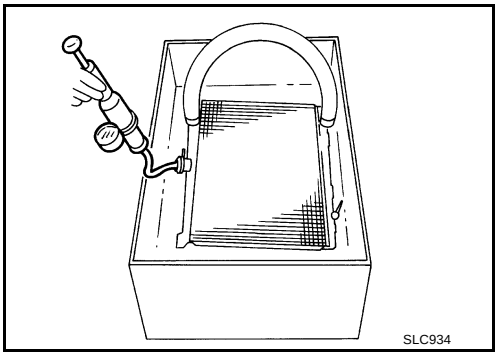
: 157 kPa (1.57 bar, 1.6 kg/cm^2 , 23 psi)

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

CAUTION:
Attach hose to A/T fluid cooler to seal its inlet and outlet. (A/T models)



2. Check for leakage by soaking radiator in water container with the testing pressure applied.

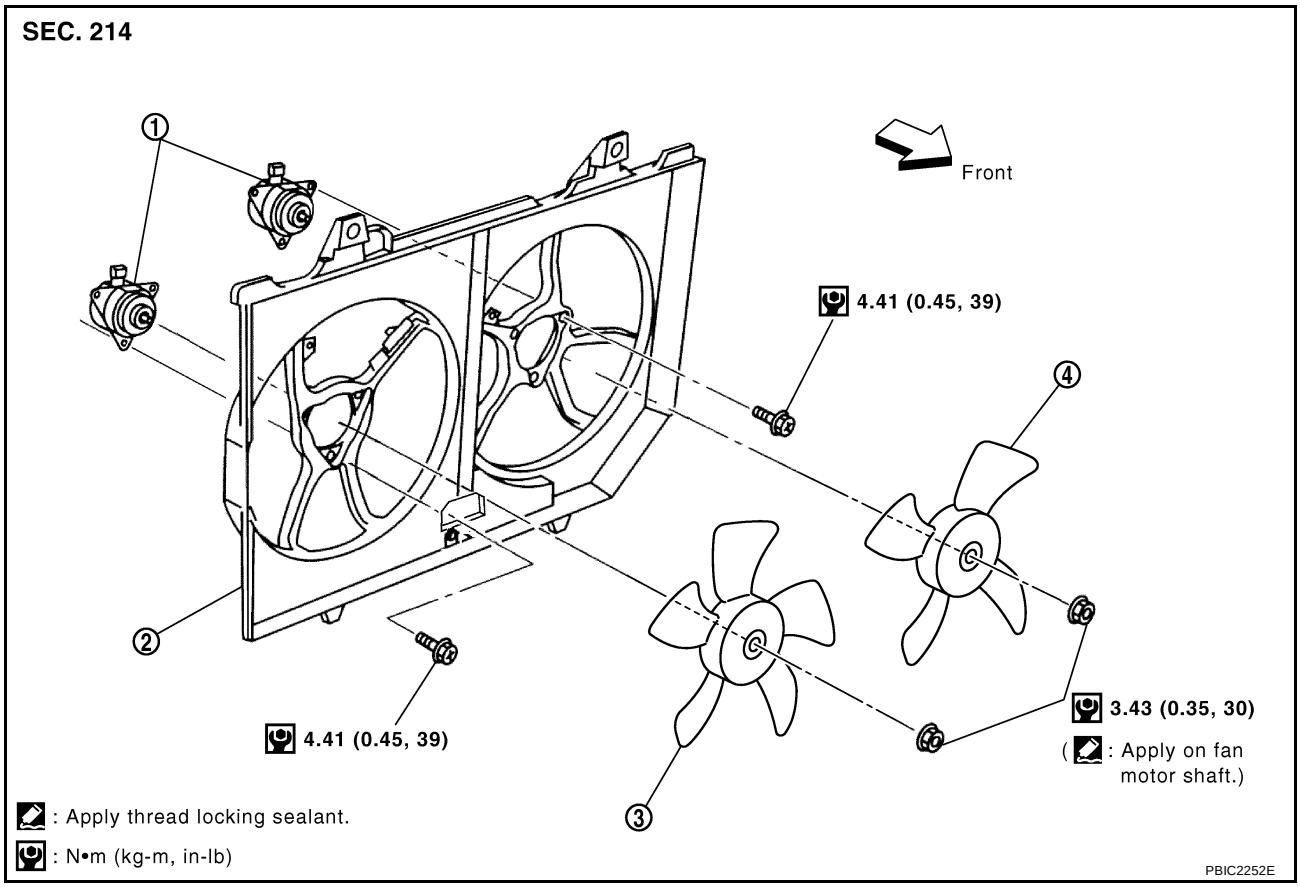


COOLING FAN

PFP:21140

Removal and Installation

EBS011TD



1. Fan motor
2. Fan shroud
3. Cooling fan (RH)
4. Cooling fan (LH)

REMOVAL

1. Drain engine coolant from radiator. Refer to CO-9, "Changing Engine Coolant" .

   CAUTION:
   - **Perform this step when engine is cold.**
   - **Do not spill engine coolant on drive belt.**
2. Remove air duct (inlet) and air duct assembly. Refer to EM-15, "AIR CLEANER AND AIR DUCT" .
3. Disconnect radiator hose (upper) at radiator side. Refer to CO-12, "RADIATOR" .

   CAUTION:
   Do not spill engine coolant on drive belt.
4. Disconnect harness connectors from fan motors, and move them to aside.
5. Remove radiator cooling fan assembly.

   CAUTION:
   Be careful not to damage or scratch on radiator core.

INSTALLATION

Install in the reverse order of removal.

- Cooling fans are controlled by ECM. For details, refer to EC-348, "DTC P1217 ENGINE OVER TEMPERATURE" (WITH EURO-OBD) or EC-700, "DTC P1217 ENGINE OVER TEMPERATURE" (WITHOUT EURO-OBD).

DISASSEMBLY AND ASSEMBLY

Disassembly

1. Remove cooling fans (RH and LH) from fan motors.
2. Remove fan motors from fan shroud.

Assembly

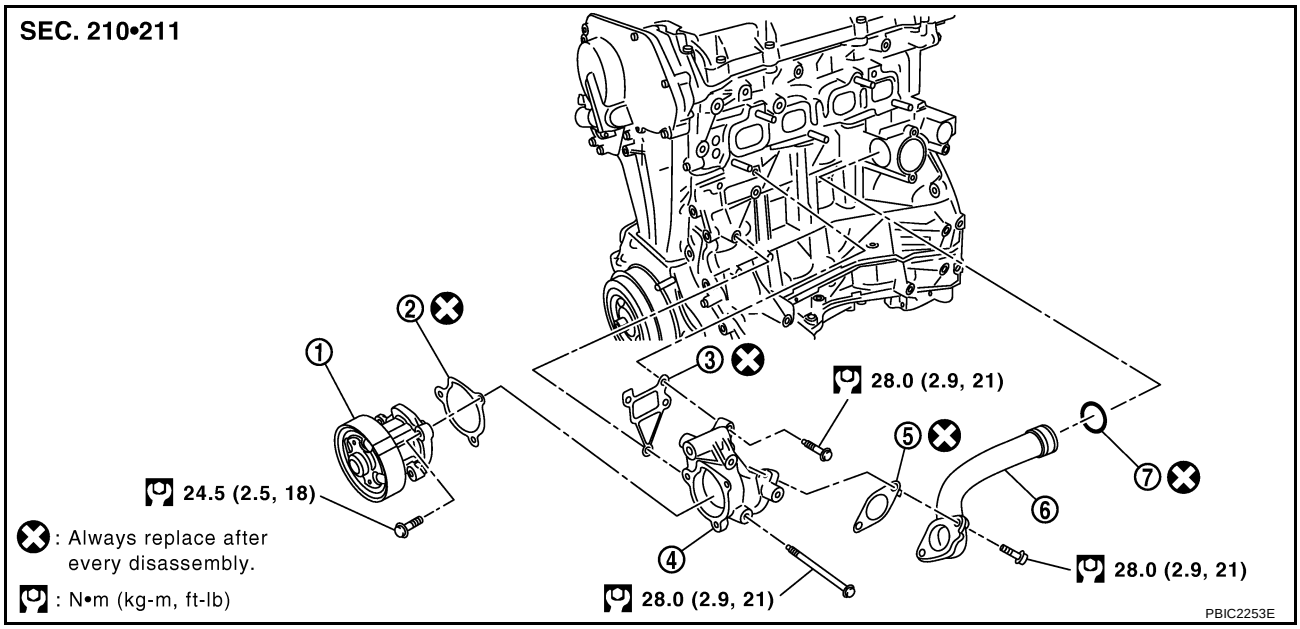
Assemble in the reverse order of disassembly.

WATER PUMP

PFP:21020

Removal and Installation

EBS00KON



1. Water pump
2. Gasket
3. Gasket
4. Water pump housing
5. Gasket
6. Water pipe
7. O-ring

REMOVAL

1. Drain engine coolant. Refer to CO-9, "Changing Engine Coolant" .

   CAUTION:
   - **Perform this step when engine is cold.**
   - **Do not spill engine coolant on drive belt.**
2. Remove the following parts.
   - RH undercover
   - Drive belt; Refer to EM-13, "DRIVE BELTS" .
   - Drive belt auto-tensioner; Refer to EM-14, "Removal and Installation of Drive Belt Auto-Tensioner" .
3. Remove water pump.
   - Engine coolant will leak from cylinder block, so have a receptacle ready below.

   CAUTION:
   - **Handle water pump vane so that it does not contact any other parts.**
   - **Water pump cannot be disassembled and should be replaced as a unit.**
4. Remove water pump housing with the following procedure;

a. Remove alternator. Refer to SC-12, "CHARGING SYSTEM" .

b. Remove oil level gauge and oil level gauge guide. Refer to EM-25, "OIL PAN AND OIL STRAINER" .

