SECTION HCO

HIGH VOLTAGE COOLING SYSTEM

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PRECAUTION

PRECAUTIONS

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

INFOID:0000000014771956

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 SR 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, it is recommended that all maintenance and repair be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper repair, 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 SR 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 WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

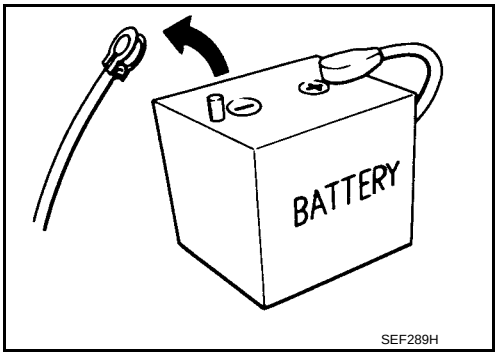
WARNING:

- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the Ignition ON or engine running, DO NOT 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 or batteries, and wait at least three minutes before performing any service.**

Precautions for Removing Battery Terminal

INFOID:0000000014771957

- With the adoption of Auto ACC function, ACC power is automatically supplied by operating the Intelligent Key or remote keyless entry or by opening/closing the driver side door. In addition, ACC power is supplied even after the ignition switch is turned to the OFF position, i.e. ACC power is supplied for a certain fixed time.
- When disconnecting the 12V battery terminal, turn off the ACC power before disconnecting the 12V battery terminal, observing “How to disconnect 12V battery terminal” described below.
  NOTE:
  Some ECUs operate for a certain fixed time even after ignition switch is turned OFF and ignition power supply is stopped. If the battery terminal is disconnected before ECU stops, accidental DTC detection or ECU data damage 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.



SEF289H

HOW TO DISCONNECT 12V BATTERY TERMINAL

Disconnect 12V battery terminal according to instruction described below.

1. Open the trunk lid or back door..
2. Turn ignition switch to the ON position.
3. Turn ignition switch to the OFF position with the driver side door opened.
4. Get out of the vehicle and close the driver side door.
5. Wait at least 3 minutes.

CAUTION:
While waiting, never operate the vehicle such as locking, opening, and closing doors. Violation of this caution results in the activation of ACC power supply according to the Auto ACC function.

6. Remove 12V battery terminal.

CAUTION:
After installing 12V battery, always check self-diagnosis results of all ECUs and erase DTC.

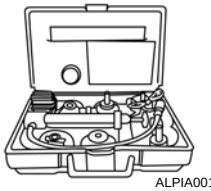
PREPARATION

PREPARATION

Special Service Tools

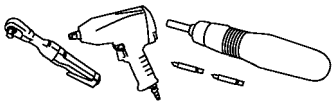
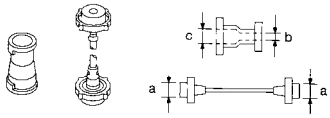
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The actual shape of the tools may differ from those illustrated here.

Tool number (TechMate No.) Tool name	Description
— (J-51771) Cooling system pressure test kit 1. — (J-51771-1) Main body 2. — (J-51771-4) Small adapter 3. — (J-51771-5) Pump with quick release 4. — (J-51771-9) Radiator cap assembly with quick coupler  ALPIA0018ZZ	Checking cooling system and radiator cap

Commercial Service Tools

INFOID:0000000014816382

(TechMate No.) Tool name	Description
(—) Power tool  PIIB1407E	Loosening nuts, screws and bolts
(J-33984-A) Radiator pressure adapter  S-NT564	Adapting cooling system pressure tester to radiator cap and reservoir tank cap **a: 28 (1.10) diameter** **b: 31.4 (1.236) diameter** **c: 41.3 (1.626) diameter** Unit: mm (in)

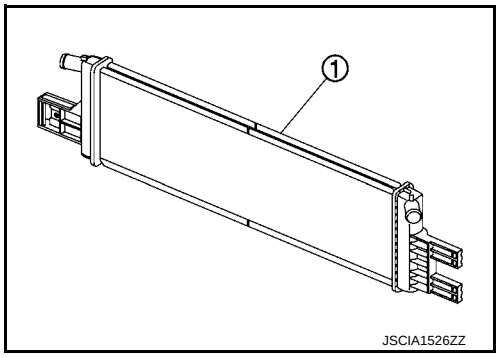
SYSTEM DESCRIPTION

COMPONENT PARTS

Sub radiator

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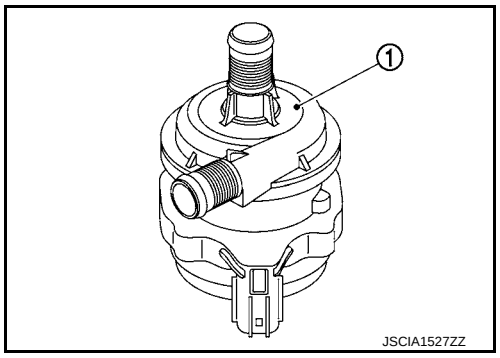
- The sub radiator (1) includes an aluminum transverse radiator core and resin tanks.
- The sub radiator is located in front of the condenser.



Electric water pump

INFOID:0000000014771960

- An electric water pump (1) is installed to the lower part of the cooling fan for circulating cooling water.
- HPCM (Hybrid power train control module) controls the flow rate of cooling water according to water temperature and vehicle speed.



