

# SECTION CO

## ENGINE COOLING SYSTEM

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# PRECAUTION

## PRECAUTIONS

### Precautions for Removing of Battery Terminal

INFOID:0000000010235635

- When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.

**NOTE:**

ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.

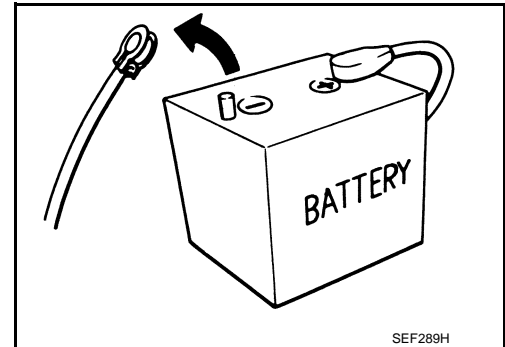
**NOTE:**

If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.

- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.

**NOTE:**

The removal of 12V battery may cause a DTC detection error.



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

INFOID:0000000009749820

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 AIR BAG" and "SEAT BELT" of this Service Manual.

**WARNING:**

Always observe the following items for preventing accidental activation.

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that 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 "SRS AIR BAG".
- Never 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 WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

**WARNING:**

Always observe the following items for preventing accidental activation.

- When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

PREPARATION

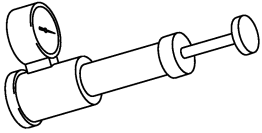
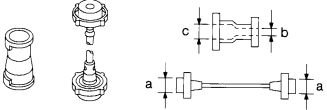
PREPARATION

Commercial Service Tools

INFOID:000000009749821

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Tool name	Description
<p>Radiator cap tester</p>  <p>PBIC1982E</p>	<p>Checking radiator and radiator cap</p>
<p>Radiator cap tester adapter</p>  <p>S-NT564</p>	<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)</p>

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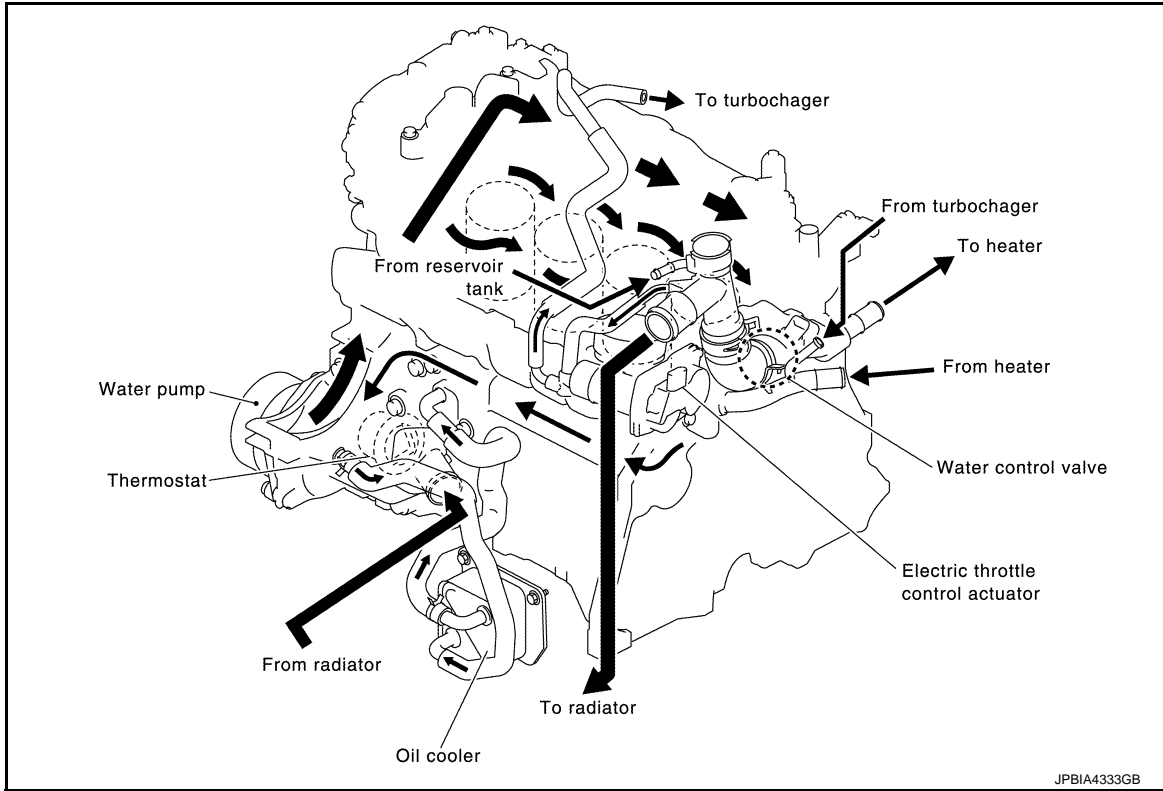
# SYSTEM DESCRIPTION

## DESCRIPTION

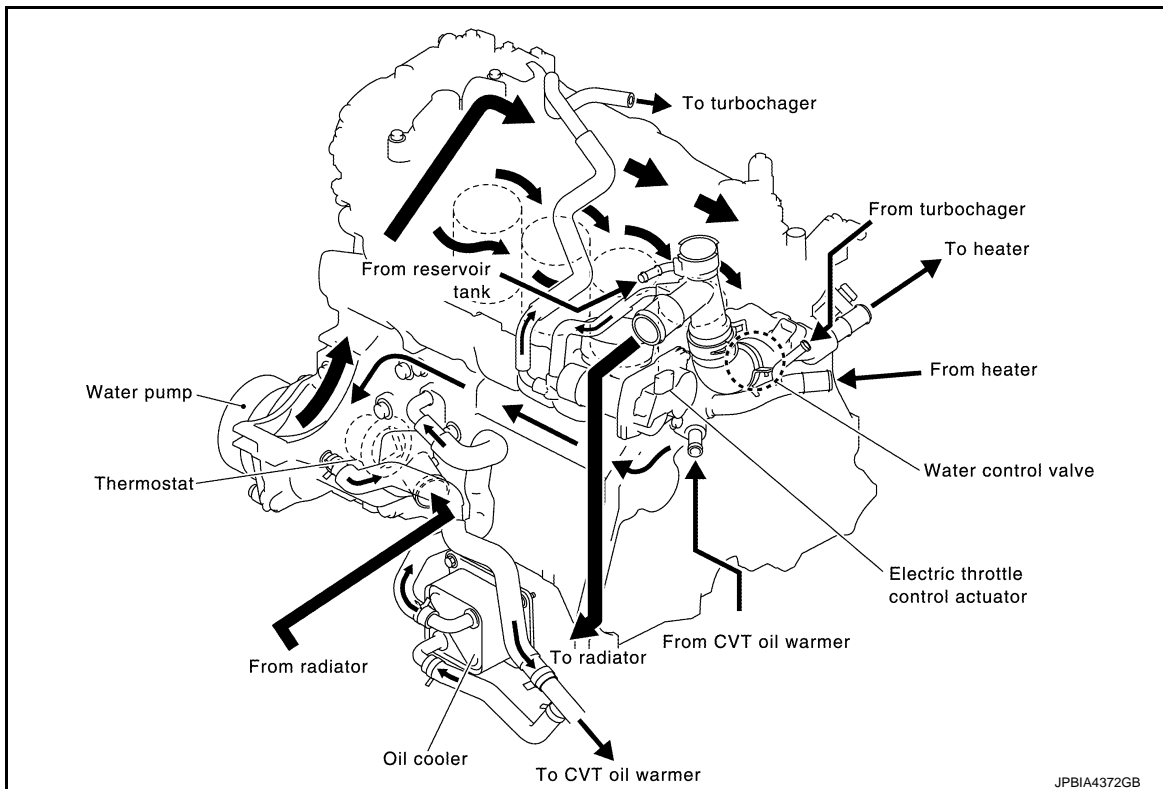
### Engine Cooling System

INFOID:000000009749822

M/T models



CVT models



# DESCRIPTION

< SYSTEM DESCRIPTION >

[MR16DDT ]

