

A
CO
C
D
E
F
G
H
I
J
K
L
M
N
O
P

SECTION CO

ENGINE COOLING SYSTEM

CONTENTS

| | | | |
|---|----|--|----|
| SYSTEM DESCRIPTION | 3 | Refilling | 12 |
| DESCRIPTION | 3 | Flushing | 14 |
| Engine Cooling System | 3 | RADIATOR | 15 |
| Engine Cooling System Schematic | 4 | RESERVOIR TANK CAP | 15 |
| SYMPTOM DIAGNOSIS | 5 | RESERVOIR TANK CAP : Inspection | 15 |
| OVERHEATING CAUSE ANALYSIS | 5 | RADIATOR | 15 |
| Troubleshooting Chart | 5 | RADIATOR : Inspection | 15 |
| PRECAUTION | 7 | REMOVAL AND INSTALLATION | 17 |
| PRECAUTIONS | 7 | RADIATOR | 17 |
| FOR USA AND CANADA | 7 | Exploded View | 17 |
| FOR USA AND CANADA : Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" | 7 | Removal and Installation | 18 |
| FOR USA AND CANADA : Precautions For Xenon Headlamp Service | 7 | Inspection | 20 |
| FOR USA AND CANADA : Precautions for Removing Battery Terminal | 8 | COOLING FAN | 22 |
| FOR MEXICO | 8 | Exploded View | 22 |
| FOR MEXICO : Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" | 8 | Removal and Installation | 22 |
| FOR MEXICO : Precautions For Xenon Headlamp Service | 8 | Disassembly and Assembly | 22 |
| FOR MEXICO : Precautions for Removing Battery Terminal | 9 | Inspection | 23 |
| PREPARATION | 10 | WATER PUMP | 24 |
| PREPARATION | 10 | Exploded View | 24 |
| Commercial Service Tools | 10 | Removal and Installation | 24 |
| PERIODIC MAINTENANCE | 11 | Inspection | 26 |
| ENGINE COOLANT | 11 | WATER INLET AND THERMOSTAT ASSEMBLY | 27 |
| Inspection | 11 | Exploded View | 27 |
| Draining | 11 | Removal and Installation | 27 |
| | | Inspection | 28 |
| | | WATER OUTLET AND WATER PIPING | 29 |
| | | Exploded View | 29 |
| | | Removal and Installation | 29 |
| | | Inspection | 30 |
| | | SERVICE DATA AND SPECIFICATIONS (SDS) | 31 |

SERVICE DATA AND SPECIFICATIONS

| | |
|--|-----------|
| (SDS) | 31 |
| Periodical Maintenance Specification | 31 |

