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CO  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M

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## SECTION

# ENGINE COOLING SYSTEM

### CONTENTS

QR25DE	
<b>PRECAUTIONS</b> .....	<b>3</b>
Precautions for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" .....	3
Precautions for Liquid Gasket .....	3
REMOVAL OF LIQUID GASKET SEALING .....	3
LIQUID GASKET APPLICATION PROCEDURE.....	3
<b>PREPARATION</b> .....	<b>5</b>
Special Service Tools .....	5
Commercial Service Tools .....	5
<b>OVERHEATING CAUSE ANALYSIS</b> .....	<b>6</b>
Troubleshooting Chart .....	6
<b>COOLING SYSTEM</b> .....	<b>7</b>
Cooling Circuit .....	7
System Drawing .....	8
<b>ENGINE COOLANT</b> .....	<b>9</b>
System Check .....	9
CHECKING COOLING SYSTEM HOSES .....	9
CHECKING RESERVOIR LEVEL .....	9
CHECKING COOLING SYSTEM FOR LEAKS.....	9
CHECKING RADIATOR CAP .....	9
CHECKING RADIATOR .....	10
Refilling Engine Coolant .....	10
<b>RADIATOR</b> .....	<b>11</b>
Removal and Installation .....	11
REMOVAL .....	11
INSTALLATION .....	11
INSPECTION .....	11
<b>COOLINGFAN</b> .....	<b>13</b>
Removal and Installation .....	13
REMOVAL .....	13
INSTALLATION .....	13
Disassembly and Assembly .....	13
DISASSEMBLY .....	13
ASSEMBLY .....	13
<b>WATER PUMP</b> .....	<b>14</b>
Removal and Installation .....	14
REMOVAL .....	14
INSPECTION AFTER REMOVAL .....	15
INSTALLATION .....	15
INSPECTION AFTER INSTALLATION .....	15
<b>THERMOSTAT AND THERMOSTAT HOUSING</b> .....	<b>16</b>
Removal and Installation .....	16
REMOVAL .....	16
INSPECTION AFTER REMOVAL .....	17
INSTALLATION .....	17
<b>WATER CONTROL VALVE</b> .....	<b>18</b>
Removal and Installation .....	18
REMOVAL .....	18
INSPECTION AFTER REMOVAL .....	19
INSTALLATION .....	19
<b>SERVICE DATA AND SPECIFICATIONS (SDS)</b> .....	<b>20</b>
Capacity .....	20
Thermostat .....	20
Water Control Valve .....	20
Radiator .....	20
VQ35DE	
<b>PRECAUTIONS</b> .....	<b>21</b>
Precautions for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" .....	21
Precautions for Liquid Gasket .....	21
REMOVAL OF LIQUID GASKET SEALING .....	21
LIQUID GASKET APPLICATION PROCEDURE..	21
<b>PREPARATION</b> .....	<b>23</b>
Special Service Tools .....	23
Commercial Service Tools .....	23
<b>OVERHEATING CAUSE ANALYSIS</b> .....	<b>24</b>
Troubleshooting Chart .....	24
<b>COOLING SYSTEM</b> .....	<b>26</b>
Cooling Circuit .....	26
System Drawing .....	27

<b>ENGINE COOLANT</b> .....	<b>28</b>	INSTALLATION .....	36
System Check .....	28	Disassembly and Assembly .....	36
CHECKING COOLING SYSTEM HOSES .....	28	DISASSEMBLY .....	36
CHECKING RESERVOIR LEVEL .....	28	ASSEMBLY .....	36
CHECKING COOLING SYSTEM FOR LEAKS ...	28	<b>WATER PUMP</b> .....	<b>37</b>
CHECKING RADIATOR CAP .....	28	Removal and Installation .....	37
CHECKING RADIATOR .....	29	REMOVAL .....	37
Refilling Engine Coolant .....	29	INSPECTION AFTER REMOVAL .....	39
<b>RADIATOR</b> .....	<b>30</b>	INSTALLATION .....	39
Removal and Installation .....	30	<b>THERMOSTAT AND THERMOSTAT HOUSING</b> .....	<b>42</b>
REMOVAL .....	30	Removal and Installation .....	42
INSTALLATION .....	30	REMOVAL .....	42
Disassembly and Assembly .....	31	INSPECTION AFTER REMOVAL .....	42
PREPARATION .....	31	INSTALLATION .....	43
DISASSEMBLY .....	31	<b>WATER OUTLET AND WATER PIPING</b> .....	<b>44</b>
ASSEMBLY .....	32	Removal and Installation .....	44
INSPECTION .....	34	REMOVAL .....	44
Disassembly and Assembly of Radiator Fan .....	35	INSTALLATION .....	44
DISASSEMBLY .....	35	<b>SERVICE DATA AND SPECIFICATIONS (SDS)</b> .....	<b>45</b>
ASSEMBLY .....	35	Capacity .....	45
<b>COOLINGFAN</b> .....	<b>36</b>	Thermostat .....	45
Removal and Installation .....	36	Radiator .....	45
REMOVAL .....	36		

**PRECAUTIONS**

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

EBS00J7B

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. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. 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  
REMOVAL OF LIQUID GASKET SEALING**

EBS00M84

- After removing nuts and bolts, separate the mating surface, using Tool and remove old liquid gasket sealing.

Tool number : KV10111100 (J-37228)

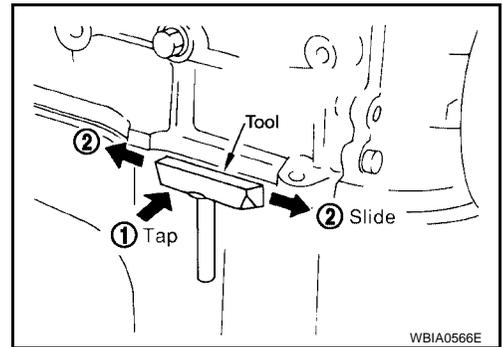
**CAUTION:**

Be careful not to damage the mating surfaces.

- Tap Tool to insert it, and then slide it by tapping on the side as shown in the figure.
- In areas where Tool is difficult to use, use plastic hammer to lightly tap the parts, to remove it.

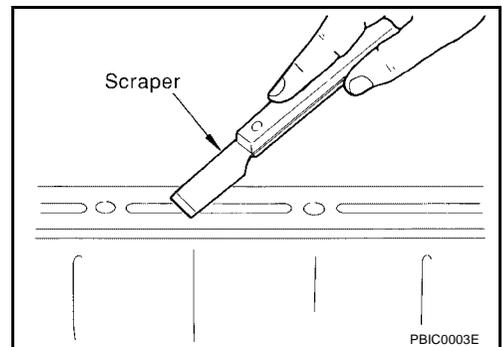
**CAUTION:**

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



**LIQUID GASKET APPLICATION PROCEDURE**

1. Remove old liquid gasket adhering to the liquid gasket application surface and the mating surface, Using scraper.
  - Remove liquid gasket completely from the groove of the liquid gasket application surface, bolts, and bolt holes.
2. Thoroughly clean the mating surfaces and remove adhering moisture, grease and foreign materials.



# PRECAUTIONS

[QR25DE]

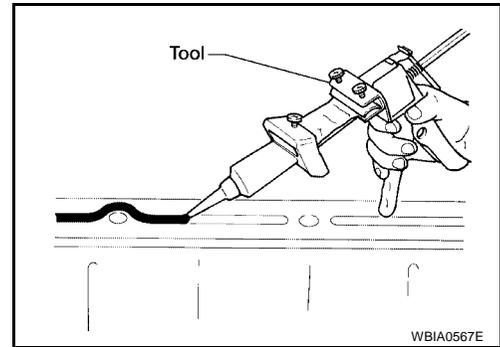
3. Attach liquid gasket tube to Tool.

**Tool number** : WS39930000 ( — )

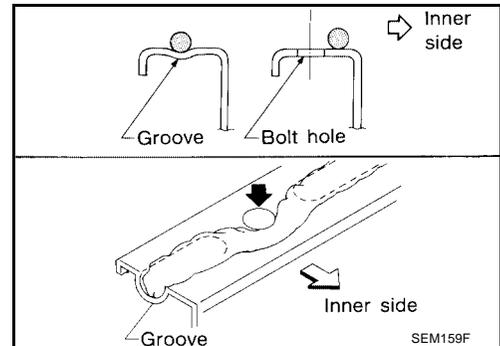
**Use Genuine RTV Silicone Sealant or equivalent. Refer to GI-45, "Recommended Chemical Products and Sealants" .**

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

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



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



**CAUTION:**

**If there are specific instructions in this manual, observe them.**

# PREPARATION

[QR25DE]

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EBS00J7D

## PREPARATION

### Special Service Tools

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	Pressing the tube of liquid gasket
EG17650301 (J-33984-A) Radiator cap tester adapter	Adapting radiator cap tester to radiator filler neck: <b>a: 28 (1.10) dia.</b> <b>b: 31.4 (1.236) dia.</b> <b>c: 41.3 (1.626) dia.</b> Unit: mm (in)
KV10111100 (J-37228) Seal cutter	Removing chain tensioner cover and water pump cover
— (J-23688) Engine coolant refractometer	Checking concentration of ethylene glycol in engine coolant

### Commercial Service Tools

EBS00J7E

Tool name	Description
Power tool	Loosening bolts and nuts

# OVERHEATING CAUSE ANALYSIS

[QR25DE]

## OVERHEATING CAUSE ANALYSIS

PFP:00012

### Troubleshooting Chart

EBS00J7F

		Symptom	Check items	
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	Worn or loose drive belt	—
		Thermostat stuck closed	Coolant circulation	
		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	Engine cooling fans	—
		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		
Reservoir tank		Cracked reservoir tank		
Overflowing reservoir tank	Exhaust gas leaks into cooling system	Cylinder head deterioration		
		Cylinder head gasket deterioration		
—	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 radiator grille	Installed car brassiere	—	
	Blocked bumper	Mud contamination or paper clogging		
	Blocked radiator			
	Blocked condenser			
	Installed large fog lamp			

# COOLING SYSTEM

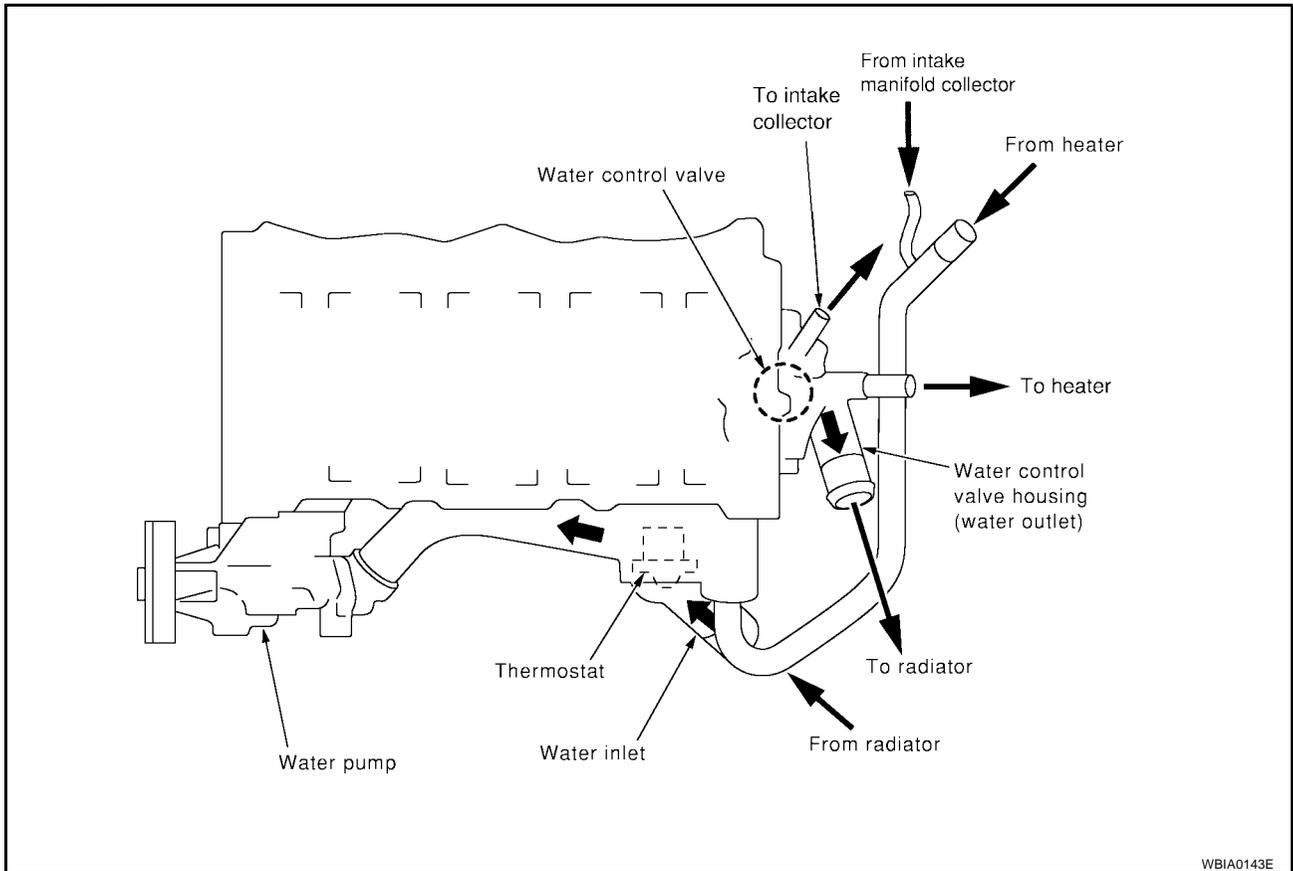
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## COOLING SYSTEM