## Engine Cooling System Schematic

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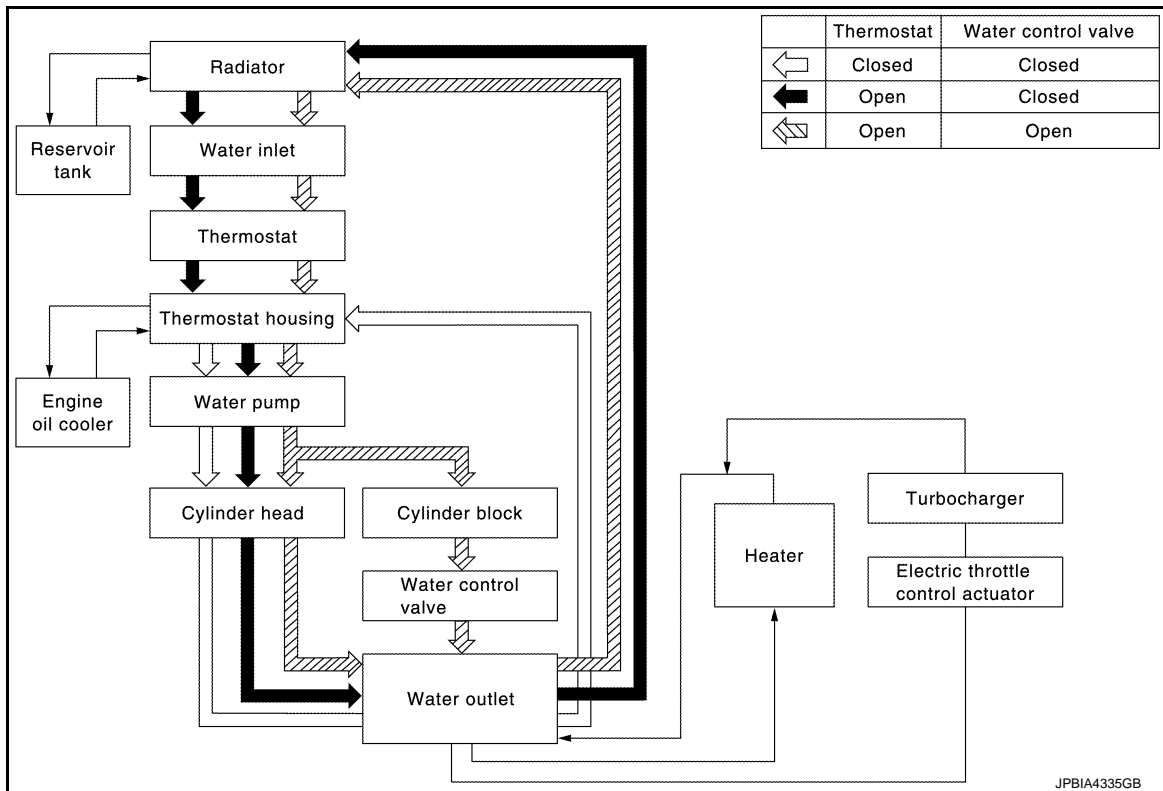
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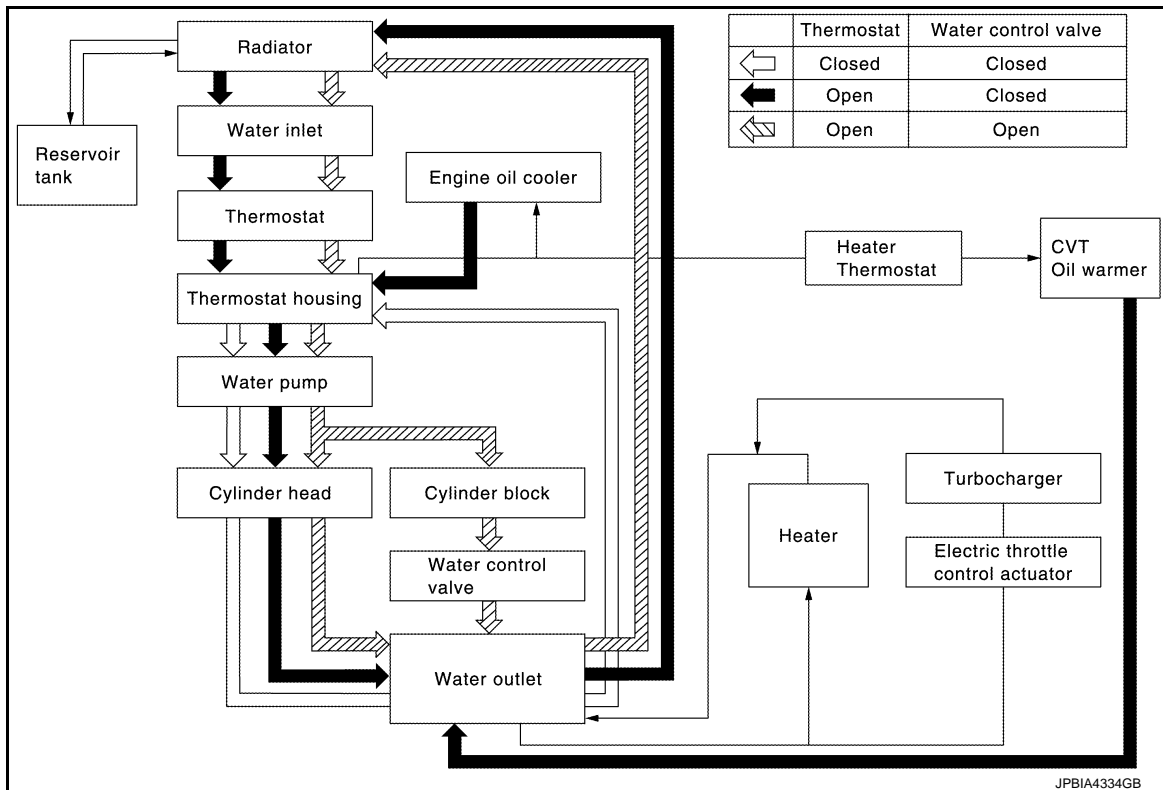
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M/T models



CVT models



# OVERHEATING CAUSE ANALYSIS

< SYMPTOM DIAGNOSIS >

[MR16DDT ]

## SYMPTOM DIAGNOSIS

### OVERHEATING CAUSE ANALYSIS

#### Troubleshooting Chart

INFOID:000000009749824

	Symptom		Check items		
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	Worn or loose drive belt	—	
		Thermostat and water control valve stuck closed	—		
		Damaged fins	Dust contamination or paper clogging		—
			Physical damage		
		Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)		
	Reduced air flow	Cooling fan does not operate	Fan assembly	—	
		High resistance to fan rotation			
		Damaged fan blades			
		Damaged radiator shroud	—	—	
		Improper engine coolant mixture ratio	—	—	
		Poor engine coolant quality	—	—	
	Insufficient engine coolant	Engine coolant leakage	Cooling hose	Loose clamp	
				Cracked hose	
			Water pump	Poor sealing	
			Radiator cap	Loose	
Poor sealing					
Radiator			O-ring for damage, deterioration or improper fitting		
		Cracked radiator tank			
Reservoir tank		Cracked radiator core			
Overflowing reservoir tank	Exhaust gas leakage into cooling system	Cracked reservoir tank			
		Cylinder head deterioration			
		Cylinder head gasket deterioration			

# OVERHEATING CAUSE ANALYSIS

< SYMPTOM DIAGNOSIS >

[MR16DDT ]

	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			
					Power train system malfunction		C
					Installed improper size wheels and tires	—	D
					Dragging brakes		
			Improper ignition timing		E		
	Blocked or restricted air flow		Blocked bumper	—		E	
		Blocked radiator grille		Installed car brassiere			
				Mud contamination or paper clogging	—	F	
			Blocked radiator	—			
			Blocked condenser			G	
	Installed large fog lamp	Blocked air flow					

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## PERIODIC MAINTENANCE

### ENGINE COOLANT

#### Inspection

INFOID:000000009749825

#### LEVEL

- Check that the reservoir tank engine coolant level is within the "MIN" to "MAX" when the engine is cool.

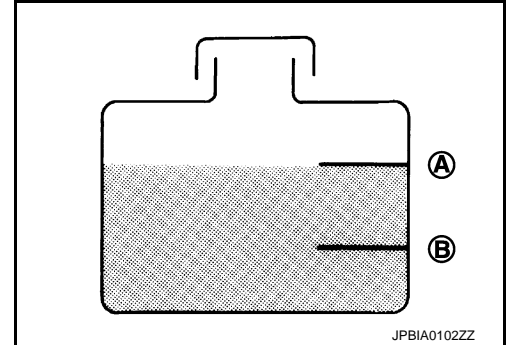
A : MAX

B : MIN

- Adjust the engine coolant level if necessary.

**CAUTION:**

Refill Genuine NISSAN Long Life Antifreeze/Coolant (blue) or equivalent in its quality mixed with water (distilled or demineralized). Refer to [MA-10, "Fluids and Lubricants"](#).



