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D  
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F  
G  
H  
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J  
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## SECTION

# ENGINE COOLING SYSTEM

## CONTENTS

<b>PRECAUTIONS</b> ..... 2	<b>COOLING FAN</b> ..... 22
Precautions for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" ..... 2	Removal and Installation ..... 22
Precautions for Battery Service ..... 2	REMOVAL ..... 22
Precautions for Liquid Gasket ..... 2	INSTALLATION ..... 22
REMOVAL OF LIQUID GASKET SEALING ..... 2	Disassembly and Assembly ..... 23
LIQUID GASKET APPLICATION PROCEDURE..... 2	DISASSEMBLY ..... 23
<b>PREPARATION</b> ..... 4	INSPECTION AFTER DISASSEMBLY ..... 23
Special Service Tools ..... 4	ASSEMBLY ..... 23
Commercial Service Tools ..... 5	<b>WATER PUMP</b> ..... 24
<b>OVERHEATING CAUSE ANALYSIS</b> ..... 6	Removal and Installation ..... 24
Troubleshooting Chart ..... 6	REMOVAL ..... 24
<b>COOLING SYSTEM</b> ..... 8	INSPECTION AFTER REMOVAL ..... 26
Cooling Circuit ..... 8	INSTALLATION ..... 26
System Chart ..... 9	INSPECTION AFTER INSTALLATION ..... 28
<b>ENGINE COOLANT</b> ..... 10	<b>WATER INLET AND THERMOSTAT ASSEMBLY ...</b> 29
Inspection ..... 10	Removal and Installation ..... 29
LEVEL CHECK ..... 10	REMOVAL ..... 29
LEAK CHECK ..... 10	INSPECTION AFTER REMOVAL ..... 29
Changing Engine Coolant ..... 10	INSTALLATION ..... 30
DRAINING ENGINE COOLANT ..... 10	INSPECTION AFTER INSTALLATION ..... 30
REFILLING ENGINE COOLANT ..... 11	<b>WATER OUTLET AND WATER PIPING</b> ..... 31
FLUSHING COOLING SYSTEM ..... 12	Removal and Installation ..... 31
<b>RADIATOR</b> ..... 13	REMOVAL ..... 31
Removal and Installation ..... 13	INSTALLATION ..... 32
REMOVAL ..... 13	INSPECTION AFTER INSTALLATION ..... 32
INSTALLATION ..... 16	<b>SERVICE DATA AND SPECIFICATIONS (SDS) .....</b> 33
INSPECTION AFTER INSTALLATION ..... 16	Standard and Limit ..... 33
Checking Radiator Cap ..... 16	ENGINE COOLANT CAPACITY (APPROXIMATE) ..... 33
Checking Radiator ..... 16	RADIATOR ..... 33
<b>RADIATOR (ALUMINUM TYPE)</b> ..... 18	THERMOSTAT ..... 33
Disassembly and Assembly ..... 18	
PREPARATION ..... 18	
DISASSEMBLY ..... 18	
ASSEMBLY ..... 19	
INSPECTION ..... 21	

# PRECAUTIONS

## PRECAUTIONS

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### Precautions 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.

### Precautions for Battery Service

NBS0001N

Before disconnecting the battery, lower both the driver and passenger windows. This will prevent any interference between the window edge and the vehicle when the door is opened/closed. During normal operation, the window slightly raises and lowers automatically to prevent any window to vehicle interference. The automatic window function will not work with the battery disconnected.

### Precautions for Liquid Gasket REMOVAL OF LIQUID GASKET SEALING

NBS0001O

- After removing mounting bolts and nuts, separate the mating surface using seal cutter (SST) and remove old liquid gasket sealing.

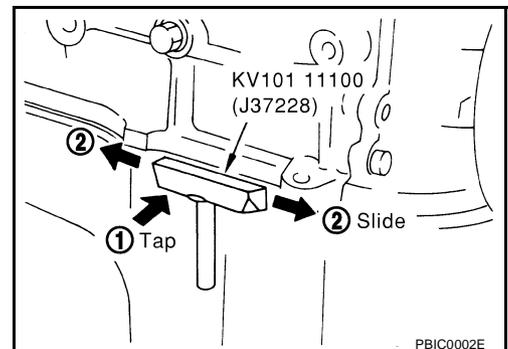
#### CAUTION:

Be careful not to damage the mating surfaces.

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

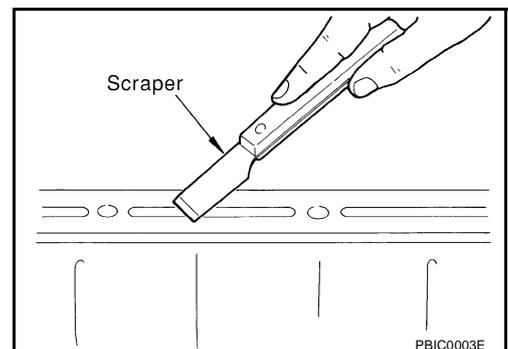
#### CAUTION:

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



### LIQUID GASKET APPLICATION PROCEDURE

1. Using scraper, remove old liquid gasket adhering to the liquid gasket application surface and the mating surface.
  - Remove liquid gasket completely from the groove of the liquid gasket application surface, mounting bolts, and bolt holes.
2. Wipe the liquid gasket application surface and the mating surface with white gasoline (lighting and heating use) to remove adhering moisture, grease and foreign materials.



## PRECAUTIONS

3. Attach liquid gasket tube to tube presser [SST: WS39930000 ( — )].

**Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"](#).**

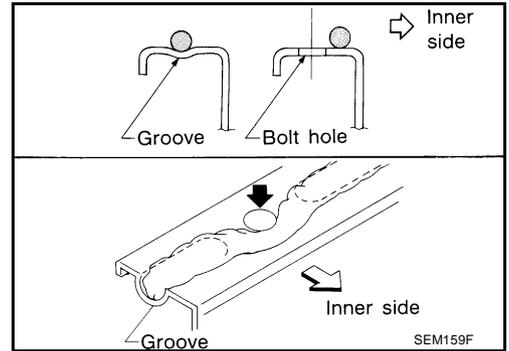
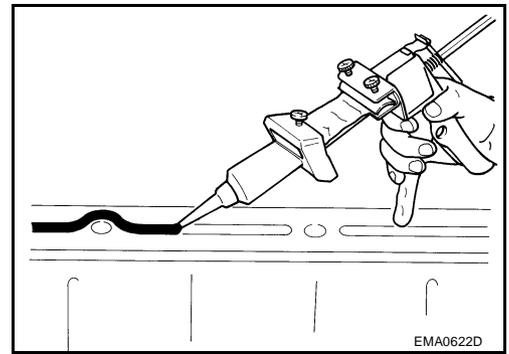
4. Apply liquid gasket without breaks to the specified location with the specified dimensions.

- 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 mounting bolts or nuts 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.**



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# PREPARATION

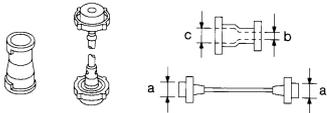
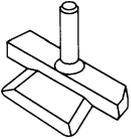
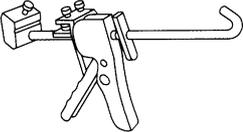
## PREPARATION

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### Special Service Tools

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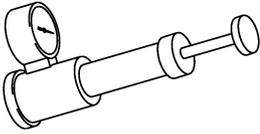
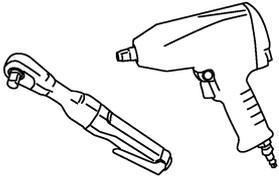
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
EG17650301 (J33984-A) Radiator cap tester adapter  <p style="text-align: center;">S-NT564</p>	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)
KV99103510 ( — ) Radiator plate pliers A  <p style="text-align: center;">S-NT224</p>	Installing radiator upper and lower tanks
KV99103520 ( — ) Radiator plate pliers B  <p style="text-align: center;">S-NT225</p>	Removing radiator upper and lower tanks
KV10111100 (J37228) Seal cutter  <p style="text-align: center;">NT046</p>	Removing chain tensioner cover and water pump cover
WS39930000 ( — ) Tube presser  <p style="text-align: center;">S-NT052</p>	Pressing the tube of liquid gasket

# PREPARATION

## Commercial Service Tools

NBS0001Q

Tool name	Description
<p data-bbox="140 259 338 285">Radiator cap tester</p>  <p data-bbox="836 463 909 480">PBIC1982E</p>	<p data-bbox="995 259 1347 285">Checking radiator and radiator cap</p>
<p data-bbox="140 493 255 519">Power tool</p>  <p data-bbox="836 697 909 715">PBIC0190E</p>	<p data-bbox="995 493 1251 519">Loosening nuts and bolts</p>

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# OVERHEATING CAUSE ANALYSIS

## OVERHEATING CAUSE ANALYSIS

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### 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	—		
		Damaged fins	Dust contamination or paper clogging		
			Physical damage		
		Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)		
	Reduced air flow	Cooling fan does not operate	Fan assembly	—	
		High resistance to fan rotation			
		Damaged fan blades			
		Damaged radiator shroud	—	—	—
		Improper engine coolant mixture ratio	—	—	—
		Poor engine coolant quality	—	Engine coolant viscosity	—
	Insufficient engine coolant	Engine coolant leaks	Cooling hose	Loose clamp	
				Cracked hose	
			Water pump	Poor sealing	
			Radiator cap	Loose	
Poor sealing					
Radiator			O-ring for damage, deterioration or improper fitting		
		Cracked radiator tank			
		Cracked radiator core			
	Reservoir tank	Cracked reservoir tank			
Overflowing reservoir tank	Exhaust gas leaks into cooling system	Cylinder head deterioration			
		Cylinder head gasket deterioration			

# OVERHEATING CAUSE ANALYSIS

	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		E
					Dragging brakes		F
			Improper ignition timing	G			
	Blocked or restricted air flow	Blocked bumper	—		H		
		Blocked radiator grille	Installed car brassiere		I		
			Mud contamination or paper clogging		J		
		Blocked radiator	—		K		
		Blocked condenser	Blocked air flow		L		
Installed large fog lamp	M						