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### Cooling Circuit

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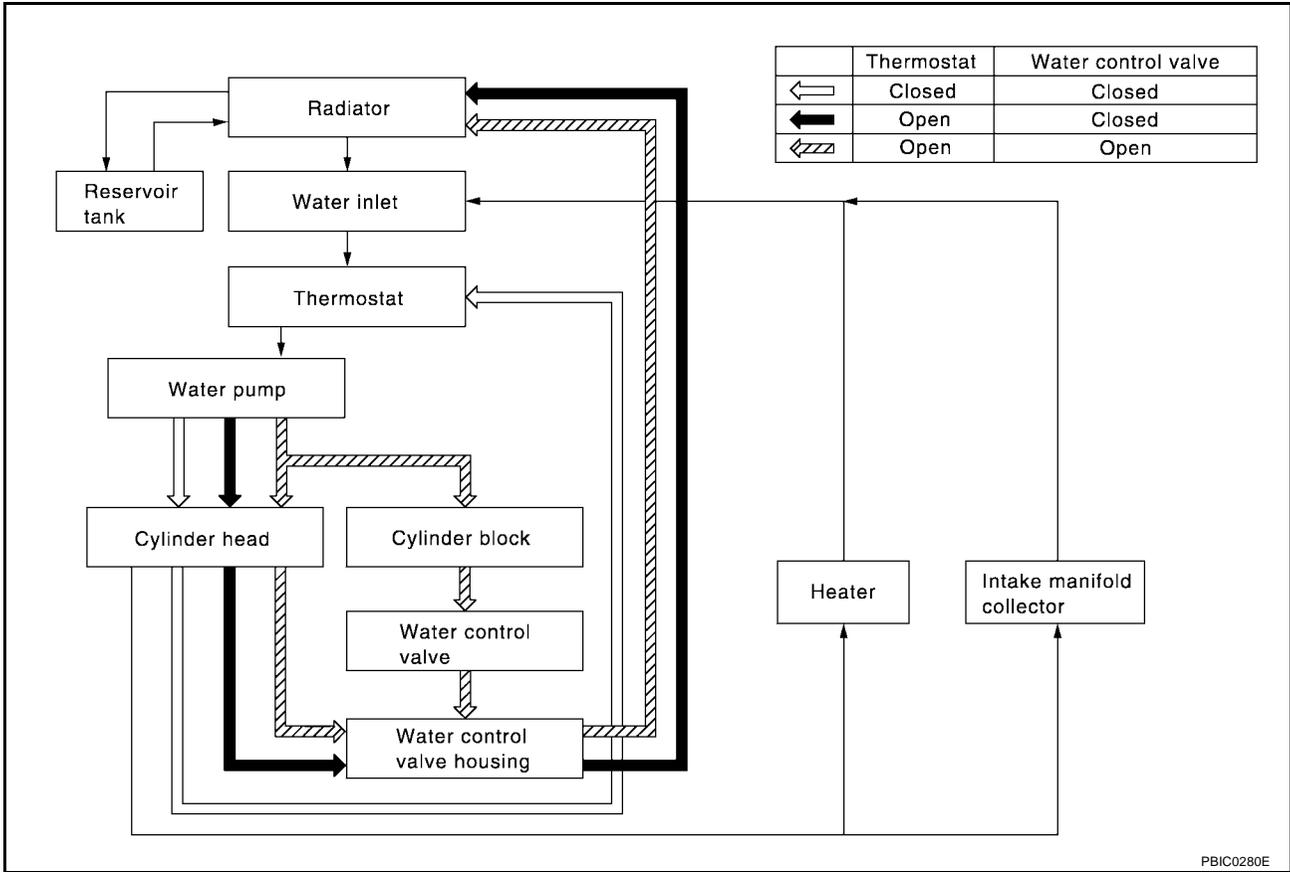
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# COOLING SYSTEM

[QR25DE]

## System Drawing

EBS00M85



## ENGINE COOLANT

### System Check

#### 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.

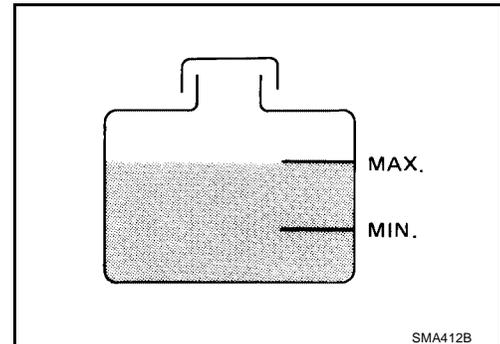
### CHECKING COOLING SYSTEM HOSES

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 using Tool.

**Tool number** : EG17650301 (J-33984-A)

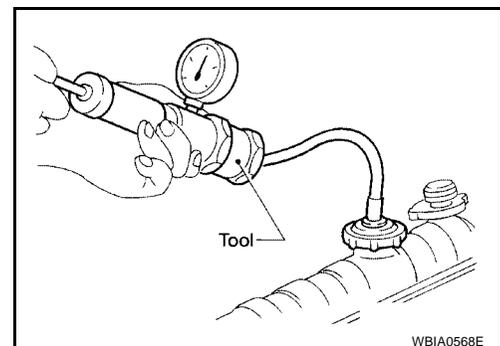
**Testing pressure** : 157 kPa (1.6 kg/cm<sup>2</sup> , 23 psi)

#### 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.



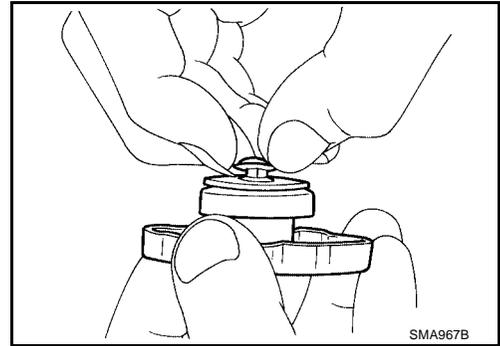
### CHECKING RADIATOR CAP

1. Inspect the radiator cap.
  - Replace the cap if the metal plunger cannot be seen around the edge of the black rubber gasket.
  - Replace the cap if deposits of waxy residue or other foreign material are on the black rubber gasket or the metal retainer.

#### NOTE:

Thoroughly wipe out the radiator filler neck to remove any waxy residue or foreign material.

2. Pull the negative-pressure valve to open it and check that it closes completely when released.
  - Check that there is no dirt or damage on the valve seat of the radiator cap negative-pressure valve.
  - Check that there are no abnormalities in the opening and closing conditions of the negative-pressure valve.



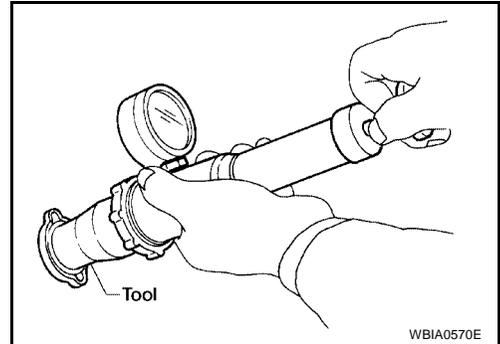
3. Check radiator cap relief pressure using Tool.

**Tool number : EG17650301 (J-33984-A)**

**Standard: 78 – 98 kPa (0.8 – 1.0 kg/cm<sup>2</sup> , 11 – 14 psi)**

**Limit: 59 kPa (0.6 kg/cm<sup>2</sup> , 9 psi)**

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



## 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 shroud and horns. Then tape the harness and electrical connectors to prevent water from entering.
1. Apply water by hose to the back side of the radiator core, with the hose pointed vertically downward.
  2. Apply water again to all radiator core surfaces 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, with the air hose pointed vertically downward.
- Use compressed air lower than 490 kPa (5 kg/cm<sup>2</sup> , 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.
  6. Check for leaks.

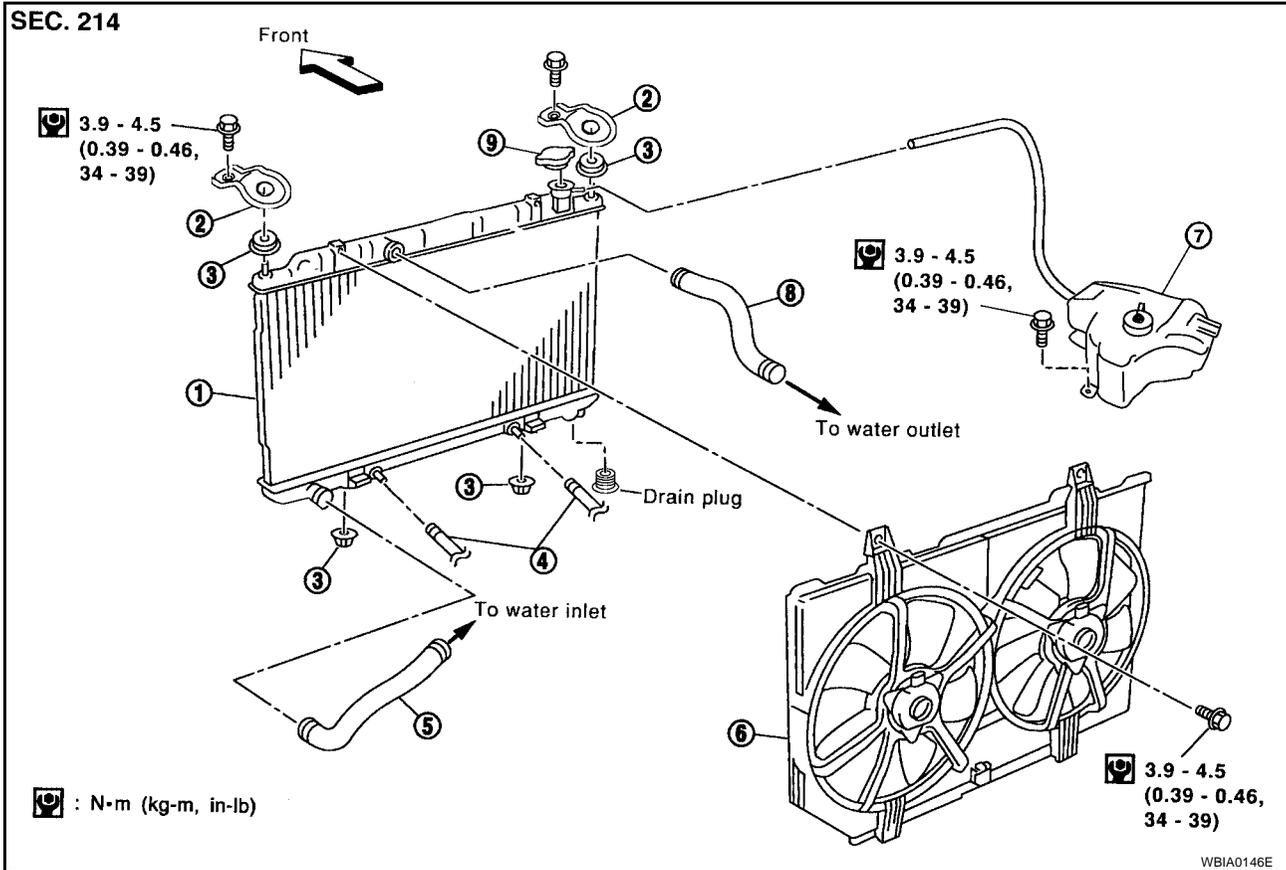
## Refilling Engine Coolant

EBS00M87

Changing the engine coolant is part of the required maintenance of the engine. Refer to [MA-15. "DRAINING ENGINE COOLANT"](#).

## RADIATOR

### Removal and Installation



- |                                      |                          |                          |
|--------------------------------------|--------------------------|--------------------------|
| 1. Radiator                          | 2. Bracket               | 3. Mounting rubber       |
| 4. A/T oil cooler hose (if equipped) | 5. Radiator hose (lower) | 6. Radiator fan assembly |
| 7. Reservoir tank                    | 8. Radiator hose (upper) | 9. Radiator filler cap   |

#### WARNING:

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

#### REMOVAL

1. Drain the coolant from the radiator. Refer to [MA-15, "Changing Engine Coolant"](#).

#### CAUTION:

Perform when engine is cold.

2. Remove fresh air duct. Refer to [EM-17, "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.

# RADIATOR

[QR25DE]

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

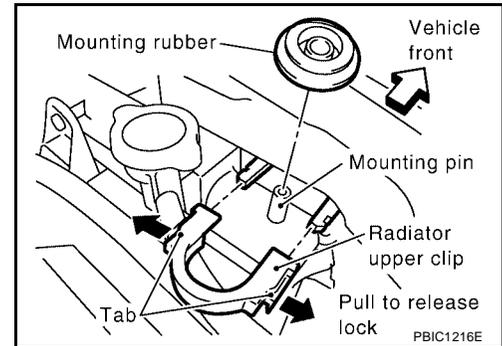
**CAUTION:**

**To prevent damage, do not pull lock tabs excessively.**

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

**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-15, "Changing Engine Coolant"](#).

## INSPECTION

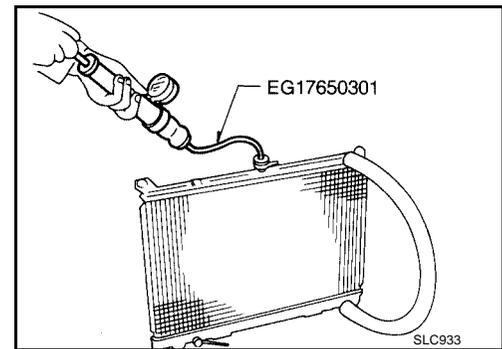
### Radiator

1. 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 electrical connectors to prevent water from entering.
- a. Apply water by hose to the back side of the radiator core, point the hose vertically downward.
- b. Apply water again to all radiator core surfaces once per minute.
- c. Stop washing when no more dirt flows off the radiator.
- d. Blow air into the back side of radiator core, point the air hose vertically downward.
  - Use compressed air lower than 490 kPa (5 kg/cm<sup>2</sup>, 71 psi) and keep distance more than 30 cm (11.8 in).
- e. Blow air again into all the radiator core surfaces once per minute until no water sprays out.
2. Inspect radiator for leaks as follows:
  - a. Apply pressure using Tool.

