SECTION HAC

HEATER & AIR CONDITIONING CONTROL SYSTEM

CONTENTS

AUTOMATIC AIR CONDITIONING

PRECAUTION 4

PRECAUTIONS 4
- High Voltage Precautions 4
- Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER" 5
- Precaution for Work 6

PREPARATION 7

PREPARATION 7
- Special Service Tool 7
- Commercial Service Tool 7

SYSTEM DESCRIPTION 8

COMPONENT PARTS 8
- Component Part Location 8

HEATING AND COOLING UNIT ASSEMBLY 10
- HEATING AND COOLING UNIT ASSEMBLY : Aspirator 10
- HEATING AND COOLING UNIT ASSEMBLY : Intake Sensor 10
- HEATING AND COOLING UNIT ASSEMBLY : Front Blower Motor 11
- HEATING AND COOLING UNIT ASSEMBLY : Variable Blower Control 11
- A/C Switch 11
- A/C Auto Amp. 12
- Ambient Sensor 12
- In-vehicle Sensor 12
- Sunload Sensor 12
- Refrigerant Pressure Sensor 12
- Electric Compressor 13

SYSTEM 15
- System Description 15
- Air Flow Control 16
- Air Inlet Control 17
- Air Outlet Control 18
- Electric Compressor Control 18
- Cooling Fan Control 19
- Engine Start Request Control 20
- Door Control 20
- Door Motor Starting Position Reset Control 25
- Temperature Control 25
- Fail-safe 25

OPERATION 27
- Switch Name and Function 27

DIAGNOSIS SYSTEM (A/C AUTO AMP.) 30
- Description 30
- CONSULT Function (HVAC) 30

DIAGNOSIS SYSTEM (A/C CONTROL) 33
- On Board Diagnosis Function 33

ECU DIAGNOSIS INFORMATION 34

A/C AUTO AMP. 34
- Reference Value 34
- Fail-safe 40
- DTC Inspection Priority Chart 41
- DTC Index 41

ECM, BCM 44
- List of ECU Reference 44

WIRING DIAGRAM 45

AUTOMATIC AIR CONDITIONING SYSTEM 45
- Wiring Diagram 45

BASIC INSPECTION 55

DIAGNOSIS AND REPAIR WORKFLOW 55
- Work Flow 55

OPERATION INSPECTION 58
- Work Procedure 58

SYSTEM SETTING 60
Temperature Setting Trimmer 60
Foot Position Setting Trimmer 60
Inlet Port Memory Function (FRE) 61
Inlet Port Memory Function (REC) 61
Target Evaporator Temp Upper Limit 61

DOOR MOTOR STARTING POSITION RESET 63
Description 63
Work Procedure 63

DTC/CIRCUIT DIAGNOSIS 64

U1000-01 CAN COMM CIRCUIT 64
DTC Description 64
Diagnosis Procedure 64

U1010-49 CONTROL UNIT (CAN) 65
DTC Description 65
Diagnosis Procedure 65

B24A0-49 A/C AUTO AMP. 66
DTC Description 66
Diagnosis Procedure 66

B24A1-16 A/C AUTO AMP. POWER SUPPLY... 67
DTC Description 67
Diagnosis Procedure 67

B24A4-11, B24A4-15 INTAKE SENSOR 68
DTC Description 68
Diagnosis Procedure 68
Component Inspection 70

B24A6-11, B24A6-15 IN-VEHICLE SENSOR ... 71
DTC Description 71
Diagnosis Procedure 71
Component Inspection 73

B24A9-11, B24A9-15 SUNLOAD SENSOR 75
DTC Description 75
Diagnosis Procedure 75

B24B4-02 A/C CONTROL 78
DTC Description 78
Diagnosis Procedure 78

B24B7-12, B24B7-14 INTAKE DOOR MOTOR 79
DTC Description 79
Diagnosis Procedure 79
Component Inspection 81

B24B9-12, B24B9-14 MODE DOOR MOTOR... 82
DTC Description 82
Diagnosis Procedure 82
Component Inspection 84

B24BB-12, B24BB-14 LEFT AIR MIX DOOR MOTOR 85
DTC Description 85
Diagnosis Procedure 85
Component Inspection 87

B24BD-12, B24BD-14 RIGHT AIR MIX DOOR MOTOR 88
DTC Description 88
Diagnosis Procedure 88
Component Inspection 90

B24D3-08 ELECTRIC COMPRESSOR COMMUNICATION 91
DTC Description 91
Diagnosis Procedure 91

B24D4-08 A/C CONTROL COMMUNICATION ... 94
DTC Description 94
Diagnosis Procedure 94

B2653-1C ELECTRIC COMPRESSOR 96
DTC Description 96
Diagnosis Procedure 96

B27B5-19, B27B6-13, B27B7-1D, B27BA-19, B27BE-49 ELECTRIC COMPRESSOR 97
DTC Description 97
Diagnosis Procedure 98

B27B8-19 ELECTRIC COMPRESSOR 99
DTC Description 99
Diagnosis Procedure 99

B27BB-1C ELECTRIC COMPRESSOR 101
DTC Description 101
Diagnosis Procedure 101

B27BC-87 ELECTRIC COMPRESSOR 103
DTC Description 103
Diagnosis Procedure 103

POWER SUPPLY AND GROUND CIRCUIT ...107

A/C AUTO AMP. 107
A/C AUTO AMP. : Diagnosis Procedure 107

A/C SWITCH ASSEMBLY 107
A/C SWITCH ASSEMBLY : Component Function Check 107
A/C SWITCH ASSEMBLY : Diagnosis Procedure. 108

BLOWER MOTOR 109
Diagnosis Procedure 109
Component Inspection (Front Blower Motor) 112
Component Inspection (Front Blower Motor Relay) 112

ELECTRIC COMPRESSOR INSULATION RESISTANCE CHECK 113
Component Inspection 113

SYMPTOM DIAGNOSIS 114

HEATER AND AIR CONDITIONING SYSTEM CONTROL SYMPTOMS 114
Diagnosis Chart By Symptom 114

INSUFFICIENT COOLING 116
Description 116
Diagnosis Procedure 116

INSUFFICIENT HEATING 117
Description 117
Diagnosis Procedure 117

ELECTRIC COMPRESSOR DOES NOT OPERATE 118
Description 118
Diagnosis Procedure 118

REMOVAL AND INSTALLATION 119

A/C SWITCH ASSEMBLY 119
Removal and Installation 119

A/C AUTO AMP. 120
Removal and Installation 120

AMBIENT SENSOR 121
Removal and Installation 121

IN-VEHICLE SENSOR 122
Removal and Installation 122

SUNLOAD SENSOR 123
Removal and Installation 123

INTAKE SENSOR 124
Exploded View 124
Removal and Installation 124

REFRIGERANT PRESSURE SENSOR 125
Removal and Installation 125

DOOR MOTOR 126
Exploded View 126

INTAKE DOOR MOTOR 127
INTAKE DOOR MOTOR : Removal and Installation 127

MODE DOOR MOTOR 127
MODE DOOR MOTOR : Removal and Installation 127

AIR MIX DOOR MOTOR 127
AIR MIX DOOR MOTOR : Removal and Installation 127

VARIABLE BLOWER CONTROL 129
Removal and Installation 129

PRECAUTION

PRECAUTIONS

High Voltage Precautions

INFOID:0000000015272560

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.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield, and glasses 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.**

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.

HIGH VOLTAGE HARNESS AND EQUIPMENT IDENTIFICATION

The colors of the high voltage harnesses and connectors are all orange. Orange "High Voltage" labels are applied to the Li-ion battery and other high voltage devices. Do not carelessly touch these harnesses and parts.

HANDLING OF HIGH VOLTAGE HARNESS AND TERMINALS

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

REGULATIONS ON WORKERS WITH MEDICAL ELECTRONICS

WARNING:

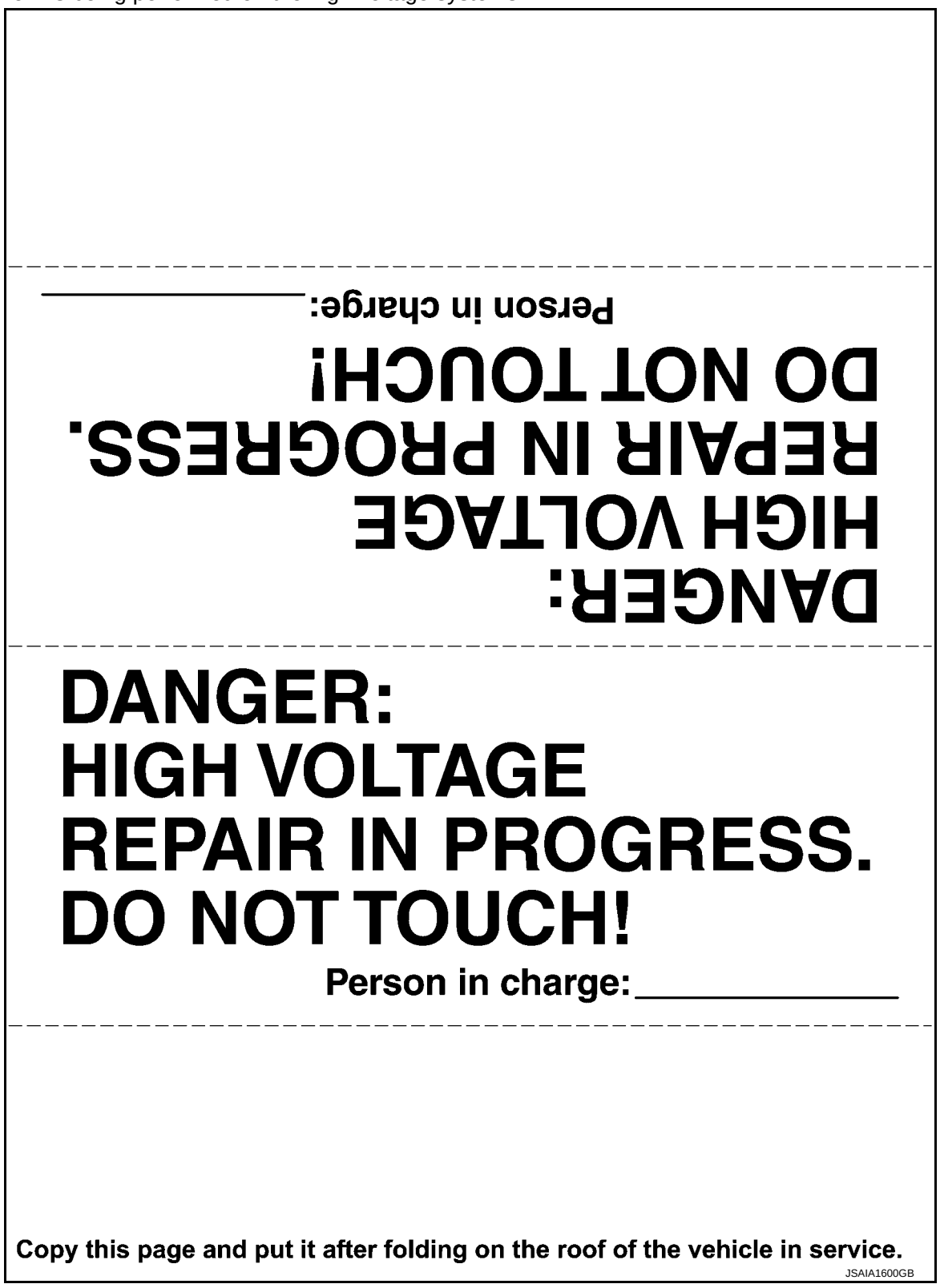
The vehicle contains parts that contain powerful magnets. If a person who is wearing a heart pacemaker or other medical device is close to these parts, the medical device may be affected by the magnets. Such persons must not perform work on the vehicle.

PROHIBITED ITEMS TO CARRY DURING THE WORK

Because this vehicle uses components that contain high voltage and powerful magnetism, do not carry any metal products which may cause short circuits, or any magnetic media (cash cards, prepaid cards, etc.) which may be damaged on your person when working.

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

To call the attention of other workers, indicate "High voltage work in progress. Do not touch!" on vehicles where work is being performed on the high voltage systems.



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

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The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain

types of collision. Information necessary to service the system safely is included in the SR and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, it is recommended that all maintenance and repair be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper repair, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SR section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

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

WARNING:

- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the Ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the Ignition OFF, disconnect the battery or batteries, and wait at least three minutes before performing any service.**

Precaution for Work

INFOID:0000000014625913

- When removing or disassembling each component, be careful not to damage or deform it. If a component may be subject to interference, be sure to protect it with a shop cloth.
- When removing (disengaging) components with a screwdriver or similar tool, be sure to wrap the component with a shop cloth or vinyl tape to protect it.
- Protect the removed parts with a shop cloth and prevent them from being dropped.
- Replace a deformed or damaged clip.
- If a part is specified as a non-reusable part, always replace it with a new one.
- Be sure to tighten bolts and nuts securely to the specified torque.
- After installation is complete, be sure to check that each part works properly.
- Follow the steps below to clean components:

- Water soluble dirt:

- Dip a soft cloth into lukewarm water, wring the water out of the cloth and wipe the dirty area.
- Then rub with a soft, dry cloth.

- Oily dirt:

- Dip a soft cloth into lukewarm water with mild detergent (concentration: within 2 to 3%) and wipe the dirty area.
- Then dip a cloth into fresh water, wring the water out of the cloth and wipe the detergent off.
- Then rub with a soft, dry cloth.

- Do not use organic solvent such as thinner, benzene, alcohol or gasoline.
- For genuine leather seats, use a genuine leather seat cleaner.

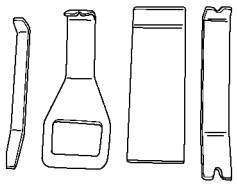
PREPARATION

PREPARATION

Special Service Tool

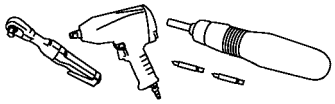
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The actual shape of the tools may differ from those illustrated here.

Tool number (TechMate No.) Tool name	Description
— (J-46534) Trim Tool Set  AWJIA0483ZZ	Removing trim components

Commercial Service Tool

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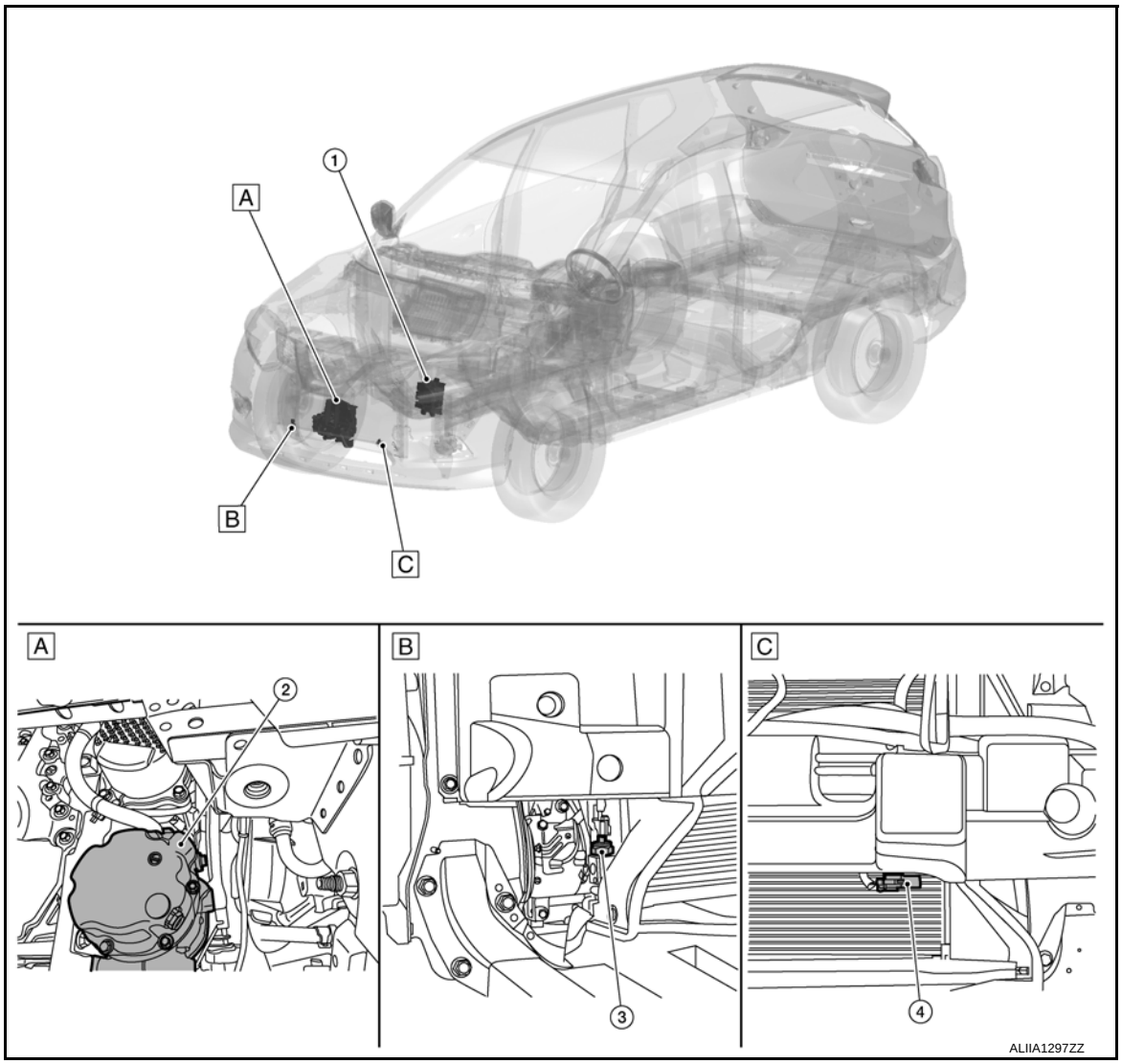
(TechMate No.) Tool name	Description
(—) Power tool  PIIB1407E	Loosening nuts, screws and bolts

SYSTEM DESCRIPTION

COMPONENT PARTS

Component Part Location

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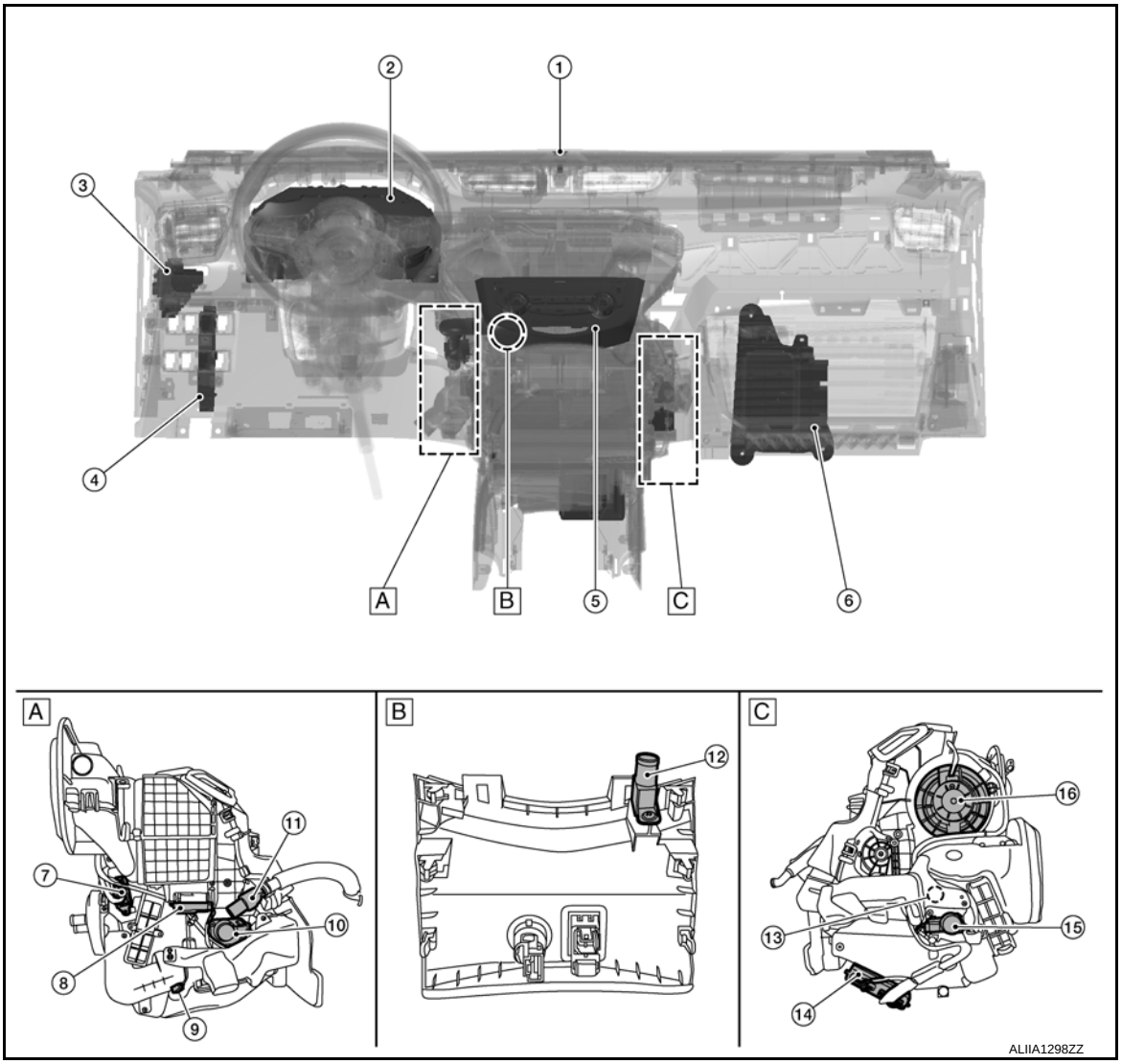


A. RH side of engine compartment

B. RH front of vehicle (view with front bumper fascia removed)

C. LH front of vehicle (view with front bumper fascia removed)

No.	Component	Description
1.	ECM	• The ECM sends the engine coolant temperature signal input from the engine coolant temperature sensor and the refrigerant pressure sensor signal input from the refrigerant pressure sensor to the A/C auto amp. via the HEV system CAN communication and CAN communication. • The ECM receives the cooling fan speed request signal via CAN communication and HEV system CAN communication. Refer to EC-23, "ECM" for detailed installation location.
2.	Electric compressor	Refer to HAC-13, "Electric Compressor".
3.	Refrigerant pressure sensor	Refer to HAC-12, "Refrigerant Pressure Sensor".
4.	Ambient sensor	Refer toHAC-12, "Ambient Sensor".



A. Left side of heating and cooling unit assembly
B. View with cluster lid C removed
C. Right side of heating and cooling unit assembly

No.	Component	Description
1.	Sunload sensor	Refer to HAC-12, "Sunload Sensor".
2.	Combination meter	• The combination meter sends the ambient temperature signal from the ambient sensor to the A/C auto amp. via CAN communication. • The combination meter sends the vehicle speed signal to the A/C auto amp. via CAN communication. Refer to MWI-5, "METER SYSTEM : Component Parts Location" for detailed installation location.
3.	Front blower relay	The front blower relay controls the flow of current to fuse 17 and 27 in the Fuse Block (J/B). The relay is grounded when the ignition switch is in the ON position. Refer PG-112, "Terminal Arrangement" to for detailed installation location.
4.	BCM	• The BCM receives the fan ON and A/C ON signals from the A/C auto amp. and supplies power to the variable blower control. • The BCM serves as a gateway for CAN communication. Refer to BCS-5, "BODY CONTROL SYSTEM : Component Parts Location" for detailed installation location.
5.	A/C switch	Refer to HAC-11, "A/C Switch".

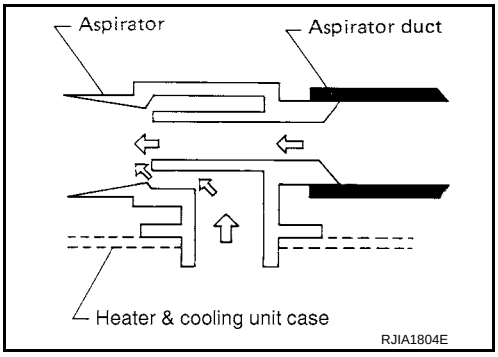
No.	Component	Description
6.	HPCM	• The HPCM receives the engine on signal from the A/C auto amp. via CAN communication. • The HPCM serves as a gateway for HEV system CAN communication and CAN communication. Refer to HBC-18, "HPCM" for detailed installation location.
7.	Variable blower control	Refer to HAC-11, "HEATING AND COOLING UNIT ASSEMBLY : Variable Blower Control".
8.	Intake door motor	The intake door motor controls the position of the intake door. Fresh air is allowed to enter the cabin in one position, and recirculated inside air is allowed to enter in the other position. The intake door motor receives position commands from the A/C auto amp.
9.	Intake sensor	Refer to HAC-10, "HEATING AND COOLING UNIT ASSEMBLY : Intake Sensor".
10.	Air mix door motor LH	The air mix door controls the mix of hot or cold air that enters the ventilation system. It is controlled by the A/C auto amp. based on the position of the temperature dial. The air mix door motor LH receives position commands from the A/C auto amp.
11.	Aspirator	Refer to HAC-10, "HEATING AND COOLING UNIT ASSEMBLY : Aspirator".
12.	In-vehicle sensor	Refer to HAC-12, "In-vehicle Sensor".
13.	Mode door motor	The mode door controls the direction the conditioned air passes through the ventilation system. Through a series of levers and gears, the mode door controls the defrost door, the foot door, and the vent door. There are 5 preset positions: VENT, B/L, FOOT, D/F, and DEF. The mode door motor receives position commands from the A/C auto amp.
14.	A/C auto amp.	Refer to HAC-12, "A/C Auto Amp.".
15.	Air mix door motor RH	The air mix door controls the mix of hot or cold air that enters the ventilation system. It is controlled by the A/C auto amp. based on the position of the temperature dial. The air mix door motor RH receives position commands from the A/C auto amp.
16.	Front Blower motor	Refer to HAC-11, "HEATING AND COOLING UNIT ASSEMBLY : Front Blower Motor".

HEATING AND COOLING UNIT ASSEMBLY

HEATING AND COOLING UNIT ASSEMBLY : Aspirator

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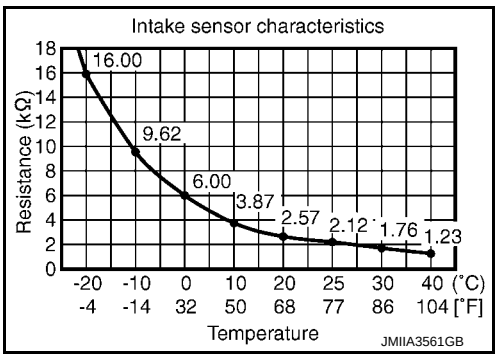
The aspirator generates the vacuum by the air blown from the heating and cooling unit assembly and draws the air of the passenger room to the in-vehicle sensor area via the aspirator duct.



HEATING AND COOLING UNIT ASSEMBLY : Intake Sensor

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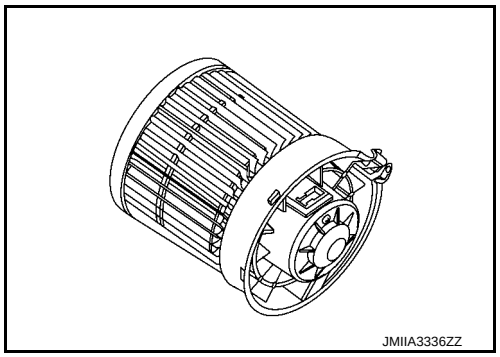
Intake sensor measures evaporator temperature (through air temperature). The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

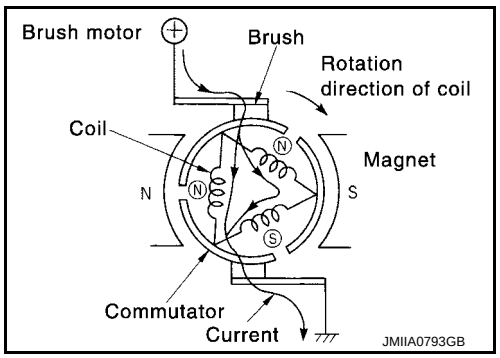


HEATING AND COOLING UNIT ASSEMBLY : Front Blower Motor

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


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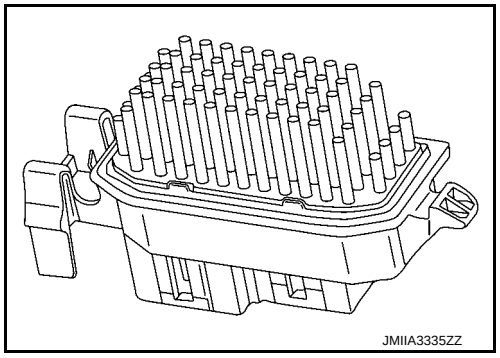


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HEATING AND COOLING UNIT ASSEMBLY : Variable Blower Control

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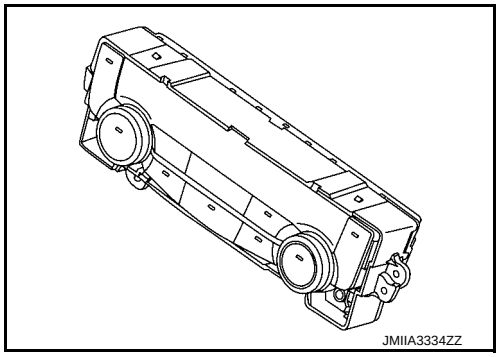
- Variable blower control, that uses MOS field effect transistor, is adopted for front blower motor speed control.
  NOTE:
  MOS field effect transistor is a transistor for which the gate portion is composed of a metal electrode on an oxide layer of semiconductor. Field effect transistor is controlled 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.
- Variable blower control continuously controls voltage to front blower motor, according to gate voltage from A/C auto amp.
- This variable blower control does not require a HI relay even when the maximum voltage is applied to front blower motor at HI status, because voltage drop is nominal.


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A/C Switch

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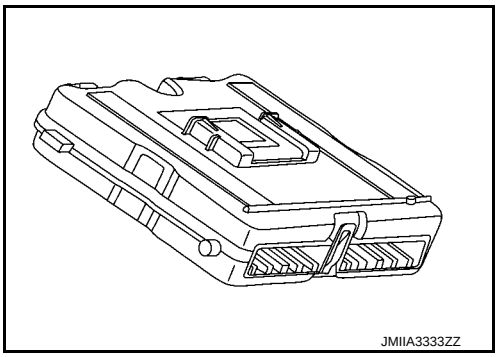
A/C switch has switches and display that can set and indicate the operation of automatic air conditioning system. A/C control transmits setting status to A/C auto amp. via LIN communication line. A/C auto amp. controls automatic air conditioning system.