| | |
|------------------|----|
| Radiator | 31 |
| Thermostat | 31 |

DESCRIPTION

< SYSTEM DESCRIPTION >

SYSTEM DESCRIPTION

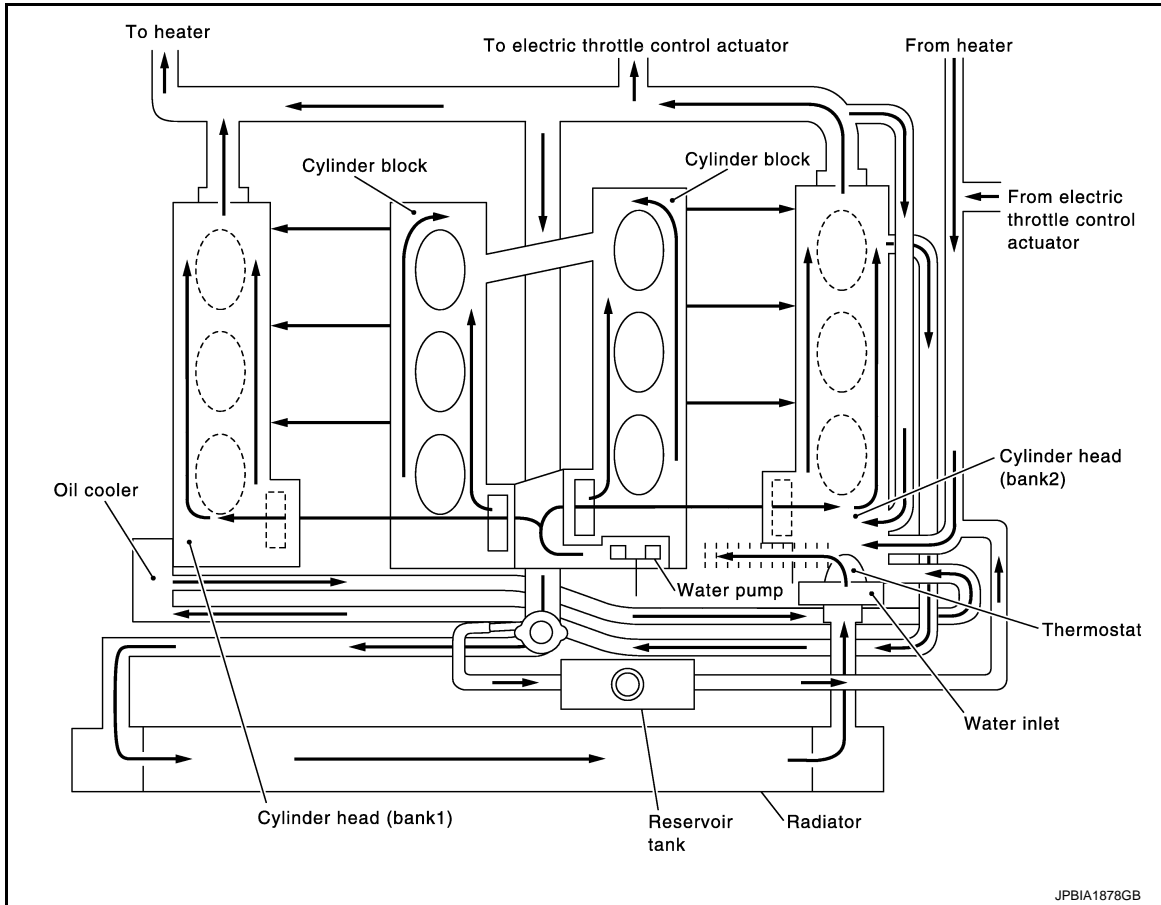
DESCRIPTION

Engine Cooling System

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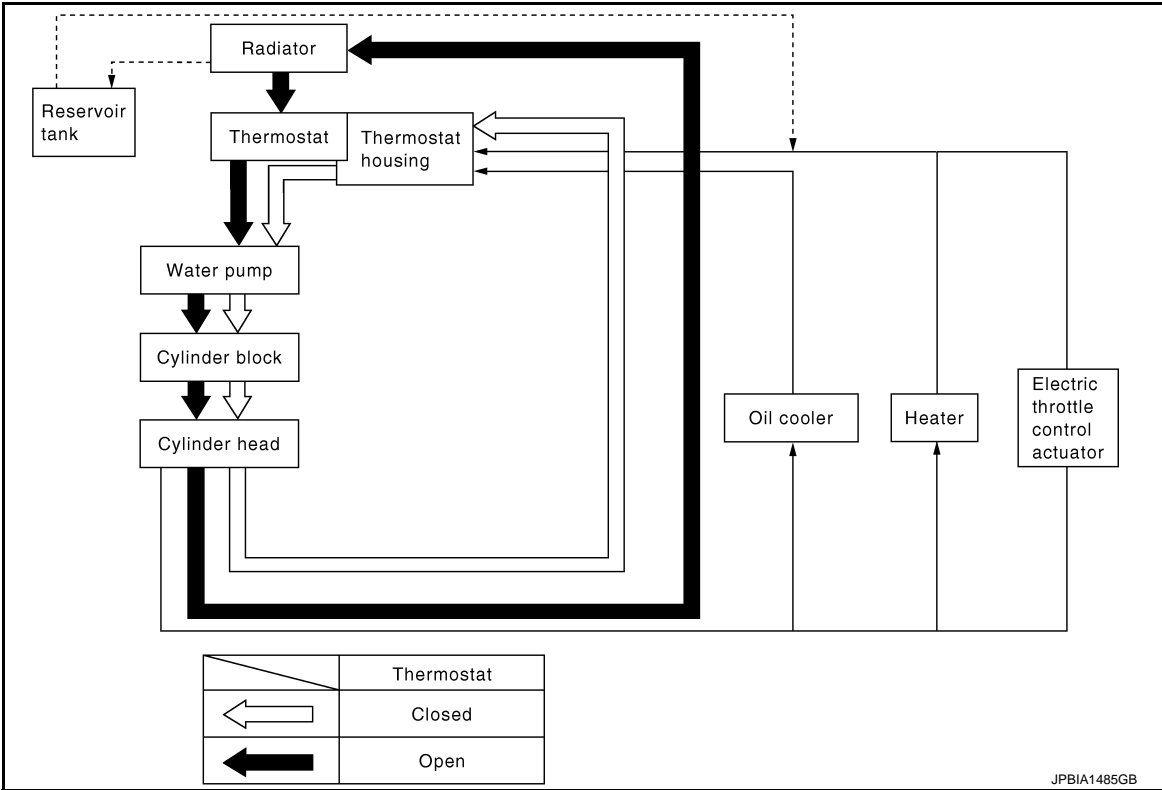
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DESCRIPTION

