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# SECTION CO

## ENGINE COOLING SYSTEM

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# PRECAUTIONS

< SERVICE INFORMATION >

## SERVICE INFORMATION

### PRECAUTIONS

#### Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

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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.

#### Precaution for Liquid Gasket

INFOID:000000004278818

#### REMOVAL OF LIQUID GASKET SEALING

- After removing the bolts and nuts, separate the mating surface using the Tool and remove the sealant.

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

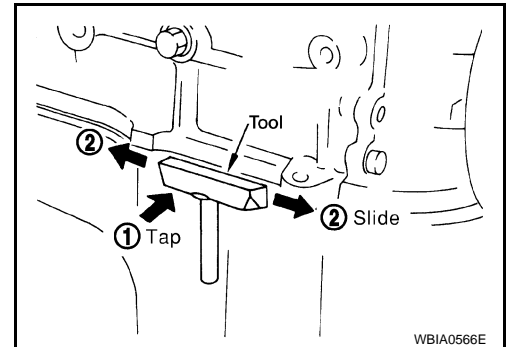
#### **CAUTION:**

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

- In areas where the Tool is difficult to use, use a plastic hammer to lightly tap (1) the Tool where the sealant is applied. Use a plastic hammer to slide the Tool (2) by tapping on the side.

#### **CAUTION:**

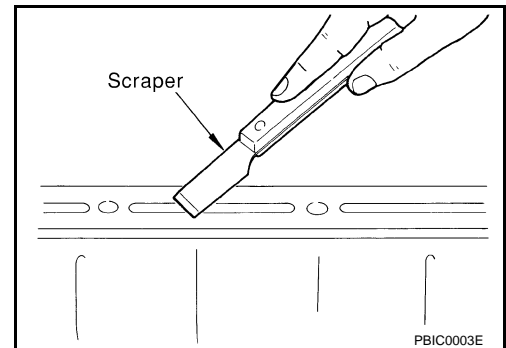
**If for some unavoidable reason a tool such as a flat-bladed screwdriver is used, be careful not to damage the mating surfaces.**



WBIA0566E

#### LIQUID GASKET APPLICATION PROCEDURE

1. Using a scraper, remove the old sealant adhering to the mating surfaces.
  - Remove the sealant completely from the groove of the mating surfaces, bolts, and bolt holes.
2. Thoroughly clean the mating surfaces and remove all adhering moisture, grease and foreign material.
3. Attach the sealant tube to Tool.
  - Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-42](#).



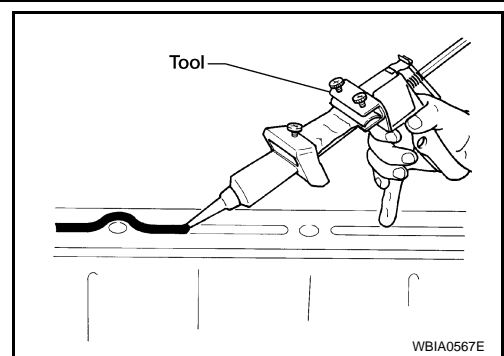
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# PRECAUTIONS

## < SERVICE INFORMATION >

4. Apply the sealant without breaks to the specified location with the specified dimensions using Tool.

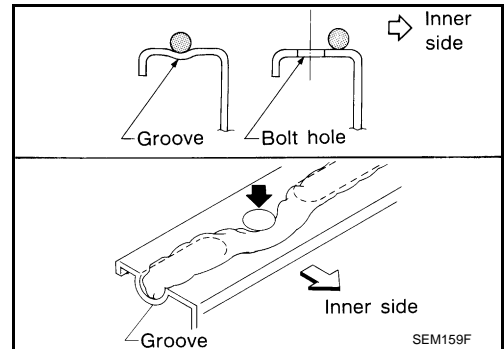
**Tool number** : WS39930000 ( - )



- 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 in the procedure, it should also be applied outside the holes.
- 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 specified oil and coolant. Refer to [MA-12](#).

**CAUTION:**

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



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# PREPARATION

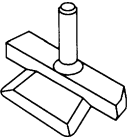
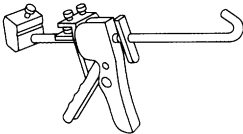
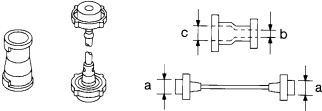
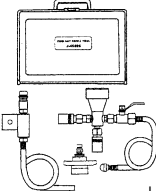
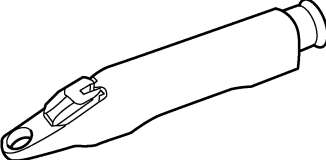
< SERVICE INFORMATION >

## PREPARATION

### Special Service Tool

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

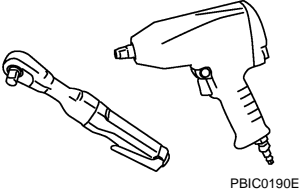
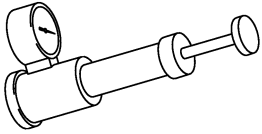
Tool number (Kent-Moore No.) Tool name	Description
KV10111100 (J-37228) Seal cutter	Removing oil pan and timing chain case   <p style="text-align: center;">S-NT046</p>
WS39930000 ( - ) Tube presser	Pressing the tube of liquid gasket   <p style="text-align: center;">S-NT052</p>
EG17650301 (J-33984-A) 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> <b>Unit: mm (in)</b>   <p style="text-align: center;">S-NT564</p>
KV991J0070 (J-45695) Coolant refill tool	For refilling engine cooling system   <p style="text-align: center;">LMA053</p>
KV991J0010 (J-23688) Engine coolant refractometer	Checking concentration of ethylene glycol in engine coolant   <p style="text-align: center;">WBIA0539E</p>

### Commercial Service Tool

INFOID:000000004278820

# PREPARATION

## < SERVICE INFORMATION >

Tool name	Description
<p data-bbox="164 199 272 226">Power tool</p>  <p data-bbox="852 415 922 436">PBIC0190E</p>	<p data-bbox="1013 199 1263 226">Loosening bolts and nuts</p>
<p data-bbox="164 451 358 478">Radiator cap tester</p>  <p data-bbox="852 667 922 688">PBIC1982E</p>	<p data-bbox="1013 451 1360 478">Checking radiator and radiator cap</p>

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# OVERHEATING CAUSE ANALYSIS

< SERVICE INFORMATION >

## OVERHEATING CAUSE ANALYSIS

### Troubleshooting Chart

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	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 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	—	Radiator shroud	—
		Improper coolant mixture ratio	—	Coolant viscosity	—
		Poor coolant quality	—		—
	Insufficient coolant	Coolant leaks		Cooling hose	Loose clamp Cracked hose Poor sealing
				Heater pump	
				Water pump	
				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

< SERVICE INFORMATION >

	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	<b>CO</b>
				Driving at extremely high speed	
				Powertrain system malfunction	C
				Installed improper size wheels and tires	D
				Dragging brakes	
		Improper ignition timing	E		
	Blocked or restricted air flow	Blocked radiator grille	Installed car brassiere		
		Blocked bumper	Mud contamination or paper clogging	—	
		Blocked radiator		F	
Blocked condenser					