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A/C Auto Amp.

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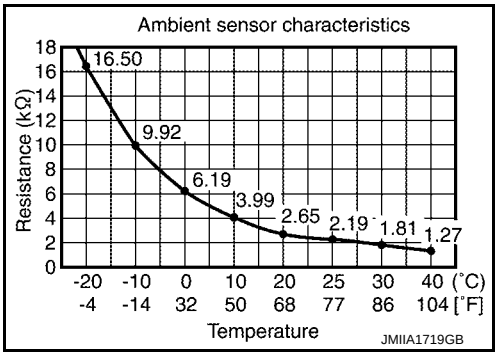
A/C auto amp. controls automatic air conditioning system by inputting and calculating signals from each sensor and each switch. A/C auto amp. has self-diagnosis function. Diagnosis of automatic air conditioning system can be performed quickly.



Ambient Sensor

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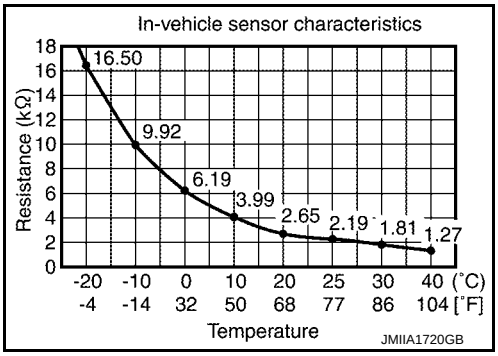
Ambient sensor measures ambient air temperature. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



In-vehicle Sensor

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In-vehicle sensor measures temperature of intake air that flows through aspirator to passenger room. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

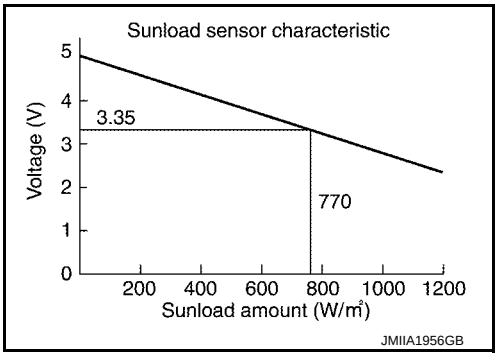


Sunload Sensor

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

NOTE:
The value of right figure is example.

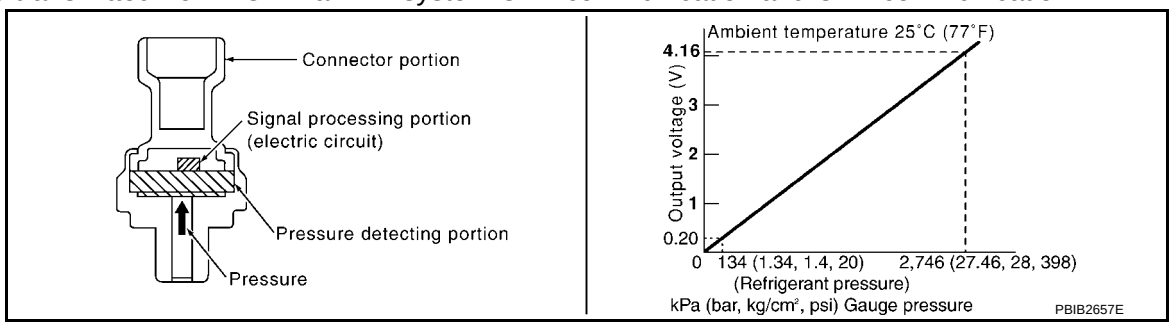


Refrigerant Pressure Sensor

INFOID:0000000015202298

DESCRIPTION

- The refrigerant pressure sensor converts high-pressure side refrigerant pressure into voltage and outputs it to ECM.
- A/C auto amp. performs electric compressor protection control according to the refrigerant pressure sensor signal transmitted from ECM via HEV system CAN communication and CAN communication.



STRUCTURE AND OPERATION

- The refrigerant pressure sensor is a capacitance type sensor. It consists of a pressure detection area and a signal processing area.
- The pressure detection area, which is a variable capacity condenser, changes internal static capacitance according to pressure force.
- The signal processing area detects the static capacitance of the pressure detection area, converts the static capacitance into a voltage value, and transmits the voltage value to ECM.

Electric Compressor

INFOID:0000000015202299

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

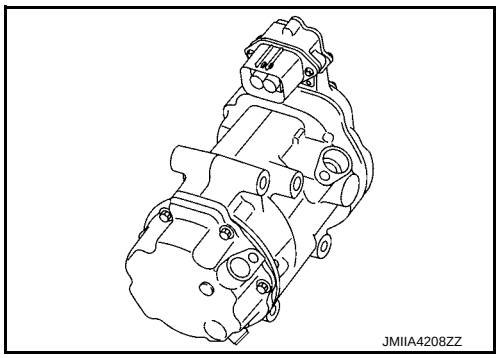
  NOTE:

  IGBT (Insulated Gate Bipolar Transistor) is a transistor which is suitable for high voltages and large currents and which can control large electrical power using a small gate voltage.
- The structure integrates the inverter, compressor, and motor, allowing compressor to operate at any speed.
- The inverter communicates with A/C auto amp., and uses PWM control to control the motor speed via the drive circuit.

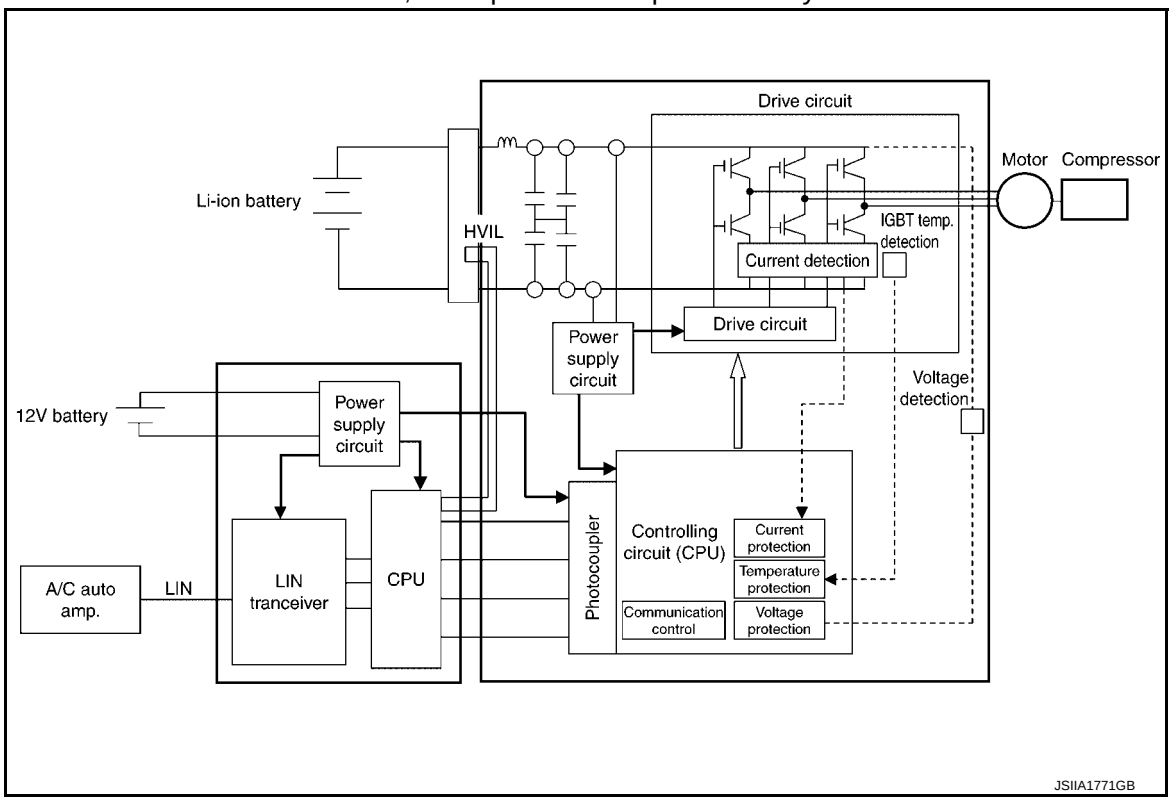
  NOTE:
  - PWM (Pulse Width Modulation) is a system that controls current and voltage by changing the duty ratio of a constant frequency pulse wave.
  - PWM is used as the adjustment method of output voltage when inverter is used as a power supply for controlling motor speed.
  - PWM changes voltage application time (pulse width) using a semiconductor element and controls motor speed.
- The IGBT temperature sensor uses the inverter control circuit to monitor for an increase in motor drive circuit temperature in order to prevent circuit overheating.
- Adopts the HVIL (High-Voltage Interlock Loop) circuit inside the electric compressor, and CPU monitors the HVIL circuit.

  NOTE:

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



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

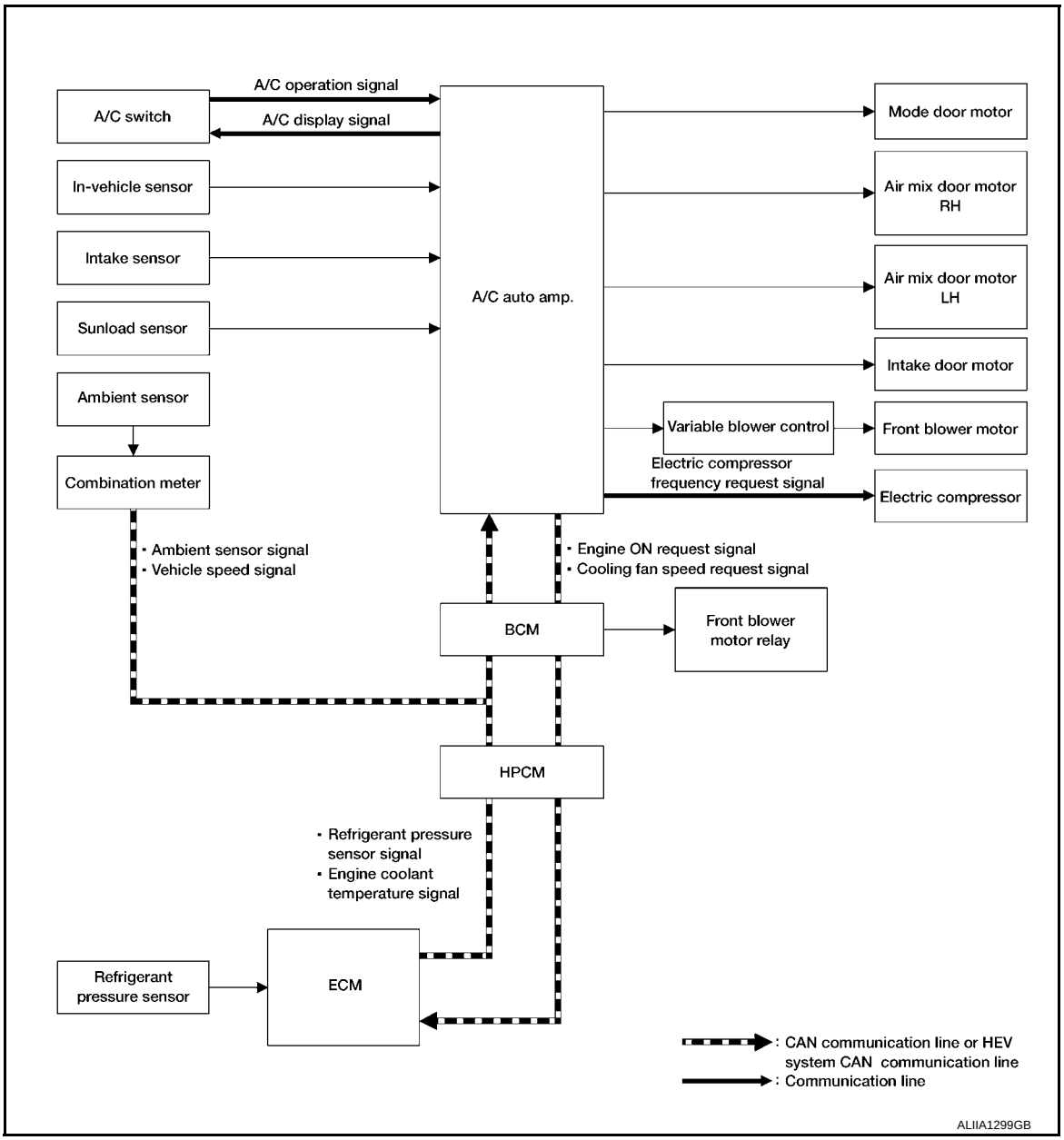


SYSTEM

System Description

INFOID:0000000015202300

SYSTEM DIAGRAM



NOTE:

- BCM and HPCM serve as a CAN gateway. For an overall description of the CAN communication system, refer to LAN-36, "CAN COMMUNICATION SYSTEM : System Description".
- The CAN communication signal of the A/C auto amp. is sent to or received from each control unit via the BCM or HPCM.

DESCRIPTION

- The automatic air conditioning system is controlled by each function of A/C auto amp., ECM and HPCM.
- Each operation of the air conditioning system can be controlled by A/C control.

CONTROL BY A/C AUTO AMP.

- HAC-25, "Temperature Control"
- HAC-18, "Air Outlet Control"
- HAC-16, "Air Flow Control"
- HAC-17, "Air Inlet Control"
- HAC-18, "Electric Compressor Control"

- HAC-19, "Cooling Fan Control"
- HAC-20, "Engine Start Request Control"
- HAC-20, "Door Control"
- HAC-25, "Door Motor Starting Position Reset Control"
- Correction for input value

Ambient temperature correction
- A/C auto amp. inputs the temperature detected by ambient sensor as the ambient temperature.
- A/C auto amp. performs the correction of the temperature detected by ambient sensor for air conditioning control.
- A/C auto amp. selects and uses the initial value of ambient temperature data depending on the engine coolant temperature when turning the ignition switch from OFF to ON. The detection temperature of the ambient sensor is used when engine coolant temperature is low [less than approximately 56°C (133°F)]. The memory data (before the ignition switch is OFF) when the engine is warmed up [approximately 56°C (133°F) or more].
- The correction of the ambient temperature is not performed when the detection temperature of the ambient temperature is less than approximately −20°C (–4°F).

In-vehicle temperature correction
- A/C auto amp. inputs the temperature detected by in-vehicle sensor as the in-vehicle temperature.
- A/C auto amp. performs the correction of the temperature detected by in-vehicle sensor for air conditioning control.
- A/C auto amp. performs the correction so that the recognition passenger room temperature changes depending on the difference between the detected passenger room temperature and the recognition passenger room temperature. If the difference is large, the changing is early. The changing becomes slow as the difference becomes small.

Intake temperature correction
- A/C auto amp. inputs the temperature detected by intake sensor as the intake temperature (evaporator temperature).
- A/C auto amp. performs the correction of the temperature detected by intake sensor for air conditioning control.
- A/C auto amp. performs the correction so that the recognition intake temperature changes depending on the difference between the detected intake temperature and the recognition intake temperature. If the difference is large, the changing is early. The changing becomes slow as the difference becomes small.

Sunload amount correction
- A/C auto amp. inputs the sunload amount detected by sunload sensor.
- A/C auto amp. performs the correction of the sunload amount detected by sunload sensor for air conditioning control.
- When the sunload amount suddenly changes, for example when entering a tunnel, perform the correction so that the recognition sunload amount of the A/C auto amp. changes slowly.

Set temperature correction
- A/C auto amp. performs the correction to the target temperature set by the temperature control switch so as to match the temperature felt by the passengers depending on the ambient temperature detected by ambient sensor and controls it so that the in-vehicle temperature is always the most suitable.

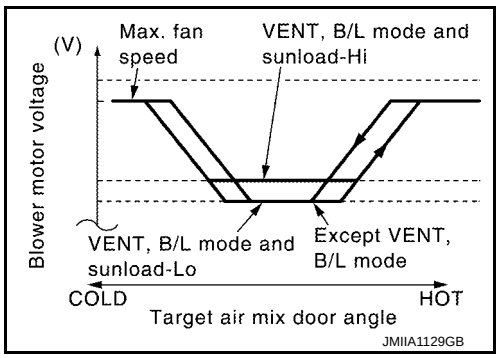
Air Flow Control

INFOID:0000000015202303

DESCRIPTION
- A/C auto amp. changes gate voltage of variable blower control and controls air flow continuously. When air flow is increased, voltage of front blower motor gradually increases to prevent a sudden increase in air flow.
- In addition to manual control and automatic control, air flow control is compose of starting fan speed control, low coolant temperature starting control, high in-vehicle temperature starting control, and blower speed control at door motor operation.

AUTOMATIC AIR FLOW CONTROL
- A/C auto amp. decides target air flow depending on target air mix door opening angle.
- A/C auto amp. changes voltage of front blower motor and controls air flow continuously so that air flow matches to target air flow.

- When air outlet is VENT or B/L, the minimum air flow is changed depending on sunload.

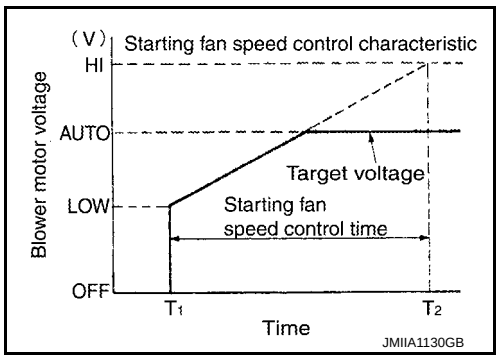


STARTING FAN SPEED CONTROL

When front blower motor is activated, A/C auto amp. gradually increases voltage of front blower motor to prevent a sudden increase in discharge air flow. (T_1 – T_2 = approximately 7 seconds)

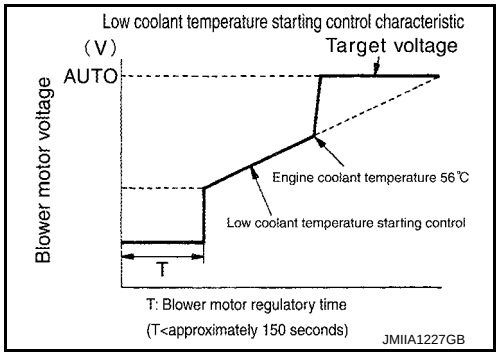
NOTE:

Do not perform the starting air flow control when the discharge outlet is set to DEF.



LOW COOLANT TEMPERATURE STARTING CONTROL

If the engine coolant temperature is 56°C (133°F) or less, to prevent a cold discharged air flow, A/C auto amp. suspends front blower motor activation for the maximum 150 seconds depending on target air mix door opening angle. After this, voltage of front blower motor is increased gradually, and front blower motor is activated.



HIGH IN-VEHICLE TEMPERATURE STARTING CONTROL

When evaporator temperature is high [intake sensor value is 35°C (95°F) or more], to prevent a hot discharged air flow, A/C auto amp. suspends front blower motor activation for approximately 3 seconds so that evaporator is cooled by refrigerant.

FAN SPEED CONTROL AT DOOR MOTOR OPERATION

When mode door motor is activated while air flow is more than the specified value, A/C auto amp. reduces temporarily fan speed so that mode door moves smoothly.

Air Inlet Control

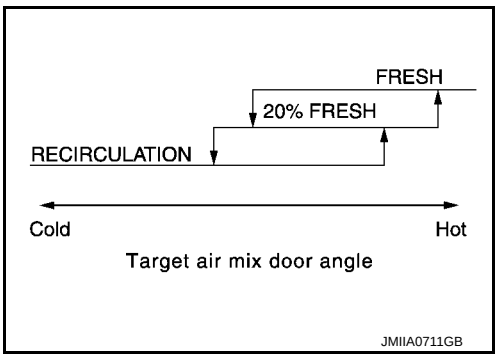
INFOID:0000000015202304

- A/C auto amp. controls intake door motor, and change air inlet.

- While air inlet is in automatic control, A/C auto amp. selects air inlet (fresh air intake, 20% fresh air intake, or recirculation) depending on set temperature, in-vehicle temperature, and ambient temperature.

NOTE:

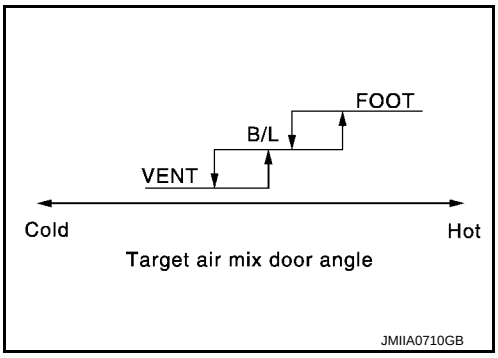
- When air inlet is set to recirculation by manual control, the air inlet may be automatically changed to fresh air intake depending on vehicle condition (example: when ambient temperature and engine coolant temperature are low).
- Air inlet may not be changed to recirculation by REC switch depending on vehicle condition.



Air Outlet Control

INFOID:0000000015202302

- 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.
- If ambient temperature is excessively low, D/F is selected to prevent windshield fogging when air outlet is set to FOOT.



Electric Compressor Control

INFOID:0000000015202305

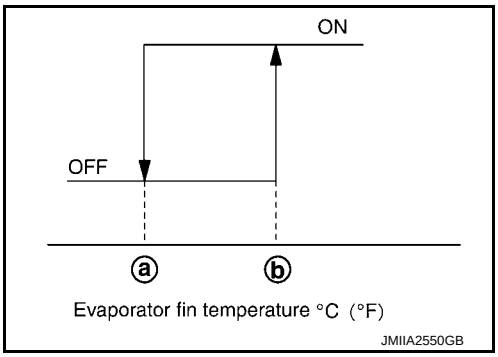
DESCRIPTION

- If the conditions for electric compressor operation are met while the front blower motor is operating, the A/C auto amp. transmits the electric compressor frequency request signal based on the various signals input to the electric compressor via LIN communication to designate the speed so that the air temperature after passing through the evaporator reaches the target temperature [3 – 12°C (37 – 54°F)].
- The electric compressor receives a command from the A/C auto amp., controls the motor speed by means of its built-in inverter circuit, and then transmits the status via LIN communication.

LOW TEMPERATURE PROTECTION CONTROL

- When the intake sensor detects that evaporator fin temperature is ⓐ or less, the A/C auto amp. transmits a request to the electric compressor for a speed of 0 rpm to stop operation of the electric compressor.
- When the evaporator fin temperature returns to the target temperature upper limit value ⓑ or higher, operation of the electric compressor resumes.

ⓐ : 1°C (34°F)
ⓑ : 4°C (39°F)



REFRIGERANT DISCHARGE AMOUNT CONTROL

- When the temperature setting is full cold or when the air outlet is not DEF, A/C auto amp. designates the speed of the electric compressor according to the required cooling capacity and controls the refrigerant discharge amount.
- A/C auto amp. increases the refrigerant discharge amount when the evaporator temperature is higher than or equal to the target temperature upper limit value. It decreases the refrigerant discharge amount when the evaporator temperature is lower than the target temperature upper limit value.

NOTE:

Target temperature upper limit value of evaporator can be changed using “TARGET EVAPORATOR TEMP UPPER LIMIT SETTING” in “WORK SUPPORT” mode of CONSULT. Refer to HAC-61, "Target Evaporator Temp Upper Limit".

ELECTRIC COMPRESSOR PROTECTION CONTROL AT PRESSURE MALFUNCTION

- When the refrigerant pressure on the high-pressure side, which is detected by the refrigerant pressure sensor, is in the status described below, the A/C auto amp. stops the electric compressor according to the refrigerant pressure sensor signal received via HEV system CAN communication and CAN communication.
  - 2.65 MPa (27.0 kg/cm^2, 384.3 psi) or more
  - 0.14 MPa (1.4 kg/cm^2, 20.3 psi) or less
- When the refrigerant pressure on the high-pressure side returns to the following range, the A/C auto amp. resumes operation of the electric compressor.
  - 2.1 MPa (21.4 kg/cm^2, 304.5 psi) or less
  - 0.16 MPa (1.6 kg/cm^2, 23.2 psi) or more

Cooling Fan Control

INFOID:0000000015202306

DESCRIPTION

A/C auto amp. controls the cooling fan operation request according to the refrigerant pressure status and vehicle speed status.

NOTE:

For an overview of the cooling fan and information about control, refer to HBC-35, "COOLING SYSTEM CONTROL : System Description".

CONTROL OUTLINE

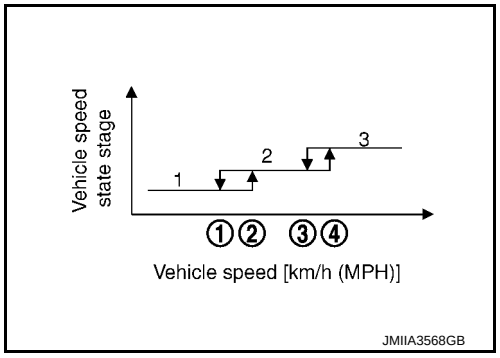
- The A/C auto amp. receives the refrigerant pressure sensor signal from ECM via HEV system CAN communication and CAN communication. It also receives the vehicle speed signal from the combination meter via CAN communication.
- A/C auto amp. sets one of the optionally determined stages according to the received refrigerant pressure sensor signal and vehicle speed signal.

  NOTE:

  For the rules that prescribe the predetermined stages, refer to the following figures.

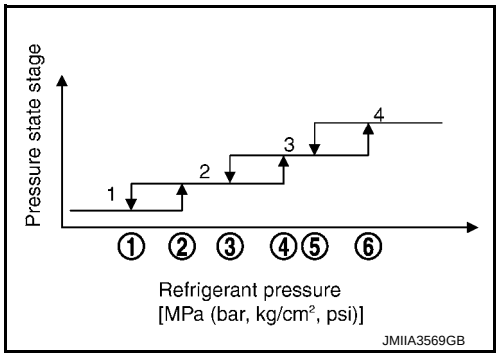
  - Vehicle speed stages

    Vehicle speed [km/h (MPH)]
    - ①: 12 (7.5)
    - ②: 20 (12)
    - ③: 72 (45)
    - ④: 80 (50)



  - Refrigerant pressure stages

    Refrigerant pressure [MPa (bar, kg/cm^2, psi)]
    - ①: 0.7 (7, 7.14, 102)
    - ②: 1.0 (10, 10.2, 145)
    - ③: 1.28 (12.8, 13.1, 186)
    - ④: 1.58 (15.8, 16.1, 229)
    - ⑤: 1.88 (18.8, 19.2, 273)
    - ⑥: 2.08 (20.8, 21.2, 302)



- This determines the intensity of cooling fan operation to be requested (0% / 40% / 100%), as shown in the following table, according to the combination of each vehicle state stage. It then transmits the cooling fan speed request signal via HEV system CAN communication and CAN communication.

Cooling fan operation strength

Unit: %

—		Refrigerant pressure stages			
		1	2	3	4
Vehicle speed stages	1	40	40	100	100
	2	40	40	100	100
	3	0	0	0	100

Engine Start Request Control

INFOID:0000000015202307

DESCRIPTION

- Start/stop of the engine is controlled comprehensively by HPCM, based on the information from control units, sensors, and switches. For details, refer to HBC-21, "HYBRID CONTROL SYSTEM : System Description".
- A/C auto amp. transmits an engine start request to HPCM when it is judged impossible to maintain the heating function, base on each sensor and temperature setting.

CONTROL OUTLINE

- A/C auto amp. detects the vehicle conditions required for engine start request control, using the following signals.
- A/C operation signal (received from A/C control via LIN communication)
- Ambient sensor signal (received from the combination meter via CAN communication)
- In-vehicle sensor signal
- Intake sensor signal
- Sunload sensor signal
- Engine coolant temperature signal (received from ECM via HEV system CAN communication and CAN communication)
- A/C auto amp. calculates the engine start request from the received ambient sensor signal and the engine coolant temperature signal when all of the following conditions are met.
- Blower motor: Active (It is considered Active even when operation is stopped by starting the air flow control at a low coolant temperature.)
- Ambient temperature: Approximately 17°C (63°F) or less
- XM: Approximately 21 or more (Target discharge air temperature judged by A/C auto amp. according to the temperature setting and the value from each sensor)

  NOTE:

  The reading of XM can be checked by the data monitor of CONSULT.
- Target air mix door angle: Approximately 10% or more
- Transmits the engine ON request signal to HPCM via CAN communication according to the calculation result of the engine start request.

Engine start request calculation table (Reference)

Ambient temperature	Engine coolant temperature	Engine start request
-15°C (5°F)	72°C (162°F) or more	OFF
	66°C (151°F) or less	ON
0°C (32°F)	67°C (153°F) or more	OFF
	61°C (142°F) or less	ON
15°C (59°F)	51°C (124°F) or more	OFF
	45°C (113°F) or less	ON

Door Control

INFOID:0000000014625922

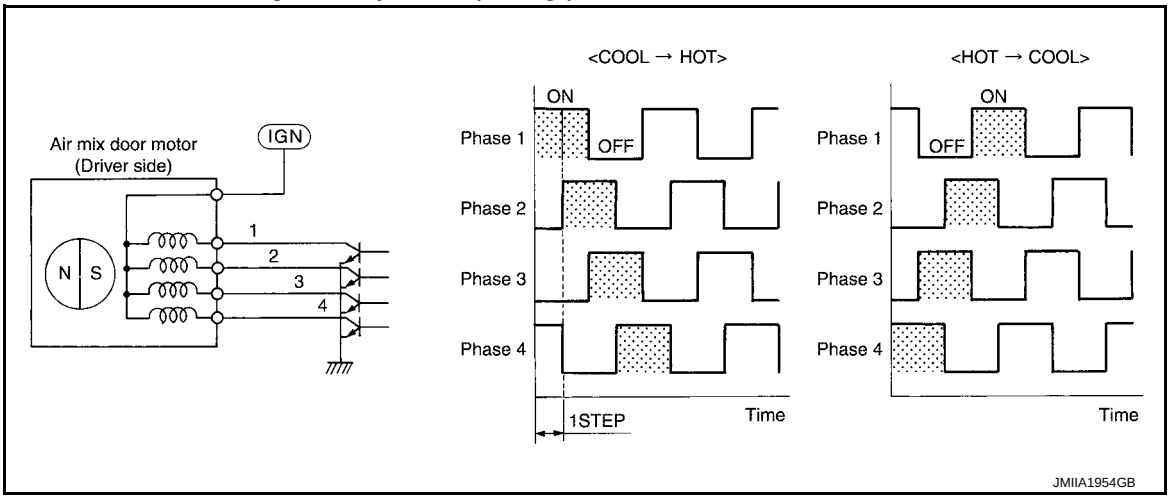
AIR MIX DOOR MOTOR (DRIVER SIDE)

DESCRIPTION

- The step motor system is adopted for air mix door motor (driver side).
- When a drive signal is input from A/C auto amp. to door motor, a step motor built into the door motor rotates according to the drive signal, and then stops at the target door position.
- Rotation of motor is transmitted to air mix door (driver side) [upper air mix door (driver side) and lower air mix door (driver side)] by link, rod and lever, then air flow temperature (driver side) is switched.