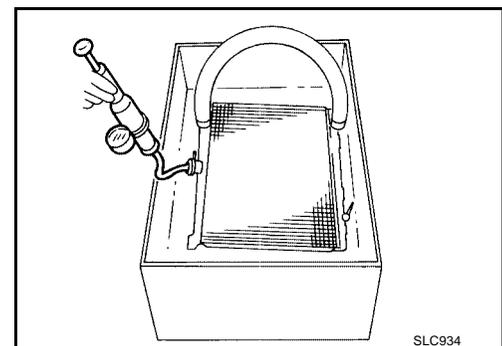
**Specified pressure value** : 157 kPa (1.6 kg/cm<sup>2</sup>, 23 psi)

**WARNING:**

**To prevent the risk of the hose coming undone while under pressure, securely fasten it down with a hose clamp. Attach a hose to the oil cooler as well (A/T model only).**



- b. Check for leakage.



**COOLINGFAN**

**Removal and Installation**

**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 engine coolant from radiator. Refer to [MA-15, "Changing Engine Coolant"](#).

**CAUTION:**

Perform when engine is cold.

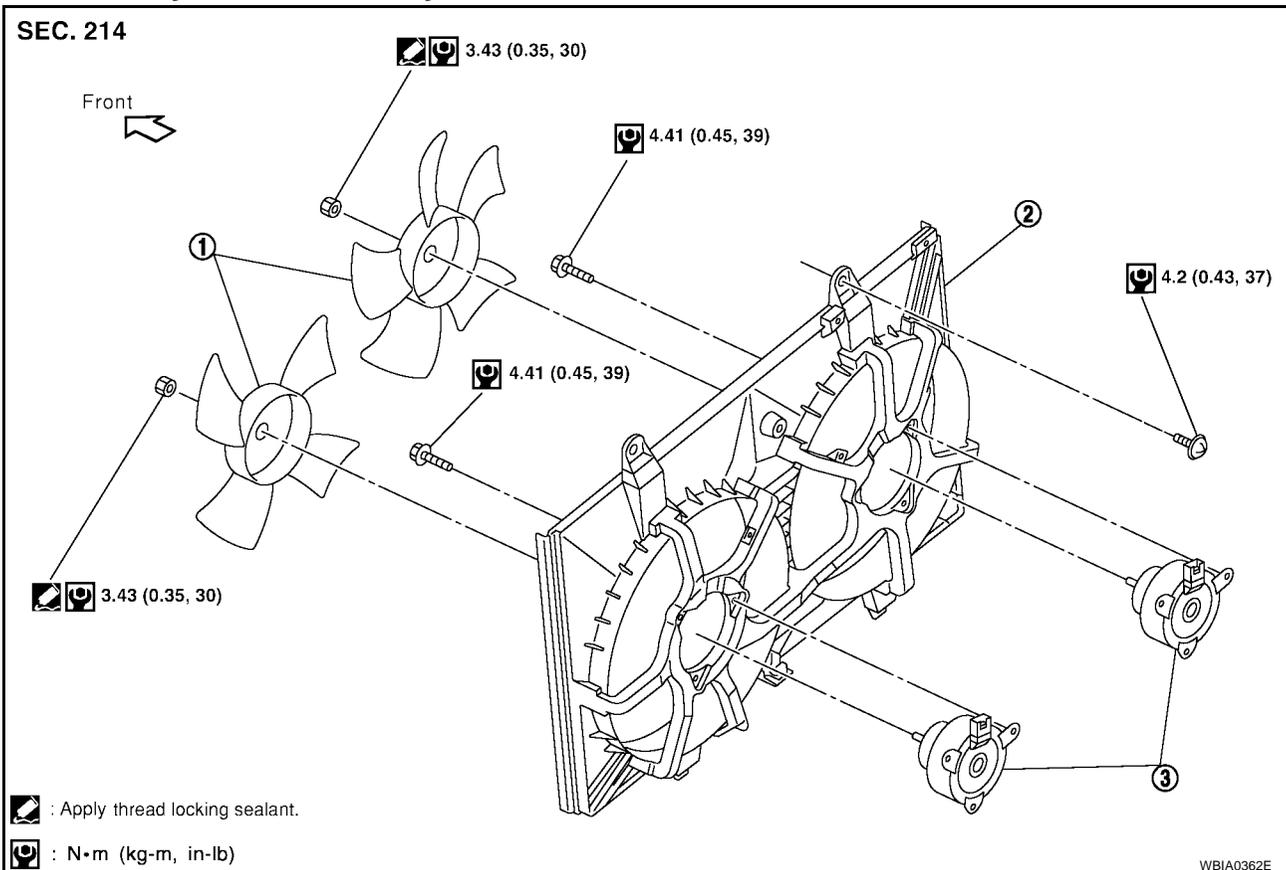
2. Remove air cleaner duct assembly. Refer to [EM-17, "Removal and Installation"](#).
3. Disconnect radiator upper hose.
4. Disconnect fan motor connectors.
5. Remove radiator cooling fan assembly.

**INSTALLATION**

Install in the reverse order of removal.

- Cooling fan is controlled by ECM. For details, refer to [EC-421, DTC P1217 ENGINE OVER TEMPERATURE](#).

**Disassembly and Assembly**



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

**DISASSEMBLY**

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

**ASSEMBLY**

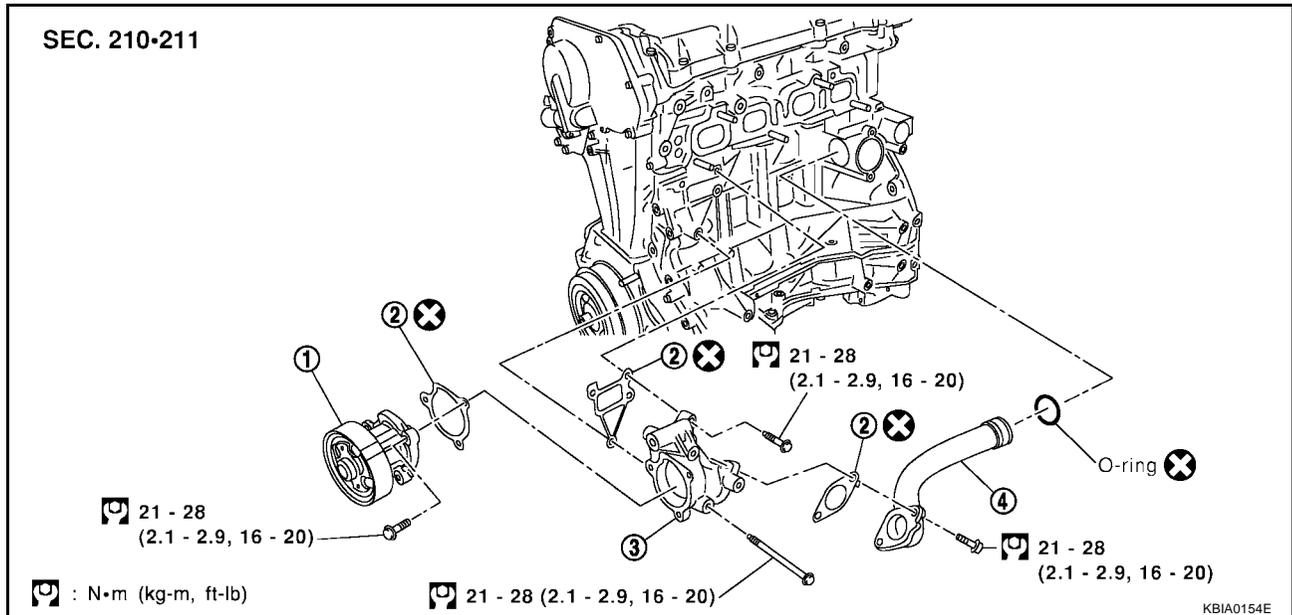
Install in the reverse order of disassembly.

## WATER PUMP

PFP:21020

### Removal and Installation

EBS00J70



- |               |           |                       |
|---------------|-----------|-----------------------|
| 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-15, "Changing Engine Coolant"](#) .

**CAUTION:**

**Perform when the engine is cold.**

2. Remove engine undercover using power tools.
3. Remove drive belt. Refer to [EM-15, "Removal and Installation"](#) .
4. Remove engine cover using power tools.
5. Remove engine coolant reservoir.
6. Remove IPDM E/R (set aside). Refer to [PG-27, "Removal and Installation of IPDM E/R"](#) .
7. Remove RH wheel and tire assembly.
8. Remove fender protector. Refer to [EI-21, "Removal and Installation"](#) .
9. Remove engine ground strap.
10. Remove the water pump.

**NOTE:**

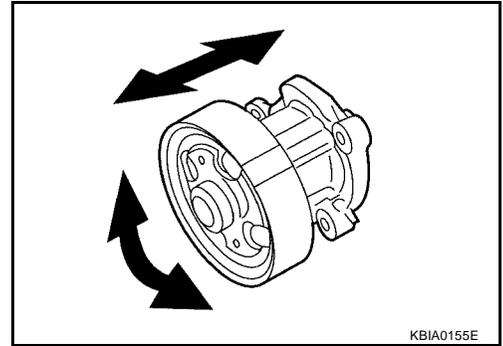
If necessary, the generator and exhaust manifold catalytic convertor assembly must be removed to remove the water pipe.

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

## INSPECTION AFTER INSTALLATION

- After installing the water pump, check for leaks using the radiator cap tester. Refer to [CO-11, "INSPECTION"](#).

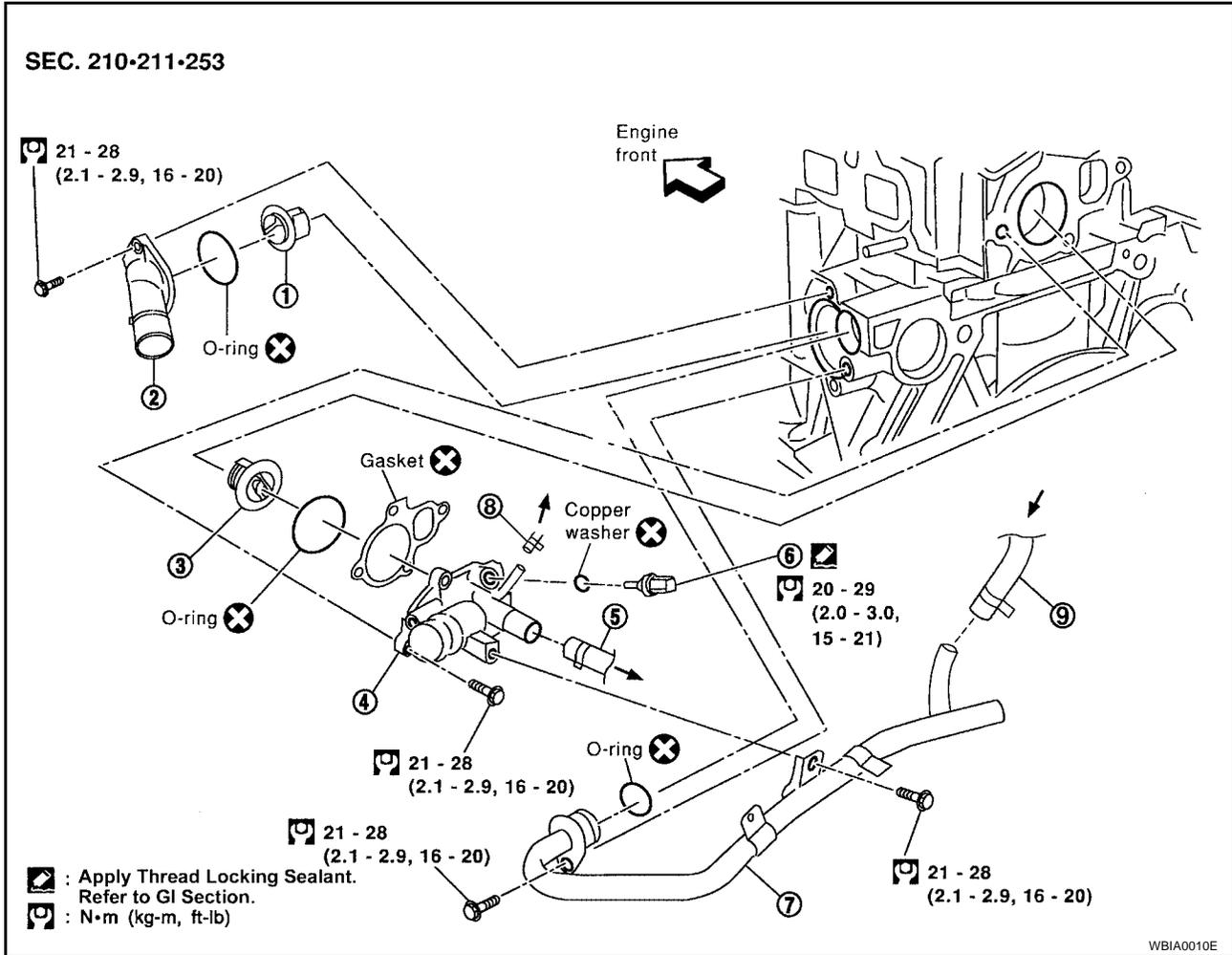
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THERMOSTAT AND THERMOSTAT HOUSING

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Removal and Installation

EBS00J7P



- |                          |  |   |
|--------------------------|--|---|
| 1. Thermostat            | 2. Engine coolant inlet                          | 3. Water control valve                            |
| 4. Engine coolant outlet | 5. Heater hose                                   | 6. Engine coolant temperature sensor              |
| 7. Heater pipe           | 8. Electric throttle control actuator inlet hose | 9. Electric throttle control actuator 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-15, "Changing Engine Coolant"](#).
2. Remove radiator lower hose from the engine coolant inlet side.
3. Remove engine coolant inlet and thermostat.