   CAUTION:
   Plug the oil level gauge guide opening to prevent oil pan from entering foreign materials.

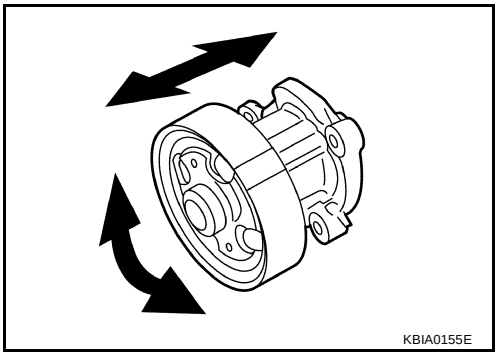
c. Remove mounting bolts for water pipe.

d. Remove water pump housing.

5. Remove exhaust manifold and three way catalyst assembly. Refer to EM-23, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .
6. Remove water pipe.

INSPECTION AFTER REMOVAL

- Visually check if there is no significant dirt or rusting on water pump body and vane.
- Make sure that there is no looseness in vane shaft, and that it turns smoothly when rotated by hand.
- Replace water pump, if necessary.


KBIA0155E

INSTALLATION

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

- When inserting water pipe end into cylinder block, apply a neutral detergent to O-ring. Then insert it immediately.

INSPECTION AFTER INSTALLATION

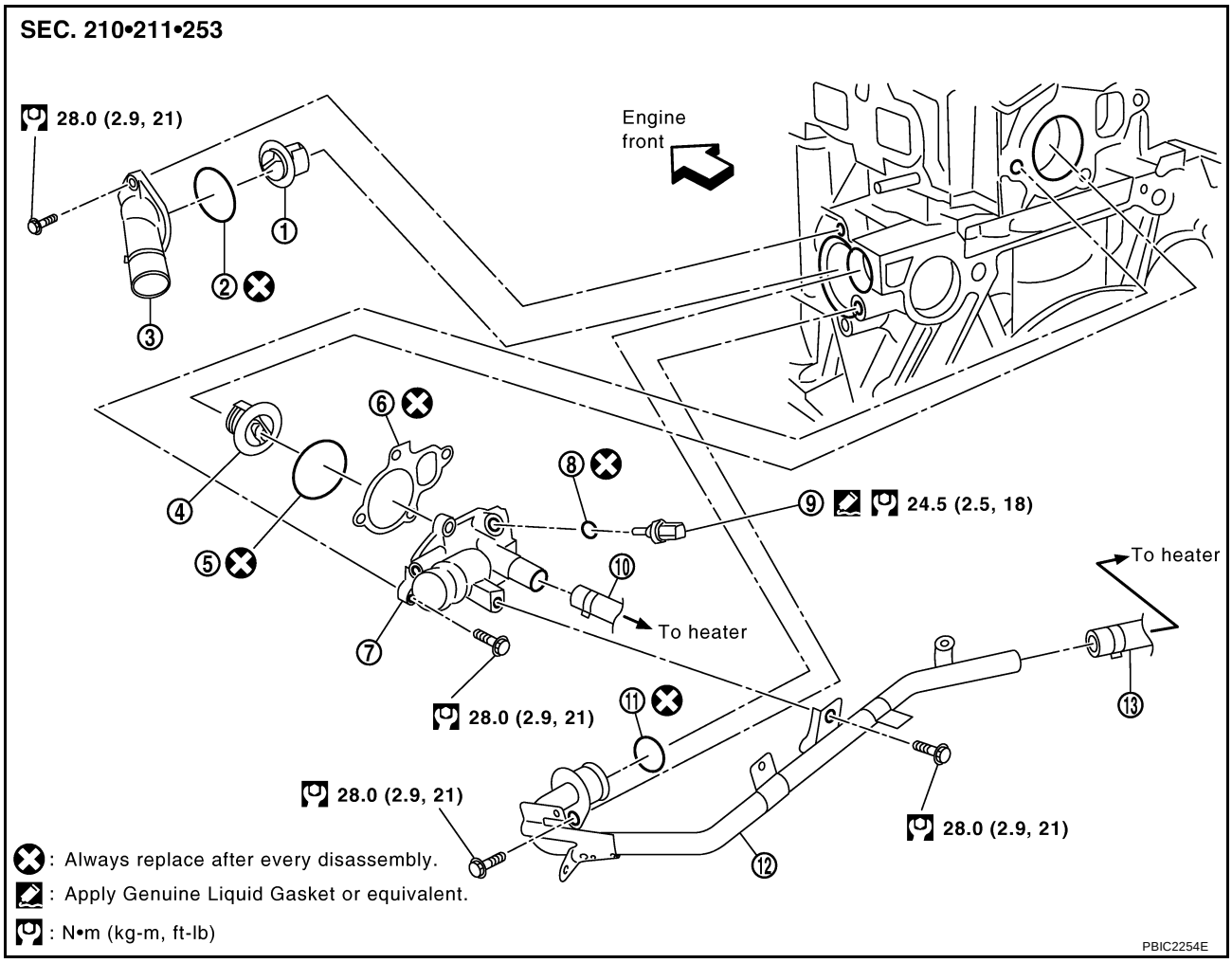
- Check for engine coolant leaks using a radiator cap tester adapter (special service tool: EG17650301) and radiator cap tester (commercial service tool). Refer to CO-9, "LEAK CHECK" .
- Start and warm up engine. Visually check if there is no leaks of engine coolant.

THERMOSTAT AND WATER CONTROL VALVE

PFP:21200

Removal and Installation

EBS00KOO



1. Thermostat
2. O-ring
3. Water inlet
4. Water control valve
5. O-ring
6. Gasket
7. Water control valve housing (water outlet)
8. Washer
9. Engine coolant temperature sensor
10. Heater hose
11. O-ring
12. Heater pipe
13. Heater hose

REMOVAL

1. Drain engine coolant. Refer to CO-9, "Changing Engine Coolant" .

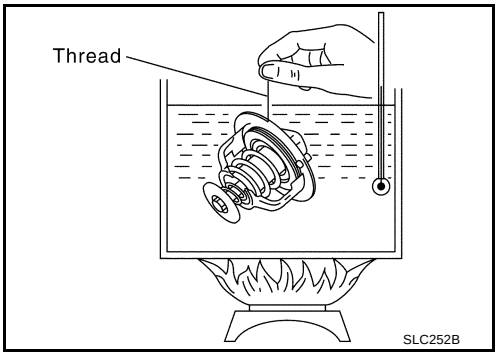
   CAUTION:
   - **Perform this step when engine is cold.**
   - **Do not spill engine coolant on drive belt.**
2. Disconnect radiator hose (lower) at water inlet side. Refer to CO-12, "RADIATOR" .
3. Remove water inlet and thermostat.
4. Remove water control valve with the following procedure:

a. Disconnect radiator hose (upper) at water control valve housing (water outlet) side.
b. Disconnect harness connector from engine coolant temperature sensor.
c. Remove heater pipe and heater hose.
d. Remove water control valve housing (water outlet) and water control valve.

INSPECTION AFTER REMOVAL

- Place a string so that it is caught in the valves of thermostat and water control valve. Immerse fully in a container filled with water. Heat while stirring. (The example in the figure shows thermostat.)
- The valve opening temperature is the temperature at which the valve opens and falls from the thread.
- Continue heating. Check the full open valve lift amount.

  NOTE:
  The full open valve lift amount standard temperature for water control valve is the reference value.
- After checking the full open valve lift amount, lower the water temperature and check the valve closing temperature.



Standard:

Items	Thermostat	Water control valve
Valve opening temperature	80.5 - 83.5°C (177 - 182°F)	93.5 - 96.5°C (200 - 206°F)
Full open valve lift	More than 8 mm/ 95°C (0.315 in/ 203°F)	More than 8 mm/ 108°C (0.315 in/ 226°F)
Valve closing temperature	More than 77°C (171°F)	More than 90°C (194°F)

- If out of the standard, replace either or both thermostat and water control valve.

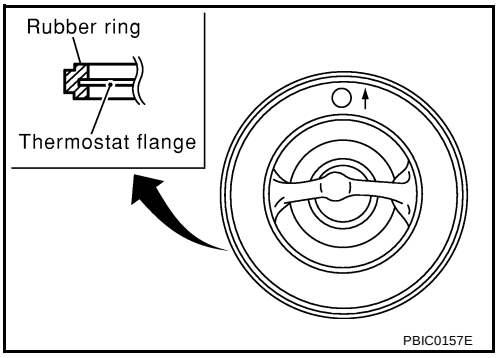
INSTALLATION

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

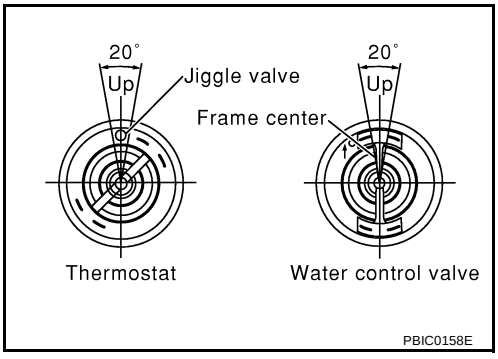
Thermostat and Water Control Valve

- Install thermostat with making rubber ring groove fit to thermostat flange with the whole circumference. (The example in the figure shows thermostat.)

  NOTE:
  Same procedure is applied for installation of water control valve.



- Install thermostat with jiggle valve facing upwards. (The position deviation may be within the range of 20 degrees as shown in the figure.)
- Install water control valve with the arrow facing up and the frame center part facing upwards. (The position deviation may be within the range of 20 degrees as shown in the figure.)