#### LEAKAGE

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

Testing pressure: Refer to [CO-27, "Radiator"](#).

**WARNING:**

Never remove radiator cap when engine is hot. Serious burns may occur from high-pressure engine coolant escaping from engine cooling system.

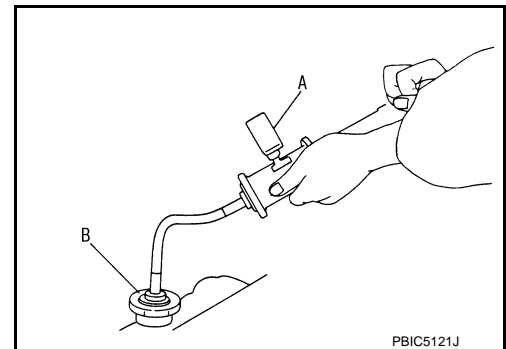
**CAUTION:**

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.



#### Draining

INFOID:000000009749826

**WARNING:**

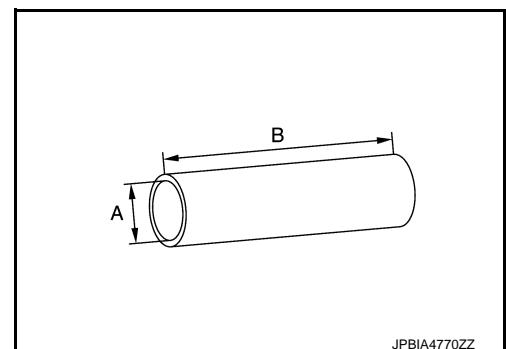
- Never remove radiator cap when engine is hot. Serious burns may occur from high-pressure engine coolant escaping from radiator.
- Wrap a thick cloth around the radiator cap. Slowly turn it a quarter of a turn to release built-up pressure. Then turn it all the way.

1. Connect drain hose.

- Use a general-purpose hose with the dimensions shown in the figure.

A :  $\phi$  8 mm (0.31 in)

B : 300 mm (11.81 in)





# ENGINE COOLANT

[MR16DDT ]

## < PERIODIC MAINTENANCE >

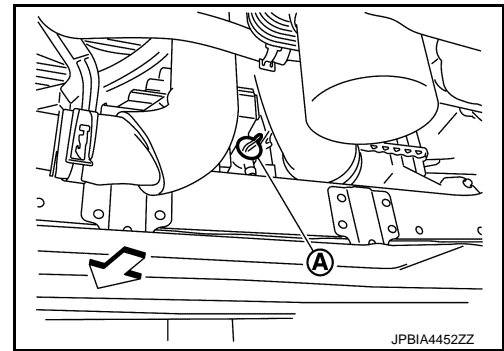
2. Open radiator drain plug (A) at the bottom of radiator, and then remove radiator cap.

↶ : Vehicle front

### CAUTION:

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

- When draining all of engine coolant in the system, open water drain plugs on cylinder block. Refer to [EM-69, "Setting"](#).



3. Remove reservoir tank if necessary, and drain engine coolant and clean reservoir tank before installing. Refer to [CO-14, "Exploded View"](#).
4. Check drained engine coolant for contaminants such as rust, corrosion or discoloration. If contaminated, flush the engine cooling system. Refer to [CO-10, "Flushing"](#).
5. Disconnect drain hose.

## Refilling

INFOID:000000009749827

### CAUTION:

- Do not reuse O-rings.
- Do not put additive such as waterleak preventive, since it may cause cooling waterway clogging.
- When refilling use Genuine NISSAN Long Life Antifreeze/Coolant (blue) or equivalent in its quality mixed with water (distilled or demineralized). Refer to [MA-10, "Fluids and Lubricants"](#).

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

### CAUTION:

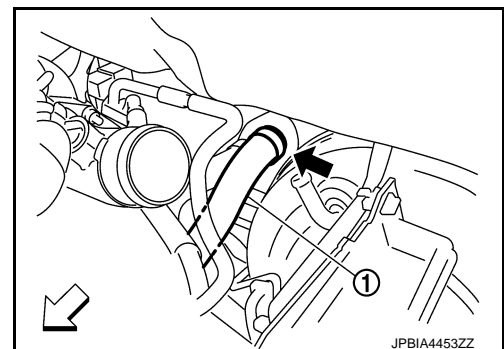
**Be sure to clean drain plug and install with new O-ring.**

**Radiator drain plug** : Refer to [CO-14, "Exploded View"](#).

- If water drain plugs on cylinder block are removed, close and tighten them. Refer to [EM-69, "Setting"](#).
2. Check that each hose clamp has been firmly tightened.
  3. Remove air duct (suction side). Refer to [EM-25, "Exploded View"](#).
  4. Disconnect vacuum hose break booster side, and removal vacuum tube from clamp. Refer to [BR-37, "Exploded View"](#).
  5. Disconnect heater hose (1) at position (↶) in the figure.

↶ : Vehicle front

- Enhance heater hose as high as possible.

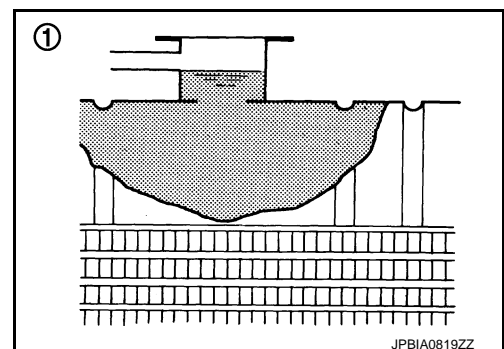


6. Fill radiator (1) to specified level.

### CAUTION:

**Never adhere the engine coolant to electronic equipments (alternator etc.).**

- Pour coolant 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.
- When engine coolant overflows disconnected heater hose, connect heater hose, and continue filling the engine coolant.



**Engine coolant capacity  
(With reservoir tank at "MAX" level)**

Refer to [CO-27, "Periodical Maintenance Specification"](#).

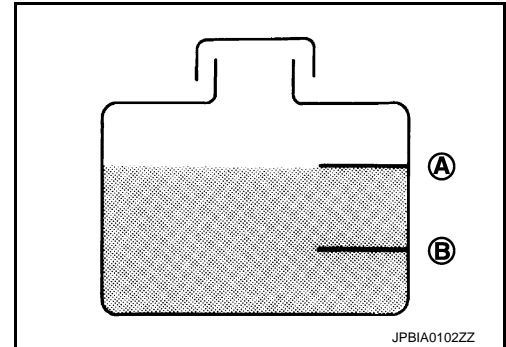
7. Refill reservoir tank to "MAX" level line with engine coolant.

A : MAX

B : MIN

**Reservoir tank engine coolant capacity  
(At "MAX" level)**

Refer to [CO-27, "Periodical Maintenance Specification"](#).



8. Install air duct (suction side). Refer to [EM-25, "Exploded View"](#).
9. Install radiator cap.
10. Warm up engine until opening thermostat. Standard for warming-up time is approximately 10 minutes at 3,000 rpm.
  - Check 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.**
11. Stop the engine and cool down to less than approximately 50°C (122°F).
  - Cool down using fan to reduce the time.
  - If necessary, refill radiator up to filler neck with engine coolant.

**CAUTION:**  
**Never adhere the engine coolant to electronic equipments (alternator etc.).**
12. Refill reservoir tank to "MAX" level line with engine coolant.
13. Repeat steps 6 through 11 two or more times with radiator cap installed until engine coolant level no longer drops.
14. Check cooling system for leakage with engine running.
15. Warm up the 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.
16. Repeat step 15 three times.
17. If sound is heard, bleed air from cooling system by repeating step 6 through 11 until reservoir tank level no longer drops.

## Flushing

INFOID:000000009749828

1. Install radiator drain plug.

**CAUTION:**

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

**Radiator drain plug** : Refer to [CO-14, "Exploded View"](#).

- If water drain plugs on cylinder block are removed, close and tighten them. Refer to [EM-69, "Setting"](#).
2. Remove air duct (suction side), air cleaner cover assembly and air cleaner body assembly. Refer to [EM-25, "Exploded View"](#).
  3. Disconnect vacuum hose breaker booster side, and remove vacuum tube from clamp. Refer to .

# ENGINE COOLANT

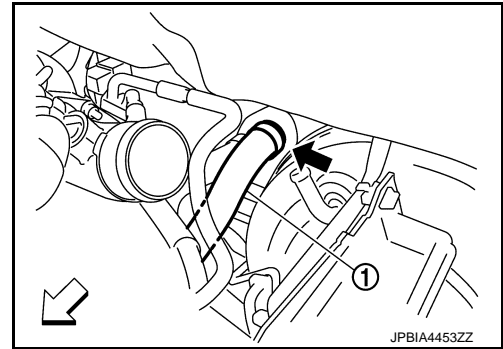
< PERIODIC MAINTENANCE >

[MR16DDT ]

4. Disconnect heater hose (1) at position (←) in the figure.

↔ : Vehicle front

- Enhance heater as high as possible.