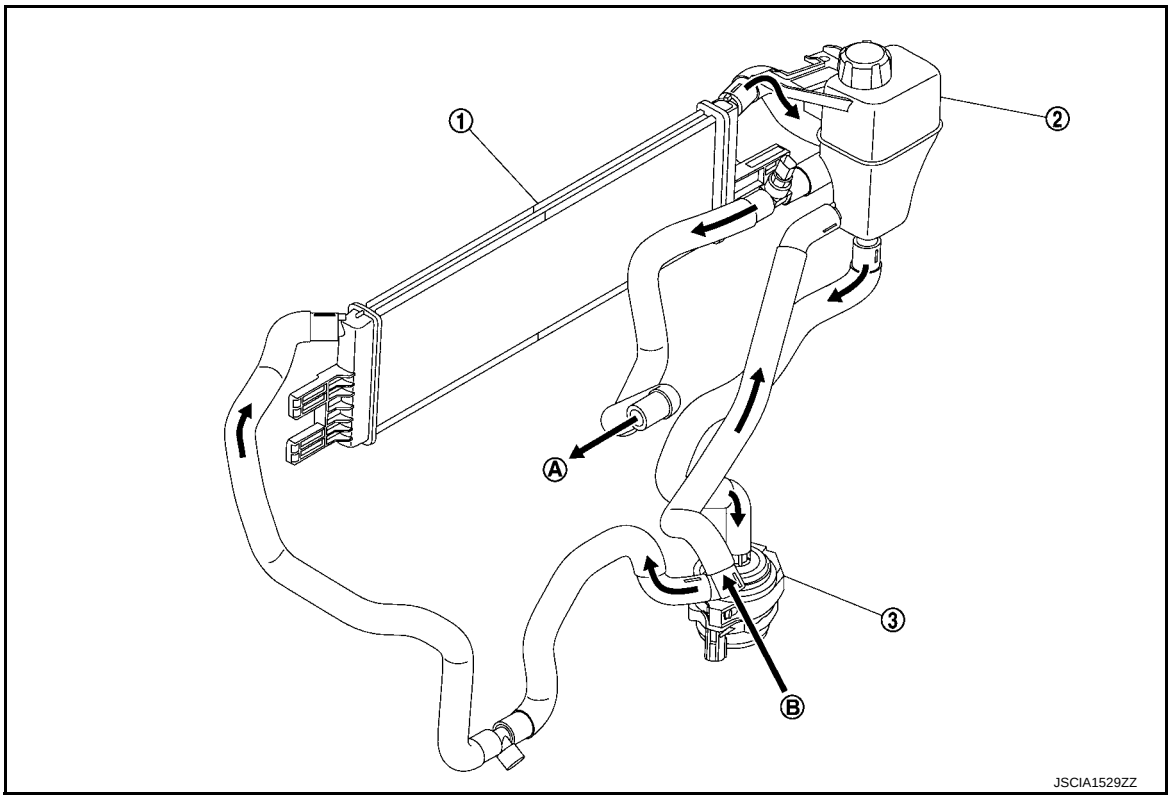
SYSTEM

High Voltage Cooling System

INFOID:0000000014771961

- High voltage cooling system is a system which cools high voltage components below:
- Traction motor
- Traction motor inverter
- Coolant is circulated by electric water pump, which is controlled by HPCM (hybrid power train control module).

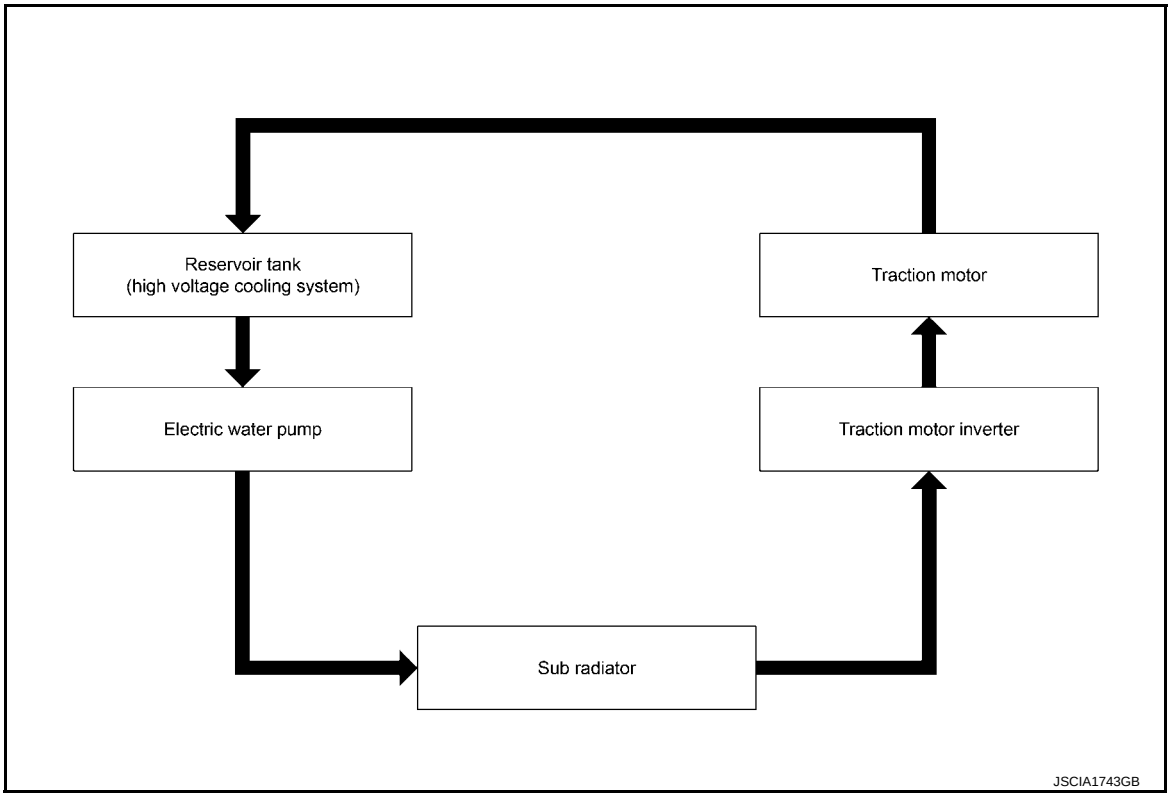
HIGH VOLTAGE COOLING SYSTEM



1. Sub radiator
2. Reservoir tank
3. Electric water pump
A. To traction motor inverter
B. From traction motor

High Voltage Cooling Schematic

INFOID:0000000014771962



BASIC INSPECTION

SUB RADIATOR

Inspection

INFOID:0000000014771963

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

CAUTION:

- **Be careful not to bend or damage sub radiator fins.**
- **When sub 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 sub radiator core vertically downward.
2. Apply water again to all sub radiator core surfaces once per minute
3. Stop washing if any stains no longer flow out from sub radiator.
4. Blow air into the back side of sub radiator core vertically downward.
   - Use compressed air lower than 490 kPa (5 kg/cm^2, 71 psi) and keep distance more than 30 cm (11.81 in).
5. Blow air again into all the sub radiator core surfaces once per minute until no water sprays out.