Heater Pipe Installation

Apply a neutral detergent to O-ring, then quickly insert the insertion part of heater pipe into cylinder block.

INSPECTION AFTER INSTALLATION

- Check for leaks of engine coolant using a radiator cap tester adapter (special service tool: EG17650301) and a radiator cap tester (commercial service tool). Refer to CO-9, "LEAK CHECK" .
- Start and warm up engine. Visually check if there is no leaks of engine coolant and A/T fluid (A/T models).

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Standard and Limit

EBS00KOP

CAPACITY

Unit: ℓ (Imp qt)

Engine coolant capacity (With reservoir tank at “MAX” level)	Approx. 7.1 (6-1/4)
Reservoir tank	0.6 (1/2)

THERMOSTAT

Valve opening temperature	80.5 - 83.5°C (177 - 182°F)
Valve lift	More than 8 mm/ 95°C (0.315 in/ 203°F)
Valve closing temperature	More than 77°C (171°F)

WATER CONTROL VALVE

Valve opening temperature	93.5 - 96.5°C (200 - 206°F)
Valve lift	More than 8 mm/ 108°C (0.315 in/ 226°F)
Valve closing temperature	More than 90°C (194°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

EBS00KOQ

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

Radiator mounting bracket	4.2 (0.43, 37)*
Radiator cooling fan assembly	4.2 (0.43, 37)*
Cooling fan	3.43 (0.35, 30)*
Fan motor	4.41 (0.45, 39)*
Water pump	24.5 (2.5, 18)
Water pump housing	28.0 (2.9, 21)
Water pipe	28.0 (2.9, 21)
Water inlet	28.0 (2.9, 21)
Water control valve housing (water outlet)	28.0 (2.9, 21)
Hater pipe	28.0 (2.9, 21)
Engine coolant temperature sensor	24.5 (2.5, 18)

PRECAUTIONS

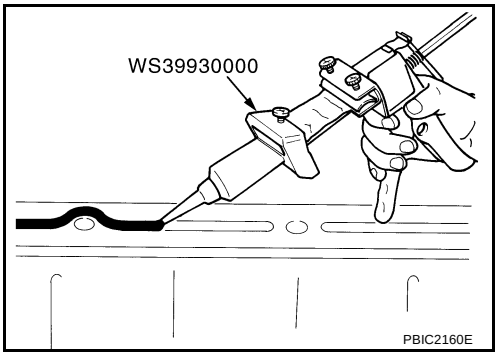
PFP:00001

Precautions For Liquid Gasket

EBS01276

LIQUID GASKET APPLICATION PROCEDURE

1. Remove old liquid gasket adhering to the liquid gasket application surface and the mating surface.
   - Remove liquid gasket completely from the liquid gasket application surface, mounting bolts, and bolt holes.
2. Wipe the liquid gasket application surface and the mating surface with white gasoline (lighting and heating use) to remove adhering moisture, grease and foreign materials.
3. Attach liquid gasket tube to the tube presser (special service tool).
   Use Genuine Liquid Gasket or equivalent.
   - Within five minutes of liquid gasket application, install the mating component.
   - If liquid gasket protrudes, wipe it off immediately.
   - Do not retighten mounting bolts or nuts after the installation.
   - After 30 minutes or more have passed from the installation, fill engine oil and engine coolant.

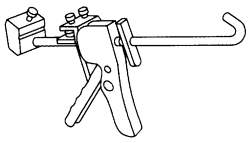
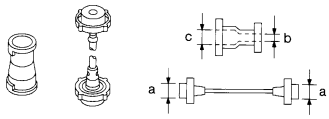
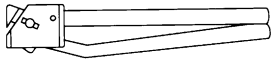


PREPARATION

PFP:00002

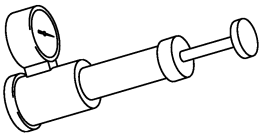
Special Service Tools

EBS00BAV

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 cap and 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

Commercial Service Tools

EBS011UY

Tool name	Description
Radiator cap tester  PBIC1982E	Checking radiator and radiator cap

OVERHEATING CAUSE ANALYSIS

PFP:00012

Troubleshooting Chart

EBS00BAW

	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	
			Physical damage	
		Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)	
	Reduced air flow	Cooling fan does not operate	Refer to DTC in EC1217 (cooling system)	—
		High resistance to fan rotation	Fan assembly	
		Damaged fan blades		
	Damaged radiator shroud	—	—	—
	Improper engine coolant mixture ratio	—	—	—
	Poor engine coolant quality	—	Engine coolant density	—
	Insufficient engine coolant	Engine 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

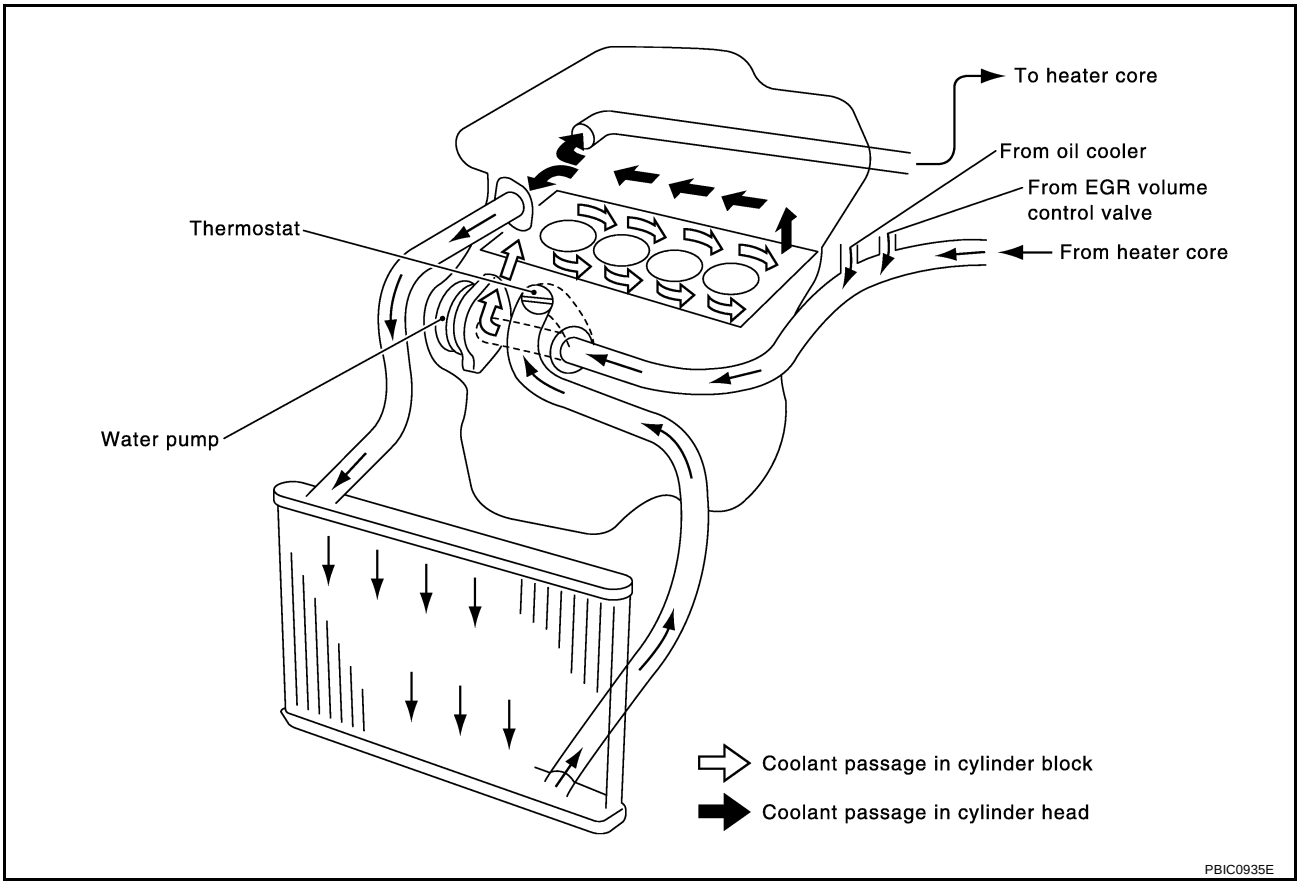
	Symptom		Check items	
Except cooling system parts malfunction	—	Overload on engine	Abusive driving	High engine rpm under no load
				Driving in low gear for extended time
				Driving at extremely high speed
			Powertrain system malfunction	—
			Installed improper size wheels and tires	
			Dragging brakes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

