SECTION CO

ENGINE COOLING SYSTEM

CONTENTS

QR25DE

VQ35DE

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EBS007RB

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Precautions for Liquid Gasket

EBS00G4L

REMOVAL OF LIQUID GASKET

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

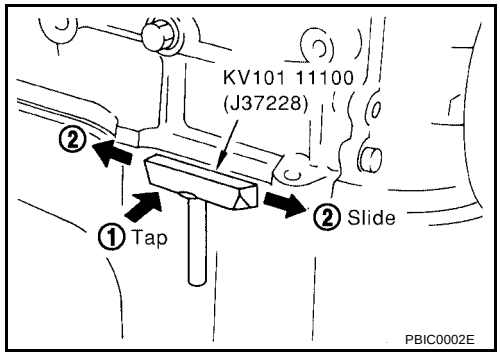
CAUTION:

Be careful not to damage the mating surfaces.

- In areas where the cutter is difficult to use, use a plastic hammer to lightly tap the areas where the sealant is applied.

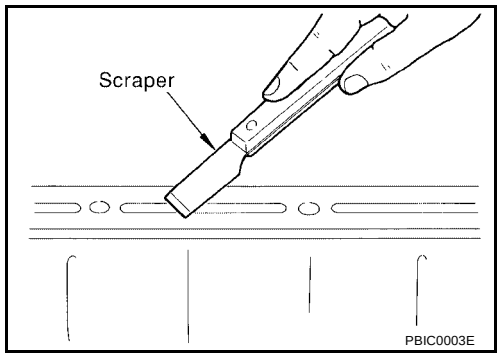
CAUTION:

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

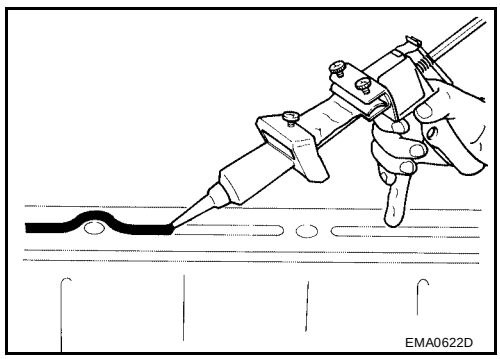


LIQUID GASKET APPLICATION PROCEDURE

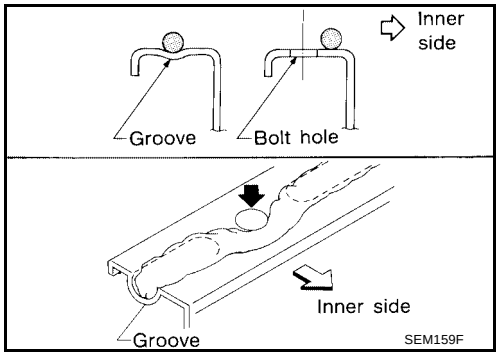
1. Using a scraper, remove the old sealant adhering to the mating surface.
- Remove the sealant completely from the groove, mounting bolts, and bolt holes.
2. Clean the mating surface thoroughly to remove adhering moisture, grease and foreign materials.
3. Install the sealant tube into the tube presser.
   Use Genuine RTV Silicone Sealant or equivalent. Refer to **GI-42, "Recommended Chemical Products and Sealants"** **.**



4. Apply the sealant without breaks to the specified area with the specified dimensions.
- If there is a groove for the sealant application, apply the sealant to the groove.



- As for the bolt holes, normally apply the sealant inside the holes. If specified, it should be applied outside the holes. Make sure to read the instructions in this manual.
- Within five minutes of sealant application, install the mating component.
- If the sealant protrudes, wipe it off immediately.
- Do not retighten after the installation.
- After 30 minutes or more have passed from the installation, fill the engine with the correct oil and coolant. Refer to GI-42, "Recommended Chemical Products and Sealants" .



CAUTION:

If there are specific instructions in the service manual, observe them.

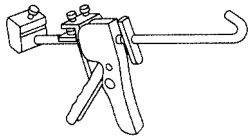
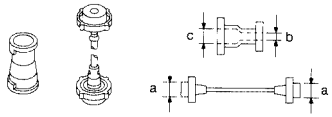
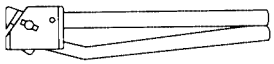
PREPARATION

PFP:00002

Special Service Tools

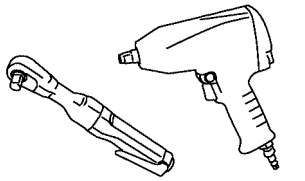
EBS007RD

The actual shape of the Kent-Moore tools may differ from those tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
WS39930000 (-—) Tube presser  S-NT052	Pressing the tube of liquid gasket
EG17650301 (J33984-A) 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

Commercial Service Tools

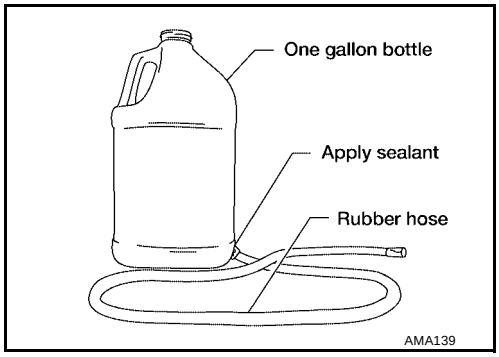
EBS007RE

Tool name	Description
Power tool  PBIC0190E	Loosening bolts and nuts

PREPARATION FOR CHANGING ENGINE COOLANT

Prepare an empty one gallon bottle, such as used for windshield washer fluid. Obtain a 1,371mm (54 in) length of hose with the same inner diameter as the coolant reservoir hose. Modify the one gallon bottle by making a hole at the bottom slightly smaller than the hose outer diameter to seal against leaks when the bottle is full of fluid.

- Insert the hose in the bottom of the bottle.
- Seal the hose to the bottle so it will not leak.



OVERHEATING CAUSE ANALYSIS

PFP:00012

Troubleshooting Chart

EBS00F18

	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 rock clogging	
			Mechanical damage	
		Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)	
	Reduced air flow	Cooling fan does not operate	—	—
		High resistance to fan rotation		
		Damaged fan blades		
	Damaged radiator shroud	—	—	—
	Improper coolant mixture ratio	—	—	—
	Poor coolant quality	—	Periodic maintenance	—
	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

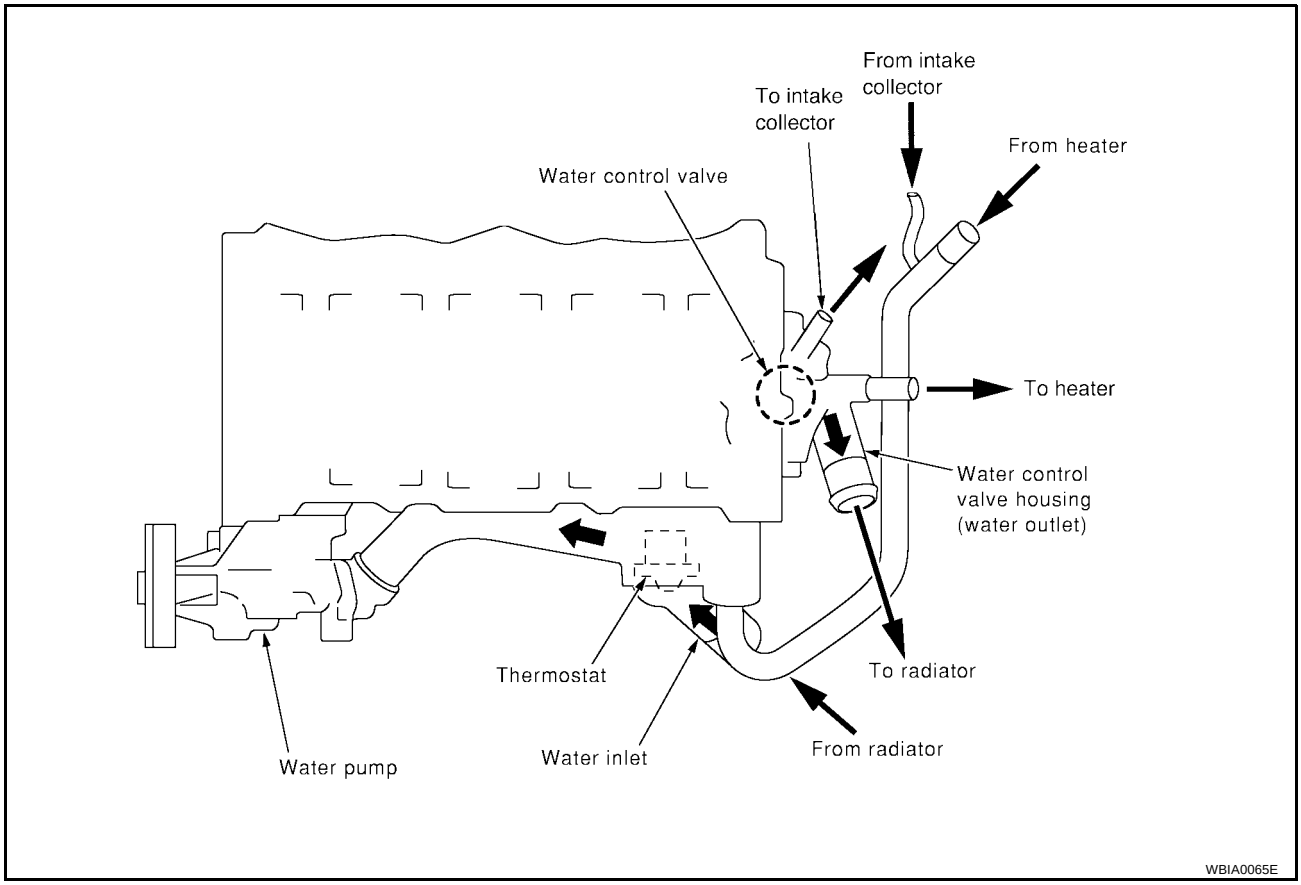
	Symptom		Check items	
Except cooling system parts malfunction	—	Overload on engine	Abusive driving	High engine rpm under no load
				Driving in low gear for extended time
				Driving at extremely high speed
			Powertrain system malfunction	—
			Installed improper size wheels and tires	
			Dragging brakes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

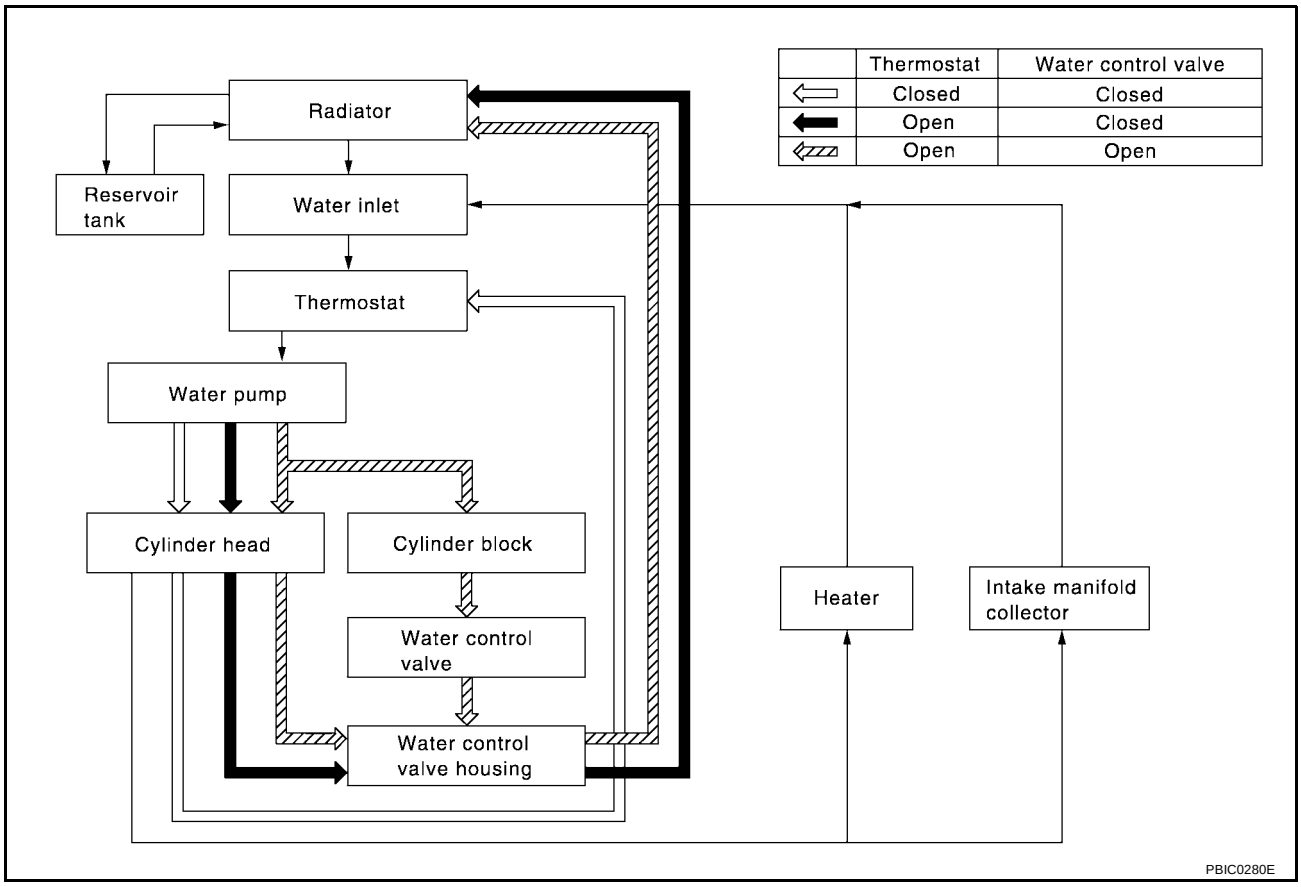
COOLING SYSTEM

PFP:21020

Cooling Circuit

EBS007RG





ENGINE COOLANT

PFP:KQ100

System Check

EBS00F1E

WARNING:
Never remove the radiator cap when the engine is hot. Serious burns could occur from high pressure fluid escaping from the radiator.
Wrap a thick cloth around the cap. Slowly push down and turn it a quarter turn to allow built-up pressure to escape. Carefully remove the cap by pushing down and turning it all the way.