PERIODIC MAINTENANCE

COOLANT

Inspection

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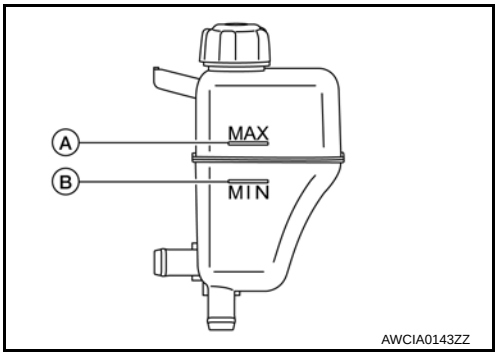
INVERTER COOLANT AMOUNT INSPECTION

- When inverter coolant temperature is low [about 50°C (122°F) or less], confirm that the inverter coolant level of the reservoir tank is in the range from MIN (B) to MAX (A).
- Adjust level if it is outside the range.

CAUTION:

- **Refill genuine NISSAN Long Life Antifreeze/Coolant (blue) or equivalent in its quality mixed with water (distilled or demineralized).**
- **Make sure not to dilute it with tap water.**

- Confirm that the reservoir tank cap is tightened.



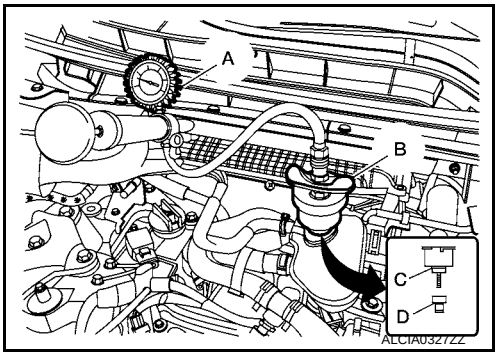
CHECKING COOLING SYSTEM FOR LEAKS

WARNING:

- **Do not remove the radiator cap or reservoir cap when engine is hot. Serious burns could occur from high-pressure engine coolant escaping from he cooling system.**
- **When removing the radiator cap or reservoir tank cap, wrap a thick cloth around the cap and slowly turn it a quarter turn to allow built up pressure to escape. Then carefully remove the cap by turning it all the way.**

To check the cooling system for leaks, apply pressure to the high voltage cooling system using Tools (A), (B), (C), and (D).

Tool (A)	**:**	**— (J-51771-5)**
Tool (B)	**:**	**— (J-51771-9)**
Tool (C)	**:**	**— (J-51771-1)**
Tool (D)	**:**	**— (J-51771-4)**
Leakage test pressure	**: Refer to HCO-21, "Sub Radiator".**	



CAUTION:

Higher pressure testing than specified may cause radiator damage.

Draining and Refilling

INFOID:0000000014771965

CAUTION:

- **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-11, "Fluids and Lubricants".**
- **Make sure not to dilute it with tap water.**
- **Do not start engine when reservoir tank (for engine and sub-radiator) does not contain coolant.**
- **Electric water pump may be activated under the status of READY. To prevent damage, electric water pump must not be activated when coolant is insufficient.**

DRAIN

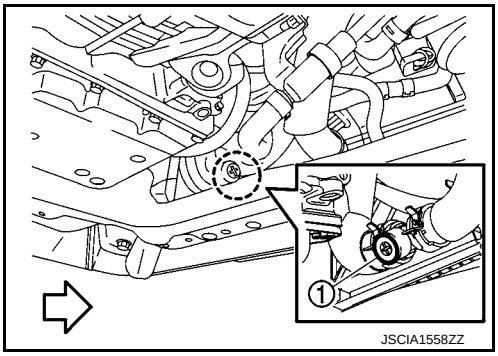
CAUTION:

- **Be sure to drain when inverter coolant temperature is cold.**
- **This should be performed so that inverter coolant does not come in contact with surrounding parts.**

1. Remove engine under cover. Refer to EXT-49, "ENGINE UNDER COVER : Removal and Installation".

2. Remove drain plug (1) and reservoir tank cap and drain inverter coolant.

⇦ : Vehicle front



3. Remove reservoir tank and drain the coolant. Refer to HCO-12, "Exploded View".

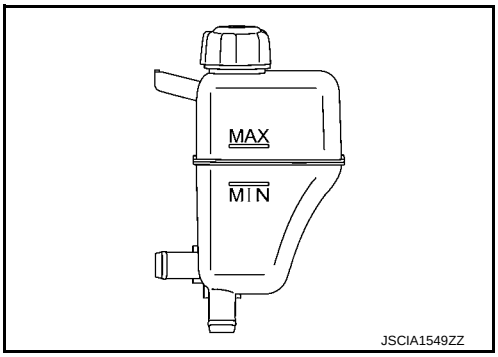
REFILLING

1. Install reservoir tank and hose clamps.
   NOTE:
   Check the tightening of hose clamps.
2. Install sub radiator drain plug.
   CAUTION:
   Be sure to clean sub radiator drain plug and install with new O-ring.

Tightening torque	**: Refer to HCO-12, "Exploded View".**

3. Open reservoir tank cap.
4. Fill coolant to MAX line from the reservoir tank cap.
   NOTE:
   Pour coolant slowly of less than 3 ℓ (2-5/8 lmp qt) a minute to allow air in system to escape.

Reservoir coolant tank capacity	**: Refer to HCO-21, "Periodical Maintenance Specification".**
LLC concentration	**: Refer to HCO-21, "Periodical Maintenance Specification".**



5. Close the reservoir tank cap.
6. Set the vehicle to READY and operate the electric water pump.
7. When the reservoir tank fluid level drops, turn the ignition switch OFF and deactivate the electric water pump.
8. Repeat the above steps from 4 to 7 until the reservoir tank fluid level stops dropping.
9. When the fluid level stops dropping, tighten reservoir tank cap.
   NOTE:
   If electric water pump is stopped with the reservoir tank cap opened, coolant may spout out.
10. Set the vehicle in READY state and activate the electric water pump. If the reservoir tank fluid level is lower after circulating the cooling water (for approximately 10 minutes), repeat the above steps from 4 to 7.
    CAUTION:
    - **Insufficient inverter coolant may cause low power or stop of vehicle due to insufficient cooling of the traction motor inverter. Be sure to bleed air thoroughly.**
    - **Do not start engine when reservoir tank (for engine and sub-radiator) does not contain coolant.**
    - **Electric water pump may be activated under the status of READY. To prevent damage, electric water pump must not be activated when coolant is insufficient.**