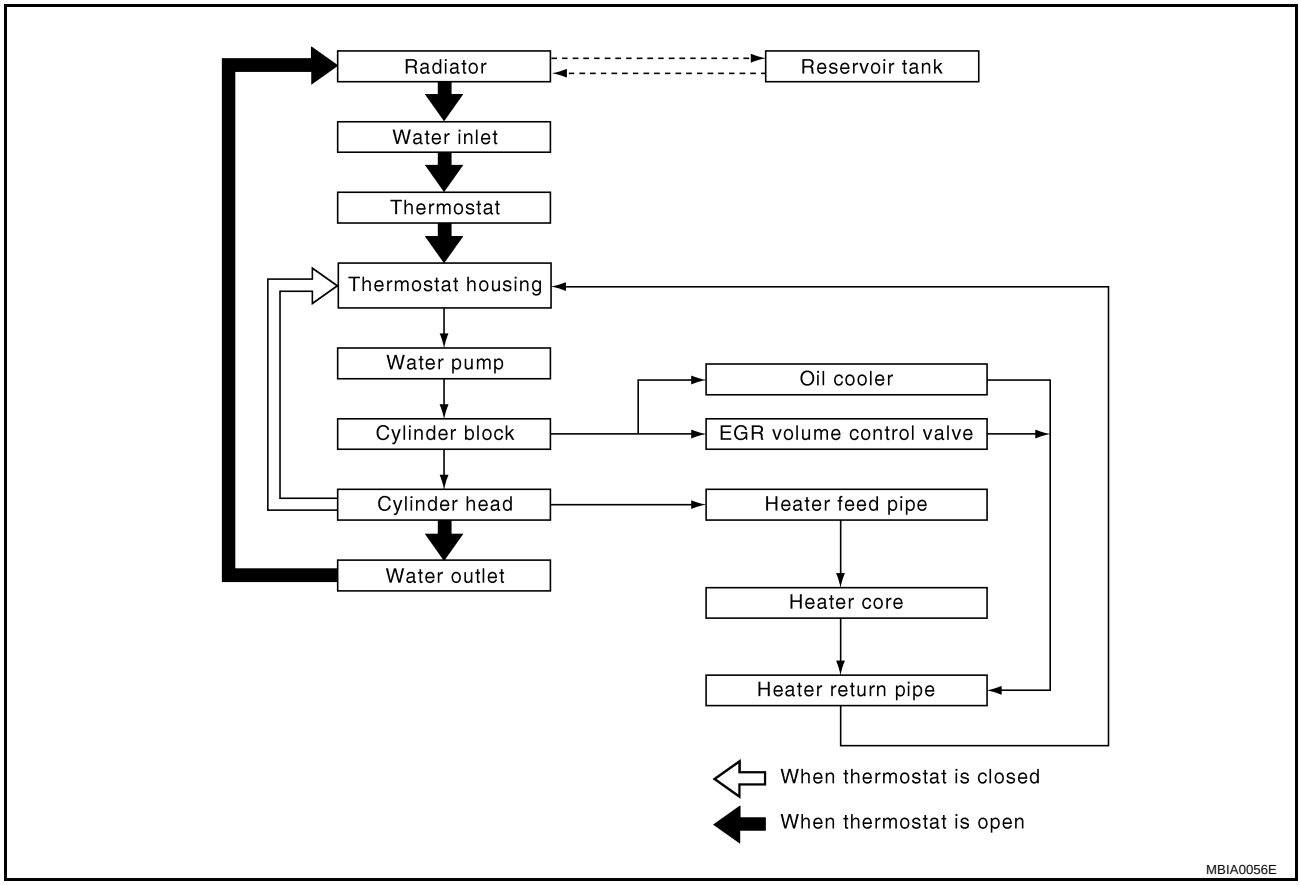
Cooling Circuit

EBS00BAX



System Chart

EBS00LS1



ENGINE COOLANT

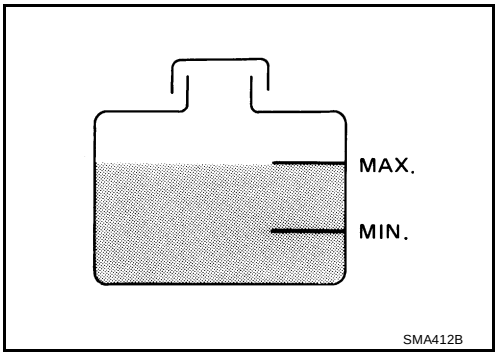
PFP:KQ100

Inspection

EBS00BAY

LEVEL CHECK

- Check if the reservoir tank engine coolant level within MIN to MAX when engine is cool.
- Adjust engine coolant level as necessary.



CHECKING RADIATOR SYSTEM FOR LEAKS

- To check for leaks, apply pressure to the cooling system with the radiator cap tester (commercial service tool) and the radiator cap tester adapter (special service tool).

  Testing pressure:

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

  WARNING:

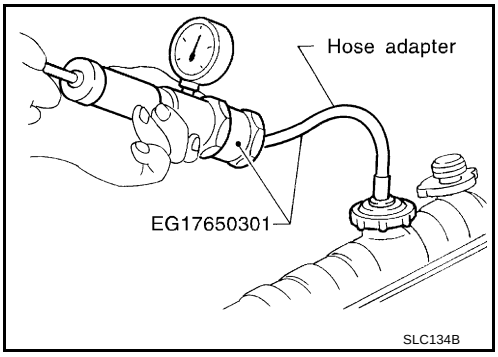
  Do not remove radiator cap when engine is hot. Serious burns could occur from high pressure engine coolant escaping from radiator.

  CAUTION:

  Higher test pressure than specified may cause radiator damage.

  NOTE:

  In a case that engine coolant decreases, replenish radiator with engine coolant.



- If anything is found, repair or replace damaged parts.

Changing Engine Coolant

EBS00BAZ

WARNING:

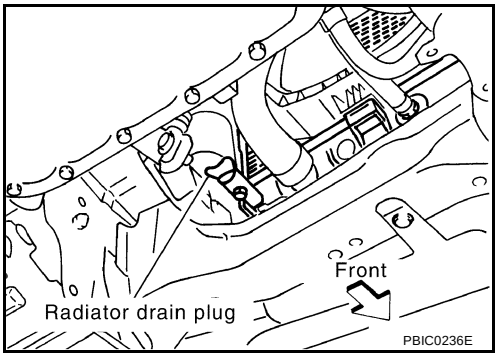
- **To avoid being scalded, do not change engine coolant when engine is hot.**
- **Wrap a thick cloth around cap and carefully remove radiator cap. First, turn radiator cap a quarter of a turn to release built-up pressure. Then turn the cap all the way.**

DRAINING ENGINE COOLANT

1. Remove engine undercover.
2. Open radiator drain plug at the bottom of radiator, and remove radiator cap.

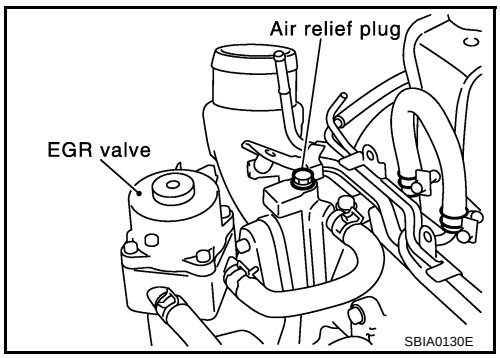
   NOTE:

   - **Be careful not to allow engine coolant to contact drive belts.**
   - Cover the exhaust tube heat shield to prevent from splashing engine coolant.



When draining all engine coolant in the system, also perform the following steps.

3. Remove air relief plug.



4. Open cylinder block drain plug. Refer to EM-212, "CYLINDER BLOCK" .
5. Remove reservoir tank, drain engine coolant, then clean reservoir tank.
6. Check drained engine coolant for contaminants such as rust, corrosion or discoloration.
   If contaminated, flush engine cooling system. Refer to CO-33, "FLUSHING COOLING SYSTEM" .

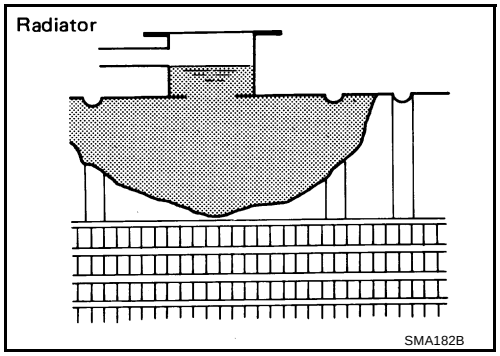
REFILLING ENGINE COOLANT

1. Install reservoir tank, and radiator drain plug.

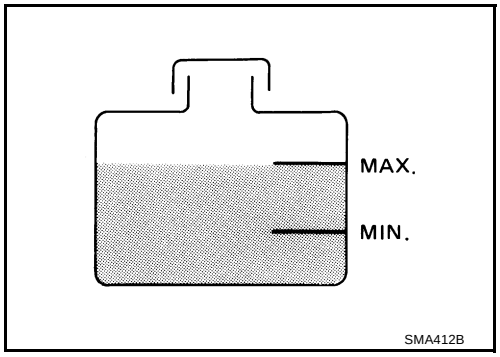
   CAUTION:
   Be sure to clean radiator drain plug and install with new O-ring.
   - **If water drain plug on cylinder block is removed, close and tighten it. Refer to EM-212, "CYLINDER BLOCK" .**

2. Fill radiator and reservoir tank to the specified level.
   - **Pour engine coolant through engine coolant filler neck slowly of less than 2 ℓ (1-3/4 lmp qt) a minute to allow air in system to escape.**
   - **Use Genuine Nissan Anti-freeze Coolant or equivalent mixed with water (distilled or demineralized). Refer to MA-17, "RECOMMENDED FLUIDS AND LUBRICANTS".**

     Engine coolant capacity
     (with reservoir tank at “MAX” level)
     : Approx. 9.5 ℓ (8-3/8 lmp qt)



     Reservoir tank capacity (at “MAX” level)
     : 0.6 ℓ (1/2 lmp qt)



   - When engine coolant overflows air relief hole, install air relief plug with new copper washer.

     Air relief plug:
     : 6.9 - 7.8 N·m (0.7 - 0.8 kg-m, 61 - 69 in-lb)

3. Warm up engine to normal operating temperature without radiator cap installed.
   - **If engine coolant overflows radiator filler hole, install radiator cap.**
4. Run engine at 3,000 rpm for 10 seconds and return to idle speed with radiator cap installed.
   - Repeat two or three times.

CAUTION:
Watch engine coolant temperature gauge so as not to overheat the engine.

5. Stop engine and cool down to less than approximately 50°C(122°F).
   - Cool down using a fan to reduce the time.
   - If necessary, refill radiator up to filler neck with engine coolant.
6. Refill reservoir tank to MAX level line with engine coolant.