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.



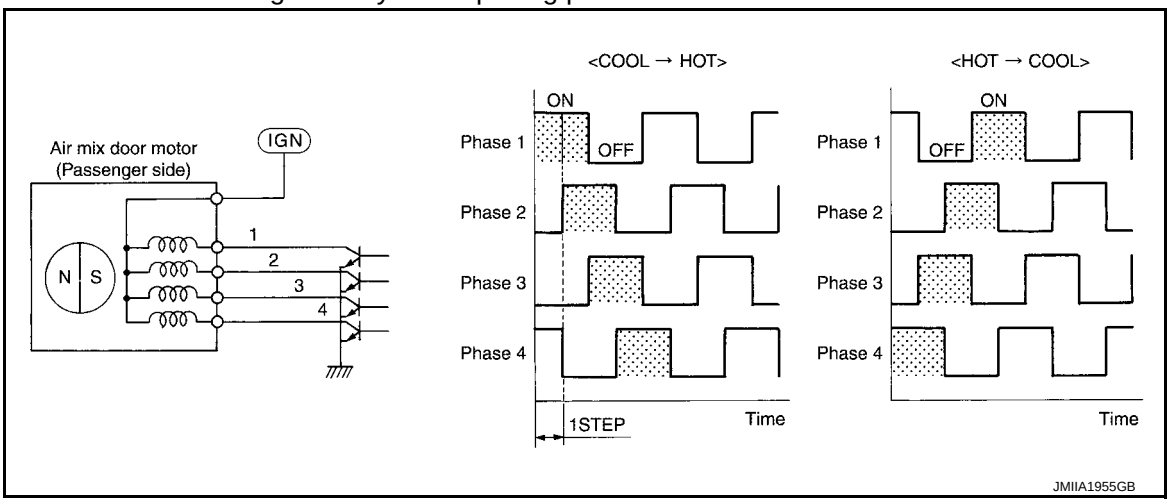
AIR MIX DOOR MOTOR (PASSENGER SIDE)

DESCRIPTION

- The step motor system is adopted for air mix door motor (passenger side).
- When a drive signal is input from A/C auto amp. to door motor, a step motor built into the door motor rotates according to the drive signal, and then stops at the target door position.
- Rotation of motor is transmitted to air mix door (passenger side) [upper air mix door (passenger side) and lower air mix door (passenger side)] by link, rod and lever, then air flow temperature (passenger side) is switched.

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.



MODE DOOR MOTOR

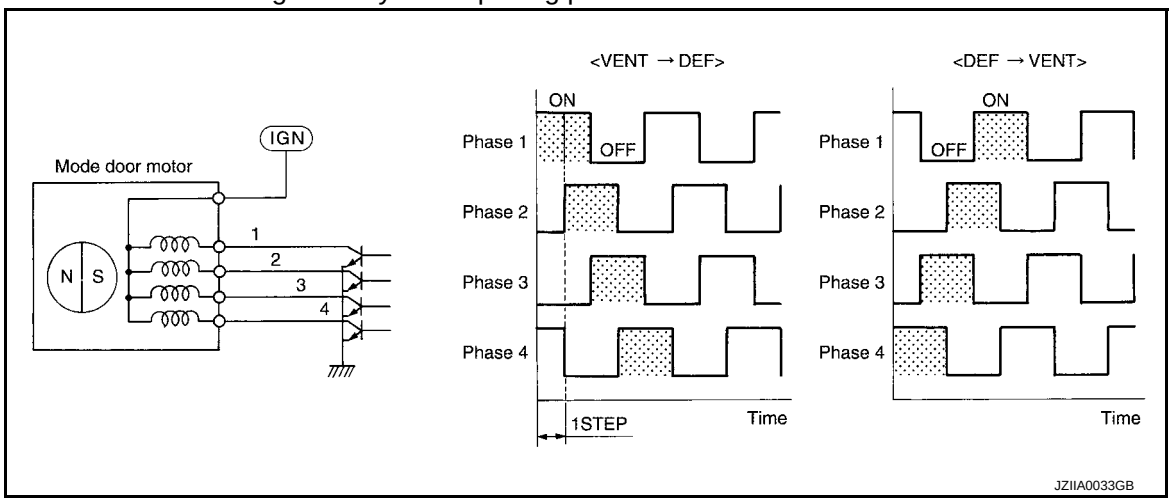
DESCRIPTION

- The step motor system is adopted for mode door motor.
- When a drive signal is input from A/C auto amp. to door motor, a step motor built into the door motor rotates according to the drive signal, and then stops at the target door position.
- Rotation of motor is transmitted to mode door (center ventilator and defroster door, sub defroster door, side ventilator door, and foot door) by link, rod, and lever, then air outlet is switched.

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.



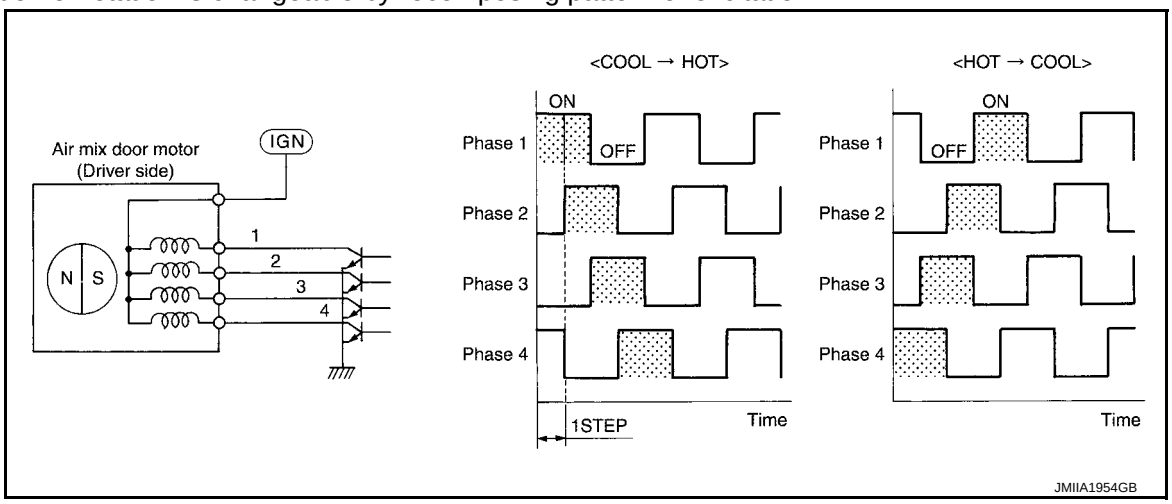
INTAKE DOOR MOTOR

DESCRIPTION

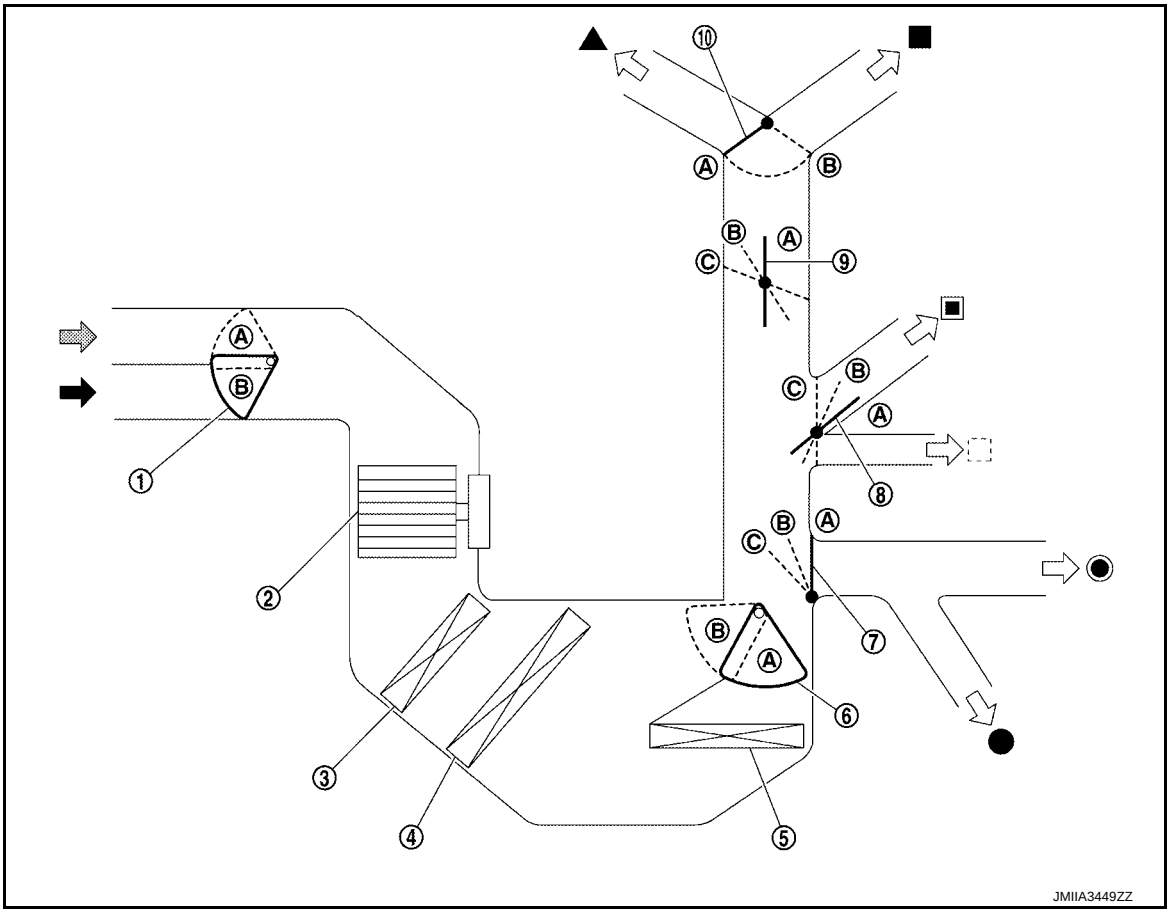
• The step motor system is adopted for intake door motor.
• When a drive signal is input from A/C auto amp. to door motor, a step motor built into the door motor rotates according to the drive signal, and then stops at the target door position.
• Rotation of motor is transmitted to intake door, then air flow is switched.

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.



SWITCHES AND THEIR CONTROL FUNCTION



① Intake door	② Front blower motor	③ Air conditioner filter
④ Evaporator	⑤ Heater core	⑥ Air mix door (driver side/passenger side)
⑦ Foot door	⑧ Side ventilator door	⑨ Sub defroster door
⑩ Center ventilator and defroster door		
Fresh air intake	Recirculation air	Discharge air
Defroster	Center ventilator	Side ventilator
Rear ventilator	Front foot	Rear foot

NOTE:
The sub defroster door and side ventilator door include a permanent opening and does not fully close.

Switch position			Door position						
			Mode door					Air mix door	
			Center ventilator and defroster door	Sub defroster door	Side ventilator door	Foot door	Intake door	Driver side	Passenger side
AUTO switch			AUTO				—	—	—
MODE switch			Ⓐ	Ⓐ	Ⓐ	Ⓐ			
			Ⓐ	Ⓑ	Ⓑ	Ⓑ			
			Ⓑ	Ⓒ	Ⓒ	Ⓒ			
			Ⓑ	Ⓑ	Ⓒ	Ⓒ			
DEF switch			Ⓑ	Ⓐ	Ⓒ	Ⓐ			
REC switch*			—	—	—	—	Ⓐ		
FRE switch*							Ⓑ		
Temperature control dial (Driver side)	DUAL switch: OFF	Full cold 18°C					—	Ⓐ	
		18.5°C – 31.5°C						AUTO	
		Full hot 32°C						Ⓑ	
Temperature control dial (Driver side)	DUAL switch: ON	Full cold 18°C						Ⓐ	—
		18.5°C – 31.5°C						AUTO	
		Full hot 32°C						Ⓑ	
Temperature control dial (Passenger side)		Full cold 18°C						—	Ⓐ
		18.5°C – 31.5°C							AUTO
		Full hot 32°C							Ⓑ
ON·OFF switch		OFF	Ⓑ	Ⓒ	Ⓒ	Ⓒ			—

*: Inlet status is displayed by indicator during activating automatic control

AIR DISTRIBUTION

MODE/DEF setting position	Discharge air flow					
	Air outlet/distribution					
	Ventilator			Foot		Defroster
	Front		Rear	Front	Rear	
	Center	Side				
	47%	38%	15%	—	—	—
	25%	34%	13%	18%	10%	—

MODE/DEF setting position	Discharge air flow					
	Air outlet/distribution					
	Ventilator			Foot		Defroster
	Front		Rear	Front	Rear	
	Center	Side				
	—	7%	4%	38%	24%	27%
	—	6%	2%	30%	17%	45%
	—	8%	2%	—	—	90%

Door Motor Starting Position Reset Control

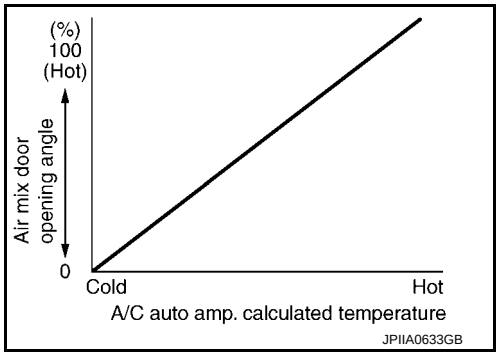
INFOID:0000000015202308

- Step motors are used for the mode door motor air mix door motor (driver side/passenger side), and intake door motor.
- Because the step motors do not have position detection mechanisms, there may be a deviation between the door position recognized by A/C auto amp. and the actual door position.
  Therefore, A/C auto amp. performs motor zero position reset for aligning its recognized door position with the actual door position.
- The reset signal is transmitted from A/C auto amp. to the air mix door motor (driver side/passenger side), mode door motor, and intake door motor, which then perform zero position reset.
- After any of the following conditions is met, A/C auto amp. performs motor zero position reset when the ignition switch is next turned ON.
  - The battery terminal is disconnected and then reconnected.
  - The travel distance reaches 3,000 km (1846 mile). [Performed every 3,000 km (1846 mile).]
- If A/C auto amp., air mix door motor (driver side, passenger side), mode door motor, or intake door motor is removed, it is necessary to perform motor zero position reset using CONSULT.

Temperature Control

INFOID:0000000015202301

- When ignition 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 depending on set temperature, in-vehicle temperature, ambient temperature, and sunload.
- Air mix door is controlled depending on 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, and at the fully hot position when set temperature is 32.0°C.



Fail-safe

INFOID:0000000015202309

FAIL-SAFE FUNCTION

- If a communication error exists between the A/C auto amp. and A/C switch for 30 seconds or longer, air conditioning is controlled under the following conditions: A/C auto amp. is controlled in the setting state before the communication error occurs for the following settings.
  - Temperature setting
  - Air outlet
  - Air flow
  - Air inlet
  - Electric compressor
- A/C auto amp. performs fail-safe control when any DTC is detected

DTC	CONSULT screen terms		Fail-safe
B24D3-08	Electric compressor communication	[BUS SIGNAL/MESSAGE ERROR]	Electric compressor operation is stopped.
B2653-1C	COMP INTERNAL TEMP SENSOR	[CIRCUIT VOLTAGE OUT OF RANGE]	
B27B7-1D	COMP CURNT SENS	[CIRCUIT CURRENT OUT OF RANGE]	
B27BB-1C	COMP HI VOL SYS	[CIRCUIT VOLTAGE OUT OF RANGE]	
B27BC-87	COMP COMM ERROR HVAC->COMP	[missing message]	

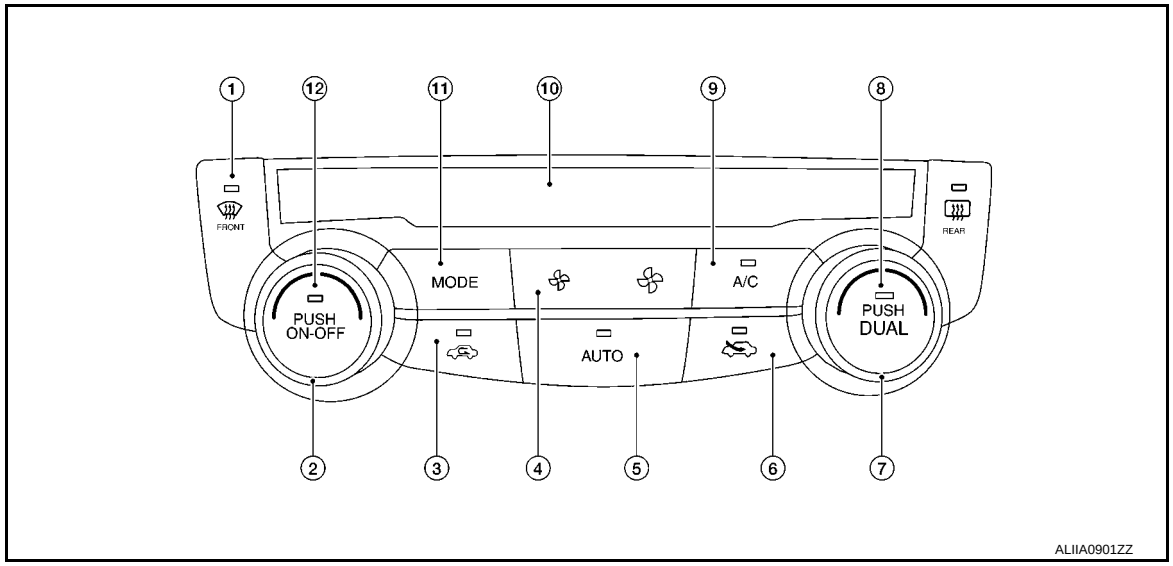
OPERATION

Switch Name and Function

INFOID:0000000014625925

CONTROL OPERATION

A/C Switch Assembly



1. Defroster switch
2. Temperature control switch (driver side)
3. Recirculation switch
4. Fan control switch
5. AUTO switch
6. Fresh air switch
7. Temperature control switch (passenger side)
8. DUAL switch
9. A/C switch
10. Display
11. Mode switch
12. ON/OFF switch

Switch Operation

Switch name	Function
Temperature control dial (Driver side)	Setting temperature is selected using this dial within a range between 18°C (60°F) and 32°C (90°F) at a rate of 0.5°C (1.0°F) per adjustment. **NOTE:** When air conditioning system is OFF, setting temperature can be selected only while air conditioning system status screen [only when MODE switch (driver side) is pressed] is indicated on display.
ON·OFF switch	Air conditioning turns ON ⇔ OFF each time this switch is pressed. • When this switch is pressed while air conditioning is ON - Air conditioning turns OFF and becomes the following status, when this switch is pressed. • Air outlet: FOOT • Air flow: OFF • Air inlet: Settings set before this switch is pressed • A/C switch: OFF • When this switch is pressed while air conditioning is OFF - Air conditioning turns ON and operates according to the settings set before air conditioning is turned OFF, when this switch is pressed.

Switch name	Function
AUTO switch	• AUTO switch indicator turns ON and air conditioning becomes the following status, when this switch is pressed while air conditioning is ON. - Air outlet: Automatic control - Air flow: Automatic control - Air inlet: Settings set before this switch is pressed - A/C switch: ON • Air conditioning turns ON and operates according to the following status, when this switch is pressed while air conditioning is OFF. (AUTO switch indicator turns ON) - Air outlet: Automatic control - Air flow: Automatic control - Air inlet: Settings set before this switch is pressed - A/C switch: ON **NOTE:** When air outlet or air flow is manually operated while AUTO switch indicator is ON, AUTO switch indicator turns OFF. However, automatic control continues for other functions than air outlet or air flow.
Fan switch	• Air flow can be set within a range between 1st – 7th speed according to switch operation. - Press +: Air flow increases - Press –: Air flow decreases • Air conditioning turns ON and operates according to the following status, when this switch is pressed while air conditioning is OFF. - Air outlet: Automatic control - Air flow: 1st speed - Air inlet: Settings set before this switch is pressed - A/C switch: Settings set before air conditioning is turned OFF **NOTE:** Automatic air flow control is cancelled (AUTO switch indicator turns OFF), when fan switch is pressed while AUTO switch indicator is ON.
A/C switch	Compressor control (switch indicator) changes between ON ⇔ OFF each time this switch is pressed while front blower motor is operated. **NOTE:** A/C switch cannot be turned ON when front blower motor is OFF.
DUAL switch	Left and right ventilation temperature separately control (switch indicator) changes between ON ⇔ OFF each time this switch is pressed while front blower motor is operated. **NOTE:** • Setting temperature for passenger side is the same as that for driver side when left and right ventilation temperature separately control is OFF. • DUAL switch operation is not accepted when DEF mode is ON.
Temperature control dial (Passenger side)	• Outlet air flow temperature of passenger side can be changed without changing outlet air flow temperature of driver side. • Setting temperature is selected using this dial within a range between 18°C (60°F) and 32°C (90°F) at a rate of 0.5°C (1.0°F) per adjustment. **NOTE:** • When air conditioning system is OFF, setting temperature can be selected only while air conditioning system status screen [only when MODE switch (passenger side) is pressed] is indicated on display. • When DEF mode is ON, temperature control dial (passenger side) is inoperative.
REC switch	Switch indicator turns ON and air inlet is set to recirculation (REC), when this switch is pressed. **NOTE:** Air inlet can be changed when air conditioning is in OFF status.
FRE switch	Switch indicator turns ON and air inlet is set to fresh air intake (FRE), when this switch is pressed. **NOTE:** Air inlet can be changed when air conditioning is in OFF status.

Switch name	Function
MODE switch	Air outlet changes from VENT⇒ B/L ⇒ FOOT ⇒ D/F ⇒ VENT each time this switch is pressed. **NOTE:** • Air outlet can be changed when air conditioning is in OFF status. • Automatic air outlet control is cancelled (AUTO switch indicator turns OFF), when MODE switch is pressed while AUTO switch indicator is ON.
DEF switch	DEF mode (switch indicator) changes between ON ⇔ OFF each time switch is pressed. • When this switch is pressed while air conditioning is ON - Air conditioning becomes the following status when DEF mode is turned ON. • Air outlet: DEF • Air flow: Settings set before DEF mode is turned ON • Air inlet: Fresh air intake • A/C switch: ON - Air conditioning becomes the following status when DEF mode is turned OFF. • Air outlet: Settings set before DEF mode is turned ON • Air flow: Settings set before DEF mode is turned OFF • Air inlet: Settings set before DEF mode is turned OFF • A/C switch: Settings set before DEF mode is turned OFF • When this switch is pressed while air conditioning is OFF - Air conditioning turns ON and operates in the following status, when DEF mode is turned ON. • Air outlet: DEF • Air flow: Automatic control • Air inlet: Fresh air intake • A/C switch: ON - Air conditioning becomes the following status when DEF mode is turned OFF. • Air outlet: Automatic control • Air flow: Settings set before DEF mode is turned OFF • Air inlet: Settings set before DEF mode is turned OFF • A/C switch: Settings set before DEF mode is turned OFF **NOTE:** When DEF mode is turned ON while AUTO switch indicator is turned ON, AUTO switch indicator turns OFF. However, automatic air flow control continues.

DIAGNOSIS SYSTEM (A/C AUTO AMP.)

Description

INFOID:0000000014625926

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

ECU	Diagnostic item (CONSULT)	
A/C auto amp.	HVAC	Self Diagnostic Result
		Data Monitor
		Active Test
		Work support
ECM	ENGINE	Self Diagnostic Result
		Data Monitor
IPDM E/R	IPDM E/R	Self Diagnostic Result
		Data Monitor

CONSULT Function (HVAC)

INFOID:0000000015202310

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

Diagnostic mode	Description
Ecu Identification	Displays the part number of A/C auto amp.
Self Diagnostic Result	Displays the diagnosis results judged by A/C auto amp.
Data Monitor	Displays the input/output signal of A/C auto amp.
Active Test	The signals used to activate each device are forcibly supplied from A/C auto amp.
Work support	Changes the setting for each setting function and performs automatic adjustment of components

NOTE:
Diagnosis should be performed with engine running. Door motor operation speeds become slower and NO results may be returned even for normal operation if battery voltage drops below 12 V during self-diagnosis.

ECU IDENTIFICATION

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

SELF-DIAGNOSIS RESULTS

Diagnosis result that is judged by A/C auto amp. can be checked. Refer to HAC-41, "DTC Index".

DATA MONITOR

Input/output signal of A/C auto amp. can be checked.

NOTE:
- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- If “NG” is displayed for any of the monitor items that indicate the diagnosis result (by “OK” or “NG”), perform self-diagnosis using CONSULT, and perform the applicable trouble diagnosis.

Display item list

Monitor item [Unit]		Description
AMB TEMP SEN	[°C]	Ambient temperature value converted from ambient temperature signal received from combination meter via CAN communication
IN-VEH TEMP	[°C]	In-vehicle temperature value converted from in-vehicle sensor signal received from in-vehicle sensor
INT TEMP SEN	[°C]	Evaporator fin temperature value converted from intake sensor signal received from intake sensor
SUNLOAD SEN	[w/m^2]	Sunload value converted from sunload sensor signal received from sunload sensor

Monitor item [Unit]		Description
AMB SEN CAL	[°C]	Ambient temperature value calculated by A/C auto amp.
IN-VEH CAL	[°C]	In-vehicle temperature value calculated by A/C auto amp.
INT TEMP CAL	[°C]	Evaporator fin temperature value calculated by A/C auto amp.
SUNL SEN CAL	[w/m^2]	Sunload value calculated by A/C auto amp.
FAN REQ SIG	[On/Off]	ON/OFF status of the blower fan ON signal (operation of front blower motor) transmitted to ECM via CAN communication and HEV system CAN communication
FAN DUTY		Target duty ratio of voltage (applied voltage) applied to front blower motor by A/C auto amp
XM		Target discharge air temperature (driver side) judged by A/C auto amp. depending on the temperature setting and the value from each sensor
ENG COOL TEMP	[°C]	The value of engine coolant temperature signal received from ECM via HEV system CAN communication and CAN communication
VEHICLE SPEED	[km/h (mph)]	Vehicle speed signal value received from combination meter via CAN communication.
COMPR RPM	[rpm]	Actual speed of electric compressor
COMPR INPUT POWER SIG	[W]	Input power value of electric compressor
COMPR IPM TEMP SIG	[°C]	IPM temperature sensor value in electric compressor
COMPR INPUT VOLT SIG	[V]	Input voltage value of electric compressor
FORCED INTAKE REC SIG	[On/OFF]	State of signal input to A/C auto amp.
HV SPLY/BLOCK CMPL FLAG	[On/OFF]	State of signal input to A/C auto amp.
COMM ERROR VCM -> HVAC	[OK/NG]	Result of communication malfunction diagnosis from HPCM to A/C auto amp.
COMPR LOW VOLT ERROR	[OK/NG]	Result of low voltage malfunction diagnosis of electric compressor
COMPR HIGH VOLT ERROR	[OK/NG]	Result of high voltage malfunction diagnosis of electric compressor
COMP INTRNL COMM ER-ROR*	[OK/NG]	Result of internal communication malfunction diagnosis of electric compressor
COMP OUTPUT CIRC SHORT	[OK/NG]	Result of short output circuit diagnosis of electric compressor
COMP OUTPUT CIRC OPEN	[OK/NG]	Result of open output circuit diagnosis of electric compressor
COMP CRNT SENS ERROR	[OK/NG]	Result of current sensor malfunction diagnosis of electric compressor
COMP LOAD ERROR	[OK/NG]	Result of load malfunction diagnosis of electric compressor
COMP INVERT TEMP ERR 1	[OK/NG]	Result of inverter temperature malfunction diagnosis of electric compressor
COMP HI VOLT SYS ERROR	[OK/NG]	Result of high voltage system malfunction diagnosis of electric compressor
COMM ERROR COMP->HVAC	[OK/NG]	Result of communication malfunction diagnosis from electric compressor to A/C auto amp.
COMP RESPONSE ERROR	[OK/NG]	Result of response error diagnosis of electric compressor
COMP IN ERR (CPU/MEMO-RY)	[OK/NG]	Result of internal (CPU/memory) malfunction diagnosis of electric compressor
COMM ERROR HVAC->COMP	[OK/NG]	Result of communication malfunction diagnosis from A/C auto amp. to electric compres-sor
COMP VOLTAGE ERROR	[OK/NG]	Result of voltage malfunction diagnosis of electric compressor
COMP MTR CURRNT ERROR	[OK/NG]	Result of current malfunction diagnosis of electric compressor
COMP INVERT TEMP ERR 2	[OK/NG]	Result of inverter temperature malfunction diagnosis of electric compressor
COMP INTL LOW TEMP ERR	[OK/NG]	Result of internal low temperature malfunction diagnosis of electric compressor
COMP INTL TEMP SENS ERR	[OK/NG]	Result of internal temperature sensor malfunction diagnosis of electric compressor
COMP RF PRESS LOAD ERR1	[OK/NG]	Result of refrigerant pressure load malfunction diagnosis of electric compressor
COMP RF PRESS LOAD ERR 2	[OK/NG]	Result of refrigerant pressure load malfunction diagnosis of electric compressor
COMP OPERATION	[On/OFF]	Operating status of electric compressor
COMP LIMITED OPERATION	[On/OFF]	Limited operation status of electric compressor

Monitor item [Unit]		Description
COMP STOP (PROTECTION)	[On/OFF]	Protective stop status of electric compressor
COMP STOP (MALFC DETCT)	[On/OFF]	Malfunction detection stop status of electric compressor
COMP STOP (CMND SP EXCS)	[On/OFF]	Stop status of electric compressor due to excess of specified speed
COMP INTRNL COMM ERROR*	[OK/NG]	Result of internal communication malfunction diagnosis of electric compressor

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 air conditioning system can be performed by selecting the mode. Refer to the following table for the conditions of each mode.
ALL SEG	**NOTE:** This item cannot be tested

Check each output device

	Test item						
	MODE 1	MODE 2	MODE 3	MODE 4	MODE 5	MODE 6	MODE 7
Mode door motor position	VENT	VENT	B/L	B/L	FOOT	D/F	DEF
Intake door motor position	REC	REC	20% FRE	20% FRE	FRE	FRE	FRE
Air mix door motor (driver side) position	FULL COLD	FULL COLD	FULL COLD	FULL HOT	FULL HOT	FULL HOT	FULL HOT
Air mix door motor (passenger side) position	FULL COLD	FULL COLD	FULL COLD	FULL HOT	FULL HOT	FULL HOT	FULL HOT
Blower motor (Duty ratio)	35%	35%	60%	60%	90%	90%	35%
Electric compressor (rpm)	ON (1500)	ON (1500)	ON (1500)	OFF (0)	OFF (0)	OFF (0)	ON (2000)

NOTE:
When performing HVAC test, set the vehicle in READY state.