RESERVOIR TANK CAP

Reservoir Tank Cap Inspection

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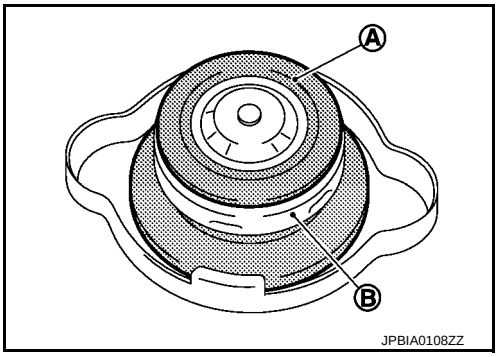
WARNING:

- **Do not remove the radiator cap or reservoir tank cap when the engine is hot. Serious burns could occur from high-pressure engine coolant escaping from the cooling system.**
- **When removing the radiator cap or reservoir tank cap, wrap a thick cloth around the cap and slowly turn it a quarter turn to allow built-up pressure to escape. Then carefully remove the cap by turning it all the way.**

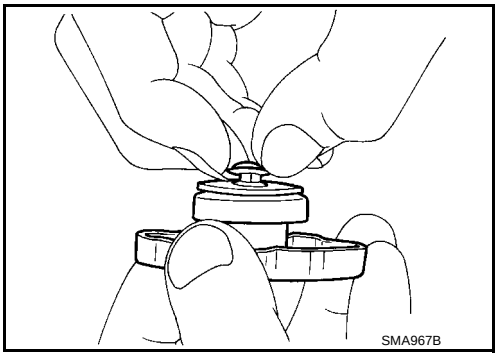
- Check the pressure valve of the radiator cap.
- Replace the radiator cap if the metal plunger (B) on the pressure valve cannot be seen around the edge of the rubber gasket (A).
- Replace the radiator cap if there is damage or deposits of foreign material on the rubber gasket or pressure valve.

CAUTION:

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

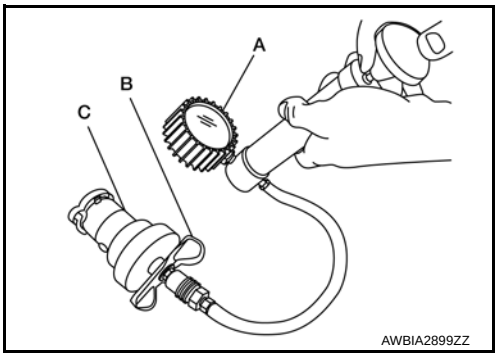


- Check the negative-pressure valve of the radiator cap.
- Replace the radiator cap if the negative-pressure valve does not close completely when pulled open and released.
- Replace the radiator cap if there is damage or deposits of foreign material on the valve seat of the negative-pressure valve.
- Replace the radiator cap if there is an abnormality in the operation of the negative-pressure valve.



- Check radiator cap relief pressure.
- Check the radiator cap relief pressure using Tools (A) and (B), and suitable tool (C).

Tool number (A)	**: —**	**(J-51771-5)**
Tool number (B)	**: —**	**(J-51771-9)**
Tool number (C) (commercially available)	**: —**	**(J-33984-A or equivalent)**
Radiator cap relief pressure	**: Refer to CO-30, "Radiator".**	



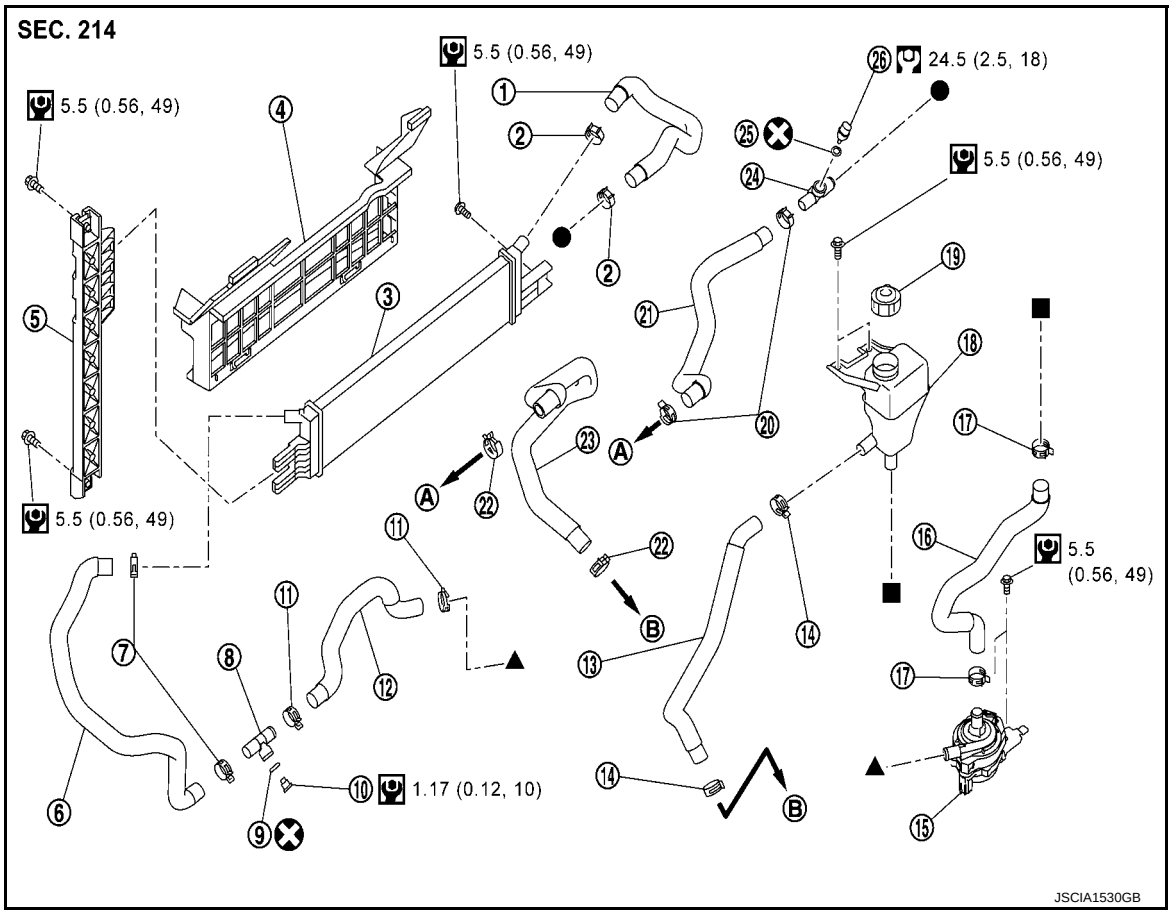
- When connecting the radiator cap to suitable tool (C), apply water or coolant to the radiator cap seal surface.
- Replace the radiator cap if the radiator cap relief pressure is outside of specification.