7. Repeat steps 2 through 5 two or more times with radiator cap installed until engine coolant level no longer drops.
8. Check cooling system for leaks with engine running.
9. Warm up engine, and check for sound of engine coolant flow while running engine from idle up to 3,000 rpm with heater temperature controller set at several position between COOL and WARM.
   - Sound may be noticeable at heater unit.
10. Repeat step 9 three times.
11. If sound is heard, bleed air from cooling system by repeating steps 2 through 5 until engine coolant level no longer drops.
    - **Clean excess engine coolant from engine.**

FLUSHING COOLING SYSTEM

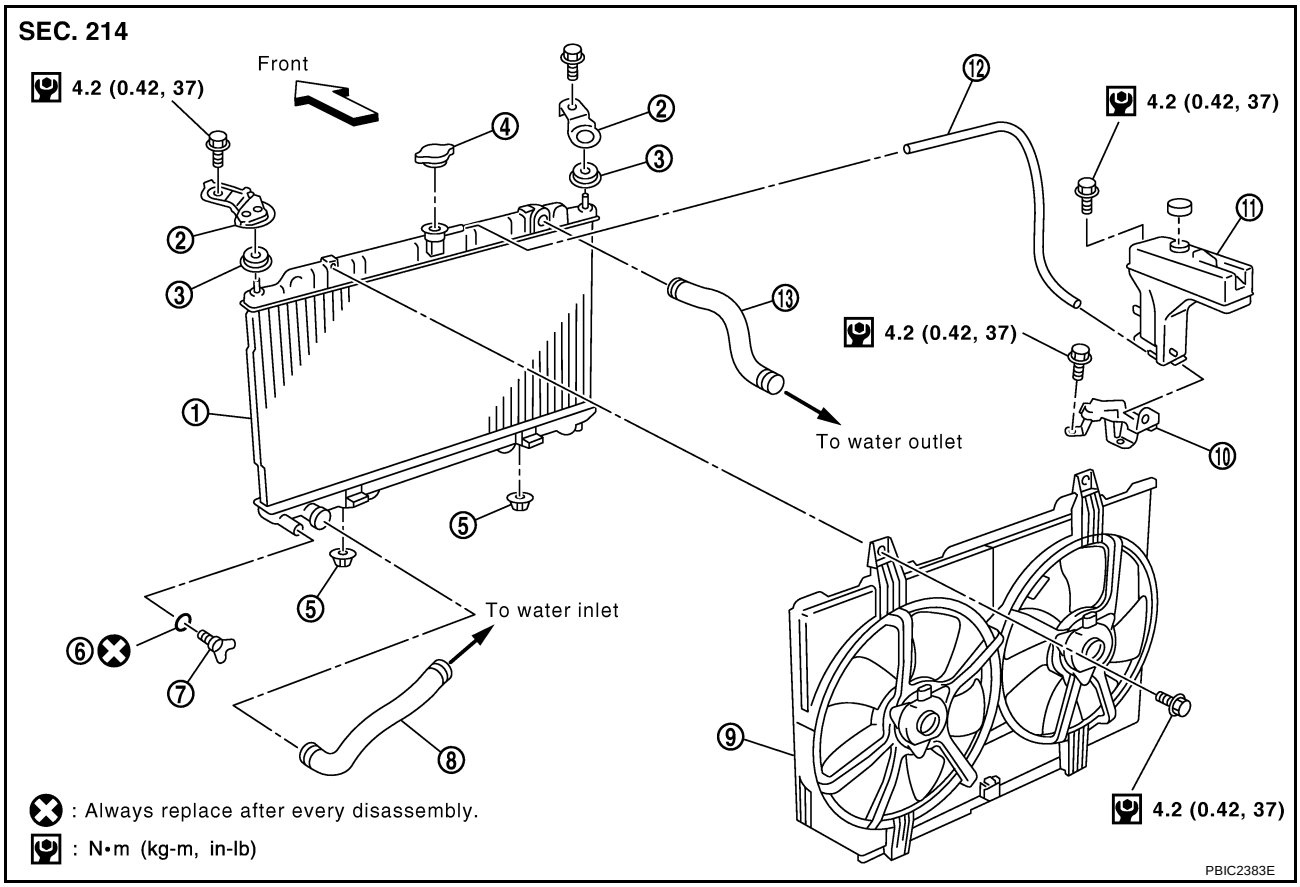
1. Fill radiator with water until water spills from the air relief hole, then close air relief plug. Fill radiator and reservoir tank with water and reinstall radiator cap.
2. Run engine and warm it up to normal operating temperature.
3. Rev engine two or three times under no-load.
4. Stop engine and wait until it cools down.
5. Drain water from the system. Refer to CO-31, "DRAINING ENGINE COOLANT" .
6. Repeat steps 1 through 5 until clear water begins to drain from radiator.

RADIATOR

PFP:21400

Removal and Installation

EBS00BB0



1. Radiator	2. Radiator mounting bracket	3. Mounting rubber (upper)
4. Radiator cap	5. Mounting rubber (lower)	6. O-ring
7. Drain plug	8. Radiator hose (lower)	9. Cooling fan assembly
10. Reservoir tank bracket	11. Reservoir tank	12. Reservoir tank hose
13. Radiator hose (upper)		

WARNING:

Do not remove radiator cap when engine is hot. Serious burns could occur from high-pressure engine coolant escaping from radiator.

REMOVAL

1. Drain engine coolant from radiator. Refer to CO-31, "DRAINING ENGINE COOLANT" .

   CAUTION:
   - **Perform this step when engine is cold.**
   - **Do not spill engine coolant on drive belts.**
2. Disconnect radiator hose (upper and lower), reservoir tank hose and radiator mounting bracket.
3. Remove radiator and cooling fan assembly.

   CAUTION:

   Do not damage or scratch radiator core when removing.

INSTALLATION

Install in the reverse order of removal.

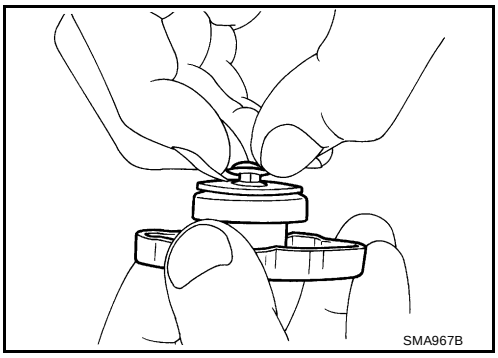
INSPECTION AFTER INSTALLATION

- Check for leaks of engine coolant using the radiator cap tester adapter (special service tool: EG17650301) and the radiator cap tester (commercial service tool). Refer to CO-31, "CHECKING RADIATOR SYSTEM FOR LEAKS" .
- Start and warm up engine. Visually check if there is no leaks of engine coolant.

Checking Radiator Cap

EBS011WM

1. Pull negative-pressure valve to open it and make sure that it closes completely when released.
   - Make sure that there is no dirt or damage on the valve seat of radiator cap negative-pressure valve.
   - Make sure that there are no unusualness in the opening and closing conditions of negative-pressure valve.



2. Check radiator cap relief pressure.

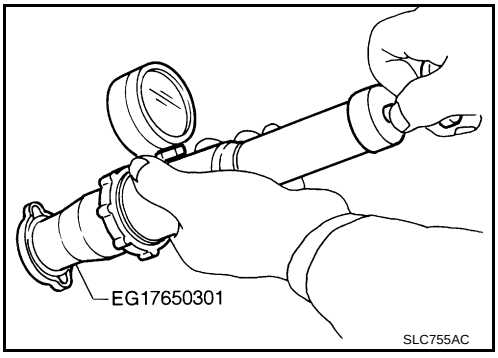
   Standard:

   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 radiator cap to the radiator cap tester (commercial service tool) and the radiator cap tester adapter (special service tool), apply engine coolant to the cap seal surface.
   - Replace radiator cap if there is an unusualness in negative-pressure valve, or if the relief pressure fall below the limit.



Checking Radiator

EBS011WN

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, radiator shroud and horns. Then tape the harness and connectors to prevent water from entering.