# THERMOSTAT AND THERMOSTAT HOUSING

[QR25DE]

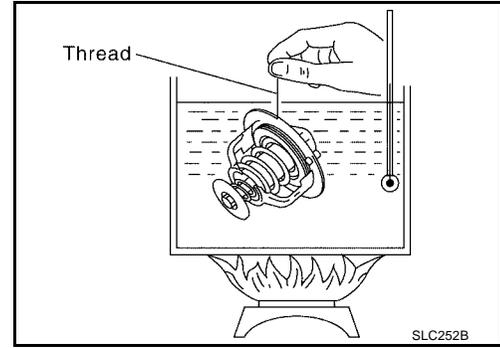
## INSPECTION AFTER REMOVAL

- 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.

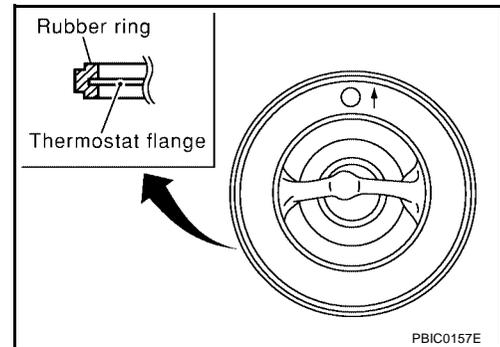


Thermostat	Standard Values
Valve opening temperature	80.5 – 83.5°C (177 – 182°F)
Valve lift	More than 8 mm / 95°C (0.315 in / 203°F)
Valve closing temperature	77°C (171°F) or higher

## INSTALLATION

Installation is in the reverse order of removal.

- Install the engine coolant temperature sensor.  
**Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-45. "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"](#).**
- 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  $\pm 10^\circ$ .
- 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.





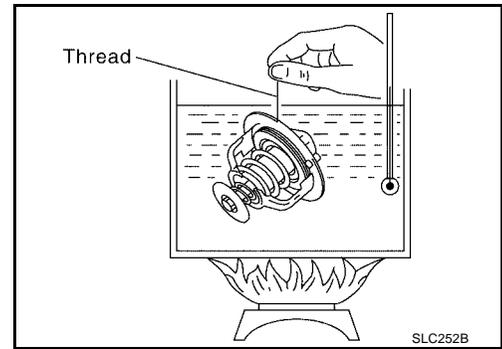
## INSPECTION AFTER REMOVAL

- 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	More than 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 engine coolant temperature sensor.  
**Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"](#).**
- 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  $\pm 10^\circ$ .

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# SERVICE DATA AND SPECIFICATIONS (SDS)

[QR25DE]

## SERVICE DATA AND SPECIFICATIONS (SDS)

PF0:00030

### Capacity

EBS00J7R

ℓ (US gal, Imp gal)

Coolant capacity (With reservoir tank at MAX level)	7.6 (2, 1 5/8)
---	----------------

### Thermostat

EBS00J7S

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

EBS00J7T

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

EBS00J7U

Unit: kPa (kg / cm<sup>2</sup>, psi)

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

**PRECAUTIONS**

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

EBS00J7V

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. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. 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  
REMOVAL OF LIQUID GASKET SEALING**

EBS00M88

- After removing nuts and bolts, separate the mating surface, using Tool and remove old liquid gasket sealing.

**Tool number : KV10111100 (J-37228)**

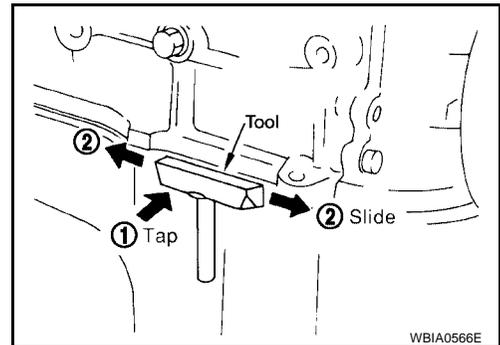
**CAUTION:**

**Be careful not to damage the mating surfaces.**

- Tap Tool to insert it, and then slide it by tapping on the side as shown in the figure.
- In areas where Tool is difficult to use, use plastic hammer to lightly tap the parts, to remove it.

**CAUTION:**

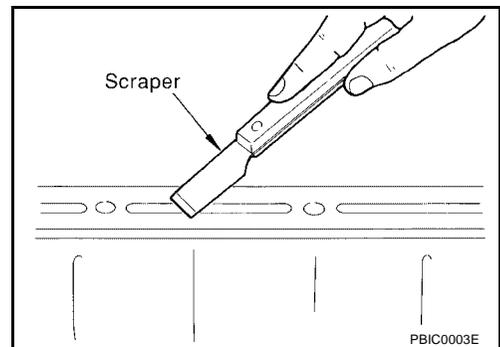
**If for some unavoidable reason suitable tool such as screwdriver is used, be careful not to damage the mating surfaces.**



WBIA0566E

**LIQUID GASKET APPLICATION PROCEDURE**

1. Remove old liquid gasket adhering to the liquid gasket application surface and the mating surface, Using scraper.
  - Remove liquid gasket completely from the groove of the liquid gasket application surface, bolts, and bolt holes.
2. Thoroughly clean the mating surfaces and remove adhering moisture, grease and foreign materials.



PBIC0003E

# PRECAUTIONS

[VQ35DE]

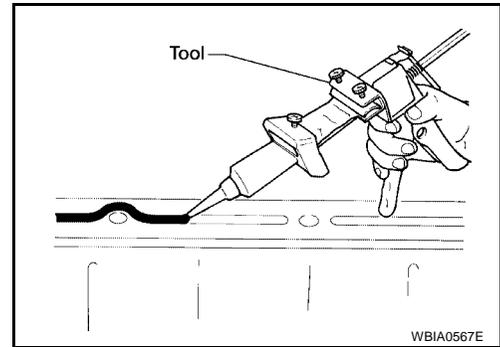
3. Attach liquid gasket tube to Tool.

**Tool number** : WS39930000 ( — )

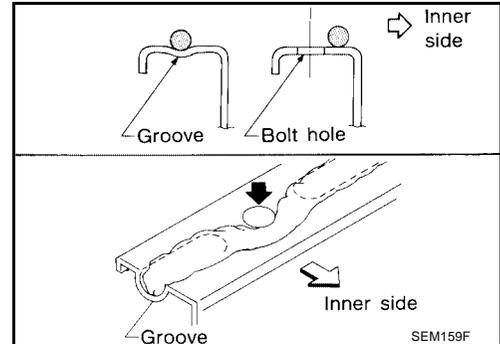
**Use Genuine RTV Silicone Sealant or equivalent. Refer to GI-45, "Recommended Chemical Products and Sealants" .**

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

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



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



**CAUTION:**

**If there are specific instructions in this manual, observe them.**

# PREPARATION

[VQ35DE]

PF0:00002

EBS00J7X

## PREPARATION

### Special Service Tools

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	Pressing the tube of liquid gasket
EG17650301 (J-33984-A) Radiator cap tester adapter	Adapting radiator cap tester to radiator cap and radiator filler neck <b>a: 28 (1.10) dia.</b> <b>b: 31.4 (1.236) dia.</b> <b>c: 41.3 (1.626) dia.</b> Unit: mm (in)
KV10111100 (J-37228) Seal cutter	Removing chain tensioner cover and water pump cover
— (J-23688) Engine coolant refractometer	Checking concentration of ethylene glycol in engine coolant

### Commercial Service Tools

EBS00J7Y

Tool name	Description
Power tool	Loosening bolts and nuts

# OVERHEATING CAUSE ANALYSIS

[VQ35DE]

## OVERHEATING CAUSE ANALYSIS

PFP:00012

### Troubleshooting Chart

EBS00JZ

		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			

# OVERHEATING CAUSE ANALYSIS

[VQ35DE]

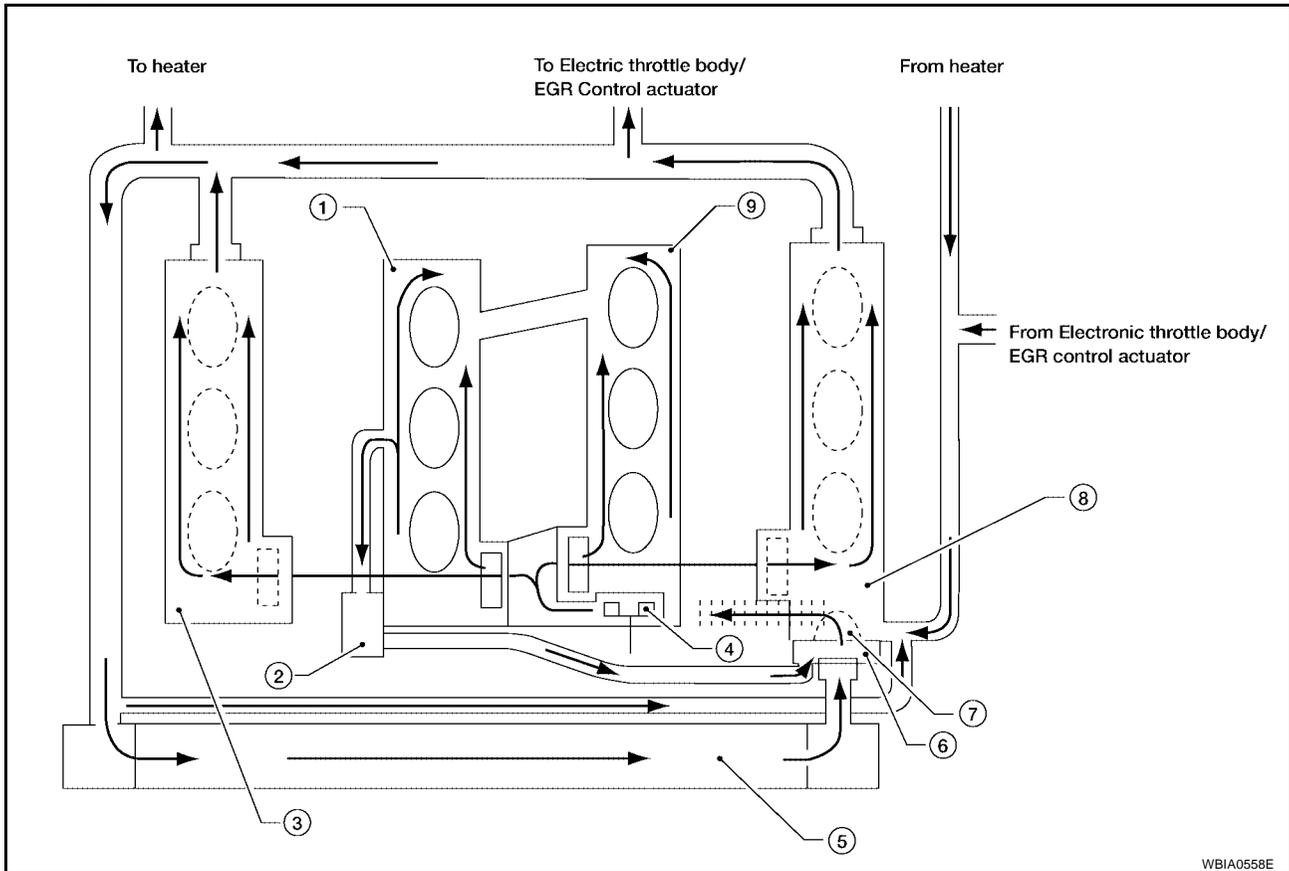
	Symptom		Check items				
Except cooling system parts malfunction	—	Overload on engine	Abusive driving	High engine rpm under no load	A		
				Driving in low gear for extended time	CO		
				Driving at extremely high speed	C		
					Powertrain system malfunction	—	D
					Installed improper size wheels and tires		D
					Dragging brakes		E
			Improper ignition timing	E			
	Blocked or restricted air flow	Blocked bumper	—	—	F		
		Blocked radiator grille	Installed car brassiere		F		
			Mud contamination or paper clogging		F		
		Blocked radiator	—		G		
		Blocked condenser	Blocked air flow		G		
Installed large fog lamp	G						