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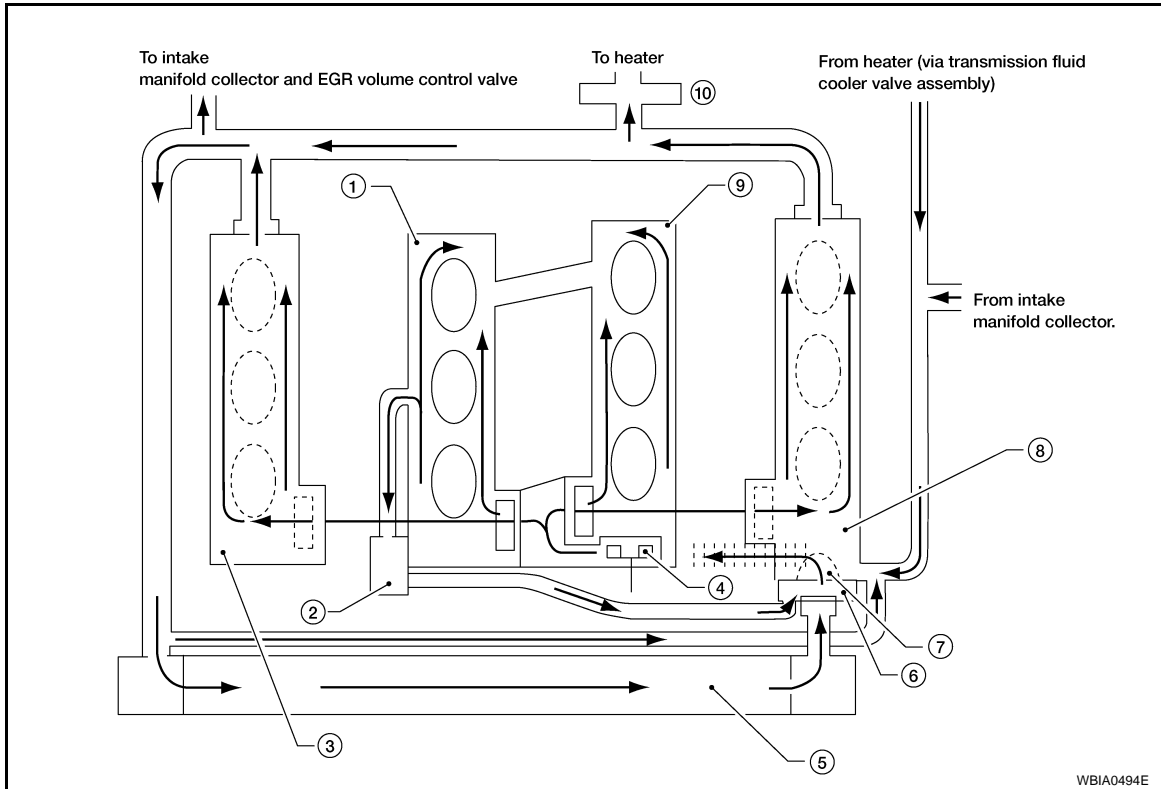
# COOLING SYSTEM

< SERVICE INFORMATION >

## COOLING SYSTEM

### Cooling Circuit

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- |                        |                       |                        |
|------------------------|-----------------------|------------------------|
| 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) |
| 10. Heater pump        |                       |                        |

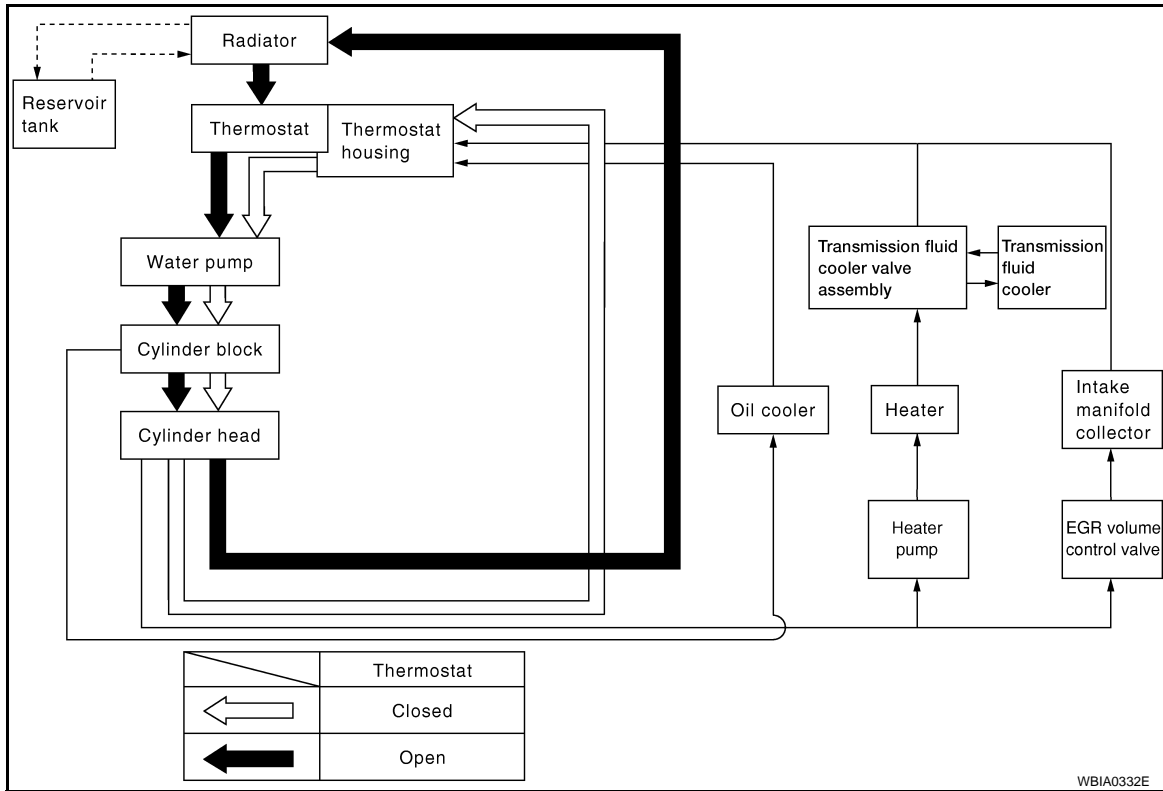


# COOLING SYSTEM

< SERVICE INFORMATION >

## Schematic

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# ENGINE COOLANT

< SERVICE INFORMATION >

## ENGINE COOLANT

### System Inspection

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#### **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.**

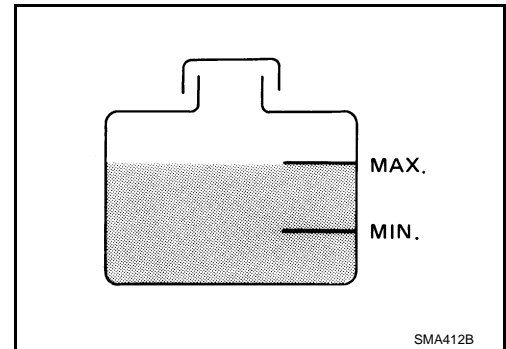
#### CHECKING COOLING SYSTEM HOSES

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 range 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 suitable tool and Tool.

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

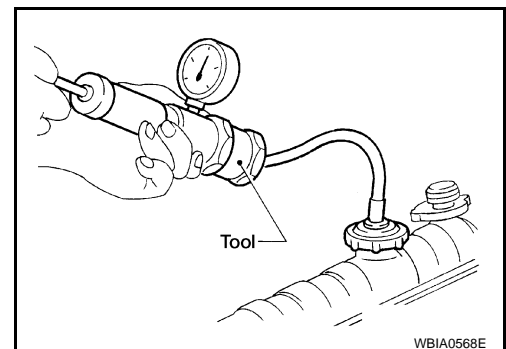
**Testing pressure** : 157 kPa (1.6 kg/cm<sup>2</sup>, 23 psi)

#### **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.

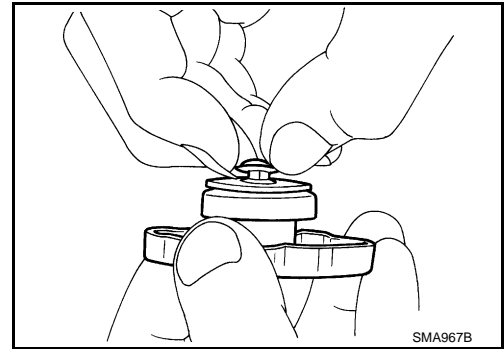
#### **NOTE:**

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

# ENGINE COOLANT

## < SERVICE INFORMATION >

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.



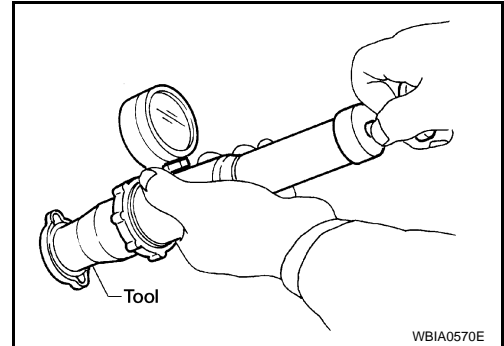
3. Check radiator cap relief pressure using suitable tool and Tool.