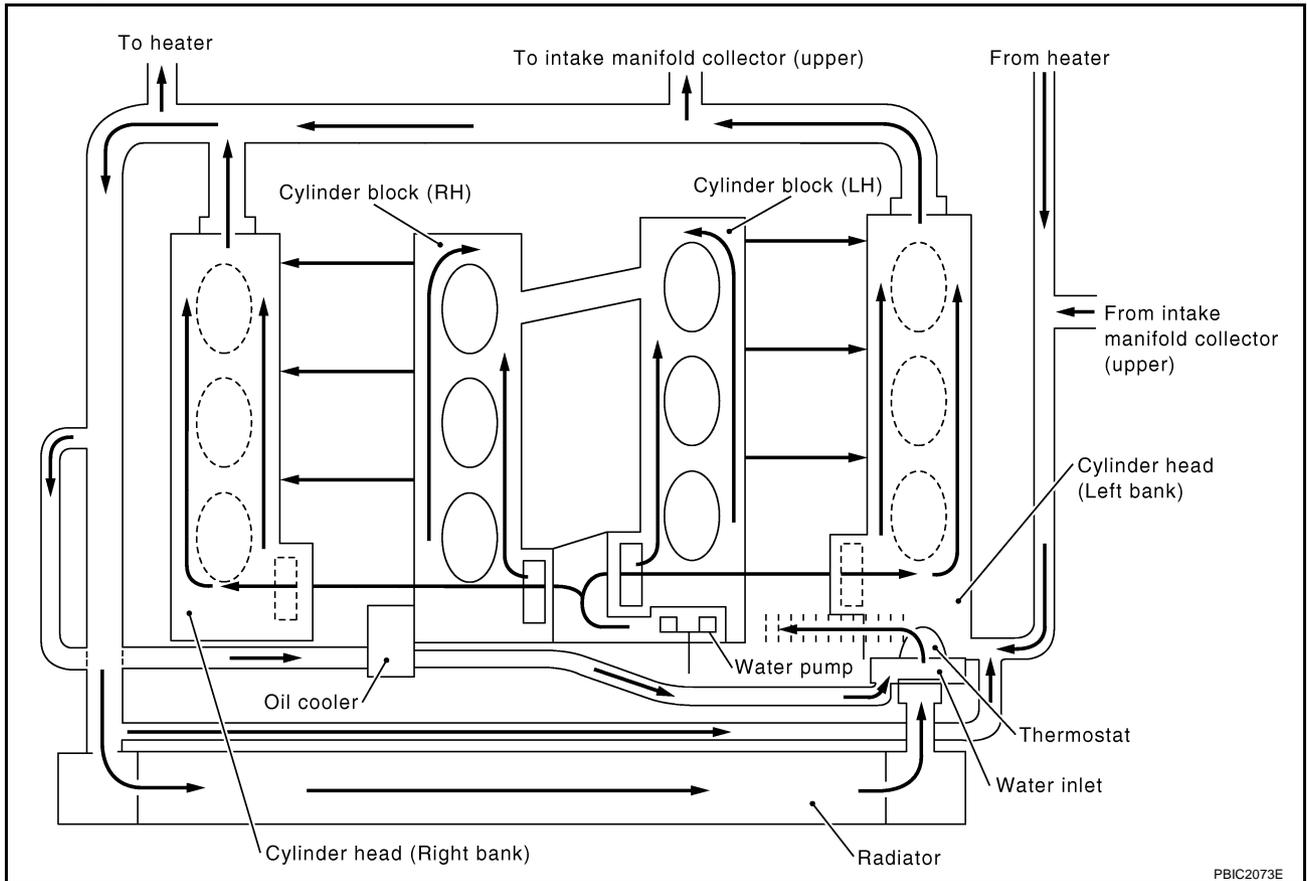
# COOLING SYSTEM

## COOLING SYSTEM

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### Cooling Circuit

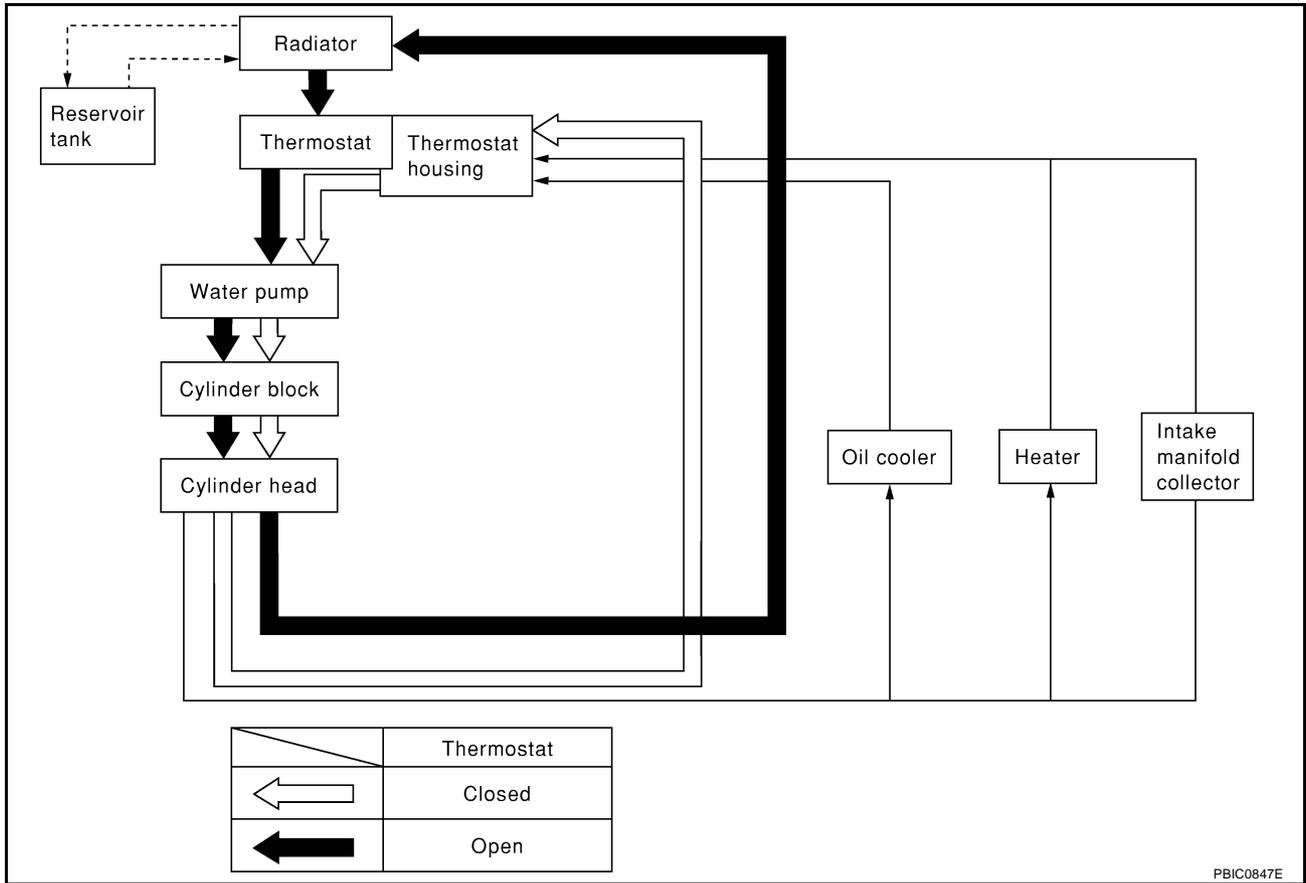
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# COOLING SYSTEM

## System Chart

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# ENGINE COOLANT

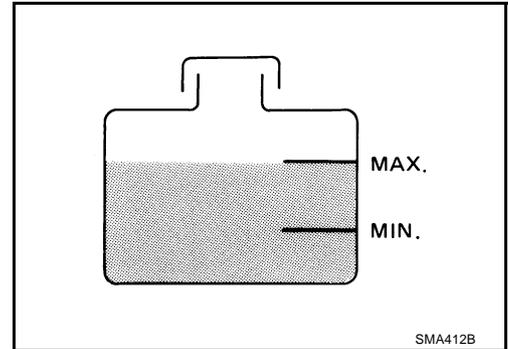
## ENGINE COOLANT

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### Inspection LEVEL CHECK

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



### LEAK CHECK

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

#### Testing pressure

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

#### WARNING:

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

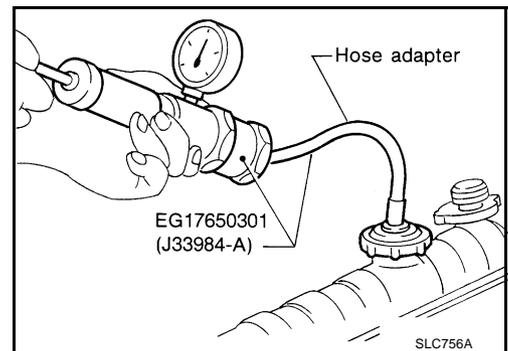
#### CAUTION:

Higher test pressure than specified may cause radiator damage.

#### NOTE:

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

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



## Changing Engine Coolant

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#### WARNING:

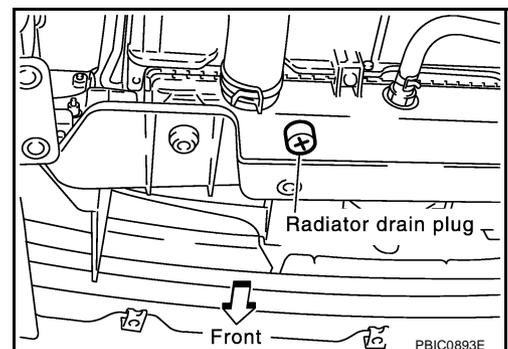
- To avoid being scalded, do not change engine coolant when engine is hot.
- Wrap a thick cloth around cap and carefully remove cap. First, turn cap a quarter of a turn to release built-up pressure. Then turn cap all the way.

#### CAUTION:

Be careful not to allow engine coolant to contact drive belts.

### DRAINING ENGINE COOLANT

1. Remove undercover with power tool.
2. Open radiator drain plug at the bottom of radiator, and then remove radiator cap.



When drain all of engine coolant in the system, open water drain plugs on engine cylinder block. Refer to [EM-138, "DISASSEMBLY"](#) .

# ENGINE COOLANT

3. Remove reservoir tank as necessary, and drain engine coolant and clean reservoir tank before installing.
4. Check drained engine coolant for contaminants such as rust, corrosion or discoloration. If contaminated, flush the engine cooling system. Refer to [CO-12, "FLUSHING COOLING SYSTEM"](#).

## REFILLING ENGINE COOLANT

1. Install reservoir tank if removed, and radiator drain plug.

### CAUTION:

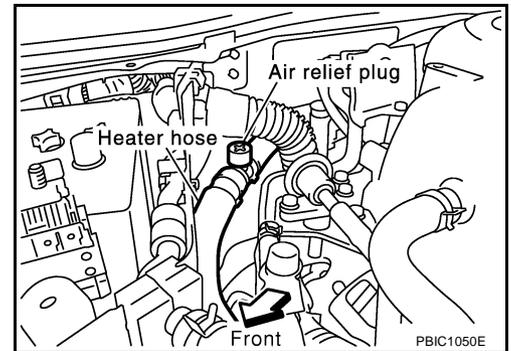
Be sure to clean drain plug and install with new O-ring.

#### Radiator drain plug:

: 0.78 - 1.6 N·m (0.08 - 0.16 kg·m, 7 - 14 in·lb)

If water drain plugs on cylinder block are removed, close and tighten them. Refer to [EM-143, "ASSEMBLY"](#).