## COOLING SYSTEM

PFP:21020

### Cooling Circuit

EBS00J80



WBIA0558E

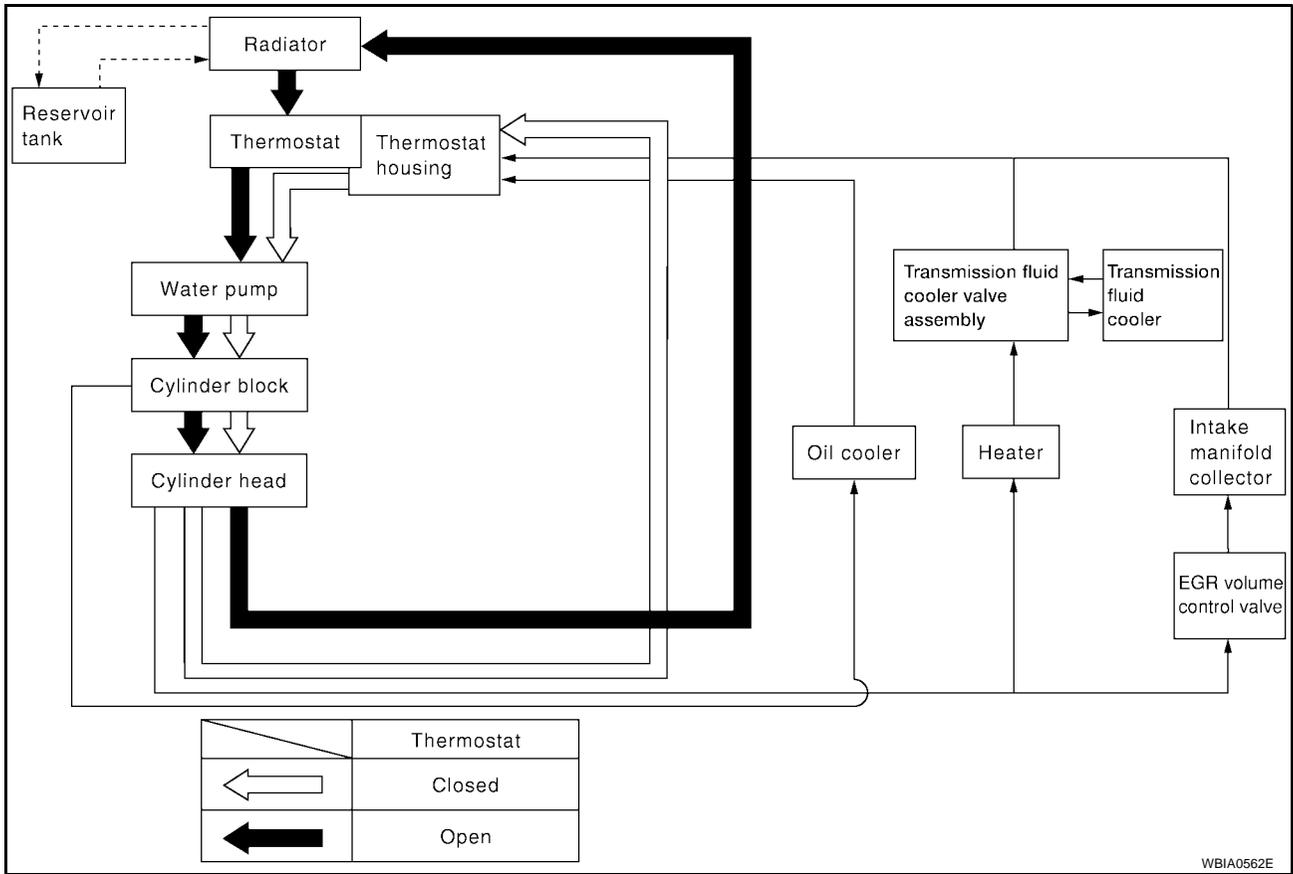
- |                        |                       |                        |
|------------------------|-----------------------|------------------------|
| 1. Cylinder block (RH) | 2. Oil cooler         | 3. Cylinder head (RH)  |
| 4. Water pump          | 5. Radiator           | 6. Water inlet         |
| 7. Thermostat          | 8. Cylinder head (LH) | 9. Cylinder block (LH) |

# COOLING SYSTEM

[VQ35DE]

## System Drawing

EBS00M89



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## ENGINE COOLANT

### System Check

#### 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.

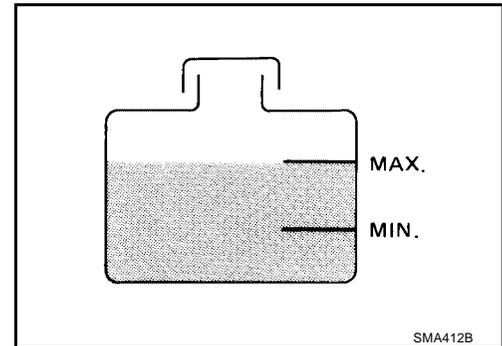
### CHECKING COOLING SYSTEM HOSES

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 using Tool.

**Tool number** : EG17650301 (J-33984-A)

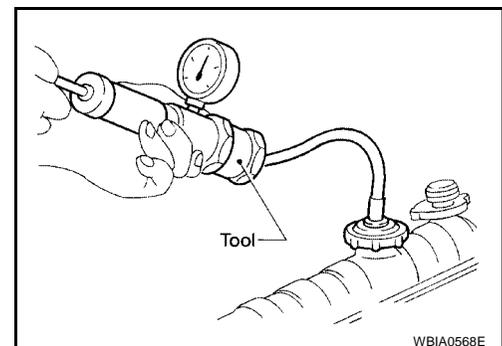
**Testing pressure** : 157 kPa (1.6 kg/cm<sup>2</sup> , 23 psi)

#### 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.



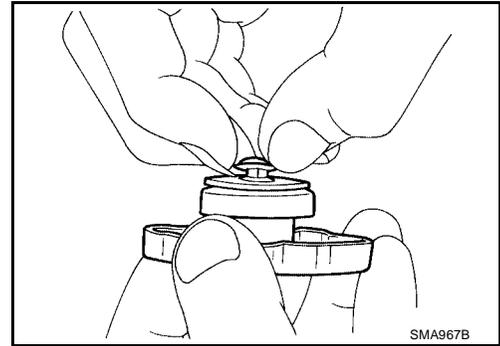
### CHECKING RADIATOR CAP

1. Inspect the radiator cap.
  - Replace the cap if the metal plunger cannot be seen around the edge of the black rubber gasket.
  - Replace the cap if deposits of waxy residue or other foreign material are on the black rubber gasket or the metal retainer.

#### NOTE:

Thoroughly wipe out the radiator filler neck to remove any waxy residue or foreign material.

2. Pull the negative-pressure valve to open it and check that it closes completely when released.
  - Check that there is no dirt or damage on the valve seat of the radiator cap negative-pressure valve.
  - Check that there are no abnormalities in the opening and closing conditions of the negative-pressure valve.



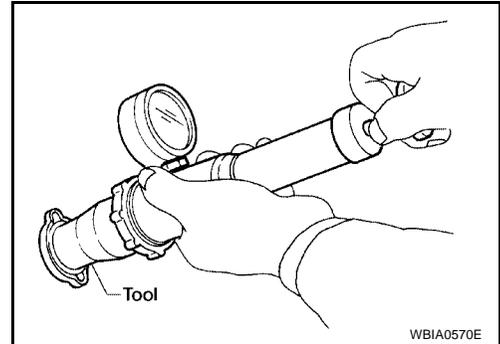
3. Check radiator cap relief pressure using Tool.

**Tool number : EG17650301 (J-33984-A)**

**Standard: 78 – 98 kPa (0.8 – 1.0 kg/cm<sup>2</sup> , 11 – 14 psi)**

**Limit: 59 kPa (0.6 kg/cm<sup>2</sup> , 9 psi)**

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



## 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 shroud and horns. Then tape the harness and electrical connectors to prevent water from entering.
1. Apply water by hose to the back side of the radiator core, with the hose pointed vertically downward.
  2. Apply water again to all radiator core surfaces 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, with the air hose pointed vertically downward.
    - Use compressed air lower than 490 kPa (5 kg/cm<sup>2</sup> , 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.
  6. Check for leaks.

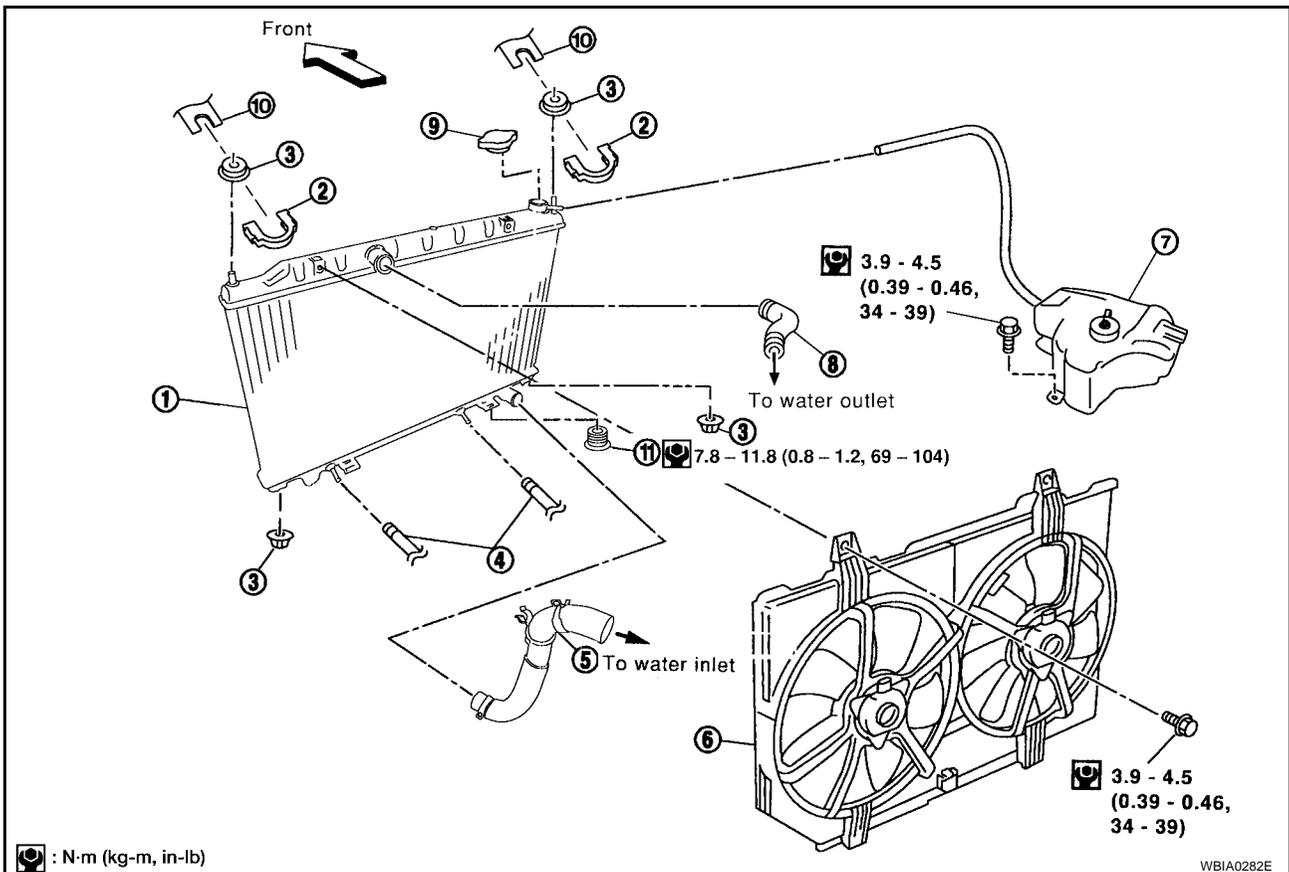
## Refilling Engine Coolant

EBS00M8B

Changing the engine coolant is part of the required maintenance of the engine. Refer to [MA-15, "DRAINING ENGINE COOLANT"](#) .

## RADIATOR

### Removal and Installation



- |  |                          |                          |
|--|--------------------------|--------------------------|
| 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-22, "Changing Engine Coolant"](#).

### CAUTION:

Perform when engine is cold.

2. Remove fresh air duct. Refer to [EM-120, "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.

# RADIATOR

[VQ35DE]

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

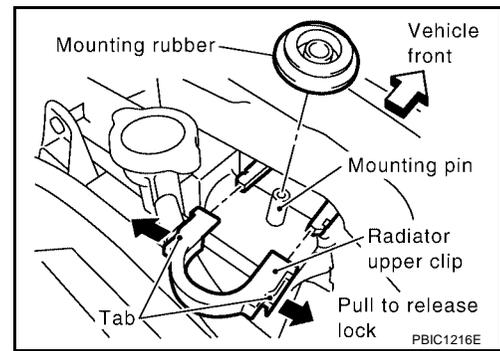
**CAUTION:**

To prevent damage, do not pull lock tabs excessively.

- Remove radiator cooling fan assembly to radiator bolts.
- Remove the radiator assembly.

**CAUTION:**

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



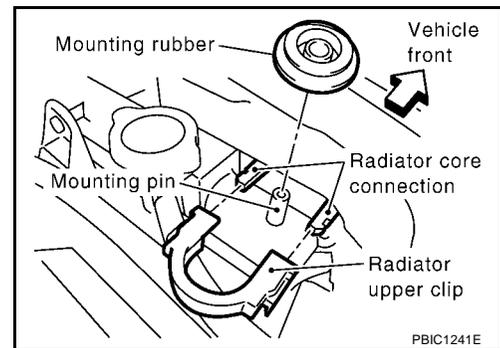
## INSTALLATION

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

- Fill the radiator with coolant. Refer to [MA-22, "Changing Engine Coolant"](#).