**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.

## Changing Engine Coolant

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### **WARNING:**

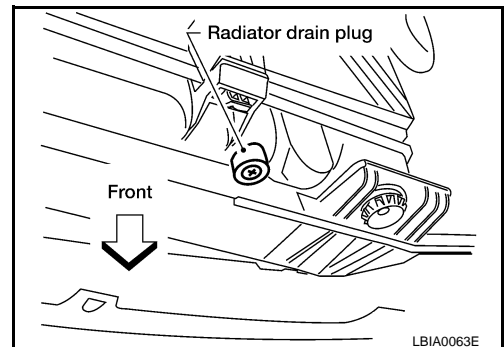
- To avoid being scalded, never change the coolant when the engine is hot.
- Wrap a thick cloth around cap and carefully remove the cap. First, turn the cap a quarter of a turn to release built-up pressure. Then push down and turn the cap all the way to remove.

## DRAINING ENGINE COOLANT

1. Remove engine undercover.
2. Open radiator drain plug at the bottom of radiator and remove the radiator filler cap. This is the only step required for a partial cooling system drain (radiator only).
3. For a complete cooling system drain, remove the reservoir tank and drain the coolant, and then clean the reservoir tank before installation.

### **CAUTION:**

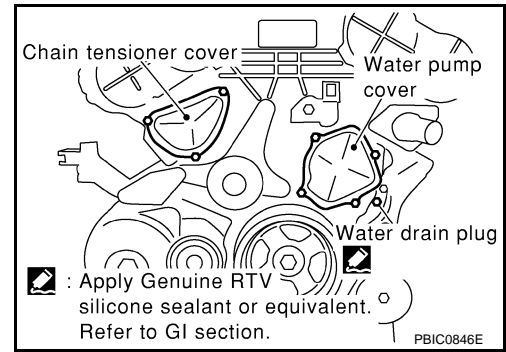
**Do not allow coolant to spill on the drive belts.**



# ENGINE COOLANT

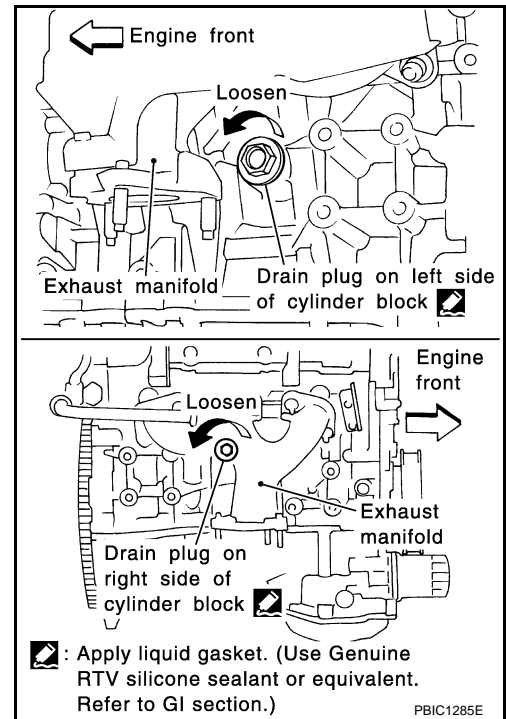
## < SERVICE INFORMATION >

4. When performing a complete cooling system drain (to remove the engine or for engine repair), remove the cylinder block front drain plug and the cylinder block RH and LH drain plugs.



### CAUTION:

If the vehicle is equipped with an engine block heater in place of the cylinder block LH drain plug, do not remove the engine block heater.



5. Check the drained coolant for contaminants such as rust, corrosion or discoloration.
- If contaminated, flush the engine cooling system.

## REFILLING ENGINE COOLANT

# ENGINE COOLANT

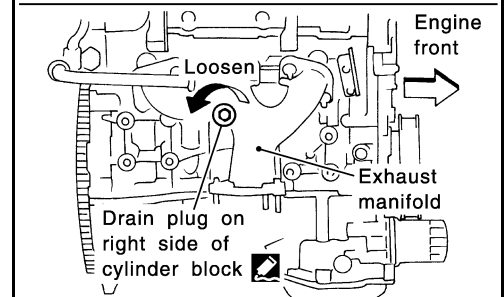
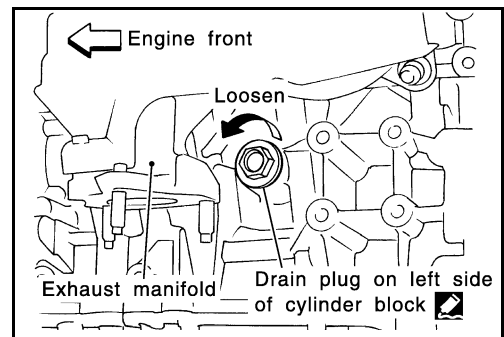
## < SERVICE INFORMATION >


1. Install the radiator drain plug. If the cooling system was drained completely, install the reservoir tank and the cylinder block drain plugs and tighten to specification.

**CAUTION:**

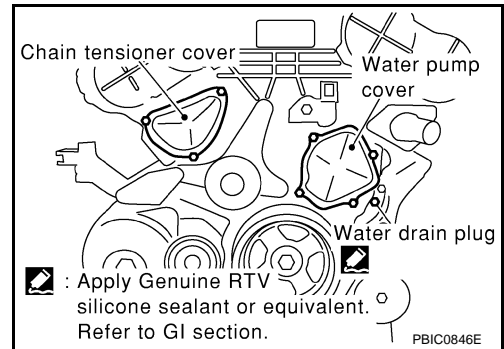
**If the vehicle is equipped with an engine block heater in place of the cylinder block LH drain plug, do not remove the engine block heater.**


- The radiator must be completely empty of coolant and water.
- Apply sealant to the threads of the cylinder block drain plugs. Use Genuine High Performance Thread Sealant or equivalent. Refer to [GI-42](#).



 : Apply liquid gasket. (Use Genuine RTV silicone sealant or equivalent. Refer to GI section.)

PBIC1285E



 : Apply Genuine RTV silicone sealant or equivalent. Refer to GI section.

PBIC0846E

- Radiator drain plug** : Refer to [CO-16](#)
- Cylinder block front drain plug** : Refer to [EM-116](#)
- Cylinder block RH drain plug** : Refer to [EM-116](#)
- Cylinder block LH drain plug** : Refer to [EM-116](#)

2. If disconnected, reattach the upper radiator hose at the engine side.
3. Set the vehicle heater controls to the full HOT and heater ON position. Turn the vehicle ignition ON with the engine OFF as necessary to activate the heater mode.

# ENGINE COOLANT

## < SERVICE INFORMATION >

4. Install the Tool by installing the radiator cap adapter onto the radiator neck opening. Then attach the gauge body assembly with the refill tube and the venturi assembly to the radiator cap adapter.

**Tool number** : KV991J0070 (J-45695)

5. Insert the refill hose into the coolant mixture container that is placed at floor level. Make sure the ball valve is in the closed position.
  - Use Specified engine coolant or equivalent.  
Refer to [MA-12, "Engine Oil Recommendation"](#).

**Engine coolant capacity (with reservoir tank)** : Refer to [MA-12, "Fluids and Lubricants"](#).

6. Install an air hose to the venturi assembly, the air pressure must be within specification.

**Compressed air supply pressure** : 5.7 - 8.5 kPa (5.6 - 8.4 kg/cm<sup>2</sup>, 80 - 120 psi)

### CAUTION:

**The compressed air supply must be equipped with an air dryer.**

7. The vacuum gauge will begin to rise and there will be an audible hissing noise. During this process open the ball valve on the refill hose slightly. Coolant will be visible rising in the refill hose. Once the refill hose is full of coolant, close the ball valve. This will purge any air trapped in the refill hose.
8. Continue to draw the vacuum until the gauge reaches 28 inches of vacuum. The gauge may not reach 28 inches in high altitude locations, use the vacuum specifications below, based on the altitude above sea level.