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Engine Cooling System Schematic

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OVERHEATING CAUSE ANALYSIS

< SYMPTOM DIAGNOSIS >

SYMPTOM DIAGNOSIS

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 | — | |
| | | 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 density |
| | 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 | | |

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OVERHEATING CAUSE ANALYSIS

< SYMPTOM DIAGNOSIS >

| | | Symptom | | Check items | |
|---|--------------------------------|--------------------------------|--|---------------------------------------|---|
| Except cooling system parts malfunction | — | Overload on engine | Abusive driving | High engine rpm under no load | — |
| | | | | Driving in low gear for extended time | |
| | | | | Driving at extremely high speed | |
| | | | Power train system malfunction | | |
| | | | Installed improper size wheels and tires | | |
| | | | Dragging brakes | | |
| | Blocked or restricted air flow | Blocked or restricted air flow | Blocked bumper | — | — |
| | | | Blocked radiator grille | Installed car brassiere | |
| | | | | Mud contamination or paper clogging | |
| | | | Blocked radiator | — | |
| Blocked condenser | | | Blocked air flow | | |
| Installed large fog lamp | | | | | |

PRECAUTIONS

< PRECAUTION >

PRECAUTION

PRECAUTIONS

FOR USA AND CANADA

FOR USA AND CANADA : Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:000000011736249

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.

FOR USA AND CANADA : Precautions For Xenon Headlamp Service

INFOID:000000011736250

WARNING:

Comply with the following warnings to prevent any serious accident.

- Disconnect the battery cable (negative terminal) or the power supply fuse before installing, removing, or touching the xenon headlamp (bulb included). The xenon headlamp contains high-voltage generated parts.
- Never work with wet hands.
- Check the xenon headlamp ON-OFF status after assembling it to the vehicle. Never turn the xenon headlamp ON in other conditions. Connect the power supply to the vehicle-side connector. (Turning it ON outside the lamp case may cause fire or visual impairments.)
- Never touch the bulb glass immediately after turning it OFF. It is extremely hot.

CAUTION:

Comply with the following cautions to prevent any error and malfunction.

- Install the xenon bulb securely. (Insufficient bulb socket installation may melt the bulb, the connector, the housing, etc. by high-voltage leakage or corona discharge.)
- Never perform HID circuit inspection with a tester.
- Never touch the xenon bulb glass with hands. Never put oil and grease on it.
- Dispose of the used xenon bulb after packing it in thick vinyl without breaking it.
- Never wipe out dirt and contamination with organic solvent (thinner, gasoline, etc.).

PRECAUTIONS

< PRECAUTION >

FOR USA AND CANADA : Precautions for Removing Battery Terminal

INFOID:000000011736251

- 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.

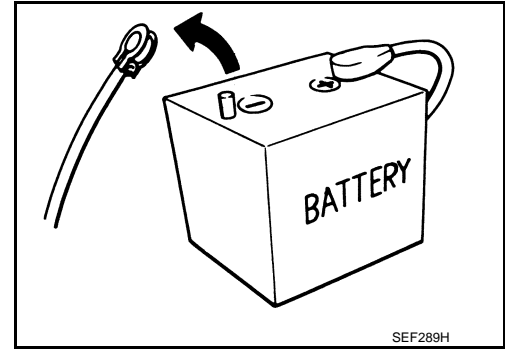
NOTE:

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.



FOR MEXICO

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

INFOID:000000011736252

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

FOR MEXICO : Precautions For Xenon Headlamp Service

INFOID:000000011736253

WARNING:

Comply with the following warnings to prevent any serious accident.