WORK SUPPORT

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

Work item	Description	Reference
TEMP SET CORRECT	Setting change of temperature setting trimmer can be performed	HAC-60, "Temperature Setting Trimmer"
REC MEMORY SET	**NOTE:** This item does not function	
FRE MEMORY SET	**NOTE:** This item does not function	
BLOW SET	**NOTE:** This item does not function	
TARGET EVAPORATOR TEMP UPPER LIMIT SETTING	Setting change of evaporator target temperature upper limit value can be performed	HAC-61, "Target Evaporator Temp Upper Limit"
Door Motor Starting Position Reset	Zero position reset of air mix door motor and mode door motor can be performed	HAC-63, "Description"

DIAGNOSIS SYSTEM (A/C CONTROL)

On Board Diagnosis Function

INFOID:0000000015202311

DESCRIPTION

On board diagnosis of A/C switch can be used to perform an operation check of the segment display and indicator lamps.

STARTING PROCEDURE

Starting Self-diagnosis Mode

The self-diagnosis function starts when the ON·OFF switch is pressed for 5 seconds or more within 10 seconds after the ignition switch turns ON.

NOTE:

- Because power is supplied to accessories by the auto ACC function for a period of time even after the ignition switch is turned OFF, when starting the self-diagnosis mode, turn OFF the ignition switch, and wait for 3 minutes with the driver door open.
- If the vehicle is operated while on standby, power may be supplied to accessories.

Ending Self-diagnosis Mode

Turn ignition switch OFF or press AUTO switch.

DIAGNOSIS DESCRIPTION

Check indicators of all A/C control switches and check all liquid crystal display segments.
When normal: All display parts and indicator lamps on A/C controller turn ON.
Malfunction: The malfunctioning part does not turn ON, or does not display. (A/C switch malfunction)

NOTE:

If on board diagnosis does not start, check A/C switch power supply and the ground circuit. Refer to HAC-108, "A/C SWITCH ASSEMBLY : Diagnosis Procedure". If the result of the check is normal, replace A/C switch. Refer to HAC-119, "Removal and Installation".

ECU DIAGNOSIS INFORMATION

A/C AUTO AMP.

Reference Value

INFOID:0000000015202312

CONSULT DATA MONITOR REFERENCE VALUES

NOTE:

- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- If “NG” is displayed for any of the monitor items that indicate the diagnosis result (by “OK” or “NG”), perform self-diagnosis using CONSULT, and perform the applicable trouble diagnosis.

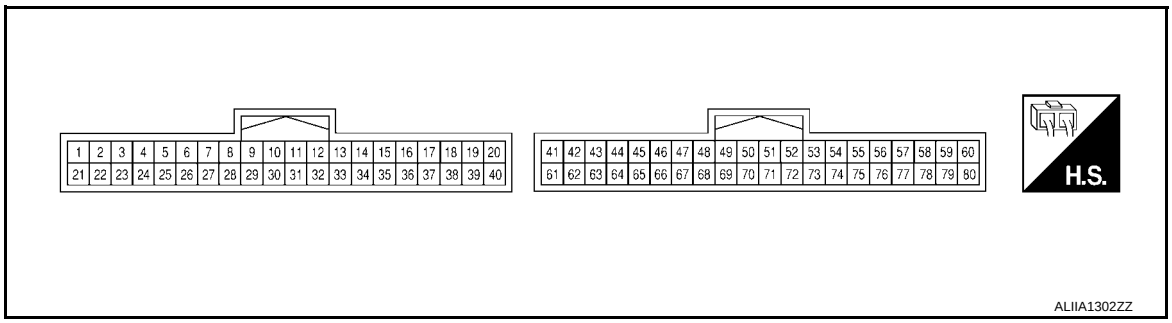
Monitor item	Condition		Value/Status
AMB TEMP SEN	Ignition switch ON		Equivalent to ambient temperature
IN-VEH TEMP	Ignition switch ON		Equivalent to in-vehicle temperature
INT TEMP SEN	Ignition switch ON		Values depending on evaporator fin temperature
SUNLOAD SEN	Ignition switch ON		Values depending on sunload amount
AMB SEN CAL	Ignition switch ON		Equivalent to ambient temperature
IN-VEH CAL	Ignition switch ON		Equivalent to in-vehicle temperature
INT TEMP CAL	Ignition switch ON		Values depending on evaporator fin temperature
SUNL SEN CAL	Ignition switch ON		Values depending on sunload amount
FAN REQ SIG	READY status (Run at idle after warming up)	Blower motor: ON	On
		Blower motor: OFF	OFF
FAN DUTY	READY status (Run at idle after warming up)	Blower motor: ON	1 – 100
		Blower motor: OFF	0
XM	Ignition switch ON		Value depending on target air flow temperature
ENG COOL TEMP	Ignition switch ON		Values depending on engine coolant temperature
VEHICLE SPEED	While driving		Equivalent to speedometer reading
COMPR RPM	READY status	A/C switch: ON (Electric compressor in operating status), vehicle stopped	Actual speed of electric compressor
COMPR INPUT POWER SIG	READY status	A/C switch: ON (Electric compressor in operating status), vehicle stopped	Input power value of electric compressor
COMPR IPM TEMP SIG	READY status	A/C switch: ON (Electric compressor in operating status), vehicle stopped	(-30) – (225) °C
COMPR INPUT VOLT SIG	READY status	A/C switch: ON (Electric compressor in operating status), vehicle stopped	Input voltage value of electric compressor
FORCED INTAKE REC SIG	READY status	A/C switch: ON (Electric compressor in operating status), vehicle stopped	Normal mode: OFF Forced recirculation request received: On
HV SPLY/BLOCK CMPL FLAG	READY status	A/C switch: ON (Electric compressor in operating status), vehicle stopped	High voltage supplied: On High voltage supply stopped: OFF

Monitor item	Condition	Value/Status
COMM ERROR VCM -> HVAC	READY status	Normal: OK Communication malfunction from HPCM to A/C auto amp. detected: NG
COMPR LOW VOLT ERROR	READY status	Normal: OK Low voltage malfunction of electric compressor detected: NG
COMPR HIGH VOLT ERROR	READY status	Normal: OK High voltage malfunction of electric compressor detected: NG
COMP INTRNL COMM ERROR*	READY status	Normal: OK Internal communication malfunction of electric compressor detected: NG
COMP OUTPUT CIRC SHORT	READY status	Normal: OK Short output circuit of electric compressor detected: NG
COMP OUTPUT CIRC OPEN	READY status	Normal: OK Open output circuit of electric compressor detected: NG
COMP CRNT SENS ERROR	READY status	Normal: OK Current sensor malfunction of electric compressor detected: NG
COMP LOAD ERROR	READY status	Normal: OK Load malfunction of electric compressor detected: NG
COMP INVERT TEMP ERR 1	READY status	Normal: OK Inverter temperature malfunction of electric compressor detected: NG
COMP HI VOLT SYS ERROR	READY status	Normal: OK High voltage system malfunction of electric compressor detected: NG
COMM ERROR COMP->HVAC	READY status	Normal: OK Communication malfunction from electric compressor to A/C auto amp. detected: NG
COMP RESPONSE ERROR	READY status	Normal: OK Response error of electric compressor detected: NG
COMP IN ERR (CPU/MEMORY)	READY status	Normal: OK Internal malfunction (CPU/memory) of electric compressor detected: NG
COMM ERROR HVAC->COMP	READY status	Normal: OK Communication malfunction from A/C auto amp. to electric compressor detected: NG
COMP VOLTAGE ERROR	READY status	Normal: OK Voltage malfunction of electric compressor detected: NG
COMP MTR CURRNT ERROR	READY status	Normal: OK Motor current malfunction of electric compressor detected: NG

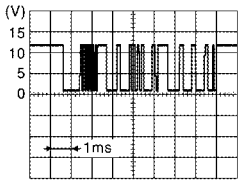
Monitor item	Condition		Value/Status
COMP INVERT TEMP ERR 2	READY status		Normal: OK Inverter temperature malfunction of electric compressor detected: NG
COMP INTL LOW TEMP ERR	READY status		Normal: OK Internal low temperature malfunction of electric compressor detected: NG
COMP INTL TEMP SENS ERR	READY status		Normal: OK Internal temperature sensor malfunction of electric compressor detected: NG
COMP RF PRESS LOAD ERR1	READY status		Normal: OK Refrigerant pressure load malfunction of electric compressor detected: NG
COMP RF PRESS LOAD ERR 2	READY status		Normal: OK Refrigerant pressure load malfunction of electric compressor detected: NG
COMP OPERATION	READY status	A/C switch: ON (Electric compressor in operating status)	On
		A/C switch: OFF	OFF
COMP LIMITED OPERATION	READY status		Electric compressor limited operation: On Other than the above: OFF
COMP STOP (PROTECTION)	READY status		Electric compressor protective stop: On Other than the above: OFF
COMP STOP (MALFC DETCT)	READY status		Electric compressor malfunction detection stop: On Other than the above: OFF
COMP STOP (CMND SP EXCS)	READY status		Electric compressor stop due to excess of specified speed: On Other than the above: OFF
COMP INTRNL COMM ERROR*	READY status		Normal: OK Internal communication malfunction of electric compressor detected: NG

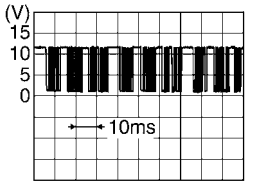
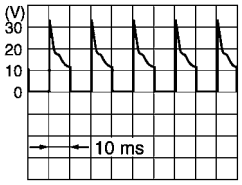
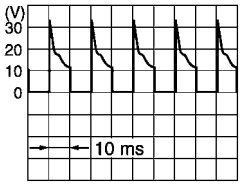
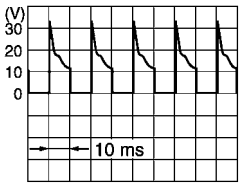
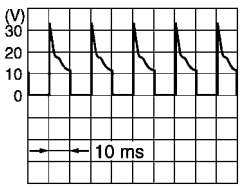
*: This item is displayed twice but it is the same monitor item.

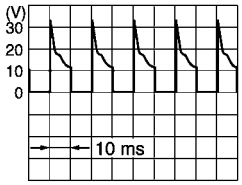
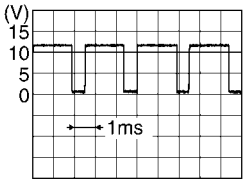
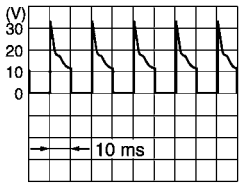
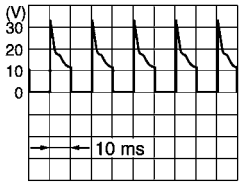
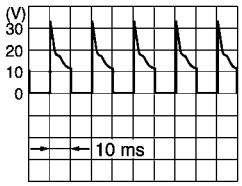
TERMINAL LAYOUT



PHYSICAL VALUES

Terminal No. (Wire color)		Description		Condition		Value (Approx.)
+	-	Signal name	Input/ Output			
1 (BG)	Ground	Accessory power supply	—	Ignition switch ON		11 – 14 V
3 (R)	Ground	Ground	—	Ignition switch ON		0 – 0.1 V
9 (B)	Ground	LIN (Electric compressor)	Input/ Output	• READY status • Electric compressor in operating status		 JSIIA1667ZZ
11 (L)	—	CAN high	Input/ Output	—		—
13 (P)	Ground	In-vehicle sensor	Input	Passenger room temperature (Ignition switch ON)	–20°C (–4°F)	3.09 V
					–10°C (14°F)	2.46 V
					0°C (32°F)	1.89 V
					10°C (50°F)	1.41 V
					20°C (68°F)	1.03 V
					25°C (77°F)	0.88 V
					30°C (86°F)	0.75 V
					40°C (104°F)	0.55 V
14 (V)	Ground	Sunload sensor signal	Input	Sunload amount (Ignition switch ON)	0 W/m^2	5.00 V
					200 W/m^2	4.46 V
					400 W/m^2	3.92 V
					600 W/m^2	3.39 V
					800 W/m^2	2.85 V
					1000 W/m^2	2.25 V
23 (G)	Ground	Sensor ground (in-vehicle, sunload)	—	Ignition switch ON		0 – 0.1 V
26* (BR)	Ground	Heated steering wheel relay control signal	Output	Ignition switch ON	Within 30 seconds after turning ON the heated steering switch	0 V
					Other than the above	Battery voltage
31 (W)	—	CAN low	Input/ Output	—		—

Terminal No. (Wire color)		Description		Condition		Value (Approx.)
+	-	Signal name	Input/ Output			
33 (Y)	Ground	LIN (A/C switch)	Input/ Output	Ignition switch ON		 JMIIA3428GB
37* (LG)	Ground	Heated steering wheel switch signal	Input	Ignition switch ON	Heated steering wheel switch: While pressing	0 V
					Other than the above	Battery voltage
41 (BR)	Ground	Air mix door motor RH drive 2	Output	• Ignition switch ON • Immediately after the temperature control dial (passenger side) is operated [when the air mix door motor RH operates]		 JPIIA1647GB
42 (LG)	Ground	Air mix door motor RH drive 1				
49 (BG)	Ground	Air mix door motor LH drive 2	Output	• Ignition switch ON • Immediately after the temperature control dial (driver side) is operated [when the air mix door motor LH operates]		 JPIIA1647GB
50 (G)	Ground	Air mix door motor LH drive 1				
51 (Y)	Ground	Mode door motor drive 2	Output	• Ignition switch ON • Immediately after the MODE switch or DEF switch are operated (when mode door motor operates)		 JPIIA1647GB
52 (SB)	Ground	Mode door motor drive 1				
54 (LG)	Ground	Intake door motor drive 3	Output	• Ignition switch ON • Immediately after the FRE switch or REC switch is operated (when intake door motor operates)		 JPIIA1647GB
56 (V)	Ground	Intake door motor drive 2				
57 (P)	Ground	Intake door motor drive 1				

Terminal No. (Wire color)		Description		Condition		Value (Approx.)
+	-	Signal name	Input/ Output			
60 (R)	Ground	Door motor power supply (mode, intake)	Output	• Ignition switch ON • Each following condition - Immediately after the INTAKE switch is operated (when intake door motor operates) - Immediately after the MODE switch or DEF switch are operated (when mode door motor operates)		11 – 14 V
61 (P)	Ground	Air mix door motor RH drive 4	Output	• Ignition switch ON • Immediately after the temperature control dial (passenger side) is operated [when the air mix door motor LH operates]		 JPIIA1647GB
62 (SB)	Ground	Air mix door motor RH drive 3				
67 (GR)	Ground	Variable blower control signal	Output	Ignition switch ON	Front blower motor: OFF	11 – 14 V
					Front blower motor: 1st speed (manual)	 JMIIA3426GB
70 (L)	Ground	Air mix door motor LH drive 4	Output	• Ignition switch ON • Immediately after the temperature control dial (driver side) is operated [when the air mix door motor LH operates]		 JPIIA1647GB
71 (R)	Ground	Air mix door motor LH drive 3				
72 (B)	Ground	Mode door motor drive 4	Output	• Ignition switch ON • Immediately after the MODE switch or DEF switch is operated (when mode door motor operates)		 JPIIA1647GB
73 (W)	Ground	Mode door motor drive 3				
75 (B)	Ground	Sensor ground (intake)	—	Ignition switch ON		0 – 0.1 V
76 (DG)	Ground	Intake door motor drive 4	Output	• Ignition switch ON • Immediately after the FRE switch or REC switch is operated (when intake door motor operates)		 JPIIA1647GB

Terminal No. (Wire color)		Description		Condition		Value (Approx.)
+	-	Signal name	Input/ Output			
77 (BR)	Ground	Front blower motor feedback	Output	Ignition switch ON	Front blower motor: OFF	11 – 14 V
					Front blower motor: 1st speed (manual)	8.5 V
					Front blower motor: 7th speed (manual)	1.5 V
78 (W)	Ground	Intake sensor	Input	Air temperature after passing through evaporator (Ignition switch ON)	–20°C (–4°F)	3.62 V
					–10°C (14°F)	3.05 V
					0°C (32°F)	2.46 V
					10°C (50°F)	1.92 V
					20°C (68°F)	1.46 V
					25°C (77°F)	1.26 V
					30°C (86°F)	1.09 V
					40°C (104°F)	0.82 V
80 (Y)	Ground	Door motor power supply (air mix)	Output	• Ignition switch ON • Following condition - Immediately after the temperature control dial is operated		11 – 14 V

*: With heated steering wheel

Fail-safe

INFOID:0000000015202313

FAIL-SAFE FUNCTION

- If a communication error exists between the A/C auto amp. and A/C control for 30 seconds or longer, air conditioning is controlled under the following conditions: A/C auto amp. is controlled in the setting state before the communication error occurs for following setting.
- Temperature setting
- Air outlet
- Air flow
- Air inlet
- Electric compressor
- A/C auto amp. performs fail-safe control when any DTC are detected

DTC	CONSULT screen terms		Fail-safe
B24D3-08	Electric compressor communication	[BUS SIGNAL/MESSAGE ERROR]	Electric compressor operation is stopped.
B2653-1C	COMP INTERNAL TEMP SENSOR	[CIRCUIT VOLTAGE OUT OF RANGE]	
B27B7-1D	COMP CURNT SENS	[CIRCUIT CURRENT OUT OF RANGE]	
B27BB-1C	COMP HI VOL SYS	[CIRCUIT VOLTAGE OUT OF RANGE]	
B27BC-87	COMP COMM ERROR HVAC->COMP	[missing message]	

DTC Inspection Priority Chart

INFOID:0000000014625931

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)
1	• U1000-01: CAN COMM CIRCUIT • U1010-49: CONTROL UNIT (CAN)
2	• B24A0-49: A/C AUTO AMP. • B24A1-16: A/C AUTO AMP. POWER SUPPLY • B24A4-11: INTAKE TEMP SEN • B24A4-15: INTAKE TEMP SEN • B24A6-11: IN-VEHICLE SEN • B24A6-15: IN-VEHICLE SEN • B24A9-11: SUNLOAD SEN • B24A9-15: SUNLOAD SEN • B24B4-02: A/C CONTROL • B24B7-12: INTAKE ACTR • B24B7-14: INTAKE ACTR • B24B9-12: MODE DOOR MOTOR • B24B9-14: MODE DOOR MOTOR • B24BB-12: LEFT AIR MIX DOOR MOTOR • B24BB-14: LEFT AIR MIX DOOR MOTOR • B24BD-12: RIGHT AIR MIX DOOR MOTOR • B24BD-14: RIGHT AIR MIX DOOR MOTOR • B24D3-08: ELECTRIC COMPRESSOR COMMUNICATION • B24D4-08: A/C CONTROL COMM
3	• B2653-1C: COMP INTERNAL TEMP • B27B5-19: COMP INTNL CIRC • B27B6-13: COMP INTNL CIRC • B27B7-1D: COMP CURNT SENS • B27BA-19: COMP SYSTEM • B27BE-49: COMP INTNL SYS • B27B8-19: COMP OVER LOADED • B27BB-1C: COMP HI VOL SYS • B27BC-87: COMP COMM ERROR HVAC->COMP

DTC Index

INFOID:0000000015202314

×: Applicable

DTC	CONSULT screen terms		Fail-safe	Reference
U1000-01	CAN COMM CIRCUIT	—	—	HAC-64, "DTC Description"
U1010-49	CONTROL UNIT (CAN)	—	—	HAC-65, "DTC Description"
B24A0-49	A/C AUTO AMP.	[INTERNAL ELECTRONIC ERROR]	—	HAC-66, "DTC Description"
B24A1-16	A/C AUTO AMP. POWER SUPPLY	[CIRC VOLT BELOW THRESHOLD]	—	HAC-67, "DTC Description"

DTC	CONSULT screen terms		Fail-safe	Reference
B24A4-11	INTAKE SENSOR	[CIRCUIT SHORT TO GROUND]	—	HAC-68, "DTC Description"
B24A4-15		[CIRC SHORT TO BATT OR OPEN]	—	
B24A6-11	IN-VEHICLE SENSOR	[CIRCUIT SHORT TO GROUND]	—	HAC-71, "DTC Description"
B24A6-15		[CIRC SHORT TO BATT OR OPEN]	—	
B24A9-11*	SUNLOAD SENSOR	[CIRCUIT SHORT TO GROUND]	—	HAC-75, "DTC Description"
B24A9-15*		[CIRC SHORT TO BATT OR OPEN]	—	
B24B4-02	A/C CONTROL	[GENERAL ELEC MAL-FUNCTN]	—	HAC-78, "DTC Description"
B24B7-12	INTAKE DOOR MOTOR	[CIRCUIT SHORT TO BATTERY]	—	HAC-79, "DTC Description"
B24B7-14		[CIRC SHORT TO GRND OR OPEN]	—	
B24B9-12	MODE DOOR MOTOR	[CIRCUIT SHORT TO BATTERY]	—	HAC-82, "DTC Description"
B24B9-14		[CIRC SHORT TO GRND OR OPEN]	—	
B24BB-12	LEFT AIR MIX DOOR MOTOR	[CIRCUIT SHORT TO BATTERY]	—	HAC-85, "DTC Description"
B24BB-14		[CIRC SHORT TO GRND OR OPEN]	—	
B24BD-12	RIGHT AIR MIX DOOR MOTOR	[CIRCUIT SHORT TO BATTERY]	—	HAC-88, "DTC Description"
B24BD-14		[CIRC SHORT TO GRND OR OPEN]	—	
B24D3-08	ELECTRIC COMPRES-SOR COMMUNICATION	[BUS SIGNAL/MES-SAGE ERROR]	—	HAC-91, "DTC Description"
B24D4-08	A/C CONTROL COMM	[BUS SIGNAL/MES-SAGE ERROR]	—	HAC-94, "DTC Description"
B2653-1C	COMP INTERNAL TEMP SENSOR	[CIRCUIT VOLTAGE OUT OF RANGE]	—	HAC-96, "DTC Description"
B27B5-19	COMP INTNL CIRC	[CIRCUIT CURRENT ABOVE THRESHOLD]	—	HAC-97, "DTC Description"
B27B6-13	COMP INTNL CIRC	[CIRCUIT OPEN]	—	HAC-97, "DTC Description"
B27B7-1D	COMP CURNT SENS	[CIRCUIT CURRENT OUT OF RANGE]	—	HAC-97, "DTC Description"
B27B8-19	COMP OVER LOADED	[CIRCUIT CURRENT ABOVE THRESHOLD]	—	HAC-99, "DTC Description"
B27BA-19	COMP SYSTEM	[CIRCUIT CURRENT ABOVE THRESHOLD]	—	HAC-97, "DTC Description"
B27BB-1C	COMP HI VOL SYS	[CIRCUIT VOLTAGE OUT OF RANGE]	—	HAC-101, "DTC Description"
B27BC-87	COMP COMM ERROR HVAC->COMP	[missing message]	—	HAC-103, "DTC Description"
B27BE-49	COMP INTNL SYS	[INTERNAL ELEC-TRONIC ERROR]	—	HAC-97, "DTC Description"

NOTE:

*: 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.

ECM, BCM

List of ECU Reference

INFOID:0000000014625933

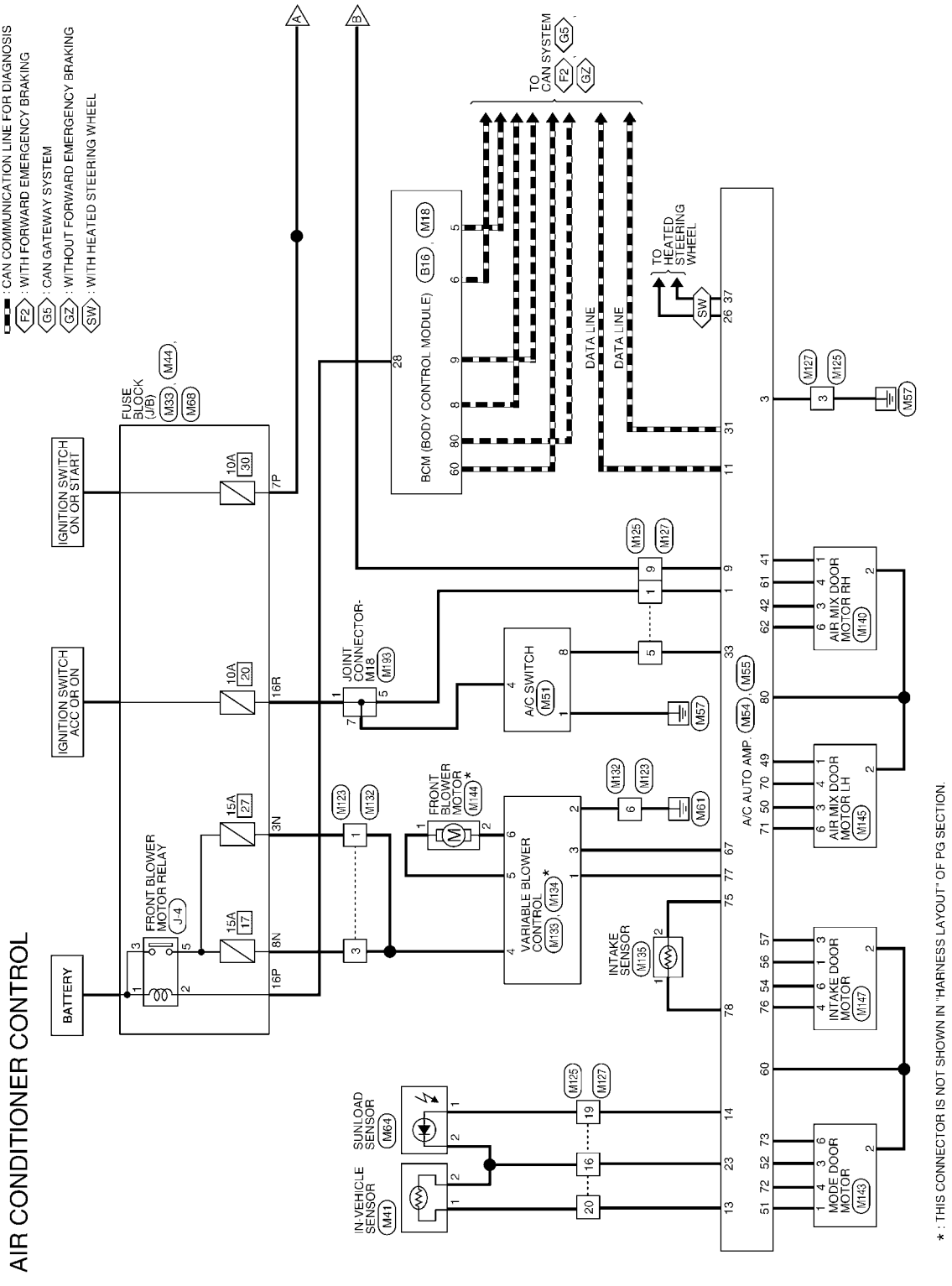
ECU	Reference
ECM	EC-87, "Reference Value"
	EC-103, "Fail-safe"
	EC-107, "DTC Inspection Priority Chart"
	EC-109, "DTC Index"
IPDM E/R	PCS-17, "Reference Value"
	PCS-26, "Fail-safe"
	PCS-27, "DTC Inspection Priority Chart"
	PCS-28, "DTC Index"
BCM	BCS-28, "Reference Value"
	BCS-46, "Fail-safe"
	BCS-47, "DTC Inspection Priority Chart"
	BCS-48, "DTC Index"

WIRING DIAGRAM

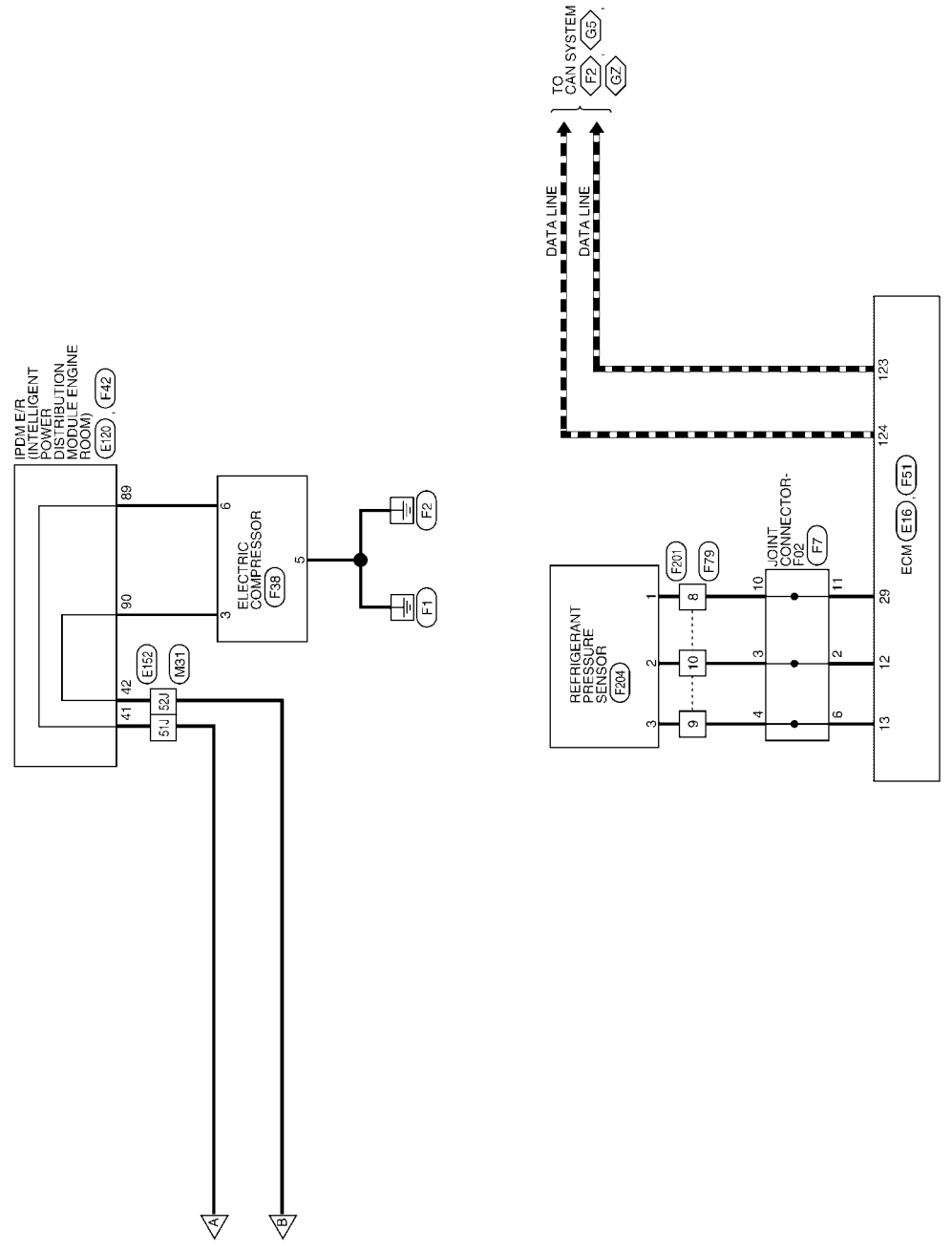
AUTOMATIC AIR CONDITIONING SYSTEM

Wiring Diagram

INFOID:0000000014625934



AAIWA0334GB


TO CAN SYSTEM
F2
G5
GZ
DATA LINE
DATA LINE
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
E120
F42
89
90
42
41
E152
M31
52J
51J
ELECTRIC COMPRESSOR
F38
6
3
5
F2
F1
A
B
REFRIGERANT PRESSURE SENSOR
F204
1
2
3
F201
F79
8
10
9
JOINT CONNECTOR-F02
F7
10
3
4
11
2
6
123
124
29
12
13
ECM
E16
F51
AAIWA0335GB

AIR CONDITIONER CONTROL CONNECTORS

Connector No.	B16
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	TH40FG-NH
Connector Color	GREEN

H.S.