5. Fill radiator and reservoir tank with water and reinstall radiator cap.
- When engine coolant over flows disconnected heater hose, connect heater hose, and continue filling the engine coolant.
6. Connect vacuum hose, and install vacuum tube.
7. Install air duct (suction side), air cleaner cover assembly and air cleaner body assembly. Refer to [EM-25, "Exploded View"](#).
8. Run the engine and warm it up to normal operating temperature.
9. Rev the engine two or three times under no-load.
10. Stop the engine and wait until it cools down.
11. Drain water from the system. Refer to [CO-8, "Draining"](#).
12. Repeat steps 1 through 9 until clear water begins to drain from radiator.

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## RADIATOR RADIATOR CAP

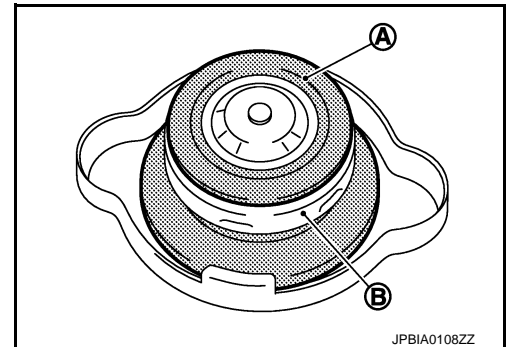
### RADIATOR CAP : Inspection

INFOID:000000009749829

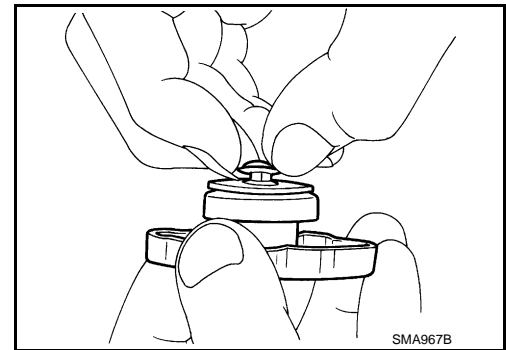
- Check valve seat (A) of radiator cap.

B : Metal plunger

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



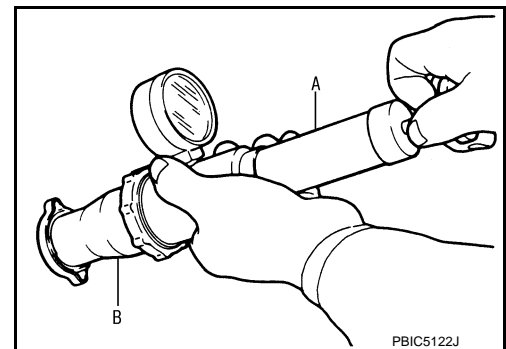
- Pull negative-pressure valve to open it, and that it close completely when released.
- Check that there is no dirt or damage on the valve seat of radiator cap negative-pressure valve.
- Check that there are no unusualness in the opening and closing conditions of negative-pressure valve.



- Check radiator cap relief pressure.

**Standard and Limit** : Refer to [CO-27, "Radiator"](#).

- When connecting radiator cap to the radiator cap tester (commercial service tool) (A) and the radiator cap tester adapter (commercial service tool) (B), 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.**

## RADIATOR

### RADIATOR : Inspection

INFOID:000000009749830

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

**CAUTION:**

- **Be careful not to bend or damage radiator fins.**
  - **When radiator is cleaned without removal, remove all surrounding parts such as radiator cooling fan assembly and horns. Then tape harness and harness connectors to prevent water from entering.**
1. Apply water by hose to the back side of the radiator core vertically downward.
  2. Apply water again to all radiator core surfaces once per minute.
  3. Stop washing if any stains no longer flow out from radiator.

# RADIATOR

< PERIODIC MAINTENANCE >

[MR16DDT ]

4. Blow air into the back side of radiator core vertically downward.
  - Use compressed air lower than 490 kPa (4.9 bar, 5 kg/cm<sup>2</sup>, 71 psi) and keep distance more than 30 cm (11.81 in).
5. Blow air again into all the radiator core surfaces once per minute until no water sprays out.

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# RADIATOR

< REMOVAL AND INSTALLATION >

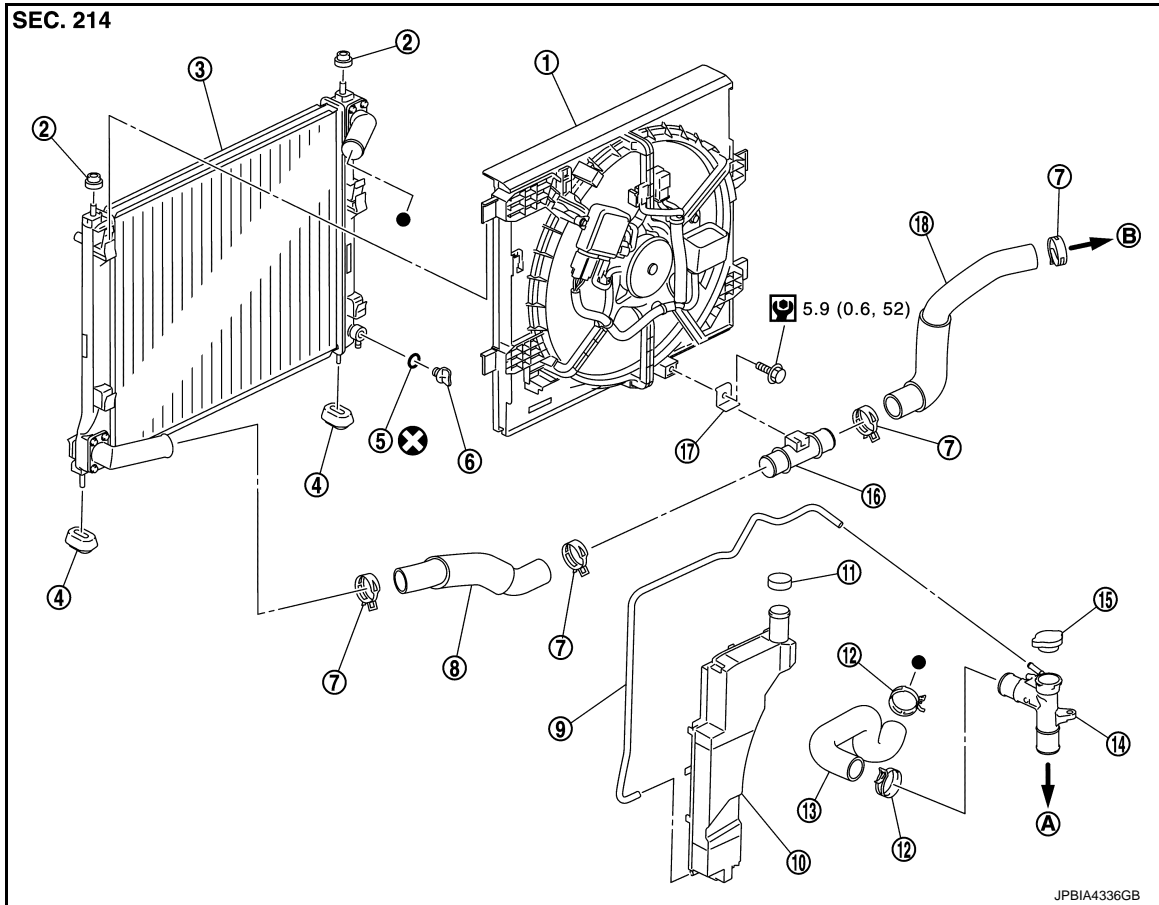
[MR16DDT ]

## REMOVAL AND INSTALLATION

### RADIATOR

#### Exploded View

INFOID:000000009749831



JPBIA4336GB

- |                            |                               |                                |
|----------------------------|-------------------------------|--------------------------------|
| 1. Cooling fan assembly    | 2. Mounting rubber (upper)    | 3. Radiator                    |
| 4. Mounting rubber (lower) | 5. O-ring                     | 6. Drain plug                  |
| 7. Clamp                   | 8. Radiator hose (lower) (LH) | 9. Reservoir tank hose         |
| 10. Reservoir tank         | 11. Reservoir tank cap        | 12. Clamp                      |
| 13. Radiator hose (upper)  | 14. Water outlet adaptor      | 15. Radiator cap               |
| 16. Radiator hose pipe     | 17. Bracket                   | 18. Radiator hose (lower) (RH) |
| A. To water outlet         | B. To water inlet             |                                |

: N·m (kg·m, in·lb)

: Always replace after every disassembly.

