

SECTION HAC

HEATER & AIR CONDITIONING CONTROL SYSTEM

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PRECAUTION

PRECAUTIONS

Precaution for Technicians Using Medical Electric

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OPERATION PROHIBITION

WARNING:

- Parts with strong magnet is used in this vehicle.
- Technicians using a medical electric device such as pacemaker must never perform operation on the vehicle, as magnetic field can affect the device function by approaching to such parts.

NORMAL CHARGE PRECAUTION

WARNING:

- If a technician uses a medical electric device such as an implantable cardiac pacemaker or an implantable cardioverter defibrillator, the possible effects on the devices must be checked with the device manufacturer before starting the charge operation.
- As radiated electromagnetic wave generated by PDM (Power Delivery Module) at normal charge operation may affect medical electric devices, a technician using a medical electric device such as implantable cardiac pacemaker or an implantable cardioverter defibrillator must not approach motor room [PDM (Power Delivery Module)] at the hood-opened condition during normal charge operation.

PRECAUTION AT TELEMATICS SYSTEM OPERATION

WARNING:

- If a technician uses implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), avoid the device implanted part from approaching within approximately 220 mm (8.66 in) from interior/exterior antenna.
- The electromagnetic wave of TCU might affect the function of the implantable cardiac pacemaker or the implantable cardioverter defibrillator (ICD), when using the service, etc.
- If a technician uses other medical electric devices than implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), the electromagnetic wave of TCU might affect the function of the device. The possible effects on the devices must be checked with the device manufacturer before TCU use.

PRECAUTION AT INTELLIGENT KEY SYSTEM OPERATION

WARNING:

- If a technician uses implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), avoid the device implanted part from approaching within approximately 220 mm (8.66 in) from interior/exterior antenna.
- The electromagnetic wave of Intelligent Key might affect the function of the implantable cardiac pacemaker or the implantable cardioverter defibrillator (ICD), at door operation, at each request switch operation, or at engine starting.
- If a technician uses other medical electric devices than implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), the electromagnetic wave of Intelligent Key might affect the function of the device. The possible effects on the devices must be checked with the device manufacturer before Intelligent Key use.

Point to Be Checked Before Starting Maintenance Work

INFOID:000000011005816

The high voltage system may starts automatically. It is required to check that the timer air conditioner and timer charge (during EVSE connection) are not set before starting maintenance work.

NOTE:

If the timer air conditioner or timer charge (during EVSE connection) is set, the high voltage system starts automatically even when the power switch is in OFF state.

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

INFOID:000000011005817

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

PRECAUTIONS

< PRECAUTION >

[AUTO A/C (WITH HEAT PUMP)]

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 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, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the 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 Airbag Diagnosis Sensor Unit or other Airbag 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 and wait at least three minutes before performing any service.

Precaution for Work

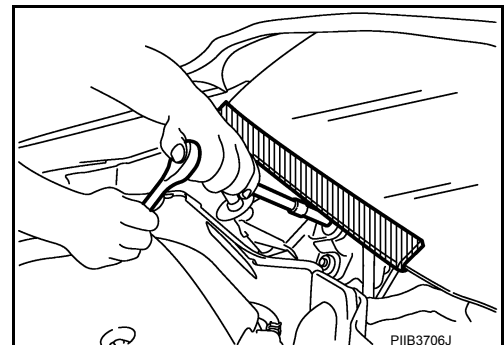
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- When removing or disassembling each component, be careful not to damage or deform it. If a component may be subject to interference, be sure to protect it with a shop cloth.
- When removing (disengaging) components with a screwdriver or similar tool, be sure to wrap the component with a shop cloth or vinyl tape to protect it.
- Protect the removed parts with a shop cloth and prevent them from being dropped.
- Replace a deformed or damaged clip.
- If a part is specified as a non-reusable part, always replace it with a new one.
- Be sure to tighten bolts and nuts securely to the specified torque.
- After installation is complete, be sure to check that each part works properly.
- Follow the steps below to clean components:
 - Water soluble dirt:
 - Dip a soft cloth into lukewarm water, wring the water out of the cloth and wipe the dirty area.
 - Then rub with a soft, dry cloth.
 - Oily dirt:
 - Dip a soft cloth into lukewarm water with mild detergent (concentration: within 2 to 3%) and wipe the dirty area.
 - Then dip a cloth into fresh water, wring the water out of the cloth and wipe the detergent off.
 - Then rub with a soft, dry cloth.
 - Do not use organic solvent such as thinner, benzene, alcohol or gasoline.
 - For genuine leather seats, use a genuine leather seat cleaner.

Precaution for Procedure without Cowl Top Cover

INFOID:000000011005818

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



PRECAUTIONS

< PRECAUTION >

[AUTO A/C (WITH HEAT PUMP)]

INFOID:000000011005819

High Voltage Precautions

DANGER:



Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.
- Be sure to wear insulated protective equipment before beginning work on the high voltage system.
- Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

HIGH VOLTAGE HARNESS AND EQUIPMENT IDENTIFICATION

All the high voltage harnesses and connectors are orange. The Li-ion battery and other high voltage devices include an orange high voltage label. Never touch these harnesses and high voltage parts.

HANDLING OF HIGH VOLTAGE HARNESS AND TERMINALS

Immediately insulate disconnected high voltage connectors and terminals with insulating tape.

REGULATIONS ON WORKERS WITH MEDICAL ELECTRONICS

WARNING:

The vehicle contains parts that contain powerful magnets. If a person who is wearing a heart pacemaker or other medical device is close to these parts, the medical device may be affected by the magnets. Such persons must not perform work on the vehicle.

PROHIBITED ITEMS TO CARRY DURING THE WORK

Hybrid vehicles and electric vehicles contain parts with high voltage and intense magnetic force. Never carry metal products and magnetic recording media (e.g. cash card, prepaid card) to repair/inspect high voltage parts. If this is not observed, the metal products may create a risk of short circuit and the magnetic recording media may lose their magnetic recording.

POSTING A SIGN OF "DANGER! HIGH VOLTAGE AREA. KEEP OUT"

PRECAUTIONS

[AUTO A/C (WITH HEAT PUMP)]

< PRECAUTION >

Indicate "HIGH VOLTAGE. DO NOT TOUCH" on the vehicle under repair/inspection to call attention to other workers.

Person in charge: _____

DO NOT TOUCH!

REPAIR IN PROGRESS.

HIGH VOLTAGE

DANGER:

DANGER:

HIGH VOLTAGE

REPAIR IN PROGRESS.

DO NOT TOUCH!

Person in charge: _____

Copy this page and put it after folding on the roof of the vehicle in service.

JSAIA1600GB

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Precaution for Removing 12V Battery

INFOID:000000011005820

1. Check that EVSE is not connected.

NOTE:

If EVSE is connected, the air conditioning system may be automatically activated by the timer A/C function.

2. Turn the power switch OFF → ON → OFF. Get out of the vehicle. Close all doors (including back door).

PRECAUTIONS

< PRECAUTION >

[AUTO A/C (WITH HEAT PUMP)]

3. Check that the charge status indicator lamp does not blink and wait for 5 minutes or more.
NOTE:
If the battery is removed within 5 minutes after the power switch is turned OFF, plural DTCs may be detected.
4. Remove 12V battery within 1 hour after turning the power switch OFF → ON → OFF.
NOTE:
 - The 12V battery automatic charge control may start automatically even when the power switch is in OFF state.
 - Once the power switch is turned ON → OFF, the 12V battery automatic charge control does not start for approximately 1 hour.**CAUTION:**
 - After all doors (including back door) are closed, if a door (including back door) is opened before battery terminals are disconnected, start over from Step 1.
 - After turning the power switch OFF, if “Remote A/C” is activated by user operation, stop the air conditioner and start over from Step 1.

Precautions for Service Work of Cooler System

INFOID:000000011005821

GENERAL REFRIGERANT PRECAUTION

WARNING:

- Never breathe A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose and throat. Remove HFC-134a (R-134a) from the A/C system, using certified service equipment meeting requirements of SAE J-2210 [HFC-134a (R-134a) recycling equipment], or J-2209 [HFC-134a (R-134a) recovery equipment]. Ventilate work area before resuming service if accidental system discharge occurs. Additional health and safety information may be obtained from refrigerant and lubricant manufacturers.
- Never release refrigerant into the air. Use approved recovery/recycling recharging equipment to capture the refrigerant each time an air conditioning system is discharged.
- Wear always eye and hand protection (goggles and gloves) when working with any refrigerant or air conditioning system.
- Never store or heat refrigerant containers above 52°C (126°F).
- Never heat a refrigerant container with an open flame; Place the bottom of the container in a warm pail of water if container warming is required.
- Never intentionally drop, puncture, or incinerate refrigerant containers.
- Keep refrigerant away from open flames: poisonous gas is produced if refrigerant burns.
- Refrigerant displaces oxygen, therefore be certain to work in well ventilated areas to prevent suffocation.
- Never pressure test or leakage test HFC-134a (R-134a) service equipment and/or vehicle air conditioning systems with compressed air during repair. Some mixtures of air and HFC-134a (R-134a) have been shown to be combustible at elevated pressures. These mixtures, if ignited, may cause injury or property damage. Additional health and safety information may be obtained from refrigerant manufacturers.

WORKING WITH HFC-134a (R-134a)

CAUTION:

- CFC-12 (R-12) refrigerant and HFC-134a (R-134a) refrigerant are not compatible. Compressor malfunction is likely to occur if the refrigerants are mixed, refer to “CONTAMINATED REFRIGERANT” below. To determine the purity of HFC-134a (R-134a) in the vehicle and recovery tank, use Refrigerant recovery/recycling recharging equipment and Refrigerant Identifier.
- Use only specified lubricant for the HFC-134a (R-134a) A/C system and HFC-134a (R-134a) components. Compressor malfunction is likely to occur if lubricant other than that specified is used.
- If rotary compressor oil (DH-PR), swash plate compressor oil (DH-PS), or CFC-12 compressor oil (mineral oil) is used, the insulation resistance may be reduced. Never use these oils.
- The specified HFC-134a (R-134a) lubricant rapidly absorbs moisture from the atmosphere. The following handling precautions must be observed:
 - Cap (seal) immediately the component to minimize the entry of moisture from the atmosphere when removing refrigerant components from a vehicle.
 - Never remove the caps (unseal) until just before connecting the components when installing refrigerant components to a vehicle. Connect all refrigerant loop components as quickly as possible to minimize the entry of moisture into system.

PRECAUTIONS

[AUTO A/C (WITH HEAT PUMP)]

< PRECAUTION >

- Use only the specified lubricant from a sealed container. Reseal immediately containers of lubricant. Lubricant becomes moisture saturated and should not be used without proper sealing.
- Never allow lubricant to come in contact with styrene foam parts. Damage may result.

REFRIGERANT CONNECTION

A new type refrigerant connection has been introduced to all refrigerant lines except the following location.

- Expansion valve to evaporator
- Refrigerant pressure sensor to liquid tank

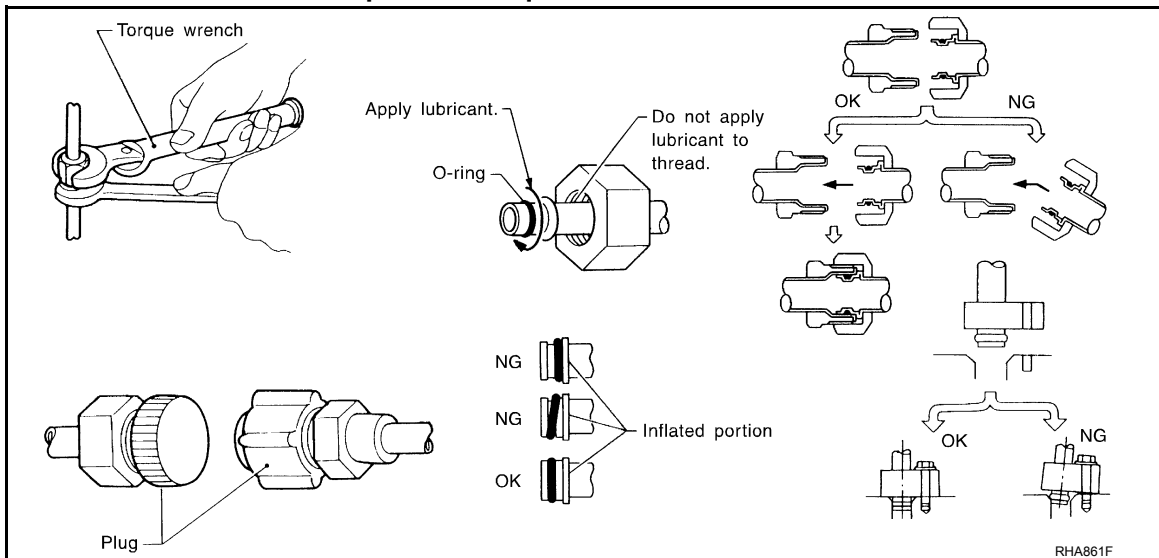
WARNING:

Check that all refrigerant is discharged into the recycling equipment and the pressure in the system is less than atmospheric pressure. Then gradually loosen the discharge side hose fitting and remove it.

CAUTION:

Observe the following when replacing or cleaning refrigerant cycle components.

- To prevent fluorescent indicator from entering, prepare and use exclusive hose for EV (electric vehicle) and HEV (hybrid vehicle) when connecting recovery/recycling/recharging equipment.
- Store it in the same way at it is when mounted on the car when the compressor is removed. Failure to do so will cause lubricant to enter the low-pressure chamber.
- Use the torque wrench or the backup wrench when installing the piping.
- Plug immediately all openings to prevent entry of dust and moisture after disconnecting tubes.
- Connect the pipes at the final stage of the operation when installing an air conditioner in the vehicle. Never remove the seal caps of pipes and other components until just before required for connection.
- Allow components stored in cool areas to warm to working area temperature before removing seal caps. This prevents condensation from forming inside A/C components.
- Remove thoroughly moisture from the refrigeration system before charging the refrigerant.
- Replace always used O-rings.
- Apply lubricant to circle of the O-ring shown in illustration when connecting tube. Be careful not to apply lubricant to threaded portion.
- O-ring must be closely attached to the groove portion of tube.
- Be careful not to damage O-ring and tube when replacing the O-ring.
- Connect tube until a click can be heard. Then tighten the nut or bolt by hand. Check that the O-ring is installed to tube correctly.
- Perform leakage test and make sure that there is no leakage from connections after connecting line. Disconnect that line and replace the O-ring when the refrigerant leaking point is found. Then tighten connections of seal seat to the specified torque.



COMPRESSOR

CAUTION:

- Plug all openings to prevent moisture and foreign matter from entering.
- Store it in the same way at it is when mounted on the car when the compressor is removed.
- Follow "Maintenance of Lubricant Quantity in Compressor" exactly when replacing or repairing compressor. Refer to [HA-17, "Electric Compressor"](#).

REFRIGERANT LEAKAGE DETECTING FLOURESCENT INDICATOR

CAUTION:

PRECAUTIONS

[AUTO A/C (WITH HEAT PUMP)]

< PRECAUTION >

- Never use fluorescent indicators as these may reduce the insulation resistance.
- If a fluorescent indicator enters the refrigerant cycle, either wash the refrigerant cycle parts or replace the parts.

Service Equipment

INFOID:000000011005822

RECOVERY/RECYCLING RECHARGING EQUIPMENT

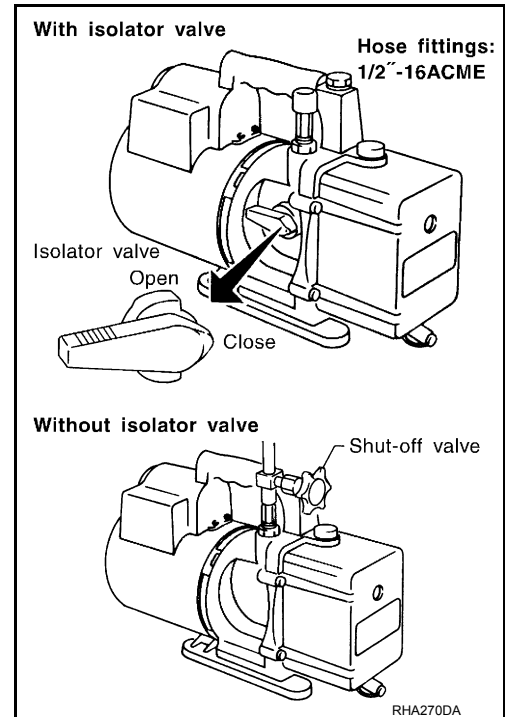
Be certain to follow the manufacturer's instructions for machine operation and machine maintenance. Never introduce any refrigerant other than that specified into the machine.

VACUUM PUMP

The lubricant contained inside the vacuum pump is not compatible with the specified lubricant for HFC-134a (R-134a) A/C systems. The vent side of the vacuum pump is exposed to atmospheric pressure. So the vacuum pump lubricant may migrate out of the pump into the service hose. This is possible when the pump is switched OFF after evacuation (vacuuming) and hose is connected to it. To prevent this migration, use a manual valve placed near the hose-to-pump connection, as per the following.

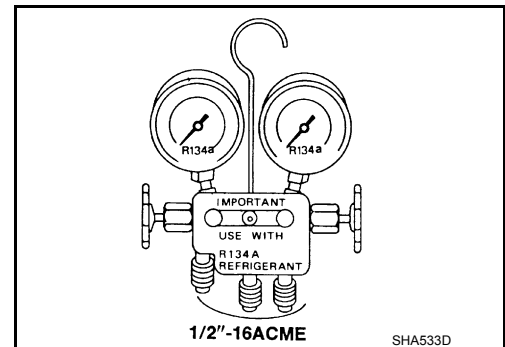
- Vacuum pumps usually have a manual isolator valve as part of the pump. Close this valve to isolate the service hose from the pump.
- Use a hose equipped with a manual shut-off valve near the pump end for pumps without an isolator. Close the valve to isolate the hose from the pump.
- Disconnect the hose from the pump if the hose has an automatic shut-off valve. As long as the hose is connected, the valve is open and lubricating oil may migrate.

Some one-way valves open when vacuum is applied and close under no vacuum condition. Such valves may restrict the pump's ability to pull a deep vacuum and are not recommended.



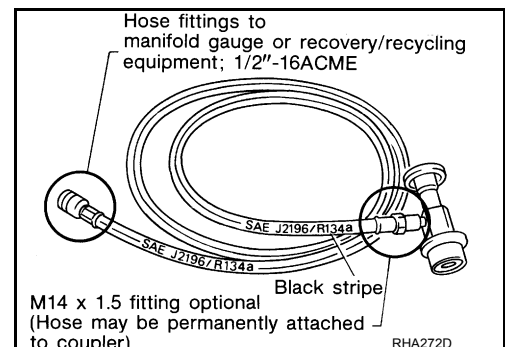
MANIFOLD GAUGE SET

Be certain that the gauge face indicates HFC-134a or R-134a. Be sure the gauge set has 1/2"-16 ACME threaded connections for service hoses. Confirm the set has been used only with refrigerant HFC-134a (R-134a) and specified lubricants.



SERVICE HOSES

Be certain that the service hoses display the markings described (colored hose with black stripe). All hoses must equip positive shut-off devices (either manual or automatic) near the end of the hoses opposite to the manifold gauge.



PRECAUTIONS

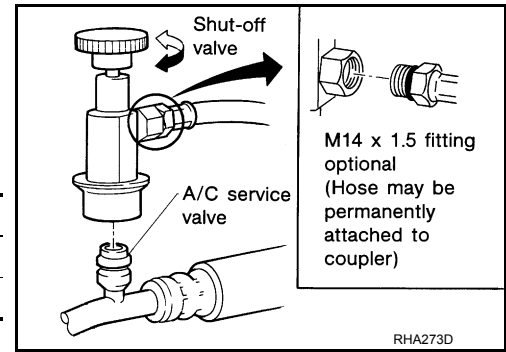
< PRECAUTION >

[AUTO A/C (WITH HEAT PUMP)]

SERVICE COUPLERS

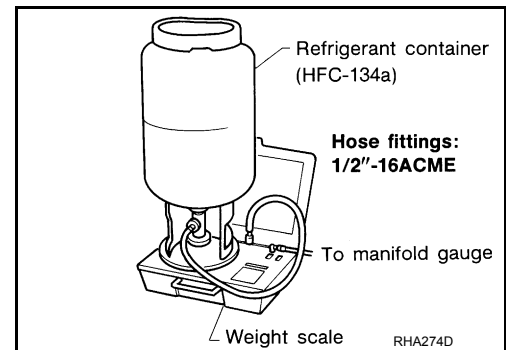
Never attempt to connect HFC-134a (R-134a) service couplers to the CFC-12 (R-12) A/C system. The HFC-134a (R-134a) couplers do not properly connect to the CFC-12 (R-12) system. However, if an improper connection is attempted, discharging and contamination may occur.

Shut-off valve rotation	A/C service valve
Clockwise	Open
Counterclockwise	Close



REFRIGERANT WEIGHT SCALE

Verify that no refrigerant other than HFC-134a (R-134a) and specified lubricants have been used with the scale. The hose fitting must be 1/2"-16 ACME if the scale controls refrigerant flow electronically.



CALIBRATING ACR4 WEIGHT SCALE

Calibrate the scale each three month.

To calibrate the weight scale on the ACR4:

1. Press "**Shift/Reset**" and "**Enter**" at the same time.
2. Press "**8787**". "**A1**" is displayed.
3. Remove all weight from the scale.
4. Press "**0**", then press "**Enter**". "**0.00**" is displayed and change to "**A2**".
5. Place a known weight (dumbbell or similar weight), between 4.5 and 8.6 kg (10 and 19 lb.) on the center of the weight scale.
6. Enter the known weight using four digits. (Example 10 lb. = 10.00, 10.5 lb. = 10.50)
7. Press "**Enter**" — the display returns to the vacuum mode.
8. Press "**Shift/Reset**" and "**Enter**" at the same time.
9. Press "**6**" — the known weight on the scale is displayed.
10. Remove the known weight from the scale. "**0.00**" is displayed.
11. Press "**Shift/Reset**" to return the ACR4 to the program mode.

CHARGING CYLINDER

Using a charging cylinder is not recommended. Refrigerant may be vented into air from cylinder's top valve when filling the cylinder with refrigerant. Also, the accuracy of the cylinder is generally less than that of an electronic scale or of quality recycle/recharge equipment.

PREPARATION

< PREPARATION >

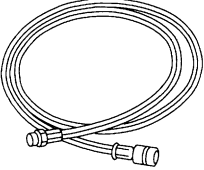

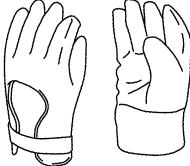

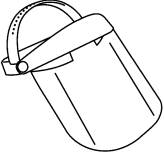
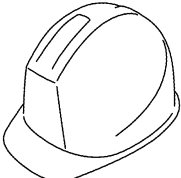
[AUTO A/C (WITH HEAT PUMP)]

PREPARATION

PREPARATION

Commercial Service Tools

INFOID:0000000011005823

Tool name	Description
<p>Service hoses</p> <ul style="list-style-type: none"> • High-pressure side hose • Low-pressure side hose • Utility hose 	 <p>S-NT201</p> <p>Hose color:</p> <ul style="list-style-type: none"> • Low-pressure side hose: Blue with black stripe • High-pressure side hose: Red with black stripe • Utility hose: Yellow with black stripe or green with black stripe <p>Hose fitting to gauge:</p> <ul style="list-style-type: none"> • 1/2" -16 ACME
<p>Insulated gloves</p> <p>Comply with EN60903:</p> <ul style="list-style-type: none"> • Use protective gloves made of insulating material. • The protective gloves must be capable of resisting the voltage of 600 or more. 	 <p>JMCIA0149ZZ</p> <p>Removing and installing high voltage components</p>
<p>Leather gloves</p> <p>[Use leather gloves that can fasten the wrist tight]</p>	 <p>JPCIA0066ZZ</p> <ul style="list-style-type: none"> • Removing and installing high voltage components • Protect insulated gloves
<p>Insulated safety shoes</p> <p>Comply with EN60903:</p> <ul style="list-style-type: none"> • Use protective shoes made of insulating material. • The protective shoes must be capable of resisting the voltage of 600 or more. 	 <p>JPCIA0011ZZ</p> <p>Removing and installing high voltage components</p>
<p>Face shield</p> <p>[Comply with EN166.]</p>	 <p>JPCIA0167ZZ</p> <ul style="list-style-type: none"> • Removing and installing high voltage components • To protect face from the spatter on the work to electric line
<p>Insulated helmet</p>	 <p>JPCIA0013ZZ</p> <p>Removing and installing high voltage components</p>

PREPARATION

< PREPARATION >

[AUTO A/C (WITH HEAT PUMP)]

Tool name	Description
Insulation resistance tester (Multi tester)	Measuring insulation resistance, voltage and resistance
(J-41995) Electrical leak detector	Power supply: DC12V (Battery terminal)
Manifold gauge set (with hoses and couplers)	Identification: • The gauge face indicates HFC-134a (R-134a). Fitting size: Thread size • 1/2" -16 ACME
Service couplers • High-pressure side coupler • Low-pressure side coupler	Hose fitting to service hose: M14 x 1.5 fitting is optional or permanently attached.
Refrigerant weight scale	For measuring of refrigerant Fitting size: Thread size 1/2" -16 ACME
Vacuum pump (Including the isolator valve)	Capacity: • Air displacement: 4 CFM • Micron rating: 20 microns • Oil capacity: 482 m ℓ (17 Imp fl oz.) Fitting size: Thread size • 1/2" -16 ACME

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PREPARATION

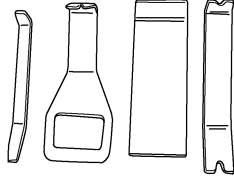

< PREPARATION >

[AUTO A/C (WITH HEAT PUMP)]

Special Service Tool

INFOID:000000011005824

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

Tool number (TechMate No.) Tool name	Description
<p>— (J-46534) Trim tool set</p> <div style="text-align: center;">  <p style="font-size: small;">AWJIA0483ZZ</p> </div>	<p>Removing trim components</p>
<p>(J-48710) NISSAN ACR2009 RRR Unit</p> <div style="text-align: center;">  <p style="font-size: small;">WJIA0293E</p> </div>	<p>Function: Refrigerant recovery, recycling and recharging</p>

Oil and Grease

INFOID:000000011005825

Name	Application	Note
Refrigerant can (HFC-134a)	Charging refrigerant	—
Compressor oil (ND-OIL11)	Refilling compressor oil	—

COMPONENT PARTS

< SYSTEM DESCRIPTION >

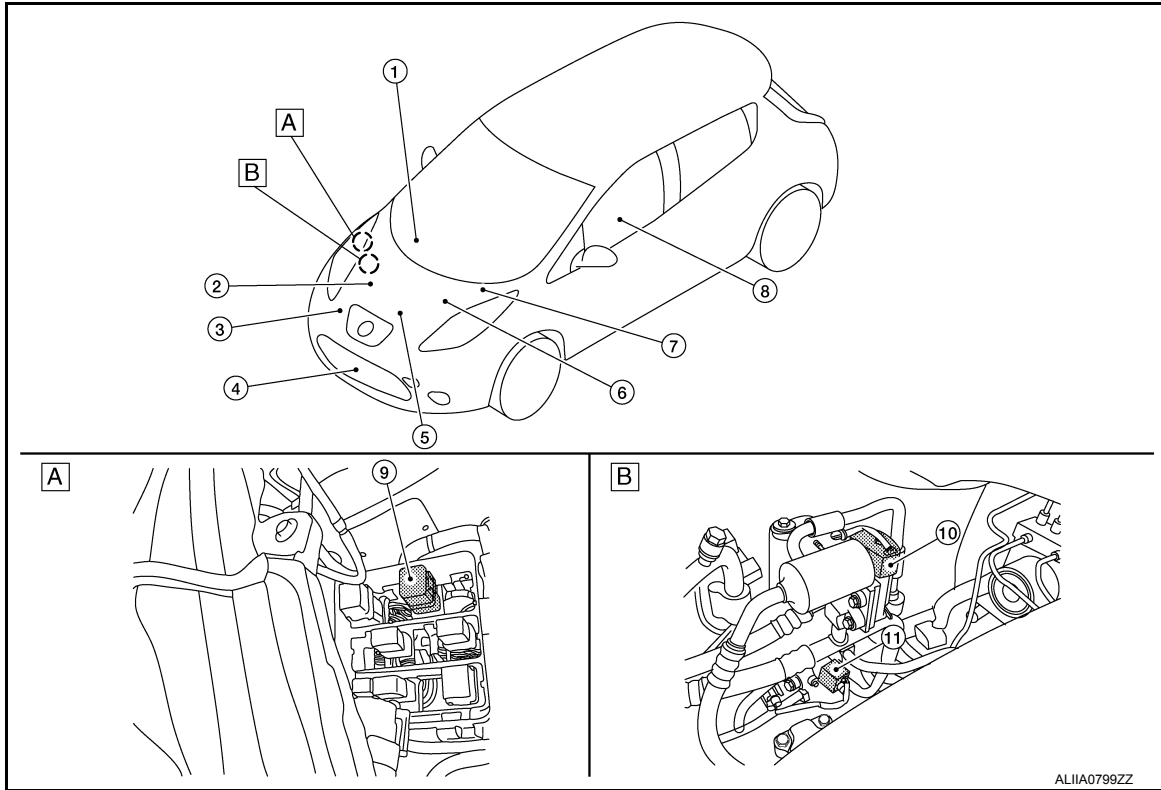
[AUTO A/C (WITH HEAT PUMP)]

SYSTEM DESCRIPTION

COMPONENT PARTS

AUTOMATIC AIR CONDITIONING SYSTEM

AUTOMATIC AIR CONDITIONING SYSTEM : Component Parts Location INFOID:000000011005826



A. Relay box

B. RH side of engine compartment

No.	Component	Description
1.	TCU	<ul style="list-style-type: none"> Transmits a remote climate control request signal that is received by the Telematics system to VCM via CAN communication. Refer to AV-510, "Component Parts Location" for detailed installation location.
2.	Electric compressor	Refer to HAC-26, "Electric Compressor" .
3.	Compressor suction refrigerant temperature sensor	Refer to HAC-28, "Compressor Suction Refrigerant Temperature Sensor" .
4.	Ambient sensor	Refer to HAC-25, "Ambient Sensor" .
5.	PDM (Power delivery module)	<ul style="list-style-type: none"> Supplies high voltage system power to the electric compressor. Refer to EVC-15, "Component Parts Location" for detailed installation location.
6.	Refrigerant pressure sensor	Refer to HAC-26, "Refrigerant Pressure Sensor" .
7.	M/C relay	The M/C (motor control) relay supplies the main power to the EV system. VCM activates the M/C relay and supplies power to the EV system when the EV system needs to be started.
8.	Li-ion battery	<ul style="list-style-type: none"> Supplies high voltage system power to the PTC heater and PDM (power delivery module). Refer to EVB-14, "Component Parts Location" for detailed installation location.
9.	A/C relay	When the M/C relay is ON, it is controlled by VCM and 12 V power is supplied to each component of air conditioning system.

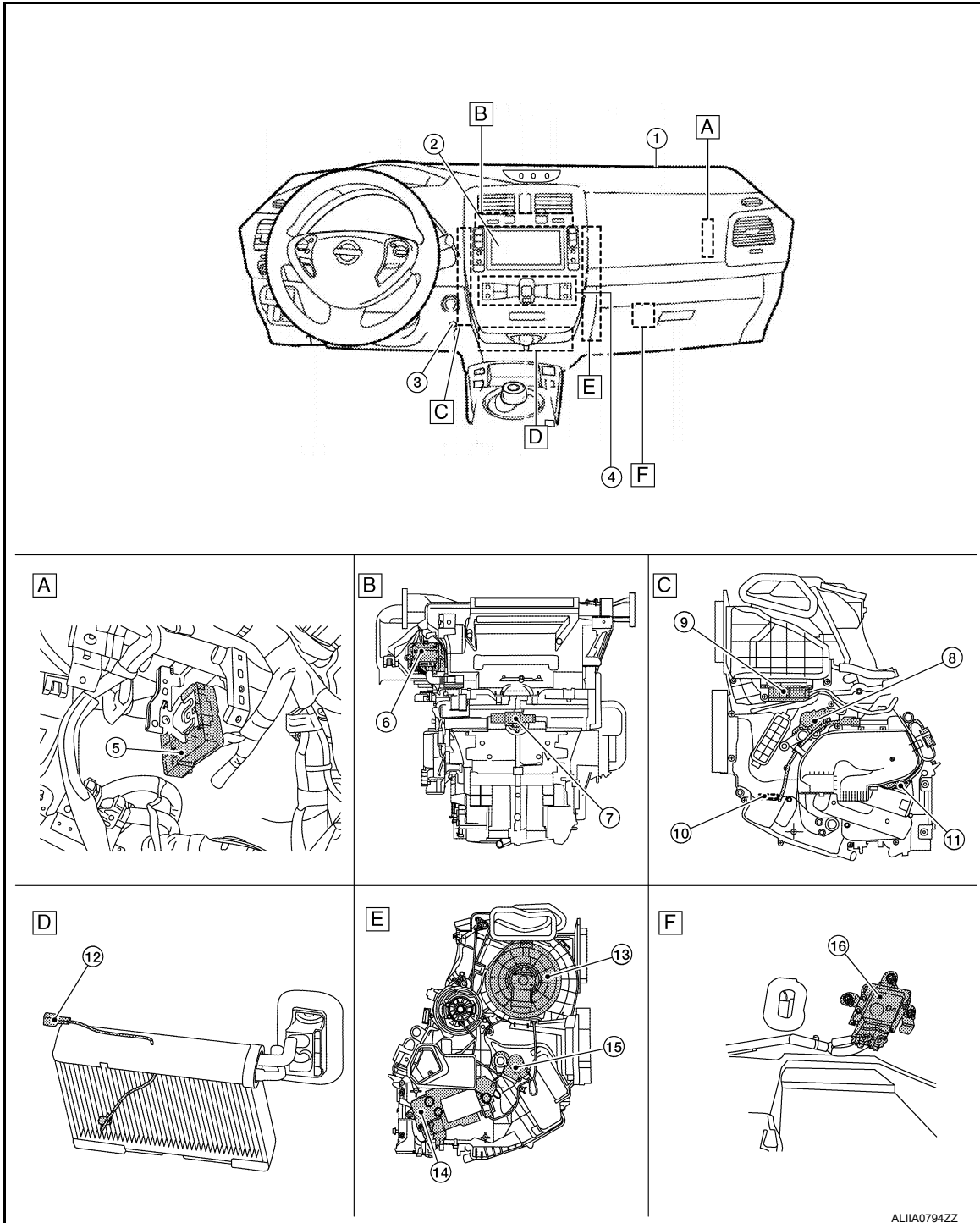
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COMPONENT PARTS

< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

No.	Component	Description
10.	Refrigerant channel switching 2 way type valve	Refer to HAC-29, "Refrigerant Channel Switching 2 Way Type Valve" .
11.	Refrigerant channel switching 3 way type valve	Refer to HAC-29, "Refrigerant Channel Switching 3 Way Type Valve" .



A. Behind glove box
D. Evaporator

B. Back side of A/C unit
E. Right side of A/C unit

C. Left side of A/C unit
F. Behind glove box

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COMPONENT PARTS

< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

No.	Component	Description
1.	Sunload sensor	Refer to HAC-26, "Sunload Sensor"
2.	AV control unit	<ul style="list-style-type: none"> Transmits a A/C-heater timer setting time signal and timer/remote setting temperature signal to VCM via CAN communication. Receives an A/C display signal from VCM via CAN and indicates the status of air conditioning system in the display. Refer to AV-212, "Component Parts Location" (without Bose®) or AV-335, "Component Parts Location" (with Bose®) for detailed installation location.
3.	In-vehicle sensor	Refer to HAC-25, "In-Vehicle Sensor" .
4.	A/C auto amp.	Refer to HAC-25, "A/C Auto Amp."
5.	Heat pump control unit	Refer to HAC-28, "Heat Pump Control Unit" .
6.	Power transistor	Refer to HAC-25, "A/C UNIT ASSEMBLY : Power Transistor" .
7.	Aspirator	Refer to HAC-22, "A/C UNIT ASSEMBLY : Aspirator" .
8.	Air mix door motor	Refer to HAC-22, "A/C UNIT ASSEMBLY : Air Mix Door Motor" .
9.	Intake door motor	Refer to HAC-23, "A/C UNIT ASSEMBLY : Intake Door Motor" .
10.	PTC heater outlet air and A/C unit case temperature sensor assembly	<ul style="list-style-type: none"> PTC heater outlet air temperature sensor: HAC-22, "A/C UNIT ASSEMBLY : PTC Heater Outlet Air Temperature Sensor". A/C unit case temperature sensor: HAC-22, "A/C UNIT ASSEMBLY : A/C Unit Case Temperature Sensor".
11.	Compressor discharge refrigerant temperature sensor	Refer to HAC-28, "Compressor Discharge Refrigerant Temperature Sensor" .
12.	Intake sensor	Refer to HAC-22, "A/C UNIT ASSEMBLY : Intake Sensor" .
13.	Blower motor	Refer to HAC-24, "A/C UNIT ASSEMBLY : Blower Motor" .
14.	PTC heater	Refer to HAC-27, "PTC Heater" .
15.	Mode door motor	Refer to HAC-23, "A/C UNIT ASSEMBLY : Mode Door Motor" .
16.	VCM	<ul style="list-style-type: none"> A/C CAN Inputs a refrigerant pressure sensor signal and transmits it to the A/C auto amp. via CAN communication. CAN A/C Calculates each input signal and transmits a timer A/C request signal, remote climate control request signal, wake up request signal and deice permission signal via CAN communication to the A/C auto amp. A/C CAN A/C Controls the high voltage system and transmits an A/C maximum power signal via CAN communication to the A/C auto amp. ECO A/C ECO Transmits an ECO mode request signal to the A/C auto amplifier during ECO mode control. AV C/U A/C Transfers a timer/remote setting temperature signal that is received from AV control unit to the A/C auto amp. CAN A/C Receives a cooling fan speed request signal from the A/C auto amp. via CAN communication for cooling fan control. CAN A/C Receives a timer A/C operation signal from the A/C auto amp. via CAN communication for timer A/C-heater timer operation start time calculation. CAN A/C Receives a deice request signal from the A/C auto amp. via CAN communication for deice control. CAN A/C AV C/U Receives an A/C display signal from the A/C auto amp. via CAN communication, then transmits it to AV control unit. Refer to EVC-15, "Component Parts Location" for detailed installation location.

A/C UNIT ASSEMBLY

COMPONENT PARTS

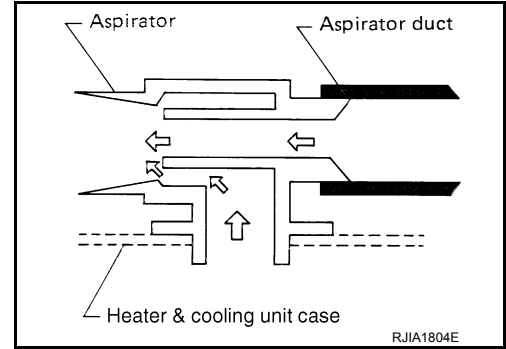
< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

A/C UNIT ASSEMBLY : Aspirator

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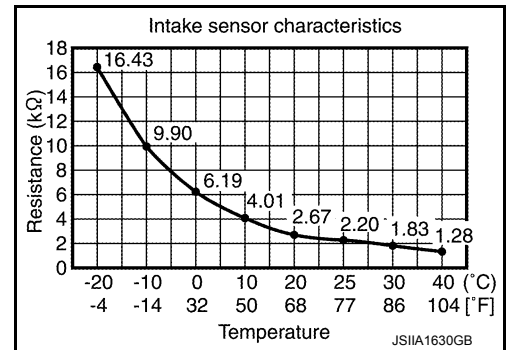
The aspirator generates vacuum by the air blown from the A/C unit and draws the air of the passenger room into the in-vehicle sensor via the aspirator duct.



A/C UNIT ASSEMBLY : Intake Sensor

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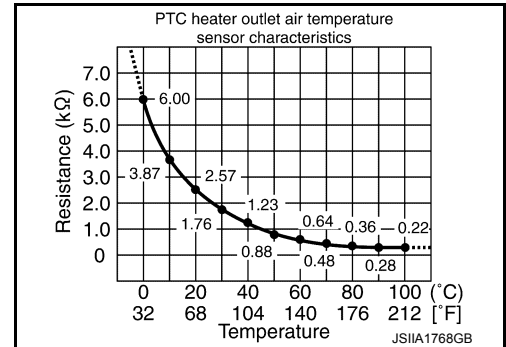
Intake sensor measures evaporator fin temperature. This sensor uses a thermistor that decreases electrical resistance as temperature increases.



A/C UNIT ASSEMBLY : PTC Heater Outlet Air Temperature Sensor

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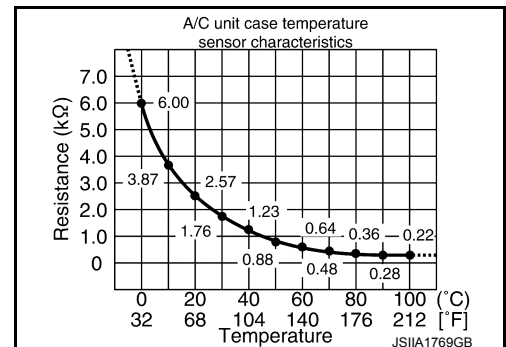
PTC heater outlet air temperature sensor measures the air temperature immediately after the air passes the PTC heater core. This sensor uses a thermistor that decreases electrical resistance as temperature increases.



A/C UNIT ASSEMBLY : A/C Unit Case Temperature Sensor

INFOID:000000011005830

A/C unit case temperature sensor measures the A/C unit case temperature around the PTC heater core. This sensor uses a thermistor that decreases electrical resistance as temperature increases.



A/C UNIT ASSEMBLY : Air Mix Door Motor

INFOID:000000011005831

DESCRIPTION

- The step motor type motor is adopted for air mix door motor.

COMPONENT PARTS

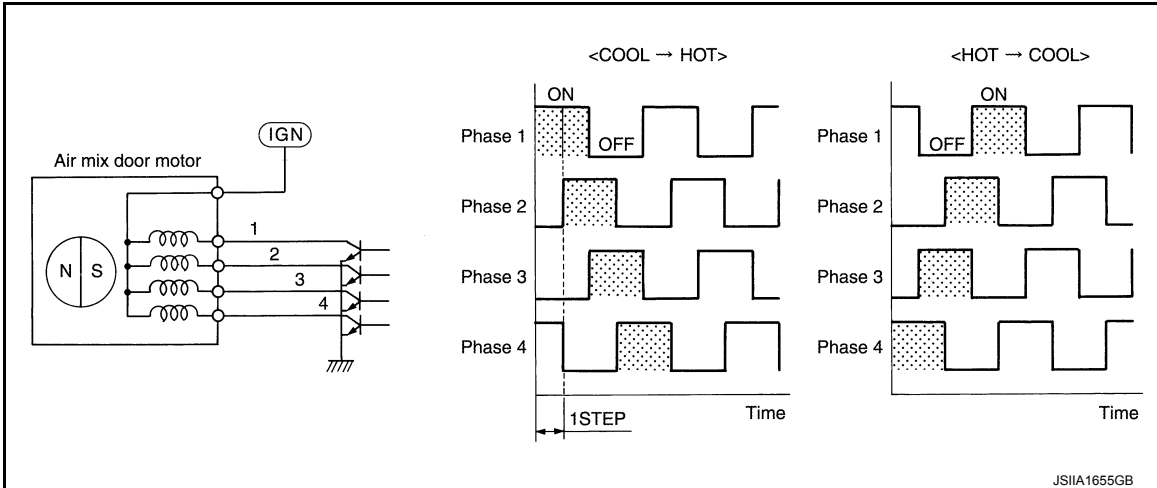
< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

- When the drive signal from the A/C auto amp. is input into the motor, the step motor inside the motor rotates by the number of steps corresponding to the drive signal and stops at the target door position.
- The rotational movement of the motor is transmitted via the rod and lever to the air mix doors (upper air mix door, lower air mix door), changing the discharge air temperature.

AIR MIX DOOR MOTOR DRIVE METHOD

- The 4 drive coils are excited in sequence in order to drive the motor.
- Direction of rotation is changeable by recomposing the pattern of excitation.



A/C UNIT ASSEMBLY : Mode Door Motor

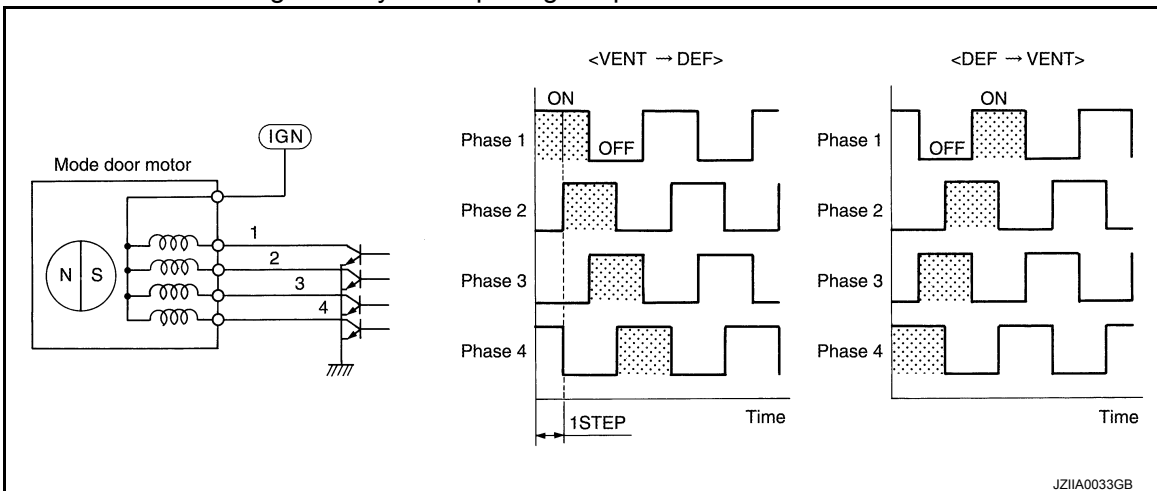
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DESCRIPTION

- The step motor type motor is adopted for mode door motor.
- When the drive signal from the A/C auto amp. is input into the motor, the step motor inside the motor rotates by the number of steps corresponding to the drive signal and stops at the target door position.
- The rotational movement of the motor is transmitted via the rod, link, and lever to the mode doors (center ventilator, defrost door, sub-defrost door, side ventilator door, and foot door), changing the air outlets.

MODE DOOR MOTOR DRIVE METHOD

- The 4 drive coils are excited in sequence in order to drive the motor.
- Direction of rotation is changeable by recomposing the pattern of excitation.



A/C UNIT ASSEMBLY : Intake Door Motor

INFOID:000000011005833

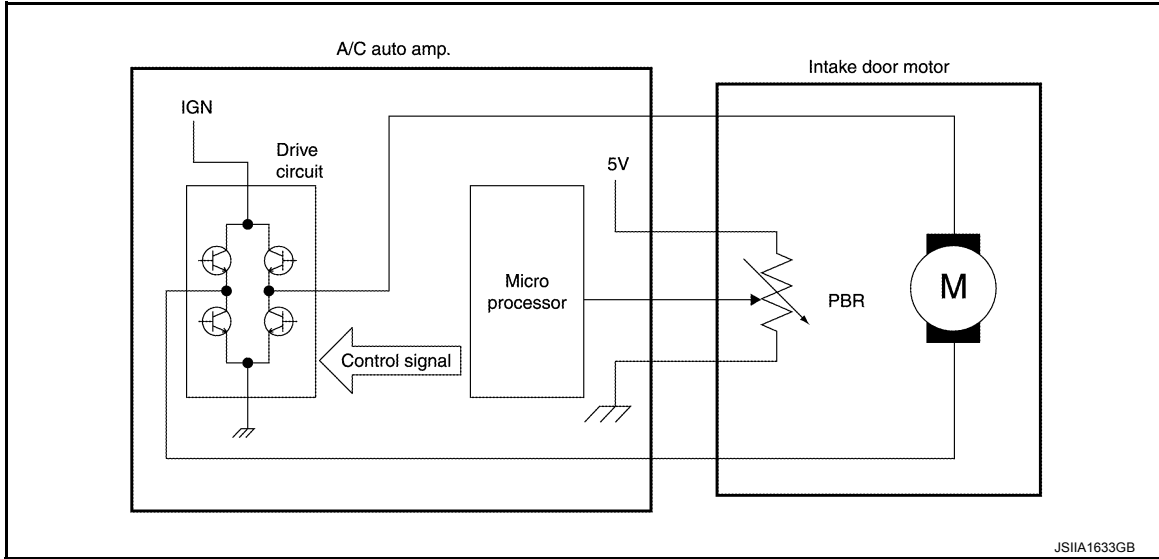
- Intake door motor consists of a motor that drives the door and PBR (Potentiometer Balance Resistor) that detects door position.
- Motor operates according to drive signal from A/C auto amp.
- Motor rotational movement is transmitted via the lever to the intake door, changing the air inlet.

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

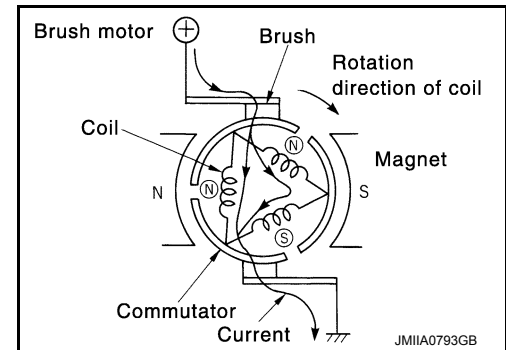
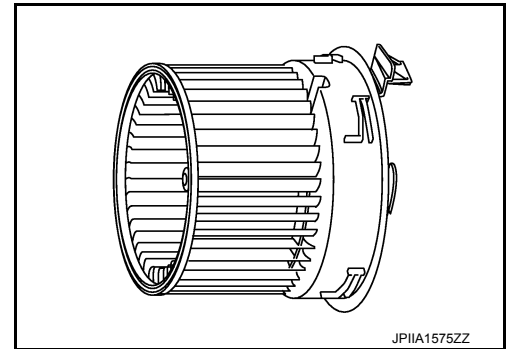
- The A/C auto amp. monitors the door position based on the PBR signal that changes in coordination with the rotation of the motor.



A/C UNIT ASSEMBLY : Blower Motor

INFOID:000000011005834

Brush motor is adopted for blower motor. Rotation speed changes according to voltage from power transistor.



COMPONENT PARTS

< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

A/C UNIT ASSEMBLY : Power Transistor

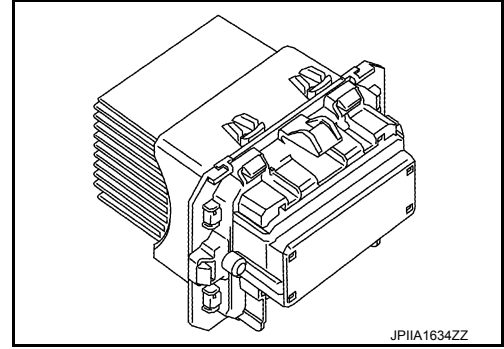
INFOID:0000000011005835

- Power transistor, that uses MOS field effect transistor, is adopted for blower fan motor speed control.

NOTE:

A MOS field effect transistor is a transistor in which the gate is composed of a metal-oxide-semiconductor (MOS). Field effect transistor is controlled by voltage, while ordinary transistor is controlled by current. Electrode of field effect transistor is called source, drain, or gate, while electrode of ordinary transistor is called emitter, collector, or base.

- Power transistor continuously controls voltage to blower fan motor (approximately 0 to 16 V), according to gate voltage from A/C auto amp.
- This power transistor does not require HI relay even when the maximum voltage is applied to blower fan motor at HI status, because voltage drop is nominal.



A/C Auto Amp.

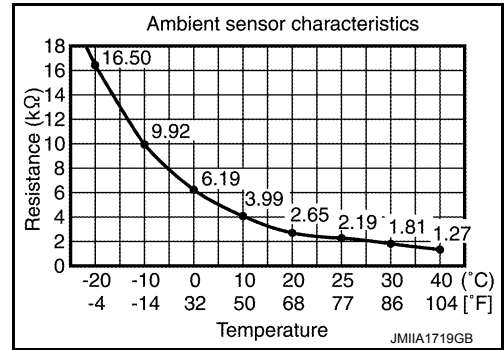
INFOID:0000000011005836

A/C auto amp. controls A/C by calculations based on signals input from each sensor and switch. A self-diagnosis function is integrated into the A/C auto amp. allowing diagnosis of automatic air conditioning system to be performed quickly.

Ambient Sensor

INFOID:0000000011005837

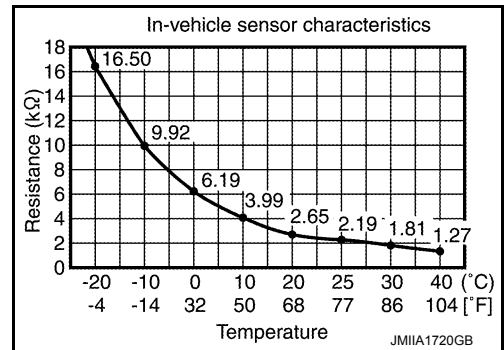
Ambient sensor measures ambient air temperature. This sensor uses a thermistor that decreases electrical resistance as temperature increases.



In-Vehicle Sensor

INFOID:0000000011005838

In-vehicle sensor measures temperature of interior air that is sucked into the aspirator. This sensor uses a thermistor that decreases electrical resistance as temperature increases.



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COMPONENT PARTS

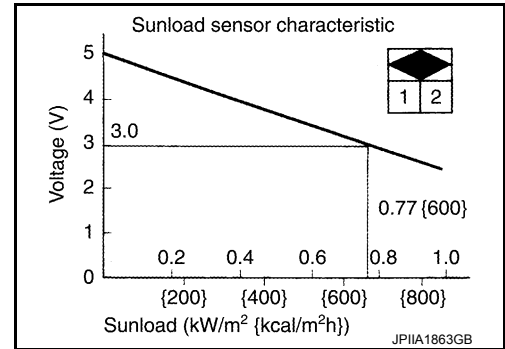
< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

Sunload Sensor

INFOID:000000011005839

Sunload sensor measures sunload amount. This sensor converts the sunload to a voltage signal by photodiode and transmits the signal to the A/C auto amp.

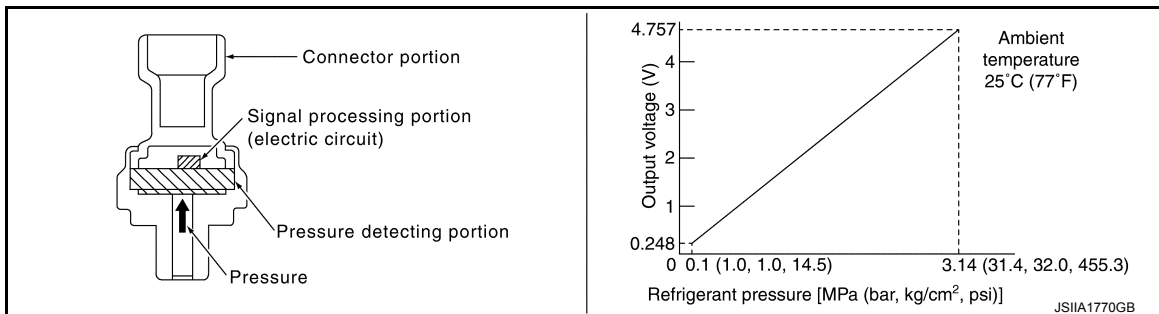


Refrigerant Pressure Sensor

INFOID:000000011005840

DESCRIPTION

- The refrigerant pressure sensor converts high-pressure side refrigerant pressure into voltage and outputs it to VCM.
- A/C auto amp. performs compressor protection control by using a refrigerant pressure signal sent from VCM via EV CAN communication.



STRUCTURE AND OPERATION

- The refrigerant pressure sensor is a capacitance type sensor. It consists of a pressure detection area and a signal processing area.
- The pressure detection area is the variable capacity compressor. It changes the internal capacitance according to the pressure.
- The signal processing area detects the capacitance of pressure detection area, converts it into the voltage, and outputs it to VCM.

Electric Compressor

INFOID:000000011005841

- An electric scroll compressor is used.
- A 3-phase output inverter with IGBT (Insulated Gate Bipolar Transistor) is used.

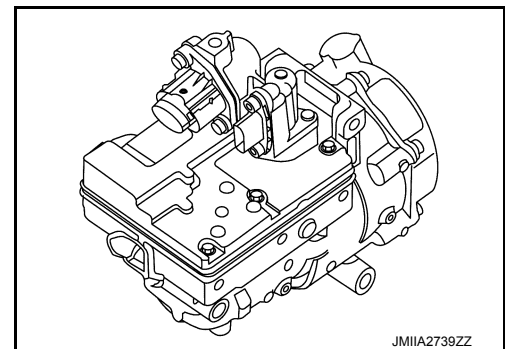
NOTE:

IGBT (Insulated Gate Bipolar Transistor) is a transistor which is suitable for high voltages and large currents and which can control large electrical power using a small gate voltage.

- The structure integrates the inverter, compressor, and motor, allowing compressor to operate at any speed.
- The inverter communicates with A/C auto amp., and uses PWM control^{Note} to control the motor speed via the drive circuit.

NOTE:

- PWM (Pulse Width Modulation) is a system that controls current and voltage by changing the duty ratio of a constant frequency pulse wave.
- PWM is used as the adjustment method of output voltage when inverter is used as a power supply for controlling motor speed.
- PWM changes voltage application time (pulse width) using a semiconductor element and controls motor speed.



JMIIA2739ZZ

COMPONENT PARTS

< SYSTEM DESCRIPTION >

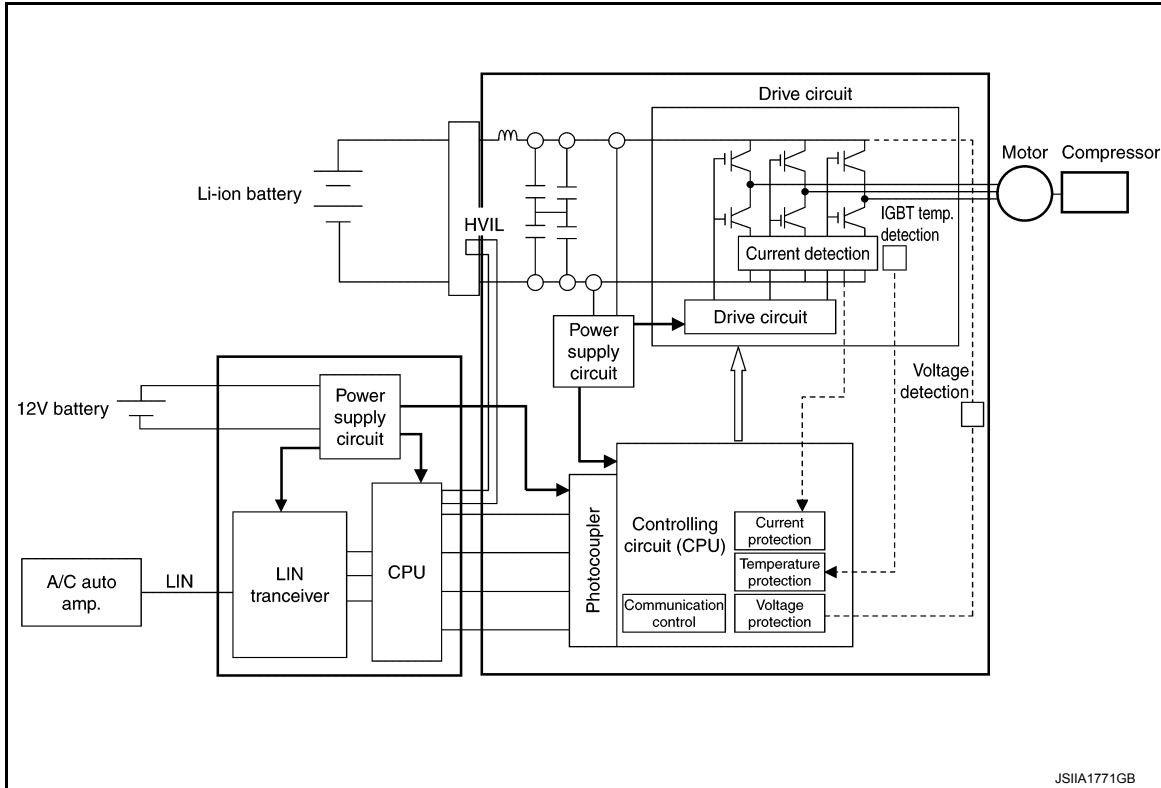
[AUTO A/C (WITH HEAT PUMP)]

- The IGBT temperature sensor uses the inverter control circuit to monitor for an increase in motor drive circuit temperature in order to prevent circuit overheating.
- Adopts the HVIL (High-Voltage Interlock Loop) circuit inside the electric compressor, and CPU monitors the HVIL circuit.

NOTE:

HVIL is composed of the loop circuit in the electric compressor and the high pressure system connector, and detects connector poor connection, etc. due to open circuit.

- The motor uses a DC brushless motor, with speed control performed by the inverter drive circuit.



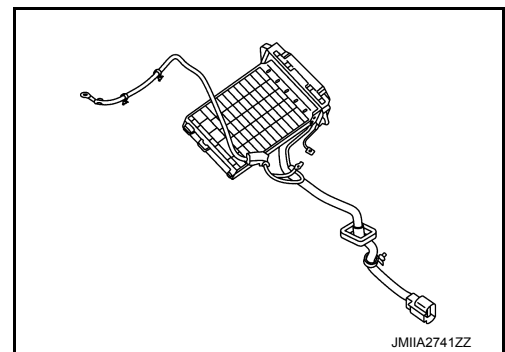
PTC Heater

INFOID:000000011005842

- A PTC heater is used as the heat source for heating.
- Provides internal control circuit and performs LIN communication with A/C auto amp.
- Based on the signals from A/C auto amp., the microcomputer inside PTC heater controls the heater output by PWM^{Note}.

NOTE:

- PWM (Pulse Width Modulation) is a system that controls current and voltage by changing the duty ratio of a constant frequency pulse wave.
- PWM is used as the adjustment method of output voltage when inverter is used as a power supply for controlling motor speed.
- PWM changes voltage application time (pulse width) using a semiconductor element and controls PTC heater.
- PTC stands for “Positive Temperature Coefficient”, and is a ceramic material with barium titanate as the primary component.



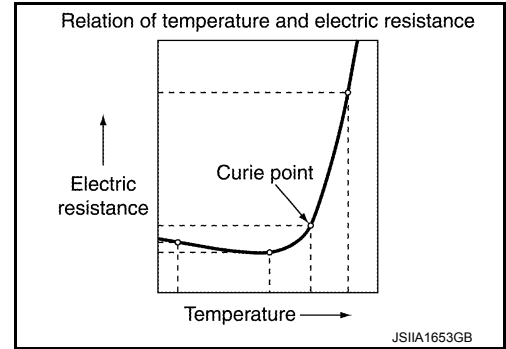
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COMPONENT PARTS

< SYSTEM DESCRIPTION >

- When current is applied, it heats up. Upon reaching a certain temperature (Curie temperature) the resistance suddenly increases, limiting the current, and maintaining a constant amount of heating.

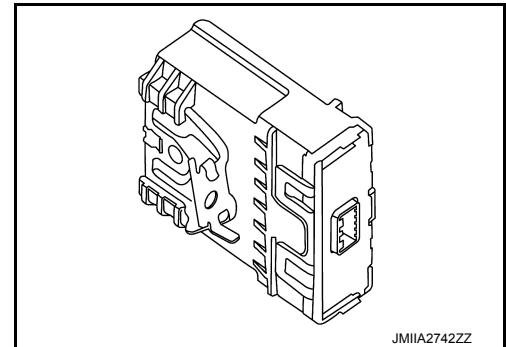
[AUTO A/C (WITH HEAT PUMP)]



INFOID:000000011005843

Heat Pump Control Unit

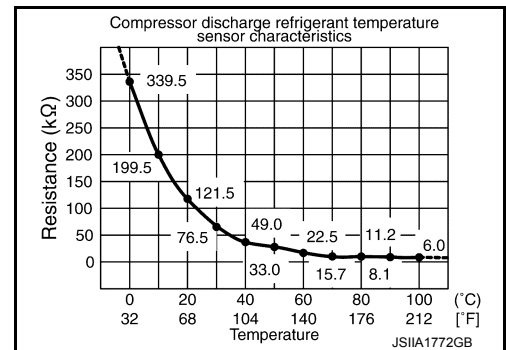
- The heat pump control unit performs LIN communication with A/C auto amp.
- Converts the voltage values that are input from the compressor discharge refrigerant temperature sensor and compressor suction refrigerant temperature sensor to the temperature values, and transmits the temperature values to the A/C auto amp.
- Controls the refrigerant channel switching 2 way type valve and the refrigerant channel switching 3 way type valve by the request signal from A/C auto amp.



Compressor Discharge Refrigerant Temperature Sensor

INFOID:000000011005844

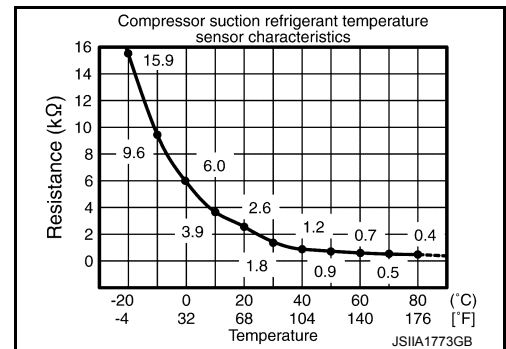
Compressor discharge refrigerant temperature sensor measures the temperature of refrigerant that is discharged from the compressor between the compressor and the inner condenser. This sensor uses a thermistor that decreases electrical resistance as temperature increases.



Compressor Suction Refrigerant Temperature Sensor

INFOID:000000011005845

Compressor suction refrigerant temperature sensor measures the temperature of refrigerant that is sucked into the compressor between the condenser and the refrigerant channel switching 3 way type valve. This sensor uses a thermistor that decreases electrical resistance as temperature increases.



COMPONENT PARTS

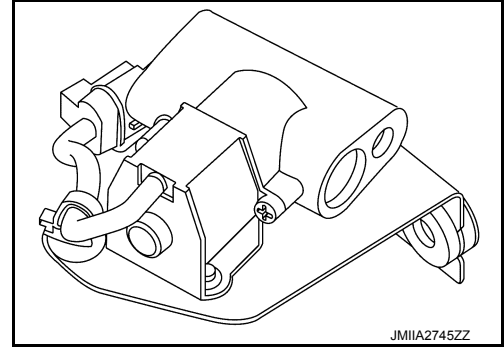
< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

Refrigerant Channel Switching 2 Way Type Valve

INFOID:000000011005846

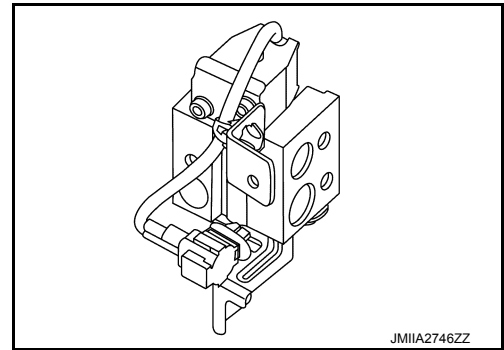
- Refrigerant channel switching 2 way type valve is an electro-magnetic valve that is controlled by the heat pump control unit.
- Controls the refrigerant flow by opening and closing the valve according to a control signal from the heat pump control unit.



Refrigerant Channel Switching 3 Way Type Valve

INFOID:000000011005847

- Refrigerant channel switching 3 way type valve is an electro-magnetic valve that is controlled by the heat pump control unit.
- Controls the refrigerant flow by switching the valve according to a control signal from the heat pump control unit.



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< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

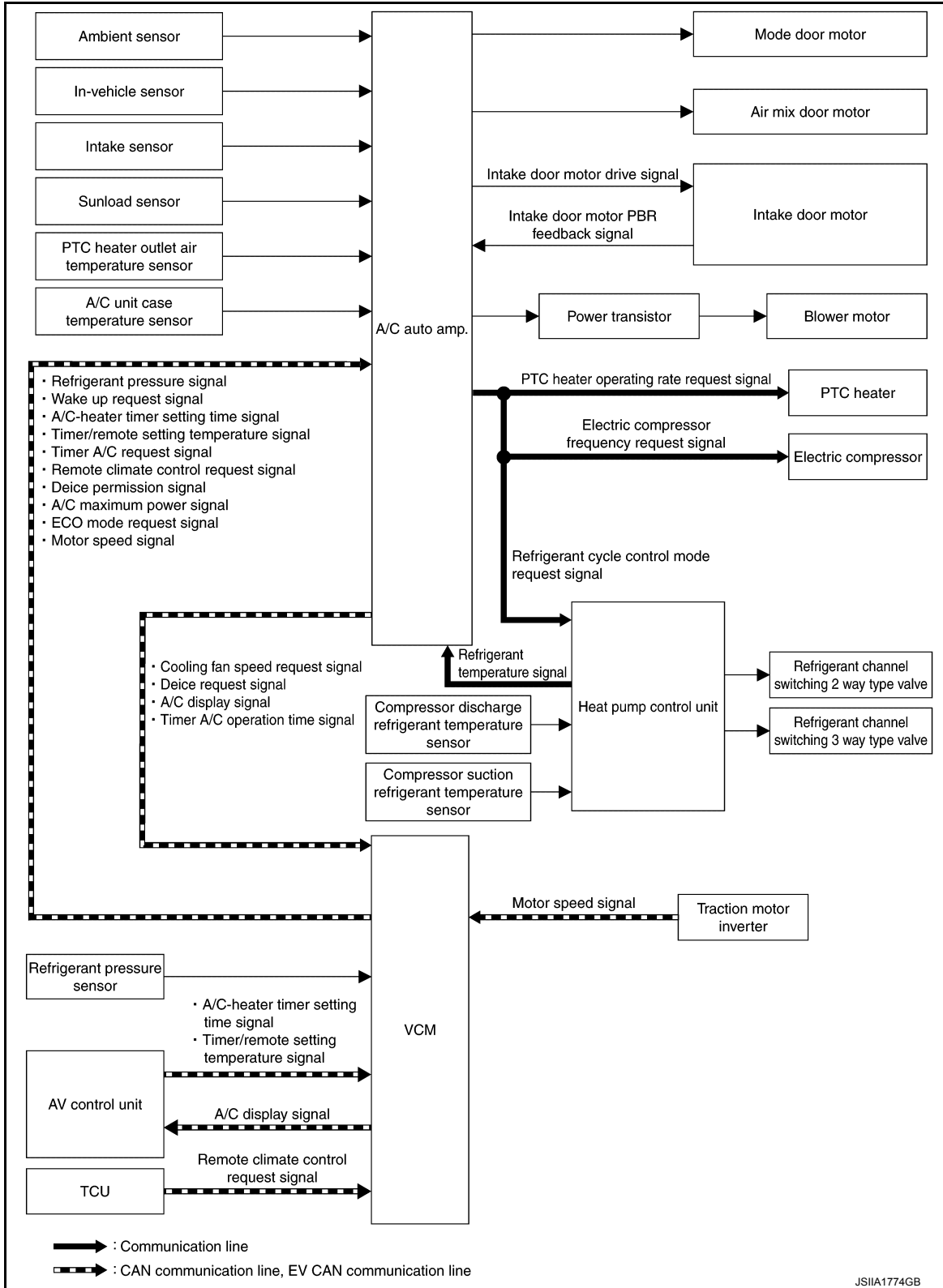
SYSTEM

AUTOMATIC AIR CONDITIONING SYSTEM

AUTOMATIC AIR CONDITIONING SYSTEM : System Description

INFOID:000000011005848

SYSTEM DIAGRAM



DESCRIPTION

SYSTEM

< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

- The automatic air conditioning system is controlled by the control functions of the A/C auto amp., VCM, AV control unit, heat pump control unit and TCU.
- The A/C system operations are input from the A/C auto amp. switches (A/C control).
- The A/C auto amp. sends various display information to VCM via EV CAN communication.
- VCM sends information received from the A/C auto amp. to the AV control unit via EV CAN communication.
- AV control unit displays the A/C status on the display, based on the information received from VCM.
- A/C auto amp. transmits each type of request signals to PTC heater, electric compressor and heat pump control unit via LIN communication for controlling the PTC heater, electric compressor and heat pump system.

CONTROL BY A/C AUTO AMP.

- [HAC-32. "AUTOMATIC AIR CONDITIONING SYSTEM : Temperature Control"](#)
- [HAC-32. "AUTOMATIC AIR CONDITIONING SYSTEM : Air Outlet Control"](#)
- [HAC-32. "AUTOMATIC AIR CONDITIONING SYSTEM : Air Flow Control"](#)
- [HAC-33. "AUTOMATIC AIR CONDITIONING SYSTEM : Air Inlet Control"](#)
- [HAC-34. "AUTOMATIC AIR CONDITIONING SYSTEM : Compressor Control"](#)
- [HAC-35. "AUTOMATIC AIR CONDITIONING SYSTEM : Door Control"](#)
- [HAC-37. "AUTOMATIC AIR CONDITIONING SYSTEM : PTC Heater Control"](#)
- [HAC-37. "AUTOMATIC AIR CONDITIONING SYSTEM : Heat Pump System Control"](#)
- Cooling fan control: A/C auto amp. calculates the necessary cooling fan speed during air conditioner operation, and requests the cooling fan operation by transmitting the cooling fan speed request signal via EV CAN communication to VCM. For details of cooling fan control, refer to [EVC-53. "HIGH VOLTAGE SYSTEM COOLING CONTROL : System Description"](#).
- Input data processing
 - Ambient temperature correction
 - The A/C auto amp. inputs the temperature detected with the ambient sensor as the ambient temperature.
 - The A/C auto amp. internally processes the ambient temperature data is two data types: data for A/C control and data for ambient temperature display.
 - When the vehicle speed is 30 km/h or less, if the effects of radiator heat and other factors result in a sudden increase in detected ambient temperature, the A/C auto amp. performs delay correction so that the recognized temperature rises slowly. Correction is performed so that the change is recognized quickly when the ambient temperature drops.
 - When the temperature detected by the ambient sensor is less than approximately -20°C , no correction is performed for the data for A/C control.
 - When the temperature detected by the ambient sensor is less than approximately -29°C , no correction is performed for the data for ambient temperature display.
 - Interior air temperature correction
 - The A/C auto amp. inputs the temperature detected by the in-vehicle sensor as the interior air temperature.
 - In order to prevent effects from uneven temperatures inside the vehicle and from external disruptions, the A/C auto amp. performs correction so that the recognized interior air temperature changes slowly. The A/C auto amp. performs the correction so that the recognized interior temperature changes according to the difference between the detected interior temperature and the recognized interior temperature. If the difference is large, the changes occur quickly, and becomes slower as the difference becomes smaller.
 - Intake temperature correction
 - The A/C auto amp. inputs the temperature detected with the intake sensor as the air temperature after passing through the evaporator.
 - In order to prevent effects from uneven intake temperatures and from external disruptions, the A/C auto amp. performs correction so that the recognized intake air temperature changes slowly. The A/C auto amp. performs the correction so that the recognized intake temperature changes according to the difference between the detected intake temperature and the recognized intake temperature. If the difference is large, the changes occur quickly, and becomes slower as the difference becomes smaller.
 - Sunload amount correction
 - The A/C auto amp. inputs the sunload detected by the sunload sensor.
 - When the sunload suddenly changes, for example when entering and leaving a tunnel, correction is performed so that the recognized sunload of the A/C auto amp. changes slowly.
 - Set temperature correction
 - The A/C auto amp. controls the interior temperature so that it is always at the optimum level, and performs correction so that the temperature felt by the passengers matches the target temperature set with the temperature control switch, according to the ambient temperature detected by the ambient sensor.

CONTROL BY VCM

SYSTEM

< SYSTEM DESCRIPTION >

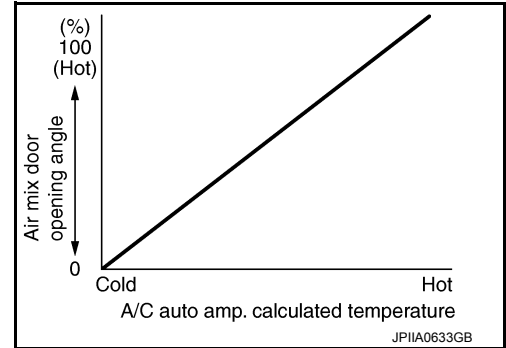
[AUTO A/C (WITH HEAT PUMP)]

For details of cooling fan control, refer to [EVC-53. "HIGH VOLTAGE SYSTEM COOLING CONTROL : System Description"](#).

AUTOMATIC AIR CONDITIONING SYSTEM : Temperature Control

INFOID:000000011005849

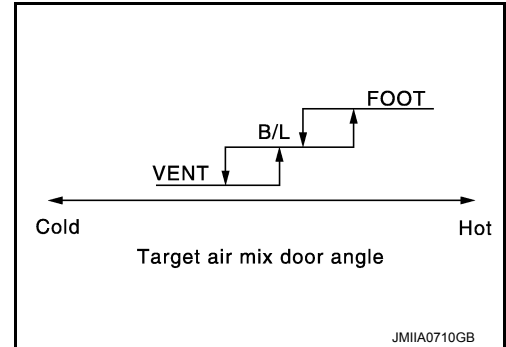
- When power switch is in the ON position, A/C auto amp. always automatically controls temperature regardless of air conditioner operational state.
- A/C auto amp. calculates the target air mix door opening angle according to set temperature, in-vehicle temperature, ambient temperature, and sunload.
- Air mix door is controlled according to the comparison of current air mix door opening angle and target air mix door opening angle.
- Regardless of in-vehicle temperature, ambient temperature, and sunload, air mix door is fixed at the fully cold position when set temperature is 16.0°C, and at the fully hot position when set temperature is 30.0°C.



AUTOMATIC AIR CONDITIONING SYSTEM : Air Outlet Control

INFOID:000000011005850

- While air outlet is in automatic control, A/C auto amp. selects the mode door position depending on a target air mix door angle and outlet air temperature calculated from sunload.
- When FOOT is set for the air outlet, the outlet is set to D/F to prevent windshield fogging only when the ambient temperature is extremely low (-13°C or less).
- When the ON/OFF switch is pressed during air conditioner operation, the air outlet is fixed at the position where the ON/OFF switch is pressed.



AUTOMATIC AIR CONDITIONING SYSTEM : Air Flow Control

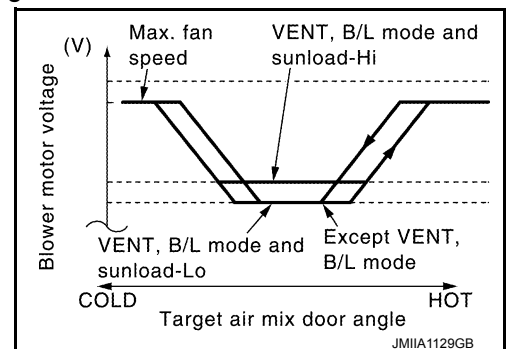
INFOID:000000011005851

DESCRIPTION

- A/C auto amp. changes gate voltage to power transistor and controls air flow continuously based on target air flow. When air flow is to be increased, voltage to blower fan motor increases gradually for preventing a sudden increase of air flow.

AUTOMATIC AIR FLOW CONTROL

- A/C auto amp. determines target air flow according to target air mix door opening angle.
- A/C auto amp. changes voltage to power transistor gate and controls air flow in a continuous range (no steps) so that target air flow is achieved. At this time, the voltage applied to the blower fan motor is changed at the rate of 1.0 V per second in order to prevent any sudden changes in air flow.
- When air outlet is VENT or B/L, the minimum air flow is changed depending on sunload.



STARTING AIR FLOW CONTROL

SYSTEM

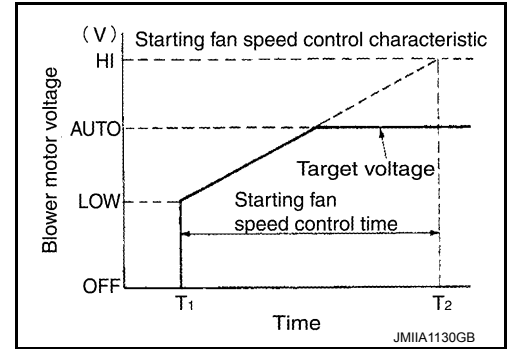
< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

When blower fan motor is activated, A/C auto amp. changes the voltage to the power transistor gate, and gradually increases the voltage to the blower fan motor, in order to prevent a sudden increase in discharge air flow (approximately 10.5 seconds for air flow to reach HI from LOW).

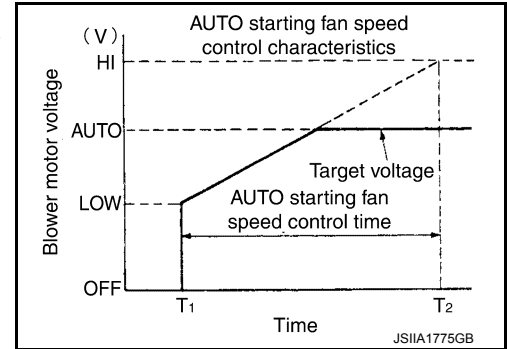
NOTE:

When outlet is DEF, air flow control at motor start is not performed.



AUTO MODE STARTING AIR FLOW CONTROL

When the blower fan motor is activated by the AUTO control, voltage to blower fan motor increases gradually and then the amount of air flow increases gradually. (Approximately 138 seconds for air flow to reach HI from LOW)



STARTING AIR FLOW CONTROL AT HIGH INTERIOR AIR TEMPERATURE

When evaporator temperature is high [intake air temperature sensor value is 35°C (95°F) or more], to prevent a hot discharged air flow, A/C auto amp. suspends blower motor activation for approximately three seconds so that evaporator is cooled by refrigerant.

AIR FLOW CONTROL AT MODE DOOR MOTOR OPERATION

If the mode motor starts when the air flow corresponds to a voltage of 8.6 V or more applied to the blower fan motor, the A/C auto amp. performs control that fixes the voltage applied to the blower fan motor at 8.5 V, temporarily decreasing the air flow and ensuring that the mode door operates smoothly.

MANUAL AIR FLOW CONTROL

When the fan switch is operated, automatic control is cancelled and the desired fan speed (1 – 7) can be selected.

		Voltage applied to blower fan motor (V)		
		Mode switch		
		VENT, B/L	FOOT, D/F	DEF
Fan speed (When manual control is selected)	1st	4.0	4.0	4.0
	2nd	5.4	5.2	5.3
	3rd	6.8	6.3	6.7
	4th	8.3	7.5	8.0
	5th	9.7	8.7	9.3
	6th	11.1	9.8	10.7
	7th	12.5	11.0	12.5

AUTOMATIC AIR CONDITIONING SYSTEM : Air Inlet Control

INFOID:0000000011005852

- Manual control by the intake switch is given priority for inlet selection.
- When the DEF switch is pressed, the inlet is fixed at fresh air intake.
- During automatic inlet control, when the electric compressor is ON and the ambient temperature is high, the intake is fixed at recirculation.
- When the A/C system is OFF, the inlet is fixed at fresh air intake.

SYSTEM

< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

- Other than the above, during automatic inlet control the A/C auto amplifier switches the intake control status according to the A/C ON/OFF judgment status (A/C switch indicator lamp status), amount of discharged air, outlet operating status and ambient temperature.

A/C ON/OFF judgment status (A/C switch indicator lamp status)	Mode switch	Ambient temperature (temperature detected by ambient sensor)	
		14°C or less	15°C or more
ON	VENT B/L	30% recirculation	Control according to the target air mix door position
	FOOT		
	D/F		
OFF	VENT B/L	30% recirculation	Fresh air intake
	FOOT		Fresh air intake
	D/F	Fresh air intake	

AUTOMATIC AIR CONDITIONING SYSTEM : Electric Power Distribution Control

INFOID:000000011005853

DESCRIPTION

- Based on the vehicle status, battery remaining energy, and other factors, VCM calculates the electrical power needed to operate the A/C system, and sends this value to the A/C auto amp. via EV CAN communication.
- Based on the ambient sensor signal, inlet position, outlet position, target air mix door position, and other information, the A/C auto amp. calculates the electrical power used by the electric compressor and PTC element heater. If the total exceeds the electric power consumption permitted by the VCM, then the operating rate of the electric compressor and PTC element heater are reduced to lower the power consumption.

WARM-UP AND COOL-DOWN CONTROL

For the first 10 minutes after the power switch is turned ON, heating/cooling operation at maximum capacity is possible based on a judgment by the A/C auto amp. (however this does not occur in ECO mode).

AUTOMATIC AIR CONDITIONING SYSTEM : Compressor Control

INFOID:000000011005854

DESCRIPTION

- When the conditions for electric compressor operation are met while the blower fan motor is operating, then based on the various input signals, the A/C auto amplifier calculates the electric compressor target speed that produces the target temperature [cooler (dehumidified) mode: 4 to 12°C, heater mode: target outlet temperature + corrected temperature value*] for the evaporator outlet temperature [cooler (dehumidified) mode] or the inner condenser temperature (heater mode). It then sends a speed request signal to the electric compressor via LIN communication and commands the speed.

NOTE:

- *: The corrected temperature during heater mode is calculated by the A/C auto amplifier according to the ambient temperature.
- The electric compressor receives the A/C auto amp. command and controls the motor speed by means of its built-in inverter circuit, then transmits this status by LIN communications.

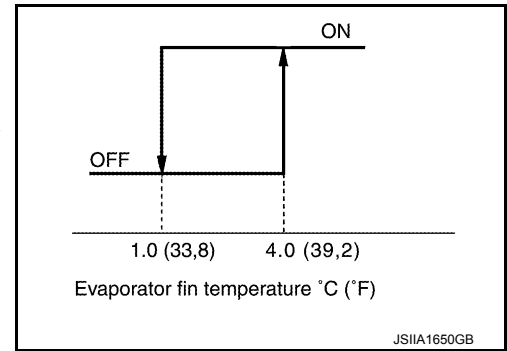
Evaporator Protection Control

SYSTEM

< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

- When intake air temperature sensor detects that air temperature after passing through evaporator is 1°C or less, A/C auto amp. sends a request to the electric compressor for a speed of 0 rpm, stopping compressor operation.
- When the air temperature after passing through evaporator reaches 4°C or more, operation of the electric compressor is resumed.



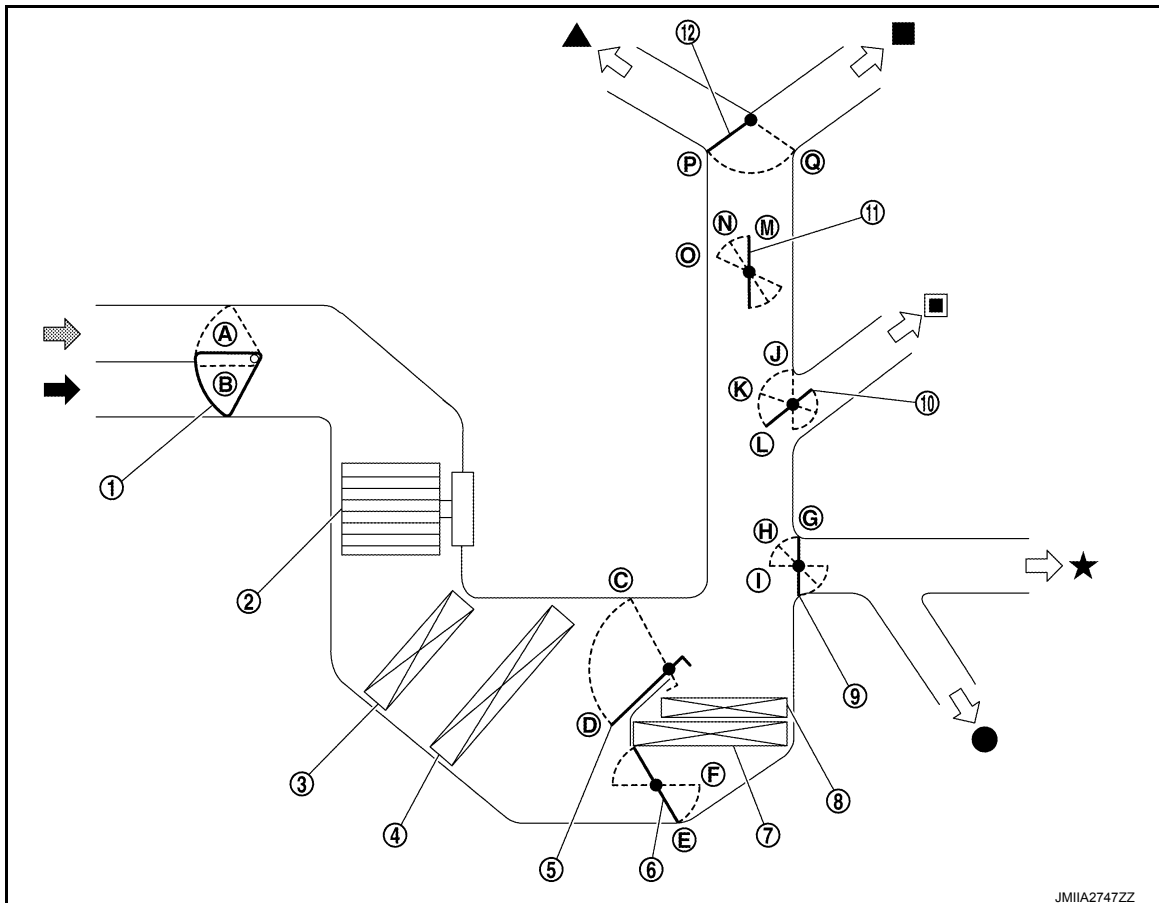
Compressor Protection Control at Pressure Malfunction

- When the refrigerant pressure on the high-pressure side (detected by the refrigerant pressure sensor) that is received from the VCM via EV system CAN communication is as shown below, the A/C auto amp. stops the compressor.
 - Approximately 2.65 MPa (Approximately 27.0 kg/cm²) or more
 - Approximately 0.14 MPa (Approximately 1.4 kg/cm²) or less
- When the refrigerant pressure on the high-pressure side returns to the range below, the A/C auto amp. resumes operation of the electric compressor.
 - Approximately 1.55 MPa (Approximately 15.8 kg/cm²) or less
 - Approximately 0.16 MPa (Approximately 1.6 kg/cm²) or more

AUTOMATIC AIR CONDITIONING SYSTEM : Door Control

INFOID:000000011005855

SWITCH AND THEIR CONTROL FUNCTION



- ① Intake door
- ④ Evaporator

- ② Blower motor
- ⑤ Upper air mix door

- ③ Air conditioner filter
- ⑥ Lower air mix door

SYSTEM

< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

- | | | |
|------------------------|----------------------|------------------------------------|
| ⑦ inner condenser | ⑧ PTC heater core | ⑨ Foot door |
| ⑩ Side ventilator door | ⑪ Sub-defroster door | ⑫ Center ventilator/defroster door |
| Fresh air | Recirculation air | Discharge air |
| Defroster | Center ventilator | Side ventilator |
| Foot | Rear foot | |

Switch position			Door position						
			Mode door				Intake door	Air mix door	
			Center ventilator/defroster door	Sub-defroster door	Side ventilator door	Foot door		Upper air mix door	Lower air mix door
AUTO switch	ON		AUTO						
MODE switch*	VENT		Ⓟ	Ⓜ	Ⓛ	ⓐ	—	—	—
	B/L			Ⓝ	Ⓚ	ⓗ			
	FOOT		Ⓞ	Ⓜ	ⓐ	Ⓛ			
	D/F		Ⓝ						
DEF switch	ON								
Intake switch*	REC						Ⓐ		
	FRE						Ⓑ		
Temperature control switch	Full cold 16.0°C		—	—	—	—	—	Ⓓ	Ⓔ
	16.5°C – 29.5°C						—	AUTO	AUTO
	Full hot 30.0°C							Ⓒ	Ⓕ
ON/OFF switch	OFF		Fixed at the position where the ON/OFF switch is pressed				Ⓑ	—	—

AIR DISTRIBUTION

Discharge air flow					
MODE/DEF setting potion	Air outlet/distribution (Approx.)				
	Ventilator		Foot		Defroster
	Center	Side	Front	Rear	
	50%	50%	—	—	—
	30%	30%	28%	12%	—
	—	15%	45%	20%	20%
	—	15%	32%	13%	40%
	—	15%	—	—	85%

SYSTEM

< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

AUTOMATIC AIR CONDITIONING SYSTEM : PTC Heater Control

INFOID:000000011005856

DESCRIPTION

- Based on the air mix door position and signals input from each sensor, the A/C auto amp. calculates the PTC heater outlet air temperature.
- A/C auto amp. calculates the PTC heater operating rate so that the calculated PTC heater outlet air temperature is achieved, and transmits the PTC heater operating rate request signal to the PTC heater via LIN communication.
- Based on the A/C auto amplifier command, the control circuit inside the PTC heater controls the PTC heater output by the PWM method.