2. Make sure that each hose clamp has been firmly tightened.
3. Remove air relief plug on heater hose.



4. Fill radiator and reservoir tank to specified level.
  - Pour engine coolant through engine coolant filler neck slowly of less than 2 ℓ (2-1/8 US qt, 1-3/4 Imp qt) a minute to allow air in system to escape.
  - Use Genuine NISSAN Long Life Antifreeze/Coolant or equivalent mixed with water (distilled or demineralized). Refer to [MA-12, "RECOMMENDED FLUIDS AND LUBRICANTS"](#).

Engine coolant capacity  
(with reservoir tank at "MAX" level)

: Approx. 8.7 ℓ (9-1/4 US qt, 7-5/8 Imp qt)

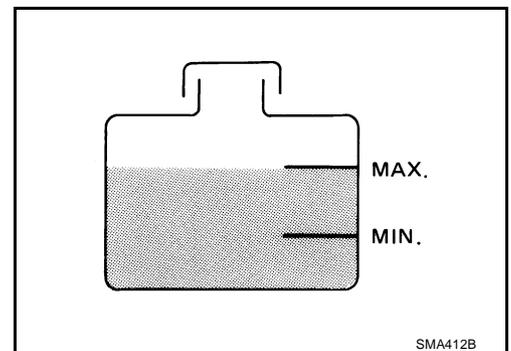
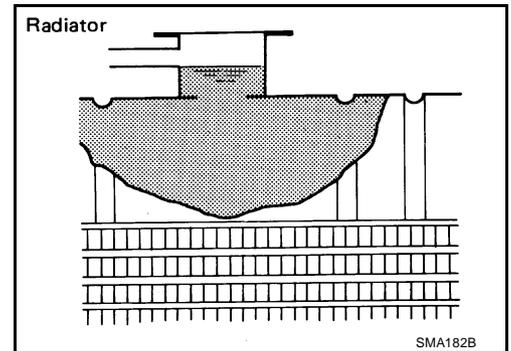
Reservoir tank capacity (at "MAX" level)

: 0.8 ℓ (7/8 US qt, 3/4 Imp qt)

- When engine coolant overflows air relief hole on heater hose, install air relief plug with new O-ring.

#### Air relief plug:

: 0.78 - 1.6 N·m (0.08 - 0.16 kg·m, 7 - 14 in·lb)



5. Install radiator cap.
6. Warm up until opening thermostat. Standard for warming-up time is approximately 10 minutes at 3,000 rpm.
  - Make sure thermostat opening condition by touching radiator hose (lower) to see a flow of warm water.
- CAUTION:**  
Watch water temperature gauge so as not to overheat engine.
7. Stop engine and cool down to less than approximately 50°C (122°F).

# ENGINE COOLANT

- Cool down using fan to reduce the time.
  - If necessary, refill radiator up to filler neck with engine coolant.
8. Refill reservoir tank to "MAX" level line with engine coolant.
  9. Repeat steps 4 through 7 two or more times with radiator cap installed until engine coolant level no longer drops.
  10. Check cooling system for leaks with engine running.
  11. Warm up engine, and check for sound of engine coolant flow while running engine from idle up to 3,000 rpm with heater temperature controller set at several position between "COOL" and "WARM".
    - Sound may be noticeable at heater unit.
  12. Repeat step 11 three times.
  13. If sound is heard, bleed air from cooling system by repeating step 4 through 7 until engine coolant level no longer drops.

## FLUSHING COOLING SYSTEM

1. Install reservoir tank if removed, and radiator drain plug.

### CAUTION:

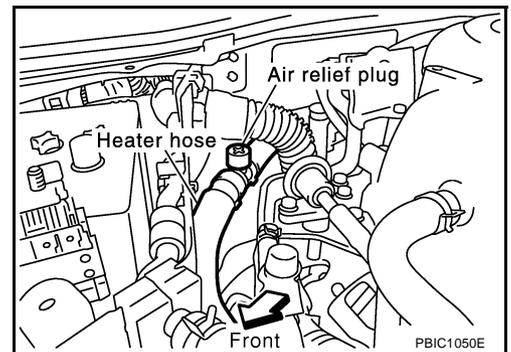
Be sure to clean drain plug and install with new O-ring.

#### Radiator drain plug:

: 0.78 - 1.6 N·m (0.08 - 0.16 kg-m, 7 - 14 in-lb)

If water drain plugs on cylinder block are removed, close and tighten them. Refer to [EM-143, "ASSEMBLY"](#).

2. Remove air relief plug on heater hose.



3. Fill radiator with water until water spills from the air relief hole, then close air relief plug. Fill radiator and reservoir tank with water and reinstall radiator cap.

#### Air relief plug:

: 0.78 - 1.6 N·m (0.08 - 0.16 kg-m, 7 - 14 in-lb)

4. Run engine and warm it up to normal operating temperature.
5. Rev engine two or three times under no-load.
6. Stop engine and wait until it cools down.
7. Drain water from the system. Refer to [CO-10, "DRAINING ENGINE COOLANT"](#).
8. Repeat steps 1 through 7 until clear water begins to drain from radiator.

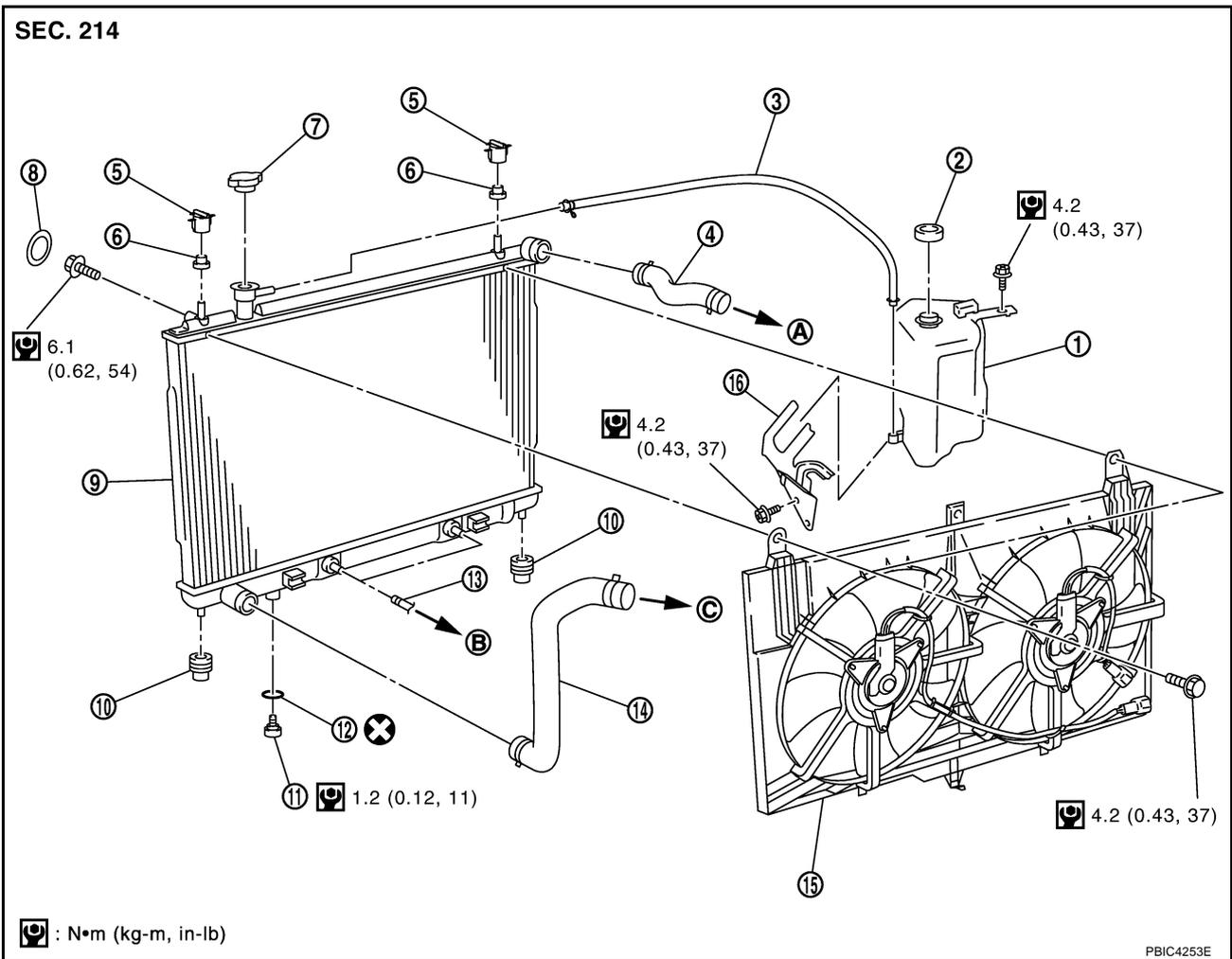
# RADIATOR

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## RADIATOR

### Removal and Installation



- |  |                             |                                   |
|--|-----------------------------|-----------------------------------|
| 1. Reservoir tank                      | 2. Reservoir tank cap       | 3. Reservoir tank hose            |
| 4. Radiator hose (upper)               | 5. Upper mount bracket      | 6. Mounting rubber (upper)        |
| 7. Radiator cap                        | 8. Cover                    | 9. Radiator                       |
| 10. Mounting rubber (lower)            | 11. Radiator drain plug     | 12. O-ring                        |
| 13. A/T fluid cooler hose (A/T models) | 14. Radiator hose (lower)   | 15. Radiator cooling fan assembly |
| 16. Bracket                            |                             |                                   |
| A. To water outlet                     | B. To A/T fluid cooler tube | C. To water inlet                 |

- Refer to [GI-10, "Components"](#) for symbol marks in the figure.

#### WARNING:

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

#### REMOVAL

1. Remove engine cover with power tool. Refer to [EM-18, "INTAKE MANIFOLD COLLECTOR"](#).
2. Remove undercover with power tool.
3. Drain engine coolant from radiator. Refer to [CO-10, "Changing Engine Coolant"](#).

#### CAUTION:

- Perform this step when engine is cold.
  - Do not spill engine coolant on drive belts.
4. Remove air duct and air cleaner case assembly. Refer to [EM-16, "AIR CLEANER AND AIR DUCT"](#).

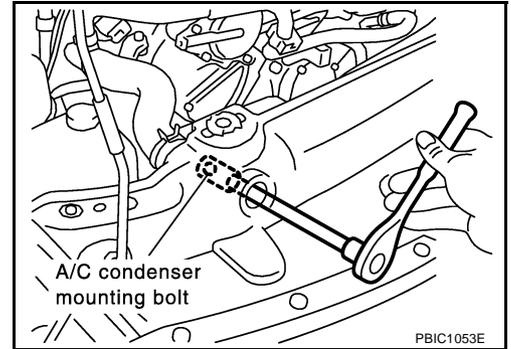
# RADIATOR

5. Remove bracket mounting bolt for anchoring A/C piping from vehicle left side, so that A/C piping can be moved.
6. Remove reservoir tank and bracket.
7. Removal radiator hoses (upper and lower) and reservoir tank hose.