Altitude above sea level	Vacuum gauge reading
0 - 100 m (328 ft)	: 28 inches of vacuum
300 m (984 ft)	: 27 inches of vacuum
500 m (1,641 ft)	: 26 inches of vacuum
1,000 m (3,281 ft)	: 24 - 25 inches of vacuum

9. When the vacuum gauge has reached the specified amount, disconnect the air hose and wait 20 seconds to see if the system loses any vacuum. If the vacuum level drops, perform any necessary repairs to the system and repeat steps 6 - 8 to bring the vacuum to the specified amount. Recheck for any leaks.
10. Place the coolant container (with the refill hose inserted) at the same level as the top of the radiator. Then open the ball valve on the refill hose so the coolant will be drawn up to fill the cooling system. The cooling system is full when the vacuum gauge reads zero.

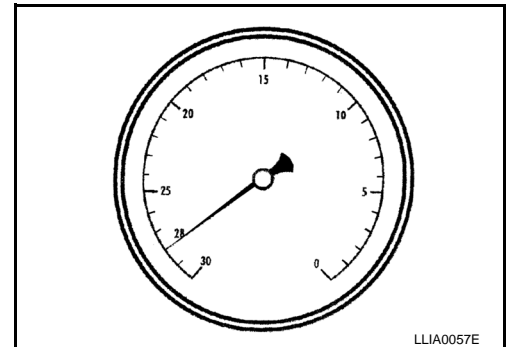
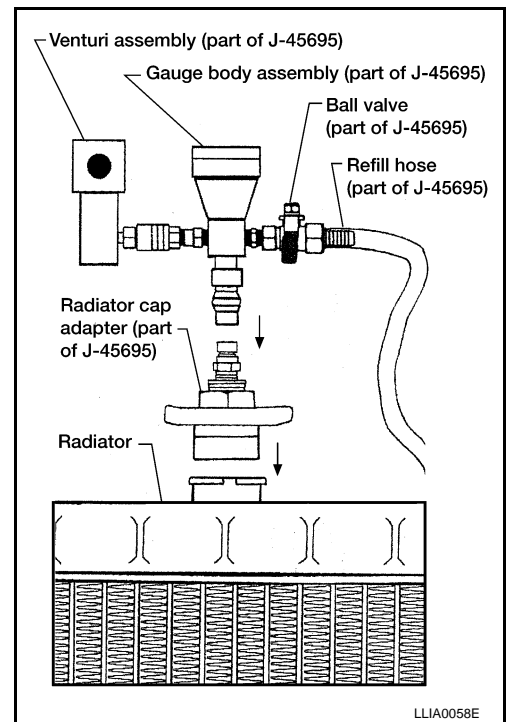
### CAUTION:

**Do not allow the coolant container to get too low when filling, to avoid air from being drawn into the cooling system.**

11. Remove the Tool from the radiator neck opening.
12. Fill the cooling system reservoir tank to the specified level, and install the radiator cap. Run the engine to warm up the cooling system and top up the system as necessary.

## FLUSHING COOLING SYSTEM

1. Fill the radiator from the filler neck above the radiator upper hose and reservoir tank with clean water and reinstall radiator filler cap.
2. Run the engine and warm it up to normal operating temperature.
3. Rev the engine two or three times under no-load.



# ENGINE COOLANT

## < SERVICE INFORMATION >

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4. Stop the engine and wait until it cools down.
5. Drain the water from the system. Refer to [CO-11, "Changing Engine Coolant"](#).
6. Repeat steps 1 through 5 until clear water begins to drain from the radiator.

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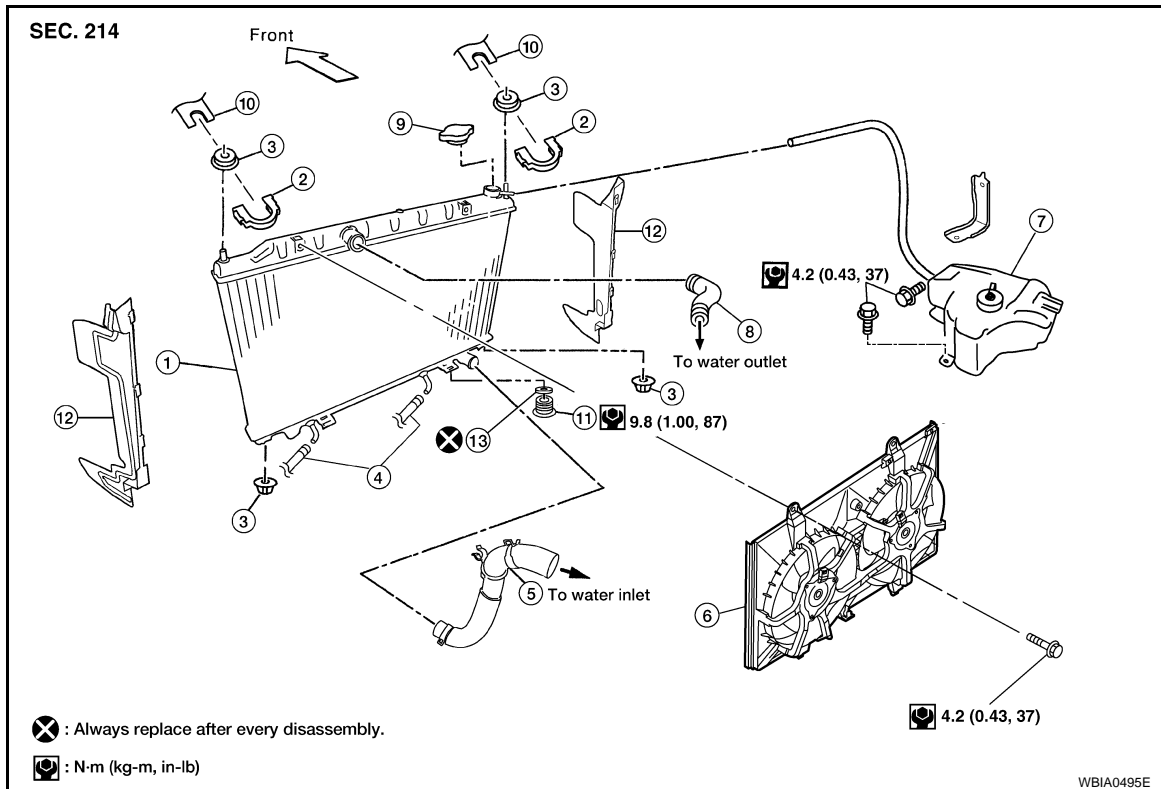
# RADIATOR

< SERVICE INFORMATION >

## RADIATOR

### Removal and Installation

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- |                                  |                          |                          |
|----------------------------------|--------------------------|--------------------------|
| 1. Radiator                      | 2. Radiator upper clip   | 3. Mounting rubber       |
| 4. A/T fluid cooler hose         | 5. Radiator hose (lower) | 6. Radiator fan assembly |
| 7. Engine coolant reservoir tank | 8. Radiator hose (upper) | 9. Radiator filler cap   |
| 10. Radiator core connection     | 11. Radiator drain plug  | 12. Air guide            |
| 13. O-ring                       |                          |                          |

#### 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 pushing down and turning the cap all the way.

#### REMOVAL

1. Drain the engine coolant from the radiator. Refer to [CO-11, "Changing Engine Coolant"](#).

#### CAUTION:

Perform when engine is cold.

2. Partially drain the A/T fluid. Refer to [AT-13, "Changing A/T Fluid"](#).
3. Remove fresh air duct. Refer to [EM-15, "Removal and Installation"](#).
4. Disconnect radiator upper and lower hoses.
5. Disconnect the A/T fluid cooler hoses.

#### NOTE:

Plug hoses to avoid leakage of A/T fluid.