- Disconnect the battery cable (negative terminal) or the power supply fuse before installing, removing, or touching the xenon headlamp (bulb included). The xenon headlamp contains high-voltage generated parts.
- Never work with wet hands.
- Check the xenon headlamp ON-OFF status after assembling it to the vehicle. Never turn the xenon headlamp ON in other conditions. Connect the power supply to the vehicle-side connector. (Turning it ON outside the lamp case may cause fire or visual impairments.)

PRECAUTIONS

< PRECAUTION >

- Never touch the bulb glass immediately after turning it OFF. It is extremely hot.

CAUTION:

Comply with the following cautions to prevent any error and malfunction.

- Install the xenon bulb securely. (Insufficient bulb socket installation may melt the bulb, the connector, the housing, etc. by high-voltage leakage or corona discharge.)
- Never perform HID circuit inspection with a tester.
- Never touch the xenon bulb glass with hands. Never put oil and grease on it.
- Dispose of the used xenon bulb after packing it in thick vinyl without breaking it.
- Never wipe out dirt and contamination with organic solvent (thinner, gasoline, etc.).

FOR MEXICO : Precautions for Removing Battery Terminal

INFOID:000000011736254

- 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.

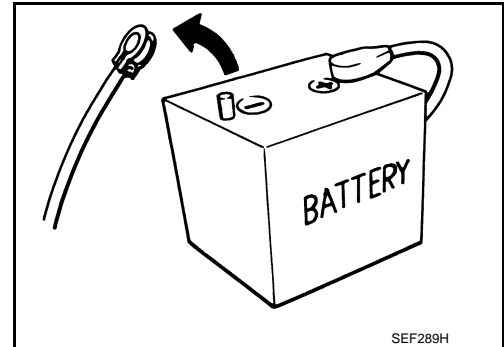
NOTE:

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.



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PREPARATION

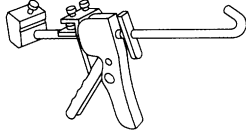
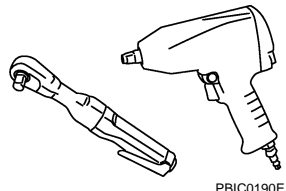
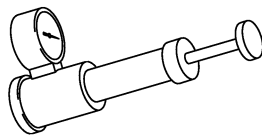
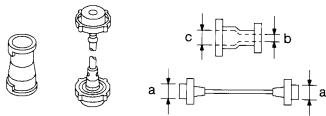
< PREPARATION >

PREPARATION

PREPARATION

Commercial Service Tools

INFOID:000000011736255

| Tool name | Description |
|--|---|
| <p>Tube presser</p>  <p style="text-align: right;">S-NT052</p> | <p>Pressing the tube of liquid gasket</p> |
| <p>Power tool</p>  <p style="text-align: right;">PBIC0190E</p> | <p>Loosening bolts and nuts</p> |
| <p>Radiator cap tester</p>  <p style="text-align: right;">PBIC1982E</p> | <p>Checking radiator and radiator cap</p> |
| <p>Radiator cap tester adapter</p>  <p style="text-align: right;">S-NT564</p> | <p>Adapting radiator cap tester to radiator cap and water outlet (front) filler neck</p> <p>a: 28 (1.10) dia. b: 31.4 (1.236) dia. c: 41.3 (1.626) dia. Unit: mm (in)</p> |

ENGINE COOLANT

< PERIODIC MAINTENANCE >

PERIODIC MAINTENANCE

ENGINE COOLANT

Inspection

INFOID:000000011736256

LEVEL

- Check if the reservoir tank engine coolant level is within the “MIN” to “MAX” when the engine is cool.

A : MAX

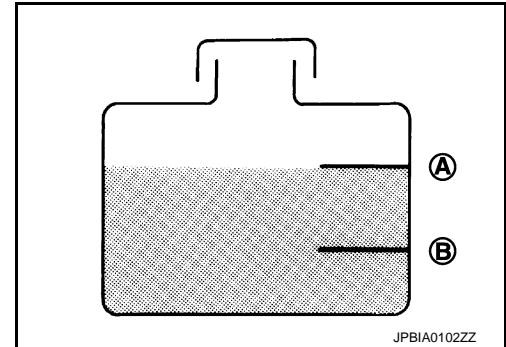
B : MIN

- 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-16, "FOR NORTH AMERICA : Fluids and Lubricants"](#) (FOR NORTH AMERICA) or [MA-18, "FOR MEXICO : Fluids and Lubricants"](#) (FOR MEXICO).