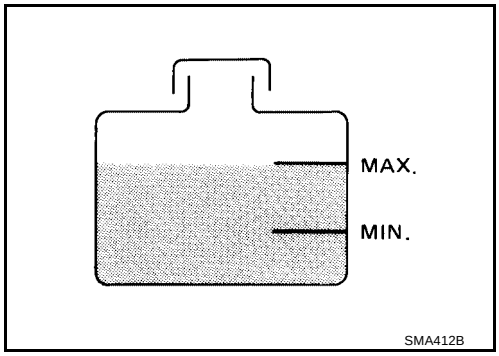
CHECKING COOLING SYSTEM HOSES

Check hoses for the following:

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

CHECKING RESERVOIR LEVEL

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



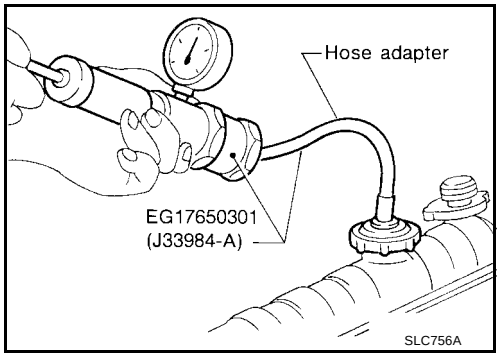
CHECKING COOLING SYSTEM FOR LEAKS

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

Testing pressure : 157 kPa (1.6 kg/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.



CHECKING RADIATOR

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.

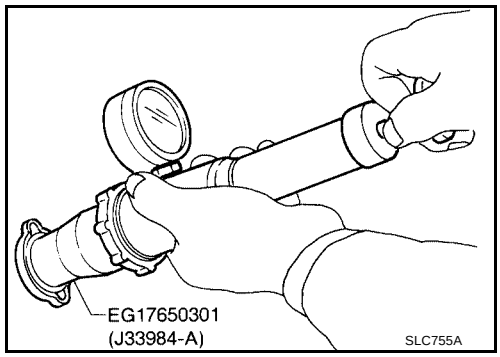
1. Apply water by hose to the back side of the radiator core vertically downward.
2. Apply water again to all radiator core surfaces once per minute.
3. Stop washing when clear water flows off of the radiator.
4. Blow air into the back side of radiator core vertically downward.
   - Use compressed air lower than 490 kPa (5 kg/cm^2 , 71 psi) and keep distance more than 300 mm (11.8 in).

5. Blow air again into all the radiator core surfaces once per minute until no water sprays out.
6. Check for leakage.

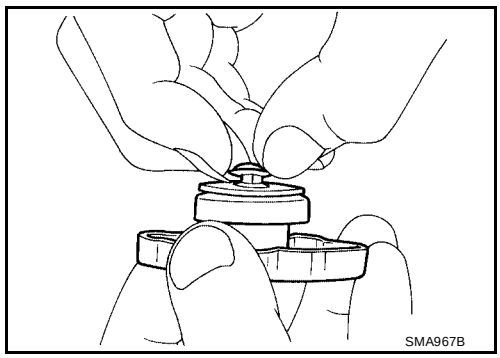
CHECKING RADIATOR CAP

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

Radiator cap relief pressure	
Standard	**: 78 - 98 kPa (0.8 - 1.0 kg/cm^2 , 11 - 14 psi)**
Limit	**: 59 kPa (0.6 kg/cm^2 , 14 psi)**



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



Refilling Engine Coolant

EBS00F1C

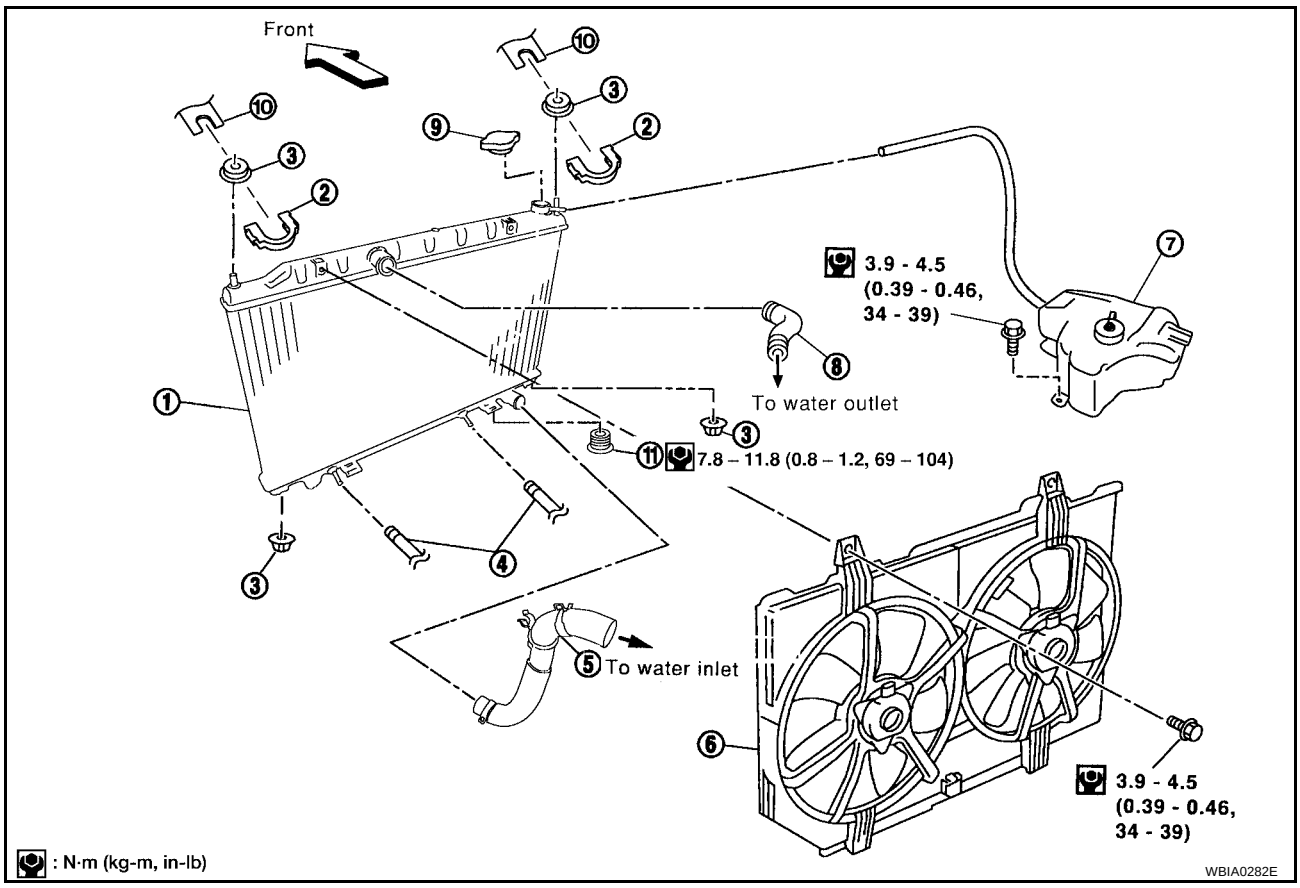
Changing the engine coolant is part of the required maintenance of the engine. Refer to MA-14, "Changing Engine Coolant" .

RADIATOR

PFP:21400

Removal and Installation

EBS00T4I



1. Radiator
2. Radiator upper clip
3. Mounting rubber
4. A/T fluid cooler hose (if equipped)
5. Radiator hose (lower)
6. Radiator fan assembly
7. Reservoir tank
8. Radiator hose (upper)
9. Radiator cap
10. Radiator core connection
11. Radiator drain plug

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 of a turn to release built-up pressure. Carefully remove radiator cap by turning it all the way.

REMOVAL

1. Drain the coolant from the radiator. Refer to MA-14, “Changing Engine Coolant”.

   CAUTION:

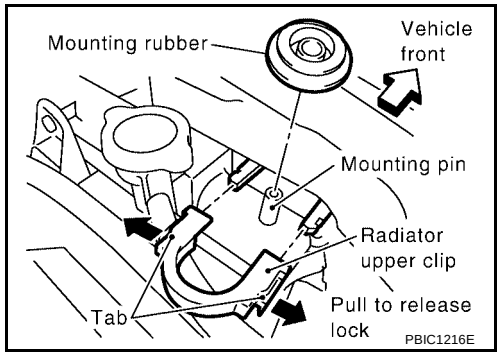
   Perform when engine is cold.
2. Remove fresh air duct. Refer to EM-16, “Removal and Installation”.
3. Disconnect radiator upper and lower hoses.
4. Remove the A/T fluid cooler hoses, if equipped.
   - Plug hoses to avoid leakage of A/T fluid.
5. Disconnect the reservoir tank hose.

6. Remove the radiator upper clips by pulling the tabs outside to release the lock, as shown.

CAUTION:
To prevent damage, do not pull lock tabs excessively.

7. Remove radiator cooling fan assembly to radiator bolts.
8. Remove the radiator assembly.

CAUTION:
Do not damage or scratch air conditioner condenser and radiator core when removing.



INSTALLATION

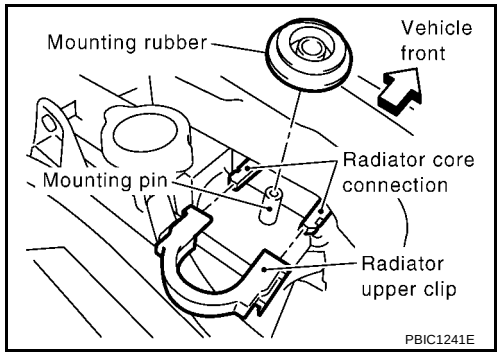
Installation is in the reverse order of removal, paying attention to the following.

- Fill the radiator with coolant. Refer to MA-14, “Changing Engine Coolant” .

Installation of Radiator Upper Clip

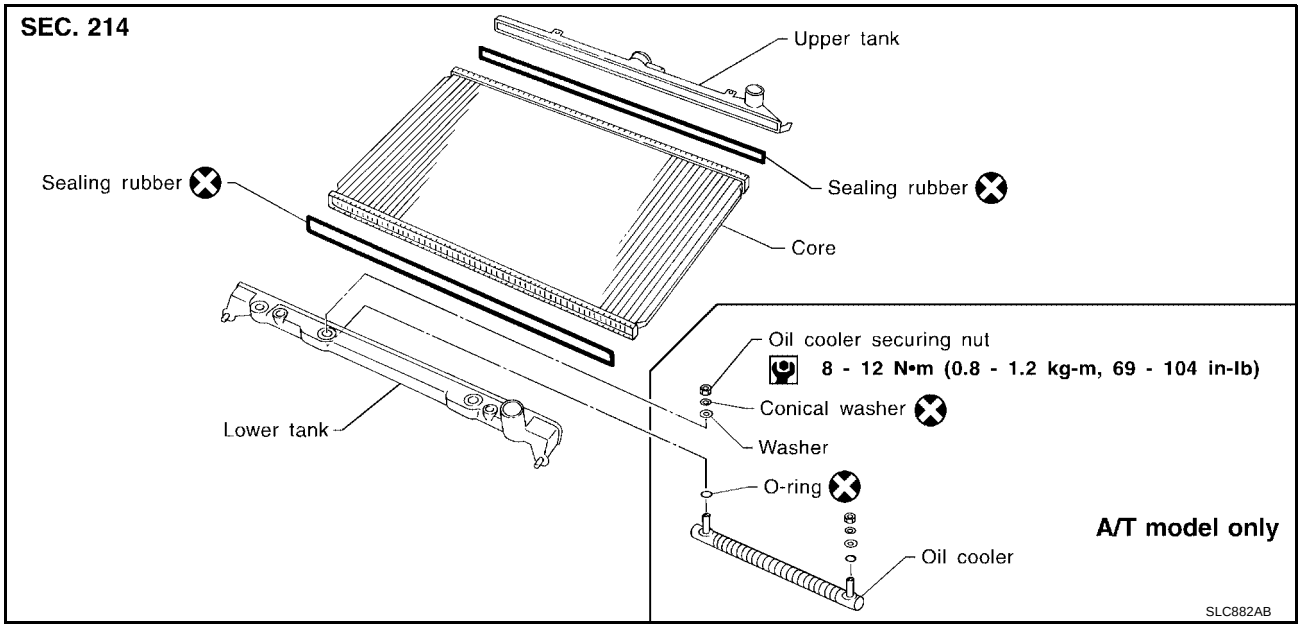
- Install radiator upper clip on radiator core connection with the following procedure:

1. Install the rubber on mounting pin of radiator core.
2. Align the radiator upper clip with the radiator core connection, then insert the radiator upper clip straight into the radiator core connections until a click is heard.
3. After connecting the radiator upper clip, use the following method to make sure it is fully connected.
   - Visually confirm that the two radiator upper clips are connected to the radiator core connections.
   - Move the radiator upper clip and the radiator forward and backward to make sure they are securely connected.



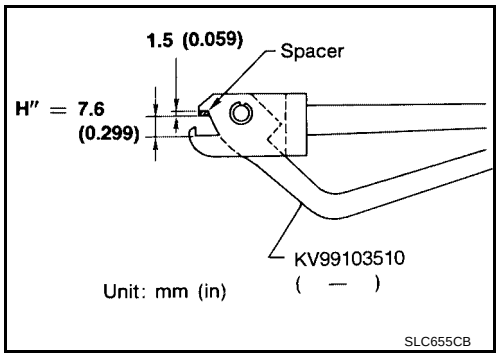
Disassembly and Assembly

EBS00T4J



PREPARATION

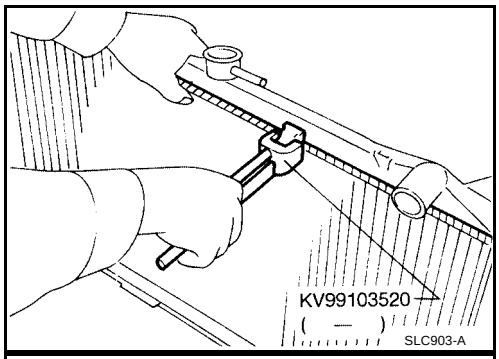
1. Attach the spacer to the tip of the Tool.
   Spacer specification: 1.5 mm (0.059 in) thick x 18 mm (0.71 in) wide x 8.5 mm (0.335 in) long.
2. Make sure that when Tool is closed dimension H″ is approx. 7.6 mm (0.299 in).
3. Adjust dimension H″ with the spacer, if necessary.