NOTE:

If the difference between setting temperature and in-vehicle temperature is large and the A/C heater load is high when the HEAT is ON (HEAT switch indicator lamp: ON) and A/C is OFF (A/C switch indicator lamp: OFF), the heater control mode of the refrigerant cycle also operates. In addition, if the difference between setting temperature and in-vehicle temperature is small and the A/C heater load is low, the PTC heater does not operate. (Outlet air is warmed by the heater control mode of the refrigerant cycle.)

A/C UNIT CASE PROTECTION CONTROL

- The A/C auto amp. performs protection control for preventing the A/C unit case from being damaged by the high temperature of the A/C unit case, due to PTC heater operation.
- A/C auto amp. detects the A/C unit case temperature around the PTC heater core with the A/C unit case temperature sensor.
- When the temperature measured by the A/C unit case temperature sensor becomes 108°C or more during PTC heater operation, the A/C auto amplifier stops PTC heater operation.
- When the temperature measured by the A/C unit case temperature sensor becomes 105°C or less, the A/C auto amp. resumes PTC heater operation stopped by protection control.

AUTOMATIC AIR CONDITIONING SYSTEM : ECO Mode Control

INFOID:000000011005857

DESCRIPTION

- When ECO mode is selected with the electric shift selector, VCM transmits the ECO mode request signal to the A/C auto amp.
- When the A/C auto amp. receives the ECO mode request signal, it performs control that reduces the power consumption of the A/C system.

ECO MODE CONTROL

- When ECO mode is selected, warm-up/cool-down control (refer to [HAC-34, "AUTOMATIC AIR CONDITIONING SYSTEM : Electric Power Distribution Control"](#)) is cancelled and the special ECO mode power distribution control is performed.
- The A/C auto amp. determines the A/C system power consumption based on the ambient temperature and set temperature.

NOTE:

When ECO mode control is activated, there is a noticeable decrease in A/C capacity when temperatures are hot or cold.

AUTOMATIC AIR CONDITIONING SYSTEM : Heat Pump System Control

INFOID:000000011005858

DESCRIPTION

- The heat pump system is a system that controls the refrigerant cycle.
- Based on the input signals, the A/C auto amp. transmits a refrigerant cycle control mode request signal to the heat pump control unit.
- The following control modes are available for the refrigerant cycle of heat pump system.
 - Cooler (dehumidified) control
 - Heater control
 - Deice control

NOTE:

For details of refrigerant cycle, refer to [HA-21, "REFRIGERATION SYSTEM : System Description"](#).

- Compared to the A/C status, the control status of refrigerant cycle control mode, refrigerant channel switching 2 way type valve and refrigerant channel switching 3 way type valve is controlled as per the following.

A

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SYSTEM

< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

A/C status	Refrigerant cycle control mode	Refrigerant channel switching 2 way type valve	Refrigerant channel switching 3 way type valve
A/C ON (A/C switch indicator lamp: ON)	Cooler (dehumidified) control	OFF	OFF
HEAT ON (HEAT switch indicator lamp: ON) and A/C OFF (A/C switch indicator lamp: OFF)	Heater control	ON	ON
During deice control operation	Deice control	OFF	ON

NOTE:

When the refrigerant cycle is not operating [HEAT switch OFF (HEAT switch indicator lamp: OFF) and A/C switch OFF (A/C switch indicator lamp: OFF)], the status of refrigerant channel switching 2 way type valve and refrigerant channel switching 3 way type valve becomes valve non-control status and the refrigerant cycle becomes cooling (dehumidified) control mode.

- If the power switch is turned OFF during heater control mode, the heat pump control unit switches to the cooling (dehumidified) control mode within 60 seconds after the power switch is turned OFF.

DEICE CONTROL

- Deice control is the function that deices frost when it forms on the condenser.
- A/C auto amp. transmits a deicing request signal to VCM when, according to the input of each sensor, it is judged that frost is formed on the condenser.
- During normal charge mode or rapid charge mode, VCM turns the A/C relay ON and transmits deice permission signal (permission).

NOTE:

- Deice control does not operate during timer A/C operation or remote A/C operation.
- If the charge mode is completed due to full charge or timer charge completion while the deice control is operating, deice control continues.
- The charge status indicator 3 blinks while deice control operates after charge completion.
- If the charge connector is disconnected from the charge port or the A/C switch is pressed after the power switch is turned ON, VCM sends a deice permission signal (prohibition) and stops deice control operation.
- When the deice permission signal (permission) is received, the A/C auto amp. transmits a refrigerant cycle control mode request signal (deice control) to the heat pump control unit and drives the electric compressor. (for a maximum of 20 minutes)
- The heat pump control unit controls the refrigerant channel switching 2 way type valve and refrigerant channel switching 3 way type valve and operates the refrigerant cycle in the deice control mode, according to the refrigerant cycle control mode request signal.
- After the deicer control mode operation of the refrigerant cycle is completed, in order to remove frost or water drops remaining on condenser, the A/C auto amplifier transmits a cooling fan request speed signal (duty rate: 40%) to VCM for 1 minute and operates the cooling fan.

AUTOMATIC AIR CONDITIONING SYSTEM : A/C-Heater Timer (Climate Ctrl. Timer)

INFOID:000000011005859

DESCRIPTION

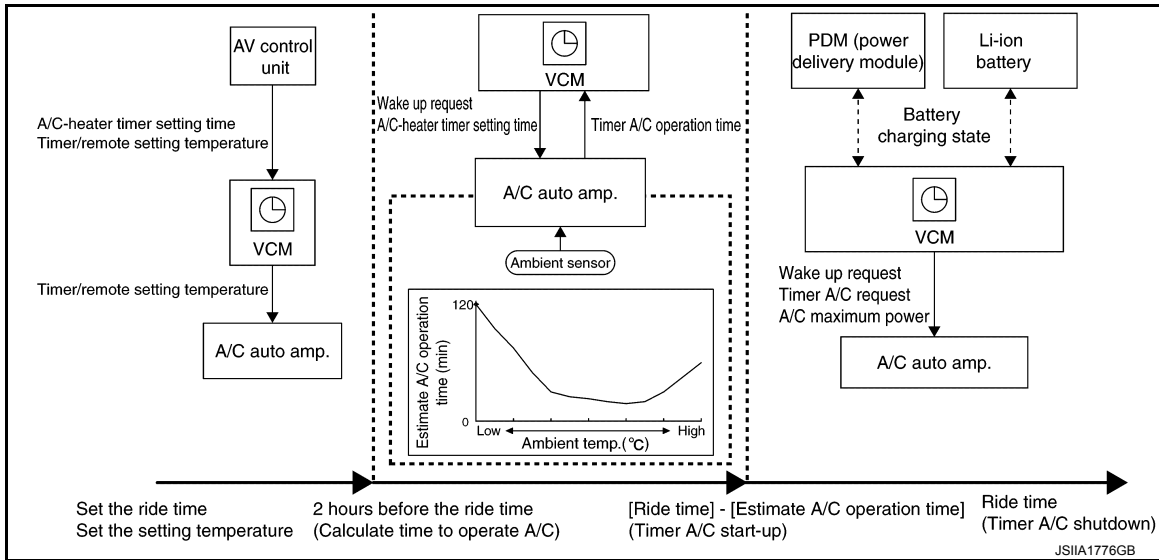
- When the A/C-Heater Timer (Climate Ctrl. Timer) is set on the navigation screen, AV control unit transmits a A/C-heater timer setting time signal (departure time and date settings set on the navigation screen) to VCM via CAN communication.
- When the timer/remote A/C temperature is set on the navigation screen, the timer/remote setting temperature signal (timer/remote A/C temperature set on the navigation screen) is transmitted from VCM via CAN communication. VCM then transfers the signal to A/C auto amp. via EV CAN communication. Then, the setting temperature is stored in A/C auto amp.
- When the operation time calculated by the A/C auto amp. has been reached, VCM starts the A/C auto amp. and starts A/C-Heater Timer.
VCM activates 2 hours before the A/C-Heater Timer setting time. Then, it requests the A/C auto amp. to calculate the necessary A/C operating time for achieving the stored setting temperature.
- Based on the ambient temperature detected by the ambient sensor, the A/C auto amp. calculates necessary A/C operating time and transmits a timer A/C operation time signal to VCM via EV CAN communication.

SYSTEM

< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

- When the operation time calculated by the A/C auto amp. is reached, VCM transmits a wake up request signal to the A/C auto amp. via EV CAN communication. Then, A/C auto amp. activates and the A/C is operated.



A/C OPERATION DURING A/C-HEATER TIMER

- During A/C-Heater Timer, the A/C auto amp. operates the A/C under the following conditions.

Intake	Outlet*	Electric compressor	PTC heater	Seatheater relay	Steering heater	Operation time of A/C-Heater Timer
<ul style="list-style-type: none"> Other than heater DEF: REC For heater DEF: FRE 	<ul style="list-style-type: none"> During heating: D/F (10 minutes) ⇔ DEF (5 minutes) During cooling: AUTO 	Maximum of 3500 rpm	Same as same as normal operation	ON	When the temperature detected by the ambient sensor is 10°C or less, 15 minutes are passed since start of timer A/C operation ON	Maximum of 2 hours (operation time is determined using the ambient temperature.)

*:For outlet switching during heating, D/F operates for 10 minutes and DEF for 5 minutes. One cycle is 15 minutes.

- If the charge plug is not connected to the charge port when A/C-Heater Timer starts, A/C-Heater Timer operation does not start. Also, if the charge plug is disconnected during A/C-Heater Timer operation, A/C-Heater Timer operation stops.
- Use CONSULT to change the setting of whether the electric compressor operates when the outlet is in DEF. Refer to [HAC-47, "CONSULT Function"](#).
- During A/C-Heater Timer operation, HEAT switch indicator lamp (during heating) or A/C switch indicator lamp (during cooling) turns ON depending on the A/C operation status.
- During A/C-Heater Timer operation, the air conditioner cannot be operated by A/C controller. Also, when any A/C control switch is pressed, A/C control switch indicator lamp blinks.

AUTOMATIC AIR CONDITIONING SYSTEM : Remote Climate Control

INFOID:0000000011005860

DESCRIPTION

- When the user selects the remote climate control, TCU transmits a remote climate control request signal to VCM. By transmitting the remote climate control request signal, VCM activates A/C auto amp. A/C auto amp. then performs remote climate control.
- When the timer/remote A/C temperature is set on the navigation screen, the timer/remote setting temperature signal (timer/remote A/C temperature set on the navigation screen) is transmitted from VCM via CAN communication. VCM then transfers the signal to A/C auto amp. via EV CAN communication. Then, the setting temperature is stored in A/C auto amp.
- A/C auto amp. controls the air conditioner using the stored setting temperature as the remote climate control setting temperature.
- VCM ends remote A/C when it judges remote A/C completion.

A/C OPERATION STATUS DURING REMOTE CLIMATE CONTROL

- During remote climate control, the A/C auto amp. operates the A/C under the following conditions.

SYSTEM

< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

Intake	Outlet*	Electric compressor	PTC heater	Seat heater relay	Steering heater	Operation time of remote climate control
<ul style="list-style-type: none"> Other than heater DEF: REC For heater DEF: FRE 	<ul style="list-style-type: none"> During heating: D/F (10 minutes) ⇔ DEF (5 minutes) During cooling: AUTO 	Maximum of 3500 rpm	Same as normal operation	ON	When the temperature detected by the ambient sensor is 10°C or less, 15 minutes are passed since start of timer A/C operation ON	Maximum of 2 hours (operation time is determined using the ambient temperature.)

*:For outlet switching during heating, D/F operates for 10 minutes and DEF for 5 minutes. One cycle is 15 minutes.

- Use CONSULT to change the setting of whether the electric compressor operates when the outlet is in DEF. Refer to [HAC-47. "CONSULT Function"](#).
- During remote climate control operation, HEAT switch indicator lamp (during heating) or A/C switch indicator lamp (during cooling) turns ON depending on the A/C operation status.
- During remote climate control operation, the air conditioner cannot be operated by A/C control. Also, when any A/C control switch is pressed, A/C control switch indicator lamp blinks.

AUTOMATIC AIR CONDITIONING SYSTEM : Door Motor Starting Position Reset

INFOID:000000011005861

A step motor is used for the mode door motor and air mix door motor.

Because the step motors do not have position detection mechanisms, there may be a deviation between the door position recognized by the A/C auto amp. and the actual door position. Therefore, the A/C auto amp. performs motor zero position reset in order to align its recognized door position with the actual door position.

When either of the conditions below is satisfied, the A/C auto amp. performs motor zero position reset when the power switch turns ON or when A/C-Heater Timer (Climate Ctrl. Timer) turns ON.

- The 12V battery terminal is disconnected and then is reconnected.
- The power switch is turned OFF during operation of the mode door motor or air mix door motor a total of 60 times.

During zero position reset operation, the DEF switch indicator flashes for several seconds. No switch operations are accepted during this time.

AUTOMATIC AIR CONDITIONING SYSTEM : Fail-safe

INFOID:000000011005862

- When the A/C auto amp. detects the conditions shown below, it stops operation of the electric compressor.

Malfunction judgment item	Description	Recovery condition
Intake sensor malfunction	Open circuit or short circuit is detected in the intake sensor circuit.	Voltage value of intake sensor circuit returns to normal.
Ambient sensor malfunction	Open circuit or short circuit is detected in the ambient sensor circuit.	Voltage value of ambient sensor circuit returns to normal.

- When the electric compressor detects the following conditions, electric compressor operation is restricted.

Malfunction judgment item	Description	Electric compressor operation	Recovery condition
Compressor low voltage malfunction	When the high voltage system input voltage is less than 230 V.	Stopped	High voltage system input voltage is 230 V or more.
Compressor high voltage malfunction	When the high voltage system input voltage is more than 420 V.	Stopped	High voltage system input voltage is 420 V or less.
Compressor internal communication malfunction	When a malfunction is detected in AC inverter internal communication.	Stopped	Internal communication returns to normal.
Compressor low voltage system malfunction	Voltage of battery power supply input to electric compressor is 9 V or less or 17 V or more.	Stopped	Voltage of battery power supply input to electric compressor is more than 9 V or less than 17 V.
Compressor internal communication malfunction	When overcurrent is detected in inverter.	Stopped	Power switch OFF.

SYSTEM

< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

Malfunction judgment item	Description	Electric compressor operation	Recovery condition
Compressor internal communication malfunction	When open circuit is detected in inverter.	Stopped	Power switch OFF.
Compressor current sensor malfunction	When inverter is OFF, the detected current value in inverter is the standard value or more.	Stopped	Power switch OFF.
Compressor overload	When the high load status at low speed of electric compressor is continued.	Stopped	Power switch OFF.
Compressor overheat	When the inverter temperature exceeds the standard value.	Stopped	Inverter temperature is the standard value or less.
Compressor system malfunction	When the internal system malfunction stop occurs repeatedly.	Stopped	Power switch OFF.
Compressor high voltage system malfunction	When the standard value voltage is input to AC inverter.	Stopped	Power switch OFF.
Compressor communication malfunction HVAC → COMP	When the electric compressor cannot receive the signal transmitted from the A/C auto amp.	Stopped	LIN communication returns to normal.
Compressor internal system malfunction	When a malfunction is detected in the CPU, ROM or RAM of the inverter.	Stopped	Power switch OFF.
Compressor HVIL circuit malfunction	When HVIL open circuit is detected in electric compressor system.	Stopped	HVIL circuit in electric compressor system returns to normal.
Compressor communication malfunction COMP → HVAC	When the A/C auto amp cannot receive the signal transmitted from the electric compressor.	Stopped	LIN communication returns to normal.
Compressor voltage limit	When the command speed control is disabled due to voltage decrease of high voltage system.	Compressor speed is limited.	Voltage of high voltage system returns to normal.
Compressor motor current limit	When the command speed control is disabled due to decrease of motor upper limit.	Compressor speed is limited.	Motor current returns to normal.
Compressor overheat	When the inverter temperature exceeds the standard value.	Compressor speed is limited.	Inverter temperature is the standard value or less.

- When the PTC heater detects the following conditions, PTC heater operation is stopped.

Malfunction judgment item	Description	Recovery condition
PTC heater overheat protection	When PTC heater circuit board internal temperature is 115°C or higher.	PTC heater circuit board internal temperature is less than 115°C.
PTC heater voltage malfunction	When supply voltage input to PTC heater is out of the standard.	Supply voltage input to PTC heater returns to within the standard.
PTC heater circuit 1 malfunction	When PTC heater circuit (PTC1) system malfunction is detected.	Power switch OFF.
PTC heater circuit 2 malfunction	When PTC heater circuit (PTC2) system malfunction is detected.	Power switch OFF.
PTC heater LIN communication malfunction	When there is a malfunction in the signal transmitted from the PTC heater.	LIN communication returns to normal.
PTC heater communication malfunction	When there is a malfunction in the signal transmitted from the A/C auto amp. or in the signal received by the PTC heater.	LIN communication returns to normal.
HVAC LIN communication malfunction	When there is a malfunction in the signal transmitted from the A/C auto amp.	LIN communication returns to normal.

- A/C auto amp. stops the electric compressor operation, when the following condition detections is received from a heat pump control unit.

SYSTEM

< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

Malfunction judgment item	Description	Recovery condition
A/C auto amp. LIN communication malfunction	When there is a malfunction in the signal transmitted from the heat pump control unit.	LIN communication returns to normal.
Compressor discharge refrigerant temperature sensor malfunction	Open circuit or short circuit is detected in the compressor discharge refrigerant temperature sensor circuit.	Voltage value of compressor discharge refrigerant temperature sensor circuit returns to normal.
Compressor suction refrigerant temperature sensor malfunction	Open circuit or short circuit is detected in the compressor suction refrigerant temperature sensor circuit.	Voltage value of compressor suction refrigerant temperature sensor circuit returns to normal.
Refrigerant channel switching 2 way type valve circuit malfunction	When the heat pump control unit detects a malfunction of the refrigerant channel switching 2 way type valve control signal status, compared to the valve status of the control that is being judged.	Power switch OFF.
Refrigerant channel switching 3 way type valve circuit malfunction	When the heat pump control unit detects a malfunction of the refrigerant channel switching 3 way type valve control signal status, compared to the valve status of the control that is being judged.	Power switch OFF.

OPERATION

< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

OPERATION

Description

INFOID:0000000011005863

- This A/C uses various sensors to detect temperature changes in the interior caused by factors such as changes in ambient temperature and sunload. When the desired temperature is set, the discharge air temperature, discharge air flow, and inlet/outlet changes are controlled automatically to maintain a constant interior temperature at all times.
- The air flow volume and switching of air inlets and air outlets can be selected manually without auto function. While using auto function, it is still possible to select a particular item manually.
- It is possible to use A/C-Heater Timer (Climate Ctrl. Timer) or remote climate control to adjust the interior to a comfortable temperature before entering the vehicle.

TABLE OF OPERATION CONDITIONS OF A/C SYSTEM FUNCTION OPERATED BY POWER SWITCH OPERATION

Each of the A/C system functions is operative under the following conditions.

×:Operate —: Does not operate

Power supply position*1	OFF	ACC	ON	READY
Ventilation function	—	—	×	×
Cooling/heating function	—	—	×*2	×
A/C-Heater Timer (Climate Ctrl. Timer) function	× (Only when EVSE is connected)	× (Only when EVSE is connected)	—	—
Remote climate control function	×	×	—	—

- *1: The vehicles state of each power supply position is following state.

- LOCK/OFF: Power switch OFF
- ACC: Power switch ACC
- ON: Power switch ON (Not vehicle condition READY)
- READY: Shifting to vehicle condition READY (Transmitting the READY signal from BCM to VCM), or Vehicle condition READY or running

- *2: When the power supply position is ON, cooling/heating function can be started only while charging is in progress. After charging is complete, cooling/heating function operates continuously while maintaining the status that EVSE is connected (the status that power supply from EVSE is allowed).

NOTE:

- Connecting EVSE when the vehicle is in READY state cancels READY state (ready indicator lamp turns OFF), and power supply position changes to ON. At this time, cooling/heating function of A/C system stops, and only ventilation function operates. When using cooling/heating function, turn power switch OFF, check that charging is started, and then turn power switch ON again.
- When the power supply position is ON, if power supply from EVSE becomes not available due to the power interruption, cooling/heating function operates as shown in the following items.
- Charging is in progress:
EV system maintained the activated status for 5 minutes after power supply from EVSE becomes not available. Therefore, cooling/heating function stops when power supply from EVSE becomes not available. Cooling/heating function re-starts simultaneously when power supply from EVSE becomes available again within 5 minutes. After 5 minutes are passed, EV system stops. Cooling/heating function does not re-start.
- After charging is complete:
EV system stops. Cooling/heating function stops.

Switch Name and Function

INFOID:0000000011005864

AUTO A/C SYSTEM OPERATIONS AND DISPLAYS

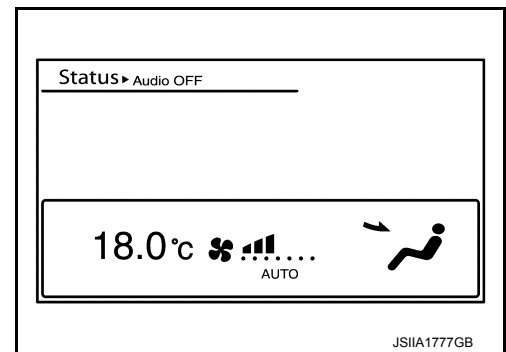
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OPERATION

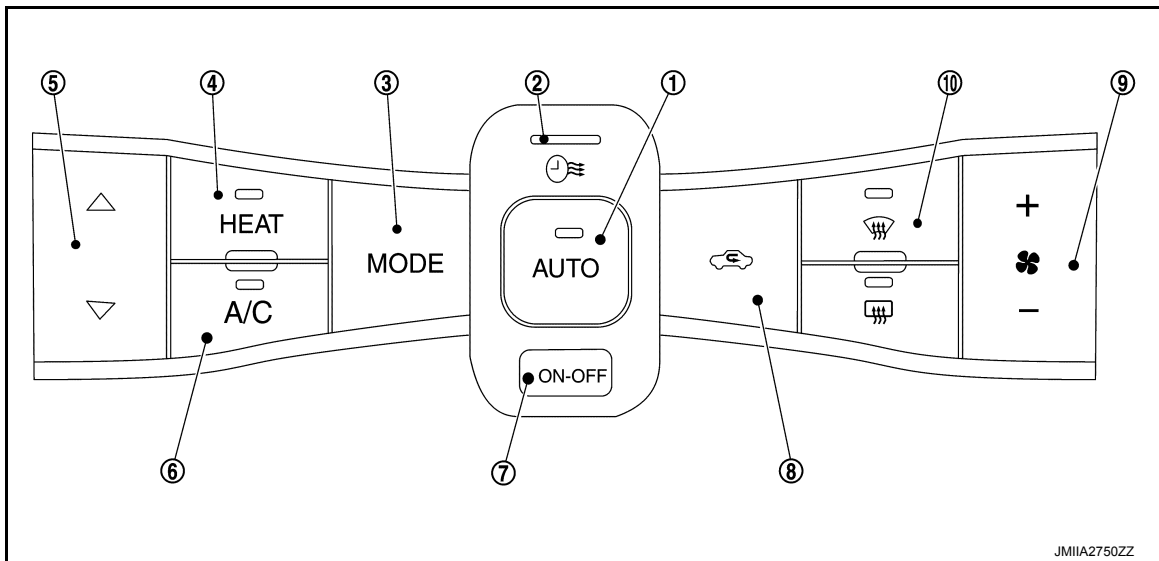
< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

A/C Status Display (Inside Display)



A/C Controller



- | | | |
|-----------------|------------------------------|----------------------|
| ① AUTO switch | ② Timer A/C indicator | ③ Mode switch |
| ④ HEAT switch | ⑤ Temperature control switch | ⑥ A/C switch |
| ⑦ ON-OFF switch | ⑧ Intake switch | ⑨ Fan control switch |
| ⑩ DEF switch | | |

<p>AUTO switch</p>	<ul style="list-style-type: none"> If the switch is pressed while the A/C is stopped, the switch indicator lamp turns ON, "AUTO" appears on the display, and the A/C system status is as per the following items: <ul style="list-style-type: none"> Air inlet: Automatic control Air outlet: Automatic control Air flow: Automatic control Electric compressor: Automatic control PTC heater: Automatic control A/C system cooling/heating operation mode switching: Automatic control If the AUTO switch is pressed while the A/C is operating and AUTO switch indicator lamp is OFF, the AUTO switch indicator lamp turns ON, "AUTO" appears on the display, and all controls switch to automatic control status. Depending on the air conditioner system cooling/heating operation mode status during AUTO operation, the A/C switch indicator lamp turns ON during cooling operation and the HEAT switch indicator lamp turns ON during heating operation. <p>NOTE:</p> <ul style="list-style-type: none"> The AUTO switch indicator lamp turns ON or OFF linked to the "AUTO" indicator on the display. When air outlet or air flow is manually operated while AUTO switch indicator lamp is ON, AUTO switch indicator lamp turns OFF. However, automatic control continues for functions other than those whose switch is operated.
<p>Timer A/C indicator</p>	<ul style="list-style-type: none"> Timer A/C indicator blinks while A/C-Heater Timer or remote climate control is operated. Turned ON when the A/C-heater timer is reserved.

OPERATION

< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

Mode switch	<p>When each MODE switch is pressed, air outlet is switched and VENT, B/L, FOOT, or D/F can be selected manually.</p> <p>NOTE:</p> <ul style="list-style-type: none"> Air outlet can be changed when air conditioner system is in the OFF position. When MODE switch is pressed while AUTO switch indicator lamp is indicated, air outlet automatic control is released (AUTO switch indicator lamp turns OFF). 	A B
HEAT switch	<ul style="list-style-type: none"> When the HEAT switch is pressed while the HEAT switch indicator lamp is OFF, the HEAT switch indicator lamp turns ON and the air conditioner system switches to the following operation modes. <ul style="list-style-type: none"> A/C switch indicator lamp is ON: dehumidified heating A/C switch indicator lamp is OFF: heating When the HEAT switch is pressed while the HEAT switch indicator lamp is ON, the HEAT switch indicator lamp turns OFF and the air conditioner system switches to the following operation modes. <ul style="list-style-type: none"> A/C switch indicator lamp is ON: cooling A/C switch indicator lamp is OFF: ventilating When the HEAT switch is pressed while the AUTO switch indicator lamp is ON, the AUTO switch indicator lamp turns OFF and automatic control of air conditioner cooling/heating operation mode change is canceled and it switches to manual control. 	C D E
Temperature control switch	<p>Operation of this switch sets the temperature setting in increments of 0.5° within the range of 60° (18°C) to 90° (32°C).</p> <ul style="list-style-type: none"> ▲: Increase temperature setting. ▼: Decrease temperature setting. <p>NOTE:</p> <p>While the ventilation mode (A/C switch indicator lamp is OFF and HEAT switch indicator lamp is OFF) operates, the temperature disappears from the display and the temperature setting cannot be operated.</p>	F G
A/C switch	<ul style="list-style-type: none"> When the A/C switch is pressed while the A/C switch indicator lamp is OFF, the A/C switch indicator lamp turns ON. Then, the refrigerant cycle operates in the cooling (dehumidified) mode. When the A/C switch is pressed while the A/C switch indicator lamp is ON, the A/C switch indicator lamp turns OFF and the refrigerant cycle stops operation in cooling (dehumidified) mode. When the A/C switch is pressed while the AUTO switch indicator lamp is ON, the AUTO switch indicator lamp turns OFF and at the same time, automatic control of air conditioner cooling/heating operation mode change is canceled and it switches to manual control. <p>NOTE:</p> <p>When blower fan motor is OFF, the refrigerant cycle does not operate. (Except for deice control)</p>	H HAC
ON/OFF switch	<ul style="list-style-type: none"> If the ON/OFF switch is pressed while the A/C is operating, the PTC heater, electric compressor and blower fan motor stops, and the outlets and inlets are set as per the following. <ul style="list-style-type: none"> Outlets: fixed in the same status as the ON/OFF switch is pressed Inlets: fresh air intake (when the inlet is controlled automatically) If the ON/OFF switch is pressed while A/C is stopped, the A/C turns ON with the same settings as before it is stopped. 	J K
Intake switch	<ul style="list-style-type: none"> Air inlet changes between recirculation (REC) ⇔ fresh air intake (FRE) each time intake switch is pressed. Indicator lamp ON: Recirculation Indicator lamp OFF: Fresh air intake Intake switch indicator lamp blinks 2 times and air inlet is set to automatic control when the intake switch is pressed and held for 2 seconds or more. When the intake switch is pressed while the AUTO switch indicator lamp is ON, the AUTO switch indicator lamp turns OFF, automatic control of the inlet is canceled, and it switches to manual control. <p>NOTE:</p> <p>Air inlet can be changed when air conditioning system is in OFF status.</p>	L M N

OPERATION

< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

Fan control switch	<p>Air flow can be manually set within the range of speeds 1 - 7 using the fan control switch.</p> <ul style="list-style-type: none">• +: Increase air flow.• -: Decrease air flow. <p>NOTE:</p> <ul style="list-style-type: none">• When this switch is operated while A/C system is OFF, A/C system turns ON.• Air flow automatic control is cancelled (AUTO switch indicator lamp turns OFF) when fan switch is operated while AUTO switch indicator lamp is ON.
DEF switch	<p>DEF mode (switch indicator lamp) changes between ON⇔OFF each time DEF switch is pressed</p> <ul style="list-style-type: none">• When switch is pressed while air conditioning system is in the ON position, DEF mode turns ON, air conditioning system changes to the following status:<ul style="list-style-type: none">- Air outlet: DEF- Air flow: Automatic control (If an air flow other than AUTO is selected before pressing DEF switch, blower fan is manual control.)- Air inlet: Fresh air intake- A/C switch indicator lamp: ON- HEAT switch indicator lamp: ON• When DEF mode turns OFF, air conditioner system state returns to the previous state before DEF mode was selected.• When switch is pressed while air conditioner system is in the OFF position, air conditioning system turns ON and changes to the following status:<ul style="list-style-type: none">- Air outlet: DEF- Air flow: Automatic control- Air inlet: Fresh air intake- A/C switch indicator lamp: ON- HEAT switch indicator lamp: ON• When DEF mode turns OFF, entire air conditioner system turns OFF. <p>NOTE:</p> <p>When DEF mode is turned ON while AUTO switch indicator lamp is ON, AUTO switch indicator lamp turns OFF. However, air flow automatic control continues. (This operation is excluded when airflow is set before DEF switch is pressed.)</p>

DIAGNOSIS SYSTEM (A/C AUTO AMP.)

< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

DIAGNOSIS SYSTEM (A/C AUTO AMP.)

Description

INFOID:0000000011005865

Air conditioning system performs self-diagnosis, operation check, function diagnosis, and various settings using diagnosis function of each control unit.

Unit name	Diagnosis item (CONSULT display)	
A/C auto amplifier	HVAC	Self Diagnostic Result
		Data Monitor
		Work support
		Active Test
AV control unit	AV	Self Diagnostic Result
		Data Monitor
		Active Test
VCM	EV/HEV	Self Diagnostic Result
		Data Monitor

CONSULT Function

INFOID:0000000011005866

APPLICABLE ITEM

CONSULT performs the following functions via communication with the A/C auto amp.

Diagnosis mode	FUNCTION DESCRIPTION
ECU identification information	Displays part number of A/C auto amp.
Self Diagnostic Result	Displays diagnosis results that are judged by A/C auto amp.
Data Monitor	Displays I/O signals of A/C auto amp.
Active Test	Forces supply of the signals which operate each load from the A/C auto amp.
Work support	Changes the settings of various setting functions and performs automatic adjustment of components.
Configuration	<ul style="list-style-type: none"> Read and save the vehicle specification. Write the vehicle specification when replacing A/C auto amp.

ECU IDENTIFICATION INFORMATION

Part number of A/C auto amp. can be checked.

SELF DIAGNOSTIC RESULT

Diagnosis results that are judged by A/C auto amp. can be checked. [HAC-56, "DTC Index"](#).

DATA MONITOR

Communication signals of A/C auto amp. can be checked.

NOTE:

The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.

Display Item List

Monitor item [STATUS or UNIT]	DESCRIPTION
AMB TEMP SEN [°C/°F]	Value of ambient sensor detection value (voltage), converted to ambient temperature
IN-VEH TEMP [°C/°F]	Value of in-vehicle sensor detection value (voltage), converted to interior temperature
INT TEMP SEN [°C/°F]	Value of intake sensor detection value (voltage), converted to intake temperature
SUNLOAD SEN [W/m ²]	Value of sunload sensor detection value (voltage), converted to sunload
AMB SEN CAL [°C/°F]	Value of ambient temperature calculated by A/C auto amp.
IN-VEH CAL [°C/°F]	Value of interior temperature calculated by A/C auto amp.

DIAGNOSIS SYSTEM (A/C AUTO AMP.)

< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

Monitor item [STATUS or UNIT]	DESCRIPTION
INT TEMP CAL [°C/°F]	Value of intake temperature calculated by A/C auto amp.
SUNL SEN CAL [W/m ²]	Value of sunload calculated by A/C auto amp.
COMP REQ SIG [On/Off]	A/C ON signal ON/OFF status
FAN REQ SIG [On/Off]	Blower fan ON signal ON/OFF status
FAN DUTY*	Target value of voltage (applied voltage) applied to Blower fan motor by A/C auto amp.
XM	Target discharge air temperature judged by A/C auto amp. according to the temperature setting and the value from each sensor
VEHICLE SPEED [km/h]	Vehicle speed calculated by A/C auto amp., based on motor speed signal received from traction motor inverter via EV CAN communication
COMPR RPM [rpm]	Rotation speed of electric compressor
COMPR INPUT POWER SIG [W]	Power consumption value of electric compressor
COMPR IPM TEMP SIG [°C/°F]	IGBT temperature sensor value on the electric compressor
COMPR INPUT VOLT SIG [V]	Input voltage value of electric compressor
PTC HEATER REQUEST [%]	Operating rate sent to the PTC element heater by the A/C auto amp.
COMP USE PERMIT POWER [W]	Calculated value of electrical power available to operate the A/C system received from VCM via EV CAN communication
REFRIGERANT PRE SEN [Mpa]	Refrigerant pressure sensor detection value sent from VCM
FORCED Off SIGNAL [On/Off]	State of input signal to A/C auto amp.
FORCED INTAKE REC SIG [On/Off]	State of input signal to A/C auto amp.
PRE-CLIMATE SIGNAL [On/Off]	State of input signal to A/C auto amp.
HV SPLY/BLOCK CMPL FLAG [On/Off]	State of input signal to A/C auto amp.
PTC CONSUMPTION VOLT [W]	Power consumption value of PTC heater
PTC OUT TEMP SENS [°C/°F]	Value of PTC heater outlet air temperature sensor detection value (voltage), converted to temperature
A/C UNIT TEMP SENS [°C/°F]	Value of A/C unit case temperature sensor detection value (voltage), converted to temperature
CMP DISCHR TEMP SENS [°C/°F]	Temperature of compressor discharge refrigerant temperature sensor, input from heat pump control unit
CMP SUCTN TEMP SENS [°C/°F]	Temperature of compressor suction refrigerant temperature sensor, input from heat pump control unit
2-WAY VALVE STATE [On/Off]	Operation status of refrigerant passage switching 2-way valve, input from heat pump control unit
3-WAY VALVE STATE [On/Off]	Operation status of refrigerant passage switching 3-way valve, input from heat pump control unit

*: "DUTY" is displayed however the voltage is indicated. Or value is not displayed, but unit is (V).

ACTIVE TEST

The signals used to activate each device forcibly supplied from A/C auto amp. operation check of air conditioning system can be performed.

NOTE:

When the active test is performed, the vehicle is set to READY.

Test item	DESCRIPTION
ALL SEG	ALL switch indicator indications are turned ON.
HVAC TEST	The operation check of A/C system can be performed by selecting the mode. Refer to the following table for the conditions of each mode.

HVAC Test

DIAGNOSIS SYSTEM (A/C AUTO AMP.)

< SYSTEM DESCRIPTION >

[AUTO A/C (WITH HEAT PUMP)]

	Test item						
	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6	Mode 7
Mode door motor position	VENT	VENT	B/L	FOOT*	FOOT*	D/F	DEF
Intake door motor position	REC	REC	REC	FRE	FRE	FRE	FRE
Air mix door motor position	FULL COLD	FULL COLD	FULL COLD	FULL HOT	FULL HOT	FULL HOT	FULL HOT
A/C operation mode	Cooling	Cooling	Cooling	Heater	Heater	Heater	Cooling
Blower fan motor (applied voltage)	10.5 V	8.5 V	10.5 V	8.5 V	8.5 V	8.5 V	12 V
Electric compressor (rpm)	ON (1500)	ON (2000)	ON (3000)	ON (2000)	ON (2000)	OFF (0)	ON (2000)
PTC heater operating rate	0%	0%	0%	30%	0%	30%	30%
Cooling fan operating rate	50%	50%	50%	70%	70%	0%	50%

*In FOOT mode, position of mode door motor (driver side) is set to the status that is selected for blow setting to DEF. Refer to [HAC-84. "Foot Position Setting Trimmer"](#).

WORK SUPPORT

Setting change of various setting functions and automatic adjustment of components can be performed.

Work item	DESCRIPTION	Refer to
TEMP SET CORRECT	If the temperature experienced by the passenger is different than the discharge air temperature controlled by the temperature setting, the A/C auto amplifier control temperature can be corrected with regards to the temperature setting.	HAC-83. "Temperature Setting Trimmer"
REC MEMORY SET	REC memory function setting can be performed.	HAC-83. "Inlet Port Memory Function (REC)"
FRE MEMORY SET	FRE memory function setting can be performed.	HAC-84. "Inlet Port Memory Function (FRE)"
BLOW SET	In FOOT mode, the air blow to DEF can be turned ON/OFF.	HAC-84. "Foot Position Setting Trimmer"
Door Motor Starting Position Reset	Zero position reset of air mix door motor and mode door motor can be performed.	HAC-86. "Work Procedure"
TARGET MAX RPM ADJ AT PRE-CLIMATE	Compressor MAX rotation in Pre Air Condition is compensated.	HAC-85. "Setting of Compressor Maximum Rotation Speed During Pre Air Conditioning"
TARGET MAX RPM ADJ AT IDL	Compressor MAX rotation when vehicle stopped is compensated.	HAC-85. "Setting of Compressor Maximum Rotation Speed During Idling"
COMP OPRT SET AT DEF MODE (TIM/RMT CLIMT CONT)	For A/C-heater timer and remote climate control, the setting of electric compressor operation during DEF mode can be changed.	HAC-84. "Compressor Operation Setting at Defroster Mode (Timer/Remote Climate Control)"

ECU DIAGNOSIS INFORMATION

A/C AUTO AMP.

Reference Value

INFOID:0000000011005867

CONSULT DATA MONITOR REFERENCE VALUES

NOTE:

The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.

Monitor item	Condition		Value/Status
AMB TEMP SEN	Power switch ON		Equivalent to ambient temperature
IN-VEH TEMP	Power switch ON		Equivalent to in-vehicle temperature
INT TEMP SEN	Power switch ON		Equivalent to evaporator fin temperature
SUNLOAD SEN	Power switch ON		Equivalent to sunload amount
AMB SEN CAL	Power switch ON		Equivalent to ambient temperature
IN-VEH CAL	Power switch ON		Equivalent to in-vehicle temperature
INT TEMP CAL	Power switch ON		Equivalent to evaporator fin temperature
SUNL SEN CAL	Power switch ON		Equivalent to sunload amount
COMP REQ SIG	Power switch READY	A/C switch: ON (A/C switch indicator lamp: ON) (Electric compressor operating condition)	On
		A/C switch: OFF (A/C switch indicator lamp: OFF)	Off
FAN REQ SIG	Power switch READY	Blower motor: ON	On
		Blower motor: OFF	Off
FAN DUTY*	Power switch READY	Blower motor: ON	4 - 13
		Blower motor: OFF	0
XM	Power switch ON		Value according to target air flow temperature
VEHICLE SPEED	Power switch READY		Equivalent to speedometer reading (0 - 120 km/h)
COMPR RPM	Power switch READY	A/C switch: ON (Compressor operation status)	Rotation speed of electric compressor (0 - 9000 rpm)
COMPR INPUT POWER SIG	Power switch READY	A/C switch: ON (Compressor operation status)	Power consumption value of electric compressor (0 - 6375 W)
COMPR IPM TEMP SIG	Power switch READY	A/C switch: ON (Compressor operation status)	IGBT temperature sensor value in electric compressor (-30°C - 225°C)
COMPR INPUT VOLT SIG	Power switch READY	A/C switch: ON (Compressor operation status)	Input voltage value of electric compressor (100 - 610V)
PTC HEATER REQUEST	Power switch READY	Heater FULL HOT operation	Operating rate sent to the PTC element heater by the A/C auto amp. (0 - 100 %)

A/C AUTO AMP.

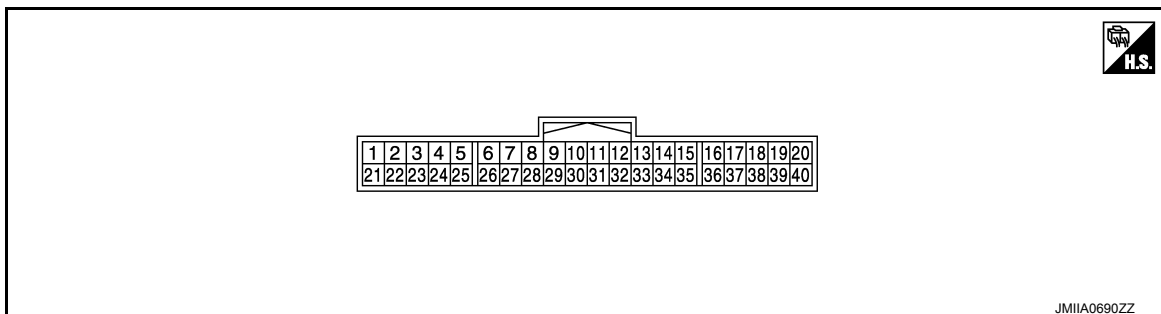
< ECU DIAGNOSIS INFORMATION >

[AUTO A/C (WITH HEAT PUMP)]

Monitor item	Condition		Value/Status
COMP USE PERMIT POWER	Power switch ON	A/C switch: ON (Compressor operation status)	Value calculation for electric compressor consumption power by A/C auto amp. (0 - 12750 W)
REFRIGERANT PRE SEN	Power switch READY	A/C switch: ON (Compressor operation status)	Equivalent to refrigerant pressure
FORCED Off SIGNAL	Power switch ON	A/C switch: ON (Compressor operation status)	Normal: Off Received electric compressor stop request: On
FORCED INTAKE REC SIG	Power switch READY	When the coolant temperature of the high voltage system is high	On
		Except the above	Off
PRE-CLIMATE SIGNAL	Power switch ON	When the A/C-Heater Timer or remote climate control is operate	On
		Except the above	Off
HV SPLY/BLOCK CMPL FLAG	Power switch READY	A/C switch: ON (Compressor operation status)	When VCM supplies a high voltage: ON When VCM stops the supply of the high voltage: OFF
PTC CONSUMPTION VOLT	Power switch READY	Heater FULL HOT operation	Value calculation for PTC heater consumption power by A/C auto amp. (0 - 12750 W)
PTC OUT TEMP SENS	Power switch READY		-30 - 225°C
A/C UNIT TEMP SENS	Power switch READY		-30 - 225°C
CMP DISCHR TEMP SENS	Power switch READY		-30 - 225°C
CMP SUCTN TEMP SENS	Power switch READY		-30 - 225°C
2-WAY VALVE STATE	Power switch READY	A/C switch: ON, during cooling mode	Off
		A/C switch: OFF, during heating mode	On
3-WAY VALVE STATE	Power switch READY	A/C switch: ON, during cooling mode	Off
		A/C switch: OFF, during heating mode	On

*: "DUTY" is displayed, but voltage is indicated. Or unit is not displayed but unit is (V).

TERMINAL LAYOUT

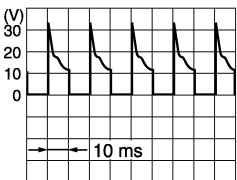
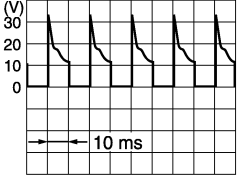
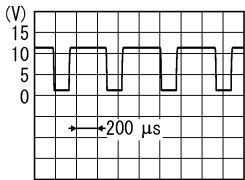
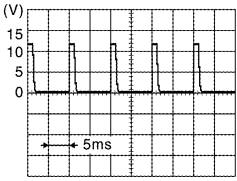


INPUT/OUTPUT SIGNAL STANDARD

A/C AUTO AMP.

< ECU DIAGNOSIS INFORMATION >

[AUTO A/C (WITH HEAT PUMP)]

Terminal No. (Wire color)		Item		Test condition	Standard	
+	-	Signal name	Input/ Output			
1 (V)	10 (B)	FRE*1	Intake door motor drive signal	Output	<ul style="list-style-type: none"> • Power switch ON • Intake switch: REC→FRE 	Battery voltage
		REC*2	Intake door motor drive signal		<ul style="list-style-type: none"> • Power switch ON • Intake switch: FRE→REC 	0 – 1 V
2 (R)	10 (B)	MODE drive 4	Mode door motor drive signal	Output	<ul style="list-style-type: none"> • Power switch ON • Immediately after mode switch is operated 	 <p style="text-align: right; font-size: small;">JPIIA1647GB</p>
3 (P)	10 (B)	MODE drive 3				
4 (BG)	10 (B)	MODE drive 2				
5 (V)	10 (B)	MODE drive 1				
6 (BR)	10 (B)	A/MIX drive 4	Air mix door motor drive signal	Output	<ul style="list-style-type: none"> • Power switch ON • Immediately after temper- ature control switch is op- erated 	 <p style="text-align: right; font-size: small;">JPIIA1647GB</p>
7 (GR)	10 (B)	A/MIX drive 3				
8 (LG)	10 (B)	A/MIX drive 2				
9 (L)	10 (B)	A/MIX drive 1				
10 (B)	Ground	Ground	—	Power switch ON	0 – 0.1 V	
12 (GR)	10 (B)	Power transistor control signal		Output	<ul style="list-style-type: none"> • Power switch ON • Fan speed: Manual speed 1 	 <p style="text-align: right; font-size: small;">ZJIA0863J</p>
15 (W)	10 (B)	Rear defogger switch		Output	<ul style="list-style-type: none"> • Power switch ON • Rear window defogger switch OFF 	 <p style="text-align: right; font-size: small;">JSIIA1668ZZ</p>
					<ul style="list-style-type: none"> • Power switch ON • Rear defogger switch is pressed. 	0 V
16 (LG)	10 (B)	Steering heater switch signal		Output	<ul style="list-style-type: none"> • Power switch ON • Steering heater switch OFF 	0 V
					<ul style="list-style-type: none"> • Power switch ON • Steering heater switch is pressed. 	0.9 V or less

A/C AUTO AMP.

< ECU DIAGNOSIS INFORMATION >

[AUTO A/C (WITH HEAT PUMP)]

Terminal No. (Wire color)		Item		Test condition	Standard														
+	-	Signal name	Input/ Output																
17 (W)	10 (B)	PTC heater outlet air temperature sensor signal		<ul style="list-style-type: none"> Power switch ON When air conditioner is operating 	<table border="1"> <caption>PTC Heater Outlet Air Temperature Sensor Signal Data</caption> <thead> <tr> <th>Temperature (°C)</th> <th>Voltage (V)</th> </tr> </thead> <tbody> <tr><td>0</td><td>4.00</td></tr> <tr><td>20</td><td>3.16</td></tr> <tr><td>40</td><td>2.25</td></tr> <tr><td>60</td><td>1.50</td></tr> <tr><td>80</td><td>0.97</td></tr> <tr><td>100</td><td>0.63</td></tr> </tbody> </table>	Temperature (°C)	Voltage (V)	0	4.00	20	3.16	40	2.25	60	1.50	80	0.97	100	0.63
Temperature (°C)	Voltage (V)																		
0	4.00																		
20	3.16																		
40	2.25																		
60	1.50																		
80	0.97																		
100	0.63																		
19 (W)	10 (B)	Illumination +		<ul style="list-style-type: none"> Power switch ON Lighting switch 1st 	Battery voltage														
				<ul style="list-style-type: none"> Power switch ON Lighting switch OFF 	0 V														
20 (B)	10 (B)	Illumination -		<ul style="list-style-type: none"> Power switch ON Lighting switch 1st 															
				<ul style="list-style-type: none"> Power switch ON Lighting switch OFF 	0 V														
21 (G)	10 (B)	REC*1	Intake door motor drive signal	<ul style="list-style-type: none"> Power switch ON Intake switch: FRE→REC 	Battery voltage														
				<ul style="list-style-type: none"> Power switch ON Intake switch: REC→FRE 	0 - 1 V														
		FRE*2	Intake door motor drive signal	<ul style="list-style-type: none"> Power switch ON Intake switch: REC→FRE 	Battery voltage														
				<ul style="list-style-type: none"> Power switch ON Intake switch: FRE→REC 	0 - 1 V														
22 (V)	10 (B)	Steering heater relay signal		Power switch ON	0 V														
				Power switch OFF	Battery voltage														
23 (SB)	10 (B)	Seat heater relay		Power switch ON	0 V														
				Power switch OFF	Battery voltage														
27 (W)	10 (B)	Sensor power (5 V)		Power switch ON	5 V														
28 (L)	—	EV CAN-H		—	—														
29 (G)	—	EV CAN-L		—	—														
30 (R)	10 (B)	Sensor ground		Power switch ON	0 - 0.1 V														
31 (G)	10 (B)	Battery power supply		Power switch OFF	Battery voltage-														
32 (Y)	10 (B)	Ignition power		Power switch ON	9.0 V or more														
				Power switch OFF	6.5 V or less														

A
B
C
D
E
F
G
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HAC
J
K
L
M
N
O
P

A/C AUTO AMP.

< ECU DIAGNOSIS INFORMATION >

[AUTO A/C (WITH HEAT PUMP)]

Terminal No. (Wire color)		Item		Test condition	Standard																											
+	-	Signal name	Input/ Output																													
33 (LG)	10 (B)	In-vehicle sensor signal	Input	<ul style="list-style-type: none"> Power switch ON When air conditioner is operating 	<table border="1"> <caption>In-vehicle sensor signal voltage vs temperature</caption> <tr><th>Temp (°C)</th><th>Temp (°F)</th><th>Voltage (V)</th></tr> <tr><td>-20</td><td>-4</td><td>4.41</td></tr> <tr><td>-10</td><td>14</td><td>4.09</td></tr> <tr><td>0</td><td>32</td><td>3.68</td></tr> <tr><td>10</td><td>50</td><td>3.22</td></tr> <tr><td>20</td><td>68</td><td>2.73</td></tr> <tr><td>25</td><td>77</td><td>2.49</td></tr> <tr><td>30</td><td>86</td><td>2.25</td></tr> <tr><td>40</td><td>104</td><td>1.82</td></tr> </table> <p style="text-align: right; font-size: small;">JSIIA1662ZZ</p>	Temp (°C)	Temp (°F)	Voltage (V)	-20	-4	4.41	-10	14	4.09	0	32	3.68	10	50	3.22	20	68	2.73	25	77	2.49	30	86	2.25	40	104	1.82
Temp (°C)	Temp (°F)	Voltage (V)																														
-20	-4	4.41																														
-10	14	4.09																														
0	32	3.68																														
10	50	3.22																														
20	68	2.73																														
25	77	2.49																														
30	86	2.25																														
40	104	1.82																														
34 (G)	10 (B)	Intake sensor signal	Input	<ul style="list-style-type: none"> Power switch ON When air conditioner is operating 	<table border="1"> <caption>Intake sensor signal voltage vs temperature</caption> <tr><th>Temp (°C)</th><th>Temp (°F)</th><th>Voltage (V)</th></tr> <tr><td>-20</td><td>-4</td><td>3.68</td></tr> <tr><td>-10</td><td>14</td><td>3.13</td></tr> <tr><td>0</td><td>32</td><td>2.56</td></tr> <tr><td>10</td><td>50</td><td>2.02</td></tr> <tr><td>20</td><td>68</td><td>1.56</td></tr> <tr><td>25</td><td>77</td><td>1.36</td></tr> <tr><td>30</td><td>86</td><td>1.18</td></tr> <tr><td>40</td><td>104</td><td>0.89</td></tr> </table> <p style="text-align: right; font-size: small;">JSIIA1663ZZ</p>	Temp (°C)	Temp (°F)	Voltage (V)	-20	-4	3.68	-10	14	3.13	0	32	2.56	10	50	2.02	20	68	1.56	25	77	1.36	30	86	1.18	40	104	0.89
Temp (°C)	Temp (°F)	Voltage (V)																														
-20	-4	3.68																														
-10	14	3.13																														
0	32	2.56																														
10	50	2.02																														
20	68	1.56																														
25	77	1.36																														
30	86	1.18																														
40	104	0.89																														
35 (P)	10 (B)	Sunload sensor signal	Input	<ul style="list-style-type: none"> Power switch ON When air conditioner is operating 	<table border="1"> <caption>Sunload sensor signal voltage vs solar radiation</caption> <tr><th>Solar Radiation (W/m²)</th><th>Voltage (V)</th></tr> <tr><td>200</td><td>4.44</td></tr> <tr><td>400</td><td>3.88</td></tr> <tr><td>600</td><td>3.31</td></tr> <tr><td>800</td><td>2.75</td></tr> <tr><td>1000</td><td>2.19</td></tr> <tr><td>1200</td><td>1.63</td></tr> </table> <p style="text-align: right; font-size: small;">JSIIA1664ZZ</p>	Solar Radiation (W/m²)	Voltage (V)	200	4.44	400	3.88	600	3.31	800	2.75	1000	2.19	1200	1.63													
Solar Radiation (W/m²)	Voltage (V)																															
200	4.44																															
400	3.88																															
600	3.31																															
800	2.75																															
1000	2.19																															
1200	1.63																															
36 (GR)	10 (B)	Ambient sensor signal	Input	<ul style="list-style-type: none"> Power switch ON When air conditioner is operating 	<table border="1"> <caption>Ambient sensor signal voltage vs temperature</caption> <tr><th>Temp (°C)</th><th>Temp (°F)</th><th>Voltage (V)</th></tr> <tr><td>-20</td><td>-4</td><td>4.42</td></tr> <tr><td>-10</td><td>14</td><td>4.11</td></tr> <tr><td>0</td><td>32</td><td>3.71</td></tr> <tr><td>10</td><td>50</td><td>3.25</td></tr> <tr><td>20</td><td>68</td><td>2.76</td></tr> <tr><td>25</td><td>77</td><td>2.52</td></tr> <tr><td>30</td><td>86</td><td>2.29</td></tr> <tr><td>40</td><td>104</td><td>1.85</td></tr> </table> <p style="text-align: right; font-size: small;">JSIIA1665ZZ</p>	Temp (°C)	Temp (°F)	Voltage (V)	-20	-4	4.42	-10	14	4.11	0	32	3.71	10	50	3.25	20	68	2.76	25	77	2.52	30	86	2.29	40	104	1.85
Temp (°C)	Temp (°F)	Voltage (V)																														
-20	-4	4.42																														
-10	14	4.11																														
0	32	3.71																														
10	50	3.25																														
20	68	2.76																														
25	77	2.52																														
30	86	2.29																														
40	104	1.85																														
37 (Y)	10 (B)	A/C unit case temperature sensor signal	Input	<ul style="list-style-type: none"> Power switch ON When air conditioner is operating 	<table border="1"> <caption>A/C unit case temperature sensor signal voltage vs temperature</caption> <tr><th>Temp (°C)</th><th>Temp (°F)</th><th>Voltage (V)</th></tr> <tr><td>0</td><td>32</td><td>4.00</td></tr> <tr><td>20</td><td>68</td><td>3.16</td></tr> <tr><td>40</td><td>104</td><td>2.25</td></tr> <tr><td>60</td><td>140</td><td>1.50</td></tr> <tr><td>80</td><td>176</td><td>0.97</td></tr> <tr><td>100</td><td>212</td><td>0.63</td></tr> </table> <p style="text-align: right; font-size: small;">JSIIA1778ZZ</p>	Temp (°C)	Temp (°F)	Voltage (V)	0	32	4.00	20	68	3.16	40	104	2.25	60	140	1.50	80	176	0.97	100	212	0.63						
Temp (°C)	Temp (°F)	Voltage (V)																														
0	32	4.00																														
20	68	3.16																														
40	104	2.25																														
60	140	1.50																														
80	176	0.97																														
100	212	0.63																														
38 (SB)	10 (B)	Intake door motor PBR feedback signal	Input	<ul style="list-style-type: none"> Power switch ON Intake switch: REC 	0.2 – 0.8 V																											
				<ul style="list-style-type: none"> Power switch ON Intake switch: FRE 	4.2 – 4.8 V																											
40 (SB)	10 (B)	LIN	Input/ Output	<ul style="list-style-type: none"> Power switch ON When air conditioner is operating 	<p style="text-align: right; font-size: small;">JSIIA1667ZZ</p>																											

A/C AUTO AMP.

< ECU DIAGNOSIS INFORMATION >

[AUTO A/C (WITH HEAT PUMP)]

Fail-safe

INFOID:0000000011005868

- When the A/C auto amp. detects the conditions shown below, it stops operation of the electric compressor.

Malfunction judgment item	Description	Recovery condition
Intake sensor malfunction	Open circuit or short circuit is detected in the intake sensor circuit.	Voltage value of intake sensor circuit returns to normal.
Ambient sensor malfunction	Open circuit or short circuit is detected in the ambient sensor circuit.	Voltage value of ambient sensor circuit returns to normal.

- When the electric compressor detects the following conditions, electric compressor operation is restricted.

Malfunction judgment item	Description	Electric compressor operation	Recovery condition
Compressor low voltage malfunction	When the high voltage system input voltage is less than 230 V	Stopped	High voltage system input voltage is 230 V or more
Compressor high voltage malfunction	When the high voltage system input voltage is more than 420 V	Stopped	High voltage system input voltage is 420 V or less
Compressor internal communication malfunction	When a malfunction is detected in AC inverter internal communication	Stopped	Internal communication returns to normal
Compressor low voltage system malfunction	Voltage of battery power supply input to electric compressor is 9 V or less or 17 V or more.	Stopped	Voltage of battery power supply input to electric compressor is more than 9 V or less than 17 V.
Compressor internal communication malfunction	When overcurrent is detected in inverter	Stopped	Power switch OFF
Compressor internal communication malfunction	When open circuit is detected in inverter	Stopped	Power switch OFF
Compressor current sensor malfunction	When inverter is OFF, the detected current value in inverter is the standard value or more	Stopped	Power switch OFF
Compressor overload	When the high load status at low speed of electric compressor is continued	Stopped	Power switch OFF
Compressor overheat	When the inverter temperature exceeds the standard value	Stopped	Inverter temperature is the standard value or less
Compressor system malfunction	When the internal system malfunction stop occurs repeatedly	Stopped	Power switch OFF
Compressor high voltage system malfunction	When the standard value voltage is input to AC inverter	Stopped	Power switch OFF
Compressor communication malfunction HVAC → COMP	When the electric compressor cannot receive the signal transmitted from the A/C auto amp	Stopped	LIN communication returns to normal
Compressor internal system malfunction	When a malfunction is detected in the CPU, ROM or RAM of the inverter	Stopped	Power switch OFF
Compressor HVIL circuit malfunction	When HVIL open circuit is detected in electric compressor system	Stopped	HVIL circuit in electric compressor system returns to normal
Compressor communication malfunction COMP → HVAC	When the A/C auto amp cannot receive the signal transmitted from the electric compressor	Stopped	LIN communication returns to normal
Compressor voltage limit	When the command speed control is disabled due to voltage decrease of high voltage system	Compressor speed is limited.	Voltage of high voltage system returns to normal
Compressor motor current limit	When the command speed control is disabled due to decrease of motor upper limit	Compressor speed is limited.	Motor current returns to normal
Compressor overheat	When the inverter temperature exceeds the standard value	Compressor speed is limited.	Inverter temperature is the standard value or less

- When the PTC heater detects the following conditions, PTC heater operation is stopped.

A/C AUTO AMP.

< ECU DIAGNOSIS INFORMATION >

[AUTO A/C (WITH HEAT PUMP)]

Malfunction judgment item	Description	Recovery condition
PTC heater overheat protection	When PTC heater circuit board internal temperature is 115°C or higher	PTC heater circuit board internal temperature is less than 115°C
PTC heater voltage malfunction	When supply voltage input to PTC heater is out of the standard	Supply voltage input to PTC heater returns to within the standard
PTC heater circuit 1 malfunction	When PTC heater circuit (PTC1) system malfunction is detected	Power switch OFF
PTC heater circuit 2 malfunction	When PTC heater circuit (PTC2) system malfunction is detected	Power switch OFF
PTC heater LIN communication malfunction	When there is a malfunction in the signal transmitted from the PTC heater	LIN communication returns to normal
PTC heater communication malfunction	When there is a malfunction in the signal transmitted from the A/C auto amp. or in the signal received by the PTC heater	LIN communication returns to normal
HVAC LIN communication malfunction	When there is a malfunction in the signal transmitted from the A/C auto amp.	LIN communication returns to normal

- A/C auto amp. stops the electric compressor operation, when the following condition detections is received from a heat pump control unit.

Malfunction judgment item	Description	Recovery condition
A/C auto amp. LIN communication malfunction	When there is a malfunction in the signal transmitted from the heat pump control unit	LIN communication returns to normal
Compressor discharge refrigerant temperature sensor malfunction	Open circuit or short circuit is detected in the compressor discharge refrigerant temperature sensor circuit	Voltage value of compressor discharge refrigerant temperature sensor circuit returns to normal
Compressor suction refrigerant temperature sensor malfunction	Open circuit or short circuit is detected in the compressor suction refrigerant temperature sensor circuit	Voltage value of compressor suction refrigerant temperature sensor circuit returns to normal
Refrigerant channel switching 2 way type valve circuit malfunction	When the heat pump control unit detects a malfunction of the refrigerant channel switching 2 way type valve control signal status, compared to the valve status of the control that is being judged	Power switch OFF
Refrigerant channel switching 3 way type valve circuit malfunction	When the heat pump control unit detects a malfunction of the refrigerant channel switching 3 way type valve control signal status, compared to the valve status of the control that is being judged	Power switch OFF

DTC Index

INFOID:000000011005869

DTC	Items (CONSULT screen terms)	Reference
U1000	CAN COMM CIRCUIT	HAC-87. "DTC Logic"
U1010	CONTROL UNIT (CAN)	HAC-88. "DTC Logic"
B2578	IN-VEHICLE SENSOR	HAC-89. "DTC Logic"
B2579	IN-VEHICLE SENSOR	
B257B	AMBIENT SENSOR	HAC-92. "DTC Logic"
B257C	AMBIENT SENSOR	
B2581	INTAKE SENSOR	HAC-95. "DTC Logic"
B2582	INTAKE SENSOR	
B2630*	SUNLOAD SENSOR	HAC-98. "DTC Logic"
B2631*	SUNLOAD SENSOR	
B2770	PTC HEATER CIRCUIT	HAC-101. "DTC Logic"

A/C AUTO AMP.

< ECU DIAGNOSIS INFORMATION >

[AUTO A/C (WITH HEAT PUMP)]

DTC	Items (CONSULT screen terms)	Reference
B2771	PTC HEATER OVERHEAT PROTECT	HAC-101, "DTC Logic"
B2772	PTC HEATER VOLTAGE	HAC-101, "DTC Logic"
B2773	PTC HEATER CIRCUIT 1	HAC-101, "DTC Logic"
B2774	PTC HEATER CIRCUIT 2	
B2777	PTC HEATER LIN COMMUNICATION	HAC-104, "DTC Logic"
B2779	PTC HEATER COMMUNICATION	
B277B	HVAC LIN COMMUNICATION	
B27A0	INTAKE DOOR MOTOR	HAC-106, "DTC Logic"
B27A1	INTAKE DOOR MOTOR	
B27A2	AIR MIX DOOR MOTOR	HAC-110, "DTC Logic"
B27A3	AIR MIX DOOR MOTOR	
B27A4	AIR MIX DOOR MOTOR	
B27A5	AIR MIX DOOR MOTOR	
B27A6	MODE DOOR MOTOR	HAC-113, "DTC Logic"
B27A7	MODE DOOR MOTOR	
B27A8	MODE DOOR MOTOR	
B27A9	MODE DOOR MOTOR	
B27B1	COMP LOW VOLTAGE	HAC-116, "DTC Logic"
B27B2	COMP HIGH VOLTAGE	
B27B3	COMP INTNL COMM	
B27B4	COMP LO VOL SYS	HAC-119, "DTC Logic"
B27B5	COMP INTNL CIRC	HAC-121, "DTC Logic"
B27B6	COMP INTNL CIRC	
B27B7	COMP CURNT SENS	
B27B8	COMP OVER LOADED	HAC-122, "DTC Logic"
B27B9	COMP OVERHEAT	HAC-124, "DTC Logic"
B27BA	COMP SYSTEM	HAC-121, "DTC Logic"
B27BB	COMP HI VOL SYS	HAC-116, "DTC Logic"
B27BC	COMP COMM ERROR HVAC->COMP	HAC-125, "DTC Logic"
B27BE	COMP INTNL SYS	HAC-121, "DTC Logic"
B27BF	COMP INTNL CIRC	HAC-129, "DTC Logic"
B27C0	COMP COMM ERROR COMP->HVAC	HAC-133, "DTC Logic"
B27C1	A/C AUTO AMP. LIN COMM	HAC-139, "DTC Logic"
B27C2	PTC OUT AIR TEMP SENS	HAC-142, "DTC Logic"
B27C3	PTC OUT AIR TEMP SENS	
B27C4	A/C UNIT CASE TEMP SENS	HAC-145, "DTC Logic"
B27C5	A/C UNIT CASE TEMP SENS	
B27C6	COMP DISCHG TEMP SENS	HAC-148, "DTC Logic"
B27C7	COMP DISCHG TEMP SENS	
B27C8	COMP SUCTION TEMP SENS	HAC-151, "DTC Logic"
B27C9	COMP SUCTION TEMP SENS	
B27CC	COMP VOL LIMIT	HAC-137, "DTC Logic"
B27CD	COMP MTR CURRNT LMT	
B27CE	COMP OVERHEAT	HAC-138, "DTC Logic"

A/C AUTO AMP.

< ECU DIAGNOSIS INFORMATION >

[AUTO A/C (WITH HEAT PUMP)]

DTC	Items (CONSULT screen terms)	Reference
B27F0	2-WAY TYPE VALVE CIRC	HAC-154, "DTC Logic"
B27F1	2-WAY TYPE VALVE CIRC	HAC-157, "DTC Logic"
B27F2	2-WAY TYPE VALVE CIRC	HAC-160, "DTC Logic"
B27F3	3-WAY TYPE VALVE CIRC	HAC-163, "DTC Logic"
B27F4	3-WAY TYPE VALVE CIRC	HAC-166, "DTC Logic"
B27F5	3-WAY TYPE VALVE CIRC	HAC-169, "DTC Logic"
B27FF	CONFIG NOT IMPLEM	HAC-172, "DTC Logic"

*: Perform self-diagnosis under sunshine. When performing indoors, aim a light (more than 60 W) at sunload sensor, otherwise self-diagnosis indicates even though the sunload sensor is functioning normally.

HEAT PUMP CONTROL UNIT

< ECU DIAGNOSIS INFORMATION >

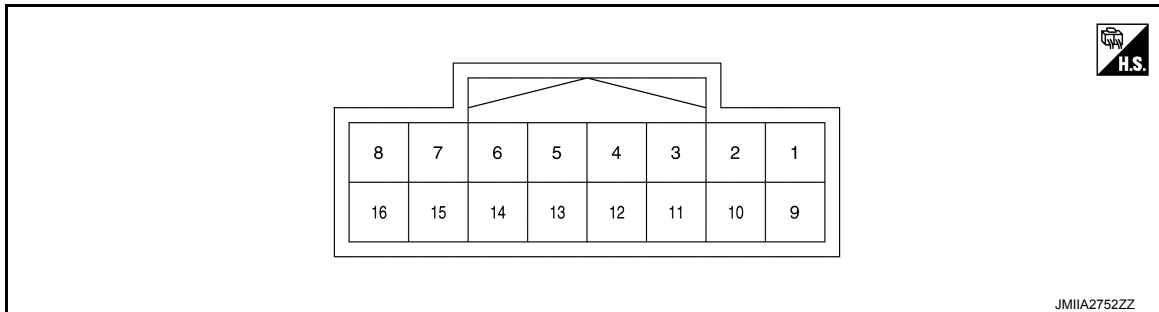
[AUTO A/C (WITH HEAT PUMP)]

HEAT PUMP CONTROL UNIT

Reference Value

INFOID:000000011005870

TERMINAL LAYOUT



INPUT/OUTPUT SIGNAL STANDARD

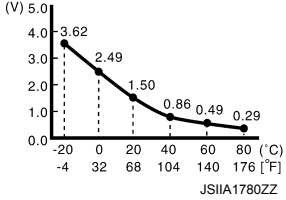
Terminal No. (Wire color)		Item		Test condition	Standard
+	-	Signal name	Input/ Output		
1 (BR)	16 (B)	LIN	Input/ Output	Power switch ON	<p>JSIIA1667ZZ</p>
2 (V)	16 (B)	Compressor discharge refrigerant temperature signal	Input	<ul style="list-style-type: none"> Power switch ON When air conditioner is operating 	<p>JSIIA1779ZZ</p>
6 (LG)	16 (B)	Refrigerant channel switching 2 way type valve signal	Output	<ul style="list-style-type: none"> Power switch ON Heat ON and FULL HOT operation 	9.5 – 13.5 V
				<ul style="list-style-type: none"> Power switch ON A/C ON and FULL COLD operation 	0 – 1 V
7 (W)	16 (B)	Refrigerant channel switching 3 way type valve signal	Output	<ul style="list-style-type: none"> Power switch ON Heat ON and FULL HOT operation 	9.5 – 13.5 V
				<ul style="list-style-type: none"> Power switch ON A/C ON and FULL COLD operation 	0 – 1 V
8 (B)	16 (B)	Sensor ground	—	Power switch ON	0 – 0.1 V
9 (V)	16 (B)	Battery power supply	Input	Power switch OFF	11 – 14 V

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HEAT PUMP CONTROL UNIT

< ECU DIAGNOSIS INFORMATION >

[AUTO A/C (WITH HEAT PUMP)]

Terminal No. (Wire color)		Item		Test condition	Standard
+	-	Signal name	Input/ Output		
11 (R)	16 (B)	Compressor suction refrigerant temperature signal	Input	<ul style="list-style-type: none"> Power switch ON When air conditioner is operating 	
16 (B)	Ground	Ground	—	Power switch ON	0 – 0.1 V

AUTOMATIC AIR CONDITIONING SYSTEM

[AUTO A/C (WITH HEAT PUMP)]

< WIRING DIAGRAM >

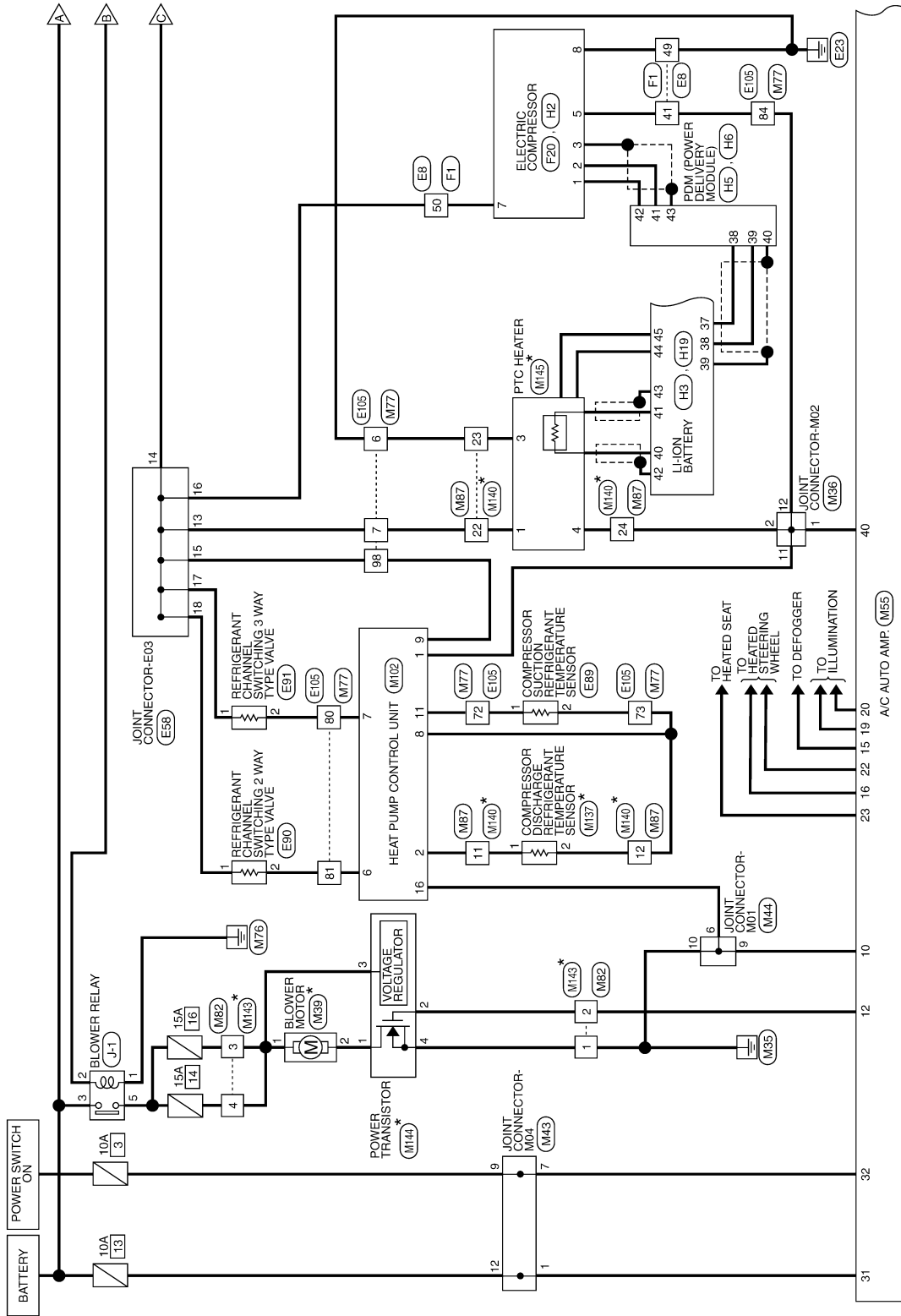
WIRING DIAGRAM

AUTOMATIC AIR CONDITIONING SYSTEM

Wiring Diagram

INFOID:000000011005871

AUTOMATIC AIR CONDITIONING SYSTEM - WITH HEAT PUMP



* : THIS CONNECTOR IS NOT SHOWN IN "HARNES LAYOUT" OF PG SECTION

AAIWA0185GB

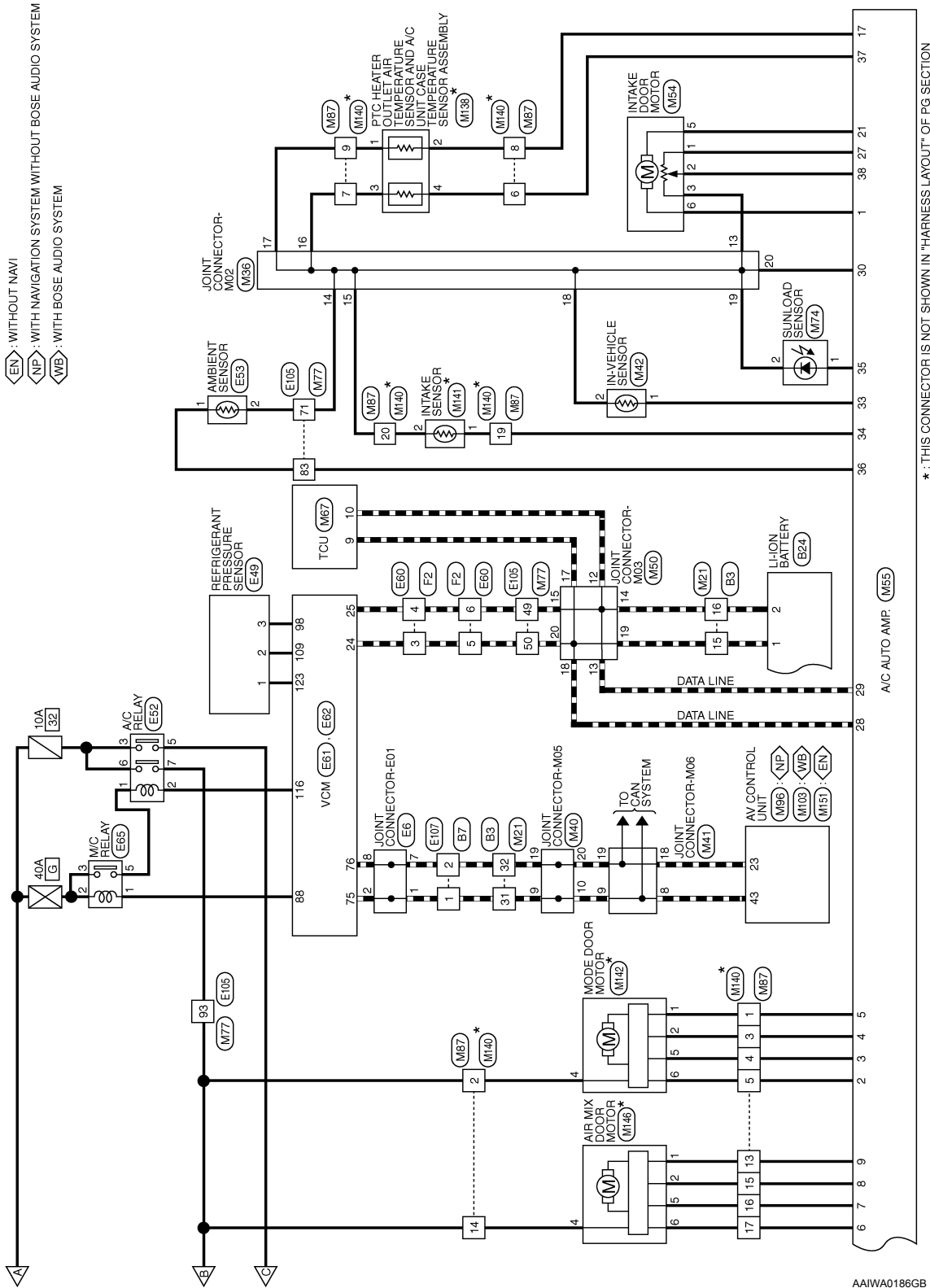
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AUTOMATIC AIR CONDITIONING SYSTEM

[AUTO A/C (WITH HEAT PUMP)]

< WIRING DIAGRAM >



*: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT" OF PG SECTION

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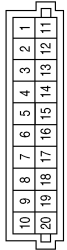
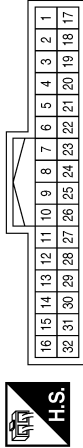
AUTOMATIC AIR CONDITIONING SYSTEM

< WIRING DIAGRAM >

[AUTO A/C (WITH HEAT PUMP)]

AUTOMATIC AIR CONDITIONING SYSTEM - WITH HEAT PUMP - CONNECTORS

Connector No.	M21
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Connector No.	M36
Connector Name	JOINT CONNECTOR-M02
Connector Color	GRAY

Terminal No.	Color of Wire	Signal Name
16	R	-
17	R	-
18	R	-
19	R	-
20	R	-

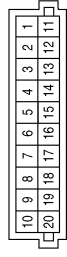
Terminal No.	Color of Wire	Signal Name
15	L	-
16	G	-
31	L	-
32	P	-

Terminal No.	Color of Wire	Signal Name
1	SB	-
2	SB	-
11	BR	-
12	L	-
13	B	-
14	R	-
15	R	-

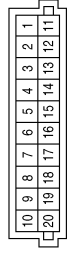
Connector No.	M39
Connector Name	BLOWER MOTOR
Connector Color	GRAY



Connector No.	M40
Connector Name	JOINT CONNECTOR-M05
Connector Color	BLUE



Connector No.	M41
Connector Name	JOINT CONNECTOR-M06
Connector Color	BLUE



Terminal No.	Color of Wire	Signal Name
1	B/W	-
2	L	-

Terminal No.	Color of Wire	Signal Name
9	L	-
10	L	-
19	P	-
20	P	-

Terminal No.	Color of Wire	Signal Name
8	L	-
9	L	-
18	P	-
19	P	-

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AUTOMATIC AIR CONDITIONING SYSTEM

< WIRING DIAGRAM >

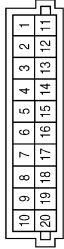
[AUTO A/C (WITH HEAT PUMP)]

Connector No.	M42
Connector Name	IN-VEHICLE SENSOR
Connector Color	WHITE



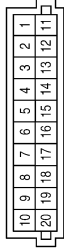
Terminal No.	Color of Wire	Signal Name
1	LG	-
2	R	-

Connector No.	M43
Connector Name	JOINT CONNECTOR-M04
Connector Color	GRAY



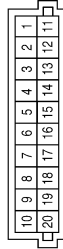
Terminal No.	Color of Wire	Signal Name
1	G	-
7	Y	-
9	W	-
12	Y	-

Connector No.	M44
Connector Name	JOINT CONNECTOR-M01
Connector Color	GRAY



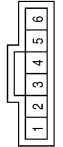
Terminal No.	Color of Wire	Signal Name
6	B	-
9	B	-
10	B	-

Connector No.	M50
Connector Name	JOINT CONNECTOR-M03
Connector Color	PINK



Terminal No.	Color of Wire	Signal Name
12	G	-
13	G	-
14	G	-
15	G	-
17	L	-
18	L	-
19	L	-
20	L	-

Connector No.	M54
Connector Name	INTAKE DOOR MOTOR
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	W	-
2	SB	-
3	B	-
4	-	-
5	G	-
6	V	-

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AUTOMATIC AIR CONDITIONING SYSTEM


< WIRING DIAGRAM >

[AUTO A/C (WITH HEAT PUMP)]

Terminal No.	Color of Wire	Signal Name
26	-	-
27	W	5V OUT
28	L	CAN-H
29	G	CAN-L
30	R	S GND
31	G	BAT
32	Y	IGN 1
33	LG	INC S
34	G	INT S
35	P	SUN S
36	GR	AMB S
37	Y	TA 2
38	SB	INT F/B
39	-	-
40	SB	LIN

Terminal No.	Color of Wire	Signal Name
9	L	MIX1
10	B	GND
11	-	-
12	GR	BLR PWM
13	-	-
14	-	-
15	W	REAR DEF
16	LG	STRG HEATER SW
17	W	TA1
18	-	-
19	W	ILL+
20	B	ILL-
21	G	FRESH
22	V	STEER RLY
23	SB	HEATER SEAT RLY
24	-	-
25	-	-

Connector No.	M55
Connector Name	A/C AUTO AMP.
Connector Color	WHITE



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40


Terminal No.	Color of Wire	Signal Name
1	V	REC
2	R	MODE4
3	P	MODE3
4	BG	MODE2
5	V	MODE1
6	BR	MIX4
7	GR	MIX3
8	LG	MIX2

Connector No.	M74
Connector Name	SUNLOAD SENSOR
Connector Color	WHITE




Terminal No.	Color of Wire	Signal Name
1	P	-
2	R	-

Connector No.	M67
Connector Name	TCU
Connector Color	WHITE



2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39

Terminal No.	Color of Wire	Signal Name
9	L	EV CAN-H
10	G	EV CAN-L

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AUTOMATIC AIR CONDITIONING SYSTEM

< WIRING DIAGRAM >

[AUTO A/C (WITH HEAT PUMP)]

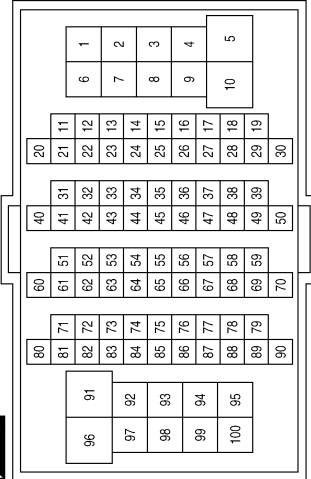
Connector No.	M82
Connector Name	WIRE TO WIRE
Connector Color	WHITE



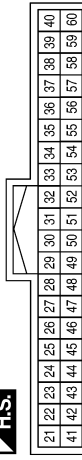
Terminal No.	Color of Wire	Signal Name
1	B	-
2	GR	-
3	Y	-
4	Y	-

Terminal No.	Color of Wire	Signal Name
6	P	-
7	GR	-
49	G	-
50	L	-
71	R	-
72	R	-
73	B	-
80	W	-
81	LG	-
83	GR	-
84	L	-
93	W	-
98	V	-

Connector No.	M77
Connector Name	WIRE TO WIRE
Connector Color	WHITE



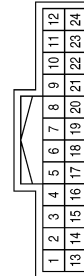
Connector No.	M96
Connector Name	AV CONTROL UNIT (WITH NAVIGATION SYSTEM WITHOUT BOSE)
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
23	P	CAN-L
43	L	CAN-H

Terminal No.	Color of Wire	Signal Name
9	R	-
11	V	-
12	B	-
13	L	-
14	W	-
15	LG	-
16	GR	-
17	BR	-
19	G	-
20	R	-
22	GR	-
23	P	-
24	SB	-

Connector No.	M87
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	V	-
2	W	-
3	BG	-
4	P	-
5	R	-
6	Y	-
7	R	-
8	W	-


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AUTOMATIC AIR CONDITIONING SYSTEM

< WIRING DIAGRAM >

[AUTO A/C (WITH HEAT PUMP)]

Connector No.	M103
Connector Name	AV CONTROL UNIT (WITH NAVIGATION SYSTEM WITH BOSE)
Connector Color	WHITE




21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60

Terminal No.	Color of Wire	Signal Name
23	P	CAN-L
43	L	CAN-H

Terminal No.	Color of Wire	Signal Name
5	-	-
6	LG	-
7	W	-
8	B	-
9	V	-
10	-	-
11	R	-
12	-	-
13	-	-
14	-	-
15	-	-
16	B	-


Connector No.	M102
Connector Name	HEAT PUMP CONTROL UNIT
Connector Color	WHITE



8	7	6	5	4	3	2	1
16	15	14	13	12	11	10	9

Terminal No.	Color of Wire	Signal Name
1	BR	-
2	V	-
3	-	-
4	-	-


Connector No.	M138
Connector Name	PTC HEATER OUTLET AIR TEMPERATURE SENSOR AND A/C UNIT CASE TEMPERATURE SENSOR ASSEMBLY
Connector Color	WHITE



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Terminal No.	Color of Wire	Signal Name
1	OW	-
2	L/W	-
3	Y/R	-
4	G/R	-

Connector No.	M137
Connector Name	COMPRESSOR DISCHARGE REFRIGERANT TEMPERATURE SENSOR
Connector Color	GRAY



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Terminal No.	Color of Wire	Signal Name
1	BR/Y	-
2	W/L	-

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AUTOMATIC AIR CONDITIONING SYSTEM

< WIRING DIAGRAM >

[AUTO A/C (WITH HEAT PUMP)]

Connector No.	M141
Connector Name	INTAKE SENSOR
Connector Color	BROWN



Terminal No.	Color of Wire	Signal Name
1	R/G	-
2	Y/G	-

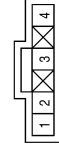
Terminal No.	Color of Wire	Signal Name
11	BR/Y	-
12	W/L	-
13	L	-
14	B/W	-
15	BR	-
16	G	-
17	R	-
19	R/G	-
20	Y/G	-
22	W/B	-
23	R/B	-
24	L/B	-

Connector No.	M140
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	V	-
2	B	-
3	Y	-
4	W	-
5	O	-
6	G/R	-
7	Y/R	-
8	L/W	-
9	O/W	-

Connector No.	M144
Connector Name	POWER TRANSISTOR
Connector Color	BLACK



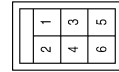
Terminal No.	Color of Wire	Signal Name
1	L	-
2	Y	-
3	B/W	-
4	V	-

Connector No.	M143
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	V	-
2	Y	-
3	B/W	-
4	B/W	-

Connector No.	M142
Connector Name	MODE DOOR MOTOR
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	V	-
2	Y	-
3	-	-
4	B	-
5	W	-
6	O	-

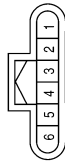
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AUTOMATIC AIR CONDITIONING SYSTEM

[AUTO A/C (WITH HEAT PUMP)]

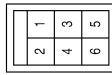
< WIRING DIAGRAM >

Connector No.	M145
Connector Name	PTC HEATER
Connector Color	BLACK



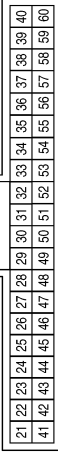
Terminal No.	Color of Wire	Signal Name
1	W/B	-
2	-	-
3	R/B	-
4	L/B	-
5	-	-
6	-	-

Connector No.	M146
Connector Name	AIR MIX DOOR MOTOR
Connector Color	BLACK



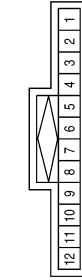
Terminal No.	Color of Wire	Signal Name
1	L	-
2	BR	-
3	-	-
4	B/W	-
5	G	-
6	R	-

Connector No.	M151
Connector Name	AV CONTROL UNIT (WITHOUT NAVIGATION)
Connector Color	WHITE



