SECTION HAC

HEATER & AIR CONDITIONING CONTROL SYSTEM

CONTENTS

AUTOMATIC AIR CONDITIONER

PRECAUTION

PRECAUTIONS

Normal Charge Precaution

INFOID:0000000007080630

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 on board charger at normal charge operation may effect medical electric devices, a technician using a medical electric device such as implantable cardiac pacemaker or an implantable cardioverter defibrillator must not enter the vehicle compartment (including luggage room) during normal charge operation.**

Point to Be Checked Before Starting Maintenance Work

INFOID:0000000007080632

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 Removing 12V Battery

INFOID:0000000007080633

When removing the 12V battery, turn ON/OFF the power switch and check that the charging status indicator does not blink. The 12V battery must be removed within one hour after checking the indicator lamp.
NOTE:

- The automatic 12V battery charge control may start even when the power switch is in OFF state.
- The automatic 12V battery charge control does not start within approximately one hour when the power switch is turned ON/OFF.

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

INFOID:0000000007080634

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted.
Information necessary to service the system safely is included in the “SRS AIR BAG” and “SEAT BELT” of this Service Manual.

WARNING:
Always observe the following items for preventing accidental activation.

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see “SRS AIR BAG”.**
- **Never use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:
Always observe the following items for preventing accidental activation.

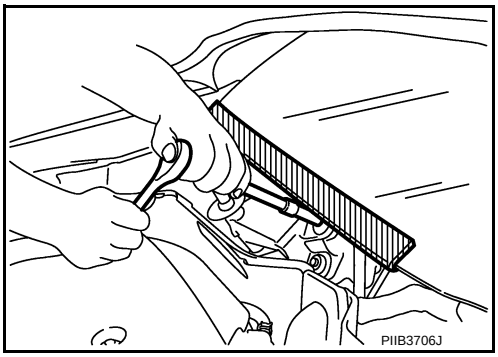
- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the power switch ON, never use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**

- **When using air or electric power tools or hammers, always switch the power switch OFF, disconnect the 12V battery, and wait at least 3 minutes before performing any service.**

Precaution for Procedure without Cowl Top Cover

INFOID:0000000007080635

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



SYSTEM DESCRIPTION

DESCRIPTION

Description

INFOID:0000000006997076

- This vehicle includes an ozone-safe full automatic air conditioning system.
- In order to facilitate diagnosis, the system uses an A/C auto amp. which is compatible with CONSULT.

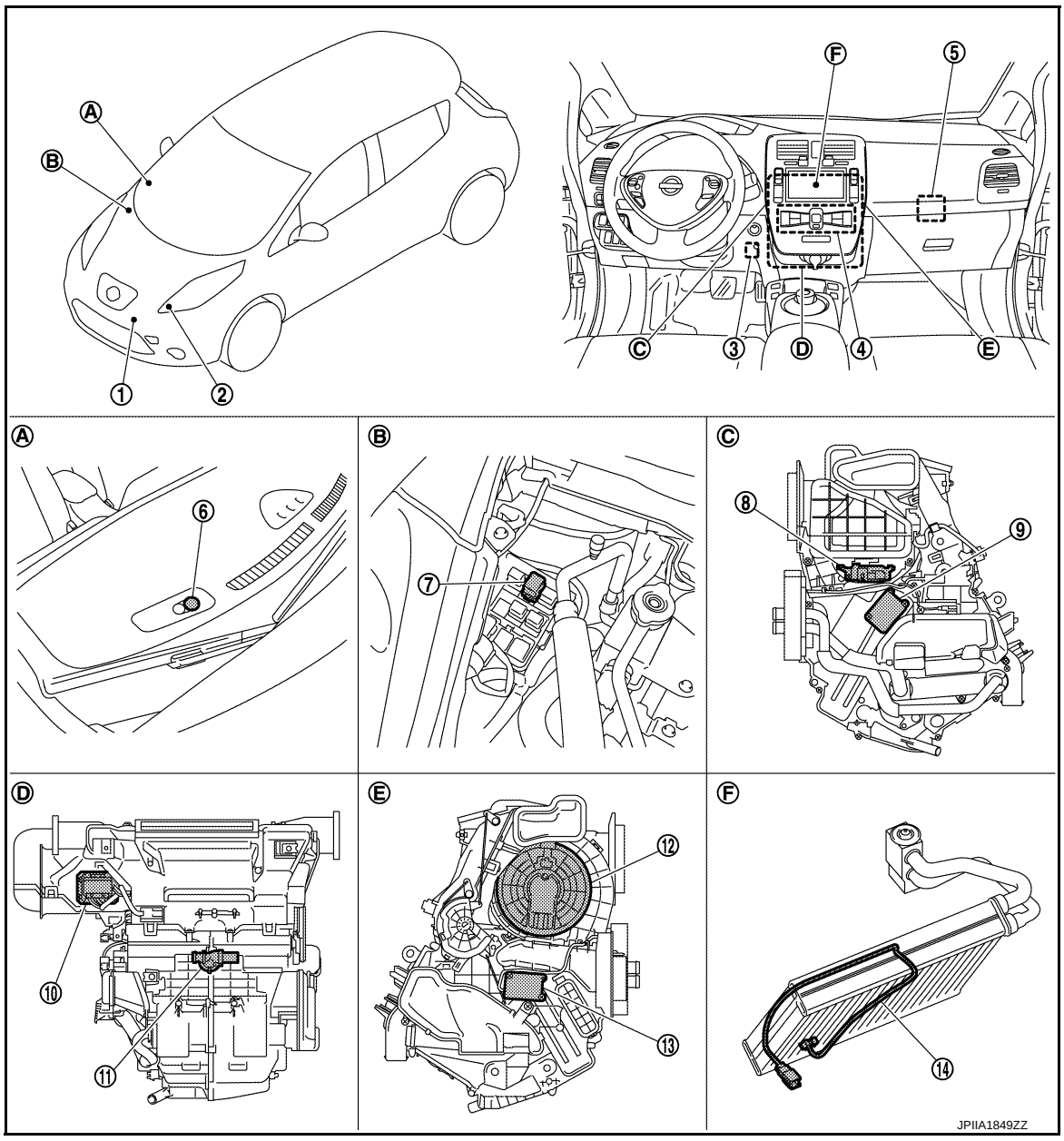
COMPONENT PARTS

AUTOMATIC AIR CONDITIONING SYSTEM

AUTOMATIC AIR CONDITIONING SYSTEM : Component Parts Location

INFOID:0000000006997077

COMPONENT PARTS LOCATION



A. Top right of instrument panel
B. Right side of motor room
C. Left side of A/C unit
D: Rear of A/C unit
E. Right side of A/C unit
F. Evaporator

COMPONENT DESCRIPTION

No.	Part name	Refer to
1.	Ambient sensor	HAC-12
2.	Refrigerant pressure sensor	HAC-13
3.	In-vehicle sensor	HAC-12
4.	A/C auto amp.	HAC-12

No.	Part name	Refer to
5.	VCM	EVC-16
6.	Sunload sensor	HAC-13
7.	A/C relay	HAC-13
8.	Intake door actuator	HAC-10
9.	Air mix door actuator	HAC-9
10.	Power transistor	HAC-12
11.	Aspirator	HAC-9
12.	Blower fan motor	HAC-11
13.	Mode door actuator	HAC-10
14.	Intake sensor	HAC-9

Detail for other compornent parts information is following.

- Refrigertion system : HA-16, "REFRIGERATION SYSTEM : Component Parts Location"
- Heating system : HA-17, "HEATING SYSTEM : Component Parts Location"

AUTOMATIC AIR CONDITIONING SYSTEM : Component Description

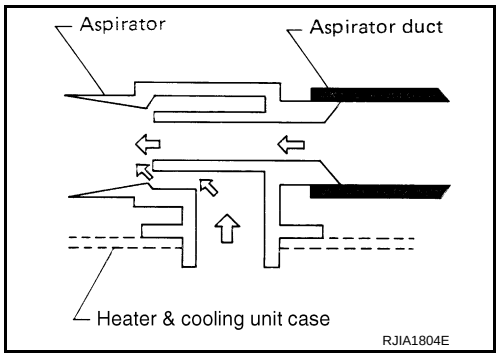
INFOID:0000000006997078

A/C UNIT ASSEMBLY

A/C UNIT ASSEMBLY : Aspirator

INFOID:0000000006997079

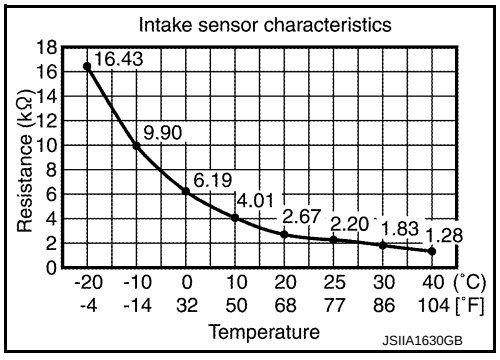
The aspirator generates vacuum by the air blown from the A/C unit and draws the air of the passenger room into the in-vehicle sensor via the aspirator duct.



A/C UNIT ASSEMBLY : Intake Sensor

INFOID:0000000006997080

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



A/C UNIT ASSEMBLY : Air Mix Door Actuator

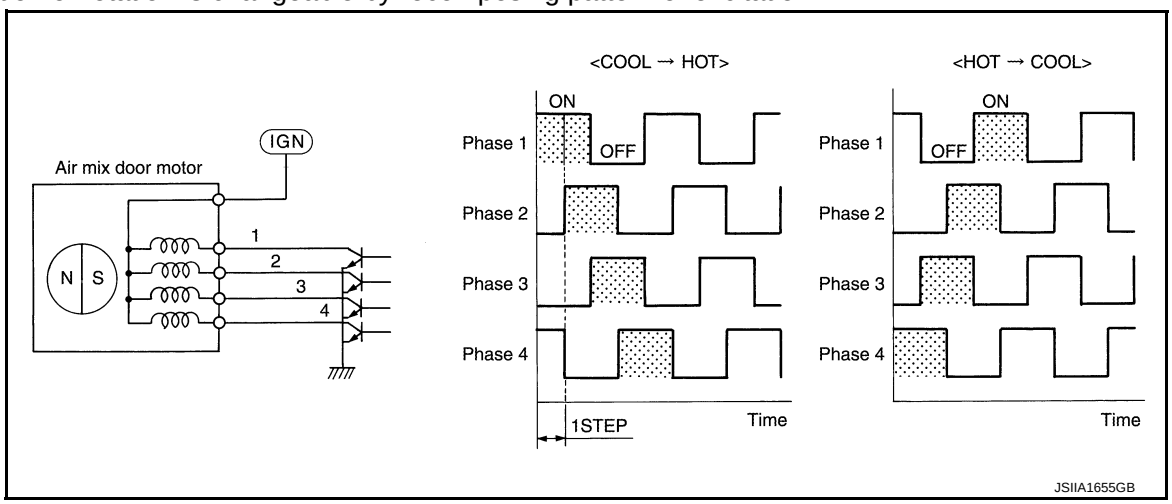
INFOID:0000000006997081

DESCRIPTION

- A step motor actuator is used for the air mix door actuator.
- When the drive signal from the A/C auto amp. is input into the actuator, the step motor inside the actuator 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 ACTUATOR DRIVE METHOD

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



A/C UNIT ASSEMBLY : Mode Door Actuator

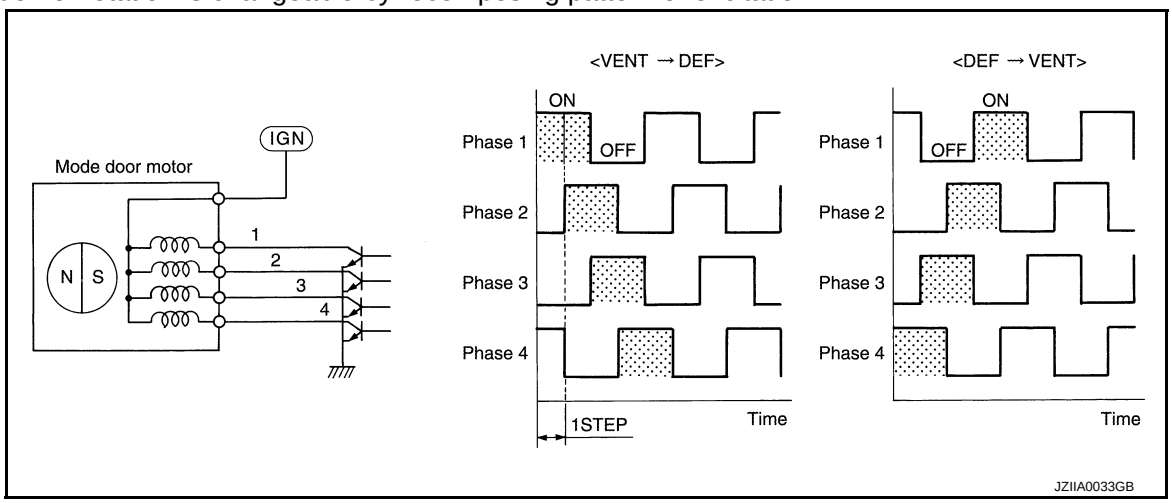
INFOID:0000000006997082

DESCRIPTION

- A step motor actuator is used for the mode door actuator.
- When the drive signal from the A/C auto amp. is input into the actuator, the step motor inside the actuator 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 ACTUATOR DRIVE METHOD

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

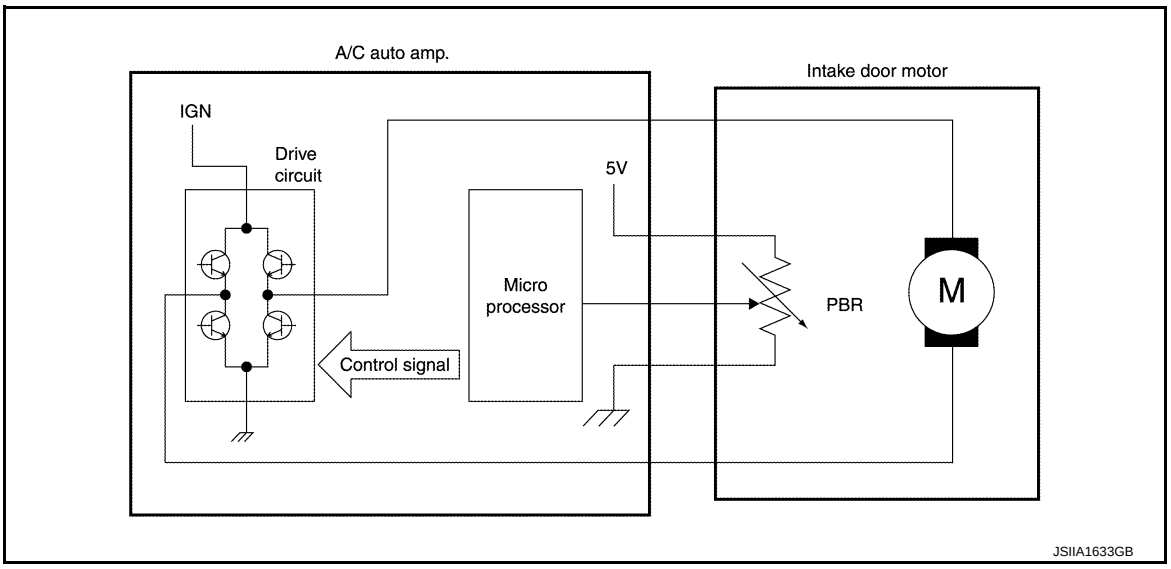


A/C UNIT ASSEMBLY : Intake Door Actuator

INFOID:0000000006997083

- Intake door actuator consists of motor that drives door and PBR (Potentiometer Balance Resister) 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.

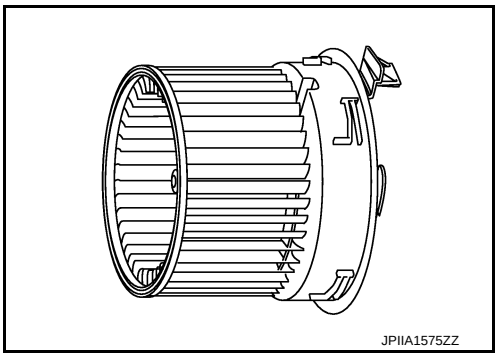
- The A/C auto amp. monitors the door position based on the PBR signal that changes in coordination with the rotation of the motor.

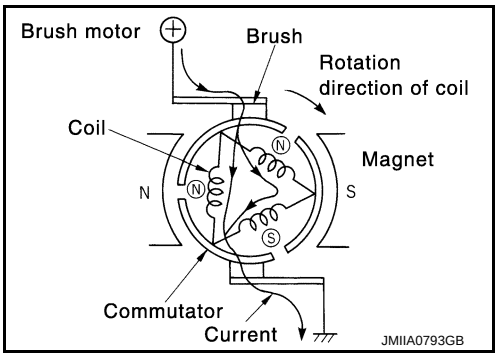


A/C UNIT ASSEMBLY : Blower Fan Motor

INFOID:0000000006997084

Brush motor, that rotates coil while brush functions as contact points, is adopted for blower motor. Rotation speed changes according to voltage from power transistor.

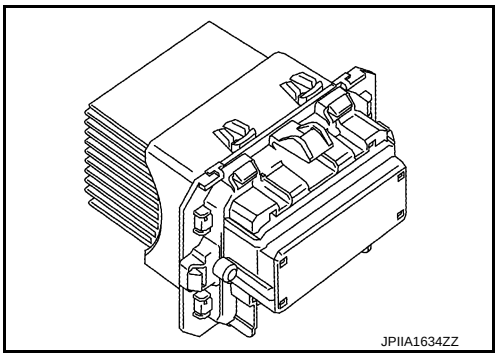




A/C UNIT ASSEMBLY : Power Transistor

INFOID:0000000006997085

- 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.

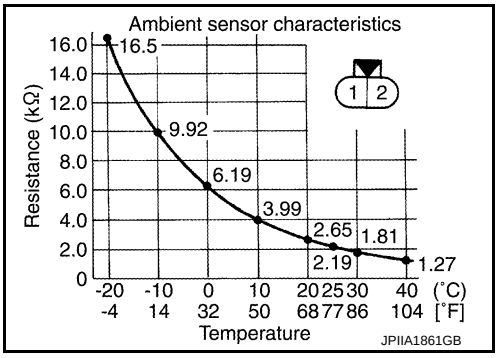
INFOID:0000000006997086

A/C auto amp. controls A/C by calculations based on signals input from each sensor and switch. A/C auto amp. has self-diagnosis function. Diagnosis of automatic air conditioning system can be performed quickly.

Ambient Sensor

INFOID:0000000006997087

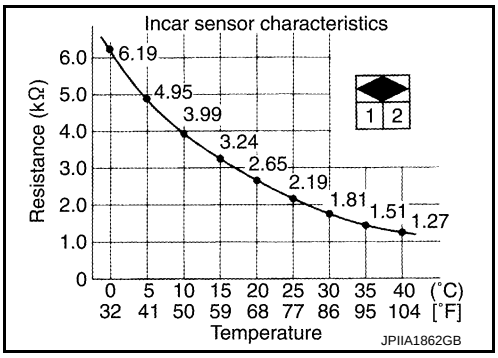
Ambient sensor measures ambient air temperature. This sensor uses thermistor that decreases electrical resistance as temperature increases.



In-Vehicle Sensor

INFOID:0000000006997088

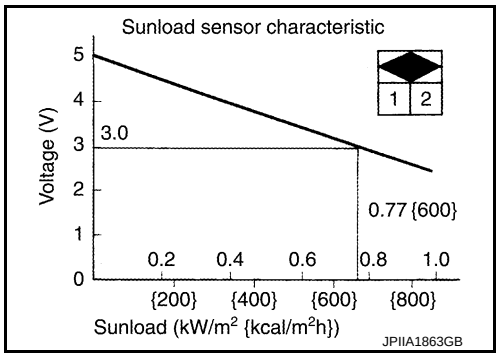
In-vehicle sensor measures temperature of interior air that is sucked into the aspirator. This sensor uses thermistor that decreases electrical resistance as temperature increases.



Sunload Sensor

INFOID:0000000006997089

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..

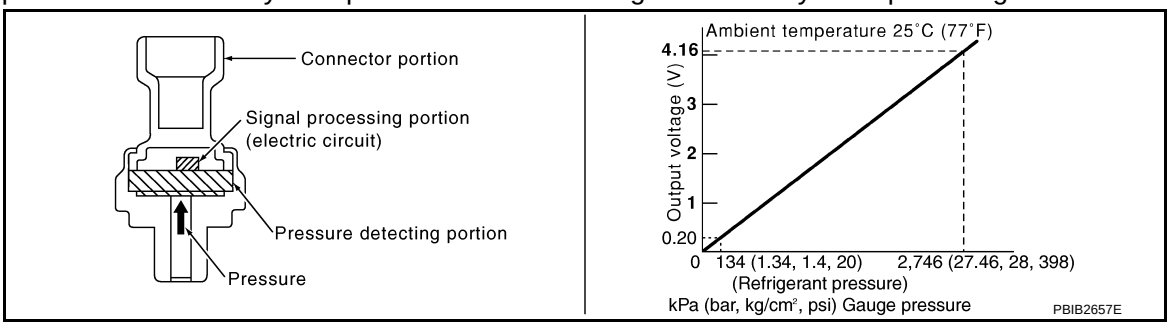


Refrigerant Pressure Sensor

INFOID:0000000006997090

DESCRIPTION

- The refrigerant pressure sensor converts high-pressure side refrigerant pressure into voltage and outputs it to ECM.
- ECM performs the cooler system protection and each engine control by the input voltage.



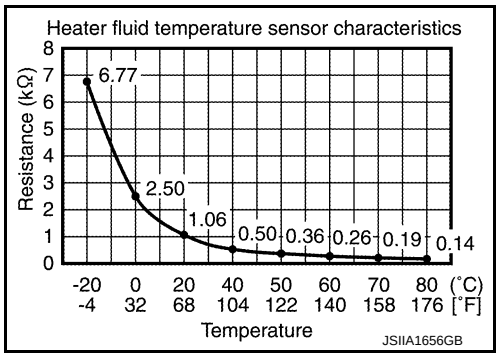
STRUCTURE AND OPERATION

- 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 ECM.

Heater Fluid Temperature Sensor

INFOID:0000000006997091

Heater fluid temperatureThe sensor measures the heater fluid temperature. This sensor uses thermistor that decreases electrical resistance as temperature increases.



A/C relay

INFOID:0000000006997092

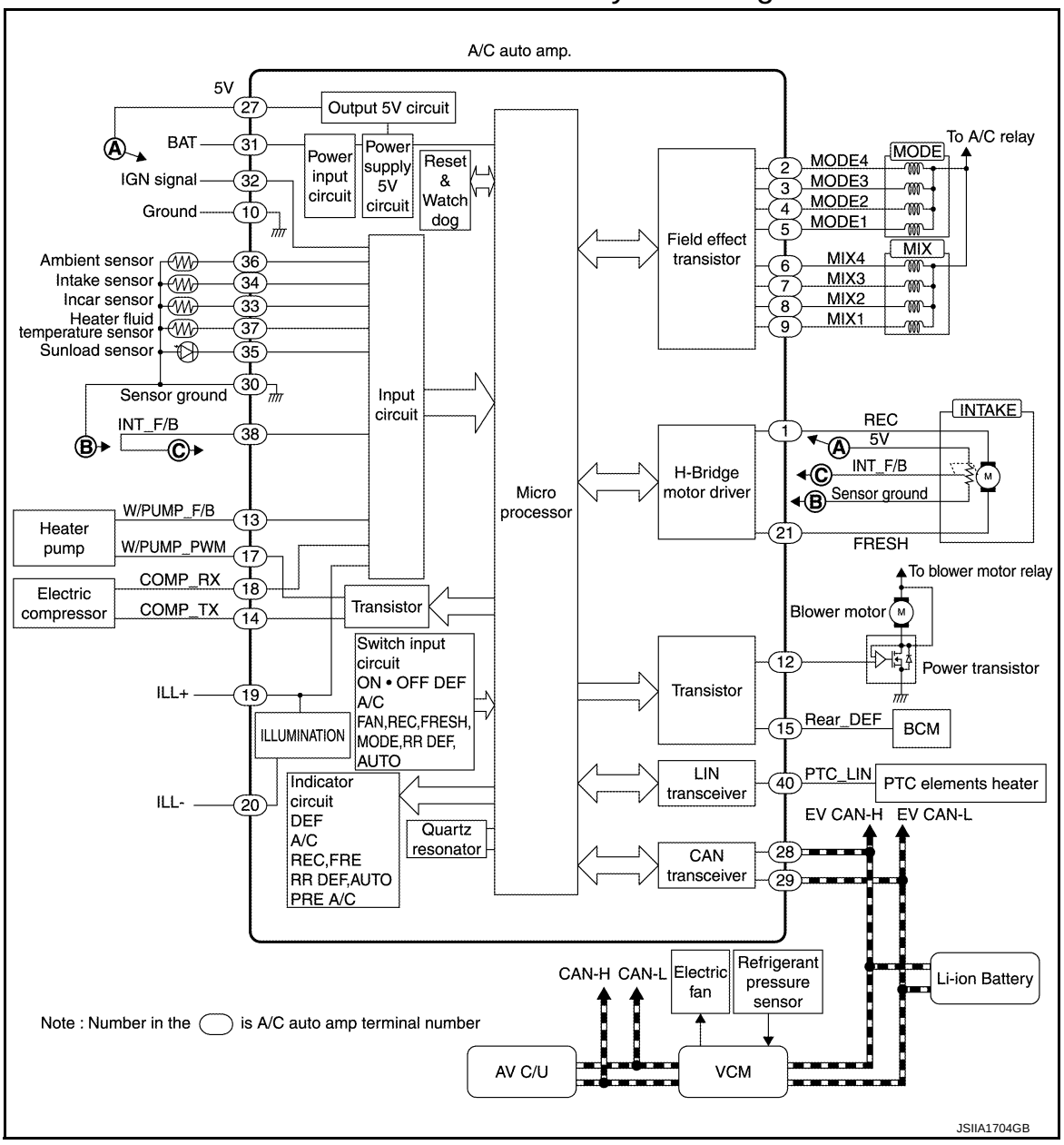
A/C relay, that operates timer air conditioning and remote control air conditioning while power switch is in the OFF position, is adopted. Refer to HAC-8, "AUTOMATIC AIR CONDITIONING SYSTEM : Component Parts Location".