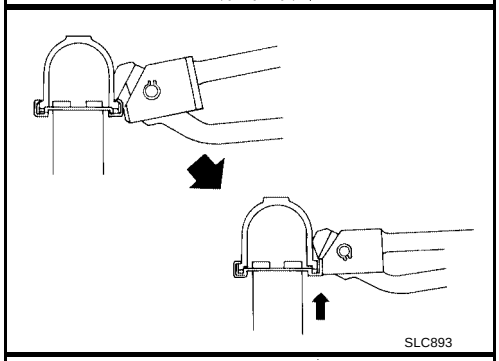
DISASSEMBLY

1. Remove the tank using Tool.

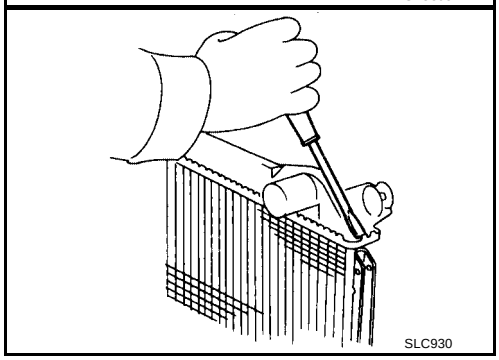
   Tool number : KV99103520 (—)



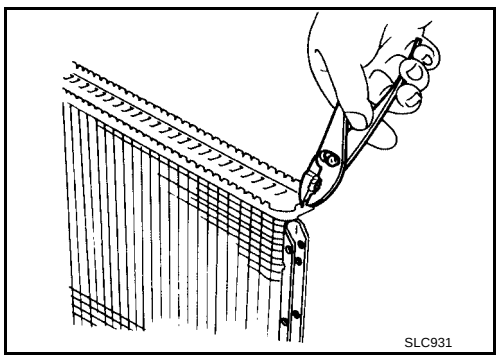
- Grip the crimped edge and bend it upwards so that Tool slips off.
  CAUTION:
  Do not bend excessively.



- In areas where the Tool cannot be used, use a suitable tool to bend the edge up.
  CAUTION:
  Be careful not to damage tank.
2. Remove sealing rubber.



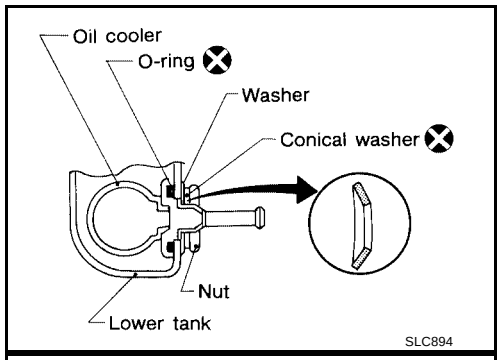
3. Make sure the edge stands straight up, using a suitable tool.
4. Remove oil cooler from tank (if equipped).



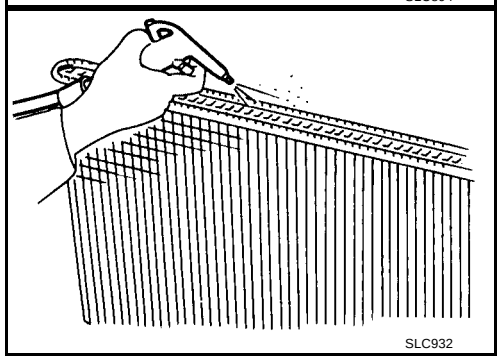
ASSEMBLY

1. Install the oil cooler (if equipped).

   NOTE:
   Pay attention to direction of conical washer.

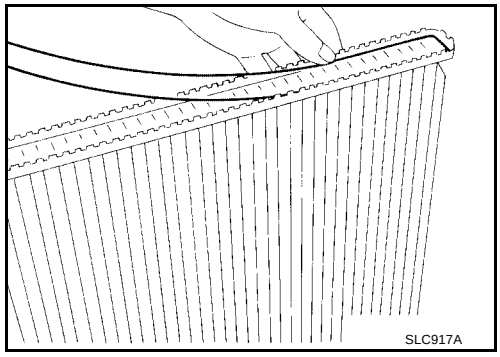


2. Clean the contact portion of the tank.



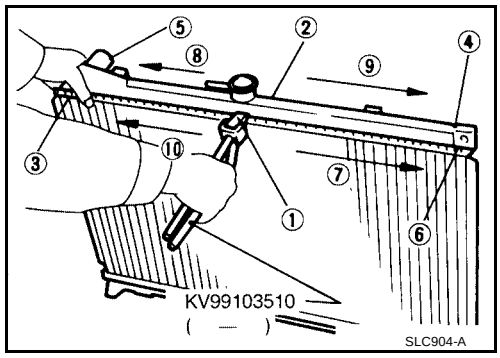
3. Install sealing rubber by pushing it in with your fingers.

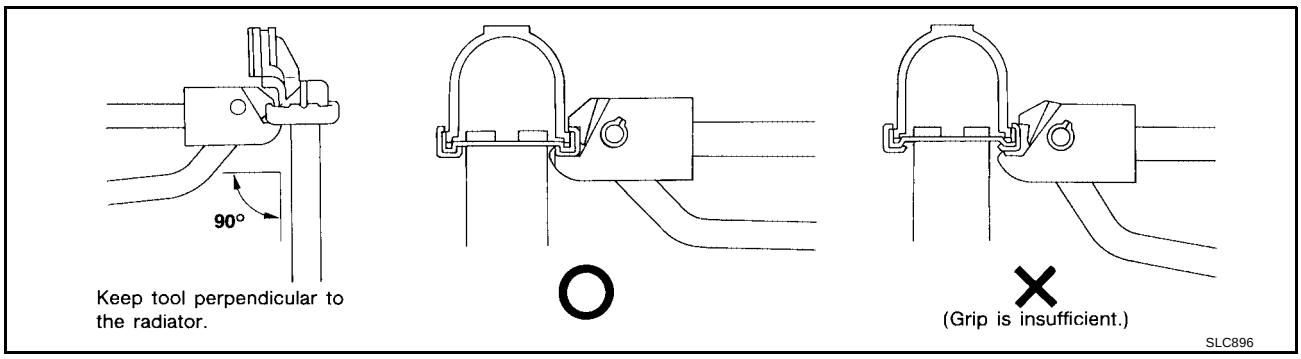
   CAUTION:
   Be careful not to twist sealing rubber gasket.



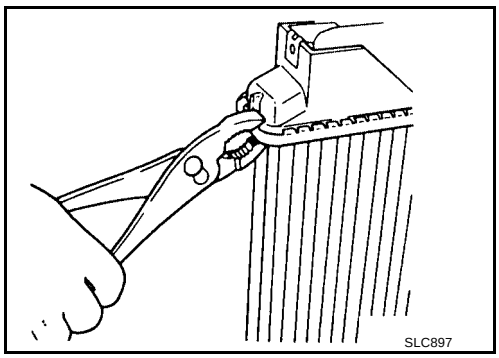
4. Crimp tank in specified sequence using Tool.

   Tool number : KV99103510 (—)





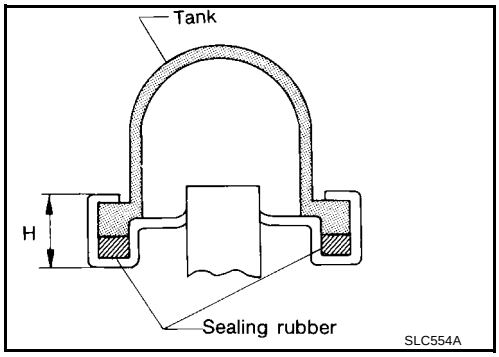
- In the locations where Tool cannot be used use a suitable tool.



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-16, "INSPECTION".



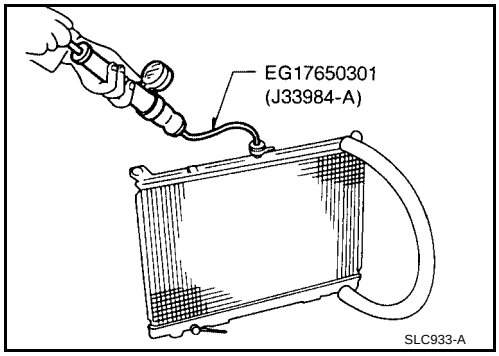
INSPECTION

1. Apply pressure using Tool.

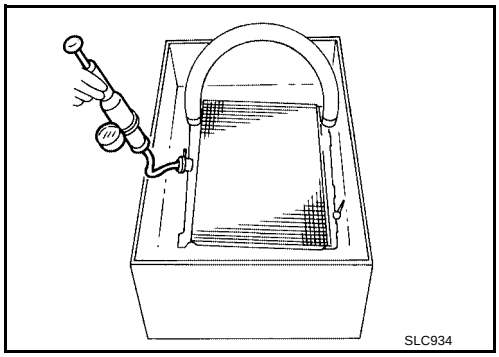
   Tool number : EG17650301 (J-33984-A)

   Specified pressure value : 157 kPa (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.
   CAUTION:
   Attach a hose to the oil cooler as well (if equipped).



2. Place radiator in water filled tank and check for leakage.



COOLING FAN

PFP:21140

Removal and Installation

EBS00T4K

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

REMOVAL

1. Drain engine coolant from radiator. Refer to MA-14, “Changing Engine Coolant“.
   CAUTION:
   Perform when engine is cold.
2. Remove air cleaner duct assembly. Refer to EM-16, “Removal and Installation“.
3. Disconnect radiator upper hose.
4. Disconnect fan motor connectors.
5. Remove radiator cooling fan assembly.

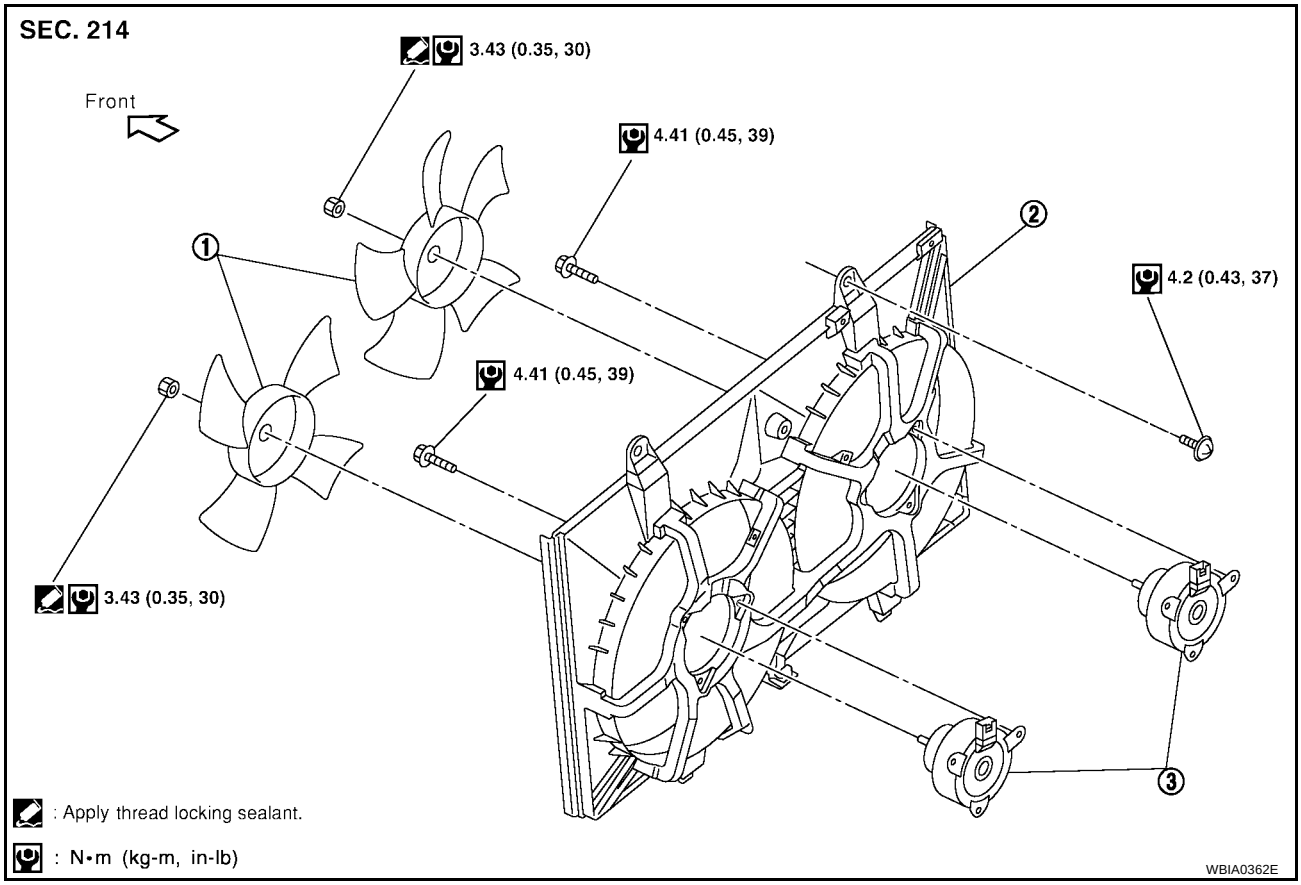
INSTALLATION

Install in the reverse order of removal.

- Cooling fan is controlled by ECM. For details, refer to EC-443, “DTC P1217 ENGINE OVER TEMPERATURE”.