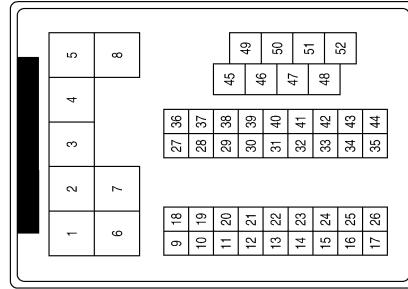
Terminal No.	Color of Wire	Signal Name
23	P	CAN-L
43	L	CAN-H

Connector No.	E6
Connector Name	JOINT CONNECTOR-E01
Connector Color	BLUE



Terminal No.	Color of Wire	Signal Name
1	L	-
2	L	-
7	P	-
8	P	-

Connector No.	E8
Connector Name	WIRE TO WIRE
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
41	L	-
49	B/R	-
50	W	-

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

AUTOMATIC AIR CONDITIONING SYSTEM

[AUTO A/C (WITH HEAT PUMP)]

< WIRING DIAGRAM >

Connector No.	E53
Connector Name	AMBIENT SENSOR
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	GR	-
2	LG	-

Connector No.	E52
Connector Name	A/C RELAY
Connector Color	BROWN



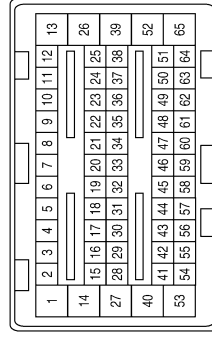
Terminal No.	Color of Wire	Signal Name
1	W	-
2	BR	-
3	R	-
5	W	-
6	R	-
7	O	-

Connector No.	E49
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Color	BLACK



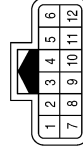
Terminal No.	Color of Wire	Signal Name
1	BR	-
2	B	-
3	SB	-

Connector No.	E61
Connector Name	VCM
Connector Color	BLACK



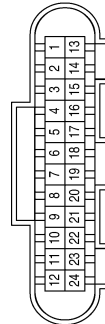
Terminal No.	Color of Wire	Signal Name
24	L	EV SYSTEM CAN-H
25	G	EV SYSTEM CAN-L

Connector No.	E60
Connector Name	WIRE TO WIRE
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
3	L	-
4	G	-
5	L	-
6	G	-

Connector No.	E58
Connector Name	JOINT CONNECTOR-E03
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
13	W	-
14	W	-
15	W	-
16	W	-
17	W	-
18	W	-

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AUTOMATIC AIR CONDITIONING SYSTEM

< WIRING DIAGRAM >

[AUTO A/C (WITH HEAT PUMP)]

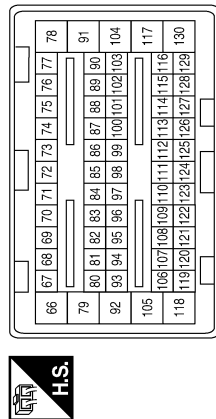
Connector No.	E65
Connector Name	M/C RELAY
Connector Color	BLUE



Terminal No.	Color of Wire	Signal Name
1	SB	-
2	R	-
3	R	-
5	W	-

Terminal No.	Color of Wire	Signal Name
75	L	CAN-H
76	P	CAN-L
88	SB	M/C RELAY SENSOR POWER SUPPLY (REFRIGERANT PRESSURE SENSOR)
98	SB	REFRIGERANT PRESSURE SENSOR
109	B	REFRIGERANT PRESSURE SENSOR
116	SB	A/C RELAY
123	BR	SENSOR GROUND (REFRIGERANT PRESSURE SENSOR)

Connector No.	E62
Connector Name	VCN
Connector Color	BROWN

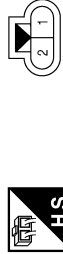


Connector No.	E91
Connector Name	REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	W	-
2	P	-

Connector No.	E90
Connector Name	REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE
Connector Color	GRAY



Terminal No.	Color of Wire	Signal Name
1	W	-
2	SB	-

Connector No.	E89
Connector Name	COMPRESSOR SUCTION REFRIGERANT TEMPERATURE SENSOR
Connector Color	BROWN



Terminal No.	Color of Wire	Signal Name
1	R	-
2	B	-

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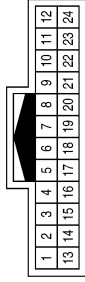
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AUTOMATIC AIR CONDITIONING SYSTEM

< WIRING DIAGRAM >

[AUTO A/C (WITH HEAT PUMP)]

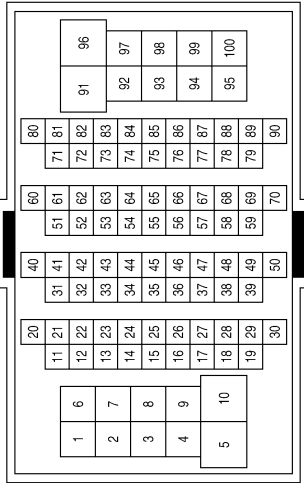
Connector No.	E107
Connector Name	WIRE TO WIRE
Connector Color	WHITE



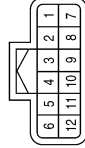
Terminal No.	Color of Wire	Signal Name
1	L	-
2	P	-

Terminal No.	Color of Wire	Signal Name
6	B/R	-
7	W	-
49	G	-
50	L	-
71	LG	-
72	R	-
73	B	-
80	P	-
81	SB	-
83	GR	-
84	L	-
93	O	-
98	W	-

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Color	WHITE



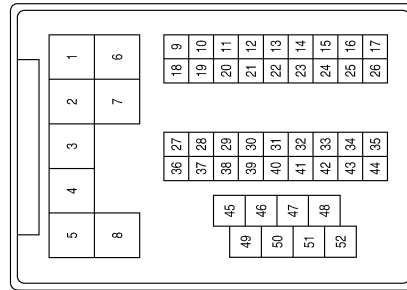
Connector No.	F2
Connector Name	WIRE TO WIRE
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
3	L	-
4	G	-
5	L	-
6	G	-

Terminal No.	Color of Wire	Signal Name
41	L	-
49	B	-
50	W	-

Connector No.	F1
Connector Name	WIRE TO WIRE
Connector Color	BLACK



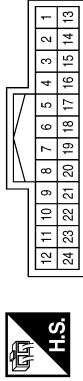
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AUTOMATIC AIR CONDITIONING SYSTEM

< WIRING DIAGRAM >

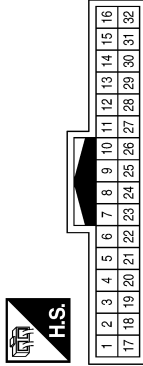
[AUTO A/C (WITH HEAT PUMP)]

Connector No.	B7
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	L	-
2	P	-

Connector No.	B3
Connector Name	WIRE TO WIRE
Connector Color	WHITE



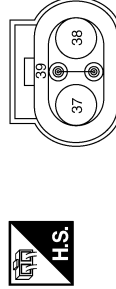
Terminal No.	Color of Wire	Signal Name
15	L	-
16	G	-
31	L	-
32	P	-

Connector No.	F20
Connector Name	ELECTRIC COMPRESSOR (WITH HEAT PUMP)
Connector Color	BLACK



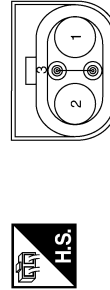
Terminal No.	Color of Wire	Signal Name
4	-	-
5	L	-
6	-	-
7	W	-
8	B	-
9	-	-

Connector No.	H3
Connector Name	LI-ION BATTERY
Connector Color	ORANGE



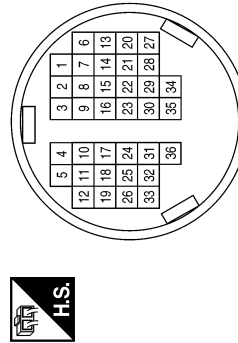
Terminal No.	Color of Wire	Signal Name
37	O	-
38	O	-
39	SHIELD	-

Connector No.	H2
Connector Name	ELECTRIC COMPRESSOR (WITH HEAT PUMP)
Connector Color	ORANGE



Terminal No.	Color of Wire	Signal Name
1	O	-
2	O	-
3	SHIELD	-

Connector No.	B24
Connector Name	LI-ION BATTERY
Connector Color	GREEN



Terminal No.	Color of Wire	Signal Name
1	L	EV CAN-H
2	G	EV CAN-L

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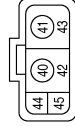
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AUTOMATIC AIR CONDITIONING SYSTEM

[AUTO A/C (WITH HEAT PUMP)]

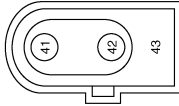
< WIRING DIAGRAM >

Connector No.	H19
Connector Name	LI-ION BATTERY
Connector Color	ORANGE



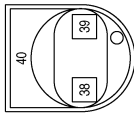
Terminal No.	Color of Wire	Signal Name
40	O	P (+)
41	O	N (-)
42	SHIELD	SHIELD (+)
43	SHIELD	SHIELD (-)
44	GR	HIGH VOLTAGE CABLE CONNECTION - DETECTING CIRCUIT (IN)
45	GR	HIGH VOLTAGE CABLE CONNECTION - DETECTING CIRCUIT (OUT)

Connector No.	H6
Connector Name	PDM (POWER DELIVERY MODULE)
Connector Color	ORANGE



Terminal No.	Color of Wire	Signal Name
41	O	-
42	O	-
43	SHIELD	-

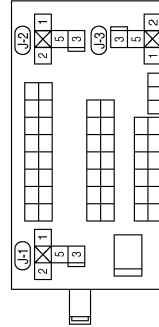
Connector No.	H5
Connector Name	PDM (POWER DELIVERY MODULE)
Connector Color	ORANGE



Terminal No.	Color of Wire	Signal Name
38	O	-
39	O	-
40	SHIELD	-

Terminal No.	Color of Wire	Signal Name
3	W	-
4	-	-
5	Y	-

Connector No.	J-1
Connector Name	BLOWER RELAY
Connector Color	-



Terminal No.	Color of Wire	Signal Name
1	B	-
2	W	-

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DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

[AUTO A/C (WITH HEAT PUMP)]

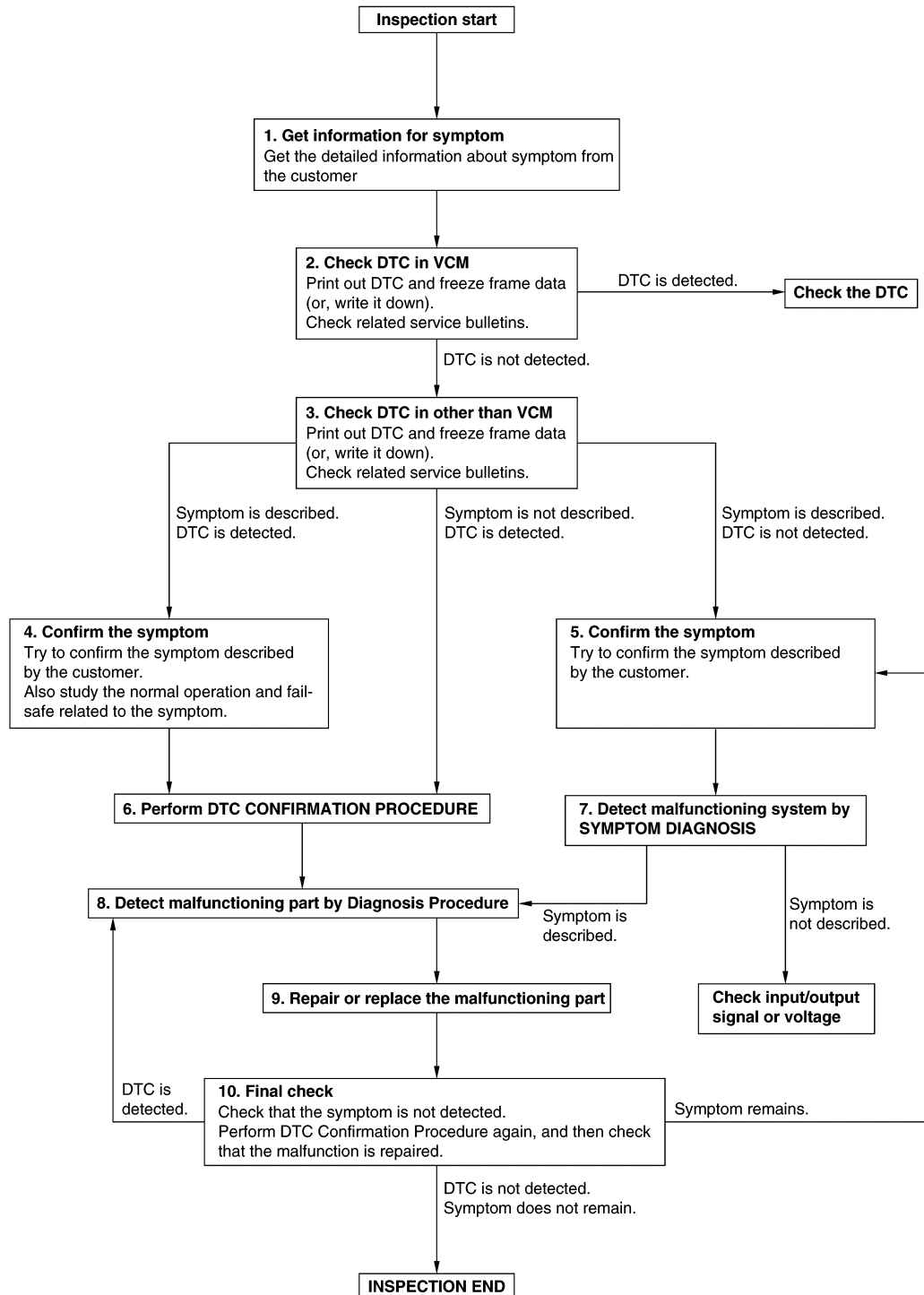
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:000000011005872

OVERALL SEQUENCE



DETAILED FLOW

Revision: June 2014

HAC-75

2015 LEAF

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DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

[AUTO A/C (WITH HEAT PUMP)]

1. GET INFORMATION FOR SYMPTOM

1. Get detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurs).
2. Check operation condition of the function that is malfunctioning.

>> GO TO 2.

2. CHECK DTC IN VCM

1. Check DTC in VCM.
2. Check related service bulletins for information.

Are any DTCs detected?

- YES >> Check the DTC logic.
NO >> GO TO 3.

3. CHECK DTC

1. Check DTC.
2. Perform the following procedure if DTC is detected.
 - Record DTC and freeze frame data (Print them out using CONSULT.)
 - Erase DTC.
 - Study the relationship between the cause detected by DTC and the symptom described by the customer.
3. Check related service bulletins for information.

Are any symptoms described and any DTC detected?

- Symptom is described, DTC is detected>>GO TO 4.
Symptom is described, DTC is not detected>>GO TO 5.
Symptom is not described, DTC is detected>>GO TO 6.

4. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
Also study the normal operation and fail-safe related to the symptom.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 7.

6. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the detected DTC, and then check that DTC is detected again. At this time, always connect CONSULT to the vehicle, and check self diagnostic results in real time. If two or more DTCs are detected, refer to DTC INSPECTION PRIORITY CHART, and determine trouble diagnosis order.

NOTE:

- Freeze frame data is useful if the DTC is not detected.
- Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check.
If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIRMATION PROCEDURE.

Is DTC detected?

- YES >> GO TO 8.
NO >> Check intermittent incident. Refer to [GI-53, "Intermittent Incident"](#).

7. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM DIAGNOSIS

DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

[AUTO A/C (WITH HEAT PUMP)]

Detect malfunctioning system according to SYMPTOM DIAGNOSIS based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

Is the symptom described?

YES >> GO TO 8.

NO >> Monitor input data from related sensors or check voltage of related module terminals using CONSULT.

8. DETECT MALFUNCTIONING PART BY DIAGNOSTIC PROCEDURE

Inspect according to Diagnostic Procedure of the system.

Is malfunctioning part detected?

YES >> GO TO 9.

NO >> Check intermittent incident. Refer to [GI-53. "Intermittent Incident"](#).

9. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnostic Procedure again after repair and replacement.
3. Check DTC. If DTC is detected, erase it.

>> GO TO 10.

10. FINAL CHECK

When DTC is detected in step 3, perform DTC CONFIRMATION PROCEDURE again, and then check that the malfunction is repaired securely.

When symptom is described by the customer, refer to confirmed symptom in step 4 or 5, and check that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 8.

YES-2 >> Symptom remains: GO TO 5.

NO >> Before returning the vehicle to the customer, always erase DTC.

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OPERATION INSPECTION

< BASIC INSPECTION >

[AUTO A/C (WITH HEAT PUMP)]

OPERATION INSPECTION

Work Procedure

INFOID:000000011005873

The purpose of the operational check is to check that the individual system operates normally.

1. CHECK MEMORY FUNCTION

1. Set temperature to 90°F (32°C) by operating the temperature control switch.
2. Press OFF switch.
3. Turn ignition switch OFF.
4. Turn ignition switch ON.
5. Press AUTO switch.
6. Check that set temperature is maintained.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> GO TO 10.

2. CHECK AIR FLOW

1. Operate fan control switch.
2. Check that air flow changes. Check operation for all fan speeds.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 10.

3. CHECK AIR OUTLET

1. Operate fan control switch to set the fan speed to maximum speed.
2. Operate MODE switch and DEF switch.
3. Check that air outlets change according to each indicated air outlet by placing a hand in front of the air outlets. Refer to [VTL-11, "System Description"](#).

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 10.

4. CHECK AIR INLET

1. Press intake switch to set the air inlet to recirculation. (Intake switch indicator lamp turns ON.)
2. Listen to intake sound and confirm air inlets change.
3. Press intake switch again to set the air inlet to fresh air intake. (Intake switch indicator lamp turns OFF.)
4. Listen to intake sound and confirm air inlets change.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> GO TO 10.

5. CHECK A/C SWITCH

1. Press A/C switch. The A/C switch indicator lamp is turns ON.
2. Check visually and by sound that the electric compressor operates.
3. Press A/C switch again The A/C switch indicator lamp is turns OFF.
4. Check that electric compressor stops.

Is the inspection result normal?

- YES >> GO TO 6.
NO >> GO TO 10.

6. CHECK DISCHARGE AIR TEMPERATURE

1. Push the HEAT switch and check that the HEAT switch indicator lamp turns ON.
2. Operate temperature control switch.
3. Check that discharge air temperature changes.

Is the inspection result normal?

- YES >> GO TO 7.
NO >> GO TO 10.

OPERATION INSPECTION

< BASIC INSPECTION >

[AUTO A/C (WITH HEAT PUMP)]

7. CHECK TEMPERATURE DECREASE

1. Operate electric compressor.
2. Operate temperature control switch and lower the set temperature to 60° (18°C).
3. Check that cool air blows from the air outlets.

Is the inspection result normal?

- YES >> GO TO 8.
NO >> GO TO 10.

8. CHECK TEMPERATURE INCREASE

1. Operate temperature control switch and raise the set temperature to 90° (32°C).
2. Check that warm air blows from the air outlets.

Is the inspection result normal?

- YES >> GO TO 9.
NO >> GO TO 10.

9. CHECK AUTO MODE

1. Press AUTO switch to confirm that "AUTO" is indicated on the display.
2. Operate temperature control switch to check that air outlet or air flow changes (the air outlet or air flow varies depending on the ambient temperature, in-vehicle temperature, set temperature, and etc.).

Is the inspection result normal?

- YES >> Inspection End.
NO >> GO TO 10.

10. CHECK SELF-DIAGNOSIS WITH CONSULT

1. Perform self-diagnosis with CONSULT.
2. Check that any DTC is detected.

Is any DTC detected?

- YES >> Refer to [HAC-56, "DTC Index"](#) and perform the appropriate diagnosis.
NO >> Refer to [HAC-183, "Symptom Table"](#) and perform the appropriate diagnosis.

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ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (A/C AUTO AMP.)

Description

INFOID:000000011005874

When replacing A/C auto amp., save or print current vehicle specification with CONSULT "Configuration" before replacement.

BEFORE REPLACEMENT

NOTE:

If "READ CONFIGURATION" can not be used, use the "WRITE CONFIGURATION - Manual setting" after replacing A/C auto amp.

AFTER REPLACEMENT

CAUTION:

- When replacing A/C auto amp., you must perform "WRITE CONFIGURATION" with CONSULT.
- Never perform "WRITE CONFIGURATION" except for new A/C auto amp.

Work Procedure

INFOID:000000011005875

1. SAVING VEHICLE SPECIFICATION

ⓅCONSULT Configuration

Perform "READ CONFIGURATION" to save or print current vehicle specification. Refer to [HAC-81. "Description"](#).

NOTE:

If "READ CONFIGURATION" can not be used, use the "WRITE CONFIGURATION - Manual setting" after replacing A/C auto amp.

>> GO TO 2.

2. REPLACE A/C AUTO AMP.

Replace A/C auto amp. Refer to [HAC-187. "Removal and Installation"](#).

>> GO TO 3.

3. WRITING VEHICLE SPECIFICATION

ⓅCONSULT Configuration

Perform "WRITE CONFIGURATION - Config file" or "WRITE CONFIGURATION - Manual setting" to write vehicle specification. Refer to [HAC-81. "Work Procedure"](#).

>> Work End.

CONFIGURATION (HVAC)

< BASIC INSPECTION >

[AUTO A/C (WITH HEAT PUMP)]

CONFIGURATION (HVAC)

Description

INFOID:000000011005876

Vehicle specification needs to be written with CONSULT because it is not written after replacing A/C auto amp. Configuration has three functions as follows

Function	Description
READ CONFIGURATION	<ul style="list-style-type: none">• Reads the vehicle configuration of current A/C auto amp.• Saves the read vehicle configuration.
WRITE CONFIGURATION - Manual setting	Writes the vehicle configuration with manual setting.
WRITE CONFIGURATION - Config file	Writes the vehicle configuration with saved data.

CAUTION:

- When replacing A/C auto amp., you must perform “WRITE CONFIGURATION” with CONSULT.
- Never perform “WRITE CONFIGURATION” except for new A/C auto amp.

Work Procedure

INFOID:000000011005877

1. WRITING MODE SELECTION

 CONSULT Configuration
Select “CONFIGURATION” of A/C auto amp.


When writing saved data>>GO TO 2.
When writing manually>>GO TO 3.

2. PERFORM “WRITE CONFIGURATION - CONFIG FILE”

 CONSULT Configuration
Perform “WRITE CONFIGURATION - Config file”.

>> Work End.

3. PERFORM “WRITE CONFIGURATION - MANUAL SETTING”

 CONSULT Configuration
Select “WRITE CONFIGURATION - Manual setting” to write vehicle specifications into the A/C auto amp. For data to write, refer to [HAC-81, "Configuration List"](#).

CAUTION:

- Thoroughly read and understand the vehicle specification. Incorrect settings may result in abnormal control of ECU.
- Make sure to select “SETTING” even if the indicated configuration of brand new A/C auto amp. is same as the desirable configuration. If not, configuration which is set automatically by selecting vehicle model can not be memorized.

NOTE:

If items are not displayed, touch “SETTING”. Refer to [HAC-81, "Configuration List"](#) for written items and setting value.

>> GO TO 4.

4. OPERATION CHECK

Confirm that each function controlled by A/C auto amp. operates normally.

>> Work End.

Configuration List

INFOID:000000011005878

CAUTION:

CONFIGURATION (HVAC)

< BASIC INSPECTION >

[AUTO A/C (WITH HEAT PUMP)]

Thoroughly read and understand the vehicle specification. ECU control may not operate normally if the setting is not correct.

Setting Item		NOTE
Item	Value	
HANDLE	RHD ⇔ LHD	—
THEFT WARNING ALARM WITH SIREN	WITH ⇔ WITHOUT	<ul style="list-style-type: none">• WITH: With siren control unit• WITHOUT: Without siren control unit

⇔: Items which confirm vehicle specifications

SYSTEM SETTING

< BASIC INSPECTION >

[AUTO A/C (WITH HEAT PUMP)]

SYSTEM SETTING

Temperature Setting Trimmer

INFOID:0000000011005879

DESCRIPTION

If the temperature felt by the customer is different from the air flow temperature controlled by the temperature setting, the A/C auto amp. control temperature can be adjusted to compensate for the temperature setting.

HOW TO SET

Ⓜ With CONSULT

Perform "TEMP SET CORRECT" in "Work support" of "HVAC".

Work support items	Display (°C)	Display (°F)
TEMP SET CORRECT	3.0	6
	2.5	5
	2.0	4
	1.5	3
	1.0	2
	0.5	1
	0 (initial status)	0 (initial status)
	-0.5	-1
	-1.0	-2
	-1.5	-3
	-2.0	-4
	-2.5	-5
	-3.0	-6

NOTE:

- When -3.0°C (-6°F) is corrected on the temperature setting set as 25.0°C (77°F) the temperature controlled by A/C auto amp. is 25.0°C (77°F) -3.0°C (-6°F) = 22.0°C (72°F) and the temperature becomes lower than the temperature setting.
- When the 12V battery cable is disconnected from the negative terminal or when the 12V battery voltage becomes 10 V or less, the setting of the difference between the set temperature and control temperature may be cancelled.

Inlet Port Memory Function (REC)

INFOID:0000000011005880

DESCRIPTION

- If the ignition switch is turned to the OFF position while the intake switch is set to ON (recirculation), "Perform the memory" or "Do not perform the memory" of intake switch ON (recirculation) condition can be selected.
- If "Perform the memory" is set, the intake switch is ON (recirculation) when turning the ignition switch to the ON position again.
- If "Do not perform the memory" is set, the air inlets is controlled automatically when turning the ignition switch to the ON position again.

HOW TO SET

Ⓜ With CONSULT

Perform the "REC MEMORY SET" in "Work support" of "HVAC".

Work support items	Display	Setting
REC MEMORY SET	WITHOUT (initial status)	Perform the memory of manual REC
	WITH	Do not perform the memory of manual REC (auto control)

NOTE:

SYSTEM SETTING

< BASIC INSPECTION >

[AUTO A/C (WITH HEAT PUMP)]

When the 12V battery cable is disconnected from the negative terminal or when the 12V battery voltage becomes 10 V or less, the setting of the REC memory function may be cancelled.

Inlet Port Memory Function (FRE)

INFOID:0000000011005881

DESCRIPTION

- If the ignition switch is turned to the OFF position while the intake switch is set to OFF (fresh air intake), “Perform the memory” or “Do not perform the memory” of intake switch OFF (fresh air intake) condition can be selected.
- If “Perform the memory” is set, the intake switch is OFF (fresh air intake) when turning the ignition switch to the ON position again.
- If “Do not perform the memory” is set, the air inlets is controlled automatically when turning the ignition switch to the ON position again.

HOW TO SET

Ⓟ With CONSULT

Perform the “FRE MEMORY SET” in “Work support” of “HVAC”.

Work support items	Display	Setting
FRE MEMORY SET	WITHOUT	Perform the memory of manual FRE
	WITH (initial status)	Do not perform the memory of manual FRE (auto control)

NOTE:

When the 12V battery cable is disconnected from the negative terminal or when the 12V battery voltage becomes 10 V or less, the setting of the FRE memory function may be cancelled.

Foot Position Setting Trimmer

INFOID:0000000011005882

DESCRIPTION

In FOOT mode, the air blowing to DEF can change ON/OFF.

HOW TO SET

Ⓟ With CONSULT

Perform the “BLOW SET” in “Work support” of “HVAC”.

Work support items	Display	Defroster door position	
		Audio control	Manual control
BLOW SET	Mode1 (initial status)	OPEN	CLOSE
	Mode2	OPEN	OPEN
	Mode3	CLOSE	OPEN
	Mode4	CLOSE	CLOSE

NOTE:

When the 12V battery cable is disconnected from the negative terminal or when the 12V battery voltage becomes 10 V or less, the setting of the discharge air mix ratio in FOOT mode may be cancelled.

Compressor Operation Setting at Defroster Mode (Timer/Remote Climate Control)

INFOID:0000000011005883

DESCRIPTION

For A/C-heater timer and remote climate control, change the setting of electric compressor operation during DEF mode.

How to set

Using CONSULT, select “COMP OPRT SET AT DEF MODE (TIM/RMT CLIMT CONT)” in “Work Support” of “HVAC”.

SYSTEM SETTING

< BASIC INSPECTION >

[AUTO A/C (WITH HEAT PUMP)]

Work support items	Display	Setup
COMP OPRT SET AT DEF MODE (TIM/RMT CLIMT CONT)	OFF	During DEF mode operation, the electric compressor stops.
	ON	During DEF mode operation, the electric compressor operates.

A

B

Setting of Compressor Maximum Rotation Speed During Pre Air Conditioning

INFOID:000000011005884

C

DESCRIPTION

The compressor maximum rotation speed during remote or timer air conditioning can be adjusted.

D

How to set

Using CONSULT, select "TARGET MAX RPM ADJ AT PRE-CLIMATE" in "Work support" for "HVAC".

E

Work support items	Note
TARGET MAX RPM ADJ AT PRE-CLIMATE	Raising set value: Improve the cooling performance. Lowering set value: Reduce the operation noise level.

F

Setting of Compressor Maximum Rotation Speed During Idling

INFOID:000000011005885

G

DESCRIPTION

The electric compressor maximum rotation speed during idling can be adjusted.

H

How to set

Using CONSULT, select "TARGET MAX RPM ADJ AT IDL" in "Work support" of "HVAC".

HAC

Work support items	Note
TARGET MAX RPM ADJ AT IDL	Raising set value: Improve the cooling performance. Lowering set value: Reduce the operation noise level.

J

K

L

M

N

O

P

DOOR MOTOR STARTING POSITION RESET

< BASIC INSPECTION >

[AUTO A/C (WITH HEAT PUMP)]

DOOR MOTOR STARTING POSITION RESET

Description

INFOID:000000011005886

- Reset signal is transmitted from A/C auto amp. to air mix door motor and mode door motor. Starting position reset can be performed.

NOTE:

- During reset, DEF switch indicator blinks.
- When air mix door motor or mode door motor is removed and installed, always perform door motor starting position reset.

Work Procedure

INFOID:000000011005887

1. PERFORM DOOR MOTOR STARTING POSITION RESET

④ With CONSULT

1. Turn ignition switch ON.
2. Select "Door Motor Starting Position Reset" in "Work support" of "HVAC" using CONSULT.
3. Touch "Start" and wait a few seconds.
4. Make sure the "COMPLETED" is displayed on CONSULT screen.

>> Inspection End.

U1000 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

DTC/CIRCUIT DIAGNOSIS

U1000 CAN COMM CIRCUIT

Description

INFOID:0000000011005888

CAN (Controller Area Network) is a serial communication line for real time applications. It is an on-board multiplex communication line with high data communication speed and excellent error detection ability. A modern vehicle is equipped with many ECMs, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, 2 control units are connected with 2 communication lines (CAN-L line and CAN-H line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

Refer to [LAN-37, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart"](#) for details of the communication signal.

DTC Logic

INFOID:0000000011005889

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
U1000	CAN COMM CIRCUIT	When A/C auto amp. is not transmitting or receiving CAN communication signal for 2 or more seconds.	CAN communication system

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

 With CONSULT

1. Turn power switch ON and wait at least 2 seconds or more.
2. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
3. Check DTC.

Is DTC detected?

YES >> Refer to [HAC-87, "Diagnosis Procedure"](#).

NO >> Check intermittent incident. Refer to [GI-53, "Intermittent Incident"](#).

Diagnosis Procedure

INFOID:0000000011005890

1. CHECK CAN COMMUNICATION SYSTEM

Check CAN communication system. Refer to [LAN-17, "Trouble Diagnosis Flow Chart"](#).

>> Inspection End.

U1010 CONTROL UNIT (CAN)

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

U1010 CONTROL UNIT (CAN)

Description

INFOID:000000011005891

Initial diagnosis of A/C auto amp.

DTC Logic

INFOID:000000011005892

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
U1010	CONTROL UNIT (CAN)	When detecting error during the initial diagnosis of CAN controller of A/C auto amp.	A/C auto amp.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON.
2. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
3. Check DTC.

Is DTC detected?

YES >> Refer to [HAC-88, "Diagnosis Procedure"](#).

NO >> Inspection End.

Diagnosis Procedure

INFOID:000000011005893

1.REPLACE A/C AUTO AMP.

Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).

>> Inspection End.

B2578, B2579 IN-VEHICLE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B2578, B2579 IN-VEHICLE SENSOR

DTC Logic

INFOID:0000000011005894

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-87, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-88, "DTC Logic"](#).

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2578	IN-VEHICLE SENSOR	The in-vehicle sensor recognition temperature is too high [more than 100°C (212°F)].	<ul style="list-style-type: none"> • In-vehicle sensor • A/C auto amp. • Harness or connectors (The sensor circuit is open or shorted.)
B2579		The in-vehicle sensor recognition temperature is too low [less than -42°C (-44°F)].	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Turn power switch ON.
2. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
3. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-89, "Diagnosis Procedure"](#).
 NO >> Inspection End.

Diagnosis Procedure

INFOID:0000000011005895

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

1. CHECK IN-VEHICLE SENSOR VOLTAGE SIGNAL

1. Turn power switch ON.
2. Operate the automatic air conditioning system.
3. Check voltage signal between A/C auto amp. harness connector terminals.

Connector	A/C auto amp.		Test condition	Voltage signal																											
	+	-																													
Terminal																															
M55	33	10	<ul style="list-style-type: none"> • Power switch ON • When air conditioner is operating 	<table border="1"> <caption>Voltage Signal vs Temperature</caption> <thead> <tr> <th>Temperature (°C)</th> <th>Temperature (°F)</th> <th>Voltage (V)</th> </tr> </thead> <tbody> <tr> <td>-20</td> <td>-4</td> <td>4.41</td> </tr> <tr> <td>-10</td> <td>14</td> <td>4.09</td> </tr> <tr> <td>0</td> <td>32</td> <td>3.68</td> </tr> <tr> <td>10</td> <td>50</td> <td>3.22</td> </tr> <tr> <td>20</td> <td>68</td> <td>2.73</td> </tr> <tr> <td>25</td> <td>77</td> <td>2.49</td> </tr> <tr> <td>30</td> <td>86</td> <td>2.25</td> </tr> <tr> <td>40</td> <td>104</td> <td>1.82</td> </tr> </tbody> </table> <p>JSIIA1662ZZ</p>	Temperature (°C)	Temperature (°F)	Voltage (V)	-20	-4	4.41	-10	14	4.09	0	32	3.68	10	50	3.22	20	68	2.73	25	77	2.49	30	86	2.25	40	104	1.82
Temperature (°C)	Temperature (°F)	Voltage (V)																													
-20	-4	4.41																													
-10	14	4.09																													
0	32	3.68																													
10	50	3.22																													
20	68	2.73																													
25	77	2.49																													
30	86	2.25																													
40	104	1.82																													

Is the inspection result normal?

- YES >> GO TO 7.
 NO >> GO TO 2.

2. CHECK IN-VEHICLE SENSOR POWER SUPPLY

B2578, B2579 IN-VEHICLE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

1. Turn power switch OFF.
2. Disconnect in-vehicle sensor connector.
3. Turn power switch ON.
4. Check voltage between in-vehicle sensor harness connector and ground.

+		-	Voltage (Approx.)
In-vehicle sensor			
Connector	Terminal		
M42	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 5.

3.CHECK IN-VEHICLE SENSOR GROUND CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between in-vehicle sensor harness connector and A/C auto amp. harness connector.

In-vehicle sensor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M42	2	M55	30	Yes

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair harness or connector.

4.CHECK IN-VEHICLE SENSOR

Check in-vehicle sensor. Refer to [HAC-91, "Component Inspection"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).
NO >> Replace in-vehicle sensor. Refer to [HAC-190, "Removal and Installation"](#).

5.CHECK IN-VEHICLE SENSOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between in-vehicle sensor harness connector and A/C auto amp. harness connector.

In-vehicle sensor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M42	1	M55	33	Yes

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair harness or connector.

6.CHECK IN-VEHICLE SENSOR POWER SUPPLY CIRCUIT FOR SHORT

Check continuity between in-vehicle sensor harness connector and ground.

In-vehicle sensor		—	Continuity
Connector	Terminal		
M42	1	Ground	No

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).
NO >> Repair harness or connector.

B2578, B2579 IN-VEHICLE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-53. "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187. "Removal and Installation"](#).
- NO >> Repair or replace malfunctioning components.

Component Inspection

INFOID:000000011005896

1. CHECK IN-VEHICLE SENSOR

1. Remove in-vehicle sensor. Refer to [HAC-190. "Removal and Installation"](#).
2. Check resistance between in-vehicle sensor terminals. Refer to applicable table for the normal value.

Terminal		Condition	Resistance: kΩ
		Temperature: °C (°F)	
1	2	-20 (-4)	16.43
		-10 (14)	9.90
		0 (32)	6.19
		10 (50)	4.01
		20 (68)	2.67
		25 (77)	2.20
		30 (86)	1.83
		40 (104)	1.28

Is the inspection result normal?

- YES >> Inspection End.
- NO >> Replace in-vehicle sensor. Refer to [HAC-190. "Removal and Installation"](#).

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

HAC

B257B, B257C AMBIENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B257B, B257C AMBIENT SENSOR

DTC Logic

INFOID:000000011005897

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-87, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-88, "DTC Logic"](#).

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B257B	AMBIENT SENSOR	The ambient sensor recognition temperature is too high [more than 100°C (212°F)].	<ul style="list-style-type: none"> • Ambient sensor • A/C auto amp. • Harness or connectors (The sensor circuit is open or shorted.)
B257C		The ambient sensor recognition temperature is too low [less than -42°C (-44°F)].	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

1. Turn power switch ON.
2. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
3. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-92, "Diagnosis Procedure"](#).
 NO >> Inspection End.

Diagnosis Procedure

INFOID:000000011005898

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

1. CHECK AMBIENT SENSOR VOLTAGE SIGNAL

1. Turn power switch ON.
2. Operate the automatic air conditioning system.
3. Check voltage signal between A/C auto amp. harness connector terminals.

Connector	A/C auto amp.		Test condition	Voltage signal																											
	+	-																													
	Terminal																														
M55	36	10	<ul style="list-style-type: none"> • Power switch ON • When air conditioner is operating 	<table border="1"> <caption>Voltage Signal vs Temperature</caption> <thead> <tr> <th>Temperature (°C)</th> <th>Temperature (°F)</th> <th>Voltage (V)</th> </tr> </thead> <tbody> <tr><td>-20</td><td>-4</td><td>4.42</td></tr> <tr><td>-10</td><td>14</td><td>4.11</td></tr> <tr><td>0</td><td>32</td><td>3.71</td></tr> <tr><td>10</td><td>50</td><td>3.25</td></tr> <tr><td>20</td><td>68</td><td>2.76</td></tr> <tr><td>25</td><td>77</td><td>2.52</td></tr> <tr><td>30</td><td>86</td><td>2.29</td></tr> <tr><td>40</td><td>104</td><td>1.85</td></tr> </tbody> </table> <p>JS1A1665ZZ</p>	Temperature (°C)	Temperature (°F)	Voltage (V)	-20	-4	4.42	-10	14	4.11	0	32	3.71	10	50	3.25	20	68	2.76	25	77	2.52	30	86	2.29	40	104	1.85
Temperature (°C)	Temperature (°F)	Voltage (V)																													
-20	-4	4.42																													
-10	14	4.11																													
0	32	3.71																													
10	50	3.25																													
20	68	2.76																													
25	77	2.52																													
30	86	2.29																													
40	104	1.85																													

Is the inspection result normal?

- YES >> GO TO 7.
 NO >> GO TO 2.

2. CHECK AMBIENT SENSOR POWER SUPPLY

B257B, B257C AMBIENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

1. Turn power switch OFF.
2. Disconnect ambient sensor connector.
3. Turn power switch ON.
4. Check voltage between ambient sensor harness connector and ground.

+		-	Voltage (Approx.)
Ambient sensor			
Connector	Terminal		
E53	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 5.

3.CHECK AMBIENT SENSOR GROUND CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between ambient sensor harness connector and A/C auto amp harness connector.

Ambient sensor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
E53	2	M55	30	Yes

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair harness or connector.

4.CHECK AMBIENT SENSOR

Check ambient sensor. Refer to [HAC-94, "Component Inspection"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).
NO >> Replace ambient sensor. Refer to [HAC-189, "Removal and Installation"](#).

5.CHECK AMBIENT SENSOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between ambient sensor harness connector and A/C auto amp. harness connector.

Ambient sensor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
E53	1	M55	36	Yes

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair harness or connector.

6.CHECK AMBIENT SENSOR POWER SUPPLY CIRCUIT FOR SHORT

Check continuity between ambient sensor harness connector and ground.

Ambient sensor		-	Continuity
Connector	Terminal		
E53	1	Ground	No

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).
NO >> Repair harness or connector.

B257B, B257C AMBIENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

7.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-53. "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187. "Removal and Installation"](#).
NO >> Repair or replace malfunctioning components.

Component Inspection

INFOID:000000011005899

1.CHECK AMBIENT SENSOR

1. Remove ambient sensor. Refer to [HAC-189. "Removal and Installation"](#).
2. Check resistance between ambient sensor terminals. Refer to applicable table for the normal value.

Terminal		Condition	Resistance: kΩ
		Temperature: °C (°F)	
1	2	-20 (-4)	16.50
		-10 (14)	9.92
		0 (32)	6.19
		10 (50)	3.99
		20 (68)	2.65
		25 (77)	2.19
		30 (86)	1.81
		40 (104)	1.27

Is the inspection result normal?

- YES >> Inspection End.
NO >> Replace ambient sensor. Refer to [HAC-189. "Removal and Installation"](#).

B2581, B2582 INTAKE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B2581, B2582 INTAKE SENSOR

DTC Logic

INFOID:0000000011005901

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-87, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-88, "DTC Logic"](#).

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2581	INTAKE SENSOR	The intake sensor recognition temperature is too high [more than 100°C (212°F)].	<ul style="list-style-type: none"> • Intake sensor • A/C auto amp. • Harness or connectors (The sensor circuit is open or shorted.)
B2582		The intake sensor recognition temperature is too low [less than -42°C (-44°F)].	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Turn power switch ON.
2. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
3. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-95, "Diagnosis Procedure"](#).
 NO >> Inspection End.

HAC

Diagnosis Procedure

INFOID:0000000011005901

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

1. CHECK INTAKE SENSOR VOLTAGE SIGNAL

1. Turn power switch ON.
2. Operate the automatic air conditioning system.
3. Check voltage signal between A/C auto amp. harness connector terminals.

Connector	A/C auto amp.		Test condition	Voltage signal																											
	+	-																													
Terminal																															
M55	34	10	<ul style="list-style-type: none"> • Power switch ON • When air conditioner is operating 	<table border="1"> <caption>Voltage Signal vs Temperature</caption> <thead> <tr> <th>Temperature (°C)</th> <th>Temperature (°F)</th> <th>Voltage (V)</th> </tr> </thead> <tbody> <tr><td>-20</td><td>-4</td><td>3.68</td></tr> <tr><td>-10</td><td>14</td><td>3.13</td></tr> <tr><td>0</td><td>32</td><td>2.56</td></tr> <tr><td>10</td><td>50</td><td>2.02</td></tr> <tr><td>20</td><td>68</td><td>1.56</td></tr> <tr><td>25</td><td>77</td><td>1.36</td></tr> <tr><td>30</td><td>86</td><td>1.18</td></tr> <tr><td>40</td><td>104</td><td>0.89</td></tr> </tbody> </table> <p>JS11A1663ZZ</p>	Temperature (°C)	Temperature (°F)	Voltage (V)	-20	-4	3.68	-10	14	3.13	0	32	2.56	10	50	2.02	20	68	1.56	25	77	1.36	30	86	1.18	40	104	0.89
Temperature (°C)	Temperature (°F)	Voltage (V)																													
-20	-4	3.68																													
-10	14	3.13																													
0	32	2.56																													
10	50	2.02																													
20	68	1.56																													
25	77	1.36																													
30	86	1.18																													
40	104	0.89																													

Is the inspection result normal?

- YES >> GO TO 7.
 NO >> GO TO 2.

2. CHECK INTAKE SENSOR POWER SUPPLY

B2581, B2582 INTAKE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

1. Turn power switch OFF.
2. Disconnect intake sensor connector.
3. Turn power switch ON.
4. Check voltage between intake sensor harness connector and ground.

+		-	Voltage (Approx.)
Intake sensor			
Connector	Terminal		
M141	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 5.

3.CHECK INTAKE SENSOR GROUND CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between intake sensor harness connector and A/C auto amp harness connector.

Intake sensor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M141	2	M55	30	Yes

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair harness or connector.

4.CHECK INTAKE SENSOR

Check intake sensor. Refer to [HAC-97, "Component Inspection"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).
NO >> Replace intake sensor. Refer to [HAC-193, "Removal and Installation"](#).

5.CHECK INTAKE SENSOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between intake sensor harness connector and A/C auto amp. harness connector.

Intake sensor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M141	1	M55	34	Yes

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair harness or connector.

6.CHECK INTAKE SENSOR POWER SUPPLY CIRCUIT FOR SHORT

Check continuity between intake sensor harness connector and ground.

Intake sensor		-	Continuity
Connector	Terminal		
M141	1	Ground	No

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).
NO >> Repair harness or connector.

B2581, B2582 INTAKE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-53. "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187. "Removal and Installation"](#).
- NO >> Repair or replace malfunctioning components.

Component Inspection

INFOID:000000011005902

1. CHECK INTAKE SENSOR

1. Remove intake sensor. Refer to [HAC-193. "Removal and Installation"](#).
2. Check resistance between intake sensor terminals. Refer to applicable table for the normal value.

Terminal		Condition	Resistance: kΩ
		Temperature: °C (°F)	
1	2	-20 (-4)	16.50
		-10 (14)	9.92
		0 (32)	6.19
		10 (50)	3.99
		20 (68)	2.65
		25 (77)	2.19
		30 (86)	1.81
		40 (104)	1.27

Is the inspection result normal?

- YES >> Inspection End.
- NO >> Replace intake sensor. Refer to [HAC-193. "Removal and Installation"](#).

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B2630, B2631 SUNLOAD SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B2630, B2631 SUNLOAD SENSOR

DTC Logic

INFOID:000000011005903

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-87, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-88, "DTC Logic"](#).
- Sunload sensor may register a malfunction when indoors, at dusk, or at other times when light is insufficient. When performing the diagnosis indoors, use a lamp (60 W or more) that is pointed at the sunload sensor.

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2630	SUNLOAD SENSOR	Detected calorie at sunload sensor 1677 W/m ² (1442 kcal/m ² ·h) or more.	<ul style="list-style-type: none"> • Sunload sensor • A/C auto amp. • Harness or connectors (The sensor circuit is open or shorted.)
B2631		Detected calorie at sunload sensor 33 W/m ² (28 kcal/m ² ·h) or less.	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Turn power switch ON.
2. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
3. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-98, "Diagnosis Procedure"](#).
 NO >> Inspection End.

Diagnosis Procedure

INFOID:000000011005904

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

1. CHECK SUNLOAD SENSOR VOLTAGE SIGNAL

1. Turn power switch ON.
2. Operate the automatic air conditioning system.
3. Move 60 W lamp to or from the sunload sensor to check that a voltage signal between A/C auto amp. harness connector terminals changes.

Connector	A/C auto amp.		Test condition	Voltage signal																
	+	-																		
Terminal																				
M55	35	10	<ul style="list-style-type: none"> • Power switch ON • When air conditioner is operating 	<table border="1"> <caption>Voltage signal vs Sunload sensor</caption> <thead> <tr> <th>Sunload sensor (W/m²)</th> <th>Voltage signal (V)</th> </tr> </thead> <tbody> <tr><td>0</td><td>5.00</td></tr> <tr><td>200</td><td>4.44</td></tr> <tr><td>400</td><td>3.88</td></tr> <tr><td>600</td><td>3.31</td></tr> <tr><td>800</td><td>2.75</td></tr> <tr><td>1000</td><td>2.19</td></tr> <tr><td>1200</td><td>1.63</td></tr> </tbody> </table> <p>JSIIA1664ZZ</p>	Sunload sensor (W/m ²)	Voltage signal (V)	0	5.00	200	4.44	400	3.88	600	3.31	800	2.75	1000	2.19	1200	1.63
Sunload sensor (W/m ²)	Voltage signal (V)																			
0	5.00																			
200	4.44																			
400	3.88																			
600	3.31																			
800	2.75																			
1000	2.19																			
1200	1.63																			

Is the inspection result normal?

- YES >> GO TO 7.

B2630, B2631 SUNLOAD SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

NO >> GO TO 2.

2. CHECK SUNLOAD SENSOR POWER SUPPLY

1. Turn power switch OFF.
2. Disconnect sunload sensor connector.
3. Turn power switch ON.
4. Check voltage between sunload sensor harness connector and ground.

+		-	Voltage (Approx.)
Sunload sensor			
Connector	Terminal		
M74	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 5.

3. CHECK SUNLOAD SENSOR GROUND CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between sunload sensor harness connector and A/C auto amp harness connector.

Sunload sensor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M74	2	M55	30	Yes

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair harness or connector.

4. REPLACE SUNLOAD SENSOR

1. Replace sunload sensor. Refer to [HAC-191, "Removal and Installation"](#).
2. Perform DTC confirmation procedure. Refer to [HAC-98, "DTC Logic"](#).
3. Check DTC.

Is DTC detected?

YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).

NO >> Inspection End.

5. CHECK SUNLOAD SENSOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between sunload sensor harness connector and A/C auto amp. harness connector.

Sunload sensor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M74	1	M55	35	Yes

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair harness or connector.

6. CHECK SUNLOAD SENSOR POWER SUPPLY CIRCUIT FOR SHORT

Check continuity between sunload sensor harness connector and ground.

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B2630, B2631 SUNLOAD SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Sunload sensor		—	Continuity
Connector	Terminal		
M74	1	Ground	No

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).

NO >> Repair harness or connector.

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-53, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).

NO >> Repair or replace malfunctioning components.

B2770, B2773, B2774 PTC HEATER

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B2770, B2773, B2774 PTC HEATER

DTC Logic

INFOID:0000000011005905

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2770	PTC HEATER CIRCUIT	When PTC heater circuit system malfunction is detected.	<ul style="list-style-type: none">• PTC heater• High voltage harness or connectors (PTC heater high voltage circuit is open or shorted.)
B2773	PTC HEATER CIRCUIT 1	When PTC heater circuit system (PTC 1) malfunction is detected.	
B2774	PTC HEATER CIRCUIT 2	When PTC heater circuit system (PTC 2) malfunction is detected.	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full hot and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-101. "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:0000000011005906

DIAGNOSIS PROCEDURE

1. REPLACE PTC HEATER

Replace PTC heater. Refer to [HAC-202. "Removal and Installation"](#).

>> Inspection End.

B2771 PTC HEATER

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B2771 PTC HEATER

DTC Logic

INFOID:000000011005907

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2771	PTC HEATER OVERHEAT PROTECT	When the PTC heater circuit board internal temperature is 115°C (239°F) or more.	<ul style="list-style-type: none">• PTC heater• Blower motor system• Air mix door motor system

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full hot and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-102, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000011005908

1. CHECK BLOWER MOTOR SYSTEM

Check the blower motor system. Refer to [HAC-175, "Component Function Check"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace malfunctioning components.

2. CHECK AIR MIX DOOR MOTOR SYSTEM

Check the air mix door motor system. Refer to [HAC-110, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> Replace PTC heater. Refer to [HAC-202, "Removal and Installation"](#).
NO >> Repair or replace malfunctioning components.

B2772 PTC HEATER

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B2772 PTC HEATER

DTC Logic

INFOID:0000000011005909

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2772	PTC HEATER VOLTAGE	When the supply voltage input to the PTC heater is the specified voltage value or less.	<ul style="list-style-type: none">• PTC heater• High voltage harness or connectors (PTC heater high voltage circuit is open or shorted.)

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full hot and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-103, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:0000000011005910

HAC

1. REPLACE PTC HEATER

Replace PTC heater. Refer to [HAC-202, "Removal and Installation"](#).

>> Inspection End.

B2777, B2779, B277B PTC HEATER

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B2777, B2779, B277B PTC HEATER

DTC Logic

INFOID:000000011005911

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2777	PTC HEATER LIN COMMUNICATION	When there is an error in the signal sent from the PTC heater.	<ul style="list-style-type: none">• PTC heater• A/C auto amp.• Harness or connectors (PTC heater circuit is open or shorted.)
B2779	PTC HEATER COMMUNICATION	When there is an error in the signal sent from the A/C auto amp. or there is an error in the signal received by the PTC heater.	
B277B	HVAC LIN COMMUNICATION	When there is an error in the signal sent from the A/C auto amp.	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
4. Check DTC.

Is DTC detected?

YES >> Refer to [HAC-104, "Diagnosis Procedure"](#).

NO >> Inspection End.

Diagnosis Procedure

INFOID:000000011005912

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

1. CHECK PTC HEATER COMMUNICATION LINE FOR OPEN

1. Turn power switch OFF.
2. Disconnect PTC heater and A/C auto amp. connector.
3. Check continuity between PTC heater harness connector and A/C auto amp harness connector.

PTC heater		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M145	4	M55	40	Yes

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair harness or connector.

2. CHECK PTC HEATER COMMUNICATION LINE FOR SHORT

Check continuity between PTC heater harness connector and ground.

PTC heater		-	Continuity
Connector	Terminal		
M145	4	Ground	No

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair harness or connector.

B2777, B2779, B277B PTC HEATER

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

3. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-53, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning components.

4. CHECK A/C AUTO AMP.

Ⓜ With CONSULT

1. Set the vehicle to READY.

2. Using CONSULT, perform "MODE6" of "HVAC TEST" in "Active Test" of HVAC". Refer to [HAC-47, "CONSULT Function"](#).

3. Check that the PTC heater operates normally.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace A/C auto amp. (Refer to [HAC-187, "Removal and Installation"](#)). Then GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC confirmation procedure. Refer to [HAC-104, "DTC Logic"](#).

Is DTC B2777, B2779 or B277B detected?

YES >> Replace PTC heater. Refer to [HAC-202, "Removal and Installation"](#).

NO >> Inspection End.

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B27A0, B27A1 INTAKE DOOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27A0, B27A1 INTAKE DOOR MOTOR

DTC Logic

INFOID:000000011005913

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-87, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-88, "DTC Logic"](#).

DTC	Items (CONSULT screen terms)	DTC detection condition*	Possible cause
B27A0	INTAKE DOOR MOTOR	PBR opening angle of intake door motor is 50% or more. (PBR feedback signal voltage of intake door motor is 2.5 V or more).	<ul style="list-style-type: none">• Intake door motor• Intake door motor system installation condition• A/C auto amp.• Harness or connectors (The motor circuit is open or shorted.)
B27A1		PBR opening angle of intake door motor is 30% or less. (PBR feedback signal voltage of intake door motor is 1.5 V or less).	

*: A/C auto amp. operates intake door motor according to target value of PBR opening angle at 40% when performing self-diagnosis.

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

1. Set the vehicle to READY.
2. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
3. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-106, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000011005914

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

1. CHECK INTAKE DOOR MOTOR OPERATION

1. Turn power switch ON.
2. Operate intake switch and check by operation sound that intake door motor operates.

Does the intake door motor operate?

- YES >> GO TO 2.
NO >> GO TO 8.

2. CHECK INTAKE DOOR MOTOR PBR POWER SUPPLY

1. Disconnect intake door motor connector.
2. Turn power switch ON.
3. Check voltage between intake door motor harness connector and ground.

+		-	Voltage (Approx.)
Intake door motor			
Connector	Terminal		
M54	1	Ground	5 V

Is the inspection result normal?

B27A0, B27A1 INTAKE DOOR MOTOR

[AUTO A/C (WITH HEAT PUMP)]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 3.
- NO >> GO TO 7.

3. CHECK INTAKE DOOR MOTOR PBR GROUND CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between intake door motor harness connector and A/C auto amp. harness connector.

Intake door motor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M54	3	M55	30	Yes

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair harness or connector.

4. CHECK INTAKE DOOR MOTOR PBR FEEDBACK SIGNAL CIRCUIT FOR OPEN

Check continuity between intake door motor harness connector and A/C auto amp. harness connector.

Intake door motor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M54	2	M55	38	Yes

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair harness or connector.

5. CHECK INTAKE DOOR MOTOR PBR FEEDBACK SIGNAL CIRCUIT FOR SHORT

Check continuity between intake door motor harness connector and ground.

Intake door motor		—	Continuity
Connector	Terminal		
M54	2	Ground	No

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair harness or connector.

6. CHECK INTAKE DOOR MOTOR PBR

Check intake door motor PBR. Refer to [HAC-108. "Component Inspection \(PBR\)".](#)

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187. "Removal and Installation".](#)
- NO >> Replace intake door motor. Refer to [HAC-205. "INTAKE DOOR MOTOR : Removal and Installation".](#)

7. CHECK INTAKE DOOR MOTOR PBR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between intake door motor harness connector and A/C auto amp. harness connector.

Intake door motor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M54	1	M55	27	Yes

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187. "Removal and Installation".](#)
- NO >> Repair harness or connector.

B27A0, B27A1 INTAKE DOOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

8. CHECK INTAKE DOOR MOTOR DRIVE SIGNAL CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect intake door motor connector, and A/C auto amp. connector.
3. Check continuity between intake door motor harness connector and A/C auto amp. harness connector.

Intake door motor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M54	5	M55	21	Yes
	6		1	

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair harness or connector.

9. CHECK INTAKE DOOR MOTOR DRIVE SIGNAL CIRCUIT FOR SHORT

Check continuity between intake door motor harness connector and ground.

Intake door motor		—	Continuity
Connector	Terminal		
M54	5	Ground	No
	6		

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair harness or connector.

10. CHECK INTAKE DOOR MOTOR

1. Turn power switch OFF.
2. Check intake door motor. Refer to [HAC-109, "Component Inspection \(Motor\)"](#).

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace intake door motor. Refer to [HAC-205, "INTAKE DOOR MOTOR : Removal and Installation"](#).

11. CHECK INSTALLATION OF INTAKE DOOR MOTOR SYSTEM

Check intake door motor system is properly installed. Refer to [HAC-204, "Exploded View"](#).

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).

NO >> Repair or replace malfunctioning components.

Component Inspection (PBR)

INFOID:0000000011005915

1. CHECK INTAKE DOOR MOTOR PBR

Check resistance between intake door motor terminals.

Terminal		Resistance (Ω)
1	2	Except 0 or ∞
	3	

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace intake door motor. Refer to [HAC-205, "INTAKE DOOR MOTOR : Removal and Installation"](#).

B27A0, B27A1 INTAKE DOOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Component Inspection (Motor)

INFOID:0000000011005916

1.CHECK INTAKE DOOR MOTOR

Supply intake door motor terminals with battery voltage and check by visually and operation sound that intake door motor operates.

Terminal		Operation direction
+	-	
5	6	REC
6	5	FRE

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace intake door motor. Refer to [HAC-205. "INTAKE DOOR MOTOR : Removal and Installation"](#).

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B27A2, B27A3, B27A4, B27A5 AIR MIX DOOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27A2, B27A3, B27A4, B27A5 AIR MIX DOOR MOTOR

DTC Logic

INFOID:000000011005917

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-87, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-88, "DTC Logic"](#).
- If air mix door motors DTC (B27A2 – B27A5) are detected, there is probably a disconnected connector or an open circuit in air mix door motor drive power supply harness.

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27A2	AIR MIX DOOR MOTOR	Short or open circuit of air mix door motor drive signal terminal 1.	<ul style="list-style-type: none">• Air mix door motor• A/C auto amp.• Harness or connectors (The motor circuit is open or shorted.)
B27A3		Short or open circuit of air mix door motor drive signal terminal 2.	
B27A4		Short or open circuit of air mix door motor drive signal terminal 3.	
B27A5		Short or open circuit of air mix door motor drive signal terminal 4.	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

1. Turn power switch ON.
2. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
3. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-110, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000011005918

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

1. CHECK AIR MIX DOOR MOTOR POWER SUPPLY

1. Turn power switch OFF.
2. Disconnect air mix door motor connector.
3. Turn power switch ON.
4. Check voltage between air mix door motor harness connector and ground.

+		-	Voltage (Approx.)
Air mix door motor			
Connector	Terminal		
M146	4	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2. CHECK A/C RELAY CIRCUIT

B27A2, B27A3, B27A4, B27A5 AIR MIX DOOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Check A/C relay circuit. Refer to [EVC-386. "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> Repair harness or connector between A/C relay and air mix door motor.
- NO >> Repair or replace malfunctioning components.

3.CHECK AIR MIX DOOR MOTOR DRIVE SIGNAL CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between air mix door motor harness connector and A/C auto amp. harness connector.

Air mix door motor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M146	1	M55	9	Yes
	2		8	
	5		7	
	6		6	

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair harness or connector.

4.CHECK AIR MIX DOOR MOTOR DRIVE SIGNAL CIRCUIT FOR SHORT

Check continuity between air mix door motor harness connector and A/C auto amp. harness connector.

Air mix door motor		—	Continuity
Connector	Terminal		
M146	1	Ground	No
	2		
	5		
	6		

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair harness or connector.

5.CHECK AIR MIX DOOR MOTOR

Check air mix door motor. Refer to [HAC-111. "Component Inspection"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187. "Removal and Installation"](#).
- NO >> Replace air mix door motor. Refer to [HAC-206. "AIR MIX DOOR MOTOR : Removal and Installation"](#).

Component Inspection

INFOID:000000011005919

1.CHECK AIR MIX DOOR MOTOR

1. Remove air mix door motor. Refer to [HAC-206. "AIR MIX DOOR MOTOR : Removal and Installation"](#).
2. Check resistance between air mix door motor terminals. Refer to applicable table for the normal value.

Terminal	Resistance (Ω) (Approx.)
4	1
	2
	5
	6

B27A2, B27A3, B27A4, B27A5 AIR MIX DOOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace air mix door motor. Refer to [HAC-206. "AIR MIX DOOR MOTOR : Removal and Installation"](#).

B27A6, B27A7, B27A8, B27A9 MODE DOOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27A6, B27A7, B27A8, B27A9 MODE DOOR MOTOR

DTC Logic

INFOID:0000000011005920

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-87, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-88, "DTC Logic"](#).
- If mode door motors DTC (B27A6 – B27A9) are detected, there is probably a disconnected connector or an open circuit in mode door motor drive power supply harness.

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27A6	MODE DOOR MOTOR	Short or open circuit of mode door motor drive signal terminal 1.	<ul style="list-style-type: none"> • Mode door motor • A/C auto amp. • Harness or connectors (The motor circuit is open or shorted.)
B27A7		Short or open circuit of mode door motor drive signal terminal 2.	
B27A8		Short or open circuit of mode door motor drive signal terminal 3.	
B27A9		Short or open circuit of mode door motor drive signal terminal 4.	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

 With CONSULT

1. Turn power switch ON.
2. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
3. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-113, "Diagnosis Procedure"](#).
 NO >> Inspection End.

Diagnosis Procedure

INFOID:0000000011005921

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

1. CHECK MODE DOOR MOTOR POWER SUPPLY

1. Turn power switch OFF.
2. Disconnect mode door motor connector.
3. Turn power switch ON.
4. Check voltage between mode door motor harness connector and ground.

+		-	Voltage (Approx.)
Mode door motor			
Connector	Terminal		
M142	4	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> GO TO 2.

2. CHECK A/C RELAY CIRCUIT

B27A6, B27A7, B27A8, B27A9 MODE DOOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Check A/C relay circuit. Refer to [EVC-386. "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> Repair harness or connector between A/C relay and mode door motor.
- NO >> Repair or replace malfunctioning components.

3. CHECK MODE DOOR MOTOR DRIVE SIGNAL CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between mode door motor harness connector and A/C auto amp. harness connector.

Mode door motor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M142	1	M55	5	Yes
	2		4	
	5		3	
	6		2	

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair harness or connector.

4. CHECK MODE DOOR MOTOR DRIVE SIGNAL CIRCUIT FOR SHORT

Check continuity between mode door motor harness connector and A/C auto amp. harness connector.

Mode door motor		—	Continuity
Connector	Terminal		
M142	1	Ground	No
	2		
	5		
	6		

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair harness or connector.

5. CHECK MODE DOOR MOTOR

Check mode door motor. Refer to [HAC-114. "Component Inspection"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187. "Removal and Installation"](#).
- NO >> Replace mode door motor. Refer to [HAC-206. "MODE DOOR MOTOR : Removal and Installation"](#).

Component Inspection

INFOID:000000011005922

1. CHECK MODE DOOR MOTOR

1. Remove mode door motor. Refer to [HAC-206. "MODE DOOR MOTOR : Removal and Installation"](#).
2. Check resistance between mode door motor terminals. Refer to applicable table for the normal value.

Terminal	Resistance (Ω) (Approx.)	
4	1	90
	2	
	5	
	6	

B27A6, B27A7, B27A8, B27A9 MODE DOOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace mode door motor. Refer to [HAC-206. "MODE DOOR MOTOR : Removal and Installation"](#).

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B27B1, B27B2, B27B3, B27BB ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27B1, B27B2, B27B3, B27BB ELECTRIC COMPRESSOR

DTC Logic

INFOID:000000011005923

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27B1	COMP LOW VOLTAGE	When the high voltage system input voltage is less than 230 V.	<ul style="list-style-type: none">• Electric compressor• Li-ion battery• PDM (power delivery module)• High voltage harness or connectors (Electric compressor high voltage circuit is open or shorted.)
B27B2	COMP HIGH VOLTAGE	When the high voltage system input voltage is more than 420 V.	
B27B3	COMP INTNL COMM	When a malfunction is detected in AC inverter internal communication.	
B27BB	COMP HI VOL SYS	When the voltage of other than standard value is input to AC inverter.	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-116, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000011005924

DANGER:



Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.
- Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.
- Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.
- Refer to [GI-34, "High Voltage Precautions"](#).

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

DIAGNOSIS PROCEDURE

CAUTION:

B27B1, B27B2, B27B3, B27BB ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Erase DTC after the work is completed.

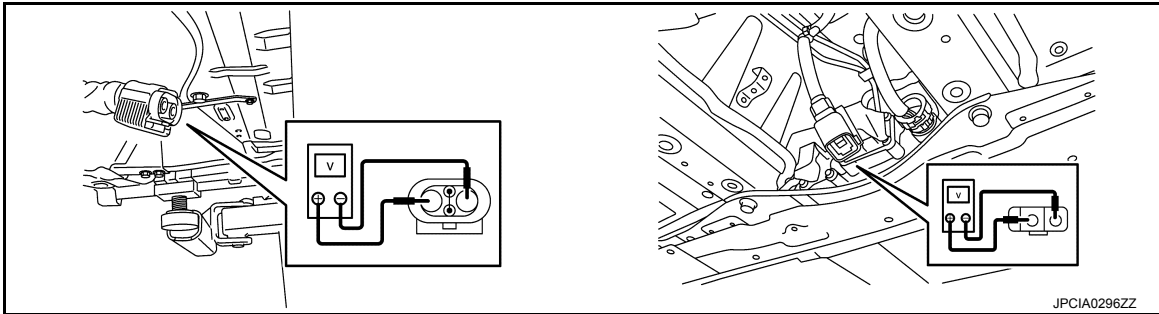
1. PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to [GI-33, "How to Disconnect High Voltage"](#).

Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181, "Exploded View"](#).
2. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181, "Removal and Installation"](#).
3. Measure voltage between high voltage harness connector terminals and PTC heater harness connector terminals.



DANGER:



Touching high voltage components without using the appropriate protective equipment will cause electrocution.



Standard

: 5 V or less

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 2.

2. CHECK LI-ION BATTERY

1. Connect 12V battery negative terminal.
2. Check Li-ion battery. Refer to [EVB-69, "Work Flow"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning components.

3. CHECK PDM (POWER DELIVERY MODULE)

Check PDM (power delivery module). Refer to [EVC-126, "Work Flow"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning components.

4. CHECK ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS POWER SUPPLY CIRCUIT FOR OPEN

1. Disconnect electric compressor and Li-ion battery connector.
2. Check continuity between electric compressor high voltage harness connector and Li-ion battery high voltage harness connector.

Electric compressor		Li-ion battery		Continuity
Connector	Terminal	Connector	Terminal	
H2	2	H3	37	Yes

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B27B1, B27B2, B27B3, B27BB ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace high voltage harness between electric compressor and PDM (power delivery module), and between PDM (power delivery module) and Li-ion battery.

5. CHECK ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS GROUND CIRCUIT

Check continuity between electric compressor high voltage harness connector and Li-ion battery high voltage harness connector.

Electric compressor		Li-ion battery		Continuity
Connector	Terminal	Connector	Terminal	
H2	1	H3	38	Yes

Is the inspection result normal?

YES >> Replace electric compressor. Refer to [HA-37, "Removal and Installation"](#).

NO >> Replace high voltage harness between electric compressor and PDM (power delivery module), and between PDM (power delivery module) and Li-ion battery.

B27B4 ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27B4 ELECTRIC COMPRESSOR

DTC Logic

INFOID:0000000011005925

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27B4	COMP LO VOL SYS	Voltage of battery power supply input to electric compressor is 9 V or less or 17 V or more.	<ul style="list-style-type: none">• Electric compressor• A/C relay system• Harness or connectors (Electric compressor circuit is open or shorted.)

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

④ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
4. Check DTC.

Is DTC detected?

YES >> Refer to [HAC-119, "Diagnosis Procedure"](#).

NO >> Inspection End.

Diagnosis Procedure

INFOID:0000000011005926

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

1. CHECK ELECTRIC COMPRESSOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn power switch OFF
2. Disconnect electric compressor connector.
3. Remove A/C relay
4. Check continuity between electric compressor harness connector and A/C relay harness connector.

Electric compressor		A/C relay		Continuity
Connector	Terminal	Connector	Terminal	
F20	7	E52	5	Yes

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair harness or connector.

2. CHECK ELECTRIC COMPRESSOR POWER SUPPLY CIRCUIT FOR SHORT

Check continuity between electric compressor harness connector and ground.

Electric compressor		—	Continuity
Connector	Terminal		
F20	7	Ground	No

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair harness or connector.

3. CHECK ELECTRIC COMPRESSOR GROUND CIRCUIT FOR OPEN

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B27B4 ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Check continuity between electric compressor harness connector and ground.

Electric compressor		—	Continuity
Connector	Terminal		
F20	8	Ground	Yes

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair harness or connector.

4. CHECK A/C RELAY

Check A/C relay. Refer to [EVC-386, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Replace electric compressor. Refer to [HA-37, "Removal and Installation"](#).

NO >> Repair or replace malfunctioning components.

B27B5, 27B6, B27B7, B27BA, B27BE ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27B5, 27B6, B27B7, B27BA, B27BE ELECTRIC COMPRESSOR

DTC Logic

INFOID:0000000011005927

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27B5	COMP INTNL CIRC	When overcurrent is detected in inverter.	Electric compressor
B27B6	COMP INTNL CIRC	When open circuit is detected in inverter.	
B27B7	COMP CURNT SENS	When inverter is OFF, the detected current value in inverter is the standard value or more.	
B27BA	COMP SYSTEM	When the internal system malfunction stop occurs repeatedly.	
B27BE	COMP INTNL SYS	When a malfunction is detected in the CPU, ROM or RAM of the inverter.	

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

ⓂWith CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-121, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:0000000011005928

1.REPLACE ELECTRIC COMPRESSOR

Replace electric compressor. Refer to [HA-37, "Removal and Installation"](#).

>> Inspection End.

B27B8 ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27B8 ELECTRIC COMPRESSOR

DTC Logic

INFOID:000000011005929

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27B8	COMP OVER LOADED	When the high load status at low speed of electric compressor is continued.	<ul style="list-style-type: none">• Refrigerant leakage• Cooling fan• Refrigerant insufficient or overfilled• Li-ion battery• PDM (power delivery module)• Electric compressor

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-122, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000011005930

1.CHECK REFRIGERANT FOR LEAKAGES

Check refrigerant for leakages. Refer to [HA-26, "Check Refrigerant Leakage"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace malfunctioning components.

2.CHECK COOLING FAN OPERATION

1. Set the vehicle to READY.
2. Operate the automatic air conditioning system.
3. Check that the cooling fan is operating.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Check cooling fan. Refer to [EVC-368, "Component Function Check"](#).

3.CHECK REFRIGERANT CYCLE

Check refrigerant cycle. Refer to [HA-29, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace malfunctioning components.

4.CHECK LI-ION BATTERY

1. Connect 12V battery negative terminal.
2. Check Li-ion battery. Refer to [EVB-69, "Work Flow"](#).

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair or replace malfunctioning components.

B27B8 ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

5. CHECK PDM (POWER DELIVERY MODULE)

Check PDM (power delivery module). Refer to [EVC-126. "Work Flow"](#).

Is the inspection result normal?

- YES >> Replace electric compressor. Refer to [HA-37. "Removal and Installation"](#).
- NO >> Repair or replace malfunctioning components.

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B27B9 ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27B9 ELECTRIC COMPRESSOR

DTC Logic

INFOID:000000011005931

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27B9	COMP OVERHEAT	When the inverter temperature exceeds the standard value.	<ul style="list-style-type: none">• Refrigerant leakage• Refrigerant insufficient• Cooling fan• Electric compressor

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-124, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000011005932

1. CHECK REFRIGERANT FOR LEAKAGES

Check refrigerant for leakages. Refer to [HA-26, "Check Refrigerant Leakage"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace malfunctioning components.

2. CHECK COOLING FAN OPERATION

1. Set the vehicle to READY.
2. Operate the automatic air conditioning system.
3. Check that the cooling fan is operating.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Check cooling fan. Refer to [EVC-368, "Component Function Check"](#).

3. CHECK REFRIGERANT CYCLE

Check refrigerant cycle. Refer to [HA-29, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace malfunctioning components.

4. CHECK AIR CONDITIONING SYSTEM BY RE-FILLING REFRIGERANT

1. Collect refrigerant, and charge the air conditioning system from a new service can with the specified amount refrigerant.
2. After operate air conditioning system 15 minutes or more, perform DTC confirmation procedure, and check that DTC [B27B9] is not detected.

Is the inspection result normal?

- YES >> Inspection End.
NO >> Replace electric compressor. Refer to [HA-37, "Removal and Installation"](#).

B27BC ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27BC ELECTRIC COMPRESSOR

DTC Logic

INFOID:0000000011005933

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27BC	COMP COMM ERROR HVAC->COMP	When the electric compressor cannot receive the signal transmitted from the A/C auto amp.	<ul style="list-style-type: none">• Electric compressor• A/C auto amp.• Harness or connectors (Electric compressor circuit is open or shorted.)• High voltage harness or connectors (Electric compressor high voltage circuit is open or shorted.)• PDM (power delivery module)

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

 With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.


Is DTC detected?

- YES >> Refer to [HAC-125, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:0000000011005934

DANGER:

 Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.
- Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.
- Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.
- Refer to [GI-34, "High Voltage Precautions"](#).

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

DIAGNOSIS PROCEDURE

CAUTION:

B27BC ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Erase DTC after the work is completed.

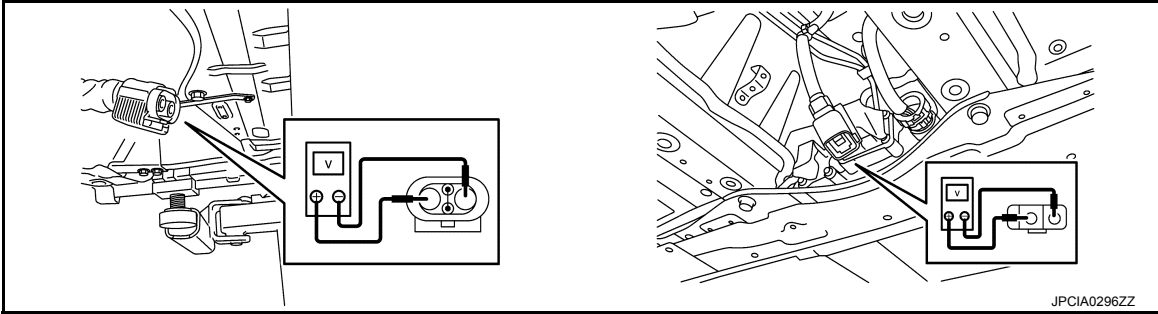
1. PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to [GI-33, "How to Disconnect High Voltage"](#).

Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181, "Exploded View"](#).
2. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181, "Removal and Installation"](#).
3. Measure voltage between high voltage harness connector terminals and PTC heater harness connector terminals.



DANGER:



Touching high voltage components without using the appropriate protective equipment will cause electrocution.



Standard

: 5 V or less

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 2.

2. CHECK ELECTRIC COMPRESSOR COMMUNICATION LINE FOR OPEN

1. Turn power switch OFF.
2. Disconnect electric compressor and A/C auto amp. connector.
3. Check continuity between electric compressor harness connector and A/C auto amp. harness connector.

NOTE:

Check for any adhering foreign substances, cracking, or damage on the electric compressor terminal and A/C auto amp. harness connector terminal.

Electric compressor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
F20	5	M55	40	Yes

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair harness or connector.

3. CHECK ELECTRIC COMPRESSOR COMMUNICATION LINE FOR SHORT

Check continuity between electric compressor harness connector and ground.

B27BC ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Electric compressor		Ground	Continuity
Connector	Terminal		
F20	5		No

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair harness or connector.

4.CHECK PDM (POWER DELIVERY MODULE)

Check PDM (power delivery module). Refer to [EVC-126, "Work Flow"](#).

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair or replace malfunctioning components.

5.CHECK ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS POWER SUPPLY CIRCUIT FOR OPEN

1. Disconnect electric compressor and Li-ion battery connector.
2. Check continuity between electric compressor high voltage harness connector and Li-ion battery high voltage harness connector.

Electric compressor		Li-ion battery		Continuity
Connector	Terminal	Connector	Terminal	
H2	2	H3	37	Yes

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Replace high voltage harness between electric compressor and PDM (power delivery module), and between PDM (power delivery module) and Li-ion battery.

6.CHECK ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS GROUND CIRCUIT

Check continuity between electric compressor high voltage harness connector and Li-ion battery high voltage harness connector.

Electric compressor		Li-ion battery		Continuity
Connector	Terminal	Connector	Terminal	
H2	1	H3	38	Yes

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Replace high voltage harness between electric compressor and PDM (power delivery module), and between PDM (power delivery module) and Li-ion battery.

7.CHECK A/C AUTO AMP.

ⓂWith CONSULT

1. Reconnect all harness connectors disconnected.
2. Set the vehicle to READY.
3. Using CONSULT, perform "MODE1" of "HVAC TEST" on "Active Test" of "HVAC". Refer to [HAC-47, "CONSULT Function"](#).
4. Check that the electric compressor operates normally.

Is the inspection result normal?

- YES >> Inspection End.
- NO >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#). Then GO TO 8.

8.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC confirmation procedure. Refer to [HAC-125, "DTC Logic"](#).

Is DTC B27BC detected?

- YES >> Replace electric compressor. Refer to [HA-37, "Removal and Installation"](#).

B27BC ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

NO >> Inspection End.

B27BF ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27BF ELECTRIC COMPRESSOR

DTC Logic

INFOID:0000000011097848

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27BF	COMP INTNL CIRC	When HVIL open circuit is detected in electric compressor system.	<ul style="list-style-type: none">• High voltage harness connector connecting malfunction• High voltage harness connector• Electric compressor

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select "Self Diagnostic Result" mode of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-129, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:0000000011097849

HAC

DANGER:



Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.
- Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.
- Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.
- Refer to [GI-34, "High Voltage Precautions"](#).

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

1. PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to [GI-33, "How to Disconnect High Voltage"](#).

Check voltage in high voltage circuit. (Check that condenser are discharged.)

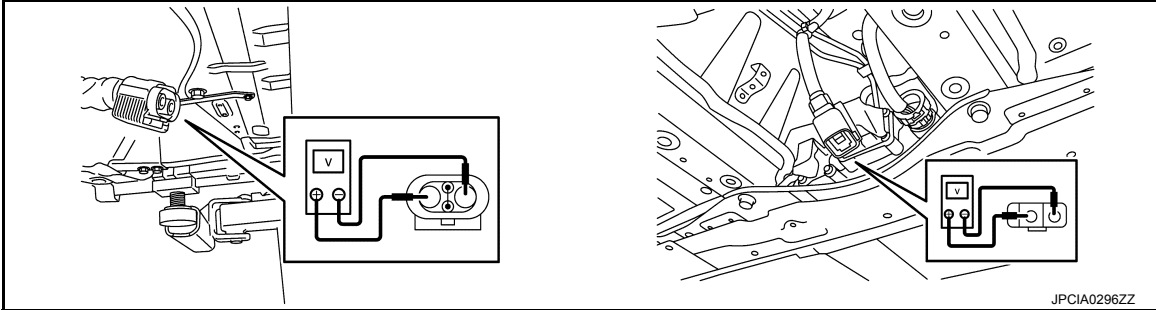
1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181, "Exploded View"](#).
2. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181, "Removal and Installation"](#).

B27BF ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

3. Measure voltage between high voltage harness connector terminals and PTC heater harness connector terminals.



DANGER:



Touching high voltage components without using the appropriate protective equipment will cause electrocution.



Standard

: 5 V or less

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 2.

2. CHECK THE CONNECTION STATUS OF THE ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS CONNECTOR

1. Disconnect the cable from the negative terminal of the 12V battery. Refer to [GI-29, "Precaution for Removing 12V Battery"](#).
2. Check that the high voltage harness connector of electric compressor is connected normally.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Reconnect the high voltage harness connector. If reconnecting is impossible due to high voltage harness connector malfunction, replace the high voltage harness between electric compressor and PDM (Power Delivery Module).

3. CHECK THE ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS CONNECTOR

1. Disconnect the electric compressor high voltage harness connector.
2. Check for any adhering foreign substances, cracking, or damage on the high voltage harness connector terminal of electric compressor.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace the high voltage harness between electric compressor and PDM (Power Delivery Module).

4. CHECK THE HVIL CIRCUIT OF THE ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS CONNECTOR

Check for continuity between HVIL circuit terminals of electric compressor vehicle side high voltage harness connector. Refer to [HAC-131, "Component Inspection"](#).

Is the inspection result normal?

YES >> Replace electric compressor. Refer to [HA-37, "Removal and Installation"](#).

NO >> Replace the high voltage harness between electric compressor and PDM (Power Delivery Module).

B27BF ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Component Inspection

INFOID:000000011097850

DANGER:



Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.
- Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.
- Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.
- Refer to [GI-34, "High Voltage Precautions"](#).

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

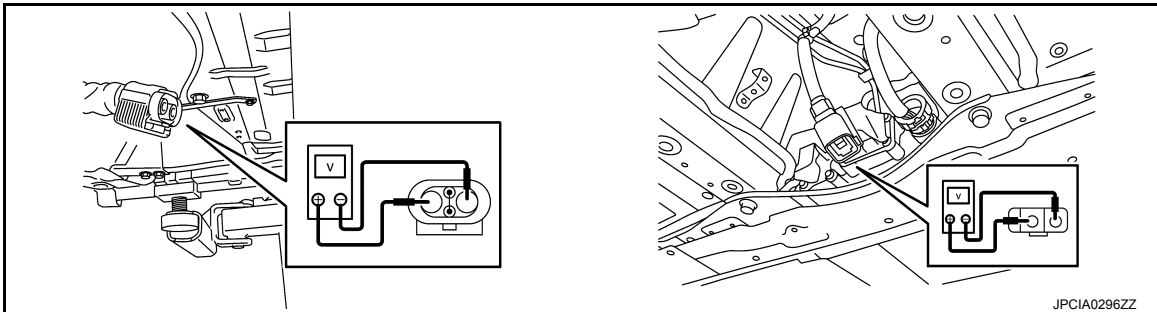
1. PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to [GI-33, "How to Disconnect High Voltage"](#).

Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181, "Exploded View"](#).
2. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181, "Removal and Installation"](#).
3. Measure voltage between high voltage harness connector terminals and PTC heater harness connector terminals.



DANGER:



Touching high voltage components without using the appropriate protective equipment will cause electrocution.



Standard

: 5 V or less

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 2.

2. CHECK THE HVIL CIRCUIT OF THE ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS CONNECTOR

B27BF ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

1. Disconnect the cable from the negative terminal of the 12V battery. Refer to [GI-29. "Precaution for Removing 12V Battery"](#).
2. Disconnect the electric compressor high voltage harness connector.
3. Check for continuity between HVIL circuit terminals of electric compressor vehicle side high voltage harness connector using a resistance meter.

Is the inspection result normal?

- YES >> Inspection End.
NO >> Replace the high voltage harness between electric compressor and PDM (Power Delivery Module).

B27C0 ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27C0 ELECTRIC COMPRESSOR

DTC Logic

INFOID:0000000011005938

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27C0	COMP COMM ERROR COMP->HVAC	When the A/C auto amp cannot receive the signal transmitted from the electric compressor.	<ul style="list-style-type: none">• Electric compressor• A/C auto amp.• Harness or connectors (Electric compressor circuit is open or shorted.)• High voltage harness or connectors (Electric compressor high voltage circuit is open or shorted.)• PDM (power delivery module)

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

 With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.


Is DTC detected?

- YES >> Refer to [HAC-133, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:0000000011005939

DANGER:

 Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.
- Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.
- Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.
- Refer to [GI-34, "High Voltage Precautions"](#).

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

DIAGNOSIS PROCEDURE

CAUTION:

B27C0 ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Erase DTC after the work is completed.

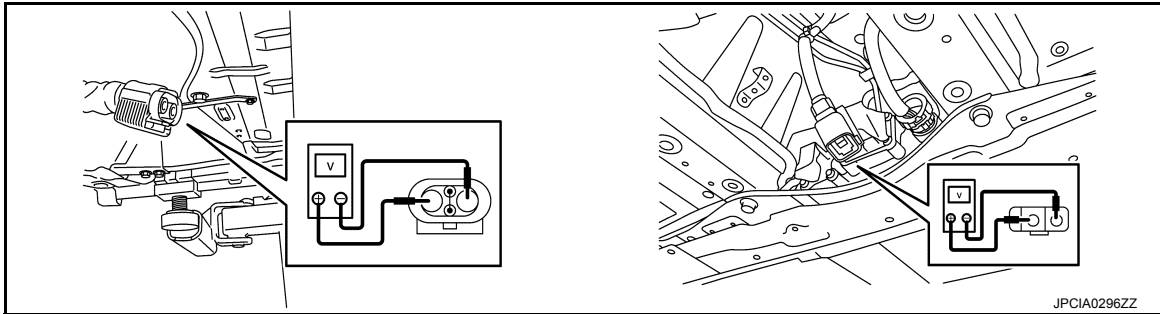
1. PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to [GI-33, "How to Disconnect High Voltage"](#).

Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181, "Exploded View"](#).
2. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181, "Removal and Installation"](#).
3. Measure voltage between high voltage harness connector terminals and PTC heater harness connector terminals.



DANGER:



Touching high voltage components without using the appropriate protective equipment will cause electrocution.



Standard : 5 V or less

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 2.

2. CHECK ELECTRIC COMPRESSOR COMMUNICATION LINE FOR OPEN

1. Turn power switch OFF.
2. Disconnect electric compressor and A/C auto amp. connector.
3. Check continuity between electric compressor harness connector and A/C auto amp. harness connector.

NOTE:

Check for any adhering foreign substances, cracking, or damage on the electric compressor terminal and A/C auto amp. harness connector terminal.

Electric compressor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
F20	5	M55	40	Yes

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair harness or connector.

3. CHECK ELECTRIC COMPRESSOR COMMUNICATION LINE FOR SHORT

Check continuity between electric compressor harness connector and ground.

B27C0 ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Electric compressor		Ground	Continuity
Connector	Terminal		
F20	5		No

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair harness or connector.

4. CHECK PDM (POWER DELIVERY MODULE)

Check PDM (power delivery module). Refer to [EVC-126, "Work Flow"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace malfunctioning components.

5. CHECK ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS POWER SUPPLY CIRCUIT FOR OPEN

1. Disconnect electric compressor and Li-ion battery connector.
2. Check continuity between electric compressor high voltage harness connector and Li-ion battery high voltage harness connector.

Electric compressor		Li-ion battery		Continuity
Connector	Terminal	Connector	Terminal	
H2	2	H3	37	Yes

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace high voltage harness between electric compressor and PDM (power delivery module), and between PDM (power delivery module) and Li-ion battery.

6. CHECK ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS GROUND CIRCUIT

Check continuity between electric compressor high voltage harness connector and Li-ion battery high voltage harness connector.

Electric compressor		Li-ion battery		Continuity
Connector	Terminal	Connector	Terminal	
H2	1	H3	38	Yes

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace high voltage harness between electric compressor and PDM (power delivery module), and between PDM (power delivery module) and Li-ion battery.

7. CHECK A/C AUTO AMP.

Ⓜ With CONSULT

1. Reconnect all harness connectors disconnected.
2. Set the vehicle to READY.
3. Using CONSULT, perform "MODE1" of "HVAC TEST" in "Active Test" of "HVAC". Refer to [HAC-47, "CONSULT Function"](#).
4. Check that the electric compressor operates normally.

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#). Then GO TO 8.

8. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC confirmation procedure. Refer to [HAC-133, "DTC Logic"](#).

Is DTC B27C0 detected?

YES >> Replace electric compressor. Refer to [HA-37, "Removal and Installation"](#).

B27C0 ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

NO >> Inspection End.

B27CC, B27CD ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27CC, B27CD ELECTRIC COMPRESSOR

DTC Logic

INFOID:0000000011005940

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27CC	COMP VOL LIMIT	When the command speed control is disabled due to voltage decrease of high voltage system.	<ul style="list-style-type: none">• Li-ion battery• Refrigerant leakage
B27CD	COMP MTR CURRNT LMT	When the command speed control is disabled due to decrease of motor upper limit.	<ul style="list-style-type: none">• Cooling fan• Refrigerant insufficient or overfilled• Electric compressor

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

④ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-137, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:0000000011005941

HAC

1. CHECK LI-ION BATTERY

1. Connect 12V battery negative terminal.
2. Check Li-ion battery. Refer to [EVB-69, "Work Flow"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace malfunctioning components.

2. CHECK REFRIGERANT FOR LEAKAGES

Check refrigerant for leakages. Refer to [HA-26, "Check Refrigerant Leakage"](#).

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Repair or replace malfunctioning components.

3. CHECK COOLING FAN OPERATION

1. Set the vehicle to READY.
2. Operate the automatic air conditioning system.
3. Check that the cooling fan is operating.

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Check cooling fan. Refer to [EVC-368, "Component Function Check"](#).

4. CHECK REFRIGERANT CYCLE

Check refrigerant cycle. Refer to [HA-29, "Inspection"](#).

Is the inspection result normal?

- YES >> Replace electric compressor. Refer to [HA-37, "Removal and Installation"](#).
NO >> Repair or replace malfunctioning components.

B27CE ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27CE ELECTRIC COMPRESSOR

DTC Logic

INFOID:000000011005942

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27CE	COMP OVERHEAT	When the inverter temperature exceeds the standard value.	<ul style="list-style-type: none">• Electric compressor• Cooling fan• Refrigerant leakage• Refrigerant insufficient

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-138, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000011005943

1. CHECK REFRIGERANT FOR LEAKAGES

Check refrigerant for leakages. Refer to [HA-26, "Check Refrigerant Leakage"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace malfunctioning components.

2. CHECK COOLING FAN OPERATION

1. Set the vehicle to READY.
2. Operate the automatic air conditioning system.
3. Check that the cooling fan is operating.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Check cooling fan. Refer to [EVC-368, "Component Function Check"](#).