6. Disconnect the engine coolant reservoir tank hose.



# RADIATOR

## < SERVICE INFORMATION >

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

**CAUTION:**

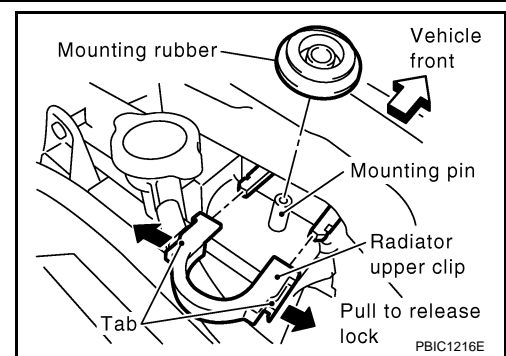
**To prevent damage, do not pull tabs excessively.**

- Disconnect fan electrical connectors.
- Remove the radiator fan assembly.

**CAUTION:**

**Do not damage or scratch A/C condenser and radiator core when removing.**

- If necessary, remove the radiator fan assembly from the radiator. Refer to [CO-18, "Disassembly and Assembly of Radiator Fan"](#).
- If necessary, remove the rubber mounting from the radiator.



## INSPECTION AFTER REMOVAL

- Apply pressure using suitable tool and Tool.

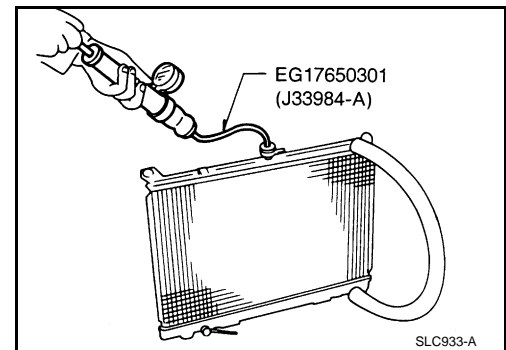
**Tool number : EG17650301 (J-33984-A)**

**WARNING:**

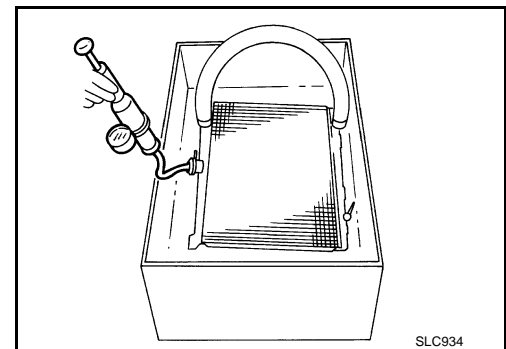
**To prevent the risk of the hose coming undone while under pressure, securely fasten it down with a hose clamp.**

**CAUTION:**

**Attach a hose to the A/T fluid cooler as well.**



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



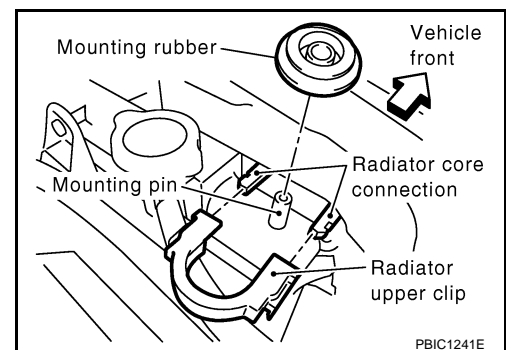
## INSTALLATION

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

- Fill the radiator with coolant. Refer to [CO-11, "Changing Engine Coolant"](#).

### Installation of Radiator Upper Clip

- Install the mounting rubber on mounting pin of radiator core.
- Align the radiator upper clip with the radiator core connector, 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 core forward and backward to make sure they are securely connected.



## INSPECTION AFTER INSTALLATION

- Check for engine coolant leaks. Refer to [CO-10, "System Inspection"](#).
- Start and warm up the engine. Visually make sure that there are no engine coolant leaks or A/T fluid leaks.

# COOLING FAN

< SERVICE INFORMATION >

## COOLING FAN

### Removal and Installation

INFOID:00000000427827

#### REMOVAL

1. Remove radiator. Refer to [CO-16. "Removal and Installation"](#).

#### CAUTION:

**Perform this step when engine is cold.**

2. Remove radiator cooling fan assembly from radiator.

#### INSTALLATION

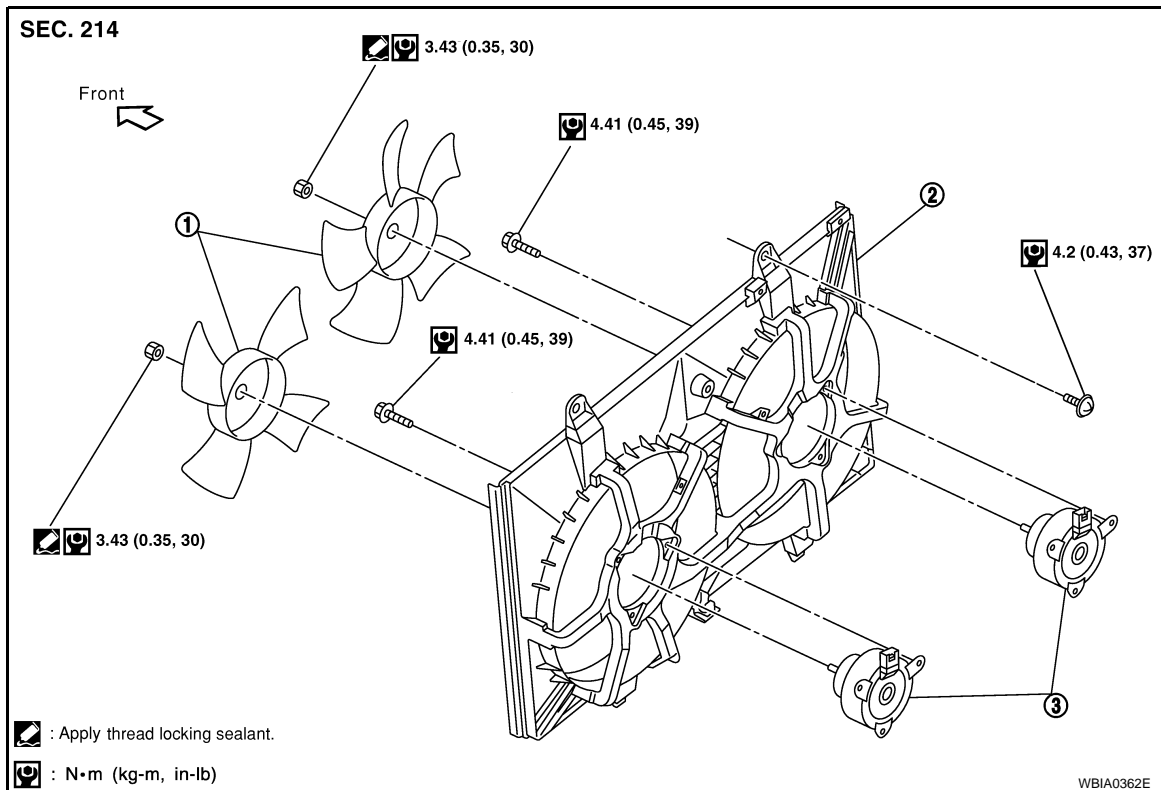
Installation is in the reverse order of removal.

#### INSPECTION AFTER INSTALLATION

- Check for engine coolant leaks. Refer to [CO-10. "System Inspection"](#).
- Start and warm up engine. Visually inspect that there are no engine coolant or A/T fluid leaks.

### Disassembly and Assembly of Radiator Fan

INFOID:00000000427828



1. Fan blade

2. Fan shroud

3. Fan motor

#### DISASSEMBLY

1. Remove the fan blade nut.
2. Remove fan blade from the fan motor.
3. Remove fan motor bolts and remove fan motor from fan shroud.

#### ASSEMBLY

Assembly is in the reverse order of disassembly.