Disassembly and Assembly of Radiator Fan

EBS00T4L



1. Fan blade
2. Fan shroud
3. Fan motor

DISASSEMBLY

1. Remove fan blade.
2. Remove fan motor from fan shroud.

ASSEMBLY

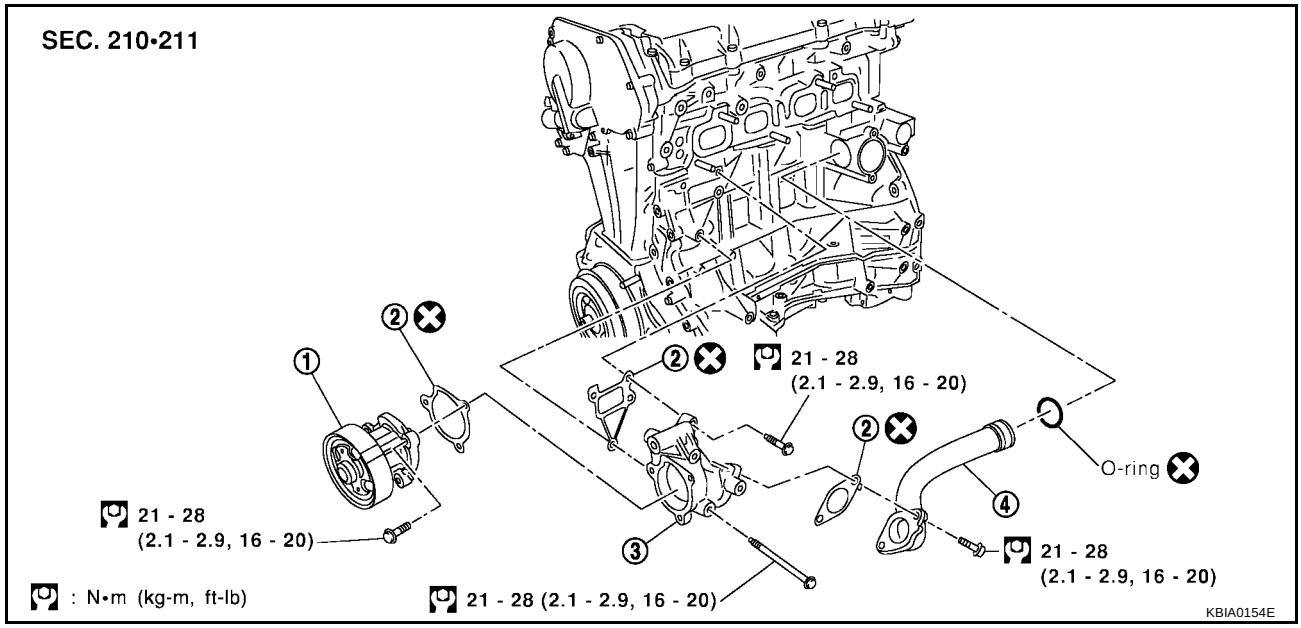
Assembly is in the reverse order of disassembly.

WATER PUMP

PFP:21020

Removal and Installation

EBS007RN



1. Water pump
2. Gasket
3. Water pump housing
4. Water pipe

WARNING:

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

REMOVAL

1. Drain coolant. Refer to MA-14, "Changing Engine Coolant" .

   CAUTION:

   Perform when the engine is cold.

2. Remove the following parts:
   - Under cover, using power tools.
   - Alternator, water pump and air compressor drive belt.
3. Remove the water pump.

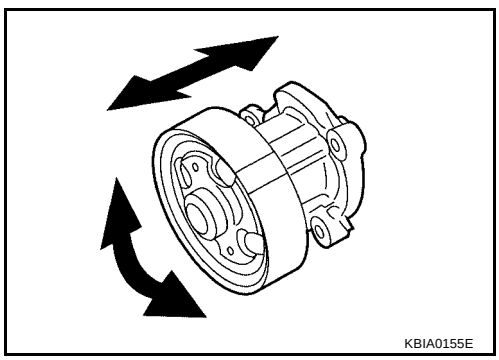
   NOTE:

   If necessary, the alternator and exhaust manifold catalytic convertor assembly must be removed to remove the water pipe.

   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 an assembly.**

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 the water pump does not perform properly, replace the water pump assembly.



INSTALLATION

- Installation is in the reverse order of removal.

INSPECTION AFTER INSTALLATION

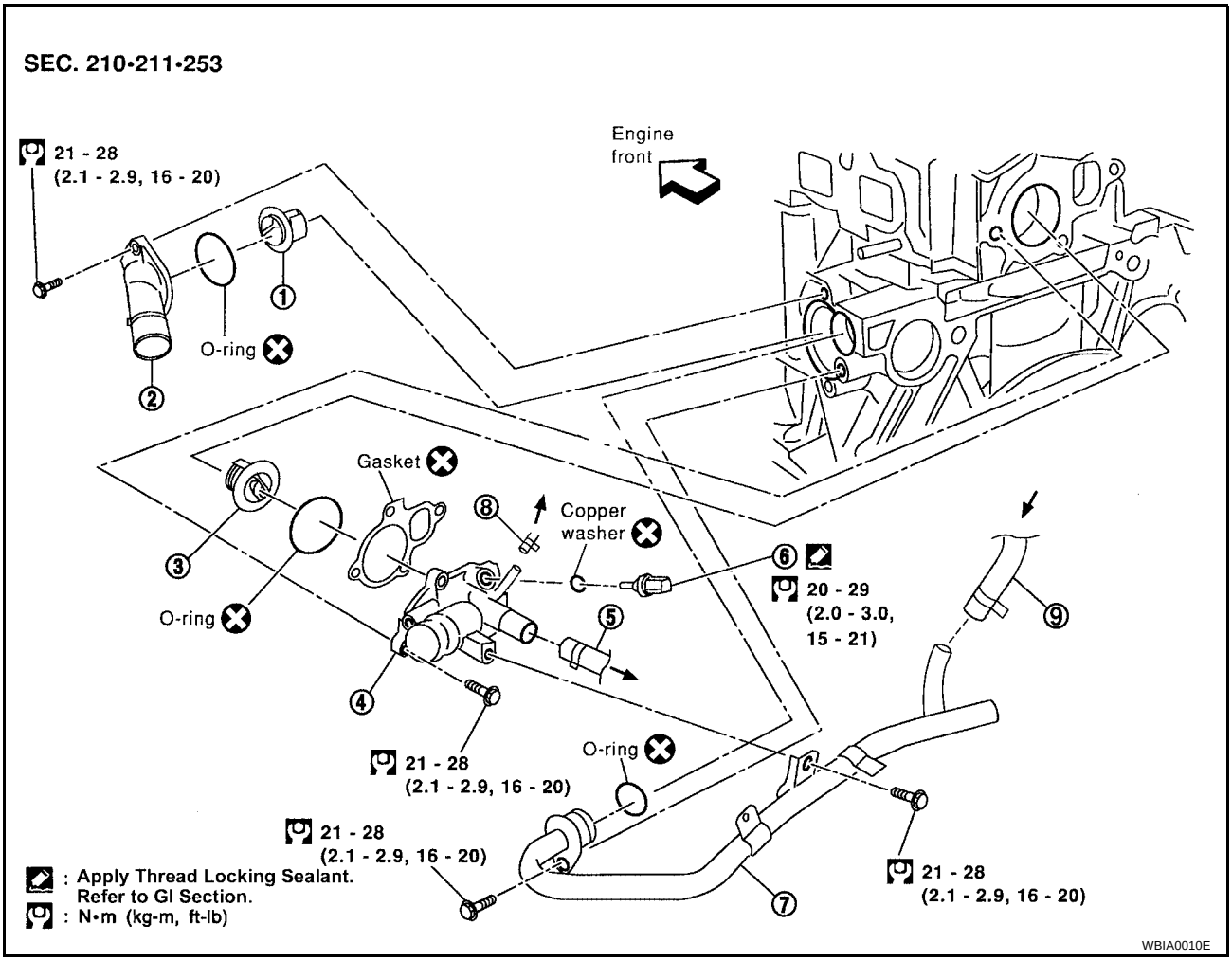
- After installing the water pump, check for leaks using the radiator cap tester.

THERMOSTAT AND THERMOSTAT HOUSING

PFP:21200

Removal and Installation

EBS007RO



1. Thermostat
2. Engine coolant inlet
3. Engine coolant control valve
4. Engine coolant outlet
5. Heater hose
6. Engine coolant temperature sensor
7. Heater pipe
8. Throttle body inlet hose
9. Throttle body outlet hose

WARNING:

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

REMOVAL

CAUTION:

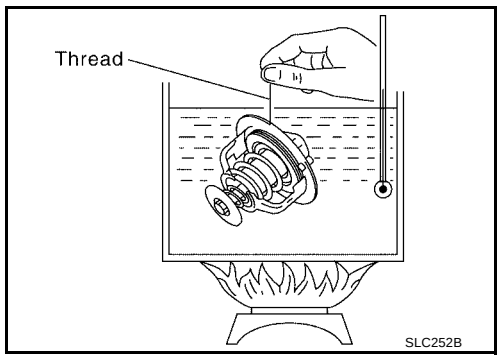
Perform when the engine is cold.

1. Drain engine coolant. Refer to MA-14, "Changing Engine Coolant" .
2. Remove radiator lower hose from the engine coolant inlet side.
3. Remove engine coolant inlet and thermostat.

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 valve opening temperature is the temperature at which the valve opens and the falls from the thread.
- Continue heating. Check the full-open lift amount.

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

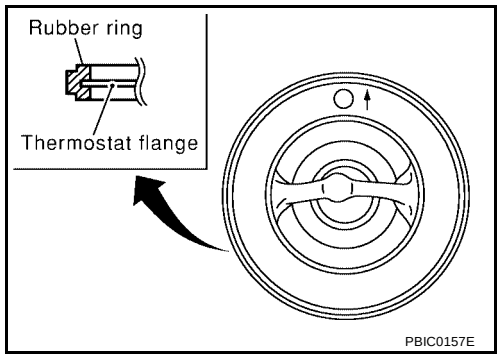


Thermostat	Standard Values
Valve opening temperature	82°C (180°F)
Full-open lift amount	8.6 mm / 95°C (0.339 in / 203°F)
Valve closing temperature	77°C (171°F)

INSTALLATION

Installation is in the reverse order of removal.

- Install the thermostat with the whole circumference of the flange part fitting securely inside the rubber ring.
- Install the thermostat with the jiggle valve facing upwards. The position deviation may be within the range of ±10°.
- If necessary, to install the heater pipe, first apply a mild detergent to the O-ring and then quickly insert the pipe into the housing.

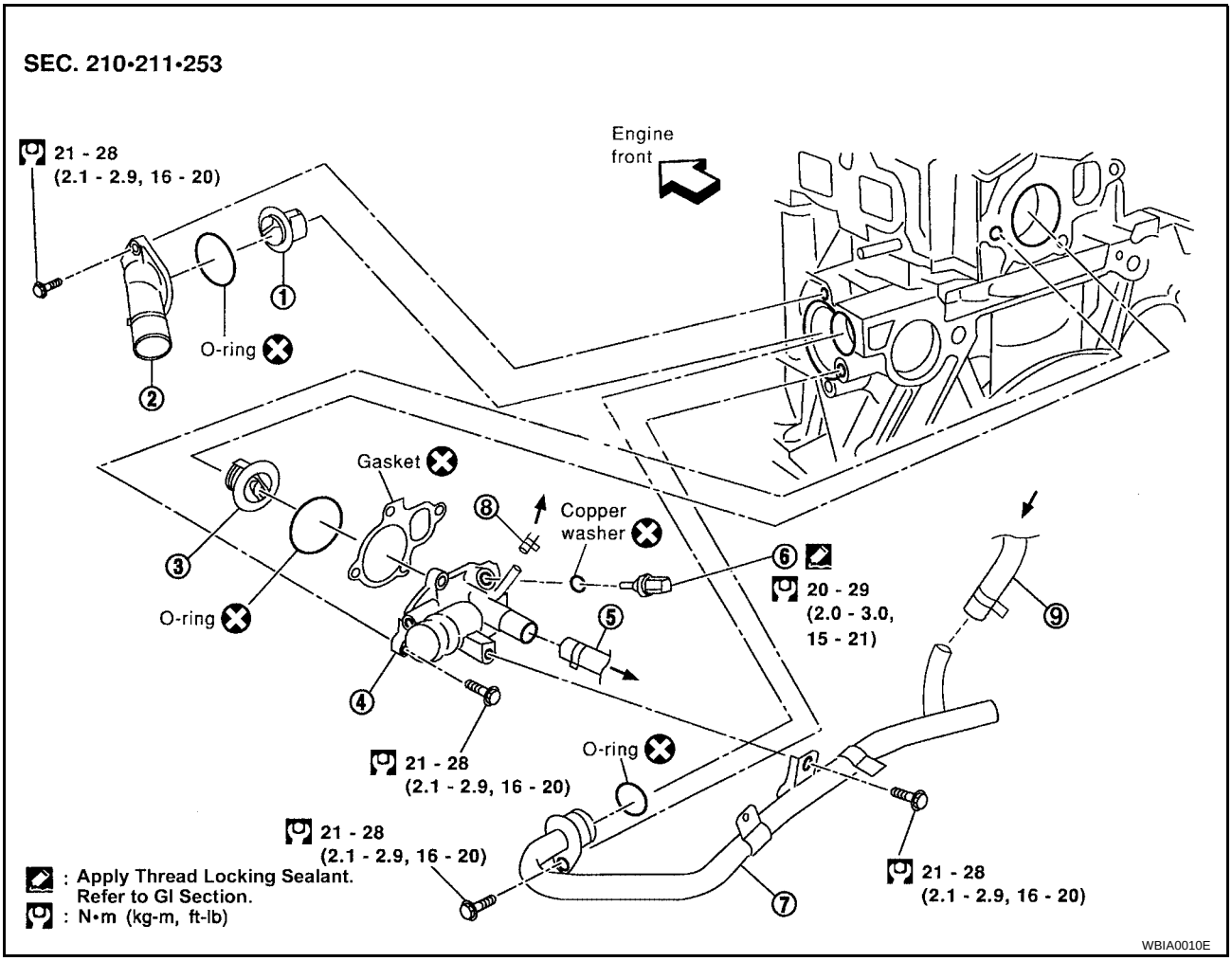


WATER CONTROL VALVE

PFP:21230

Removal and Installation

EBS007RP



1. Thermostat
2. Engine coolant inlet
3. Engine coolant control valve
4. Engine coolant outlet
5. Heater hose
6. Engine coolant temperature sensor
7. Heater pipe
8. Throttle body inlet hose
9. Throttle body outlet hose

WARNING:

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

REMOVAL

CAUTION:

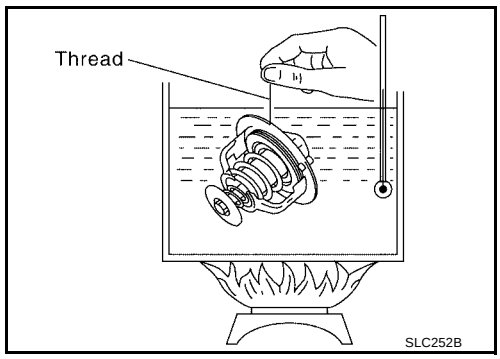
Perform when the engine cold.

1. Drain the engine coolant. Refer to MA-14, "Changing Engine Coolant" .
2. Remove the upper radiator hose, heater pipe, throttle body inlet hose, and heater hose.
3. Remove the engine coolant outlet.
4. Remove the engine coolant control valve.