3. CHECK REFRIGERANT CYCLE

Check refrigerant cycle. Refer to [HA-29, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace malfunctioning components.

4. CHECK AIR CONDITIONING SYSTEM BY RE-FILLING REFRIGERANT

1. Collect refrigerant, and charge the air conditioning system from a new service can with the specified amount refrigerant.
2. After operate air conditioning system 15 minutes or more, perform DTC confirmation procedure, and check that DTC [B27CE] is not detected.

Is the inspection result normal?

- YES >> Inspection End.
NO >> Replace electric compressor. Refer to [HA-37, "Removal and Installation"](#).

B27C1 HEAT PUMP CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27C1 HEAT PUMP CONTROL UNIT

DTC Logic

INFOID:0000000011005944

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27C1	A/C AUTO AMP. LIN COMM	When there is a malfunction in the signal transmitted from the heat pump control unit	<ul style="list-style-type: none"> Heat pump control unit A/C auto amp. Harness or connectors (Heat pump control unit circuit is open or shorted.)

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

④ With CONSULT

- Turn power switch OFF.
- Set the vehicle to READY.
- Select "Self Diagnostic Result" of "HVAC" using CONSULT.
- Check DTC.

Is DTC detected?

YES >> Refer to [HAC-139, "Diagnosis Procedure"](#).

NO >> Inspection End.

Diagnosis Procedure

INFOID:0000000011005945

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

1. CHECK HEAT PUMP CONTROL UNIT POWER SUPPLY

- Turn power switch ON
- Check voltage between heat pump control unit harness connector and ground.

+		-	Voltage (Approx.)
Heat pump control unit			
Connector	Terminal		
M102	9	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 2.

2. CHECK A/C RELAY

Check A/C relay. Refer to [EVC-386, "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning components.

3. CHECK HEAT PUMP CONTROL UNIT POWER SUPPLY CIRCUIT FOR OPEN

- Turn power switch OFF.
- Disconnect heat pump control unit.
- Remove A/C relay.
- Check continuity between heat pump control unit harness connector and A/C relay harness connector.

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HAC

B27C1 HEAT PUMP CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Heat pump control unit		A/C relay		Continuity
Connector	Terminal	Connector	Terminal	
M102	9	E52	5	Yes

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair harness or connector.

4. CHECK HEAT PUMP CONTROL UNIT POWER SUPPLY CIRCUIT FOR SHORT

Check continuity between heat pump control unit harness connector and ground.

Heat pump control unit		-	Continuity
Connector	Terminal		
M102	9	Ground	No

Is the inspection result normal?

YES >> Check intermittent incident. Refer to [GI-53, "Intermittent Incident"](#).

NO >> Repair harness or connector.

5. CHECK HEAT PUMP CONTROL UNIT GROUND CIRCUIT

1. Turn power switch OFF.
2. Disconnect heat pump control unit connector.
3. Check continuity between heat pump control unit harness connector and ground.

Heat pump control unit		-	Continuity
Connector	Terminal		
M102	16	Ground	Yes

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair harness or connector.

6. CHECK HEAT PUMP CONTROL UNIT COMMUNICATION LINE FOR OPEN

1. Disconnect A/C auto amp. connector.
2. Check continuity between heat pump control unit harness connector and A/C auto amp. harness connector.

NOTE:

Check for any adhering foreign substances, cracking, or damage on the heat pump control unit terminal and A/C auto amp. harness connector terminal.

Heat pump control unit		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M102	1	M55	40	Yes

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair harness or connector.

7. CHECK HEAT PUMP CONTROL UNIT COMMUNICATION LINE FOR SHORT

Check continuity between heat pump control unit harness connector and ground.

Heat pump control unit		-	Continuity
Connector	Terminal		
M102	1	Ground	No

Is the inspection result normal?

B27C1 HEAT PUMP CONTROL UNIT

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

YES >> GO TO 8.

NO >> Repair harness or connector.

8. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC confirmation procedure. Refer to [HAC-139, "DTC Logic"](#).

Is DTC B27C1 detected?

YES >> Replace heat pump control unit. Refer to [HAC-188, "Removal and Installation"](#).

NO >> Inspection End.

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B27C2, B27C3 PTC HEATER OUTLET AIR TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27C2, B27C3 PTC HEATER OUTLET AIR TEMPERATURE SENSOR

DTC Logic

INFOID:000000011005946

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-87, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-88, "DTC Logic"](#).

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27C2	PTC OUT AIR TEMP SENS	The PTC heater outlet air temperature sensor recognition temperature is too low [less than -42°C (-44°F)].	<ul style="list-style-type: none"> • PTC heater outlet air temperature sensor • A/C auto amp. • Harness or connectors (The sensor circuit is open or shorted.)
B27C3		The PTC heater outlet air temperature sensor recognition temperature is too high [more than 200°C (392°F)].	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓢ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full hot and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-148, "Diagnosis Procedure"](#).
 NO >> Inspection End.

Diagnosis Procedure

INFOID:000000011005947

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

1. CHECK PTC HEATER OUTLET AIR TEMPERATURE SENSOR VOLTAGE SIGNAL

1. Turn power switch ON.
2. Operate the automatic air conditioning system.
3. Check voltage between A/C auto amp. harness connector terminals.

connector	A/C auto amp.		Test condition	Voltage signal																					
	+	-																							
Terminal																									
M55	17	10	<ul style="list-style-type: none"> • Power switch ON • When air conditioner is operating 	<table border="1"> <caption>Voltage Signal vs Temperature</caption> <thead> <tr> <th>Temperature (°C)</th> <th>Temperature (°F)</th> <th>Voltage (V)</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>32</td> <td>4.00</td> </tr> <tr> <td>20</td> <td>68</td> <td>3.16</td> </tr> <tr> <td>40</td> <td>104</td> <td>2.25</td> </tr> <tr> <td>60</td> <td>140</td> <td>1.50</td> </tr> <tr> <td>80</td> <td>176</td> <td>0.97</td> </tr> <tr> <td>100</td> <td>212</td> <td>0.63</td> </tr> </tbody> </table>	Temperature (°C)	Temperature (°F)	Voltage (V)	0	32	4.00	20	68	3.16	40	104	2.25	60	140	1.50	80	176	0.97	100	212	0.63
Temperature (°C)	Temperature (°F)	Voltage (V)																							
0	32	4.00																							
20	68	3.16																							
40	104	2.25																							
60	140	1.50																							
80	176	0.97																							
100	212	0.63																							

Is the inspection result normal?

B27C2, B27C3 PTC HEATER OUTLET AIR TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

- YES >> GO TO 7.
- NO >> GO TO 2.

2. CHECK PTC HEATER OUTLET AIR TEMPERATURE SENSOR POWER SUPPLY

1. Turn power switch OFF.
2. Disconnect PTC heater outlet air and A/C unit case temperature sensor assembly connector.
3. Turn power switch ON.
4. Check voltage between PTC heater outlet air and A/C unit case temperature sensor assembly harness connector and ground.

+		-	Voltage (Approx.)
Connector	Terminal		
M138	2	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> GO TO 5.

3. CHECK PTC HEATER OUTLET AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between PTC heater outlet air and A/C unit case temperature sensor assembly harness connector and A/C auto amp harness connector.

PTC heater outlet air and A/C unit case temperature sensor assembly		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M138	1	M55	30	Yes

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair harness or connector.

4. CHECK PTC HEATER OUTLET AIR TEMPERATURE SENSOR

Check PTC heater outlet air temperature sensor. Refer to [HAC-144, "Component Inspection"](#).

Is the inspection result normal?

- YES >> Inspection End.
- NO >> Replace PTC heater outlet air and A/C unit case temperature sensor assembly. Refer to [HAC-198, "Removal and Installation"](#).

5. CHECK PTC HEATER OUTLET AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between PTC heater outlet air and A/C unit case temperature sensor assembly harness connector and A/C auto amp. harness connector.

PTC heater outlet air and A/C unit case temperature sensor assembly		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M138	2	M55	17	Yes

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair harness or connector.

6. CHECK PTC HEATER OUTLET AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT FOR SHORT

B27C2, B27C3 PTC HEATER OUTLET AIR TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Check continuity between PTC heater outlet air and A/C unit case temperature sensor assembly harness connector and ground.

PTC heater outlet air and A/C unit case temperature sensor assembly		—	Continuity
Connector	Terminal		
M138	2	Ground	No

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).

NO >> Repair harness or connector.

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-53, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).

NO >> Repair or replace malfunctioning components.

Component Inspection

INFOID:000000011005948

1. CHECK PTC HEATER OUTLET AIR TEMPERATURE SENSOR

1. Remove PTC heater outlet air and A/C unit case temperature sensor assembly. Refer to [HAC-198, "Removal and Installation"](#).
2. Check resistance between PTC heater outlet air and A/C unit case temperature sensor assembly terminals. Refer to applicable table for the normal value.

Terminal		Condition	Resistance: k Ω
		Temperature: $^{\circ}$ C ($^{\circ}$ F)	
1	2	0 (32)	6.00
		10 (50)	3.87
		20 (68)	2.57
		30 (86)	1.76
		40 (104)	1.23
		60 (140)	0.64
		80 (176)	0.36
		100 (212)	0.22

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace PTC heater outlet air and A/C unit case temperature sensor assembly. Refer to [HAC-198, "Removal and Installation"](#).

B27C4, B27C5 A/C UNIT CASE TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27C4, B27C5 A/C UNIT CASE TEMPERATURE SENSOR

DTC Logic

INFOID:0000000011005949

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-87, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-88, "DTC Logic"](#).

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27C4	A/C UNIT CASE TEMP SENS	The A/C unit case temperature sensor recognition temperature is too low [less than -42°C (-44°F)].	<ul style="list-style-type: none"> • A/C unit case temperature sensor • A/C auto amp. • Harness or connectors (The sensor circuit is open or shorted.)
B27C5		The A/C unit case temperature sensor recognition temperature is too high [more than 200°C (392°F)].	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full hot and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-145, "Diagnosis Procedure"](#).
 NO >> Inspection End.

Diagnosis Procedure

INFOID:0000000011005950

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

1. CHECK A/C UNIT CASE TEMPERATURE SENSOR VOLTAGE SIGNAL

1. Turn power switch ON.
2. Operate the automatic air conditioning system.
3. Check voltage between A/C auto amp. harness connector terminals.

connector	A/C auto amp.		Test condition	Voltage signal																					
	+	-																							
Terminal																									
M55	37	10	<ul style="list-style-type: none"> • Power switch ON • When air conditioner is operating 	<table border="1"> <caption>Voltage Signal vs Temperature</caption> <thead> <tr> <th>Temperature (°C)</th> <th>Temperature (°F)</th> <th>Voltage (V)</th> </tr> </thead> <tbody> <tr><td>0</td><td>32</td><td>4.00</td></tr> <tr><td>20</td><td>68</td><td>3.16</td></tr> <tr><td>40</td><td>104</td><td>2.25</td></tr> <tr><td>60</td><td>140</td><td>1.50</td></tr> <tr><td>80</td><td>176</td><td>0.97</td></tr> <tr><td>100</td><td>212</td><td>0.63</td></tr> </tbody> </table> <p>JS1IA1778ZZ</p>	Temperature (°C)	Temperature (°F)	Voltage (V)	0	32	4.00	20	68	3.16	40	104	2.25	60	140	1.50	80	176	0.97	100	212	0.63
Temperature (°C)	Temperature (°F)	Voltage (V)																							
0	32	4.00																							
20	68	3.16																							
40	104	2.25																							
60	140	1.50																							
80	176	0.97																							
100	212	0.63																							

Is the inspection result normal?

B27C4, B27C5 A/C UNIT CASE TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

YES >> GO TO 7.

NO >> GO TO 2.

2. CHECK A/C UNIT CASE TEMPERATURE SENSOR POWER SUPPLY

1. Turn power switch OFF.
2. Disconnect PTC heater outlet air and A/C unit case temperature sensor assembly connector.
3. Turn power switch ON.
4. Check voltage between PTC heater outlet air and A/C unit case temperature sensor assembly harness connector and ground.

+		-	Voltage (Approx.)
PTC heater outlet air and A/C unit case temperature sensor assembly			
Connector	Terminal		
M138	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 5.

3. CHECK A/C UNIT CASE TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between PTC heater outlet air and A/C unit case temperature sensor assembly harness connector and A/C auto amp harness connector.

PTC heater outlet air and A/C unit case temperature sensor assembly		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M138	3	M55	30	Yes

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair harness or connector.

4. CHECK A/C UNIT CASE TEMPERATURE SENSOR

Check A/C unit case temperature sensor. Refer to [HAC-153, "Component Inspection"](#).

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).

NO >> Replace PTC heater outlet air and A/C unit case temperature sensor assembly. Refer to [HAC-198, "Removal and Installation"](#).

5. CHECK A/C UNIT CASE TEMPERATURE SENSOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between PTC heater outlet air and A/C unit case temperature sensor assembly harness connector and A/C auto amp. harness connector.

PTC heater outlet air and A/C unit case temperature sensor assembly		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M138	4	M55	37	Yes

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair harness or connector.

6. CHECK A/C UNIT CASE TEMPERATURE SENSOR POWER SUPPLY CIRCUIT FOR SHORT

B27C4, B27C5 A/C UNIT CASE TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Check continuity between PTC heater outlet air and A/C unit case temperature sensor assembly harness connector and ground.

PTC heater outlet air and A/C unit case temperature sensor assembly		—	Continuity
Connector	Terminal		
M138	4	Ground	No

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).

NO >> Repair harness or connector.

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-53, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).

NO >> Repair or replace malfunctioning components.

Component Inspection

INFOID:0000000011005951

1. CHECK A/C CASE UNIT TEMPERATURE SENSOR

1. Remove PTC heater outlet air and A/C unit case temperature sensor assembly. Refer to [HAC-198, "Removal and Installation"](#).
2. Check resistance between PTC heater outlet air and A/C unit case temperature sensor assembly terminals. Refer to applicable table for the normal value.

Terminal		Condition	Resistance: kΩ
		Temperature: °C (°F)	
3	4	0 (32)	6.00
		10 (50)	3.87
		20 (68)	2.57
		30 (86)	1.76
		40 (104)	1.23
		60 (140)	0.64
		80 (176)	0.36
		100 (212)	0.22

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace PTC heater outlet air and A/C unit case temperature sensor assembly. Refer to [HAC-198, "Removal and Installation"](#).

B27C6, B27C7 COMPRESSOR DISCHARGE REFRIGERANT TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27C6, B27C7 COMPRESSOR DISCHARGE REFRIGERANT TEMPERATURE SENSOR

DTC Logic

INFOID:000000011005952

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-87, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-88, "DTC Logic"](#).

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27C6	COMP DISCHG TEMP SENS	The compressor discharge refrigerant temperature sensor recognition temperature is too low [less than -6.9°C (19.6°F)].	<ul style="list-style-type: none"> • Compressor discharge refrigerant temperature sensor • A/C auto amp. • Harness or connectors (The sensor circuit is open or shorted.)
B27C7		The compressor discharge refrigerant temperature sensor recognition temperature is too high [more than 283.4°C (542.1°F)].	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 1 second.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-148, "Diagnosis Procedure"](#).
 NO >> Inspection End.

Diagnosis Procedure

INFOID:000000011005953

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

1. CHECK COMPRESSOR DISCHARGE REFRIGERANT TEMPERATURE SENSOR VOLTAGE SIGNAL

1. Turn power switch ON.
2. Operate the automatic air conditioning system.
3. Check voltage between heat pump control unit harness connector terminals.

Heat pump control unit			Test condition	Voltage signal																					
connector	+	-																							
	Terminal																								
M102	2	16	<ul style="list-style-type: none"> • Power switch ON • When air conditioner is operating 	<table border="1"> <caption>Voltage Signal vs Temperature</caption> <thead> <tr> <th>Temperature (°C)</th> <th>Temperature (°F)</th> <th>Voltage (V)</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>32</td> <td>4.86</td> </tr> <tr> <td>20</td> <td>68</td> <td>4.62</td> </tr> <tr> <td>40</td> <td>104</td> <td>4.16</td> </tr> <tr> <td>60</td> <td>140</td> <td>3.46</td> </tr> <tr> <td>80</td> <td>176</td> <td>2.64</td> </tr> <tr> <td>100</td> <td>212</td> <td>1.88</td> </tr> </tbody> </table> <p>JSIIA1779ZZ</p>	Temperature (°C)	Temperature (°F)	Voltage (V)	0	32	4.86	20	68	4.62	40	104	4.16	60	140	3.46	80	176	2.64	100	212	1.88
Temperature (°C)	Temperature (°F)	Voltage (V)																							
0	32	4.86																							
20	68	4.62																							
40	104	4.16																							
60	140	3.46																							
80	176	2.64																							
100	212	1.88																							

B27C6, B27C7 COMPRESSOR DISCHARGE REFRIGERANT TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> GO TO 2.

2. CHECK COMPRESSOR DISCHARGE REFRIGERANT TEMPERATURE SENSOR POWER SUPPLY

1. Turn power switch OFF.
2. Disconnect compressor discharge refrigerant temperature sensor connector.
3. Turn power switch ON.
4. Check voltage between compressor discharge refrigerant temperature sensor harness connector and ground.

+		-	Voltage (Approx.)
Connector	Terminal		
M137	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> GO TO 5.

3. CHECK COMPRESSOR DISCHARGE REFRIGERANT TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between compressor discharge refrigerant temperature sensor harness connector and heat pump control unit harness connector.

Compressor discharge refrigerant temperature sensor		Heat pump control unit		Continuity
Connector	Terminal	Connector	Terminal	
M137	2	M102	8	Yes

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair harness or connector.

4. CHECK COMPRESSOR DISCHARGE REFRIGERANT TEMPERATURE SENSOR

Check compressor discharge refrigerant temperature sensor. Refer to [HAC-150, "Component Inspection"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).
- NO >> Replace compressor discharge refrigerant temperature sensor. Refer to [HAC-195, "Removal and Installation"](#).

5. CHECK COMPRESSOR DISCHARGE REFRIGERANT TEMPERATURE SENSOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect heat pump control unit connector.
3. Check continuity between compressor discharge refrigerant temperature sensor harness connector and heat pump control unit harness connector.

Compressor discharge refrigerant temperature sensor		Heat pump control unit		Continuity
Connector	Terminal	Connector	Terminal	
M137	1	M102	2	Yes

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair harness or connector.

6. CHECK COMPRESSOR DISCHARGE REFRIGERANT TEMPERATURE SENSOR POWER SUPPLY CIRCUIT FOR OPEN

B27C6, B27C7 COMPRESSOR DISCHARGE REFRIGERANT TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

CUIT FOR SHORT

Check continuity between compressor discharge refrigerant temperature sensor harness connector and ground.

Compressor discharge refrigerant temperature sensor		—	Continuity
Connector	Terminal		
M137	1	Ground	No

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187. "Removal and Installation"](#).
 NO >> Repair harness or connector.

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-53. "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187. "Removal and Installation"](#).
 NO >> Repair or replace malfunctioning components.

Component Inspection

INFOID:0000000011005954

1. CHECK COMPRESSOR DISCHARGE REFRIGERANT TEMPERATURE SENSOR

1. Remove compressor discharge refrigerant temperature sensor. Refer to [HAC-195. "Removal and Installation"](#).
2. Check resistance between compressor discharge refrigerant temperature sensor terminals. Refer to applicable table for the normal value.

Terminal		Condition	Resistance: kΩ
		Temperature: °C (°F)	
1	2	0 (32)	16.43
		10 (50)	9.90
		20 (68)	6.19
		30 (86)	4.01
		40 (104)	2.67
		60 (140)	2.20
		80 (176)	1.83
		100 (212)	1.28

Is the inspection result normal?

- YES >> Inspection End.
 NO >> Replace compressor discharge refrigerant temperature sensor. Refer to [HAC-195. "Removal and Installation"](#).

B27C8, B27C9 COMPRESSOR SUCTION REFRIGERANT TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27C8, B27C9 COMPRESSOR SUCTION REFRIGERANT TEMPERATURE SENSOR

DTC Logic

INFOID:0000000011005955

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-87, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-88, "DTC Logic"](#).

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27C8	COMP SUCTION TEMP SENS	The compressor suction refrigerant temperature sensor recognition temperature is too low [less than -66°C (-86.8°F)].	<ul style="list-style-type: none"> • Compressor suction refrigerant temperature sensor • A/C auto amp. • Harness or connectors (The sensor circuit is open or shorted.)
B27C9		The compressor suction refrigerant temperature sensor recognition temperature is too high [more than 138.4°C (281.1°F)].	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 1 second.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-151, "Diagnosis Procedure"](#).
 NO >> Inspection End.

Diagnosis Procedure

INFOID:0000000011005956

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

1. CHECK COMPRESSOR SUCTION REFRIGERANT TEMPERATURE SENSOR VOLTAGE SIGNAL

1. Turn power switch ON.
2. Operate the automatic air conditioning system.
3. Check voltage between heat pump control unit harness connector terminals.

Heat pump control unit		Test condition	Voltage signal																					
connector	+ Terminal			- Terminal																				
M102	11	16	<ul style="list-style-type: none"> • Power switch ON • When air conditioner is operating <table border="1"> <caption>Voltage Signal vs Temperature</caption> <thead> <tr> <th>Temperature (°C)</th> <th>Temperature (°F)</th> <th>Voltage (V)</th> </tr> </thead> <tbody> <tr> <td>-20</td> <td>-4</td> <td>3.62</td> </tr> <tr> <td>0</td> <td>32</td> <td>2.49</td> </tr> <tr> <td>20</td> <td>68</td> <td>1.50</td> </tr> <tr> <td>40</td> <td>104</td> <td>0.86</td> </tr> <tr> <td>60</td> <td>140</td> <td>0.49</td> </tr> <tr> <td>80</td> <td>176</td> <td>0.29</td> </tr> </tbody> </table> <p>JSIIA1780ZZ</p>	Temperature (°C)	Temperature (°F)	Voltage (V)	-20	-4	3.62	0	32	2.49	20	68	1.50	40	104	0.86	60	140	0.49	80	176	0.29
Temperature (°C)	Temperature (°F)	Voltage (V)																						
-20	-4	3.62																						
0	32	2.49																						
20	68	1.50																						
40	104	0.86																						
60	140	0.49																						
80	176	0.29																						

B27C8, B27C9 COMPRESSOR SUCTION REFRIGERANT TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> GO TO 2.

2. CHECK COMPRESSOR SUCTION REFRIGERANT TEMPERATURE SENSOR POWER SUPPLY

1. Turn power switch OFF.
2. Disconnect compressor suction refrigerant temperature sensor connector.
3. Turn power switch ON.
4. Check voltage between compressor suction refrigerant temperature sensor harness connector and ground.

+		-	Voltage (Approx.)
Compressor suction refrigerant temperature sensor Connector	Terminal		
E89	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> GO TO 5.

3. CHECK COMPRESSOR SUCTION REFRIGERANT TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect heat pump control unit connector.
3. Check continuity between compressor suction refrigerant temperature sensor harness connector and heat pump control unit harness connector.

Compressor suction refrigerant temperature sensor		Heat pump control unit		Continuity
Connector	Terminal	Connector	Terminal	
E89	2	M102	8	Yes

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair harness or connector.

4. CHECK COMPRESSOR SUCTION REFRIGERANT TEMPERATURE SENSOR

Check compressor suction refrigerant temperature sensor. Refer to [HAC-153. "Component Inspection"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187. "Removal and Installation"](#).
- NO >> Replace compressor suction refrigerant temperature sensor. Refer to [HAC-196. "Removal and Installation"](#).

5. CHECK COMPRESSOR SUCTION REFRIGERANT TEMPERATURE SENSOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect heat pump control unit connector.
3. Check continuity between compressor suction refrigerant temperature sensor harness connector and heat pump control unit harness connector.

Compressor suction refrigerant temperature sensor		Heat pump control unit		Continuity
Connector	Terminal	Connector	Terminal	
E89	1	M102	11	Yes

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair harness or connector.

6. CHECK COMPRESSOR SUCTION REFRIGERANT TEMPERATURE SENSOR POWER SUPPLY CIRCUIT FOR OPEN

B27C8, B27C9 COMPRESSOR SUCTION REFRIGERANT TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

CUIT FOR SHORT

Check continuity between compressor suction refrigerant temperature sensor harness connector and ground.

Compressor suction refrigerant temperature sensor		—	Continuity
Connector	Terminal		
E89	1	Ground	No

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).
 NO >> Repair harness or connector.

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-53, "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).
 NO >> Repair or replace malfunctioning components.

Component Inspection

INFOID:0000000011005957

1. CHECK COMPRESSOR SUCTION REFRIGERANT TEMPERATURE SENSOR

- Remove compressor suction refrigerant temperature sensor. Refer to [HAC-196, "Removal and Installation"](#).
- Check resistance between compressor suction refrigerant temperature sensor terminals. Refer to applicable table for the normal value.

Terminal		Condition	Resistance: kΩ
		Temperature: °C (°F)	
1	2	-20 (-4)	15.9
		-10 (14)	9.6
		0 (32)	6.0
		10 (50)	3.9
		20 (68)	2.6
		40 (104)	1.2
		60 (140)	0.7
		80 (176)	0.4

Is the inspection result normal?

- YES >> Inspection End.
 NO >> Replace compressor suction refrigerant temperature sensor. Refer to [HAC-196, "Removal and Installation"](#).

B27F0 REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27F0 REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE

DTC Logic

INFOID:000000011005958

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-87, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-88, "DTC Logic"](#).

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27F0	2-WAY TYPE VALVE CIRC	When the heat pump control unit detects a malfunction of the refrigerant channel switching 2 way type valve control signal status, compared to the valve status of the control that is being judged.	<ul style="list-style-type: none">• Refrigerant channel switching 2 way type valve• Heat pump control unit• Harness or connectors (The heat pump control unit circuit or refrigerant channel switching 2 way type valve circuit is open or shorted.)

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 5 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-154, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000011005959

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

NOTE:

After diagnosis is completed, reconnect all harness connectors. Then, use CONSULT to enter "Active Test" of "HVAC", and perform "MODE2" (cooling operation) and "MODE5" (heating operation) of "HVAC TEST" for the maximum of 10 minutes. (Refer to [HAC-47, "CONSULT Function"](#).) Check that cool air blows during cooling operation, and that warm air blows during heating operation.

1. CHECK REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE CONTROL CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect refrigerant channel switching 2 way type valve connector and heat pump control unit connector.
3. Check continuity between refrigerant channel switching 2 way type valve harness connector and heat pump control unit harness connector.

NOTE:

Check for any adhering foreign substances, cracking, or damage on the refrigerant channel switching 2 way type valve terminal and heat pump control unit harness connector terminal.

B27F0 REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Refrigerant channel switching 2 way type valve		Heat pump control unit		Continuity
Connector	Terminal	Connector	Terminal	
E90	2	M102	6	Yes

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair harness or connector.

2. CHECK REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE CONTROL CIRCUIT FOR SHORT (BATTERY)

1. Turn power switch ON.
2. Check continuity between heat pump control unit harness connector and ground.

+		-	Voltage (Approx.)
Heat pump control unit			
Connector	Terminal		
M102	6	Ground	0 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair harness or connector.

3. CHECK REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE CONTROL CIRCUIT FOR SHORT (GROUND)

1. Turn power switch OFF.
2. Check continuity between heat pump control unit harness connector and ground.

Heat pump control unit		—	Continuity
Connector	Terminal		
M102	6	Ground	No

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair harness or connector.

4. CHECK REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE POWER SUPPLY

1. Turn power switch ON.
2. Check continuity between refrigerant channel switching 2 way type valve harness connector and ground.

+		-	Voltage (Approx.)
Refrigerant channel switching 2 way type valve			
Connector	Terminal		
E90	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. CHECK A/C RELAY CIRCUIT

Check A/C relay circuit. Refer to [EVC-386. "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Repair harness or connector between A/C relay and refrigerant channel switching 2 way type valve.

NO >> Repair or replace malfunctioning components.

6. CHECK HEAT PUMP CONTROL UNIT COMMUNICATION LINE FOR OPEN

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B27F0 REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

1. Turn power switch OFF.
2. Disconnect heat pump control unit connector and A/C auto amp. connector.
3. Check continuity between heat pump control unit harness connector and A/C auto amp. harness connector.

NOTE:

Check for any adhering foreign substances, cracking, or damage on the heat pump control unit terminal and A/C auto amp. harness connector terminal.

Heat pump control unit		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M102	1	M55	40	Yes

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair harness or connector.

7. CHECK HEAT PUMP CONTROL UNIT COMMUNICATION LINE FOR SHORT

Check continuity between heat pump control unit harness connector and ground.

Heat pump control unit		—	Continuity
Connector	Terminal		
M102	1	Ground	No

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair harness or connector.

8. CHECK REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE

Check refrigerant channel switching 2 way type valve. Refer to [HAC-156. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace high-pressure cooler pipe assembly. Refer to [HA-47. "2-WAY VALVE AND 3-WAY VALVE ASSEMBLY : Removal and Installation"](#).

9. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC confirmation procedure. Refer to [HAC-154. "DTC Logic"](#).

Is DTC B27F0 detected?

YES >> Replace heat pump control unit. Refer to [HAC-188. "Removal and Installation"](#).

NO >> Check intermittent incident. Refer to [GI-53. "Intermittent Incident"](#).

Component Inspection

INFOID:000000011005960

1. CHECK REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE

1. Turn power switch OFF.
2. Disconnect refrigerant channel switching 2 way type valve connector.
3. Check resistance between refrigerant channel switching 2 way type valve terminals. Refer to applicable table for the normal value.

Terminal		Resistance (Ω)
1	2	13.6 ± 1.4

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace refrigerant channel switching 2 way type valve (high-pressure cooler pipe assembly). Refer to [HA-47. "2-WAY VALVE AND 3-WAY VALVE ASSEMBLY : Removal and Installation"](#).

B27F1 REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27F1 REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE

DTC Logic

INFOID:000000011005961

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-87, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-88, "DTC Logic"](#).

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27F1	2-WAY TYPE VALVE CIRC	When the heat pump control unit detects a malfunction of the refrigerant channel switching 2 way type valve control signal status, compared to the valve status of the control that is being judged.	<ul style="list-style-type: none">• Refrigerant channel switching 2 way type valve• Heat pump control unit• Harness or connectors (The heat pump control unit circuit or refrigerant channel switching 2 way type valve circuit is open or shorted.)

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

④ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full hot and wait at least 5 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-157, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000011005962

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

NOTE:

After diagnosis is completed, reconnect all harness connectors. Then, use CONSULT to enter "Active Test" of "HVAC", and perform "MODE2" (cooling operation) and "MODE5" (heating operation) of "HVAC TEST" for the maximum of 10 minutes. (Refer to [HAC-47, "CONSULT Function"](#).) Check that cool air blows during cooling operation, and that warm air blows during heating operation.

1. CHECK REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE CONTROL CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect refrigerant channel switching 2 way type valve connector and heat pump control unit connector.
3. Check continuity between refrigerant channel switching 2 way type valve harness connector and heat pump control unit harness connector.

NOTE:

Check for any adhering foreign substances, cracking, or damage on the refrigerant channel switching 2 way type valve terminal and heat pump control unit harness connector terminal.

B27F1 REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Refrigerant channel switching 2 way type valve		Heat pump control unit		Continuity
Connector	Terminal	Connector	Terminal	
E90	2	M102	6	Yes

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair harness or connector.

2. CHECK REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE CONTROL CIRCUIT FOR SHORT (BATTERY)

1. Turn power switch ON.
2. Check continuity between heat pump control unit harness connector and ground.

+		-	Voltage (Approx.)
Heat pump control unit			
Connector	Terminal		
M102	6	Ground	0 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair harness or connector.

3. CHECK REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE CONTROL CIRCUIT FOR SHORT (GROUND)

1. Turn power switch OFF.
2. Check continuity between heat pump control unit harness connector and ground.

Heat pump control unit		—	Continuity
Connector	Terminal		
M102	6	Ground	No

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair harness or connector.

4. CHECK REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE POWER SUPPLY

1. Turn power switch ON.
2. Check continuity between refrigerant channel switching 2 way type valve harness connector and ground.

+		-	Voltage (Approx.)
Refrigerant channel switching 2 way type valve			
Connector	Terminal		
E90	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. CHECK A/C RELAY CIRCUIT

Check A/C relay circuit. Refer to [EVC-386. "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Repair harness or connector between A/C relay and refrigerant channel switching 2 way type valve.

NO >> Repair or replace malfunctioning components.

6. CHECK HEAT PUMP CONTROL UNIT COMMUNICATION LINE FOR OPEN

B27F1 REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE

[AUTO A/C (WITH HEAT PUMP)]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn power switch OFF.
2. Disconnect heat pump control unit connector and A/C auto amp. connector.
3. Check continuity between heat pump control unit harness connector and A/C auto amp. harness connector.

NOTE:

Check for any adhering foreign substances, cracking, or damage on the heat pump control unit terminal and A/C auto amp. harness connector terminal.

Heat pump control unit		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M102	1	M55	40	Yes

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair harness or connector.

7. CHECK HEAT PUMP CONTROL UNIT COMMUNICATION LINE FOR SHORT

Check continuity between heat pump control unit harness connector and ground.

Heat pump control unit		—	Continuity
Connector	Terminal		
M102	1	Ground	No

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair harness or connector.

8. CHECK REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE

Check refrigerant channel switching 2 way type valve. Refer to [HAC-156. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace high-pressure cooler pipe assembly. Refer to [HA-47. "2-WAY VALVE AND 3-WAY VALVE ASSEMBLY : Removal and Installation"](#).

9. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC confirmation procedure. Refer to [HAC-157. "DTC Logic"](#).

Is DTC B27F1 detected?

YES >> Replace heat pump control unit. Refer to [HAC-188. "Removal and Installation"](#).

NO >> Check intermittent incident. Refer to [GI-53. "Intermittent Incident"](#).

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B27F2 REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27F2 REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE

DTC Logic

INFOID:000000011005963

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-87, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-88, "DTC Logic"](#).

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27F2	2-WAY TYPE VALVE CIRC	When the heat pump control unit detects a malfunction of the refrigerant channel switching 2 way type valve control signal status, compared to the valve status of the control that is being judged.	<ul style="list-style-type: none">• Refrigerant channel switching 2 way type valve• Heat pump control unit• Harness or connectors (The heat pump control unit circuit or refrigerant channel switching 2 way type valve circuit is open or shorted.)

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

④ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 5 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-160, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000011005964

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

NOTE:

After diagnosis is completed, reconnect all harness connectors. Then, use CONSULT to enter "Active Test" of "HVAC", and perform "MODE2" (cooling operation) and "MODE5" (heating operation) of "HVAC TEST" for the maximum of 10 minutes. (Refer to [HAC-47, "CONSULT Function"](#).) Check that cool air blows during cooling operation, and that warm air blows during heating operation.

1. CHECK REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE CONTROL CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect refrigerant channel switching 2 way type valve connector and heat pump control unit connector.
3. Check continuity between refrigerant channel switching 2 way type valve harness connector and heat pump control unit harness connector.

NOTE:

Check for any adhering foreign substances, cracking, or damage on the refrigerant channel switching 2 way type valve terminal and heat pump control unit harness connector terminal.

B27F2 REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Refrigerant channel switching 2 way type valve		Heat pump control unit		Continuity
Connector	Terminal	Connector	Terminal	
E90	2	M102	6	Yes

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair harness or connector.

2. CHECK REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE CONTROL CIRCUIT FOR SHORT (BATTERY)

1. Turn power switch ON.
2. Check continuity between heat pump control unit harness connector and ground.

+		-	Voltage (Approx.)
Heat pump control unit			
Connector	Terminal		
M102	6	Ground	0 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair harness or connector.

3. CHECK REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE CONTROL CIRCUIT FOR SHORT (GROUND)

1. Turn power switch OFF.
2. Check continuity between heat pump control unit harness connector and ground.

Heat pump control unit		—	Continuity
Connector	Terminal		
M102	6	Ground	No

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair harness or connector.

4. CHECK REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE POWER SUPPLY

1. Turn power switch ON.
2. Check continuity between refrigerant channel switching 2 way type valve harness connector and ground.

+		-	Voltage (Approx.)
Refrigerant channel switching 2 way type valve			
Connector	Terminal		
E90	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. CHECK A/C RELAY CIRCUIT

Check A/C relay circuit. Refer to [EVC-386. "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Repair harness or connector between A/C relay and refrigerant channel switching 2 way type valve.

NO >> Repair or replace malfunctioning components.

6. CHECK HEAT PUMP CONTROL UNIT COMMUNICATION LINE FOR OPEN

B27F2 REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

1. Turn power switch OFF.
2. Disconnect heat pump control unit connector and A/C auto amp. connector.
3. Check continuity between heat pump control unit harness connector and A/C auto amp. harness connector.

NOTE:

Check for any adhering foreign substances, cracking, or damage on the heat pump control unit terminal and A/C auto amp. harness connector terminal.

Heat pump control unit		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M102	1	M55	40	Yes

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair harness or connector.

7. CHECK HEAT PUMP CONTROL UNIT COMMUNICATION LINE FOR SHORT

Check continuity between heat pump control unit harness connector and ground.

Heat pump control unit		—	Continuity
Connector	Terminal		
M102	1	Ground	No

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair harness or connector.

8. CHECK REFRIGERANT CHANNEL SWITCHING 2 WAY TYPE VALVE

Check refrigerant channel switching 2 way type valve. Refer to [HAC-156. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace high-pressure cooler pipe assembly. Refer to [HA-47. "2-WAY VALVE AND 3-WAY VALVE ASSEMBLY : Removal and Installation"](#).

9. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC confirmation procedure. Refer to [HAC-160. "DTC Logic"](#).

Is DTC B27F2 detected?

YES >> Replace heat pump control unit. Refer to [HAC-188. "Removal and Installation"](#).

NO >> Check intermittent incident. Refer to [GI-53. "Intermittent Incident"](#).

B27F3 REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27F3 REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE

DTC Logic

INFOID:0000000011005965

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-87, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-88, "DTC Logic"](#).

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27F3	3-WAY TYPE VALVE CIRC	When the heat pump control unit detects a malfunction of the refrigerant channel switching 3 way type valve control signal status, compared to the valve status of the control that is being judged.	<ul style="list-style-type: none">• Refrigerant channel switching 3 way type valve• Heat pump control unit• Harness or connectors (The heat pump control unit circuit or refrigerant channel switching 3 way type valve circuit is open or shorted.)

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

④ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 5 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-163, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:0000000011005966

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

NOTE:

After diagnosis is completed, reconnect all harness connectors. Then, use CONSULT to enter "Active Test" of "HVAC", and perform "MODE2" (cooling operation) and "MODE5" (heating operation) of "HVAC TEST" for the maximum of 10 minutes. (Refer to [HAC-47, "CONSULT Function"](#).) Check that cool air blows during cooling operation, and that warm air blows during heating operation.

1. CHECK REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE CONTROL CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect refrigerant channel switching 3 way type valve connector and heat pump control unit connector.
3. Check continuity between refrigerant channel switching 3 way type valve harness connector and heat pump control unit harness connector.

NOTE:

Check for any adhering foreign substances, cracking, or damage on the refrigerant channel switching 3 way type valve terminal and heat pump control unit harness connector terminal.

B27F3 REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Refrigerant channel switching 3 way type valve		Heat pump control unit		Continuity
Connector	Terminal	Connector	Terminal	
E91	2	M102	7	Yes

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair harness or connector.

2.CHECK REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE CONTROL CIRCUIT FOR SHORT (BATTERY)

1. Turn power switch ON.
2. Check continuity between heat pump control unit harness connector and ground.

+		-	Voltage (Approx.)
Heat pump control unit			
Connector	Terminal		
M102	7	Ground	0 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair harness or connector.

3.CHECK REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE CONTROL CIRCUIT FOR SHORT (GROUND)

1. Turn power switch OFF.
2. Check continuity between heat pump control unit harness connector and ground.

Heat pump control unit		—	Continuity
Connector	Terminal		
M102	7	Ground	No

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair harness or connector.

4.CHECK REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE POWER SUPPLY

1. Turn power switch ON.
2. Check continuity between refrigerant channel switching 3 way type valve harness connector and ground.

+		-	Voltage (Approx.)
Refrigerant channel switching 3 way type valve			
Connector	Terminal		
E91	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK A/C RELAY CIRCUIT

Check A/C relay circuit. Refer to [EVC-386. "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Repair harness or connector between A/C relay and refrigerant channel switching 3 way type valve.

NO >> Repair or replace malfunctioning components.

6.CHECK HEAT PUMP CONTROL UNIT COMMUNICATION LINE FOR OPEN

B27F3 REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

1. Turn power switch OFF.
2. Disconnect heat pump control unit connector and A/C auto amp. connector.
3. Check continuity between heat pump control unit harness connector and A/C auto amp. harness connector.

NOTE:

Check for any adhering foreign substances, cracking, or damage on the heat pump control unit terminal and A/C auto amp. harness connector terminal.

Heat pump control unit		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M102	1	M55	40	Yes

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair harness or connector.

7. CHECK HEAT PUMP CONTROL UNIT COMMUNICATION LINE FOR SHORT

Check continuity between heat pump control unit harness connector and ground.

Heat pump control unit		—	Continuity
Connector	Terminal		
M102	1	Ground	No

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair harness or connector.

8. CHECK REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE

Check refrigerant channel switching 3 way type valve. Refer to [HAC-165. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace high-pressure cooler pipe assembly. Refer to [HA-47. "2-WAY VALVE AND 3-WAY VALVE ASSEMBLY : Removal and Installation"](#).

9. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC confirmation procedure. Refer to [HAC-163. "DTC Logic"](#).

Is DTC B27F3 detected?

YES >> Replace heat pump control unit. Refer to [HAC-188. "Removal and Installation"](#).

NO >> Check intermittent incident. Refer to [GI-53. "Intermittent Incident"](#).

Component Inspection

INFOID:0000000011005967

1. CHECK REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE

1. Turn power switch OFF.
2. Disconnect refrigerant channel switching 3 way type valve connector.
3. Check resistance between refrigerant channel switching 3 way type valve terminals. Refer to applicable table for the normal value.

Terminal		Resistance (Ω)
1	2	13.6 ± 1.4

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace refrigerant channel switching 3 way type valve (high-pressure cooler pipe assembly). Refer to [HA-47. "2-WAY VALVE AND 3-WAY VALVE ASSEMBLY : Removal and Installation"](#).

B27F4 REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27F4 REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE

DTC Logic

INFOID:000000011005968

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-87, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-88, "DTC Logic"](#).

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27F4	3-WAY TYPE VALVE CIRC	When the heat pump control unit detects a malfunction of the refrigerant channel switching 3 way type valve control signal status, compared to the valve status of the control that is being judged.	<ul style="list-style-type: none">• Refrigerant channel switching 3 way type valve• Heat pump control unit• Harness or connectors (The heat pump control unit circuit or refrigerant channel switching 3 way type valve circuit is open or shorted.)

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full hot and wait at least 5 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-166, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000011005969

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

NOTE:

After diagnosis is completed, reconnect all harness connectors. Then, use CONSULT to enter "Active Test" of "HVAC", and perform "MODE2" (cooling operation) and "MODE5" (heating operation) of "HVAC TEST" for the maximum of 10 minutes. (Refer to [HAC-47, "CONSULT Function"](#).) Check that cool air blows during cooling operation, and that warm air blows during heating operation.

1. CHECK REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE CONTROL CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect refrigerant channel switching 3 way type valve connector and heat pump control unit connector.
3. Check continuity between refrigerant channel switching 3 way type valve harness connector and heat pump control unit harness connector.

NOTE:

Check for any adhering foreign substances, cracking, or damage on the refrigerant channel switching 3 way type valve terminal and heat pump control unit harness connector terminal.

B27F4 REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Refrigerant channel switching 3 way type valve		Heat pump control unit		Continuity
Connector	Terminal	Connector	Terminal	
E91	2	M102	7	Yes

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair harness or connector.

2.CHECK REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE CONTROL CIRCUIT FOR SHORT (BATTERY)

1. Turn power switch ON.
2. Check continuity between heat pump control unit harness connector and ground.

+		-	Voltage (Approx.)
Heat pump control unit			
Connector	Terminal		
M102	7	Ground	0 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair harness or connector.

3.CHECK REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE CONTROL CIRCUIT FOR SHORT (GROUND)

1. Turn power switch OFF.
2. Check continuity between heat pump control unit harness connector and ground.

Heat pump control unit		—	Continuity
Connector	Terminal		
M102	7	Ground	No

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair harness or connector.

4.CHECK REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE POWER SUPPLY

1. Turn power switch ON.
2. Check continuity between refrigerant channel switching 3 way type valve harness connector and ground.

+		-	Voltage (Approx.)
Refrigerant channel switching 3 way type valve			
Connector	Terminal		
E91	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK A/C RELAY CIRCUIT

Check A/C relay circuit. Refer to [EVC-386. "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Repair harness or connector between A/C relay and refrigerant channel switching 3 way type valve.

NO >> Repair or replace malfunctioning components.

6.CHECK HEAT PUMP CONTROL UNIT COMMUNICATION LINE FOR OPEN

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HAC

B27F4 REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

1. Turn power switch OFF.
2. Disconnect heat pump control unit connector and A/C auto amp. connector.
3. Check continuity between heat pump control unit harness connector and A/C auto amp. harness connector.

NOTE:

Check for any adhering foreign substances, cracking, or damage on the heat pump control unit terminal and A/C auto amp. harness connector terminal.

Heat pump control unit		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M102	1	M55	40	Yes

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair harness or connector.

7. CHECK HEAT PUMP CONTROL UNIT COMMUNICATION LINE FOR SHORT

Check continuity between heat pump control unit harness connector and ground.

Heat pump control unit		—	Continuity
Connector	Terminal		
M102	1	Ground	No

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair harness or connector.

8. CHECK REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE

Check refrigerant channel switching 3 way type valve. Refer to [HAC-165. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace high-pressure cooler pipe assembly. Refer to [HA-47. "2-WAY VALVE AND 3-WAY VALVE ASSEMBLY : Removal and Installation"](#).

9. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC confirmation procedure. Refer to [HAC-166. "DTC Logic"](#).

Is DTC B27F4 detected?

YES >> Replace heat pump control unit. Refer to [HAC-188. "Removal and Installation"](#).

NO >> Check intermittent incident. Refer to [GI-53. "Intermittent Incident"](#).

B27F5 REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27F5 REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE

DTC Logic

INFOID:000000011005970

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-87, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-88, "DTC Logic"](#).

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27F5	3-WAY TYPE VALVE CIRC	When the heat pump control unit detects a malfunction of the refrigerant channel switching 3 way type valve control signal status, compared to the valve status of the control that is being judged.	<ul style="list-style-type: none">• Refrigerant channel switching 3 way type valve• Heat pump control unit• Harness or connectors (The heat pump control unit circuit or refrigerant channel switching 3 way type valve circuit is open or shorted.)

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

④ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 5 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-169, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000011005971

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

NOTE:

After diagnosis is completed, reconnect all harness connectors. Then, use CONSULT to enter "Active Test" of "HVAC", and perform "MODE2" (cooling operation) and "MODE5" (heating operation) of "HVAC TEST" for the maximum of 10 minutes. (Refer to [HAC-47, "CONSULT Function"](#).) Check that cool air blows during cooling operation, and that warm air blows during heating operation.

1. CHECK REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE CONTROL CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect refrigerant channel switching 3 way type valve connector and heat pump control unit connector.
3. Check continuity between refrigerant channel switching 3 way type valve harness connector and heat pump control unit harness connector.

NOTE:

Check for any adhering foreign substances, cracking, or damage on the refrigerant channel switching 3 way type valve terminal and heat pump control unit harness connector terminal.

B27F5 REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Refrigerant channel switching 3 way type valve		Heat pump control unit		Continuity
Connector	Terminal	Connector	Terminal	
E91	2	M102	7	Yes

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair harness or connector.

2.CHECK REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE CONTROL CIRCUIT FOR SHORT (BATTERY)

1. Turn power switch ON.
2. Check continuity between heat pump control unit harness connector and ground.

+		-	Voltage (Approx.)
Heat pump control unit			
Connector	Terminal		
M102	7	Ground	0 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair harness or connector.

3.CHECK REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE CONTROL CIRCUIT FOR SHORT (GROUND)

1. Turn power switch OFF.
2. Check continuity between heat pump control unit harness connector and ground.

Heat pump control unit		—	Continuity
Connector	Terminal		
M102	7	Ground	No

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair harness or connector.

4.CHECK REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE POWER SUPPLY

1. Turn power switch ON.
2. Check continuity between refrigerant channel switching 3 way type valve harness connector and ground.

+		-	Voltage (Approx.)
Refrigerant channel switching 3 way type valve			
Connector	Terminal		
E91	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.CHECK A/C RELAY CIRCUIT

Check A/C relay circuit. Refer to [EVC-386. "Diagnosis Procedure"](#).

Is the inspection result normal?

YES >> Repair harness or connector between A/C relay and refrigerant channel switching 3 way type valve.

NO >> Repair or replace malfunctioning components.

6.CHECK HEAT PUMP CONTROL UNIT COMMUNICATION LINE FOR OPEN

B27F5 REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE

[AUTO A/C (WITH HEAT PUMP)]

< DTC/CIRCUIT DIAGNOSIS >

1. Turn power switch OFF.
2. Disconnect heat pump control unit connector and A/C auto amp. connector.
3. Check continuity between heat pump control unit harness connector and A/C auto amp. harness connector.

NOTE:

Check for any adhering foreign substances, cracking, or damage on the heat pump control unit terminal and A/C auto amp. harness connector terminal.

Heat pump control unit		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M102	1	M55	40	Yes

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair harness or connector.

7. CHECK HEAT PUMP CONTROL UNIT COMMUNICATION LINE FOR SHORT

Check continuity between heat pump control unit harness connector and ground.

Heat pump control unit		—	Continuity
Connector	Terminal		
M102	1	Ground	No

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair harness or connector.

8. CHECK REFRIGERANT CHANNEL SWITCHING 3 WAY TYPE VALVE

Check refrigerant channel switching 3 way type valve. Refer to [HAC-165. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace high-pressure cooler pipe assembly. Refer to [HA-47. "2-WAY VALVE AND 3-WAY VALVE ASSEMBLY : Removal and Installation"](#).

9. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC confirmation procedure. Refer to [HAC-169. "DTC Logic"](#).

Is DTC B27F5 detected?

YES >> Replace heat pump control unit. Refer to [HAC-188. "Removal and Installation"](#).

NO >> Check intermittent incident. Refer to [GI-53. "Intermittent Incident"](#).

B27FF A/C AUTO AMP.

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

B27FF A/C AUTO AMP.

DTC Logic

INFOID:000000011005972

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27FF	CONFIG NOT IMPLEM	When A/C auto amp. configuration (control unit setting) is not performed.	A/C auto amp (Not performed configuration)

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

④ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

YES >> Refer to [HAC-172, "Diagnosis Procedure"](#).

NO >> Inspection End.

Diagnosis Procedure

INFOID:000000011005973

1.PERFORM A/C AUTO AMP. CONFIGURATION

④ With CONSULT

1. Turn power switch ON
2. Use CONSULT and perform configuration (control unit setting) of "HVAC". Refer to [HAC-81, "Work Procedure"](#).

>> Inspection End.

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

POWER SUPPLY AND GROUND CIRCUIT

A/C AUTO AMP.

A/C AUTO AMP. : Diagnosis Procedure

INFOID:000000011005974

Regarding Wiring Diagram information, refer to [HAC-61. "Wiring Diagram"](#).

1. CHECK SYMPTOM

Check symptom (A or B).

Symptom	
A	<ul style="list-style-type: none">• Air conditioning system does not activate.• Air conditioning system does cannot be controlled.• Operation status of air conditioning system is not indicated on display.
B	<ul style="list-style-type: none">• Memory function does not operate normally.• The setting is not maintained. (It returns to the initial condition)

Which symptom is detected?

A >> GO TO 2.

B >> GO TO 4.

2. CHECK FUSE

1. Turn power switch OFF.
2. Check 10A fuse [No. 3, located in fuse block (J/B)].

NOTE:

Refer to [PG-71. "Terminal Arrangement"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace the blown fuse after repairing the affected circuit if a fuse is blown.

3. CHECK A/C AUTO AMP. POWER SWITCH POWER SUPPLY

1. Disconnect A/C auto amp. connector.
2. Turn power switch ON.
3. Check voltage between A/C auto amp. harness connector and ground.

+		-	Voltage (Approx.)
A/C auto amp.			
Connector	Terminal		
M55	32	Ground	9 V or more

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair harness or connector between A/C auto amp. and fuse.

4. CHECK FUSE

1. Turn power switch OFF.
2. Check 10A fuse [No.13, located in fuse block (J/B)].

NOTE:

Refer to [PG-71. "Terminal Arrangement"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace the blown fuse after repairing the affected circuit.

5. CHECK A/C AUTO AMP. BATTERY POWER SUPPLY

1. Disconnect A/C auto amp. connector.

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

2. Check voltage between A/C auto amp. harness connector and ground.

+		-	Voltage (Approx.)
A/C auto amp.			
Connector	Terminal		
M55	31	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair harness or connector between A/C auto amp. and fuse.

6. CHECK A/C AUTO AMP. GROUND CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Check continuity between A/C auto amp. harness connector and ground.

A/C auto amp.		—	Continuity
Connector	Terminal		
M55	10	Ground	Yes

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).

NO >> Repair harness or connector.

BLOWER MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

BLOWER MOTOR

Component Function Check

INFOID:0000000011005975

1.CHECK BLOWER MOTOR

Ⓜ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Using CONSULT, perform "HVAC TEST" in "Active Test" of "HVAC". Refer to [HAC-47, "CONSULT Function"](#).
4. When the test items are being conducted, check that the blower motor operates normally for each mode.

Is the inspection result normal?

- YES >> Inspection End.
 NO >> Refer to [HAC-175, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:0000000011005976

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

1.CHECK FUSE

1. Turn power switch OFF.
2. Check 15A fuses [Nos. 14 and 16, located in fuse block (J/B)].

NOTE:

Refer to [PG-71, "Terminal Arrangement"](#).

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Replace the blown fuse after repairing the affected circuit.

2.CHECK BLOWER MOTOR POWER SUPPLY

1. Disconnect blower motor connector.
2. Turn power switch ON.
3. Check voltage between blower motor harness connector and ground.

+		-	Voltage (Approx.)
Blower motor			
Connector	Terminal		
M39	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 4.
 NO >> GO TO 3.

3.CHECK BLOWER RELAY

1. Turn power switch OFF.
2. Check blower relay. Refer to [HAC-178, "Component Inspection \(Blower Relay\)"](#).

Is the inspection result normal?

- YES >> Repair harness or connector between blower motor and fuse.
 NO >> Replace blower relay.

4.CHECK BLOWER MOTOR CONTROL CIRCUIT

1. Turn power switch OFF.
2. Connect blower motor connector.
3. Disconnect power transistor connector.
4. Turn power switch ON.
5. Check voltage between power transistor harness connector and ground.

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BLOWER MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

+		-	Voltage (Approx.)
Power transistor			
Connector	Terminal		
M144	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 6.
NO >> GO TO 5.

5. CHECK BLOWER MOTOR CONTROL CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect blower motor connector.
3. Check continuity between power transistor harness connector and blower motor harness connector.

Power transistor		Blower motor		Continuity
Connector	Terminal	Connector	Terminal	
M144	1	M39	2	Yes

Is the inspection result normal?

- YES >> Replace blower motor. Refer to [VTL-22, "Removal and Installation"](#).
NO >> Repair harness or connector.

6. CHECK POWER TRANSISTOR POWER SWITCH POWER SUPPLY

Check voltage between power transistor harness connector and ground.

+		-	Voltage (Approx.)
Power transistor			
Connector	Terminal		
M144	3	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 7.
NO >> Repair harness or connector between power transistor and fuse.

7. CHECK POWER TRANSISTOR GROUND CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Check continuity between power transistor harness connector and ground.

Power transistor		-	Continuity
Connector	Terminal		
M144	4	Ground	Yes

Is the inspection result normal?

- YES >> GO TO 8.
NO >> Repair harness or connector.

8. CHECK POWER TRANSISTOR CONTROL SIGNAL

1. Connect blower motor connector and A/C auto amp. connector.
2. Turn power switch ON.
3. Set air outlet to VENT.
4. Change fan speed from 1st – 7th, and check duty ratios between blower motor harness connector and ground by using an oscilloscope.

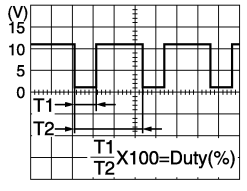
NOTE:

Calculate the drive signal duty ratio as shown in the figure.
T2 = Approx. 1.6 ms

BLOWER MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

+		-	Condition	Duty ratio (Approx.)	Output waveform
Power transistor					
Connector	Terminal		Fan speed (manual) Air outlet: VENT		
M144	2	Ground	1st	26%	
			2nd	34%	
			3rd	41%	
			4th	51%	
			5th	62%	
			6th	73%	
			7th	82%	

Is the inspection result normal?

- YES >> Replace power transistor. Refer to [HAC-200, "Removal and Installation"](#).
- NO >> GO TO 9.

9. CHECK POWER TRANSISTOR CONTROL SIGNAL CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect power transistor connector and A/C auto amp. connector.
3. Check continuity between power transistor harness connector and A/C auto amp. harness connector.

Power transistor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M144	2	M55	12	Yes

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair harness or connector.

10. CHECK POWER TRANSISTOR CONTROL SIGNAL CIRCUIT FOR SHORT

Check continuity between power transistor harness connector and ground.

Power transistor		-	Continuity
Connector	Terminal		
M144	2	Ground	No

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).
- NO >> Repair harness or connector.

Component Inspection (Blower Motor)

INFOID:000000011005977

1. CHECK BLOWER MOTOR

1. Remove blower motor. Refer to [VTL-22, "Removal and Installation"](#).
2. Check that there is not any mixing foreign object in the blower motor.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace blower motor. Refer to [VTL-22, "Removal and Installation"](#).

2. CHECK BLOWER MOTOR

Check that there is not breakage or damage in the blower motor.

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Replace blower motor. Refer to [VTL-22, "Removal and Installation"](#).

BLOWER MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

3. CHECK BLOWER MOTOR

Check that blower motor turns smoothly.

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace blower motor. Refer to [VTL-22. "Removal and Installation"](#).

Component Inspection (Blower Relay)

INFOID:000000011005978

1. CHECK BLOWER RELAY

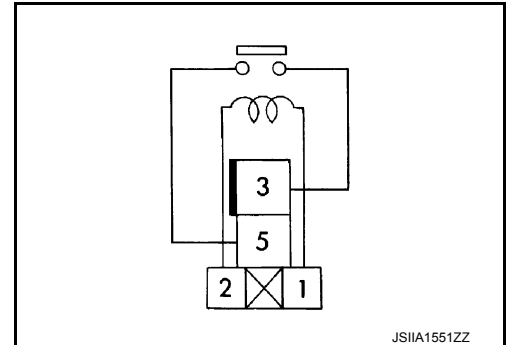
1. Remove blower relay. Refer to [PG-71. "Terminal Arrangement"](#).
2. Check continuity between blower relay terminal 3 and 5 when the voltage is supplied between terminal 1 and 2.

Terminal		Voltage	Continuity
3	5	ON	Yes
		OFF	No

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace blower relay.



ELECTRIC COMPRESSOR INSULATION RESISTANCE CHECK

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

ELECTRIC COMPRESSOR INSULATION RESISTANCE CHECK

Component Inspection

INFOID:000000011097912

DANGER:



Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.
- Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.
- Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.
- Refer to [GI-34, "High Voltage Precautions"](#).

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

DIAGNOSIS PROCEDURE

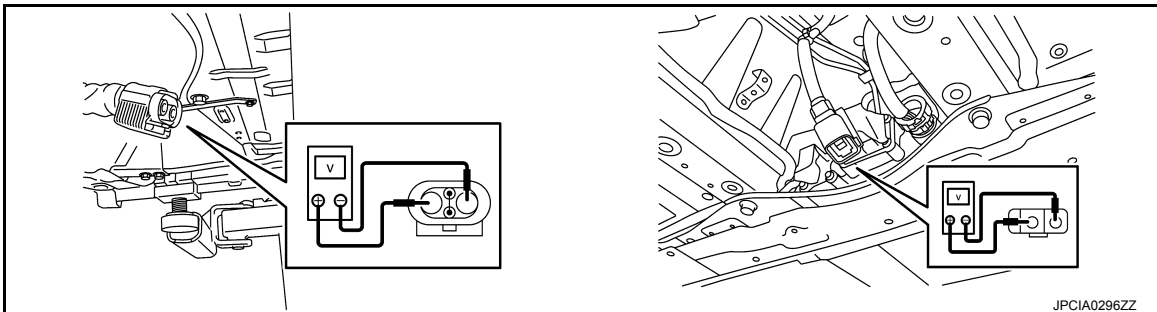
1. PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to [GI-33, "How to Disconnect High Voltage"](#).

Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181, "Exploded View"](#).
2. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181, "Removal and Installation"](#).
3. Measure voltage between high voltage harness connector terminals and PTC heater harness connector terminals.



DANGER:



Touching high voltage components without using the appropriate protective equipment will cause electrocution.



Standard

: 5 V or less

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.

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ELECTRIC COMPRESSOR INSULATION RESISTANCE CHECK

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

>> GO TO 2.

2. CHECK ELECTRIC COMPRESSOR INSULATION RESISTANCE

1. Disconnect high voltage harness connector from electric compressor.
2. Check the insulation resistance of the electric compressor with an insulation resistance tester.

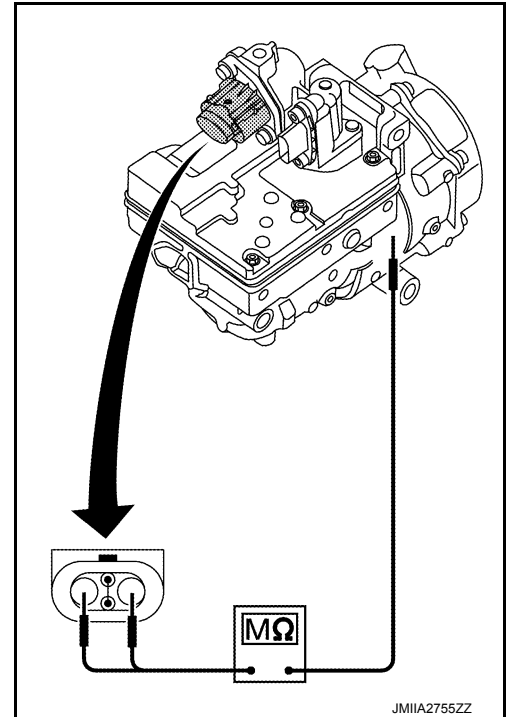
CAUTION:

- Unlike the ordinary tester, the insulation resistance tester applies 500V when measuring. If used incorrectly, there is the danger of electric shock. If used in the vehicle 12V system, there is the danger of damage to electronic devices. Read the insulation resistance tester instruction manual carefully and be sure to work safely.
- Use 500V range of insulation resistance tester to measure insulation resistance. Wait for 30 seconds until the value becomes stable.

+	-	Resistance
Terminal		
1	Aluminum part on side of electric compressor	3 MΩ or more
2		

Is the inspection result normal?

- YES >> Inspection End.
NO >> Replace electric compressor. Refer to [HA-37. "Removal and Installation"](#).



PTC HEATER INSPECTION RESISTANCE CHECK

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

PTC HEATER INSPECTION RESISTANCE CHECK

Component Inspection

INFOID:000000011005980

DANGER:



Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.
- Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.
- Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.
- Refer to [GI-34, "High Voltage Precautions"](#).

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

Regarding Wiring Diagram information, refer to [HAC-61, "Wiring Diagram"](#).

DIAGNOSIS PROCEDURE

CAUTION:

Erase DTC after the work is completed.

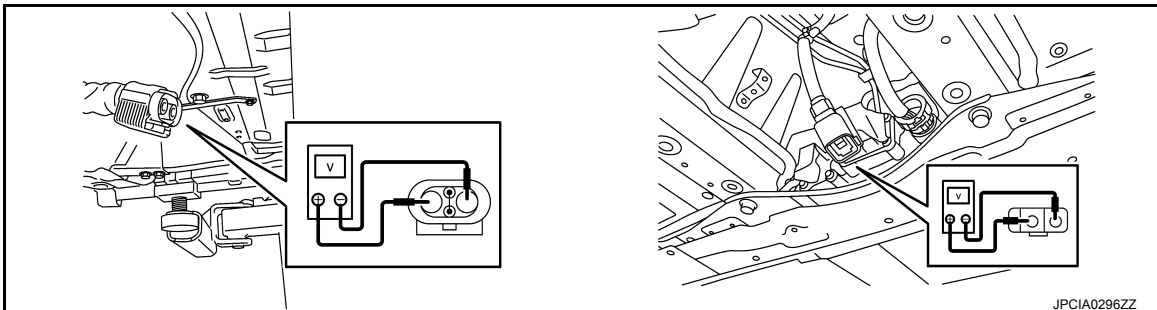
1. PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to [GI-33, "How to Disconnect High Voltage"](#).

Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181, "Exploded View"](#).
2. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181, "Removal and Installation"](#).
3. Measure voltage between high voltage harness connector terminals and PTC heater harness connector terminals.



DANGER:



Touching high voltage components without using the appropriate protective equipment will cause electrocution.



PTC HEATER INSPECTION RESISTANCE CHECK

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

Standard : 5 V or less

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 2.

2. CHECK PTC HEATER INSULATION RESISTANCE

1. Disconnect 12V battery negative terminal. Refer to [HAC-11, "Precaution for Removing 12V Battery"](#).
2. Disconnect high voltage harness connector from Li-ion battery.
3. Check the insulation resistance of the PTC heater with an insulation resistance tester.

CAUTION:

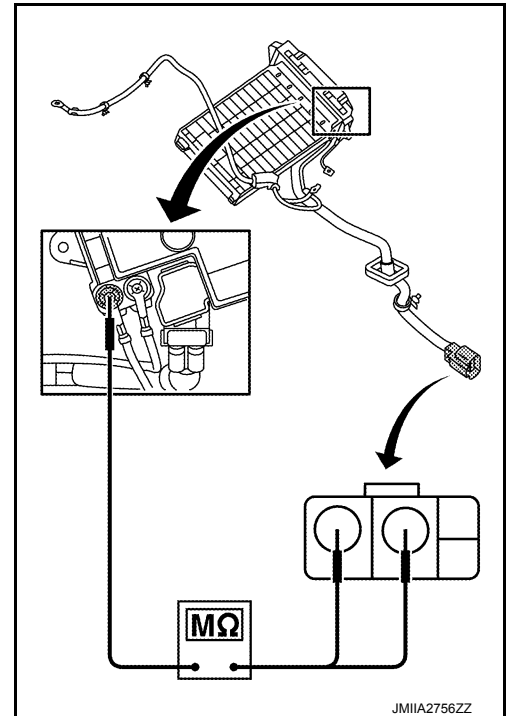
- Unlike the ordinary tester, the insulation resistance tester applies 500V when measuring. If used incorrectly, there is the danger of electric shock. If used in the vehicle 12V system, there is the danger of damage to electronic devices. Read the insulation resistance tester instruction manual carefully and be sure to work safely.
- Use 500V range of insulation resistance tester to measure insulation resistance. Wait for 30 seconds until the value becomes stable.

+		-	Resistance
Li-ion battery			
Connector	Terminal	Bonding wire fixed portion	1 MΩ or more
H19	40		
	41		

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace PTC heater. Refer to [HAC-202, "Removal and Installation"](#).



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AUTOMATIC AIR CONDITIONING SYSTEM

< SYMPTOM DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

SYMPTOM DIAGNOSIS

AUTOMATIC AIR CONDITIONING SYSTEM

Symptom Table

INFOID:0000000011005981

NOTE:

Perform self-diagnoses with CONSULT before performing the symptom diagnosis. If any DTC is detected, perform the corresponding diagnosis.

Symptom	Corresponding malfunctioning part	Check item/Reference
<ul style="list-style-type: none"> Air conditioning system does not activate. Air conditioning system cannot be controlled. 	<ul style="list-style-type: none"> A/C auto amp. ignition power supply and ground circuit A/C auto amp. 	HAC-173, "A/C AUTO AMP.: Diagnosis Procedure"
Discharge air temperature does not change.	Air mix door motor system installation condition	Check air mix door motor system is properly installed. Refer to HAC-204, "Exploded View" .
Air outlet does not change.	Mode door motor system installation condition	Check mode door motor system is properly installed. Refer to HAC-204, "Exploded View" .
Air inlet does not change.	Intake door motor system installation condition	Check intake door motor system is properly installed. Refer to HAC-204, "Exploded View" .
Blower motor does not operate or operation speed is not normal.	<ul style="list-style-type: none"> Blower motor power supply circuit Blower motor control circuit A/C auto amp. ignition power supply circuit Power transistor power supply and ground circuit Power transistor control signal circuit Blower motor Power transistor A/C auto amp. 	HAC-175, "Diagnosis Procedure"
Compressor does not operate.	<ul style="list-style-type: none"> The circuit between VCM and refrigerant pressure sensor Refrigerant pressure sensor Blower fan ON signal circuit A/C auto amp. 	HAC-186, "Diagnosis Procedure"
<ul style="list-style-type: none"> Insufficient cooling. No cool air comes out. (Air flow volume is normal.) 	<ul style="list-style-type: none"> Cooler cycle Air leakage from each duct A/C auto amp. connection recognition signal circuit Temperature setting trimmer 	HAC-184, "Diagnosis Procedure"
<ul style="list-style-type: none"> Insufficient heating. No warm air comes out. (Air flow volume is normal.) 	<ul style="list-style-type: none"> Cooler cycle Air leakage from each duct Temperature setting trimmer A/C auto amp. connection 	HAC-185, "Diagnosis Procedure"
Noise is heard when the A/C system operates.	During compressor operation.	Cooler cycle HA-34, "Symptom Table"
	During blower motor operation.	<ul style="list-style-type: none"> Mixing any foreign object in blower motor Blower motor fan breakage Blower motor rotation inferiority HAC-177, "Component Inspection (Blower Motor)"
<ul style="list-style-type: none"> Memory function does not operate normally. The setting is not maintained. (It returns to initial condition.) 	<ul style="list-style-type: none"> A/C auto amp. battery power supply circuit A/C auto amp. 	HAC-173, "A/C AUTO AMP.: Diagnosis Procedure"

INSUFFICIENT COOLING

< SYMPTOM DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

INSUFFICIENT COOLING

Description

INFOID:000000011005982

Symptom

- Insufficient cooling
- No cold air comes out. (Air flow volume is normal.)

Diagnosis Procedure

INFOID:000000011005983

NOTE:

Perform the self-diagnosis with CONSULT before performing the diagnosis by symptom. Perform the diagnosis by DTC if DTC is detected.

1.CHECK ELECTRIC COMPRESSOR OPERATION

Check the electric compressor operation state while the air conditioner system is operated.

Does electric compressor operate?

YES >> GO TO 2.

NO >> Perform diagnosis for "COMPRESSOR DOES NOT OPERATE". Refer to [HAC-186, "Diagnosis Procedure"](#).

2.CHECK REFRIGERANT CYCLE

Connect recovery/recycling/recharging equipment to the vehicle and perform the refrigerant system diagnosis. Refer to [HA-34, "Symptom Table"](#).

Is the check result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning component.

3.CHECK FOR AIR LEAKAGE FROM DUCT

Check duct and nozzle, etc. of A/C system for air leakage.

Is the check result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning component.

4.CHECK DETECTION TEMPERATURE OF EACH SENSOR

With CONSULT

Using CONSULT, check that detection temperature of each sensor is normal in "Data Monitor" of "HVAC". Refer to [HAC-47, "CONSULT Function"](#).

Is the check result normal?

YES >> GO TO 5.

NO >> Repair or replace malfunctioning component.

5.CHECK SETTING OF DIFFERENCE BETWEEN SET TEMPERATURE AND CONTROL TEMPERATURE

With CONSULT

1. Using CONSULT, check the setting of "TEMP SET CORRECT" on "Work support" of "HVAC". Refer to [HAC-83, "Temperature Setting Trimmer"](#).

2. Check that the difference between set temperature and control temperature is set to "+ direction".

NOTE:

The control temperature can be set with a setting difference between the set temperature and control temperature.

3. Change the set temperature correction value to "0".

Are the symptoms solved?

YES >> Perform the setting separately if necessary. Inspection End.

NO >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).

INSUFFICIENT HEATING

< SYMPTOM DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

INSUFFICIENT HEATING

Description

INFOID:0000000011005984

Symptom

- Insufficient heating
- No warm air comes out. (Air flow volume is normal.)

Diagnosis Procedure

INFOID:0000000011005985

NOTE:

Perform the self-diagnosis with CONSULT before performing the diagnosis by symptom. Perform the diagnosis by DTC if DTC is detected.

1. CHECK REFRIGERANT CYCLE

Connect recovery/recycling/recharging equipment to the vehicle and perform the refrigerant system diagnosis. Refer to [HA-34, "Symptom Table"](#).

Is the check result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning component.

2. CHECK FOR AIR LEAKAGE FROM DUCT

Check duct and nozzle, etc. of A/C system for air leakage.

Is the check result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning component.

3. CHECK DETECTION TEMPERATURE OF EACH SENSOR

With CONSULT

Using CONSULT, check that detection temperature of each sensor is normal in "Data Monitor" of "HVAC". Refer to [HAC-47, "CONSULT Function"](#).

Is the check result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning component.

4. CHECK SETTING OF DIFFERENCE BETWEEN SET TEMPERATURE AND CONTROL TEMPERATURE

With CONSULT

1. Using CONSULT, check the setting of "TEMP SET CORRECT" on "Work support" of "HVAC". Refer to [HAC-83, "Temperature Setting Trimmer"](#).

2. Check that the difference between set temperature and control temperature is set to "– direction".

NOTE:

The control temperature can be set with a setting difference between the set temperature and control temperature.

3. Change the set temperature correction value to "0".

Are the symptoms solved?

YES >> Perform the setting separately if necessary. Inspection End.

NO >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).

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COMPRESSOR DOES NOT OPERATE

< SYMPTOM DIAGNOSIS >

[AUTO A/C (WITH HEAT PUMP)]

COMPRESSOR DOES NOT OPERATE

Description

INFOID:000000011005986

SYMPTOM

Compressor does not operate.

Diagnosis Procedure

INFOID:000000011005987

NOTE:

- Perform self-diagnoses with CONSULT before performing symptom diagnosis. If any DTC is detected, perform the corresponding diagnosis.
- Check that refrigerant is enclosed in cooler cycle normally. If refrigerant amount is shortage from proper amount, perform the inspection of refrigerant leakage.

1. CHECK REFRIGERANT PRESSURE SENSOR

Check refrigerant pressure sensor. Refer to [EVC-363, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Repair or replace malfunctioning component.

2. CHECK A/C AUTO AMP. INPUT SIGNAL

 With CONSULT


1. Select "DATA MONITOR" mode of "HVAC" using CONSULT.
2. Select "FORCED Off SIGNAL", and check status under the following conditions.

Monitor item	Condition		Status
FORCED Off SIGNAL	Power switch ON	A/C switch ON (A/C compressor activate)	Normal condition: OFF Except above: ON

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Check for the VCM. Refer to [EVC-41, "ELECTRIC POWER TRAIN SYSTEM : System Description"](#).

3. CHECK A/C AUTO AMP. OUTPUT SIGNAL

 With CONSULT

1. Set the vehicle to READY.
2. Using CONSULT, perform "HVAC TEST" in "Active Test" of "HVAC". Refer to [HAC-47, "CONSULT Function"](#).
3. Check the electric compressor operations in each mode.

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-187, "Removal and Installation"](#).
- NO >> Replace electric compressor. Refer to [HA-37, "Removal and Installation"](#).

A/C CONTROL (A/C AUTO AMP.)

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITH HEAT PUMP)]

REMOVAL AND INSTALLATION


A/C CONTROL (A/C AUTO AMP.)

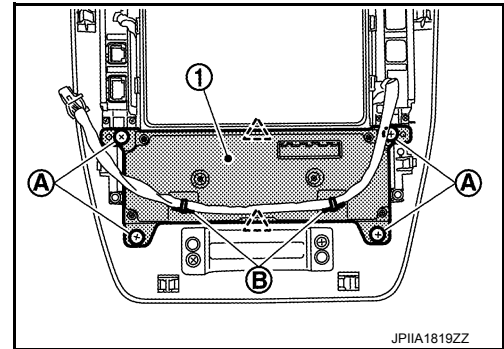
Removal and Installation

INFOID:000000011005988

REMOVAL

1. Remove cluster lid C. Refer to [IP-16. "Exploded View"](#).
2. Release harness clips (B) (if equipped).
3. Remove screws (A).
4. Disengage pawls, and then remove A/C auto amp. (1) from cluster lid C.

 : Pawl



NOTE:

When replacing A/C auto amp., save or print current vehicle specification with CONSULT "Configuration" before replacement.

INSTALLATION

Install in the reverse order of removal.

CAUTION:

- When replacing A/C auto amp., you must perform "WRITE CONFIGURATION" with CONSULT.
- Never perform "WRITE CONFIGURATION" except for new A/C auto amp.

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HEAT PUMP CONTROL UNIT

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITH HEAT PUMP)]

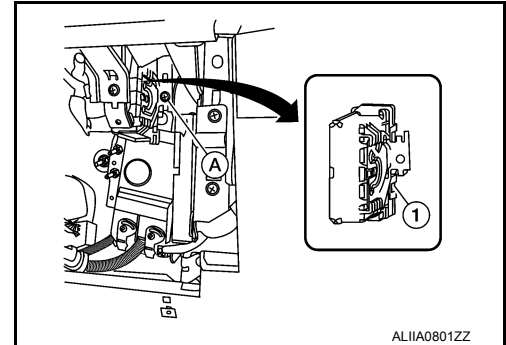
HEAT PUMP CONTROL UNIT

Removal and Installation

INFOID:000000011005989

REMOVAL

1. Remove glove box cover assembly. Refer to [IP-16. "Exploded View"](#).
2. Disconnect heat pump control unit connector.
3. Remove screw (A) and heat pump control unit (1) from vehicle.



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INSTALLATION

Install in the reverse order of removal.

AMBIENT SENSOR

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITH HEAT PUMP)]


AMBIENT SENSOR

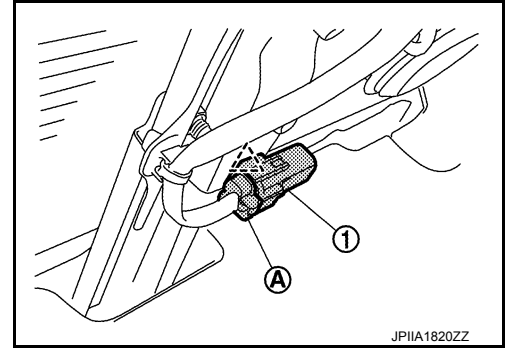
Removal and Installation

INFOID:0000000011005990

REMOVAL

1. Remove front under cover. Refer to [EXT-13. "Removal and Installation"](#).
2. Disconnect ambient sensor connector (A).
3. Disengage pawl, and then remove ambient sensor (1) from the vehicle.

 : Pawl



INSTALLATION

Install in the reverse order of removal.

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IN-VEHICLE SENSOR

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITH HEAT PUMP)]

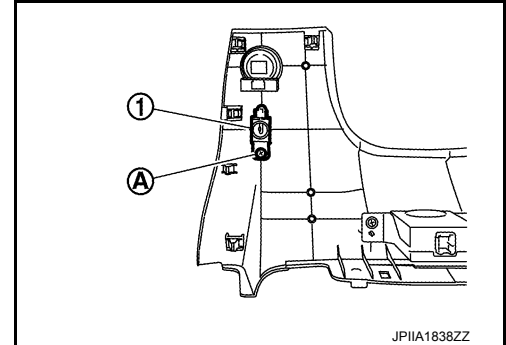
IN-VEHICLE SENSOR

Removal and Installation

INFOID:000000011005991

REMOVAL

1. Remove instrument lower panel LH. Refer to [IP-16. "Exploded View"](#).
2. Remove screw (A), and then remove in-vehicle sensor (1) from instrument lower panel LH.



INSTALLATION

Install in the reverse order of removal.

SUNLOAD SENSOR

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITH HEAT PUMP)]


SUNLOAD SENSOR

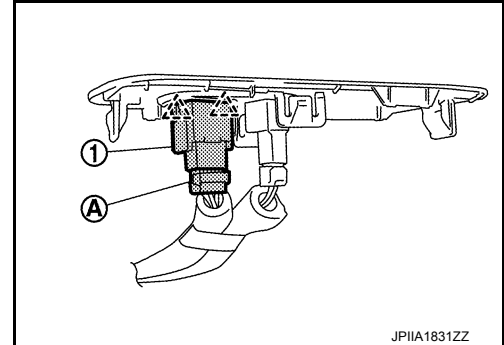
Removal and Installation

INFOID:000000011005992

REMOVAL

1. Remove switch panel. Refer to [JP-16, "Exploded View"](#).
2. Disconnect sunload sensor connector (A).
3. Disengage pawls, and then remove sunload sensor (1) from switch panel.

 : Pawl



INSTALLATION

Install in the reverse order of removal.

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INTAKE SENSOR

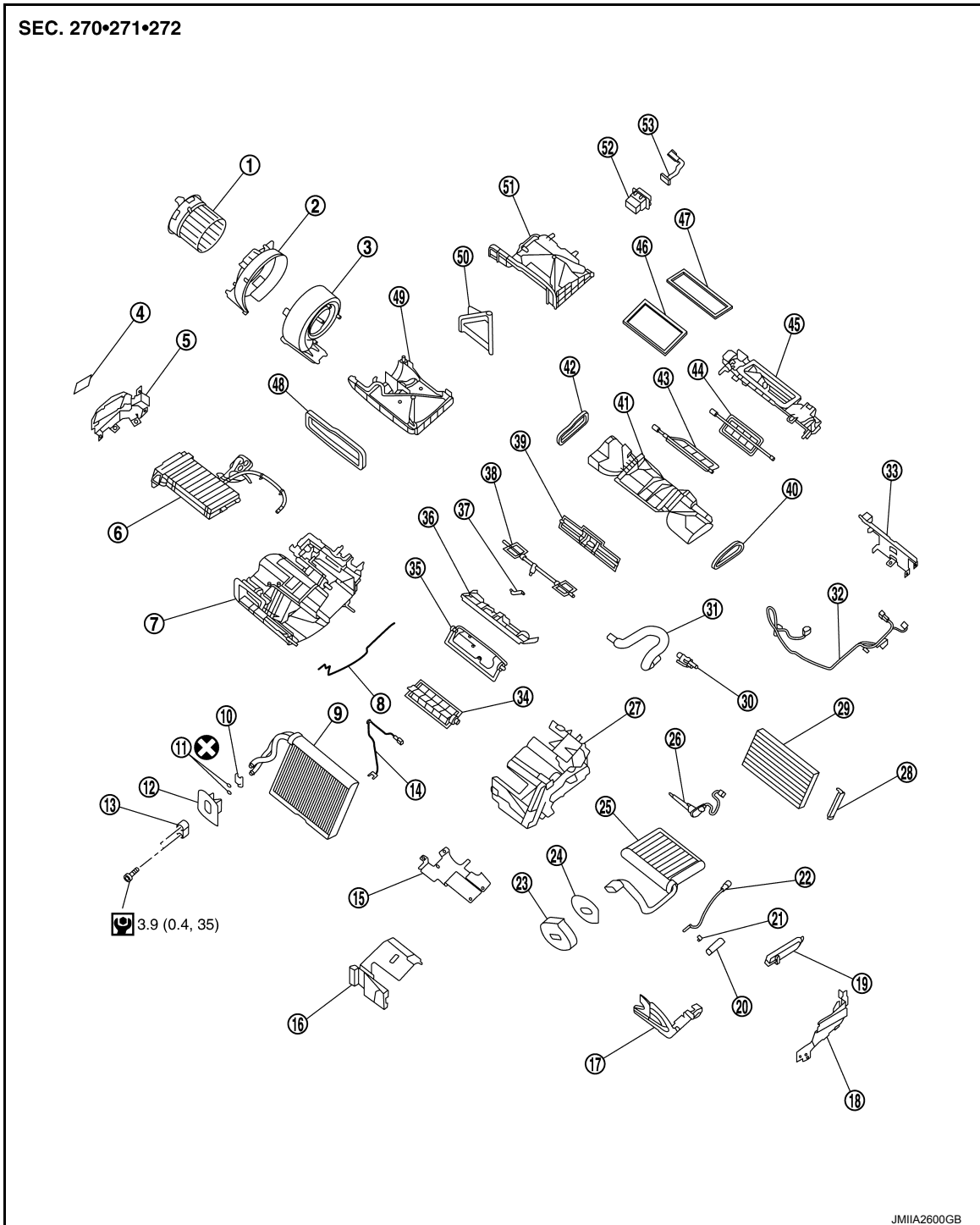
< REMOVAL AND INSTALLATION >

[AUTO A/C (WITH HEAT PUMP)]

INTAKE SENSOR

Exploded View

INFOID:000000011005993




- | | | |
|--|-------------------------|-----------------------------|
| 1. Blower motor | 2. Blower case RH | 3. Blower case LH |
| 4. High voltage warning label | 5. PTC heater shield RH | 6. PTC heater |
| 7. Heating and cooling unit assembly case RH | 8. Case packing | 9. Evaporator |
| 10. Plate | 11. O-rings | 12. Grommet |
| 13. Low pressure pipe flange | 14. Intake sensor | 15. PTC heater shield lower |


INTAKE SENSOR

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITH HEAT PUMP)]

- | | | |
|---|---|---|
| 16. Evaporator cover | 17. Inner condenser pipe cover | 18. PTC heater shield LH |
| 19. Inner condenser cover | 20. Sleeve | 21. Clip |
| 22. Compressor discharge refrigerant temperature sensor | 23. Grommet | 24. Gasket |
| 25. Inner condenser | 26. PTC heater outlet and A/C unit case air temperature sensor assembly | 27. Heating and cooling unit assembly case LH |
| 28. Filter cover | 29. Filter | 30. Aspirator |
| 31. Aspirator hose | 32. Harness | 33. PTC heater shield |
| 34. Lower air mix door | 35. Upper air mix door | 36. Air mix door guide |
| 37. Front door rod | 38. Side ventilator door | 39. Foot door |
| 40. Side ventilator seal LH | 41. Lower attachment case | 42. Side ventilator seal RH |
| 43. Center ventilator and defroster door | 44. Sub defroster door | 45. Upper attachment case |
| 46. Defroster seal | 47. Ventilator seal | 48. Intake seal |
| 49. Lower intake case | 50. Intake door | 51. Upper intake seal |
| 52. Power transistor | 53. Sub harness | |

 : Always replace after every disassembly.

 : N·m (kg-m, in-lb)

Removal and Installation

INFOID:000000011005994

REMOVAL

1. Remove evaporator assembly. Refer to [HA-61, "EVAPORATOR : Removal and Installation"](#).
2. Remove intake sensor from evaporator.

INSTALLATION

Note the following items, and then install in the order of removal.

CAUTION:

- Mark the mounting position of intake sensor bracket prior to removal so that the reinstalled sensor can be located in the same position.
- When removing or installing the intake sensor, be sure not to rotate the bracket insertion part. Failure to do this may cause damage to the evaporator.

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COMPRESSOR DISCHARGE REFRIGERANT TEMPERATURE SENSOR

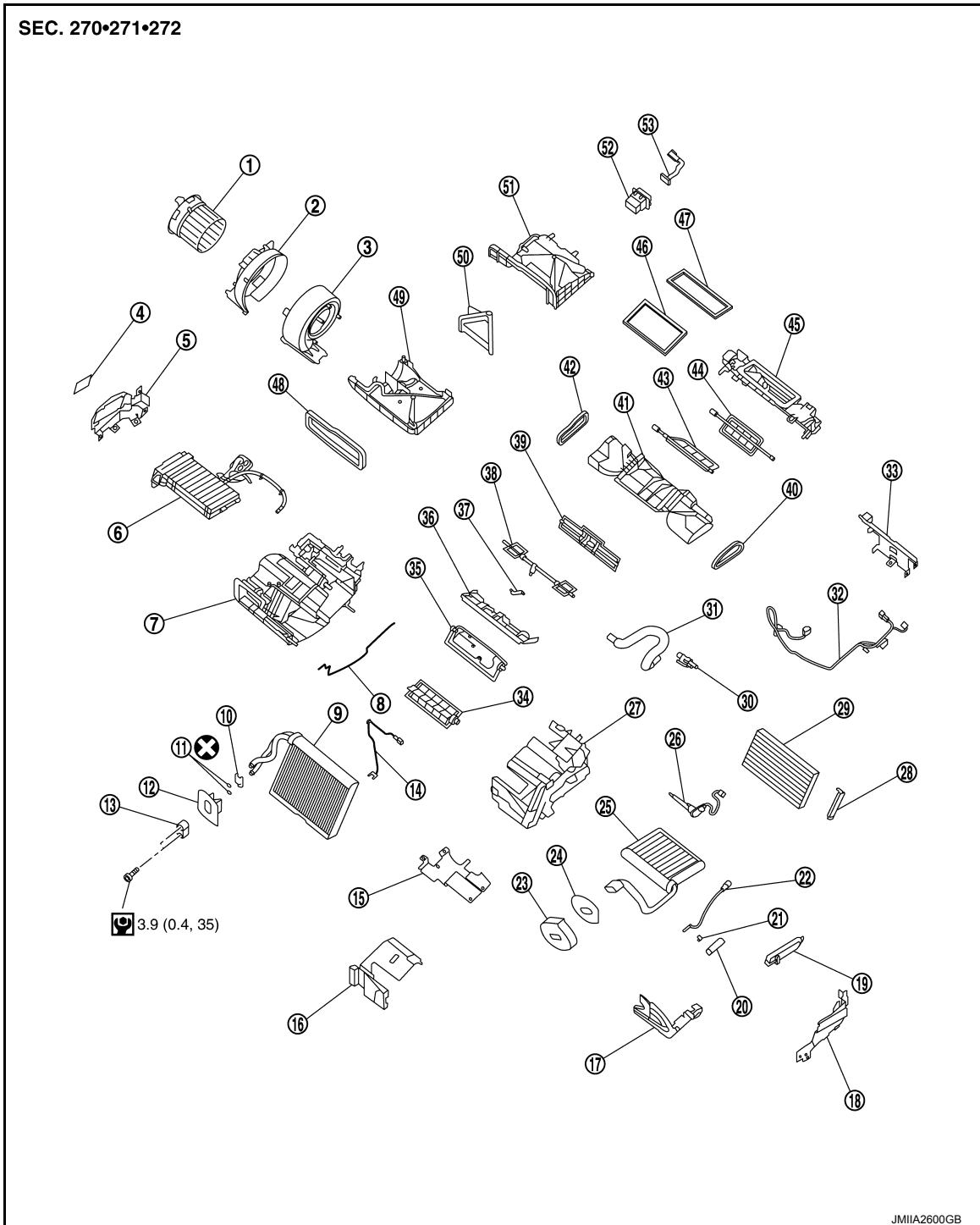
< REMOVAL AND INSTALLATION >

[AUTO A/C (WITH HEAT PUMP)]

COMPRESSOR DISCHARGE REFRIGERANT TEMPERATURE SENSOR

Exploded View

INFOID:000000011005995




- | | | |
|--|-------------------------|-----------------------------|
| 1. Blower motor | 2. Blower case RH | 3. Blower case LH |
| 4. High voltage warning label | 5. PTC heater shield RH | 6. PTC heater |
| 7. Heating and cooling unit assembly case RH | 8. Case packing | 9. Evaporator |
| 10. Plate | 11. O-rings | 12. Grommet |
| 13. Low pressure pipe flange | 14. Intake sensor | 15. PTC heater shield lower |


COMPRESSOR DISCHARGE REFRIGERANT TEMPERATURE SENSOR

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITH HEAT PUMP)]

- | | | |
|---|---|---|
| 16. Evaporator cover | 17. Inner condenser pipe cover | 18. PTC heater shield LH |
| 19. Inner condenser cover | 20. Sleeve | 21. Clip |
| 22. Compressor discharge refrigerant temperature sensor | 23. Grommet | 24. Gasket |
| 25. Inner condenser | 26. PTC heater outlet and A/C unit case air temperature sensor assembly | 27. Heating and cooling unit assembly case LH |
| 28. Filter cover | 29. Filter | 30. Aspirator |
| 31. Aspirator hose | 32. Harness | 33. PTC heater shield |
| 34. Lower air mix door | 35. Upper air mix door | 36. Air mix door guide |
| 37. Front door rod | 38. Side ventilator door | 39. Foot door |
| 40. Side ventilator seal LH | 41. Lower attachment case | 42. Side ventilator seal RH |
| 43. Center ventilator and defroster door | 44. Sub defroster door | 45. Upper attachment case |
| 46. Defroster seal | 47. Ventilator seal | 48. Intake seal |
| 49. Lower intake case | 50. Intake door | 51. Upper intake seal |
| 52. Power transistor | 53. Sub harness | |

 : Always replace after every disassembly.