60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41
80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62	61

Terminal No.	Color of Wire	Signal Name
41	–	–
42	–	–
43	–	–
44	–	–
45	–	–
46	R	I SES BACKDOOR BUTTON SW
47	–	–
48	–	–
49	G	I NO TOUCH TGATE SENSOR
50	W	I RR DOOR SW
51	LG	I TGATE SW
52	R	I RL DOOR SW
53	SB	I AS DOOR2 SW
54	–	–
55	LA/G	I RR AUTOSTOP SW
56	Y	I TGATE OPENER SW
57	SB	I DR DOOR2 SW
58	–	–
59	–	–
60	L	CAN-H
61	V	SES EXT REAR ANTENNA B
62	Y	SES INT MIDDLE ANTENNA B
63	L	SES INT MIDDLE ANTENNA A
64	LG	SES EXT REAR ANTENNA A
65	–	–
66	–	–
67	–	–
68	–	–
69	–	–
70	–	–
71	–	–
72	–	–
73	–	–
74	–	–
75	–	–
76	–	–
77	V	SHIFT LOCK RLY

78	–	–
79	LA/W	O STOP LAMP3
80	P	CAN-L

Connector No.	E16
Connector Name	ECM
Connector Type	RH24FB-RZ8-L-LH
Connector Color	BLACK

H.S.

121	125	129	133	137	141	145	149
122	126	130	134	138	142	146	150
123	127	131	135	139	143	147	151
124	128	132	136	140	144	148	152

Terminal No.	Color of Wire	Signal Name
121	L	EVAP CONTROL SYSTEM PRESSURE SENSOR
122	–	–
123	P	CAN-L
124	L	CAN-H
125	R	SENSOR POWER SUPPLY
126	–	–
127	–	–
128	BG	FUEL TANK TEMPERATURE SENSOR
129	–	–
130	–	–
131	–	–
132	–	–
133	LG	IGNITION SWITCH
134	–	–
135	–	–
136	–	–
137	G	HEV CAN-L
138	L	HEV CAN-H
139	Y	STOP LAMP SWITCH
140	GR	BRAKE PEDAL POSITION SWITCH
141	Y	EVAP CANISTER VENT CONTROL VALVE
142	–	–
143	–	–
144	–	–
145	G	ECM POWER SUPPLY
146	–	–
147	GR	ECM GROUND
148	B	SENSOR GROUND
149	GR	ECM GROUND
150	–	–
151	–	–

152	GR	ECM GROUND

Connector No.	E120
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	TH24FGY-NH
Connector Color	GRAY

H.S.

30	29	28	27	26	25	24	23	22	21	20	19
42	41	40	39	38	37	36	35	34	33	32	31

Terminal No.	Color of Wire	Signal Name
19	LG	O IGN ECM
20	–	–
21	–	–
22	P	CAN-L
23	–	–
24	L	CAN-H
25	–	–
26	–	–
27	SB	CABIN MOTOR 5
28	R	CABIN MOTOR 6
29	LG	CABIN MOTOR 7
30	Y	CABIN MOTOR 8
31	B	2ND SIGNAL GROUND
32	GR	LI PUSH SW
33	BR	I AUTO STOP WIPER
34	–	–
35	–	–
36	–	–
37	–	–
38	–	–
39	L	HEV CAN-H
40	G	HEV CAN-L
41	W	CABIN MOTOR 3
42	R	CABIN MOTOR 4

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AIR CONDITIONER CONTROL CONNECTORS

Connector No.	E152
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-CS16-TM4
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1J	–	TO MAIN HARNESS
2J	Y	TO MAIN HARNESS
3J	–	TO MAIN HARNESS
4J	–	TO MAIN HARNESS
5J	–	TO MAIN HARNESS
6J	–	TO MAIN HARNESS
7J	–	TO MAIN HARNESS
8J	–	TO MAIN HARNESS
9J	BR	TO MAIN HARNESS
10J	–	TO MAIN HARNESS
11J	–	TO MAIN HARNESS
12J	–	TO MAIN HARNESS
13J	–	TO MAIN HARNESS
14J	–	TO MAIN HARNESS
15J	–	TO MAIN HARNESS
16J	–	TO MAIN HARNESS
17J	–	TO MAIN HARNESS
18J	–	TO MAIN HARNESS
19J	–	TO MAIN HARNESS
20J	–	TO MAIN HARNESS
21J	GR	TO MAIN HARNESS
22J	SHIELD	TO MAIN HARNESS
23J	LG	TO MAIN HARNESS
24J	V	TO MAIN HARNESS
25J	L	TO MAIN HARNESS
26J	BR	TO MAIN HARNESS
27J	G	TO MAIN HARNESS
28J	R	TO MAIN HARNESS
29J	L	TO MAIN HARNESS
30J	V	TO MAIN HARNESS
31J	–	TO MAIN HARNESS
32J	–	TO MAIN HARNESS
33J	R	TO MAIN HARNESS
34J	L	TO MAIN HARNESS
35J	BG	TO MAIN HARNESS
36J	LG	TO MAIN HARNESS
37J	GR	TO MAIN HARNESS
38J	BR	TO MAIN HARNESS
39J	–	TO MAIN HARNESS
40J	–	TO MAIN HARNESS
41J	G	TO MAIN HARNESS
42J	W	TO MAIN HARNESS
43J	L	TO MAIN HARNESS
44J	B	TO MAIN HARNESS
45J	SB	TO MAIN HARNESS
46J	BR	TO MAIN HARNESS
47J	W	TO MAIN HARNESS
48J	W	TO MAIN HARNESS
49J	L	TO MAIN HARNESS
50J	P	TO MAIN HARNESS
51J	W	TO MAIN HARNESS
52J	R	TO MAIN HARNESS
53J	SB	TO MAIN HARNESS
54J	LG	TO MAIN HARNESS
55J	W	TO MAIN HARNESS
56J	BG	TO MAIN HARNESS
57J	R	TO MAIN HARNESS
58J	V	TO MAIN HARNESS
59J	BR	TO MAIN HARNESS
60J	P	TO MAIN HARNESS
61J	L	TO MAIN HARNESS
62J	P	TO MAIN HARNESS
63J	L	TO MAIN HARNESS
64J	R	TO MAIN HARNESS
65J	L	TO MAIN HARNESS
66J	BG	TO MAIN HARNESS
67J	–	TO MAIN HARNESS
68J	–	TO MAIN HARNESS
69J	G	TO MAIN HARNESS
70J	L	TO MAIN HARNESS
71J	–	TO MAIN HARNESS
72J	–	TO MAIN HARNESS
73J	–	TO MAIN HARNESS
74J	–	TO MAIN HARNESS
75J	–	TO MAIN HARNESS
76J	–	TO MAIN HARNESS
77J	–	TO MAIN HARNESS
78J	–	TO MAIN HARNESS
79J	SHIELD	TO MAIN HARNESS
80J	B	TO MAIN HARNESS
81J	W	TO MAIN HARNESS
82J	–	TO MAIN HARNESS
83J	–	TO MAIN HARNESS
84J	–	TO MAIN HARNESS
85J	–	TO MAIN HARNESS
86J	–	TO MAIN HARNESS
87J	–	TO MAIN HARNESS
88J	–	TO MAIN HARNESS
89J	–	TO MAIN HARNESS
90J	–	TO MAIN HARNESS
91J	–	TO MAIN HARNESS
92J	LG	TO MAIN HARNESS
93J	L	TO MAIN HARNESS
94J	L	TO MAIN HARNESS
95J	BR	TO MAIN HARNESS
96J	–	TO MAIN HARNESS
97J	GR	TO MAIN HARNESS
98J	P	TO MAIN HARNESS
99J	W	TO MAIN HARNESS
100J	Y	TO MAIN HARNESS

Connector No.	F7
Connector Name	JOINT CONNECTOR-F02
Connector Type	SAA24FB-J
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	–	–
2	W	REFRIGERANT PRESSURE SENSOR
3	W	REFRIGERANT PRESSURE SENSOR
4	B	SENSOR GROUND
5	B	SENSOR GROUND
6	B	SENSOR GROUND
7	B	SENSOR GROUND
8	–	–
9	Y	SENSOR POWER SUPPLY
10	Y	SENSOR POWER SUPPLY
11	Y	SENSOR POWER SUPPLY
12	Y	SENSOR POWER SUPPLY
13	B	GROUND
14	SHIELD	SHIELD
15	SHIELD	SHIELD
16	SHIELD	SHIELD

17	B	GROUND
18	–	–
19	–	–
20	G	ENGINE OIL PRESSURE SENSOR
21	G	ENGINE OIL PRESSURE SENSOR
22	–	–
23	G	FUEL RAIL PRESSURE SENSOR
24	G	FUEL RAIL PRESSURE SENSOR

Connector No.	F38
Connector Name	ELECTRIC COMPRESSOR
Connector Type	SAZ06FB
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	–	–
2	–	–
3	R	LIN COMP
4	–	–
5	B	GROUND
6	W	IGNITION

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AIR CONDITIONER CONTROL CONNECTORS

Connector No.	F42
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	TH24FB-NH
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
87	L	HEV CAN-H
88	G	HEV CAN-L
89	W	MOTOR CABIN 3
90	R	MOTOR CABIN 4
91	–	–
92	BG	LI NP SW
93	P	LI ECM DRIVER
94	–	–
95	–	–
96	–	–
97	–	–
98	–	–
99	BG	MOTOR CABIN 5
100	GR	MOTOR CABIN 6
101	LG	MOTOR CABIN 7
102	Y	MOTOR CABIN 8
103	W	HOOD SW2
104	–	–
105	–	–
106	BR	LO FAN RELAY2(PWM)
107	–	–
108	–	–
109	–	–
110	–	–

Connector No.	F51
Connector Name	ECM
Connector Type	MAB35FB-MEB20-LH
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	G	FUEL INJECTOR NO. 1, 4 (HI)
2	B	FUEL INJECTOR NO. 2 (LO)
3	L	FUEL INJECTOR NO. 3 (LO)
4	P	FUEL INJECTOR DRIVER POWER SUPPLY-1
5	L	FUEL INJECTOR DRIVER POWER SUPPLY-2
6	P	FUEL INJECTOR NO. 4 (LO)
7	W	FUEL INJECTOR NO. 2, 3 (HI)
8	R	FUEL INJECTOR NO. 1 (LO)
9	GR	ECM GROUND
10	B	ECM GROUND
11	–	–
12	W	REFRIGERANT PRESSURE SENSOR
13	B	SENSOR GROUND
14	GR	SHIELD
15	W	KNOCK SENSOR
16	–	–
17	–	–
18	–	–
19	R	EXHAUST GAS TEMPERATURE SENSOR
20	SHIELD	SHIELD
21	SB	ENGINE COOLING ELECTRIC WATER PUMP SPEED SIGNAL
22	P	ENGINE OIL TEMPERATURE SENSOR
23	G	ENGINE OIL PRESSURE SENSOR
24	–	–
25	G	FUEL RAIL PRESSURE SENSOR
26	B	SENSOR POWER SUPPLY
27	W	SENSOR POWER SUPPLY
28	–	–
29	Y	SENSOR POWER SUPPLY
30	W	SENSOR POWER SUPPLY
31	–	–
32	–	–
33	R	CRANKSHAFT POSITION SENSOR 1
34	–	–
35	BR	ENGINE OUTLET COOLANT TEMPERATURE SENSOR
36	GR	INTAKE AIR TEMPERATURE SENSOR
37	L	MASS AIR FLOW SENSOR
38	–	–
39	R	INTAKE MANIFOLD RUNNER VALVE POSITION SENSOR
40	–	–
41	–	–
42	R	SENSOR GROUND
43	BR	SENSOR GROUND
44	BR	SENSOR GROUND
45	B	SENSOR GROUND
46	–	–
47	V	HIGH PRESSURE FUEL PUMP SUPPLY
48	V	HIGH PRESSURE FUEL PUMP HIGH
49	LG	HIGH PRESSURE FUEL PUMP LOW
50	B	ECM GROUND
51	–	–
52	–	–
53	Y	INTAKE MANIFOLD RUNNER VALVE MOTOR POWER SUPPLY
54	G	INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR (CLOSE)
55	Y	INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR (OPEN)

Connector No.	F79
Connector Name	WIRE TO WIRE
Connector Type	RH10FB
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	–	TO ENGINE CONTROL SUB HARNESS
2	R	TO ENGINE CONTROL SUB HARNESS
3	W	TO ENGINE CONTROL SUB HARNESS
4	BG	TO ENGINE CONTROL SUB HARNESS

5	B	TO ENGINE CONTROL SUB HARNESS
6	GR	TO ENGINE CONTROL SUB HARNESS
7	LG	TO ENGINE CONTROL SUB HARNESS
8	Y	TO ENGINE CONTROL SUB HARNESS
9	B	TO ENGINE CONTROL SUB HARNESS
10	W	TO ENGINE CONTROL SUB HARNESS

Connector No.	F201
Connector Name	WIRE TO WIRE
Connector Type	RH10MB
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	–	TO ENGINE CONTROL HARNESS
2	B	TO ENGINE CONTROL HARNESS
3	W	TO ENGINE CONTROL HARNESS
4	BG	TO ENGINE CONTROL HARNESS
5	B	TO ENGINE CONTROL HARNESS
6	Y	TO ENGINE CONTROL HARNESS
7	LG	TO ENGINE CONTROL HARNESS
8	Y	TO ENGINE CONTROL HARNESS
9	B	TO ENGINE CONTROL HARNESS
10	W	TO ENGINE CONTROL HARNESS

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AIR CONDITIONER CONTROL CONNECTORS

Connector No.	F204
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Type	RK03FB
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	SENSOR POWER SUPPLY
2	W	REFRIGERANT PRESSURE SENSOR
3	B	SENSOR GROUND

Connector No.	M18
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	TH40FGY-NH
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	L	LIN 3 D
2	LA/G	O DI FR LEFT D
3	LA/Y	O DI FR RIGHT D
4	P	O SPARE4 RL N
5	R	CAN-L
6	L	CAN-H
7	–	–
8	L	CAN-H
9	R	CAN-L
10	BG	I DOORLOCK SW
11	Y	I HAZARD SW D
12	W	O PWR AUTOLIGHT SENSOR
13	–	–
14	–	–
15	–	–
16	–	–
17	L	O PWR ATDVC
18	–	–
19	LG	I AUTOLIGHT SENSOR
20	–	–
21	–	–
22	–	–
23	G	O WL AUTHORIZATION RL
24	LA/R	O DEFROSTER RL D
25	BR	O BAT TEMP1 RL
26	–	–
27	Y	O IGN1 RL
28	LA/W	O IGN2 RL
29	–	–
30	V	O GND AUTOLIGHT SENSOR
31	–	–
32	–	–
33	LG	O CSW 5
34	Y	I CSW 5
35	BG	O SECURITY LED
36	G	O CSW 3
37	GR	O CSW 4
38	V	O CSW 1
39	W	O CSW 2
40	SB	I DOORUNLOCK SW

Connector No.	M31
Connector Name	WIRE TO WIRE
Connector Type	TH80MW-CS16-TM4
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1J	–	TO ENGINE ROOM HARNESS
2J	R	TO ENGINE ROOM HARNESS
3J	–	TO ENGINE ROOM HARNESS
4J	–	TO ENGINE ROOM HARNESS
5J	–	TO ENGINE ROOM HARNESS
6J	–	TO ENGINE ROOM HARNESS
7J	–	TO ENGINE ROOM HARNESS
8J	–	TO ENGINE ROOM HARNESS
9J	W	TO ENGINE ROOM HARNESS
10J	–	TO ENGINE ROOM HARNESS
11J	–	TO ENGINE ROOM HARNESS
12J	–	TO ENGINE ROOM HARNESS
13J	–	TO ENGINE ROOM HARNESS
14J	–	TO ENGINE ROOM HARNESS
15J	–	TO ENGINE ROOM HARNESS
16J	–	TO ENGINE ROOM HARNESS
17J	–	TO ENGINE ROOM HARNESS
18J	–	TO ENGINE ROOM HARNESS
19J	–	TO ENGINE ROOM HARNESS
20J	–	TO ENGINE ROOM HARNESS
21J	LA/L	TO ENGINE ROOM HARNESS
22J	SHIELD	TO ENGINE ROOM HARNESS
23J	LG	TO ENGINE ROOM HARNESS
24J	V	TO ENGINE ROOM HARNESS
25J	L	TO ENGINE ROOM HARNESS
26J	BR	TO ENGINE ROOM HARNESS
27J	G	TO ENGINE ROOM HARNESS
28J	Y	TO ENGINE ROOM HARNESS
29J	L	TO ENGINE ROOM HARNESS
30J	V	TO ENGINE ROOM HARNESS
31J	–	TO ENGINE ROOM HARNESS
32J	–	TO ENGINE ROOM HARNESS
33J	R	TO ENGINE ROOM HARNESS
33J	Y	TO ENGINE ROOM HARNESS - (WITH DRIVER ASSISTANCE SYSTEM)
34J	L	TO ENGINE ROOM HARNESS
35J	BG	TO ENGINE ROOM HARNESS
36J	GR	TO ENGINE ROOM HARNESS
37J	Y	TO ENGINE ROOM HARNESS
38J	LA/BR	TO ENGINE ROOM HARNESS
39J	–	TO ENGINE ROOM HARNESS
40J	–	TO ENGINE ROOM HARNESS
41J	LA/R	TO ENGINE ROOM HARNESS
42J	W	TO ENGINE ROOM HARNESS
43J	L	TO ENGINE ROOM HARNESS
44J	B	TO ENGINE ROOM HARNESS
45J	SB	TO ENGINE ROOM HARNESS
46J	BR	TO ENGINE ROOM HARNESS
47J	W	TO ENGINE ROOM HARNESS
48J	R	TO ENGINE ROOM HARNESS
49J	SB	TO ENGINE ROOM HARNESS
50J	GR	TO ENGINE ROOM HARNESS
51J	W	TO ENGINE ROOM HARNESS
52J	R	TO ENGINE ROOM HARNESS
53J	BR	TO ENGINE ROOM HARNESS
54J	LG	TO ENGINE ROOM HARNESS
55J	LA/Y	TO ENGINE ROOM HARNESS
56J	LA/V	TO ENGINE ROOM HARNESS
57J	LA/R	TO ENGINE ROOM HARNESS
58J	W	TO ENGINE ROOM HARNESS
59J	BR	TO ENGINE ROOM HARNESS
60J	P	TO ENGINE ROOM HARNESS
61J	L	TO ENGINE ROOM HARNESS
62J	R	TO ENGINE ROOM HARNESS
63J	L	TO ENGINE ROOM HARNESS
64J	R	TO ENGINE ROOM HARNESS
65J	L	TO ENGINE ROOM HARNESS
66J	BG	TO ENGINE ROOM HARNESS
67J	–	TO ENGINE ROOM HARNESS
68J	–	TO ENGINE ROOM HARNESS
69J	G	TO ENGINE ROOM HARNESS
70J	L	TO ENGINE ROOM HARNESS
71J	–	TO ENGINE ROOM HARNESS
72J	–	TO ENGINE ROOM HARNESS
73J	–	TO ENGINE ROOM HARNESS
74J	–	TO ENGINE ROOM HARNESS
75J	–	TO ENGINE ROOM HARNESS
76J	–	TO ENGINE ROOM HARNESS
77J	–	TO ENGINE ROOM HARNESS
78J	–	TO ENGINE ROOM HARNESS
79J	SHIELD	TO ENGINE ROOM HARNESS
80J	B	TO ENGINE ROOM HARNESS
81J	W	TO ENGINE ROOM HARNESS
82J	–	TO ENGINE ROOM HARNESS
83J	–	TO ENGINE ROOM HARNESS
84J	–	TO ENGINE ROOM HARNESS
85J	–	TO ENGINE ROOM HARNESS
86J	–	TO ENGINE ROOM HARNESS
87J	–	TO ENGINE ROOM HARNESS
88J	–	TO ENGINE ROOM HARNESS
89J	–	TO ENGINE ROOM HARNESS
90J	–	TO ENGINE ROOM HARNESS
91J	–	TO ENGINE ROOM HARNESS
92J	Y	TO ENGINE ROOM HARNESS
93J	G	TO ENGINE ROOM HARNESS
94J	L	TO ENGINE ROOM HARNESS
95J	P	TO ENGINE ROOM HARNESS
96J	–	TO ENGINE ROOM HARNESS
97J	SB	TO ENGINE ROOM HARNESS
98J	P	TO ENGINE ROOM HARNESS
99J	LA/R	TO ENGINE ROOM HARNESS
100J	R	TO ENGINE ROOM HARNESS

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AIR CONDITIONER CONTROL CONNECTORS

Connector No.	M33
Connector Name	FUSE BLOCK (J/B)
Connector Type	CS06FW-M2
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1N	L	ACCESSORY RELAY 1 OUTPUT
2N	LG	BATTERY
3N	Y	FRONT BLOWER MOTOR RELAY OUTPUT
4N	LG	BATTERY
5N	R	BATTERY
6N	BG	BATTERY
7N	BR	ACCESSORY RELAY-1 CONTROL
8N	SB	FRONT BLOWER MOTOR RELAY OUTPUT

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

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	INCAR SEN
2	P	SEN GND

Connector No.	M44
Connector Name	FUSE BLOCK (J/B)
Connector Type	NS16FW-CS
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1P	R	IGNITION
2P	G	IGNITION
3P	Y	IGNITION RELAY-2 CONTROL
4P	LG	REAR WINDOW DEFOGGER RELAY OUTPUT
5P	GR	REAR WINDOW DEFOGGER RELAY OUTPUT
6P	LA/R	REAR WINDOW DEFOGGER RELAY CONTROL
7P	Y	IGNITION
8P	V	IGNITION
9P	L	BATTERY
10P	LG	IGNITION
11P	-	-
12P	-	-
13P	G	BATTERY
14P	-	-
15P	L	BATTERY
16P	LA/W	FRONT BLOWER MOTOR RELAY CONTROL

Connector No.	M51
Connector Name	A/C SWITCH
Connector Type	TH10FB-NH
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	B	GROUND
2	-	-
3	-	-
4	GR	ACCESSORY
5	-	-
6	-	-
7	-	-
8	LG	LIN SW AMP

Connector No.	M54
Connector Name	A/C AUTO AMP.
Connector Type	TH40FB-NH
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	BG	AUTO ACC
2	-	-
3	R	GND
4	-	-
5	-	-
6	-	-
7	-	-
8	-	-
9	B	LIN COMP
10	-	-
11	L	CAN-H
12	-	-
13	P	INCAR SEN
14	V	SUN SEN
15	-	-
16	-	-
17	-	-
18	-	-
19	-	-
20	-	-
21	-	-
22	-	-
23	G	SEN GND
24	-	-
25	-	-
26	BR	STRG HEATER RLY
27	-	-
28	-	-
29	-	-
30	-	-
31	W	CAN-L
32	-	-
33	Y	LIN SW AMP
34	-	-
35	-	-
36	-	-
37	LG	STRG HEATER SW
38	-	-
39	-	-
40	-	-

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AIR CONDITIONER CONTROL CONNECTORS

Connector No.	M55
Connector Name	A/C AUTO AMP.
Connector Type	TH40FGY-NH
Connector Color	GRAY

H.S.

41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60
61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Terminal No.	Color of Wire	Signal Name
41	BR	MIX AS 2
42	LG	MIX AS 1
43	–	–
44	–	–
45	–	–
46	–	–
47	–	–
48	–	–
49	BG	MIX DR 2
50	G	MIX DR 1
51	Y	MODE2
52	SB	MODE1
53	–	–
54	LG	INTAKE3
55	–	–
56	V	INTAKE2
57	P	INTAKE1
58	–	–
59	–	–
60	R	12V PROT MOTOR 12
61	P	MIX AS 4
62	SB	MIX AS 3
63	–	–
64	–	–
65	–	–
66	–	–
67	GR	FR FAN OUT
68	–	–
69	–	–
70	L	MIX DR 4
71	R	MIX DR 3
72	B	MODE4
73	W	MODE3
74	–	–
75	B	INTAKE SEN GND
76	DG	INTAKE4
77	BR	FR FAN F/B
78	W	INTAKE SEN

79	–	–
80	Y	12V PROT MOTOR34

Connector No.	M64
Connector Name	SUNLOAD SENSOR
Connector Type	K02FB
Connector Color	BLACK

H.S.

1 2

Terminal No.	Color of Wire	Signal Name
1	G	SUN SEN
2	BR	SEN GND

Connector No.	M68
Connector Name	FUSE BLOCK (J/B)
Connector Type	NS16FBR-CS
Connector Color	BROWN

H.S.

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

Terminal No.	Color of Wire	Signal Name
1R	V	ILLUMINATION +
2R	G	IGNITION
3R	V	BATTERY
4R	–	–
5R	–	–
6R	LA/L	ACCESSORY
7R	LA/V	BATTERY
8R	–	–
9R	–	–
10R	GR	BATTERY
11R	–	–
12R	–	–
13R	–	–
14R	W	BATTERY
15R	W	BATTERY
16R	GR	ACCESSORY

Connector No.	M123
Connector Name	WIRE TO WIRE
Connector Type	M06FW-LC
Connector Color	WHITE

H.S.

6 5 4
3 2 1

Terminal No.	Color of Wire	Signal Name
1	Y	TO MAIN HARNESS
2	G	TO MAIN HARNESS
3	SB	TO MAIN HARNESS
4	V	TO MAIN HARNESS
5	W	TO MAIN HARNESS
6	B	TO MAIN HARNESS

Connector No.	M125
Connector Name	WIRE TO WIRE
Connector Type	TH32FW-NH
Connector Color	WHITE

H.S.

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

Terminal No.	Color of Wire	Signal Name
1	SB	TO HVAC SUB HARNESS
2	–	TO HVAC SUB HARNESS
3	B	TO HVAC SUB HARNESS
4	–	TO HVAC SUB HARNESS
5	LG	TO HVAC SUB HARNESS
6	–	TO HVAC SUB HARNESS
7	L	TO HVAC SUB HARNESS
8	W	TO HVAC SUB HARNESS
9	R	TO HVAC SUB HARNESS
10	BR	TO HVAC SUB HARNESS
11	V	TO HVAC SUB HARNESS
12	GR	TO HVAC SUB HARNESS
13	LG	TO HVAC SUB HARNESS
14	SB	TO HVAC SUB HARNESS
15	–	TO HVAC SUB HARNESS
16	BR	TO HVAC SUB HARNESS
17	–	TO HVAC SUB HARNESS

18	BR	TO HVAC SUB HARNESS
19	G	TO HVAC SUB HARNESS
20	Y	TO HVAC SUB HARNESS
21	BG	TO HVAC SUB HARNESS
22	–	TO HVAC SUB HARNESS
23	R	TO HVAC SUB HARNESS
24	SB	TO HVAC SUB HARNESS
25	G	TO HVAC SUB HARNESS
26	BR	TO HVAC SUB HARNESS
27	LG	TO HVAC SUB HARNESS
28	W	TO HVAC SUB HARNESS
29	BG	TO HVAC SUB HARNESS
30	G	TO HVAC SUB HARNESS
31	–	TO HVAC SUB HARNESS
32	–	TO HVAC SUB HARNESS

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AIR CONDITIONER CONTROL CONNECTORS

Connector No.	M127
Connector Name	WIRE TO WIRE
Connector Type	TH32MW-NH
Connector Color	WHITE

H.S.

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

Terminal No.	Color of Wire	Signal Name
1	BG	TO MAIN HARNESS
2	–	TO MAIN HARNESS
3	R	TO MAIN HARNESS
4	–	TO MAIN HARNESS
5	Y	TO MAIN HARNESS
6	–	TO MAIN HARNESS
7	L	TO MAIN HARNESS
8	W	TO MAIN HARNESS
9	B	TO MAIN HARNESS
10	BR	TO MAIN HARNESS
11	L	TO MAIN HARNESS
12	R	TO MAIN HARNESS
13	L	TO MAIN HARNESS
14	BR	TO MAIN HARNESS
15	–	TO MAIN HARNESS
16	G	TO MAIN HARNESS
17	–	TO MAIN HARNESS
18	BR	TO MAIN HARNESS
19	V	TO MAIN HARNESS
20	P	TO MAIN HARNESS
21	BG	TO MAIN HARNESS
22	–	TO MAIN HARNESS
23	W	TO MAIN HARNESS
24	G	TO MAIN HARNESS
25	LG	TO MAIN HARNESS
26	BR	TO MAIN HARNESS
27	BR	TO MAIN HARNESS
28	W	TO MAIN HARNESS
29	R	TO MAIN HARNESS
30	G	TO MAIN HARNESS
31	–	TO MAIN HARNESS
32	–	TO MAIN HARNESS

Connector No.	M132
Connector Name	WIRE TO WIRE
Connector Type	M06MW-LC
Connector Color	WHITE

H.S.