SYSTEM

AUTOMATIC AIR CONDITIONING SYSTEM

AUTOMATIC AIR CONDITIONING SYSTEM : System Diagram

INFOID:0000000006997093



AUTOMATIC AIR CONDITIONING SYSTEM : System Description

INFOID:0000000006997094

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 V-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-16, "AUTOMATIC AIR CONDITIONING SYSTEM : Temperature Control"
- HAC-16, "AUTOMATIC AIR CONDITIONING SYSTEM : Air Outlet Control"
- HAC-17, "AUTOMATIC AIR CONDITIONING SYSTEM : Air Flow Control"

- HAC-18, "AUTOMATIC AIR CONDITIONING SYSTEM : Air Inlet Control"
- HAC-20, "AUTOMATIC AIR CONDITIONING SYSTEM : Compressor Control"
- HAC-21, "AUTOMATIC AIR CONDITIONING SYSTEM : PTC Element Heater Control"
- HAC-22, "AUTOMATIC AIR CONDITIONING SYSTEM : Heater Pump 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 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 (–4°F), no correction is performed of the data for A/C control.
- When the temperature detected by the ambient sensor is less than approximately –29°C (–20°F), no correction is performed of 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 only 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 only 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

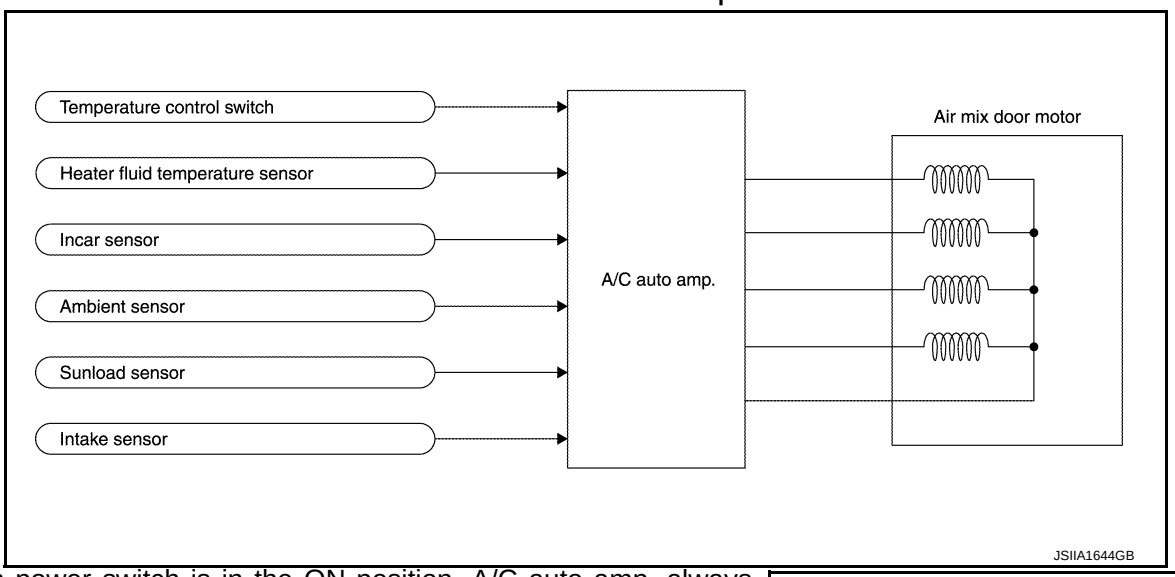
The A/C auto amp. controls the interior temperature so that it is always at the optimum level, and performs correction so that the temperature experienced by the passengers matches the target temperature set with the temperature control dial, according to the ambient temperature detected by the ambient sensor.

CONTROL BY VCM

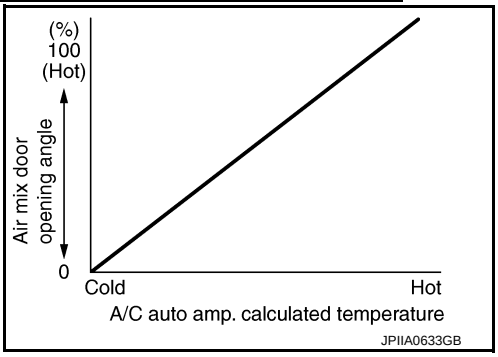
- For details of cooling fan control, refer to EVC-39, "HIGH VOLTAGE SYSTEM COOLING CONTROL : System Description".

AUTOMATIC AIR CONDITIONING SYSTEM : Temperature Control

INFOID:0000000006997095

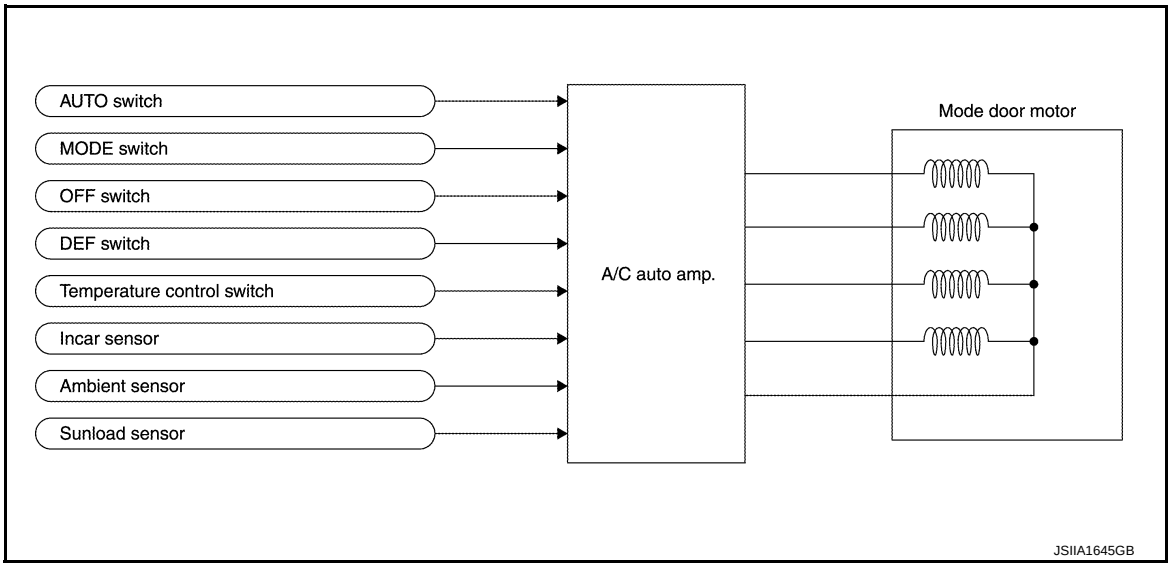


- When power switch is in the ON position, A/C auto amp. always automatically controls temperature regardless of air conditioner operational state.
- A/C auto amp. calculates the target air mix door opening angle according to set temperature, in-vehicle temperature, ambient temperature, and sunload.
- 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 18.0°C (60°F–61°F), and at the fully hot position when set temperature is 32.0°C (89°F–90°F).

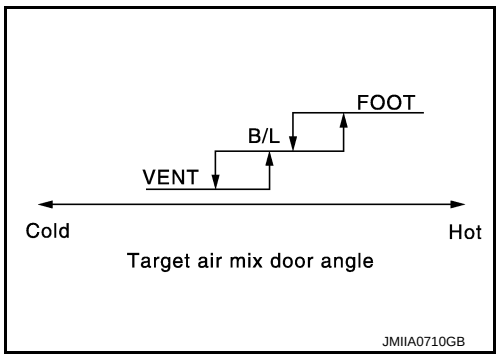


AUTOMATIC AIR CONDITIONING SYSTEM : Air Outlet Control

INFOID:0000000006997096



- 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 selected 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 (8.6°F) or less].
- If the OFF switch is pressed, the outlet is fixed at FOOT.

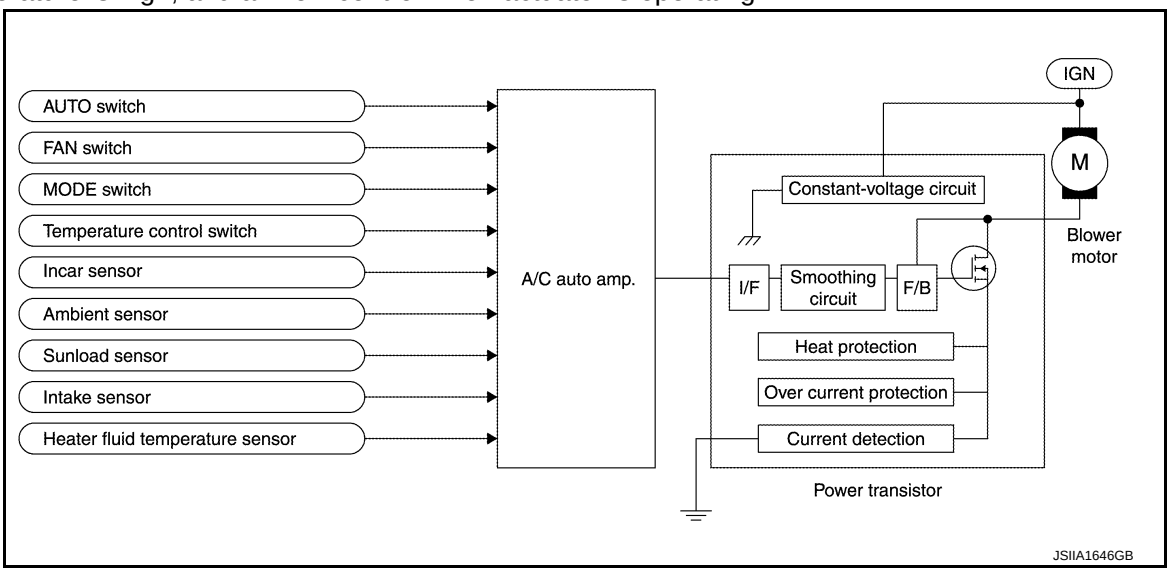


AUTOMATIC AIR CONDITIONING SYSTEM : Air Flow Control

INFOID:0000000006997097

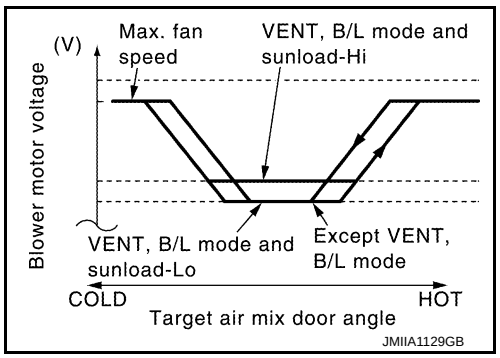
DESCRIPTION

- In addition to manual air flow control and automatic air flow control, air flow control also includes starting air flow control, starting air flow control when coolant temperature is low, starting air flow control when interior temperature is high, and air flow control when actuator is operating.



AUTOMATIC AIR FLOW CONTROL

- A/C auto amp. decides 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 Volt 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.

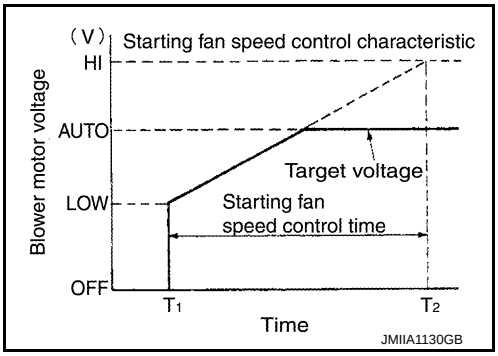


STARTING AIR FLOW CONTROL

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).

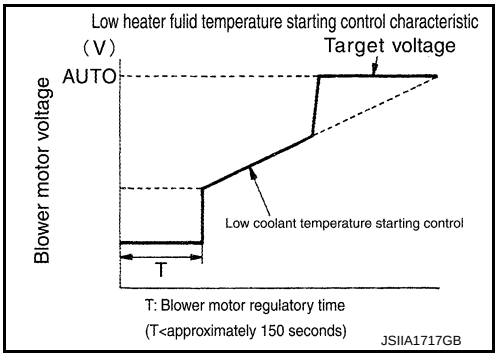
NOTE:

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



STARTING AIR FLOW CONTROL AT LOW HEATER FULID TEMPERATURE

When blower fan motor starts, the A/C auto amp. suspends blower motor activation for a maximum of 150 seconds, according to the target air mix door position, to prevent cold air from being discharged. After this, voltage applied to power transistor gate is increased gradually, and the blower fan motor starts.



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 3 seconds so that evaporator is cooled by refrigerant.

AIR FLOW CONTROL AT ACTUATOR OPERATION

If the mode actuator 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 canceled and the desired fan speed (1 – 7) can be selected.

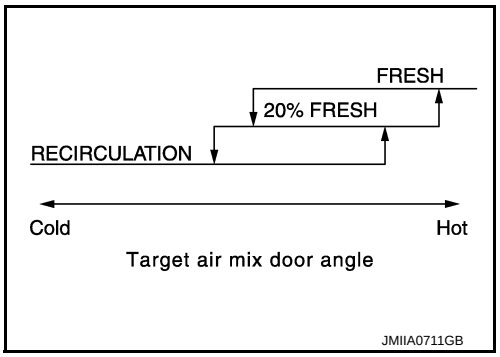
		Voltage applied to blower fan motor (V)		
		Mode switch		
		VENT, B/L	FOOT, D/F	DEF
Fan speed (When manual control is selected)	1st	4.0	4.0	4.0
	2nd	5.4	5.1	5.1
	3rd	6.8	6.2	6.3
	4th	8.3	7.3	7.4
	5th	9.7	8.3	8.5
	6th	11.1	9.4	9.7
	7th	12.5	10.5	11.2

AUTOMATIC AIR CONDITIONING SYSTEM : Air Inlet Control

INFOID:0000000006997098

- 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.

- During automatic inlet control when the ambient temperature is other than 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.

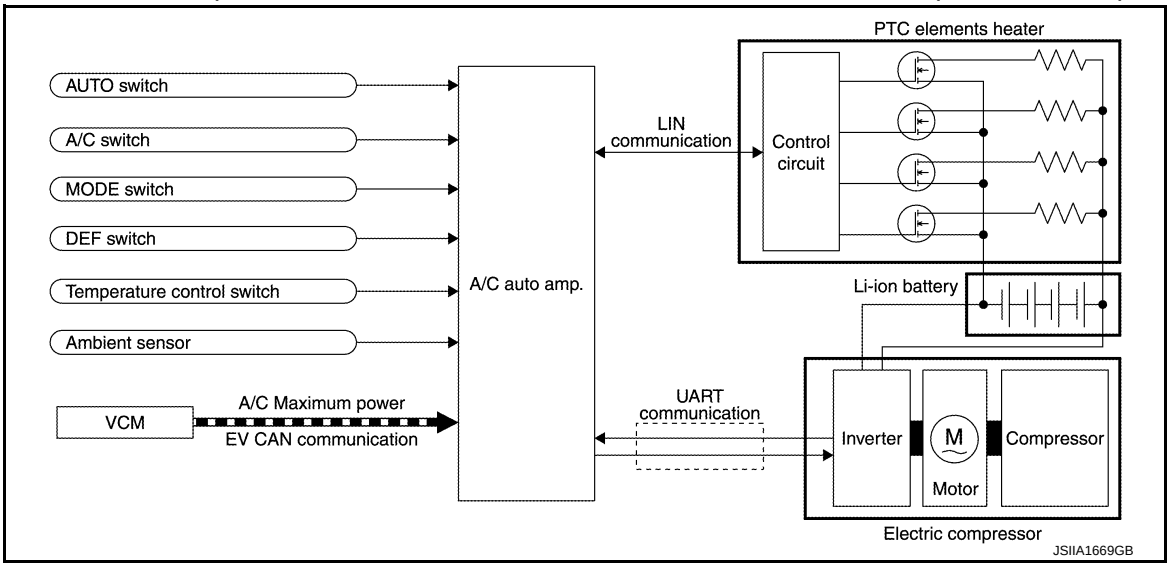
Compressor	Mode switch	Ambient temperature (temperature detected by ambient sensor)	
		14°C (57.2°F) or less	15°C (59°F) or more
ON	VENT B/L	30% recirculation	Control according to the target air mix door position 
	FOOT		
	D/F	Fresh air intake	
OFF	VENT B/L	30% recirculation	Fresh air intake
	FOOT		
	D/F	Fresh air intake	

AUTOMATIC AIR CONDITIONING SYSTEM : Electric Power Distribution Control

INFOID:0000000006997099

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

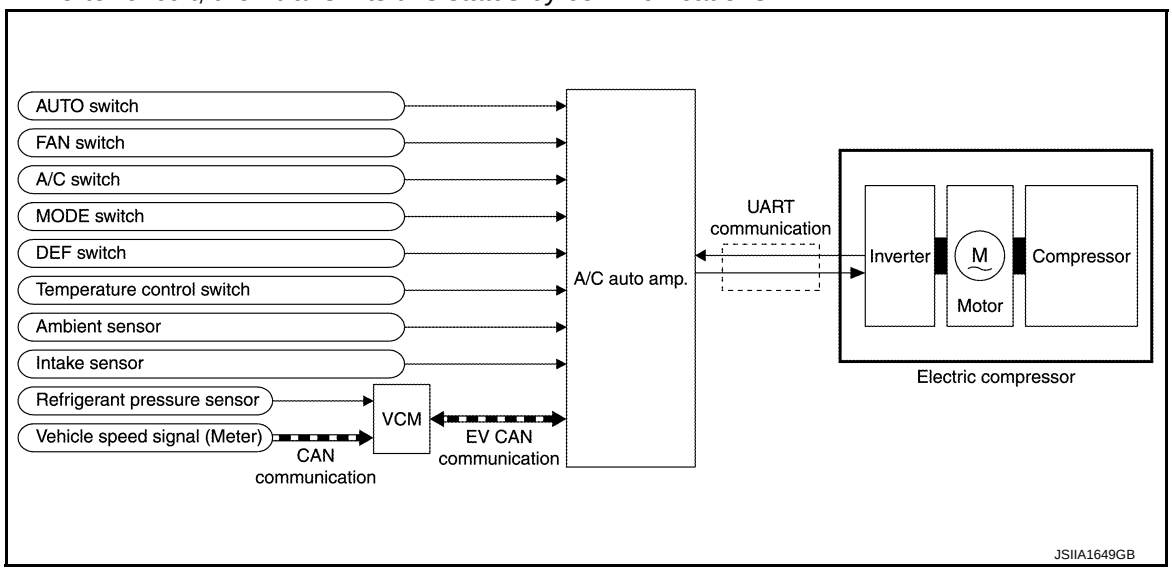
- For the first 10 minutes after the power switch is turned ON, heating/cooling operation at maximum capacity is possible based on a judgment by the A/C auto amp.. (However this does not occur in ECO mode.)

AUTOMATIC AIR CONDITIONING SYSTEM : Compressor Control

INFOID:0000000006997100

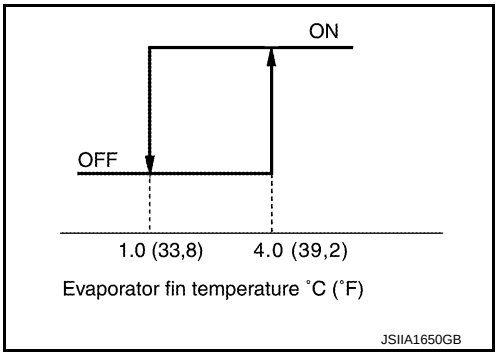
DESCRIPTION

- 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 will produce the target temperature [4°C – 12°C (39.2°F – 53.6°F)] for the evaporator outlet temperature, and sends a speed command to the electric compressor via a communications signal.
- 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 Cryoprotective Protection Control

- When intake air temperature sensor detects that air temperature after passing through evaporator is 1°C (33.8°F) 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 (39.2°F) 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/cm^2) or more
  - Approximately 0.14 MPa (Approximately 1.4 kg/cm^2) 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/cm^2) or less
  - Approximately 0.16 MPa (Approximately 1.6 kg/cm^2) or more

Fail-Safe Control

- 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 2 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 conditions shown below, 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 (266°F).	Stopped	Compressor stops for 5 minutes then restarts.
Compressor IPM overheat	IPM temperature is more than 125°C (257°F) within 1 minute after start.	Stopped	IPM temperature drops to 123°C (253.4°F) or less.
	IPM temperature is more than 88°C (190.4°F) at least 1 minute after start.		IPM temperature drops to 86°C (186.8°F) 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 3 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 canceled.
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 (230°F) .	Compressor speed is limited.	IPM temperature drops to 108°C (226.4°F) or less.
Compressor IPM temperature restriction	IPM temperature exceeded 83°C (181.4°F) .	Compressor speed is limited.	IPM temperature drops to 81°C (177.8°F) 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 2 seconds or more.

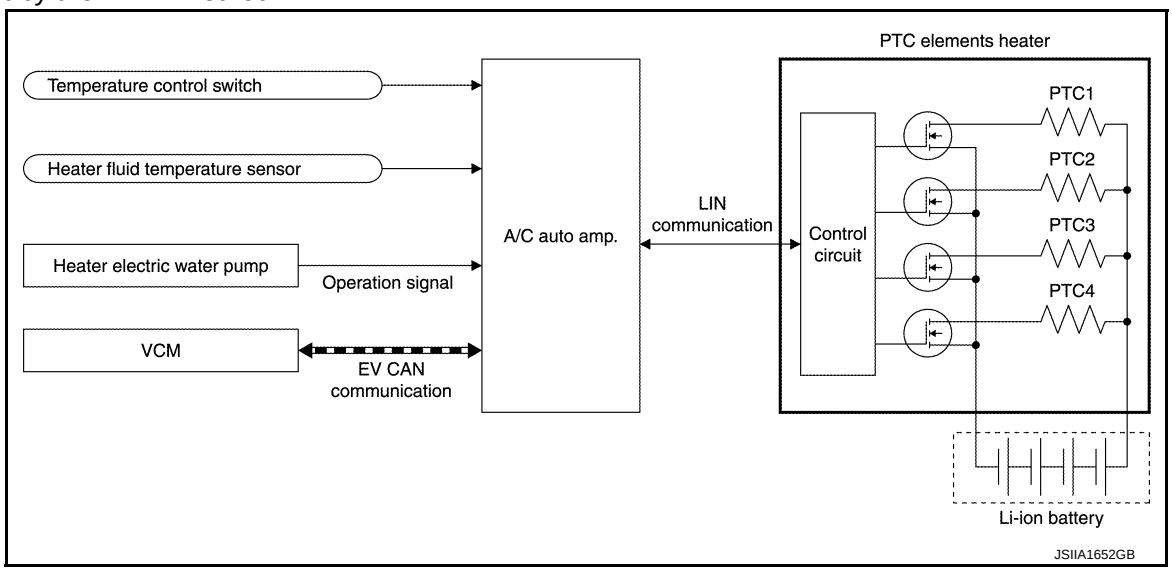
AUTOMATIC AIR CONDITIONING SYSTEM : PTC Element Heater Control

INFOID:0000000006997101

DESCRIPTION

- Based on the air mix door position and signals input from each sensor, the A/C auto amp. calculates the target coolant temperature [ambient temperature – approximately 70°C (158°F)].

- A/C auto amp. transmits the operating rate to the PTC element heater via LIN communications so that the calculated target coolant temperature is achieved.
- Based on the A/C auto amp. command, the control circuit inside the PTC element heater controls the heater output by the PWM method.

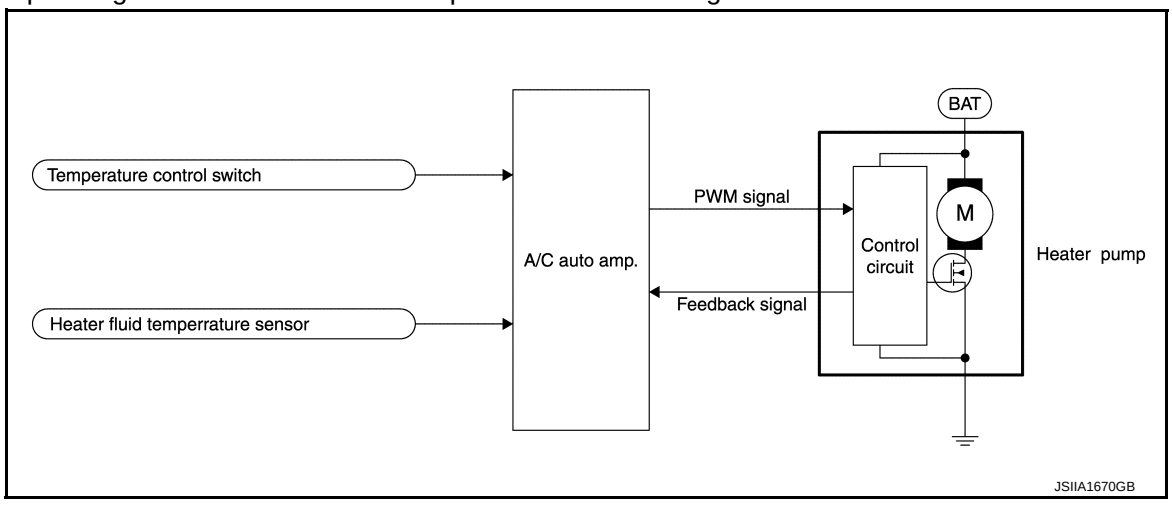


AUTOMATIC AIR CONDITIONING SYSTEM : Heater Pump Control

INFOID:0000000006997102

DESCRIPTION

- Based on the signals input from the sensors and the air mix door position, the A/C auto amp. calculates the operating rate for the heater electric water pump.
- The A/C automatic amplifier outputs the target operating rate to the heater electric water pump via the PWM signal.
- Based on the A/C auto amp. command, the heater electric water pump activates the pump and outputs pump operating status to the A/C auto amp. as the feedback signal.



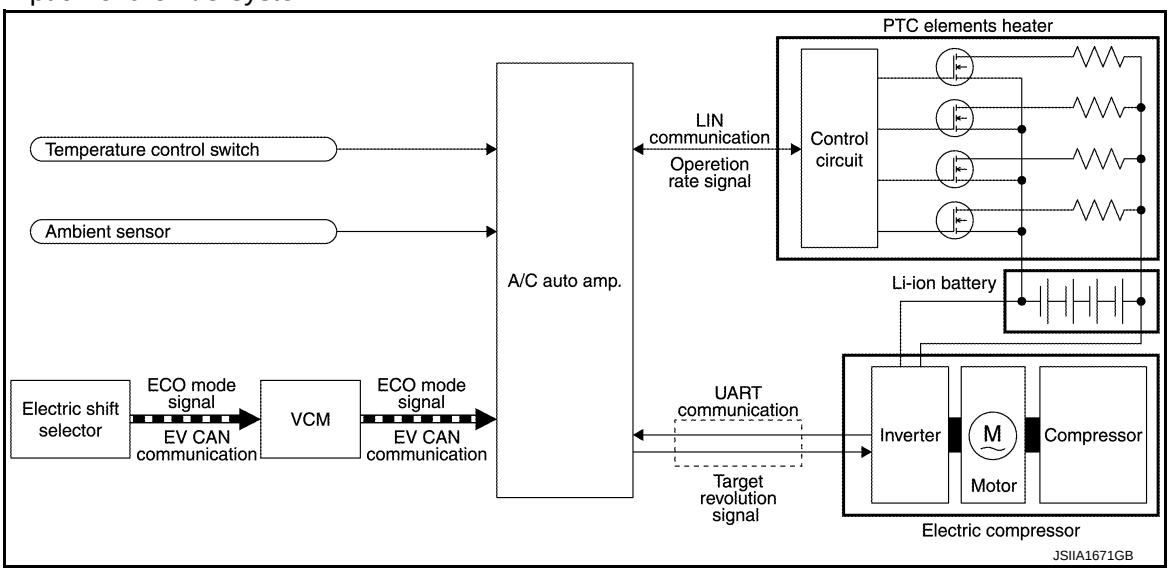
AUTOMATIC AIR CONDITIONING SYSTEM : ECO Mode Control

INFOID:0000000006997103

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-19, "AUTOMATIC AIR CONDITIONING SYSTEM : Electric Power Distribution Control") is canceled 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.