 : N·m (kg·m, in·lb)

Removal and Installation

INFOID:000000011005996

REMOVAL

1. Remove the inner condenser assembly. Refer to [HA-62. "INNER CONDENSER : Removal and Installation"](#).
2. Remove compressor discharge refrigerant temperature sensor from the inner condenser assembly.

INSTALLATION

Note the following items, and then install in the order of removal.

CAUTION:

- **Mark the mounting position of compressor discharge refrigerant temperature sensor prior to removal so that the reinstalled sensor can be located in the same position.**

COMPRESSOR SUCTION REFRIGERANT TEMPERATURE SENSOR

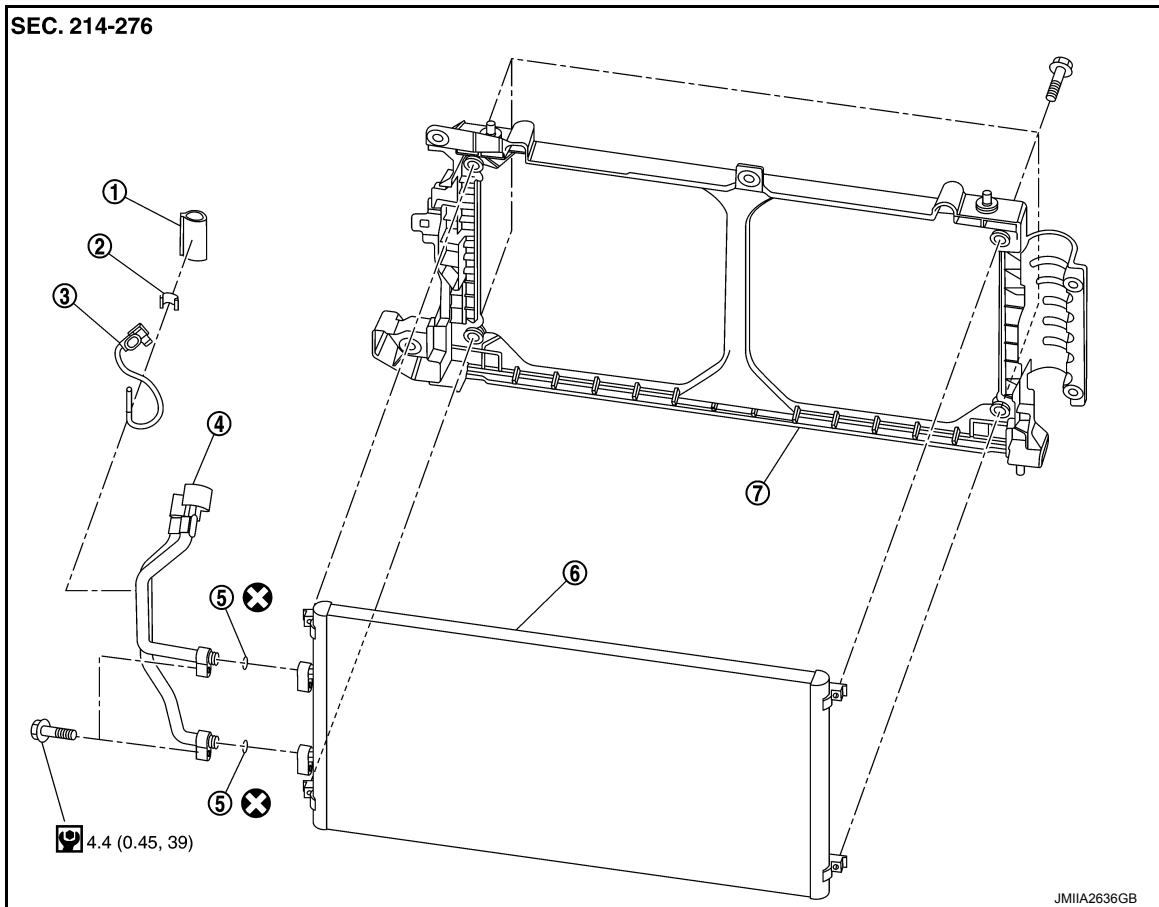
< REMOVAL AND INSTALLATION >

[AUTO A/C (WITH HEAT PUMP)]

COMPRESSOR SUCTION REFRIGERANT TEMPERATURE SENSOR

Exploded View

INFOID:000000011005997



- | | | |
|-------------------------------|-----------|--|
| 1. Sleeve | 2. Clip | 3. Compressor suction refrigerant temperature sensor |
| 4. Condenser pipe assembly | 5. O-ring | 6. Condenser |
| 7. Condenser support assembly | | |

⊗: Always replace after every disassembly.

Ⓜ: N·m (kg·m, in-lb)

Ⓜ: N·m (kg·m, ft-lb)

Removal and Installation

INFOID:000000011005998

REMOVAL

1. Remove condenser assembly. Refer to [HA-52. "Removal and Installation"](#).
2. Remove compressor suction refrigerant temperature sensor from the condenser assembly.

INSTALLATION

Note the following items, and then install in the order of removal.

CAUTION:

- Mark the mounting position of compressor suction refrigerant temperature sensor prior to removal so that the reinstalled sensor can be located in the same position.

PTC HEATER OUTLET AND A/C UNIT CASE AIR TEMPERATURE SENSOR ASSEMBLY

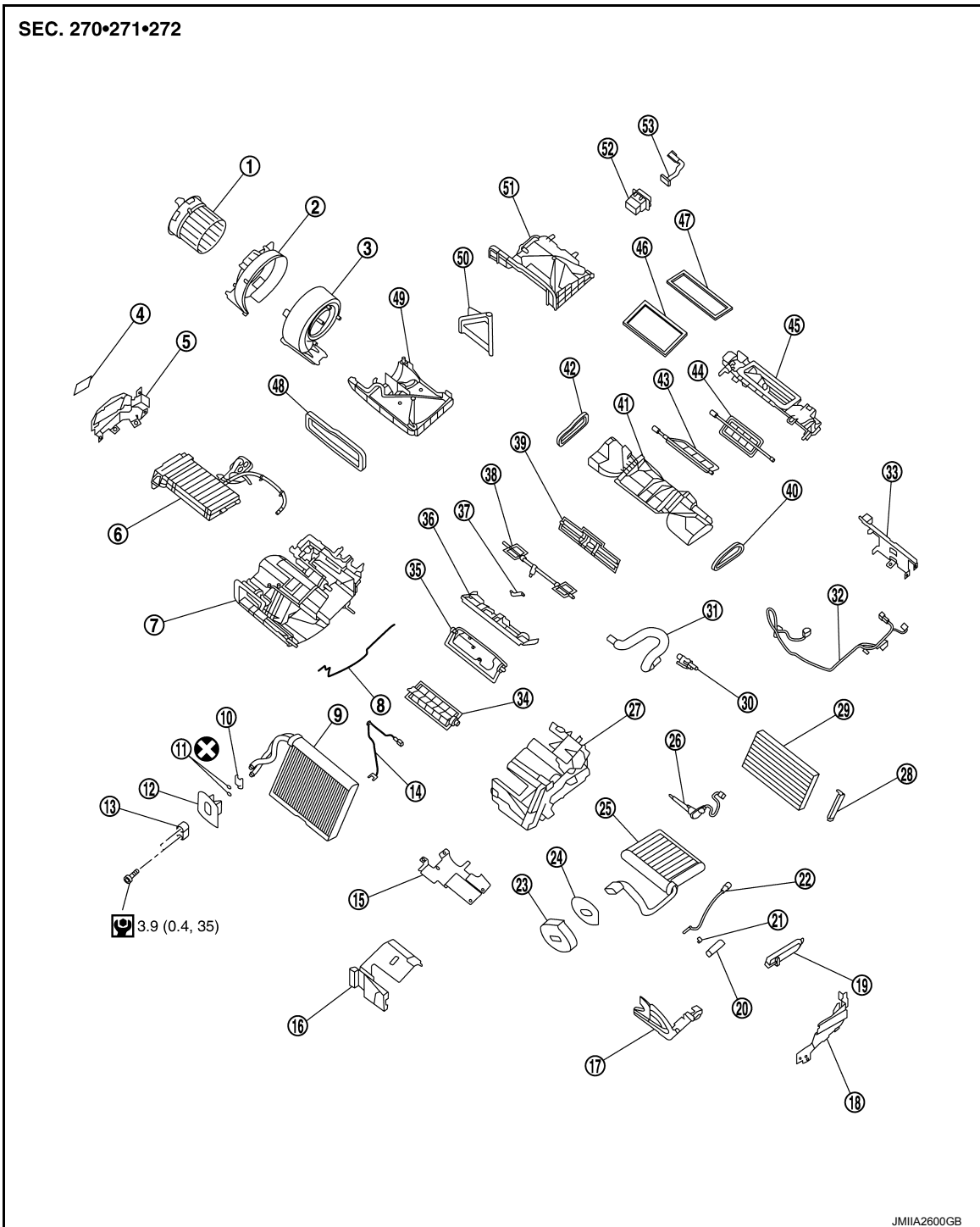
< REMOVAL AND INSTALLATION >

[AUTO A/C (WITH HEAT PUMP)]

PTC HEATER OUTLET AND A/C UNIT CASE AIR TEMPERATURE SENSOR ASSEMBLY

Exploded View

INFOID:000000011005999



- | | | |
|--|-------------------------|-------------------|
| 1. Blower motor | 2. Blower case RH | 3. Blower case LH |
| 4. High voltage warning label | 5. PTC heater shield RH | 6. PTC heater |
| 7. Heating and cooling unit assembly case RH | 8. Case packing | 9. Evaporator |


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PTC HEATER OUTLET AND A/C UNIT CASE AIR TEMPERATURE SENSOR ASSEMBLY

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITH HEAT PUMP)]

10. Plate	11. O-rings	12. Grommet
13. Low pressure pipe flange	14. Intake sensor	15. PTC heater shield lower
16. Evaporator cover	17. Inner condenser pipe cover	18. PTC heater shield LH
19. Inner condenser cover	20. Sleeve	21. Clip
22. Compressor discharge refrigerant temperature sensor	23. Grommet	24. Gasket
25. Inner condenser	26. PTC heater outlet and A/C unit case air temperature sensor assembly	27. Heating and cooling unit assembly case LH
28. Filter cover	29. Filter	30. Aspirator
31. Aspirator hose	32. Harness	33. PTC heater shield
34. Lower air mix door	35. Upper air mix door	36. Air mix door guide
37. Front door rod	38. Side ventilator door	39. Foot door
40. Side ventilator seal LH	41. Lower attachment case	42. Side ventilator seal RH
43. Center ventilator and defroster door	44. Sub defroster door	45. Upper attachment case
46. Defroster seal	47. Ventilator seal	48. Intake seal
49. Lower intake case	50. Intake door	51. Upper intake seal
52. Power transistor	53. Sub harness	

 : Always replace after every disassembly.

 : N·m (kg-m, in-lb)

Removal and Installation

INFOID:000000011006000

REMOVAL

1. Remove the heating and cooling unit assembly. Refer to [HA-56. "Exploded View"](#).
2. Remove PTC heater outlet and A/C unit case air temperature sensor assembly from the heating and cooling unit assembly.

INSTALLATION

Install in the reverse order of removal.

REFRIGERANT PRESSURE SENSOR

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITH HEAT PUMP)]

REFRIGERANT PRESSURE SENSOR

Removal and Installation

INFOID:0000000011045513

DANGER:



Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.
- Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.
- Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them. Refer to [GI-34, "High Voltage Precautions"](#).

CAUTION:

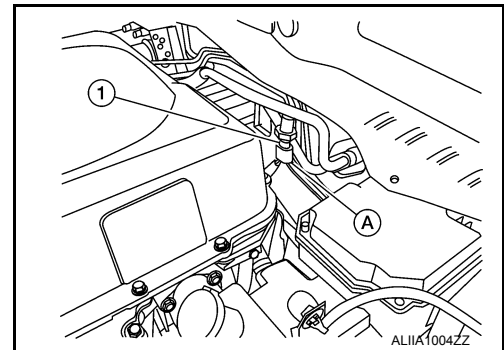
Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

REMOVAL

1. Remove cowl top. Refer to [EXT-19, "Removal and Installation"](#).
2. Disconnect harness (A) to remove pressure sensor (1).

CAUTION:

- Wrap the liquid tank with shop cloth to prevent scratches.
- To prevent the inclusion of foreign matter, use a cap or vinyl tape to seal off the refrigerant pressure sensor mounting point on the liquid tank from the atmosphere.



INSTALLATION

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

CAUTION:

- To prevent leakage of refrigerant, replace the O-ring with a new one. Apply a coat of compressor oil to the O-ring prior to installation.
- Perform a check for refrigerant leakage when charging with refrigerant. Refer to [HA-85, "Check Refrigerant Leakage"](#).

POWER TRANSISTOR

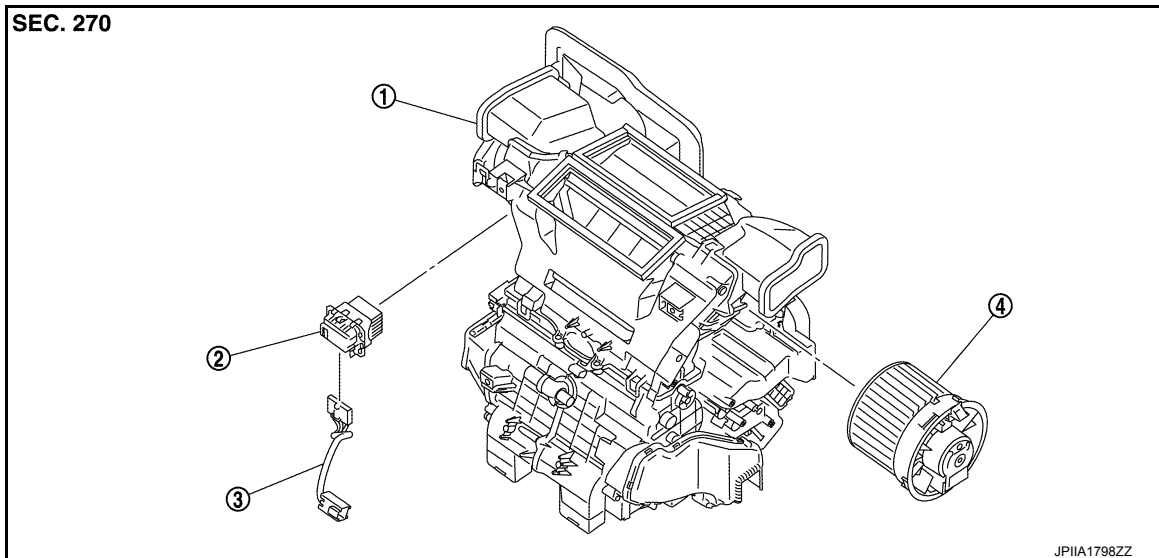
< REMOVAL AND INSTALLATION >

[AUTO A/C (WITH HEAT PUMP)]

POWER TRANSISTOR

Exploded View

INFOID:000000011006001



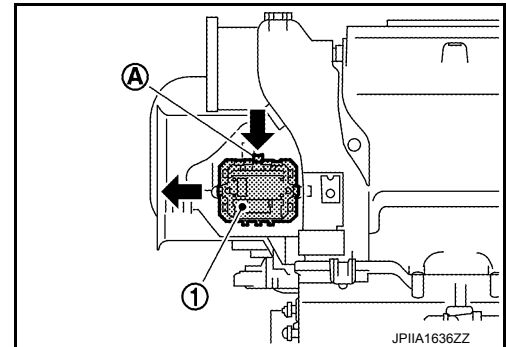
1. Heating and cooling unit assembly
2. Power transistor
3. Sub harness
4. Blower motor

Removal and Installation

INFOID:000000011006002

REMOVAL

1. Remove instrument panel assembly. Refer to [IP-17, "Removal and Installation"](#).
2. Disconnect power transistor connector.
3. Slide power transistor (1) to the left while pressing lever (A), and then remove power transistor.



INSTALLATION

Install in the reverse order of removal.

PTC HEATER

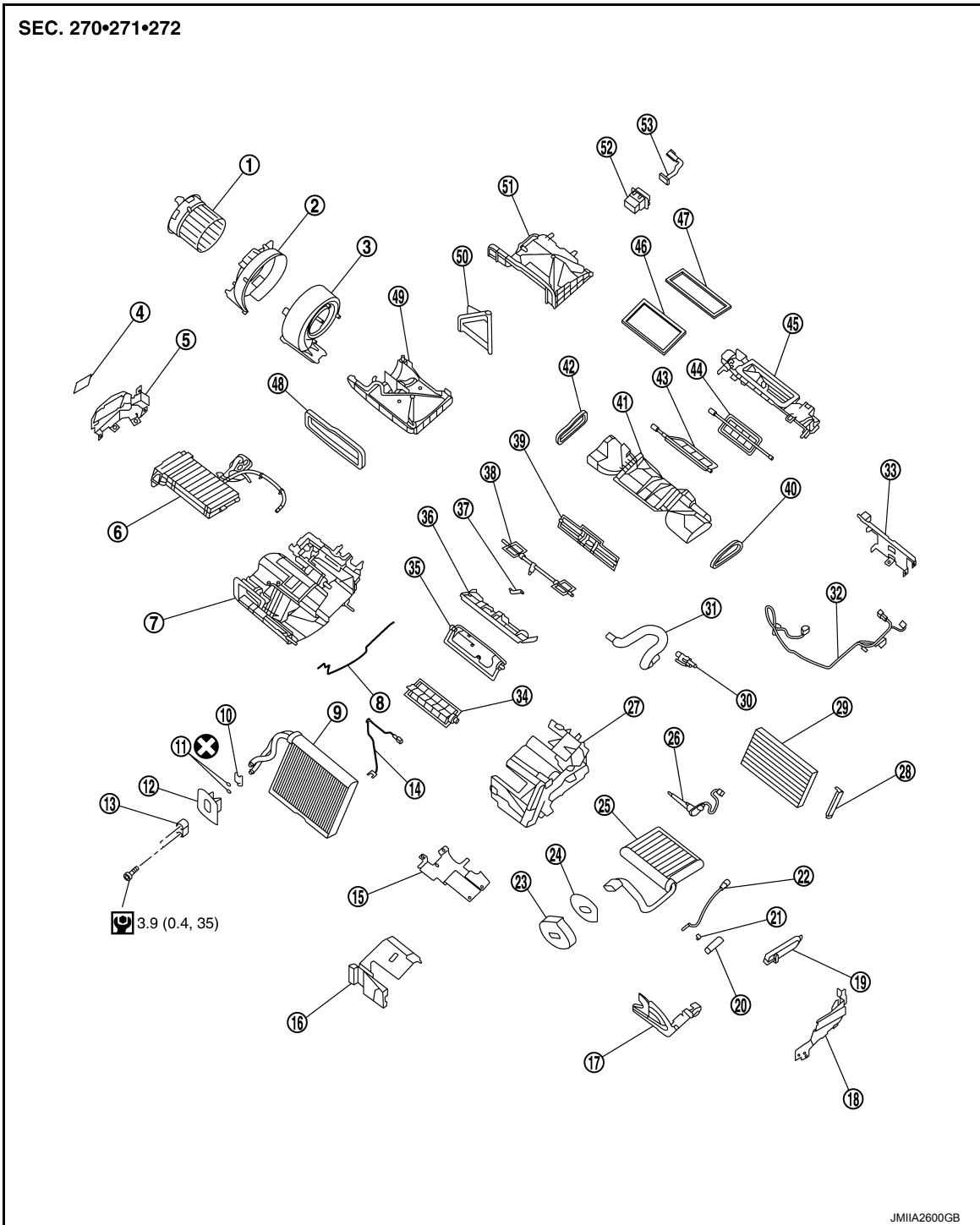
< REMOVAL AND INSTALLATION >

[AUTO A/C (WITH HEAT PUMP)]

PTC HEATER

Exploded View

INFOID:000000011006003



- | | | |
|--|-------------------------|-----------------------------|
| 1. Blower motor | 2. Blower case RH | 3. Blower case LH |
| 4. High voltage warning label | 5. PTC heater shield RH | 6. PTC heater |
| 7. Heating and cooling unit assembly case RH | 8. Case packing | 9. Evaporator |
| 10. Plate | 11. O-rings | 12. Grommet |
| 13. Low pressure pipe flange | 14. Intake sensor | 15. PTC heater shield lower |


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PTC HEATER

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITH HEAT PUMP)]

- | | | |
|---|---|---|
| 16. Evaporator cover | 17. Inner condenser pipe cover | 18. PTC heater shield LH |
| 19. Inner condenser cover | 20. Sleeve | 21. Clip |
| 22. Compressor discharge refrigerant temperature sensor | 23. Grommet | 24. Gasket |
| 25. Inner condenser | 26. PTC heater outlet and A/C unit case air temperature sensor assembly | 27. Heating and cooling unit assembly case LH |
| 28. Filter cover | 29. Filter | 30. Aspirator |
| 31. Aspirator hose | 32. Harness | 33. PTC heater shield |
| 34. Lower air mix door | 35. Upper air mix door | 36. Air mix door guide |
| 37. Front door rod | 38. Side ventilator door | 39. Foot door |
| 40. Side ventilator seal LH | 41. Lower attachment case | 42. Side ventilator seal RH |
| 43. Center ventilator and defroster door | 44. Sub defroster door | 45. Upper attachment case |
| 46. Defroster seal | 47. Ventilator seal | 48. Intake seal |
| 49. Lower intake case | 50. Intake door | 51. Upper intake seal |
| 52. Power transistor | 53. Sub harness | |


 : Always replace after every disassembly.

 : N·m (kg·m, in·lb)

Removal and Installation

INFOID:000000011006004

DANGER:

 Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.
- Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.
- Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them. Refer to [GI-34, "High Voltage Precautions"](#).

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

REMOVAL

WARNING:

Disconnect the high voltage. Refer to [GI-33, "How to Disconnect High Voltage"](#).

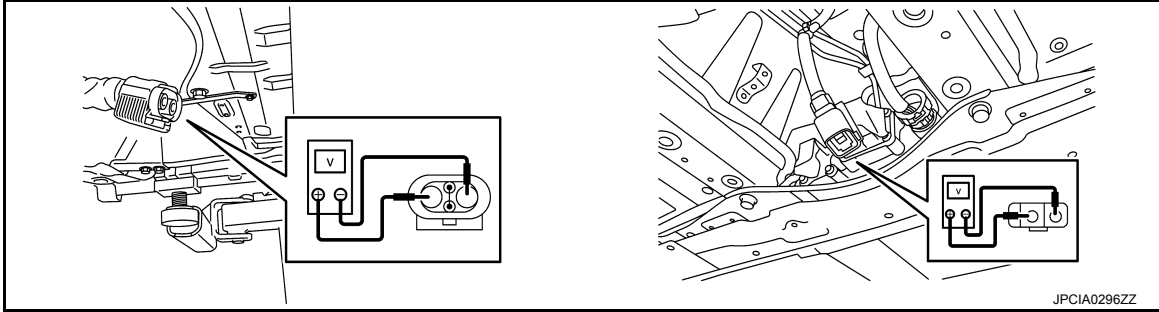
1. Check voltage in high voltage circuit. (Check that condenser are discharged.)
 - a. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181, "Removal and Installation"](#) [EVB-181, "Exploded View"](#).
 - b. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181, "Removal and Installation"](#).

PTC HEATER


< REMOVAL AND INSTALLATION >

[AUTO A/C (WITH HEAT PUMP)]

- c. Measure voltage between high voltage harness connector terminals and PTC heater harness connector terminals.



DANGER:

 Touching high voltage components without using the appropriate protective equipment will cause electrocution.



Standard : 5 V or less

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.

2. Remove heating and cooling unit assembly. Refer to [HA-56. "Exploded View"](#).
3. Remove PTC heater from the heating and cooling unit assembly.

INSTALLATION

Install in the reverse order of removal.

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DOOR MOTOR

< REMOVAL AND INSTALLATION >

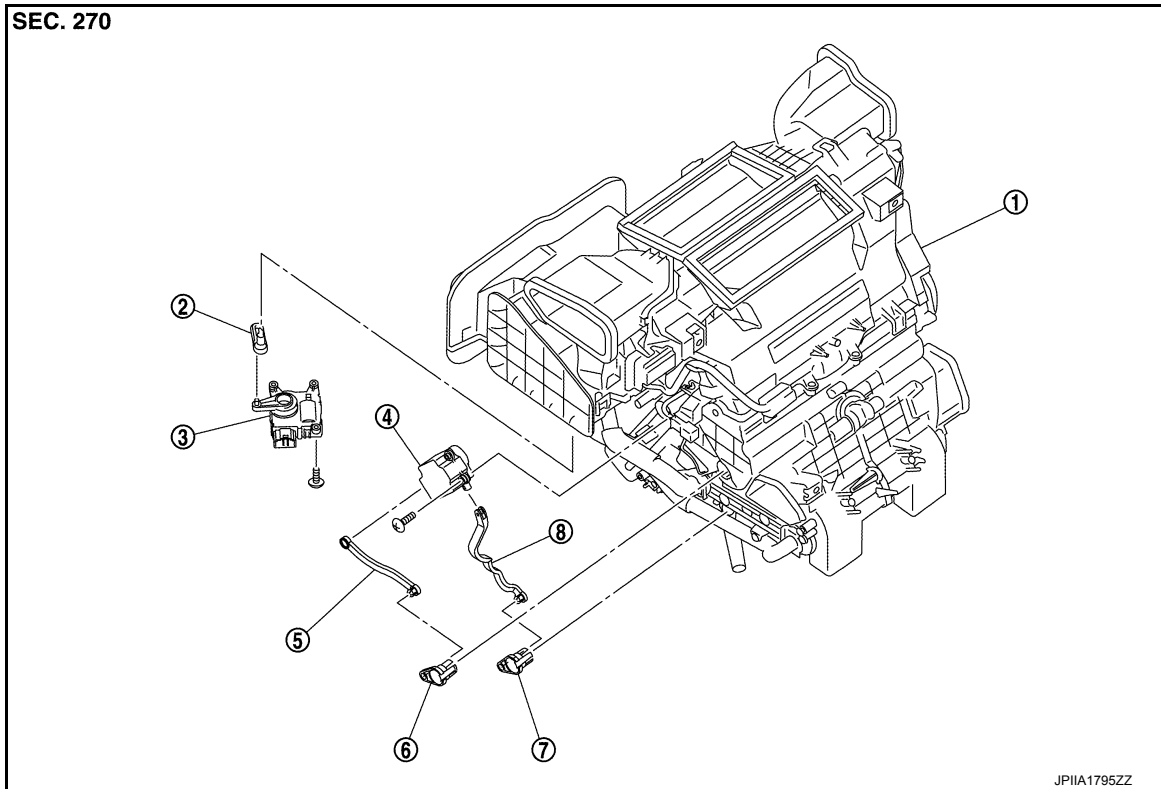
[AUTO A/C (WITH HEAT PUMP)]

DOOR MOTOR

Exploded View

INFOID:000000011006005

LEFT SIDE



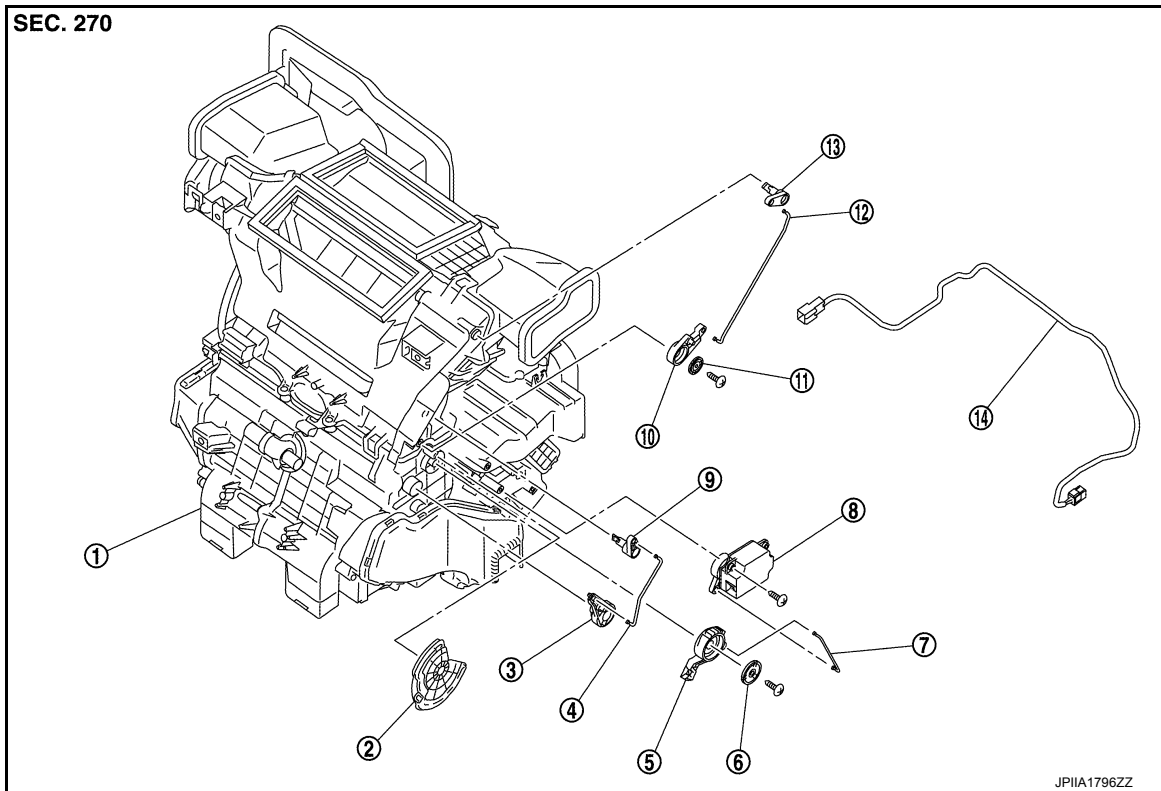
- | | | |
|--------------------------------------|---------------------------|-----------------------------|
| 1. Heating and cooling unit assembly | 2. Intake door lever | 3. Intake door motor |
| 4. Air mix door motor | 5. Upper air mix door rod | 6. Upper air mix door lever |
| 7. Lower air mix door lever | 8. Lower air mix door rod | |

RIGHT SIDE

DOOR MOTOR

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITH HEAT PUMP)]



- | | | |
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| 1. Heating and cooling unit assembly | 2. Main link | 3. Sub defroster door link |
| 4. Sub defroster door rod | 5. Mode link | 6. Plate |
| 7. Mode link rod | 8. Mode door motor | 9. Sub defroster door lever |
| 10. Center ventilator and defroster door link | 11. Plate | 12. Center ventilator and defroster door rod |
| 13. Center ventilator and defroster door lever | 14. Sub harness | |

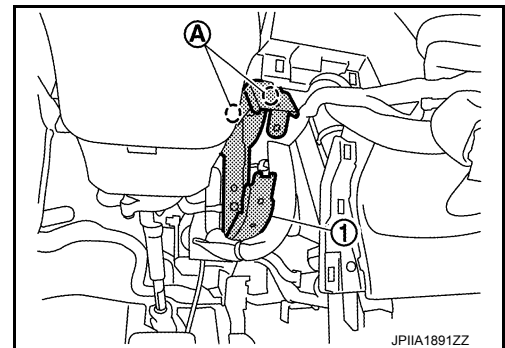
INTAKE DOOR MOTOR

INTAKE DOOR MOTOR : Removal and Installation

INFOID:000000011006006

REMOVAL

1. Remove instrument lower panel LH. Refer to [IP-16. "Exploded View"](#).
2. Remove knee protector.
3. Remove nuts (A), and then remove knee protector bracket (1).



4. Remove brake pedal assembly. Refer to [BR-500. "Removal and Installation"](#).
5. Disconnect intake door motor connector.

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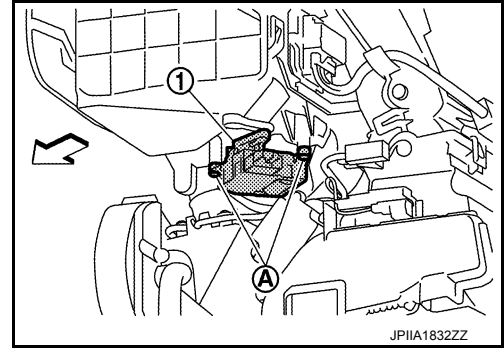
DOOR MOTOR

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITH HEAT PUMP)]

6. Remove screws (A), and then remove intake door motor (1) from heating and cooling unit assembly.

← : Vehicle front



INSTALLATION

Install in the reverse order of removal.

MODE DOOR MOTOR

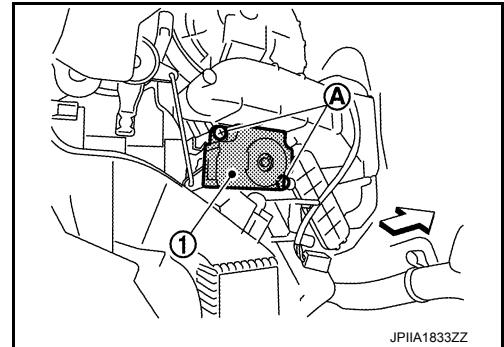
MODE DOOR MOTOR : Removal and Installation

INFOID:000000011006007

REMOVAL

1. Remove glove box cover assembly. Refer to [IP-16, "Exploded View"](#).
2. Disconnect mode door motor connector.
3. Remove screws (A), and then remove mode door motor (1) from the heating and cooling unit assembly.

← : Vehicle front



INSTALLATION

Note the following item, and then install in the order of removal.

CAUTION:

After installing door motor, perform door motor starting position. Refer to [HAC-86, "Work Procedure"](#).

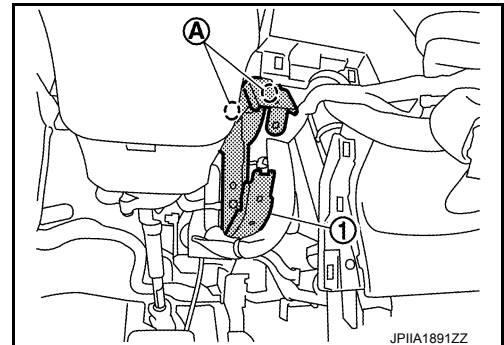
AIR MIX DOOR MOTOR

AIR MIX DOOR MOTOR : Removal and Installation

INFOID:000000011006008

REMOVAL

1. Remove instrument lower panel LH. Refer to [IP-16, "Exploded View"](#).
2. Remove knee protector.
3. Remove nuts (A), and then remove knee protector bracket (1).



4. Remove brake pedal assembly. Refer to [BR-500, "Removal and Installation"](#).

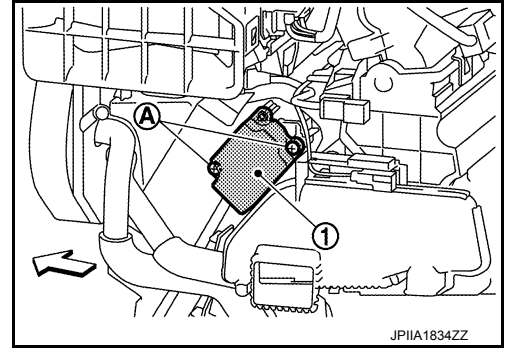
DOOR MOTOR

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITH HEAT PUMP)]

5. Disconnect air mix door motor connector.
6. Remove screws (A), and then remove air mix door motor (1) from heating and cooling unit assembly.

← : Vehicle front



INSTALLATION

Note the following item, and then install in the order of removal.

CAUTION:

After installing door motor, perform door motor starting position. Refer to [HAC-86, "Work Procedure"](#).

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PRECAUTIONS

< PRECAUTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

PRECAUTION

PRECAUTIONS

Precaution for Technicians Using Medical Electric

INFOID:000000010641510

OPERATION PROHIBITION

WARNING:

- Parts with strong magnet is used in this vehicle.
- Technicians using a medical electric device such as pacemaker must never perform operation on the vehicle, as magnetic field can affect the device function by approaching to such parts.

NORMAL CHARGE PRECAUTION

WARNING:

- If a technician uses a medical electric device such as an implantable cardiac pacemaker or an implantable cardioverter defibrillator, the possible effects on the devices must be checked with the device manufacturer before starting the charge operation.
- As radiated electromagnetic wave generated by PDM (Power Delivery Module) at normal charge operation may affect medical electric devices, a technician using a medical electric device such as implantable cardiac pacemaker or an implantable cardioverter defibrillator must not approach motor room [PDM (Power Delivery Module)] at the hood-opened condition during normal charge operation.

PRECAUTION AT TELEMATICS SYSTEM OPERATION

WARNING:

- If a technician uses implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), avoid the device implanted part from approaching within approximately 220 mm (8.66 in) from interior/exterior antenna.
- The electromagnetic wave of TCU might affect the function of the implantable cardiac pacemaker or the implantable cardioverter defibrillator (ICD), when using the service, etc.
- If a technician uses other medical electric devices than implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), the electromagnetic wave of TCU might affect the function of the device. The possible effects on the devices must be checked with the device manufacturer before TCU use.

PRECAUTION AT INTELLIGENT KEY SYSTEM OPERATION

WARNING:

- If a technician uses implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), avoid the device implanted part from approaching within approximately 220 mm (8.66 in) from interior/exterior antenna.
- The electromagnetic wave of Intelligent Key might affect the function of the implantable cardiac pacemaker or the implantable cardioverter defibrillator (ICD), at door operation, at each request switch operation, or at engine starting.
- If a technician uses other medical electric devices than implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), the electromagnetic wave of Intelligent Key might affect the function of the device. The possible effects on the devices must be checked with the device manufacturer before Intelligent Key use.

Point to Be Checked Before Starting Maintenance Work

INFOID:000000010641511

The high voltage system may starts automatically. It is required to check that the timer air conditioner and timer charge (during EVSE connection) are not set before starting maintenance work.

NOTE:

If the timer air conditioner or timer charge (during EVSE connection) is set, the high voltage system starts automatically even when the power switch is in OFF state.

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

INFOID:000000010641512

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

PRECAUTIONS

[AUTO A/C (WITHOUT HEAT PUMP)]

< PRECAUTION >

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 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, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the 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 Airbag Diagnosis Sensor Unit or other Airbag 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 and wait at least three minutes before performing any service.

Precaution for Work

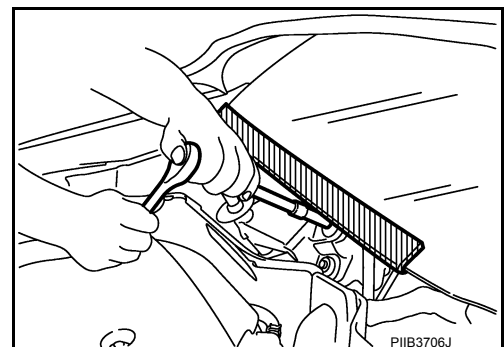
INFOID:000000011107762

- When removing or disassembling each component, be careful not to damage or deform it. If a component may be subject to interference, be sure to protect it with a shop cloth.
- When removing (disengaging) components with a screwdriver or similar tool, be sure to wrap the component with a shop cloth or vinyl tape to protect it.
- Protect the removed parts with a shop cloth and prevent them from being dropped.
- Replace a deformed or damaged clip.
- If a part is specified as a non-reusable part, always replace it with a new one.
- Be sure to tighten bolts and nuts securely to the specified torque.
- After installation is complete, be sure to check that each part works properly.
- Follow the steps below to clean components:
 - Water soluble dirt:
 - Dip a soft cloth into lukewarm water, wring the water out of the cloth and wipe the dirty area.
 - Then rub with a soft, dry cloth.
 - Oily dirt:
 - Dip a soft cloth into lukewarm water with mild detergent (concentration: within 2 to 3%) and wipe the dirty area.
 - Then dip a cloth into fresh water, wring the water out of the cloth and wipe the detergent off.
 - Then rub with a soft, dry cloth.
 - Do not use organic solvent such as thinner, benzene, alcohol or gasoline.
 - For genuine leather seats, use a genuine leather seat cleaner.

Precaution for Procedure without Cowl Top Cover

INFOID:0000000110641513

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



PRECAUTIONS

< PRECAUTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

High Voltage Precautions

INFOID:000000010641514

DANGER:



Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.
- Be sure to wear insulated protective equipment before beginning work on the high voltage system.
- Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

HIGH VOLTAGE HARNESS AND EQUIPMENT IDENTIFICATION

All the high voltage harnesses and connectors are orange. The Li-ion battery and other high voltage devices include an orange high voltage label. Never touch these harnesses and high voltage parts.

HANDLING OF HIGH VOLTAGE HARNESS AND TERMINALS

Immediately insulate disconnected high voltage connectors and terminals with insulating tape.

REGULATIONS ON WORKERS WITH MEDICAL ELECTRONICS

WARNING:

The vehicle contains parts that contain powerful magnets. If a person who is wearing a heart pacemaker or other medical device is close to these parts, the medical device may be affected by the magnets. Such persons must not perform work on the vehicle.

PROHIBITED ITEMS TO CARRY DURING THE WORK

Hybrid vehicles and electric vehicles contain parts with high voltage and intense magnetic force. Never carry metal products and magnetic recording media (e.g. cash card, prepaid card) to repair/inspect high voltage parts. If this is not observed, the metal products may create a risk of short circuit and the magnetic recording media may lose their magnetic recording.

POSTING A SIGN OF "DANGER! HIGH VOLTAGE AREA. KEEP OUT"

PRECAUTIONS

[AUTO A/C (WITHOUT HEAT PUMP)]

< PRECAUTION >

Indicate "HIGH VOLTAGE. DO NOT TOUCH" on the vehicle under repair/inspection to call attention to other workers.

Person in charge: _____

DO NOT TOUCH!

REPAIR IN PROGRESS.

HIGH VOLTAGE

DANGER:

DANGER:

HIGH VOLTAGE

REPAIR IN PROGRESS.

DO NOT TOUCH!

Person in charge: _____

Copy this page and put it after folding on the roof of the vehicle in service.

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Precaution for Removing 12V Battery

INFOID:000000010641515

1. Check that EVSE is not connected.

NOTE:

If EVSE is connected, the air conditioning system may be automatically activated by the timer A/C function.

2. Turn the power switch OFF → ON → OFF. Get out of the vehicle. Close all doors (including back door).

PRECAUTIONS

[AUTO A/C (WITHOUT HEAT PUMP)]

< PRECAUTION >

3. Check that the charge status indicator lamp does not blink and wait for 5 minutes or more.
NOTE:
If the battery is removed within 5 minutes after the power switch is turned OFF, plural DTCs may be detected.
4. Remove 12V battery within 1 hour after turning the power switch OFF → ON → OFF.
NOTE:
 - The 12V battery automatic charge control may start automatically even when the power switch is in OFF state.
 - Once the power switch is turned ON → OFF, the 12V battery automatic charge control does not start for approximately 1 hour.**CAUTION:**
 - After all doors (including back door) are closed, if a door (including back door) is opened before battery terminals are disconnected, start over from Step 1.
 - After turning the power switch OFF, if “Remote A/C” is activated by user operation, stop the air conditioner and start over from Step 1.

Precautions for Service Work of Cooler System

INFOID:000000010641516

GENERAL REFRIGERANT PRECAUTION

WARNING:

- Never breathe A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose and throat. Remove HFC-134a (R-134a) from the A/C system, using certified service equipment meeting requirements of SAE J-2210 [HFC-134a (R-134a) recycling equipment], or J-2209 [HFC-134a (R-134a) recovery equipment]. Ventilate work area before resuming service if accidental system discharge occurs. Additional health and safety information may be obtained from refrigerant and lubricant manufacturers.
- Never release refrigerant into the air. Use approved recovery/recycling recharging equipment to capture the refrigerant each time an air conditioning system is discharged.
- Wear always eye and hand protection (goggles and gloves) when working with any refrigerant or air conditioning system.
- Never store or heat refrigerant containers above 52°C (126°F).
- Never heat a refrigerant container with an open flame; Place the bottom of the container in a warm pail of water if container warming is required.
- Never intentionally drop, puncture, or incinerate refrigerant containers.
- Keep refrigerant away from open flames: poisonous gas is produced if refrigerant burns.
- Refrigerant displaces oxygen, therefore be certain to work in well ventilated areas to prevent suffocation.
- Never pressure test or leakage test HFC-134a (R-134a) service equipment and/or vehicle air conditioning systems with compressed air during repair. Some mixtures of air and HFC-134a (R-134a) have been shown to be combustible at elevated pressures. These mixtures, if ignited, may cause injury or property damage. Additional health and safety information may be obtained from refrigerant manufacturers.

WORKING WITH HFC-134a (R-134a)

CAUTION:

- CFC-12 (R-12) refrigerant and HFC-134a (R-134a) refrigerant are not compatible. Compressor malfunction is likely to occur if the refrigerants are mixed, refer to “CONTAMINATED REFRIGERANT” below. To determine the purity of HFC-134a (R-134a) in the vehicle and recovery tank, use Refrigerant recovery/recycling recharging equipment and Refrigerant Identifier.
- Use only specified lubricant for the HFC-134a (R-134a) A/C system and HFC-134a (R-134a) components. Compressor malfunction is likely to occur if lubricant other than that specified is used.
- If rotary compressor oil (DH-PR), swash plate compressor oil (DH-PS), or CFC-12 compressor oil (mineral oil) is used, the insulation resistance may be reduced. Never use these oils.
- The specified HFC-134a (R-134a) lubricant rapidly absorbs moisture from the atmosphere. The following handling precautions must be observed:
 - Cap (seal) immediately the component to minimize the entry of moisture from the atmosphere when removing refrigerant components from a vehicle.
 - Never remove the caps (unseal) until just before connecting the components when installing refrigerant components to a vehicle. Connect all refrigerant loop components as quickly as possible to minimize the entry of moisture into system.

PRECAUTIONS

[AUTO A/C (WITHOUT HEAT PUMP)]

< PRECAUTION >

- Use only the specified lubricant from a sealed container. Reseal immediately containers of lubricant. Lubricant becomes moisture saturated and should not be used without proper sealing.
- Never allow lubricant to come in contact with styrene foam parts. Damage may result.

REFRIGERANT CONNECTION

A new type refrigerant connection has been introduced to all refrigerant lines except the following location.

- Expansion valve to evaporator
- Refrigerant pressure sensor to liquid tank

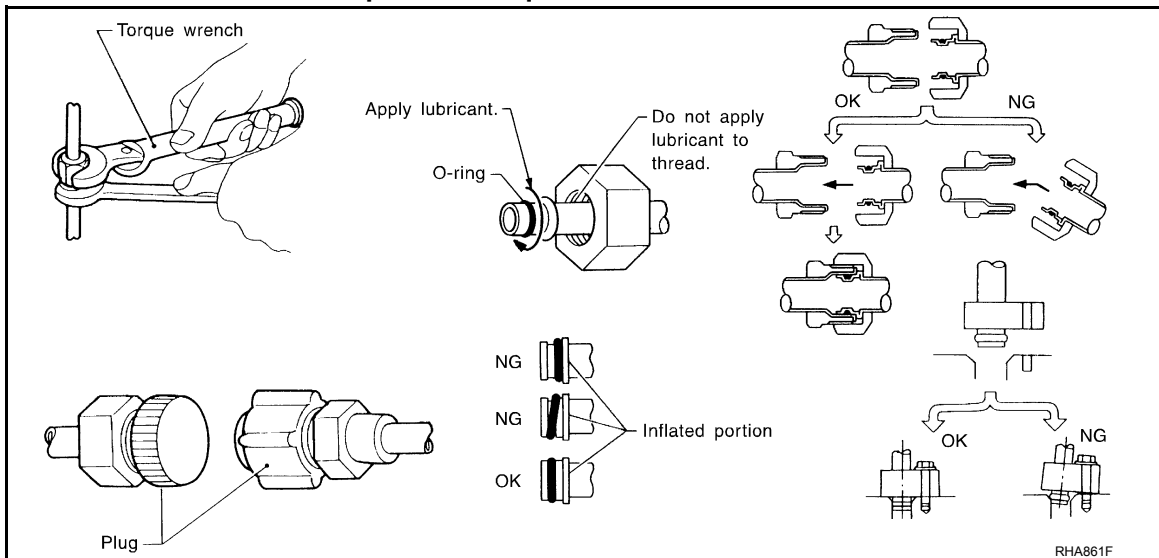
WARNING:

Check that all refrigerant is discharged into the recycling equipment and the pressure in the system is less than atmospheric pressure. Then gradually loosen the discharge side hose fitting and remove it.

CAUTION:

Observe the following when replacing or cleaning refrigerant cycle components.

- To prevent fluorescent indicator from entering, prepare and use exclusive hose for EV (electric vehicle) and HEV (hybrid vehicle) when connecting recovery/recycling/recharging equipment.
- Store it in the same way at it is when mounted on the car when the compressor is removed. Failure to do so will cause lubricant to enter the low-pressure chamber.
- Use the torque wrench or the backup wrench when installing the piping.
- Plug immediately all openings to prevent entry of dust and moisture after disconnecting tubes.
- Connect the pipes at the final stage of the operation when installing an air conditioner in the vehicle. Never remove the seal caps of pipes and other components until just before required for connection.
- Allow components stored in cool areas to warm to working area temperature before removing seal caps. This prevents condensation from forming inside A/C components.
- Remove thoroughly moisture from the refrigeration system before charging the refrigerant.
- Replace always used O-rings.
- Apply lubricant to circle of the O-ring shown in illustration when connecting tube. Be careful not to apply lubricant to threaded portion.
- O-ring must be closely attached to the groove portion of tube.
- Be careful not to damage O-ring and tube when replacing the O-ring.
- Connect tube until a click can be heard. Then tighten the nut or bolt by hand. Check that the O-ring is installed to tube correctly.
- Perform leakage test and make sure that there is no leakage from connections after connecting line. Disconnect that line and replace the O-ring when the refrigerant leaking point is found. Then tighten connections of seal seat to the specified torque.



COMPRESSOR

CAUTION:

- Plug all openings to prevent moisture and foreign matter from entering.
- Store it in the same way at it is when mounted on the car when the compressor is removed.
- Follow "Maintenance of Lubricant Quantity in Compressor" exactly when replacing or repairing compressor. Refer to [HA-88, "Description"](#).

REFRIGERANT LEAKAGE DETECTING FLOURESCENT INDICATOR

CAUTION:

PRECAUTIONS

[AUTO A/C (WITHOUT HEAT PUMP)]

< PRECAUTION >

- Never use fluorescent indicators as these may reduce the insulation resistance.
- If a fluorescent indicator enters the refrigerant cycle, either wash the refrigerant cycle parts or replace the parts.

Service Equipment

INFOID:0000000010641517

RECOVERY/RECYCLING RECHARGING EQUIPMENT

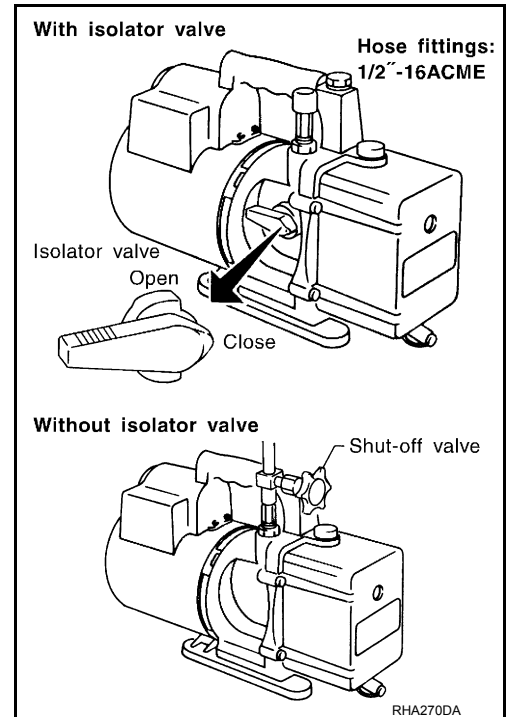
Be certain to follow the manufacturer's instructions for machine operation and machine maintenance. Never introduce any refrigerant other than that specified into the machine.

VACUUM PUMP

The lubricant contained inside the vacuum pump is not compatible with the specified lubricant for HFC-134a (R-134a) A/C systems. The vent side of the vacuum pump is exposed to atmospheric pressure. So the vacuum pump lubricant may migrate out of the pump into the service hose. This is possible when the pump is switched OFF after evacuation (vacuuming) and hose is connected to it. To prevent this migration, use a manual valve placed near the hose-to-pump connection, as per the following.

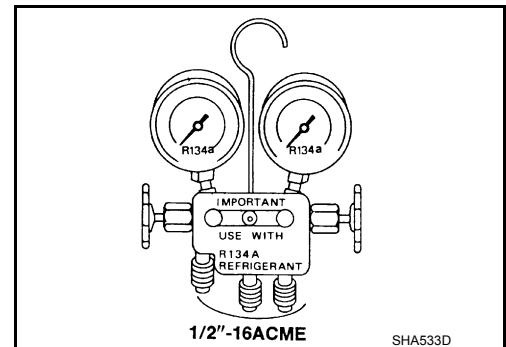
- Vacuum pumps usually have a manual isolator valve as part of the pump. Close this valve to isolate the service hose from the pump.
- Use a hose equipped with a manual shut-off valve near the pump end for pumps without an isolator. Close the valve to isolate the hose from the pump.
- Disconnect the hose from the pump if the hose has an automatic shut-off valve. As long as the hose is connected, the valve is open and lubricating oil may migrate.

Some one-way valves open when vacuum is applied and close under no vacuum condition. Such valves may restrict the pump's ability to pull a deep vacuum and are not recommended.



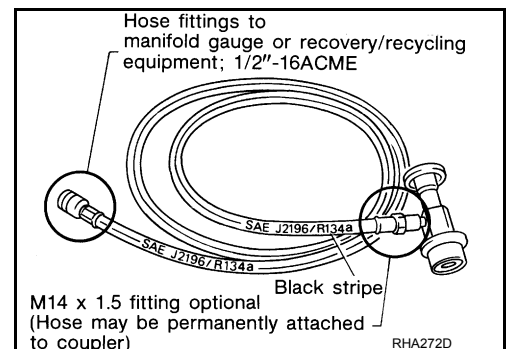
MANIFOLD GAUGE SET

Be certain that the gauge face indicates HFC-134a or R-134a. Be sure the gauge set has 1/2"-16 ACME threaded connections for service hoses. Confirm the set has been used only with refrigerant HFC-134a (R-134a) and specified lubricants.



SERVICE HOSES

Be certain that the service hoses display the markings described (colored hose with black stripe). All hoses must equip positive shut-off devices (either manual or automatic) near the end of the hoses opposite to the manifold gauge.



PRECAUTIONS

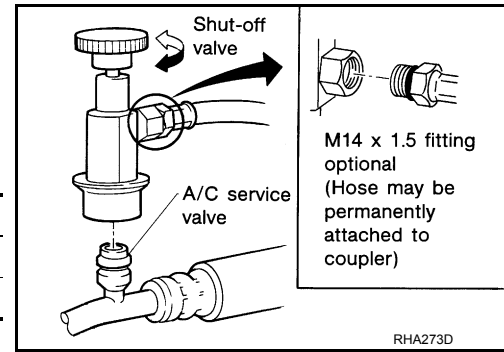
< PRECAUTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

SERVICE COUPLERS

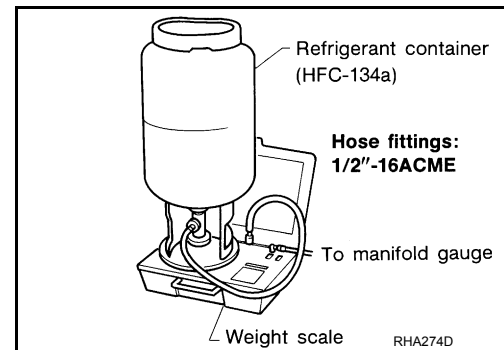
Never attempt to connect HFC-134a (R-134a) service couplers to the CFC-12 (R-12) A/C system. The HFC-134a (R-134a) couplers do not properly connect to the CFC-12 (R-12) system. However, if an improper connection is attempted, discharging and contamination may occur.

Shut-off valve rotation	A/C service valve
Clockwise	Open
Counterclockwise	Close



REFRIGERANT WEIGHT SCALE

Verify that no refrigerant other than HFC-134a (R-134a) and specified lubricants have been used with the scale. The hose fitting must be 1/2"-16 ACME if the scale controls refrigerant flow electronically.



CALIBRATING ACR4 WEIGHT SCALE

Calibrate the scale each three month.

To calibrate the weight scale on the ACR4:

1. Press **"Shift/Reset"** and **"Enter"** at the same time.
2. Press **"8787"**. **"A1"** is displayed.
3. Remove all weight from the scale.
4. Press **"0"**, then press **"Enter"**. **"0.00"** is displayed and change to **"A2"**.
5. Place a known weight (dumbbell or similar weight), between 4.5 and 8.6 kg (10 and 19 lb.) on the center of the weight scale.
6. Enter the known weight using four digits. (Example 10 lb. = 10.00, 10.5 lb. = 10.50)
7. Press **"Enter"** — the display returns to the vacuum mode.
8. Press **"Shift/Reset"** and **"Enter"** at the same time.
9. Press **"6"** — the known weight on the scale is displayed.
10. Remove the known weight from the scale. **"0.00"** is displayed.
11. Press **"Shift/Reset"** to return the ACR4 to the program mode.

CHARGING CYLINDER

Using a charging cylinder is not recommended. Refrigerant may be vented into air from cylinder's top valve when filling the cylinder with refrigerant. Also, the accuracy of the cylinder is generally less than that of an electronic scale or of quality recycle/recharge equipment.

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PREPARATION

< PREPARATION >

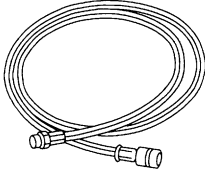

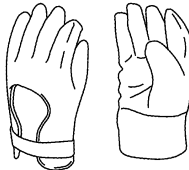

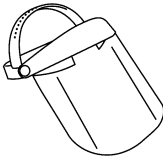
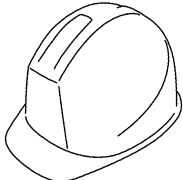
[AUTO A/C (WITHOUT HEAT PUMP)]

PREPARATION

PREPARATION

Commercial Service Tools

INFOID:000000010641518

Tool name	Description
<p>Service hoses</p> <ul style="list-style-type: none"> • High-pressure side hose • Low-pressure side hose • Utility hose 	 <p>S-NT201</p> <p>Hose color:</p> <ul style="list-style-type: none"> • Low-pressure side hose: Blue with black stripe • High-pressure side hose: Red with black stripe • Utility hose: Yellow with black stripe or green with black stripe <p>Hose fitting to gauge:</p> <ul style="list-style-type: none"> • 1/2" -16 ACME
<p>Insulated gloves</p> <p>Comply with EN60903:</p> <ul style="list-style-type: none"> • Use protective gloves made of insulating material. • The protective gloves must be capable of resisting the voltage of 600 or more. 	 <p>JMCIA0149ZZ</p> <p>Removing and installing high voltage components</p>
<p>Leather gloves</p> <p>[Use leather gloves that can fasten the wrist tight]</p>	 <p>JPCIA0066ZZ</p> <ul style="list-style-type: none"> • Removing and installing high voltage components • Protect insulated gloves
<p>Insulated safety shoes</p> <p>Comply with EN60903:</p> <ul style="list-style-type: none"> • Use protective shoes made of insulating material. • The protective shoes must be capable of resisting the voltage of 600 or more. 	 <p>JPCIA0011ZZ</p> <p>Removing and installing high voltage components</p>
<p>Face shield</p> <p>[Comply with EN166.]</p>	 <p>JPCIA0167ZZ</p> <ul style="list-style-type: none"> • Removing and installing high voltage components • To protect face from the spatter on the work to electric line
<p>Insulated helmet</p>	 <p>JPCIA0013ZZ</p> <p>Removing and installing high voltage components</p>

PREPARATION

< PREPARATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

Tool name	Description
Insulation resistance tester (Multi tester) <div data-bbox="703 233 881 405" style="text-align: center;"> </div> <div data-bbox="846 415 932 432" style="text-align: center;"> <small>JPCIA0014ZZ</small> </div>	Measuring insulation resistance, voltage and resistance <div style="text-align: right;">A B C</div>
(J-48710) NISSAN ACR2009 RRR Unit <div data-bbox="721 478 854 684" style="text-align: center;"> </div> <div data-bbox="846 667 919 684" style="text-align: center;"> <small>WJIA0293E</small> </div>	Refrigerant recovery, recycling and recharging <div style="text-align: right;">D E</div>
(J-41995) Electrical leak detector <div data-bbox="691 737 898 930" style="text-align: center;"> </div> <div data-bbox="846 919 907 936" style="text-align: center;"> <small>AHA281A</small> </div>	Power supply: DC12V (Battery terminal) <div style="text-align: right;">F G H</div>
Manifold gauge set (with hoses and couplers) <div data-bbox="672 993 902 1178" style="text-align: center;"> </div> <div data-bbox="846 1167 915 1184" style="text-align: center;"> <small>RJIA0196E</small> </div>	Identification: <ul style="list-style-type: none"> • The gauge face indicates HFC-134a (R-134a). Fitting size: Thread size <ul style="list-style-type: none"> • 1/2"-16 ACME <div style="text-align: right;">J</div>
Service couplers <ul style="list-style-type: none"> • High-pressure side coupler • Low-pressure side coupler <div data-bbox="711 1255 870 1415" style="text-align: center;"> </div> <div data-bbox="846 1419 902 1436" style="text-align: center;"> <small>S-NT202</small> </div>	Hose fitting to service hose: M14 x 1.5 fitting is optional or permanently attached. <div style="text-align: right;">K L</div>
Refrigerant weight scale <div data-bbox="646 1486 876 1686" style="text-align: center;"> </div> <div data-bbox="846 1671 902 1688" style="text-align: center;"> <small>S-NT200</small> </div>	For measuring of refrigerant Fitting size: Thread size 1/2"-16 ACME <div style="text-align: right;">M N O</div>
Vacuum pump (Including the isolator valve) <div data-bbox="621 1730 875 1938" style="text-align: center;"> </div> <div data-bbox="846 1923 902 1940" style="text-align: center;"> <small>S-NT203</small> </div>	Capacity: <ul style="list-style-type: none"> • Air displacement: 4 CFM • Micron rating: 20 microns • Oil capacity: 482 mℓ (17 Imp fl oz.) Fitting size: Thread size <ul style="list-style-type: none"> • 1/2"-16 ACME <div style="text-align: right;">P</div>

PREPARATION

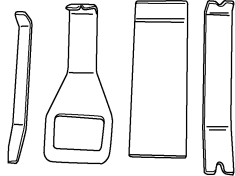
< PREPARATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

Special Service Tool

INFOID:000000010641519

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

Tool number (TechMate No.) Tool name — (J-46534) Trim tool set	Description Removing trim components
 <p style="text-align: center; font-size: small; margin-top: 5px;">AWJIA0483ZZ</p>	

Oil and Grease

INFOID:000000010641520

Name	Application	Note
Refrigerant can (HFC-134a)	Charging refrigerant	—
Compressor oil (ND-OIL11)	Refilling compressor oil	—

COMPONENT PARTS

< SYSTEM DESCRIPTION >

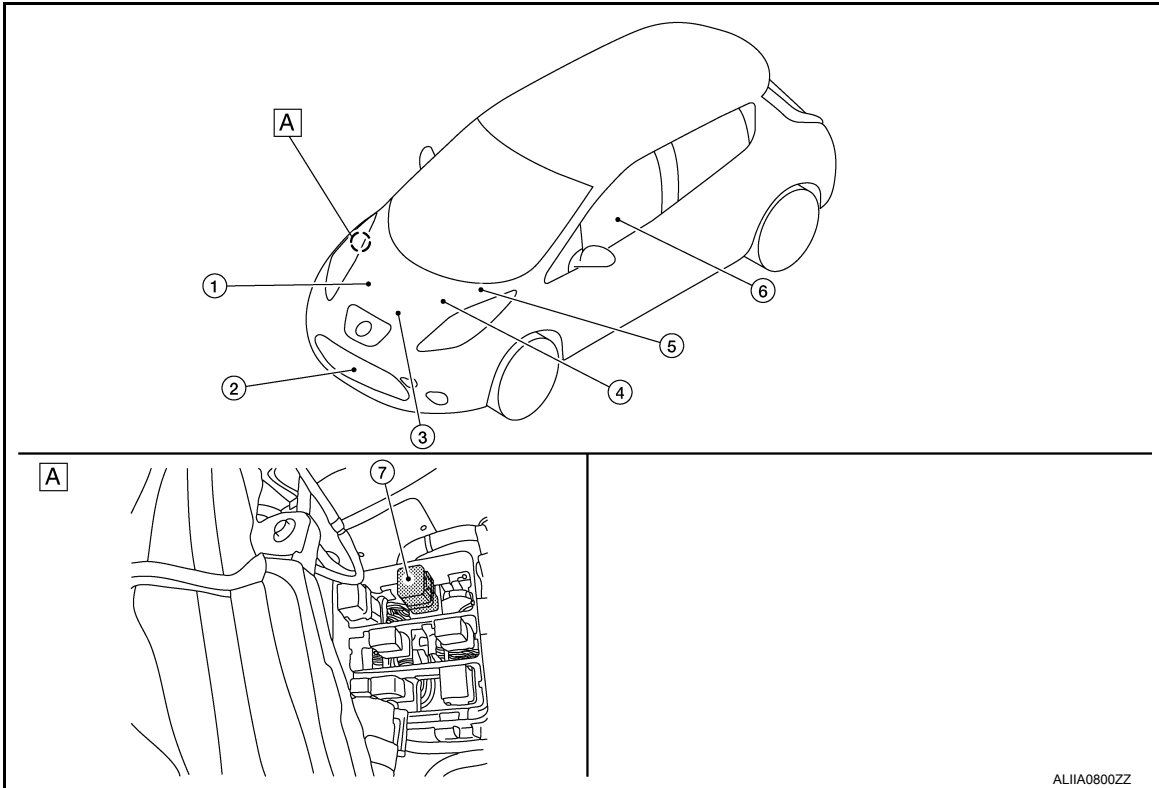
[AUTO A/C (WITHOUT HEAT PUMP)]

SYSTEM DESCRIPTION

COMPONENT PARTS

AUTOMATIC AIR CONDITIONING SYSTEM

AUTOMATIC AIR CONDITIONING SYSTEM : Component Parts Location INFOID:000000010641521



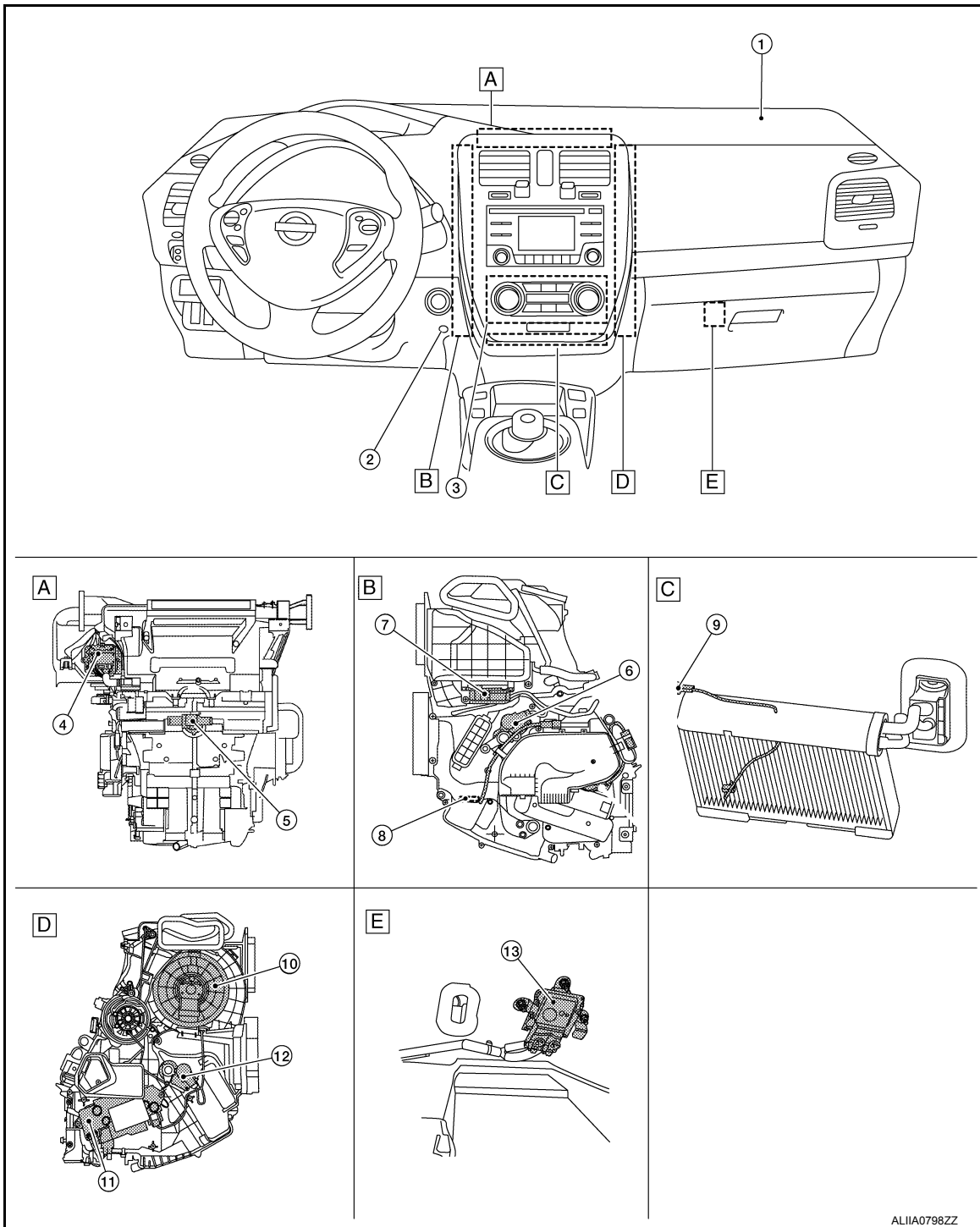
A. Relay box

No.	Component	Description
1.	Electric compressor	Refer to HAC-226, "Electric Compressor" .
2.	Ambient sensor	Refer to HAC-225, "Ambient Sensor" .
3.	PDM (Power delivery module)	<ul style="list-style-type: none"> Supplies high voltage system power to the electric compressor. Refer to EVC-15, "Component Parts Location" for details installation location.
4.	Refrigerant pressure sensor	Refer to HAC-226, "Refrigerant Pressure Sensor" .
5.	M/C relay	The M/C (motor control) relay supplies the main power to the EV system. VCM activates the M/C relay and supplies power to the EV system when the EV system needs to be started.
6.	Li-ion battery	<ul style="list-style-type: none"> Supplies high voltage system power to the PTC heater and PDM (power delivery module). Refer to EVB-14, "Component Parts Location" for details installation location.
7.	A/C relay	When the M/C relay is ON, it is controlled by VCM and 12 V power is supplied to each component of air conditioning system.

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]



ALIA0798ZZ

A. Back side of A/C unit
D. Right side of A/C unit

B. Left side of A/C unit
E. Behind glove box

C. Evaporator

No.	Component	Description
1.	Sunload sensor	Refer to HAC-226, "Sunload Sensor" .
2.	In-vehicle sensor	Refer to HAC-225, "In-Vehicle Sensor" .
3.	A/C auto amp.	Refer to HAC-225, "A/C Auto Amp." .
4.	Power transistor	Refer to HAC-225, "A/C UNIT ASSEMBLY : Power Transistor" .
5.	Aspirator	Refer to HAC-221, "A/C UNIT ASSEMBLY : Aspirator" .

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

No.	Component	Description
6.	Air mix door motor	Refer to HAC-222, "A/C UNIT ASSEMBLY : Air Mix Door Motor" .
7.	Intake door motor	Refer to HAC-223, "A/C UNIT ASSEMBLY : Intake Door Motor" .
8.	PTC heater outlet air and A/C unit case temperature sensor assembly	<ul style="list-style-type: none"> • PTC heater outlet air temperature sensor: HAC-222, "A/C UNIT ASSEMBLY : PTC Heater Outlet Air Temperature Sensor". • A/C unit case temperature sensor: HAC-222, "A/C UNIT ASSEMBLY : A/C Unit Case Temperature Sensor".
9.	Intake sensor	Refer to HAC-222, "A/C UNIT ASSEMBLY : Intake Sensor" .
10.	Blower motor	Refer to HAC-224, "A/C UNIT ASSEMBLY : Blower Motor" .
11.	PTC heater	Refer to HAC-228, "PTC Heater" .
12.	Mode door motor	Refer to HAC-223, "A/C UNIT ASSEMBLY : Mode Door Motor" .
13.	VCM	<ul style="list-style-type: none"> • A/C CAN Inputs a refrigerant pressure sensor signal and transmits it to the A/C auto amp. via CAN communication. • CAN A/C Calculates each input signal and transmits a timer A/C request signal, remote climate control request signal, wake up request signal and deice permission signal via CAN communication to the A/C auto amp. • A/C CAN A/C Controls the high voltage system and transmits an A/C maximum power signal via CAN communication to the A/C auto amp. • ECO A/C ECO Transmits an ECO mode request signal to the A/C auto amplifier during ECO mode control. • AV C/U A/C Transfers a timer/remote setting temperature signal that is received from AV control unit to the A/C auto amp. • CAN A/C Receives a cooling fan speed request signal from the A/C auto amp. via CAN communication for cooling fan control. • CAN A/C Receives a timer A/C operation signal from the A/C auto amp. via CAN communication for timer A/C-heater timer operation start time calculation. • CAN A/C Receives a deice request signal from the A/C auto amp. via CAN communication for deice control. • CAN A/C AV C/U Receives an A/C display signal from the A/C auto amp. via CAN communication, then transmits it to AV control unit. • Refer to EVC-15, "Component Parts Location" for details installation location.

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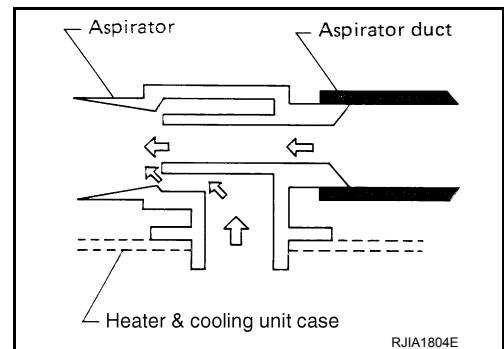
HAC

A/C UNIT ASSEMBLY

A/C UNIT ASSEMBLY : Aspirator

INFOID:000000010641522

The aspirator generates vacuum by the air blown from the A/C unit and draws the air of the passenger room into the in-vehicle sensor via the aspirator duct.



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COMPONENT PARTS

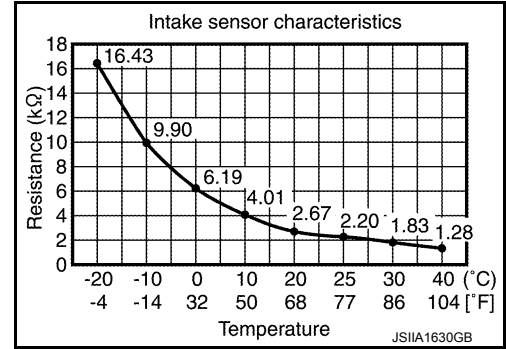
< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

A/C UNIT ASSEMBLY : Intake Sensor

INFOID:000000010641524

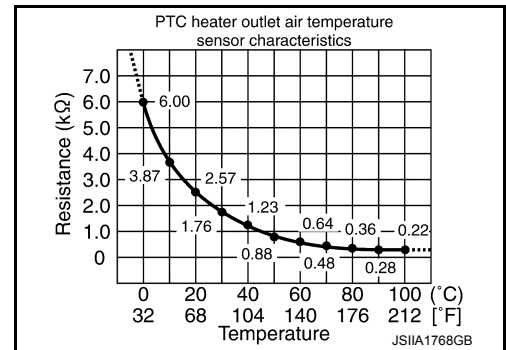
Intake sensor measures evaporator fin temperature. This sensor uses a thermistor that decreases electrical resistance as temperature increases.



A/C UNIT ASSEMBLY : PTC Heater Outlet Air Temperature Sensor

INFOID:000000010641524

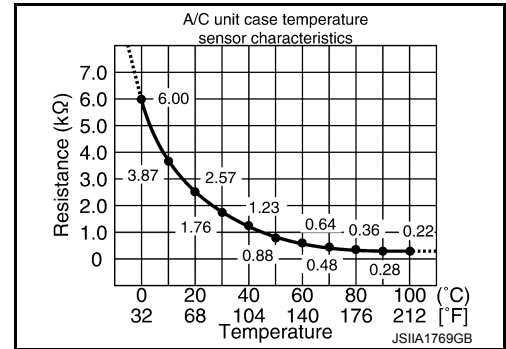
PTC heater outlet air temperature sensor measures the air temperature immediately after the air passes the PTC heater core. This sensor uses a thermistor that decreases electrical resistance as temperature increases.



A/C UNIT ASSEMBLY : A/C Unit Case Temperature Sensor

INFOID:000000010641525

A/C unit case temperature sensor measures the A/C unit case temperature around the PTC heater core. This sensor uses a thermistor that decreases electrical resistance as temperature increases.



A/C UNIT ASSEMBLY : Air Mix Door Motor

INFOID:000000010641526

DESCRIPTION

- The step motor type motor is adopted for air mix door motor.
- When the drive signal from the A/C auto amp. is input into the motor, the step motor inside the motor rotates by the number of steps corresponding to the drive signal and stops at the target door position.
- The rotational movement of the motor is transmitted via the rod and lever to the air mix doors (upper air mix door, lower air mix door), changing the discharge air temperature.

AIR MIX DOOR MOTOR DRIVE METHOD

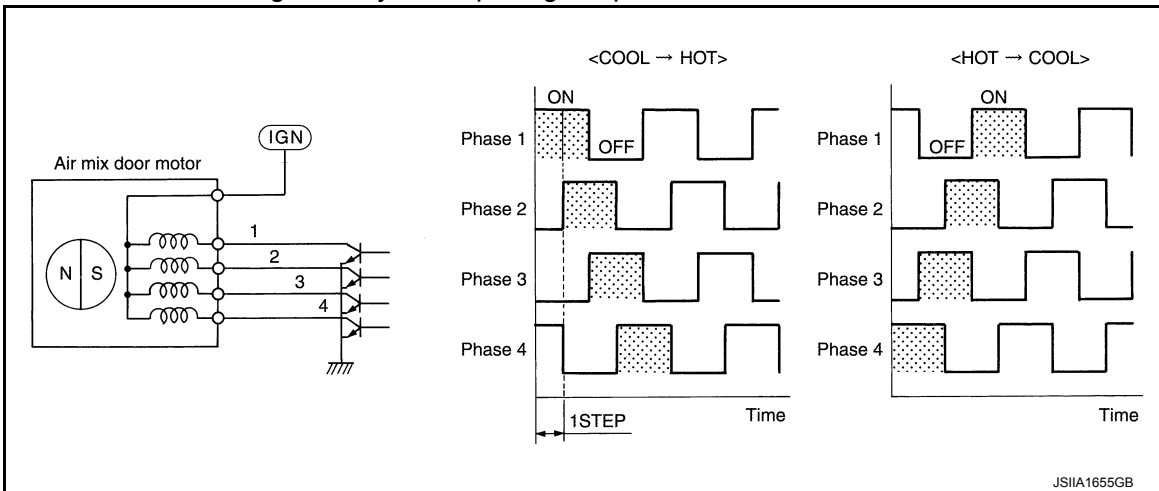
- The 4 drive coils are excited in sequence in order to drive the motor.

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

- Direction of rotation is changeable by recomposing the pattern of excitation.



A/C UNIT ASSEMBLY : Mode Door Motor

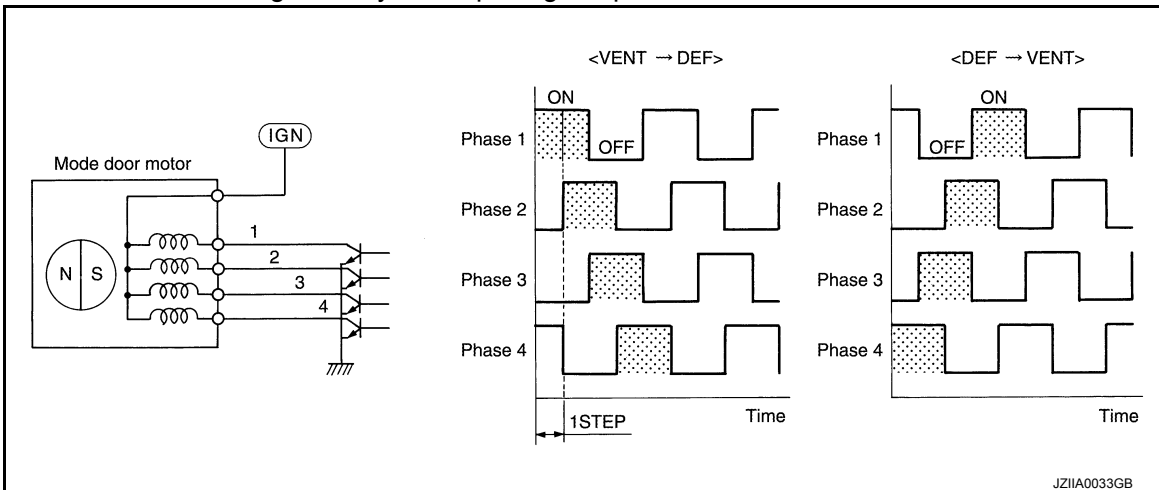
INFOID:000000010641527

DESCRIPTION

- The step motor type motor is adopted for mode door motor.
- When the drive signal from the A/C auto amp. is input into the motor, the step motor inside the motor rotates by the number of steps corresponding to the drive signal and stops at the target door position.
- The rotational movement of the motor is transmitted via the rod, link, and lever to the mode doors (center ventilator, defrost door, sub-defrost door, side ventilator door, and foot door), changing the air outlets.

MODE DOOR MOTOR DRIVE METHOD

- The 4 drive coils are excited in sequence in order to drive the motor.
- Direction of rotation is changeable by recomposing the pattern of excitation.



A/C UNIT ASSEMBLY : Intake Door Motor

INFOID:000000010641528

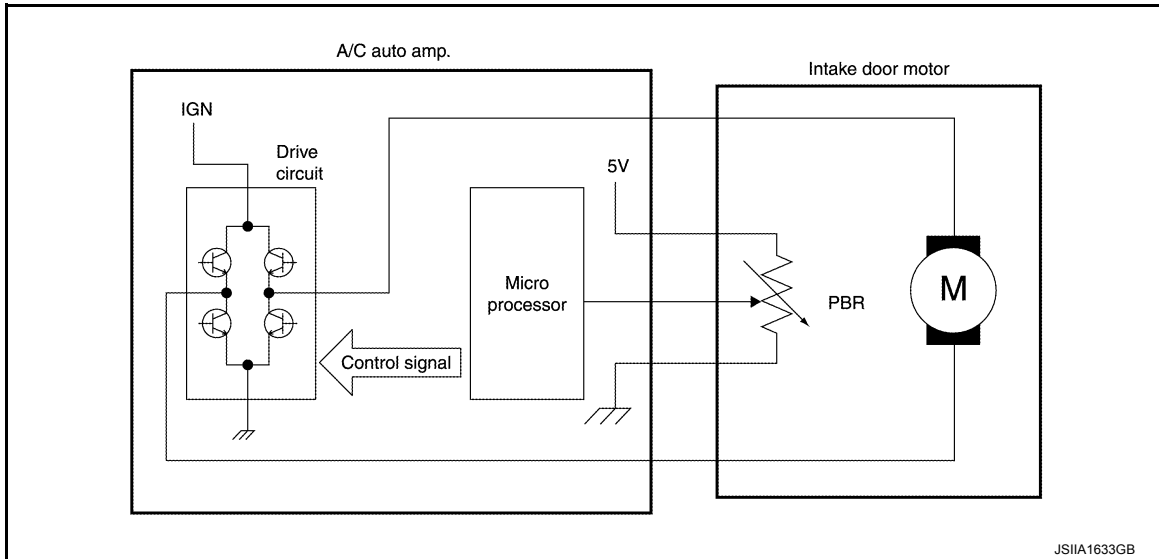
- Intake door motor consists of a motor that drives the door and PBR (Potentiometer Balance Resistor) that detects door position.
- Motor operates according to drive signal from A/C auto amp.
- Motor rotational movement is transmitted via the lever to the intake door, changing the air inlet.

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

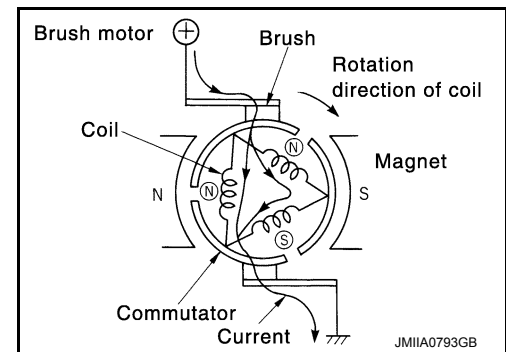
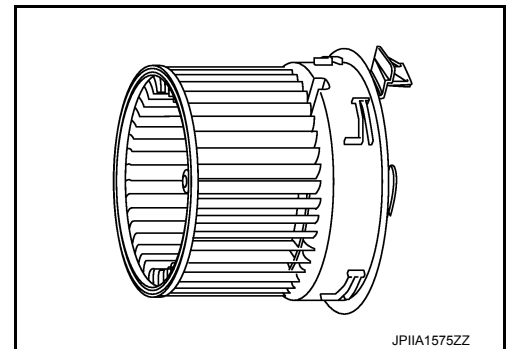
- The A/C auto amp. monitors the door position based on the PBR signal that changes in coordination with the rotation of the motor.



A/C UNIT ASSEMBLY : Blower Motor

INFOID:0000000010641529

Brush motor is adopted for blower motor. Rotation speed changes according to voltage from power transistor.



COMPONENT PARTS

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

A/C UNIT ASSEMBLY : Power Transistor

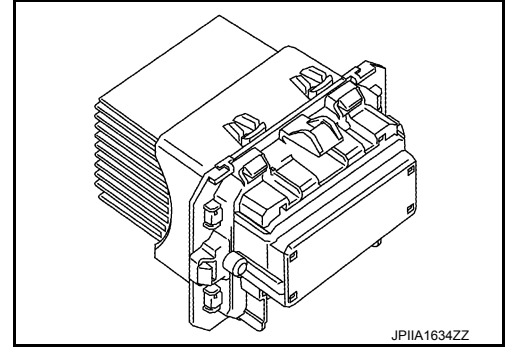
INFOID:000000010641531

- Power transistor, that uses MOS field effect transistor, is adopted for blower fan motor speed control.

NOTE:

A MOS field effect transistor is a transistor in which the gate is composed of a metal-oxide-semiconductor (MOS). Field effect transistor is controlled by voltage, while ordinary transistor is controlled by current. Electrode of field effect transistor is called source, drain, or gate, while electrode of ordinary transistor is called emitter, collector, or base.

- Power transistor continuously controls voltage to blower fan motor (approximately 0 to 16 V), according to gate voltage from A/C auto amp.
- This power transistor does not require HI relay even when the maximum voltage is applied to blower fan motor at HI status, because voltage drop is nominal.



A/C Auto Amp.

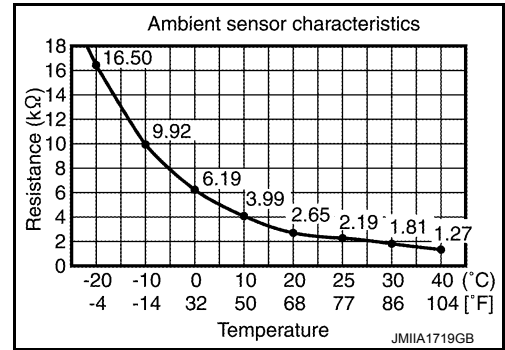
INFOID:000000010641531

A/C auto amp. controls A/C by calculations based on signals input from each sensor and switch. A/C auto amp. a self-diagnosis function is integrated in A/C auto amp. allowing diagnosis of automatic air conditioning system to be performed quickly.

Ambient Sensor

INFOID:000000010641532

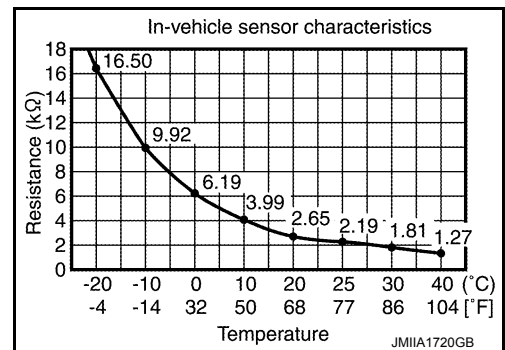
Ambient sensor measures ambient air temperature. This sensor uses a thermistor that decreases electrical resistance as temperature increases.



In-Vehicle Sensor

INFOID:000000010641533

In-vehicle sensor measures temperature of interior air that is sucked into the aspirator. This sensor uses a thermistor that decreases electrical resistance as temperature increases.