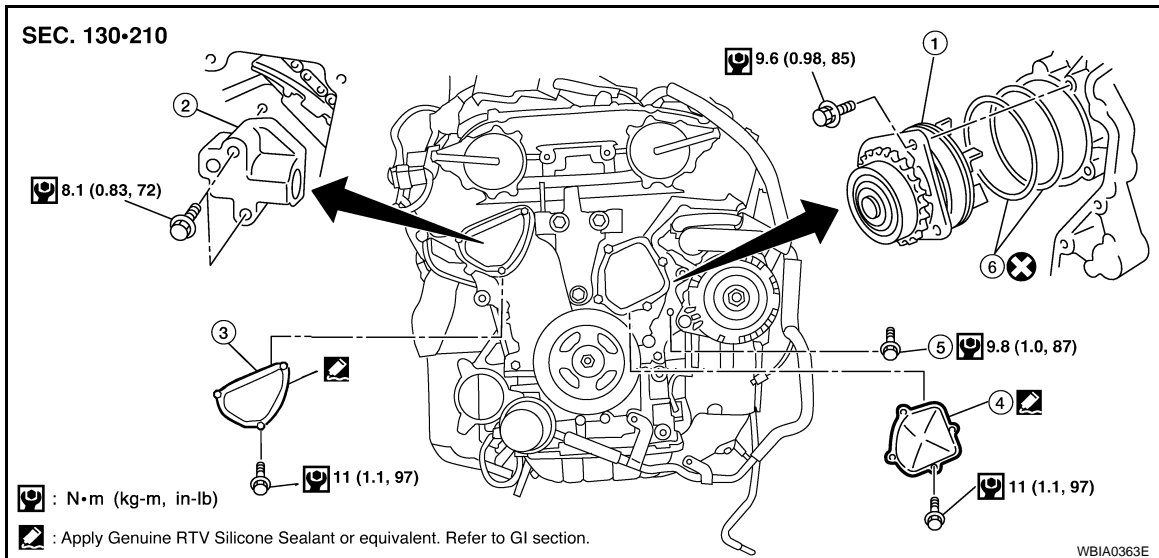
# WATER PUMP

< SERVICE INFORMATION >

## WATER PUMP

### Removal and Installation

INFOID:000000004278829



- |                     |                           |                          |
|---------------------|---------------------------|--------------------------|
| 1. Water pump       | 2. Timing chain tensioner | 3. Chain tensioner cover |
| 4. Water pump cover | 5. Water drain plug       | 6. O-rings               |

#### WARNING:

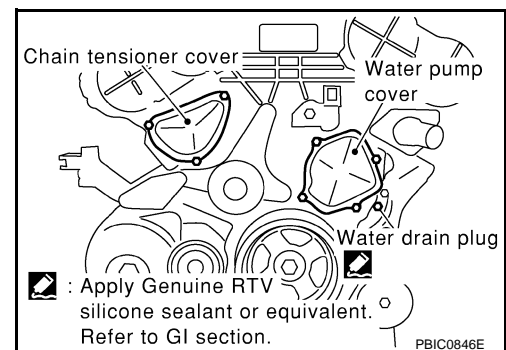
Never remove the radiator cap when the engine is hot. Serious burns could occur from high pressure coolant escaping from the radiator.

#### 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. Drain engine coolant from the radiator. Refer to [CO-11, "Changing Engine Coolant"](#).  
**CAUTION:**  
Perform when the engine is cold.
2. Remove engine coolant reservoir tank. Refer to [CO-16, "Removal and Installation"](#).
3. Remove IPDM E/R bolts and position aside. Refer to [PG-28, "Removal and Installation of IPDM E/R"](#).
4. Remove RH wheel and tire assembly. Refer to [WT-6, "Conventional Tire and Wheel"](#).
5. Remove fender protector (RH). Refer to [EI-21, "Removal and Installation"](#).
6. Remove drive belts. Refer to [EM-14, "Removal and Installation"](#).
7. Remove idler pulley and idler pulley bracket.
8. Support engine and remove front engine insulator and bracket. Refer to [EM-110, "Removal and Installation"](#).
9. Remove water drain plug on water pump side of cylinder block.
10. Remove chain tensioner cover and water pump cover.



# WATER PUMP

## < SERVICE INFORMATION >

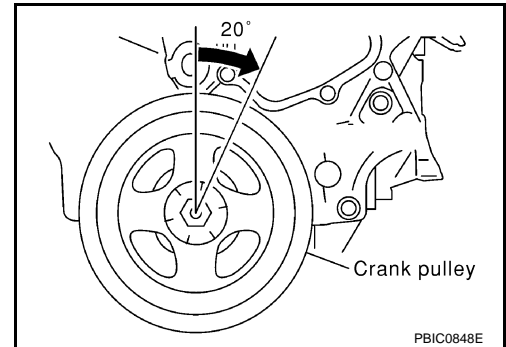
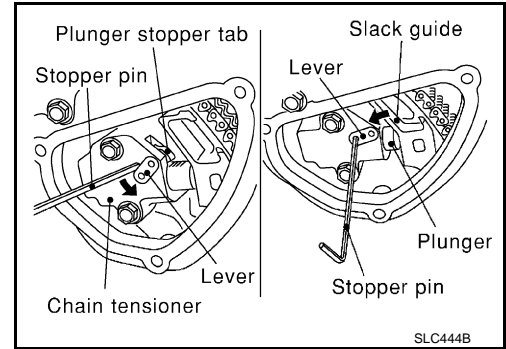
11. Remove the timing chain tensioner assembly.

- Pull the lever down and release the plunger stopper tab.
- 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 (0.098 in)] is used for a stopper pin as an example.

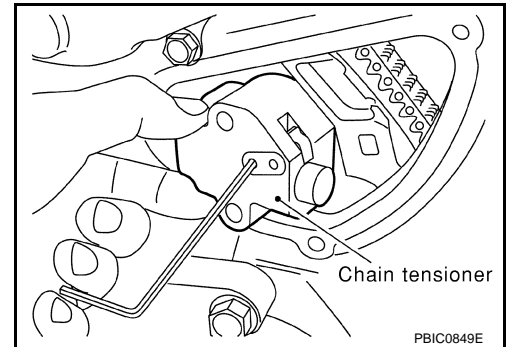
- Insert the plunger into the tensioner body by pressing the timing chain slack guide.
  - Keep the slack guide pressed and hold the plunger stopper tab in by pushing the stopper pin deeper through the lever and into the timing chain tensioner body hole.
- e. Make a gap between water pump gear and timing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



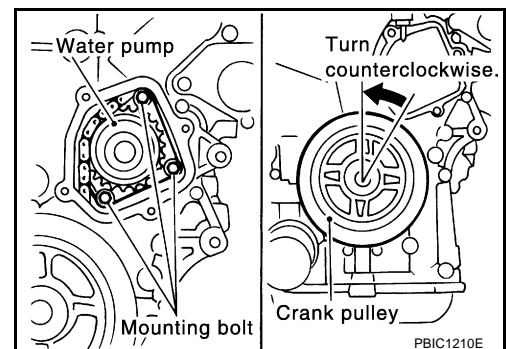
12. Remove timing chain tensioner.

**CAUTION:**

Be careful not to drop timing chain tensioner bolts inside front timing chain case.



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



# WATER PUMP

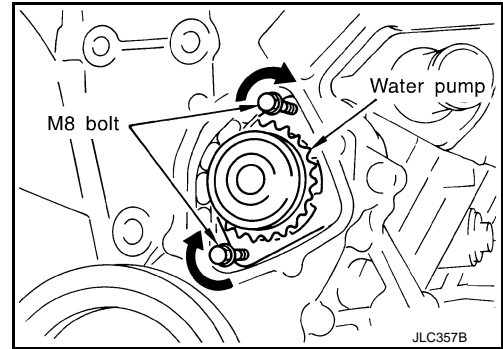
## < SERVICE INFORMATION >

14. Screw M8 bolts [pitch: 1.25 mm (0.49 in) length: approx. 50 mm (1.97 in)] into water pump's 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.

**CAUTION:**

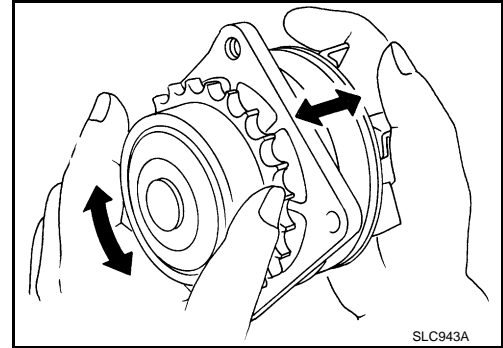
- Pull straight out while preventing vane from contacting socket in installation area.
- Remove water pump without causing sprocket to contact timing chain.