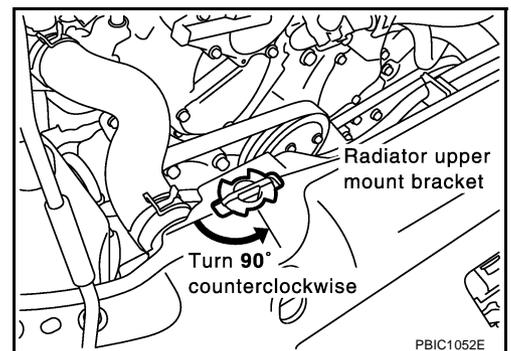
**CAUTION:**

**Be careful not to allow engine coolant to contact drive belts.**

8. Remove radiator cooling fan assembly. Refer to [CO-22, "COOLING FAN"](#) .
9. Disconnect A/T fluid cooler hoses. (A/T models)
  - Install blind plug to avoid leakage of A/T fluid.
10. Remove cover, and then two A/C condenser mounting bolts located in upper part of radiator.



11. Rotate two radiator upper mount brackets 90 degrees in the direction as shown in the figure, and remove them.



12. Remove radiator as follows:

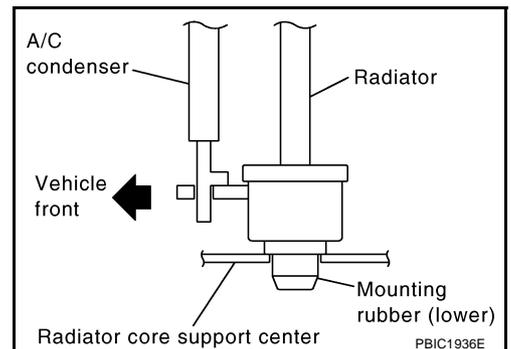
**CAUTION:**

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

- a. With lifting and pulling radiator in a rear direction, disassemble lower mount from radiator core support center.

**CAUTION:**

**Because A/C condenser is onto the front-lower portion of radiator, moving to rear direction should be at minimum.**



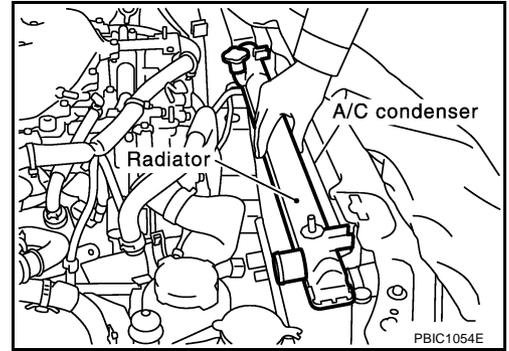
# RADIATOR

- b. Lift A/C condenser up and remove radiator after disengaging the fitting as front-bottom surface.

**CAUTION:**

**Lifting A/C condenser should be minimum to prevent a load to A/C piping.**

- c. After removing radiator, put A/C condenser on radiator core support center to prevent a load to A/C piping, and temporarily fix it with rope or similar means.



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# RADIATOR

## INSTALLATION

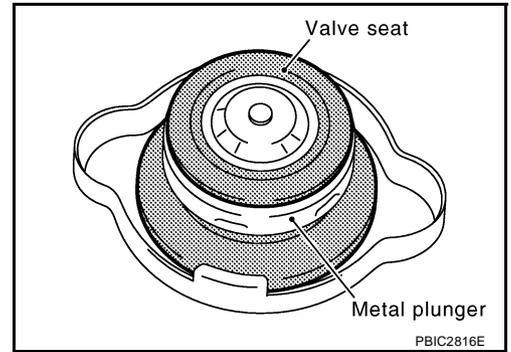
Installation is the reverse order of removal.

## INSPECTION AFTER INSTALLATION

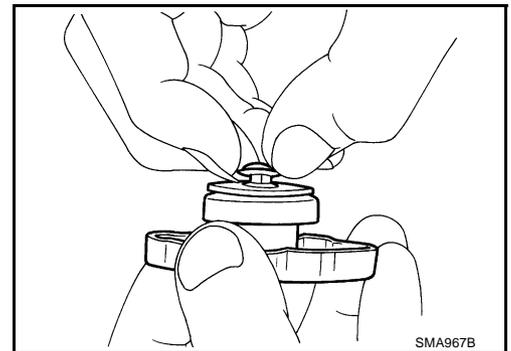
- Check for leaks of engine coolant using radiator cap tester adapter [SST: EG17650301 (J33984-A)] and radiator cap tester (commercial service tool). Refer to [CO-10, "LEAK CHECK"](#).
- Start and warm up engine. Visually make sure that there is no leaks of engine coolant and A/T fluid.

## Checking Radiator Cap

- Check valve seat of radiator cap.
  - Check if valve seat is swollen to the extent that the edge of the plunger cannot be seen when watching it vertically from the top.
  - Check if valve seat has no soil and damage.



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



- Check radiator cap relief pressure.

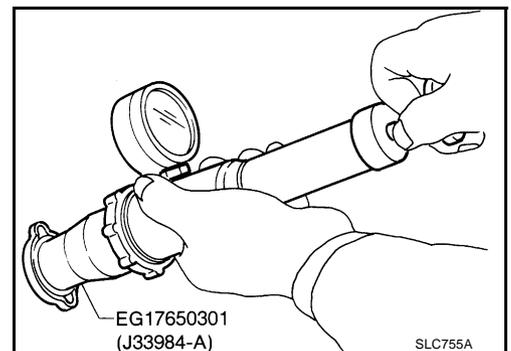
### Standard:

**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 radiator cap to the radiator cap tester (commercial service tool) and the radiator cap tester adapter (SST), apply engine coolant to the cap seal surface.



- Replace radiator cap if there is an unusualness related to the above three.

### CAUTION:

**When installing radiator cap, thoroughly wipe out the radiator filler neck to remove any waxy residue or foreign material.**

## Checking Radiator

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

- Be careful not to bend or damage the radiator fins.
  - When radiator is cleaned without removal, remove all surrounding parts such as cooling fan, radiator shroud and horns. Then tape harness and electrical connectors to prevent water from entering.
1. Apply water by hose to the back side of radiator core vertically downward.
  2. Apply water again to all radiator core surface once per minute.

# RADIATOR

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3. Stop washing if any stains no longer flow out from radiator.
4. Blow air into the back side of radiator core 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.

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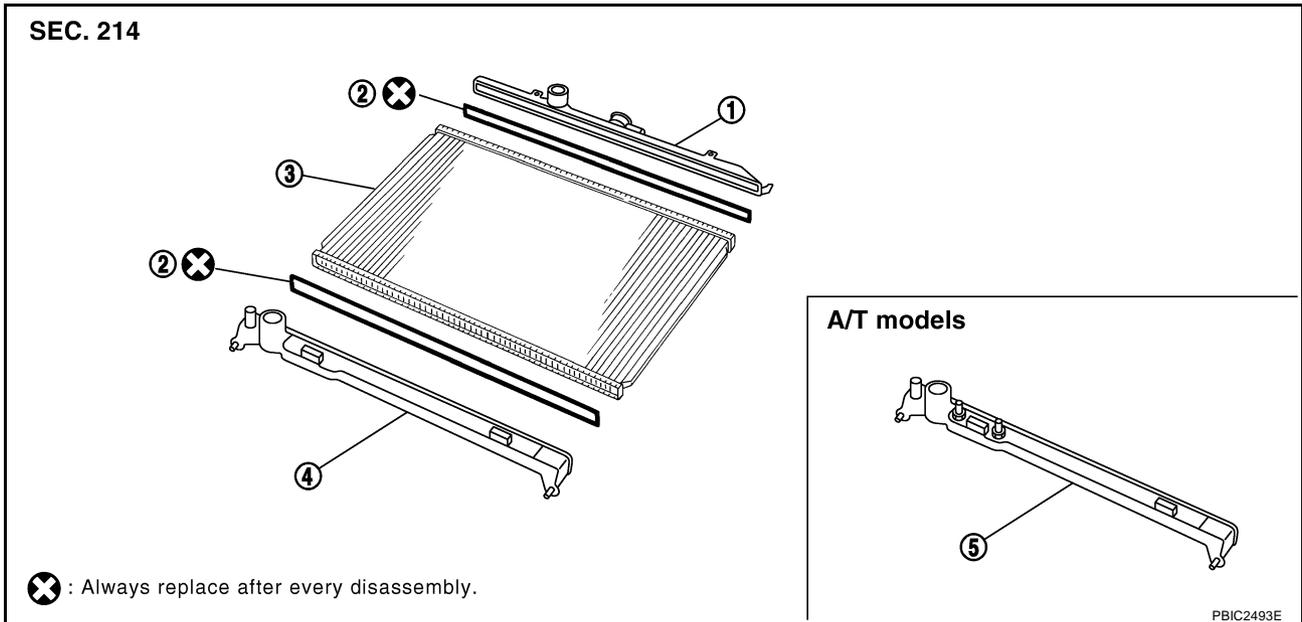
# RADIATOR (ALUMINUM TYPE)

PFP:21460

NBS0001Z

## RADIATOR (ALUMINUM TYPE)

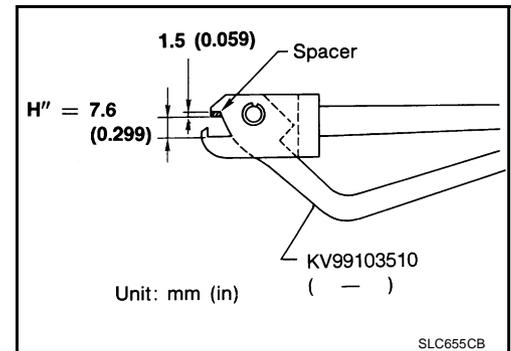
### Disassembly and Assembly



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

### PREPARATION

- Attach spacer to tip of radiator plate pliers A (SST).  
Spacer specification: 18 mm (0.71 in) wide × 8.5 mm (0.335 in) long × 1.5 mm (0.059 in) thick.



- Make sure that when radiator plate pliers A [SST: KV99103510 ( — )] are closed dimension H'' is approx. 7.6 mm (0.299 in).
- Adjust dimension H'' with spacer, if necessary.