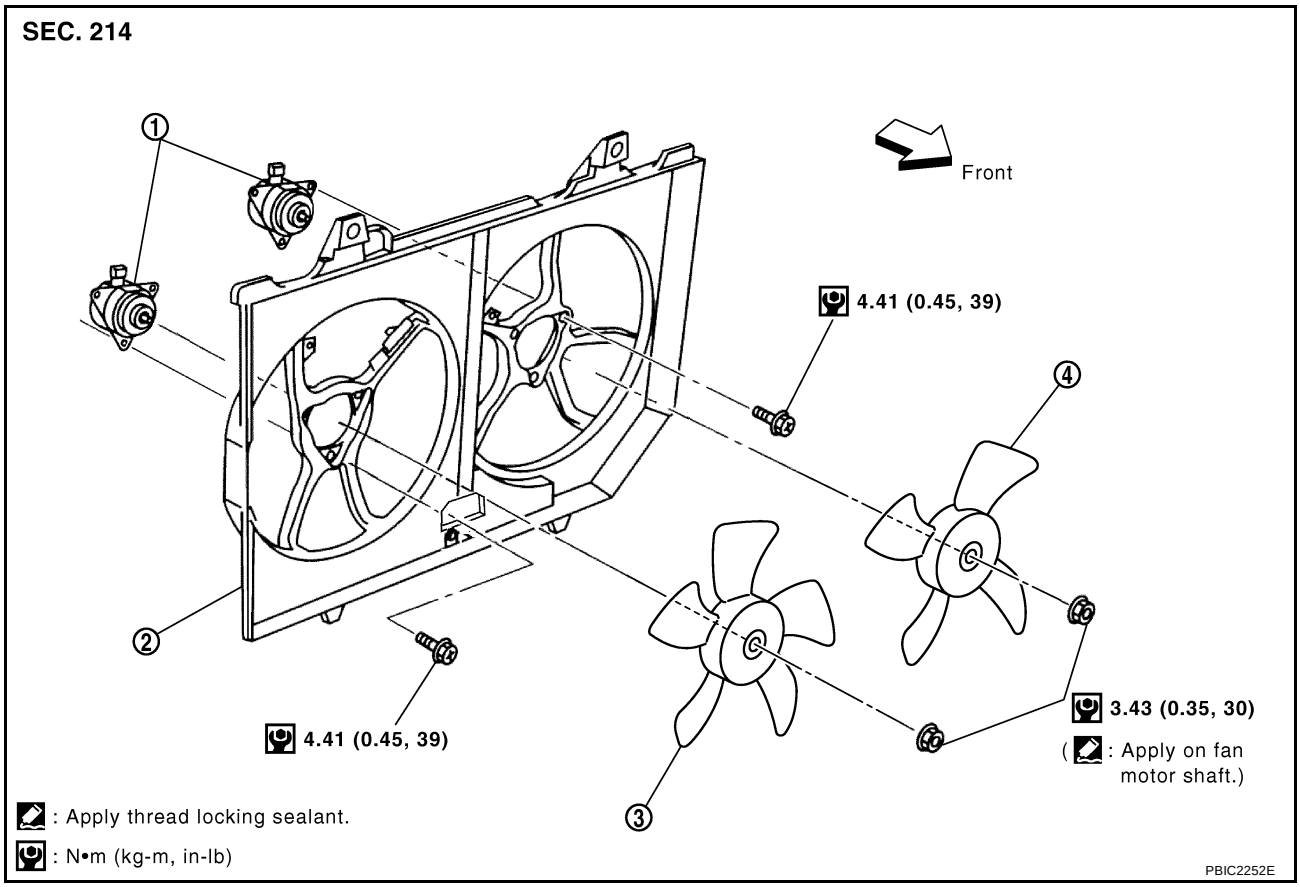
1. Apply water by hose to the back side of the radiator core vertically downwards.
2. Apply water again to all radiator core surface once per minute.
3. Stop washing if any stains no longer flow out from the radiator.
4. Blow air into the back side of radiator core vertically downwards.
   - Use compressed air lower than 490 kPa (4.9 bar, 5 kg/cm^2 , 71psi) 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.

COOLING FAN

PFP:21140

Removal and Installation

EBS011WO



1. Cooling fan motors
2. Cooling fan shroud
3. Cooling fan (RH)
4. Cooling fan (LH)

REMOVAL

1. Drain engine coolant from radiator. Refer to CO-31, "Changing Engine Coolant" .

   CAUTION:
   Perform when engine is cold.
2. Remove air duct (inlet) and air duct assembly. Refer to EM-133, "AIR CLEANER AND AIR DUCT" .
3. Disconnect radiator hose (upper) at radiator side. Refer to CO-12, "RADIATOR" .

   CAUTION:
   Do not spill engine coolant on drive belt.
4. Disconnect harness connectors from fan motors, and move them to aside.
5. Remove radiator cooling fan assembly. Refer to CO-34, "RADIATOR" .

   CAUTION:
   Be careful not to damage or scratch on radiator core.

INSTALLATION

Install in the reverse order of removal.

- Cooling fans are controlled by ECM. For details, refer to EC-1011, "DTC P0217 ENGINE OVER TEMPERATURE" (WITH EURO-OBD), EC-1320, "DTC P0217 ENGINE OVER TEMPERATURE" (WITHOUT EURO-OBD).

DISASSEMBLY AND ASSEMBLY

Disassembly

1. Remove cooling fans.
2. Remove cooling fan motors from cooling fan shroud.

Assembly

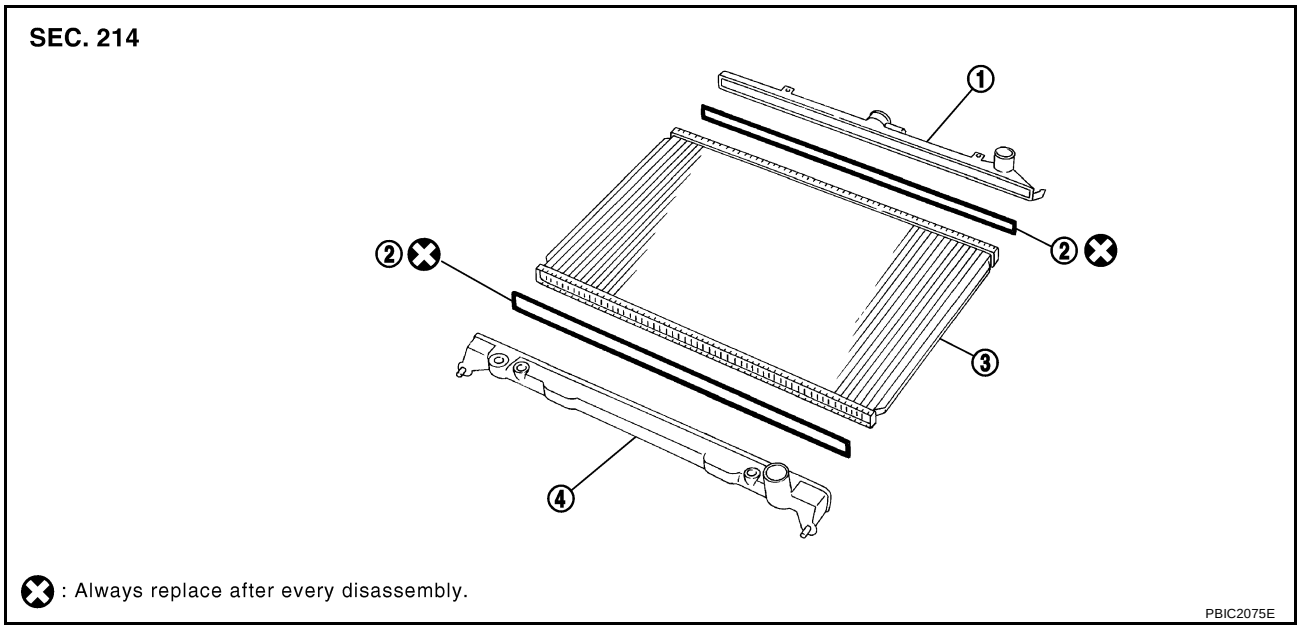
Assemble in the reverse order of disassembly.

RADIATOR (ALUMINUM TYPE)

PFP:21460

Disassembly and Assembly

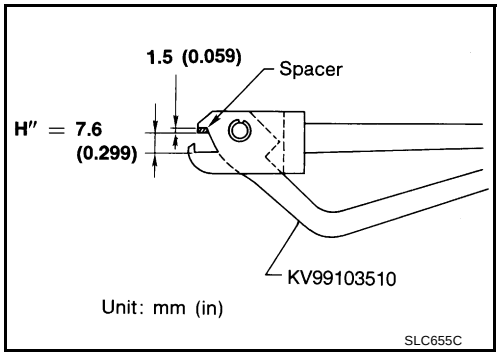
EBS00BB3



1. Upper tank
2. Sealing rubber
3. Core
4. Lower tank

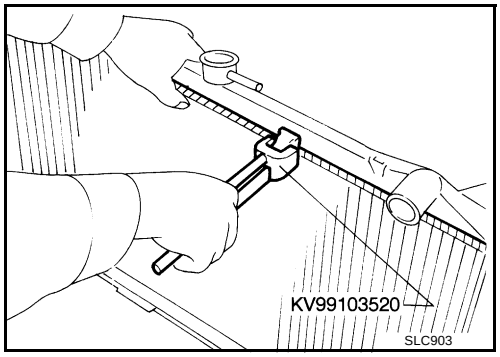
PREPARATION

1. Attach the spacer to the tip of the radiator plate pliers A (special service tool).
   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 (special service tool) are closed dimension H″ is approx. 7.6 mm (0.299 in).
3. Adjust dimension H″ with the spacer, if necessary.



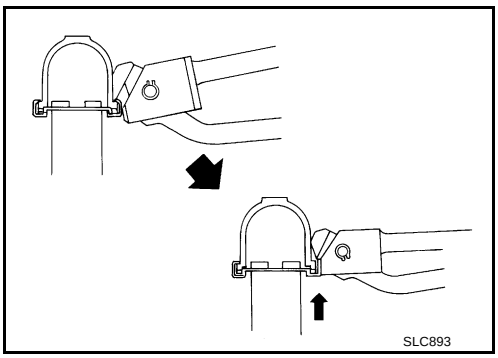
DISASSEMBLY

1. Remove upper or lower tanks with radiator plate pliers B (special service tool).



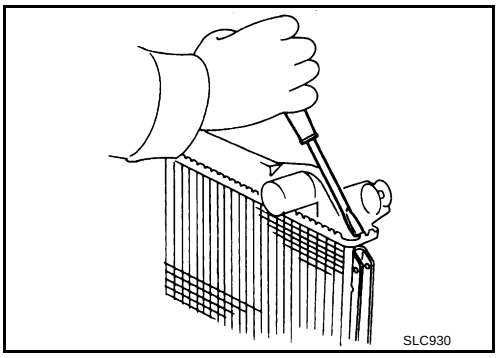
- Grip the crimped edge and bend it upwards so that radiator plate pliers B slips off.

  CAUTION:
  Do not bend excessively.

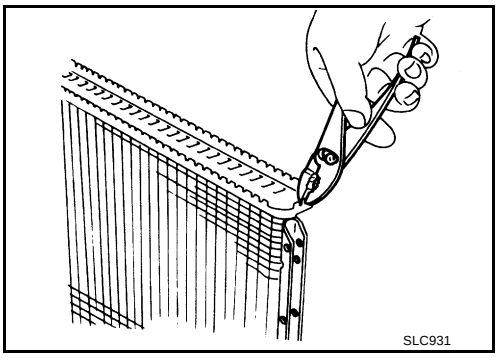


- In areas where radiator plate pliers B cannot be used, use a screwdriver to bend the edge up.