15. Remove M8 bolts and O-rings from water pump.



## INSPECTION AFTER REMOVAL

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

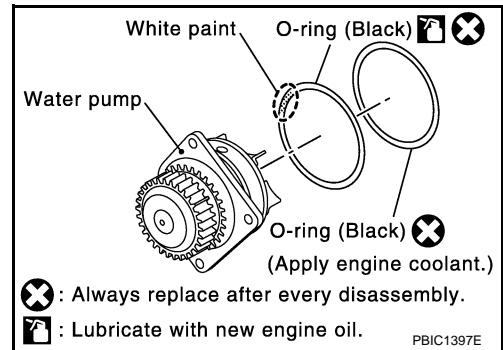


## INSTALLATION

1. Install new O-rings to water pump.
2. Apply engine oil and engine coolant to the O-rings as shown.

**NOTE:**

Locate the O-ring with white paint mark to engine front side.

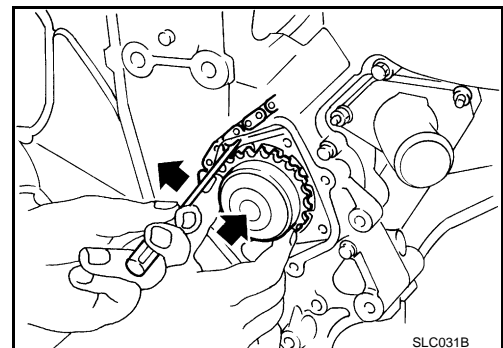


3. Install the water pump.

**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.



4. Remove dust and foreign material completely from back side of chain tensioner and from installation area of rear timing chain case.

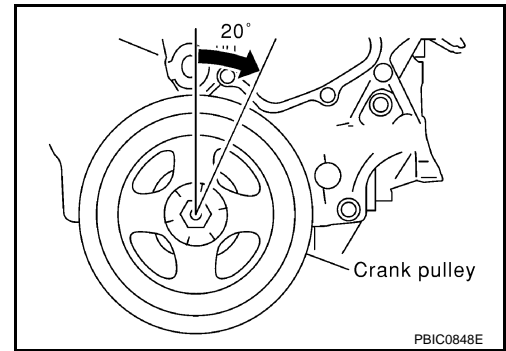
# WATER PUMP

## < SERVICE INFORMATION >

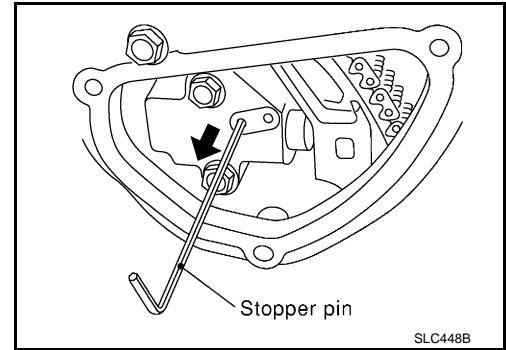
- Turn the crankshaft pulley approximately 20° clockwise so that the timing chain on the timing chain tensioner side is loose.

**NOTE:**

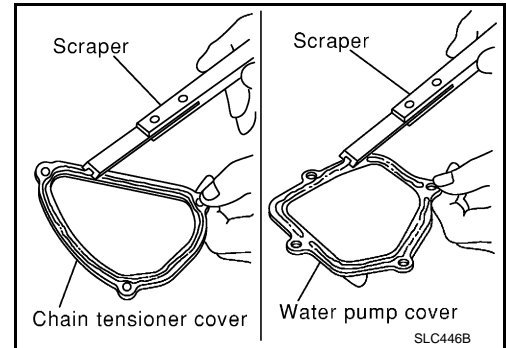
When installing the timing chain tensioner, engine oil should be applied to the oil hole and tensioner.



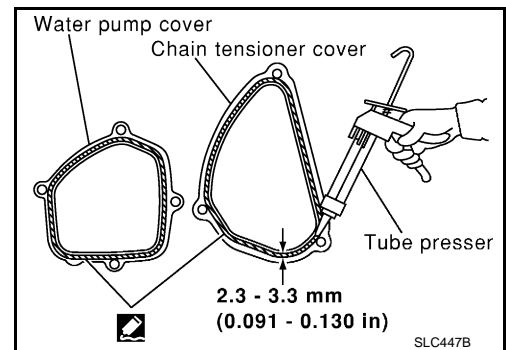
- Install the timing chain tensioner.
- Remove the stopper pin.



- Install chain tensioner and water pump cover.
  - 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.



- Apply a continuous bead of RTV Silicone Sealant, or equivalent, to mating surface of chain tensioner cover and water pump cover. Refer to [GI-42](#).

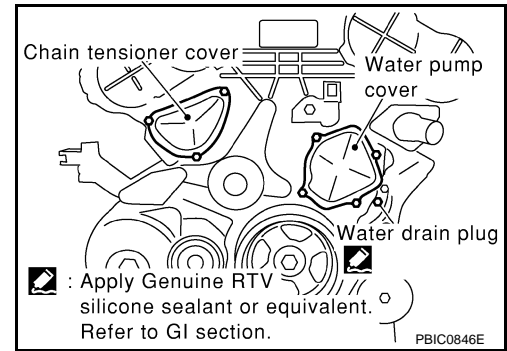


# WATER PUMP

## < SERVICE INFORMATION >

9. Install water drain plug on water pump side of cylinder block.

**Water drain plug : 9.5 N·m (0.97 kg-m, 76 in-lb)**



10. Tighten idler pulley bolts.

**Idler pulley bolts : 34.8 N·m (3.5 kg-m, 26 ft-lb)**

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

- Refill engine coolant. Refer to [CO-11, "Changing 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.

### INSPECTION AFTER INSTALLATION

- Check for engine coolant leaks. Refer to [CO-10, "System Inspection"](#).
- Start and warm up the engine. Visually make sure that there are no engine coolant leaks or A/T fluid leaks.