INSPECTION AFTER REMOVAL

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

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



Standard values

Water Control Valve	Standard Value
Valve opening temperature	93.5° - 96.5°C (200° - 206°F)
Full-open lift amount	8 mm / 108°C (0.315 in / 226° F)
Valve closing temperature	90°C (194° F) or higher

INSTALLATION

Installation is in the reverse order of removal.

- Install the water control valve with the whole circumference of the flange part fitting securely inside the rubber ring.
- Install the water control valve with the up-mark facing up and the frame center part facing upwards. The position deviation may be within the range of ±10°.

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Capacity

EBS007RQ

Coolant capacity (without reservoir tank)	6.9 ℓ (7 1/4 qt.)
Reservoir tank coolant capacity (at MAX level)	0.7 ℓ (3/4 qt.)

Thermostat

EBS007RR

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

Water Control Valve

EBS007RS

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

Radiator

EBS007RT

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 - 98 (0.59 - 0.98, 0.6 - 1.0, 9 - 14)
Leakage test pressure		157 (1.57, 1.6, 23)

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EBS007RU

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Precautions for Liquid Gasket

EBS00G4M

REMOVAL OF LIQUID GASKET SEALING

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

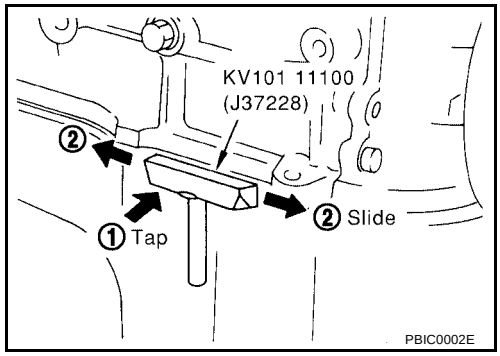
CAUTION:

Be careful not to damage the mating surfaces.

- In areas where the cutter is difficult to use, use a plastic hammer to lightly tap the areas where the sealant is applied.

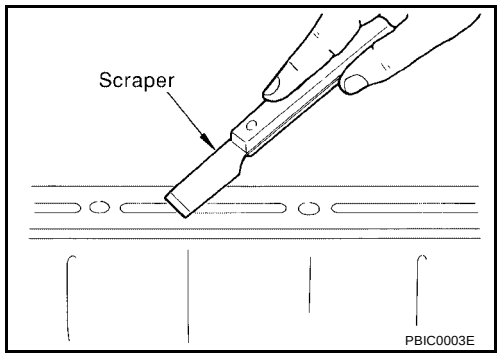
CAUTION:

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

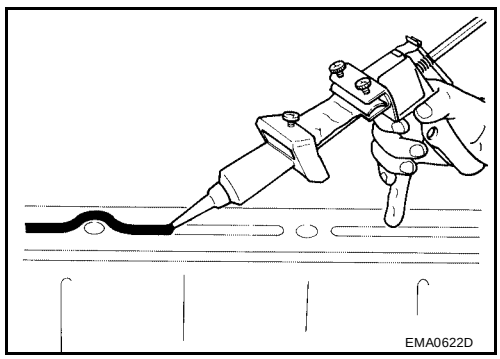


LIQUID GASKET APPLICATION PROCEDURE

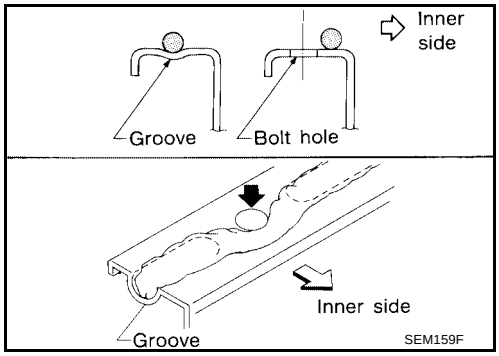
1. Using a scraper, remove the old sealant adhering to the mating surface.
- Remove the sealant completely from the groove, mounting bolts, and bolt holes.
2. Thoroughly clean the mating surface removing any adhering moisture, grease and foreign material.
3. Attach the sealant tube to the tube presser.
   Use Genuine RTV Silicone Sealant or equivalent. Refer to **GI-42, "Recommended Chemical Products and Sealants"** **.**



4. Apply the sealant without breaks to the specified location with the specified dimensions.
- If there is a groove for the sealant application, apply the sealant to the groove.



- As for the bolt holes, normally apply the sealant inside the holes. Occasionally, it should be applied outside the holes. Make sure to read the text of service manual.
- Within five minutes of sealant application, install the mating component.
- If the sealant protrudes, wipe it off immediately.
- Do not retighten after the installation.
- After 30 minutes or more have passed from the installation, fill the engine with the proper oil and coolant. Refer to GI-42, "Recommended Chemical Products and Sealants" .



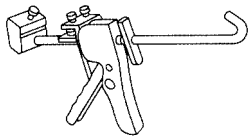
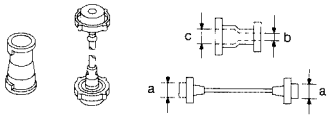
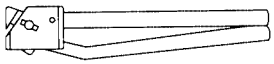
PREPARATION

PFP:00002

Special Service Tools

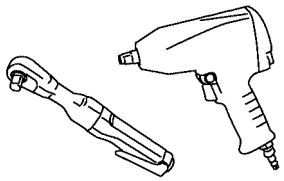
EBS007RW

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

Tool number (Kent-Moore No.) Tool name	Description
WS39930000 (–) Tube pressure  S-NT052	Pressing the tube of liquid gasket
EG17650301 (J33984-A) 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

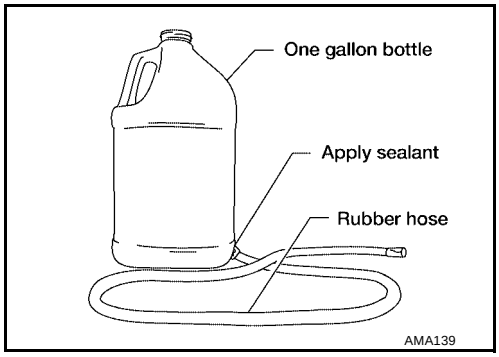
EBS007RX

Tool name	Description
Power tool  PBIC0190E	Loosening bolts and nuts

PREPARATION FOR CHANGING ENGINE COOLANT

Prepare an empty one gallon bottle, such as used for windshield washer fluid. Obtain a 1,371mm (54 in) length of hose with the same inner diameter as the coolant reservoir hose. Modify the one gallon bottle by making a hole at the bottom slightly smaller than the hose outer diameter to seal against leaks when the bottle is full of fluid.

- Insert the hose in the bottom of the bottle.
- Seal the hose to the bottle so it will not leak.



OVERHEATING CAUSE ANALYSIS

PFP:00012

Troubleshooting Chart

EBS00F1A

	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	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

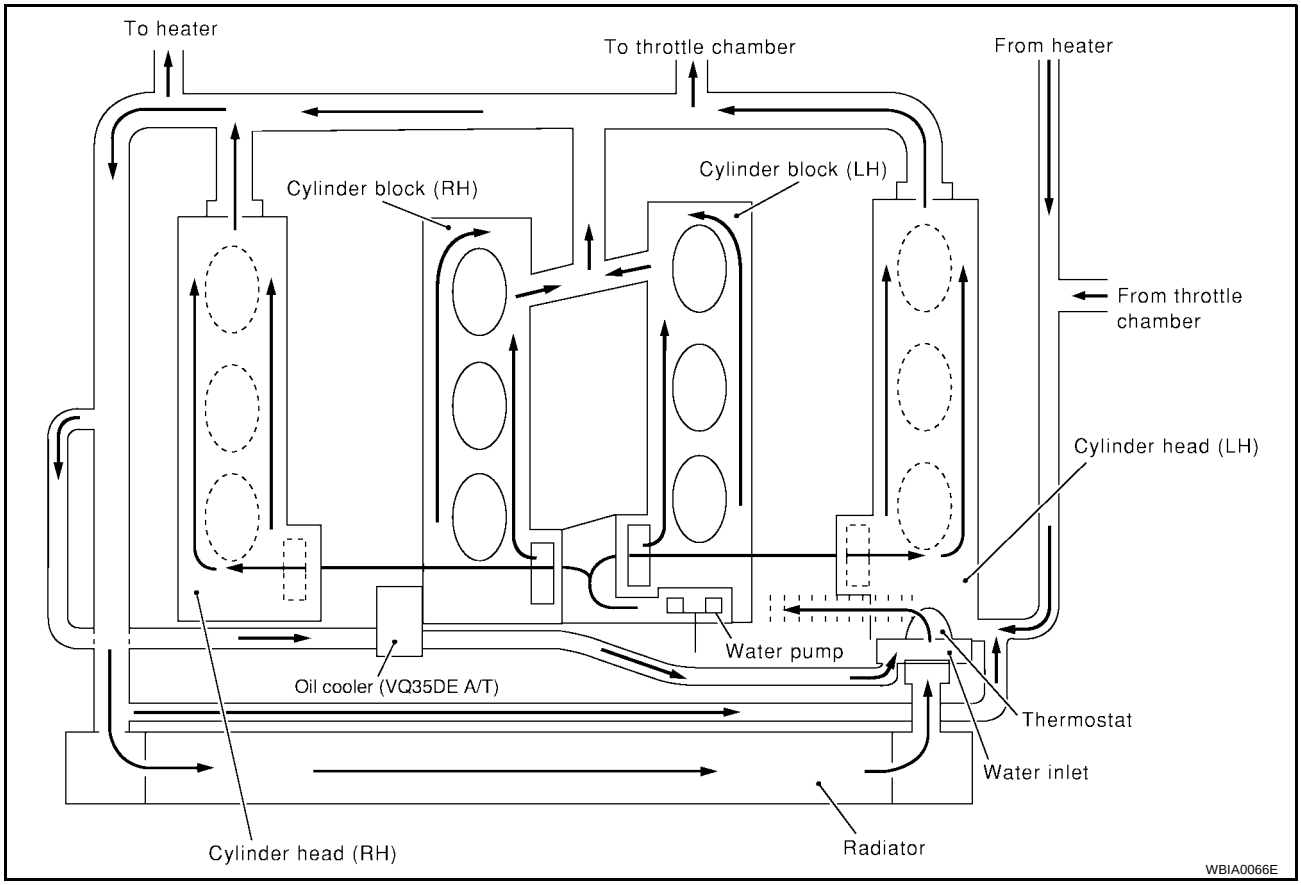
<table>
<tr><th></th><th colspan="2">Symptom</th><th colspan="2">Check items</th></tr>
<tr><td rowspan="10">Except cooling system parts malfunction</td><td rowspan="7">—</td><td rowspan="7">Overload on engine</td><td rowspan="3">Abusive driving</td><td>High engine rpm under no load</td></tr>
<tr><td>Driving in low gear for extended time</td></tr>
<tr><td>Driving at extremely high speed</td></tr>
<tr><td>Powertrain system malfunction</td><td rowspan="4">—</td></tr>
<tr><td>Installed improper size wheels and tires</td></tr>
<tr><td>Dragging brakes</td></tr>
<tr><td>Improper ignition timing</td></tr>
<tr><td rowspan="5">Blocked or restricted air flow</td><td>Blocked bumper</td><td>—</td><td rowspan="5">—</td></tr>
<tr><td rowspan="2">Blocked radiator grille</td><td>Installed car brassiere</td></tr>
<tr><td>Mud contamination or paper clogging</td></tr>
<tr><td>Blocked radiator</td><td>—</td></tr>
<tr><td>Blocked condenser</td><td rowspan="2">Blocked air flow</td></tr>
<tr><td>Installed large fog lamp</td></tr>
</table>

COOLING SYSTEM

PFP:21020

Cooling Circuit

EBS007RZ



ENGINE COOLANT

PFP:KQ100

System Check

EBS00F1F

WARNING:
Never remove the radiator cap when the engine is hot. Serious burns could occur from high pressure fluid escaping from the radiator.
Wrap a thick cloth around the cap. Slowly push down and turn it a quarter turn to allow built-up pressure to escape. Carefully remove the cap by pushing down and turning it all the way.

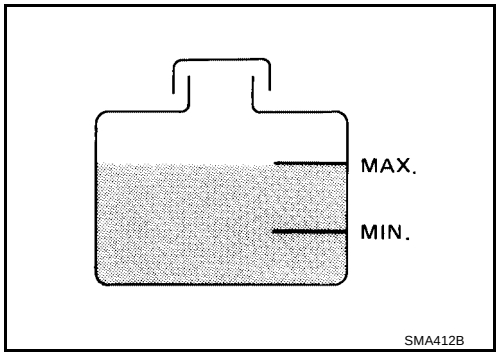
CHECKING COOLING SYSTEM HOSES

Check hoses for the following:

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

CHECKING RESERVOIR LEVEL

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



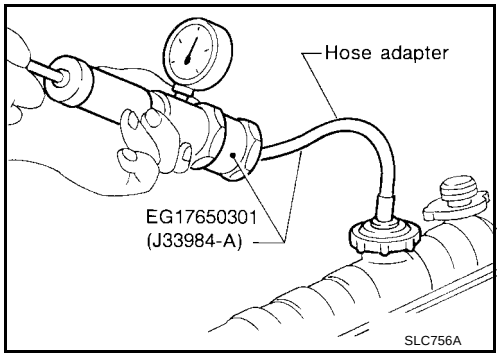
CHECKING COOLING SYSTEM FOR LEAKS

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

Testing pressure : 157 kPa (1.6 kg/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.



CHECKING RADIATOR

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.

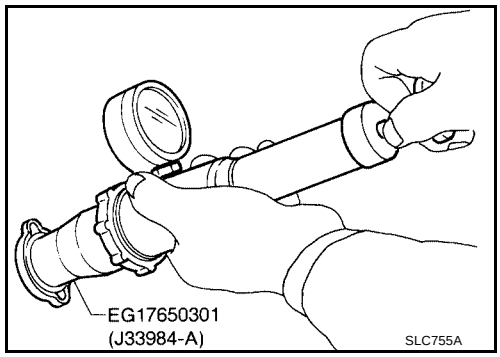
1. Apply water by hose to the back side of the radiator core vertically downward.
2. Apply water again to all radiator core surfaces once per minute.
3. Stop washing when clear water flows off of the radiator.
4. Blow air into the back side of radiator core vertically downward.
   - Use compressed air lower than 490 kPa (5 kg/cm^2 , 71 psi) and keep distance more than 300 mm (11.8 in).