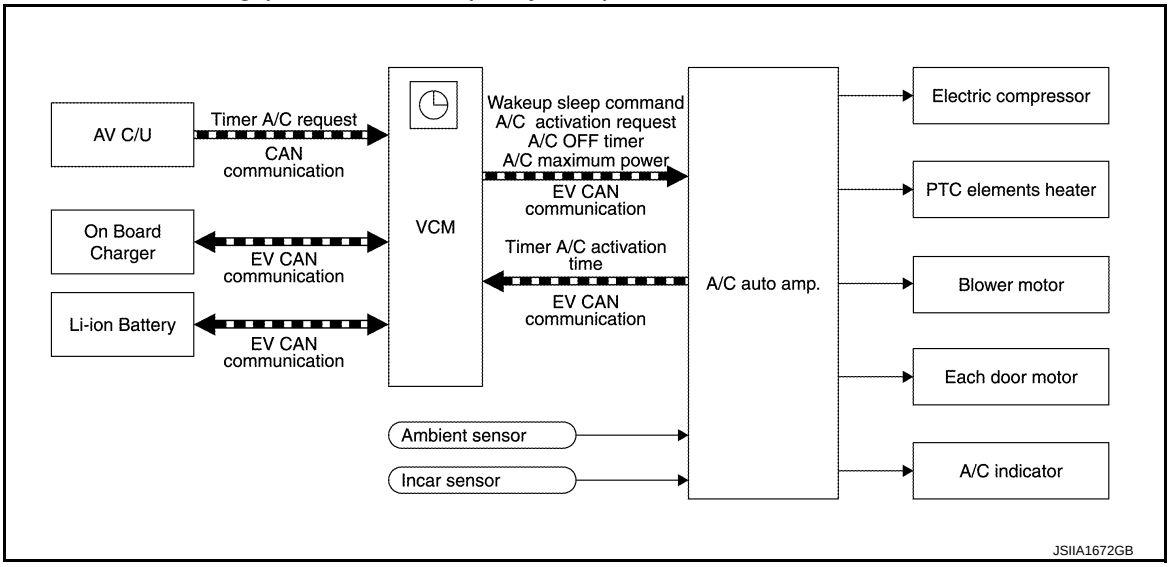
NOTE:
When ECO mode control is activated, there will be a noticeable decrease in A/C capacity when temperatures are hot or cold.

AUTOMATIC AIR CONDITIONING SYSTEM : Timer A/C Control

INFOID:0000000006997104

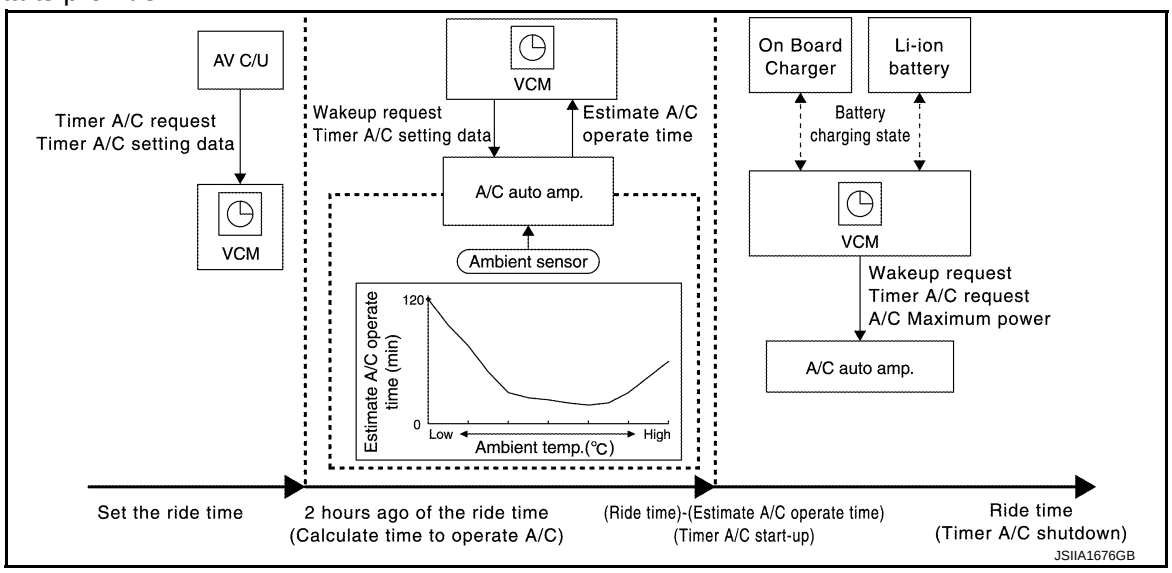
DESCRIPTION

- When timer A/C is set on the navigation screen, the navigation system transmits the timer A/C request signal and timer A/C time setting (set vehicle occupancy time) to VCM.



- VCM starts 2 hours before the set timer A/C time, and sends a request to the A/C auto amp. for calculation of the A/C operating 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 pre-A/C.



A/C OPERATION DURING TIMER A/C

- During timer A/C, the A/C auto amp. operates the A/C under the conditions shown below.

Temperature setting	Intake door positon	Mode door positon	Electric compressor
25°C (75°F)	Recirculation	D/F (during heating)	Max. 3500 rpm
		Auto (during cooling)	

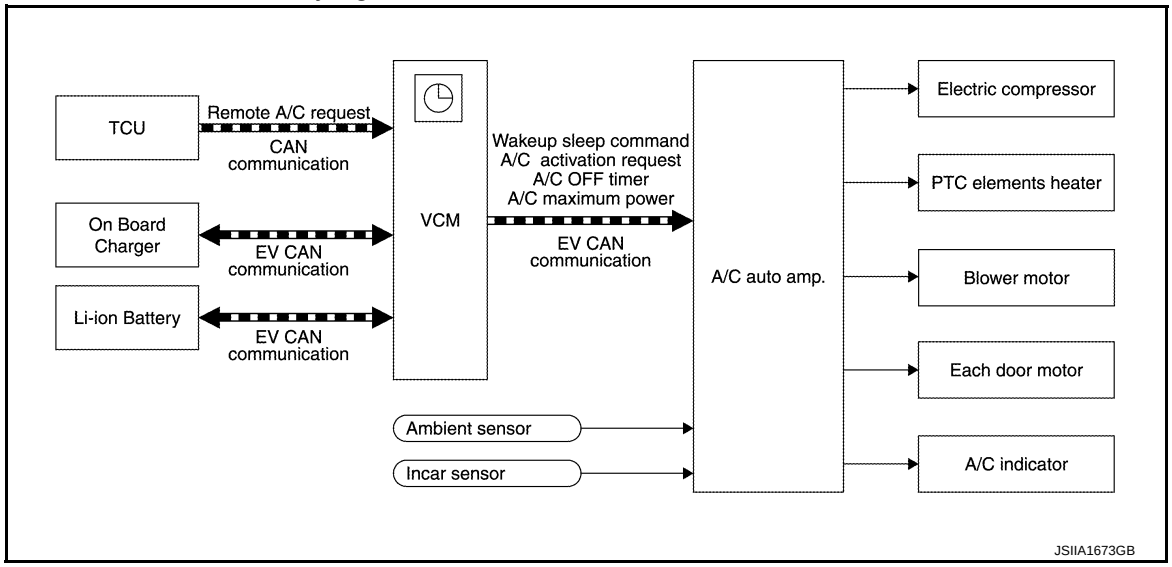
- If the charging plug is not inserted into the charging port at the time of timer A/C start, timer A/C operation does not start. If the charging plug is disconnected during timer A/C operation, timer A/C operation is stopped.

AUTOMATIC AIR CONDITIONING SYSTEM : Remote A/C Control

INFOID:0000000006997105

DESCRIPTION

- When the user selects remote A/C, VCM starts the A/C auto amp.. During remote A/C, the A/C auto amp. performs remote A/C control.
- VCM ends remote A/C when it judges remote A/C end.



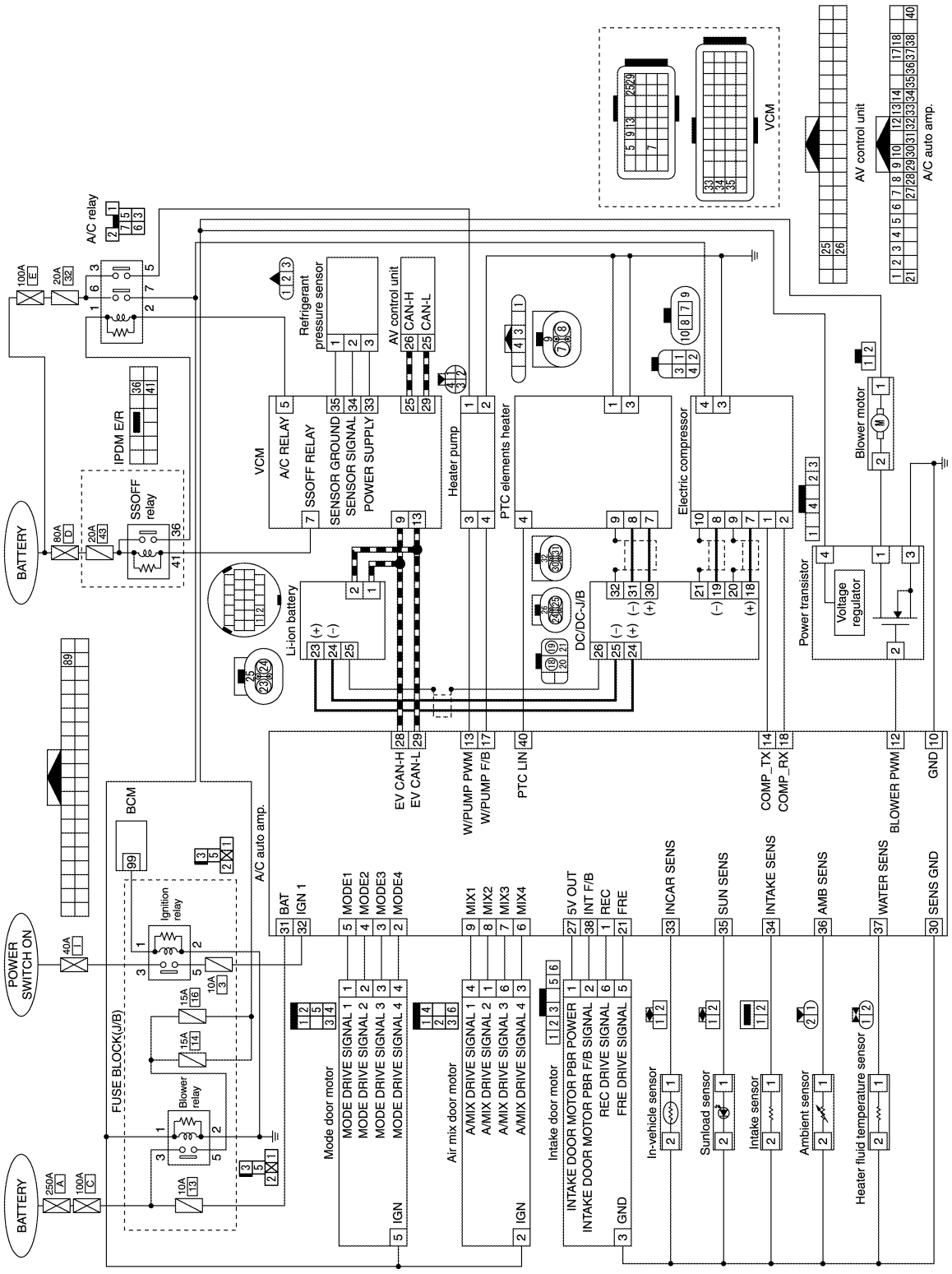
A/C OPERATION STATUS DURING REMOTE A/C

- During remote A/C, the A/C auto amp. operates the A/C under the conditions shown below.

Temperature setting	Intake door positon	Mode door positon	Electric compressor
25°C (75°F)	Recirculation	D/F (during heating)	Max. 3500 rpm
		Auto (during cooling)	

AUTOMATIC AIR CONDITIONING SYSTEM : Circuit Diagram

INFOID:0000000006997106



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AUTOMATIC AIR CONDITIONING SYSTEM : Actuator Zero Position Reset

INFOID:0000000006997107

A step motor actuator is used for the mod door actuator and air mix door actuator.
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 actuator zero position reset in order to align its recognized door position with the actual door position.
When either of the conditions below is met, then the A/C auto amp. performs actuator zero position reset when the power switch next turns ON or when pre-A/C turns ON.

- The 12V battery terminal was disconnected and then reconnected.
- The power switch turned OFF during operation of the mode door actuator or air mix door actuator 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.

OPERATION

Description

INFOID:0000000006997108

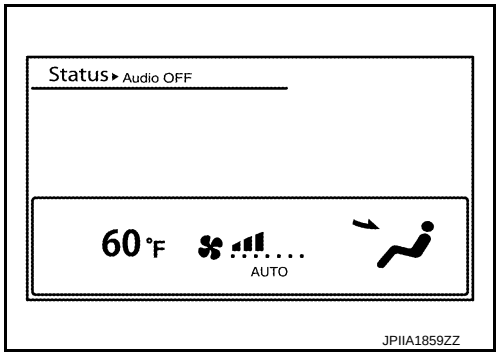
- This A/C uses various sensors to detect temperature changes in the interior caused by factors such as changes in ambient temperature and sunload. When the desired temperature is set, the discharge air temperature, discharge air flow, and inlet/outlet changes are controlled automatically to maintain 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 timer A/C or remote A/C to adjust the interior to a comfortable temperature before entering the vehicle.

Switch Name and Function

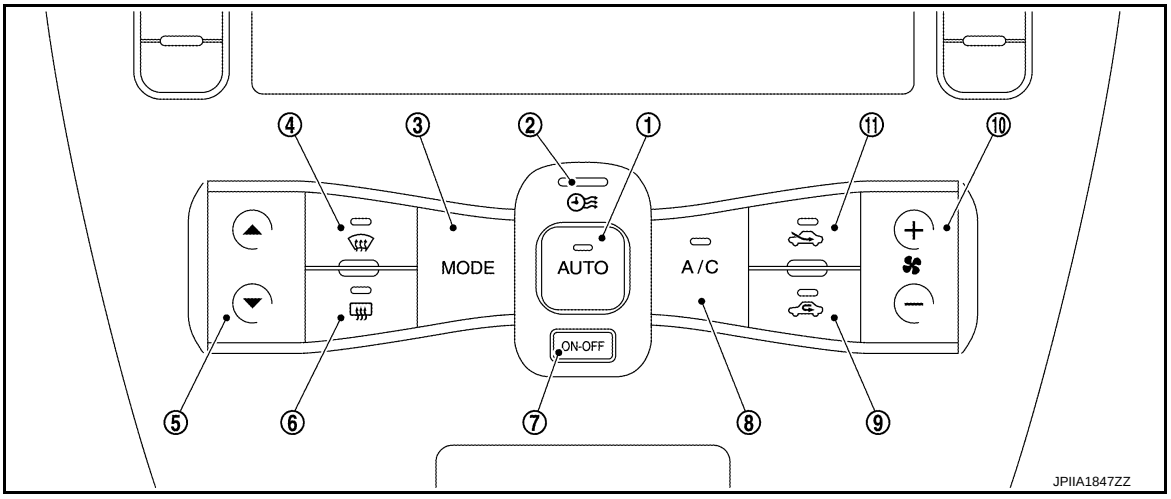
INFOID:0000000006997109

AUTO A/C SYSTEM OPERATIONS AND DISPLAYS

A/C Status Display (Inside Display)



A/C Controller



1. AUTO switch
2. A/C indicator
3. MODE switch
4. DEF switch
5. Temperature control switches
6. Rear window defogger switch
7. ON·OFF switch
8. A/C switch
9. REC switch
10. Fan control switch
11. FRE switch

AUTO switch	• 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 shown below. - 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. **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 other functions than air outlet or air flow.
A/C indicator	While the A/C-Heater Timer (Climate Ctrl.Timer) operates, the indicator flashes. If the A/C-Heater Timer (Climate Ctrl. Timer) is set to activate, the indicator illuminates.
MODE switch	When each MODE switch is pressed, air outlet is switched and VENT, B/L, FOOT, or D/F can be selected manually. **NOTE:** • 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).
DEF switch	DEF mode (switch indicator lamp) changes between ON ⇔ OFF each time DEF switch is pressed When switch is pressed while air conditioning system is in the ON position • When DEF mode turns ON, air conditioning system becomes the following status. - 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. - 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. **NOTE:** When DEF mode is turned ON while “AUTO” is indicated on display, “AUTO” indication turns OFF. However, airflow automatic control continues. (This operation is excluded when airflow is set before DEF switch is pressed.)
Temperature control switches	Operation of this switch sets the temperature setting in increments of 0.5°C (1°F) within the range of 18.0°C (60°F) to 32.0°C (90°F). • ▲: Increase temperature setting. • ▼: Decrease temperature setting. **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).
Rear window defogger switch	Refer to DEF-5, "System Description".
ON/OFF switch	• 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. - 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 was stopped.

A/C switch	• 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). **NOTE:** When blower fan motor is OFF, compressor control cannot be activated.
REC switch	• 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 2 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). **NOTE:** Air inlet can be changed when air conditioning system is in OFF status.
Fan control switch	Air flow can be manually set within the range of speeds 1 – 7 using the fan control dial. • +: Increase air flow. • -: Decrease air flow. **NOTE:** • 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).
FRE switch	• When the FRE switch is pressed, the inlet changes to FRE (fresh air intake) and the FRE indicator lamp turns ON. • If the FRE switch is pressed and held for approximately 2 seconds or more when the inlet is FRE (fresh air intake), 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). **NOTE:** Air inlet can be changed when air conditioning system is in OFF status.

DIAGNOSIS SYSTEM (HVAC)

Description

INFOID:0000000006997110

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-diagnosis results
		Data Monitor
		Work Support
		ACTIVE TEST
AV control unit	AV	Self-diagnosis results
		Data Monitor
		ACTIVE TEST
VCM	EV/HEV	Self-diagnosis results
		Data Monitor

CONSULT Function

INFOID:0000000006997111

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-diagnosis 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.

ECU IDENTIFICATION INFORMATION

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

SELF-DIAGNOSIS RESULTS

Diagnosis results that are judged by A/C auto amp. can be checked. HAC-40, "DTC Index".

DATA MONITOR

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

Display Item List

Monitor item [STATUS or UNIT]		DESCRIPTION
Ambient sensor	[°C/°F]	Value of ambient sensor detection value (voltage), converted to ambient temperature
In-vehicle sensor	[°C/°F]	Value of in-vehicle sensor detection value (voltage), converted to interior temperature
Intake sensor	[°C/°F]	Value of intake sensor detection value (voltage), converted to intake temperature
Sunload sensor	[W/m^2]	Value of sunload sensor detection value (voltage), converted to sunload
Ambient sensor value	[°C/°F]	Value of ambient temperature calculated by A/C auto amp.
In-vehicle sensor value	[°C/°F]	Value of interior temperature calculated by A/C auto amp.
Intake sensor value	[°C/°F]	Value of intake temperature calculated by A/C auto amp.
Sunload sensor value	[W/m^2]	Value of sunload calculated by A/C auto amp.
Compressor request	[On/Off]	A/C ON signal ON/OFF status
Blower fan request	[On/Off]	Blower fan ON signal ON/OFF status

Monitor item [STATUS or UNIT]		DESCRIPTION
Blower 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
COMPR RPM	[rpm]	Rotation speed of electric compressor
COMPR INPUT POWER SIG	[W]	Power consumption value of electric compressor
COMPR INPUT CRNT CHARGE	[A]	Input current value of electric compressor
COMPR IPM TEMP SIG	[°C/°F]	Detection value of IPM temperature sensor inside electric compressor
COMPR INPUT VOLT SIG	[V]	Input voltage value of electric compressor
COMPR DISCHR TMP OVRHEAT	[OK/NG]	If the compressor discharge refrigerant temperature (estimated value) exceeds 130°C, status is NG.
COMPR IPM OVERHEAT	[OK/NG]	• If the IPM temperature exceeds 125°C within 1 minute after start, status is NG. • If the IPM temperature exceeds 88°C 1 minute or more after start, status is NG.
COMPR VOLT SATURATION	[OK/NG]	If the inverter output voltage increases to 140% or more, status is NG.
COMPR OVER CURRENT	[OK/NG]	• Start failed 3 times because current of 35.1 A or more flowed within 90 seconds after start. • Current of 35.1 A or more flows when compressor is stopped.
COMPR OVER LOADED	[OK/NG]	If the input current of the electric compressor increases to 13.5 A or more, status is NG.
COMPR LOW VOLT ERROR	[OK/NG]	If the input voltage of the electric compressor lowers less than 230 V, status is NG.
COMPR HIGH VOLT ERROR	[OK/NG]	If the input voltage of the electric compressor exceeds 420 V, status is NG.
COMM ERROR HVAC→COMPR	[OK/NG]	If the electric compressor recognizes an UART communication error, status is NG.
COMPR IPM TEMP SEN ERROR	[OK/NG]	If an open circuit or short circuit is recognized for the IPM temperature sensor, status is NG.
COMPR SHUNT SIG ERROR	[OK/NG]	If the shunt signal in the electric compressor is judged abnormal, status is NG.
COMPR ROM,RAM,AD ERROR	[OK/NG]	If any data error is detected in the ROM or RAM area of the electric compressor, status is NG.
COMPR DISCHRG TEMP LIMIT	[OK/NG]	If the discharge temperature estimated value exceeds 110°C, status is NG.
COMPR IPM TEMP LIMIT	[OK/NG]	If the IPM temperature exceeds 83°C, status is NG.
COMPR LOW SPEED OVR LOAD	[OK/NG]	If the compressor cannot rotate at the specified speed, status is NG.
COMM ERROR COMP→HVAC	[OK/NG]	If the A/C auto amp. recognizes an UART communication error, status is NG.
PTC HEATER REQUEST	[%]	Operating rate sent to the PTC element heater by the A/C auto amp.
PTC HEATER CIRCUIT	[OK/NG]	If the diagnosis value for the control element inside PTC element heater exceeds the specified value, status is NG.
PTC OVERHEAT PROTECTION	[OK/NG]	If the board temperature inside PTC element heater exceeds the control value, status is NG.
PTC HEATER VOLTAGE	[OK/NG]	If the voltage applied to PTC element heater exceeds the specified value, status is NG.
PTC HEATER CIRCUIT 1	[OK/NG]	If the diagnosis value for the control element 1 inside PTC element heater exceeds the specified value, status is NG.
PTC HEATER CIRCUIT 2	[OK/NG]	If the diagnosis value for the control element 2 inside PTC element heater exceeds the specified value, status is NG.
PTC HEATER CIRCUIT 3	[OK/NG]	If the diagnosis value for the control element 3 inside PTC element heater exceeds the specified value, status is NG.

Monitor item [STATUS or UNIT]		DESCRIPTION
PTC HEATER CIRCUIT 4	[OK/NG]	If the diagnosis value for the control element 4 inside PTC element heater exceeds the specified value, status is NG if so designed.
PTC LIN COMMUNICATION	[OK/NG]	If the PTC element heater recognizes an error in the LIN communication from the A/C auto amp., status is NG.
PTC COMMUNICATION	[OK/NG]	If the A/C auto amp. recognizes an error in the LIN communication from the PTC element heater, status is NG.
PTC INTERLOCK	[OK/NG]	If an error is detected in the connection check for the PTC element heater high-voltage connector, status is NG.
COMM ERROR PTC→H-VAC	[OK/NG]	If the A/C auto amp. recognizes an error in the LIN communication from the PTC element heater, status is NG.
COMP USE PERMIT POWER	[W]	Power available to electric compressor calculated by A/C auto amp.
REFRIGERANT PRE SEN	[Mpa]	Refrigerant pressure sensor detection value sent from VCM
FORCED OFF SIG	[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.
COMM ERROR VCM→H-VAC	[OK/NG]	If the A/C auto amplifier recognizes an error in the CAN communication from VCM, status is NG.
PTC CONSUMPTION VOLT	[W]	Power available to PTC element heater calculated by A/C auto amp.
WATER TEMPSENSOR	[°C/°F]	Value of heater fluid temperature sensor detection value (voltage), converted to temperature
PUMP RPM (DIRECTION)	[rpm]	Value sent to heater pump by A/C auto amp.
PUMP RPM (EFFECTIVE)	[rpm]	Actual rotation speed of heater pump
PUMP CANNOT READ INPUT SIG	[ON/OFF]	If the heater pump cannot read out any PWM signal output from the A/C auto amp., status is ON.
H/P OPERATION LIMIT	[ON/OFF]	If a pump malfunction is detected, the status is ON.
HEATER PUMP VOLTAGE	[OK/NG]	If the heater pump input voltage is less than 8 V or is 16 V or more, status is NG.
HEATER PUMP FAULT	[OK/NG]	If a pump malfunction is judged, status is NG.
COMM ERROR H/P→HVAC	[OK/NG]	If the DUTY signal from heater pump is not normal, status is NG.

*: “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.

Test item	DESCRIPTION
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

	Test item						
	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6	Mode 7
Mode door actuator position	VENT	VENT	B/L	B/L	FOOT*	D/F	DEF
Intake door actuator position	REC	REC	REC	20%FRE	FRE	FRE	FRE
Air mix door actuator position	FULL COLD	FULL COLD	FULL COLD	Halfway	Halfway	FULL HOT	FULL HOT
Blower fan motor (applied voltage)	5 V	8.5 V	10.5 V	8.5 V	8.5 V	8.5 V	5 V
Electric compressor (rpm)	ON (2000)	ON (2000)	ON (3000)	ON (2000)	OFF (0)	OFF (0)	OFF (0)

	Test item						
	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6	Mode 7
PTC element heater operating rate	0%	0%	0%	50%	50%	50%	0%
Heater electric water pump operating rate	10%	10%	10%	20%	20%	50%	40%

*In FOOT mode, position of mode door actuator (driver side) is set to the status that is selected for blow setting to DEF. Refer to HAC-56, "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
Set temperature correction	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-55, "Temperature Setting Trimmer"
REC memory setting	REC memory function setting can be performed.	HAC-55, "Inlet Port Memory Function (REC)"
FRE memory setting	FRE memory function setting can be performed.	HAC-56, "Inlet Port Memory Function (FRE)"
Blow setting in FOOT mode	In FOOT mode, the air blow to DEF can be turned ON/OFF.	HAC-56, "Foot Position Setting Trimmer"
MAX rotation compensation in Pri Air Conditioner	Compressor MAX rotation in Pri Air Condition is compensated.	HAC-56, "Setting of compressor maximum rotation speed during pre air conditioning"
MAX rotation compensation in IDL	Compressor MAX rotation when vehicle stopped is compensated.	HAC-57, "Setting of compressor maximum rotation speed during idling"
Actuator zero position reset	Zero position reset of air mix door actuator and mode door actuator can be performed.	HAC-58, "Work Procedure"

ECU DIAGNOSIS INFORMATION

A/C AUTO AMP.