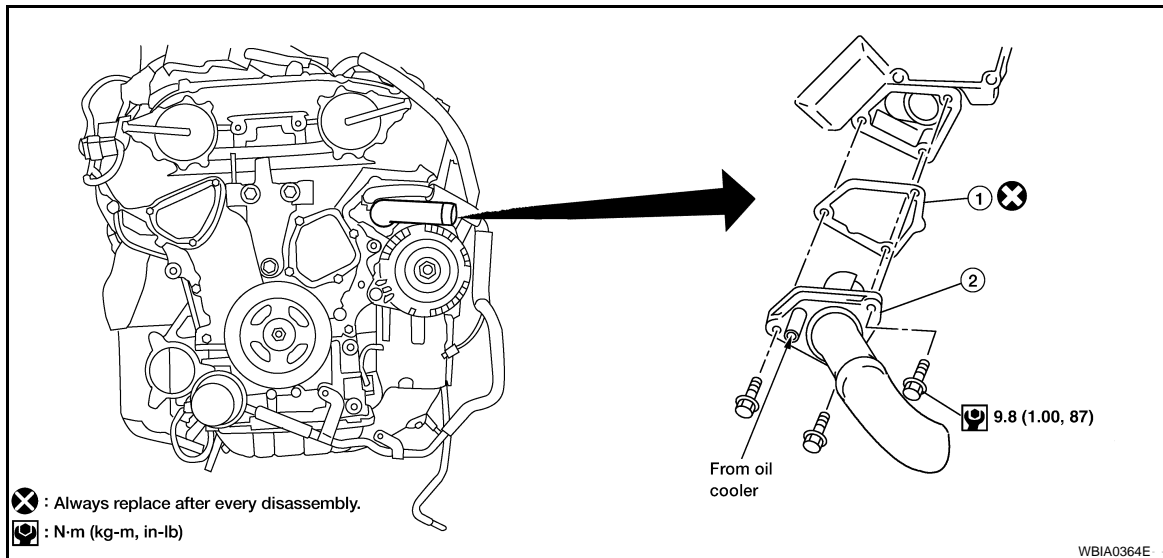
# THERMOSTAT AND THERMOSTAT HOUSING

< SERVICE INFORMATION >

## THERMOSTAT AND THERMOSTAT HOUSING

### Removal and Installation

INFOID:000000004278830



1. Gasket
2. Engine coolant inlet and thermostat assembly

### REMOVAL

1. Drain engine coolant from the radiator. Refer to [CO-11, "Changing Engine Coolant"](#).

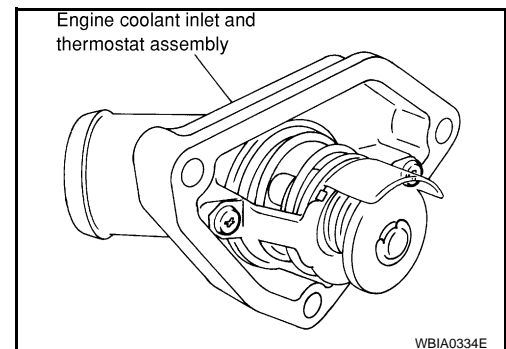
**CAUTION:**

**Perform when engine is cool.**

2. Remove IPDM E/R bolts and position aside. Refer to [PG-28, "Removal and Installation of IPDM E/R"](#).
3. Disconnect lower radiator hose.
4. Disconnect oil cooler line.
5. Remove engine coolant inlet and thermostat assembly.

**CAUTION:**

**Do not disassemble engine coolant inlet and thermostat assembly. Replace them as a unit, if necessary.**



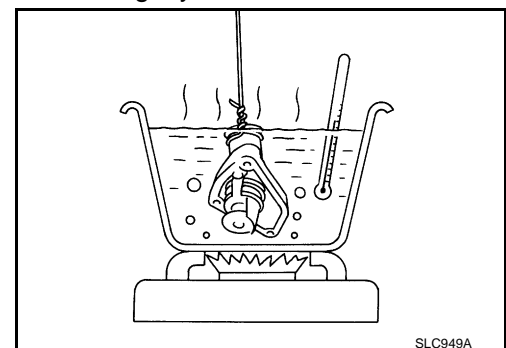
### INSPECTION AFTER REMOVAL

- Check valve seating condition at ordinary room temperatures. It should seat tightly.
- 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 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 AND THERMOSTAT HOUSING

## < SERVICE INFORMATION >

Thermostat	Standard Values
Valve opening temperature	80 – 84°C (176 – 183°F)
Valve lift	8.6 mm / 95°C (0.339 in / 203°F)
Valve closing temperature	77°C (171°F)

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### INSTALLATION

Installation is in the reverse order of removal.

- Refill engine coolant. Refer to [CO-11, "Changing Engine Coolant"](#).

C

#### **CAUTION:**

**Do not spill coolant in engine compartment. Use a shop cloth to absorb coolant.**

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### INSPECTION AFTER INSTALLATION

- Check for engine coolant leaks. Refer to [CO-10, "System Inspection"](#).
- Start and warm up the engine. Visually make sure that there are no engine coolant leaks.

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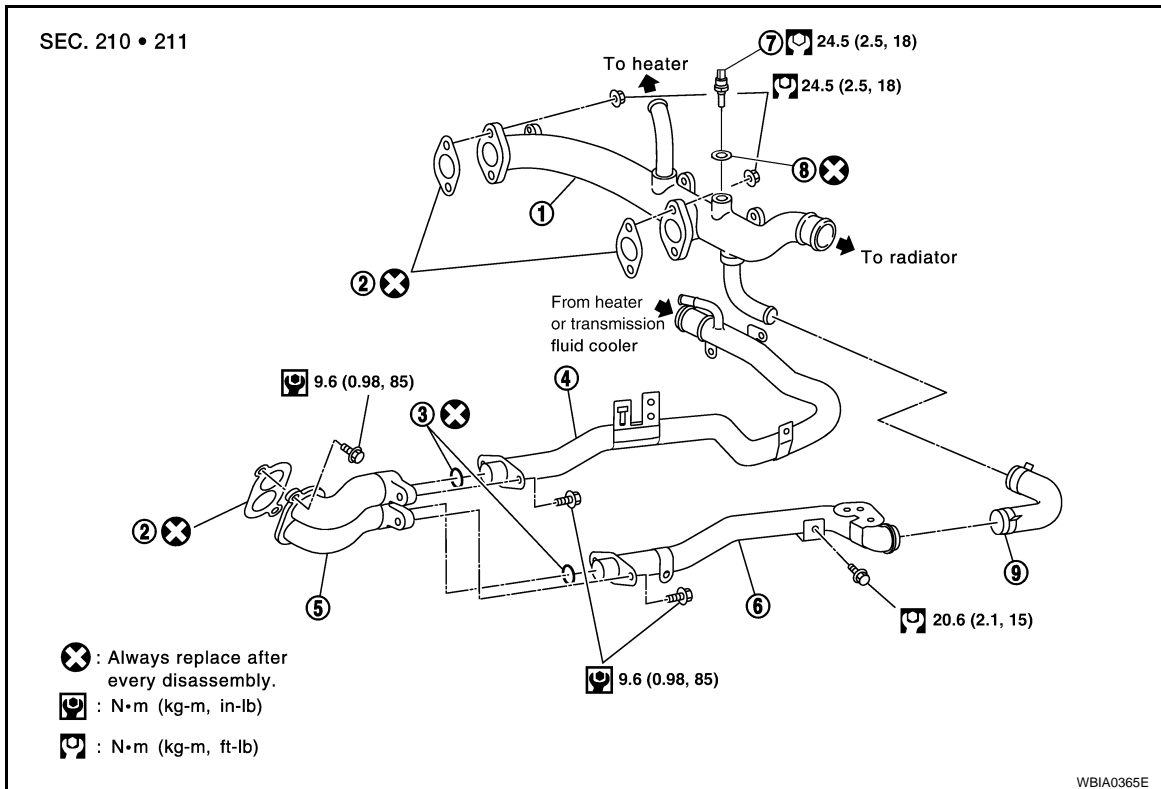
# WATER OUTLET AND WATER PIPING

< SERVICE INFORMATION >

## WATER OUTLET AND WATER PIPING

### Removal and Installation

INFOID:000000004278831



- |                                      |                    |                      |
|--------------------------------------|--------------------|----------------------|
| 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          | 9. Water bypass 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

1. Drain engine coolant from radiator and drain plugs on both sides of cylinder block. Refer to [CO-11, "Changing Engine Coolant"](#).

### CAUTION:

**Perform when the engine is cold.**

2. Remove fresh air duct, air cleaner to electric throttle control actuator tube, mass air flow sensor and upper air cleaner case as an assembly. Refer to [EM-15, "Removal and Installation"](#).
3. Remove radiator upper hose and heater hose.
4. Remove connector(s) from heater pipe.
5. Disconnect engine coolant temperature sensor electrical connector.
6. Remove water outlet, heater pipe, water connector, and water bypass pipe nuts and bolts.

### INSTALLATION

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.

### CAUTION:

**Use new O-rings for installation.**

- Refill engine coolant. Refer to [CO-11, "Changing Engine Coolant"](#).

### INSPECTION AFTER INSTALLATION

- Check for engine coolant leaks. Refer to [CO-10, "System Inspection"](#).
- Start and warm up the engine. Visually make sure that there are no engine coolant leaks.

# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE INFORMATION >

## SERVICE DATA AND SPECIFICATIONS (SDS)

### Standard and Limit

INFOID:000000004278832

### ENGINE COOLANT CAPACITY (APPROXIMATE)

Unit: ℓ (US qt, Imp qt)

Coolant capacity (With reservoir tank at MAX level)	10.5 (11-1/8, 9-1/4)
---	----------------------

### THERMOSTAT

Valve opening temperature	80 – 84°C (176 – 183°F)
Full-open lift amount	8.6 mm / 95°C (0.339 in / 203°F)
Valve closing temperature	77°C (171°F)

### RADIATOR

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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