REMOVAL AND INSTALLATION

SUB RADIATOR

Exploded View

INFOID:0000000014771967



1. Sub radiator hose (outlet)	2. Clamp	3. Sub radiator
4. Sub radiator air guide	5. Support bracket	6. Sub radiator hose (inlet)
7. Clamp	8. Water hose connector	9. O-ring
10. Drain plug	11. Clamp	12. Water hose 3
13. Water hose 4	14. Clamp	15. Electric water pump assembly
16. Water hose 5	17. Clamp	18. Reservoir tank
19. Reservoir tank cap	20. Clamp	21. Water hose 1
22. Clamp	23. Water hose 2	24. Water hose connector
25. O-ring	26. Coolant temperature sensor	A. To traction motor inverter
B. To traction motor	⇦ : Vehicle front	

: N·m (kg-m, ft-lb)

: N·m (kg-m, in-lb)

: Always replace after every disassembly

●, ▲, ■ : Indicates that the part is connected at points with same symbol in actual vehicle.

Removal and Installation

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REMOVAL

WARNING:

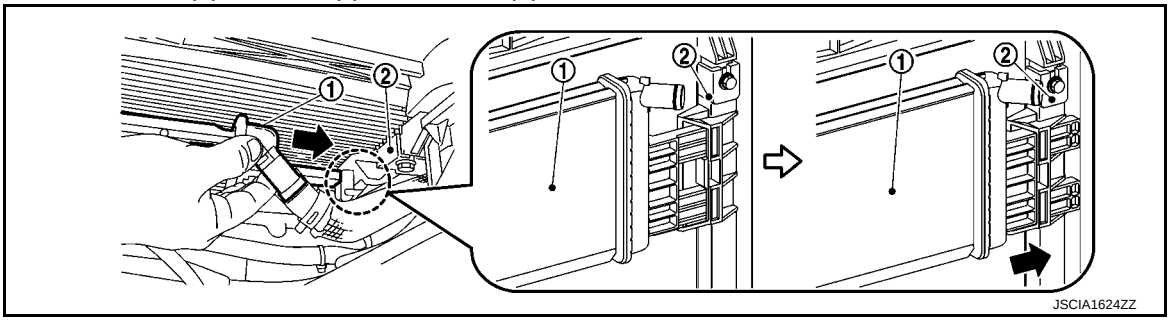
Do not remove the reservoir tank cap when the high voltage parts including traction motor is hot. Serious burns could occur from inverter coolant escaping from the reservoir. Wrap a thick cloth around the reservoir tank cap. Slowly turn it a quarter turn to allow built-up pressure to escape. Carefully remove the reservoir tank cap by turning it all the way.

NOTE:

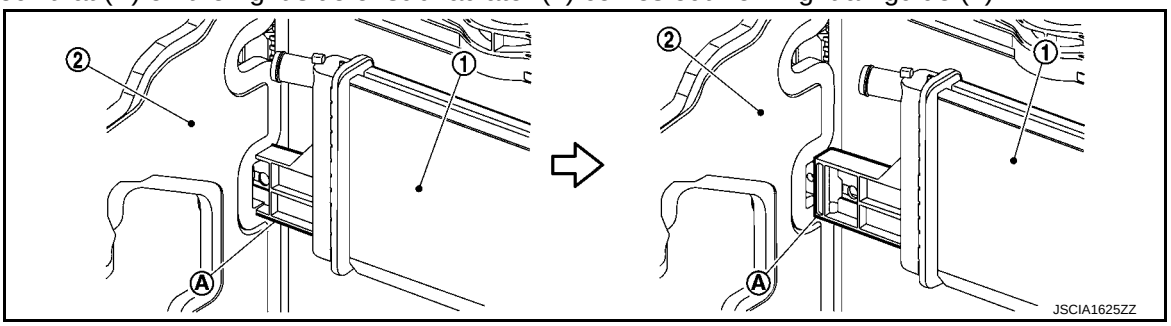
When removing components such as hoses, tubes/lines, etc., cap or plug openings to prevent fluid from spilling.

1. Drain coolant from drain plug. Refer to HCO-9, "Draining and Refilling".
   CAUTION:
   - **Perform this step when the high voltage parts are cold.**
   - **Do not spill inverter coolant on the drive belt.**
2. Remove front grille. Refer to EXT-33, "Removal and Installation"
3. Remove hood lock support stay mounting bolts and put the hood lock support stay out of the way. Refer to DLK-298, "Exploded View"
4. Remove sub radiator air guide. Refer to DLK-298, "Exploded View".
5. Disconnect sub radiator hose (outlet) and sub radiator hose (inlet) on the sub radiator side.
6. Remove sub radiator bolts.
7. Remove sub radiator from the vehicle according to the following steps.

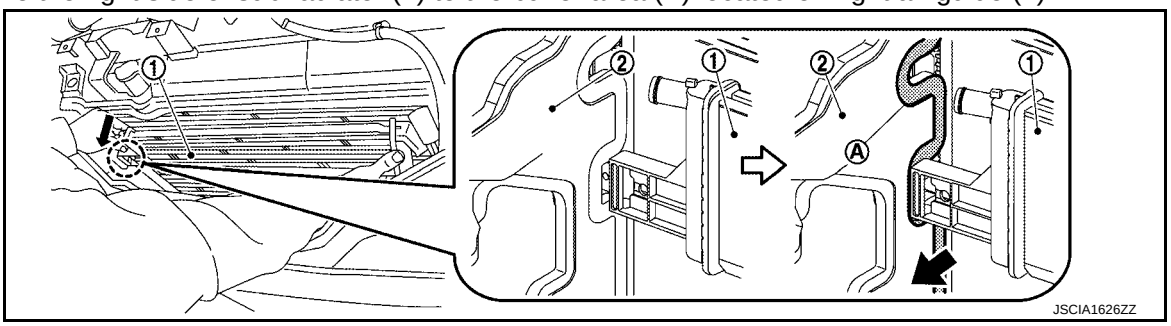
a. Slide sub radiator (1) to the support bracket (2) side.