### DISASSEMBLY

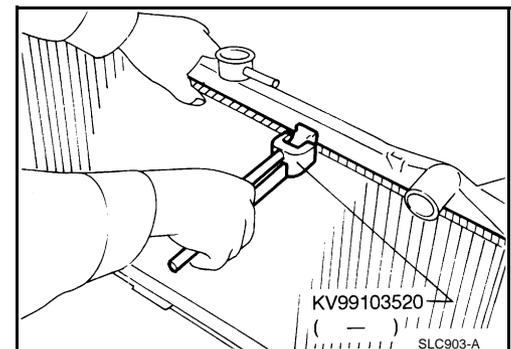
- Remove upper and lower tanks with radiator plate pliers B (SST).

#### CAUTION:

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

#### NOTE:

Regard lower tank and A/T fluid cooler as an assembly. (A/T models)

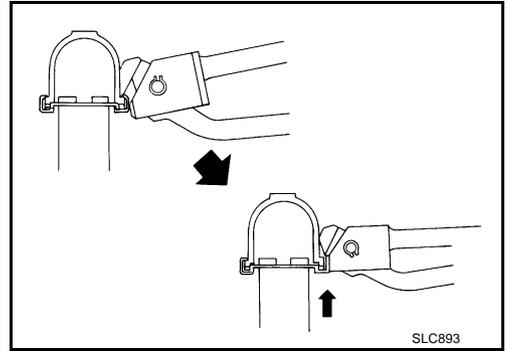


## RADIATOR (ALUMINUM TYPE)

- Grip the crimped edge and bend it upwards so that radiator plate pliers B [SST: KV99103520( — )] slips off.

**CAUTION:**

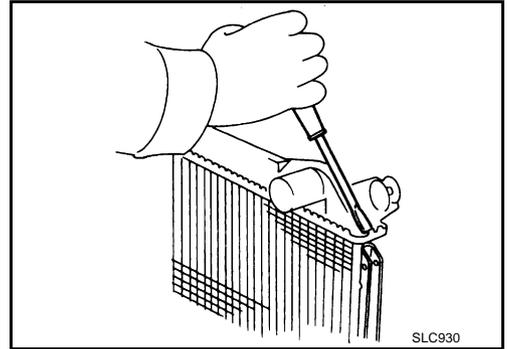
**Do not bend excessively.**



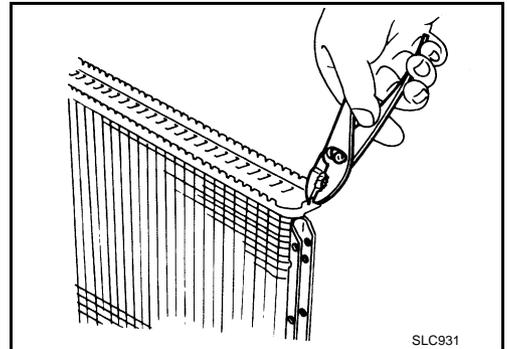
- In areas where radiator plate pliers B [SST: KV99103520( — )] cannot be used, use screwdriver to bend the edge up.

**CAUTION:**

**Be careful not to damage tank.**

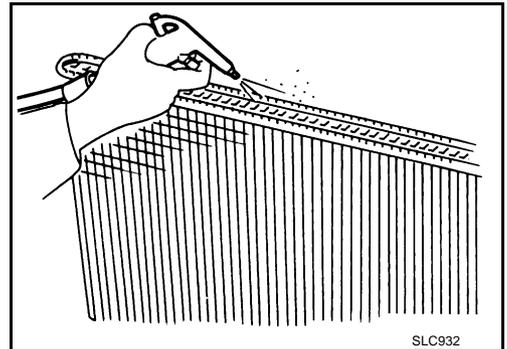


2. Remove sealing rubber.
3. Make sure the edge stands straight up.



### ASSEMBLY

1. Clean contact portion of tank.



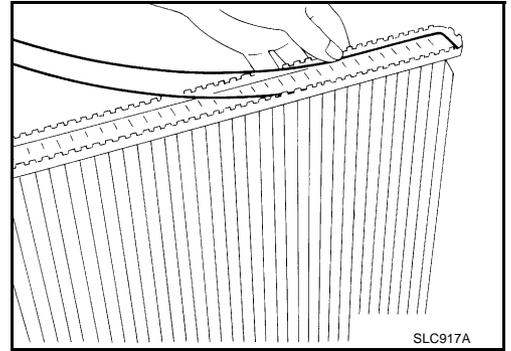
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## RADIATOR (ALUMINUM TYPE)

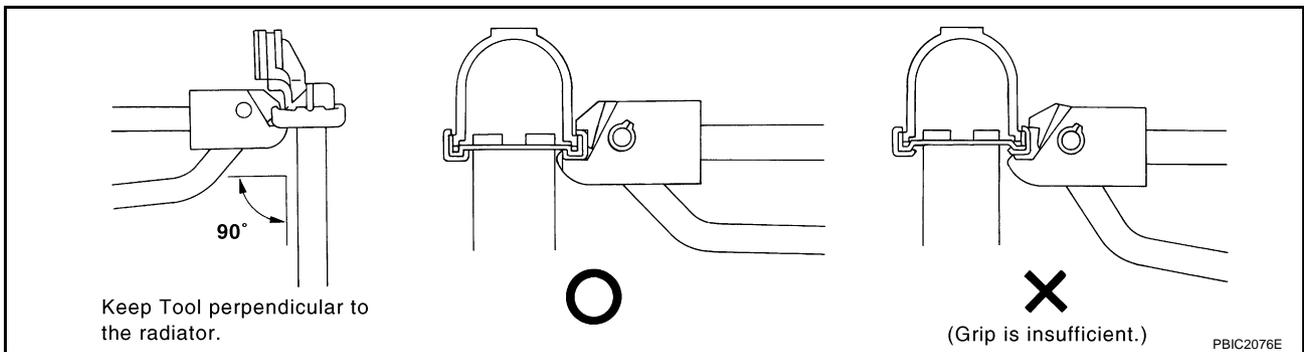
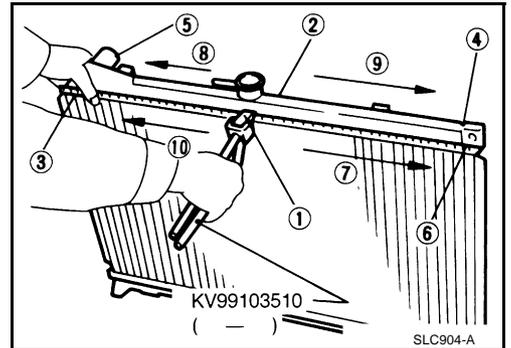
2. Install sealing rubber while pushing it with fingers.

**CAUTION:**

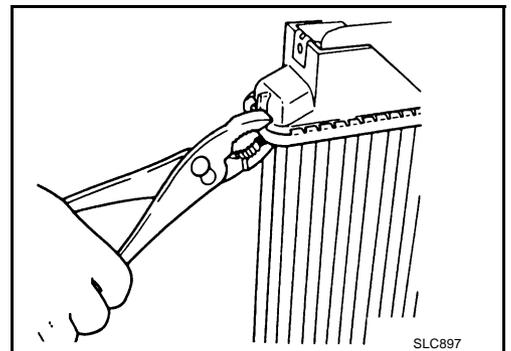
Be careful not to twist sealing rubber.



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



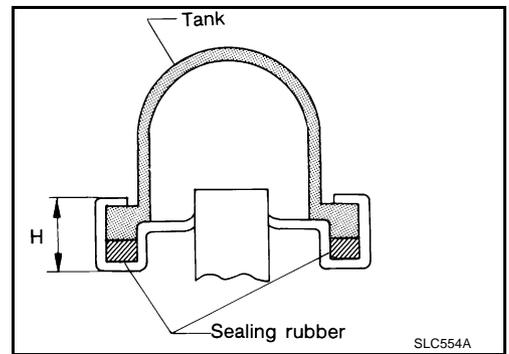
- Use pliers in the locations where radiator plate pliers A [SST: KV99103510 ( — )] cannot be used.



## RADIATOR (ALUMINUM TYPE)

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

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



5. Make sure that there is no leakage.  
Refer to [CO-21, "INSPECTION"](#).

### INSPECTION

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

**Testing pressure**

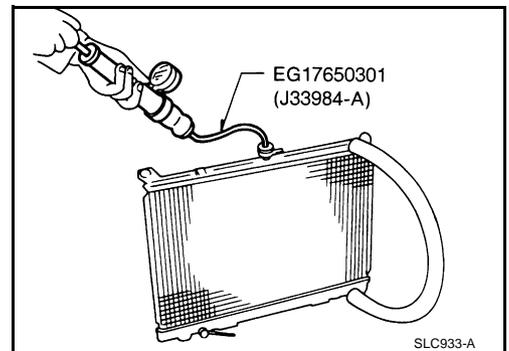
**: 157 kPa (1.6 kg/cm<sup>2</sup> , 23 psi)**

#### **WARNING:**

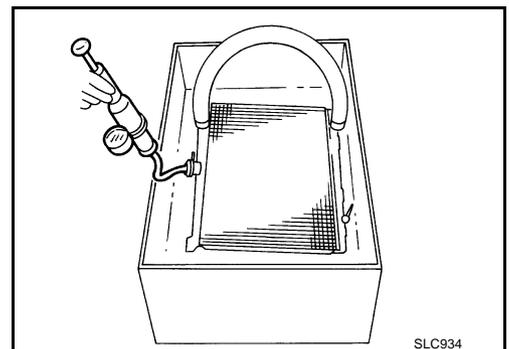
To prevent the risk of hose coming undone while under pressure, securely fasten it down with hose clamp.