Input/Output Standard

INFOID:0000000006997113

CONSULT DATA MONITOR REFERENCE VALUES

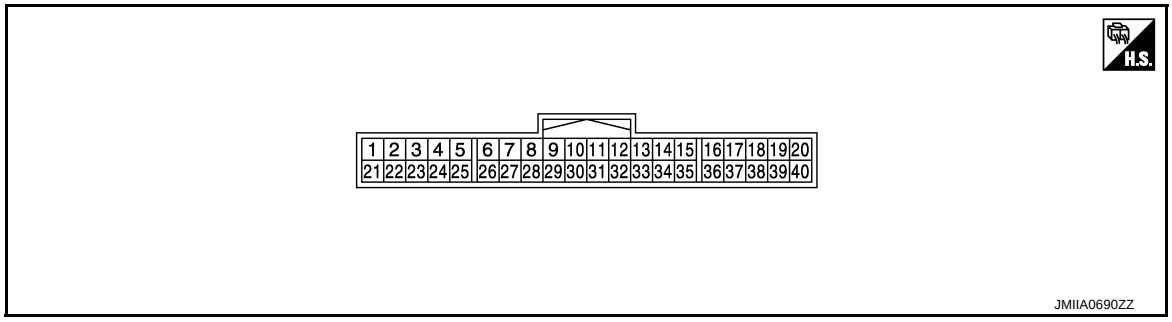
Monitor item	Condition		Value/Status
AMB TEMP SEN	Power switch ON		Equivalent to ambient temperature
IN-VEH TEMP	Power switch ON		Equivalent to in-vehicle temperature
INT TEMP SEN	Power switch ON		Equivalent to evaporator fin temperature
SUNLOAD SEN	Power switch ON		Equivalent to sunload amount
AMB SEN 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 (Compressor operation status)	On
		A/C switch: 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
COMPR RPM	Power switch READY	A/C switch: ON (Compressor operation status)	Rotation speed of electric compressor
COMPR INPUT POWER SIG	Power switch READY	A/C switch: ON (Compressor operation status)	Power consumption value of electric compressor
COMPR INPUT CRNT CHARGE	Power switch READY	A/C switch: ON (Compressor operation status)	Input current value of electric compressor
COMPR IPM TEMP SIG	Power switch READY	A/C switch: ON (Compressor operation status)	Detection value of IPM temperature sensor inside electric compressor
COMPR INPUT VOLT SIG	Power switch READY	A/C switch: ON (Compressor operation status)	Input voltage value of electric compressor
COMPR DISCHR TMP OVRHEAT	Power switch READY	A/C switch: ON (Compressor operation status)	OK
COMPR IPM OVERHEAT	Power switch READY	A/C switch: ON (Compressor operation status)	OK
COMPR VOLT SATURATION	Power switch READY	A/C switch: ON (Compressor operation status)	OK
COMPR OVER CURRENT	Power switch READY	A/C switch: ON (Compressor operation status)	OK
COMPR OVER LOADED	Power switch READY	A/C switch: ON (Compressor operation status)	OK
COMPR LOW VOLT ERROR	Power switch READY	A/C switch: ON (Compressor operation status)	OK
COMPR HIGH VOLT ERROR	Power switch READY	A/C switch: ON (Compressor operation status)	OK

Monitor item	Condition		Value/Status
COMM ERROR HVAC→COMPR	Power switch READY	A/C switch: ON (Compressor operation status)	OK
COMPR IPM TEMP SEN ERROR	Power switch READY	A/C switch: ON (Compressor operation status)	OK
COMPR SHUNT SIG ERROR	Power switch READY	A/C switch: ON (Compressor operation status)	OK
COMPR ROM,RAM,AD ERROR	Power switch READY	A/C switch: ON (Compressor operation status)	OK
COMPR DISCHRG TEMP LIMIT	Power switch READY	A/C switch: ON (Compressor operation status)	OK
COMPR IPM TEMP LIMIT	Power switch READY	A/C switch: ON (Compressor operation status)	OK
COMPR LOW SPEED OVR LOAD	Power switch READY	A/C switch: ON (Compressor operation status)	OK
COMM ERROR COMP→HVAC	Power switch READY	A/C switch: ON (Compressor operation status)	OK
PTC HEATER REQUEST	Power switch READY	Heater FULL HOT operation	Operating rate sent to the PTC element heater by the A/C auto amp.
PTC HEATER CIRCUIT	Power switch READY	Heater FULL HOT operation	OK
PTC OVERHEAT PROTECTION	Power switch READY	Heater FULL HOT operation	OK
PTC HEATER VOLTAGE	Power switch READY	Heater FULL HOT operation	OK
PTC HEATER CIRCUIT 1	Power switch READY	Heater FULL HOT operation	OK
PTC HEATER CIRCUIT 2	Power switch READY	Heater FULL HOT operation	OK
PTC HEATER CIRCUIT 3	Power switch READY	Heater FULL HOT operation	OK
PTC HEATER CIRCUIT 4	Power switch READY	Heater FULL HOT operation	OK
PTC LIN COMMUNICATION	Power switch READY	Heater FULL HOT operation	OK
PTC COMMUNICATION	Power switch READY	Heater FULL HOT operation	OK
PTC INTERLOCK	Power switch READY	Heater FULL HOT operation	OK
COMM ERROR PTC→HVAC	Power switch READY	Heater FULL HOT operation	OK
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.
REFRIGERANT PRE SEN	Power switch READY	A/C switch: ON (Compressor operation status)	Equivalent to refrigerant pressure
FORCED OFF SIG	Power switch ON	A/C switch: ON (Compressor operation status)	OFF
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 timer A/C or remote A/C is operate	ON

Monitor item	Condition		Value/Status
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
COMM ERROR VCM→HVAC	Power switch ON		OK
PTC CONSUMPTION VOLT	Power switch READY	Heater FULL HOT operation	Value calculation for PTC elements heater consumption power by A/C auto amp.
WATER TEMPSENSOR	Power switch ON		Equivalent to heater fluid temperature
PUMP RPM (DIRECTION)	Power switch READY	Heater FULL HOT operation	Value sent to electric compressor by A/C auto amp.
PUMP RPM (EFFECTIVE)	Power switch READY	Heater FULL HOT operation	Actual rotation speed of electric compressor
PUMP CANNOT READ INPUT SIG	Power switch READY	Heater FULL HOT operation	OFF
H/P OPERATION LIMIT	Power switch READY	Heater FULL HOT operation	OFF
HEATER PUMP VOLTAGE	Power switch READY	Heater FULL HOT operation	OK
HEATER PUMP FAULT	Power switch READY	Heater FULL HOT operation	OK
COMM ERROR H/P→HVAC	Power switch READY	Heater FULL HOT operation	OK

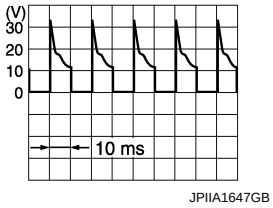
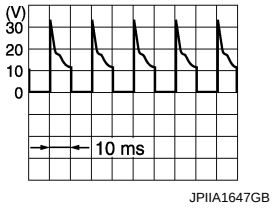
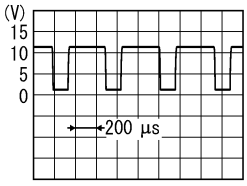
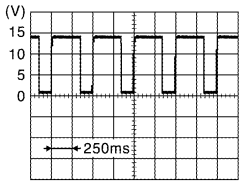
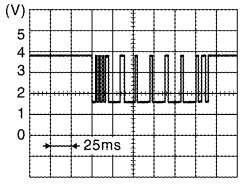
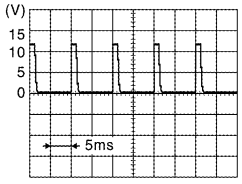
*: “DUTY” is displayed, but voltage is indicated. Or unit is not displayed but unit is (V).

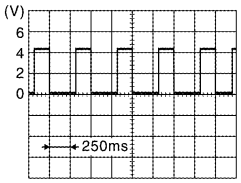
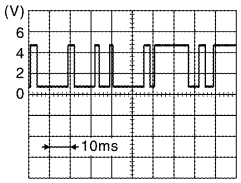
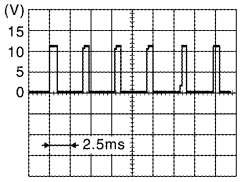
TERMINAL LAYOUT

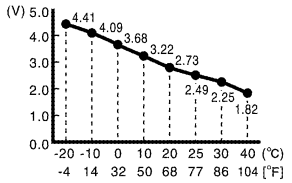
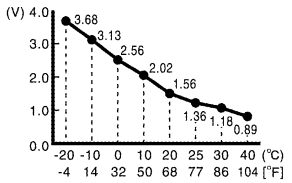
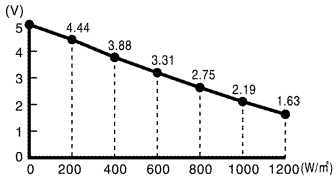
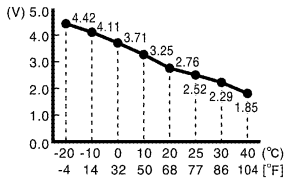
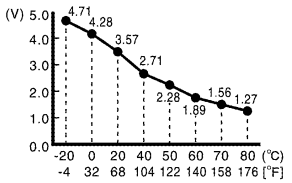
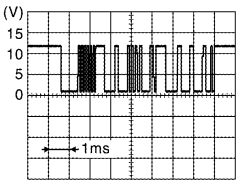


INPUT/OUTPUT SIGNAL STANDARD

Terminal No. (Wire color)		Item			Test condition	Standard
+	–	Signal name		Input/ Output		
1 (V)	10 (B)	REC	Intake door actuator drive signal	Output	• Power switch ON • Intake switch: FRE→REC	9.5 – 13.5 V
					• Power switch ON • Intake switch: REC→FRE	0 – 1 V

Terminal No. (Wire color)		Item			Test condition	Standard
+	–	Signal name		Input/ Output		
2 (R)	10 (B)	MODE drive 4	Mode door actuator drive signal	Output	• Power switch ON • Immediately after mode switch is operated	 JPIIA1647GB
3 (P)	10 (B)	MODE drive 3				
4 (Y)	10 (B)	MODE drive 2				
5 (V)	10 (B)	MODE drive 1				
6 (BR)	10 (B)	A/MIX drive 4	Air mix door actuator drive signal	Output	• Power switch ON • Immediately after temperature control dial is operated	 JPIIA1647GB
7 (SB)	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	• Power switch ON • Fan speed: Manual speed 1	 ZJIA0863J
13 (V)	10 (B)	Heater water pump control signal		Output	• Power switch READY • Heater FULL HOT operation	 JSIIA1657ZZ
14 (L)	10 (B)	COMP_TX		Output	• Power switch READY • FULL COLD • Electric compressor operation	 JSIIA1658ZZ
15 (W)	10 (B)	Rear defogger switch		Output	• Power switch ON • Rear window defogger switch OFF	 JSIIA1668ZZ
					• Power switch ON • Rear defogger switch is pressed.	0 V

Terminal No. (Wire color)		Item		Test condition	Standard
+	–	Signal name	Input/ Output		
17 (R)	10 (B)	Heater water pump feedback signal	Input	• Power switch READY • Heater FULL HOT operation	 JSIIA1659ZZ
18 (W)	10 (B)	COMP_RX	Input	• Power switch READY • FULL COLD • Electric compressor operation	 JSIIA1660ZZ
19 (W)	10 (B)	Illumination +	Input	• Power switch ON • Lighting switch 1st	12 V
				• Power switch ON • Lighting switch OFF	0 V
20 (B)	10 (B)	Illumination –	—	• Power switch ON • Lighting switch 1st	 JSIIA1661ZZ
				• Power switch ON • Lighting switch OFF	0 V
21 (G)	10 (B)	FRE — Intake door actuator drive signal	Output	• Power switch ON • Intake switch: REC→FRE	9.5 – 13.5 V
				• Power switch ON • Intake switch: FRE→REC	0 – 1 V
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 (W)	10 (B)	Battery power supply	Input	Power switch OFF	11 – 14 V
32 (Y)	10 (B)	Ignition power	Input	Power switch ON	11 – 14 V

Terminal No. (Wire color)		Item		Test condition	Standard
+	–	Signal name	Input/ Output		
33 (LG)	10 (B)	In-vehicle sensor signal	Input	• Power switch ON • When air Conditioner is operating	 JSIIA1662ZZ
34 (G)	10 (B)	Intake sensor signal	Input	• Power switch ON • When air Conditioner is operating	 JSIIA1663ZZ
35 (P)	10 (B)	Sunload sensor signal	Input	• Power switch ON • When air Conditioner is operating	 JSIIA1664ZZ
36 (GR)	10 (B)	Ambient sensor signal	Input	• Power switch ON • When air Conditioner is operating	 JSIIA1665ZZ
37 (BR)	10 (B)	Heater fluid temperature sensor	Input	• Power switch ON • When air Conditioner is operating	 JSIIA1666ZZ
38 (SB)	10 (B)	Intake door actuator PBR feedback signal	Input	• Power switch ON • Intake switch: REC	0.2 – 0.8 V
				• Power switch ON • Intake switch: FRE	4.2 – 4.8 V
40 (SB)	10 (B)	LIN (PTC)	Input/ Output	• Power switch READY • Heater FULL HOT operation	 JSIIA1667ZZ

DTC Index

INFOID:0000000006997114

DTC	Items (CONSULT screen terms)	Reference
U1000	CAN COMM CIRCUIT	HAC-59, "DTC Logic"
U1010	CONTROL UNIT (CAN)	HAC-60, "DTC Logic"
B2578	IN-VEHICLE SENSOR	HAC-61, "DTC Logic"
B2579	IN-VEHICLE SENSOR	HAC-61, "DTC Logic"
B257B	AMBIENT SENOR	HAC-64, "DTC Logic"
B257C	AMBIENT SENOR	HAC-64, "DTC Logic"
B2581	INTAKE SENSOR	HAC-67, "DTC Logic"
B2582	INTAKE SENSOR	HAC-67, "DTC Logic"
B2630*	SUNLOAD SENSOR	HAC-70, "DTC Logic"
B2631*	SUNLOAD SENSOR	HAC-70, "DTC Logic"
B2770	PTC ELEMENTS HEATER	HAC-72, "DTC Logic"
B2771	PTC ELEMENTS HEATER	HAC-72, "DTC Logic"
B2772	PTC ELEMENTS HEATER	HAC-72, "DTC Logic"
B2773	PTC ELEMENTS HEATER	HAC-72, "DTC Logic"
B2774	PTC ELEMENTS HEATER	HAC-72, "DTC Logic"
B2775	PTC ELEMENTS HEATER	HAC-72, "DTC Logic"
B2776	PTC ELEMENTS HEATER	HAC-72, "DTC Logic"
B2777	PTC ELEMENTS HEATER	HAC-79, "DTC Logic"
B2779	PTC ELEMENTS HEATER	HAC-79, "DTC Logic"
B277A	PTC ELEMENTS HEATER	HAC-81, "DTC Logic"
B277B	PTC ELEMENTS HEATER	HAC-79, "DTC Logic"
B277C	HEATER FLUID TEMPERATURE SENSOR	HAC-83, "DTC Logic"
B277D	HEATER FLUID TEMPERATURE SENSOR	HAC-83, "DTC Logic"
B2780	ELECTRIC COMPRESSOR	HAC-86, "DTC Logic"
B2781	ELECTRIC COMPRESSOR	HAC-87, "DTC Logic"
B2782	ELECTRIC COMPRESSOR	HAC-88, "DTC Logic"
B2783	ELECTRIC COMPRESSOR	HAC-89, "DTC Logic"
B2784	ELECTRIC COMPRESSOR	HAC-89, "DTC Logic"
B2785	ELECTRIC COMPRESSOR	HAC-90, "DTC Logic"
B2786	ELECTRIC COMPRESSOR	HAC-90, "DTC Logic"
B2787	ELECTRIC COMPRESSOR	HAC-91, "DTC Logic"
B2788	ELECTRIC COMPRESSOR	HAC-92, "DTC Logic"
B2789	ELECTRIC COMPRESSOR	HAC-93, "DTC Logic"
B278A	ELECTRIC COMPRESSOR	HAC-94, "DTC Logic"
B278B	ELECTRIC COMPRESSOR	HAC-94, "DTC Logic"
B278C	ELECTRIC COMPRESSOR	HAC-97, "DTC Logic"
B278D	ELECTRIC COMPRESSOR	HAC-97, "DTC Logic"
B278F	HEATER PUMP	HAC-100, "DTC Logic"
B2790	HEATER PUMP	HAC-100, "DTC Logic"
B2791	ELECTRIC COMPRESSOR	HAC-103, "DTC Logic"
B2792	HEATER PUMP	HAC-105, "DTC Logic"

DTC	Items (CONSULT screen terms)	Reference
B2793	HEATER PUMP	HAC-106, "DTC Logic"
B2794	HEATER PUMP	HAC-107, "DTC Logic"
B27A0	INTAKE DOOR MOTOR	HAC-108, "DTC Logic"
B27A1	INTAKE DOOR MOTOR	HAC-108, "DTC Logic"
B27A2	DR AIR MIX DOOR MOT	HAC-112, "DTC Logic"
B27A3	DR AIR MIX DOOR MOT	HAC-112, "DTC Logic"
B27A4	DR AIR MIX DOOR MOT	HAC-112, "DTC Logic"
B27A5	DR AIR MIX DOOR MOT	HAC-112, "DTC Logic"
B27A6	MODE DOOR MOTOR	HAC-114, "DTC Logic"
B27A7	MODE DOOR MOTOR	HAC-114, "DTC Logic"
B27A8	MODE DOOR MOTOR	HAC-114, "DTC Logic"
B27A9	MODE DOOR MOTOR	HAC-114, "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.

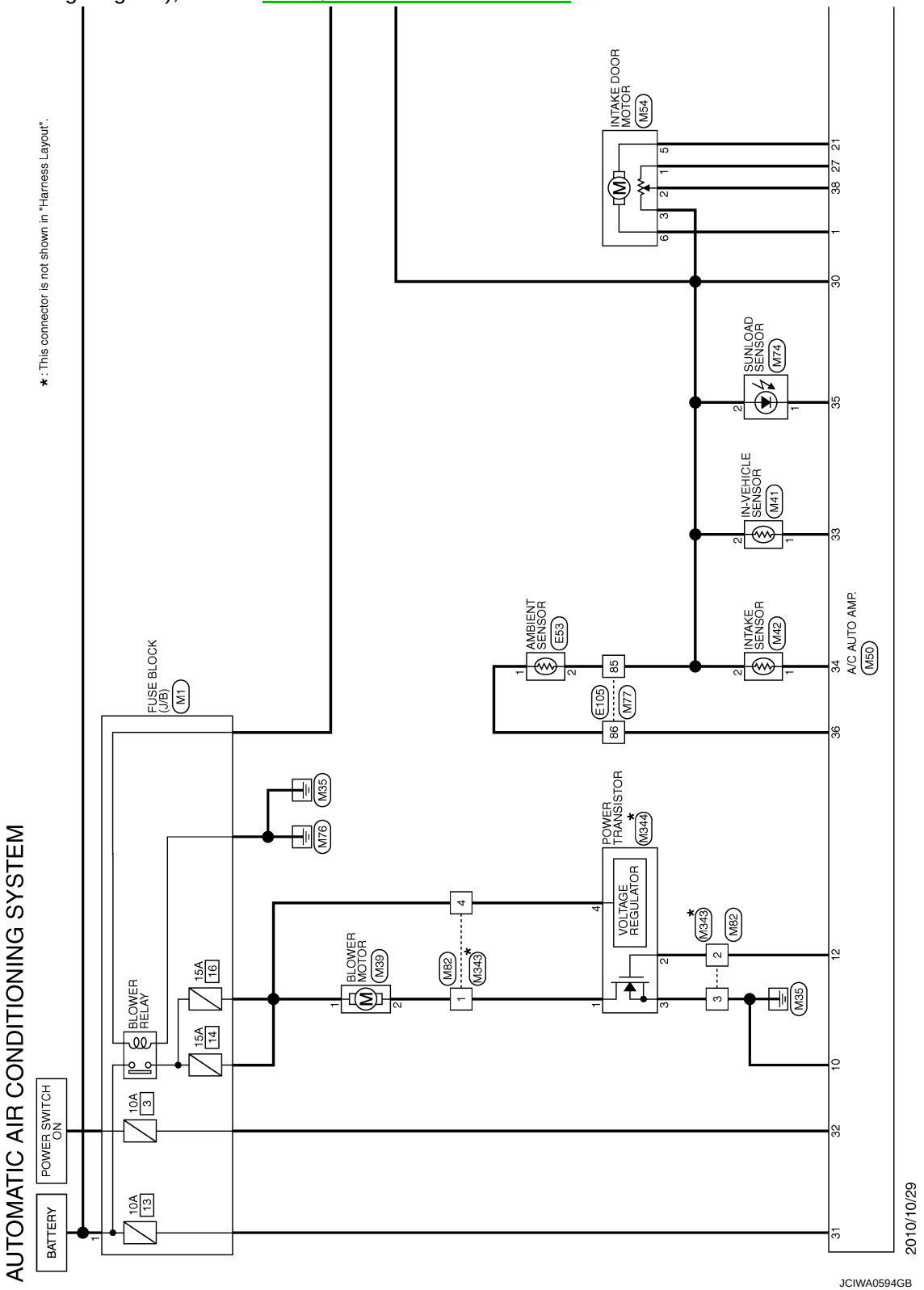
WIRING DIAGRAM

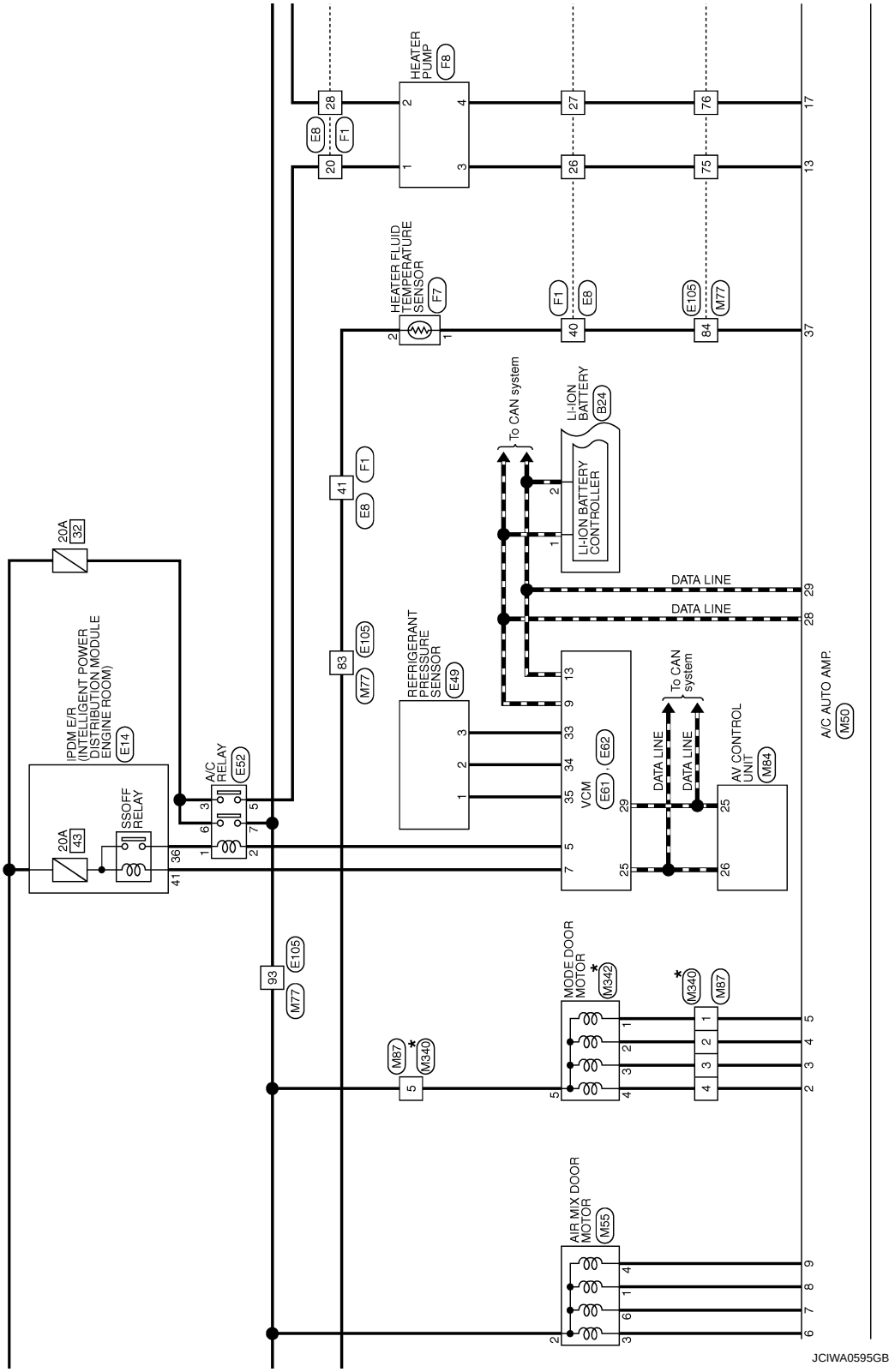
AUTOMATIC AIR CONDITIONER SYSTEM

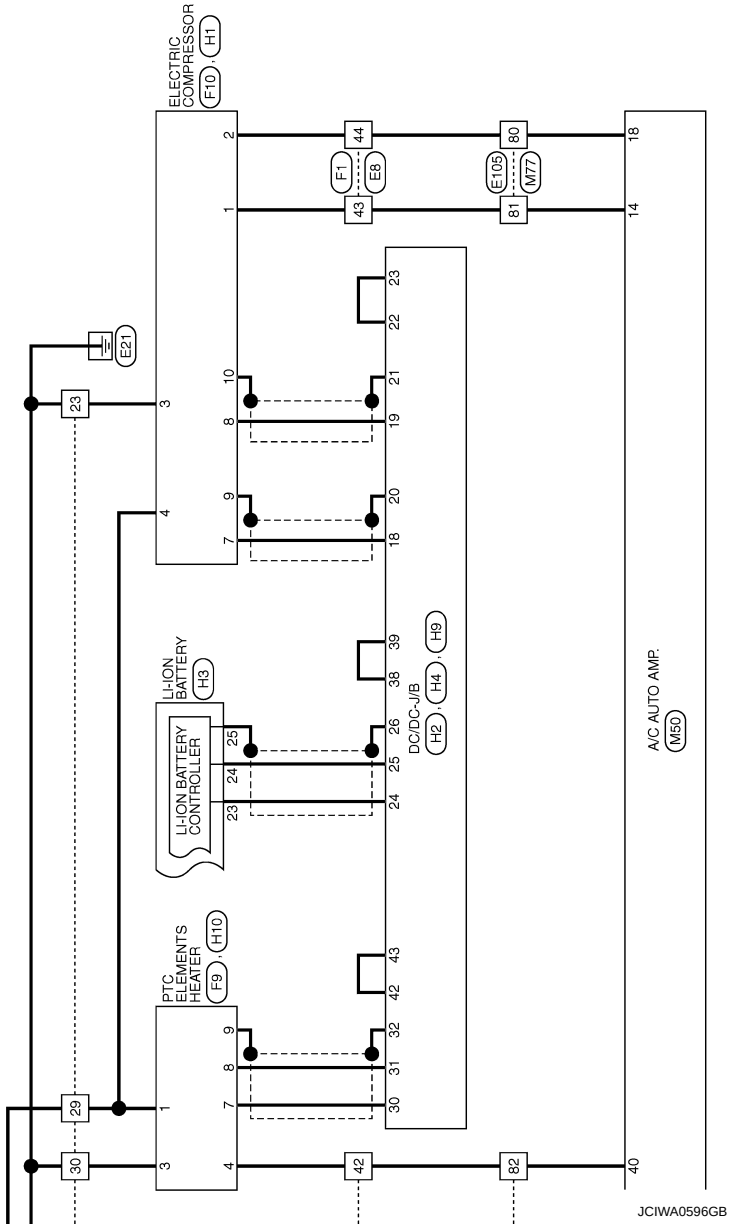
Wiring Diagram

INFOID:0000000006960428

For connector terminal arrangements, harness layouts, and alphabets in a ⬡ (option abbreviation; if notdescribed in wiring diagram), refer to GI-12, "Connector Information" .