  CAUTION:
  Be careful not to damage tank.

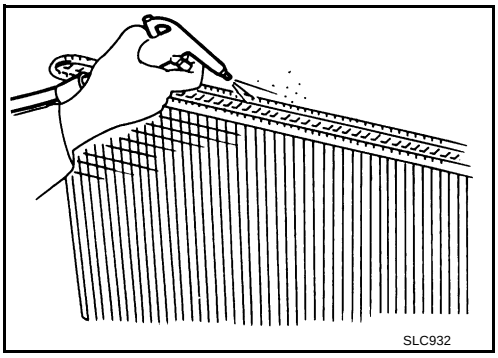


2. Remove sealing rubber.
3. Make sure the edge stands straight up.



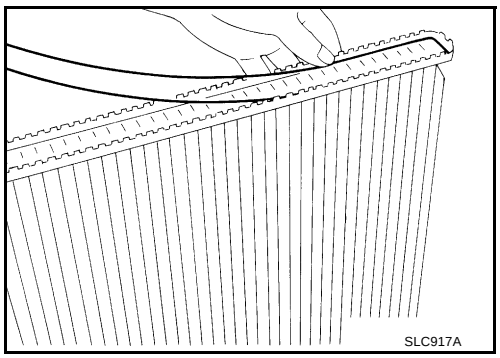
ASSEMBLY

1. Clean contact portion of tank.

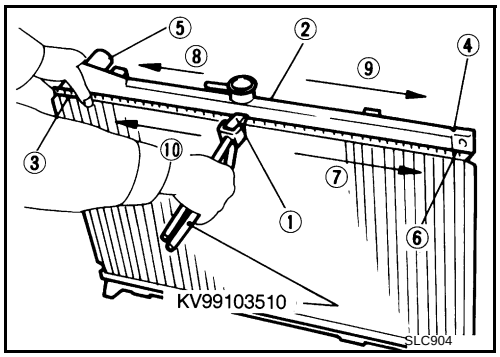


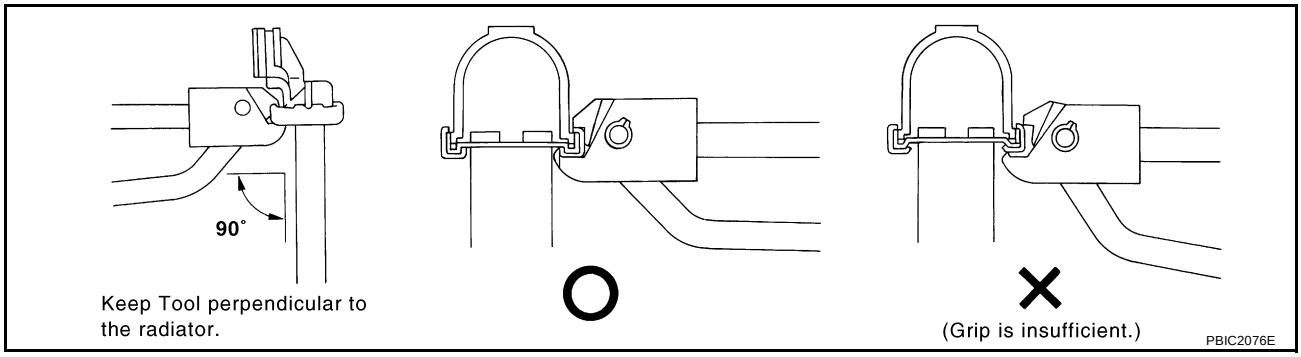
2. Install sealing rubber while pushing it with fingers.

CAUTION:
Be careful not to twist sealing rubber.

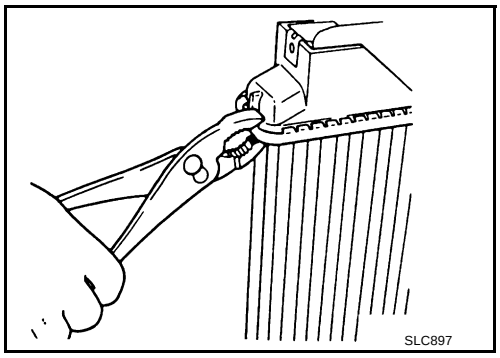


3. Caulk tank in numerical order as shown in the figure with radiator plate pliers A (special service tool).





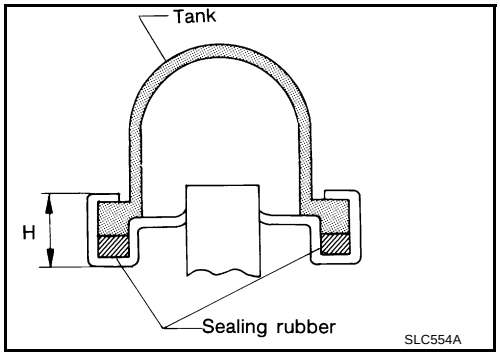
- Use pliers in the locations where radiator plate pliers A cannot be used.



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

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

5. Make sure that there is no leakage.
Refer to CO-41, "INSPECTION" .



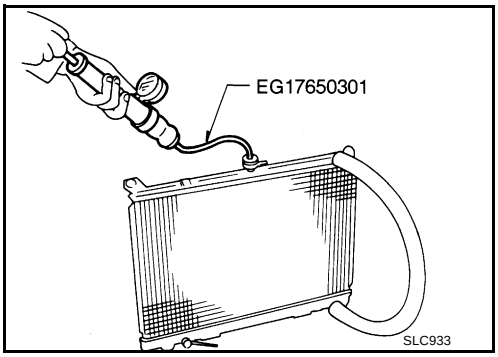
INSPECTION

1. Apply pressure with the radiator cap tester adapter (special service tool) and the radiator cap tester (commercial service tool).

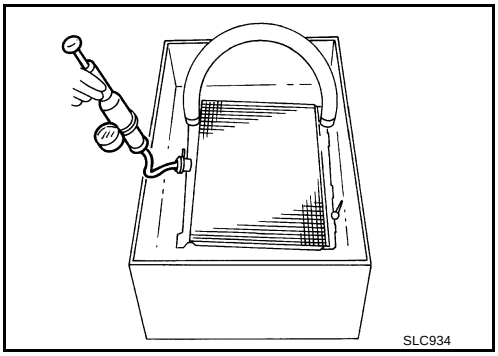
   Testing pressure

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

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



2. Check for leakage by soaking radiator in water container with the testing pressure applied.

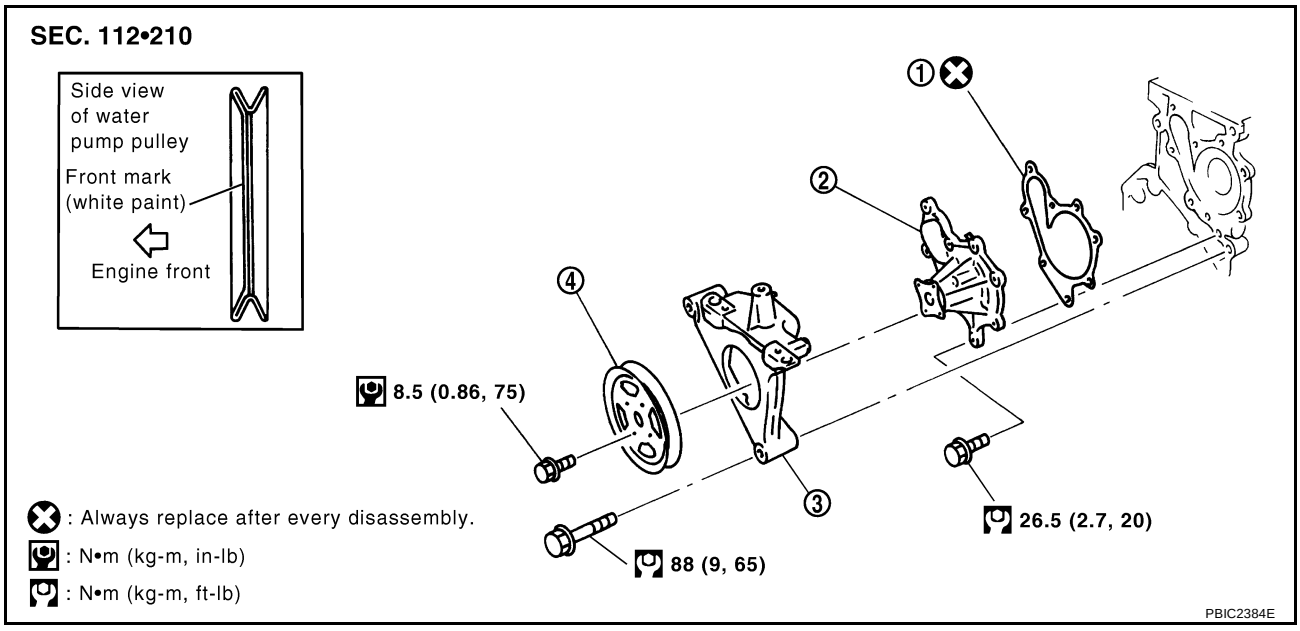


WATER PUMP

PFP:21020

Removal and Installation

EBS00BB4



1. Gasket
2. Water pump
3. RH engine mounting bracket
4. Water pump pulley

WARNING:

Do not remove radiator cap when the engine is hot. Serious burns could occur from high pressure engine coolant escaping from the radiator.