- Check that the reservoir tank cap is tightened.



LEAKAGE

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

Testing pressure : Refer to [CO-31, "Radiator"](#).

WARNING:

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

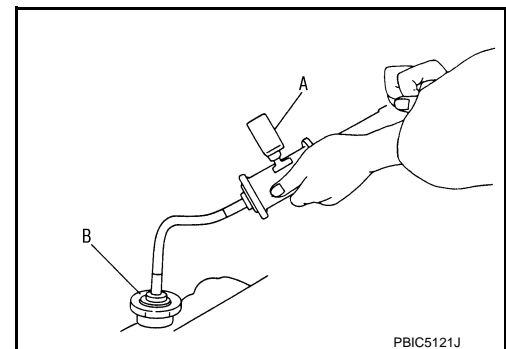
CAUTION:

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:000000011736257

WARNING:

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

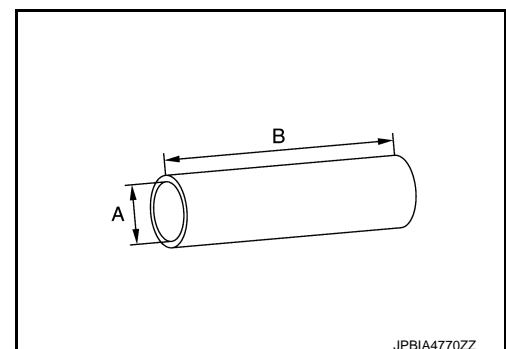
1. Connect drain hose.

NOTE:

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

A : $\phi 15 - 16$ mm (0.59 - 0.63 in)

B : 145 mm (5.71 in)

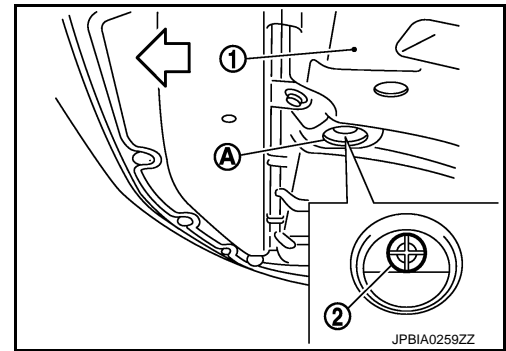


ENGINE COOLANT

< PERIODIC MAINTENANCE >

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

- 1 : Engine under cover
- A : Radiator drain plug hole
- ⇐ : Vehicle front



When draining all of engine coolant in the system, open water drain plugs on cylinder block. Refer to [EM-78, "Setting"](#).

3. Remove reservoir tank if 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-14, "Flushing"](#).
5. Disconnect drain hose.

Refilling

INFOID:000000011736258

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-16, "FOR NORTH AMERICA : Fluids and Lubricants"](#) (FOR NORTH AMERICA) or [MA-18, "FOR MEXICO : Fluids and Lubricants"](#) (FOR MEXICO).

1. Install radiator drain plug.

CAUTION:

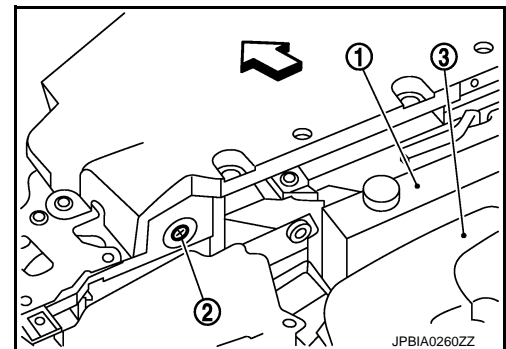
Be sure to clean drain plug and install with new O-ring.

Tightening torque : Refer to [CO-17, "Exploded View"](#).

If water drain plugs on cylinder block are removed, close and tighten them. Refer to [EM-117, "Disassembly and Assembly"](#).

2. Remove air cleaner case (LH). Refer to [EM-30, "Exploded View"](#).
3. Install reservoir tank if removed.
4. Check that each hose clamp has been firmly tightened.
5. Remove air relief plug (2) on radiator left side.