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COMPONENT PARTS

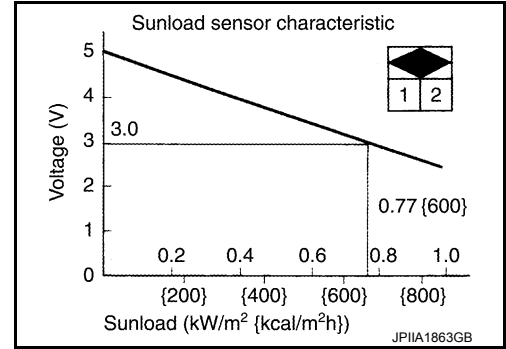
< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

Sunload Sensor

INFOID:000000010641534

Sunload sensor measures sunload amount. This sensor converts the sunload to a voltage signal by photodiode and transmits the signal to the A/C auto amp.

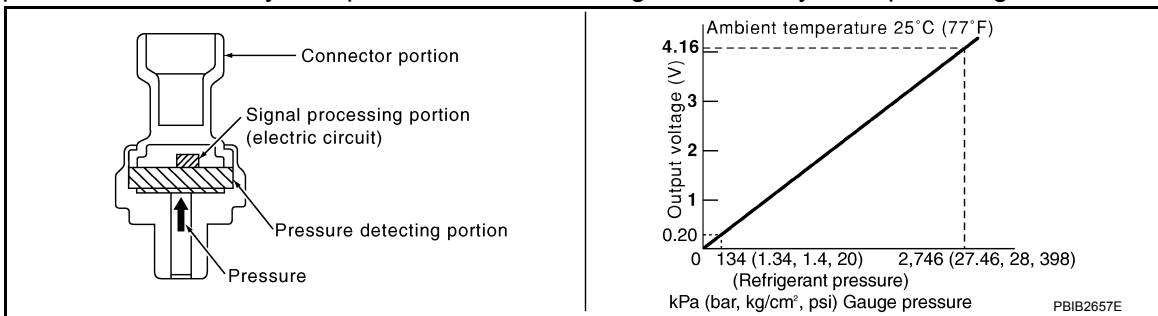


Refrigerant Pressure Sensor

INFOID:000000010641535

DESCRIPTION

- The refrigerant pressure sensor converts high-pressure side refrigerant pressure into voltage and outputs it to VCM.
- VCM performs the cooler system protection and each engine control by the input voltage.



STRUCTURE AND OPERATION

- The refrigerant pressure sensor is a capacitance type sensor. It consists of a pressure detection area and a signal processing area.
- The pressure detection area is the variable capacity compressor. It changes the internal capacitance according to the pressure.
- The signal processing area detects the capacitance of pressure detection area, converts it into the voltage, and outputs it to VCM.

Electric Compressor

INFOID:000000010641536

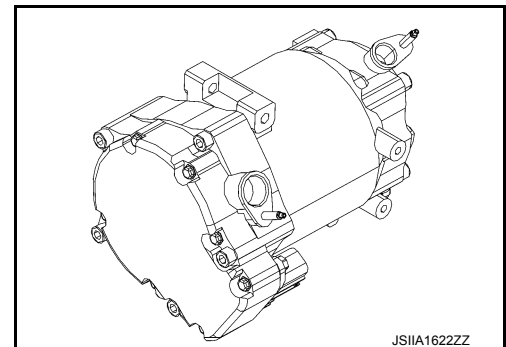
- An electric scroll compressor is used.
- A 3-phase output inverter with IPM^{Note} is used.
- The inverter is adopted to IPM^{Note} for smaller size and improved reliability.

NOTE:

IPM (Intelligent Power Module) is the element which delivered power device equivalent to IGBT and the protection feature of the circuit to one package.

NOTE:

IGBT (Insulated Gate Bipolar Transistor) is a transistor which is suitable for high voltages and large currents and which can control large electrical power using a small gate voltage.



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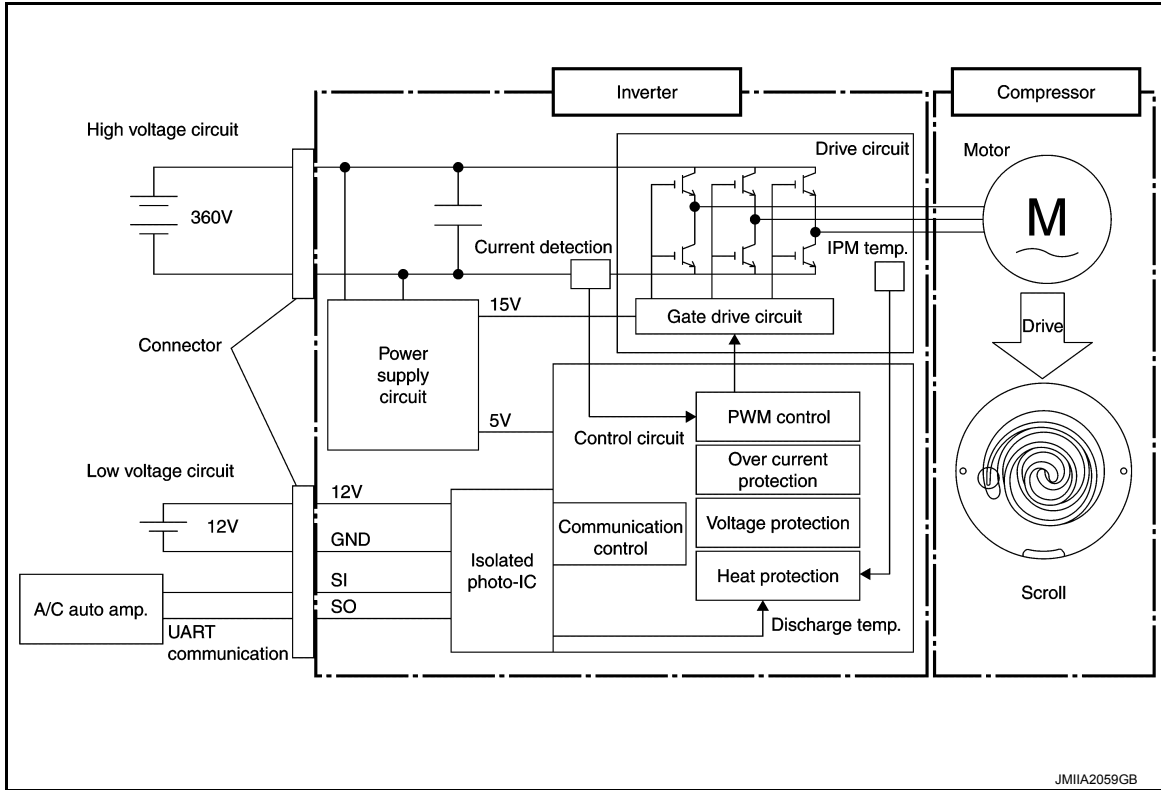
- The structure integrates the inverter, compressor, and motor, allowing compressor to operate at any speed.

COMPONENT PARTS

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

- The inverter communicates with A/C auto amp., and uses PWM control^{Note} to control the motor speed via the drive circuit.



A
B
C
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F
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H

NOTE:

- PWM (Pulse Width Modulation) is a system that controls current and voltage by changing the duty ratio of a constant frequency pulse wave.
- PWM is used as the adjustment method of output voltage when inverter is used as a power supply for controlling motor speed.
- PWM changes voltage application time (pulse width) using a semiconductor element and controls motor speed.
- The IPM contains an internal protection circuit, and uses the inverter control circuit to monitor for an increase in motor drive circuit temperature in order to prevent circuit overheating.
- The motor uses a DC brushless motor, with speed control performed by the inverter drive circuit.

HAC

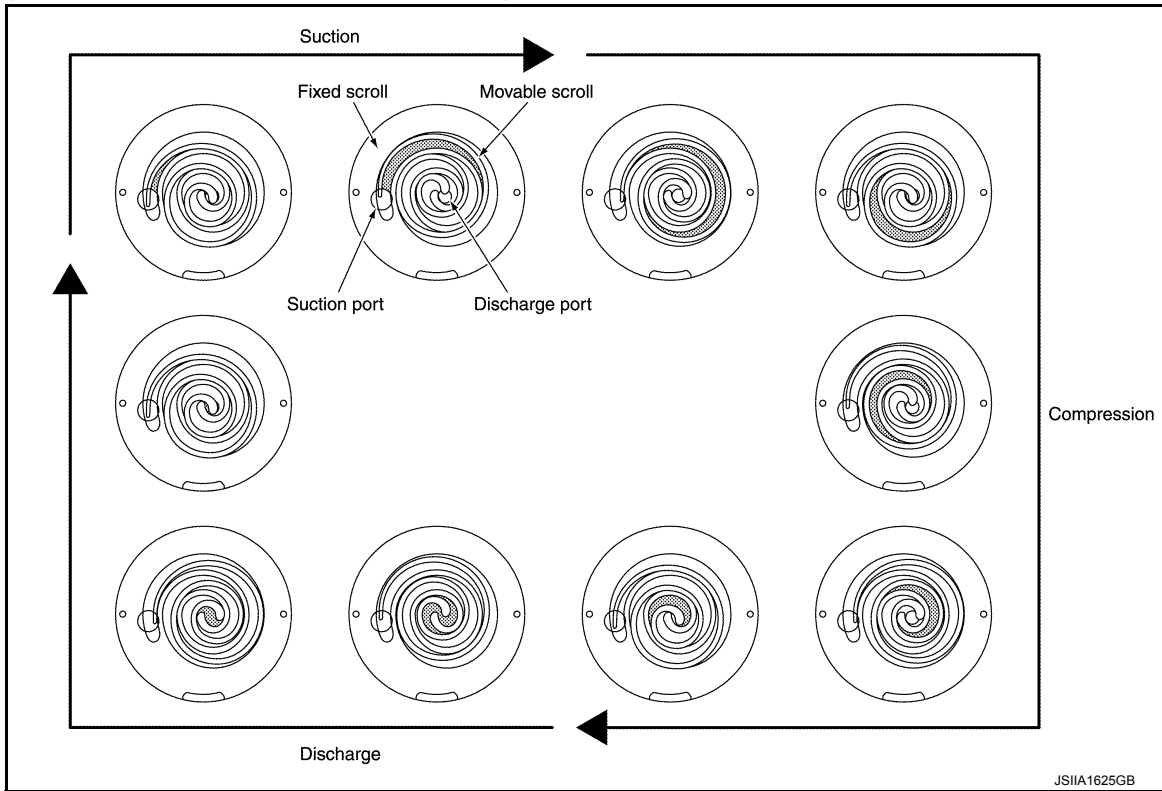
J
K
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COMPONENT PARTS

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

- A scroll-type compressor is used. The motor drive force is used to rotate the moveable scroll and perform refrigerant intake, compression, and discharge.



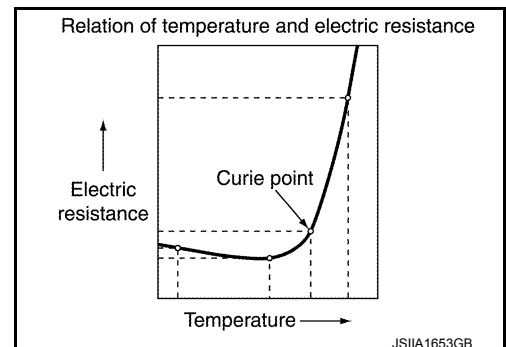
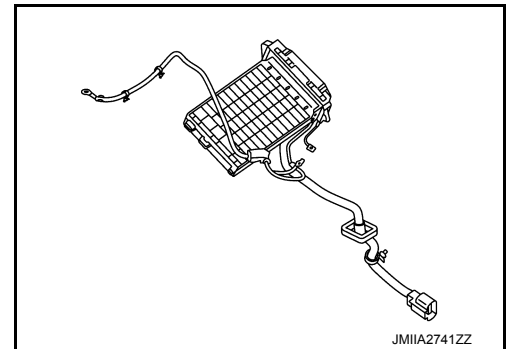
PTC Heater

INFOID:000000010641537

- A PTC heater is used as the heat source for heating.
- Provides internal control circuit and performs LIN communication with A/C auto amp.
- Based on the signals from A/C auto amp., the microcomputer inside PTC heater controls the heater output by PWM^{Note}.

NOTE:

- PWM (Pulse Width Modulation) is a system that controls current and voltage by changing the duty ratio of a constant frequency pulse wave.
- PWM is used as the adjustment method of output voltage when inverter is used as a power supply for controlling motor speed.
- PWM changes voltage application time (pulse width) using a semiconductor element and controls PTC heater.
- PTC stands for "Positive Temperature Coefficient", and is a ceramic material with barium titanate as the primary component.
- When current is applied, it heats up. Upon reaching a certain temperature (Curie temperature) the resistance suddenly increases, limiting the current, and maintaining a constant amount of heating.



SYSTEM

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

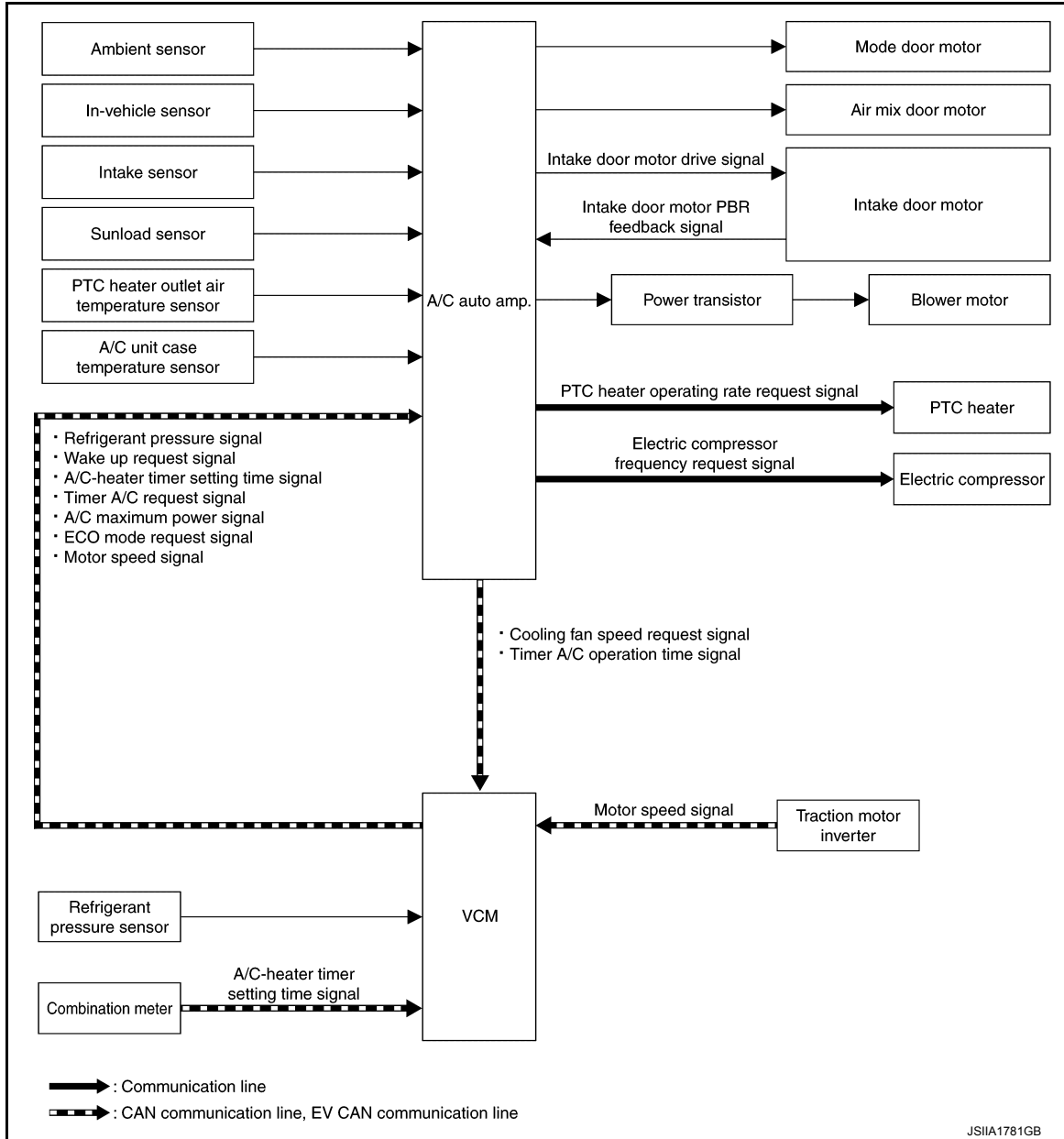
SYSTEM

AUTOMATIC AIR CONDITIONING SYSTEM

AUTOMATIC AIR CONDITIONING SYSTEM : System Description

INFOID:000000010641538

SYSTEM DIAGRAM



DESCRIPTION

- The automatic air conditioning system is controlled by the control functions of the A/C auto amp., VCM, and AV control unit.
- The A/C system operations are input from the A/C auto amp. switches.
- The A/C auto amp. sends various display information to VCM via EV CAN communication.
- VCM sends information received from the A/C auto amp. to the AV control unit via EV CAN communication.
- AV control unit displays the A/C status on the display, based on the information received from VCM.

CONTROL BY A/C AUTO AMP.

- [HAC-230. "AUTOMATIC AIR CONDITIONING SYSTEM : Temperature Control"](#)
- [HAC-231. "AUTOMATIC AIR CONDITIONING SYSTEM : Air Outlet Control"](#)
- [HAC-231. "AUTOMATIC AIR CONDITIONING SYSTEM : Air Flow Control"](#)
- [HAC-232. "AUTOMATIC AIR CONDITIONING SYSTEM : Air Inlet Control"](#)

SYSTEM

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

- [HAC-233. "AUTOMATIC AIR CONDITIONING SYSTEM : Compressor Control"](#)
- [HAC-236. "AUTOMATIC AIR CONDITIONING SYSTEM : PTC Heater Control"](#)
- Input data processing
- Ambient temperature correction
 - The A/C auto amp. inputs the temperature detected with the ambient sensor as the ambient temperature.
 - The A/C auto amp. internally processes the ambient temperature data in two data types: data for A/C control and data for ambient temperature display.
 - When the vehicle speed is 30 km/h or less, if the effects of radiator heat and other factors result in a sudden increase in detected ambient temperature, the A/C auto amp. performs delay correction so that the recognized temperature rises slowly. Correction is performed so that the change is recognized quickly when the ambient temperature drops.
 - When the temperature detected by the ambient sensor is less than approximately -20°C , no correction is performed for the data for A/C control.
 - When the temperature detected by the ambient sensor is less than approximately -29°C , no correction is performed for the data for ambient temperature display.
- Interior air temperature correction
 - The A/C auto amp. inputs the temperature detected by the in-vehicle sensor as the interior air temperature.
 - In order to prevent effects from uneven temperatures inside the vehicle and from external disruptions, the A/C auto amp. performs correction so that the recognized interior air temperature changes slowly. The A/C auto amp. performs the correction so that the recognized interior temperature changes according to the difference between the detected interior temperature and the recognized interior temperature. If the difference is large, the changes occur quickly, and becomes slower as the difference becomes smaller.
- Intake temperature correction
 - The A/C auto amp. inputs the temperature detected with the intake sensor as the air temperature after passing through the evaporator.
 - In order to prevent effects from uneven intake temperatures and from external disruptions, the A/C auto amp. performs correction so that the recognized intake air temperature changes slowly. The A/C auto amp. performs the correction so that the recognized intake temperature changes according to the difference between the detected intake temperature and the recognized intake temperature. If the difference is large, the changes occur quickly, and becomes slower as the difference becomes smaller.
- Sunload amount correction
 - The A/C auto amp. inputs the sunload detected by the sunload sensor.
 - When the sunload suddenly changes, for example when entering and leaving a tunnel, correction is performed so that the recognized sunload of the A/C auto amp. changes slowly.
- Set temperature correction
 - The A/C auto amp. controls the interior temperature so that it is always at the optimum level, and performs correction so that the temperature felt by the passengers matches the target temperature set with the temperature control switch, according to the ambient temperature detected by the ambient sensor.

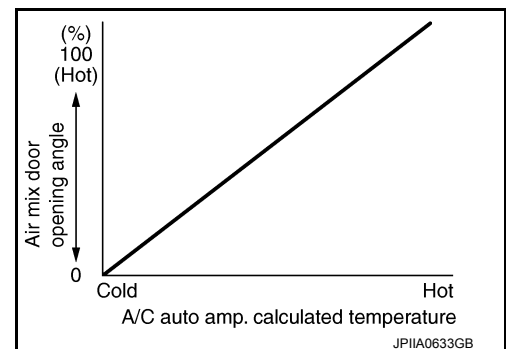
CONTROL BY VCM

- For details of cooling fan control, refer to [EVC-53. "HIGH VOLTAGE SYSTEM COOLING CONTROL : System Description"](#).

AUTOMATIC AIR CONDITIONING SYSTEM : Temperature Control

INFOID:000000010641539

- When power switch is in the ON position, A/C auto amp. always automatically controls temperature regardless of air conditioner operational state.
- A/C auto amp. calculates the target air mix door opening angle according to set temperature, in-vehicle temperature, ambient temperature, and sunload.
- Air mix door is controlled according to the comparison of current air mix door opening angle and target air mix door opening angle.
- Regardless of in-vehicle temperature, ambient temperature, and sunload, air mix door is fixed at the fully cold position when set temperature is 16.0°C , and at the fully hot position when set temperature is 30.0°C .



SYSTEM

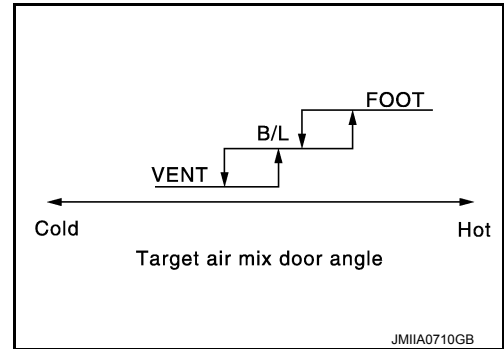
< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

AUTOMATIC AIR CONDITIONING SYSTEM : Air Outlet Control

INFOID:000000010641540

- While air outlet is in automatic control, A/C auto amp. selects the mode door position depending on a target air mix door angle and outlet air temperature calculated from sunload.
- When FOOT is set for the air outlet, the outlet is set to D/F to prevent windshield fogging only when the ambient temperature is extremely low (-13°C or less).
- When the ON/OFF switch is pressed during air conditioner operation, the air outlet is fixed at the position where the ON/OFF switch is pressed.



AUTOMATIC AIR CONDITIONING SYSTEM : Air Flow Control

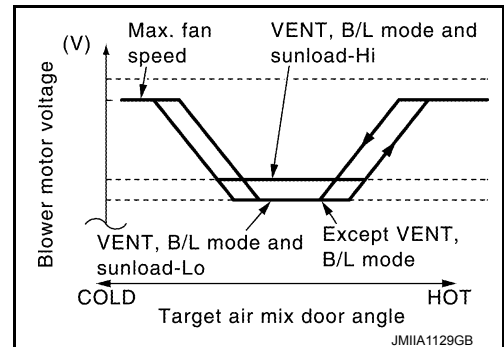
INFOID:000000010641541

DESCRIPTION

- A/C auto amp. changes gate voltage to power transistor and controls air flow continuously based on target air flow. When air flow is to be increased, voltage to blower fan motor increases gradually for preventing a sudden increase of air flow.

AUTOMATIC AIR FLOW CONTROL

- A/C auto amp. determines target air flow according to target air mix door opening angle.
- A/C auto amp. changes voltage to power transistor gate and controls air flow in a continuous range (no steps) so that target air flow is achieved. At this time, the voltage applied to the blower fan motor is changed at the rate of 1.0 V per second in order to prevent any sudden changes in air flow.
- When air outlet is VENT or B/L, the minimum air flow is changed depending on sunload.

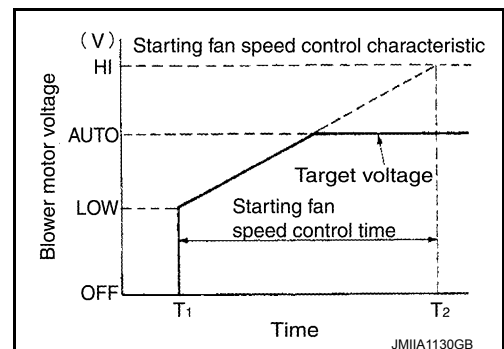


STARTING AIR FLOW CONTROL

When blower fan motor is activated, A/C auto amp. changes the voltage to the power transistor gate, and gradually increases the voltage to the blower fan motor, in order to prevent a sudden increase in discharge air flow (approximately 10.5 seconds for air flow to reach HI from LOW).

NOTE:

When outlet is DEF, air flow control at motor start is not performed.



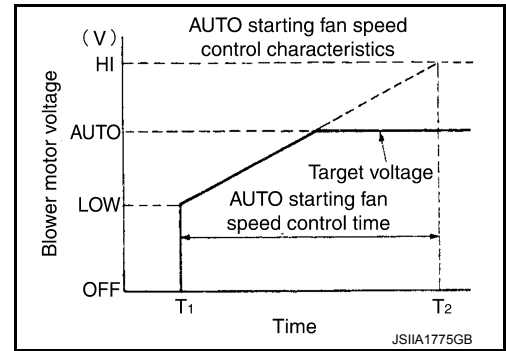
AUTO MODE STARTING AIR FLOW CONTROL

SYSTEM

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

When the blower fan motor is activated by the AUTO control, voltage to blower fan motor increases gradually and then the amount of air flow increases gradually. (Approximately 138 seconds for air flow to reach HI from LOW)



STARTING AIR FLOW CONTROL AT HIGH INTERIOR AIR TEMPERATURE

When evaporator temperature is high [intake air temperature sensor value is 35°C (95°F) or more], to prevent a hot discharged air flow, A/C auto amp. suspends blower motor activation for approximately three seconds so that evaporator is cooled by refrigerant.

AIR FLOW CONTROL AT MODE DOOR MOTOR OPERATION

If the mode motor starts when the air flow corresponds to a voltage of 8.6 V or more applied to the blower fan motor, the A/C auto amp. performs control that fixes the voltage applied to the blower fan motor at 8.5 V, temporarily decreasing the air flow and ensuring that the mode door operates smoothly.

MANUAL AIR FLOW CONTROL

When the fan switch is operated, automatic control is cancelled and the desired fan speed (1 – 7) can be selected.

		Voltage applied to blower fan motor (V)		
		Mode switch		
		VENT, B/L	FOOT, D/F	DEF
Fan speed (When manual control is selected)	1st	4.0	4.0	4.0
	2nd	5.4	5.2	5.3
	3rd	6.8	6.3	6.7
	4th	8.3	7.5	8.0
	5th	9.7	8.7	9.3
	6th	11.1	9.8	10.7
	7th	12.5	11.0	12.5

AUTOMATIC AIR CONDITIONING SYSTEM : Air Inlet Control

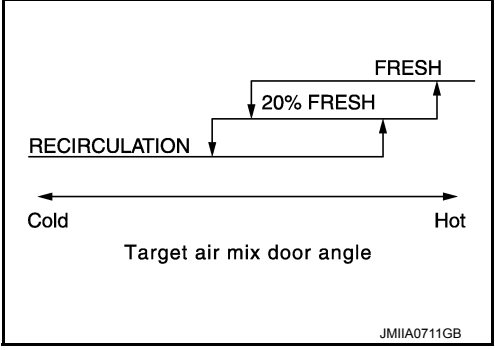
INFOID:000000010641542

- Manual control by the REC switch and FRE switch is given priority for inlet selection.
- When the DEF switch is pressed, the inlet is fixed at fresh air intake.
- During automatic inlet control, when the electric compressor is ON and the ambient temperature is high, the intake is fixed at recirculation.
- When the A/C system is OFF, the inlet is fixed at fresh air intake.
- During automatic inlet control when the ambient temperature is except above, the A/C auto amp. changes the intake control status according to the ambient temperature and the operating status of the electric compressor, discharge air flow, and outlet operating status.

SYSTEM

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

Compressor	Mode switch	Ambient temperature (temperature detected by ambient sensor)	
		14°C or less	15°C or more
ON	VENT B/L	30% recirculation	Control according to the target air mix door position 
	FOOT		
	D/F	Fresh air intake	
OFF	VENT B/L	30% recirculation	Fresh air intake
	FOOT		
	D/F	Fresh air intake	

AUTOMATIC AIR CONDITIONING SYSTEM : Electric Power Distribution Control

INFOID:000000010641543

DESCRIPTION

- Based on the vehicle status, battery remaining energy, and other factors, VCM calculates the electrical power needed to operate the A/C system, and sends this value to the A/C auto amp. via EV CAN communication.
- Based on the ambient sensor signal, inlet position, outlet position, target air mix door position, and other information, the A/C auto amp. calculates the electrical power used by the electric compressor and PTC element heater. If the total exceeds the electric power consumption permitted by the VCM, then the operating rate of the electric compressor and PTC element heater are reduced to lower the power consumption.

WARM-UP AND COOL-DOWN CONTROL

For the first 10 minutes after the power switch is turned ON, heating/cooling operation at maximum capacity is possible based on a judgment by the A/C auto amp. (however this does not occur in ECO mode).

AUTOMATIC AIR CONDITIONING SYSTEM : Compressor Control

INFOID:000000010641544

DESCRIPTION

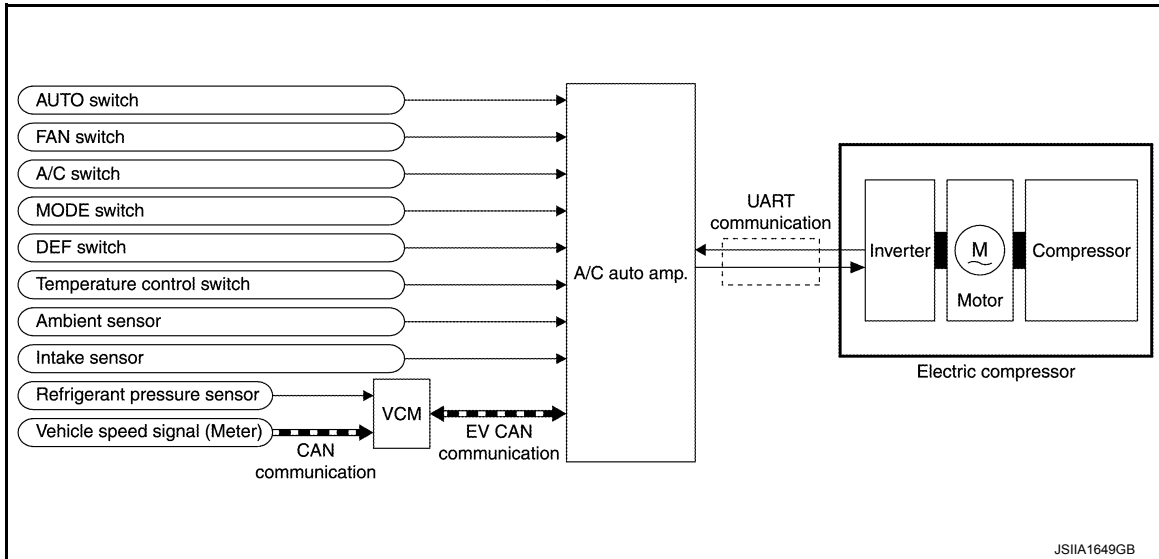
- If the conditions for electric compressor operation are met while the blower fan motor is operating, then based on the various input signals, the A/C auto amp. calculates the compressor target speed that produces the target temperature (4–12°C) for the evaporator outlet temperature, and sends a speed command to the electric compressor via a communications signal.

SYSTEM

< SYSTEM DESCRIPTION >

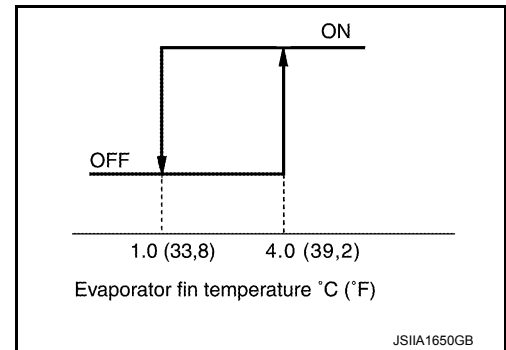
[AUTO A/C (WITHOUT HEAT PUMP)]

- The electric compressor receives the A/C auto amp. command and controls the motor speed by means of its built-in inverter circuit, then transmits this status by communications.



Evaporator Protection Control

- When intake air temperature sensor detects that air temperature after passing through evaporator is 1°C or less, A/C auto amp. sends a request to the electric compressor for a speed of 0 rpm, stopping compressor operation.
- When the air temperature after passing through evaporator reaches 4°C or more, operation of the electric compressor is resumed.



Compressor Protection Control at Pressure Malfunction

- When the refrigerant pressure on the high-pressure side (detected by the refrigerant pressure sensor) that is received from the VCM via EV system CAN communication is as shown below, the A/C auto amp. stops the compressor.
 - Approximately 2.65 MPa (Approximately 27.0 kg/cm²) or more
 - Approximately 0.14 MPa (Approximately 1.4 kg/cm²) or less
- When the refrigerant pressure on the high-pressure side returns to the range below, the A/C auto amp. resumes operation of the electric compressor.
 - Approximately 1.55 MPa (Approximately 15.8 kg/cm²) or less
 - Approximately 0.16 MPa (Approximately 1.6 kg/cm²) or more

AUTOMATIC AIR CONDITIONING SYSTEM : Door Control

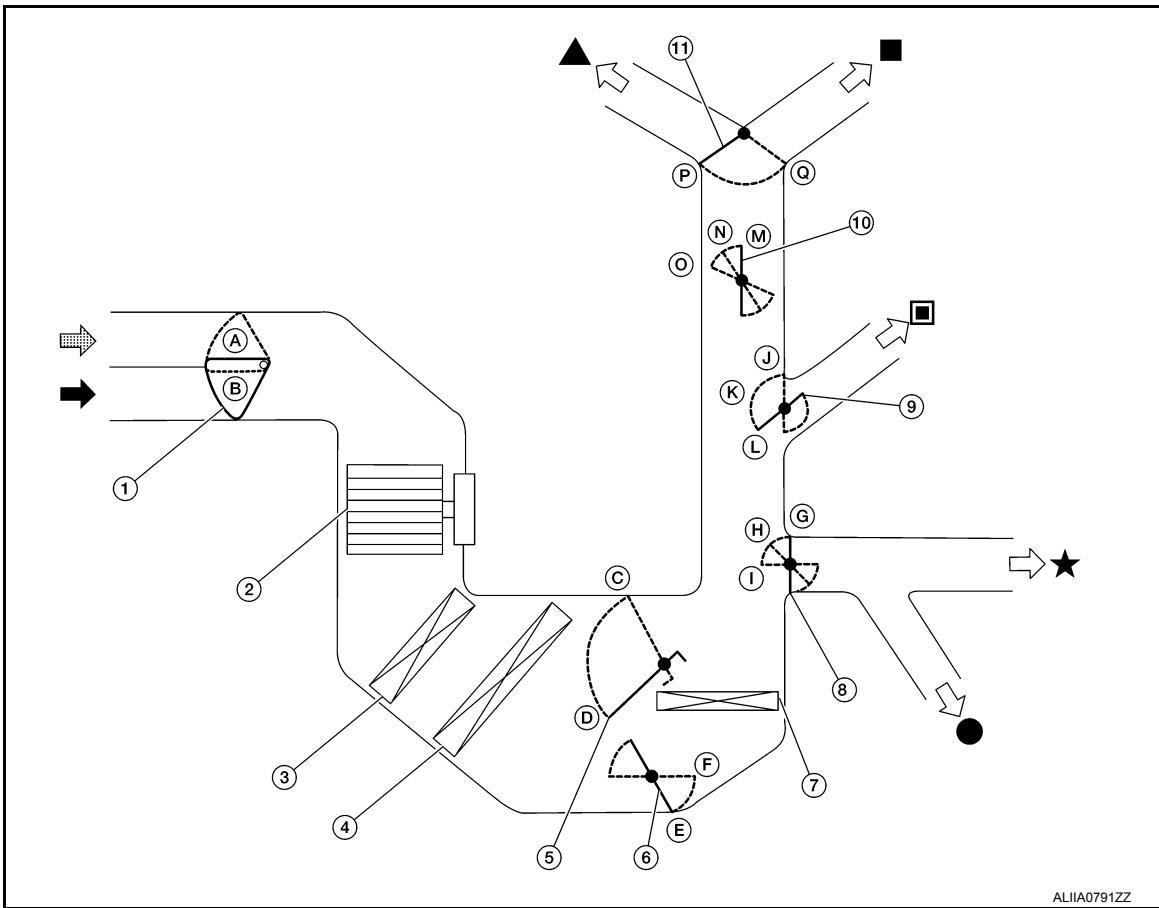
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SWITCH AND THEIR CONTROL FUNCTION

SYSTEM

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]



- ① Intake door
- ② Blower motor
- ③ Air conditioner filter
- ④ Evaporator
- ⑤ Upper air mix door
- ⑥ Lower air mix door
- ⑦ PTC heater core
- ⑧ Foot door
- ⑨ Side ventilator door
- ⑩ Sub-defroster door
- ⑪ Center ventilator/defroster door
- ◀ Fresh air
- ◀ Recirculation air
- ◀ Discharge air
- ▲ Defroster
- Center ventilator
- Side ventilator
- ★ Foot
- Rear foot











Switch position		Door position						
		Mode door				Intake door	Air mix door	
		Center ventilator/defroster door	Sub- defroster door	Side ventilator door	Foot door		Upper air mix door	Lower air mix door
AUTO switch	ON	AUTO						

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


SYSTEM

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

Switch position			Door position							
			Mode door				Intake door	Air mix door		
			Center ventilator/defroster door	Sub-defroster door	Side ventilator door	Foot door		Upper air mix door	Lower air mix door	
MODE switch *	VENT		Ⓟ	Ⓜ	Ⓛ	Ⓞ	—	—	—	
	B/L			Ⓝ	Ⓚ	ⓗ				
	FOOT		Ⓠ	Ⓞ	Ⓜ	Ⓛ				
	D/F			Ⓝ		Ⓛ				
DEF switch	ON	 		Ⓜ		Ⓞ				
Intake switch *	REC	 					Ⓐ			
	FRE	 					Ⓑ			
Temperature control switch	Full cold 16.0°C		—	—	—	—	—	Ⓓ	Ⓔ	
	16.5°C – 29.5°C							—	AUTO	AUTO
	Full hot 30.0°C								Ⓒ	Ⓕ
ON/OFF switch	OFF		Fixed at the position where the ON/OFF switch is pressed				Ⓑ	—	—	

AIR DISTRIBUTION

Discharge air flow					
MODE/DEF setting potion	Air outlet/distribution (Approx.)				
	Ventilator		Foot		Defroster
	Center	Side	Front	Rear	
	50%	50%	—	—	—
	30%	30%	28%	12%	—
	—	15%	45%	20%	20%
	—	15%	32%	13%	40%
	—	15%	—	—	85%

AUTOMATIC AIR CONDITIONING SYSTEM : PTC Heater Control

INFOID:000000010641546

DESCRIPTION

- Based on the air mix door position and signals input from each sensor, the A/C auto amp. calculates the PTC heater outlet air temperature.
- A/C auto amp. calculates the PTC heater operating rate so that the calculated PTC heater outlet air temperature is achieved, and transmits the PTC heater operating rate request signal to the PTC heater via LIN communication.
- Based on the A/C auto amplifier command, the control circuit inside the PTC heater controls the PTC heater output by the PWM method.

NOTE:

SYSTEM

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

If the difference between setting temperature and in-vehicle temperature is large and the A/C heater load is high when the HEAT is ON (HEAT switch indicator lamp: ON) and A/C is OFF (A/C switch indicator lamp: OFF), the heater control mode of the refrigerant cycle also operates. In addition, if the difference between setting temperature and in-vehicle temperature is small and the A/C heater load is low, the PTC heater does not operate. (Outlet air is warmed by the heater control mode of the refrigerant cycle.)

A/C UNIT CASE PROTECTION CONTROL

- The A/C auto amp. performs protection control for preventing the A/C unit case from being damaged by the high temperature of the A/C unit case, due to PTC heater operation.
- A/C auto amp. detects the A/C unit case temperature around the PTC heater core with the A/C unit case temperature sensor.
- When the temperature measured by the A/C unit case temperature sensor becomes 108°C or more during PTC heater operation, the A/C auto amplifier stops PTC heater operation.
- When the temperature measured by the A/C unit case temperature sensor becomes 105°C or less, the A/C auto amp. resumes PTC heater operation stopped by protection control.

AUTOMATIC AIR CONDITIONING SYSTEM : ECO Mode Control

INFOID:000000010641547

DESCRIPTION

- When ECO mode is selected with the electric shift selector, VCM transmits the ECO mode request signal to the A/C auto amp.
- When the A/C auto amp. receives the ECO mode request signal, it performs control that reduces the power consumption of the A/C system.

ECO MODE CONTROL

- When ECO mode is selected, warm-up/cool-down control (refer to [HAC-233. "AUTOMATIC AIR CONDITIONING SYSTEM : Electric Power Distribution Control"](#)) is cancelled and the special ECO mode power distribution control is performed.
- The A/C auto amp. determines the A/C system power consumption based on the ambient temperature and set temperature.

NOTE:

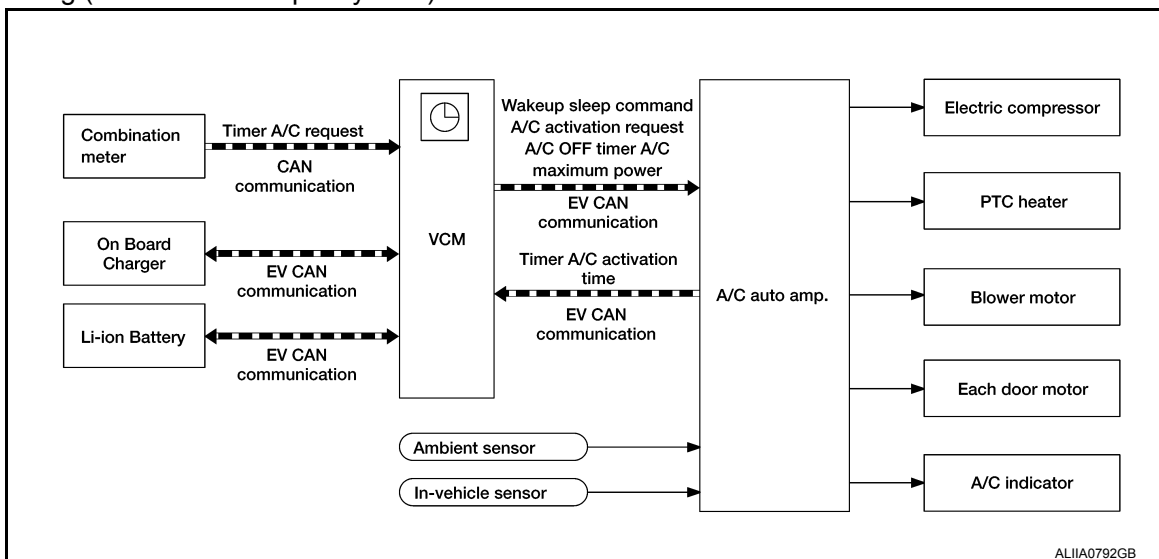
When ECO mode control is activated, there is a noticeable decrease in A/C capacity when temperatures are hot or cold.

AUTOMATIC AIR CONDITIONING SYSTEM : A/C-Heater Timer (Climate Ctrl. Timer)

INFOID:000000010641548

DESCRIPTION

- When A/C-Heater Timer (Climate Ctrl. Timer) is set on the combination meter, the combination meter transmits the A/C-Heater Timer (Climate Ctrl. Timer) request signal and A/C-Heater Timer (Climate Ctrl. Timer) time setting (set vehicle occupancy time) to VCM.

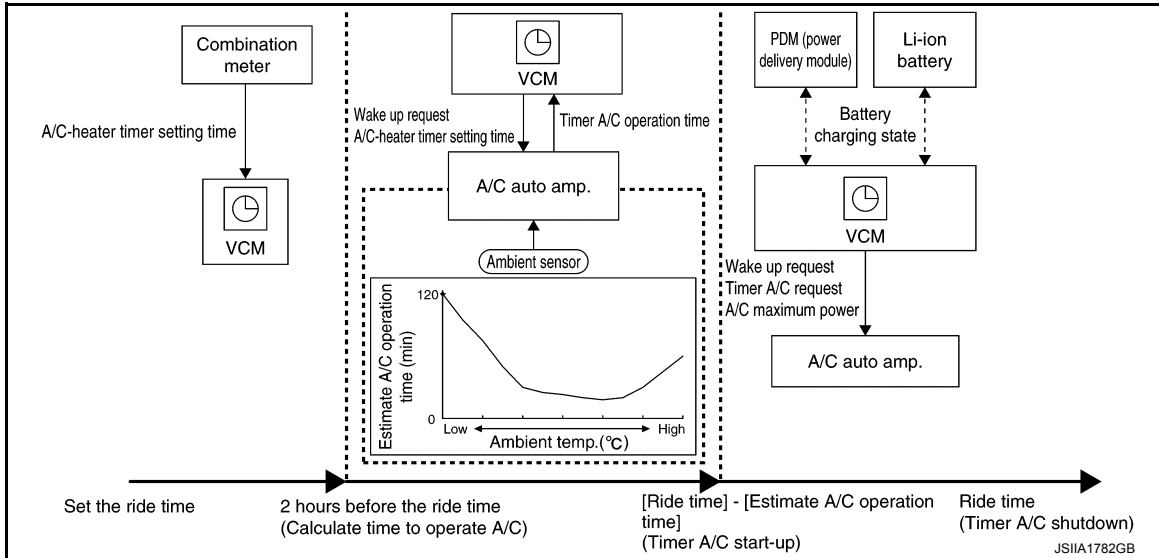


SYSTEM

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

- VCM starts two hours before the set A/C-Heater Timer (Climate Ctrl. Timer) time, and sends a request to the A/C auto amp. for calculation of the A/C operation time required to achieve the target temperature, and receives the results.
- When the operation time calculated by the A/C auto amp. has been reached, VCM starts the A/C auto amp. and starts A/C-Heater Timer (Climate Ctrl. Timer).



A/C OPERATION DURING A/C-HEATER TIMER (CLIMATE CTRL. TIMER)

- During A/C-Heater Timer (Climate Ctrl. Timer), the A/C auto amp. operates the A/C under the following conditions.

Temperature control switch	Intake switch	Mode switch	Electric compressor
25°C	Recirculation	D/F (during heating) Auto (during cooling)	Max. 3500 rpm

- If the charging plug is not inserted into the charging port at the time of A/C-Heater Timer (Climate Ctrl. Timer) start, A/C-Heater Timer (Climate Ctrl. Timer) operation does not start. If the charging plug is disconnected during A/C-Heater Timer (Climate Ctrl. Timer) operation, A/C-Heater Timer (Climate Ctrl. Timer) operation is stopped.

AUTOMATIC AIR CONDITIONING SYSTEM : Door Motor Starting Position Reset

INFOID:000000010641549

A step motor is used for the mode door motor and air mix door motor.

Because the step motors do not have position detection mechanisms, there may be a deviation between the door position recognized by the A/C auto amp. and the actual door position. Therefore, the A/C auto amp. performs motor zero position reset in order to align its recognized door position with the actual door position.

When either of the conditions below is satisfied, the A/C auto amp. performs motor zero position reset when the power switch next turns ON or when A/C-Heater Timer (Climate Ctrl. Timer) turns ON.

- The 12V battery terminal is disconnected and then is reconnected.
- The power switch is turned OFF during operation of the mode door motor or air mix door motor a total of 60 times.

During zero position reset operation, the DEF switch indicator flashes for several seconds. No switch operations are accepted during this time.

AUTOMATIC AIR CONDITIONING SYSTEM : Fail-safe

INFOID:000000010641550

- When the A/C auto amp. detects the conditions shown below, it stops operation of the electric compressor.

Malfunction judgment item	Description	Recovery condition
UART communication malfunction (Electric compressor → A/C auto amp.)	A/C auto amp. judges that there is a UART communications malfunction.	UART communications occur normally for two seconds or more.

SYSTEM

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

Malfunction judgment item	Description	Recovery condition
Intake sensor malfunction	Open circuit or short circuit is detected in the intake sensor circuit.	Voltage value of intake sensor circuit returns to normal.
Ambient sensor malfunction	Open circuit or short circuit is detected in the ambient sensor circuit.	Voltage value of ambient sensor circuit returns to normal.

- When the electric compressor detects the following conditions, compressor operation is restricted.

Malfunction judgment item	Description	Compressor operation	Recovery condition
Compressor discharge temperature overheat	Compressor discharge refrigerant temperature (estimated value) is more than 130°C.	Stopped	Compressor stops for five minutes then restarts.
Compressor IPM overheat	IPM temperature is more than 125°C within one minute after start.	Stopped	IPM temperature drops to 123°C or less.
	IPM temperature is more than 88°C at least one minute after start.		IPM temperature drops to 86°C or less.
Compressor voltage saturation	Inverter output voltage is 140% or more.	Compressor speed is limited.	Inverter output voltage drops to under 140%.
Compressor overcurrent	Start failed three times because current of 35.1 A or more flowed within 90 seconds after start.	Stopped	IGN_OFF
	Current of 35.1 A or more flows when compressor is stopped.		
Compressor overload	DC input is more than 13.5 A.	Compressor speed is limited.	DC input drops to 13.5 A or less for 15 seconds.
Compressor low-voltage malfunction	High voltage is below 230 V.	Stopped	High voltage rises to 235 V or more.
Compressor high-voltage malfunction	High voltage is more than 420 V.	Stopped	High voltage drops to 415 V or less.
Compressor IPM temperature sensor malfunction	It is judged that an IPM temperature sensor open circuit or short circuit is occurred.	Stopped	The IPM temperature sensor open circuit or short circuit judgment is cancelled.
Compressor shunt signal offset malfunction	It is judged that an unexpected shunt signal value is occurred.	Stopped	IGN_OFF
Compressor ROM, RAM, AD malfunction	A data malfunction is detected in the ROM area or RAM area. It is judged that an unexpected AD value is occurred.	Stopped	IGN_OFF
Compressor discharge temperature restriction	Estimated discharge temperature exceeded 110°C.	Compressor speed is limited.	IPM temperature drops to 108°C or less.
Compressor IPM temperature restriction	IPM temperature exceeded 83°C.	Compressor speed is limited.	IPM temperature drops to 81°C or less.
Compressor low-speed overload	Compressor is not operating at command speed.	Compressor speed increase	Current is decreased and compressor became able to operate at command speed.
UART communication malfunction (Electric compressor → A/C auto amp.)	Electric compressor judges that a UART communication malfunction is occurred.	Stopped	UART communications occur normally for two seconds or more.

OPERATION

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

OPERATION

Description

INFOID:000000010641551

- This A/C uses various sensors to detect temperature changes in the interior caused by factors such as changes in ambient temperature and sunload. When the desired temperature is set, the discharge air temperature, discharge air flow, and inlet/outlet changes are controlled automatically to maintain a constant interior temperature at all times.
- The air flow volume and switching of air inlets and air outlets can be selected manually without auto function. While using auto function, it is still possible to select a particular item manually.
- It is possible to use A/C-Heater Timer (Climate Ctrl. Timer) to adjust the interior to a comfortable temperature before entering the vehicle.

TABLE OF OPERATION CONDITIONS OF A/C SYSTEM FUNCTION OPERATED BY POWER SWITCH OPERATION

Each of the A/C system functions is operative under the following conditions.

×: Operate —: Does not operate

Power supply position	OFF	ACC	ON	READY
Ventilation function	—	—	×	×
Cooling/heating function	—	—	×	×
A/C-Heater Timer (Climate Ctrl. Timer) function	×	—	—	—

NOTE:

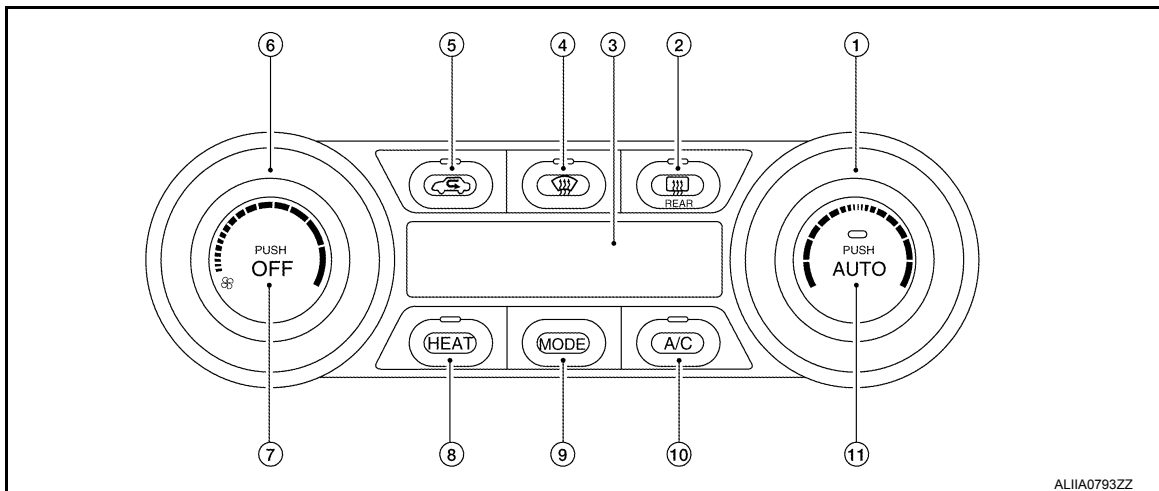
- Connecting EVSE when the vehicle is in READY state cancels READY state (ready indicator lamp turns OFF), and power supply position changes to ON. At this time, cooling/heating function of A/C system stops, and only ventilation function operates. When using cooling/heating function, turn power switch OFF, check that charging is started, and then turn power switch ON again.
- If cooling/heating function is used during charging, and when charging is completed, cooling/heating function stops, and only ventilation function operates.

Switch Name and Function

INFOID:000000010641552

AUTO A/C SYSTEM OPERATIONS AND DISPLAYS

A/C Controller



- | | | |
|------------------------|--------------------------------|----------------|
| 1. Temperature control | 2. Rear window defogger switch | 3. Display |
| 4. DEF switch | 5. REC switch | 6. Fan control |
| 7. ON-OFF switch | 8. Heat switch | 9. Mode switch |
| 10. A/C switch | 11. AUTO switch | |

OPERATION

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

AUTO switch	<ul style="list-style-type: none"> • If the switch is pressed while the A/C is stopped, the switch indicator lamp turns ON, "AUTO" appears on the display, and the A/C system status is as per the following items: <ul style="list-style-type: none"> - Air inlet: Automatic control - Air outlet: Automatic control - Air flow: Automatic control - Compressor: Automatic control • If the switch is pressed while the A/C is operating and "AUTO" is OFF, the switch indicator lamp turns ON, "AUTO" appears on the display, and all control switches to automatic control. <p>NOTE: When air outlet or air flow is manually operated while "AUTO" is indicated on display, "AUTO" indication turns OFF. However, automatic control continues for functions other than air outlet or air flow.</p>	A B C
Mode switch	<p>When each MODE switch is pressed, air outlet is switched and VENT, B/L, FOOT, or D/F can be selected manually.</p> <p>NOTE:</p> <ul style="list-style-type: none"> • Air outlet can be changed when air conditioner system is in the OFF position. • When MODE switch is pressed while "AUTO" is indicated on display, air outlet automatic control is released ("AUTO" turns OFF). 	D E
DEF switch	<p>DEF mode (switch indicator lamp) changes between ON↔OFF each time DEF switch is pressed</p> <ul style="list-style-type: none"> • When switch is pressed while air conditioning system is in the ON position, DEF mode turns ON, air conditioning system changes to the following status: <ul style="list-style-type: none"> - Air outlet: DEF - Air flow: Automatic control (If an air flow other than AUTO is selected before pressing DEF switch, blower fan is manual control.) - Air inlet: Fresh air intake - A/C switch: ON • When DEF mode turns OFF, air conditioner system state returns to the previous state before DEF mode was selected. • When switch is pressed while air conditioner system is in the OFF position, air conditioning system turns ON and changes to the following status: <ul style="list-style-type: none"> - Air outlet: DEF - Air flow: Automatic control - Air inlet: Fresh air intake - A/C switch: ON • When DEF mode turns OFF, entire air conditioner system turns OFF. <p>NOTE: When DEF mode is turned ON while "AUTO" is indicated on display, "AUTO" indication turns OFF. However, air flow automatic control continues. (This operation is excluded when air flow is set before DEF switch is pressed.)</p>	F G H J K
Temperature control	<p>Operation of this switch increases or decreases the temperature setting in increments of 0.5° within the range of 60° (18°C) to 90° (32°C).</p> <p>NOTE: When A/C system is OFF, the set temperature can be selected only while the temperature setting is shown on the display (several seconds after mode switch is pressed).</p>	L
Rear window defogger switch	<p>Refer to DEF-7, "System Description".</p>	M
ON/OFF switch	<ul style="list-style-type: none"> • If the switch is pressed while the A/C is operating, the compressor and blower fan motor stop, and the outlets and inlets are set as shown below. <ul style="list-style-type: none"> - Air outlet: FOOT - Air inlet: Fresh air intake (during automatic inlet control) • If the switch is pressed while A/C is stopped, the A/C turns ON with the same settings as before it is stopped. 	N
A/C switch	<ul style="list-style-type: none"> • If the A/C switch is pressed while the compressor is ON, "A/C OFF" appears in the A/C section of the display, the A/C switch indicator lamp turns OFF (orange), and the compressor turns OFF. • When the A/C switch is pressed again, "A/C ON" appears in the A/C display, the A/C switch indicator lamp (orange) turns ON, and the compressor turns ON. • If the switch is operated while "AUTO" is shown on the display, automatic compressor control is cancelled ("AUTO" turns OFF). <p>NOTE: When blower fan motor is OFF, compressor control cannot be activated.</p>	O P
Heat switch	<p>When the heat switch is pressed, the heat switch indicator light turns ON, and the PTC heater turns ON.</p> <p>NOTE: When blower fan motor is OFF, PTC heater control cannot be activated.</p>	

HAC

OPERATION

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

REC switch	<ul style="list-style-type: none">• When the REC switch is pressed, the inlet changes to REC (recirculation) and the REC indicator lamp turns ON.• If the REC switch is pressed and held for approximately two seconds or more when the inlet is REC (recirculation), the REC and FRE indicator lamps (orange) flash twice, and the inlet switches to automatic control. During automatic control, the air inlet status (FRE, REC) is indicated by the indicator lamp.• If the switch is operated while "AUTO" is shown on the display, automatic intake control is cancelled ("AUTO" turns OFF). <p>NOTE: Air inlet can be changed when air conditioning system is in OFF status.</p>
Fan control switch	<p>Air flow can be manually set within the range of speeds 1–7 using the fan control switch.</p> <ul style="list-style-type: none">• +: Increase air flow.• -: Decrease air flow. <p>NOTE:</p> <ul style="list-style-type: none">• When this switch is operated while A/C system is OFF, A/C system turns ON.• If the switch is operated while "AUTO" is shown on the display, automatic air flow control is cancelled ("AUTO" turns OFF).

DIAGNOSIS SYSTEM (A/C AUTO AMP.)

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

DIAGNOSIS SYSTEM (A/C AUTO AMP.)

Description

INFOID:000000010641553

Air conditioning system performs self-diagnosis, operation check, function diagnosis, and various settings using diagnosis function of each control unit.

Unit name	Diagnosis item (CONSULT display)	
A/C auto amplifier	HVAC	Self Diagnostic Result
		Data Monitor
		Work support
		Active Test
AV control unit	AV	Self Diagnostic Result
		Data Monitor
		Active Test
VCM	EV/HEV	Self Diagnostic Result
		Data Monitor

CONSULT Function

INFOID:000000010641554

APPLICABLE ITEM

CONSULT performs the following functions via communication with the A/C auto amp.

Diagnosis mode	FUNCTION DESCRIPTION
ECU identification information	Displays part number of A/C auto amp.
Self Diagnostic Results	Displays diagnosis results that are judged by A/C auto amp.
Data Monitor	Displays I/O signals of A/C auto amp.
Active Test	Forces supply of the signals which operate each load from the A/C auto amp.
Work support	Changes the settings of various setting functions and performs automatic adjustment of components.
Configuration	<ul style="list-style-type: none"> Read and save the vehicle specification. Write the vehicle specification when replacing A/C auto amp.

ECU IDENTIFICATION INFORMATION

Part number of A/C auto amp. can be checked.

SELF DIAGNOSTIC RESULTS

Diagnosis results that are judged by A/C auto amp. can be checked. [HAC-252, "DTC Index"](#).

DATA MONITOR

Communication signals of A/C auto amp. can be checked.

NOTE:

The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.

Display Item List

Monitor item [STATUS or UNIT]	DESCRIPTION
AMB TEMP SEN [°C/°F]	Value of ambient sensor detection value (voltage), converted to ambient temperature
IN-VEH TEMP [°C/°F]	Value of in-vehicle sensor detection value (voltage), converted to interior temperature
INT TEMP SEN [°C/°F]	Value of intake sensor detection value (voltage), converted to intake temperature
SUNLOAD SEN [W/m ²]	Value of sunload sensor detection value (voltage), converted to sunload
AMB SEN CAL [°C/°F]	Value of ambient temperature calculated by A/C auto amp.
IN-VEH CAL [°C/°F]	Value of interior temperature calculated by A/C auto amp.

DIAGNOSIS SYSTEM (A/C AUTO AMP.)

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

Monitor item [STATUS or UNIT]	DESCRIPTION
INT TEMP CAL [°C/°F]	Value of intake temperature calculated by A/C auto amp.
SUNL SEN CAL [W/m ²]	Value of sunload calculated by A/C auto amp.
COMP REQ SIG [On/Off]	A/C ON signal ON/OFF status
FAN REQ SIG [On/Off]	Blower fan ON signal ON/OFF status
FAN DUTY*	Target value of voltage (applied voltage) applied to Blower fan motor by A/C auto amp.
XM	Target discharge air temperature judged by A/C auto amp. according to the temperature setting and the value from each sensor
VEHICLE SPEED [km/h]	Vehicle speed calculated by A/C auto amp., based on motor speed signal received from traction motor inverter via EV CAN communication
COMPR RPM [rpm]	Rotation speed of electric compressor
COMPR INPUT POWER SIG [W]	Power consumption value of electric compressor
COMPR IPM TEMP SIG [°C/°F]	IGBT temperature sensor value on the electric compressor
COMPR INPUT VOLT SIG [V]	Input voltage value of electric compressor
PTC HEATER REQUEST [%]	Operating rate sent to the PTC element heater by the A/C auto amp.
COMP USE PERMIT POWER [W]	Calculated value of electrical power available to operate the A/C system received from VCM via EV CAN communication
REFRIGERANT PRE SEN [Mpa]	Refrigerant pressure sensor detection value sent from VCM
FORCED Off SIGNAL [On/Off]	State of input signal to A/C auto amp.
FORCED INTAKE REC SIG [On/Off]	State of input signal to A/C auto amp.
PRE-CLIMATE SIGNAL [On/Off]	State of input signal to A/C auto amp.
HV SPLY/BLOCK CMPL FLAG [On/Off]	State of input signal to A/C auto amp.
PTC CONSUMPTION VOLT [W]	Power consumption value of PTC heater
PTC OUT TEMP SENS [°C/°F]	Value of PTC heater outlet air temperature sensor detection value (voltage), converted to temperature
A/C UNIT TEMP SENS [°C/°F]	Value of A/C unit case temperature sensor detection value (voltage), converted to temperature
CMP DISCHR TEMP SENS [°C/°F]	Temperature of compressor discharge refrigerant temperature sensor, input from heat pump control unit
CMP SUCTN TEMP SENS [°C/°F]	Temperature of compressor suction refrigerant temperature sensor, input from heat pump control unit
2-WAY VALVE STATE [On/Off]	Operation status of refrigerant passage switching 2-way valve, input from heat pump control unit
3-WAY VALVE STATE [On/Off]	Operation status of refrigerant passage switching 3-way valve, input from heat pump control unit

*: "DUTY" is displayed however the voltage is indicated. Or value is not displayed, but unit is (V).

ACTIVE TEST

The signals used to activate each device forcibly supplied from A/C auto amp. operation check of air conditioning system can be performed.

NOTE:

When the active test is performed, the vehicle is set to READY.

Test item	DESCRIPTION
ALL SEG	ALL switch indicator indications are turned ON.
HVAC TEST	The operation check of A/C system can be performed by selecting the mode. Refer to the following table for the conditions of each mode.

HVAC Test

DIAGNOSIS SYSTEM (A/C AUTO AMP.)

< SYSTEM DESCRIPTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

	Test item						
	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6	Mode 7
Mode door motor position	VENT	VENT	B/L	FOOT*	FOOT*	D/F	DEF
Intake door motor position	REC	REC	REC	FRE	FRE	FRE	FRE
Air mix door motor position	FULL COLD	FULL COLD	FULL COLD	FULL HOT	FULL HOT	FULL HOT	FULL HOT
A/C operation mode	Cooling	Cooling	Cooling	Heater	Heater	Heater	Cooling
Blower fan motor (applied voltage)	10.5 V	8.5 V	10.5 V	8.5 V	8.5 V	8.5 V	12 V
Electric compressor (rpm)	ON (1500)	ON (2000)	ON (3000)	ON (2000)	ON (2000)	OFF (0)	ON (2000)
PTC heater operating rate	0%	0%	0%	30%	0%	30%	30%
Cooling fan operating rate	50%	50%	50%	70%	70%	0%	50%

*In FOOT mode, position of mode door motor (driver side) is set to the status that is selected for blow setting to DEF. Refer to [HAC-276. "Foot Position Setting Trimmer"](#).

WORK SUPPORT

Setting change of various setting functions and automatic adjustment of components can be performed.

Work item	DESCRIPTION	Refer to
TEMP SET CORRECT	If the temperature experienced by the passenger is different than the discharge air temperature controlled by the temperature setting, the A/C auto amplifier control temperature can be corrected with regards to the temperature setting.	HAC-275. "Temperature Setting Trimmer"
REC MEMORY SET	REC memory function setting can be performed.	HAC-275. "Inlet Port Memory Function (REC)"
FRE MEMORY SET	FRE memory function setting can be performed.	HAC-276. "Inlet Port Memory Function (FRE)"
BLOW SET	In FOOT mode, the air blow to DEF can be turned ON/OFF.	HAC-276. "Foot Position Setting Trimmer"
Door Motor Starting Position Reset	Zero position reset of air mix door motor and mode door motor can be performed.	HAC-278. "Work Procedure"
TARGET MAX RPM ADJ AT PRE-CLIMATE	Compressor MAX rotation in Pre Air Condition is compensated.	HAC-277. "Setting of Compressor Maximum Rotation Speed During Pre Air Conditioning"
TARGET MAX RPM ADJ AT IDL	Compressor MAX rotation when vehicle stopped is compensated.	HAC-277. "Setting of Compressor Maximum Rotation Speed During Idling"
COMP OPRT SET AT DEF MODE (TIM/RMT CLIMT CONT)	For A/C-heater timer and remote climate control, the setting of electric compressor operation during DEF mode can be changed.	HAC-276. "Compressor Operation Setting at Defroster Mode (Timer/Remote Climate Control)"

A/C AUTO AMP.

< ECU DIAGNOSIS INFORMATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

ECU DIAGNOSIS INFORMATION

A/C AUTO AMP.

Reference Value

INFOID:0000000010641555

CONSULT DATA MONITOR REFERENCE VALUES

NOTE:

The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.

Monitor item	Condition		Value/Status
AMB TEMP SEN	Power switch ON		Equivalent to ambient temperature
IN-VEH TEMP	Power switch ON		Equivalent to in-vehicle temperature
INT TEMP SEN	Power switch ON		Equivalent to evaporator fin temperature
SUNLOAD SEN	Power switch ON		Equivalent to sunload amount
AMB SEN CAL	Power switch ON		Equivalent to ambient temperature
IN-VEH CAL	Power switch ON		Equivalent to in-vehicle temperature
INT TEMP CAL	Power switch ON		Equivalent to evaporator fin temperature
SUNL SEN CAL	Power switch ON		Equivalent to sunload amount
COMP REQ SIG	Power switch READY	A/C switch: ON (A/C switch indicator lamp: ON) (Electric compressor operating condition)	On
		A/C switch: OFF (A/C switch indicator lamp: OFF)	Off
FAN REQ SIG	Power switch READY	Blower motor: ON	On
		Blower motor: OFF	Off
FAN DUTY*	Power switch READY	Blower motor: ON	4 - 13
		Blower motor: OFF	0
XM	Power switch ON		Value according to target air flow temperature
VEHICLE SPEED	Power switch READY		Equivalent to speedometer reading (0 - 120 km/h)
COMPR RPM	Power switch READY	A/C switch: ON (Compressor operation status)	Rotation speed of electric compressor (0 - 9000 rpm)
COMPR INPUT POWER SIG	Power switch READY	A/C switch: ON (Compressor operation status)	Power consumption value of electric compressor (0 - 6375 W)
COMPR IPM TEMP SIG	Power switch READY	A/C switch: ON (Compressor operation status)	IGBT temperature sensor value in electric compressor (-30°C - 225°C)
COMPR INPUT VOLT SIG	Power switch READY	A/C switch: ON (Compressor operation status)	Input voltage value of electric compressor (100 - 610V)
PTC HEATER REQUEST	Power switch READY	Heater FULL HOT operation	Operating rate sent to the PTC element heater by the A/C auto amp. (0 - 100 %)

A/C AUTO AMP.

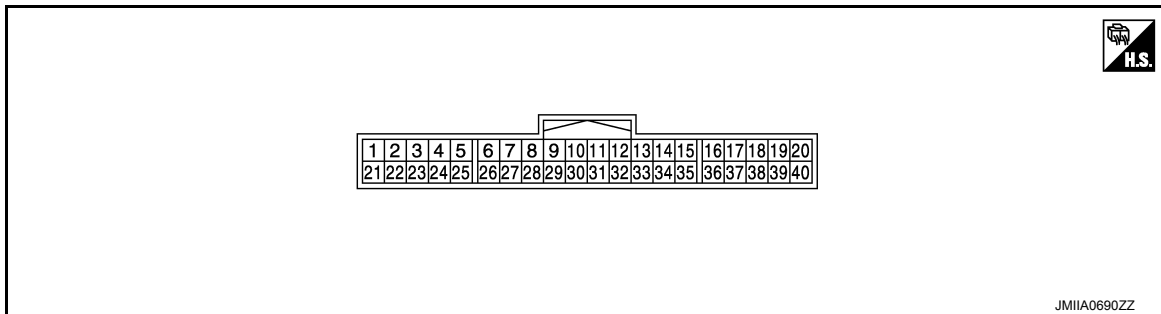
< ECU DIAGNOSIS INFORMATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

Monitor item	Condition		Value/Status
COMP USE PERMIT POWER	Power switch ON	A/C switch: ON (Compressor operation status)	Value calculation for electric compressor consumption power by A/C auto amp. (0 - 12750 W)
REFRIGERANT PRE SEN	Power switch READY	A/C switch: ON (Compressor operation status)	Equivalent to refrigerant pressure
FORCED Off SIGNAL	Power switch ON	A/C switch: ON (Compressor operation status)	Normal: Off Received electric compressor stop request: On
FORCED INTAKE REC SIG	Power switch READY	When the coolant temperature of the high voltage system is high	On
		Except the above	Off
PRE-CLIMATE SIGNAL	Power switch ON	When the A/C-Heater Timer or remote climate control is operate	On
		Except the above	Off
HV SPLY/BLOCK CMPL FLAG	Power switch READY	A/C switch: ON (Compressor operation status)	When VCM supplies a high voltage: ON When VCM stops the supply of the high voltage: OFF
PTC CONSUMPTION VOLT	Power switch READY	Heater FULL HOT operation	Value calculation for PTC heater consumption power by A/C auto amp. (0 - 12750 W)
PTC OUT TEMP SENS	Power switch READY		-30 - 225°C
A/C UNIT TEMP SENS	Power switch READY		-30 - 225°C

*: "DUTY" is displayed, but voltage is indicated. Or unit is not displayed but unit is (V).

TERMINAL LAYOUT



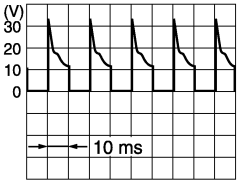
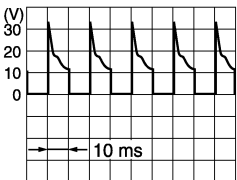
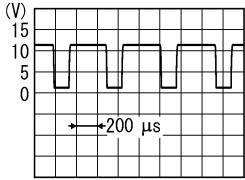
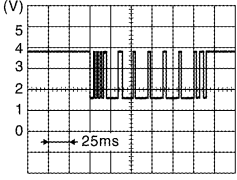
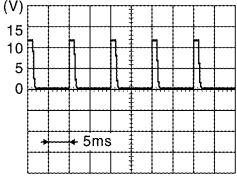
INPUT/OUTPUT SIGNAL STANDARD

Terminal No. (Wire color)		Item		Test condition	Standard
+	-	Signal name	Input/ Output		
1 (V)	10 (B)	REC	Intake door motor drive signal	• Power switch ON • Intake switch: FRE→REC	Battery voltage
				• Power switch ON • Intake switch: REC→FRE	0 - 1 V

A/C AUTO AMP.

< ECU DIAGNOSIS INFORMATION >

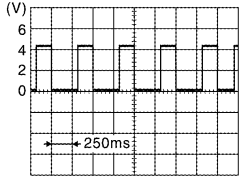
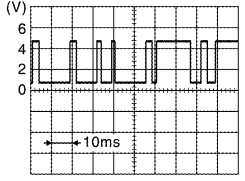
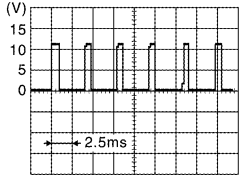
[AUTO A/C (WITHOUT HEAT PUMP)]

Terminal No. (Wire color)		Item		Test condition	Standard
+	-	Signal name	Input/ Output		
2 (R)	10 (B)	MODE drive 4	Mode door motor drive signal	Output	<ul style="list-style-type: none"> Power switch ON Immediately after mode switch is operated  <p style="text-align: right; font-size: small;">JP1IA1647GB</p>
3 (P)	10 (B)	MODE drive 3			
4 (BG)	10 (B)	MODE drive 2			
5 (V)	10 (B)	MODE drive 1			
6 (BR)	10 (B)	A/MIX drive 4	Air mix door motor drive signal	Output	<ul style="list-style-type: none"> Power switch ON Immediately after temperature control switch is operated  <p style="text-align: right; font-size: small;">JP1IA1647GB</p>
7 (GR)	10 (B)	A/MIX drive 3			
8 (LG)	10 (B)	A/MIX drive 2			
9 (L)	10 (B)	A/MIX drive 1			
10 (B)	Ground	Ground	—	Power switch ON	0 – 0.1 V
12 (GR)	10 (B)	Power transistor control signal	Output	<ul style="list-style-type: none"> Power switch ON Fan speed: Manual speed 1  <p style="text-align: right; font-size: small;">ZJIA0863J</p>	
14 (L)	10 (B)	COMP_TX	Output	<ul style="list-style-type: none"> Power switch ON FULL COLD Electric compressor operation  <p style="text-align: right; font-size: small;">JS1IA1658ZZ</p>	
15 (W)	10 (B)	Rear defogger switch	Output	<ul style="list-style-type: none"> Power switch ON Rear window defogger switch OFF  <p style="text-align: right; font-size: small;">JS1IA1668ZZ</p>	
				<ul style="list-style-type: none"> Power switch ON Rear defogger switch is pressed. 	0 V
16 (LG)	10 (B)	Steering heater switch signal	Output	<ul style="list-style-type: none"> Power switch ON Steering heater switch OFF 	0 V
				<ul style="list-style-type: none"> Power switch ON Steering heater switch is pressed. 	0.9 V or less

A/C AUTO AMP.

< ECU DIAGNOSIS INFORMATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

Terminal No. (Wire color)		Item		Test condition	Standard
+	-	Signal name	Input/ Output		
17 (W)	10 (B)	Heater water pump feedback signal	Input	<ul style="list-style-type: none"> Power switch ON Heater FULL HOT operation 	 <p style="text-align: right; font-size: small;">JSIIA1659ZZ</p>
18 (W)	10 (B)	COMP_RX	Input	<ul style="list-style-type: none"> Power switch ON FULL COLD Electric compressor operation 	 <p style="text-align: right; font-size: small;">JSIIA1660ZZ</p>
19 (W)	10 (B)	Illumination +	Input	<ul style="list-style-type: none"> Power switch ON Lighting switch 1st 	Battery voltage
				<ul style="list-style-type: none"> Power switch ON Lighting switch OFF 	0 V
20 (B)	10 (B)	Illumination -	—	<ul style="list-style-type: none"> Power switch ON Lighting switch 1st 	 <p style="text-align: right; font-size: small;">JSIIA1661ZZ</p>
				<ul style="list-style-type: none"> Power switch ON Lighting switch OFF 	0 V
21 (G)	10 (B)	FRE	Intake door motor drive signal	<ul style="list-style-type: none"> Power switch ON Intake switch: REC→FRE 	Battery voltage
				<ul style="list-style-type: none"> Power switch ON Intake switch: FRE→REC 	0 - 1 V
22 (V)	10 (B)	Steering heater relay signal	Output	Power switch ON	0 V
				Power switch OFF	Battery voltage
23 (SB)	10 (B)	Seat heater relay	Output	Power switch ON	0 V
				Power switch OFF	Battery voltage
27 (W)	10 (B)	Sensor power (5 V)	Output	Power switch ON	5 V
28 (L)	—	EV CAN-H	Input/ Output	—	—
29 (G)	—	EV CAN-L	Input/ Output	—	—
30 (R)	10 (B)	Sensor ground	—	Power switch ON	0 - 0.1 V
31 (G)	10 (B)	Battery power supply	Input	Power switch OFF	Battery voltage
32 (Y)	10 (B)	Ignition power	Input	Power switch ON	Battery voltage

A
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N
O
P

HAC

A/C AUTO AMP.

< ECU DIAGNOSIS INFORMATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

Terminal No. (Wire color)		Item		Test condition	Standard																											
+	-	Signal name	Input/ Output																													
33 (LG)	10 (B)	In-vehicle sensor signal	Input	<ul style="list-style-type: none"> Power switch ON When air Conditioner is operating 	<table border="1"> <caption>In-vehicle sensor signal voltage vs temperature</caption> <thead> <tr> <th>Temperature (°C)</th> <th>Temperature (°F)</th> <th>Voltage (V)</th> </tr> </thead> <tbody> <tr><td>-20</td><td>-4</td><td>4.41</td></tr> <tr><td>-10</td><td>14</td><td>4.09</td></tr> <tr><td>0</td><td>32</td><td>3.68</td></tr> <tr><td>10</td><td>50</td><td>3.22</td></tr> <tr><td>20</td><td>68</td><td>2.73</td></tr> <tr><td>25</td><td>77</td><td>2.49</td></tr> <tr><td>30</td><td>86</td><td>2.25</td></tr> <tr><td>40</td><td>104</td><td>1.82</td></tr> </tbody> </table> <p>JSIIA1662ZZ</p>	Temperature (°C)	Temperature (°F)	Voltage (V)	-20	-4	4.41	-10	14	4.09	0	32	3.68	10	50	3.22	20	68	2.73	25	77	2.49	30	86	2.25	40	104	1.82
Temperature (°C)	Temperature (°F)	Voltage (V)																														
-20	-4	4.41																														
-10	14	4.09																														
0	32	3.68																														
10	50	3.22																														
20	68	2.73																														
25	77	2.49																														
30	86	2.25																														
40	104	1.82																														
34 (G)	10 (B)	Intake sensor signal	Input	<ul style="list-style-type: none"> Power switch ON When air Conditioner is operating 	<table border="1"> <caption>Intake sensor signal voltage vs temperature</caption> <thead> <tr> <th>Temperature (°C)</th> <th>Temperature (°F)</th> <th>Voltage (V)</th> </tr> </thead> <tbody> <tr><td>-20</td><td>-4</td><td>3.68</td></tr> <tr><td>-10</td><td>14</td><td>3.13</td></tr> <tr><td>0</td><td>32</td><td>2.56</td></tr> <tr><td>10</td><td>50</td><td>2.02</td></tr> <tr><td>20</td><td>68</td><td>1.56</td></tr> <tr><td>25</td><td>77</td><td>1.36</td></tr> <tr><td>30</td><td>86</td><td>1.18</td></tr> <tr><td>40</td><td>104</td><td>0.89</td></tr> </tbody> </table> <p>JSIIA1663ZZ</p>	Temperature (°C)	Temperature (°F)	Voltage (V)	-20	-4	3.68	-10	14	3.13	0	32	2.56	10	50	2.02	20	68	1.56	25	77	1.36	30	86	1.18	40	104	0.89
Temperature (°C)	Temperature (°F)	Voltage (V)																														
-20	-4	3.68																														
-10	14	3.13																														
0	32	2.56																														
10	50	2.02																														
20	68	1.56																														
25	77	1.36																														
30	86	1.18																														
40	104	0.89																														
35 (P)	10 (B)	Sunload sensor signal	Input	<ul style="list-style-type: none"> Power switch ON When air Conditioner is operating 	<table border="1"> <caption>Sunload sensor signal voltage vs solar radiation</caption> <thead> <tr> <th>Solar Radiation (W/m²)</th> <th>Voltage (V)</th> </tr> </thead> <tbody> <tr><td>200</td><td>4.44</td></tr> <tr><td>400</td><td>3.88</td></tr> <tr><td>600</td><td>3.31</td></tr> <tr><td>800</td><td>2.75</td></tr> <tr><td>1000</td><td>2.19</td></tr> <tr><td>1200</td><td>1.63</td></tr> </tbody> </table> <p>JSIIA1664ZZ</p>	Solar Radiation (W/m²)	Voltage (V)	200	4.44	400	3.88	600	3.31	800	2.75	1000	2.19	1200	1.63													
Solar Radiation (W/m²)	Voltage (V)																															
200	4.44																															
400	3.88																															
600	3.31																															
800	2.75																															
1000	2.19																															
1200	1.63																															
36 (GR)	10 (B)	Ambient sensor signal	Input	<ul style="list-style-type: none"> Power switch ON When air Conditioner is operating 	<table border="1"> <caption>Ambient sensor signal voltage vs temperature</caption> <thead> <tr> <th>Temperature (°C)</th> <th>Temperature (°F)</th> <th>Voltage (V)</th> </tr> </thead> <tbody> <tr><td>-20</td><td>-4</td><td>4.42</td></tr> <tr><td>-10</td><td>14</td><td>4.11</td></tr> <tr><td>0</td><td>32</td><td>3.71</td></tr> <tr><td>10</td><td>50</td><td>3.25</td></tr> <tr><td>20</td><td>68</td><td>2.76</td></tr> <tr><td>25</td><td>77</td><td>2.52</td></tr> <tr><td>30</td><td>86</td><td>2.29</td></tr> <tr><td>40</td><td>104</td><td>1.85</td></tr> </tbody> </table> <p>JSIIA1665ZZ</p>	Temperature (°C)	Temperature (°F)	Voltage (V)	-20	-4	4.42	-10	14	4.11	0	32	3.71	10	50	3.25	20	68	2.76	25	77	2.52	30	86	2.29	40	104	1.85
Temperature (°C)	Temperature (°F)	Voltage (V)																														
-20	-4	4.42																														
-10	14	4.11																														
0	32	3.71																														
10	50	3.25																														
20	68	2.76																														
25	77	2.52																														
30	86	2.29																														
40	104	1.85																														
37 (Y)	10 (B)	Heater fluid temperature sensor	Input	<ul style="list-style-type: none"> Power switch ON When air Conditioner is operating 	<table border="1"> <caption>Heater fluid temperature sensor voltage vs temperature</caption> <thead> <tr> <th>Temperature (°C)</th> <th>Temperature (°F)</th> <th>Voltage (V)</th> </tr> </thead> <tbody> <tr><td>-20</td><td>-4</td><td>4.71</td></tr> <tr><td>0</td><td>32</td><td>4.28</td></tr> <tr><td>20</td><td>68</td><td>3.57</td></tr> <tr><td>40</td><td>104</td><td>2.71</td></tr> <tr><td>50</td><td>122</td><td>2.28</td></tr> <tr><td>60</td><td>140</td><td>1.89</td></tr> <tr><td>70</td><td>158</td><td>1.56</td></tr> <tr><td>80</td><td>176</td><td>1.27</td></tr> </tbody> </table> <p>JSIIA1666ZZ</p>	Temperature (°C)	Temperature (°F)	Voltage (V)	-20	-4	4.71	0	32	4.28	20	68	3.57	40	104	2.71	50	122	2.28	60	140	1.89	70	158	1.56	80	176	1.27
Temperature (°C)	Temperature (°F)	Voltage (V)																														
-20	-4	4.71																														
0	32	4.28																														
20	68	3.57																														
40	104	2.71																														
50	122	2.28																														
60	140	1.89																														
70	158	1.56																														
80	176	1.27																														
38 (SB)	10 (B)	Intake door motor PBR feedback signal	Input	<ul style="list-style-type: none"> Power switch ON Intake switch: REC 	0.2 – 0.8 V																											
				<ul style="list-style-type: none"> Power switch ON Intake switch: FRE 	4.2 – 4.8 V																											
40 (SB)	10 (B)	LIN (PTC)	Input/ Output	<ul style="list-style-type: none"> Power switch ON Heater FULL HOT operation 	<p>JSIIA1667ZZ</p>																											

A/C AUTO AMP.

< ECU DIAGNOSIS INFORMATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

Fail-safe

INFOID:0000000110641556

- When the A/C auto amp. detects the conditions shown below, it stops operation of the electric compressor.

Malfunction judgment item	Description	Recovery condition
UART communication malfunction (Electric compressor → A/C auto amp.)	A/C auto amp. judges that there is a UART communications malfunction.	UART communications occur normally for two seconds or more.
Intake sensor malfunction	Open circuit or short circuit is detected in the intake sensor circuit.	Voltage value of intake sensor circuit returns to normal.
Ambient sensor malfunction	Open circuit or short circuit is detected in the ambient sensor circuit.	Voltage value of ambient sensor circuit returns to normal.

- When the electric compressor detects the following conditions, compressor operation is restricted.

Malfunction judgment item	Description	Compressor operation	Recovery condition
Compressor discharge temperature overheat	Compressor discharge refrigerant temperature (estimated value) is more than 130°C.	Stopped	Compressor stops for five minutes then restarts.
Compressor IPM overheat	IPM temperature is more than 125°C within one minute after start.	Stopped	IPM temperature drops to 123°C or less.
	IPM temperature is more than 88°C at least one minute after start.		IPM temperature drops to 86°C or less.
Compressor voltage saturation	Inverter output voltage is 140% or more.	Compressor speed is limited.	Inverter output voltage drops to under 140%.
Compressor overcurrent	Start failed three times because current of 35.1 A or more flowed within 90 seconds after start.	Stopped	IGN_OFF
	Current of 35.1 A or more flows when compressor is stopped.		
Compressor overload	DC input is more than 13.5 A.	Compressor speed is limited.	DC input drops to 13.5 A or less for 15 seconds.
Compressor low-voltage malfunction	High voltage is below 230 V.	Stopped	High voltage rises to 235 V or more.
Compressor high-voltage malfunction	High voltage is more than 420 V.	Stopped	High voltage drops to 415 V or less.
Compressor IPM temperature sensor malfunction	It is judged that an IPM temperature sensor open circuit or short circuit is occurred.	Stopped	The IPM temperature sensor open circuit or short circuit judgment is cancelled.
Compressor shunt signal offset malfunction	It is judged that an unexpected shunt signal value is occurred.	Stopped	IGN_OFF
Compressor ROM, RAM, AD malfunction	A data malfunction is detected in the ROM area or RAM area. It is judged that an unexpected AD value is occurred.	Stopped	IGN_OFF
Compressor discharge temperature restriction	Estimated discharge temperature exceeded 110°C.	Compressor speed is limited.	IPM temperature drops to 108°C or less.
Compressor IPM temperature restriction	IPM temperature exceeded 83°C.	Compressor speed is limited.	IPM temperature drops to 81°C or less.
Compressor low-speed overload	Compressor is not operating at command speed.	Compressor speed increase	Current is decreased and compressor became able to operate at command speed.
UART communication malfunction (Electric compressor → A/C auto amp.)	Electric compressor judges that a UART communication malfunction is occurred.	Stopped	UART communications occur normally for two seconds or more.

A/C AUTO AMP.

< ECU DIAGNOSIS INFORMATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

DTC Index

INFOID:000000010641557

DTC	Items (CONSULT screen terms)	Reference
U1000	CAN COMM CIRCUIT	HAC-279, "DTC Logic"
U1010	CONTROL UNIT(CAN)	HAC-280, "DTC Logic"
B2578	IN-VEHICLE SENSOR	HAC-281, "DTC Logic"
B2579	IN-VEHICLE SENSOR	HAC-281, "DTC Logic"
B257B	AMBIENT SENSOR	HAC-284, "DTC Logic"
B257C	AMBIENT SENSOR	HAC-284, "DTC Logic"
B2581	INTAKE SENSOR	HAC-287, "DTC Logic"
B2582	INTAKE SENSOR	HAC-287, "DTC Logic"
B2630*	SUNLOAD SENSOR	HAC-290, "DTC Logic"
B2631*	SUNLOAD SENSOR	HAC-290, "DTC Logic"
B2770	PTC HEATER CIRCUIT	HAC-293, "DTC Logic"
B2771	PTC HEATER OVERHEAT PROTECT	HAC-294, "DTC Logic"
B2772	PTC HEATER VOLTAGE	HAC-295, "DTC Logic"
B2773	PTC HEATER CIRCUIT 1	HAC-293, "DTC Logic"
B2774	PTC HEATER CIRCUIT 2	HAC-293, "DTC Logic"
B2777	PTC HEATER LIN COMMUNICATION	HAC-296, "DTC Logic"
B2779	PTC HEATER COMMUNICATION	HAC-296, "DTC Logic"
B277B	HVAC LIN COMMUNICATION	HAC-296, "DTC Logic"
B2780	COMPRESSOR ROM, RAM, AD	HAC-298, "DTC Logic"
B2781	COMP IPM TEMP SENSOR	HAC-299, "DTC Logic"
B2782	COMP SHUNT SIGNAL OFFSET	HAC-300, "DTC Logic"
B2783	COMP DISCHARGE TEMP OVER HEAT	HAC-301, "DTC Logic"
B2784	COMP DISCHARGE TEMP LIMIT	HAC-301, "DTC Logic"
B2785	COMP IPM OVER HEAT	HAC-303, "DTC Logic"
B2786	COMP IPM DISCHARGE TEMP LIMIT	HAC-303, "DTC Logic"
B2787	COMP VOLTAGE SATURATION	HAC-305, "DTC Logic"
B2788	COMP OVER CURRENT	HAC-306, "DTC Logic"
B2789	COMP OVER LOADED	HAC-307, "DTC Logic"
B278A	COMP LOW VOLTAGE	HAC-308, "DTC Logic"
B278B	COMP HIGH VOLTAGE	HAC-308, "DTC Logic"
B278C	COMP COMM ERROR HVAC→COMP	HAC-311, "DTC Logic"
B278D	COMP COMM ERROE COMP→HVAC	HAC-311, "DTC Logic"
B2791	COMP LOW SPEED HIGH LOAD	HAC-315, "DTC Logic"
B27A0	INTAKE DOOR MOTOR	HAC-317, "DTC Logic"
B27A1	INTAKE DOOR MOTOR	HAC-317, "DTC Logic"
B27A2	AIR MIX DOOR MOTOR	HAC-321, "DTC Logic"
B27A3	AIR MIX DOOR MOTOR	HAC-321, "DTC Logic"
B27A4	AIR MIX DOOR MOTOR	HAC-321, "DTC Logic"
B27A5	AIR MIX DOOR MOTOR	HAC-321, "DTC Logic"
B27A6	MODE DOOR MOTOR	HAC-324, "DTC Logic"
B27A7	MODE DOOR MOTOR	HAC-324, "DTC Logic"

A/C AUTO AMP.