: Indicates that the parts is connected at points with symbols in actual vehicle.

### Removal and Installation

INFOID:000000009749832

#### REMOVAL

##### **WARNING:**

- Never remove radiator cap when engine is hot. Serious burns may occur from high-pressure engine coolant escaping from engine cooling system.
- Wrap a thick cloth around the radiator cap. Slowly turn it a quarter of a turn to release built-up pressure. Then turn it all the way.

##### **NOTE:**

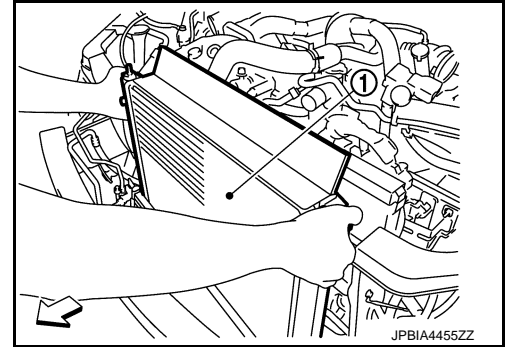
# RADIATOR

[MR16DDT ]

## < REMOVAL AND INSTALLATION >

When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

1. Drain engine coolant from radiator. Refer to [CO-8. "Draining"](#).  
**CAUTION:**
  - Perform this step when the engine is cold.
  - Never spill engine coolant on drive belt.
2. Remove engine cover. Refer to [EM-24. "Exploded View"](#).
3. Remove engine under cover.
4. Remove radiator hose (upper and lower).
5. Remove front bumper. Refer to [EXT-12. "Exploded View"](#).
6. Remove radiator core support upper. Refer to [DLK-134. "Removal and Installation"](#) (With Intelligent Key) or [DLK-257. "Removal and Installation"](#) (Without Intelligent Key).
7. Disconnect cooling fan harness connector.
8. Remove reservoir tank.
9. Remove cooling fan assembly.  
**CAUTION:**  
**Never damage or scratch the radiator core.**
10. Remove condenser from radiator and temporarily fasten it on vehicle with a rope.
11. Pull up and remove the radiator assembly (1).  
**CAUTION:**  
**Never damage radiator core and condenser assembly core.**



## INSTALLATION

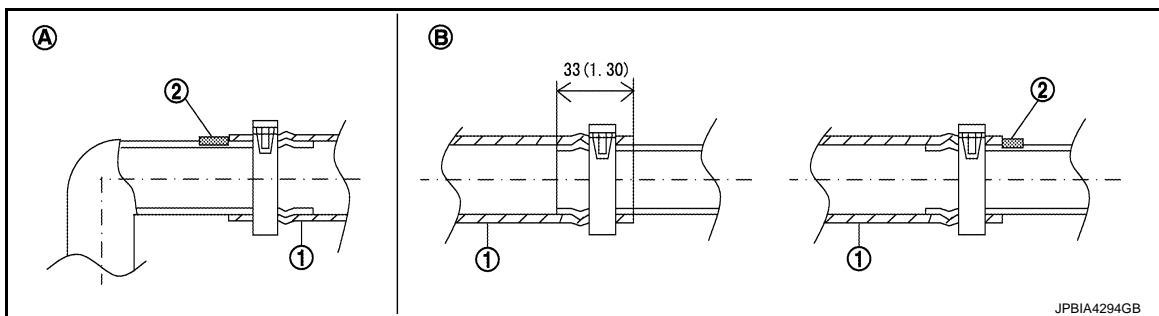
### CAUTION:

**Do not reuse O-rings.**

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

### NOTE:

- Insert the radiator hose (1) all the way to the stopper (2) or by 33 mm (1.30 in) (hose without a stopper).



Unit mm (in)

A. Radiator side

B. Engine side

- For the orientation of the hose clamp pawl, refer to the figure.

Radiator hose	Hose end	Paint mark	Position of hose clamp*
Radiator hose (upper)	Radiator side	Upper	A
	Engine side	Upper	B

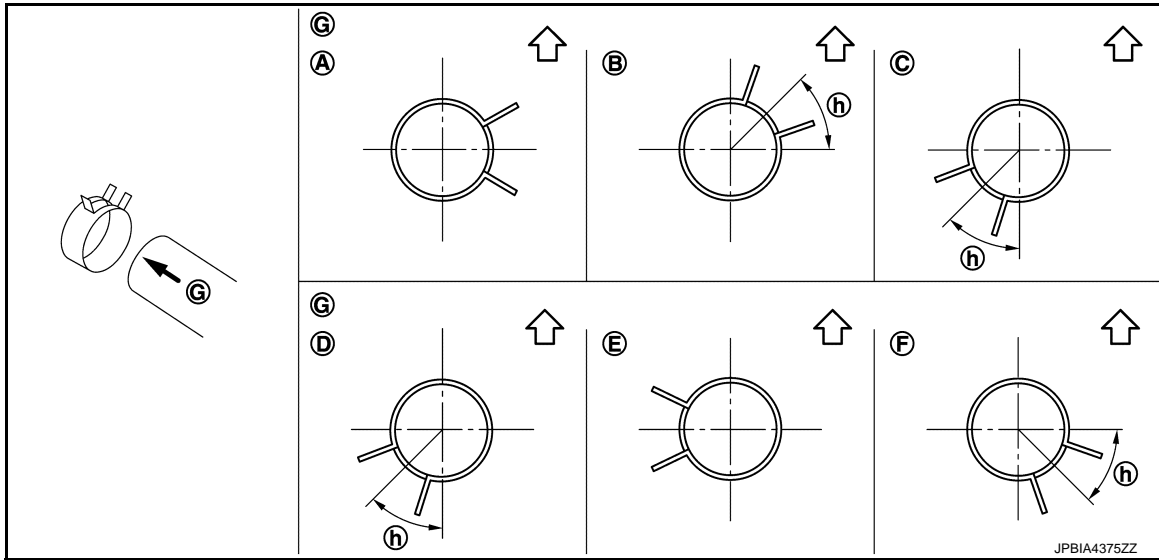
# RADIATOR

## < REMOVAL AND INSTALLATION >

[MR16DDT ]

Radiator hose	Hose end	Paint mark	Position of hose clamp*
Radiator hose (lower) (RH)	Radiator side	Upper	C
	Engine side	Front side	D
Radiator hose (lower) (LH)	Radiator side	Rear side	E
	Engine side	Rear side	F

\*Refer to the illustrations for the specific position each hose clamp tab.

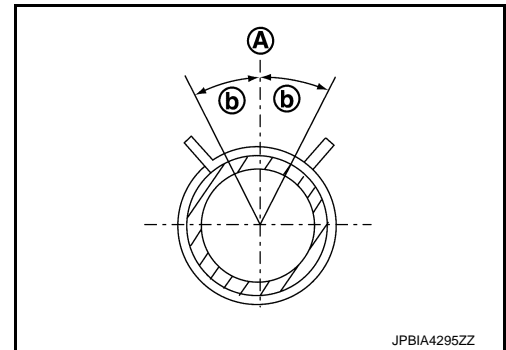


G. View G

h. 45°

⇧ : Vehicle upper

- The angle (b) created by the hose clamp pawl and the specified line (A) must be within  $\pm 15^\circ$  as shown in the figure.

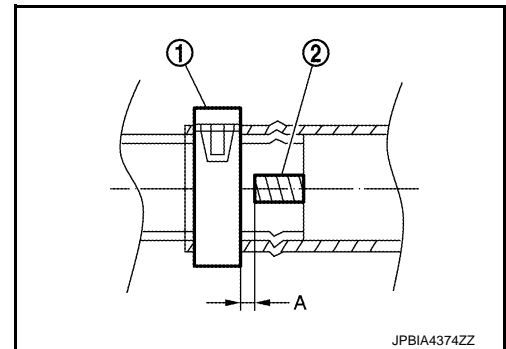


JPBIA4295ZZ

- To install hose clamps (1), check that the dimension (A) from the end of the paint mark (2) on the radiator hose to the hose clamp is within the reference value.