- 1 : Reservoir tank
- 3 : Engine cover
- ⇐ : Vehicle front

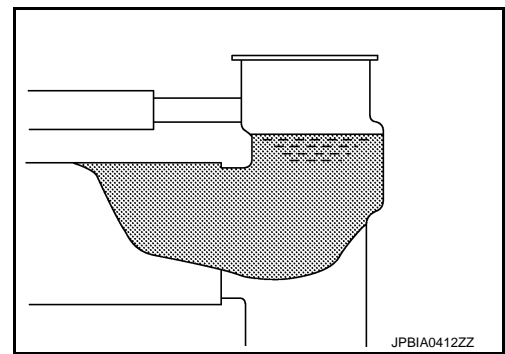


ENGINE COOLANT

< PERIODIC MAINTENANCE >

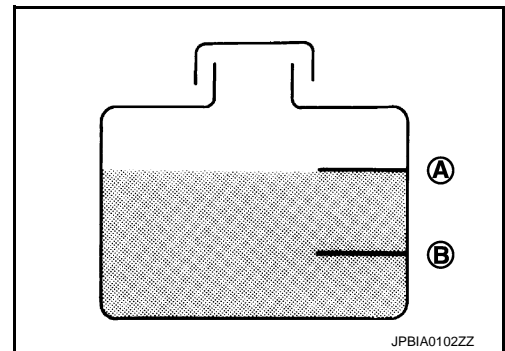
6. Fill radiator, and reservoir tank if removed, to specified level.
 - **Pour engine coolant through engine coolant filler neck slowly of less than 2 ℓ (2-1/8 US qt, 1-3/4 Imp qt) a minute to allow air in system to escape.**

Engine coolant capacity (With reservoir tank at "MAX" level) : Refer to [CO-31, "Periodical Maintenance Specification"](#).



Reservoir tank engine coolant capacity (At "MAX" level) : Refer to [CO-31, "Periodical Maintenance Specification"](#).

A : MAX
B : MIN



7. When engine coolant overflows air relief hole on radiator, install air relief plug with new O-ring.
CAUTION:
Do not reuse O-ring.

Tightening torque : Refer to [CO-17, "Exploded View"](#).

8. Repeat step 6.
9. Install air cleaner case (LH). Refer to [EM-30, "Exploded View"](#).
10. Install reservoir tank cap.
11. 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.
12. 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.
13. Refill reservoir tank to "MAX" level line with engine coolant.
14. Repeat steps 11 through 13 two or more times with reservoir tank cap installed until engine coolant level no longer drops.
15. Check cooling system for leakage with engine running.
16. 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.
17. Repeat step 16 three times.
18. If sound is heard, bleed air from cooling system by repeating step 6, and steps from 10 to 17 until engine coolant level no longer drops.
19. Check that the reservoir tank cap is tightened.

ENGINE COOLANT

< PERIODIC MAINTENANCE >

Flushing

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1. Install radiator drain plug.

CAUTION:

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

Tightening torque : Refer to [CO-17, "Exploded View"](#).

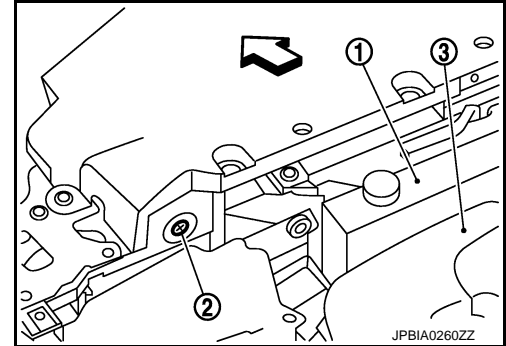
If water drain plugs on cylinder block are removed, close and tighten them. Refer to [EM-117, "Dis-assembly and Assembly"](#).

2. Remove air cleaner case (LH). Refer to [EM-30, "Exploded View"](#).
3. Install reservoir tank if removed.
4. Remove air relief plug (2) on radiator.

1 : Reservoir tank

3 : Engine cover

⇐ : Vehicle front



5. Fill radiator with water until water spills from the air relief hole, then close air relief plug.

Tightening torque : Refer to [CO-17, "Exploded View"](#).