4	5	6
1	2	3

Terminal No.	Color of Wire	Signal Name
1	B	TO MAIN HARNESS
2	G	TO MAIN HARNESS
3	B	TO MAIN HARNESS
4	V	TO MAIN HARNESS
5	W	TO MAIN HARNESS
6	O	TO MAIN HARNESS

Connector No.	M133
Connector Name	VARIABLE BLOWER CONTROL
Connector Type	7283-6469-40
Connector Color	GRAY

H.S.

1	2
3	4

Terminal No.	Color of Wire	Signal Name
1	BR	FR FAN F/B
2	O	GROUND
3	GR	FR FAN OUT
4	B	FRONT BLOWER MOTOR RELAY OUTPUT

Connector No.	M134
Connector Name	VARIABLE BLOWER CONTROL
Connector Type	7283-6458-40
Connector Color	GRAY

H.S.

5	6

Terminal No.	Color of Wire	Signal Name
5	W	FR FAN OUT
6	B	FR FAN F/B

Connector No.	M135
Connector Name	INTAKE SENSOR
Connector Type	12059281
Connector Color	GRAY

H.S.

1	2

Terminal No.	Color of Wire	Signal Name
1	W	INTAKE SEN
2	B	INTAKE SEN GND

Connector No.	M140
Connector Name	AIR MIX DOOR MOTOR RH
Connector Type	MAA06FB
Connector Color	BLACK

H.S.

1	4
2	5
3	6

Terminal No.	Color of Wire	Signal Name
1	BR	MIX AS 2
2	Y	12V PROT MOTOR34
3	LG	MIX AS 1
4	P	MIX AS 4
5	–	–
6	SB	MIX AS 3

Connector No.	M143
Connector Name	MODE DOOR MOTOR
Connector Type	MAA06FB
Connector Color	BLACK

H.S.

1	4
2	5
3	6

Terminal No.	Color of Wire	Signal Name
1	Y	MODE 2
2	R	12V PROT MOTOR 12
3	SB	MODE 1
4	B	MODE 4
5	–	–
6	W	MODE 3

Connector No.	M144
Connector Name	FRONT BLOWER MOTOR
Connector Type	M02FW-LC
Connector Color	WHITE

H.S.

1
2

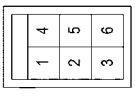
Terminal No.	Color of Wire	Signal Name
1	W	FR FAN OUT
2	B	FR FAN F/B

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AIR CONDITIONER CONTROL CONNECTORS

Connector No.	M145
Connector Name	AIR MIX DOOR MOTOR LH
Connector Type	MAA06FB
Connector Color	BLACK

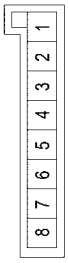
H.S.



Terminal No.	Color of Wire	Signal Name
1	BG	MIX DR 2
2	Y	12V PROT MOTOR34
3	G	MIX DR 1
4	L	MIX DR 4
5	–	–
6	R	MIX DR 3

Connector No.	M193
Connector Name	JOINT CONNECTOR-M18
Connector Type	SAC08JW
Connector Color	WHITE

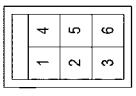
H.S.



Terminal No.	Color of Wire	Signal Name
1	GR	ACCESSORY
2	GR	ACCESSORY
3	GR	ACCESSORY
4	GR	ACCESSORY
5	SB	AUTO ACC
6	GR	ACCESSORY
7	GR	ACCESSORY
8	W	ACCESSORY

Connector No.	M147
Connector Name	INTAKE DOOR MOTOR
Connector Type	MAA06FB
Connector Color	BLACK

H.S.



Terminal No.	Color of Wire	Signal Name
1	V	INTAKE2
2	R	12V PROT MOTOR 12
3	P	INTAKE 1
4	DG	INTAKE 4
5	–	–
6	LG	INTAKE 3

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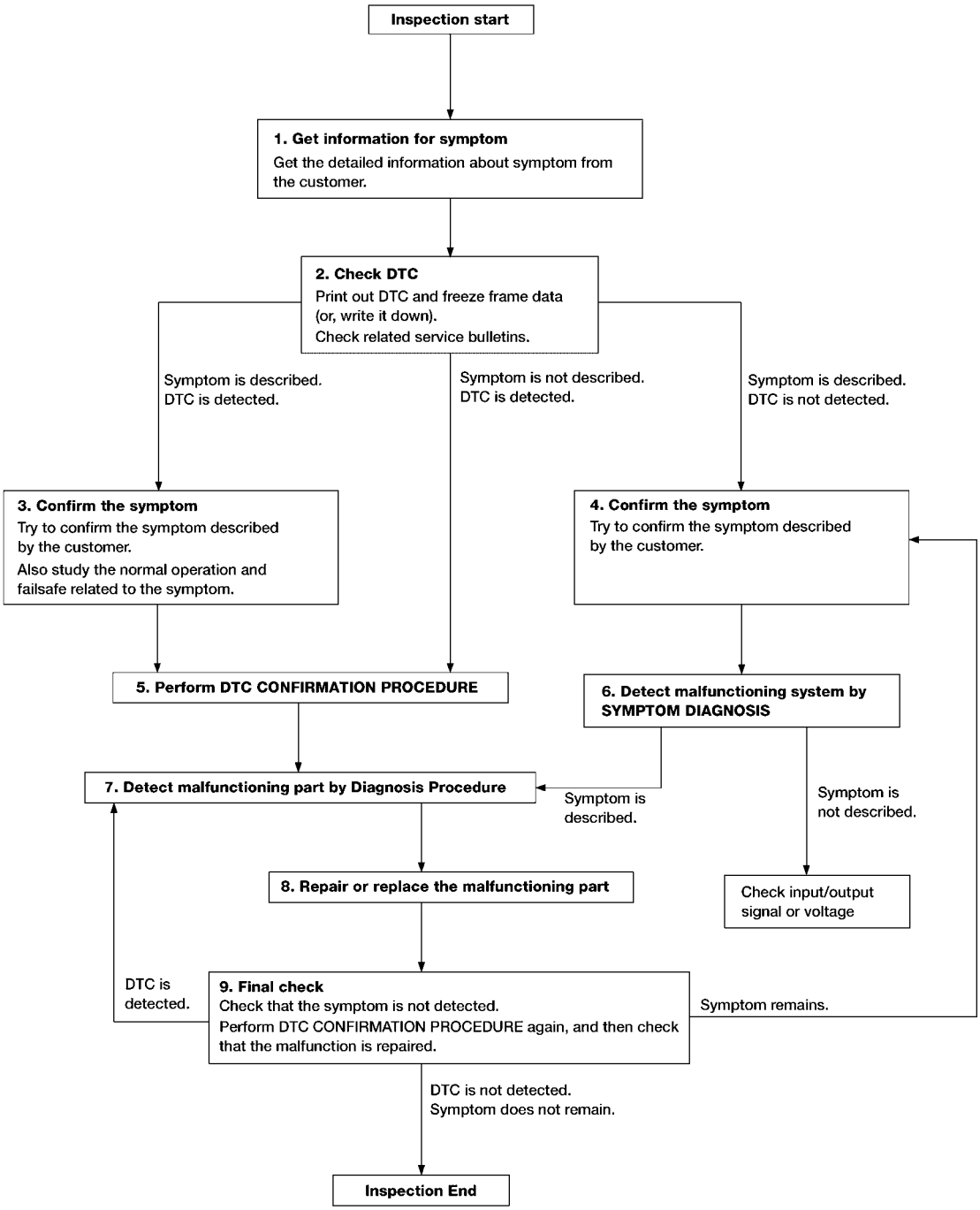
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000015253476

OVERALL SEQUENCE



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DETAILED FLOW

1.GET INFORMATION FOR SYMPTOM

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

>> GO TO 2.

2.CHECK DTC

1. Check DTC.
2. Perform the following procedure if DTC is detected.

- Record DTC and freeze frame data (Print them out using CONSULT.)
- Erase DTC.
- Study the relationship between the cause detected by DTC and the symptom described by the customer.

3. Check related service bulletins for information.

Are any symptoms described and any DTC detected?

Symptom is described, DTC is detected>>GO TO 3.
Symptom is described, DTC is not detected>>GO TO 4.
Symptom is not described, DTC is detected>>GO TO 5.

3.CONFIRM THE SYMPTOM

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

>> GO TO 5.

4.CONFIRM THE SYMPTOM

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

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

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

NOTE:

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

Is DTC detected?

YES >> GO TO 7.
NO >> Check according to GI-54, "Intermittent Incident".

6.DETECT MALFUNCTIONING SYSTEM BY SYMPTOM DIAGNOSIS

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

Is the symptom described?

YES >> GO TO 7.
NO >> Monitor input data from related sensors or check voltage of related module terminals using CONSULT.

7.DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

Is malfunctioning part detected?

YES >> GO TO 8.
NO >> Check according to GI-54, "Intermittent Incident".

8. REPAIR OR REPLACE THE MALFUNCTIONING PART

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

>> GO TO 9.

9. FINAL CHECK

When DTC is detected in step 2, perform DTC CONFIRMATION PROCEDURE again, then check that the malfunction is repaired.
When symptom is described by the customer, refer to confirmed symptom in step 3 or 4, and check that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 7.
YES-2 >> Symptom remains: GO TO 4.
NO >> Before returning the vehicle to the customer, always erase DTC.

OPERATION INSPECTION

Work Procedure

INFOID:0000000015202316

DESCRIPTION

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

Check condition **: Set the vehicle in READY status, start the engine, and then warm it up until the engine coolant temperature reaches an appropriate temperature.**

OPERATION INSPECTION

1. CHECK MEMORY FUNCTION

1. Press AUTO switch to activate air conditioning.
2. Set temperature to 32.0°C by operating temperature control dial (driver side).
3. Press ON·OFF switch.
4. Turn ignition switch OFF.
5. Turn ignition switch ON.
6. Press AUTO switch.
7. Check that the set temperature (32.0°C) is maintained.

Is the inspection result normal?

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

2. CHECK FAN SPEED

1. Start engine.
2. Operate fan switch and check that fan speed changes.
3. 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 switch to set the fan speed to maximum speed.
2. Operate MODE switch and DEF switch.
3. Check that air outlets change according to each indicated air outlet by placing a hand in front of the outlets.

Is the inspection result normal?

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

4. CHECK AIR INLET

1. Press REC switch to set the air inlet to recirculation. The REC switch indicator turns ON.
2. Listen to intake sound and confirm air inlets change.
3. Press FRE switch again to set the air inlet to fresh air intake. The FRE switch indicator 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 ELECTRIC COMPRESSOR

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 10.

6. CHECK DISCHARGE AIR TEMPERATURE

1. Operate temperature control dial (driver side).
2. Check that discharge air temperature (driver side) changes.
3. Operate temperature control dial (passenger side). DUAL switch indicator turns ON.
4. Check that discharge air temperature (passenger side) changes.
5. Press DUAL switch. DUAL switch indicator turns OFF.
6. Check that air temperature setting (LH/RH) is unified to the driver side temperature setting.

Is the inspection result normal?

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

7. CHECK WITH TEMPERATURE SETTING LOWERED

1. Operate electric compressor.
2. Operate temperature control dial (driver side) to lower the set temperature to 18.0°C.
3. Check that cool air blows from the air outlets.

Is the inspection result normal?

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

8. CHECK TEMPERATURE INCREASE

1. Warm up engine to the normal operating temperature.
2. Operate temperature control dial (driver side) to raise the set temperature to 32.0°C.
3. 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 and check that AUTO" indicator turns ON.
2. Operate temperature control switch (driver side) to check that fan speed or air outlet changes (the air outlet or fan speed 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 ON BOARD DIAGNOSIS SYSTEM

1. Perform self-diagnosis with on board diagnosis.
2. Check that any whether malfunction result is detected.

Is any malfunction result detected?

YES >> Refer to HAC-33, "On Board Diagnosis Function" and perform the appropriate diagnosis.
NO >> GO TO 11.

11. 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-41, "DTC Index", and perform the appropriate diagnosis.
NO >> GO TO 12.

12. CHECK FAIL-SAFE ACTIVATION

Check that symptom is applied to the fail-safe activation. Refer to HAC-40, "Fail-safe".

>> Refer to HAC-114, "Diagnosis Chart By Symptom", and perform the appropriate diagnosis.

SYSTEM SETTING

Temperature Setting Trimmer

INFOID:0000000014625937

Description

If the temperature felt by the customer is different than the airflow temperature controlled by the temperature setting, the auto amplifier control temperature can be adjusted to compensate for the temperature setting.

How to set

CONSULT

Perform “TEMP SET CORRECT” in “Work support” of “HVAC”.

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

NOTE:

- When the temperature setting is set to 25.0°C (77°F) and –3.0°C (–6°F), the temperature controlled by auto amp is 25.0°C (77°F) – 3.0°C (6°F) = 22.0°C (71°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 10V or less, the setting of the difference between the temperature setting and control temperature may be cancelled.

Foot Position Setting Trimmer

INFOID:0000000014625938

DESCRIPTION

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

HOW TO SET

CONSULT

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

Work support items	Display	Defroster door position	
		Auto control	Manual control
BLOW SET	Mode1	OPEN	CLOSE
	Mode2 (initial status)	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.

Inlet Port Memory Function (FRE)

INFOID:0000000014625939

Description

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

How to set

CONSULT

Perform "FRE MEMORY SET" in "Work support" of "HVAC".

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

NOTE:

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

Inlet Port Memory Function (REC)

INFOID:0000000014625940

Description

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

How to set

CONSULT

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

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

NOTE:

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

Target Evaporator Temp Upper Limit

INFOID:0000000014625941

DESCRIPTION

Set the target evaporator temperature upper limit.

HOW TO SET

CONSULT

Perform the "TARGET EVAPORATOR TEMP UPPER LIMIT SETTING" in "Work support" mode of "HVAC".

Work support items	Display
TARGET EVAPORATOR TEMP UPPER LIMIT SETTING	Initial Setting
	Low
	Middle
	High

DOOR MOTOR STARTING POSITION RESET

Description

INFOID:0000000014625942

- Reset signal is transmitted from A/C auto amp. to air mix door motor, intake door motor and mode door motor. Starting position reset can be performed.
  NOTE:
  During reset, DEF switch indicator blinks.
- When air mix door motor, intake door motor or mode door motor is removed and installed, always perform door motor starting position reset.

Work Procedure

INFOID:0000000014625943

1.PERFORM DOOR MOTOR STARTING POSITION RESET

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

>> Inspection End.

DTC/CIRCUIT DIAGNOSIS

U1000-01 CAN COMM CIRCUIT

DTC Description

INFOID:0000000015202322

DESCRIPTION

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-44, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart" for details of the communication signal.

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
U1000-01	CAN COMM CIRCUIT (CAN COMM CIRCUIT)	Diagnosis condition	When ignition switch is ON.
		Signal (terminal)	–
		Threshold	–
		Diagnosis delay time	2 seconds or more

POSSIBLE CAUSE

CAN communication system

FAIL-SAFE

—

DTC CONFIRMATION PROCEDURE

1.PERFORM SELF-DIAGNOSIS

Ⓔ CONSULT
1. Turn ignition switch ON and wait for 2 seconds or more.
2. Select “Self Diagnostic Result” mode of “HVAC”.
3. Check DTC.

Is DTC detected?

YES >> Refer to HAC-64, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: Inspection End

Diagnosis Procedure

INFOID:0000000015202323

1.CHECK CAN COMMUNICATION SYSTEM

Check CAN communication system. Refer to LAN-26, "Trouble Diagnosis Flow Chart".

>> Inspection End.

U1010-49 CONTROL UNIT (CAN)

DTC Description

INFOID:0000000014625948

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
U1010-49	CONTROL UNIT (CAN) [CONTROL UNIT (CAN)]	Diagnosis condition	When ignition switch is ON.
		Signal (terminal)	–
		Threshold	–
		Diagnosis delay time	–

POSSIBLE CAUSE

A/C auto amp.

FAIL-SAFE

—

DTC CONFIRMATION PROCEDURE

1.PERFORM SELF-DIAGNOSIS

CONSULT
1. Turn ignition switch ON.
2. Select “Self Diagnostic Result” mode of “HVAC”.
3. Check DTC.

Is DTC detected?

YES >> Refer to HAC-64, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: Inspection End

Diagnosis Procedure

INFOID:0000000014625949

NOTE:
This DTC can be set if the BCM is placed in transit mode. Confirm if the DTC is CURRENT or PAST. If PAST, perform the following steps before carrying out Diagnosis Procedure.

CONSULT
1. Clear DTC using CONSULT. Refer to HAC-30, "CONSULT Function (HVAC)".
2. Perform OPERATION INSPECTION. Refer to HAC-58, "Work Procedure".
3. Select “Self Diagnostic Result” mode of “HVAC”. Refer to HAC-30, "CONSULT Function (HVAC)".
4. If DTC resets, proceed with Diagnosis Procedure.

1.REPLACE A/C AUTO AMP.

Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".

>> Inspection End.

B24A0-49 A/C AUTO AMP.

DTC Description

INFOID:0000000015202324

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)		DTC detection condition	
B24A0-49	A/C AUTO AMP. (Air conditioning automatic amplifier)	[INTERNAL ELECTRONIC ERROR]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	–
			Diagnosis delay time	–

POSSIBLE CAUSE

A/C auto amp.

FAIL-SAFE

—

DTC CONFIRMATION PROCEDURE

1.PERFORM SELF-DIAGNOSIS

CONSULT
1. Turn ignition switch ON.
2. Select “Self Diagnostic Result” mode of “HVAC”.
3. Check DTC.

Is DTC detected?

YES >> Refer to HAC-66, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: Inspection End

Diagnosis Procedure

INFOID:0000000015202325

1.PERFORM SELF DIAGNOSTIC RESULT

CONSULT
1. Turn ignition switch ON.
2. Select “Self Diagnostic Result” mode of “HVAC”.
3. Select “ERASE”.
4. Turn ignition switch OFF.
5. Turn ignition switch ON.
6. Perform “DTC CONFIRMATION PROCEDURE”. Refer to HAC-66, "DTC Description".

Is DTC detected again?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Inspection End.

B24A1-16 A/C AUTO AMP. POWER SUPPLY

DTC Description

INFOID:0000000015202326

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)		DTC detection condition	
B24A1-16	A/C AUTO AMP. POWER SUPPLY (Air conditioning automatic amplifier power supply)	[CIRC VOLT BELOW THRESHOLD]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	Less than 10.6V
			Diagnosis delay time	30 seconds or more

POSSIBLE CAUSE

- A/C auto amp.
- Harness or connector (Accessory power supply circuits is open or shorted.)

FAIL-SAFE

—

DTC CONFIRMATION PROCEDURE

1.PERFORM SELF-DIAGNOSIS

CONSULT

1. Turn ignition switch ON.
2. Select “Self Diagnostic Result” mode of “HVAC”.
3. Check DTC.

Is DTC detected?

YES >> Refer to HAC-67, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: Inspection End

Diagnosis Procedure

INFOID:0000000015202327

1.CHECK A/C AUTO AMP. POWER SUPPLY AND GROUND CIRCUITS

Check A/C auto amp. power supply and ground circuits. Refer to HAC-107, "A/C AUTO AMP. : Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Repair or replace malfunctioning parts.

B24A4-11, B24A4-15 INTAKE SENSOR

DTC Description

INFOID:0000000015202328

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)		DTC detection condition	
B24A4-11	INTAKE SENSOR (Intake sensor)	[CIRCUIT SHORT TO GROUND]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	More than 100°C (212°F)
			Diagnosis delay time	–
B24A4-15		[CIRC SHORT TO BATT OR OPEN]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	Less than −44°C (−47°F)
			Diagnosis delay time	–

POSSIBLE CAUSE

[B24A4-11]
- Intake sensor
- A/C auto amp.
- Harness or connectors (The sensor circuit is shorted to ground.)

[B24A4-15]
- Intake sensor
- A/C auto amp.
- Harness or connectors (The sensor circuit is open or shorted to battery.)

FAIL-SAFE

—

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

Ⓔ CONSULT
1. Turn ignition switch ON.
2. Select “Self Diagnostic Result” mode of “HVAC”.
3. Check DTC.

Is DTC detected?

YES >> Refer to HAC-68, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: Inspection End

Diagnosis Procedure

INFOID:0000000015202329

Regarding Wiring Diagram information, refer to HAC-45, "Wiring Diagram".

NOTE:
If the connector of the intake sensor is disconnected, the intake sensor must be replaced with a new one. Therefore, do not disconnect the connector of the intake sensor at the time of trouble diagnosis.

1.CHECK INTAKE SENSOR SIGNAL

1. Turn ignition switch ON.
2. Check voltage between A/C auto amp. harness connector and ground

(+)		(–)	Condition		Voltage (Approx.)
A/C auto amp.					
Connector	Terminal				
M55	78	Ground	Sensor detection temperature	–20°C (–4°F)	3.62 V
				–10°C (14°F)	3.05 V
				0°C (32°F)	2.46 V
				10°C (50°F)	1.92 V
				20°C (68°F)	1.46 V
				25°C (77°F)	1.26 V
				30°C (86°F)	1.09 V
				40°C (104°F)	0.82 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2.CHECK INTAKE SENSOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn ignition 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	
M135	1	M55	78	Yes

Is the inspection result normal?

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

3.CHECK INTAKE SENSOR GROUND CIRCUIT FOR OPEN

1. 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	
M135	2	M55	75	Yes

Is the inspection result normal?

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

4.CHECK INTAKE SENSOR POWER SUPPLY CIRCUIT FOR SHORT

1. Check continuity between intake sensor harness connector and ground.

Intake sensor		(–)	Continuity
Connector	Terminal		
M135	1	Ground	No

2. Check voltage between intake sensor harness connector and ground.

(+)		(–)	Voltage (Approx.)
Intake sensor			
Connector	Terminal		
M135	1	Ground	0 V

Is the inspection result normal?

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

5.CHECK INTAKE SENSOR

Check intake sensor. Refer to HAC-70, "Component Inspection".

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Replace intake sensor. Refer to HAC-124, "Removal and Installation".

6.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-54, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Repair or replace malfunctioning parts.

Component Inspection

INFOID:0000000015202330

NOTE:
If the connector of the intake sensor is disconnected, the intake sensor must be replaced with a new one. Therefore, do not disconnect the connector of the intake sensor at the time of trouble diagnosis.

1.CHECK INTAKE SENSOR

1. Remove intake sensor from heating and cooling unit assembly without disconnect intake sensor connector. Refer to HAC-124, "Removal and Installation".
2. Check resistance between intake sensor harness connector terminals. Refer to applicable table for the normal value.

Intake sensor			Condition	Resistance: kΩ
Connector	Terminal		Temperature: °C (°F)	
M135	1	2	–15 (5)	17.73
			–10 (14)	13.46
			–5 (23)	10.33
			0 (32)	8.00
			5 (41)	6.25
			10 (50)	4.93
			15 (59)	3.92
			20 (68)	3.14
			25 (77)	2.54
			30 (86)	2.06
			35 (95)	1.69
			40 (104)	1.39
			45 (113)	1.15

Is the inspection result normal?

YES >> Inspection End
NO >> Replace intake sensor. Refer to HAC-124, "Removal and Installation".

B24A6-11, B24A6-15 IN-VEHICLE SENSOR

DTC Description

INFOID:0000000015202331

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)		DTC detection condition	
B24A6-11	IN-VEHICLE SENSOR (In-vehicle sensor)	[CIRCUIT SHORT TO GROUND]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	More than 100°C (212°F)
			Diagnosis delay time	–
B24A6-15		[CIRC SHORT TO BATT OR OPEN]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	Less than -44°C (-47°F)
			Diagnosis delay time	–

POSSIBLE CAUSE

[B24A6-11]
- In-vehicle sensor
- A/C auto amp.
- Harness or connectors (The sensor circuit is shorted to ground.)

[B24A6-15]
- In-vehicle sensor
- A/C auto amp.
- Harness or connectors (The sensor circuit is open or shorted to battery.)

FAIL-SAFE

—

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

CONSULT
1. Turn ignition switch ON.
2. Select “Self Diagnostic Result” mode of “HVAC”.
3. Check DTC.

Is DTC detected?

YES >> Refer to HAC-71, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: Inspection End

Diagnosis Procedure

INFOID:0000000015202332

Regarding Wiring Diagram information, refer to HAC-45, "Wiring Diagram".

1. CHECK IN-VEHICLE SENSOR SIGNAL

1. Turn ignition switch ON.
2. Check voltage between A/C auto amp. harness connector and ground

(+)		(–)	Condition		Voltage (Approx.)
A/C auto amp.					
Connector	Terminal				
M54	13	Ground	Sensor detection temperature	–20°C (–4°F)	3.09 V
				–10°C (14°F)	2.46 V
				0°C (32°F)	1.89 V
				10°C (50°F)	1.41 V
				20°C (68°F)	1.03 V
				25°C (77°F)	0.88 V
				30°C (86°F)	0.75 V
				40°C (104°F)	0.55 V

Is the inspection result normal?

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

2.CHECK IN-VEHICLE SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect in-vehicle sensor connector.
3. Turn ignition 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 ignition 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	M54	23	Yes

Is the inspection result normal?

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

4.CHECK IN-VEHICLE SENSOR

Check in-vehicle sensor. Refer to HAC-73, "Component Inspection".

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Replace in-vehicle sensor. Refer to HAC-122, "Removal and Installation".

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

1. Turn ignition 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	M54	13	Yes

Is the inspection result normal?

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

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

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

In-vehicle sensor		(–)	Continuity
Connector	Terminal		
M41	1	Ground	No

2. Check voltage between in-vehicle sensor harness connector and ground

(+)		(–)	Voltage (Approx.)
In-vehicle sensor			
Connector	Terminal		
M41	1	Ground	0 V

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Repair harness or connector.

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-54, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Repair or replace malfunctioning parts.

Component Inspection

INFOID:0000000015202333

1. CHECK IN-VEHICLE SENSOR

1. Remove in-vehicle sensor. Refer to HAC-122, "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	–15 (5)	12.73
		–10 (14)	9.92
		–5 (23)	7.80
		0 (32)	6.19
		5 (41)	4.95
		10 (50)	3.99
		15 (59)	3.24
		20 (68)	2.65
		25 (77)	2.19
		30 (86)	1.81
		35 (95)	1.51
		40 (104)	1.27
		45 (113)	1.07

Is the inspection result normal?

YES >> Inspection End
NO >> Replace in-vehicle sensor. Refer to HAC-122, "Removal and Installation".

B24A9-11, B24A9-15 SUNLOAD SENSOR

DTC Description

INFOID:0000000015202334

DTC DETECTION LOGIC

NOTE:
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 No.	CONSULT screen terms (Trouble diagnosis content)		DTC detection condition	
B24A9-11	SUNLOAD SENSOR (Sunload sensor)	[CIRCUIT SHORT TO GROUND]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	Detected calorie at sunload sensor is 950 kcal/m^2·h (817 w/m^2) or more
			Diagnosis delay time	–
B24A9-15		[CIRC SHORT TO BATT OR OPEN]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	Detected calorie at sunload sensor is 50 kcal/m^2·h (43 w/m^2) or less
			Diagnosis delay time	–

POSSIBLE CAUSE

[B24A9-11]
- Sunload sensor
- A/C auto amp.
- Harness or connectors (The sensor circuit is shorted to ground.)

[B24A9-15]
- Sunload sensor
- A/C auto amp.
- Harness or connectors (The sensor circuit is open or shorted to battery.)

FAIL-SAFE

—

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

CONSULT
1. Turn ignition switch ON.
2. Select “Self Diagnostic Result” mode of “HVAC”.
3. Check DTC.

Is DTC detected?

YES >> Refer to HAC-75, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: Inspection End

Diagnosis Procedure

INFOID:0000000015202335

Regarding Wiring Diagram information, refer to HAC-45, "Wiring Diagram".

1.CHECK SUNLOAD SENSOR SIGNAL

1. Turn ignition switch ON.
2. Check voltage between A/C auto amp. harness connector and ground

(+)		(–)	Condition		Voltage (Approx.)
A/C auto amp.					
Connector	Terminal				
M54	14	Ground	Sensor detection sunload amount	0 W/m^2	5.00 V
				200 W/m^2	4.46 V
				400 W/m^2	3.92 V
				600 W/m^2	3.39 V
				800 W/m^2	2.85 V
				1000 W/m^2	2.25 V

Is the inspection result normal?

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

2.CHECK SUNLOAD SENSOR POWER SUPPLY

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

(+)		(–)	Voltage (Approx.)
Sunload sensor			
Connector	Terminal		
M64	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 ignition 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	
M64	2	M54	23	Yes

Is the inspection result normal?

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

4.REPLACE SUNLOAD SENSOR

1. Replace sunload sensor. Refer to HAC-123, "Removal and Installation".
2. Perform DTC confirmation procedure. Refer to HAC-75, "DTC Description".
3. Check DTC.

Is DTC detected?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Inspection End

5. CHECK SUNLOAD SENSOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn ignition 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	
M64	1	M54	14	Yes

Is the inspection result normal?

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

6. CHECK SUNLOAD SENSOR POWER SUPPLY CIRCUIT FOR SHORT

1. Check continuity between sunload sensor harness connector and ground.

Sunload sensor		(–)	Continuity
Connector	Terminal		
M64	1	Ground	No

2. Check voltage between sunload sensor harness connector and ground

(+)		(–)	Voltage (Approx.)
Sunload sensor			
Connector	Terminal		
M64	1	Ground	0 V

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Repair harness or connector.

7. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-54, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Repair or replace malfunctioning parts.

B24B4-02 A/C CONTROL

DTC Description

INFOID:0000000015202336

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)		DTC detection condition	
B24B4-02	A/C CONTROL (Air conditioning control)	[GENERAL ELEC MAL-FUNCTN]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	–
			Diagnosis delay time	30 seconds or more

POSSIBLE CAUSE

A/C switch (Internal circuit malfunction)

FAIL-SAFE

—

DTC CONFIRMATION PROCEDURE

1.PERFORM SELF-DIAGNOSIS

CONSULT
1. Turn ignition switch ON.
2. Select “Self Diagnostic Result” mode of “HVAC”.
3. Check DTC.

Is DTC detected?