**Dimension "A"**

**3 mm (0.12 in)**



JPBIA4374ZZ

## Inspection

INFOID:000000009749833

## INSPECTION AFTER INSTALLATION



# RADIATOR

< REMOVAL AND INSTALLATION >

[MR16DDT ]

- Check for leakage of engine coolant using the radiator cap tester adapter (commercial service tool) and the radiator cap tester (commercial service tool). Refer to [CO-8, "Inspection"](#).
- Start and warm up the engine. Check visually that there is no leakage of engine coolant.

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# COOLING FAN

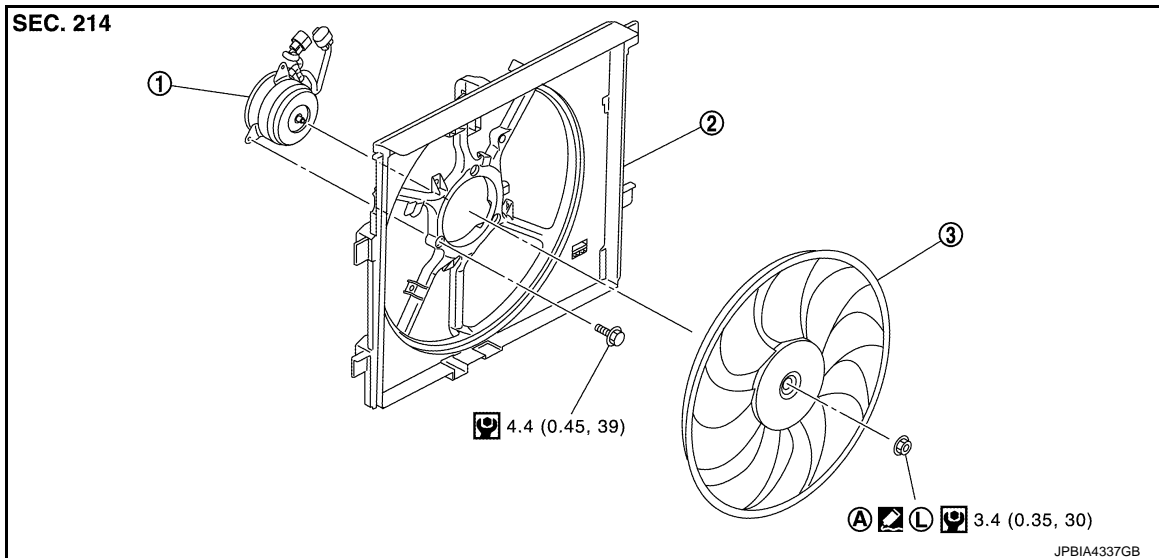
< REMOVAL AND INSTALLATION >

[MR16DDT ]

## COOLING FAN

### Exploded View

INFOID:000000009749834



1. Fan motor  
A. Apply on fan motor shaft
2. Fan shroud
3. Cooling fan

: N·m (kg-m, in-lb)

: Apply genuine high strength thread locking sealant or equivalent.

## Removal and Installation

INFOID:000000009749835

### REMOVAL

1. Drain engine coolant. Refer to [CO-8, "Draining"](#).  
**CAUTION:**
  - Perform this step engine is cold.
  - Never spill engine coolant on drive belt.
2. Remove engine cover.
3. Remove front bumper. Refer to [EXT-12, "Exploded View"](#).
4. Remove radiator core support upper. Refer to [DLK-134, "Removal and Installation"](#) (With Intelligent Key) or [DLK-257, "Removal and Installation"](#) (Without Intelligent Key).
5. Disconnect cooling fan harness connector.
6. Remove reservoir tank. Refer to [CO-14, "Exploded View"](#).
7. Remove radiator hose (upper). Refer to [CO-14, "Exploded View"](#).
8. Remove cooling fan assembly.  
**CAUTION:**  
Be careful not to damage or scratch on radiator core when removing.

### INSTALLATION

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

#### **CAUTION:**

Only use genuine parts for fan shroud mounting bolt and observe the specified torque (to prevent radiator from being damaged).

#### **NOTE:**

Cooling fan is controlled by ECM. For details, Refer to [EC-531, "Component Function Check"](#).

# COOLING FAN

< REMOVAL AND INSTALLATION >

[MR16DDT ]

## Disassembly and Assembly

INFOID:000000009749836

A

### DISASSEMBLY

1. Remove cooling fan mounting nut, and then remove the cooling fan.
2. Remove fan motor.

CO

### ASSEMBLY

Note the following, and assemble in the reverse order of disassembly.

- Apply genuine high strength thread locking sealant on fan motor shaft.

C

### Inspection

INFOID:000000009749837

D

### INSPECTION AFTER DISASSEMBLY

#### Cooling Fan

Inspect cooling fan for crack or unusual bend.

- If anything is found, replace cooling fan.

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# WATER PUMP

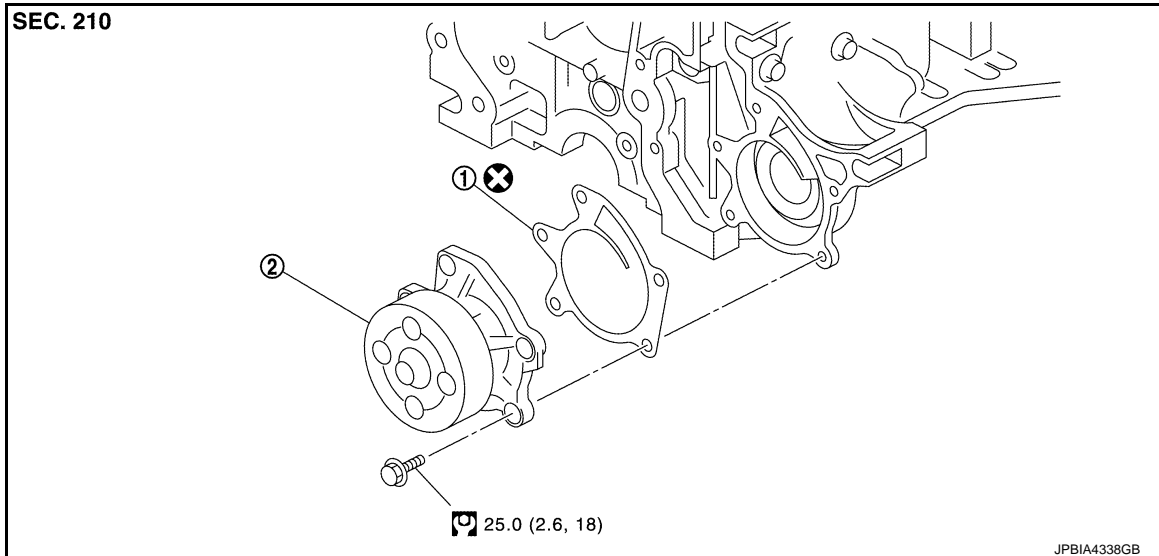
< REMOVAL AND INSTALLATION >

[MR16DDT ]

## WATER PUMP

### Exploded View

INFOID:000000009749838



1. Gasket
2. Water pump

: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

## Removal and Installation

INFOID:000000009749839

### REMOVAL

1. Drain engine coolant from radiator. Refer to [CO-8, "Draining"](#).  
**CAUTION:**
  - Perform this step when the engine is cold.
  - Never spill engine coolant on drive belt.
2. Steer front wheel to the right.
3. Remove front fender protector (RH). Refer to [EXT-27, "Exploded View"](#).
4. Remove drive belt. Refer to [EM-18, "Exploded View"](#).
5. Remove water pump.
  - Engine coolant will leak from cylinder block, so have a receptacle ready below.**CAUTION:**
  - Handle water pump vane so that it does not contact any other parts.
  - Water pump cannot be disassembled and should be replaced as a unit.

### INSTALLATION

Install in the reverse order of removal.

### Inspection

INFOID:000000009749840

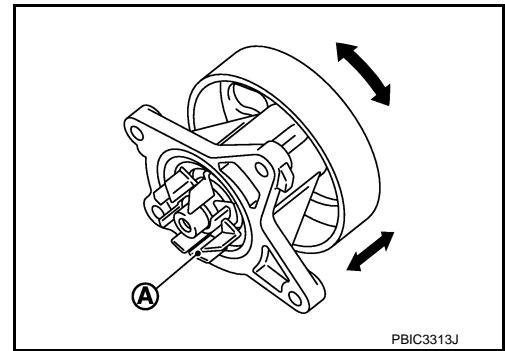
### INSPECTION AFTER REMOVAL

# WATER PUMP

[MR16DDT ]

## < REMOVAL AND INSTALLATION >

- Check visually that there is no significant dirt or rusting on water pump body and vane (A).
- Check that there is no looseness in vane shaft, and that it turns smoothly when rotated by hand.
- Replace water pump, if necessary.