REMOVAL

1. Remove RH engine undercover.
2. Remove drive belt. Refer to EM-131, "DRIVE BELTS" .
3. Drain engine coolant. Refer to CO-31, "DRAINING ENGINE COOLANT" .

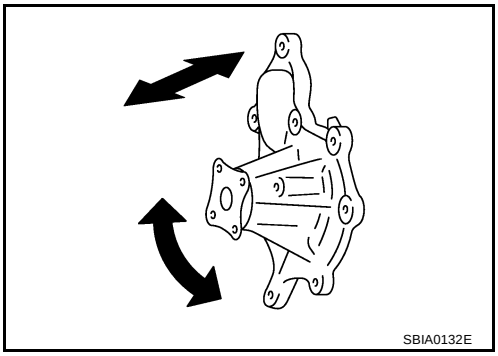
   CAUTION:

   Perform when engine is cold.
4. Support the bottom of oil pan with a floor jack etc, and remove RH engine mounting insulator (front side of engine). Refer to EM-208, "ENGINE ASSEMBLY" .
5. Remove water pump pulley.
   - Loosen the pulley bolts after fixing the pulley using a screwdriver etc.
6. Remove RH engine mounting bracket.
7. Remove water pump.
   - Engine coolant will leak from cylinder block, so have a receptacle ready below.

     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.**

INSPECTION AFTER REMOVAL

- Visually check if there is no significant dirt or rusting on the water pump body and vane.
- Make sure that there is no looseness in the vane shaft, and that it turns smoothly when rotated by hand.
- If there are any unusualness, replace water pump assembly as necessary.


SBIA0132E

INSTALLATION

- Install in the reverse order of removal.
- Install water pump pulley with the front mark (painted white, used to prevent errors during assembly) facing the front of engine. Refer to CO-42, "WATER PUMP" .

INSPECTION AFTER INSTALLATION

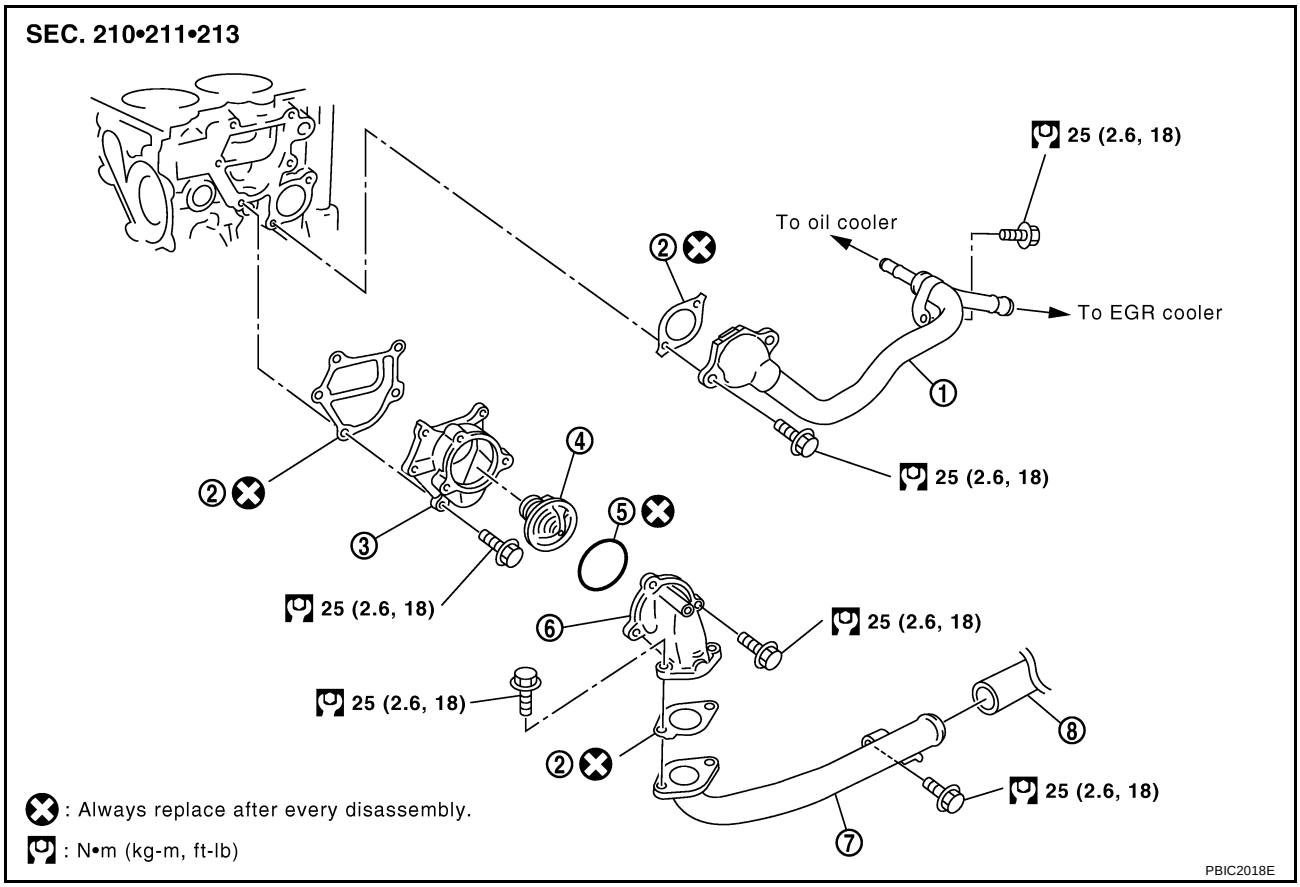
- Check for leaks of engine coolant using the radiator cap tester adapter (special service tool: EG17650301) and the radiator cap tester (commercial service tool). Refer to CO-31, "CHECKING RADIATOR SYSTEM FOR LEAKS" .
- Start and warm up engine. Visually check if there is no leaks of engine coolant.

THERMOSTAT AND WATER PIPING

PFP:21200

Removal and Installation

EBS00BK9



1. Heater return pipe
2. Gasket
3. Thermostat housing
4. Thermostat
5. Rubber ring
6. Water inlet
7. Water inlet pipe
8. Radiator hose (lower)

WARNING:

Do not remove radiator cap when engine is hot. Serious burns could occur from high pressure engine coolant escaping from radiator.

REMOVAL

1. Remove engine undercover.
2. Drain engine coolant. Refer to CO-31, "DRAINING ENGINE COOLANT" .

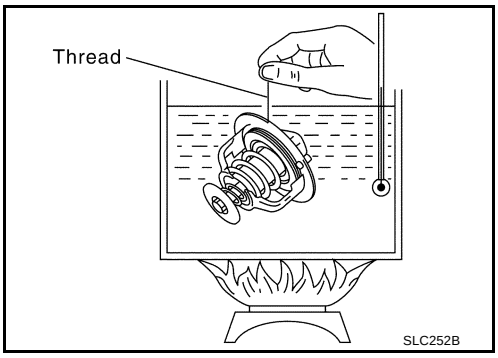
   CAUTION:

   Perform when engine is cold.
3. Remove radiator hose (lower) from water inlet side. Refer to CO-34, "RADIATOR" .
4. Remove water inlet and thermostat.
5. Remove thermostat housing.

INSPECTION AFTER REMOVAL

Thermostat

- Place a string so that it is caught in the valves of the thermostat. Immerse fully in a container filled with water. Heat while stirring.
- 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.



Standard values

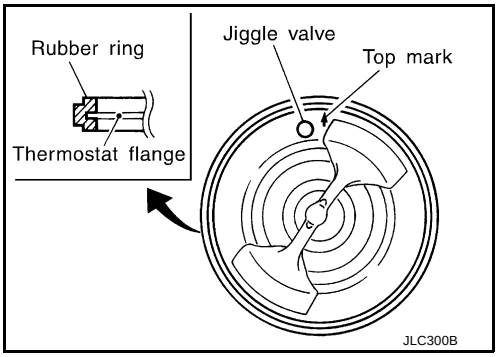
Item	Thermostat
Valve opening temperature	80 - 84°C (176 - 183° F)
Full-open lift amount	More than 10 mm/ 95°C (0.39 in/ 203 °F)
Valve closing temperature	More than 77°C (171°F)

- If out of the standard, replace thermostat.

INSTALLATION

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

- Install the thermostat with the whole circumference of each flange part fit securely inside the rubber ring.
- Install the thermostat with the jiggle valve facing upwards.



INSPECTION AFTER INSTALLATION

- Check for leaks of engine coolant using the radiator cap tester adapter (special service tool: EG17650301) and the radiator cap tester (commercial service tool). Refer to CO-31, "CHECKING RADIATOR SYSTEM FOR LEAKS" .
- Start and warm up engine. Visually check if there is no leaks of engine coolant.

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Standard and Limit

EBS00CU0

CAPACITY

Unit: ℓ (Imp qt)

Engine coolant capacity (With reservoir tank at MAX level)	Approx 9.5 (8-3/8)
Reservoir tank	0.6 (1/2)

THERMOSTAT

Valve opening temperature	80 - 84°C (176 - 183°F)
Full open lift amount	More than 10 mm/ 95°C (0.39 in/203°F)
Valve closing temperature	More than 77°C (171°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

EBS00BKE

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

Air relief plug	6.9 - 7.8 (0.7 - 0.8, 61 - 69)*
Radiator mounting bracket Cooling fan assembly Cooling fan (left and right) Cooling fan motors	4.2 (0.42, 37)* 4.2 (0.42, 37)* 3.43 (0.35, 30)* 4.41 (0.45, 39)*
Water pump Water pump pulley Water inlet Thermostat housing Water inlet pipe Heater return pipe	26.5 (2.7, 20) 8.5 (0.86, 75)* 25 (2.6, 18) 25 (2.6, 18) 25 (2.6, 18) 25 (2.6, 18)