#### **CAUTION:**

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



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



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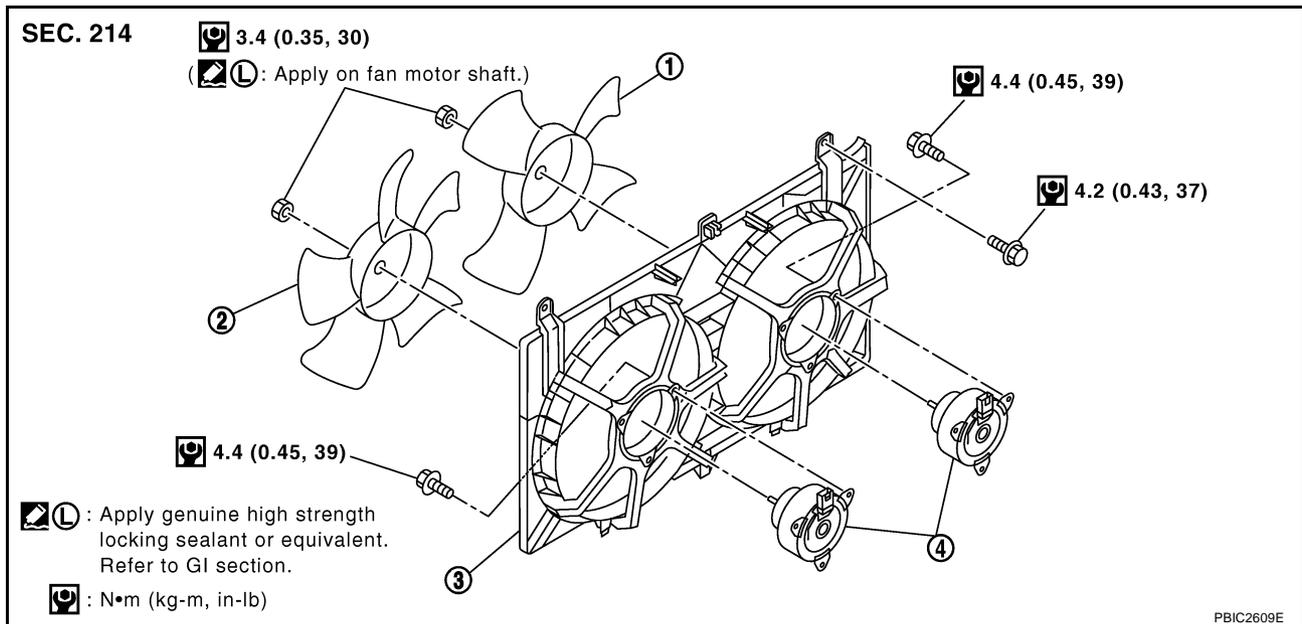
# COOLING FAN

PFP:21140

## COOLING FAN

### Removal and Installation

NBS00020



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

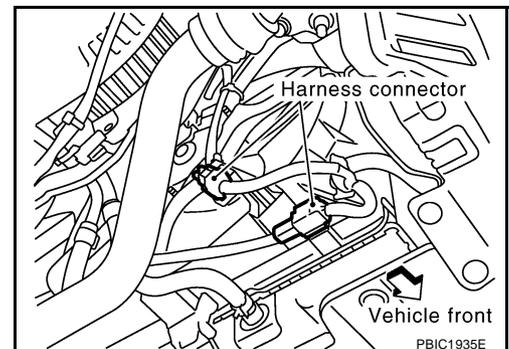
### REMOVAL

1. Remove engine cover with power tool. Refer to [EM-18, "INTAKE MANIFOLD COLLECTOR"](#).
2. Drain engine coolant from radiator. Refer to [CO-10, "Changing Engine Coolant"](#).

#### CAUTION:

- Perform this step when engine is cold.
- Do not spill engine coolant on drive belts.

3. Remove air cleaner case assembly. Refer to [EM-16, "AIR CLEANER AND AIR DUCT"](#).
4. Disconnect radiator hose (upper) at radiator side. Refer to [CO-13, "RADIATOR"](#).
5. Disconnect fan motor harness connectors at the right-lower portion of fan shroud.



6. Remove mounting bolts to lift up and radiator cooling fan assembly.

#### CAUTION:

Be careful not to damage or scratch on radiator core.

### INSTALLATION

Installation is the reverse order of removal.

#### NOTE:

Cooling fans are controlled by ECM. For details, refer to [EC-551, "DTC P1217 ENGINE OVER TEMPERATURE"](#).

# COOLING FAN

NBS00021

## Disassembly and Assembly

### DISASSEMBLY

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

### INSPECTION AFTER DISASSEMBLY

#### Cooling Fan

Inspect cooling fan for crack or unusual bend.

- If anything is found, replace cooling fan.

### ASSEMBLY

Assembly is the reverse order of disassembly.

#### **CAUTION:**

**RH and LH cooling fans are different. Be careful not to misassemble them.**

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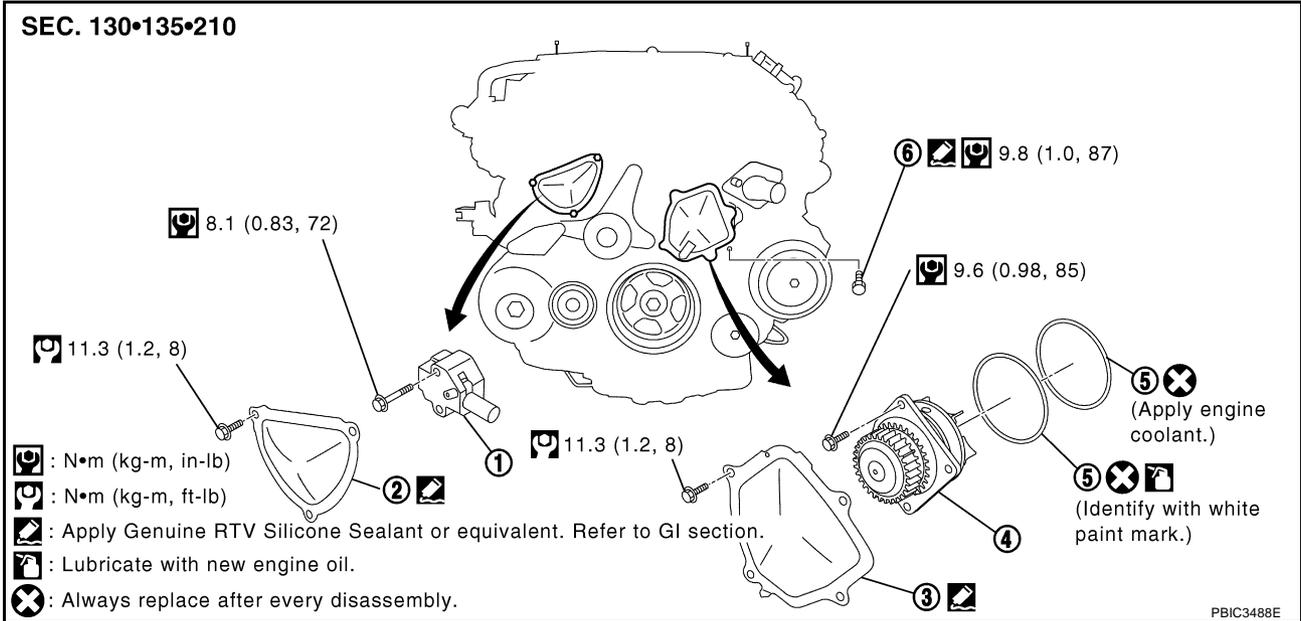
# WATER PUMP

## WATER PUMP

PFP:21020

### Removal and Installation

NBS00022



- |                                     |                          |                             |
|-------------------------------------|--------------------------|-----------------------------|
| 1. Timing chain tensioner (primary) | 2. Chain tensioner cover | 3. Water pump cover         |
| 4. Water pump                       | 5. O-ring                | 6. Water drain plug (front) |

#### CAUTION:

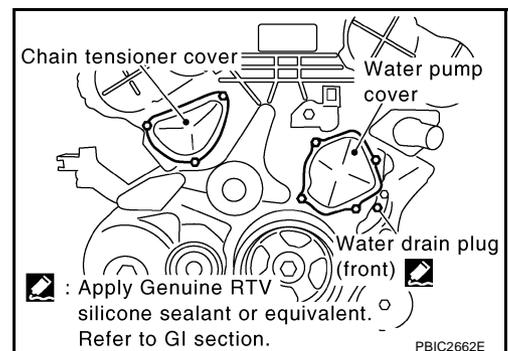
- When removing water pump assembly, be careful not to get engine coolant on drive belt.
- Water pump cannot be disassembled and should be replaced as a unit.
- After installing water pump, connect hose and clamp securely, then check for leaks using radiator cap tester (commercial service tool) and radiator cap tester adapter [SST: EG17650301 (J33984-A)].

#### REMOVAL

1. Remove undercover with power tool.
2. Remove drive belts. Refer to [EM-14, "DRIVE BELTS"](#).
3. Drain engine coolant from radiator. Refer to [CO-10, "Changing Engine Coolant"](#).

#### CAUTION:

- Perform this step when engine is cold.
  - Do not spill engine coolant on drive belts.
4. Remove radiator hoses (upper and lower) and cooling fan assembly. Refer to [CO-13, "RADIATOR"](#).
  5. Remove water drain plug (front) on water pump side of cylinder block to drain engine coolant from engine inside.



6. Remove chain tensioner cover and water pump cover from front timing chain case.
  - Use seal cutter [SST: KV10111100 (J37228)] to cut liquid gasket for removal.
7. Remove timing chain tensioner (primary) as follows:

# WATER PUMP

- a. Remove lower mounting bolt.

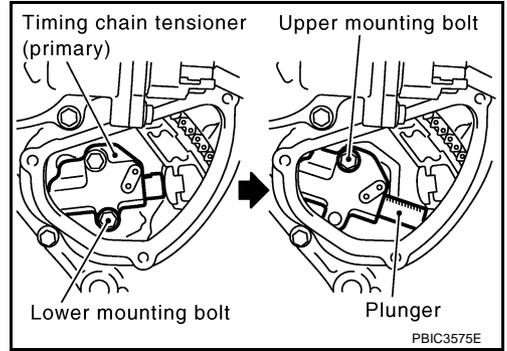
**CAUTION:**

**Be careful not to drop mounting bolt inside timing chain case.**

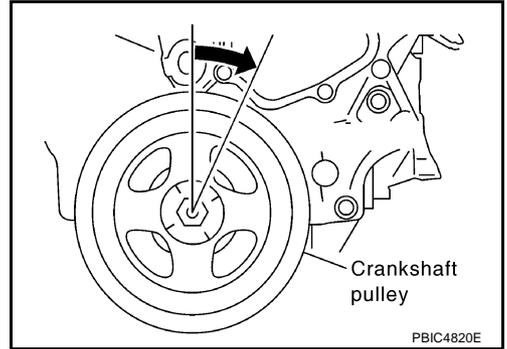
- b. Loosen upper mounting bolt slowly, and then turn chain tensioner (primary) on the mounting bolt so that plunger is fully expanded.

**NOTE:**

Even if plunger is fully expanded, it is not dropped from the body of timing chain tensioner (primary).



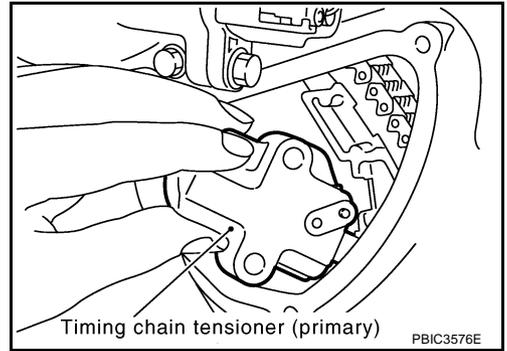
- c. Turn crankshaft pulley clockwise so that timing chain on the timing chain tensioner (primary) side is loose.



- d. Remove upper mounting bolt, and then remove timing chain tensioner (primary).