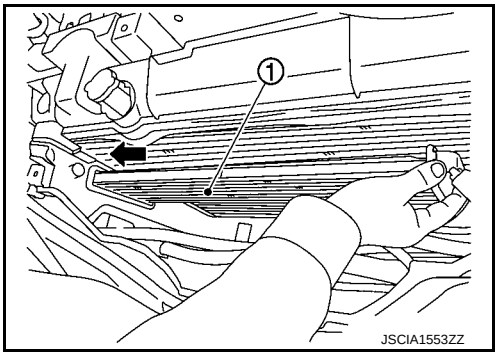
b. Check that (A) on the right side of sub radiator (1) comes out from right air guide (2).



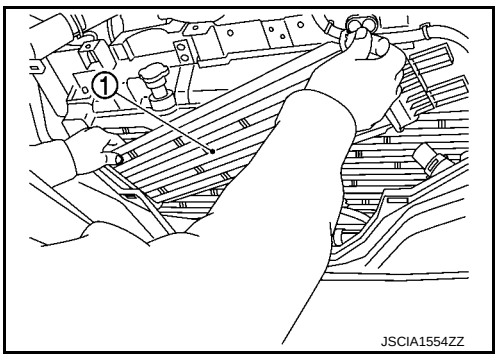
c. Move the right side of sub radiator (1) to the buffer area (A) located on right air guide (2).



d. Slide sub radiator (1) to the right side of vehicle.

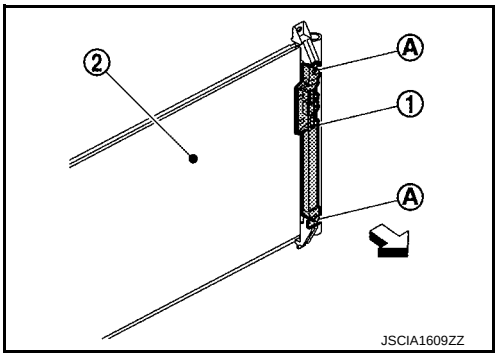


e. Lift the left side of sub radiator (1) to remove it.
CAUTION:
Never damage radiator and sub radiator when removing them.



8. Remove support bracket (1), if necessary.

2 : Condenser
A : Mounting bolt
⇦ : Vehicle front



INSTALLATION

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

CAUTION:

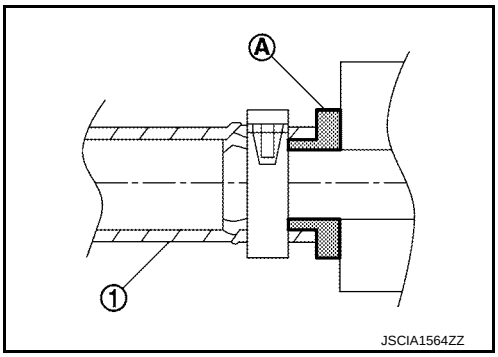
- **Be sure to perform the air bleeding. Refer to HCO-9, "Draining and Refilling".**
- **Never reuse O-rings.**

Sub radiator hose / Water hose

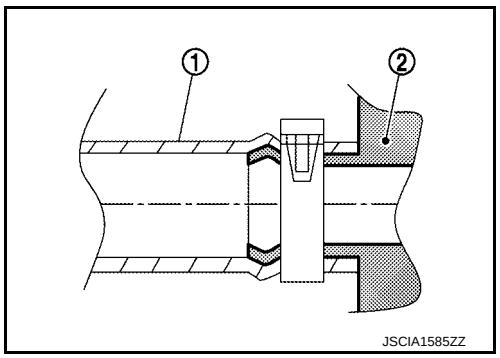
CAUTION:

The instructions below must be followed even when these parts are removed as a single part.

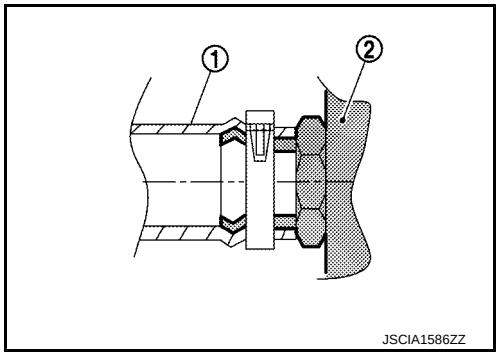
- When inserting sub radiator hose (outlet) (1) or sub radiator hose (Inlet) (1) to sub radiator, insert the hose until it reaches stopper (A).
- When inserting water hose (1) to electric water pump or reservoir tank, insert the hose until it reaches stopper (A).



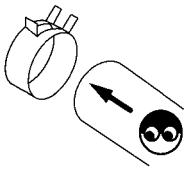
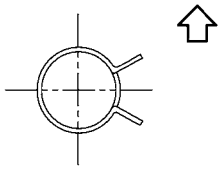
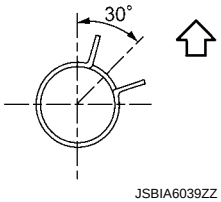
- When inserting water hose (1) to traction motor inverter (2), insert the hose until it reaches traction motor inverter.

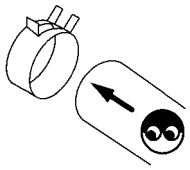
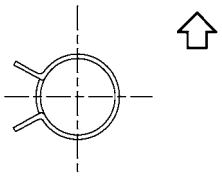
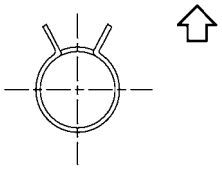
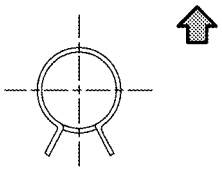
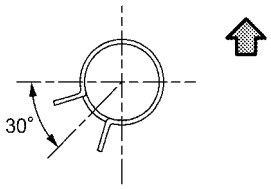
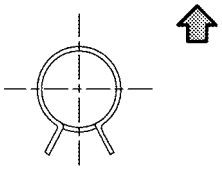
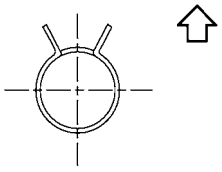


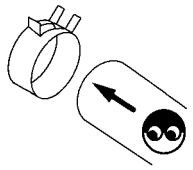
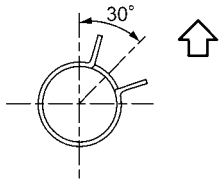
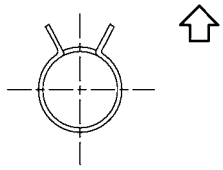
- When inserting water hose (1) to traction motor (2), insert the hose until it reaches traction motor.