HEATER PUMP F8
HEATER FLUID TEMPERATURE SENSOR F7
LI-ION BATTERY B24
LI-ION BATTERY CONTROLLER
To CAN system
DATA LINE
DATA LINE
REFRIGERANT PRESSURE SENSOR E49
VCM E61 E62
To CAN system
DATA LINE
DATA LINE
AV CONTROL UNIT M84
A/C AUTO AMP. M50
20A 32
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) E14
20A 43
SSOFF RELAY
A/C RELAY E52
MODE DOOR MOTOR M342
M340
M87
AIR MIX DOOR MOTOR M55
JCIWA0595GB


ELECTRIC COMPRESSOR
F10 : H1
LI-ION BATTERY
H3
LI-ION BATTERY CONTROLLER
DC/DC-J/B
H2 : H4 : H9
PTC ELEMENTS HEATER
F9 : H10
A/C AUTO AMP.
M50
E21
F1
E8
E105
M77
JCIWA0596GB

AUTOMATIC AIR CONDITIONING SYSTEM

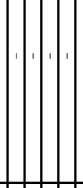
Connector No.	B24
Connector Name	LI-ION BATTERY
Connector Type	Yazaki 7283-8750-30

Terminal No.	Color of Wire	Signal Name [Specification]
1	L	EV CAN-H
2	G	EV CAN-L
4	R	IGN
5	R	BAT
6	B	GND3
7	B	GND2
8	B	GND1
10	B	PRE CHG GND
11	G	PRE CHG V
13	B	RLY2 GND
14	L	RLY2 V
16	B	RLY1 GND
17	Y	RLY1 V
21	R	CHG IGN

Connector No.	E8
Connector Name	WIRE TO WIRE
Connector Type	SAA36MB-RS10-SJZ2

Terminal No.	Color of Wire	Signal Name [Specification]
1	Y	–
2	L	–
3	GR	–
4	LG	–
5	P	–
6	B	–
8	BR	–
10	B	–
11	W	–
12	O	–
13	G	–
14	V	–
15	SB	–
16	R	–
17	L	–
18	LG	–
20	V	–
21	G	–
22	Y	–
23	B/R	–
26	V	–
27	P	–
28	B/R	–
29	W	–
30	B/R	–
31	LG	–
32	W	–
33	Y	–
34	P	–
35	P	–
36	R	–
37	G	–
38	B/R	–
40	BR	–
41	G	–
42	SB	–
43	L	–
44	O	–
47	V	–
48	P	–

Connector No.	E14
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS12FBR-CS



Terminal No.	Color of Wire	Signal Name [Specification]
35	G	–
36	GR	–
38	V	–
39	L	–
41	W	–
42	R	–
43	O	–
44	LG	–
45	Y	–

Connector No.	E49
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Type	RK03FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	BR	–
2	B	–
3	L	–

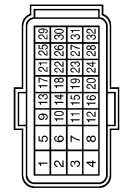
Connector No.	E52
Connector Name	A/C RELAY
Connector Type	M06FBR-R-LC

Terminal No.	Color of Wire	Signal Name [Specification]
1	GR	–
2	SB	–
3	R	–
5	V	–
6	R	–
7	W	–

Connector No.	E53
Connector Name	AMBIENT SENSOR
Connector Type	RS02FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	GR	AMBIENT SENSOR SIGNAL
2	LG	SENSOR GROUND

Connector No.	E61
Connector Name	VCM
Connector Type	RH24FGY-RZ8-R-RH



Terminal No.	Color of Wire	Signal Name [Specification]
1	G	POWER ON POWER SUPPLY
4	B/R	GROUND
5	SB	A/C RELAY
6	R	BATTERY POWER SUPPLY
7	W	SSOFF RELAY
8	B/R	GROUND
9	L	EV SYSTEM CAN-H
13	G	EV SYSTEM CAN-L
15	O	ASCD BRAKE SWITCH SIGNAL
18	SB	STOP LAMP SW SIGNAL
21	R	POWER ON POWER SUPPLY
23	P	HIGH VOLTAGE CABLE INTERLOCK
25	L	CAN-H
26	Y	WATER PUMP 2 SIGNAL
28	W	WATER PUMP 1 SIGNAL
29	P	CAN-L

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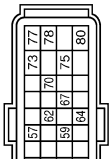
AUTOMATIC AIR CONDITIONING SYSTEM

Connector No.	E62
Connector Name	VCM
Connector Type	RH40FBR-R28-L-RH

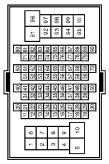
H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
33	L	SENSOR POWER SUPPLY (REFRIGERANT PRESSURE SENSOR)
34	B	REFRIGERANT PRESSURE SENSOR SIGNAL
35	BR	SENSOR GROUND (REFRIGERANT PRESSURE SENSOR)
37	W	SENSOR POWER SUPPLY (ACCELERATOR PEDAL POSITION SENSOR 1)
38	R	ACCELERATOR PEDAL POSITION SENSOR 1 SIGNAL
39	B	SENSOR GROUND (ACCELERATOR PEDAL POSITION SENSOR 1)
40	SHIELD	–
41	R	SENSOR POWER SUPPLY (BATTERY CURRENT SENSOR)
42	Y	BATTERY CURRENT SENSOR SIGNAL
43	L	SENSOR GROUND (BATTERY CURRENT SENSOR)
45	W	SENSOR POWER SUPPLY (ACCELERATOR PEDAL POSITION SENSOR 2)
46	R	ACCELERATOR PEDAL POSITION SENSOR 2 SIGNAL
47	B	SENSOR GROUND (ACCELERATOR PEDAL POSITION SENSOR 2)
48	SHIELD	–
50	L	BATTERY TEMPERATURE SENSOR SIGNAL
51	O	COOLANT TEMPERATURE SENSOR SIGNAL
52	W	SENSOR GROUND (COOLANT TEMPERATURE SENSOR)
57	LG	POWER VOLTAGE VARIABLE CONTROL SIGNAL
59	V	RADIATOR FAN CONTROL SIGNAL
62	G	WATER PUMP 1 ACTIVATION SIGNAL
64	R	WATER PUMP 2 ACTIVATION SIGNAL
67	Y	DC/DC CONVERTER TEMPERATURE SIGNAL
70	W	DC/DC CONVERTER ACTIVATION SIGNAL
73	GR	F/S RELAY
75	W	F/S CHG RELAY
77	LG	F/S RELAY POWER SUPPLY
78	G	M/C RELAY
80	SB	REVERSE LAMP RELAY

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Type	TH80MW-CS16-TM4

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
1	BR	–
2	R	–
3	GR	–
4	LG	–
6	W	–
7	V	–
8	P	–
9	G	–
10	R	–
11	O	–
12	W	–
13	B	–
14	Y	–
15	BR	–
16	LG	–
17	L	–
19	G	–
20	V	–
21	P	–
22	LG	–
23	GR	–
24	L	–
25	R	–
26	SB	–
27	B	–
29	BR	–
30	W	–
31	V	–
32	LG	–
33	O	–
34	L	–
35	BR	–
38	SB	–
39	GR	–
40	Y	–
41	R	–
42	W	–
43	SB	–
44	GR	–
45	G	–
46	P	–
47	LG	–
48	V	–
49	G	–
50	L	–
51	W	–
54	P	–
55	O	–
56	Y	–
57	P	–
58	LG	–
60	LG	–
61	GR	–
62	BR	–
64	R	–
65	Y	–
66	G	–
67	V	–
68	W	–
69	SB	–
71	Y	–
72	L	–
73	R	–
74	L	–
75	V	–
76	P	–
80	O	–
81	L	–
82	SB	–
83	G	–
84	BR	–
85	LG	–
86	GR	–
88	B	–
89	W	–
90	SHIELD	–
91	Y	–
92	BR	–
93	W	–
94	R	–
95	V	–
96	P	–
97	G	–
98	SB	–
99	O	–

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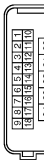
AUTOMATIC AIR CONDITIONING SYSTEM

Connector No.	F1
Connector Name	WIRE TO WIRE
Connector Type	SAA36FB-RS10-SJZ2



Terminal No.	Color of Wire	Signal Name [Specification]
1	Y	–
2	L	–
3	GR	–
4	LG	–
5	P	–
6	B	–
8	W	–
10	R	–
11	W	–
12	O	–
13	G	–
14	V	–
15	SB	–
16	LG	–
17	BR	–
18	Y	–
20	V	–
21	G	–
22	LG	–
23	B	–
26	SB	–
27	R	–
28	Y	–
29	W	–
30	P	–
31	L	–
32	W	–
33	Y	–
34	R	–
35	G	–
36	LG	–
37	G	– [With quick charge port]
37	O	– [Without quick charge port]
38	B	–
40	BR	–
41	O	–
42	SB	–
43	L	–

44	LG	–
47	V	–
48	P	–

Connector No.	F7
Connector Name	HEATER FLUID TEMPERATURE SENSOR
Connector Type	E02FGY-RS

Terminal No.	Color of Wire	Signal Name [Specification]
1	BR	–
2	O	–

Connector No.	F8
Connector Name	HEATER PUMP
Connector Type	RS04FG

Terminal No.	Color of Wire	Signal Name [Specification]
1	V	–
2	Y	–
3	SB	–
4	R	–

Connector No.	F9
Connector Name	PTC ELEMENTS HEATER
Connector Type	RH06FB

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–
3	P	–
4	SB	–

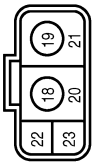
Connector No.	F10
Connector Name	ELECTRIC COMPRESSOR
Connector Type	SAZ06FW

Terminal No.	Color of Wire	Signal Name [Specification]
1	L	–
2	LG	–
3	B	–
4	W	–

Connector No.	H1
Connector Name	ELECTRIC COMPRESSOR
Connector Type	TM02FOR

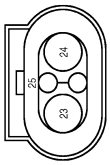
Terminal No.	Color of Wire	Signal Name [Specification]
7	O	–
8	O	–
9	SHIELD	–
10	SHIELD	–

Connector No.	H2
Connector Name	DC/DC-J/B
Connector Type	TM02FOR-2V



Terminal No.	Color of Wire	Signal Name [Specification]
18	O	(+)
19	O	(-)
20	SHIELD	–
21	SHIELD	–
22	O	HIGH VOLTAGE CABLE CONNECTION DETECTING CIRCUIT (IN)
23	O	HIGH VOLTAGE CABLE CONNECTION DETECTING CIRCUIT (OUT)

Connector No.	H3
Connector Name	LI-ION BATTERY
Connector Type	24342-3NA0B



Terminal No.	Color of Wire	Signal Name [Specification]
23	O	(+)
24	O	(-)
25	SHIELD	–

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Connector No.	H4
Connector Name	DC/DC-J/B
Connector Type	24342-3NA0B

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
24	O	(+)
25	O	(-)
26	SHIELD	–
38	–	HIGH VOLTAGE CABLE CONNECTION-DETECTING CIRCUIT (IN)
39	–	HIGH VOLTAGE CABLE CONNECTION-DETECTING CIRCUIT (OUT)

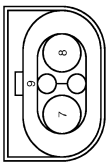
Connector No.	H9
Connector Name	DC/DC-J/B
Connector Type	24342-3NA0E

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
30	O	(+)
31	O	(-)
32	SHIELD	–
42	–	HIGH VOLTAGE CABLE CONNECTION-DETECTING CIRCUIT (IN)
43	–	HIGH VOLTAGE CABLE CONNECTION-DETECTING CIRCUIT (OUT)

Connector No.	H10
Connector Name	PTC ELEMENTS HEATER
Connector Type	24342-3NA0E

H.S.



Terminal No.	Color of Wire	Signal Name [Specification]
7	O	–
8	O	–
9	SHIELD	–

Connector No.	M1
Connector Name	FUSE BLOCK (J/B)
Connector Type	L01FW-MC

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	–

Connector No.	M39
Connector Name	BLOWER MOTOR
Connector Type	TM02FW

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	Y	–
2	R	–

Connector No.	M41
Connector Name	IN-VEHICLE SENSOR
Connector Type	A02FW

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	LG	IN-VEHICLE SENSOR SIGNAL
2	R	SENSOR GROUND

Connector No.	M42
Connector Name	INTAKE SENSOR
Connector Type	TK02FBR

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	G	INTAKE SENSOR SIGNAL
2	R	SENSOR GROUND

Connector No.	M50
Connector Name	A/C AUTO AMP.
Connector Type	TH40FW-NH

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	V	REC
2	R	MODE4

3	P	MODE3
4	Y	MODE2
5	V	MODE1
6	BR	MIX4
7	SB	MIX3
8	LG	MIX2
9	L	MIX1
10	B	GND
12	GR	BLOWER PWM
13	V	W/PUMP PWM
14	L	COMP TX
15	W	RR DEF SW O/P
17	R	W/PUMP F/B
18	W	COMP RX
19	W	LIGHT+
20	B	LIGHT-
21	G	FRESH
27	W	5V OUT
28	L	EV CAN-H
29	G	EV CAN-L
30	R	SENS GND
31	W	BATT
32	Y	IGN 1
33	LG	INCAR SENS
34	G	INTAKE SENS
35	P	SUN SENS
36	GR	AMB SENS
37	BR	WATER SENS
38	SB	INT F/B
40	SB	PTC LIN

Connector No.	M54
Connector Name	INTAKE DOOR MOTOR
Connector Type	98193-0001

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	W	INTAKE DOOR MOTOR PBR POWER SUPPLY
2	SB	INTAKE DOOR MOTOR PBR F/B SIGNAL
3	B	GROUND
5	G	REC DRIVE SIGNAL
6	V	INTAKE DOOR MOTOR PBR F/B SIGNAL

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AUTOMATIC AIR CONDITIONING SYSTEM

Connector No.	M55
Connector Name	AIR MIX DOOR MOTOR
Connector Type	MAA06FB

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	LG	A/MIX DRIVE SIGNAL 2
2	W	IGNITION POWER SUPPLY
3	BR	A/MIX DRIVE SIGNAL 4
4	L	A/MIX DRIVE SIGNAL 1
6	SB	A/MIX DRIVE SIGNAL 3

Connector No.	M74
Connector Name	SUNLOAD SENSOR
Connector Type	A02FW

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	P	SUNLOAD SENSOR SIGNAL
2	R	SENSOR GROUND

Connector No.	M77
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-CS16-TM4

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	GR	–
2	V	–
3	GR	–
4	LG	–
6	W	–
7	V	–
8	P	–
9	SB	–
10	L	–
11	LG	–
12	W	–
13	R	–
14	Y	–
15	R	–
16	GR	–
17	BR	–
19	G	–
20	G	–
21	P	–
22	LG	–
23	GR	–
24	L	–
25	V	–
26	W	–
27	L	–
29	V	–
30	W	–
31	SB	–
32	LG	–
33	V	–
34	L	–
35	SB	–
38	LG	–
39	GR	–
40	Y	–
41	R	–
42	W	–
43	SB	–
44	GR	–
45	P	–
46	R	–
47	W	–
48	L	–
49	G	–
50	L	–
51	L	–
54	W	–
55	G	–
56	BR	–
57	P	–
58	R	–
60	Y	–
61	GR	–
62	SB	–
64	G	–
65	V	–
66	P	–
67	Y	–
68	P	–
69	BR	–
71	Y	–
72	L	–
73	G	–
74	L	–
75	V	–
76	R	–
80	W	–
81	L	–
82	SB	–
83	R	–
84	BR	–
85	R	–
86	GR	–
88	R	–
89	W	–
90	SHIELD	–
91	Y	–
92	BR	–
93	W	–
94	P	–
95	V	–
96	P	–
97	G	–
98	R	–
99	LG	–

Connector No.	M82
Connector Name	WIRE TO WIRE
Connector Type	M04FW-LC

H.S.

Terminal No.	Color of Wire	Signal Name [Specification]
1	R	–
2	GR	–
3	B	–
4	Y	–

Connector No.	M84
Connector Name	AV CONTROL UNIT
Connector Type	TH40FW-NH

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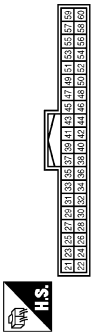

Terminal No.	Color of Wire	Signal Name [Specification]
21	LG	AV COMM (L)
22	SB	AV COMM (H)
23	LG	AV COMM (L)
24	SB	AV COMM (H)
25	P	CAN-L
26	L	CAN-H
28	GR	VEHICLE SPEED SIGNAL (8-PULSE)
29	BR	PARKING BRAKE SIGNAL
30	G	REVERSE SIGNAL
31	V	POWER SWITCH ON SIGNAL
32	R	DIMMER SIGNAL
46	L	MICROPHONE SIGNAL
47	Y	MICROPHONE VCC
48	SHIELD	MICROPHONE SHIELD
49	R	AUX SOUND SIGNAL LH (+)
50	W	AUX SOUND SIGNAL RH (+)
51	B	AUX SOUND SIGNAL (–)
52	SHIELD	SHIELD
56	B	CAMERA CONNECTION RECOGNITION SIGNAL
57	R	CAMERA POWER SUPPLY
58	W	CAMERA GROUND
59	R	CAMERA IMAGE SIGNAL
60	SHIELD	SHIELD

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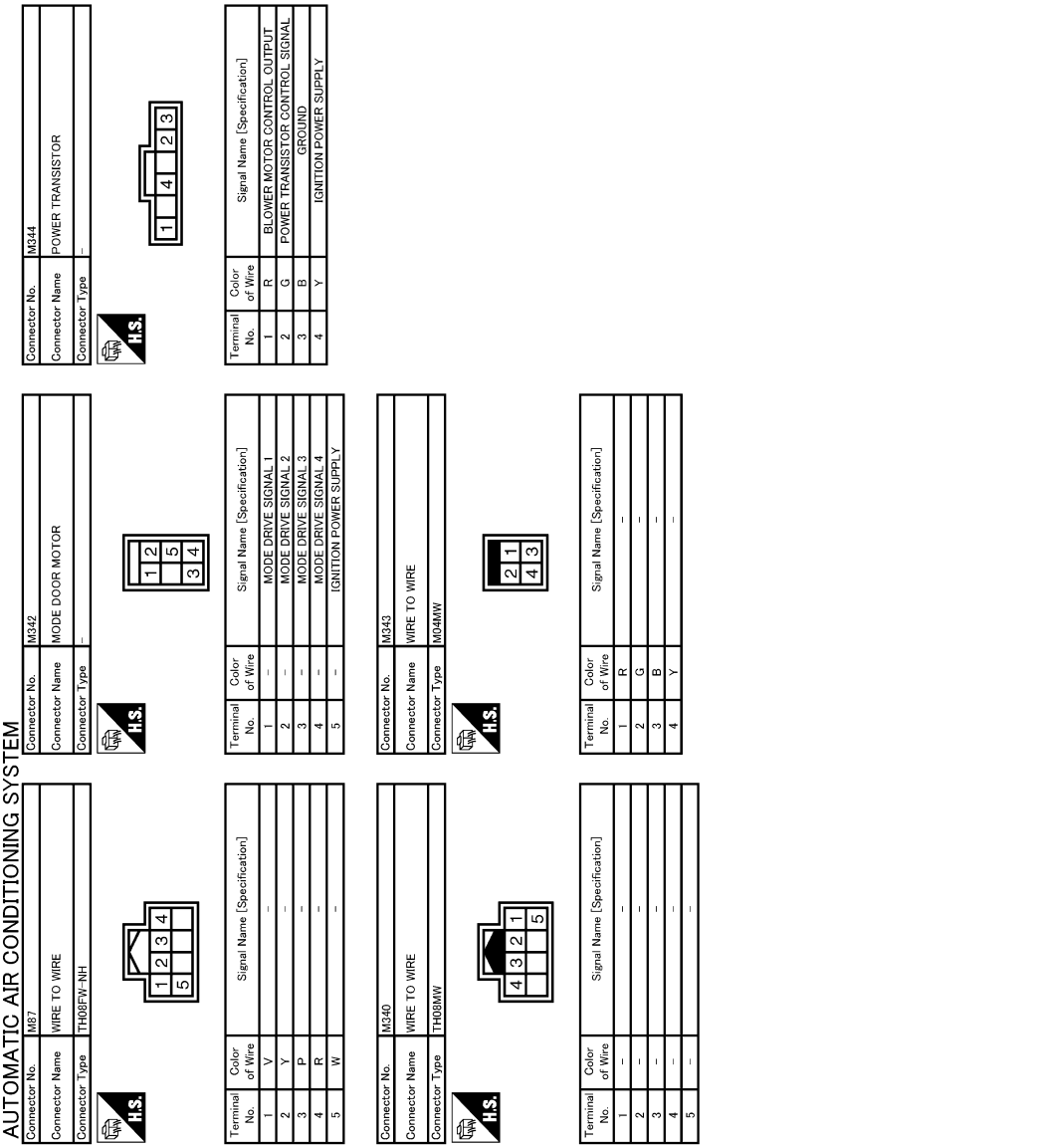
AUTOMATIC AIR CONDITIONING SYSTEM



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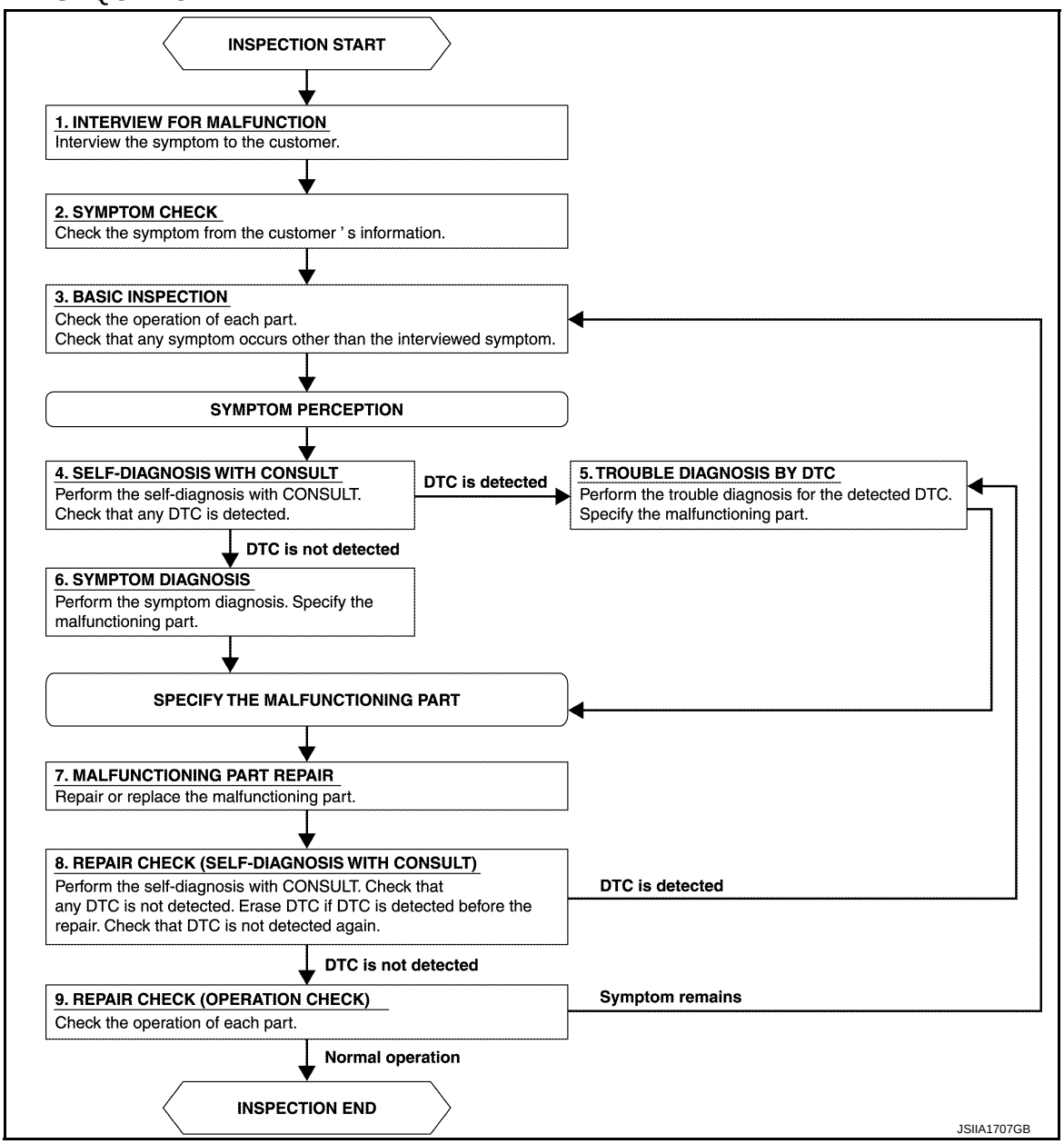
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:0000000006997117

OVERALL SEQUENCE



DETAILED FLOW

1.INTERVIEW FOR MALFUNCTION

Interview the symptom to the customer.