6. Fill radiator and reservoir tank with water and reinstall reservoir tank cap.
7. Install air cleaner case (LH). Refer to [EM-30, "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-11, "Draining"](#).
12. Repeat steps 1 through 11 until clear water begins to drain from radiator.
13. Check that the reservoir tank cap is tightened.

RADIATOR

< PERIODIC MAINTENANCE >

RADIATOR

RESERVOIR TANK CAP

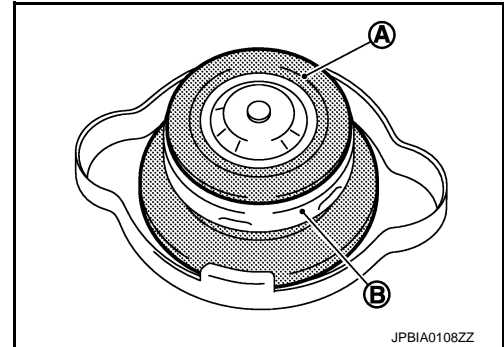
RESERVOIR TANK CAP : Inspection

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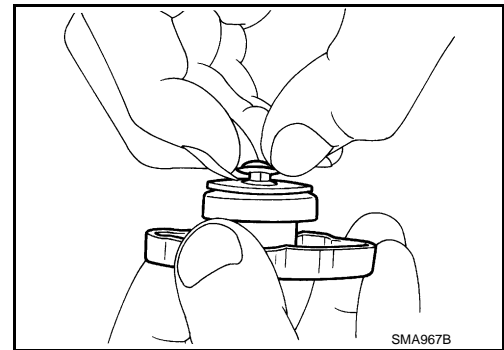
- Check valve seat (A) of reservoir tank cap.

B : Metal plunger

- 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.



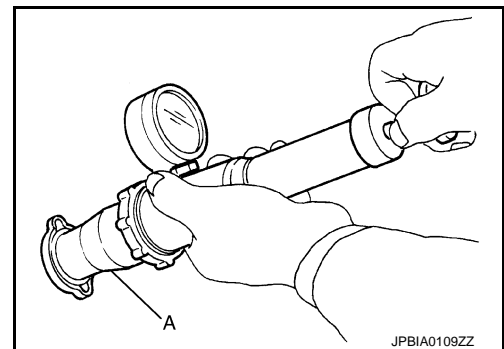
- Pull negative-pressure valve to open it, and check that it close completely when released.
- Check that there is no dirt or damage on the valve seat of reservoir tank cap negative-pressure valve.
- Check that there are no unusualness in the opening and closing conditions of negative-pressure valve.



- Check reservoir tank cap relief pressure.

Standard and limit : Refer to [CO-31, "Radiator"](#).

- When connecting reservoir tank cap to the radiator cap tester and the radiator cap tester adapter (commercial service tool) (A), apply engine coolant to the cap seal surface.



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

CAUTION:

When installing reservoir tank cap, thoroughly wipe out the reservoir tank to remove any waxy residue or foreign material.

RADIATOR

RADIATOR : Inspection

INFOID:000000011736261

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

- 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 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.
 4. Blow air into the back side of radiator core vertically downward.

RADIATOR

< PERIODIC MAINTENANCE >

- Use compressed air lower than 490 kPa (5 kg/cm², 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.