## INSPECTION AFTER INSTALLATION

- Check for leakage of engine coolant using the radiator cap tester adapter (commercial service tool) and the radiator cap tester (commercial service tool). Refer to [CO-8. "Inspection"](#).
- Start and warm up the engine. Check visually that there is no leakage of engine coolant.

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# THERMOSTAT

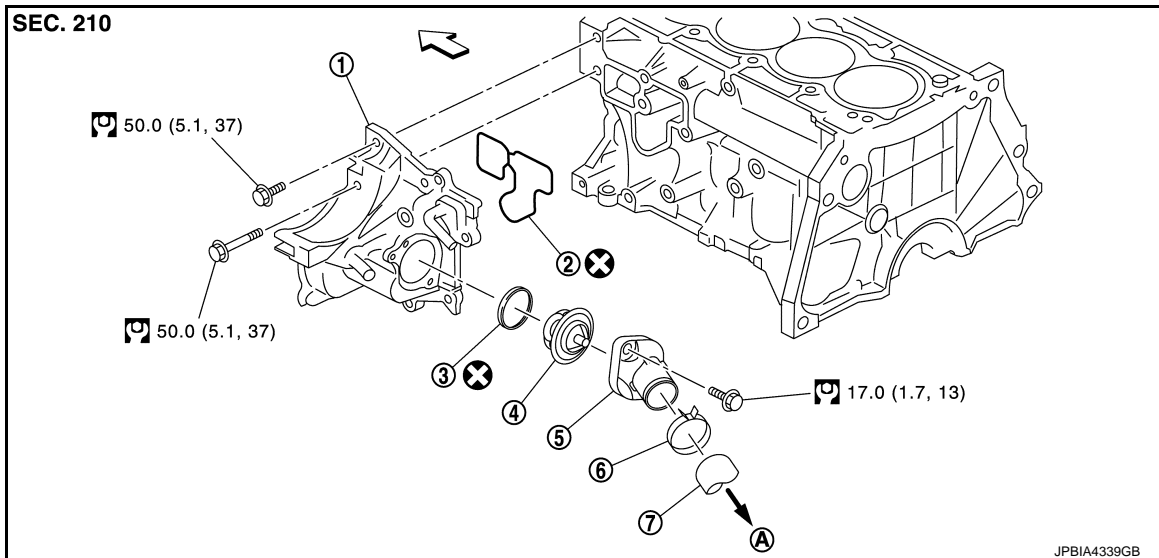
< REMOVAL AND INSTALLATION >

[MR16DDT]

## THERMOSTAT

### Exploded View

INFOID:000000009749841



- |                          |                |                |
|--------------------------|----------------|----------------|
| 1. Thermostat housing    | 2. Gasket      | 3. Rubber ring |
| 4. Thermostat            | 5. Water inlet | 6. Clamp       |
| 7. Radiator hose (upper) |                |                |
| A. To radiator           |                |                |
| ← Engine front           |                |                |

: N-m (kg-m, ft-lb)

: Always replace after every disassembly.

## Removal and Installation

INFOID:000000009749842

### REMOVAL

1. Drain engine coolant from radiator. Refer to [CO-8. "Draining"](#).  
**CAUTION:**  
**Perform this step when engine is cold.**
2. Remove intake manifold. Refer to [EM-27. "Exploded View"](#).
3. Disconnect radiator hose (lower) (RH) from water inlet. Refer to [CO-14. "Exploded View"](#).
4. Remove water inlet and thermostat.
  - Engine coolant leakage from cylinder block, so have a receptacle ready below.

### Thermostat housing

1. Drain engine coolant. Refer to [CO-8. "Draining"](#).
2. Remove alternator. Refer to [CHG-30. "Exploded View"](#).
3. Remove water pump. Refer to [CO-20. "Exploded View"](#).
4. Disconnect water hose, and then remove thermostat housing.

### INSTALLATION

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

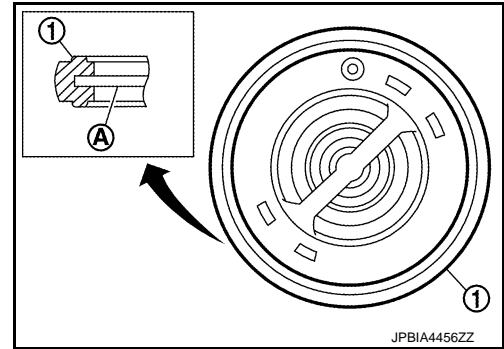
### Thermostat

# THERMOSTAT

[MR16DDT ]

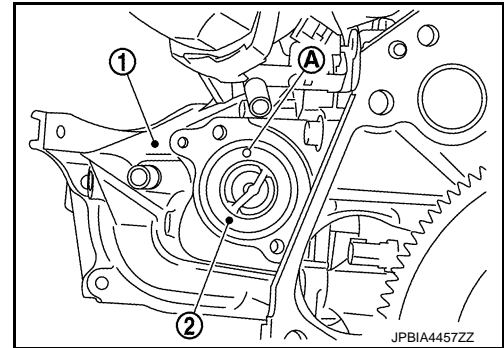
## < REMOVAL AND INSTALLATION >

- Install thermostat with making rubber ring (1) groove fit to thermostat flange (A) with the whole circumference.



- Install thermostat (2) with jiggle valve (A) facing upwards.

1 : Thermostat housing



Thermostat housing

- Install in the reverse order of removal.

## Inspection

INFOID:000000009749843

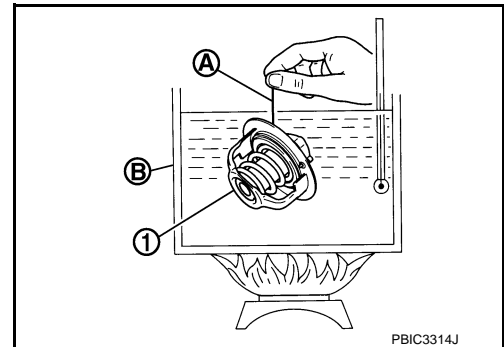
## INSPECTION AFTER REMOVAL

Thermostat

- Place a thread (A) so that it is caught in the valves of thermostat (1). Immerse fully in a container (B) 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 valve lift amount.
- After checking the maximum valve lift amount, lower the water temperature and check the valve closing temperature.

**Standard: Refer to [CO-27, "Thermostat"](#).**

- If out of the standard, replace thermostat.



## INSPECTION AFTER INSTALLATION

- Check for leakage of engine coolant using the radiator cap tester adapter (commercial service tool) and the radiator cap tester (commercial service tool). Refer to [CO-8, "Inspection"](#).
- Start and warm up the engine. Check visually that there is no leakage of engine coolant.