5. Blow air again into all the radiator core surfaces once per minute until no water sprays out.
6. Check for leakage.

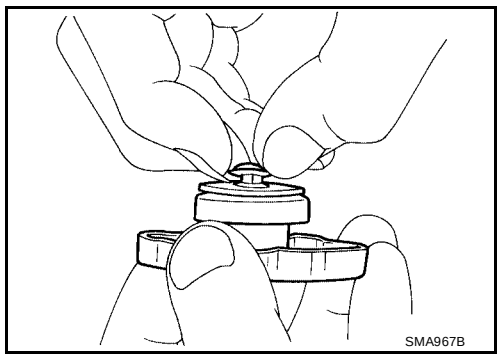
CHECKING RADIATOR CAP

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

Radiator cap relief pressure	
Standard	**: 78 - 98 kPa (0.8 - 1.0 kg/cm^2 , 11 - 14 psi)**
Limit	**: 59 kPa (0.6 kg/cm^2 , 14 psi)**



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



Refilling Engine Coolant

EBS00F1D

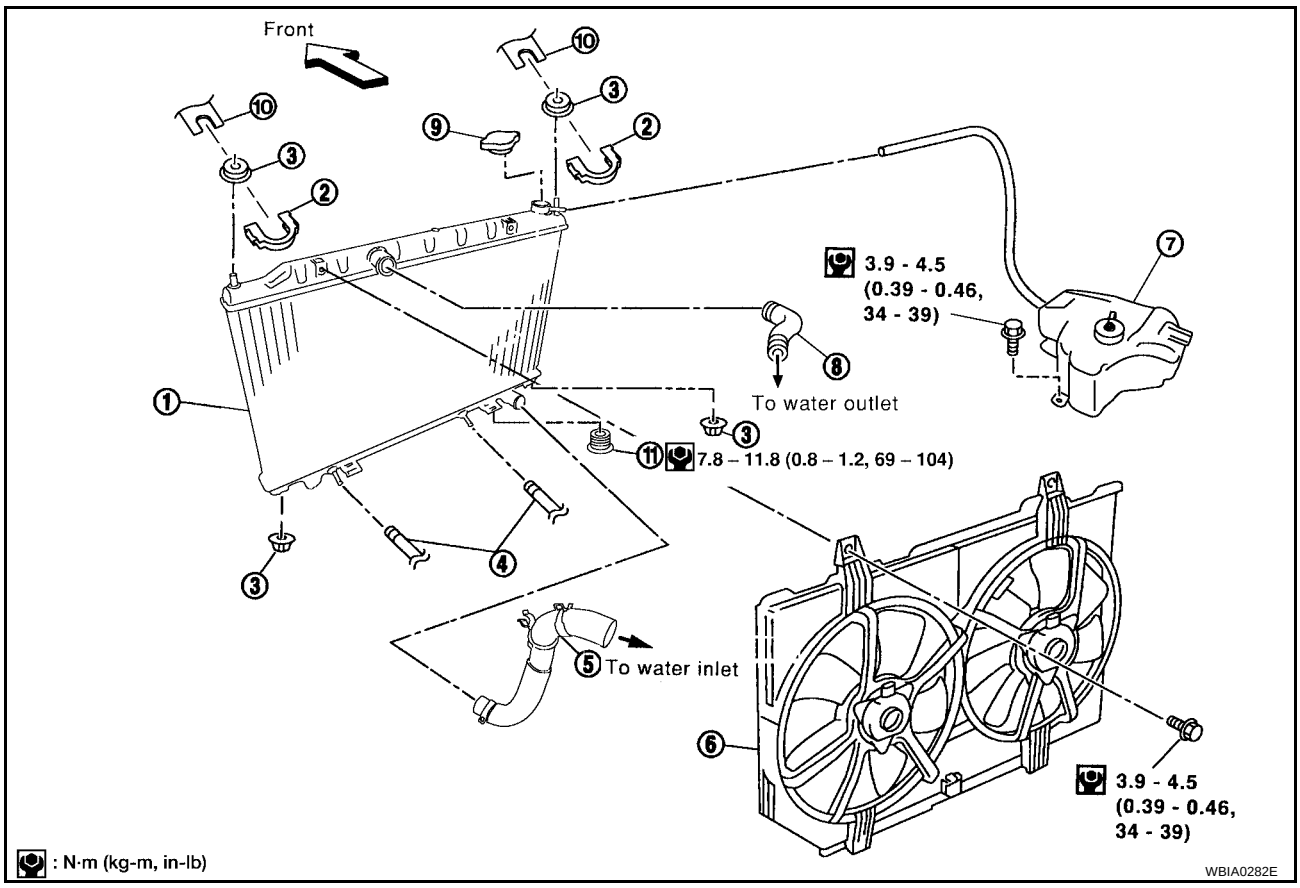
Changing the engine coolant is part of the required maintenance of the engine. Refer to MA-14, "Changing Engine Coolant" .

RADIATOR

PFP:21400

Removal and Installation

EBS00T4E



1. Radiator
2. Radiator upper clip
3. Mounting rubber
4. A/T fluid cooler hose (if equipped)
5. Radiator hose (lower)
6. Radiator fan assembly
7. Reservoir tank
8. Radiator hose (upper)
9. Radiator cap
10. Radiator core connection
11. Radiator drain plug

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 of a turn to release built-up pressure. Carefully remove radiator cap by turning it all the way.

REMOVAL

1. Drain the coolant from the radiator. Refer to MA-14, “Changing Engine Coolant”.

   CAUTION:

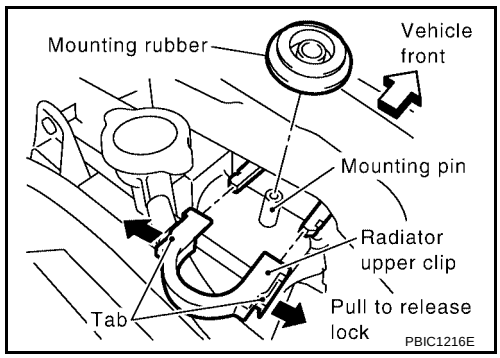
   Perform when engine is cold.
2. Remove fresh air duct. Refer to EM-112, “Removal and Installation“.
3. Disconnect radiator upper and lower hoses.
4. Remove the A/T fluid cooler hoses, if equipped.
   - Plug hoses to avoid leakage of A/T fluid.
5. Disconnect the reservoir tank hose.

6. Remove the radiator upper clips by pulling the tabs outside to release the lock, as shown.

CAUTION:
To prevent damage, do not pull lock tabs excessively.

7. Remove radiator cooling fan assembly to radiator bolts.
8. Remove the radiator assembly.

CAUTION:
Do not damage or scratch air conditioner condenser and radiator core when removing.



INSTALLATION

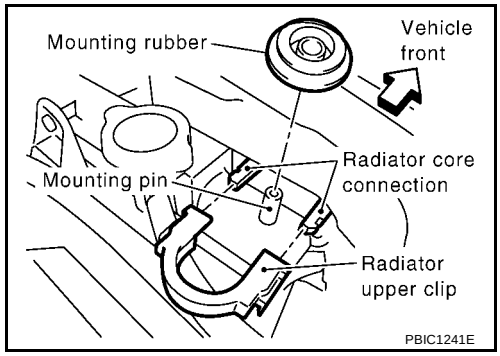
Installation is in the reverse order of removal, paying attention to the following.

- Fill the radiator with coolant. Refer to MA-14, “Changing Engine Coolant”.

Installation of Radiator Upper Clip

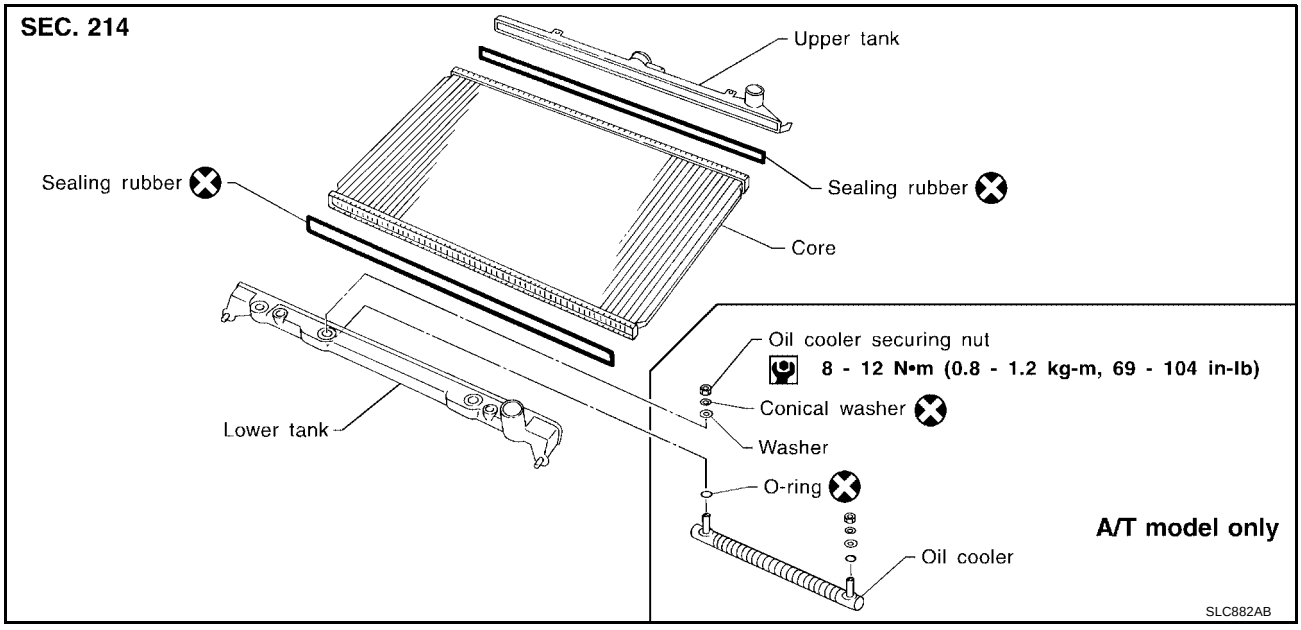
- Install radiator upper clip on radiator core connection with the following procedure:

1. Install the rubber on mounting pin of radiator core.
2. Align the radiator upper clip with the radiator core connection, then insert the radiator upper clip straight into the radiator core connections until a click is heard.
3. After connecting the radiator upper clip, use the following method to make sure it is fully connected.
   - Visually confirm that the two radiator upper clips are connected to the radiator core connections.
   - Move the radiator upper clip and the radiator forward and backward to make sure they are securely connected.



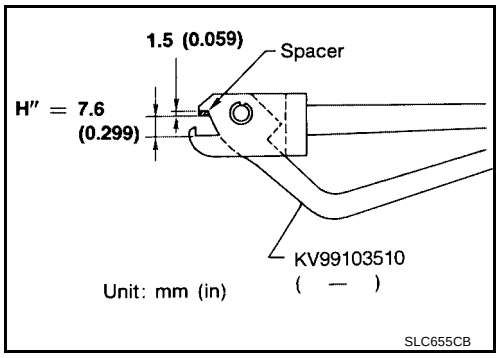
Disassembly and Assembly

EBS00T4F



PREPARATION

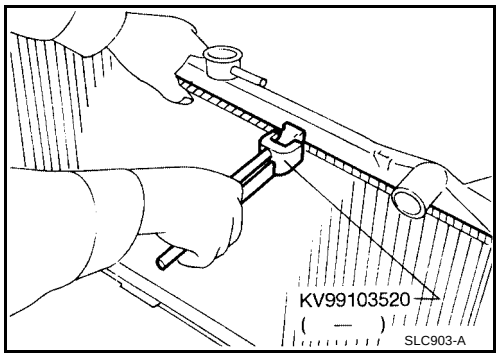
1. Attach the spacer to the tip of the Tool.
   Spacer specification: 1.5 mm (0.059 in) thick x 18 mm (0.71 in) wide x 8.5 mm (0.335 in) long.
2. Make sure that when Tool is closed dimension H″ is approx. 7.6 mm (0.299 in).
3. Adjust dimension H″ with the spacer, if necessary.



DISASSEMBLY

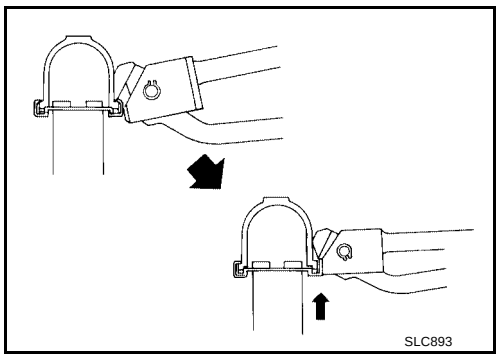
1. Remove the tank using Tool.

   Tool number : KV99103520 (—)



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

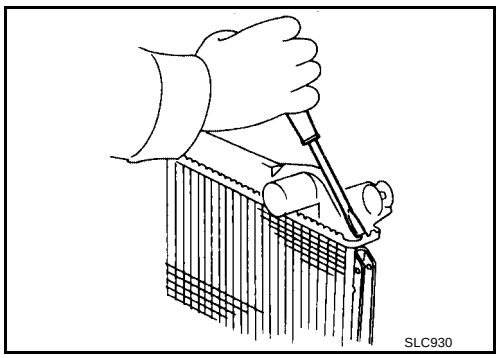
  CAUTION:
  Do not bend excessively.



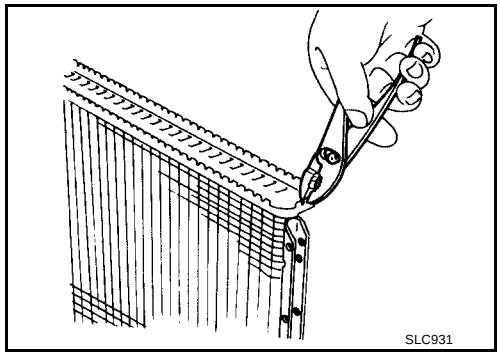
- In areas where the Tool cannot be used, use a suitable tool to bend the edge up.

  CAUTION:
  Be careful not to damage tank.