RADIATOR

< REMOVAL AND INSTALLATION >

REMOVAL AND INSTALLATION

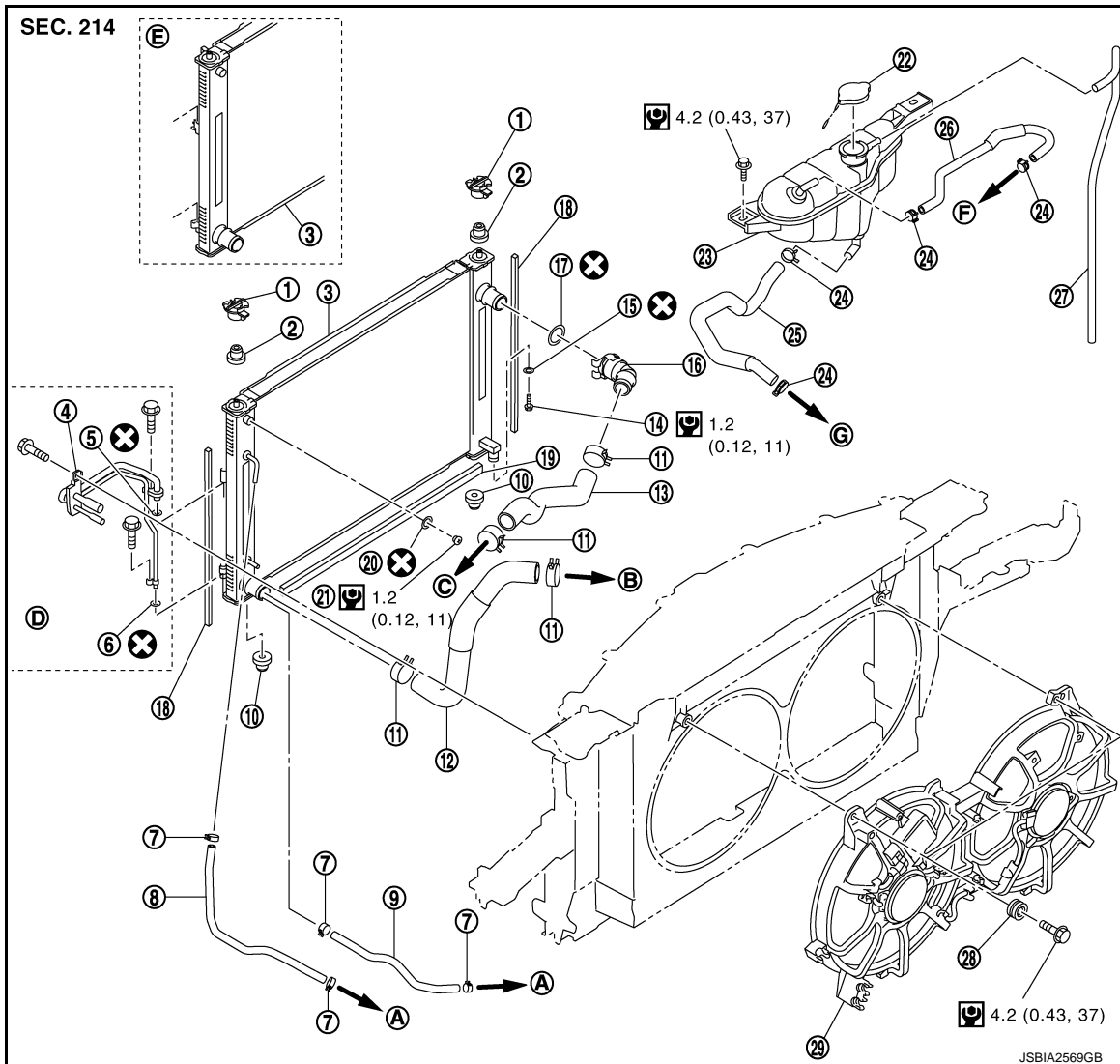
RADIATOR

Exploded View

INFOID:000000011736262

A

CO



C

D

E

F

G

H

I

J

K

L

M

- | | | |
|---|---------------------------------------|---------------------------------------|
| 1. Upper mount bracket | 2. Mounting rubber (upper) | 3. Radiator & condenser assembly |
| 4. Condenser pipe assembly | 5. O-ring | 6. O-ring |
| 7. Clamp (A/T models) | 8. A/T fluid cooler hose (A/T models) | 9. A/T fluid cooler hose (A/T models) |
| 10. Mounting rubber (lower) | 11. Clamp | 12. Radiator hose (lower) |
| 13. Radiator hose (upper) | 14. Drain plug | 15. O-ring |
| 16. Radiator water inlet pipe | 17. O-ring | 18. Radiator Seal |
| 19. Radiator Seal (lower) | 20. O-ring | 21. Air relief plug |
| 22. Reservoir tank cap | 23. Reservoir tank | 24. Clamp |
| 25. Reservoir tank hose | 26. Reservoir tank hose | 27. Reservoir tank hose |
| 28. Grommet | 29. Radiator cooling fan assembly | |
| A. To transmission | B. To water inlet | C. To water outlet (front) |
| D. Comply with the assembly procedure when tightening. Refer to HA-42 | E. M/T models | F. To water outlet (front) |
| G. To heater pipe | | |

Refer to [GI-4. "Components"](#) for symbols in the figure.

N

O

P