>> GO TO 2.

2.SYMPTOM CHECK

Check the symptom from the customer's information.

>> GO TO 3.

3.BASIC INSPECTION

Check the operation of each part. Check that any symptom occurs other than the interviewed symptom.

>> GO TO 4.

4.SELF-DIAGNOSIS WITH CONSULT

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

Is any DTC detected?

YES >> GO TO 5.
NO >> GO TO 6.

5.TROUBLE DIAGNOSIS BY DTC

Perform the trouble diagnosis for the detected DTC. Specify the malfunctioning part.

>> GO TO 7.

6.SYMPTOM DIAGNOSIS

Perform the symptom diagnosis. Specify the malfunctioning part.

>> GO TO 7.

7.MALFUNCTION PART REPAIR

Repair or replace the malfunctioning part.

>> GO TO 8.

8.REPAIR CHECK (SELF-DIAGNOSIS WITH CONSULT)

Perform the self-diagnosis with CONSULT. Check that any DTC is not detected. Erase DTC if DTC is detected before the repair. Check that DTC is not detected again.

Is any DTC detected?

YES >> GO TO 5.
NO >> GO TO 9.

9.REPAIR CHECK (OPERATION CHECK)

Check the operation of each part.

Does it operate normally?

YES >> INSPECTION END
NO >> GO TO 3.

OPERATION INSPECTION

Work Procedure

INFOID:0000000006997118

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

1.CHECK MEMORY FUNCTION

1. Set temperature to 32.0°C (90°F) 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 dial.
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 dial 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-10, "VENTILATION SYSTEM : 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.

7.CHECK TEMPERATURE DECREASE

1. Operate compressor.
2. Operate temperature control dial and lower the set temperature to 18.0°C (60°F).
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 32.0°C (90°F).
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-40, "DTC Index" and perform the appropriate diagnosis.
NO >> Refer to HAC-129, "Symptom Table" and perform the appropriate diagnosis.

SYSTEM SETTING

Temperature Setting Trimmer

INFOID:0000000006997119

DESCRIPTION

f 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” of HVAC work support item.

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 battery cable is disconnected from the negative terminal or when the 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:0000000006997120

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” of HVAC work support item.

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:

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

Inlet Port Memory Function (FRE)

INFOID:0000000006997121

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” of HVAC work support item.

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

Foot Position Setting Trimmer

INFOID:0000000006997122

DESCRIPTION

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

HOW TO SET

With CONSULT

Perform the “BLOW SET” of HVAC work support item.

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

Setting of compressor maximum rotation speed during pre air conditioning

INFOID:0000000006997123

DESCRIPTION

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

How to set

Using CONSULT, select ”PRE A/C MAX RPM ADJ“ from ”WORK SUPPOR“ for ”HVAC“.

Work support items	Note
PRE A/C MAX RPM ADJ	Raising set value: Improve the cooling performance. Lowering set value: Reduce the operation noise level.

Setting of compressor maximum rotation speed during idling

INFOID:0000000006997124

DESCRIPTION

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

How to set

Using CONSULT, select ”IDL MAX RPM ADJ“ from ”WORK SUPPOR“ for ”HVAC“.

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

DOOR MOTOR STARTING POSITION RESET

Description

INFOID:0000000006997125

- 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:0000000006997126

1.PERFORM DOOR MOTOR STARTING POSITION RESET

With CONSULT
1. Turn ignition switch ON.
2. Select “Door Motor Starting Position Reset” in “ACTIVE TEST” mode of “HVAC” using CONSULT.
3. Touch “Start” and wait a few seconds.
4. Make sure the “COMPLETED” is displayed on CONSULT screen.

>> INSPECTION END

DTC/CIRCUIT DIAGNOSIS

U1000 CAN COMM CIRCUIT

Description

INFOID:0000000006960439

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-33, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart" for details of the communication signal.

DTC Logic

INFOID:0000000006960440

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” mode of “HVAC” using CONSULT.
3. Check DTC.

Is DTC detected?

YES >> Refer to HAC-59, "Diagnosis Procedure".
NO >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Diagnosis Procedure

INFOID:0000000006960441

1. CHECK CAN COMMUNICATION SYSTEM

Check CAN communication system. Refer to LAN-15, "Trouble Diagnosis Flow Chart".

>> INSPECTION END

U1010 CONTROL UNIT (CAN)

Description

INFOID:0000000006960442

Initial diagnosis of A/C auto amp.

DTC Logic

INFOID:0000000006960443

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” mode of “HVAC” using CONSULT.
3. Check DTC.

Is DTC detected?

YES >> Refer to HAC-60, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960444

1.REPLACE A/C CONTROL (A/C AUTO AMP.)

Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".

>> INSPECTION END

B2578, B2579 IN-VEHICLE SENSOR

DTC Logic

INFOID:0000000006960445

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to HAC-59, "DTC Logic".
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. HAC-60, "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)].	• 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” mode of “HVAC” using CONSULT.
3. Check DTC.

Is DTC detected?

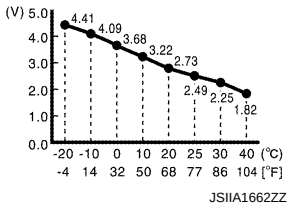
YES >> Refer to HAC-61, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960446

1.CHECK IN-VEHICLE SENSOR VOLTAGE SIGNAL

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

A/C auto amp. connector	+ Terminal	– Terminal	Test condition	Voltage signal
M50	33	30	• Power switch ON • When air conditioner is operating	

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Is the inspection result normal?

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

2.CHECK IN-VEHICLE SENSOR POWER SUPPLY

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		
M41	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	
M41	2	M50	30	Existed

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-63, "Component Inspection".

Is the inspection result normal?

YES >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".
NO >> Replace in-vehicle sensor. Refer to HAC-136, "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	
M41	1	M50	33	Existed

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		
M41	1	Ground	Not existed

Is the inspection result normal?

YES >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".
NO >> Repair harness or connector.

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".

NO >> Repair or replace malfunctioning parts.

Component Inspection

INFOID:0000000006960447

1. CHECK IN-VEHICLE SENSOR

1. Remove in-vehicle sensor. Refer to HAC-136, "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-136, "Removal and Installation".

B257B, B257C AMBIENT SENSOR

DTC Logic

INFOID:0000000006960448

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to HAC-59, "DTC Logic".
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. HAC-60, "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)].	• 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” mode of “HVAC” using CONSULT.
3. Check DTC.

Is DTC detected?

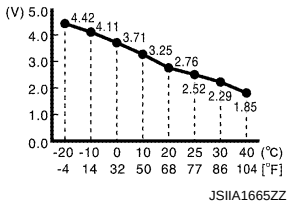
YES >> Refer to HAC-64, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960449

1. CHECK AMBIENT SENSOR VOLTAGE SIGNAL

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

A/C auto amp. connector	+ Terminal	– Terminal	Test condition	Voltage signal
M50	36	30	• Power switch ON • When air conditioner is operating	

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Is the inspection result normal?

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

2. CHECK AMBIENT SENSOR POWER SUPPLY

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	M50	30	Existed

Is the inspection result normal?

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

4.CHECK AMBIENT SENSOR

Check ambient sensor. Refer to HAC-66, "Component Inspection".

Is the inspection result normal?

YES >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".
NO >> Replace ambient sensor. Refer to HAC-135, "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	M50	36	Existed

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	Not existed

Is the inspection result normal?

YES >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".
NO >> Repair harness or connector.

7.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".

NO >> Repair or replace malfunctioning parts.

Component Inspection

INFOID:0000000006960450

1. CHECK AMBIENT SENSOR

1. Remove ambient sensor. Refer to HAC-135, "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-135, "Removal and Installation".

B2581, B2582 INTAKE SENSOR

DTC Logic

INFOID:0000000006960451

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to HAC-59, "DTC Logic".
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. HAC-60, "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)].	• 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” mode of “HVAC” using CONSULT.
3. Check DTC.

Is DTC detected?

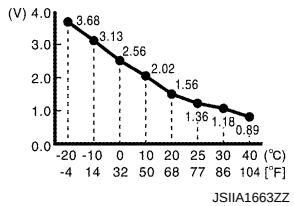
YES >> Refer to HAC-67, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960452

1.CHECK INTAKE SENSOR VOLTAGE SIGNAL

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

A/C auto amp. connector	+ Terminal	– Terminal	Test condition	Voltage signal
M50	34	30	• Power switch ON • When air conditioner is operating	

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Is the inspection result normal?

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

2.CHECK INTAKE SENSOR POWER SUPPLY

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		
M42	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	
M42	2	M50	30	Existed

Is the inspection result normal?

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

4.CHECK INTAKE SENSOR

Check intake sensor. Refer to HAC-69, "Component Inspection".

Is the inspection result normal?

YES >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".
NO >> Replace intake sensor. Refer to HAC-138, "Removal and Installation".

5.CHECK INTAKE SENSOR PLY 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	
M42	1	M50	34	Existed

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		
M42	1	Ground	Not existed

Is the inspection result normal?

YES >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".
NO >> Repair harness or connector.

7.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".

NO >> Repair or replace malfunctioning parts.

Component Inspection

INFOID:0000000006960453

1. CHECK INTAKE SENSOR

1. Remove intake sensor. Refer to HAC-138, "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-138, "Removal and Installation".

B2630, B2631 SUNLOAD SENSOR

DTC Logic

INFOID:0000000006960454

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to HAC-59, "DTC Logic".
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. HAC-60, "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.	• 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” mode of “HVAC” using CONSULT.
3. Check DTC.

Is DTC detected?

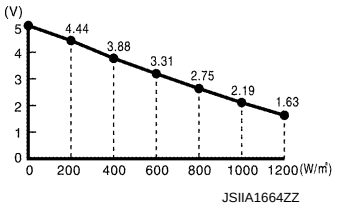
YES >> Refer to HAC-70, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960455

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 solar sensor to check that a voltage signal between A/C auto amp. harness connector terminals changes.

A/C auto amp. connector	+ Terminal	– Terminal	Test condition	Voltage signal
M50	35	30	• Power switch ON • When air conditioner is operating	

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Is the inspection result normal?

YES >> GO TO 6.
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	M50	30	Existed

Is the inspection result normal?

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

4. 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	M50	35	Existed

Is the inspection result normal?

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

5. CHECK SUNLOAD SENSOR POWER SUPPLY CIRCUIT FOR SHORT

Check continuity between sunload sensor harness connector and ground.

Sunload sensor		—	Continuity
Connector	Terminal		
M74	1	Ground	Not existed

Is the inspection result normal?

YES >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".
NO >> Repair harness or connector.

6. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".
NO >> Repair or replace malfunctioning parts.

B2770, B2773, B2774, B2775, B2776 PTC ELEMENTS HEATER

DTC Logic

INFOID:0000000006960456

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2770	PTC HEATER CIRCUIT	• When each diagnosis is repeated several times • When the PTC elements heater internal circuit is not reset	• PTC elements heater • High voltage harness or connectors (PTC elements heater high voltage circuit is open or shorted.) • Harness or connectors (PTC elements heater circuit is open or shorted.)
B2773	PTC HEATER CIRCUIT 1	When the PTC elements heater internal circuit is not reset	
B2774	PTC HEATER CIRCUIT 2		
B2775	PTC HEATER CIRCUIT 3		
B2776	PTC HEATER CIRCUIT 4		

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” mode of “HVAC” using CONSULT.

Is DTC detected?

YES >> Refer to HAC-72, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960457

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 shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield 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-32, "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.

DIAGNOSIS PROCEDURE

CAUTION:
Erase DTC after the work is completed.

1.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-31, "How to Cut Off High Voltage".

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

1. Disconnect high voltage connector from front side of Li-ion battery. Refer to EVB-136, "Removal and Installation".

DANGER:

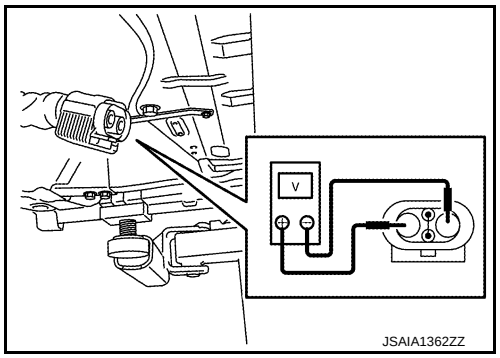
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

2. 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 PTC ELEMENTS HEATER HIGH VOLTAGE HARNESS POWER SUPPLY CIRCUIT FOR OPEN

1. Disconnect PTC elements heater and DC/DC-J/B connector.
2. Check continuity between PTC elements heater high voltage harness connector and DC/DC-J/B high voltage harness connector.

PTC elements heater		DC/DC-J/B		Continuity
Connector	Terminal	Connector	Terminal	
H10	7	H9	30	Existed

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace high voltage harness between PTC elements heater and DC/DC-J/B.

3. CHECK PTC ELEMENTS HEATER HIGH VOLTAGE HARNESS GROUND CIRCUIT

Check continuity between PTC elements heater high voltage harness connector and DC/DC-J/B high voltage harness connector.

PTC elements heater		DC/DC-J/B		Continuity
Connector	Terminal	Connector	Terminal	
H10	8	H9	31	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace high voltage harness between PTC elements heater and DC/DC-J/B.

4. CHECK PTC ELEMENTS HEATER POWER SUPPLY

1. Disconnect PTC elements heater connector.
2. Connect 12V battery negative terminal.
3. Turn power switch ON.
4. Check voltage between PTC elements heater harness connector and ground.

+		–	Voltage (Approx.)
PTC elements heater			
Connector	Terminal		
F9	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 6.

5. CHECK PTC ELEMENTS HEATER GROUND CIRCUIT

1. Turn power switch OFF.
2. Check continuity between PTC elements heater harness connector and ground.

PTC elements heater		–	Continuity
Connector	Terminal		
F9	3	Ground	Existed

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-294, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Repair harness or connector between A/C relay and PTC elements heater.
NO >> Repair or replace error-detected parts.

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace PTC elements heater. Refer to HA-66, "Removal and Installation".
NO >> Repair or replace malfunctioning parts.

B2771 PTC ELEMENTS HEATER

DTC Logic

INFOID:0000000006960458

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC B278F or B2790, first perform the trouble diagnosis for DTC B278F or B2790. Refer to HAC-100, "DTC Logic".
- If DTC is displayed along with DTC B2792, first perform the trouble diagnosis for DTC B2792. Refer to HAC-105, "DTC Logic".
- If DTC is displayed along with DTC B2793, first perform the trouble diagnosis for DTC B2793. Refer to HAC-106, "DTC Logic".
- If DTC is displayed along with DTC B2794, first perform the trouble diagnosis for DTC B2794. Refer to HAC-107, "DTC Logic".

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2771	PTC HEATER OVERHEAT PROTECT	When the PTC elements heater circuit board internal temperature is 115°C (239°F) or more	• PTC elements heater • Heater pump • Heater fluid leaks

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” mode of “HVAC” using CONSULT.

Is DTC detected?

YES >> Refer to HAC-75, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960459

1.CHECK HEATER FLUID FOR LEAK

Check heater fluid for leak. Refer to HA-41, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace malfunctioning parts.

2.CHECK HEATER PUMP

With CONSULT

1. Turn power switch ON.
2. Use CONSULT and conduct an “HVAC Test” for the “HVAC” “Active Test”. Refer to HAC-30, "CONSULT Function".
3. When the test items are being conducted, check that the heater pump operates normally for each mode.

Is the inspection result normal?

YES >> Replace PTC elements heater. Refer to HA-66, "Removal and Installation".
NO >> Replace heater pump. Refer to HA-72, "Removal and Installation".

B2772 PTC ELEMENTS HEATER

DTC Logic

INFOID:0000000006960460

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 elements heater more than the specified value	• PTC elements heater • High voltage harness or connectors (PTC elements heater high voltage circuit is open or shorted.) • Harness or connectors (PTC elements heater 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” mode of “HVAC” using CONSULT.

Is DTC detected?

YES >> Refer to HAC-76, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960461

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 shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield 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-32, "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.

DIAGNOSIS PROCEDURE

CAUTION:
Erase DTC after the work is completed.

1. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-31, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Disconnect high voltage connector from front side of Li-ion battery. Refer to EVB-136, "Removal and Installation".

DANGER:

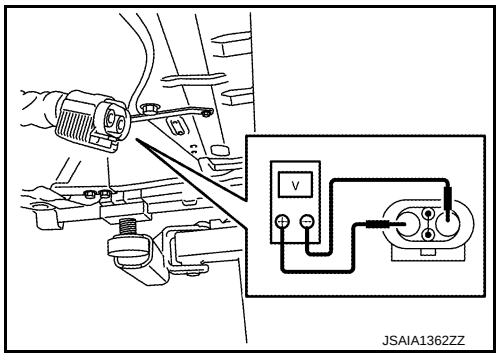
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

2. 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 PTC ELEMENTS HEATER HIGH VOLTAGE HARNESS POWER SUPPLY CIRCUIT FOR OPEN

1. Disconnect PTC elements heater and DC/DC-J/B connector.
2. Check continuity between PTC elements heater high voltage harness connector and DC/DC-J/B high voltage harness connector.

PTC elements heater		DC/DC-J/B		Continuity
Connector	Terminal	Connector	Terminal	
H10	7	H9	30	Existed

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace high voltage harness between PTC elements heater and DC/DC-J/B.

3. CHECK PTC ELEMENTS HEATER HIGH VOLTAGE HARNESS GROUND CIRCUIT

Check continuity between PTC elements heater high voltage harness connector and DC/DC-J/B high voltage harness connector.

PTC elements heater		DC/DC-J/B		Continuity
Connector	Terminal	Connector	Terminal	
H10	8	H9	31	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace high voltage harness between PTC elements heater and DC/DC-J/B.

4. CHECK PTC ELEMENTS HEATER POWER SUPPLY

1. Disconnect PTC elements heater connector.
2. Connect 12V battery negative terminal.
3. Turn power switch ON.
4. Check voltage between PTC elements heater harness connector and ground.

+		–	Voltage (Approx.)
PTC elements heater			
Connector	Terminal		
F9	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 6.

5. CHECK PTC ELEMENTS HEATER GROUND CIRCUIT

1. Turn power switch OFF.
2. Check continuity between PTC elements heater harness connector and ground.

PTC elements heater		–	Continuity
Connector	Terminal		
F9	3	Ground	Existed

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-294, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Repair harness or connector between A/C relay and PTC elements heater.
NO >> Repair or replace error-detected parts.

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace PTC elements heater. Refer to HA-66, "Removal and Installation".
NO >> Repair or replace malfunctioning parts.

B2777, B2779, B277B PTC ELEMENTS HEATER

DTC Logic

INFOID:0000000006960462

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 elements heater	• PTC elements heater • A/C auto amp. • Harness or connectors (PTC elements 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 elements heater	
B277B	HVAC LIN COMMUNICATION	When there is an error in the signal send 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” mode of “HVAC” using CONSULT.

Is DTC detected?

YES >> Refer to HAC-79, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960463

1.CHECK PTC ELEMENTS HEATER COMMUNICATION LINE FOR OPEN

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

PTC elements heater		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
F9	4	M50	40	Existed

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair harness or connector.

2.CHECK PTC ELEMENTS HEATER COMMUNICATION LINE FOR SHORT

Check continuity between PTC elements heater harness connector and ground.

PTC elements heater		–	Continuity
Connector	Terminal		
F9	4	Ground	Not existed

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair harness or connector.

3.CHECK A/C AUTO AMP.

With CONSULT
1. Turn power switch ON.

2. Use CONSULT to perform “Mode 5” of the “HVAC Test”of the “HVAC””Active Test”. Refer to HAC-30, "CONSULT Function".
3. Check that the PTC elements heater operates normally.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace A/C control (A/C auto amp.). (Refer to HAC-134, "Removal and Installation"). Then GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC confirmation procedure. Refer to HAC-79, "DTC Logic".

Is DTC B2777, B2779 or B277B detected?

YES >> Replace PTC elements heater. Refer to HA-66, "Removal and Installation".
NO >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".

B277A PTC ELEMENTS HEATER

DTC Logic

INFOID:0000000006960464

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B277A	PTC HEATER CONNECTOR	The high voltage harness connector of the PTC elements heater is connected improperly.	• PTC elements heater • Connection-detecting signal harness or connectors (PTC elements heater connection-detecting signal 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” mode of “HVAC” using CONSULT.

Is DTC detected?

YES >> Refer to HAC-81, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960465

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 shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield 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-32, "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.

DIAGNOSIS PROCEDURE

CAUTION:
Erase DTC after the work is completed.

1. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-31, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)
1. Disconnect high voltage connector from front side of Li-ion battery. Refer to EVB-136, "Removal and Installation".

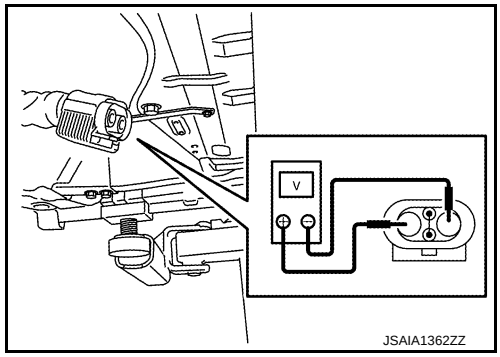
DANGER:

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

2. 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 THE CONNECTION-DETECTING OF PTC ELEMENTS HEATER HIGH VOLTAGE HARNESS CONNECTOR

1. Connect 12V battery negative terminal.
2. Visually check the connection-detecting state of PTC elements heater high voltage harness connector.

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 4.

3.CHECK CONNECTION-DETECTING TERMINAL OF PTC ELEMENTS HEATER HIGH VOLTAGE HARNESS CONNECTOR

1. Disconnect PTC elements heater high voltage harness connector.
2. Visually check that there is no deformation in the connection-detecting terminal of the PTC elements heater high voltage harness connector.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace high voltage harness between DC/DC-J/B and PTC elements heater.

4.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Connect PTC elements heater high voltage harness connector.
2. Perform DTC confirmation procedure. Refer to HAC-81, "DTC Logic".
3. Check DTC.

Is DTC detected?

YES >> GO TO 5.
NO >> INSPECTION END

5.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Turn power switch OFF.
2. Repeat step 3 and 4.
3. Check DTC.

Is DTC detected?

YES >> Replace PTC elements heater. Refer to HA-66, "Removal and Installation".
NO >> INSPECTION END

B277C, B277D HEATER FLUID TEMPERATURE SENSOR

DTC Logic

INFOID:0000000006960466

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B277C	HEATER TEMPERATURE SENSOR	Open circuit in the heater fluid temperature sensor	• Heater fluid temperature sensor • A/C auto amp. • Harness or connectors (Heater fluid temperature sensor circuit is open or shorted.)
B277D		Short circuit in the heater fluid temperature sensor	

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” mode of “HVAC” using CONSULT.

Is DTC detected?

YES >> Refer to HAC-83, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960467

1.CHECK HEATER FLUID TEMPERATURE SENSOR POWER SUPPLY

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

+		−	Voltage (Approx.)
Heater fluid temperature sensor			
Connector	Terminal		
F7	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK HEATER FLUID TEMPERATURE SENSOR POWER SUPPLY CIRCUIT FOR OPEN

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

Heater fluid temperature sensor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
F7	1	M50	37	Existed

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair harness or connector.

3.CHECK HEATER FLUID TEMPERATURE SENSOR POWER SUPPLY CIRCUIT FOR SHORT

Check continuity between heater fluid temperature sensor harness connector and ground.

Heater fluid temperature sensor		—	Continuity
Connector	Terminal		
F7	1	Ground	Not existed

Is the inspection result normal?

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

4. CHECK HEATER FLUID TEMPERATURE SENSOR GROUND CIRCUIT

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

Heater fluid temperature sensor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
F7	2	M50	30	Existed

Is the inspection result normal?

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

5. CHECK HEATER FLUID TEMPERATURE SENSOR

Check heater fluid temperature sensor. Refer to HAC-84, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace heater fluid temperature sensor. Refer to HAC-145, "Removal and Installation".

6. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".
NO >> Repair or replace malfunctioning parts.

Component Inspection

INFOID:0000000006960468

1. CHECK HEATER FLUID TEMPERATURE SENSOR

1. Remove heater fluid temperature sensor. Refer to HAC-145, "Removal and Installation".
2. Check resistance between heater fluid temperature sensor terminals by heating with hot water. Refer to applicable table for the normal value.

Terminals		Condition	Resistance : kΩ
		Temperature : °C (°F)	
1	2	–20 (–4)	6.77
		0 (32)	2.50
		20 (68)	1.06
		40 (104)	0.50
		50 (122)	0.36
		60 (140)	0.26
		70 (158)	0.19
		80 (176)	0.14

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace heater fluid temperature sensor. Refer to HAC-145, "Removal and Installation".

B2780 ELECTRIC COMPRESSOR

DTC Logic

INFOID:0000000006960469

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2780	COMPRESSOR ROM,RAM,AD	• 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

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.

Is DTC detected?

YES >> Refer to HAC-86, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960470

1.REPLACE ELECTRIC COMPRESSOR

Replace electric compressor. Refer to HA-44, "Removal and Installation".

>> INSPECTION END

B2781 ELECTRIC COMPRESSOR

DTC Logic

INFOID:0000000006960471

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” mode of “HVAC” using CONSULT.

Is DTC detected?

YES >> Refer to HAC-87, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960472

1.REPLACE ELECTRIC COMPRESSOR

Replace electric compressor. Refer to HA-44, "Removal and Installation".

>> INSPECTION END

B2782 ELECTRIC COMPRESSOR

DTC Logic

INFOID:0000000006960473

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” mode of “HVAC” using CONSULT.

Is DTC detected?

YES >> Refer to HAC-88, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960474

1.REPLACE ELECTRIC COMPRESSOR

Replace electric compressor. Refer to HA-44, "Removal and Installation".

>> INSPECTION END

B2783, B2784 ELECTRIC COMPRESSOR

DTC Logic

INFOID:0000000006960475

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 (°F) or more	• Electric compressor (Discharge pressure increase) • Cooling fan • Refrigerant leakage
B2784	COMP DISCHARGE TEMP LIMIT	When the estimated refrigerant temperature discharged from the electric compressor 110°C (230°F) or more	

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.

Is DTC detected?

YES >> Refer to HAC-89, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960476

1.CHECK REFRIGERANT FOR LEAKAGES

Check refrigerant for leakages. Refer to HA-29, "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-277, "Component Function Check".

3.CHECK REFRIGERANT CYCLE

Check refrigerant cycle. Refer to HA-35, "Inspection".