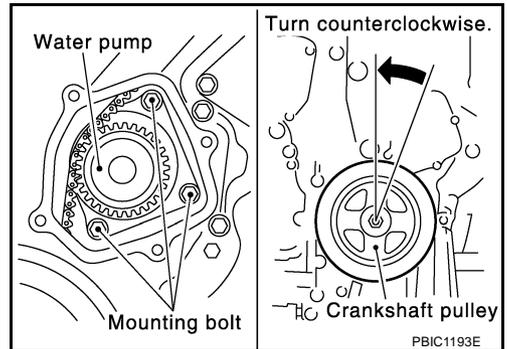
**CAUTION:**

**Be careful not to drop mounting bolt inside timing chain case.**



8. Remove water pump as follows:

- a. Remove three water pump mounting bolts. Secure a gap between water pump gear and timing chain, by turning crankshaft pulley counterclockwise until timing chain looseness on water pump sprocket becomes maximum.



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# WATER PUMP

- b. Screw M8 bolts [pitch: 1.25 mm (0.049 in) length: approx. 50 mm (1.97 in)] into water pumps upper and lower mounting bolt holes until they reach timing chain case. Then, alternately tighten each bolt for a half turn, and pull out water pump.

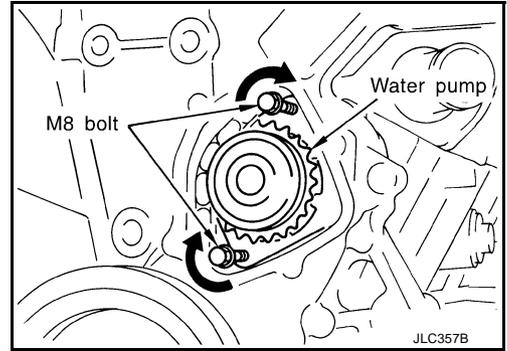
**CAUTION:**

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

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

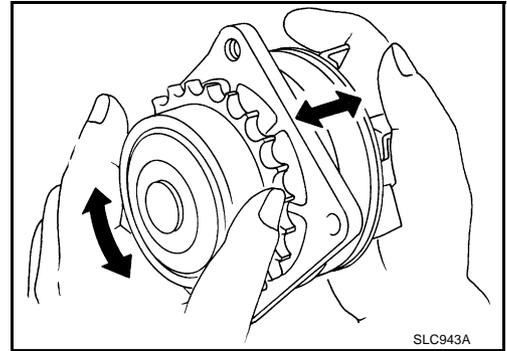
**CAUTION:**

**Do not disassemble water pump.**



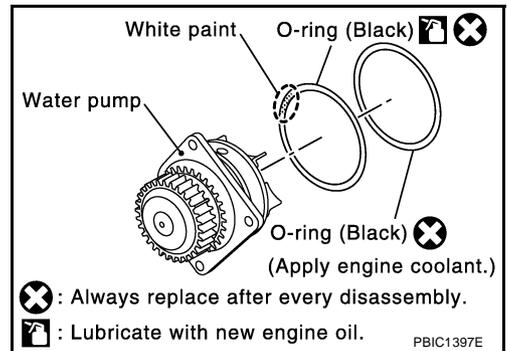
## INSPECTION AFTER REMOVAL

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



## INSTALLATION

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

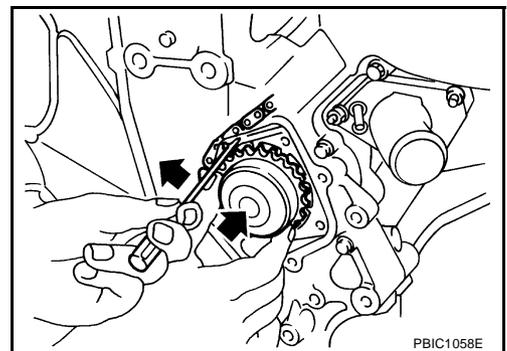


2. Install water pump.

**CAUTION:**

**Do not allow cylinder block to nip O-rings when installing water pump.**

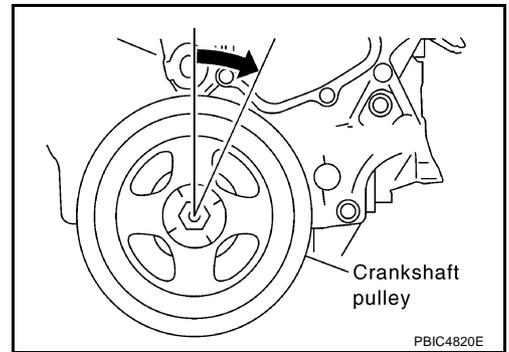
- Make sure that timing chain and water pump sprocket are engaged.
- Insert water pump by tightening mounting bolts alternately and evenly.



3. Install timing chain tensioner (primary) as follows:

# WATER PUMP

- a. Turn crankshaft pulley clockwise so that timing chain on the timing chain tensioner (primary) side is loose.

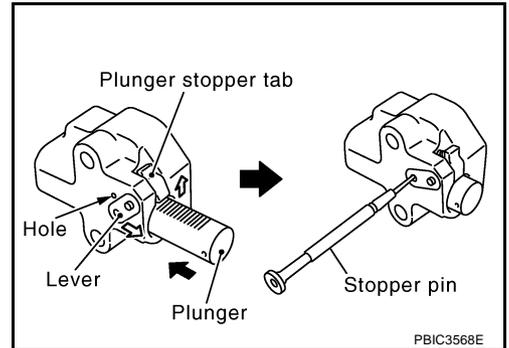


- b. Pull plunger stopper tab up (or turn lever downward) so as to remove plunger stopper tab from the ratchet of plunger.

**NOTE:**

Plunger stopper tab and lever are synchronized.

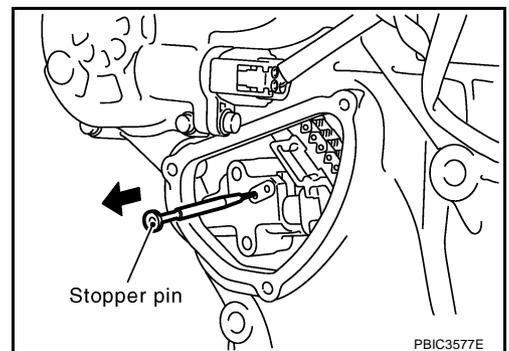
- c. Push plunger into the inside of tensioner body.
- d. Hold plunger in the fully compressed position by engaging plunger stopper tab with the tip of ratchet.
- e. To secure lever, insert stopper pin through hole of lever into tensioner body hole.
- The lever parts and the tab are synchronized. Therefore, the plunger will be secured under this condition.



**NOTE:**

Figure shows the example of 1.2 mm (0.047 in) diameter thin screwdriver being used as the stopper pin.

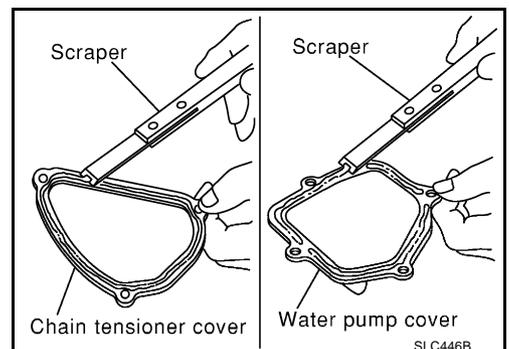
- f. Install timing chain tensioner (primary).
- Remove dust and foreign material completely from backside of timing chain tensioner (primary) and from installation area of rear timing chain case.
- g. Remove stopper pin.



- h. Make sure again that timing chain and water pump sprocket are engaged.

4. Install chain tensioner cover and water pump cover as follows:

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



## WATER PUMP

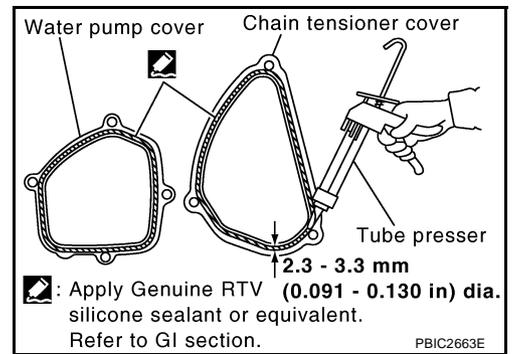
- b. Apply a continuous bead of liquid gasket with tube presser [SST: WS39930000 ( — )] to mating surface of chain tensioner cover and water pump cover.

**Use Genuine RTV Silicone Sealant or equivalent. Refer to [GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"](#) .**

**CAUTION:**

**Attaching should be done within 5 minutes after coating.**

- c. Tighten mounting bolts.



5. Install water drain plug (front) on water pump side of cylinder block.
6. Install in the reverse order of removal after this step.
- **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 chain tensioner. 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 leaks of engine coolant using radiator cap tester adapter [SST: EG17650301 (J33984-A)] and radiator cap tester (commercial service tool). Refer to [CO-10, "LEAK CHECK"](#) .
- Start and warm up engine. Visually make sure that there is no leaks of engine coolant.

# WATER INLET AND THERMOSTAT ASSEMBLY

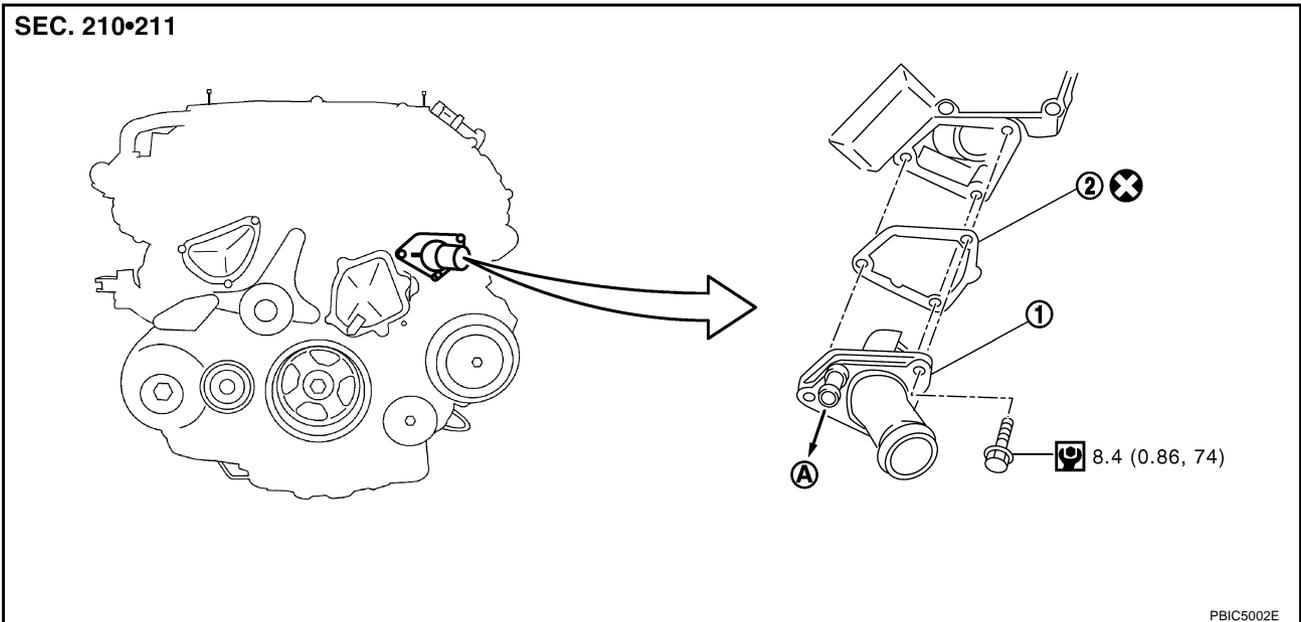
## WATER INLET AND THERMOSTAT ASSEMBLY

PFP:21200

### Removal and Installation

NBS00023

SEC. 210•211



1. Water inlet and thermostat assembly
  2. Gasket
- A. To oil cooler

- Refer to [GI-10, "Components"](#) for symbol marks in the figure.