2. Remove sealing rubber.

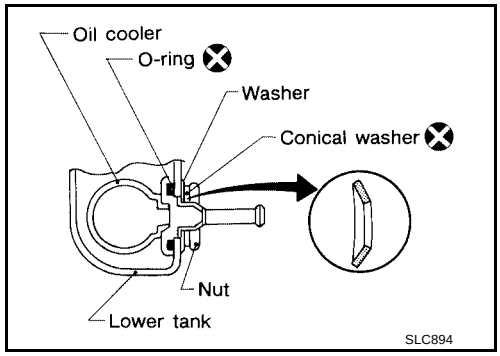


3. Make sure the edge stands straight up, using a suitable tool.
4. Remove oil cooler from tank (if equipped).

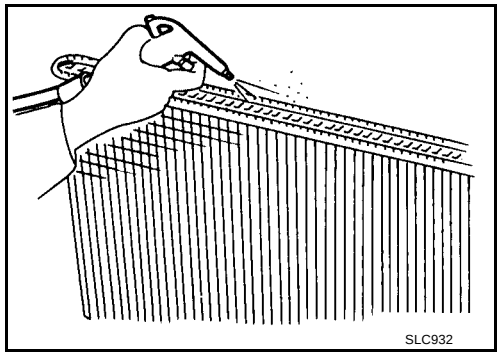


ASSEMBLY

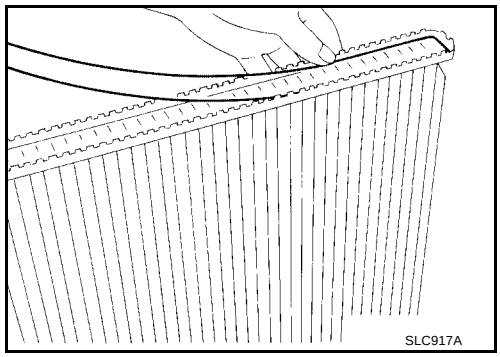
1. Install the oil cooler (if equipped).
   NOTE:
   Pay attention to direction of conical washer.



2. Clean the contact portion of the tank.

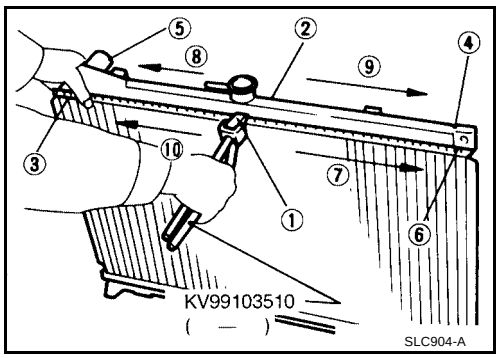


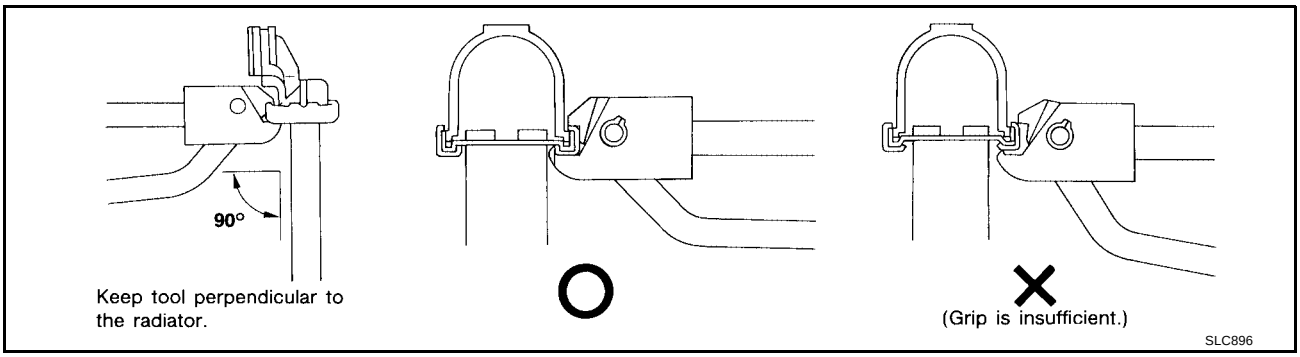
3. Install sealing rubber by pushing it in with your fingers.
   CAUTION:
   Be careful not to twist sealing rubber gasket.



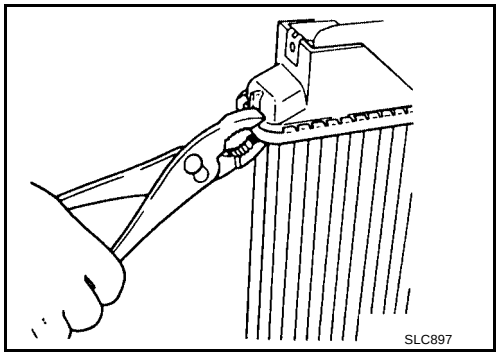
4. Crimp tank in specified sequence using Tool.

Tool number : KV99103510 (—)





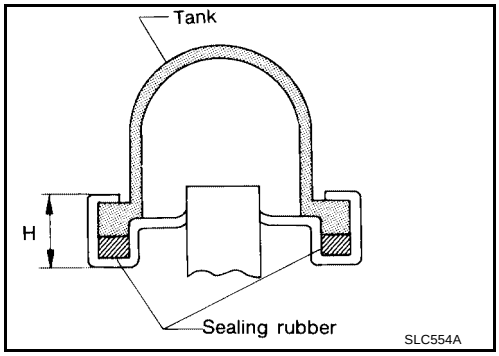
- In the locations where Tool cannot be used use a suitable tool.



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-39, "INSPECTION".

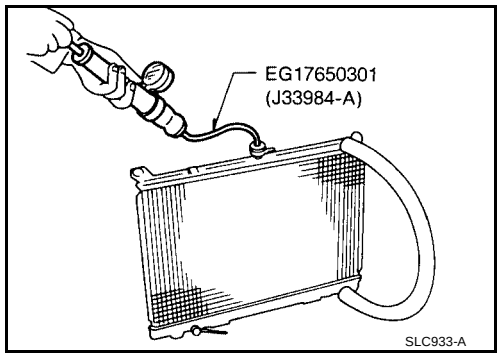


INSPECTION

1. Apply pressure using Tool.

Tool number : EG17650301 (J-33984-A)

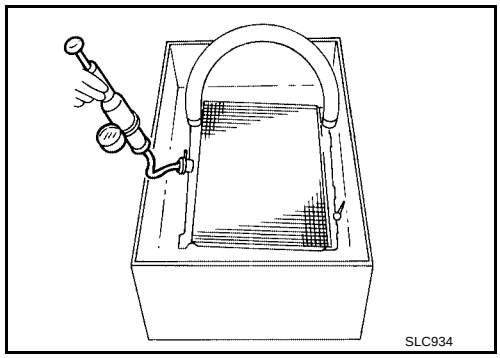
Specified pressure value : 157 kPa (1.6 kg/cm^2 , 23 psi)



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

CAUTION:
Attach a hose to the oil cooler as well (if equipped).

2. Place radiator in water filled tank and check for leakage.



COOLING FAN

PFP:21140

Removal and Installation

EBS00T4G

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

REMOVAL

1. Drain engine coolant from radiator. Refer to MA-14, “Changing Engine Coolant”.
   CAUTION:
   Perform when engine is cold.
2. Remove air cleaner duct assembly. Refer to EM-112, “Removal and Installation”.
3. Disconnect radiator upper hose.
4. Disconnect fan motor connectors.
5. Remove radiator cooling fan assembly.

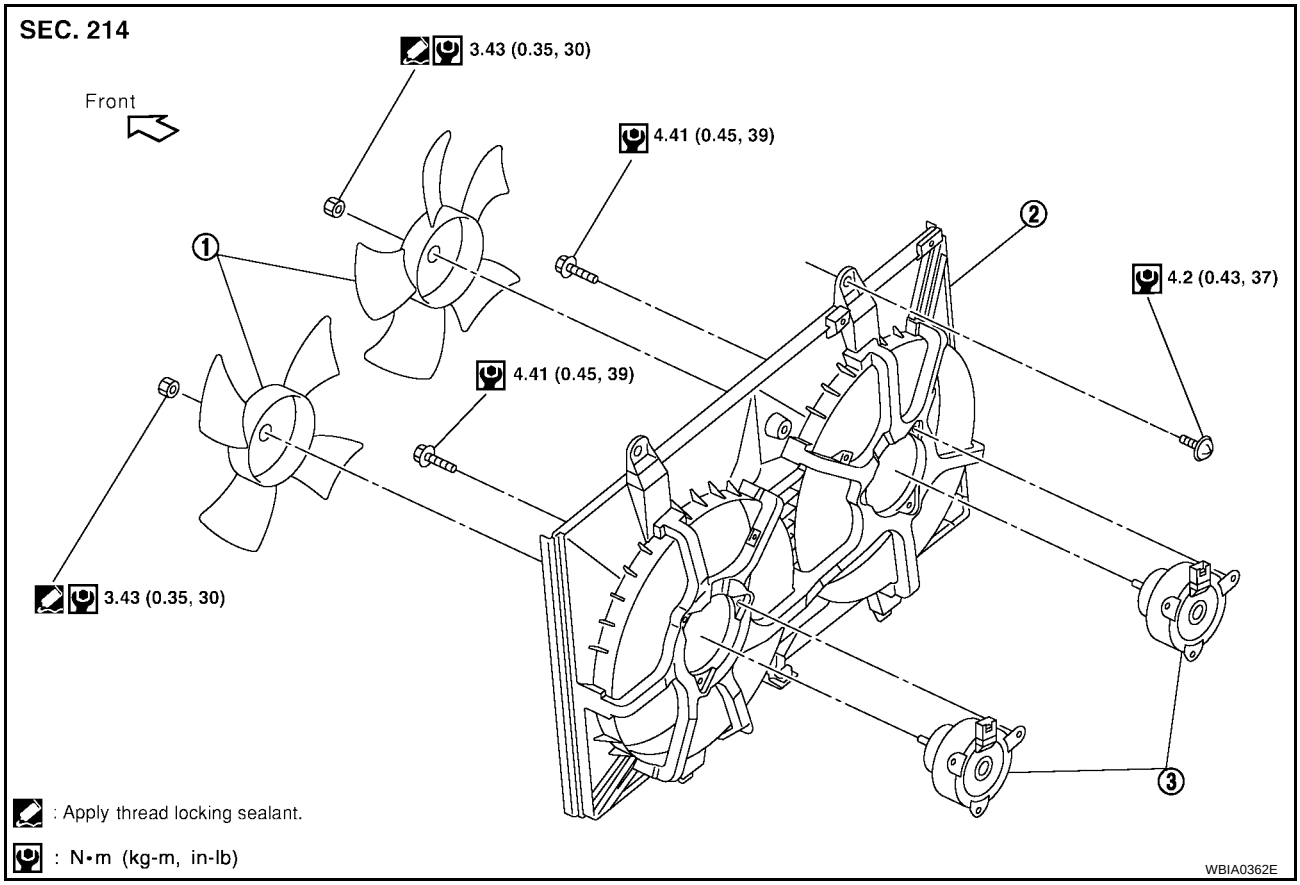
INSTALLATION

Install in the reverse order of removal.

- Cooling fan is controlled by ECM. For details, refer to EC-1109, “DTC P1217 ENGINE OVER TEMPERATURE“.

Disassembly and Assembly of Radiator Fan

EBS00T4H



1. Fan blade
2. Fan shroud
3. Fan motor

DISASSEMBLY

1. Remove fan blade.
2. Remove fan motor from fan shroud.

ASSEMBLY

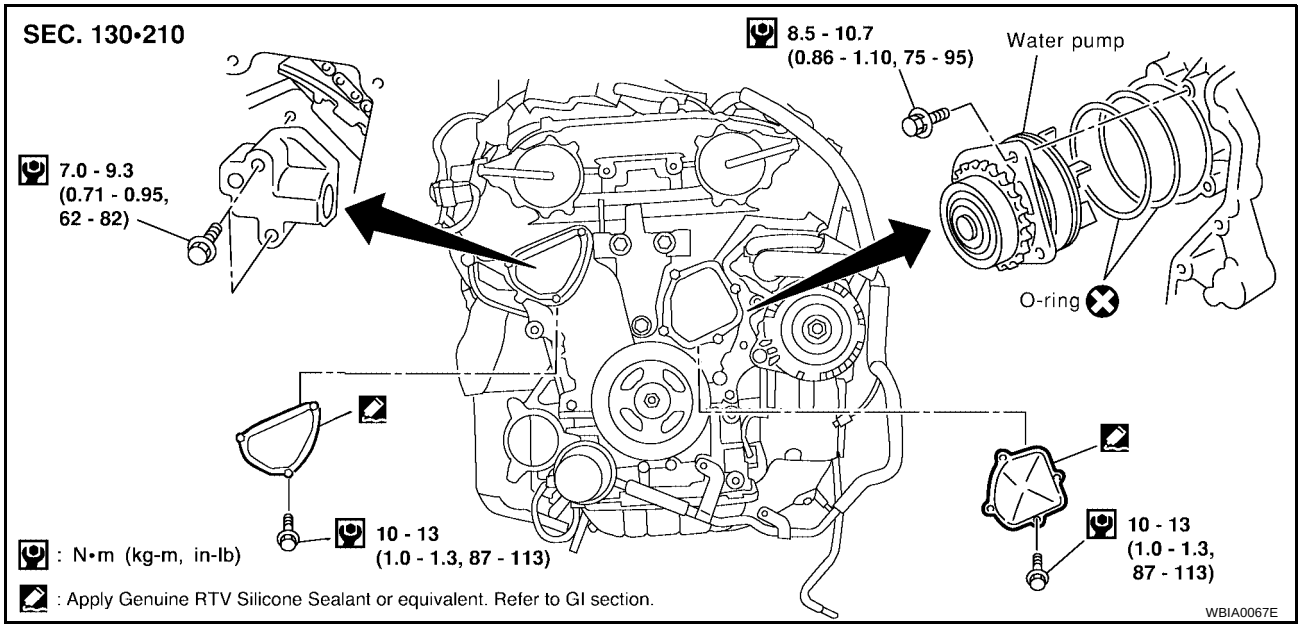
Assembly is in the reverse order of disassembly.