# WATER OUTLET

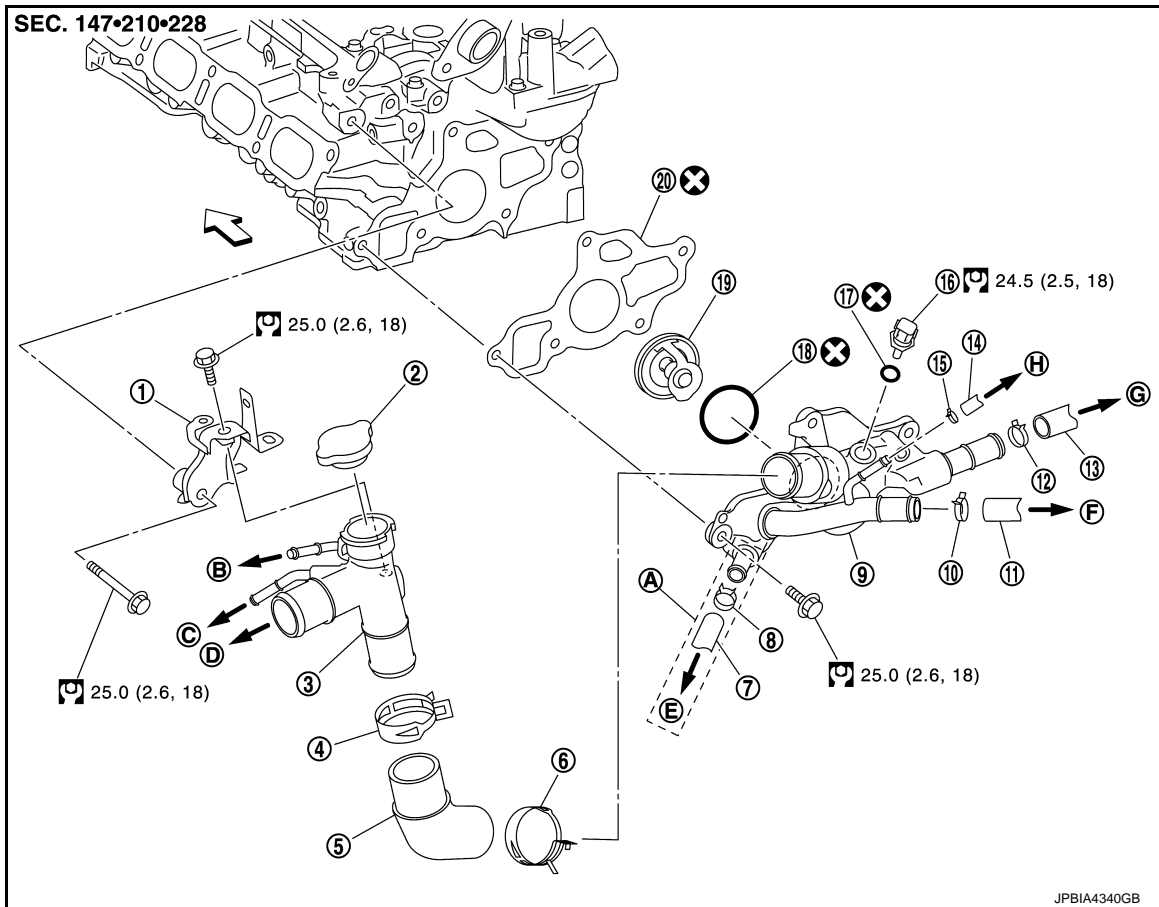
< REMOVAL AND INSTALLATION >

[MR16DDT ]

## WATER OUTLET

### Exploded View

INFOID:000000009749844



- |                                       |                      |                         |
|---------------------------------------|----------------------|-------------------------|
| 1. Heater pipe bracket                | 2. Radiator cap      | 3. Water outlet adaptor |
| 4. Clamp                              | 5. Water outlet hose | 6. Clamp                |
| 7. Hose                               | 8. Clamp             | 9. Water outlet         |
| 10. Clamp                             | 11. Heater hose      | 12. Clamp               |
| 13. Heater hose                       | 14. Hose             | 15. Clamp               |
| 16. Engine coolant temperature sensor | 17. Gasket           | 18. Rubber ring         |
| 19. Water control valve               | 20. Gasket           |                         |
- ⇐ Engine front
- |                             |                               |  |
|-----------------------------|-------------------------------|--|
| A. For CVT models           | B. To reservoir tank          | C. To electric throttle control actuator |
| D. To radiator hose (upper) | E. To CVT oil warmer          | F. To heater hose                        |
| G. To heater hose           | H. To turbocharger inlet tube |  |

: N·m (kg·m, ft·lb)

: Always replace after every disassembly.

## Removal and Installation

INFOID:000000009749845

### REMOVAL

1. Drain engine coolant from radiator. Refer to [CO-8. "Draining"](#).  
**CAUTION:**  
• Perform this step when engine is cold.
2. Remove engine cover. Refer to [EM-24. "Exploded View"](#).



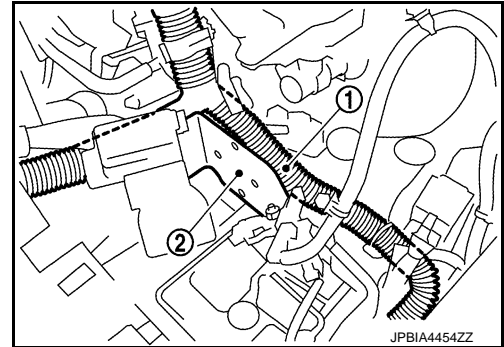
# WATER OUTLET

[MR16DDT ]

## < REMOVAL AND INSTALLATION >

3. Remove battery. [PG-99. "Exploded View"](#).
4. Remove air duct (upper) and air cleaner cover assembly and air cleaner body assembly.
5. Disconnect radiator hose (upper). Refer to [CO-14. "Exploded View"](#).
6. Remove water outlet adaptor.
7. Disconnect connectors of engine harness around the battery.
8. Remove bracket (2), and disconnect engine harness clip. (transmission side and water outlet side)

1 : Engine harness



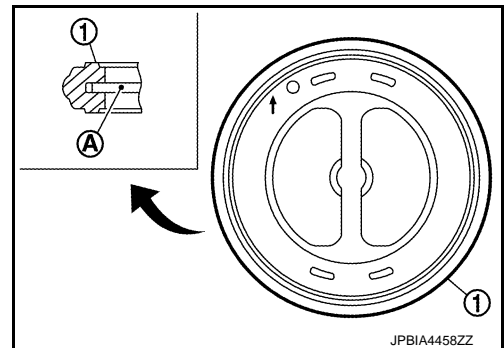
9. Disconnect crankshaft position sensor harness connector.
10. Move engine harness, and keep a service area.
11. Remove water hose of each water outlet connection and heater hose.
12. Remove water outlet.
13. Remove engine coolant temperature sensor from water outlet, if necessary.

## INSTALLATION

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

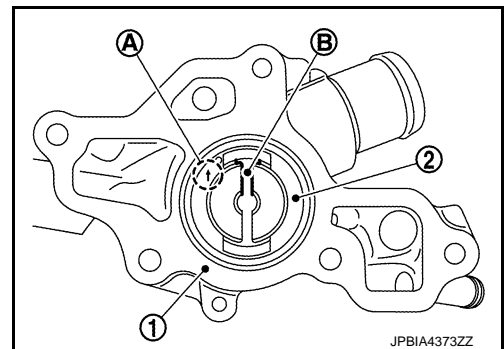
### Water Control valve

- Install water control valve with making rubber ring (1) groove fit to water control valve flange (A) with the whole circumference.



- Install water control valve (2) with the arrow (A) facing up and the frame center part (B) facing upwards.

1 : Water outlet



INFOID:000000009749846

## Inspection

### INSPECTION AFTER REMOVAL

#### Water Control Valve

## WATER OUTLET

[MR16DDT ]

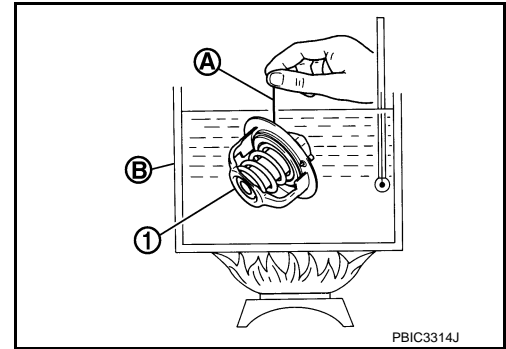
### < REMOVAL AND INSTALLATION >

- Place a thread (A) so that it is caught in the valves of water control valve (1). Immerse fully in a container (B) 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 continuous valve lifting toward maximum valve lift.

**NOTE:**

The maximum valve lift amount standard temperature for water control valve is the reference value.

- After checking the maximum valve lift amount, lower the water temperature and check the valve closing temperature.



**Standard:** Refer to [CO-27, "Water Control Valve"](#).

- If out of the standard, replace water control valve.

### INSPECTION AFTER INSTALLATION

- Check for leakage of engine coolant using the radiator cap tester adapter (commercial service tool) and the radiator cap tester (commercial service tool). Refer to [CO-8, "Inspection"](#).
- Start and warm up the engine. Check visually that there is no leakage of engine coolant.

# SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[MR16DDT ]

## SERVICE DATA AND SPECIFICATIONS (SDS)

### SERVICE DATA AND SPECIFICATIONS (SDS)

#### Periodical Maintenance Specification

INFOID:000000009749847

#### ENGINE COOLANT CAPACITY (APPROXIMATE)

Unit: ℓ (US qt, Imp qt)

Engine coolant capacity (With reservoir tank at "MAX" level)	M/T models	7.9 (8- 3/8, 7)
	CVT models	8.1 (8- 1/2, 7-1/8)
Reservoir tank engine coolant capacity (At "MAX" level)		0.6 (5/8, 1/2)

#### Radiator

INFOID:000000009749848

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 testing pressure		98 (1.0, 14)

#### Thermostat

INFOID:000000009749849

##### Standard

Valve opening temperature	80.5 - 83.5°C (177 - 182°F)
Maximum valve lift	8.0 mm/95°C (0.315 in/203°F)
Valve closing temperature	77°C (171°F)

#### Water Control Valve

INFOID:000000009749850

##### Standard

Valve opening temperature	93.5 - 96.5°C (200 - 206°F)
Maximum valve lift	8.0 mm/108°C (0.315 in/226°F)
Valve closing temperature	90°C (194°F)

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