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

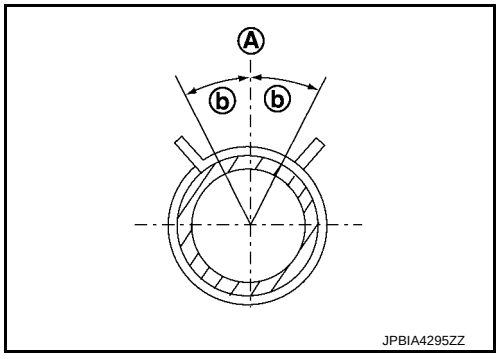
Radiator hose	Hose end	Paint mark	Position of hose clamp*  JPCIA0366ZZ ⇦ : Vehicle upper ⇦ : Vehicle front
Sub radiator hose (outlet)	Sub radiator side	Vehicle upper	 JPCIA0360ZZ
Water hose 1	Traction motor inverter side	Vehicle front	 JSBIA6039ZZ

Radiator hose	Hose end	Paint mark	Position of hose clamp*  JPCIA0366ZZ ⇦ : Vehicle upper ⇦ : Vehicle front
Sub radiator hose (inlet)	Sub radiator side	Vehicle upper	 JPCIA0364ZZ
Water hose 3	Electric water pump side	Vehicle rear	 JPCIA0362ZZ
Water hose 5	Reservoir tank	Vehicle rear	 JSCIA1565ZZ
	Electric water pump side	Vehicle rear	 JSCIA1566ZZ
Water hose 4	Reservoir tank	Vehicle rear	 JSCIA1565ZZ
	Traction motor side	Vehicle upper	 JPCIA0362ZZ

Radiator hose	Hose end	Paint mark	Position of hose clamp*  JPCIA0366ZZ ⇦ : Vehicle upper ⇦ : Vehicle front
Water hose 2	Traction motor inverter side	Vehicle front	 JSBIA6039ZZ
	Traction motor side	Vehicle upper	 JPCIA0362ZZ

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

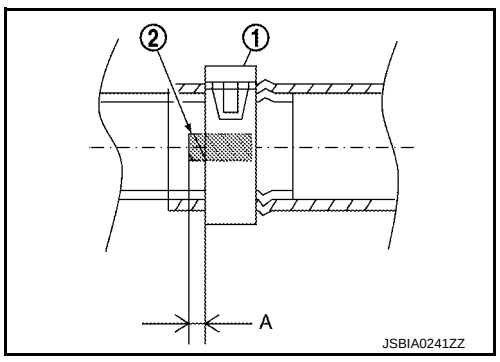
- The angle (b) created by the hose clamp pawl and the specified line (A) must be within ±30° as shown in the figure.



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" : (+1) – (-1) mm
: (-0.04) – (+0.04) in



JSBIA0241ZZ

Inspection

INFOID:0000000014771969

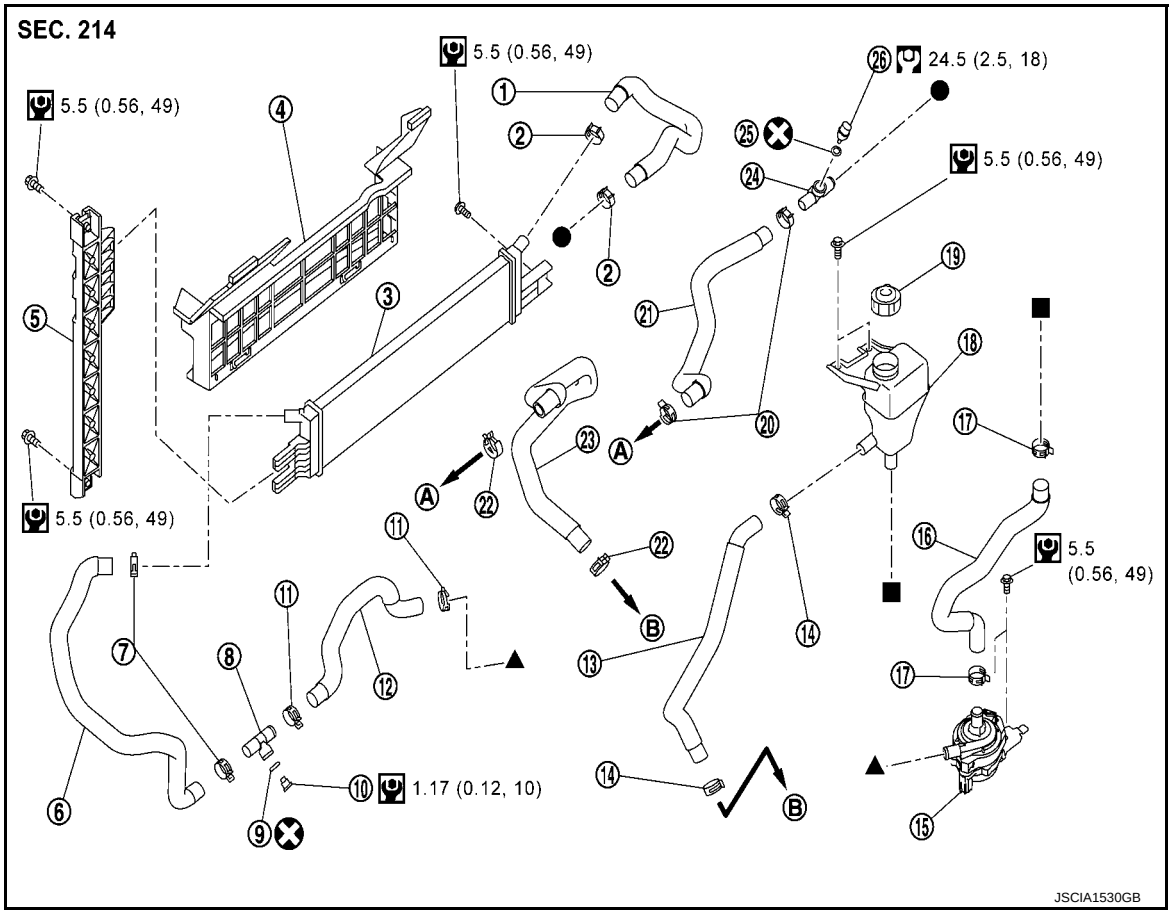
INSPECTION AFTER INSTALLATION

- Check that the reservoir tank cap is tight.
- Using a suitable tool check that there are no inverter coolant leaks. Refer to HCO-9, "Inspection".
- Start the electric water pump and check the joints for inverter coolant leaks.