Is the inspection result normal?

YES >> Replace electric compressor. Refer to HA-44, "Removal and Installation".
NO >> Repair or replace malfunctioning parts.

B2785, B2786 ELECTRIC COMPRESSOR

DTC Logic

INFOID:0000000006960477

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2785	COMP IPM OVER HEAT	• 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	• Electric compressor (Discharge pressure increase) • Cooling fan • Refrigerant leakage
B2786	COMP IPM DISCHARGE TEMP LIMIT	When the IPM temperature 83°C (181°F) or more	

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.

Is DTC detected?

YES >> Refer to HAC-90, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960478

1.CHECK REFRIGERANT FOR LEAKAGES

Check refrigerant for leakages. Refer to HA-29, "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-277, "Component Function Check".

3.CHECK REFRIGERANT CYCLE

Check refrigerant cycle. Refer to HA-35, "Inspection".

Is the inspection result normal?

YES >> Replace electric compressor. Refer to HA-44, "Removal and Installation".
NO >> Repair or replace malfunctioning parts.

B2787 ELECTRIC COMPRESSOR

DTC Logic

INFOID:0000000006960479

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	• Li-ion battery • Electric compressor (Discharge pressure increase) • Cooling fan • Overfilled refrigerant

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.

Is DTC detected?

YES >> Refer to HAC-91, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960480

1.CHECK LI-ION BATTERY

Check li-ion battery. Refer to EVB-52, "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-29, "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-277, "Component Function Check".

4.CHECK REFRIGERANT CYCLE

Check refrigerant cycle. Refer to HA-35, "Inspection".

Is the inspection result normal?

YES >> Replace electric compressor. Refer to HA-44, "Removal and Installation".
NO >> Repair or replace malfunctioning parts.

B2788 ELECTRIC COMPRESSOR

DTC Logic

INFOID:0000000006960481

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: • Within 90 seconds after starting • Motor current is 35.1 A or more • 3 times in a 5 second interval	• 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” mode of “HVAC” using CONSULT.

Is DTC detected?

YES >> Refer to HAC-92, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960482

1.CHECK REFRIGERANT FOR LEAKAGES

Check refrigerant for leakages. Refer to HA-29, "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-277, "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-44, "Removal and Installation".

4.CHECK REFRIGERANT CYCLE

Check refrigerant cycle. Refer to HA-35, "Inspection".

Is the inspection result normal?

YES >> Replace electric compressor. Refer to HA-44, "Removal and Installation".
NO >> Repair or replace malfunctioning parts.

B2789 ELECTRIC COMPRESSOR

DTC Logic

INFOID:0000000006960483

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	• 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” mode of “HVAC” using CONSULT.

Is DTC detected?

YES >> Refer to HAC-93, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960484

1.CHECK REFRIGERANT FOR LEAKAGES

Check refrigerant for leakages. Refer to HA-29, "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-277, "Component Function Check".

3.CHECK REFRIGERANT CYCLE

Check refrigerant cycle. Refer to HA-35, "Inspection".

Is the inspection result normal?

YES >> Replace electric compressor. Refer to HA-44, "Removal and Installation".
NO >> Repair or replace malfunctioning parts.

B278A, B278B ELECTRIC COMPRESSOR

DTC Logic

INFOID:0000000006960485

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	• Electric compressor • Li-ion battery • DC/DC-J/B • 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

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.

Is DTC detected?

YES >> Refer to HAC-94, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960486

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 shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield 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-32, "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.

DIAGNOSIS PROCEDURE

CAUTION:
Erase DTC after the work is completed.

1.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-31, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)
1. Disconnect high voltage connector from front side of Li-ion battery. Refer to EVB-136, "Removal and Installation".

DANGER:

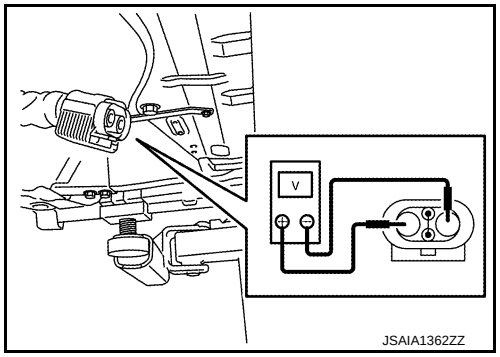
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

2. 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 HIGH VOLTAGE HARNESS POWER SUPPLY CIRCUIT FOR OPEN

1. Disconnect electric compressor and DC/DC-J/B connector.
2. Check continuity between Electric compressor high voltage harness connector and DC/DC-J/B high voltage harness connector.

Electric compressor		DC/DC-J/B		Continuity
Connector	Terminal	Connector	Terminal	
H1	7	H2	18	Existed

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace high voltage harness between electric compressor and DC/DC-J/B.

3. CHECK ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS GROUND CIRCUIT

Check continuity between Electric compressor high voltage harness connector and DC/DC-J/B high voltage harness connector.

Electric compressor		DC/DC-J/B		Continuity
Connector	Terminal	Connector	Terminal	
H1	8	H2	19	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace high voltage harness between electric compressor and DC/DC-J/B.

4. CHECK LI-ION BATTERY

1. Connect 12V battery negative terminal.
2. Check li-ion battery. Refer to EVB-52, "Work Flow".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace malfunctioning parts.

5. CHECK DC/DC-J/B

Check DC/DC-J/B. Refer to EVC-94, "Work Flow".

Is the inspection result normal?

YES >> Replace electric compressor. Refer to HA-44, "Removal and Installation".
NO >> Repair or replace malfunctioning parts.

B278C, B278D ELECTRIC COMPRESSOR

DTC Logic

INFOID:0000000006960487

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.	• Electric compressor • A/C auto amp. • Harness or connectors (Electric compressor circuit is open or shorted.)
B278D	COMP COMM ERROR 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” mode of “HVAC” using CONSULT.

Is DTC detected?

YES >> Refer to HAC-97, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960488

1.INSPECTION START

Confirm the detected DTC. Refer to HAC-97, "DTC Logic".

Which DTC is detected?

B278C >> GO TO 2.
B278D >> GO TO 4.

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.

Electric compressor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
F10	1	M50	14	Existed

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		–	Continuity
Connector	Terminal		
F10	1	Ground	Not existed

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair harness or connector.

4. CHECK ELECTRIC COMPRESSOR COMMUNICATION LINE FOR OPEN

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

Electric compressor		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
F10	2	M50	18	Existed

Is the inspection result normal?

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

5. CHECK ELECTRIC COMPRESSOR COMMUNICATION LINE FOR SHORT

Check continuity between electric compressor harness connector and ground.

Electric compressor		–	Continuity
Connector	Terminal		
F10	2	Ground	Not existed

Is the inspection result normal?

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

6. 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	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 8.

7. CHECK ELECTRIC COMPRESSOR GROUND CIRCUIT

1. Turn power switch OFF.
2. Check continuity between electric compressor harness connector and ground.

Electric compressor		–	Continuity
Connector	Terminal		
F10	3	Ground	Existed

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair harness or connector.

8. CHECK A/C RELAY CIRCUIT

Check A/C relay circuit. Refer to EVC-294, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Repair harness or connector between A/C relay and electric compressor.
NO >> Repair or replace error-detected parts.

9. CHECK A/C AUTO AMP.

With CONSULT
1. Reconnect all harness connectors disconnected.
2. Turn power switch ON.
3. Use CONSULT to perform “Mode 1” of the “HVAC Test”of the “HVAC”“Active Test”. Refer to HAC-30, "CONSULT Function".
4. Check that the electric compressor operates normally.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace A/C control (A/C auto amp.). (Refer to HAC-134, "Removal and Installation"). Then GO TO 10.

10. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC confirmation procedure. Refer to HAC-97, "DTC Logic".

Is DTC B278C or B278D detected?

YES >> Replace electric compressor. Refer to HA-44, "Removal and Installation".
NO >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".

B278F, B2790 HEATER PUMP

DTC Logic

INFOID:0000000006960489

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B278F	HEATER PUMP COMM HVAC→H/P	When there is an error in the DUTY signal sent from the A/C auto amp.	• Heater pump • A/C auto amp. • Harness or connectors (Heater pump circuit is open or shorted.)
B2790	HEATER PUMP COMM H/P→HVAC	When there is an error in the DUTY signal sent from the heater pump.	

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” mode of “HVAC” using CONSULT.

Is DTC detected?

YES >> Refer to HAC-100, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960490

1.INSPECTION START

Confirm the detected DTC. Refer to HAC-100, "DTC Logic".

Which DTC is detected?

B278F >> GO TO 2.
B2790 >> GO TO 6.

2.CHECK HEATER PUMP COMMUNICATION LINE FOR OPEN

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

Heater pump		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
F8	3	M50	13	Existed

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair harness or connector.

3.CHECK HEATER PUMP COMMUNICATION LINE FOR SHORT

Check continuity between heater pump harness connector and ground.

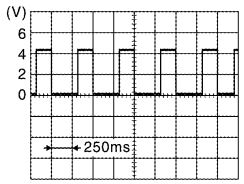
Heater pump		–	Continuity
Connector	Terminal		
F8	3	Ground	Not existed

Is the inspection result normal?

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

4.CHECK A/C AUTO AMP. INPUT SIGNAL

1. Connect heater pump and A/C auto amp. connector.
2. Turn power switch ON.
3. Check signal between A/C auto amp. harness connector and ground with oscilloscope.

A/C auto amp.			Condition	Condition (Reference value)
Connector	+	–		
	Terminal			
M50	13	10	• Power switch ON • Set temperature: Full hot	 JSIIA1659ZZ

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".

5.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace heater pump. Refer to HA-72, "Removal and Installation".
NO >> Repair or replace malfunctioning parts.

6.CHECK HEATER PUMP COMMUNICATION LINE FOR OPEN

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

Heater pump		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
F8	4	M50	17	Existed

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair harness or connector.

7.CHECK HEATER PUMP COMMUNICATION LINE FOR SHORT

Check continuity between heater pump harness connector and ground.

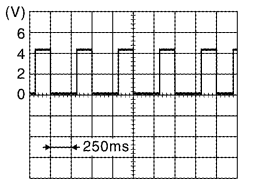
Heater pump		–	Continuity
Connector	Terminal		
F8	4	Ground	Not existed

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair harness or connector.

8.CHECK A/C AUTO AMP. INPUT SIGNAL

1. Connect heater pump and A/C auto amp. connector.
2. Turn power switch ON.
3. Check signal between A/C auto amp. harness connector and ground with oscilloscope.

A/C auto amp.			Condition	Condition (Reference value)
Connector	+	–		
	Terminal			
M50	17	10	• Power switch ON • Set temperature: Full hot	 JSIIA1659ZZ

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace heater pump. Refer to HA-72, "Removal and Installation".

9. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".
NO >> Repair or replace malfunctioning parts.

B2791 ELECTRIC COMPRESSOR

DTC Logic

INFOID:0000000006960491

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.	• Electric compressor • Cooling fan • Li-ion battery • DC/DC-J/B • Overfilled refrigerant

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.

Is DTC detected?

YES >> Refer to HAC-103, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960492

1.CHECK REFRIGERANT FOR LEAKAGES

Check refrigerant for leakages. Refer to HA-29, "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-277, "Component Function Check".

3.CHECK REFRIGERANT CYCLE

Check refrigerant cycle. Refer to HA-35, "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-52, "Work Flow".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace malfunctioning parts.

5.CHECK DC/DC-J/B

Check DC/DC-J/B. Refer to EVC-94, "Work Flow".

Is the inspection result normal?

YES >> Replace electric compressor. Refer to HA-44, "Removal and Installation".
NO >> Repair or replace malfunctioning parts.

B2792 HEATER PUMP

DTC Logic

INFOID:0000000006960493

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2792	HEATER PUMP OPERATION LIMIT	When the heater pump does not operate normally and is restarted	• Stuck heater pump • Element temperature malfunction • Over current malfunction

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” mode of “HVAC” using CONSULT.

Is DTC detected?

YES >> Refer to HAC-105, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960494

1.CHECK HEATER PUMP

With CONSULT
1. Turn power switch ON.
2. Use CONSULT and conduct an “HVAC TEST” for the “HVAC” “Active Test”. Refer to HAC-30, "CONSULT Function".
3. When the test items are being conducted, check that the heater pump operates normally for each mode.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Replace heater pump. Refer to HA-72, "Removal and Installation".

B2793 HEATER PUMP

DTC Logic

INFOID:0000000006960495

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2793	HEATER PUMP VOLTAGE	When a supply voltage of 8.0 V or less or 15.0 V or more being input to the heater pump is detected	voltage malfunction

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” mode of “HVAC” using CONSULT.

Is DTC detected?

YES >> Refer to HAC-106, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960496

1.CHECK HEATER PUMP POWER SUPPLY

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

+		–	Voltage (Approx.)
Heater pump			
Connector	Terminal		
F8	1	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK HEATER PUMP GROUND CIRCUIT

Check continuity between heater pump harness connector and ground.

Heater pump		–	Continuity
Connector	Terminal		
F8	2	Ground	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair harness or connector.

3.CHECK A/C RELAY CIRCUIT

Check A/C relay circuit. Refer to EVC-294, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Repair harness or connector between A/C relay and heater pump.
NO >> Repair or replace error-detected parts.

B2794 HEATER PUMP

DTC Logic

INFOID:0000000006960497

DTC DETECTION LOGIC

DTC	Items (CONSULT screen terms)	DTC detection condition	Possible cause
B2794	Heater pump	When the heater pump is not operating	• Stuck heater pump • Element temperature malfunction • Over current malfunction

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” mode of “HVAC” using CONSULT.

Is DTC detected?

YES >> Refer to HAC-107, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960498

1.CHECK HEATER PUMP

With CONSULT
1. Turn power switch ON.
2. Use CONSULT and conduct an “HVAC TEST” for the “HVAC” “Active Test”. Refer to HAC-30, "CONSULT Function".
3. When the test items are being conducted, check that the heater pump operates normally for each mode.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Replace heater pump. Refer to HA-72, "Removal and Installation".

B27A0, B27A1 INTAKE DOOR MOTOR

DTC Logic

INFOID:0000000006960499

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to HAC-59, "DTC Logic".
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. HAC-60, "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)	• 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” mode of “HVAC” using CONSULT.
3. Check DTC.

Is DTC detected?

YES >> Refer to HAC-108, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960500

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?

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	M50	30	Existed

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	M50	38	Existed

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	Not existed

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-110, "Component Inspection (PBR)".

Is the inspection result normal?

YES >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".
NO >> Replace intake door motor. Refer to HAC-142, "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	M50	27	Existed

Is the inspection result normal?

YES >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".
NO >> Repair harness or connector.

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	M50	21	Existed
	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	Not existed
	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-110, "Component Inspection (Motor)".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace intake door motor. Refer to HAC-142, "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-141, "Exploded View".

Is the inspection result normal?

YES >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".
NO >> Repair or replace malfunctioning parts.

Component Inspection (PBR)

INFOID:0000000006960501

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-142, "INTAKE DOOR MOTOR : Removal and Installation".

Component Inspection (Motor)

INFOID:0000000006960502

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	FRE
6	5	REC

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake door motor. Refer to HAC-142, "INTAKE DOOR MOTOR : Removal and Installation".

B27A2, B27A3, B27A4, B27A5 AIR MIX DOOR MOTOR

DTC Logic

INFOID:0000000006960503

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to HAC-59, "DTC Logic".
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. HAC-60, "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	DR AIR MIX DOOR MOT	Short or open circuit of air mix door motor drive signal terminal 1.	• 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” mode of “HVAC” using CONSULT.
3. Check DTC.

Is DTC detected?

YES >> Refer to HAC-112, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960504

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
Air mix door motor			
Connector	Terminal		
M55	2	Ground	Battery voltage

Is the inspection result normal?

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

2. CHECK A/C RELAY CIRCUIT

Check A/C relay circuit. Refer to EVC-294, "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 error-detected parts.

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	
M55	3	M50	6	Existed
	6		7	
	1		8	
	4		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		
M55	3	Ground	Not existed
	6		
	1		
	4		

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-113, "Component Inspection".

Is the inspection result normal?

YES >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".
NO >> Replace air mix door motor. Refer to HAC-143, "AIR MIX DOOR MOTOR : Removal and Installation".

Component Inspection

INFOID:0000000006960505

1. CHECK AIR MIX DOOR MOTOR

1. Remove air mix door motor. Refer to HAC-143, "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.)
2	1	90
	3	
	4	
	6	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace air mix door motor. Refer to HAC-143, "AIR MIX DOOR MOTOR : Removal and Installation".

B27A6, B27A7, B27A8, B27A9 MODE DOOR MOTOR

DTC Logic

INFOID:0000000006960506

DTC DETECTION LOGIC

NOTE:

- If DTC is displayed along with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to HAC-59, "DTC Logic".
- If DTC is displayed along with DTC U1010, first perform the trouble diagnosis for DTC U1010. HAC-60, "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.	• 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” mode of “HVAC” using CONSULT.
3. Check DTC.

Is DTC detected?

YES >> Refer to HAC-114, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006960507

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
Mode door motor			
Connector	Terminal		
M342	5	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK A/C RELAY CIRCUIT

Check A/C relay circuit. Refer to EVC-294, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Repair harness or connector between A/C relay and mode door motor.
NO >> Repair or replace error-detected parts.

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	
M342	4	M50	2	Existed
	3		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		
M342	4	Ground	Not existed
	3		
	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-115, "Component Inspection".

Is the inspection result normal?

YES >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".
NO >> Replace mode door motor. Refer to HAC-143, "MODE DOOR MOTOR : Removal and Installation".

Component Inspection

INFOID:0000000006960508

1.CHECK MODE DOOR MOTOR

1. Remove mode door motor. Refer to HAC-143, "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.)
5	1	90
	2	
	3	
	4	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace mode door motor. Refer to HAC-143, "MODE DOOR MOTOR : Removal and Installation".

POWER SUPPLY AND GROUND CIRCUIT
A/C AUTO AMP.

A/C AUTO AMP. : Diagnosis Procedure

INFOID:0000000006960509

1.CHECK SYMPTOM

Check symptom (A or B).

	Symptom
A	• Air conditioning system does not activate. • Air conditioning system does cannot be controlled. • Operation status of air conditioning system is not indicated on display. **NOTE:** Fail-safe does not activate.
B	• 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-81, "Fuse, Connector and 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
A/C auto amp.			
Connector	Terminal		
M50	32	Ground	Battery voltage

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-81, "Fuse, Connector and Terminal Arrangement".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace the blown fuse after repairing the affected circuit if a fuse is blown.

5.CHECK A/C AUTO AMP. BATTERY POWER SUPPLY

1. Disconnect A/C auto amp. connector.
2. Check voltage between A/C auto amp. harness connector and ground.

+		–	Voltage
A/C auto amp.			
Connector	Terminal		
M50	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		
M50	10	Ground	Existed

Is the inspection result normal?

YES >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".
NO >> Repair harness or connector.

BLOWER MOTOR

Component Function Check

INFOID:0000000006960510

1.CHECK BLOWER MOTOR

With CONSULT
1. Turn power switch ON.
2. Use CONSULT and conduct an “HVAC TEST” for the “HVAC” “Active Test”.
3. When the test items are being conducted, check that the blower motor operates normally for each mode. Refer to Active Test in HAC-30, "CONSULT Function".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Refer to HAC-118, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006960511

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-81, "Fuse, Connector and Terminal Arrangement".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace the blown fuse after repairing the affected circuit if a fuse is blown.

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-121, "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.

+		–	Voltage (Approx.)
Power transistor			
Connector	Terminal		
M82	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	
M82	1	M39	2	Existed

Is the inspection result normal?

YES >> Replace blower motor. Refer to VTL-19, "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		
M82	4	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.

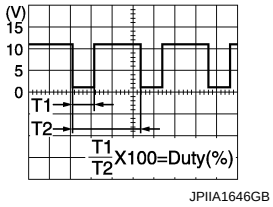
Power transistor		—	Continuity
Connector	Terminal		
M82	3	Ground	Existed

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

+		–	Condition	Duty ratio (Approx.)	Output waveform
Power transistor					
Connector	Terminal		Fan speed (manual) Air outlet: VENT		
M82	2	Ground	1st	26%	
			2nd	34%	
			3rd	41%	
			4th	51%	
			5th	62%	
			6th	73%	
			7th	82%	

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Is the inspection result normal?

YES >> Replace power transistor. Refer to HAC-140, "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	
M82	2	M50	12	Existed

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		
M82	2	Ground	Not existed

Is the inspection result normal?

YES >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".
NO >> Repair harness or connector.

Component Inspection (Blower Motor)

INFOID:0000000006960512

1.CHECK BLOWER MOTOR

1. Remove blower motor. Refer to VTL-19, "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-19, "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-19, "Removal and Installation"..

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-19, "Removal and Installation"..

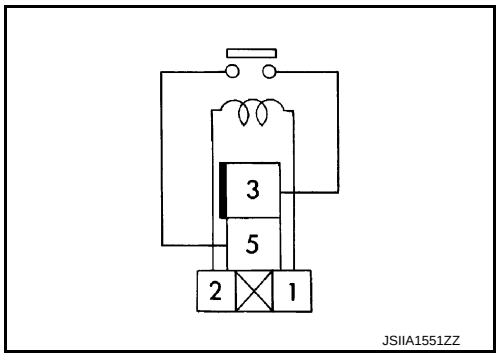
Component Inspection (Blower Relay)

INFOID:0000000006960513

1.CHECK BLOWER RELAY

1. Remove blower relay. Refer to PG-81, "Fuse, Connector and 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	Existed
		OFF	Not existed



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace blower relay.

HEATER PUMP

Component Function Check

INFOID:0000000006960514

1.CHECK HEATER PUMP OPERATING CONDITION

With CONSULT
1. Select “ACTIVE TEST” mode of “HVAC” using CONSULT-III.
2. Confirm heater pump operation by the sound or hose pulsation.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Refer to HAC-122, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006960515

1.CHECK HEATER PUMP POWER SUPPLY

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

+		−	Voltage (Approx.)
Heater pump			
Connector	Terminal		
E8	1	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK A/C RELAY CIRCUIT

Check A/C relay circuit. Refer to EVC-294, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Repair harness or connector between A/C relay and heater pump.
NO >> Repair or replace error-detected parts.

3.CHECK HEATER PUMP GROUND CIRCUIT

Check continuity between heater pump harness connector and ground.

Heater pump		—	Continuity
Connector	Terminal		
E8	2	Ground	Existed

Is the inspection result normal?

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

4.CHECK HEATER PUMP COMMUNICATION LINE FOR OPEN-I

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

Heater pump		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
E8	3	M50	13	Existed

Is the inspection result normal?

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

5. CHECK HEATER PUMP COMMUNICATION LINE FOR SHORT-I

Check continuity between heater pump harness connector and ground.

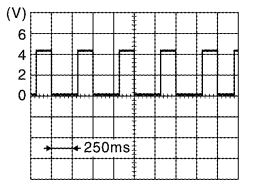
Heater pump		–	Continuity
Connector	Terminal		
E8	3	Ground	Not existed

Is the inspection result normal?

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

6. CHECK A/C AUTO AMP. INPUT SIGNAL-I

1. Connect heater pump and A/C auto amp. connector.
2. Turn power switch ON.
3. Check signal between A/C auto amp. harness connector and ground with oscilloscope.

A/C auto amp.			Condition	Condition (Reference value)
Connector	+	–		
	Terminal			
M50	13	10	• Power switch ON • Set temperature: Full hot	 JSIIA1659ZZ

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace A/Cauto amp.. Refer to HAC-134, "Removal and Installation".

7. CHECK HEATER PUMP COMMUNICATION LINE FOR OPEN-II

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

Heater pump		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
E8	4	M50	17	Existed

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair harness or connector.

8. CHECK HEATER PUMP COMMUNICATION LINE FOR SHORT-II

Check continuity between heater pump harness connector and ground.

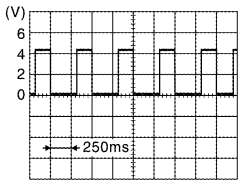
Heater pump		–	Continuity
Connector	Terminal		
E8	4	Ground	Not existed

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair harness or connector.

9.CHECK A/C AUTO AMP. INPUT SIGNAL-II

1. Connect heater pump and A/C auto amp. connector.
2. Turn power switch ON.
3. Check signal between A/C auto amp. harness connector and ground with oscilloscope.

A/C auto amp.			Condition	Condition (Reference value)
Connector	+	–		
	Terminal			
M50	17	10	• Power switch ON • Set temperature: Full hot	 JSIIA1659ZZ

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace heater pump. Refer to HA-72, "Removal and Installation".

10.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace A/C control (A/C auto amp.). Refer to HAC-134, "Removal and Installation".
NO >> Repair or replace malfunctioning parts.

ELECTRIC COMPRESSOR INSULATION RESISTANCE CHECK

Component Inspection

INFOID:0000000006960516

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 shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield 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-32, "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:

Shut off high voltage circuit. Refer to GI-31, "How to Cut Off High Voltage".

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

1. Disconnect high voltage connector from front side of Li-ion battery. Refer to EVB-136, "Removal and Installation".

   DANGER:

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

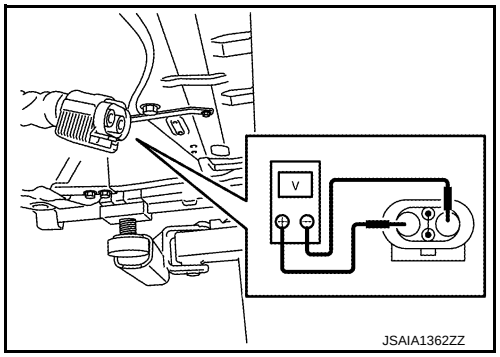
2. Measure voltage between high voltage harness terminals.

   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.

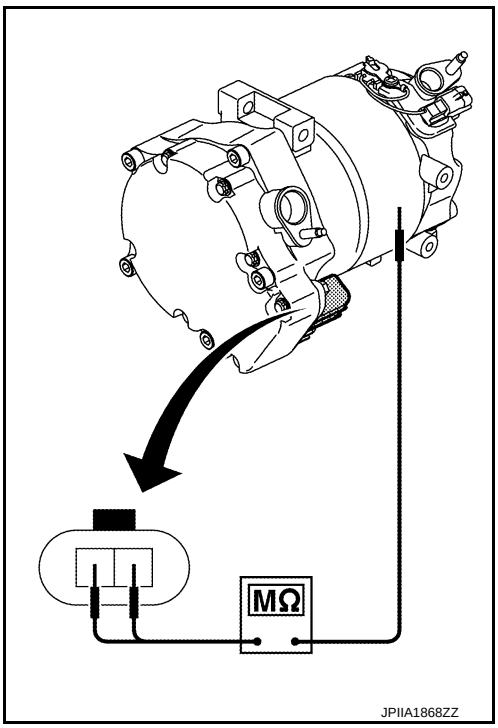
2.CHAECK ELECTRIC COMPRESSOR INSULATION RESISTANCE

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.**



+		
Electric compressor	–	Resistance
Terminal		
7	Aluminum part on side of electric compressor	1 MΩ or more
8		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric compressor. Refer to HA-44, "Removal and Installation".