< ECU DIAGNOSIS INFORMATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

DTC	Items (CONSULT screen terms)	Reference
B27A8	MODE DOOR MOTOR	HAC-324, "DTC Logic"
B27A9	MODE DOOR MOTOR	HAC-324, "DTC Logic"
B27C2	PTC OUT AIR TEMP SENS	HAC-327, "DTC Logic"
B27C3	PTC OUT AIR TEMP SENS	
B27C4	A/C UNIT CASE TEMP SENS	HAC-330, "DTC Logic"
B27C5	A/C UNIT CASE TEMP SENS	
B27FF	CONFIG NOT IMPLEM	HAC-333, "DTC Logic"

*: Perform self-diagnosis under sunshine. When performing indoors, aim a light (more than 60 W) at sunload sensor, otherwise self-diagnosis indicates even though the sunload sensor is functioning normally.

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AUTOMATIC AIR CONDITIONING SYSTEM

[AUTO A/C (WITHOUT HEAT PUMP)]

< WIRING DIAGRAM >

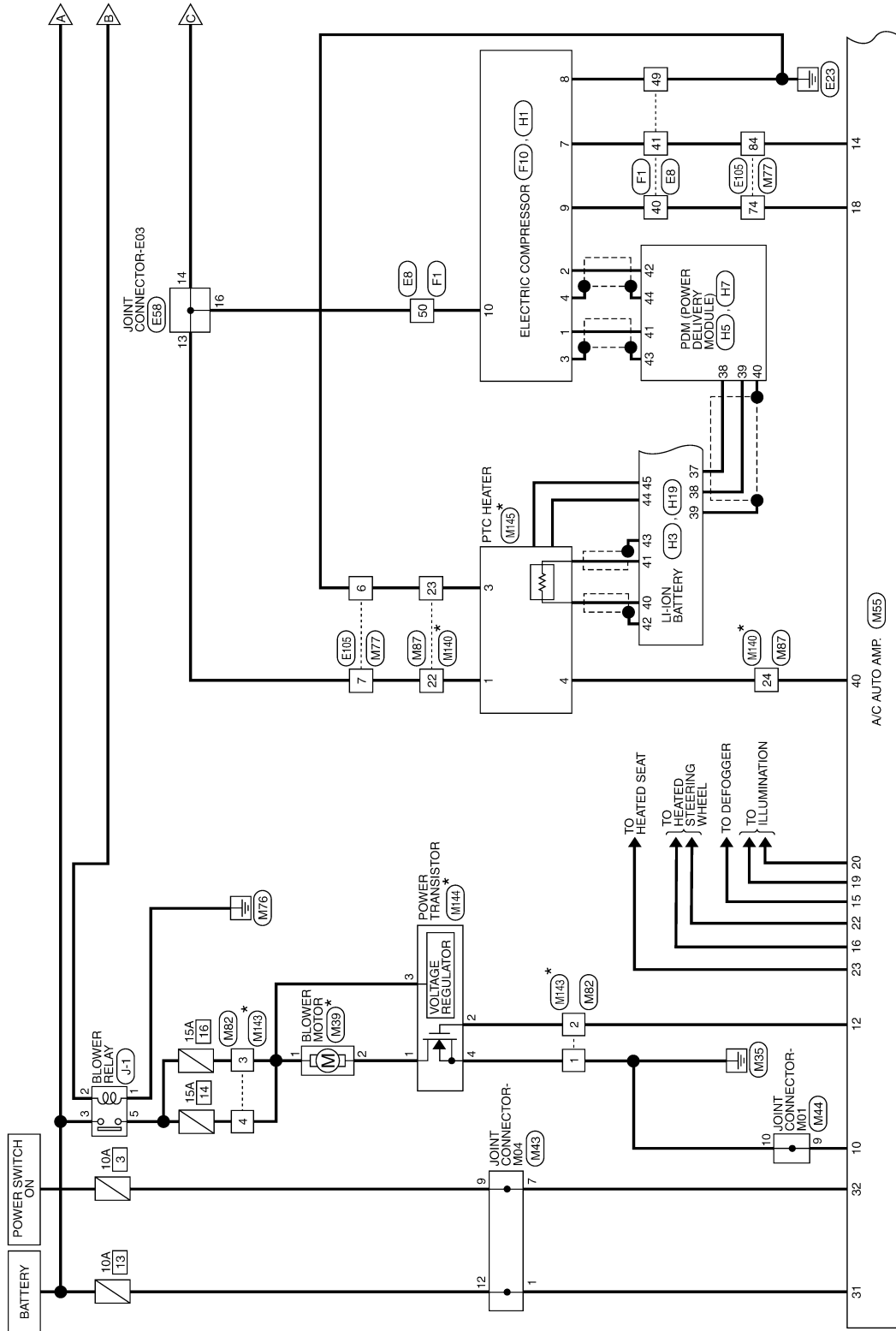
WIRING DIAGRAM

AUTOMATIC AIR CONDITIONING SYSTEM

Wiring Diagram

INFOID:000000010641558

AUTOMATIC AIR CONDITIONING SYSTEM - WITHOUT HEAT PUMP



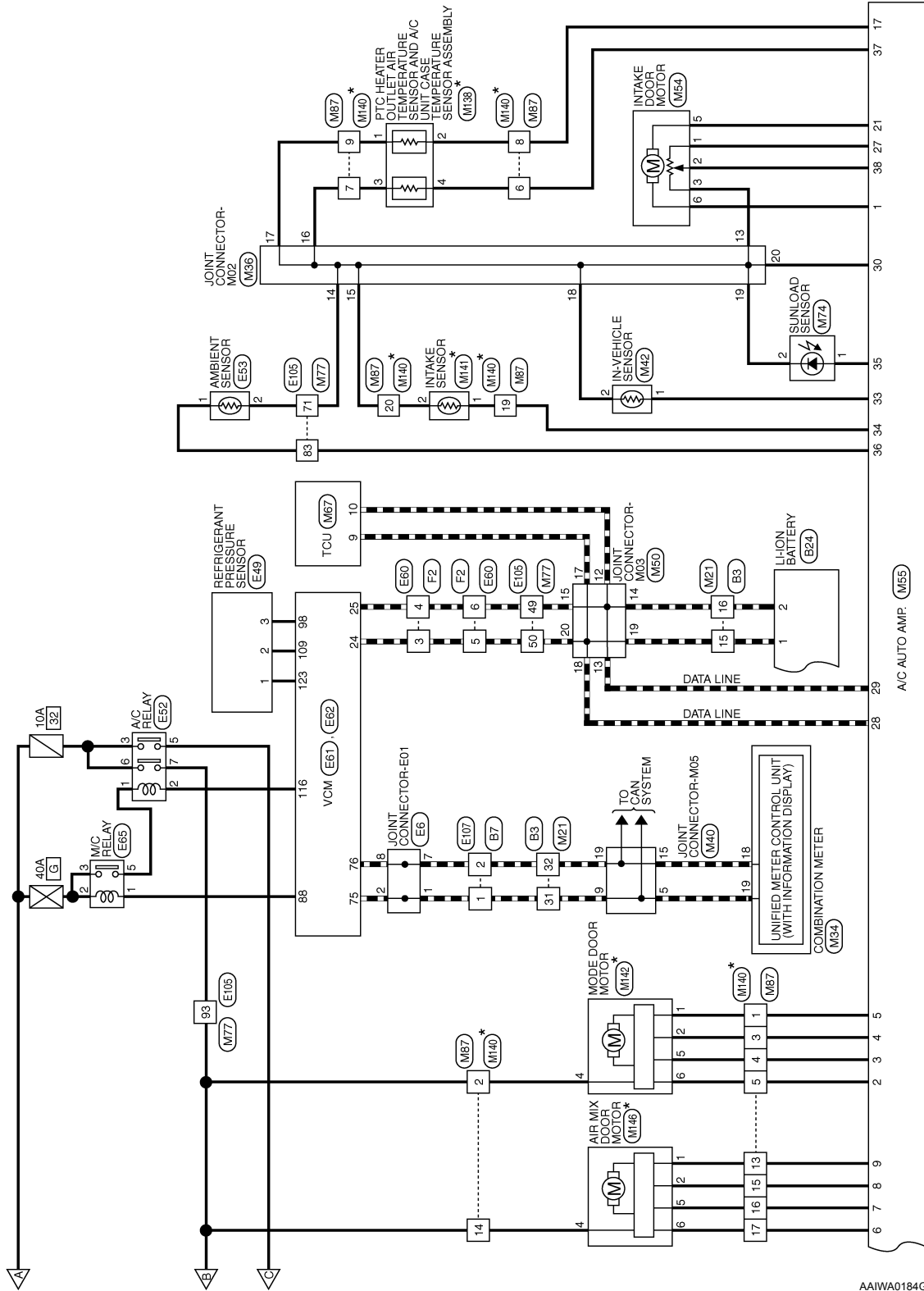
* : THIS CONNECTOR IS NOT SHOWN IN "HARNES LAYOUT" OF PG SECTION

AAIWA0183GB

AUTOMATIC AIR CONDITIONING SYSTEM

[AUTO A/C (WITHOUT HEAT PUMP)]

< WIRING DIAGRAM >



* : THIS CONNECTOR IS NOT SHOWN IN "HARNES LAYOUT" OF PG SECTION

AAIWA0184GB

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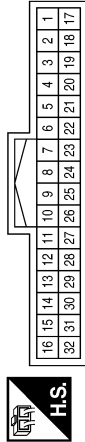
AUTOMATIC AIR CONDITIONING SYSTEM

< WIRING DIAGRAM >

[AUTO A/C (WITHOUT HEAT PUMP)]

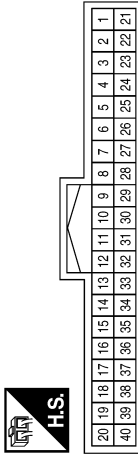
AUTOMATIC AIR CONDITIONING SYSTEM - WITHOUT HEAT PUMP - CONNECTORS

Connector No.	M21
Connector Name	WIRE TO WIRE
Connector Color	WHITE



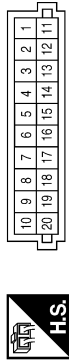
Terminal No.	Color of Wire	Signal Name
15	L	-
16	G	-
31	L	-
32	P	-

Connector No.	M34
Connector Name	COMBINATION METER
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
18	P	CAN-L
19	L	CAN-H

Connector No.	M36
Connector Name	JOINT CONNECTOR-M02
Connector Color	GRAY



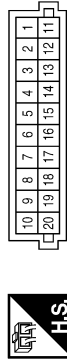
Terminal No.	Color of Wire	Signal Name
13	B	-
14	R	-
15	R	-
16	R	-
17	R	-
18	R	-
19	R	-
20	R	-

Connector No.	M39
Connector Name	BLOWER MOTOR
Connector Color	GRAY



Terminal No.	Color of Wire	Signal Name
1	B/W	-
2	L	-

Connector No.	M40
Connector Name	JOINT CONNECTOR-M05
Connector Color	BLUE



Terminal No.	Color of Wire	Signal Name
9	L	-
10	L	-
19	P	-
20	P	-

Connector No.	M42
Connector Name	IN-VEHICLE SENSOR
Connector Color	WHITE



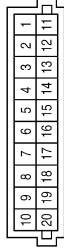
Terminal No.	Color of Wire	Signal Name
1	LG	-
2	R	-

AUTOMATIC AIR CONDITIONING SYSTEM

< WIRING DIAGRAM >

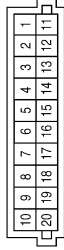
[AUTO A/C (WITHOUT HEAT PUMP)]

Connector No.	M50
Connector Name	JOINT CONNECTOR-M03
Connector Color	PINK



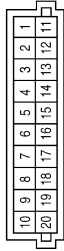
Terminal No.	Color of Wire	Signal Name
12	G	-
13	G	-
14	G	-
15	G	-
17	L	-
18	L	-
19	L	-
20	L	-

Connector No.	M44
Connector Name	JOINT CONNECTOR-M01
Connector Color	GRAY



Terminal No.	Color of Wire	Signal Name
9	B	-
10	B	-

Connector No.	M43
Connector Name	JOINT CONNECTOR-M04
Connector Color	GRAY



Terminal No.	Color of Wire	Signal Name
1	G	-
7	Y	-
9	W	-
12	Y	-

Connector No.	M54
Connector Name	INTAKE DOOR MOTOR
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	W	-
2	SB	-
3	B	-
4	-	-
5	G	-
6	V	-

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AUTOMATIC AIR CONDITIONING SYSTEM

< WIRING DIAGRAM >

[AUTO A/C (WITHOUT HEAT PUMP)]

Terminal No.	Color of Wire	Signal Name
31	G	BAT
32	Y	IGN 1
33	LG	INC S
34	G	INT S
35	P	SUN S
36	GR	AMB S
37	Y	TA 2
38	SB	INT F/B
39	-	-
40	SB	LIN

Terminal No.	Color of Wire	Signal Name
12	GR	BLR PWM
13	-	-
14	L	COMP TX
15	W	REAR DEF
16	LG	STRG HEATER SW
17	W	TA1
18	W	COMP RX
19	W	ILL+
20	B	ILL-
21	G	FRESH
22	V	STEER RLY
23	SB	HEATER SEAT RLY
24	-	-
25	-	-
26	-	-
27	W	5V OUT
28	L	CAN-H
29	G	CAN-L
30	R	S GND

Connector No.	M55
Connector Name	A/C AUTO AMP.
Connector Color	WHITE



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

Terminal No.	Color of Wire	Signal Name
1	V	REC
2	R	MODE4
3	P	MODE3
4	BG	MODE2
5	V	MODE1
6	BR	MIX4
7	GR	MIX3
8	LG	MIX2
9	L	MIX1
10	B	GND
11	-	-

Connector No.	M74
Connector Name	SUNLOAD SENSOR
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	P	-
2	R	-

Connector No.	M67
Connector Name	TCU
Connector Color	WHITE



2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39

Terminal No.	Color of Wire	Signal Name
9	L	EV CAN-H
10	G	EV CAN-L

AAIIA0443GB

AUTOMATIC AIR CONDITIONING SYSTEM

[AUTO A/C (WITHOUT HEAT PUMP)]

< WIRING DIAGRAM >

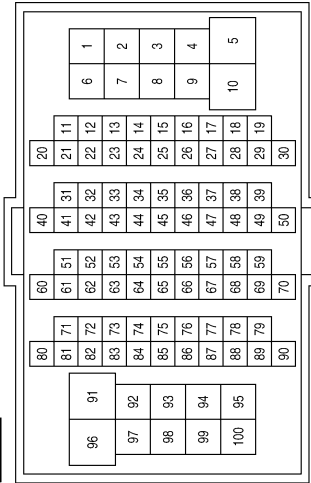
Connector No.	M82
Connector Name	WIRE TO WIRE
Connector Color	WHITE



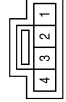
Terminal No.	Color of Wire	Signal Name
1	B	-
2	GR	-
3	Y	-
4	Y	-

Terminal No.	Color of Wire	Signal Name
6	P	-
7	GR	-
49	G	-
50	L	-
71	R	-
74	W	-
83	GR	-
84	L	-
93	W	-

Connector No.	M77
Connector Name	WIRE TO WIRE
Connector Color	WHITE



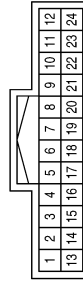
Connector No.	M138
Connector Name	PTC HEATER OUTLET AIR TEMPERATURE SENSOR AND A/C UNIT CASE TEMPERATURE SENSOR ASSEMBLY
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	OW	-
2	LW	-
3	Y/R	-
4	G/R	-

Terminal No.	Color of Wire	Signal Name
7	R	-
8	W	-
9	R	-
13	L	-
14	W	-
15	LG	-
16	GR	-
17	BR	-
19	G	-
20	R	-
22	GR	-
23	P	-
24	SB	-

Connector No.	M87
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	V	-
2	W	-
3	BG	-
4	P	-
5	R	-
6	Y	-

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AUTOMATIC AIR CONDITIONING SYSTEM

< WIRING DIAGRAM >

[AUTO A/C (WITHOUT HEAT PUMP)]

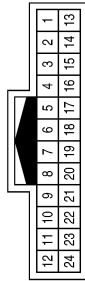
Connector No.	M141
Connector Name	INTAKE SENSOR
Connector Color	BROWN



Terminal No.	Color of Wire	Signal Name
1	R/G	-
2	Y/G	-

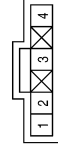
Terminal No.	Color of Wire	Signal Name
8	L/W	-
9	O/W	-
13	L	-
14	B/W	-
15	BR	-
16	G	-
17	R	-
19	R/G	-
20	Y/G	-
22	W/B	-
23	R/B	-
24	L/B	-

Connector No.	M140
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	V	-
2	B	-
3	Y	-
4	W	-
5	O	-
6	G/R	-
7	Y/R	-

Connector No.	M144
Connector Name	POWER TRANSISTOR
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	L	-
2	Y	-
3	B/W	-
4	V	-

Connector No.	M143
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	V	-
2	Y	-
3	B/W	-
4	B/W	-

Connector No.	M142
Connector Name	MODE DOOR MOTOR
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	V	-
2	Y	-
3	-	-
4	B	-
5	W	-
6	O	-

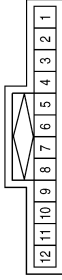
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AUTOMATIC AIR CONDITIONING SYSTEM

< WIRING DIAGRAM >

[AUTO A/C (WITHOUT HEAT PUMP)]

Connector No.	E6
Connector Name	JOINT CONNECTOR-E01
Connector Color	BLUE



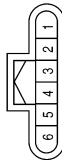
Terminal No.	Color of Wire	Signal Name
1	L	-
2	L	-
7	P	-
8	P	-

Connector No.	M146
Connector Name	AIR MIX DOOR MOTOR
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	L	-
2	BR	-
3	-	-
4	B/W	-
5	G	-
6	R	-

Connector No.	M145
Connector Name	PTC HEATER
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	W/B	-
2	-	-
3	R/B	-
4	L/B	-
5	-	-
6	-	-

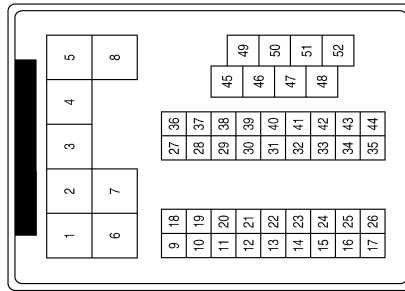
Connector No.	E49
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	BR	-
2	B	-
3	SB	-

Terminal No.	Color of Wire	Signal Name
40	O	-
41	L	-
49	B/R	-
50	W	-

Connector No.	E8
Connector Name	WIRE TO WIRE
Connector Color	BLACK



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AUTOMATIC AIR CONDITIONING SYSTEM

< WIRING DIAGRAM >

[AUTO A/C (WITHOUT HEAT PUMP)]

Connector No.	E52
Connector Name	A/C RELAY
Connector Color	BROWN



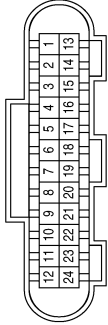
Terminal No.	Color of Wire	Signal Name
1	W	-
2	BR	-
3	R	-
5	W	-
6	R	-
7	O	-

Connector No.	E53
Connector Name	AMBIENT SENSOR
Connector Color	BLACK



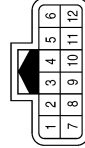
Terminal No.	Color of Wire	Signal Name
1	GR	-
2	LG	-

Connector No.	E58
Connector Name	JOINT CONNECTOR-E03
Connector Color	BLACK



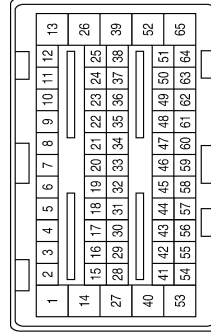
Terminal No.	Color of Wire	Signal Name
13	W	-
14	W	-
16	W	-

Connector No.	E60
Connector Name	WIRE TO WIRE
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
3	L	-
4	G	-
5	L	-
6	G	-

Connector No.	E61
Connector Name	VCM
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
24	L	EV SYSTEM CAN-H
25	G	EV SYSTEM CAN-L

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AUTOMATIC AIR CONDITIONING SYSTEM

< WIRING DIAGRAM >

[AUTO A/C (WITHOUT HEAT PUMP)]

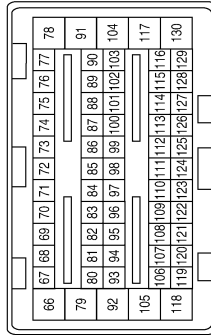
Connector No.	E65
Connector Name	M/C RELAY
Connector Color	BLUE



Terminal No.	Color of Wire	Signal Name
1	SB	-
2	R	-
3	R	-
5	W	-

Terminal No.	Color of Wire	Signal Name
75	L	CAN-H
76	P	CAN-L
88	SB	M/C RELAY
98	SB	SENSOR POWER SUPPLY (REFRIGERANT PRESSURE SENSOR)
109	B	REFRIGERANT PRESSURE SENSOR
116	BR	A/C RELAY
123	BR	SENSOR GROUND (REFRIGERANT PRESSURE SENSOR)

Connector No.	E62
Connector Name	VCN
Connector Color	BROWN



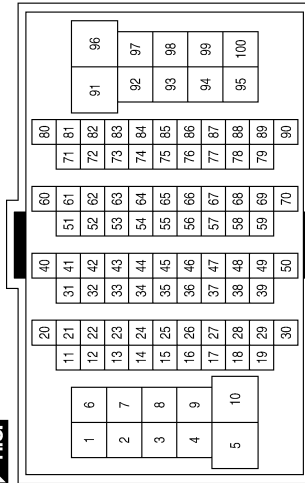
Connector No.	E107
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	L	-
2	P	-

Terminal No.	Color of Wire	Signal Name
6	B/R	-
7	W	-
49	G	-
50	L	-
71	LG	-
74	O	-
83	GR	-
84	L	-
93	O	-

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Color	WHITE



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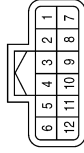
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AUTOMATIC AIR CONDITIONING SYSTEM

[AUTO A/C (WITHOUT HEAT PUMP)]

< WIRING DIAGRAM >

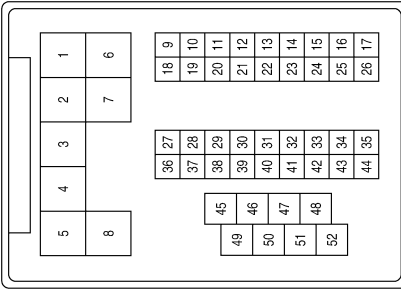
Connector No.	F2
Connector Name	WIRE TO WIRE
Connector Color	BLACK



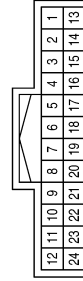
Terminal No.	Color of Wire	Signal Name
3	L	-
4	G	-
5	L	-
6	G	-

Terminal No.	Color of Wire	Signal Name
40	Y	-
41	L	-
49	P	-
50	W	-

Connector No.	F1
Connector Name	WIRE TO WIRE
Connector Color	BLACK

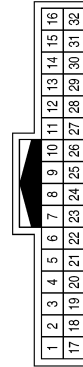


Connector No.	B7
Connector Name	WIRE TO WIRE
Connector Color	WHITE



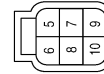
Terminal No.	Color of Wire	Signal Name
1	L	-
2	P	-

Connector No.	B3
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
15	L	-
16	G	-
31	L	-
32	P	-

Connector No.	F10
Connector Name	ELECTRIC COMPRESSOR (WITHOUT HEAT PUMP)
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
5	-	-
6	-	-
7	L	-
8	P	-
9	Y	-
10	W	-

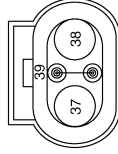
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AUTOMATIC AIR CONDITIONING SYSTEM

< WIRING DIAGRAM >

[AUTO A/C (WITHOUT HEAT PUMP)]

Connector No.	H3
Connector Name	LI-ION BATTERY
Connector Color	ORANGE



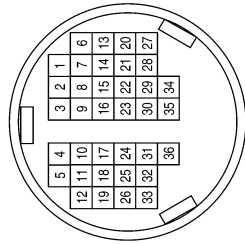
Terminal No.	Color of Wire	Signal Name
37	O	-
38	O	-
39	SHIELD	-

Connector No.	H1
Connector Name	ELECTRIC COMPRESSOR (WITHOUT HEAT PUMP)
Connector Color	ORANGE



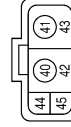
Terminal No.	Color of Wire	Signal Name
1	O	-
2	O	-
3	SHIELD	-
4	SHIELD	-

Connector No.	B24
Connector Name	LI-ION BATTERY
Connector Color	GREEN



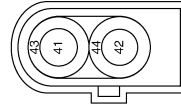
Terminal No.	Color of Wire	Signal Name
1	L	EV CAN-H
2	G	EV CAN-L

Connector No.	H19
Connector Name	LI-ION BATTERY
Connector Color	ORANGE



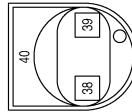
Terminal No.	Color of Wire	Signal Name
40	O	(+)
41	O	(-)
42	SHIELD	SHIELD (+)
43	SHIELD	SHIELD (-)
44	GR	HIGH VOLTAGE CABLE CONNECTION - DETECTING CIRCUIT (IN)
45	GR	HIGH VOLTAGE CABLE CONNECTION - DETECTING CIRCUIT (OUT)

Connector No.	H7
Connector Name	PDM (POWER DELIVERY MODULE)
Connector Color	ORANGE



Terminal No.	Color of Wire	Signal Name
41	O	-
42	O	-
43	SHIELD	-
44	SHIELD	-

Connector No.	H5
Connector Name	PDM (POWER DELIVERY MODULE)
Connector Color	ORANGE



Terminal No.	Color of Wire	Signal Name
38	O	-
39	O	-
40	SHIELD	-

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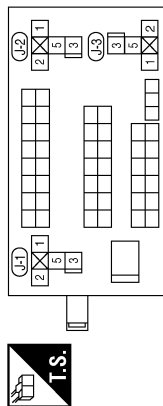
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AUTOMATIC AIR CONDITIONING SYSTEM

< WIRING DIAGRAM >

[AUTO A/C (WITHOUT HEAT PUMP)]

Connector No.	J-1
Connector Name	BLOWER RELAY
Connector Color	-



Terminal No.	Color of Wire	Signal Name
1	B	-
2	W	-
3	W	-
4	-	-
5	Y	-

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DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

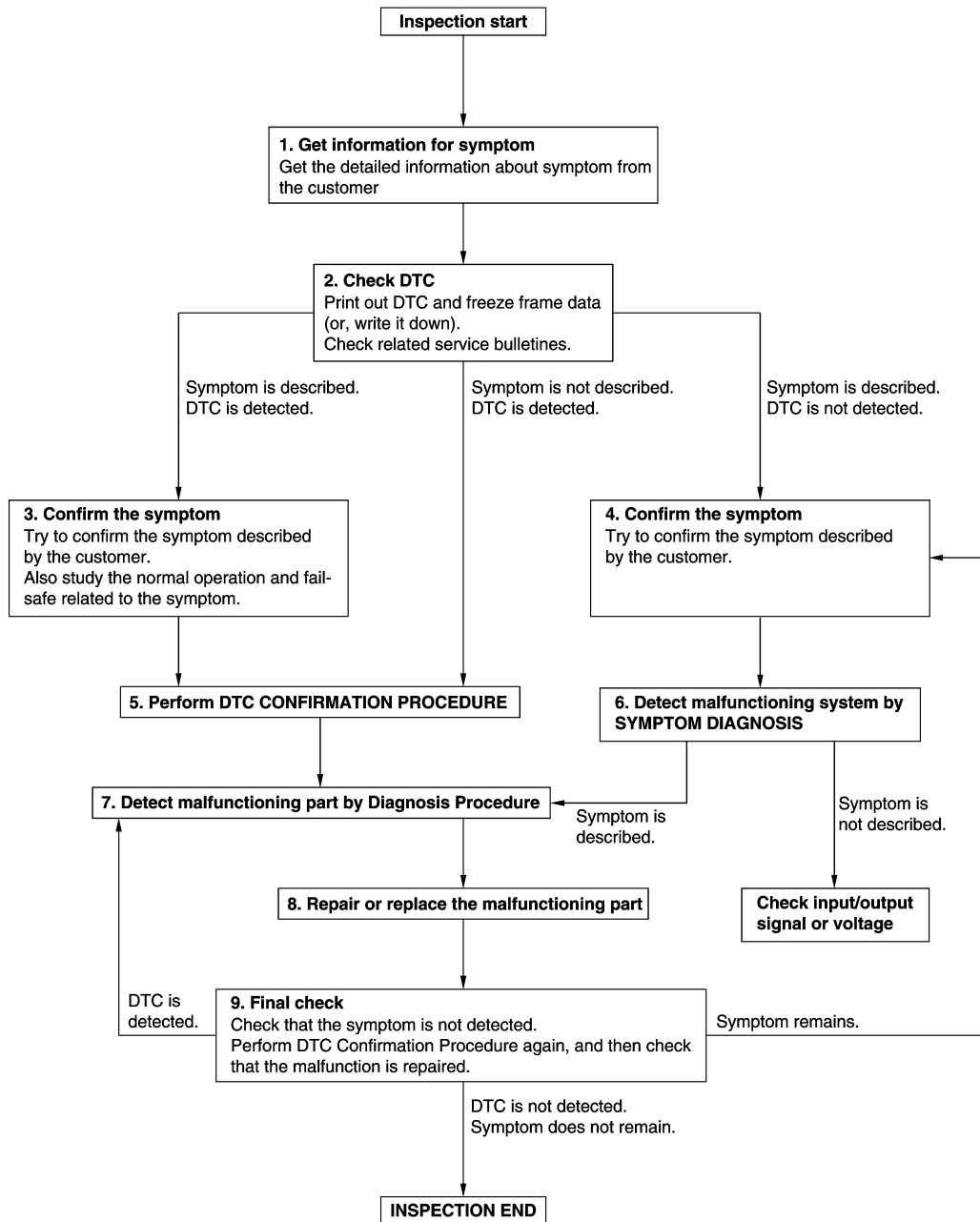
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:000000010641559

OVERALL SEQUENCE



DETAILED FLOW

Revision: June 2014

HAC-267

2015 LEAF

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DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

1. GET INFORMATION FOR SYMPTOM

1. Get detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurs).
2. Check operation condition of the function that is malfunctioning.

>> GO TO 2.

2. CHECK DTC

1. Check DTC.
2. Perform the following procedure if DTC is detected.
 - Record DTC and freeze frame data (Print them out using CONSULT.)
 - Erase DTC.
 - Study the relationship between the cause detected by DTC and the symptom described by the customer.
3. Check related service bulletins for information.

Are any symptoms described and any DTC detected?

Symptom is described, DTC is detected>>GO TO 3.

Symptom is described, DTC is not detected>>GO TO 4.

Symptom is not described, DTC is detected>>GO TO 5.

3. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.

Also study the normal operation and fail-safe related to the symptom.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the detected DTC, and then check that DTC is detected again. At this time, always connect CONSULT to the vehicle, and check self diagnostic results in real time. If two or more DTCs are detected, refer to DTC INSPECTION PRIORITY CHART, and determine trouble diagnosis order.

NOTE:

- Freeze frame data is useful if the DTC is not detected.
- Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check.
If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIRMATION PROCEDURE.

Is DTC detected?

YES >> GO TO 7.

NO >> Check intermittent incident. Refer to [GI-53. "Intermittent Incident"](#).

6. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM DIAGNOSIS

Detect malfunctioning system according to SYMPTOM DIAGNOSIS based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

Is the symptom described?

YES >> GO TO 7.

NO >> Monitor input data from related sensors or check voltage of related module terminals using CONSULT.

7. DETECT MALFUNCTIONING PART BY DIAGNOSTIC PROCEDURE

DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

Inspect according to Diagnostic Procedure of the system.

Is malfunctioning part detected?

YES >> GO TO 8.

NO >> Check intermittent incident. Refer to [GI-53. "Intermittent Incident"](#).

8. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnostic Procedure again after repair and replacement.
3. Check DTC. If DTC is detected, erase it.

>> GO TO 9.

9. FINAL CHECK

When DTC is detected in step 2, perform DTC CONFIRMATION PROCEDURE again, and then check that the malfunction is repaired securely.

When symptom is described by the customer, refer to confirmed symptom in step 3 or 4, and check that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 7.

YES-2 >> Symptom remains: GO TO 4.

NO >> Before returning the vehicle to the customer, always erase DTC.

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OPERATION INSPECTION

< BASIC INSPECTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

OPERATION INSPECTION

Work Procedure

INFOID:000000010641560

The purpose of the operational check is to check that the individual system operates normally.

1. CHECK MEMORY FUNCTION

1. Set temperature to 90° (32°C) by operating the temperature control switch.
2. Press OFF switch.
3. Turn ignition switch OFF.
4. Turn ignition switch ON.
5. Press AUTO switch.
6. Check that set temperature is maintained.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> GO TO 10.

2. CHECK AIR FLOW

1. Operate fan control switch.
2. Check that air flow changes. Check operation for all fan speeds.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 10.




3. CHECK AIR OUTLET

1. Operate fan control switch to set the fan speed to maximum speed.
2. Operate MODE switch and DEF switch.
3. Check that air outlets change according to each indicated air outlet by placing a hand in front of the air outlets. Refer to [VTL-11, "System Description"](#).

Is the inspection result normal?

- YES >> GO TO 4.
NO >> GO TO 10.

4. CHECK AIR INLET

1. Press intake switch to set the air inlet to recirculation. [Intake switch indicator ( side) turns ON.]
2. Listen to intake sound and confirm air inlets change.
3. Press intake switch again to set the air inlet to fresh air intake. [Intake switch indicator ( side) turns OFF and ( side) turns ON.]
4. Listen to intake sound and confirm air inlets change.

Is the inspection result normal?

- YES >> GO TO 5.
NO >> GO TO 10.

5. CHECK COMPRESSOR

1. Press A/C switch. The A/C switch indicator is turns ON.
2. Check visually and by sound that the compressor operates.
3. Press A/C switch again The A/C switch indicator is turns OFF.
4. Check that compressor stops.

Is the inspection result normal?

- YES >> GO TO 6.
NO >> GO TO 10.

6. CHECK DISCHARGE AIR TEMPERATURE

1. Operate temperature control switch.
2. Check that discharge air temperature changes.

Is the inspection result normal?

- YES >> GO TO 7.
NO >> GO TO 10.

OPERATION INSPECTION

< BASIC INSPECTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

7. CHECK TEMPERATURE DECREASE

1. Operate compressor.
2. Operate temperature control switch and lower the set temperature to 60° (18°C).
3. Check that cool air blows from the air outlets.

Is the inspection result normal?

- YES >> GO TO 8.
NO >> GO TO 10.

8. CHECK TEMPERATURE INCREASE

1. Operate temperature control switch and raise the set temperature to 90° (32°C).
2. Check that warm air blows from the air outlets.

Is the inspection result normal?

- YES >> GO TO 9.
NO >> GO TO 10.

9. CHECK AUTO MODE

1. Press AUTO switch to confirm that "AUTO" is indicated on the display.
2. Operate temperature control switch to check that air outlet or air flow changes (the air outlet or air flow varies depending on the ambient temperature, in-vehicle temperature, set temperature, and etc.).

Is the inspection result normal?

- YES >> Inspection End.
NO >> GO TO 10.

10. CHECK SELF-DIAGNOSIS WITH CONSULT

1. Perform self-diagnosis with CONSULT.
2. Check that any DTC is detected.

Is any DTC detected?

- YES >> Refer to [HAC-252, "DTC Index"](#) and perform the appropriate diagnosis.
NO >> Refer to [HAC-344, "Symptom Table"](#) and perform the appropriate diagnosis.

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ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (A/C AUTO AMP.)
< BASIC INSPECTION > [AUTO A/C (WITHOUT HEAT PUMP)]

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT (A/C AUTO AMP.)

Description

INFOID:000000010641561

When replacing A/C auto amp., save or print current vehicle specification with CONSULT "Configuration" before replacement.

BEFORE REPLACEMENT

NOTE:

If "READ CONFIGURATION" can not be used, use the "WRITE CONFIGURATION - Manual setting" after replacing A/C auto amp.

AFTER REPLACEMENT

CAUTION:

- When replacing A/C auto amp., you must perform "WRITE CONFIGURATION" with CONSULT.
- Never perform "WRITE CONFIGURATION" except for new A/C auto amp.

Work Procedure

INFOID:000000010641562

1.SAVING VEHICLE SPECIFICATION

ⓅCONSULT Configuration

Perform "READ CONFIGURATION" to save or print current vehicle specification. Refer to [HAC-273. "Description"](#).

NOTE:

If "READ CONFIGURATION" can not be used, use the "WRITE CONFIGURATION - Manual setting" after replacing A/C auto amp.

>> GO TO 2.

2.REPLACE A/C AUTO AMP.

Replace A/C auto amp. Refer to [HAC-348. "Removal and Installation"](#).

>> GO TO 3.

3.WRITING VEHICLE SPECIFICATION

ⓅCONSULT Configuration

Perform "WRITE CONFIGURATION - Config file" or "WRITE CONFIGURATION - Manual setting" to write vehicle specification. Refer to [HAC-273. "Work Procedure"](#).

>> Work End.

CONFIGURATION (HVAC)

< BASIC INSPECTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

CONFIGURATION (HVAC)

Description

INFOID:000000010641563

Vehicle specification needs to be written with CONSULT because it is not written after replacing A/C auto amp. Configuration has three functions as follows

Function	Description
READ CONFIGURATION	<ul style="list-style-type: none">• Reads the vehicle configuration of current A/C auto amp.• Saves the read vehicle configuration.
WRITE CONFIGURATION - Manual setting	Writes the vehicle configuration with manual setting.
WRITE CONFIGURATION - Config file	Writes the vehicle configuration with saved data.

CAUTION:

- When replacing A/C auto amp., you must perform “WRITE CONFIGURATION” with CONSULT.
- Never perform “WRITE CONFIGURATION” except for new A/C auto amp.

Work Procedure

INFOID:000000010641564

1. WRITING MODE SELECTION

 CONSULT Configuration
Select “CONFIGURATION” of A/C auto amp.


When writing saved data>>GO TO 2.
When writing manually>>GO TO 3.

2. PERFORM “WRITE CONFIGURATION - CONFIG FILE”

 CONSULT Configuration
Perform “WRITE CONFIGURATION - Config file”.

>> Work End.

3. PERFORM “WRITE CONFIGURATION - MANUAL SETTING”

 CONSULT Configuration
Select “WRITE CONFIGURATION - Manual setting” to write vehicle specifications into the A/C auto amp. For data to write, refer to [HAC-273, "Configuration List"](#).

CAUTION:

- Thoroughly read and understand the vehicle specification. Incorrect settings may result in abnormal control of ECU.
- Make sure to select “SETTING” even if the indicated configuration of brand new A/C auto amp. is same as the desirable configuration. If not, configuration which is set automatically by selecting vehicle model can not be memorized.

NOTE:

If items are not displayed, touch “SETTING”. Refer to [HAC-273, "Configuration List"](#) for written items and setting value.

>> GO TO 4.

4. OPERATION CHECK

Confirm that each function controlled by A/C auto amp. operates normally.

>> Work End.

Configuration List

INFOID:000000010641565

CAUTION:

CONFIGURATION (HVAC)

< BASIC INSPECTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

Thoroughly read and understand the vehicle specification. ECU control may not operate normally if the setting is not correct.

Setting Item	
Item	Value
HANDLE	RHD ⇔ LHD

⇔: Items which confirm vehicle specifications

SYSTEM SETTING

< BASIC INSPECTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

SYSTEM SETTING

Temperature Setting Trimmer

INFOID:000000010641566

DESCRIPTION

If the temperature felt by the customer is different from the air flow temperature controlled by the temperature setting, the A/C auto amp. control temperature can be adjusted to compensate for the temperature setting.

HOW TO SET

Ⓜ With CONSULT

Perform "TEMP SET CORRECT" in "Work support" of "HVAC".

Work support items	Display (°C)	Display (°F)
TEMP SET CORRECT	3.0	6
	2.5	5
	2.0	4
	1.5	3
	1.0	2
	0.5	1
	0 (initial status)	0 (initial status)
	-0.5	-1
	-1.0	-2
	-1.5	-3
	-2.0	-4
	-2.5	-5
	-3.0	-6

NOTE:

- When -3.0°C (-6°F) is corrected on the temperature setting set as 25.0°C (77°F) the temperature controlled by A/C auto amp. is 25.0°C (77°F) -3.0°C (-6°F) = 22.0°C (72°F) and the temperature becomes lower than the temperature setting.
- When the 12V battery cable is disconnected from the negative terminal or when the 12V battery voltage becomes 10 V or less, the setting of the difference between the set temperature and control temperature may be cancelled.

Inlet Port Memory Function (REC)

INFOID:000000010641567

DESCRIPTION

- If the ignition switch is turned to the OFF position while the intake switch is set to ON (recirculation), "Perform the memory" or "Do not perform the memory" of intake switch ON (recirculation) condition can be selected.
- If "Perform the memory" is set, the intake switch is ON (recirculation) when turning the ignition switch to the ON position again.
- If "Do not perform the memory" is set, the air inlets is controlled automatically when turning the ignition switch to the ON position again.

HOW TO SET

Ⓜ With CONSULT

Perform the "REC MEMORY SET" in "Work support" of "HVAC".

Work support items	Display	Setting
REC MEMORY SET	WITHOUT (initial status)	Perform the memory of manual REC
	WITH	Do not perform the memory of manual REC (auto control)

NOTE:

SYSTEM SETTING

< BASIC INSPECTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

When the 12V battery cable is disconnected from the negative terminal or when the 12V battery voltage becomes 10 V or less, the setting of the REC memory function may be cancelled.

Inlet Port Memory Function (FRE)

INFOID:000000010641568

DESCRIPTION

- If the ignition switch is turned to the OFF position while the intake switch is set to OFF (fresh air intake), “Perform the memory” or “Do not perform the memory” of intake switch OFF (fresh air intake) condition can be selected.
- If “Perform the memory” is set, the intake switch is OFF (fresh air intake) when turning the ignition switch to the ON position again.
- If “Do not perform the memory” is set, the air inlets is controlled automatically when turning the ignition switch to the ON position again.

HOW TO SET

ⓅWith CONSULT

Perform the “FRE MEMORY SET” in “Work support” of “HVAC”.

Work support items	Display	Setting
FRE MEMORY SET	WITHOUT	Perform the memory of manual FRE
	WITH (initial status)	Do not perform the memory of manual FRE (auto control)

NOTE:

When the 12V battery cable is disconnected from the negative terminal or when the 12V battery voltage becomes 10 V or less, the setting of the FRE memory function may be cancelled.

Foot Position Setting Trimmer

INFOID:000000010641569

DESCRIPTION

In FOOT mode, the air blowing to DEF can change ON/OFF.

HOW TO SET

ⓅWith CONSULT

Perform the “BLOW SET” in “Work support” of “HVAC”.

Work support items	Display	Defroster door position	
		Audio control	Manual control
BLOW SET	Mode1 (initial status)	OPEN	CLOSE
	Mode2	OPEN	OPEN
	Mode3	CLOSE	OPEN
	Mode4	CLOSE	CLOSE

NOTE:

When the 12V battery cable is disconnected from the negative terminal or when the 12V battery voltage becomes 10 V or less, the setting of the discharge air mix ratio in FOOT mode may be cancelled.

Compressor Operation Setting at Defroster Mode (Timer/Remote Climate Control)

INFOID:000000010641570

DESCRIPTION

For A/C-heater timer and remote climate control, change the setting of electric compressor operation during DEF mode.

How to set

Using CONSULT, select “COMP OPRT SET AT DEF MODE (TIM/RMT CLIMT CONT)” in “Work support” of “HVAC”.

SYSTEM SETTING

< BASIC INSPECTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

Work support items	Display	Setup
COMP OPRT SET AT DEF MODE (TIM/RMT CLIMT CONT)	OFF	During DEF mode operation, the electric compressor stops.
	ON	During DEF mode operation, the electric compressor operates.

A

B

Setting of Compressor Maximum Rotation Speed During Pre Air Conditioning

INFOID:000000010641571

C

DESCRIPTION

The compressor maximum rotation speed during remote or timer air conditioning can be adjusted.

D

How to set

Using CONSULT, select "TARGET MAX RPM ADJ AT PRE-CLIMATE" in "Work Support" of "HVAC".

E

Work support items	Note
TARGET MAX RPM ADJ AT PRE-CLIMATE	Raising set value: Improve the cooling performance. Lowering set value: Reduce the operation noise level.

F

Setting of Compressor Maximum Rotation Speed During Idling

INFOID:000000010641572

G

DESCRIPTION

The electric compressor maximum rotation speed during idling can be adjusted.

H

How to set

Using CONSULT, select "TARGET MAX RPM ADJ AT IDL" in "Work support" of "HVAC".

HAC

Work support items	Note
TARGET MAX RPM ADJ AT IDL	Raising set value: Improve the cooling performance. Lowering set value: Reduce the operation noise level.

J

K

L

M

N

O

P

DOOR MOTOR STARTING POSITION RESET

< BASIC INSPECTION >

[AUTO A/C (WITHOUT HEAT PUMP)]

DOOR MOTOR STARTING POSITION RESET

Description

INFOID:000000010641573

- Reset signal is transmitted from A/C auto amp. to air mix door motor and mode door motor. Starting position reset can be performed.

NOTE:

- During reset, DEF switch indicator blinks.
- When air mix door motor or mode door motor is removed and installed, always perform door motor starting position reset.

Work Procedure

INFOID:000000010641574

1. PERFORM DOOR MOTOR STARTING POSITION RESET

④ With CONSULT

1. Turn ignition switch ON.
2. Select "Door Motor Starting Position Reset" in "Work support" of "HVAC" using CONSULT.
3. Touch "Start" and wait a few seconds.
4. Make sure the "COMPLETED" is displayed on CONSULT screen.

>> Inspection End.

U1000 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

DTC/CIRCUIT DIAGNOSIS

U1000 CAN COMM CIRCUIT

Description

INFOID:000000010641575

CAN (Controller Area Network) is a serial communication line for real time applications. It is an on-board multiplex communication line with high data communication speed and excellent error detection ability. A modern vehicle is equipped with many ECMs, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, 2 control units are connected with 2 communication lines (CAN-L line and CAN-H line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

Refer to [LAN-37, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart"](#) for details of the communication signal.

DTC Logic

INFOID:000000010641576

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
U1000	CAN COMM CIRCUIT	When A/C auto amp. is not transmitting or receiving CAN communication signal for 2 or more seconds.	CAN communication system

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

 With CONSULT

1. Turn power switch ON and wait at least 2 seconds or more.
2. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
3. Check DTC.

Is DTC detected?

YES >> Refer to [HAC-279, "Diagnosis Procedure"](#).

NO >> Check intermittent incident. Refer to [GI-53, "Intermittent Incident"](#).

Diagnosis Procedure

INFOID:000000010641577

1. CHECK CAN COMMUNICATION SYSTEM

Check CAN communication system. Refer to [LAN-17, "Trouble Diagnosis Flow Chart"](#).

>> Inspection End.

U1010 CONTROL UNIT (CAN)

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

U1010 CONTROL UNIT (CAN)

Description

INFOID:000000010641578

Initial diagnosis of A/C auto amp.

DTC Logic

INFOID:000000010641579

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
U1010	CONTROL UNIT (CAN)	When detecting error during the initial diagnosis of CAN controller of A/C auto amp.	A/C auto amp.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON.
2. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
3. Check DTC.

Is DTC detected?

YES >> Refer to [HAC-280, "Diagnosis Procedure"](#).

NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641580

1.REPLACE A/C AUTO AMP.

Replace A/C auto amp. Refer to [HAC-348, "Removal and Installation"](#).

>> Inspection End.

B2578, B2579 IN-VEHICLE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B2578, B2579 IN-VEHICLE SENSOR

DTC Logic

INFOID:000000010641581

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-279, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-280, "DTC Logic"](#).

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2578	IN-VEHICLE SENSOR	The in-vehicle sensor recognition temperature is too high [more than 100°C (212°F)].	<ul style="list-style-type: none"> • In-vehicle sensor • A/C auto amp. • Harness or connectors (The sensor circuit is open or shorted.)
B2579		The in-vehicle sensor recognition temperature is too low [less than -42°C (-44°F)].	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Turn power switch ON.
2. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
3. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-281, "Diagnosis Procedure"](#).
 NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641582

Regarding Wiring Diagram information, refer to [HAC-254, "Wiring Diagram"](#).

1. CHECK IN-VEHICLE SENSOR VOLTAGE SIGNAL

1. Turn power switch ON.
2. Operate the automatic air conditioning system.
3. Check voltage signal between A/C auto amp. harness connector terminals.

Connector	A/C auto amp.		Test condition	Voltage signal																											
	+	-																													
Terminal																															
M55	33	10	<ul style="list-style-type: none"> • Power switch ON • When air conditioner is operating 	<table border="1"> <caption>Voltage Signal vs Temperature</caption> <thead> <tr> <th>Temperature (°C)</th> <th>Temperature (°F)</th> <th>Voltage (V)</th> </tr> </thead> <tbody> <tr><td>-20</td><td>-4</td><td>4.41</td></tr> <tr><td>-10</td><td>14</td><td>4.09</td></tr> <tr><td>0</td><td>32</td><td>3.68</td></tr> <tr><td>10</td><td>50</td><td>3.22</td></tr> <tr><td>20</td><td>68</td><td>2.73</td></tr> <tr><td>25</td><td>77</td><td>2.49</td></tr> <tr><td>30</td><td>86</td><td>2.25</td></tr> <tr><td>40</td><td>104</td><td>1.82</td></tr> </tbody> </table> <p>JS11A1662ZZ</p>	Temperature (°C)	Temperature (°F)	Voltage (V)	-20	-4	4.41	-10	14	4.09	0	32	3.68	10	50	3.22	20	68	2.73	25	77	2.49	30	86	2.25	40	104	1.82
Temperature (°C)	Temperature (°F)	Voltage (V)																													
-20	-4	4.41																													
-10	14	4.09																													
0	32	3.68																													
10	50	3.22																													
20	68	2.73																													
25	77	2.49																													
30	86	2.25																													
40	104	1.82																													

Is the inspection result normal?

- YES >> GO TO 7.
 NO >> GO TO 2.

2. CHECK IN-VEHICLE SENSOR POWER SUPPLY

B2578, B2579 IN-VEHICLE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

1. Turn power switch OFF.
2. Disconnect in-vehicle sensor connector.
3. Turn power switch ON.
4. Check voltage between in-vehicle sensor harness connector and ground.

+		-	Voltage (Approx.)
In-vehicle sensor			
Connector	Terminal		
M42	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 5.

3. CHECK IN-VEHICLE SENSOR GROUND CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between in-vehicle sensor harness connector and A/C auto amp. harness connector.

In-vehicle sensor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M42	2	M55	30	Yes

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair harness or connector.

4. CHECK IN-VEHICLE SENSOR

Check in-vehicle sensor. Refer to [HAC-283, "Component Inspection"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-348, "Removal and Installation"](#).
NO >> Replace in-vehicle sensor. Refer to [HAC-350, "Removal and Installation"](#).

5. CHECK IN-VEHICLE SENSOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between in-vehicle sensor harness connector and A/C auto amp. harness connector.

In-vehicle sensor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M42	1	M55	33	Yes

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair harness or connector.

6. CHECK IN-VEHICLE SENSOR POWER SUPPLY CIRCUIT FOR SHORT

Check continuity between in-vehicle sensor harness connector and ground.

In-vehicle sensor		—	Continuity
Connector	Terminal		
M42	1	Ground	No

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-348, "Removal and Installation"](#).
NO >> Repair harness or connector.

B2578, B2579 IN-VEHICLE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-53. "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-348. "Removal and Installation"](#).
- NO >> Repair or replace malfunctioning components.

Component Inspection

INFOID:000000010641583

1. CHECK IN-VEHICLE SENSOR

1. Remove in-vehicle sensor. Refer to [HAC-350. "Removal and Installation"](#).
2. Check resistance between in-vehicle sensor terminals. Refer to applicable table for the normal value.

Terminal		Condition	Resistance: kΩ
		Temperature: °C (°F)	
1	2	-20 (-4)	16.43
		-10 (14)	9.90
		0 (32)	6.19
		10 (50)	4.01
		20 (68)	2.67
		25 (77)	2.20
		30 (86)	1.83
		40 (104)	1.28

Is the inspection result normal?

- YES >> Inspection End.
- NO >> Replace in-vehicle sensor. Refer to [HAC-350. "Removal and Installation"](#).

A
B
C
D
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G
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P

HAC

B257B, B257C AMBIENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B257B, B257C AMBIENT SENSOR

DTC Logic

INFOID:000000010641584

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-279, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-280, "DTC Logic"](#).

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B257B	AMBIENT SENSOR	The ambient sensor recognition temperature is too high [more than 100°C (212°F)].	<ul style="list-style-type: none"> • Ambient sensor • A/C auto amp. • Harness or connectors (The sensor circuit is open or shorted.)
B257C		The ambient sensor recognition temperature is too low [less than -42°C (-44°F)].	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

1. Turn power switch ON.
2. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
3. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-284, "Diagnosis Procedure"](#).
 NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641585

Regarding Wiring Diagram information, refer to [HAC-254, "Wiring Diagram"](#).

1. CHECK AMBIENT SENSOR VOLTAGE SIGNAL

1. Turn power switch ON.
2. Operate the automatic air conditioning system.
3. Check voltage signal between A/C auto amp. harness connector terminals.

Connector	A/C auto amp.		Test condition	Voltage signal																											
	+	-																													
Terminal																															
M55	36	10	<ul style="list-style-type: none"> • Power switch ON • When air conditioner is operating 	<table border="1"> <caption>Voltage Signal vs Temperature</caption> <thead> <tr> <th>Temperature (°C)</th> <th>Temperature (°F)</th> <th>Voltage (V)</th> </tr> </thead> <tbody> <tr><td>-20</td><td>-4</td><td>4.42</td></tr> <tr><td>-10</td><td>14</td><td>4.11</td></tr> <tr><td>0</td><td>32</td><td>3.71</td></tr> <tr><td>10</td><td>50</td><td>3.25</td></tr> <tr><td>20</td><td>68</td><td>2.76</td></tr> <tr><td>25</td><td>77</td><td>2.52</td></tr> <tr><td>30</td><td>86</td><td>2.29</td></tr> <tr><td>40</td><td>104</td><td>1.85</td></tr> </tbody> </table> <p>JS1A1665ZZ</p>	Temperature (°C)	Temperature (°F)	Voltage (V)	-20	-4	4.42	-10	14	4.11	0	32	3.71	10	50	3.25	20	68	2.76	25	77	2.52	30	86	2.29	40	104	1.85
Temperature (°C)	Temperature (°F)	Voltage (V)																													
-20	-4	4.42																													
-10	14	4.11																													
0	32	3.71																													
10	50	3.25																													
20	68	2.76																													
25	77	2.52																													
30	86	2.29																													
40	104	1.85																													

Is the inspection result normal?

- YES >> GO TO 7.
 NO >> GO TO 2.

2. CHECK AMBIENT SENSOR POWER SUPPLY

B257B, B257C AMBIENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

1. Turn power switch OFF.
2. Disconnect ambient sensor connector.
3. Turn power switch ON.
4. Check voltage between ambient sensor harness connector and ground.

+		-	Voltage (Approx.)
Ambient sensor			
Connector	Terminal		
E53	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 5.

3.CHECK AMBIENT SENSOR GROUND CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between ambient sensor harness connector and A/C auto amp harness connector.

Ambient sensor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
E53	2	M55	30	Yes

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair harness or connector.

4.CHECK AMBIENT SENSOR

Check ambient sensor. Refer to [HAC-286, "Component Inspection"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-348, "Removal and Installation"](#).
NO >> Replace ambient sensor. Refer to [HAC-349, "Removal and Installation"](#).

5.CHECK AMBIENT SENSOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between ambient sensor harness connector and A/C auto amp. harness connector.

Ambient sensor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
E53	1	M55	36	Yes

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair harness or connector.

6.CHECK AMBIENT SENSOR POWER SUPPLY CIRCUIT FOR SHORT

Check continuity between ambient sensor harness connector and ground.

Ambient sensor		-	Continuity
Connector	Terminal		
E53	1	Ground	No

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-348, "Removal and Installation"](#).
NO >> Repair harness or connector.

B257B, B257C AMBIENT SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-53. "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-348. "Removal and Installation"](#).
NO >> Repair or replace malfunctioning components.

Component Inspection

INFOID:000000010641586

1. CHECK AMBIENT SENSOR

1. Remove ambient sensor. Refer to [HAC-349. "Removal and Installation"](#).
2. Check resistance between ambient sensor terminals. Refer to applicable table for the normal value.

Terminal		Condition	Resistance: kΩ
		Temperature: °C (°F)	
1	2	-20 (-4)	16.50
		-10 (14)	9.92
		0 (32)	6.19
		10 (50)	3.99
		20 (68)	2.65
		25 (77)	2.19
		30 (86)	1.81
		40 (104)	1.27

Is the inspection result normal?

- YES >> Inspection End.
NO >> Replace ambient sensor. Refer to [HAC-349. "Removal and Installation"](#).

B2581, B2582 INTAKE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B2581, B2582 INTAKE SENSOR

DTC Logic

INFOID:000000010641587

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-279, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-280, "DTC Logic"](#).

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2581	INTAKE SENSOR	The intake sensor recognition temperature is too high [more than 100°C (212°F)].	<ul style="list-style-type: none"> • Intake sensor • A/C auto amp. • Harness or connectors (The sensor circuit is open or shorted.)
B2582		The intake sensor recognition temperature is too low [less than -42°C (-44°F)].	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Turn power switch ON.
2. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
3. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-287, "Diagnosis Procedure"](#).
 NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641588

Regarding Wiring Diagram information, refer to [HAC-254, "Wiring Diagram"](#).

1. CHECK INTAKE SENSOR VOLTAGE SIGNAL

1. Turn power switch ON.
2. Operate the automatic air conditioning system.
3. Check voltage signal between A/C auto amp. harness connector terminals.

Connector	A/C auto amp.		Test condition	Voltage signal																											
	+	-																													
Terminal																															
M55	34	10	<ul style="list-style-type: none"> • Power switch ON • When air conditioner is operating 	<table border="1"> <caption>Graph Data: Voltage Signal vs Temperature</caption> <thead> <tr> <th>Temperature (°C)</th> <th>Temperature (°F)</th> <th>Voltage (V)</th> </tr> </thead> <tbody> <tr><td>-20</td><td>-4</td><td>3.68</td></tr> <tr><td>-10</td><td>14</td><td>3.13</td></tr> <tr><td>0</td><td>32</td><td>2.56</td></tr> <tr><td>10</td><td>50</td><td>2.02</td></tr> <tr><td>20</td><td>68</td><td>1.56</td></tr> <tr><td>25</td><td>77</td><td>1.36</td></tr> <tr><td>30</td><td>86</td><td>1.18</td></tr> <tr><td>40</td><td>104</td><td>0.89</td></tr> </tbody> </table> <p>JS11A1663ZZ</p>	Temperature (°C)	Temperature (°F)	Voltage (V)	-20	-4	3.68	-10	14	3.13	0	32	2.56	10	50	2.02	20	68	1.56	25	77	1.36	30	86	1.18	40	104	0.89
Temperature (°C)	Temperature (°F)	Voltage (V)																													
-20	-4	3.68																													
-10	14	3.13																													
0	32	2.56																													
10	50	2.02																													
20	68	1.56																													
25	77	1.36																													
30	86	1.18																													
40	104	0.89																													

Is the inspection result normal?

- YES >> GO TO 7.
 NO >> GO TO 2.

2. CHECK INTAKE SENSOR POWER SUPPLY

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HAC

B2581, B2582 INTAKE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

1. Turn power switch OFF.
2. Disconnect intake sensor connector.
3. Turn power switch ON.
4. Check voltage between intake sensor harness connector and ground.

+		-	Voltage (Approx.)
Intake sensor			
Connector	Terminal		
M141	1	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 5.

3.CHECK INTAKE SENSOR GROUND CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between intake sensor harness connector and A/C auto amp harness connector.

Intake sensor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M141	2	M55	30	Yes

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair harness or connector.

4.CHECK INTAKE SENSOR

Check intake sensor. Refer to [HAC-289, "Component Inspection"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-348, "Removal and Installation"](#).
NO >> Replace intake sensor. Refer to [HAC-353, "Removal and Installation"](#).

5.CHECK INTAKE SENSOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between intake sensor harness connector and A/C auto amp. harness connector.

Intake sensor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M141	1	M55	34	Yes

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair harness or connector.

6.CHECK INTAKE SENSOR POWER SUPPLY CIRCUIT FOR SHORT

Check continuity between intake sensor harness connector and ground.

Intake sensor		-	Continuity
Connector	Terminal		
M141	1	Ground	No

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-353, "Removal and Installation"](#).
NO >> Repair harness or connector.

B2581, B2582 INTAKE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-53. "Intermittent Incident"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-348. "Removal and Installation"](#).
- NO >> Repair or replace malfunctioning components.

Component Inspection

INFOID:000000010641589

1. CHECK INTAKE SENSOR

1. Remove intake sensor. Refer to [HAC-353. "Removal and Installation"](#).
2. Check resistance between intake sensor terminals. Refer to applicable table for the normal value.

Terminal		Condition	Resistance: kΩ
		Temperature: °C (°F)	
1	2	-20 (-4)	16.50
		-10 (14)	9.92
		0 (32)	6.19
		10 (50)	3.99
		20 (68)	2.65
		25 (77)	2.19
		30 (86)	1.81
		40 (104)	1.27

Is the inspection result normal?

- YES >> Inspection End.
- NO >> Replace intake sensor. Refer to [HAC-353. "Removal and Installation"](#).

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HAC

B2630, B2631 SUNLOAD SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B2630, B2631 SUNLOAD SENSOR

DTC Logic

INFOID:000000010641590

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-279, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-280, "DTC Logic"](#).
- Sunload sensor may register a malfunction when indoors, at dusk, or at other times when light is insufficient. When performing the diagnosis indoors, use a lamp (60 W or more) that is pointed at the sunload sensor.

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2630	SUNLOAD SENSOR	Detected calorie at sunload sensor 1677 W/m ² (1442 kcal/m ² ·h) or more.	<ul style="list-style-type: none"> • Sunload sensor • A/C auto amp. • Harness or connectors (The sensor circuit is open or shorted.)
B2631		Detected calorie at sunload sensor 33 W/m ² (28 kcal/m ² ·h) or less.	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Turn power switch ON.
2. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
3. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-290, "Diagnosis Procedure"](#).
 NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641591

Regarding Wiring Diagram information, refer to [HAC-254, "Wiring Diagram"](#).

1. CHECK SUNLOAD SENSOR VOLTAGE SIGNAL

1. Turn power switch ON.
2. Operate the automatic air conditioning system.
3. Move 60 W lamp to or from the sunload sensor to check that a voltage signal between A/C auto amp. harness connector terminals changes.

Connector	A/C auto amp.		Test condition	Voltage signal
	+	-		
Terminal				
M55	35	10	<ul style="list-style-type: none"> • Power switch ON • When air conditioner is operating 	<p>JSIIA1664ZZ</p>

Is the inspection result normal?

- YES >> GO TO 7.

B2630, B2631 SUNLOAD SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

NO >> GO TO 2.

2. CHECK SUNLOAD SENSOR POWER SUPPLY

1. Turn power switch OFF.
2. Disconnect sunload sensor connector.
3. Turn power switch ON.
4. Check voltage between sunload sensor harness connector and ground.

+		-	Voltage (Approx.)
Sunload sensor			
Connector	Terminal		
M74	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 5.

3. CHECK SUNLOAD SENSOR GROUND CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between sunload sensor harness connector and A/C auto amp harness connector.

Sunload sensor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M74	2	M55	30	Yes

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair harness or connector.

4. REPLACE SUNLOAD SENSOR

1. Replace sunload sensor. Refer to [HAC-351, "Removal and Installation"](#).
2. Perform DTC confirmation procedure. Refer to [HAC-290, "DTC Logic"](#).
3. Check DTC.

Is DTC detected?

YES >> Replace A/C auto amp. Refer to [HAC-348, "Removal and Installation"](#).

NO >> Inspection End.

5. CHECK SUNLOAD SENSOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between sunload sensor harness connector and A/C auto amp. harness connector.

Sunload sensor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M74	1	M55	35	Yes

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair harness or connector.

6. CHECK SUNLOAD SENSOR POWER SUPPLY CIRCUIT FOR SHORT

Check continuity between sunload sensor harness connector and ground.

B2630, B2631 SUNLOAD SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

Sunload sensor		—	Continuity
Connector	Terminal		
M74	1	Ground	No

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to [HAC-348, "Removal and Installation"](#).

NO >> Repair harness or connector.

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-53, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to [HAC-348, "Removal and Installation"](#).

NO >> Repair or replace malfunctioning components.

B2770, B2773, B2774 PTC HEATER

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B2770, B2773, B2774 PTC HEATER

DTC Logic

INFOID:000000010641592

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2770	PTC HEATER CIRCUIT	When PTC heater circuit system malfunction is detected.	<ul style="list-style-type: none">• PTC heater• High voltage harness or connectors (PTC heater high voltage circuit is open or shorted.)
B2773	PTC HEATER CIRCUIT 1	When PTC heater circuit system (PTC 1) malfunction is detected.	
B2774	PTC HEATER CIRCUIT 2	When PTC heater circuit system (PTC 2) malfunction is detected.	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full hot and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-293. "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641593

DIAGNOSIS PROCEDURE

1. REPLACE PTC HEATER

Replace PTC heater. Refer to [HAC-360. "Removal and Installation"](#).

>> Inspection End.

B2771 PTC HEATER

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B2771 PTC HEATER

DTC Logic

INFOID:000000010641594

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2771	PTC HEATER OVERHEAT PROTECT	When the PTC heater circuit board internal temperature is 115°C (239°F) or more.	<ul style="list-style-type: none">• PTC heater• Blower motor system• Air mix door motor system

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full hot and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-294, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641595

1. CHECK BLOWER MOTOR SYSTEM

Check the blower motor system. Refer to [HAC-336, "Component Function Check"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace malfunctioning components.

2. CHECK AIR MIX DOOR MOTOR SYSTEM

Check the air mix door motor system. Refer to [HAC-321, "Diagnosis Procedure"](#)

Is the inspection result normal?

- YES >> Replace PTC heater. Refer to [HAC-360, "Removal and Installation"](#).
NO >> Repair or replace malfunctioning components.

B2772 PTC HEATER

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B2772 PTC HEATER

DTC Logic

INFOID:000000010641596

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2772	PTC HEATER VOLTAGE	When the supply voltage input to the PTC heater is the specified voltage value or less.	<ul style="list-style-type: none">• PTC heater• High voltage harness or connectors (PTC heater high voltage circuit is open or shorted.)

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full hot and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-295, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641597

HAC

1. REPLACE PTC HEATER

Replace PTC heater. Refer to [HAC-360, "Removal and Installation"](#).

>> Inspection End.

B2777, B2779, B277B PTC HEATER

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B2777, B2779, B277B PTC HEATER

DTC Logic

INFOID:000000010641598

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2777	PTC HEATER LIN COMMUNICATION	When there is an error in the signal sent from the PTC heater.	<ul style="list-style-type: none">• PTC heater• A/C auto amp.• Harness or connectors (PTC heater circuit is open or shorted.)
B2779	PTC HEATER COMMUNICATION	When there is an error in the signal sent from the A/C auto amp. or there is an error in the signal received by the PTC heater.	
B277B	HVAC LIN COMMUNICATION	When there is an error in the signal sent from the A/C auto amp.	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
4. Check DTC.

Is DTC detected?

YES >> Refer to [HAC-296, "Diagnosis Procedure"](#).

NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641599

Regarding Wiring Diagram information, refer to [HAC-254, "Wiring Diagram"](#).

1. CHECK PTC HEATER COMMUNICATION LINE FOR OPEN

1. Turn power switch OFF.
2. Disconnect PTC heater and A/C auto amp. connector.
3. Check continuity between PTC heater harness connector and A/C auto amp harness connector.

PTC heater		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M145	4	M55	40	Yes

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair harness or connector.

2. CHECK PTC HEATER COMMUNICATION LINE FOR SHORT

Check continuity between PTC heater harness connector and ground.

PTC heater		-	Continuity
Connector	Terminal		
M145	4	Ground	No

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair harness or connector.

B2777, B2779, B277B PTC HEATER

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

3. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-53, "Intermittent Incident"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning components.

4. CHECK A/C AUTO AMP.

Ⓜ With CONSULT

1. Set the vehicle to READY.

2. Using CONSULT, perform "MODE6" of "HVAC TEST" in "Active Test" of HVAC". Refer to [HAC-243, "CONSULT Function"](#).

3. Check that the PTC heater operates normally.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace A/C auto amp. (Refer to [HAC-348, "Removal and Installation"](#)). Then GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC confirmation procedure. Refer to [HAC-296, "DTC Logic"](#).

Is DTC B2777, B2779 or B277B detected?

YES >> Replace PTC heater. Refer to [HAC-360, "Removal and Installation"](#).

NO >> Inspection End.

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B2780 ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B2780 ELECTRIC COMPRESSOR

DTC Logic

INFOID:000000010641600

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2780	COMPRESSOR ROM, RAM, AD	<ul style="list-style-type: none">When an error is detected in the ROM and RAM area data.When an error is detected in the AD value (circuit that converts the analog value to a digital value).	Electric compressor

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

④ With CONSULT

- Turn power switch OFF.
- Set the vehicle to READY.
- Operate the automatic air conditioning system.
- Set the temperature to full cold and wait at least 2 seconds.
- Select "Self Diagnostic Result" of "HVAC" using CONSULT.
- Check DTC.

Is DTC detected?

YES >> Refer to [HAC-298, "Diagnosis Procedure"](#).

NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641601

1. REPLACE ELECTRIC COMPRESSOR

Replace electric compressor. Refer to [HA-96, "Removal and Installation"](#).

>> Inspection End.

B2781 ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B2781 ELECTRIC COMPRESSOR

DTC Logic

INFOID:000000010641602

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2781	COMP IPM TEMP SENSOR	IPM temp sensor is open or shorted.	Electric compressor

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-299, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641603

1. REPLACE ELECTRIC COMPRESSOR

Replace electric compressor. Refer to [HA-96, "Removal and Installation"](#).

>> Inspection End.

B2782 ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B2782 ELECTRIC COMPRESSOR

DTC Logic

INFOID:000000010641604

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2782	COMP SHUNT SIGNAL OFFSET	When an error is detected in the shunt signal (current value in the A/C inverter).	Electric compressor

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

 With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

YES >> Refer to [HAC-300, "Diagnosis Procedure"](#).

NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641605

1.REPLACE ELECTRIC COMPRESSOR

Replace electric compressor. Refer to [HA-96, "Removal and Installation"](#).

>> Inspection End.

B2783, B2784 ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B2783, B2784 ELECTRIC COMPRESSOR

DTC Logic

INFOID:000000010641606

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2783	COMP DISCHARGE TEMP OVER HEAT	When the estimated refrigerant temperature discharged from the electric compressor 130°C (266°F) or more.	<ul style="list-style-type: none">• Electric compressor (Discharge pressure increase)• Cooling fan
B2784	COMP DISCHARGE TEMP LIMIT	When the estimated refrigerant temperature discharged from the electric compressor 110°C (230°F) or more.	<ul style="list-style-type: none">• Refrigerant leakage• Refrigerant insufficient

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

YES >> Refer to [HAC-301, "Diagnosis Procedure"](#).

NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641607

1. CHECK REFRIGERANT FOR LEAKAGES

Check refrigerant for leakages. Refer to [HA-85, "Check Refrigerant Leakage"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning parts.

2. CHECK COOLING FAN OPERATION

1. Set the vehicle to READY.
2. Operate the automatic air conditioning system.
3. Check that the cooling fan is operating.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Check cooling fan. Refer to [EVC-368, "Component Function Check"](#).

3. CHECK REFRIGERANT CYCLE

Check refrigerant cycle. Refer to [HA-90, "Inspection"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning parts.

4. CHECK AIR CONDITIONING SYSTEM BY RE-FILLING REFRIGERANT

1. Collect refrigerant, and charge the air conditioning system from a new service can with the specified amount refrigerant.
2. After operate air conditioning system 15 minutes or more, perform DTC confirmation procedure, and check that DTC [B2783] or DTC [B2784] is not detected.

Is the inspection result normal?

B2783, B2784 ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

- YES >> Replace electric compressor. Refer to [HA-96. "Removal and Installation"](#).
- NO >> Repair or replace malfunctioning parts.

B2785, B2786 ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B2785, B2786 ELECTRIC COMPRESSOR

DTC Logic

INFOID:000000010641608

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2785	COMP IPM OVER HEAT	<ul style="list-style-type: none">When the IPM temperature 125°C (257°F) or more within 1 min. after starting the electric compressor.When the IPM temperature 88°C (190°F) or more after 1 min. or longer after starting the electric compressor.	<ul style="list-style-type: none">Electric compressor (Discharge pressure increase)Cooling fanRefrigerant leakageRefrigerant insufficient
B2786	COMP IPM DISCHARGE TEMP LIMIT	When the IPM temperature 83°C (181°F) or more.	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

④ With CONSULT

- Turn power switch OFF.
- Set the vehicle to READY.
- Operate the automatic air conditioning system.
- Set the temperature to full cold and wait at least 2 seconds.
- Select "Self Diagnostic Result" of "HVAC" using CONSULT.
- Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-303, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641609

1. CHECK REFRIGERANT FOR LEAKAGES

Check refrigerant for leakages. Refer to [HA-85, "Check Refrigerant Leakage"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace malfunctioning parts.

2. CHECK COOLING FAN OPERATION

- Set the vehicle to READY.
- Operate the automatic air conditioning system.
- Check that the cooling fan is operating.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Check cooling fan. Refer to [EVC-368, "Component Function Check"](#).

3. CHECK REFRIGERANT CYCLE

Check refrigerant cycle. Refer to [HA-90, "Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair or replace malfunctioning parts.

4. CHECK AIR CONDITIONING SYSTEM BY RE-FILLING REFRIGERANT

- Collect refrigerant, and charge the air conditioning system from a new service can with the specified amount refrigerant.
- After operate air conditioning system 15 minutes or more, perform DTC confirmation procedure, and check that DTC [B2785] or DTC [B2786] is not detected.

B2785, B2786 ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

Is the inspection result normal?

YES >> Replace electric compressor. Refer to [HA-96, "Removal and Installation"](#).

NO >> Repair or replace malfunctioning parts.

B2787 ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B2787 ELECTRIC COMPRESSOR

DTC Logic

INFOID:000000010641610

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2787	COMP VOLTAGE SATURATION	When the motor voltage 140% or more relative to the inverter output voltage.	<ul style="list-style-type: none">• Li-ion battery• Electric compressor (Discharge pressure increase)• Cooling fan• Overfilled refrigerant

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

④ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

YES >> Refer to [HAC-305, "Diagnosis Procedure"](#).

NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641611

HAC

1. CHECK LI-ION BATTERY

Check Li-ion battery. Refer to [EVB-69, "Work Flow"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning parts.

2. CHECK REFRIGERANT FOR LEAKAGES

Check refrigerant for leakages. Refer to [HA-85, "Check Refrigerant Leakage"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning parts.

3. CHECK COOLING FAN OPERATION

1. Set the vehicle to READY.
2. Operate the automatic air conditioning system.
3. Check that the cooling fan is operating.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Check cooling fan. Refer to [EVC-368, "Component Function Check"](#).

4. CHECK REFRIGERANT CYCLE

Check refrigerant cycle. Refer to [HA-90, "Inspection"](#).

Is the inspection result normal?

YES >> Replace electric compressor. Refer to [HA-96, "Removal and Installation"](#).

NO >> Repair or replace malfunctioning parts.

B2788 ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B2788 ELECTRIC COMPRESSOR

DTC Logic

INFOID:000000010641612

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2788	COMP OVER CURRENT	When the electric compressor is not operated under the following conditions: <ul style="list-style-type: none">• Within 90 seconds after starting• Motor current is 35.1 A or more• 3 times in a 5 second interval	<ul style="list-style-type: none">• Electric compressor (Discharge pressure increase) (Inverter internal short-circuit) (Stuck compressor)• Cooling fan

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

YES >> Refer to [HAC-306, "Diagnosis Procedure"](#).

NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641613

1. CHECK REFRIGERANT FOR LEAKAGES

Check refrigerant for leakages. Refer to [HA-85, "Check Refrigerant Leakage"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning parts.

2. CHECK COOLING FAN OPERATION

1. Set the vehicle to READY.
2. Operate the automatic air conditioning system.
3. Check that the cooling fan is operating.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Check cooling fan. Refer to [EVC-368, "Component Function Check"](#).

3. CHECK ELECTRIC COMPRESSOR OPERATION

Check electric compressor operation.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace electric compressor. Refer to [HA-96, "Removal and Installation"](#).

4. CHECK REFRIGERANT CYCLE

Check refrigerant cycle. Refer to [HA-90, "Inspection"](#).

Is the inspection result normal?

YES >> Replace electric compressor. Refer to [HA-96, "Removal and Installation"](#).

NO >> Repair or replace malfunctioning parts.

B2789 ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B2789 ELECTRIC COMPRESSOR

DTC Logic

INFOID:000000010641614

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2789	COMP OVER LOADED	When a current of 13.5 A or more is input to the electric compressor.	<ul style="list-style-type: none">• Electric compressor (Discharge pressure increase)• Cooling fan

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-307, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641615

1. CHECK REFRIGERANT FOR LEAKAGES

Check refrigerant for leakages. Refer to [HA-85, "Check Refrigerant Leakage"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Repair or replace malfunctioning parts.

2. CHECK COOLING FAN OPERATION

1. Set the vehicle to READY.
2. Operate the automatic air conditioning system.
3. Check that the cooling fan is operating.

Is the inspection result normal?

- YES >> GO TO 3.
NO >> Check cooling fan. Refer to [EVC-368, "Component Function Check"](#).

3. CHECK REFRIGERANT CYCLE

Check refrigerant cycle. Refer to [HA-90, "Inspection"](#).

Is the inspection result normal?

- YES >> Replace electric compressor. Refer to [HA-96, "Removal and Installation"](#).
NO >> Repair or replace malfunctioning parts.

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B278A, B278B ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B278A, B278B ELECTRIC COMPRESSOR

DTC Logic

INFOID:000000010641616

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B278A	COMP LOW VOLTAGE	When the high voltage system input voltage is less than 230 V.	<ul style="list-style-type: none">• Electric compressor• Li-ion battery• PDM• High voltage harness or connectors (Electric compressor high voltage circuit is open or shorted.)
B278B	COMP HIGH VOLTAGE	When the high voltage system input voltage is more than 420 V.	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

④ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-308, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641617

DANGER:



Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.
- Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.
- Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.
- Refer to [GI-34, "High Voltage Precautions"](#).

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

Regarding Wiring Diagram information, refer to [HAC-254, "Wiring Diagram"](#).

DIAGNOSIS PROCEDURE

CAUTION:

Erase DTC after the work is completed.

1. PRECONDITIONING

B278A, B278B ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

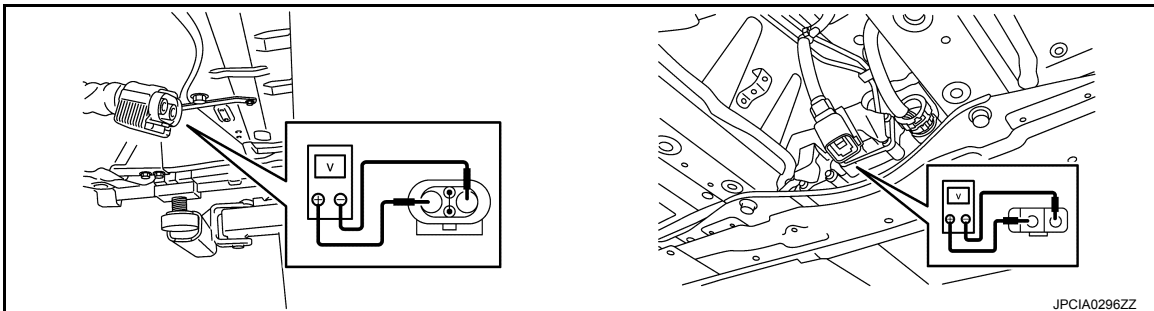
[AUTO A/C (WITHOUT HEAT PUMP)]

WARNING:

Disconnect the high voltage. Refer to [GI-33, "How to Disconnect High Voltage"](#).

Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181, "Exploded View"](#).
2. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181, "Removal and Installation"](#).
3. Measure voltage between high voltage harness connector terminals and PTC heater harness connector terminals.



DANGER:



Touching high voltage components without using the appropriate protective equipment will cause electrocution.



Standard : 5 V or less

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 2.

2.CHECK LI-ION BATTERY

1. Connect 12V battery negative terminal.
2. Check Li-ion battery. Refer to [EVB-69, "Work Flow"](#).

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Repair or replace malfunctioning components.

3.CHECK PDM (POWER DELIVERY MODULE)

Check PDM (power delivery module). Refer to [EVC-126, "Work Flow"](#).

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair or replace malfunctioning components.

4.CHECK ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS POWER SUPPLY CIRCUIT FOR OPEN

1. Disconnect electric compressor and Li-ion battery connector.
2. Check continuity between electric compressor high voltage harness connector and Li-ion battery high voltage harness connector.

Electric compressor		Li-ion battery		Continuity
Connector	Terminal	Connector	Terminal	
H1	1	H3	37	Yes

Is the inspection result normal?

- YES >> GO TO 5.

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B278A, B278B ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

NO >> Replace high voltage harness between electric compressor and PDM (power delivery module), and between PDM (power delivery module) and Li-ion battery.

5. CHECK ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS GROUND CIRCUIT

Check continuity between electric compressor high voltage harness connector and Li-ion battery high voltage harness connector.

Electric compressor		Li-ion battery		Continuity
Connector	Terminal	Connector	Terminal	
H1	2	H3	38	Yes

Is the inspection result normal?

YES >> Replace electric compressor. Refer to [HA-96. "Removal and Installation"](#).

NO >> Replace high voltage harness between electric compressor and PDM (power delivery module), and between PDM (power delivery module) and Li-ion battery.

B278C, B278D ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B278C, B278D ELECTRIC COMPRESSOR

DTC Logic

INFOID:000000010641618

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B278C	COMP COMM ERROR HVAC→COMP	When the electric compressor cannot receive the signal sent from the A/C auto amp.	<ul style="list-style-type: none">• Electric compressor• A/C auto amp.• Harness or connectors (Electric compressor circuit is open or shorted.)• High voltage harness or connectors (Electric compressor high voltage circuit is open or shorted.)
B278D	COMP COMM ERROE COMP→HVAC	When the A/C auto amp. cannot receive the signal sent from the electric compressor.	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
4. Check DTC.


Is DTC detected?

- YES >> Refer to [HAC-311, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641619

DANGER:

 Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.
- Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.
- Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.
- Refer to [GI-34, "High Voltage Precautions"](#).

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

Regarding Wiring Diagram information, refer to [HAC-254, "Wiring Diagram"](#).

DIAGNOSIS PROCEDURE

CAUTION:

Erase DTC after the work is completed.

1. PRECONDITIONING

B278C, B278D ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

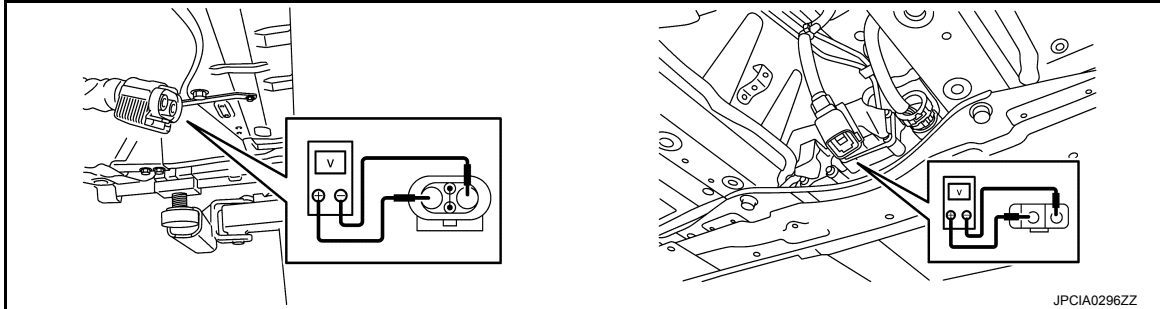
[AUTO A/C (WITHOUT HEAT PUMP)]

WARNING:

Disconnect the high voltage. Refer to [GI-33, "How to Disconnect High Voltage"](#).

Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181, "Exploded View"](#).
2. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181, "Removal and Installation"](#).
3. Measure voltage between high voltage harness connector terminals and PTC heater harness connector terminals.



DANGER:



Touching high voltage components without using the appropriate protective equipment will cause electrocution.



Standard : 5 V or less

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 2.

2. CHECK ELECTRIC COMPRESSOR COMMUNICATION LINE FOR OPEN

1. Turn power switch OFF.
2. Disconnect electric compressor and A/C auto amp. connector.
3. Check continuity between electric compressor harness connector and A/C auto amp. harness connector.

NOTE:

Check for any adhering foreign substances, cracking, or damage on the electric compressor terminal and A/C auto amp. harness connector terminal.

Electric compressor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
F10	7	M55	14	Yes
	9		18	

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair harness or connector.

3. CHECK ELECTRIC COMPRESSOR COMMUNICATION LINE FOR SHORT

Check continuity between electric compressor harness connector and ground.

Electric compressor		Ground	Continuity
Connector	Terminal		
F10	7		No
	9		

B278C, B278D ELECTRIC COMPRESSOR

[AUTO A/C (WITHOUT HEAT PUMP)]

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair harness or connector.

4. CHECK ELECTRIC COMPRESSOR POWER SUPPLY

1. Disconnect electric compressor connector.
2. Turn power switch ON.
3. Check voltage between electric compressor harness connector and ground.

+		-	Voltage (Approx.)
Electric compressor			
Connector	Terminal		
F10	10	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> GO TO 6.

5. CHECK ELECTRIC COMPRESSOR GROUND CIRCUIT

1. Turn power switch OFF.
2. Check continuity between electric compressor harness connector and ground.

Electric compressor		Ground	Continuity
Connector	Terminal		
F10	8		Yes

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Repair harness or connector.

6. CHECK A/C RELAY CIRCUIT

Check A/C relay circuit. Refer to [EVC-386, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> Repair harness or connector between A/C relay and electric compressor.
- NO >> Repair or replace malfunctioning components.

7. CHECK PDM (POWER DELIVERY MODULE)

Check PDM (power delivery module). Refer to [EVC-126, "Work Flow"](#).

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Repair or replace malfunctioning components.

8. CHECK ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS POWER SUPPLY CIRCUIT FOR OPEN

1. Disconnect electric compressor and Li-ion battery connector.
2. Check continuity between electric compressor high voltage harness connector and Li-ion battery high voltage harness connector.

Electric compressor		Li-ion battery		Continuity
Connector	Terminal	Connector	Terminal	
H1	1	H3	37	Yes

Is the inspection result normal?

- YES >> GO TO 9.
- NO >> Replace high voltage harness between electric compressor and PDM (power delivery module), and between PDM (power delivery module) and Li-ion battery.

9. CHECK ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS GROUND CIRCUIT

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B278C, B278D ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

Check continuity between electric compressor high voltage harness connector and Li-ion battery high voltage harness connector.

Electric compressor		Li-ion battery		Continuity
Connector	Terminal	Connector	Terminal	
H1	2	H3	38	Yes

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace high voltage harness between electric compressor and PDM (power delivery module), and between PDM (power delivery module) and Li-ion battery.

10.CHECK A/C AUTO AMP.

 With CONSULT

1. Reconnect all harness connectors disconnected.
2. Set the vehicle to READY.
3. Using CONSULT, perform "MODE1" of "HVAC TEST" in "Active Test" of "HVAC". Refer to [HAC-243. "CONSULT Function"](#).
4. Check that the electric compressor operates normally.

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace A/C auto amp. Refer to [HAC-348. "Removal and Installation"](#). Then GO TO 11.

11.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC confirmation procedure. Refer to [HAC-311. "DTC Logic"](#).

Is DTC B278C detected?

YES >> Replace electric compressor. Refer to [HA-96. "Removal and Installation"](#).

NO >> Inspection End.

B2791 ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B2791 ELECTRIC COMPRESSOR

DTC Logic

INFOID:000000010641620

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2791	COMP LOW SPEED HIGH LOAD	When the driving load of the electric compressor reaches a maximum value during slow rotation.	<ul style="list-style-type: none">• Electric compressor• Cooling fan• Li-ion battery• PDM• Overfilled refrigerant

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

④ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

YES >> Refer to [HAC-315, "Diagnosis Procedure"](#).

NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641621

HAC

1. CHECK REFRIGERANT FOR LEAKAGES

Check refrigerant for leakages. Refer to [HA-85, "Check Refrigerant Leakage"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning parts.

2. CHECK COOLING FAN OPERATION

1. Set the vehicle to READY.
2. Operate the automatic air conditioning system.
3. Check that the cooling fan is operating.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Check cooling fan. Refer to [EVC-368, "Component Function Check"](#).

3. CHECK REFRIGERANT CYCLE

Check refrigerant cycle. Refer to [HA-90, "Inspection"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace malfunctioning parts.

4. CHECK LI-ION BATTERY

Check Li-ion battery. Refer to [EVB-69, "Work Flow"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace malfunctioning parts.

5. CHECK PDM (POWER DELIVERY MODULE)

B2791 ELECTRIC COMPRESSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

Check PDM (power delivery module). Refer to [EVC-126. "Work Flow"](#).

Is the inspection result normal?

- YES >> Replace electric compressor. Refer to [HA-96. "Removal and Installation"](#).
- NO >> Repair or replace malfunctioning components.

B27A0, B27A1 INTAKE DOOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B27A0, B27A1 INTAKE DOOR MOTOR

DTC Logic

INFOID:000000010641622

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-279, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-280, "DTC Logic"](#).

DTC	Items (CONSULT screen terms)	DTC detection condition*	Possible cause
B27A0	INTAKE DOOR MOTOR	PBR opening angle of intake door motor is 50% or more (PBR feedback signal voltage of intake door motor is 2.5 V or more).	<ul style="list-style-type: none">• Intake door motor• Intake door motor system installation condition• A/C auto amp.• Harness or connectors (The motor circuit is open or shorted.)
B27A1		PBR opening angle of intake door motor is 30% or less (PBR feedback signal voltage of intake door motor is 1.5 V or less).	

*: A/C auto amp. operates intake door motor according to target value of PBR opening angle at 40% when performing self-diagnosis.

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Set the vehicle to READY.
2. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
3. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-317, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641623

Regarding Wiring Diagram information, refer to [HAC-254, "Wiring Diagram"](#).