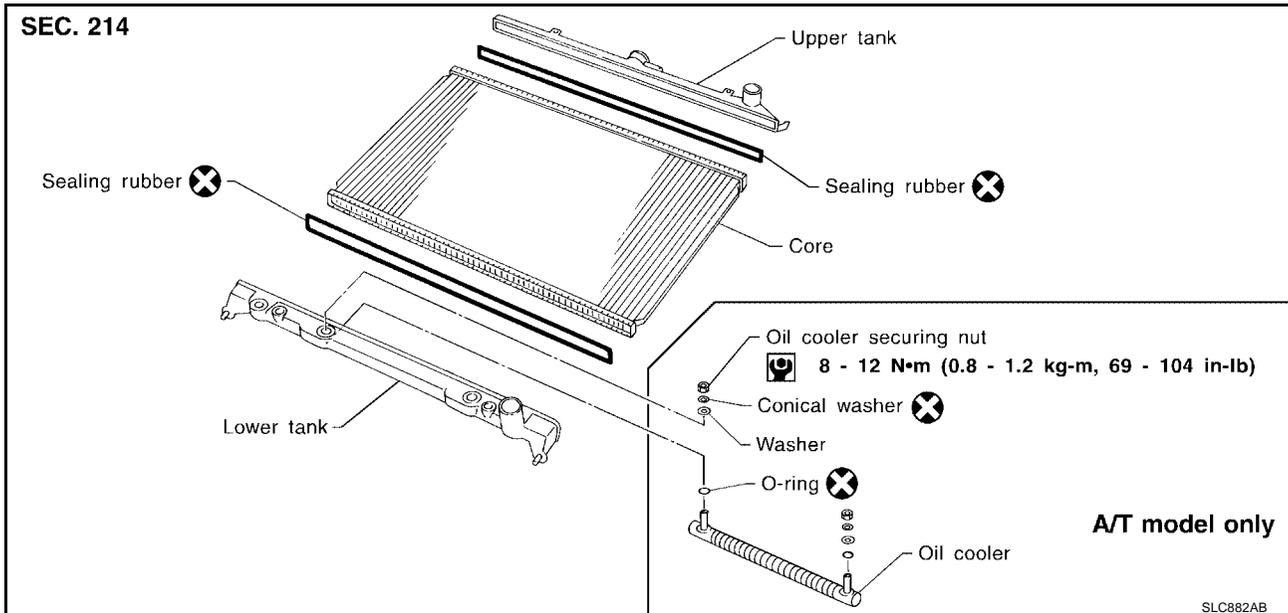
### Installation of Radiator Upper Clip

- Install radiator upper clip on radiator core connection with the following procedure:
  - Install the rubber on mounting pin of radiator core.
  - 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.
  - 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.



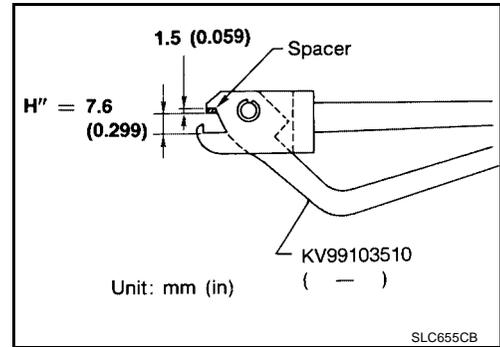
## Disassembly and Assembly

EBS00T53



## PREPARATION

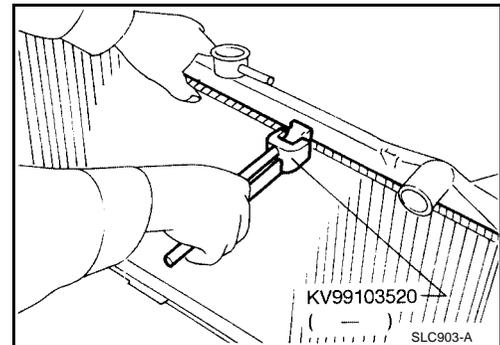
1. Attach the spacer to the tip of the Tool.  
Spacer specification: 1.5 mm (0.059 in) thick x 18 mm (0.71 in) wide x 8.5 mm (0.335 in) long.
2. Make sure that when Tool is closed dimension H'' is approx. 7.6 mm (0.299 in).
3. Adjust dimension H'' with the spacer, if necessary.



## DISASSEMBLY

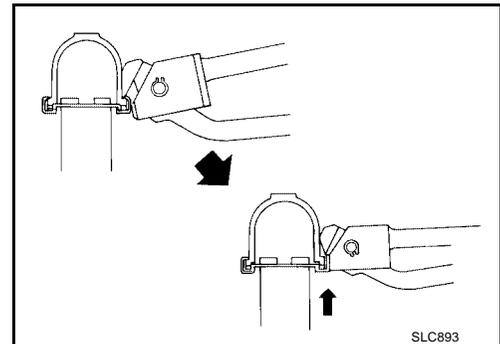
1. Remove the tank using Tool.

**Tool number** : KV99103520 ( - )



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

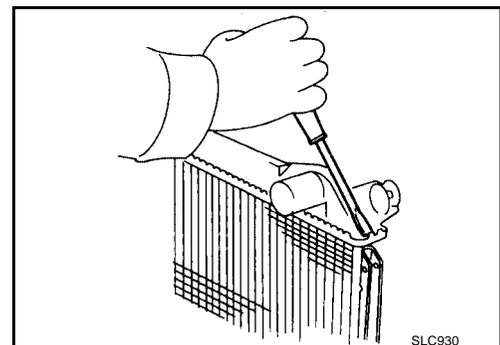
**CAUTION:**  
Do not bend excessively.



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

**CAUTION:**  
Be careful not to damage tank.

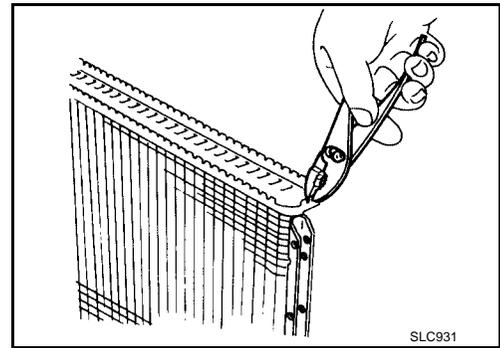
2. Remove sealing rubber.



# RADIATOR

[VQ35DE]

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

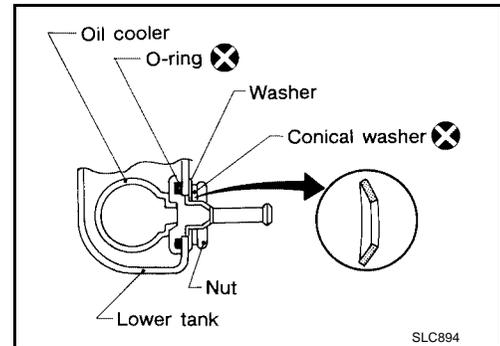


## ASSEMBLY

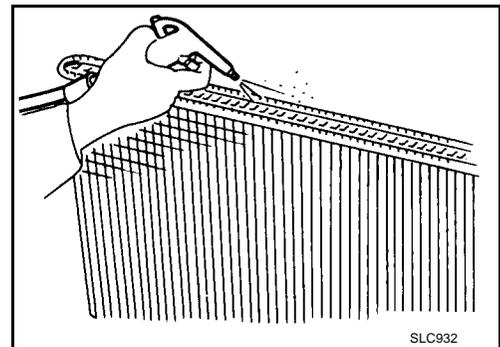
1. Install the oil cooler (if equipped).

### NOTE:

Pay attention to direction of conical washer.



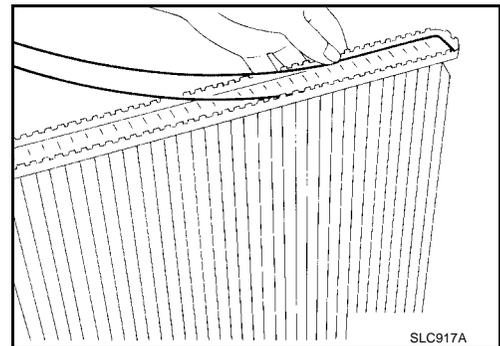
2. Clean the contact portion of the tank.



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

### CAUTION:

Be careful not to twist sealing rubber gasket.



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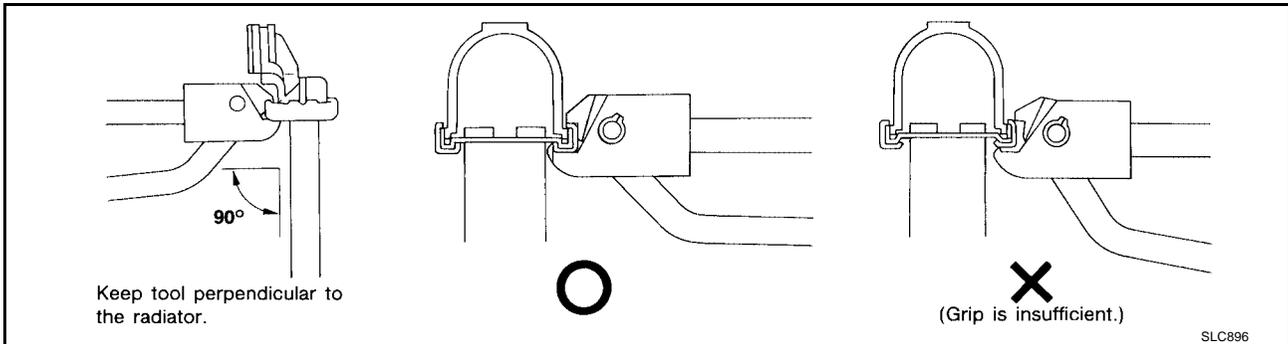
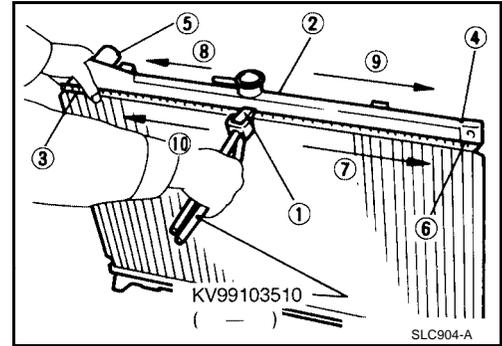
M

# RADIATOR

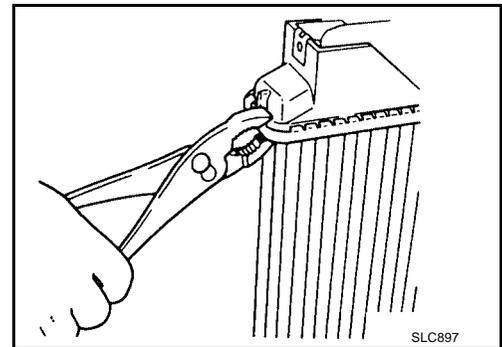
[VQ35DE]

4. Crimp tank in specified sequence using Tool.

**Tool number : KV99103510 ( — )**



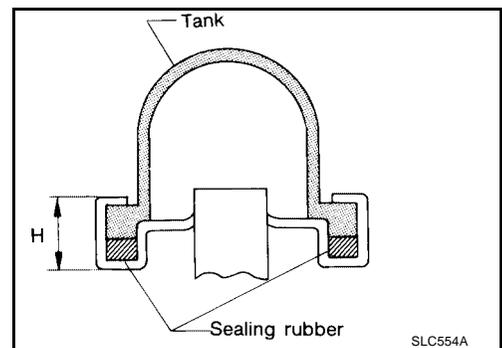
- In the locations where Tool cannot be used use a suitable tool.



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-35, "INSPECTION"](#).



# RADIATOR

[VQ35DE]

## INSPECTION

1. Apply pressure using Tool.

**Tool number** : EG17650301 (J-33984-A)

**Specified pressure value** : 157 kPa (1.6 kg/cm<sup>2</sup> , 23 psi)

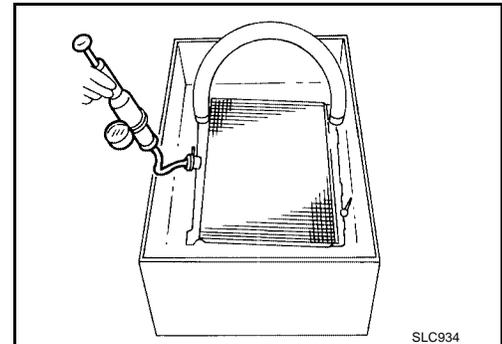
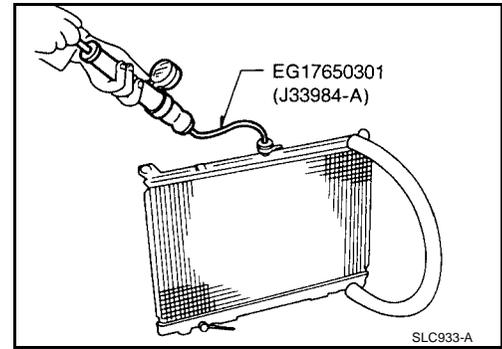
**WARNING:**

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.



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## COOLING FAN

PFP:21140

### Removal and Installation

EBS00T54

**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 engine coolant from radiator. Refer to [MA-22, "Changing Engine Coolant"](#).

**CAUTION:**

Perform when engine is cold.

2. Remove air cleaner duct assembly. Refer to [EM-120, "Removal and Installation"](#).
3. Disconnect radiator upper hose.
4. Disconnect fan motor connectors.
5. Remove radiator cooling fan assembly.