YES >> Refer to HAC-78, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: Inspection End

Diagnosis Procedure

INFOID:0000000015202337

1.PERFORM SELF DIAGNOSTIC RESULT

CONSULT
1. Turn ignition switch ON.
2. Select “Self Diagnostic Result” mode of “HVAC”.
3. Select “ERASE”.
4. Turn ignition switch OFF.
5. Turn ignition switch ON.
6. Perform “DTC CONFIRMATION PROCEDURE”. Refer to HAC-78, "DTC Description".

Is DTC detected again?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Inspection End.

B24B7-12, B24B7-14 INTAKE DOOR MOTOR

DTC Description

INFOID:0000000015202338

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)		DTC detection condition	
B24B7-12	INTAKE DOOR MOTOR (Intake door motor)	[CIRCUIT SHORT TO BATTERY]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	–
			Diagnosis delay time	–
B24B7-14		[CIRC SHORT TO GRND OR OPEN]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	–
			Diagnosis delay time	–

POSSIBLE CAUSE

[B24B7-12]
- Harness and connector (Intake door motor circuit is shorted to battery)
- Intake door motor
- A/C auto amp.

[B24B7-14]
- Harness and connector (Intake door motor circuit is open or shorted to ground)
- Intake door motor
- A/C auto amp.

FAIL-SAFE

—

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

CONSULT
1. Turn ignition switch ON.
2. Select “Self Diagnostic Result” mode of “HVAC”.
3. Check DTC.

Is DTC detected?

YES >> Refer to HAC-79, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: Inspection End

Diagnosis Procedure

INFOID:0000000015202339

Regarding Wiring Diagram information, refer to HAC-45, "Wiring Diagram".

1.CHECK INTAKE DOOR MOTOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake door motor connector.
3. Turn ignition switch ON.
4. Check voltage between intake door motor harness connector and ground for several seconds after pressing the REC switch or FRE switch.

(+)		(–)	Voltage (Approx.)
Intake door motor			
Connector	Terminal		
M147	2	Ground	11 – 14 V

Is the inspection result normal?

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

2.CHECK INTAKE DOOR MOTOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn ignition 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	
M147	2	M55	60	Yes

Is the inspection result normal?

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

3.CHECK INTAKE DOOR MOTOR POWER SUPPLY CIRCUIT FOR SHORT

Check continuity between intake door motor harness connector and ground.

Intake door motor		(–)	Continuity
Connector	Terminal		
M147	2	Ground	No

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Repair harness or connector.

4.CHECK INTAKE DOOR MOTOR DRIVE SIGNAL CIRCUIT FOR OPEN

1. Turn ignition 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	
M147	6	M55	54	Yes
	1		56	
	3		57	
	4		76	

Is the inspection result normal?

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

5.CHECK INTAKE DOOR MOTOR DRIVE SIGNAL CIRCUIT FOR SHORT

1. Check continuity between intake door motor harness connector and ground.

Intake door motor		(–)	Continuity
Connector	Terminal		
M147	6	Ground	No
	1		
	3		
	4		

2. Check voltage between intake door motor harness connector and ground.

(+)		(–)	Voltage (Approx.)
Intake door motor			
Connector	Terminal		
M147	6	Ground	0 V
	1		
	3		
	4		

Is the inspection result normal?

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

6. CHECK INTAKE DOOR MOTOR

Check intake door motor. Refer to HAC-81, "Component Inspection".

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Replace intake door motor. Refer to HAC-127, "INTAKE DOOR MOTOR : Removal and Installation".

Component Inspection

INFOID:0000000015202340

1. CHECK INTAKE DOOR MOTOR

1. Remove intake door motor. Refer to HAC-127, "INTAKE DOOR MOTOR : Removal and Installation".
2. Check resistance between intake 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 intake door motor. Refer to HAC-127, "INTAKE DOOR MOTOR : Removal and Installation".

B24B9-12, B24B9-14 MODE DOOR MOTOR

DTC Description

INFOID:0000000015202341

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)		DTC detection condition	
B24B9-12	MODE DOOR MOTOR (Mode door motor)	[CIRCUIT SHORT TO BATTERY]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	–
			Diagnosis delay time	–
B24B9-14		[CIRC SHORT TO GRND OR OPEN]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	–
			Diagnosis delay time	–

POSSIBLE CAUSE

[B24B9-12]
- Harness and connector (Mode door motor circuit is shorted to battery)
- Mode door motor
- A/C auto amp.

[B24B9-14]
- Harness and connector (Mode door motor circuit is open or shorted to ground)
- Mode door motor
- A/C auto amp.

FAIL-SAFE

—

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

Ⓔ CONSULT
1. Turn ignition switch ON.
2. Select “Self Diagnostic Result” mode of “HVAC”.
3. Check DTC.

Is DTC detected?

YES >> Refer to HAC-82, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: Inspection End

Diagnosis Procedure

INFOID:0000000015202342

Regarding Wiring Diagram information, refer to HAC-45, "Wiring Diagram".

1.CHECK MODE DOOR MOTOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect mode door motor connector.
3. Turn ignition switch ON.
4. Check voltage between mode door motor harness connector and ground for several seconds after pressing the MODE switch.

(+)		(–)	Voltage (Approx.)
Mode door motor			
Connector	Terminal		
M143	2	Ground	11 – 14 V

Is the inspection result normal?

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

2.CHECK MODE DOOR MOTOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn ignition 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	
M143	2	M55	60	Yes

Is the inspection result normal?

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

3.CHECK MODE DOOR MOTOR POWER SUPPLY CIRCUIT FOR SHORT

Check continuity between mode door motor harness connector and ground.

Mode door motor		(–)	Continuity
Connector	Terminal		
M143	2	Ground	No

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Repair harness or connector.

4.CHECK MODE DOOR MOTOR DRIVE SIGNAL CIRCUIT FOR OPEN

1. Turn ignition 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	
M143	1	M55	51	Yes
	3		52	
	4		72	
	6		73	

Is the inspection result normal?

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

5.CHECK MODE DOOR MOTOR DRIVE SIGNAL CIRCUIT FOR SHORT

1. Check continuity between mode door motor harness connector and ground.

Mode door motor		(–)	Continuity
Connector	Terminal		
M143	1	Ground	No
	3		
	4		
	6		

2. Check voltage between mode door motor harness connector and ground.

(+)		(–)	Voltage (Approx.)
Mode door motor			
Connector	Terminal		
M143	1	Ground	0 V
	3		
	4		
	6		

Is the inspection result normal?

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

6. CHECK MODE DOOR MOTOR

Check mode door motor. Refer to HAC-84, "Component Inspection".

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Replace mode door motor. Refer to HAC-127, "MODE DOOR MOTOR : Removal and Installation".

Component Inspection

INFOID:0000000015202343

1. CHECK MODE DOOR MOTOR

1. Remove mode door motor. Refer to HAC-127, "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.)
2	1	90
	3	
	4	
	6	

Is the inspection result normal?

YES >> Inspection End.
NO >> Replace mode door motor. Refer to HAC-127, "MODE DOOR MOTOR : Removal and Installation".

B24BB-12, B24BB-14 LEFT AIR MIX DOOR MOTOR

DTC Description

INFOID:0000000015202344

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)		DTC detection condition	
B24BB-12	LEFT AIR MIX DOOR MOTOR (Left side air mix door motor)	[CIRCUIT SHORT TO BATTERY]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	–
			Diagnosis delay time	–
B24BB-14		[CIRC SHORT TO GRND OR OPEN]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	–
			Diagnosis delay time	–

POSSIBLE CAUSE

[B24BD-12]
- Harness and connector [Air mix door motor LH circuit is shorted to battery]
- Air mix door motor LH
- A/C auto amp.

[B24BD-14]
- Harness and connector [Air mix door motor LH circuit is open or shorted to ground]
- Air mix door motor LH
- A/C auto amp.

FAIL-SAFE

—

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

CONSULT
1. Turn ignition switch ON.
2. Select “Self Diagnostic Result” mode of “HVAC”.
3. Check DTC.

Is DTC detected?

YES >> Refer to HAC-85, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: Inspection End

Diagnosis Procedure

INFOID:0000000015202345

Regarding Wiring Diagram information, refer to HAC-45, "Wiring Diagram".

1.CHECK AIR MIX DOOR MOTOR LH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect air mix door motor LH connector.
3. Turn ignition switch ON.
4. Check voltage between air mix door motor LH harness connector and ground for several seconds after operating the temperature control dial (driver side) while DUAL switch is OFF.

(+)		(–)	Voltage (Approx.)
Air mix door motor LH			
Connector	Terminal		
M145	2	Ground	11 – 14 V

Is the inspection result normal?

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

2.CHECK AIR MIX DOOR MOTOR LH POWER SUPPLY CIRCUIT FOR OPEN

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

Air mix door motor LH		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M145	2	M55	80	Yes

Is the inspection result normal?

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

3.CHECK AIR MIX DOOR MOTOR LH POWER SUPPLY CIRCUIT FOR SHORT

Check continuity between air mix door motor LH harness connector and ground.

Air mix door motor LH		(–)	Continuity
Connector	Terminal		
M145	2	Ground	No

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Repair harness or connector.

4.CHECK AIR MIX DOOR MOTOR LH DRIVE SIGNAL CIRCUIT FOR OPEN

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

Air mix door motor LH		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M145	1	M55	49	Yes
	3		50	
	4		70	
	6		71	

Is the inspection result normal?

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

5.CHECK AIR MIX DOOR MOTOR LH DRIVE SIGNAL CIRCUIT FOR SHORT

1. Check continuity between air mix door motor LH harness connector and ground.

Air mix door motor LH		(–)	Continuity
Connector	Terminal		
M145	1	Ground	No
	3		
	4		
	6		

2. Check voltage between air mix door motor LH harness connector and ground.

(+)		(–)	Voltage (Approx.)
Air mix door motor LH			
Connector	Terminal		
M145	1	Ground	0 V
	3		
	4		
	6		

Is the inspection result normal?

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

6. CHECK AIR MIX DOOR MOTOR LH

Check air mix door motor LH. Refer to HAC-87, "Component Inspection".

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Replace air mix door motor LH. Refer to HAC-127, "AIR MIX DOOR MOTOR : Removal and Installation".

Component Inspection

INFOID:0000000015202346

1. CHECK AIR MIX DOOR MOTOR LH

1. Remove air mix door motor LH. Refer to HAC-127, "AIR MIX DOOR MOTOR : Removal and Installation".
2. Check resistance between air mix door motor LH 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 LH. Refer to HAC-127, "AIR MIX DOOR MOTOR : Removal and Installation".

B24BD-12, B24BD-14 RIGHT AIR MIX DOOR MOTOR

DTC Description

INFOID:0000000015202347

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)		DTC detection condition	
B24BD-12	RIGHT AIR MIX DOOR MOTOR (Right side air mix door motor)	[CIRCUIT SHORT TO BATTERY]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	–
			Diagnosis delay time	–
B24BD-14		[CIRC SHORT TO GRND OR OPEN]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	–
			Diagnosis delay time	–

POSSIBLE CAUSE

[B24BB-12]
- Harness and connector [Air mix door motor RH circuit is shorted to battery]
- Air mix door motor RH
- A/C auto amp.

[B24BB-14]
- Harness and connector [Air mix door motor RH circuit is open or shorted to ground]
- Air mix door motor RH
- A/C auto amp.

FAIL-SAFE

—

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

Ⓔ CONSULT
1. Turn ignition switch ON.
2. Select “Self Diagnostic Result” mode of “HVAC”.
3. Check DTC.

Is DTC detected?

YES >> Refer to HAC-88, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: Inspection End

Diagnosis Procedure

INFOID:0000000015202348

Regarding Wiring Diagram information, refer to HAC-45, "Wiring Diagram".

1. CHECK AIR MIX DOOR MOTOR RH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect air mix door motor RH connector.
3. Turn ignition switch ON.
4. Check voltage between air mix door motor RH harness connector and ground for several seconds after operating the temperature control dial (driver side) while DUAL switch is OFF.

(+)		(–)	Voltage (Approx.)
Air mix door motor RH			
Connector	Terminal		
M140	2	Ground	11 – 14 V

Is the inspection result normal?

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

2.CHECK AIR MIX DOOR MOTOR RH POWER SUPPLY CIRCUIT FOR OPEN

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

Air mix door motor RH		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M140	2	M55	80	Yes

Is the inspection result normal?

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

3.CHECK AIR MIX DOOR MOTOR RH POWER SUPPLY CIRCUIT FOR SHORT

Check continuity between air mix door motor RH harness connector and ground.

Air mix door motor RH		(–)	Continuity
Connector	Terminal		
M140	2	Ground	No

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Repair harness or connector.

4.CHECK AIR MIX DOOR MOTOR RH DRIVE SIGNAL CIRCUIT FOR OPEN

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

Air mix door motor RH		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M140	1	M55	41	Yes
	3		42	
	4		61	
	6		62	

Is the inspection result normal?

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

5.CHECK AIR MIX DOOR MOTOR AIR MIX DOOR MOTOR RH DRIVE SIGNAL CIRCUIT FOR SHORT

1. Check continuity between air mix door motor RH harness connector and ground.

Air mix door motor RH		(–)	Continuity
Connector	Terminal		
M140	1	Ground	No
	3		
	4		
	6		

2. Check voltage between air mix door motor RH harness connector and ground.

(+)		(–)	Voltage (Approx.)
Air mix door motor RH			
Connector	Terminal		
M140	1	Ground	0 V
	3		
	4		
	6		

Is the inspection result normal?

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

6. CHECK AIR MIX DOOR MOTOR RH

Check air mix door motor RH. Refer to HAC-90, "Component Inspection".

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Replace air mix door motor RH. Refer to HAC-127, "AIR MIX DOOR MOTOR : Removal and Installation".

Component Inspection

INFOID:0000000015202349

1. CHECK AIR MIX DOOR MOTOR RH

1. Remove air mix door motor RH. Refer to HAC-127, "AIR MIX DOOR MOTOR : Removal and Installation".
2. Check resistance between air mix door motor RH 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 RH. Refer to HAC-127, "AIR MIX DOOR MOTOR : Removal and Installation".

B24D3-08 ELECTRIC COMPRESSOR COMMUNICATION

DTC Description

INFOID:0000000015202350

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)		DTC detection condition	
B24D3-08	ELECTRIC COMPRESSOR COMMUNICATION (Electric compressor communication)	[BUS SIGNAL/MESSAGE ERROR]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	Electric compressor LIN circuit (terminal 3)
			Threshold	–
			Diagnosis delay time	2 seconds or more

POSSIBLE CAUSE

- Harness and connector (Electric compressor circuit is open or shorted)
- IPDM E/R
- Electric compressor
- A/C auto amp.

FAIL-SAFE

Electric compressor operation is stopped.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

Ⓔ CONSULT

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “Self Diagnostic Result” mode of “HVAC”.
3. Check DTC.

Is DTC detected?

YES >> Refer to HAC-91, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: Inspection End

Diagnosis Procedure

INFOID:0000000015202351

Regarding Wiring Diagram information, refer to HAC-45, "Wiring Diagram".

1. CHECK LIN (ELECTRIC COMPRESSOR) SIGNAL CIRCUIT FOR OPEN-1

1. Turn ignition switch OFF.
2. Disconnect electric compressor connector 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	
F38	3	M54	9	Yes

Is the inspection result normal?

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

2. CHECK LIN (ELECTRIC COMPRESSOR) SIGNAL CIRCUIT FOR OPEN-2

1. Disconnect IPDM E/R connector.
2. Check continuity between electric compressor harness connector and IPDM E/R harness connector.

Electric compressor		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F38	3	F42	90	Yes

Is the inspection result normal?

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

3. CHECK LIN (ELECTRIC COMPRESSOR) SIGNAL CIRCUIT FOR OPEN-3

Check continuity between IPDM E/R harness connector and A/C auto amp. harness connector.

IPDM E/R		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
E120	42	M54	9	Yes

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-46, "Removal and Installation".
NO >> Repair harness or connector.

4. CHECK LIN (ELECTRIC COMPRESSOR) SIGNAL CIRCUIT FOR SHORT-1

1. Check continuity between electric compressor harness connector and ground.

Electric compressor		(–)	Continuity
Connector	Terminal		
F38	3	Ground	No

2. Turn ignition switch ON.
3. Check voltage between electric compressor harness connector and ground.

(+)		(–)	Voltage (Approx.)
Electric compressor			
Connector	Terminal		
F38	3	Ground	0 V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 5.

5. CHECK LIN (ELECTRIC COMPRESSOR) SIGNAL CIRCUIT FOR SHORT-2

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R connector.
3. Check continuity between electric compressor harness connector and ground.

Electric compressor		(–)	Continuity
Connector	Terminal		
F38	3	Ground	No

4. Turn ignition switch ON.
5. Check voltage between electric compressor harness connector and ground.

(+)		(–)	Voltage (Approx.)
Electric compressor			
Connector	Terminal		
F38	3	Ground	0 V

Is the inspection result normal?

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

6. CHECK LIN (ELECTRIC COMPRESSOR) SIGNAL CIRCUIT FOR SHORT-3

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R connector.
3. Check continuity between IPDM E/R harness connector and ground.

IPDM E/R		(–)	Continuity
Connector	Terminal		
E120	42	Ground	No

4. Turn ignition switch ON.
5. Check voltage between IPDM E/R harness connector and ground.

(+)		(–)	Voltage (Approx.)
IPDM E/R			
Connector	Terminal		
E120	42	Ground	0 V

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-46, "Removal and Installation".
NO >> Repair harness or connector.

7. OPERATION INSPECTION OF AIR CONDITIONING SYSTEM

1. Turn ignition switch OFF.
2. Connect electric compressor connector and A/C auto amp. connector.
3. Turn ignition switch ON.
4. Operate the A/C switch, and check if it reacts to the operation launched with other switch than A/C switch.

Is the inspection result normal?

YES >> Replace electric compressor. Refer to HA-32, "ELECTRIC COMPRESSOR : Removal and Installation".
NO >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".

B24D4-08 A/C CONTROL COMMUNICATION

DTC Description

INFOID:0000000015202352

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)		DTC detection condition	
B24D4-08	A/C CONTROL COMM (Air conditioning control communication)	[BUS SIGNAL/MESSAGE ERROR]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	A/C switch LIN circuit (terminal 8)
			Threshold	–
			Diagnosis delay time	2 seconds or more

POSSIBLE CAUSE

- Fuse
- Harness and connector (A/C switch circuit is open or shorted)
- A/C switch
- A/C auto amp.

FAIL-SAFE

—

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

CONSULT

1. Turn ignition switch ON.
2. Select “Self Diagnostic Result” mode of “HVAC”.
3. Check DTC.

Is DTC detected?

YES >> Refer to HAC-94, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: Inspection End

Diagnosis Procedure

INFOID:0000000015202353

Regarding Wiring Diagram information, refer to HAC-45, "Wiring Diagram".

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check 10A fuse [No. 20, located in fuse block (J/B)].

NOTE:
Refer to PG-112, "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 A/C SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect A/C switch connector.
3. Turn ignition switch ON.
4. Check voltage between A/C switch harness connector and ground.

+		(–)	Voltage (Approx.)
A/C switch			
Connector	Terminal		
M51	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair harness or connector between A/C switch and fuse.

3. CHECK A/C SWITCH GROUND CIRCUIT FOR OPEN

1. Turn ignition switch OFF.
2. Check continuity between A/C switch harness connector and ground.

A/C switch		(–)	Continuity
Connector	Terminal		
M51	1	Ground	Yes

Is the inspection result normal?

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

4. CHECK LIN COMMUNICATION SIGNAL CIRCUIT FOR OPEN

1. Disconnect A/C auto amp. connector.
2. Check continuity between A/C switch harness connector and A/C auto amp. harness connector.

A/C switch		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M51	8	M54	33	Yes

Is the inspection result normal?

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

5. CHECK LIN COMMUNICATION SIGNAL CIRCUIT FOR SHORT

Check continuity between A/C switch harness connector and ground.

A/C switch		(–)	Continuity
Connector	Terminal		
M51	8	Ground	No

Is the inspection result normal?

YES >> Replace A/C switch. Refer to HAC-119, "Removal and Installation".
NO >> Repair harness or connector.

B2653-1C ELECTRIC COMPRESSOR

DTC Description

INFOID:0000000015202354

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)		DTC detection condition	
B2653-1C	COMP INTERNAL TEMP SENSOR (Compressor internal temperature sensor)	[CIRCUIT VOLTAGE OUT OF RANGE]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	–
			Diagnosis delay time	2 seconds or more

POSSIBLE CAUSE

Electric compressor

FAIL-SAFE

Electric compressor operation is stopped.

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

CONSULT

1. Turn ignition switch OFF.
2. Turn ignition switch ON.
3. Operate the air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select “Self Diagnostic Result” mode of “HVAC“.
6. Check DTC.

Is DTC detected?

YES >> Refer to HAC-96, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: Inspection End

Diagnosis Procedure

INFOID:0000000015202355

1.PERFORM SELF DIAGNOSTIC RESULT

CONSULT

1. Turn ignition switch ON.
2. Select “Self Diagnostic Result” mode of “HVAC”.
3. Select “ERASE”.
4. Turn ignition switch OFF.
5. Turn ignition switch ON.
6. Perform “DTC CONFIRMATION PROCEDURE”. Refer to HAC-96, "DTC Description".

Is DTC detected again?

YES >> Replace electric compressor. Refer to HA-32, "ELECTRIC COMPRESSOR : Removal and Installation".
NO >> Inspection End.

B27B5-19, B27B6-13, B27B7-1D, B27BA-19, B27BE-49 ELECTRIC COMPRESSOR

DTC Description

INFOID:0000000015202356

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)		DTC detection condition	
B27B5-19	COMP INTNL CIRC (Compressor internal circuit)	[CIRCUIT CURRENT ABOVE THRESHOLD]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	–
			Diagnosis delay time	2 seconds or more
B27B6-13	COMP INTNL CIRC (Compressor internal circuit)	[CIRCUIT OPEN]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	–
			Diagnosis delay time	2 seconds or more
B27B7-1D	COMP CURNT SENS (Compressor current sensor)	[CIRCUIT CURRENT OUT OF RANGE]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	–
			Diagnosis delay time	2 seconds or more
B27BA-19	COMP SYSTEM (Compressor system)	[CIRCUIT CURRENT ABOVE THRESHOLD]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	–
			Diagnosis delay time	2 seconds or more
B27BE-49	COMP INTNL SYS (Compressor internal system)	[INTERNAL ELECTRONIC ERROR]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	–
			Diagnosis delay time	2 seconds or more

POSSIBLE CAUSE

Electric compressor

FAIL-SAFE

- [B27B5-19]: —
- [B27B6-13]: —
- [B27B7-1D]: Electric compressor operation is stopped.
- [B27BA-19]: —
- [B27BE-49]: —

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

CONSULT

1. Turn ignition switch OFF.
2. Turn ignition switch ON.
3. Operate the air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select “Self Diagnostic Result” mode of “HVAC”.
6. Check DTC.

Is DTC detected?

YES >> Refer to HAC-98, "Diagnosis Procedure".

NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".

NO-2 >> Confirmation after repair: Inspection End

Diagnosis Procedure

INFOID:0000000015202357

1.PERFORM SELF DIAGNOSTIC RESULT

CONSULT
1. Turn ignition switch ON.
2. Select “Self Diagnostic Result” mode of “HVAC”.
3. Select “ERASE”.
4. Turn ignition switch OFF.
5. Turn ignition switch ON.
6. Perform “DTC CONFIRMATION PROCEDURE”. Refer to HAC-97, "DTC Description".

Is DTC detected again?

YES >> Replace electric compressor. Refer to HA-32, "ELECTRIC COMPRESSOR : Removal and Installation".

NO >> Inspection End.

B27B8-19 ELECTRIC COMPRESSOR

DTC Description

INFOID:0000000015202358

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)		DTC detection condition	
B27B8-19	COMP OVER LOADED (Compressor over loaded)	[CIRCUIT CURRENT ABOVE THRESHOLD]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	–
			Diagnosis delay time	2 seconds or more

POSSIBLE CAUSE

- Refrigerant leakage
- Cooling fan
- Refrigerant insufficient or overfilled
- Li-ion battery
- Traction motor inverter
- Electric compressor

FAIL-SAFE

—

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

CONSULT

1. Turn ignition switch OFF.
2. Turn ignition switch ON.
3. Operate the air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select “Self Diagnostic Result” mode of “HVAC”.
6. Check DTC.

Is DTC detected?

YES >> Refer to HAC-99, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: Inspection End

Diagnosis Procedure

INFOID:0000000015202359

1.CHECK REFRIGERANT FOR LEAKAGES

Check refrigerant for leakages. Refer to HA-25, "Leak Test".

Is the inspection result normal?

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

2.CHECK COOLING FAN OPERATION

1. Turn ignition switch ON.
2. Operate the 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 EC-551, "Component Function Check".

3.CHECK REFRIGERANT CYCLE

Check refrigerant cycle. Refer to HA-31, "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 HBB-50, "Work Flow".

Is the inspection result normal?

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

5. CHECK TRACTION MOTOR INVERTER

Check traction motor inverter. Refer to TMS-52, "Work Flow".

Is the inspection result normal?

YES >> Replace electric compressor. Refer to HA-32, "ELECTRIC COMPRESSOR : Removal and Installation".
NO >> Repair or replace malfunctioning parts.

B27BB-1C ELECTRIC COMPRESSOR

DTC Description

INFOID:0000000015202360

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)		DTC detection condition	
B27BB-1C	COMP HI VOL SYS (Compressor high voltage system)	[CIRCUIT VOLTAGE OUT OF RANGE]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	–
			Diagnosis delay time	2 seconds or more

POSSIBLE CAUSE

- Electric compressor
- Li-ion battery
- Traction motor inverter
- High voltage harness or connectors (Electric compressor high voltage circuit is open or shorted.)

FAIL-SAFE

Electric compressor operation is stopped.

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

CONSULT

1. Turn ignition switch OFF.
2. Turn ignition switch ON.
3. Operate the air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select “Self Diagnostic Result” mode of “HVAC”.
6. Check DTC.

Is DTC detected?

YES >> Refer to HAC-101, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: Inspection End

Diagnosis Procedure

INFOID:0000000015202361

DANGER:

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

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to GI-28, "High Voltage Precautions".**

CAUTION:

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

Regarding Wiring Diagram information, refer to HBB-40, "Wiring Diagram".

CAUTION:
Erase DTC after the work is completed.

1.CHECK LI-ION BATTERY

Check Li-ion battery. Refer to HBB-50, "Work Flow".

Is the inspection result normal?

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

2.CHECK TRACTION MOTOR INVERTER

Check traction motor inverter. Refer to TMS-52, "Work Flow".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace malfunctioning parts.

3.PRECONDITIONING

WARNING:
Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 4.

4.CHECK ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS CIRCUIT-1

1. Disconnect electric compressor and traction motor inverter connector.
2. Check continuity between electric compressor high voltage harness connector and traction motor inverter high voltage harness connector.

Electric compressor		Traction motor inverter		Continuity
Connector	Terminal	Connector	Terminal	
H8	2	H3	46	Yes
	3		47	

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace high voltage harness between electric compressor and traction motor inverter.

5.CHECK ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS CIRCUIT-2

1. Disconnect Li-ion battery connector.
2. Check continuity between Li-ion battery high voltage harness connector and traction motor inverter high voltage harness connector.

Li-ion battery		Traction motor inverter		Continuity
Connector	Terminal	Connector	Terminal	
H6	25	H1	44	Yes
	26		43	

Is the inspection result normal?

YES >> Replace electric compressor. Refer to HA-32, "ELECTRIC COMPRESSOR : Removal and Installation".
NO >> Replace high voltage harness between Li-ion battery and traction motor inverter.

B27BC-87 ELECTRIC COMPRESSOR

DTC Description

INFOID:0000000015202362

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)		DTC detection condition	
B27BC-87	COMP COMM ERROR HVAC->COMP (Compressor communication error heating ventilating and air-conditioning system->Compressor)	[missing message]	Diagnosis condition	When ignition switch is ON.
			Signal (terminal)	–
			Threshold	–
			Diagnosis delay time	2 seconds or more

POSSIBLE CAUSE

- Fuse
- IPDM E/R
- Electric compressor
- A/C auto amp.
- Harness or connectors (Electric compressor circuit is open or shorted.)
- High voltage harness or connectors (Electric compressor high voltage circuit is open or shorted.)
- Traction motor inverter

FAIL-SAFE

Electric compressor operation is stopped.

DTC CONFIRMATION PROCEDURE

1. PERFORM DTC CONFIRMATION PROCEDURE

CONSULT

1. Turn ignition switch OFF.
2. Turn ignition switch ON.
3. Operate the air conditioning system.
4. Set the temperature to full cold and wait at least 2 seconds.
5. Select “Self Diagnostic Result” mode of “HVAC”.
6. Check DTC.

Is DTC detected?

YES >> Refer to HAC-103, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: Inspection End

Diagnosis Procedure

INFOID:0000000015202363

DANGER:

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

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to GI-28, "High Voltage Precautions".**

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

Regarding Wiring Diagram information, refer to HAC-45, "Wiring Diagram".

CAUTION:
Erase DTC after the work is completed.

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check 10A fuse (No. 30).
   NOTE:
   Refer to PG-112, "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 ELECTRIC COMPRESSOR POWER SUPPLY-1

1. Disconnect electric connector.
2. Turn ignition switch ON.
3. Check voltage between electric compressor harness connector and ground.

(+)		(–)	Voltage (Approx.)
Electric compressor			
Connector	Terminal		
F38	6	Ground	8 – 16 V

Is the inspection result normal?

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

3.CHECK ELECTRIC COMPRESSOR POWER SUPPLY-2

Check voltage between IPDM E/R harness connector and ground.

(+)		(–)	Voltage (Approx.)
IPDM E/R			
Connector	Terminal		
E120	41	Ground	8 – 16 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair harness or connector between IPDM E/R and fuse.

4.CHECK ELECTRIC COMPRESSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R connector.
3. Check continuity between IPDM E/R harness connector and electric compressor harness connector.

IPDM E/R		Electric compressor		Continuity
Connector	Terminal	Connector	Terminal	
F42	89	F38	6	Yes

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-46, "Removal and Installation".
NO >> Repair harness or connector.

5. CHECK ELECTRIC COMPRESSOR GROUND CIRCUIT

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

Electric compressor		(–)	Continuity
Connector	Terminal		
F38	5	Ground	Yes

Is the inspection result normal?

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

6. CHECK ELECTRIC COMPRESSOR LIN COMMUNICATION CIRCUIT-1

1. Disconnect A/C auto amp. connector.
2. 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	
F38	3	M54	9	Yes

Is the inspection result normal?