ELECTRIC WATER PUMP

Exploded View

INFOID:0000000014771970



1.	Sub radiator hose (outlet)	2.	Clamp	3.	Sub radiator
4.	Sub radiator air guide	5.	Support bracket	6.	Sub radiator hose (inlet)
7.	Clamp	8.	Water hose connector	9.	O-ring
10.	Drain plug	11.	Clamp	12.	Water hose 3
13.	Water hose 4	14.	Clamp	15.	Electric water pump assembly
16.	Water hose 5	17.	Clamp	18.	Reservoir tank
19.	Reservoir tank cap	20.	Clamp	21.	Water hose 1
22.	Clamp	23.	Water hose 2	24.	Water hose connector
25.	O-ring	26.	Coolant temperature sensor	A.	To traction motor inverter
B.	To traction motor	⇦	: Vehicle front		

: N·m (kg-m, ft-lb)

: N·m (kg-m, in-lb)

: Always replace after every disassembly

●, ▲, ■ : Indicates that the part is connected at points with same symbol in actual vehicle.

Removal and Installation

INFOID:0000000014771971

REMOVAL

WARNING:

Do not remove the reservoir tank cap when the high voltage parts including traction motor is hot. Serious burns could occur from inverter coolant escaping from the reservoir. Wrap a thick cloth around

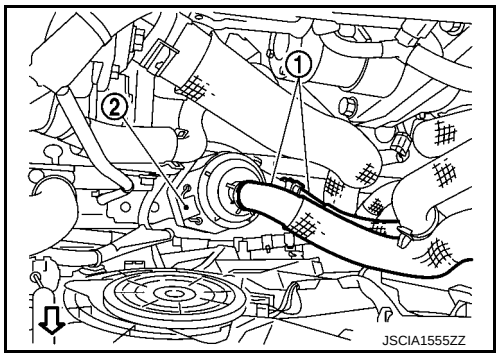
the reservoir tank cap. Slowly turn it a quarter turn to allow built-up pressure to escape. Carefully remove the reservoir tank cap by turning it all the way.

NOTE:

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

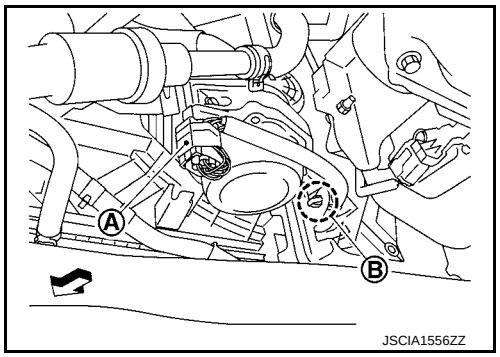
1. Drain coolant from drain plug. Refer to HCO-9, "Draining and Refilling".
   CAUTION:
   - **Perform this step when the high voltage parts are cold.**
   - **Do not spill inverter coolant on the drive belt.**
2. Remove reservoir tank.
3. Remove water hose (1) upward from electric water pump (2).

   ⇦ : Vehicle front



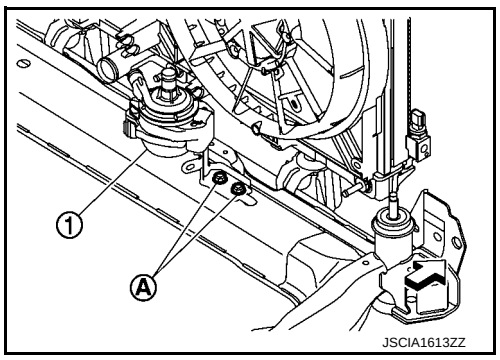
4. Disconnect electric water pump harness connector (A) and harness clip (B) from the bottom of the vehicle.

   ⇦ : Vehicle front

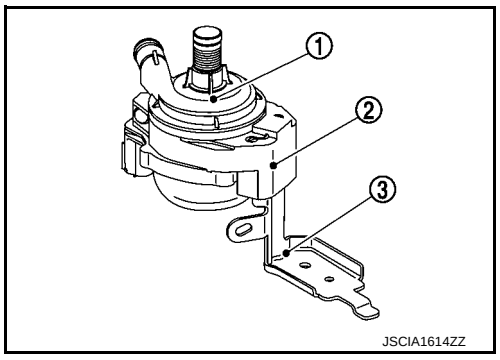


5. Remove bolts (A) of electric water pump, and remove electric water pump (1).

   ⇦ : Vehicle front



CAUTION:
- **Do not remove electric water pump (1) from mount rubber (2).**
- **Do not remove mount rubber from bracket (3).**



INSTALLATION

Installation is in the reverse order of removal.

CAUTION:

- **Be sure to perform the air bleeding. Refer to HCO-9, "Draining and Refilling".**
- **Install while being careful of water hose clamp installation location. Refer to HCO-18, "Exploded View".**
- **Secure electric water pump assembly while installing water hoses.**

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Periodical Maintenance Specification

INFOID:0000000014771972

Unit: ℓ (US qt, Imp qt)

Coolant capacity (With reservoir tank at “MAX” level)	2.3 (2-3/8, 2)
Reservoir tank engine coolant capacity (At “MAX” level)	0.45 (1/2, 3/8)

LLC concentration %	50

Sub Radiator

INFOID:0000000014771973

Unit: kPa (kg/cm^2, psi)

Leakage testing pressure		220 (2.24, 31.91)
Reservoir tank cap relief pressure	Standard	29 (0.296 – 4.205)
	Limit	19 (0.194, 2.755)