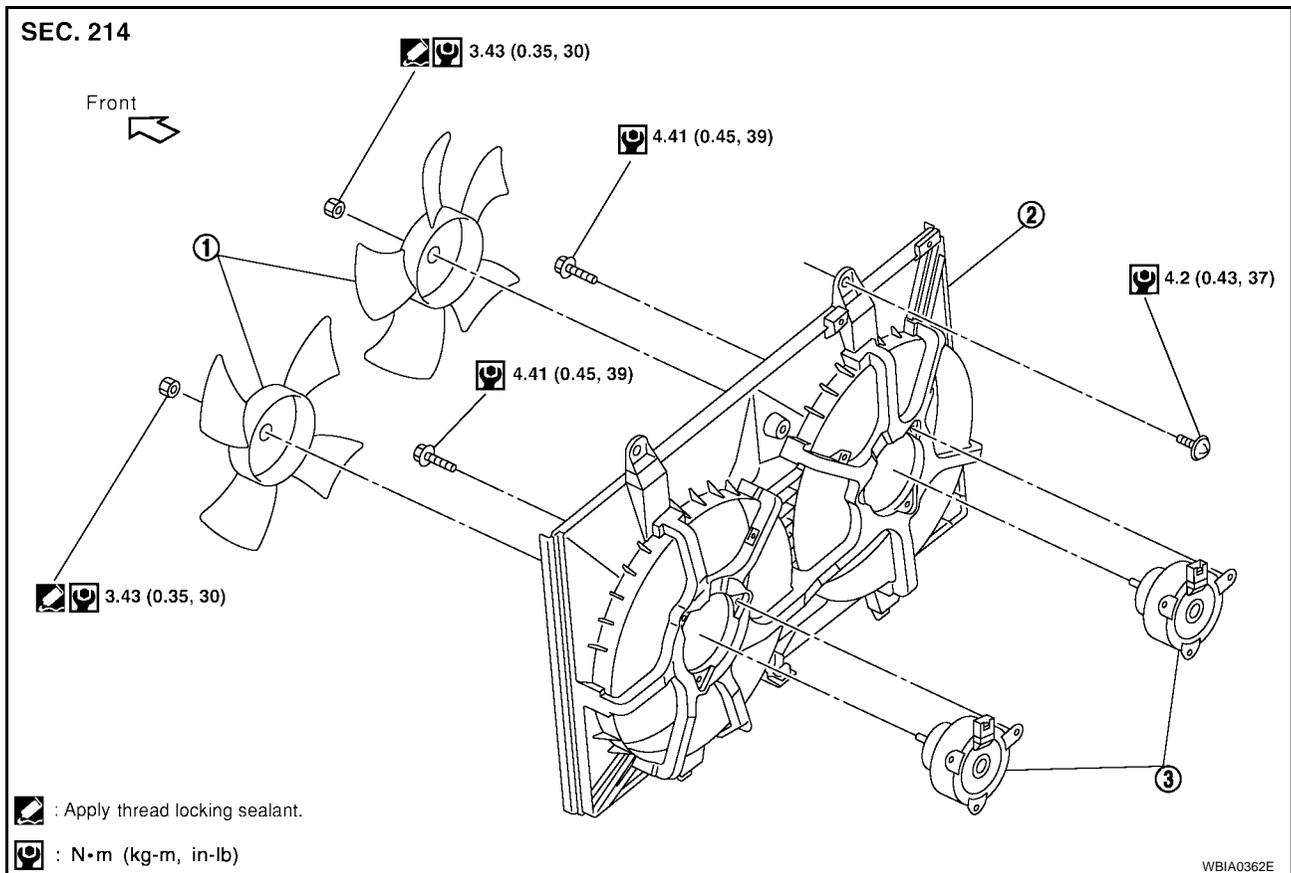
#### INSTALLATION

Install in the reverse order of removal.

- Cooling fan is controlled by ECM. For details, refer to [EC-1111, "DTC P1217 ENGINE OVER TEMPERATURE"](#).

### Disassembly and Assembly of Radiator Fan

EBS00T55



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

#### DISASSEMBLY

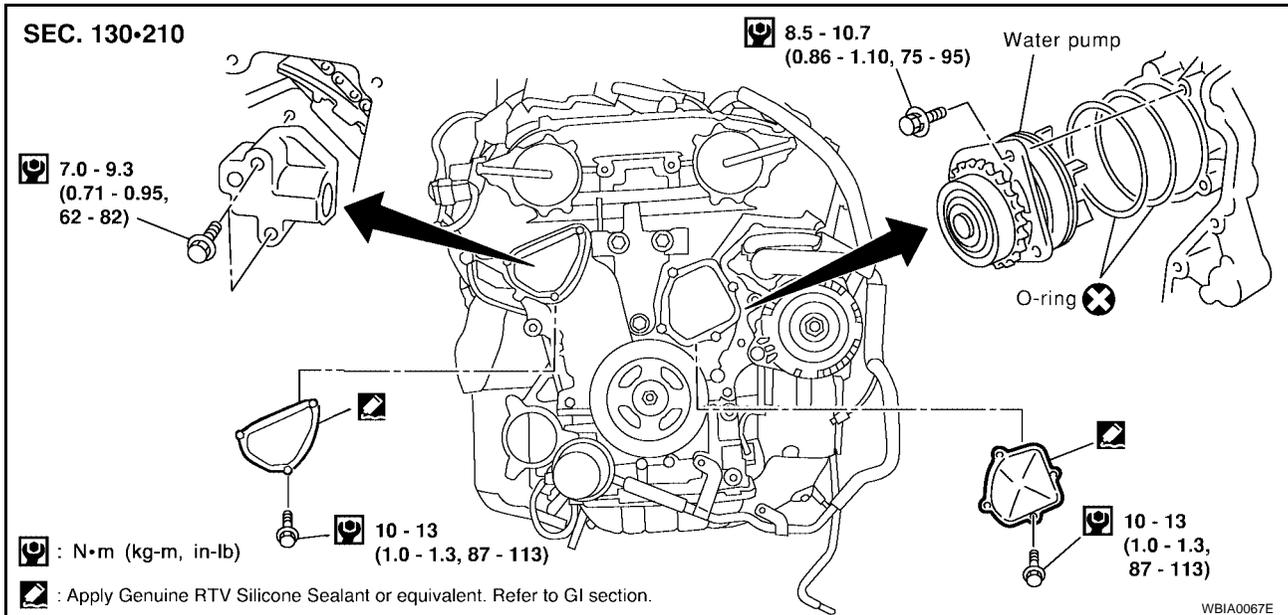
1. Remove fan blade.
2. Remove fan motor from fan shroud.

#### ASSEMBLY

Assembly is in the reverse order of disassembly.

## WATER PUMP

### Removal and Installation



#### 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.

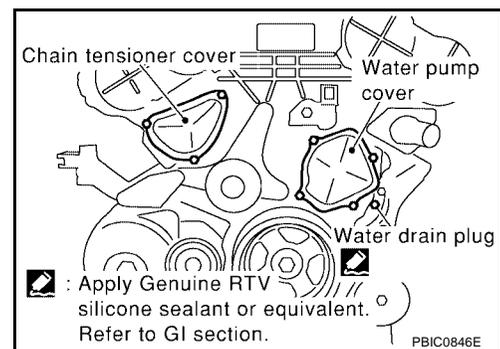
#### REMOVAL

1. Remove undercover, using power tools.
2. Drain coolant from radiator. Refer to [MA-22, "Changing Engine Coolant"](#).

#### CAUTION:

**Perform when the engine is cold.**

3. Remove engine coolant reservoir tank. Refer to [CO-30, "Removal and Installation"](#).
4. Reposition IPDM/ER aside. Refer to [PG-27, "Removal and Installation of IPDM E/R"](#).
5. Remove RH wheel and tire and the splash shield.
6. Remove drive belts.
7. Remove idler pulley, then the power steering and generator adjusting bars.
8. Support engine and remove the front engine insulator and bracket. Refer to [EM-219, "Removal and Installation"](#).
9. Remove water drain plug on water pump side of cylinder block.
10. Remove chain tensioner cover and water pump cover.
11. Remove the chain tensioner assembly.
  - a. Pull the lever down and release the plunger stopper tab.



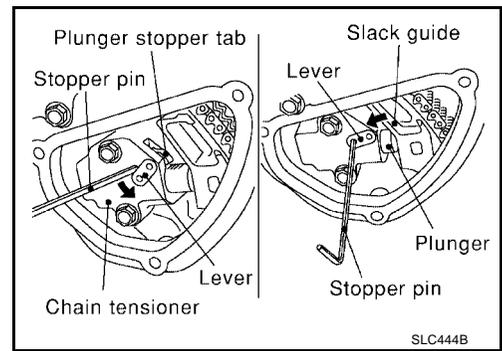
# WATER PUMP

[VQ35DE]

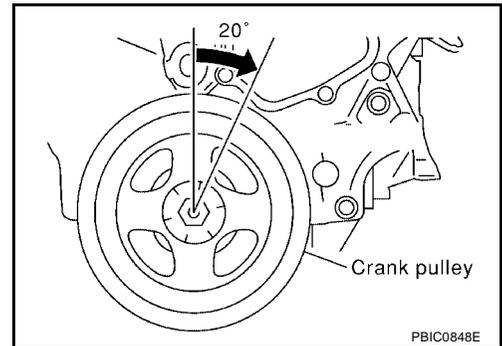
- b. Insert the stopper pin into the tensioner body hole to hold the lever and keep the stopper tab released.

**NOTE:**

An allen wrench [(2.5 mm (0.98 in))] is used for a stopper pin as an example.



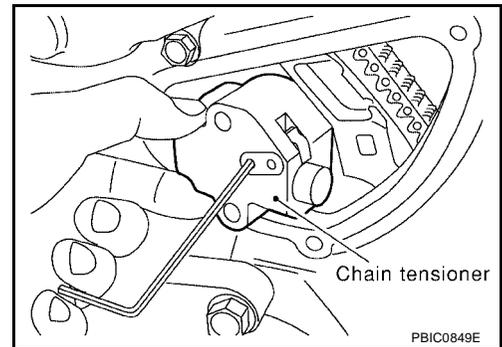
- c. Insert the plunger into the tensioner body by pressing the timing chain slack guide.  
d. Keep the slack guide pressed and hold the plunger in by pushing the stopper pin deeper through the lever and into the tensioner body hole  
e. Make a gap between water pump gear and timing chain, by turning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



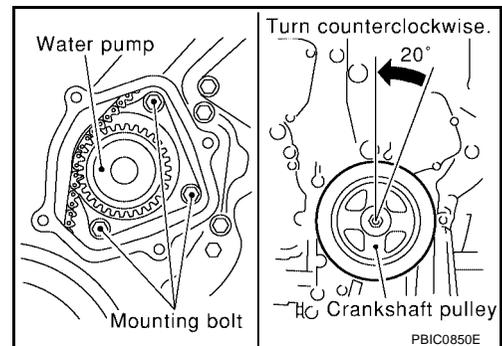
12. Remove chain tensioner.

**CAUTION:**

Be careful not to drop bolts inside chain case.



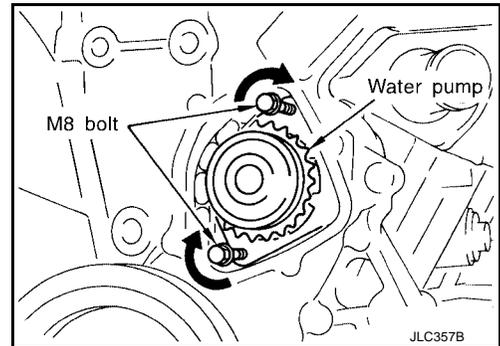
13. Remove the three water pump bolts. Make a gap between water pump gear and timing chain, by turning crankshaft pulley counterclockwise until timing chain loosens on water pump sprocket.



# WATER PUMP

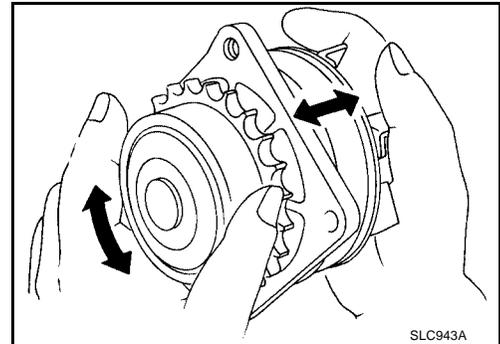
[VQ35DE]

- Screw M8 bolts [pitch: 1.25 mm (0.49 in) length: approx. 50 mm (1.97 in)] into water pumps upper and lower bolt holes until they reach the timing chain case. Then, alternately tighten each bolt for a half turn, and pull out the water pump.
  - Pull straight out while preventing vane from contacting socket in installation area.
  - Remove water pump without causing sprocket to contact timing chain.
- Remove M8 bolts and O-rings from water pump.



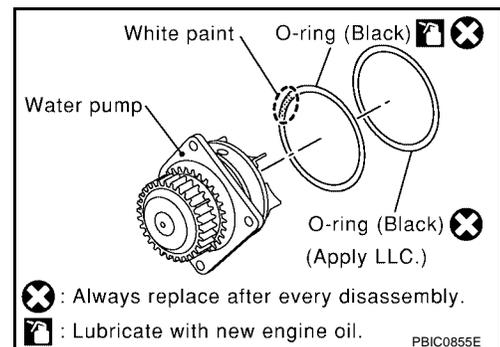
## INSPECTION AFTER REMOVAL

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



## INSTALLATION

- Install new O-rings to water pump.
- Apply engine oil and coolant to the O-rings as shown.
  - Locate the O-ring with white paint mark to engine front side.



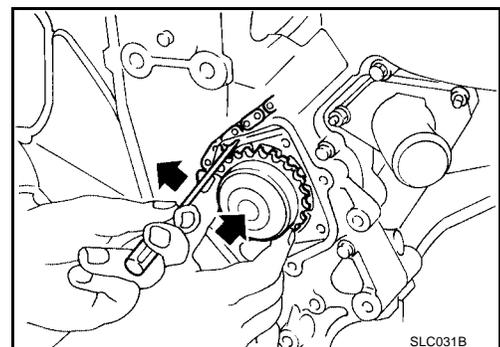
- Install the water pump.

### CAUTION:

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

- Check that timing chain and water pump sprocket are engaged.
- Insert water pump by tightening bolts alternately and evenly.

**Water pump bolts**      **8.5 – 10.7 N·m (0.86 – 1.10 kg·m, 75 – 95 in·lb)**



- Remove dust and foreign material completely from backside of chain tensioner and from installation area of rear timing chain case.

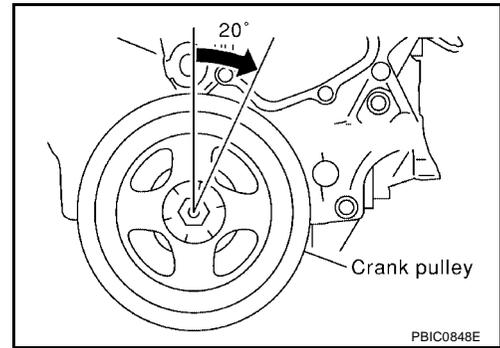
# WATER PUMP

[VQ35DE]

5. Turn the crankshaft pulley approximately 20° clockwise so that the timing chain on the timing chain tensioner side is loose.