1. CHECK INTAKE DOOR MOTOR OPERATION

1. Turn power switch ON.
2. Operate intake switch and check by operation sound that intake door motor operates.

Does the intake door motor operate?

- YES >> GO TO 2.
NO >> GO TO 8.

2. CHECK INTAKE DOOR MOTOR PBR POWER SUPPLY

1. Disconnect intake door motor connector.
2. Turn power switch ON.
3. Check voltage between intake door motor harness connector and ground.

+		-	Voltage (Approx.)
Intake door motor			
Connector	Terminal		
M54	1	Ground	5 V

Is the inspection result normal?

B27A0, B27A1 INTAKE DOOR MOTOR

[AUTO A/C (WITHOUT HEAT PUMP)]

< DTC/CIRCUIT DIAGNOSIS >

- YES >> GO TO 3.
NO >> GO TO 7.

3. CHECK INTAKE DOOR MOTOR PBR GROUND CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between intake door motor harness connector and A/C auto amp. harness connector.

Intake door motor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M54	3	M55	30	Yes

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair harness or connector.

4. CHECK INTAKE DOOR MOTOR PBR FEEDBACK SIGNAL CIRCUIT FOR OPEN

Check continuity between intake door motor harness connector and A/C auto amp. harness connector.

Intake door motor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M54	2	M55	38	Yes

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Repair harness or connector.

5. CHECK INTAKE DOOR MOTOR PBR FEEDBACK SIGNAL CIRCUIT FOR SHORT

Check continuity between intake door motor harness connector and ground.

Intake door motor		—	Continuity
Connector	Terminal		
M54	2	Ground	No

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair harness or connector.

6. CHECK INTAKE DOOR MOTOR PBR

Check intake door motor PBR. Refer to [HAC-319. "Component Inspection \(PBR\)".](#)

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-348. "Removal and Installation".](#)
NO >> Replace intake door motor. Refer to [HAC-363. "INTAKE DOOR MOTOR : Removal and Installation".](#)

7. CHECK INTAKE DOOR MOTOR PBR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between intake door motor harness connector and A/C auto amp. harness connector.

Intake door motor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M54	1	M55	27	Yes

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-348. "Removal and Installation".](#)
NO >> Repair harness or connector.

B27A0, B27A1 INTAKE DOOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

8. CHECK INTAKE DOOR MOTOR DRIVE SIGNAL CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect intake door motor connector, and A/C auto amp. connector.
3. Check continuity between intake door motor harness connector and A/C auto amp. harness connector.

Intake door motor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M54	5	M55	21	Yes
	6		1	

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair harness or connector.

9. CHECK INTAKE DOOR MOTOR DRIVE SIGNAL CIRCUIT FOR SHORT

Check continuity between intake door motor harness connector and ground.

Intake door motor		—	Continuity
Connector	Terminal		
M54	5	Ground	No
	6		

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair harness or connector.

10. CHECK INTAKE DOOR MOTOR

1. Turn power switch OFF.
2. Check intake door motor. Refer to [HAC-320, "Component Inspection \(Motor\)"](#).

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace intake door motor. Refer to [HAC-363, "INTAKE DOOR MOTOR : Removal and Installation"](#).

11. CHECK INSTALLATION OF INTAKE DOOR MOTOR SYSTEM

Check intake door motor system is properly installed. Refer to [HAC-362, "Exploded View"](#).

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to [HAC-363, "INTAKE DOOR MOTOR : Removal and Installation"](#).

NO >> Repair or replace malfunctioning components.

Component Inspection (PBR)

INFOID:000000010641624

1. CHECK INTAKE DOOR MOTOR PBR

Check resistance between intake door motor terminals.

Terminal		Resistance (Ω)
1	2	Except 0 or ∞
	3	

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace intake door motor. Refer to [HAC-363, "INTAKE DOOR MOTOR : Removal and Installation"](#).

B27A0, B27A1 INTAKE DOOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

Component Inspection (Motor)

INFOID:000000010641625

1.CHECK INTAKE DOOR MOTOR

Supply intake door motor terminals with battery voltage and check by visually and operation sound that intake door motor operates.

Terminal		Operation direction
+	-	
5	6	REC
6	5	FRE

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace intake door motor. Refer to [HAC-363, "INTAKE DOOR MOTOR : Removal and Installation"](#).

B27A2, B27A3, B27A4, B27A5 AIR MIX DOOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B27A2, B27A3, B27A4, B27A5 AIR MIX DOOR MOTOR

DTC Logic

INFOID:000000010641626

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-279, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-280, "DTC Logic"](#).
- If air mix door motors DTC (B27A2 – B27A5) are detected, there is probably a disconnected connector or an open circuit in air mix door motor drive power supply harness.

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27A2	AIR MIX DOOR MOTOR	Short or open circuit of air mix door motor drive signal terminal 1.	<ul style="list-style-type: none">• Air mix door motor• A/C auto amp.• Harness or connectors (The motor circuit is open or shorted.)
B27A3		Short or open circuit of air mix door motor drive signal terminal 2.	
B27A4		Short or open circuit of air mix door motor drive signal terminal 3.	
B27A5		Short or open circuit of air mix door motor drive signal terminal 4.	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

 With CONSULT

1. Turn power switch ON.
2. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
3. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-321, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641627

Regarding Wiring Diagram information, refer to [HAC-254, "Wiring Diagram"](#).

1. CHECK AIR MIX DOOR MOTOR POWER SUPPLY

1. Turn power switch OFF.
2. Disconnect air mix door motor connector.
3. Turn power switch ON.
4. Check voltage between air mix door motor harness connector and ground.

+		-	Voltage (Approx.)
Air mix door motor			
Connector	Terminal		
M146	4	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2. CHECK A/C RELAY CIRCUIT

B27A2, B27A3, B27A4, B27A5 AIR MIX DOOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

Check A/C relay circuit. Refer to [EVC-386, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> Repair harness or connector between A/C relay and air mix door motor.
- NO >> Repair or replace malfunctioning components.

3.CHECK AIR MIX DOOR MOTOR DRIVE SIGNAL CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between air mix door motor harness connector and A/C auto amp. harness connector.

Air mix door motor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M146	6	M55	6	Yes
	5		7	
	2		8	
	1		9	

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair harness or connector.

4.CHECK AIR MIX DOOR MOTOR DRIVE SIGNAL CIRCUIT FOR SHORT

Check continuity between air mix door motor harness connector and A/C auto amp. harness connector.

Air mix door motor		—	Continuity
Connector	Terminal		
M146	6	Ground	No
	5		
	2		
	1		

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair harness or connector.

5.CHECK AIR MIX DOOR MOTOR

Check air mix door motor. Refer to [HAC-322, "Component Inspection"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-348, "Removal and Installation"](#).
- NO >> Replace air mix door motor. Refer to [HAC-364, "AIR MIX DOOR MOTOR : Removal and Installation"](#).

Component Inspection

INFOID:000000010641628

1.CHECK AIR MIX DOOR MOTOR

1. Remove air mix door motor. Refer to [HAC-364, "AIR MIX DOOR MOTOR : Removal and Installation"](#).
2. Check resistance between air mix door motor terminals. Refer to applicable table for the normal value.

Terminal	Resistance (Ω) (Approx.)	
4	1	90
	2	
	5	
	6	

B27A2, B27A3, B27A4, B27A5 AIR MIX DOOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace air mix door motor. Refer to [HAC-364. "AIR MIX DOOR MOTOR : Removal and Installation"](#).

A

B

C

D

E

F

G

H

HAC

J

K

L

M

N

O

P

B27A6, B27A7, B27A8, B27A9 MODE DOOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B27A6, B27A7, B27A8, B27A9 MODE DOOR MOTOR

DTC Logic

INFOID:000000010641629

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-279, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-280, "DTC Logic"](#).
- If mode door motors DTC (B27A6 – B27A9) are detected, there is probably a disconnected connector or an open circuit in mode door motor drive power supply harness.

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27A6	MODE DOOR MOTOR	Short or open circuit of mode door motor drive signal terminal 1.	<ul style="list-style-type: none">• Mode door motor• A/C auto amp.• Harness or connectors (The motor circuit is open or shorted.)
B27A7		Short or open circuit of mode door motor drive signal terminal 2.	
B27A8		Short or open circuit of mode door motor drive signal terminal 3.	
B27A9		Short or open circuit of mode door motor drive signal terminal 4.	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

1. Turn power switch ON.
2. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
3. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-324, "Diagnosis Procedure"](#).
NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641630

Regarding Wiring Diagram information, refer to [HAC-254, "Wiring Diagram"](#).

1. CHECK MODE DOOR MOTOR POWER SUPPLY

1. Turn power switch OFF.
2. Disconnect mode door motor connector.
3. Turn power switch ON.
4. Check voltage between mode door motor harness connector and ground.

+		-	Voltage (Approx.)
Mode door motor			
Connector	Terminal		
M142	4	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 2.

2. CHECK A/C RELAY CIRCUIT

B27A6, B27A7, B27A8, B27A9 MODE DOOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

Check A/C relay circuit. Refer to [EVC-386. "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> Repair harness or connector between A/C relay and mode door motor.
- NO >> Repair or replace malfunctioning components.

3.CHECK MODE DOOR MOTOR DRIVE SIGNAL CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between mode door motor harness connector and A/C auto amp. harness connector.

Mode door motor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M142	6	M55	2	Yes
	5		3	
	2		4	
	1		5	

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair harness or connector.

4.CHECK MODE DOOR MOTOR DRIVE SIGNAL CIRCUIT FOR SHORT

Check continuity between mode door motor harness connector and A/C auto amp. harness connector.

Mode door motor		—	Continuity
Connector	Terminal		
M142	6	Ground	No
	5		
	2		
	1		

Is the inspection result normal?

- YES >> GO TO 5.
- NO >> Repair harness or connector.

5.CHECK MODE DOOR MOTOR

Check mode door motor. Refer to [HAC-325. "Component Inspection"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-348. "Removal and Installation"](#).
- NO >> Replace mode door motor. Refer to [HAC-364. "MODE DOOR MOTOR : Removal and Installation"](#).

Component Inspection

INFOID:0000000010641631

1.CHECK MODE DOOR MOTOR

1. Remove mode door motor. Refer to [HAC-364. "MODE DOOR MOTOR : Removal and Installation"](#).
2. Check resistance between mode door motor terminals. Refer to applicable table for the normal value.

Terminal	Resistance (Ω) (Approx.)	
4	1	90
	2	
	5	
	6	

B27A6, B27A7, B27A8, B27A9 MODE DOOR MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace mode door motor. Refer to [HAC-364. "MODE DOOR MOTOR : Removal and Installation"](#).

B27C2, B27C3 PTC HEATER OUTLET AIR TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B27C2, B27C3 PTC HEATER OUTLET AIR TEMPERATURE SENSOR

DTC Logic

INFOID:000000010641632

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-279, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-280, "DTC Logic"](#).

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27C2	PTC OUT AIR TEMP SENS	The PTC heater outlet air temperature sensor recognition temperature is too low [less than -42°C (-44°F)].	<ul style="list-style-type: none"> • PTC heater outlet air temperature sensor • A/C auto amp. • Harness or connectors (The sensor circuit is open or shorted.)
B27C3		The PTC heater outlet air temperature sensor recognition temperature is too high [more than 200°C (392°F)].	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full hot and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-327, "Diagnosis Procedure"](#).
 NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641633

Regarding Wiring Diagram information, refer to [HAC-254, "Wiring Diagram"](#).

1. CHECK PTC HEATER OUTLET AIR TEMPERATURE SENSOR VOLTAGE SIGNAL

1. Turn power switch ON.
2. Operate the automatic air conditioning system.
3. Check voltage between A/C auto amp. harness connector terminals.

connector	A/C auto amp.		Test condition	Voltage signal																					
	+	-																							
Terminal																									
M55	17	10	<ul style="list-style-type: none"> • Power switch ON • When air conditioner is operating 	<table border="1"> <caption>Voltage Signal vs Temperature</caption> <thead> <tr> <th>Temperature (°C)</th> <th>Temperature (°F)</th> <th>Voltage (V)</th> </tr> </thead> <tbody> <tr><td>0</td><td>32</td><td>4.00</td></tr> <tr><td>20</td><td>68</td><td>3.16</td></tr> <tr><td>40</td><td>104</td><td>2.25</td></tr> <tr><td>60</td><td>140</td><td>1.50</td></tr> <tr><td>80</td><td>176</td><td>0.97</td></tr> <tr><td>100</td><td>212</td><td>0.63</td></tr> </tbody> </table> <p>JSIIA1778ZZ</p>	Temperature (°C)	Temperature (°F)	Voltage (V)	0	32	4.00	20	68	3.16	40	104	2.25	60	140	1.50	80	176	0.97	100	212	0.63
Temperature (°C)	Temperature (°F)	Voltage (V)																							
0	32	4.00																							
20	68	3.16																							
40	104	2.25																							
60	140	1.50																							
80	176	0.97																							
100	212	0.63																							

Is the inspection result normal?

B27C2, B27C3 PTC HEATER OUTLET AIR TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

- YES >> GO TO 7.
NO >> GO TO 2.

2. CHECK PTC HEATER OUTLET AIR TEMPERATURE SENSOR POWER SUPPLY

1. Turn power switch OFF.
2. Disconnect PTC heater outlet air and A/C unit case temperature sensor assembly connector.
3. Turn power switch ON.
4. Check voltage between PTC heater outlet air and A/C unit case temperature sensor assembly harness connector and ground.

+		-	Voltage (Approx.)
Connector	Terminal		
M138	2	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
NO >> GO TO 5.

3. CHECK PTC HEATER OUTLET AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between PTC heater outlet air and A/C unit case temperature sensor assembly harness connector and A/C auto amp harness connector.

PTC heater outlet air and A/C unit case temperature sensor assembly		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M138	1	M55	30	Yes

Is the inspection result normal?

- YES >> GO TO 4.
NO >> Repair harness or connector.

4. CHECK PTC HEATER OUTLET AIR TEMPERATURE SENSOR

Check PTC heater outlet air temperature sensor. Refer to [HAC-329, "Component Inspection"](#).

Is the inspection result normal?

- YES >> Inspection End.
NO >> Replace PTC heater outlet air and A/C unit case temperature sensor assembly. Refer to [HAC-355, "Removal and Installation"](#).

5. CHECK PTC HEATER OUTLET AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between PTC heater outlet air and A/C unit case temperature sensor assembly harness connector and A/C auto amp. harness connector.

PTC heater outlet air and A/C unit case temperature sensor assembly		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M138	2	M55	17	Yes

Is the inspection result normal?

- YES >> GO TO 6.
NO >> Repair harness or connector.

6. CHECK PTC HEATER OUTLET AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT FOR SHORT

B27C2, B27C3 PTC HEATER OUTLET AIR TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

Check continuity between PTC heater outlet air and A/C unit case temperature sensor assembly harness connector and ground.

PTC heater outlet air and A/C unit case temperature sensor assembly		—	Continuity
Connector	Terminal		
M138	2	Ground	No

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to [HAC-348. "Removal and Installation"](#).

NO >> Repair harness or connector.

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-53. "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to [HAC-348. "Removal and Installation"](#).

NO >> Repair or replace malfunctioning components.

Component Inspection

INFOID:000000010641634

1. CHECK PTC HEATER OUTLET AIR TEMPERATURE SENSOR

1. Remove PTC heater outlet air and A/C unit case temperature sensor assembly. Refer to [HAC-355. "Removal and Installation"](#).
2. Check resistance between PTC heater outlet air and A/C unit case temperature sensor assembly terminals. Refer to applicable table for the normal value.

Terminal		Condition	Resistance: kΩ
		Temperature: °C (°F)	
1	2	0 (32)	6.00
		10 (50)	3.87
		20 (68)	2.57
		30 (86)	1.76
		40 (104)	1.23
		60 (140)	0.64
		80 (176)	0.36
		100 (212)	0.22

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace PTC heater outlet air and A/C unit case temperature sensor assembly. Refer to [HAC-355. "Removal and Installation"](#).

B27C4, B27C5 A/C UNIT CASE TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B27C4, B27C5 A/C UNIT CASE TEMPERATURE SENSOR

DTC Logic

INFOID:000000010641635

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to [HAC-279, "DTC Logic"](#).
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. [HAC-280, "DTC Logic"](#).

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27C4	A/C UNIT CASE TEMP SENS	The A/C unit case temperature sensor recognition temperature is too low [less than -42°C (-44°F)].	<ul style="list-style-type: none"> • A/C unit case temperature sensor • A/C auto amp. • Harness or connectors (The sensor circuit is open or shorted.)
B27C5		The A/C unit case temperature sensor recognition temperature is too high [more than 200°C (392°F)].	

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓟ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full hot and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-336, "Diagnosis Procedure"](#).
 NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641636

Regarding Wiring Diagram information, refer to [HAC-254, "Wiring Diagram"](#).

1. CHECK A/C UNIT CASE TEMPERATURE SENSOR VOLTAGE SIGNAL

1. Turn power switch ON.
2. Operate the automatic air conditioning system.
3. Check voltage between A/C auto amp. harness connector terminals.

connector	A/C auto amp.		Test condition	Voltage signal																					
	+	-																							
Terminal																									
M55	37	10	<ul style="list-style-type: none"> • Power switch ON • When air conditioner is operating 	<table border="1"> <caption>Voltage Signal vs Temperature</caption> <thead> <tr> <th>Temperature (°C)</th> <th>Temperature (°F)</th> <th>Voltage (V)</th> </tr> </thead> <tbody> <tr><td>0</td><td>32</td><td>4.00</td></tr> <tr><td>20</td><td>68</td><td>3.16</td></tr> <tr><td>40</td><td>104</td><td>2.25</td></tr> <tr><td>60</td><td>140</td><td>1.50</td></tr> <tr><td>80</td><td>176</td><td>0.97</td></tr> <tr><td>100</td><td>212</td><td>0.63</td></tr> </tbody> </table> <p>JSIIA1778ZZ</p>	Temperature (°C)	Temperature (°F)	Voltage (V)	0	32	4.00	20	68	3.16	40	104	2.25	60	140	1.50	80	176	0.97	100	212	0.63
Temperature (°C)	Temperature (°F)	Voltage (V)																							
0	32	4.00																							
20	68	3.16																							
40	104	2.25																							
60	140	1.50																							
80	176	0.97																							
100	212	0.63																							

Is the inspection result normal?

B27C4, B27C5 A/C UNIT CASE TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

- YES >> GO TO 7.
- NO >> GO TO 2.

2. CHECK A/C UNIT CASE TEMPERATURE SENSOR POWER SUPPLY

1. Turn power switch OFF.
2. Disconnect PTC heater outlet air and A/C unit case temperature sensor assembly connector.
3. Turn power switch ON.
4. Check voltage between PTC heater outlet air and A/C unit case temperature sensor assembly harness connector and ground.

+		-	Voltage (Approx.)
PTC heater outlet air and A/C unit case temperature sensor assembly			
Connector	Terminal		
M138	4	Ground	5 V

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> GO TO 5.

3. CHECK A/C UNIT CASE TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between PTC heater outlet air and A/C unit case temperature sensor assembly harness connector and A/C auto amp harness connector.

PTC heater outlet air and A/C unit case temperature sensor assembly		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M138	3	M55	30	Yes

Is the inspection result normal?

- YES >> GO TO 4.
- NO >> Repair harness or connector.

4. CHECK A/C UNIT CASE TEMPERATURE SENSOR

Check A/C unit case temperature sensor. Refer to [HAC-332, "Component Inspection"](#).

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-348, "Removal and Installation"](#).
- NO >> Replace PTC heater outlet air and A/C unit case temperature sensor assembly. Refer to [HAC-355, "Removal and Installation"](#).

5. CHECK A/C UNIT CASE TEMPERATURE SENSOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect A/C auto amp. connector.
3. Check continuity between PTC heater outlet air and A/C unit case temperature sensor assembly harness connector and A/C auto amp. harness connector.

PTC heater outlet air and A/C unit case temperature sensor assembly		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M138	4	M55	37	Yes

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Repair harness or connector.

6. CHECK A/C UNIT CASE TEMPERATURE SENSOR POWER SUPPLY CIRCUIT FOR SHORT

B27C4, B27C5 A/C UNIT CASE TEMPERATURE SENSOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

Check continuity between PTC heater outlet air and A/C unit case temperature sensor assembly harness connector and ground.

PTC heater outlet air and A/C unit case temperature sensor assembly		—	Continuity
Connector	Terminal		
M138	4	Ground	No

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to [HAC-348. "Removal and Installation"](#).

NO >> Repair harness or connector.

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to [GI-53. "Intermittent Incident"](#).

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to [HAC-348. "Removal and Installation"](#).

NO >> Repair or replace malfunctioning components.

Component Inspection

INFOID:000000010641637

1. CHECK A/C CASE UNIT TEMPERATURE SENSOR

1. Remove PTC heater outlet air and A/C unit case temperature sensor assembly. Refer to [HAC-355. "Removal and Installation"](#).
2. Check resistance between PTC heater outlet air and A/C unit case temperature sensor assembly terminals. Refer to applicable table for the normal value.

Terminal		Condition	Resistance: k Ω
		Temperature: $^{\circ}$ C ($^{\circ}$ F)	
3	4	0 (32)	6.00
		10 (50)	3.87
		20 (68)	2.57
		30 (86)	1.76
		40 (104)	1.23
		60 (140)	0.64
		80 (176)	0.36
		100 (212)	0.22

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace PTC heater outlet air and A/C unit case temperature sensor assembly. Refer to [HAC-355. "Removal and Installation"](#).

B27FF A/C AUTO AMP.

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

B27FF A/C AUTO AMP.

DTC Logic

INFOID:000000010641638

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B27FF	CONFIG NOT IMPLM	When A/C auto amp. configuration (control unit setting) is not performed.	A/C auto amp (Not performed configuration)

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

Ⓜ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Operate the automatic air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select "Self Diagnostic Result" of "HVAC" using CONSULT.
6. Check DTC.

Is DTC detected?

- YES >> Refer to [HAC-333, "Diagnosis Procedure"](#).
 NO >> Inspection End.

Diagnosis Procedure

INFOID:000000010641639

1.PERFORM A/C AUTO AMP. CONFIGURATION

Ⓜ With CONSULT

1. Turn power switch ON
2. Use CONSULT and perform configuration (control unit setting) of "HVAC". Refer to [HAC-273, "Work Procedure"](#).

>> Inspection End.

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POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

POWER SUPPLY AND GROUND CIRCUIT

A/C AUTO AMP.

A/C AUTO AMP. : Diagnosis Procedure

INFOID:000000010641640

Regarding Wiring Diagram information, refer to [HAC-254. "Wiring Diagram"](#).

1. CHECK SYMPTOM

Check symptom (A or B).

Symptom	
A	<ul style="list-style-type: none">• Air conditioning system does not activate.• Air conditioning system does not operate normally.• Operation status of air conditioning system is not indicated on display.
B	<ul style="list-style-type: none">• Memory function does not operate normally.• The setting is not maintained. (It returns to the initial condition)

Which symptom is detected?

A >> GO TO 2.

B >> GO TO 4.

2. CHECK FUSE

1. Turn power switch OFF.
2. Check 10A fuse [No. 3, located in fuse block (J/B)].

NOTE:

Refer to [PG-71. "Terminal Arrangement"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace the blown fuse after repairing the affected circuit.

3. CHECK A/C AUTO AMP. POWER SWITCH POWER SUPPLY

1. Disconnect A/C auto amp. connector.
2. Turn power switch ON.
3. Check voltage between A/C auto amp. harness connector and ground.

+		-	Voltage (Approx.)
A/C auto amp.			
Connector	Terminal		
M55	32	Ground	9 V or more

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair harness or connector between A/C auto amp. and fuse.

4. CHECK FUSE

1. Turn power switch OFF.
2. Check 10A fuse [No.13, located in fuse block (J/B)].

NOTE:

Refer to [PG-71. "Terminal Arrangement"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace the blown fuse after repairing the affected circuit.

5. CHECK A/C AUTO AMP. BATTERY POWER SUPPLY

1. Disconnect A/C auto amp. connector.

POWER SUPPLY AND GROUND CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

2. Check voltage between A/C auto amp. harness connector and ground.

+		-	Voltage (Approx.)
A/C auto amp.			
Connector	Terminal		
M55	31	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair harness or connector between A/C auto amp. and fuse.

6. CHECK A/C AUTO AMP. GROUND CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Check continuity between A/C auto amp. harness connector and ground.

A/C auto amp.		—	Continuity
Connector	Terminal		
M55	10	Ground	Yes

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to [HAC-348, "Removal and Installation"](#).

NO >> Repair harness or connector.

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BLOWER MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

BLOWER MOTOR

Component Function Check

INFOID:000000010641641

1. CHECK BLOWER MOTOR

Ⓟ With CONSULT

1. Turn power switch OFF.
2. Set the vehicle to READY.
3. Using CONSULT, perform "HVAC TEST" in "Active Test" of "HVAC". Refer to [HAC-243, "CONSULT Function"](#).
4. When the test items are being conducted, check that the blower motor operates normally for each mode.

Is the inspection result normal?

YES >> Inspection End.

NO >> Refer to [HAC-336, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000010641642

Regarding Wiring Diagram information, refer to [HAC-254, "Wiring Diagram"](#).

1. CHECK FUSE

1. Turn power switch OFF.
2. Check 15A fuses [Nos. 14 and 16, located in fuse block (J/B)].

NOTE:

Refer to [PG-71, "Terminal Arrangement"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace the blown fuse after repairing the affected.

2. CHECK BLOWER MOTOR POWER SUPPLY

1. Disconnect blower motor connector.
2. Turn power switch ON.
3. Check voltage between blower motor harness connector and ground.

+		-	Voltage (Approx.)
Blower motor			
Connector	Terminal		
M39	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3. CHECK BLOWER RELAY

1. Turn power switch OFF.
2. Check blower relay. Refer to [HAC-339, "Component Inspection \(Blower Relay\)"](#).

Is the inspection result normal?

YES >> Repair harness or connector between blower motor and fuse.

NO >> Replace blower relay.

4. CHECK BLOWER MOTOR CONTROL CIRCUIT

1. Turn power switch OFF.
2. Connect blower motor connector.
3. Disconnect power transistor connector.
4. Turn power switch ON.
5. Check voltage between power transistor harness connector and ground.

BLOWER MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

+		-	Voltage (Approx.)
Power transistor			
Connector	Terminal		
M144	1	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> GO TO 5.

5.CHECK BLOWER MOTOR CONTROL CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect blower motor connector.
3. Check continuity between power transistor harness connector and blower motor harness connector.

Power transistor		Blower motor		Continuity
Connector	Terminal	Connector	Terminal	
M144	1	M39	2	Yes

Is the inspection result normal?

- YES >> Replace blower motor. Refer to [VTL-22, "Removal and Installation"](#).
- NO >> Repair harness or connector.

6.CHECK POWER TRANSISTOR POWER SWITCH POWER SUPPLY

Check voltage between power transistor harness connector and ground.

+		-	Voltage (Approx.)
Power transistor			
Connector	Terminal		
M144	3	Ground	Battery voltage

Is the inspection result normal?

- YES >> GO TO 7.
- NO >> Repair harness or connector between power transistor and fuse.

7.CHECK POWER TRANSISTOR GROUND CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Check continuity between power transistor harness connector and ground.

Power transistor		-	Continuity
Connector	Terminal		
M144	4	Ground	Yes

Is the inspection result normal?

- YES >> GO TO 8.
- NO >> Repair harness or connector.

8.CHECK POWER TRANSISTOR CONTROL SIGNAL

1. Connect blower motor connector and A/C auto amp. connector.
2. Turn power switch ON.
3. Set air outlet to VENT.
4. Change fan speed from 1st – 7th, and check duty ratios between blower motor harness connector and ground by using an oscilloscope.

NOTE:

Calculate the drive signal duty ratio as shown in the figure.
T2 = Approx. 1.6 ms

BLOWER MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

+		-	Condition	Duty ratio (Approx.)	Output waveform
Power transistor					
Connector	Terminal		Fan speed (manual) Air outlet: VENT		
M144	2	Ground	1st	26%	
			2nd	34%	
			3rd	41%	
			4th	51%	
			5th	62%	
			6th	73%	
			7th	82%	

Is the inspection result normal?

- YES >> Replace power transistor. Refer to [HAC-358, "Removal and Installation"](#).
- NO >> GO TO 9.

9. CHECK POWER TRANSISTOR CONTROL SIGNAL CIRCUIT FOR OPEN

1. Turn power switch OFF.
2. Disconnect power transistor connector and A/C auto amp. connector.
3. Check continuity between power transistor harness connector and A/C auto amp. harness connector.

Power transistor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M144	2	M55	12	Yes

Is the inspection result normal?

- YES >> GO TO 10.
- NO >> Repair harness or connector.

10. CHECK POWER TRANSISTOR CONTROL SIGNAL CIRCUIT FOR SHORT

Check continuity between power transistor harness connector and ground.

Power transistor		-	Continuity
Connector	Terminal		
M144	2	Ground	No

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-348, "Removal and Installation"](#).
- NO >> Repair harness or connector.

Component Inspection (Blower Motor)

INFOID:0000000010641643

1. CHECK BLOWER MOTOR

1. Remove blower motor. Refer to [VTL-22, "Removal and Installation"](#).
2. Check that there is not any mixing foreign object in the blower motor.

Is the inspection result normal?

- YES >> GO TO 2.
- NO >> Replace blower motor. Refer to [VTL-22, "Removal and Installation"](#).

2. CHECK BLOWER MOTOR

Check that there is not breakage or damage in the blower motor.

Is the inspection result normal?

- YES >> GO TO 3.
- NO >> Replace blower motor. Refer to [VTL-22, "Removal and Installation"](#).

BLOWER MOTOR

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

3.CHECK BLOWER MOTOR

Check that blower motor turns smoothly.

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace blower motor. Refer to [VTL-22. "Removal and Installation"](#).

Component Inspection (Blower Relay)

INFOID:000000010641644

1.CHECK BLOWER RELAY

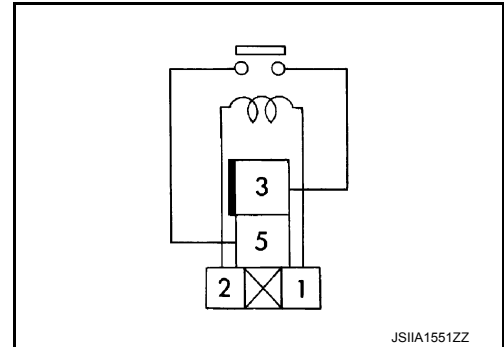
1. Remove blower relay. Refer to [PG-71. "Terminal Arrangement"](#).
2. Check continuity between blower relay terminal 3 and 5 when the voltage is supplied between terminal 1 and 2.

Terminal		Voltage	Continuity
3	5	ON	Yes
		OFF	No

Is the inspection result normal?

YES >> Inspection End.

NO >> Replace blower relay.



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ELECTRIC COMPRESSOR INSULATION RESISTANCE CHECK

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

ELECTRIC COMPRESSOR INSULATION RESISTANCE CHECK

Component Inspection

INFOID:000000010641645

WARNING:

- Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.
- Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.
- Be sure to wear insulating protective equipment before beginning work on the high voltage system.
- Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.
- Refer to [GI-34, "High Voltage Precautions"](#).

CAUTION:

There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

1. PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to [GI-33, "How to Disconnect High Voltage"](#).

Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181, "Exploded View"](#).
2. Disconnect high voltage connector from front side of Li-ion battery. Refer to [EVB-181, "Removal and Installation"](#).
3. Measure voltage between high voltage harness terminals.

DANGER:



Touching high voltage components without using the appropriate protective equipment will cause electrocution.

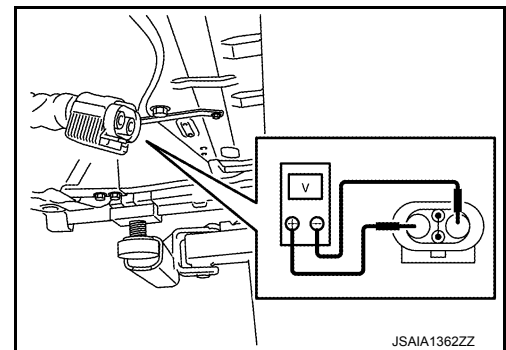


Standard

: 5 V or less

CAUTION:

For voltage measurements, use a tester which can measure to 500V or higher.



>> GO TO 2.

2. CHECK ELECTRIC COMPRESSOR INSULATION RESISTANCE

1. Disconnect high voltage harness connector from electric compressor.

ELECTRIC COMPRESSOR INSULATION RESISTANCE CHECK

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

2. Check the insulation resistance of the electric compressor with an insulation resistance tester.

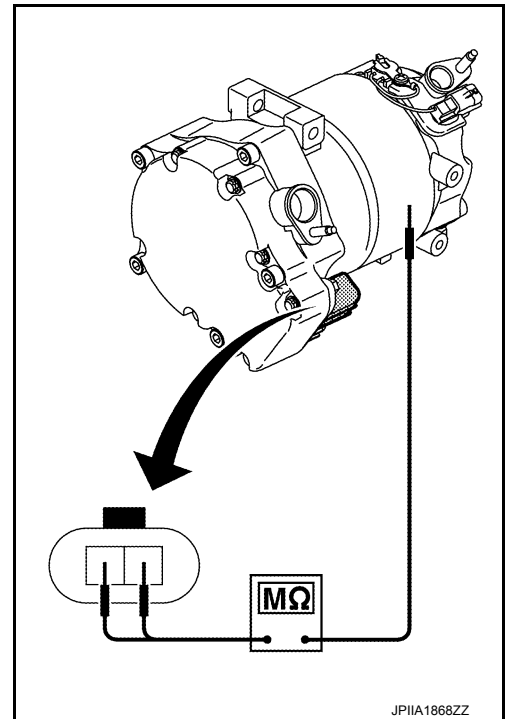
CAUTION:

- Unlike the ordinary tester, the insulation resistance tester applies 500V when measuring. If used incorrectly, there is the danger of electric shock. If used in the vehicle 12V system, there is the danger of damage to electronic devices. Read the insulation resistance tester instruction manual carefully and be sure to work safely.
- Use 500V range of insulation resistance tester to measure insulation resistance. Wait for 30 seconds until the value becomes stable.

+	-	Resistance
Electric compressor	Aluminum part on side of electric compressor	1 MΩ or more
Terminal		
1 3		

Is the inspection result normal?

- YES >> Inspection End.
NO >> Replace electric compressor. Refer to [HA-96. "Removal and Installation"](#).



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PTC HEATER INSPECTION RESISTANCE CHECK

< DTC/CIRCUIT DIAGNOSIS >


[AUTO A/C (WITHOUT HEAT PUMP)]

PTC HEATER INSPECTION RESISTANCE CHECK

Component Inspection

INFOID:000000010641646

DANGER:

 Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.
- Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.
- Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.
- Refer to [GI-34, "High Voltage Precautions"](#).

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

Regarding Wiring Diagram information, refer to [HAC-254, "Wiring Diagram"](#).

DIAGNOSIS PROCEDURE

CAUTION:

Erase DTC after the work is completed.

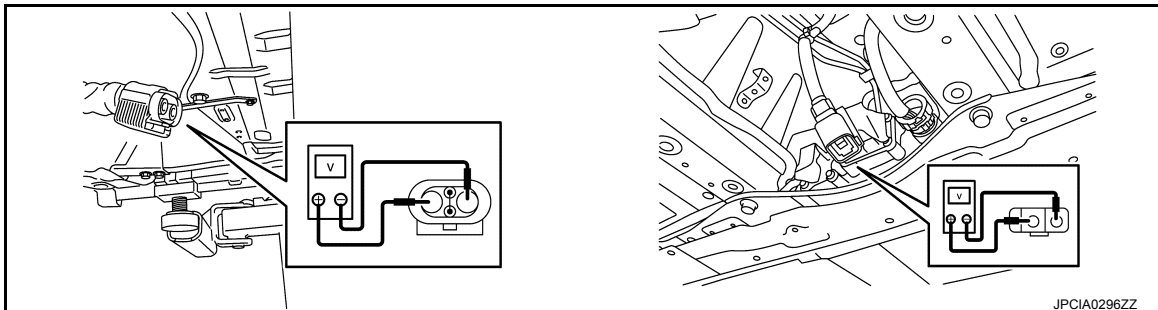
1. PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to [GI-33, "How to Disconnect High Voltage"](#).

Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181, "Exploded View"](#).
2. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181, "Removal and Installation"](#).
3. Measure voltage between high voltage harness connector terminals and PTC heater harness connector terminals.



DANGER:

 Touching high voltage components without using the appropriate protective equipment will cause electrocution.



PTC HEATER INSPECTION RESISTANCE CHECK

< DTC/CIRCUIT DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

Standard : 5 V or less

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 2.

2. CHECK PTC HEATER INSULATION RESISTANCE

1. Disconnect 12V battery negative terminal. Refer to [GI-29. "Precaution for Removing 12V Battery"](#).
2. Disconnect high voltage harness connector from Li-ion battery.
3. Check the insulation resistance of the PTC heater with an insulation resistance tester.

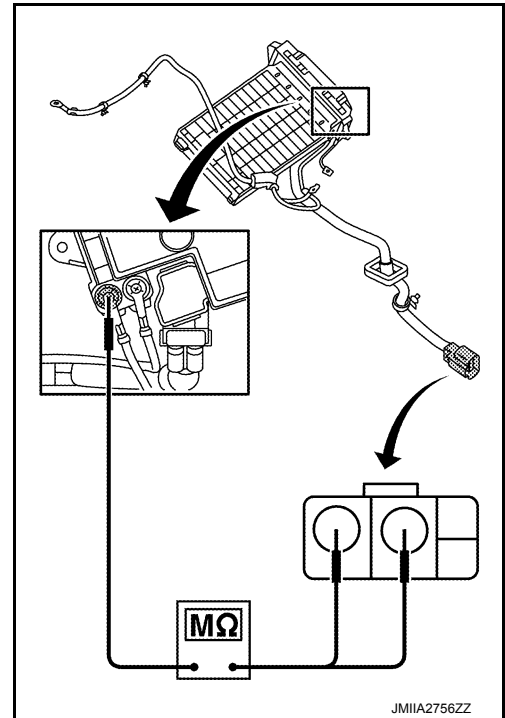
CAUTION:

- Unlike the ordinary tester, the insulation resistance tester applies 500V when measuring. If used incorrectly, there is the danger of electric shock. If used in the vehicle 12V system, there is the danger of damage to electronic devices. Read the insulation resistance tester instruction manual carefully and be sure to work safely.
- Use 500V range of insulation resistance tester to measure insulation resistance. Wait for 30 seconds until the value becomes stable.

+		-	Resistance
Li-ion battery			
Connector	Terminal	Bonding wire fixed portion	1 MΩ or more
H19	40		
	41		

Is the inspection result normal?

- YES >> Inspection End.
 NO >> Replace PTC heater. Refer to [HAC-360. "Removal and Installation"](#).



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AUTOMATIC AIR CONDITIONING SYSTEM

< SYMPTOM DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

SYMPTOM DIAGNOSIS

AUTOMATIC AIR CONDITIONING SYSTEM

Symptom Table

INFOID:000000010641647

NOTE:

Perform self-diagnoses with CONSULT before performing the symptom diagnosis. If any DTC is detected, perform the corresponding diagnosis.

Symptom	Corresponding malfunction part	Check item/Reference
<ul style="list-style-type: none"> Air conditioning system does not activate. Air conditioning system cannot be controlled. 	<ul style="list-style-type: none"> A/C auto amp. ignition power supply and ground circuit A/C auto amp. 	HAC-334, "A/C AUTO AMP. : Diagnosis Procedure"
Discharge air temperature does not change.	Air mix door motor system installation condition	Check air mix door motor system is properly installed. Refer to HAC-362, "Exploded View" .
Air outlet does not change.	Mode door motor system installation condition	Check mode door motor system is properly installed. Refer to HAC-362, "Exploded View" .
Air inlet does not change.	Intake door motor system installation condition	Check intake door motor system is properly installed. Refer to HAC-362, "Exploded View" .
Blower motor does not operate or operation speed is not normal.	<ul style="list-style-type: none"> Blower motor power supply circuit Blower motor control circuit A/C auto amp. ignition power supply circuit Power transistor power supply and ground circuit Power transistor control signal circuit Blower motor Power transistor A/C auto amp. 	HAC-336, "Diagnosis Procedure"
Compressor does not operate.	<ul style="list-style-type: none"> The circuit between VCM and refrigerant pressure sensor Refrigerant pressure sensor Blower fan ON signal circuit A/C auto amp. 	HAC-347, "Diagnosis Procedure"
<ul style="list-style-type: none"> Insufficient cooling. No cool air comes out. (Air flow volume is normal.) 	<ul style="list-style-type: none"> Cooler cycle Air leakage from each duct A/C auto amp. connection recognition signal circuit Temperature setting trimmer 	HAC-345, "Diagnosis Procedure"
<ul style="list-style-type: none"> Insufficient heating. No warm air comes out. (Air flow volume is normal.) 	<ul style="list-style-type: none"> Heater hose Heater core PTC elements heater Heater pump Air leakage from each duct Temperature setting trimmer A/C auto amp. connection 	HAC-346, "Diagnosis Procedure"
Noise is heard when the A/C system operates.	During compressor operation.	Cooler cycle HA-93, "Symptom Table"
	During blower motor operation.	<ul style="list-style-type: none"> Mixing any foreign object in blower motor Blower motor fan breakage Blower motor rotation inferiority
<ul style="list-style-type: none"> Memory function does not operate normally. The setting is not maintained. (It returns to initial condition.) 	<ul style="list-style-type: none"> A/C auto amp. battery power supply circuit A/C auto amp. 	HAC-334, "A/C AUTO AMP. : Diagnosis Procedure"

INSUFFICIENT COOLING

< SYMPTOM DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

INSUFFICIENT COOLING

Description

INFOID:000000010641648

Symptom

- Insufficient cooling
- No cold air comes out. (Air flow volume is normal.)

Diagnosis Procedure

INFOID:000000010641649

NOTE:

Perform the self-diagnosis with CONSULT before performing the diagnosis by symptom. Perform the diagnosis by DTC if DTC is detected.

1. CHECK ELECTRIC COMPRESSOR OPERATION

Check the electric compressor operation state while the air conditioner system is operated.

Does electric compressor operate?

YES >> GO TO 2.

NO >> Perform diagnosis for "COMPRESSOR DOES NOT OPERATE" in the diagnosis by symptom. Refer to [HAC-347, "Diagnosis Procedure"](#).

2. CHECK REFRIGERANT CYCLE

Connect recovery/recycling/recharging equipment to the vehicle and perform the refrigerant system diagnosis. Refer to [HA-93, "Symptom Table"](#).

Is the check result normal?

YES >> GO TO 3.

NO >> Repair or replace malfunctioning part according to diagnosis result.

3. CHECK FOR AIR LEAKAGE FROM DUCT

Check duct and nozzle, etc. of A/C system for air leakage.

Is the check result normal?

YES >> GO TO 4.

NO >> Repair or replace parts according to the inspection results.

4. CHECK SETTING OF DIFFERENCE BETWEEN SET TEMPERATURE AND CONTROL TEMPERATURE

With CONSULT

1. Using CONSULT, check the setting of "TEMP SET CORRECT" in "Work Support" of "HVAC". Refer to [HAC-275, "Temperature Setting Trimmer"](#).

2. Check that the difference between set temperature and control temperature is set to "+ direction".

NOTE:

The control temperature can be set with a setting difference between the set temperature and control temperature.

3. Change the set temperature correction value to "0".

Are the symptoms solved?

YES >> Perform the setting separately if necessary. Inspection End.

NO >> Replace A/C auto amp. Refer to [HAC-348, "Removal and Installation"](#).

INSUFFICIENT HEATING

< SYMPTOM DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

INSUFFICIENT HEATING

Description

INFOID:000000010641650

Symptom

- Insufficient heating
- No warm air comes out. (Air flow volume is normal.)

Diagnosis Procedure

INFOID:000000010641651

NOTE:

Perform the self-diagnosis with CONSULT before performing the diagnosis by symptom. Perform the diagnosis by DTC if DTC is detected.

1. CHECK FOR AIR LEAKAGE FROM DUCT

Check duct and nozzle, etc. of A/C system for air leakage.

Is the check result normal?

- YES >> GO TO 2.
NO >> Repair or replace malfunctioning component.

2. CHECK DETECTION TEMPERATURE OF EACH SENSOR

With CONSULT

Using CONSULT, check that it is normal to detection temperature of each sensor by "Data Monitor" of "HVAC". Refer to [HAC-243, "CONSULT Function"](#).

Is the check result normal?

- YES >> GO TO 3.
NO >> Repair or replace malfunctioning component.

3. CHECK SETTING OF DIFFERENCE BETWEEN SET TEMPERATURE AND CONTROL TEMPERATURE

With CONSULT

1. Using CONSULT, check the setting of "TEMP SET CORRECT" in "Work support" of "HVAC". Refer to [HAC-275, "Temperature Setting Trimmer"](#).
2. Check that the difference between set temperature and control temperature is set to "- direction".

NOTE:

The control temperature can be set with a setting difference between the set temperature and control temperature.

3. Change the set temperature correction value to "0".

Are the symptoms solved?

- YES >> Perform the setting separately if necessary. Inspection End.
NO >> Replace A/C auto amp. Refer to [HAC-348, "Removal and Installation"](#).

COMPRESSOR DOES NOT OPERATE

< SYMPTOM DIAGNOSIS >

[AUTO A/C (WITHOUT HEAT PUMP)]

COMPRESSOR DOES NOT OPERATE

Description

INFOID:000000010641652

SYMPTOM

Compressor does not operate.

Diagnosis Procedure

INFOID:000000010641653

NOTE:

- Perform self-diagnoses with CONSULT before performing symptom diagnosis. If any DTC is detected, perform the corresponding diagnosis.
- Check that refrigerant is enclosed in cooler cycle normally. If refrigerant amount is shortage from proper amount, perform the inspection of refrigerant leakage.

1. CHECK REFRIGERANT PRESSURE SENSOR

Check refrigerant pressure sensor. Refer to [EVC-363, "Diagnosis Procedure"](#).

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Repair or replace malfunctioning parts.

2. CHECK A/C AUTO AMP. INPUT SIGNAL

Ⓜ With CONSULT

1. Select "Data Monitor" of "HVAC" using CONSULT.
2. Select "FORCED Off SIGNAL", and check status under the following conditions.

Monitor item	Condition		Status
FORCED Off SIGNAL	Power switch ON	A/C switch ON (A/C compressor activate)	Normal condition: OFF Except above: ON

HAC

Is the inspection result normal?

- YES >> GO TO 3.
 NO >> Check for the VCM. Refer to [EVC-41, "ELECTRIC POWER TRAIN SYSTEM : System Description"](#).

3. CHECK A/C AUTO AMP. OUTPUT SIGNAL

Ⓜ With CONSULT

1. Set the vehicle to READY.
2. Using CONSULT, perform "HVAC TEST" in "Active Test" of "HVAC". Refer to [HAC-243, "CONSULT Function"](#).
3. Check the electric compressor operations in each mode.

Is the inspection result normal?

- YES >> Replace A/C auto amp. Refer to [HAC-348, "Removal and Installation"](#).
 NO >> Replace electric compressor. Refer to [HA-96, "Removal and Installation"](#).

A/C CONTROL (A/C AUTO AMP.)

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

REMOVAL AND INSTALLATION


A/C CONTROL (A/C AUTO AMP.)

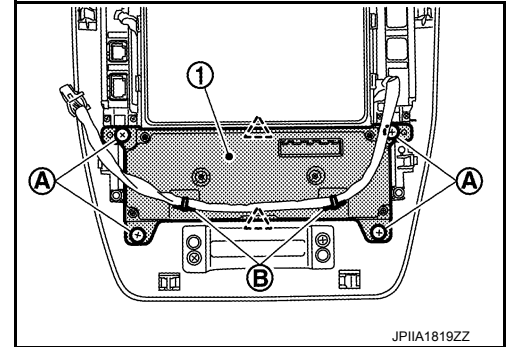
Removal and Installation

INFOID:000000010641654

REMOVAL

1. Remove cluster lid C. Refer to [JP-17. "Removal and Installation"](#).
2. Release harness clips (B) (if equipped).
3. Remove screws (A).
4. Disengage pawls, and then remove A/C auto amp. (1) from cluster lid C.

 : Pawl



NOTE:

When replacing A/C auto amp., save or print current vehicle specification with CONSULT "Configuration" before replacement.

INSTALLATION

Install in the reverse order of removal.

CAUTION:

- When replacing A/C auto amp., you must perform "WRITE CONFIGURATION" with CONSULT.
- Never perform "WRITE CONFIGURATION" except for new A/C auto amp.

AMBIENT SENSOR

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITHOUT HEAT PUMP)]


AMBIENT SENSOR

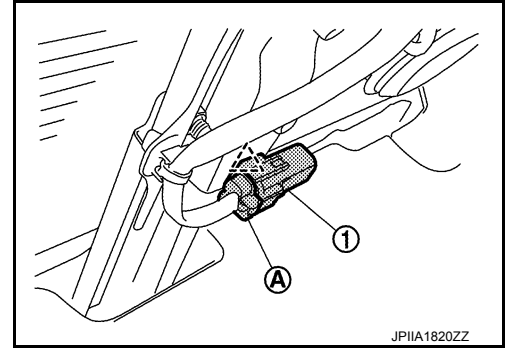
Removal and Installation

INFOID:000000010641655

REMOVAL

1. Remove front under cover. Refer to [EXT-23. "FRONT UNDER COVER : Removal and Installation"](#).
2. Disconnect ambient sensor connector (A).
3. Disengage pawl, and then remove ambient sensor (1) from the vehicle.

 : Pawl



INSTALLATION

Install in the reverse order of removal.

A
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HAC

IN-VEHICLE SENSOR

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

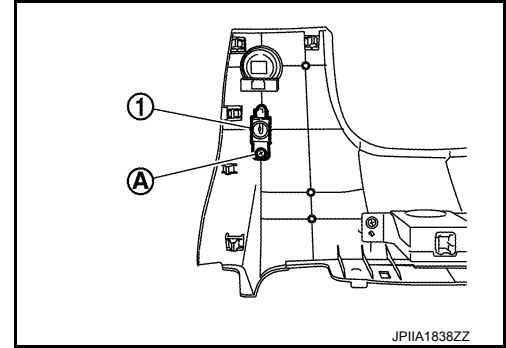
IN-VEHICLE SENSOR

Removal and Installation

INFOID:000000010641656

REMOVAL

1. Remove instrument lower panel LH. Refer to [IP-17. "Removal and Installation"](#).
2. Remove screw (A), and then remove in-vehicle sensor (1) from instrument lower panel LH.



INSTALLATION

Install in the reverse order of removal.

SUNLOAD SENSOR

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITHOUT HEAT PUMP)]


SUNLOAD SENSOR

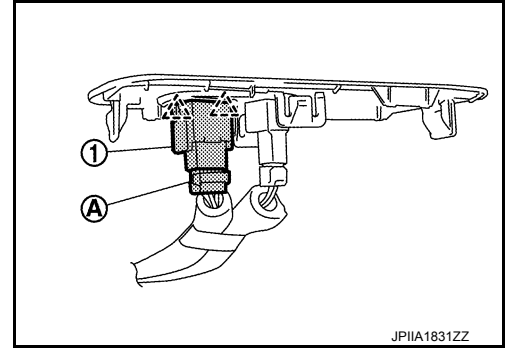
Removal and Installation

INFOID:000000010641657

REMOVAL

1. Remove switch panel. Refer to [IP-17. "Removal and Installation"](#).
2. Disconnect sunload sensor connector (A).
3. Disengage pawls, and then remove sunload sensor (1) from switch panel.

 : Pawl



INSTALLATION

Install in the reverse order of removal.

A
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HAC

INTAKE SENSOR

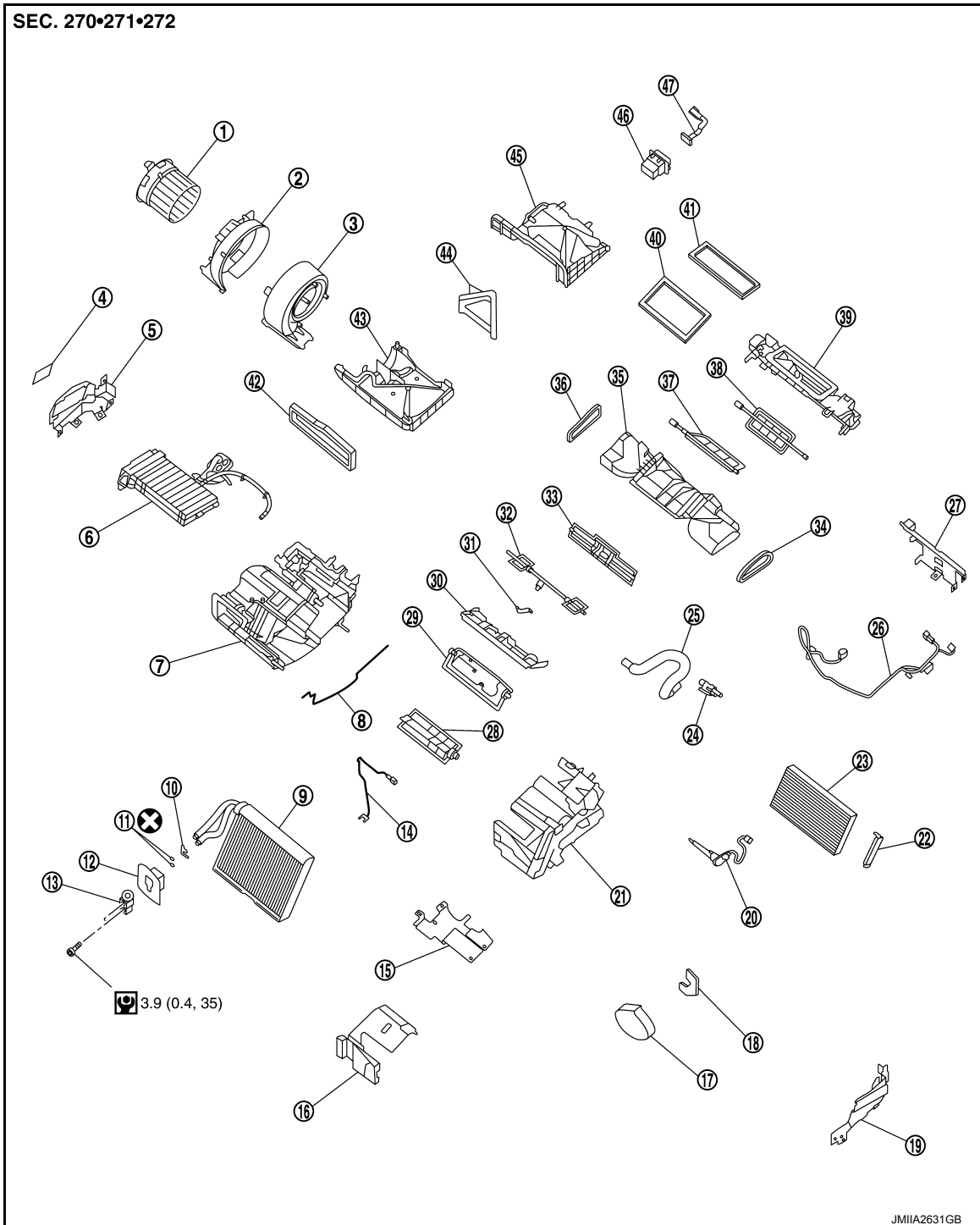
< REMOVAL AND INSTALLATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

INTAKE SENSOR

Exploded View

INFOID:000000010641658



JMIIA2631GB

- | | | |
|--|-------------------------|-----------------------------|
| 1. Blower motor | 2. Blower case RH | 3. Blower case LH |
| 4. High voltage warning label | 5. PTC heater shield RH | 6. PTC heater |
| 7. Heating and cooling unit assembly case RH | 8. Case packing | 9. Evaporator |
| 10. Plate | 11. O-rings | 12. Grommet |
| 13. Expansion valve | 14. Intake sensor | 15. PTC heater shield lower |


INTAKE SENSOR

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

- | | | |
|--|---|---|
| 16. Evaporator cover | 17. Gasket | 18. Seal |
| 19. PTC heater shield LH | 20. PTC heater outlet and A/C unit case air temperature sensor assembly | 21. Heating and cooling unit assembly case LH |
| 22. Filter cover | 23. Filter | 24. Aspirator |
| 25. Aspirator tube | 26. Harness | 27. PTC heater shield |
| 28. Lower air mix door | 29. Upper air mix door | 30. Air mix door guide |
| 31. Foot door rod | 32. Side ventilator door | 33. Foot door |
| 34. Side ventilator door seal LH | 35. Lower attachment case | 36. Side ventilator seal RH |
| 37. Center ventilator and defroster door | 38. Sub defroster door | 39. Upper attachment case |
| 40. Defroster seal | 41. Ventilator seal | 42. Intake seal |
| 43. Lower intake case | 44. Intake door | 45. Upper intake case |
| 46. Power transistor | 47. Sub harness | |

 : Always replace after every disassembly.

 : N·m (kg·m, in·lb)

Removal and Installation

INFOID:000000010641659

REMOVAL

1. Remove evaporator assembly. Refer to [HA-119, "EVAPORATOR : Removal and Installation"](#).
2. Remove intake sensor from evaporator.

INSTALLATION

Note the following items, and then install in the order of removal.

CAUTION:

- **Mark the mounting position of intake sensor bracket prior to removal so that the reinstalled sensor can be located in the same position.**
- **When removing or installing the intake sensor, be sure not to rotate the bracket insertion part. Failure to do this may cause damage to the evaporator.**

PTC HEATER OUTLET AND A/C UNIT CASE AIR TEMPERATURE SENSOR ASSEMBLY

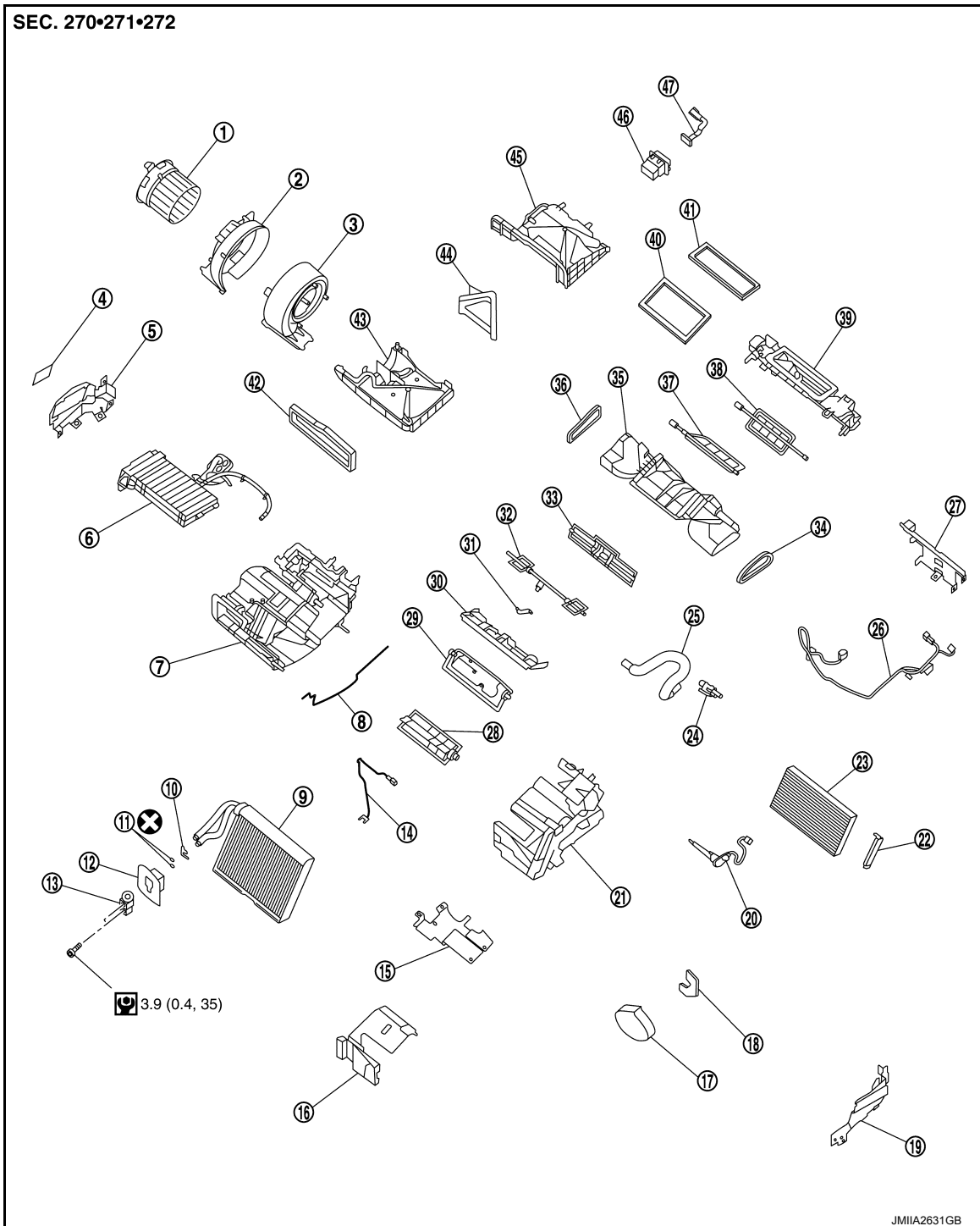
< REMOVAL AND INSTALLATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

PTC HEATER OUTLET AND A/C UNIT CASE AIR TEMPERATURE SENSOR ASSEMBLY

Exploded View

INFOID:000000010641660




- | | | |
|--|-------------------------|-------------------|
| 1. Blower motor | 2. Blower case RH | 3. Blower case LH |
| 4. High voltage warning label | 5. PTC heater shield RH | 6. PTC heater |
| 7. Heating and cooling unit assembly case RH | 8. Case packing | 9. Evaporator |


PTC HEATER OUTLET AND A/C UNIT CASE AIR TEMPERATURE SENSOR ASSEMBLY

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

- | | | | |
|--|---|---|---|
| 10. Plate | 11. O-rings | 12. Grommet | |
| 13. Expansion valve | 14. Intake sensor | 15. PTC heater shield lower | A |
| 16. Evaporator cover | 17. Gasket | 18. Seal | |
| 19. PTC heater shield LH | 20. PTC heater outlet and A/C unit case air temperature sensor assembly | 21. Heating and cooling unit assembly case LH | B |
| 22. Filter cover | 23. Filter | 24. Aspirator | |
| 25. Aspirator tube | 26. Harness | 27. PTC heater shield | C |
| 28. Lower air mix door | 29. Upper air mix door | 30. Air mix door guide | |
| 31. Foot door rod | 32. Side ventilator door | 33. Foot door | |
| 34. Side ventilator door seal LH | 35. Lower attachment case | 36. Side ventilator seal RH | D |
| 37. Center ventilator and defroster door | 38. Sub defroster door | 39. Upper attachment case | |
| 40. Defroster seal | 41. Ventilator seal | 42. Intake seal | |
| 43. Lower intake case | 44. Intake door | 45. Upper intake case | E |
| 46. Power transistor | 47. Sub harness | | |

 : Always replace after every disassembly.

 : N·m (kg·m, in·lb)

Removal and Installation

INFOID:000000010641661

REMOVAL

1. Remove the heating and cooling unit assembly. Refer to [HA-116, "HEATING AND COOLING UNIT ASSEMBLY : Removal and Installation"](#).
2. Remove PTC heater outlet and A/C unit case air temperature sensor from the heating and cooling unit assembly.

INSTALLATION

Install in the reverse order of removal.

A
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REFRIGERANT PRESSURE SENSOR

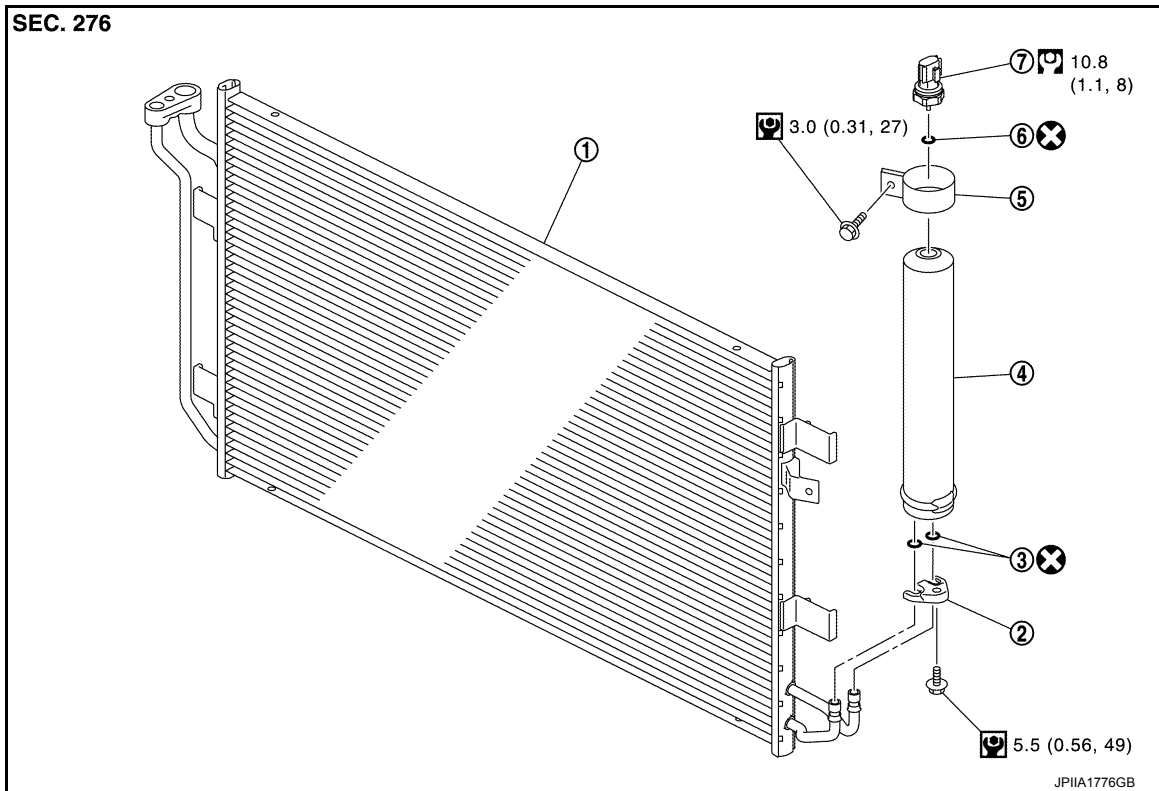
< REMOVAL AND INSTALLATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

REFRIGERANT PRESSURE SENSOR

Exploded View

INFOID:000000010641662



- | | | |
|--------------------------------|------------------------|-----------|
| 1. Condenser | 2. Bracket | 3. O-ring |
| 4. Liquid tank | 5. Liquid tank bracket | 6. O-ring |
| 7. Refrigerant pressure sensor | | |

⊗: Always replace after every disassembly.


🔧: N·m (kg-m, in-lb)

🔧: N·m (kg-m, ft-lb)

Removal and Installation

INFOID:000000010641663

DANGER:

 Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.
- Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.
- Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them. Refer to [GI-34, "High Voltage Precautions"](#).

CAUTION:

REFRIGERANT PRESSURE SENSOR

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

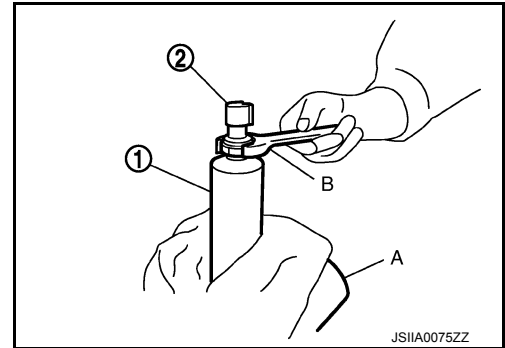
Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

REMOVAL

1. Remove liquid tank. Refer to [HA-111, "LIQUID TANK : Removal and Installation"](#).
2. Use a vise (A) to fasten the liquid tank (1) in place, then use a spanner wrench (B) and remove refrigerant pressure sensor (2).

CAUTION:

- Wrap the liquid tank with shop cloth to prevent scratches.
- To prevent the inclusion of foreign matter, use a cap or vinyl tape to seal off the refrigerant pressure sensor mounting point on the liquid tank from the atmosphere.



INSTALLATION

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

CAUTION:

- To prevent leakage of refrigerant, replace the O-ring with a new one. Apply a coat of compressor oil to the O-ring prior to installation.
- Perform a check for refrigerant leakage when charging with refrigerant. Refer to [HA-85, "Check Refrigerant Leakage"](#).

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POWER TRANSISTOR

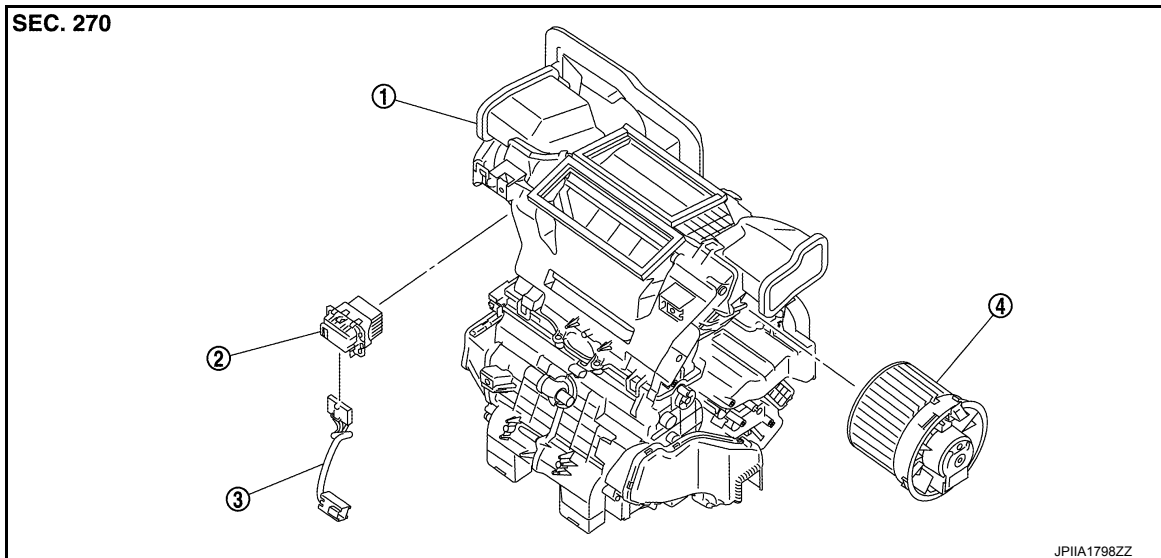
< REMOVAL AND INSTALLATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

POWER TRANSISTOR

Exploded View

INFOID:000000010641664



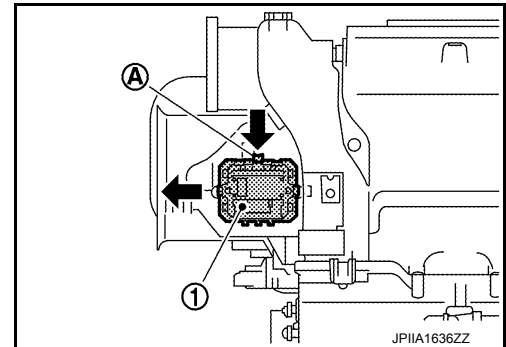
- 1. Heating and cooling unit assembly
- 2. Power transistor
- 3. Sub harness
- 4. Blower motor

Removal and Installation

INFOID:000000010641665

REMOVAL

1. Remove instrument panel assembly. Refer to [IP-17, "Removal and Installation"](#).
2. Disconnect power transistor connector.
3. Slide power transistor (1) to the left while pressing lever (A), and then remove power transistor.



INSTALLATION

Install in the reverse order of removal.

PTC HEATER

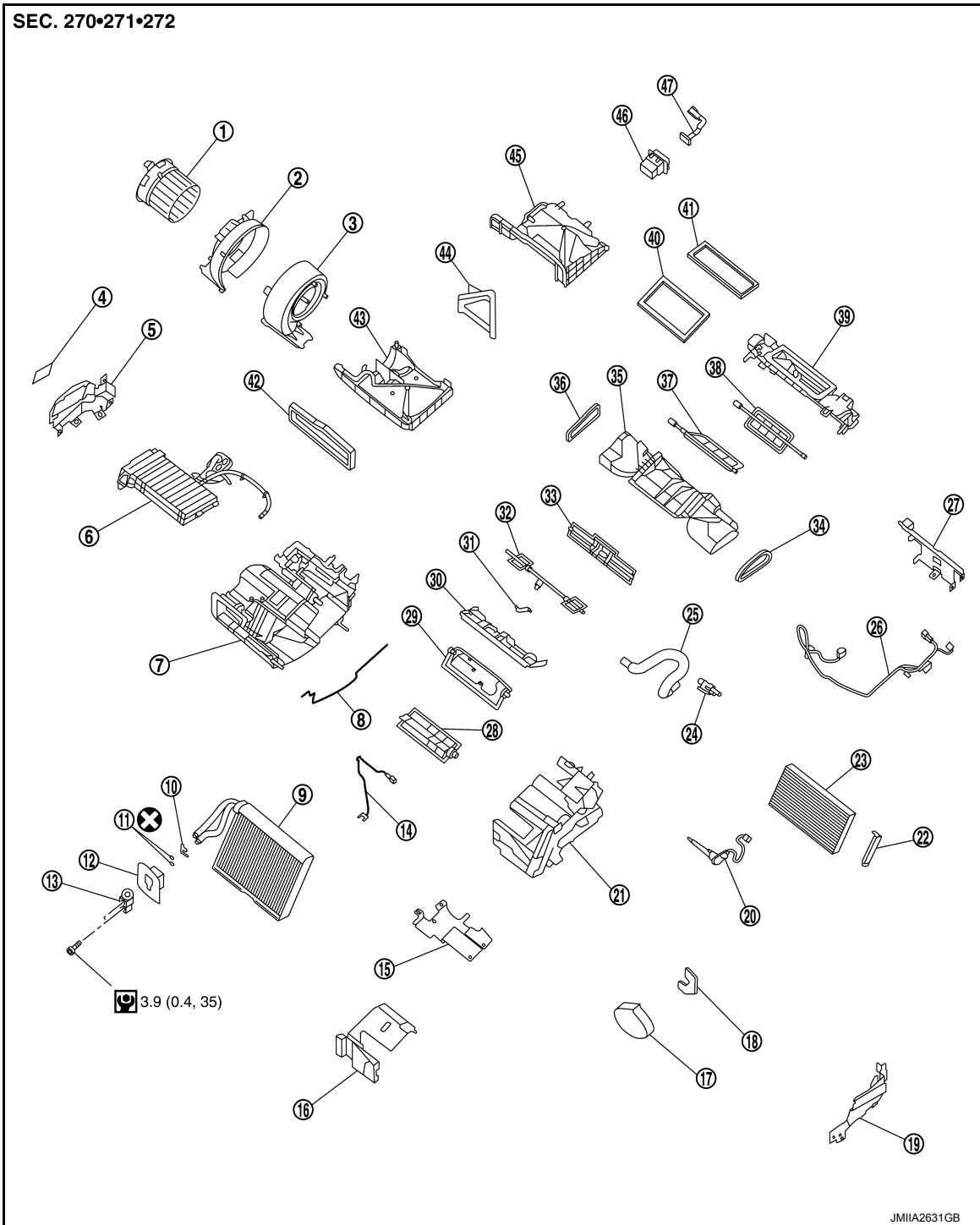
< REMOVAL AND INSTALLATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

PTC HEATER

Exploded View

INFOID:000000010641666



- | | | |
|--|-------------------------|-----------------------------|
| 1. Blower motor | 2. Blower case RH | 3. Blower case LH |
| 4. High voltage warning label | 5. PTC heater shield RH | 6. PTC heater |
| 7. Heating and cooling unit assembly case RH | 8. Case packing | 9. Evaporator |
| 10. Plate | 11. O-rings | 12. Grommet |
| 13. Expansion valve | 14. Intake sensor | 15. PTC heater shield lower |

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PTC HEATER

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

- | | | |
|--|---|---|
| 16. Evaporator cover | 17. Gasket | 18. Seal |
| 19. PTC heater shield LH | 20. PTC heater outlet and A/C unit case air temperature sensor assembly | 21. Heating and cooling unit assembly case LH |
| 22. Filter cover | 23. Filter | 24. Aspirator |
| 25. Aspirator tube | 26. Harness | 27. PTC heater shield |
| 28. Lower air mix door | 29. Upper air mix door | 30. Air mix door guide |
| 31. Foot door rod | 32. Side ventilator door | 33. Foot door |
| 34. Side ventilator door seal LH | 35. Lower attachment case | 36. Side ventilator seal RH |
| 37. Center ventilator and defroster door | 38. Sub defroster door | 39. Upper attachment case |
| 40. Defroster seal | 41. Ventilator seal | 42. Intake seal |
| 43. Lower intake case | 44. Intake door | 45. Upper intake case |
| 46. Power transistor | 47. Sub harness | |

⊗ : Always replace after every disassembly.

🔧 : N·m (kg-m, in-lb)

Removal and Installation

INFOID:000000010641667

DANGER:



Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.
- Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.
- Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them. Refer to [GI-34, "High Voltage Precautions"](#).

CAUTION:

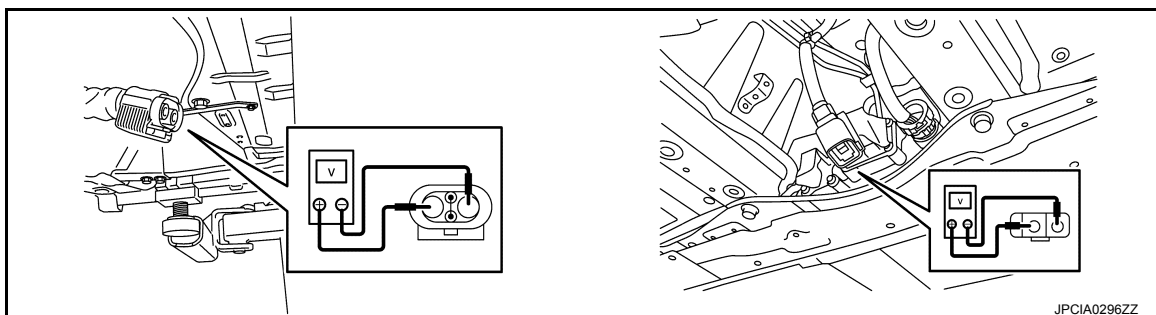
Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

REMOVAL

WARNING:

Disconnect the high voltage. Refer to [GI-33, "How to Disconnect High Voltage"](#).

1. Check voltage in high voltage circuit. (Check that condenser are discharged.)
 - a. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181, "Exploded View"](#).
 - b. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181, "Removal and Installation"](#).
 - c. Measure voltage between high voltage harness connector terminals and PTC heater harness connector terminals.



JPCIA0296ZZ

PTC HEATER

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

DANGER:



Touching high voltage components without using the appropriate protective equipment will cause electrocution.



Standard : 5 V or less

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.

- Remove heating and cooling unit assembly. Refer to [HA-116, "HEATING AND COOLING UNIT ASSEMBLY : Removal and Installation"](#).
- Remove PTC heater from the heating and cooling unit assembly.

INSTALLATION

Install in the reverse order of removal.

A
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HAC

DOOR MOTOR

< REMOVAL AND INSTALLATION >

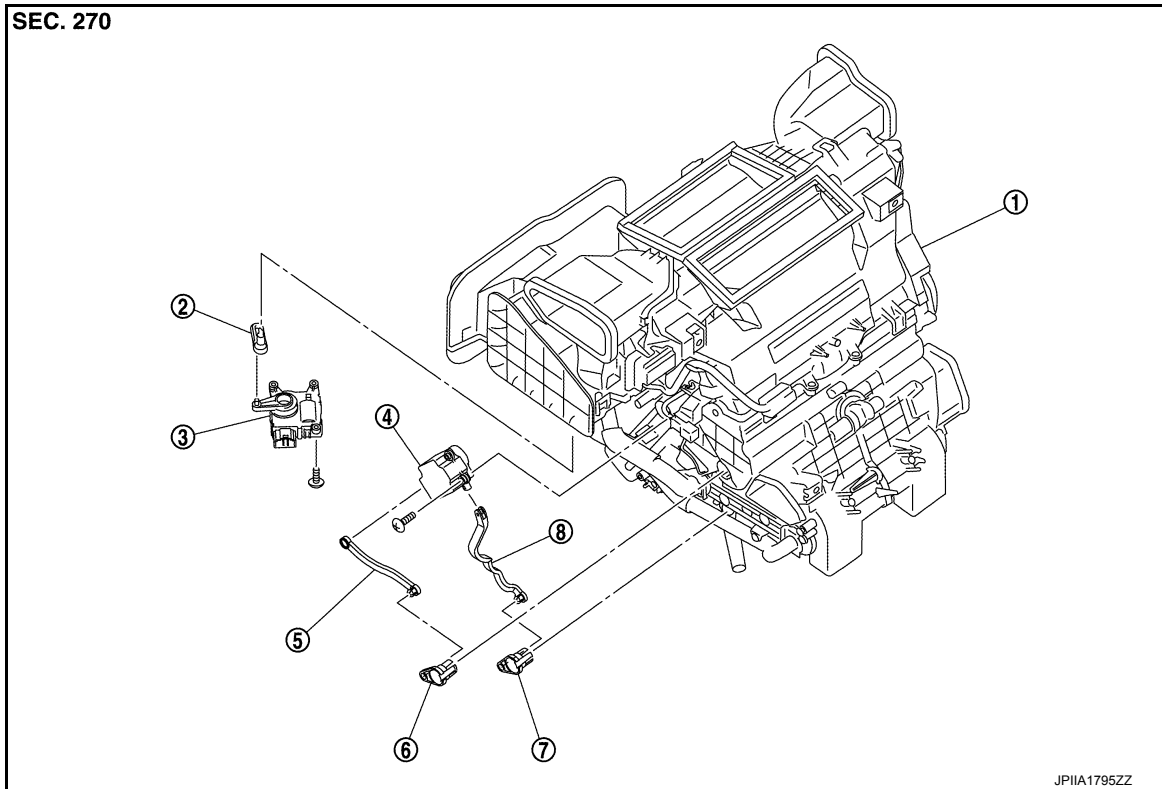
[AUTO A/C (WITHOUT HEAT PUMP)]

DOOR MOTOR

Exploded View

INFOID:000000010641668

LEFT SIDE



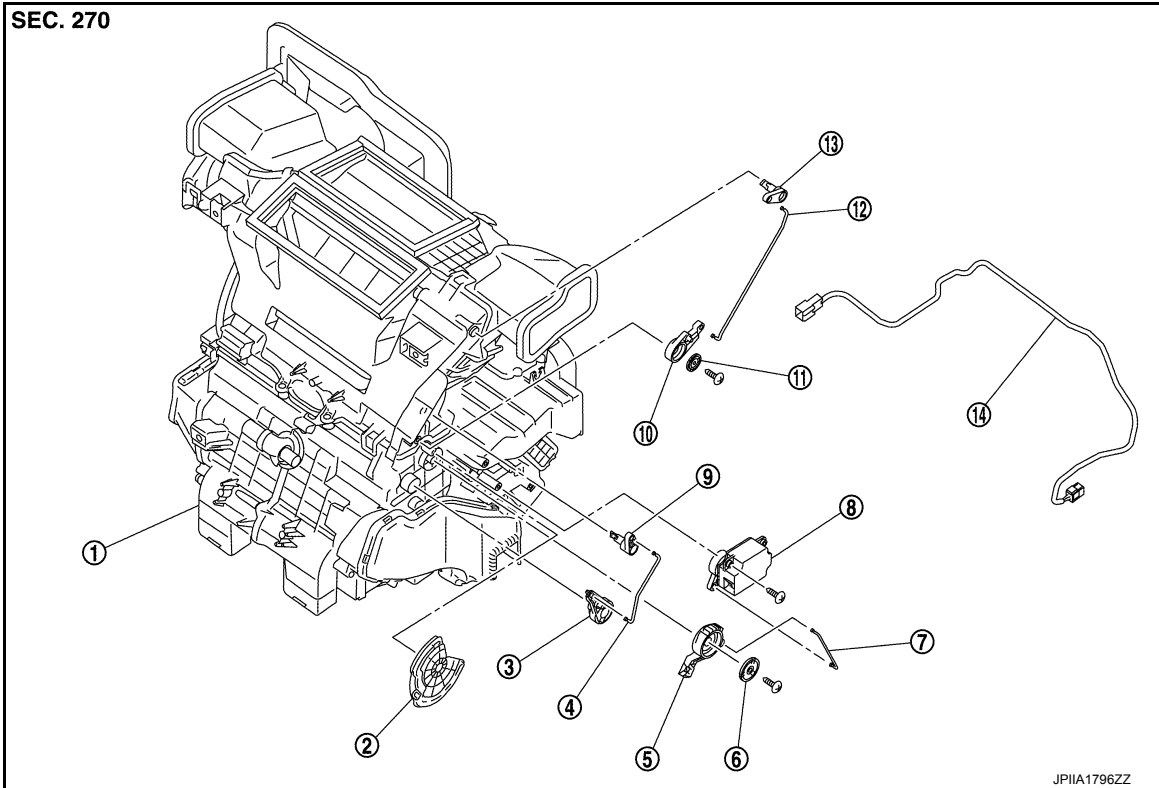
- | | | |
|--------------------------------------|---------------------------|-----------------------------|
| 1. Heating and cooling unit assembly | 2. Intake door lever | 3. Intake door motor |
| 4. Air mix door motor | 5. Upper air mix door rod | 6. Upper air mix door lever |
| 7. Lower air mix door lever | 8. Lower air mix door rod | |

RIGHT SIDE

DOOR MOTOR

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITHOUT HEAT PUMP)]



- | | | |
|--|--------------------|--|
| 1. Heating and cooling unit assembly | 2. Main link | 3. Sub defroster door link |
| 4. Sub defroster door rod | 5. Mode link | 6. Plate |
| 7. Mode link rod | 8. Mode door motor | 9. Sub defroster door lever |
| 10. Center ventilator and defroster door link | 11. Plate | 12. Center ventilator and defroster door rod |
| 13. Center ventilator and defroster door lever | 14. Sub harness | |

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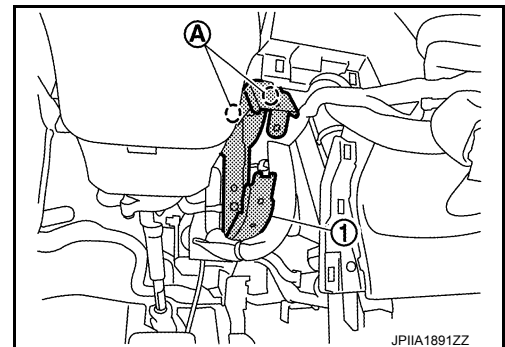
INTAKE DOOR MOTOR

INTAKE DOOR MOTOR : Removal and Installation

INFOID:000000010641669

REMOVAL

1. Remove instrument lower panel LH. Refer to [IP-17. "Removal and Installation"](#).
2. Remove knee protector.
3. Remove nuts (A), and then remove knee protector bracket (1).



4. Remove brake pedal assembly. Refer to [BR-500. "Removal and Installation"](#).
5. Disconnect intake door motor connector.

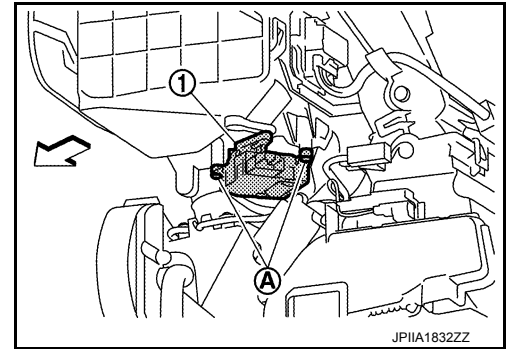
DOOR MOTOR

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

6. Remove screws (A), and then remove intake door motor (1) from heating and cooling unit assembly.

← : Vehicle front



INSTALLATION

Install in the reverse order of removal.

MODE DOOR MOTOR

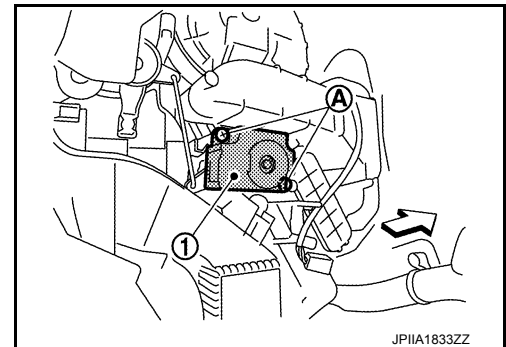
MODE DOOR MOTOR : Removal and Installation

INFOID:0000000010641670

REMOVAL

1. Remove glove box cover assembly. Refer to [IP-17, "Removal and Installation"](#).
2. Disconnect mode door motor connector.
3. Remove screws (A), and then remove mode door motor (1) from heating and cooling unit assembly.

← : Vehicle front



INSTALLATION

Note the following item, and then install in the order of removal.

CAUTION:

After installing door motor, perform door motor starting position. Refer to [HAC-278, "Work Procedure"](#).

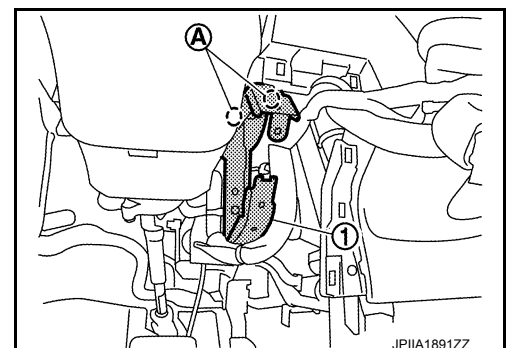
AIR MIX DOOR MOTOR

AIR MIX DOOR MOTOR : Removal and Installation

INFOID:0000000010641671

REMOVAL

1. Remove instrument lower panel LH. Refer to [IP-17, "Removal and Installation"](#).
2. Remove knee protector.
3. Remove nuts (A), and then remove knee protector bracket (1).



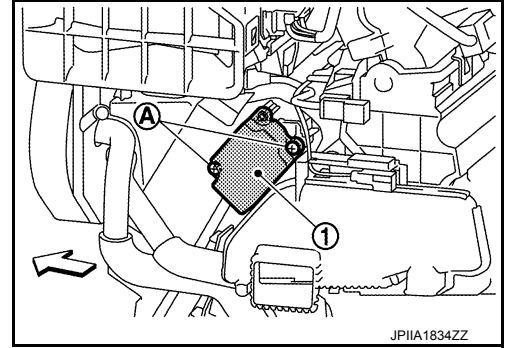
DOOR MOTOR

< REMOVAL AND INSTALLATION >

[AUTO A/C (WITHOUT HEAT PUMP)]

4. Remove brake pedal assembly. Refer to [BR-500, "Removal and Installation"](#).
5. Disconnect air mix door motor connector.
6. Remove screws (A), and then remove air mix door motor (1) from heating and cooling unit assembly.

← : Vehicle front



INSTALLATION

Note the following item, and then install in the order of removal.

CAUTION:

After installing door motor, perform door motor starting position. Refer to [HAC-278, "Work Procedure"](#).

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HAC