PTC ELEMENTS HEATER INSULATION RESISTANCE CHECK

Component Inspection

INFOID:0000000006960517

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 shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield 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-32, "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:

Shut off high voltage circuit. Refer to GI-31, "How to Cut Off High Voltage".

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

1. Disconnect high voltage connector from front side of Li-ion battery. Refer to EVB-136, "Removal and Installation".

   DANGER:

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

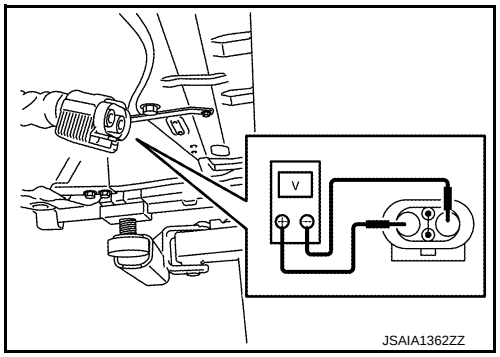
2. Measure voltage between high voltage harness terminals.

   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.

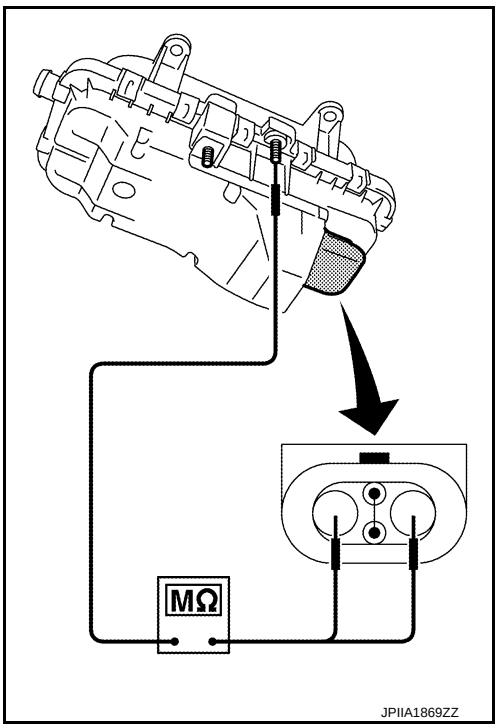
2.CHAECK PTC ELEMENTS HEATER INSULATION RESISTANCE

1. Disconnect 12V battery negative terminal.
2. Disconnect high voltage harness connector from PTC elements heater.

3. Check the insulation resistance of the PTC elements 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.**



+		
PTC elements	–	Resistance
Terminal		
7	Bonding wire stud bolt	1 MΩ or more
8		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace PTC elements heater. Refer to HA-66, "Removal and Installation".

SYMPTOM DIAGNOSIS

AUTOMATIC AIR CONDITIONER SYSTEM

Symptom Table

INFOID:0000000006997127

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
• Air conditioning system does not activate. • Air conditioning system cannot be controlled.		• A/C auto amp. ignition power supply and ground circuit • A/C auto amp.	HAC-116, "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-141, "Exploded View".
Air outlet does not change.		Mode door motor system installation condition	Check mode door motor system is properly installed. Refer to HAC-141, "Exploded View".
Air inlet does not change.		Intake door motor system installation condition	Check intake door motor system is properly installed. Refer to HAC-141, "Exploded View".
Blower motor does not operates or operation speed is not normal.		• 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-118, "Diagnosis Procedure"
Compressor does not operate.		• The circuit between VCM and refrigerant pressure sensor • Refrigerant pressure sensor • Blower fan ON signal circuit • A/C auto amp.	HAC-133, "Diagnosis Procedure"
• Insufficient cooling. • No cool air comes out. (Air flow volume is normal.)		• Cooler cycle • Air leakage from each duct • A/C auto amp. connection recognition signal circuit • Temperature setting trimmer	HAC-130, "Diagnosis Procedure"
• Insufficient heating. • No warm air comes out. (Air flow volume is normal.)		• Heater hose • Heater core • PTC elements heater • Heater pump • Air leakage from each duct • Temperature setting trimmer • A/C auto amp. connection	HAC-131, "Diagnosis Procedure"
Noise is heard when the A/C system operates.	During compressor operation.	Cooler cycle	HA-38, "Symptom Table"
	During blower motor operation.	• Mixing any foreign object in blower motor • Blower motor fan breakage • Blower motor rotation inferiority	HAC-120, "Component Inspection (Blower Motor)"
• Memory function does not operate normally. • The setting is not maintained. (It returns to initial condition.)		• A/C auto amp. battery power supply circuit • A/C auto amp.	HAC-116, "A/C AUTO AMP. : Diagnosis Procedure"

INSUFFICIENT COOLING

Description

INFOID:0000000006997128

Symptom
- Insufficient cooling
- No cold air comes out. (Air flow volume is normal.)

Diagnosis Procedure

INFOID:0000000006997129

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. Refter to HAC-133, "Diagnosis Procedure".

2.CHECK REFRIGERANT CYCLE

Connect recovery/recycling/recharging equipment (for HFC-134a) to the vehicle and perform the refrigerant system diagnosis. Refer to HA-38, "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” on “WORK SUPPORT” of “HVAC”. Refer to HAC-55, "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-134, "Removal and Installation".

INSUFFICIENT HEATING

Description

INFOID:0000000006997130

Symptom
- Insufficient heating
- No warm air comes out. (Air flow volume is normal.)

Diagnosis Procedure

INFOID:0000000006997131

NOTE:
Perform the self-diagnosis with CONSULT before performing the diagnosis by symptom. Perform the diagnosis by DTC if DTC is detected.

1.CHECK HEATING SYSTEM

1. Check the heater level and check for leakage. Refer to HA-41, "Inspection".
2. Check the water flow sounds on coolant. Refer to HA-41, "Draining and Refilling".

Is the check result normal?

YES >> GO TO 2.
NO >> Refill the heater fluid and repair or replace the parts according to the inspection results.

2.CHECK HEATER PUMP

Check the heater pump operation. Refer to HAC-122, "Component Function Check".

Is the check result normal?

YES >> GO TO 3.
NO >> Repair or replace malfunctioning part according to diagnosis result.

3.CHECK HEATER HOSE INSTALLATION CONDITION

Check the heater hose installation condition visually (for twist, crush, etc.).

Is the check result normal?

YES >> GO TO 4.
NO >> Repair or replace malfunctioning part according to diagnosis result.

4.CHECK HEATER CORE

1. Check the temperature of inlet hose and outlet hose of heater core.
2. Check that the inlet side of heater core is hot and the outlet side is slightly lower than/almost equal to the inlet side.
   CAUTION:
   The temperature inspection should be performed after a short time because the engine coolant temperature is too hot.

Is the check result normal?

YES >> GO TO 5.
NO >> Replace the heater core.

5.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 6.
NO >> Repair or replace malfunctioning part according to diagnosis result.

6.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-55, "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-134, "Removal and Installation".

COMPRESSOR DOES NOT OPERATE

Description

INFOID:0000000006997132

SYMPTOM

Compressor does not operate.

Diagnosis Procedure

INFOID:0000000006997133

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-270, "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” mode of “” using CONSULT.
2. Select “FORCED OFF SIG” , and check status under the following conditions.

Monitor item	Condition		Status
FORCED OFF SIG	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-43, "AIR CONDITIONER CONTROL : System Description" .

3.CHECK A/C AUTO AMP. OUTPUT SIGNAL

With CONSULT

1. Select “ACTIV TEST” mode of “” using CONSULT. Refer to HAC-30, "CONSULT Function".
2. Check the electric compressor operations in each mode.

Is the inspection result normal?

YES >> Replace A/C auto amp.
NO >> Replace electric compressor.

REMOVAL AND INSTALLATION

A/C CONTROL (A/C AUTO AMP.)

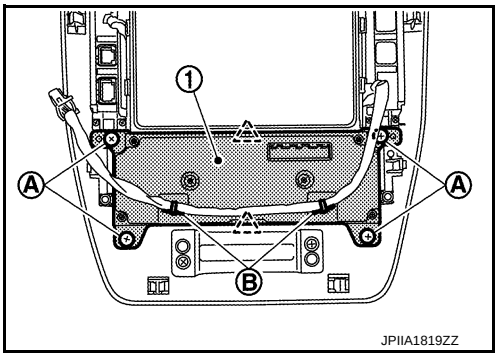
Removal and Installation

INFOID:0000000006960525

REMOVAL

1. Remove cluster lid C. Refer to IP-13, "Removal and Installation".
2. Remove mounting screws (A) and harness clips (B).
3. Disengage fixing pawl to remove A/C control (1) from cluster lid C.

: Pawl



INSTALLATION

Install in the reverse order of removal.

AMBIENT SENSOR

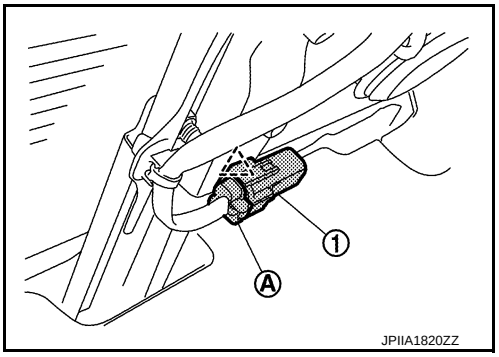
Removal and Installation

INFOID:0000000006960526

REMOVAL

1. Remove front under cover. Refer to EXT-21, "FRONT UNDER COVER : Removal and Installation".
2. Disconnect ambient sensor connector (A).
3. Disengage fixing pawl to remove ambient sensor (1) from vehicle.

: Pawl



INSTALLATION

Install in the reverse order of removal.

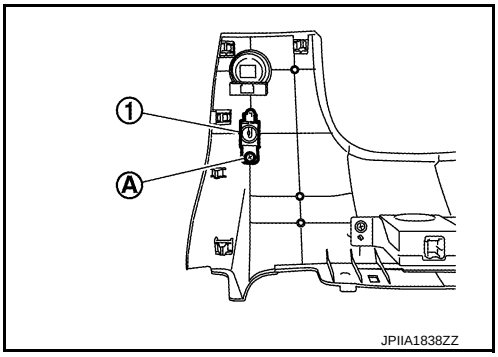
IN-VEHICLE SENSOR

Removal and Installation

INFOID:0000000006960527

REMOVAL

1. Remove instrument lower panel LH. Refer to IP-13, "Removal and Installation".
2. Remove fixing screw to remove in-vehicle sensor from instrument lower panel.



INSTALLATION

Install in the reverse order of removal.

SUNLOAD SENSOR

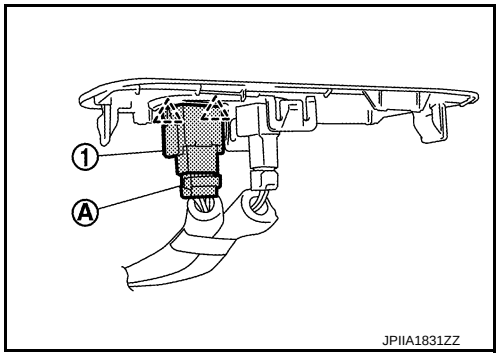
Removal and Installation

INFOID:0000000006960528

REMOVAL

1. Remove switch panel. Refer to IP-13, "Removal and Installation".
2. Disconnect sunload sensor connector (A).
3. Disengage fixing pawl to remove sunload sensor (1) from switch panel.

: Pawl



INSTALLATION

Install in the reverse order of removal.

INTAKE SENSOR

Exploded View

INFOID:0000000006960529

Refer to HA-58, "Exploded View".

Removal and Installation

INFOID:0000000006960530

REMOVAL

1. Remove evaporator assembly. Refer to HA-62, "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.**

REFRIGERANT PRESSURE SENSOR

Exploded View

INFOID:0000000006960531

Refer to HA-54, "Exploded View".

Removal and Installation

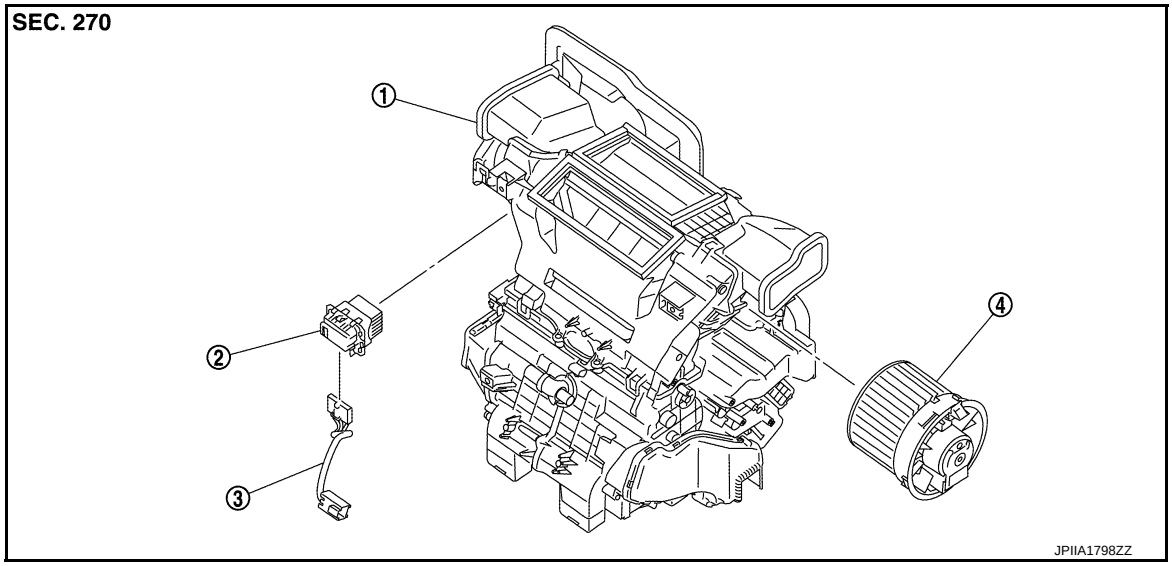
INFOID:0000000006960532

Refer to HA-57, "REFRIGERANT PRESSURE SENSOR : Removal and Installation".

POWER TRANSISTOR

Exploded View

INFOID:0000000006960533



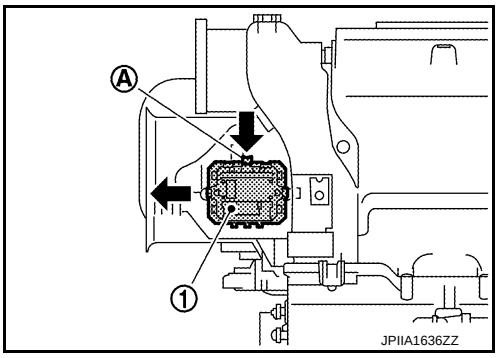
1. A/C unit assembly
2. Power transistor
3. Sub harness
4. Blower motor

Removal and Installation

INFOID:0000000006960534

REMOVAL

1. Remove instrument panel assembly. Refer to IP-13, "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

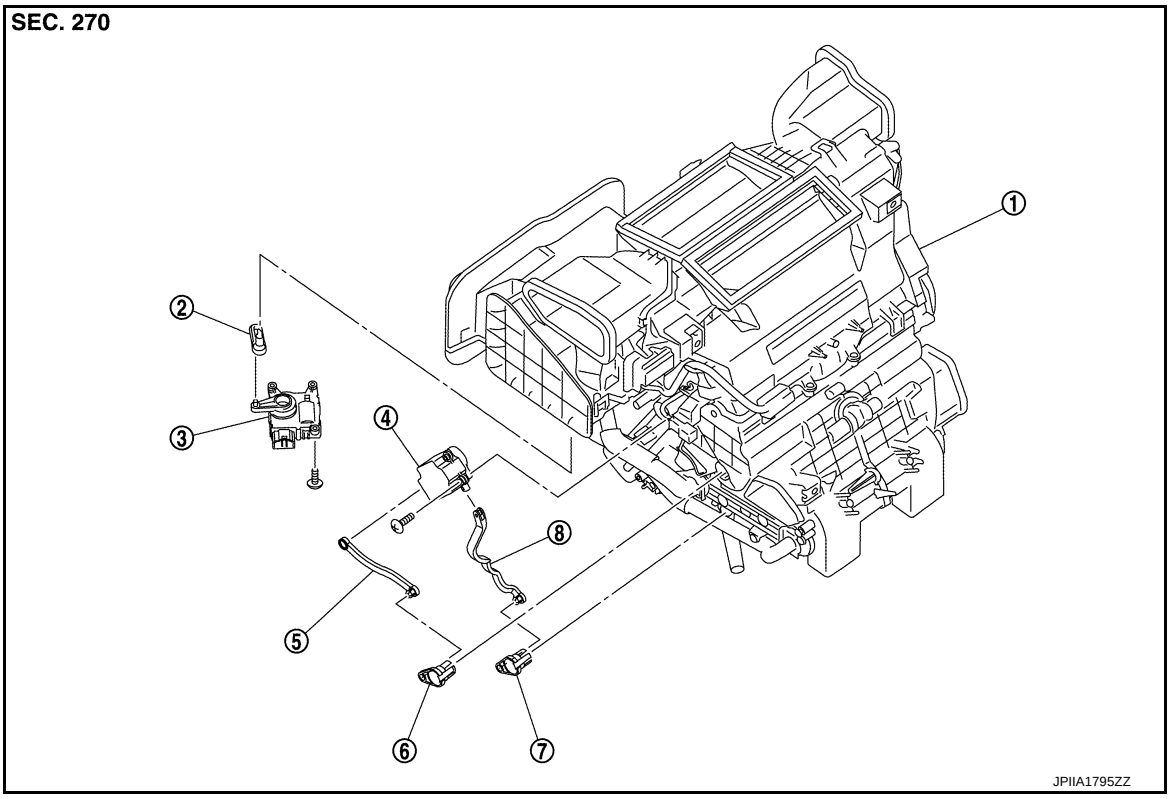
Install in the reverse order of removal.

DOOR MOTOR

Exploded View

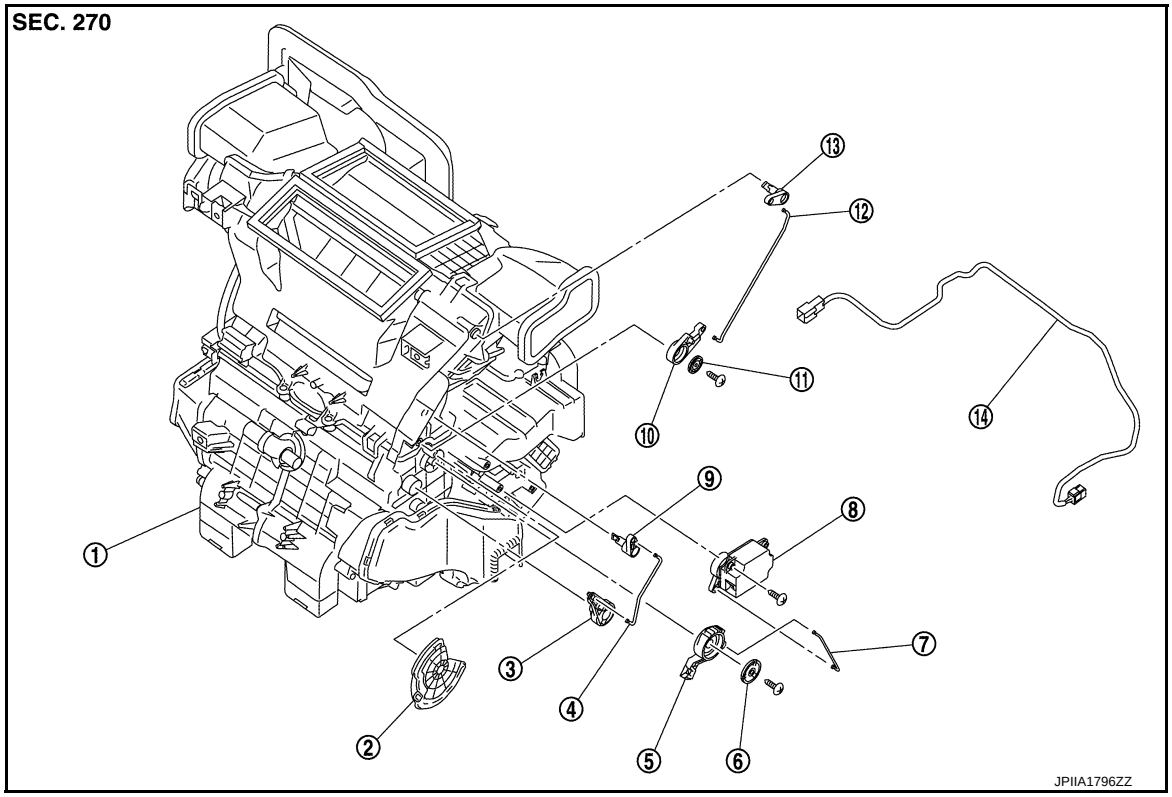
INFOID:0000000006960535

LEFT SIDE



1. A/C 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



1. A/C 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

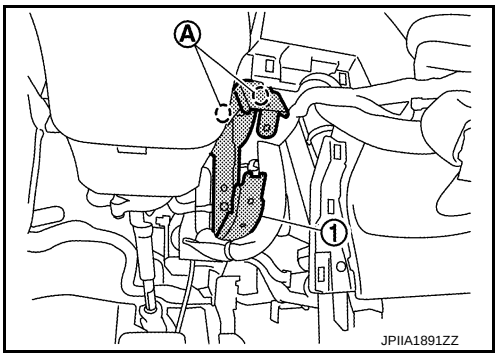
INTAKE DOOR MOTOR

INTAKE DOOR MOTOR : Removal and Installation

INFOID:0000000006960536

REMOVAL

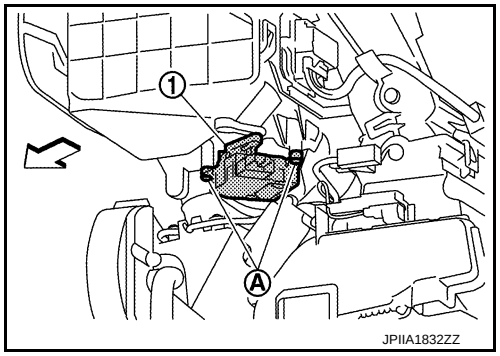
1. Remove instrument lower panel LH. Refer to IP-13, "Removal and Installation".
2. Remove knee protector.
3. Remove mounting nuts (A), then remove knee protector bracket (1).



4. Remove brake pedal assembly. Refer to BR-211, "Removal and Installation".
5. Disconnect intake door motor connector.

6. Remove fixing screws (A) to remove intake door motor (1) from A/C unit assembly.

⇦ : Vehicle front



INSTALLATION

Install in the reverse order of removal.

MODE DOOR MOTOR

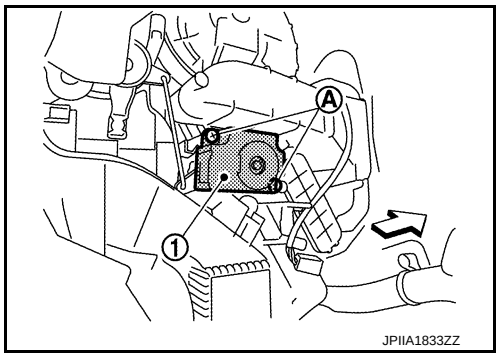
MODE DOOR MOTOR : Removal and Installation

INFOID:0000000006960537

REMOVAL

1. Remove glove box cover assembly Refer to IP-13, "Removal and Installation".
2. Disconnect mode door motor connector.
3. Remove fixing screws (A) to remove mode door motor (1) from A/C unit assembly.

⇦ : Vehicle front



INSTALLATION

Note the following items, and then install in the order of removal.

CAUTION:

After installing door motor, perform door motor starting position. Refer to HAC-58, "Work Procedure".

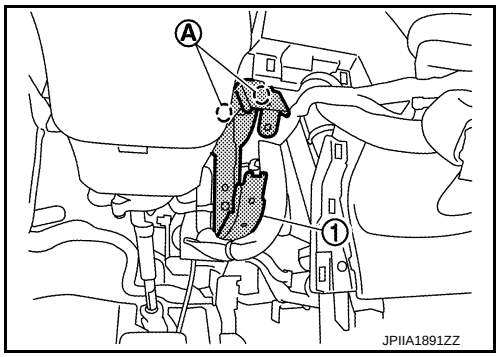
AIR MIX DOOR MOTOR

AIR MIX DOOR MOTOR : Removal and Installation

INFOID:0000000006960538

REMOVAL

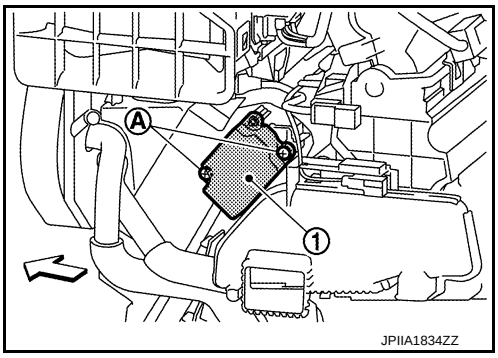
1. Remove instrument lower panel LH. Refer to IP-13, "Removal and Installation".
2. Remove knee protector.
3. Remove mounting nuts (A), then remove knee protector bracket (1).



4. Remove brake pedal assembly. Refer to BR-211, "Removal and Installation".

5. Disconnect air mix door motor connector.
6. Remove fixing screws (A) to remove air mix door motor (1) from A/C unit assembly.

⇦ : Vehicle front



INSTALLATION

Note the following items, and then install in the order of removal.

CAUTION:

After installing door motor, perform door motor starting position. Refer to HAC-58, "Work Procedure".

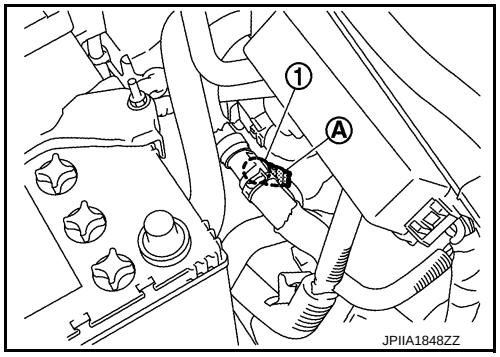
HEATER FLUID TEMPERATURE SENSOR

Removal and Installation

INFOID:0000000006960539

REMOVAL

1. Drain out heater fluid. Refer to HA-41, "Draining and Refilling".
2. Disconnect heater fluid temperature sensor connector (A) and heater hose to remove heater fluid temperature sensor adapter (1).



INSTALLATION

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

NOTE:

When adding heater fluid, refer to HA-41, "Draining and Refilling".