**NOTE:**

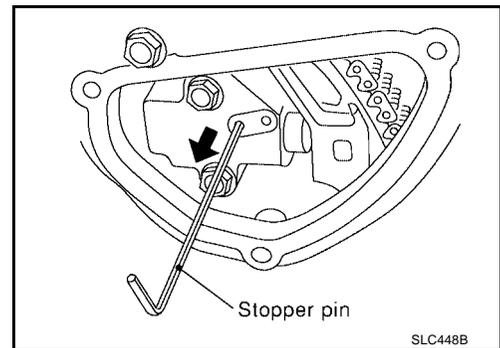
When installing the timing chain tensioner, engine oil should be applied to the oil hole and tensioner.



6. Install the timing chain tensioner.

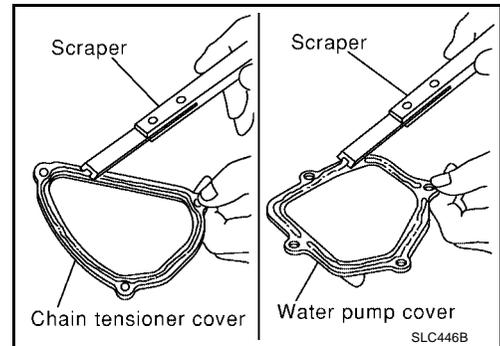
**Timing chain tensioner bolts** : 7.0 – 9.3 N-m (0.71 – 0.95 kg-m, 62 – 82 in-lb)

7. Remove the stopper pin.

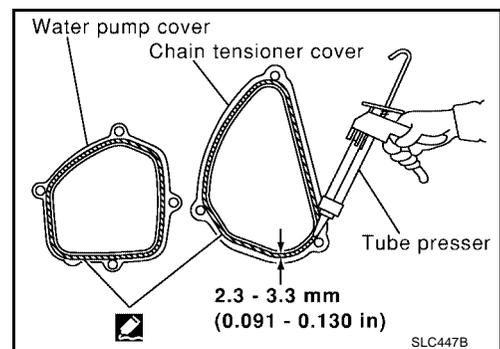


8. Install chain tensioner and water pump cover.

- a. Before installing, remove all traces of sealant from mating surface of water pump cover and chain tensioner cover using a scraper. Also remove traces of sealant from the mating surface of the front cover.



- b. Apply a continuous bead of RTV Silicone Sealant or equivalent, to mating surface of chain tensioner cover and water pump cover. Refer to [GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"](#).



9. Install water drain plug on water pump side of cylinder block. Refer to [MA-22, "Changing Engine Coolant"](#).

10. Install idler pulley.

**Idler pulley bolts** : 25 - 31 N-m (2.5 - 3.2 kg-m, 18 - 23 ft-lb)

11. Installation of remaining components is in the reverse order of removal.

# WATER PUMP

[VQ35DE]

- Refill engine coolant. Refer to [MA-23. "REFILLING ENGINE COOLANT"](#) .
- 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.

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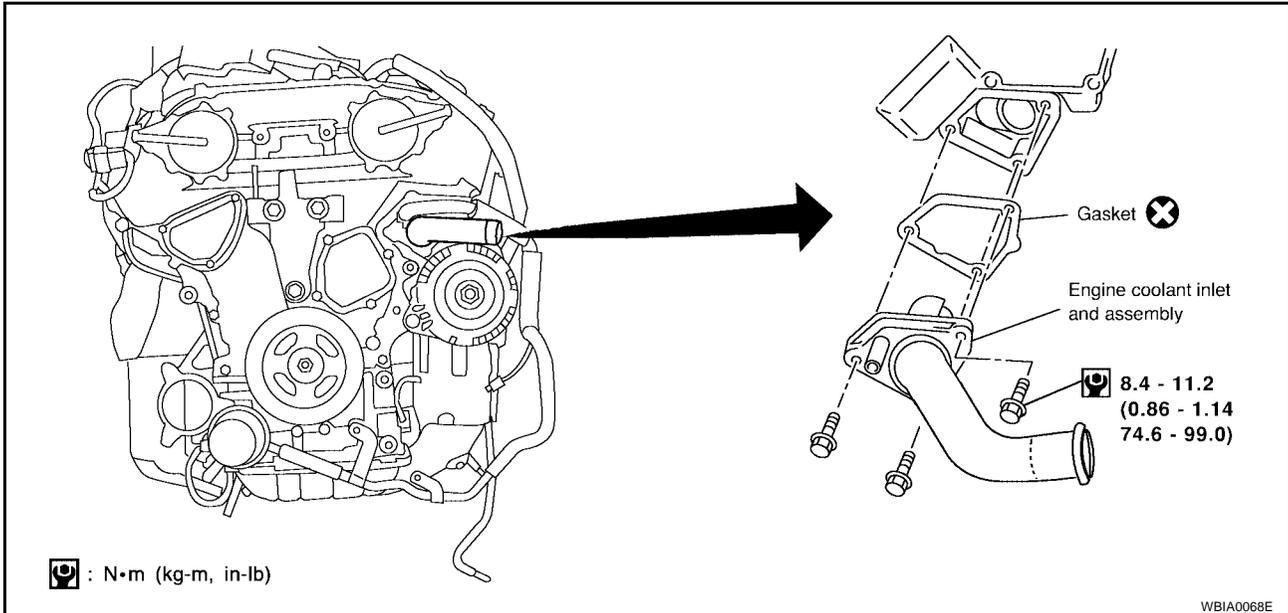
M

## THERMOSTAT AND THERMOSTAT HOUSING

PFP:21200

### Removal and Installation

EBS00J86



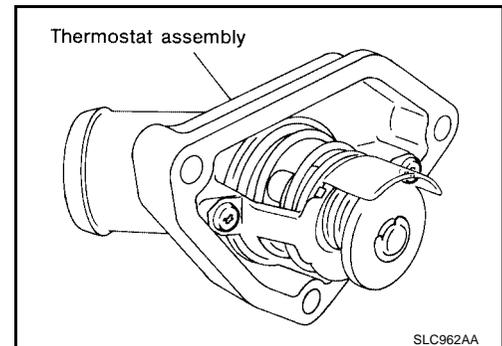
### REMOVAL

1. Remove engine undercover using power tool.
2. Drain coolant from radiator. Refer to [MA-22, "Changing Engine Coolant"](#) .

**CAUTION:**

**Perform when engine is cool.**

3. Remove drive belts. Refer to [EM-119, "DRIVE BELTS"](#) .
4. Remove water drain plug on water pump side of the engine. Refer to [MA-22, "DRAINING ENGINE COOLANT"](#) .
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.**

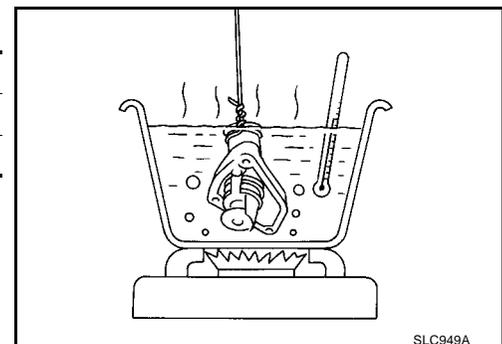


### INSPECTION AFTER REMOVAL

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

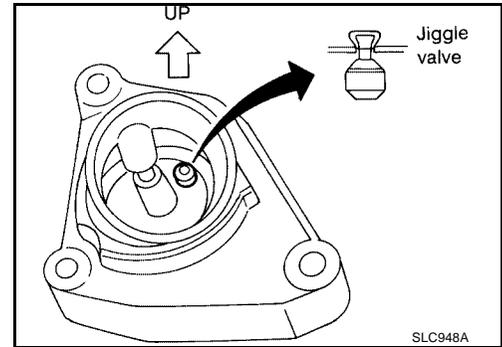
Thermostat	Standard Values
Valve opening temperature	82°C (180°F)
Valve lift	8.6 mm / 95°C (0.339 in / 203°F)

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 of the remaining components is in the reverse order of removal.



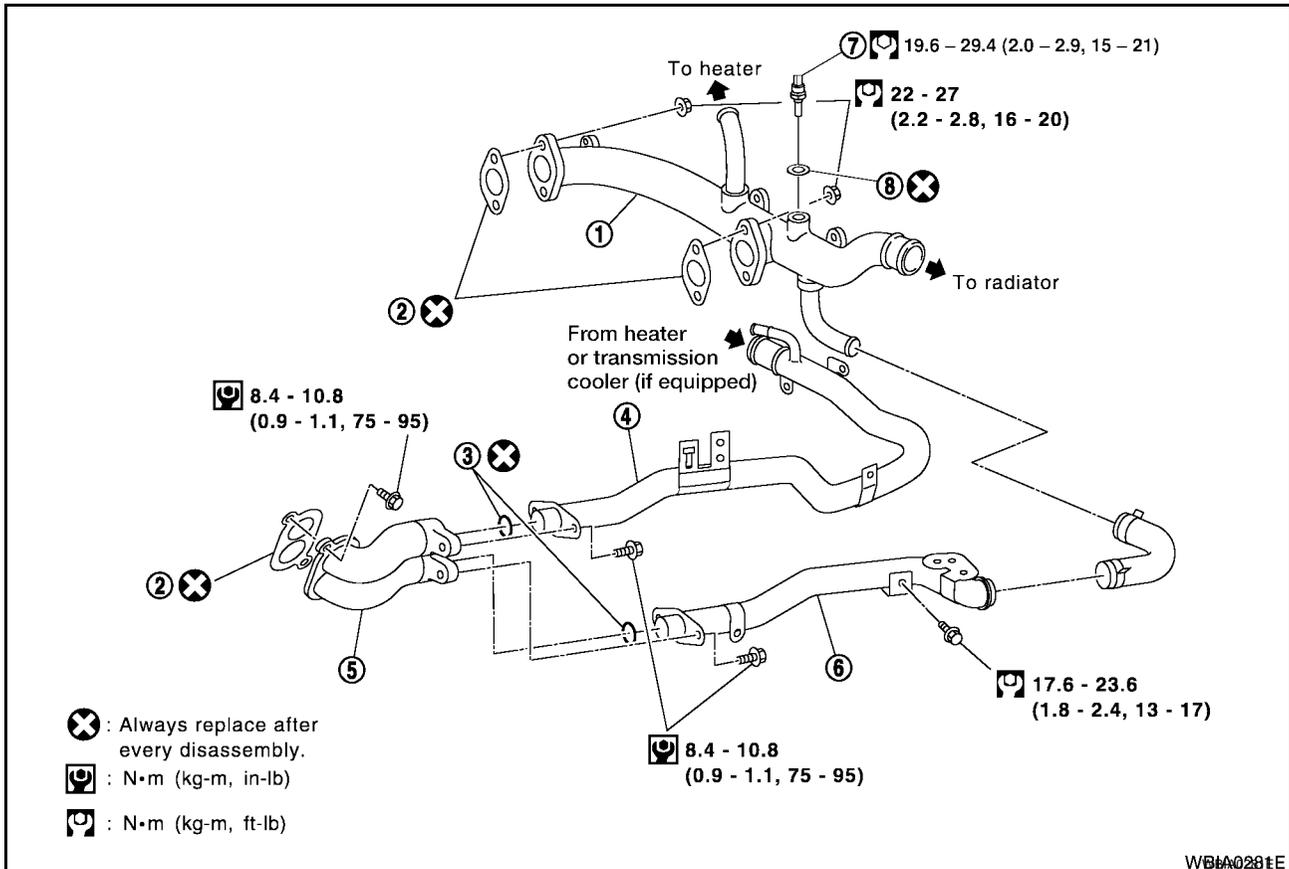
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## WATER OUTLET AND WATER PIPING

PFP:11060

### Removal and Installation

EBS00J87



- |                                      |                    |                      |
|--------------------------------------|--------------------|----------------------|
| 1. Water outlet                      | 2. Gasket          | 3. O-ring            |
| 4. Heater pipe                       | 5. Water connector | 6. Water bypass pipe |
| 7. Engine coolant temperature sensor | 8. Washer          |                      |

### REMOVAL

1. Remove engine undercover using power tools
2. Drain coolant from drain plugs on radiator and both sides of cylinder block. Refer to [MA-22, "DRAINING ENGINE COOLANT"](#).

**CAUTION:**

**Perform when the engine is cold.**

3. Remove engine cover using power tool.
4. Remove air duct and air cleaner case assembly. Refer to [EM-120, "Removal and Installation"](#).
5. Remove radiator upper hose and heater hose.
6. Remove connector(s) from heater pipe.
7. Disconnect engine coolant temperature sensor electrical connector on water outlet.
8. Remove water outlet, heater pipe, water connector, and water bypass pipe nuts and bolts.

### INSTALLATION

1. Installation is in the reverse order of removal.
  - Securely insert each hose, and install a clamp at a position where it does not interfere with the pipe bulge.
  - When inserting a water pipe into water connector, apply neutral detergent to O-ring.
  - Refill engine coolant. Refer to [MA-23, "REFILLING ENGINE COOLANT"](#).

# SERVICE DATA AND SPECIFICATIONS (SDS)

[VQ35DE]

## SERVICE DATA AND SPECIFICATIONS (SDS)

PF0:00100

### Capacity

EBS00J88

ℓ (US gal, Imp gal)

Coolant capacity (With reservoir tank at MAX level)	8.2 (2 1/8, 1 3/4)
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### Thermostat

EBS00J89

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

### Radiator

EBS00J8A

Unit: kPa (kg/cm<sup>2</sup>, psi)

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

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