WATER PUMP

PFP:21020

Removal and Installation

EBS007S5



CAUTION:

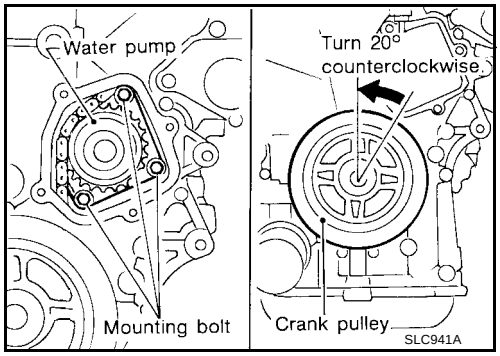
- **When removing water pump assembly, be careful not to get coolant on drive belt.**
- **Water pump cannot be disassembled and should be replaced as a unit.**
- **After installing water pump, connect hose and clamp securely, then check for leaks using radiator cap tester.**

REMOVAL

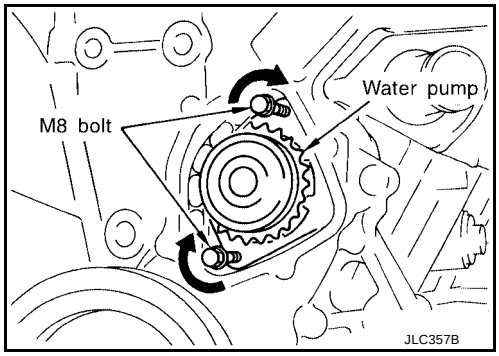
1. Remove undercover, using power tools.
2. Remove suspension member stay.
3. Drain coolant from radiator. Refer to MA-14, "Changing Engine Coolant" .
4. Remove radiator shrouds.
5. Remove drive belts.
6. Remove cooling fan.
7. Remove water drain plug on water pump side of cylinder block.
8. Remove chain tensioner cover and water pump cover.
9. Remove the chain tensioner assembly.

a. Pull the lever down and release the plunger stopper tab.
b. Insert the stopper pin into the tensioner body hole to hold the lever and keep the stopper tab released
c. Insert the plunger into the tensioner body by pressing the timing chain slack guide.
d. Keep the slack guide pressed and hold the plunger in by pushing the stopper pin deeper through the lever and into the tensioner body hole
e. Make a gap between water pump gear and timing chain, by turning the crankshaft pulley 20° counter-clockwise.

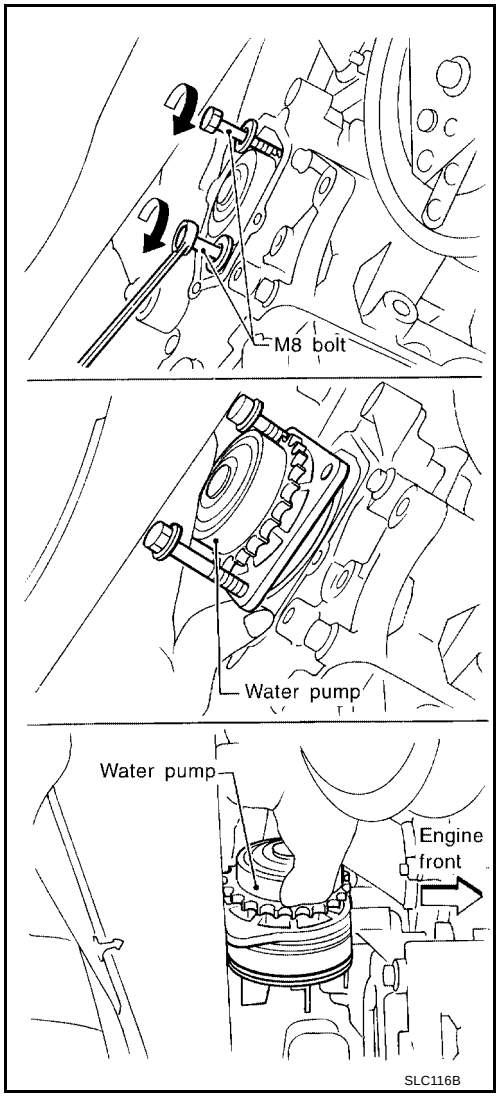
10. Remove the three water pump mounting bolts.



11. Install two bolts into the water pump body bolt holes.

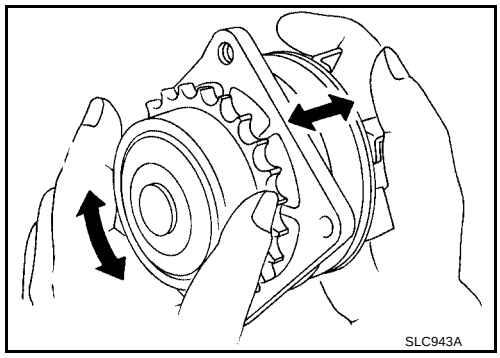


12. Tighten the two bolts by turning half turn alternately until they reach timing chain rear case.
    - In order to prevent damage to the water pump or timing chain rear case, do not tighten one bolt continuously. Always turn each bolt a half turn each time.
13. Lift up the water pump and remove it.
    - When lifting up on the water pump, do not allow the water pump gear to hit the timing chain.



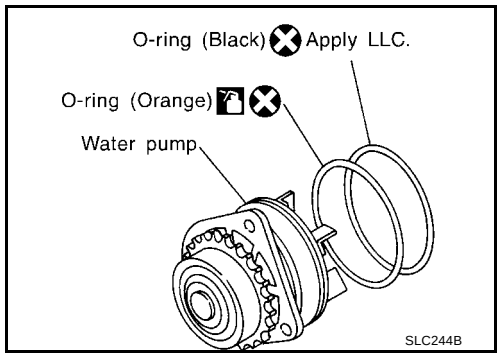
INSPECTION AFTER REMOVAL

1. Check for badly rusted or corroded water pump body assembly.
2. Check for rough operation due to excessive end play.

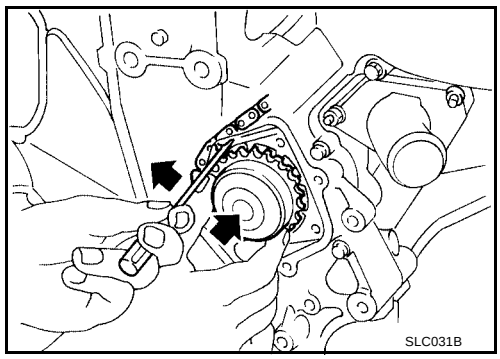


INSTALLATION

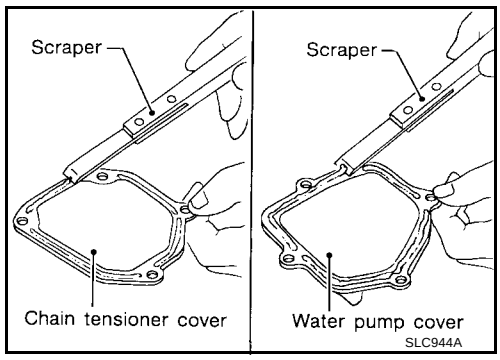
1. Apply engine oil and coolant to the O-rings as shown.



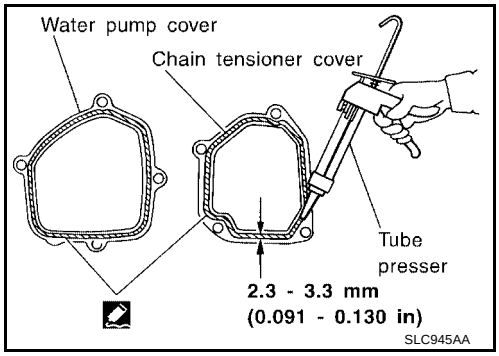
2. Install the water pump.
   - **Do not allow cylinder block to interfere with the O-rings when installing the water pump.**



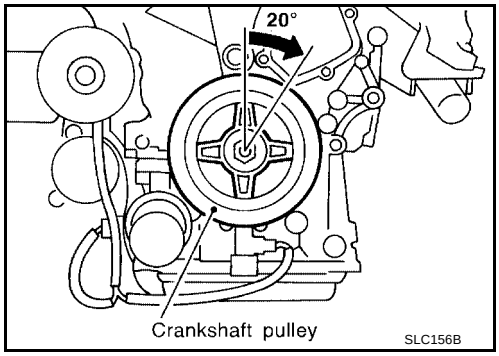
3. Before installing, remove all traces of RTV Silicone Sealant from mating surface of water pump cover and chain tensioner cover using a scraper.
   Also remove traces of RTV Silicone Sealant from the mating surface of the front cover.



4. Apply a continuous bead of Genuine RTV Silicone Sealant, or equivalent, to mating surface of chain tensioner cover and water pump cover. Refer to GI-42, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .



5. Return the crankshaft pulley to its original position by turning it 20° clockwise.



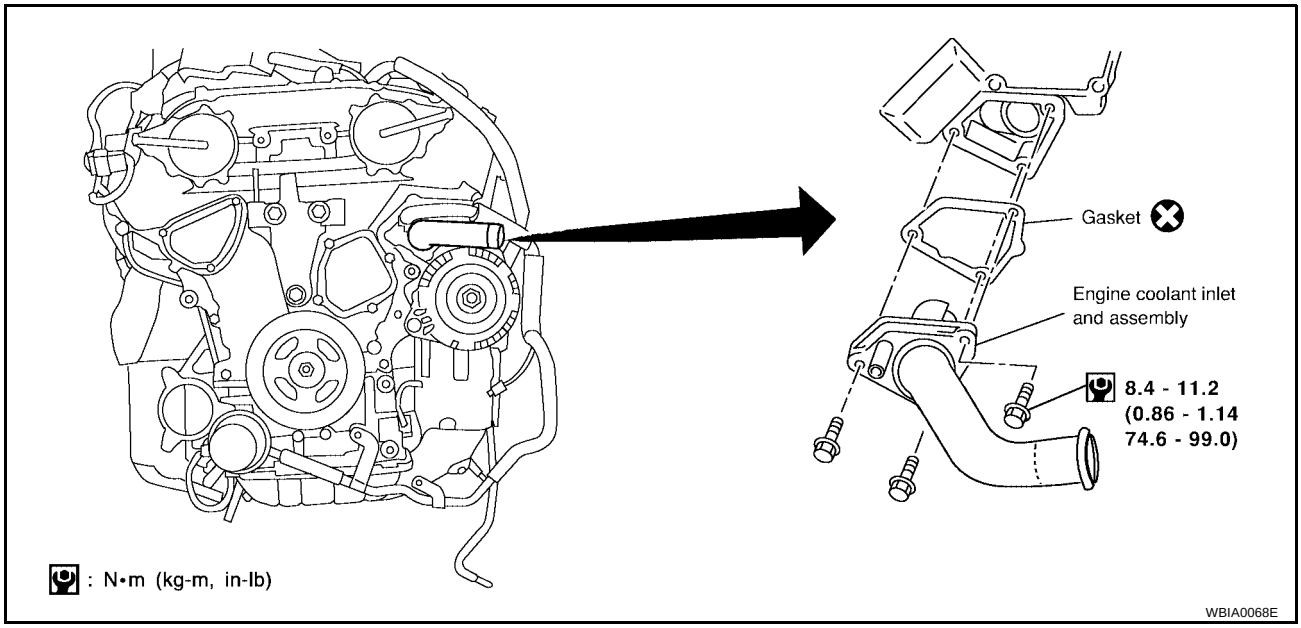
6. Install the timing chain tensioner, then remove the stopper pin.
   - **When installing the timing chain tensioner, engine oil should be applied to the oil hole and tensioner.**
   - **After starting engine, let idle for three minutes, then rev engine up to 3,000 rpm under no load to purge air from the high-pressure chamber of the chain tensioner. The engine may produce a rattling noise. This indicates that air still remains in the chamber and is not a matter of concern.**
7. Installation is in the reverse order of removal.

THERMOSTAT AND THERMOSTAT HOUSING

PFP:21200

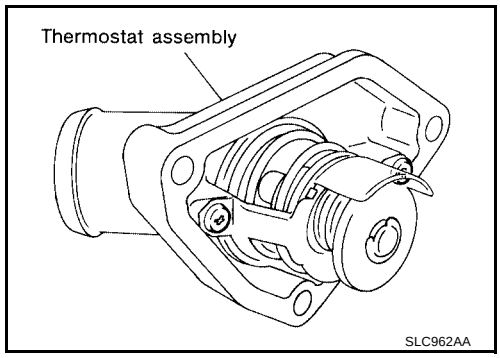
Removal and Installation

EBS007S6



REMOVAL

1. Remove undercover.
2. Drain coolant from radiator. Refer to MA-14, "Changing Engine Coolant" .
3. Remove drive belts.
4. Remove water drain plug on water pump side of the engine.
5. Disconnect lower radiator hose.
6. Remove engine coolant inlet and thermostat assembly.
   - **Do not disassemble engine coolant inlet and thermostat. Replace them as a unit, if necessary.**

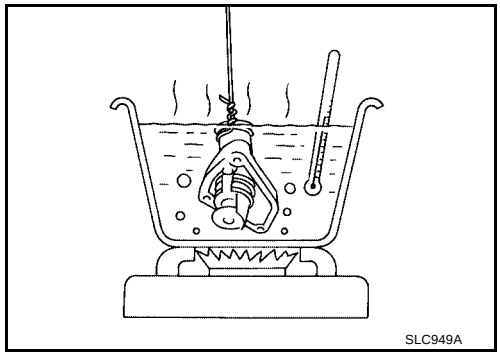


INSPECTION AFTER REMOVAL

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

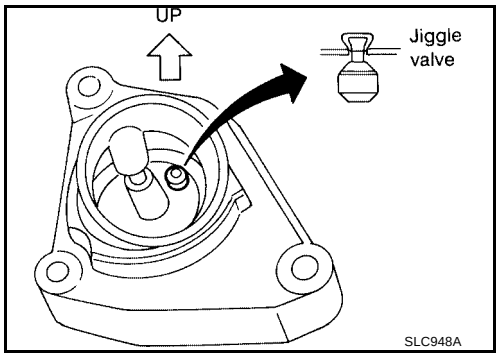
Thermostat	Standard Values
Valve opening temperature	82°C (180°F)
Valve lift	8.6 mm / 95°C (0.339 in / 203°F)

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



INSTALLATION

1. Install thermostat with jiggle valve facing upward.
   - **After installation, run engine for a few minutes, and check for leaks.**
   - **Be careful not to spill coolant over engine compartment. Use a rag to absorb coolant.**
2. Installation is in the reverse order of removal.



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00100

Capacity

EBS007S7

Coolant capacity (without reservoir tank)	7.5 ℓ (7 7/8 qt.)
Reservoir tank coolant capacity (at MAX level)	0.7 ℓ (3/4 qt.)

Thermostat

EBS007S8

Valve opening temperature	82°C (180°F)
Valve lift	8.6 mm / 95°C (0.339 in / 203°F)

Radiator

EBS007S9

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

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