### REMOVAL

1. Remove undercover with power tool.
2. Drain engine coolant from radiator drain plug at the bottom of radiator, and from water drain plug at the front of cylinder block. Refer to [CO-10, "Changing Engine Coolant"](#) and [CO-24, "WATER PUMP"](#).

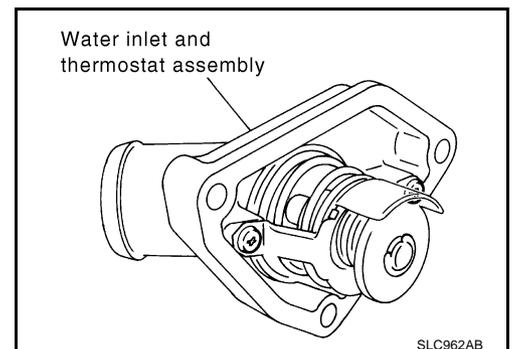
#### CAUTION:

- Perform this step when engine is cold.
- Do not spill engine coolant on drive belts.

3. Remove air duct and air cleaner case. Refer to [EM-16, "AIR CLEANER AND AIR DUCT"](#).
4. Remove water drain plug on water pump side of cylinder block.
5. Disconnect radiator hose (lower) and oil cooler hose from water inlet and thermostat assembly.
6. Remove water inlet and thermostat assembly.

#### CAUTION:

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



### INSPECTION AFTER REMOVAL

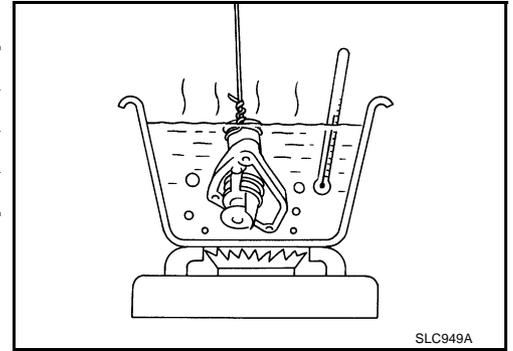
1. Check valve seating condition at ordinary room temperatures. It should seat tightly.

# WATER INLET AND THERMOSTAT ASSEMBLY

## 2. Check valve operation.

Thermostat	Standard
Valve opening temperature	76 - 79°C (169 - 174°F)
Maximum valve lift	8.6 mm/90°C (0.339 in/194°F)
Valve closing temperature	71°C (160°F)

- If the malfunctioning condition, when valve seating at ordinary room temperature, or measured values are out of the standard, replace water inlet and thermostat assembly.



## INSTALLATION

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

- **Be careful not to spill engine coolant over engine room. Use rag to absorb engine coolant.**

## INSPECTION AFTER INSTALLATION

- Check for leaks of engine coolant using radiator cap tester adapter [SST: EG17650301 (J33984-A)] and radiator cap tester (commercial service tool). Refer to [CO-10, "LEAK CHECK"](#).
- Start and warm up engine. Visually make sure that there is no leaks of engine coolant.

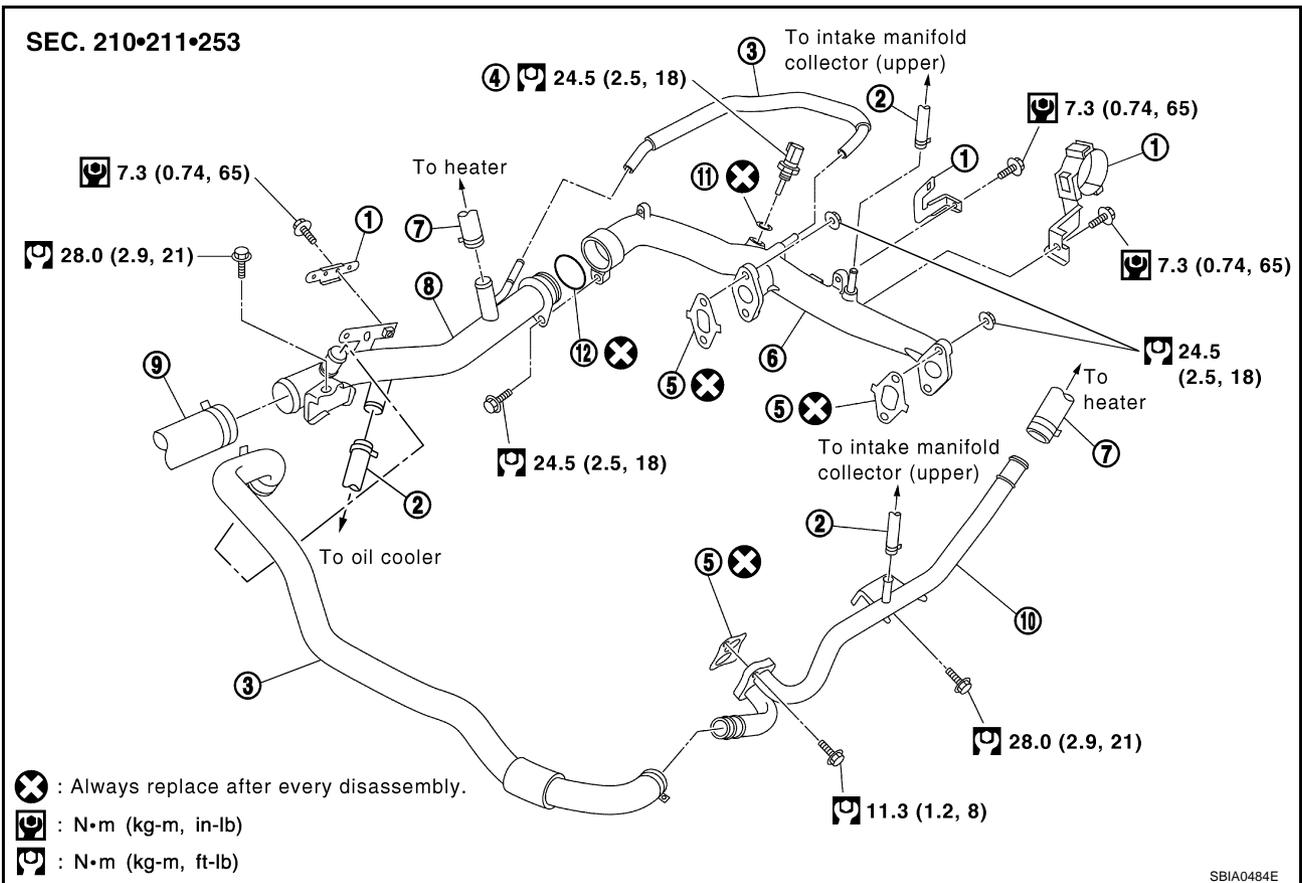
# WATER OUTLET AND WATER PIPING

## WATER OUTLET AND WATER PIPING

PF11060

### Removal and Installation

NBS00024



- |                                      |               |                          |
|--------------------------------------|---------------|--------------------------|
| 1. Harness bracket                   | 2. Water hose | 3. Water bypass hose     |
| 4. Engine coolant temperature sensor | 5. Gasket     | 6. Water outlet          |
| 7. Heater hose                       | 8. Water pipe | 9. Radiator hose (upper) |
| 10. Heater pipe                      | 11. Washer    | 12. O-ring               |

#### NOTE:

Figure shows the example of the shape of part labeled 3. being used except for M/T models.

#### REMOVAL

- Remove undercover with power tool.
- Drain engine coolant from radiator drain plug at the bottom of radiator, and from water drain plug at the front of cylinder block. Refer to [CO-10, "Changing Engine Coolant"](#) and [CO-24, "WATER PUMP"](#).

#### CAUTION:

- Perform this step when engine is cold.
- Do not spill engine coolant on drive belts.

- Remove engine cover with power tool. Refer to [EM-18, "INTAKE MANIFOLD COLLECTOR"](#).
- Remove air duct and air cleaner case. Refer to [EM-16, "AIR CLEANER AND AIR DUCT"](#).
- Remove radiator hose (upper), heater hoses and water hoses.
- Remove the following parts, when remove water outlet.
  - A/T fluid charging pipe (A/T models): Refer to [AT-274, "TRANSMISSION ASSEMBLY"](#).
  - Intake manifold collectors (upper and lower): Refer to [EM-18, "INTAKE MANIFOLD COLLECTOR"](#).
  - Rocker cover (right bank): Refer to [EM-44, "ROCKER COVER"](#).
- Remove engine coolant temperature sensor as necessary.

#### CAUTION:

**Be careful not to damage engine coolant temperature sensor.**

- Remove water outlet, heater pipe, water bypass hoses and water pipe.

# WATER OUTLET AND WATER PIPING

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## INSTALLATION

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

- Securely insert each hose, and install clamp at a position where it does not interfere with the pipe bulge.
- When inserting water pipe into water outlet, apply neutral detergent to O-ring.

## INSPECTION AFTER INSTALLATION

- Check for leaks of engine coolant using radiator cap tester adapter [SST: EG17650301 (J33984-A)] and radiator cap tester (commercial service tool). Refer to [CO-10, "LEAK CHECK"](#).
- Start and warm up engine. Visually make sure that there is no leaks of engine coolant.

# SERVICE DATA AND SPECIFICATIONS (SDS)

## SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00100

### Standard and Limit ENGINE COOLANT CAPACITY (APPROXIMATE)

NBS00025

Unit: ℓ (US qt, Imp qt)

Engine coolant capacity (With reservoir tank at "MAX" level)	8.7 (9-1/4, 7- 5/8)
Reservoir tank engine coolant capacity (At "MAX" level)	0.8 (7/8, 3/4)

### 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)

### THERMOSTAT

Valve opening temperature	76 - 79°C (169 - 174°F)
Maximum valve lift	8.6 mm/90°C (0.339 in/194°F)
Water closing temperature	71°C (160°F)

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# SERVICE DATA AND SPECIFICATIONS (SDS)

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