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

7. CHECK ELECTRIC COMPRESSOR LIN COMMUNICATION CIRCUIT-2

Check continuity between electric compressor harness connector and ground.

Electric compressor		(–)	Continuity
Connector	Terminal		
F38	3	Ground	Yes

Is the inspection result normal?

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

8. CHECK TRACTION MOTOR INVERTER

Check traction motor inverter. Refer to TMS-52, "Work Flow".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace malfunctioning parts.

9. PRECONDITIONING

WARNING:
Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 10.

10. CHECK ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS CIRCUIT-1

1. Disconnect electric compressor and traction motor inverter connector.
2. Check continuity between electric compressor high voltage harness connector and traction motor inverter high voltage harness connector.

Regarding Wiring Diagram information, refer to HBB-40, "Wiring Diagram".

Electric compressor		Traction motor inverter		Continuity
Connector	Terminal	Connector	Terminal	
H8	2	H3	46	Yes
	3		47	

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace high voltage harness between electric compressor and traction motor inverter.

11. CHECK ELECTRIC COMPRESSOR HIGH VOLTAGE HARNESS CIRCUIT-2

1. Disconnect Li-ion battery connector.
2. Check continuity between Li-ion battery high voltage harness connector and traction motor inverter high voltage harness connector.

Li-ion battery		Traction motor inverter		Continuity
Connector	Terminal	Connector	Terminal	
H6	25	H1	44	Yes
	26		43	

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace high voltage harness between Li-ion battery and traction motor inverter.

12. CHECK A/C AUTO AMP.

Ⓔ CONSULT
1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Select “MODE1” of “HVAC TEST” in “ACTIVE TEST” mode of “HVAC”. Refer to HAC-30, "CONSULT Function (HVAC)".
4. Check that the electric compressor operates normally.

Is the inspection result normal?

YES >> Inspection End
NO >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation". Then GO TO 13.

13. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC confirmation procedure. Refer to HAC-103, "DTC Description".

Is DTC detected?

YES >> Replace electric compressor. Refer to HA-32, "ELECTRIC COMPRESSOR : Removal and Installation".
NO >> Inspection End

POWER SUPPLY AND GROUND CIRCUIT

A/C AUTO AMP.

A/C AUTO AMP. : Diagnosis Procedure

INFOID:0000000015202317

Regarding Wiring Diagram information, refer to HAC-45, "Wiring Diagram".

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check 10A fuse [No. 20, located in fuse block (J/B)].
   NOTE:
   Refer to PG-112, "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 A/C AUTO AMP. ACCESSORY POWER SUPPLY

1. Disconnect A/C auto amp. connector.
2. Turn ignition switch ON.
3. Check voltage between A/C auto amp. harness connector and ground.

(+)		(–)	Voltage (Approx.)
A/C auto amp.			
Connector	Terminal		
M54	1	Ground	11 – 14 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair harness or connector between A/C auto amp. and fuse.

3.CHECK A/C AUTO AMP. GROUND CIRCUIT FOR OPEN

1. Turn ignition switch OFF.
2. Check continuity between A/C auto amp. harness connector and ground.

A/C auto amp.		(–)	Continuity
Connector	Terminal		
M54	3	Ground	Yes

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Repair harness or connector.

A/C SWITCH ASSEMBLY

A/C SWITCH ASSEMBLY : Component Function Check

INFOID:0000000014625991

1.CHECK OPERATION

1. Press the AUTO switch, and then check that “AUTO” is shown on the display.
2. Operate the temperature control dial (driver side). Check that the fan speed or outlet changes. (The discharge air temperature or fan speed varies depending on the ambient temperature, in-vehicle temperature, and temperature setting.)

Does it operate normally?

YES >> Inspection End.

NO >> Perform trouble diagnosis for the A/C switch. Refer to HAC-108, "A/C SWITCH ASSEMBLY : Diagnosis Procedure".

A/C SWITCH ASSEMBLY : Diagnosis Procedure

INFOID:0000000014625992

Regarding Wiring Diagram information, refer to HAC-45, "Wiring Diagram".

1.CHECK A/C SWITCH POWER SUPPLY

1. Disconnect the A/C switch connector.
2. Turn ignition switch ON.
3. Check voltage between A/C switch harness connector and ground.

(+)		(–)	Voltage (Approx.)
A/C switch			
Connector	Terminal		
M51	4	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK FUSE

Check 10A fuse [No. 20, located in the fuse block (J/B)].

NOTE:
Refer to PG-112, "Terminal Arrangement".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the blown fuse after repairing the affected circuit.

3.CHECK A/C SWITCH POWER SUPPLY CIRCUIT FOR OPEN

1. Check continuity between A/C switch harness connector and fuse block (J/B) harness connector.

A/C switch		Fuse block (J/B)		Continuity
Connector	Terminal	Connector	Terminal	
M51	4	M68	16R	Yes

Is the inspection result normal?

YES >> Inspection End.
NO >> Repair harness or connector.

4.CHECK A/C SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check continuity between A/C switch harness connector and ground.

A/C switch		(–)	Continuity
Connector	Terminal		
M51	1	Ground	Yes

Is the inspection result normal?

YES >> Replace the A/C switch. Refer to HAC-119, "Removal and Installation".
NO >> Repair the harness or connectors.

BLOWER MOTOR

Diagnosis Procedure

INFOID:0000000015202318

Regarding Wiring Diagram information, refer to HAC-45, "Wiring Diagram".

1.CHECK FUSE

1. Turn ignition switch OFF.
2. Check 15A fuse [Nos. 17 and 27, located in fuse block (J/B)].
   NOTE:
   Refer to PG-112, "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 VARIABLE BLOWER CONTROL POWER SUPPLY

1. Disconnect variable blower control connector.
2. Turn ignition switch ON.
3. Check voltage between variable blower control harness connector and ground.

(+)		(–)	Voltage (Approx.)
Variable blower control			
Connector	Terminal		
M133	4	Ground	Battery voltage

Is the inspection result normal?

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

3.CHECK FRONT BLOWER MOTOR RELAY

1. Turn ignition switch OFF.
2. Check front blower motor relay. Refer to HAC-112, "Component Inspection (Front Blower Motor Relay)".

Is the inspection result normal?

YES >> Repair harness or connector between variable blower control and fuse.
NO >> Replace front blower motor relay.

4.CHECK FRONT BLOWER MOTOR CONTROL CIRCUIT

1. Turn ignition switch OFF.
2. Connect variable blower control connector.
3. Disconnect front blower motor connector.
4. Turn ignition switch ON.
5. Check voltage between front blower motor harness connector and ground.

(+)		(–)	Voltage (Approx.)
Front blower motor			
Connector	Terminal		
M144	1	Ground	Battery voltage

Is the inspection result normal?

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

5.CHECK FRONT BLOWER MOTOR CONTROL CIRCUIT FOR OPEN

1. Turn ignition switch OFF.

2. Disconnect variable blower control connector.
3. Check continuity between variable blower control harness connector and front blower motor harness connector.

Variable blower control		Front blower motor		Continuity
Connector	Terminal	Connector	Terminal	
M134	5	M144	1	Yes

Is the inspection result normal?

YES >> Replace variable blower control. Refer to HAC-129, "Removal and Installation".
NO >> Repair harness or connector.

6. CHECK FRONT BLOWER MOTOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect variable blower control connector.
3. Check continuity between variable blower control harness connector and front blower motor harness connector.

Variable blower control		Front blower motor		Continuity
Connector	Terminal	Connector	Terminal	
M134	6	M144	2	Yes

Is the inspection result normal?

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

7. CHECK VARIABLE BLOWER CONTROL GROUND CIRCUIT

Check continuity between variable blower control harness connector and ground.

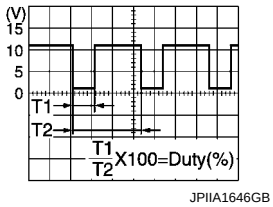
Variable blower control		(–)	Continuity
Connector	Terminal		
M133	2	Ground	Yes

Is the inspection result normal?

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

8. CHECK VARIABLE BLOWER CONTROL SIGNAL

1. Connect variable blower control connector and A/C auto amp. connector.
2. Turn ignition switch ON.
3. Set air outlet to VENT.
4. Change fan speed from 1st – 7th, and check duty ratios between variable blower control harness connector and ground by using an oscilloscope.
   NOTE:
   Calculate the drive signal duty ratio as shown in the figure.
   T2 = Approx. 2.5 ms

(+)		(–)	Condition	Duty ratio (Approx.)	Voltage (Approx.)
Variable blower control					
Connector	Terminal		Fan speed (manual) Air outlet: VENT		
M133	3	Ground	1st	23%	 JPIIA1646GB
			2nd	29%	
			3rd	36%	
			4th	44%	
			5th	52%	
			6th	61%	
			7th	72%	

Is the inspection result normal?

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

9. CHECK VARIABLE BLOWER CONTROL SIGNAL CIRCUIT FOR OPEN

1. Turn ignition switch OFF.
2. Disconnect variable blower control connector and A/C auto amp. connector.
3. Check continuity between variable blower control harness connector and A/C auto amp. harness connector.

Variable blower control		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M133	3	M55	67	Yes

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Repair harness or connector.

10. CHECK FRONT BLOWER MOTOR FEEDBACK SIGNAL

When fan speed is set to OFF, and check voltage between variable blower control harness connector and ground.

(+)		(–)	Voltage (Approx.)
Variable blower control			
Connector	Terminal		
M133	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 11.

11. CHECK FRONT BLOWER MOTOR FEEDBACK SIGNAL CIRCUIT FOR OPEN

1. Turn ignition switch OFF.
2. Disconnect variable blower control connector and A/C auto amp. connector.
3. Check continuity between variable blower control harness connector and A/C auto amp. harness connector.

Variable blower control		A/C auto amp.		Continuity
Connector	Terminal	Connector	Terminal	
M133	1	M55	77	Yes

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Repair harness or connector.

12. REPLACE VARIABLE BLOWER CONTROL

1. Turn ignition switch OFF.
2. Replace variable blower control. Refer to HAC-129, "Removal and Installation".
3. Turn ignition switch ON.
4. Change fan speed from 1st – 7th, and check that front blower motor operates normally.

Is the inspection result normal?

YES >> Inspection End
NO >> Replace front blower motor. Refer to VTL-17, "Removal and Installation".

Component Inspection (Front Blower Motor)

INFOID:0000000015202319

1. CHECK BLOWER MOTOR-1

1. Remove front blower motor. Refer to VTL-17, "Removal and Installation".
2. Check that there are no foreign objects in the front blower motor.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace front blower motor. Refer to VTL-17, "Removal and Installation".

2. CHECK BLOWER MOTOR-2

Check that there is not breakage or damage in the front blower motor.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace front blower motor. Refer to VTL-17, "Removal and Installation".

3. CHECK BLOWER MOTOR-3

Check that front blower motor turns smoothly.

Is the inspection result normal?

YES >> Inspection End
NO >> Replace front blower motor. Refer to VTL-17, "Removal and Installation".

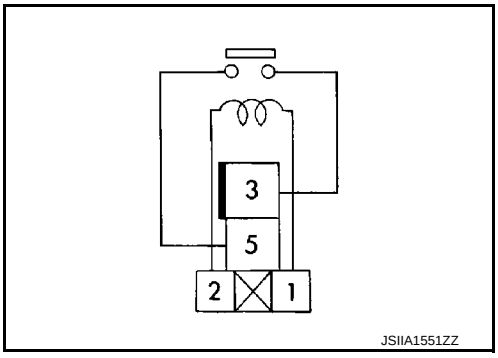
Component Inspection (Front Blower Motor Relay)

INFOID:0000000015202320

1. CHECK FRONT BLOWER MOTOR RELAY

1. Remove front blower motor relay. Refer to PG-112, "Terminal Arrangement".
2. Check continuity between front blower motor relay terminal 3 and 5 when the voltage is supplied between terminal 1 and 2.

Terminal		Voltage	Continuity
3	5	ON	Yes
		OFF	No



Is the inspection result normal?

YES >> Inspection End
NO >> Replace front blower motor relay.

ELECTRIC COMPRESSOR INSULATION RESISTANCE CHECK

Component Inspection

INFOID:0000000015202321

DANGER:

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

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to GI-28, "High Voltage Precautions".**

CAUTION:

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

DIAGNOSIS PROCEDURE

1. PRECONDITIONING

WARNING:

Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

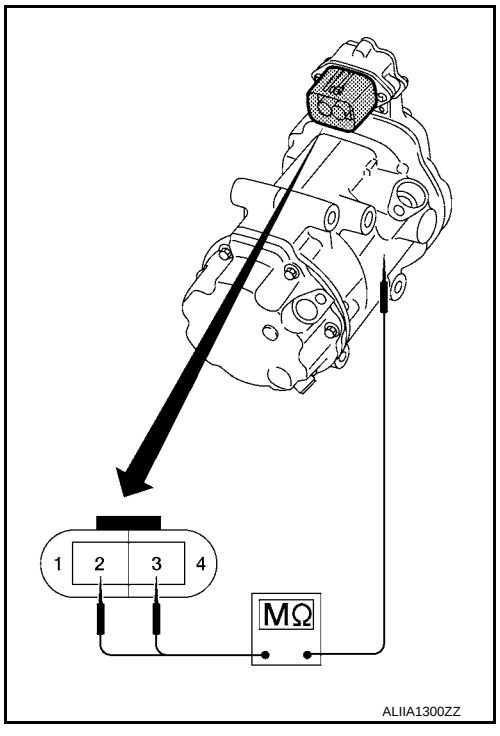
>> GO TO 2.

2. CHECK ELECTRIC COMPRESSOR INSULATION RESISTANCE

1. Disconnect high voltage harness connector from electric compressor.
2. Check the insulation resistance of the electric compressor with an insulation resistance tester.

   CAUTION:

   - **Unlike the ordinary tester, the insulation resistance tester applies 500V when measuring. If used incorrectly, there is the danger of electric shock. If used in the vehicle 12V system, there is the danger of damage to electronic devices. Read the insulation resistance tester instruction manual carefully and be sure to work safely.**
   - **Use 500V range of insulation resistance tester to measure insulation resistance. Wait for 30 seconds until the value becomes stable.**



(+) Terminal	(–)	Resistance
2	Aluminum part on side of electric compressor	3 MΩ or more
3		

Is the inspection result normal?

YES >> Inspection End

NO >> Replace electric compressor. Refer to HA-32, "ELECTRIC COMPRESSOR : Removal and Installation".

SYMPTOM DIAGNOSIS

HEATER AND AIR CONDITIONING SYSTEM CONTROL SYMPTOMS

Diagnosis Chart By Symptom

INFOID:0000000014625993

NOTE:
Perform the self-diagnoses with CONSULT before performing the symptom diagnosis. If DTC is detected, perform the corresponding diagnosis.

Symptom	Corresponding malfunction part	Reference
• Air conditioning does not activate. • Air conditioning cannot be controlled. • Operation status of air conditioning is not indicated on display.	• A/C auto amp. ignition power supply circuit • A/C switch (A/C auto amp.)	HAC-107, "A/C AUTO AMP. : Diagnosis Procedure"
• Air outlet does not change. • Mode door motor does not operate normally.	• Circuit between mode door motor and A/C auto amp. • Mode door motor control linkage • Mode door motor • A/C auto amp.	HAC-82, "Diagnosis Procedure"
• Discharge air temperature of driver side does not change. • Air mix door motor LH does not operate normally.	• Circuit between air mix door motor LH and A/C auto amp. • Air mix door motor LH installation condition • Air mix door motor LH • A/C auto amp.	HAC-85, "Diagnosis Procedure"
• Discharge air temperature of passenger side does not change. • Air mix door motor RH does not operate normally.	• Circuit between air mix door motor RH and A/C auto amp. • Air mix door motor RH installation condition • Air mix door motor RH • A/C auto amp.	HAC-88, "Diagnosis Procedure"
• Intake door does not change. • Intake door motor does not operate normally.	• Circuit between intake door motor and A/C auto amp. • Intake door motor control linkage • Intake door motor • A/C auto amp.	HAC-79, "Diagnosis Procedure"
Front blower motor operation is malfunctioning.	• Power supply system of front blower motor • Circuit between front blower motor and A/C auto amp. • Front blower motor • A/C auto amp.	HAC-109, "Diagnosis Procedure"
Electric compressor does not operate.	• Circuit between ECM and refrigerant pressure sensor • Refrigerant pressure sensor • CAN communication circuit • A/C auto amp.	HAC-118, "Diagnosis Procedure"
• Insufficient cooling. • No cool air comes out. (Air flow volume is normal.)	• Refrigerant cycle • Air leakage from each duct • A/C auto amp. connection recognition signal circuit • Temperature setting trimmer (front)	HAC-116, "Diagnosis Procedure"
• Insufficient heating. • No warm air comes out. (Air flow volume is normal.)	• Engine cooling system • Heater hose • Heater core • Air leakage from each duct • Temperature setting trimmer (front)	HAC-117, "Diagnosis Procedure"

Symptom		Corresponding malfunction part	Reference
Noise is heard when air conditioning system operates.	During A/C compressor operation	Refrigerant cycle	HA-21, "Symptom Table"
	During front blower motor operation	• Mixing any foreign object in front blower motor • Front blower motor fan breakage • Front blower motor rotation inferiority	HAC-112, "Component Inspection (Front Blower Motor)"
• Memory function does not operate. • Setting temperature is not memorized.		• Battery power supply system of A/C auto amp. • A/C auto amp.	HAC-107, "A/C AUTO AMP. : Diagnosis Procedure"

INSUFFICIENT COOLING

Description

INFOID:0000000015202368

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

Diagnosis Procedure

INFOID:0000000015202369

NOTE:
Perform self-diagnoses with CONSULT before performing symptom diagnosis. If any DTC is detected, perform the corresponding diagnosis.

1.CHECK ELECTRIC COMPRESSOR OPERATION

Check the electric compressor operation state while the air conditioning system is operated.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform diagnosis of ELECTRIC COMPRESSOR DOES NOT OPERATE in SYMPTOM DIAGNOSIS. Refer to HAC-118, "Diagnosis Procedure".

2.CHECK REFRIGERANT CYCLE PRESSURE

Connect recovery/recycling recharging equipment to the vehicle and perform pressure inspection with gauge. Refer to HA-21, "Symptom Table".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace parts depending on the inspection results.

3.CHECK AIR LEAKAGE FROM EACH DUCT

Check duct and nozzle, etc. of the air conditioning system for leakage.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace parts depending on the inspection results.

4.CHECK SETTING OF TEMPERATURE SETTING TRIMMER

1. Check setting value of temperature setting trimmer. Refer to HAC-60, "Temperature Setting Trimmer".
2. Check that temperature setting trimmer is set to “+ direction”.
   NOTE:
   The control temperature can be set with the setting of the temperature setting trimmer.
3. Set difference between the set temperature and control temperature to “0”.

Is inspection result normal?

YES >> Inspection End
NO >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".

INSUFFICIENT HEATING

Description

INFOID:0000000015202366

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

Diagnosis Procedure

INFOID:0000000015202367

NOTE:
Perform self-diagnoses with CONSULT before performing symptom diagnosis. If any DTC is detected, perform the corresponding diagnosis.

1.CHECK COOLING SYSTEM

1. Check engine coolant level and check for leakage. Refer to CO-10, "Inspection".
2. Check radiator cap. Refer to CO-10, "Inspection".
3. Check water flow sounds of the engine coolant. Refer to CO-11, "Refilling".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Refill engine coolant and repair or replace the parts depending on the inspection results.

2.CHECK HEATER HOSE

Check installation of heater hose by visually or touching.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace parts depending on the inspection results.

3.CHECK HEATER CORE

1. Check temperature of inlet hose and outlet hose of heater core.
2. Check that inlet side of heater core is hot and the outlet side is slightly lower than/almost equal to the inlet side.
   CAUTION:
   Always perform the temperature inspection in a short period of time because the engine coolant temperature is very hot.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace heater core. Refer to HA-53, "HEATER CORE : Removal and Installation".

4.CHECK AIR LEAKAGE FROM EACH DUCT

Check duct and nozzle, etc. of the air conditioning system for air leakage.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace parts depending on the inspection results.

5.CHECK SETTING OF TEMPERATURE SETTING TRIMMER

1. Check setting value of temperature setting trimmer. Refer to HAC-60, "Temperature Setting Trimmer".
2. Check that temperature setting trimmer is set to “– direction”.
   NOTE:
   The control temperature can be set by the temperature setting trimmer.
3. Set difference between the set temperature and control temperature to “0”.

Are the symptoms solved?

YES >> Inspection End
NO >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".

ELECTRIC COMPRESSOR DOES NOT OPERATE

Description

INFOID:0000000015202364

SYMPTOM

Electric compressor does not operate.

Diagnosis Procedure

INFOID:0000000015202365

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 EC-579, "Component Function Check".

Is the inspection result normal?

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

2. CHECK A/C AUTO AMP. OUTPUT SIGNAL

CONSULT

1. Turn ignition ON.
2. Select “HVAC TEST” in “ACTIVE TEST” mode of “HVAC”. Refer to HAC-30, "CONSULT Function (HVAC)".
3. Check the electric compressor operations in each mode.

Is the inspection result normal?

YES >> Replace A/C auto amp. Refer to HAC-120, "Removal and Installation".
NO >> Replace electric compressor. Refer to HA-32, "ELECTRIC COMPRESSOR : Removal and Installation".

REMOVAL AND INSTALLATION

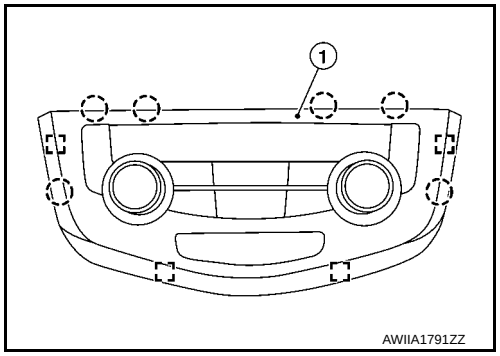
A/C SWITCH ASSEMBLY

Removal and Installation

INFOID:0000000014626000

REMOVAL

1. Release the A/C switch assembly clips and pawls using a suitable tool.
   : Metal clip
   : Pawl
2. Disconnect the harness connectors from the A/C switch assembly (1) and remove.
3. Remove A/C switch assembly from finisher.



INSTALLATION

Installation is in the reverse order of removal.

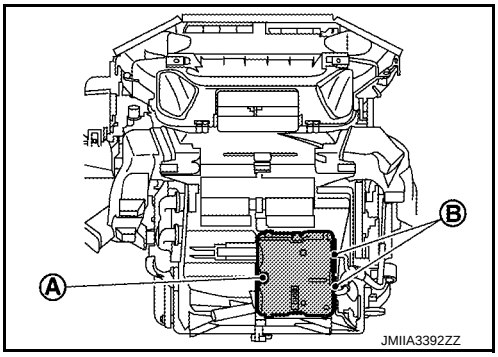
A/C AUTO AMP.

Removal and Installation

INFOID:0000000014626001

REMOVAL

1. Remove center console side finisher (RH). Refer to IP-18, "Exploded View".
2. Remove screw (A) and disconnect harness connectors (B).



3. Remove A/C auto amp.

INSTALLATION

Installation is in the reverse order of removal.

CAUTION:

After installing A/C auto amp., perform the door motor starting position reset. Refer to HAC-63, "Description".

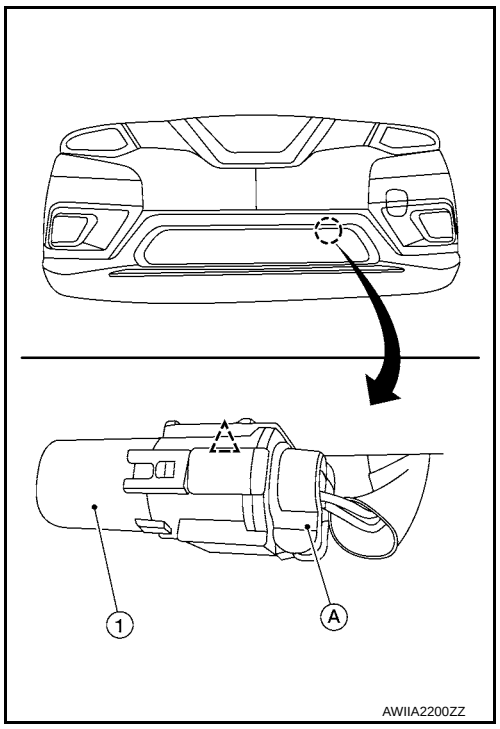
AMBIENT SENSOR

Removal and Installation

INFOID:0000000014626002

REMOVAL

1. Disconnect the harness connector (A) from the ambient sensor (1).
2. Release the clip and remove ambient sensor.
   : Clip



INSTALLATION

Installation is in the reverse order of removal.

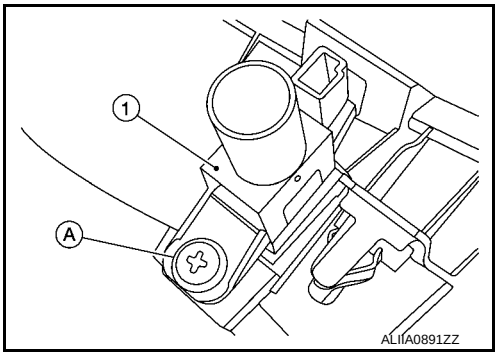
IN-VEHICLE SENSOR

Removal and Installation

INFOID:0000000014626003

REMOVAL

1. Remove cluster lid C. Refer to IP-21, "Removal and Installation".
2. Disconnect harness connector from in-vehicle sensor.
3. Disconnect aspirator hose from in-vehicle sensor.
4. Remove screw (A) and in-vehicle sensor (1).



INSTALLATION

Installation is in the reverse order of removal.

SUNLOAD SENSOR

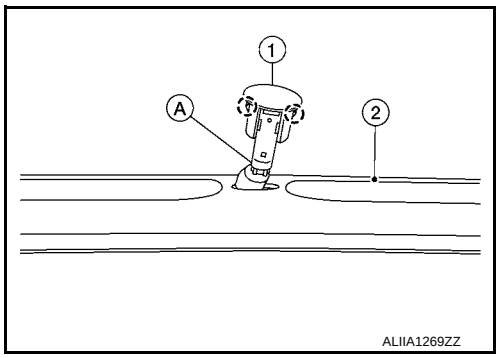
Removal and Installation

INFOID:0000000014626004

REMOVAL

1. Release pawls using a suitable tool and remove sunload sensor (1) from defroster grille (2).
2. Disconnect harness connector (A) from sunload sensor (1), then remove sunload sensor.

: Pawl



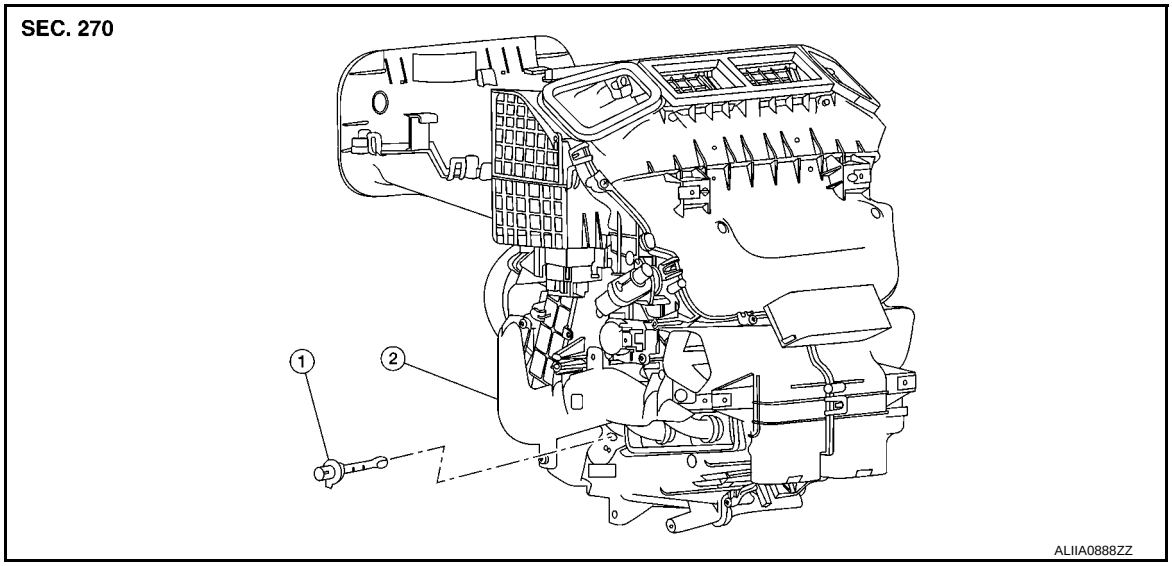
INSTALLATION

Installation is in the reverse order of removal.

INTAKE SENSOR

Exploded View

INFOID:0000000014626005



1. Intake sensor
2. Heating and cooling unit assembly

Removal and Installation

INFOID:0000000014626006

REMOVAL

1. Remove front foot duct (LH). Refer to VTL-10, "FRONT FOOT DUCT : Removal and Installation".
2. Disconnect the harness connector and remove intake sensor.

INSTALLATION

Installation is in the reverse order of removal.

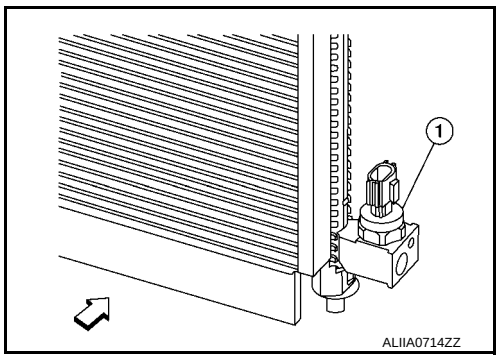
REFRIGERANT PRESSURE SENSOR

Removal and Installation

INFOID:0000000014626007

REMOVAL

1. Discharge the refrigerant. Refer to HA-26, "Recycle Refrigerant".
2. Remove front fender protector (RH). Refer to EXT-40, "FENDER PROTECTOR : Removal and Installation".
3. Disconnect the harness connector from the refrigerant pressure sensor.
4. Remove the refrigerant pressure sensor (1) from the condenser.
   ⇦: Front
   CAUTION:
   Cap or wrap the opening of the refrigerant pressure sensor with suitable material such as vinyl tape to avoid the entry of air.



INSTALLATION

Installation is in the reverse order of removal.

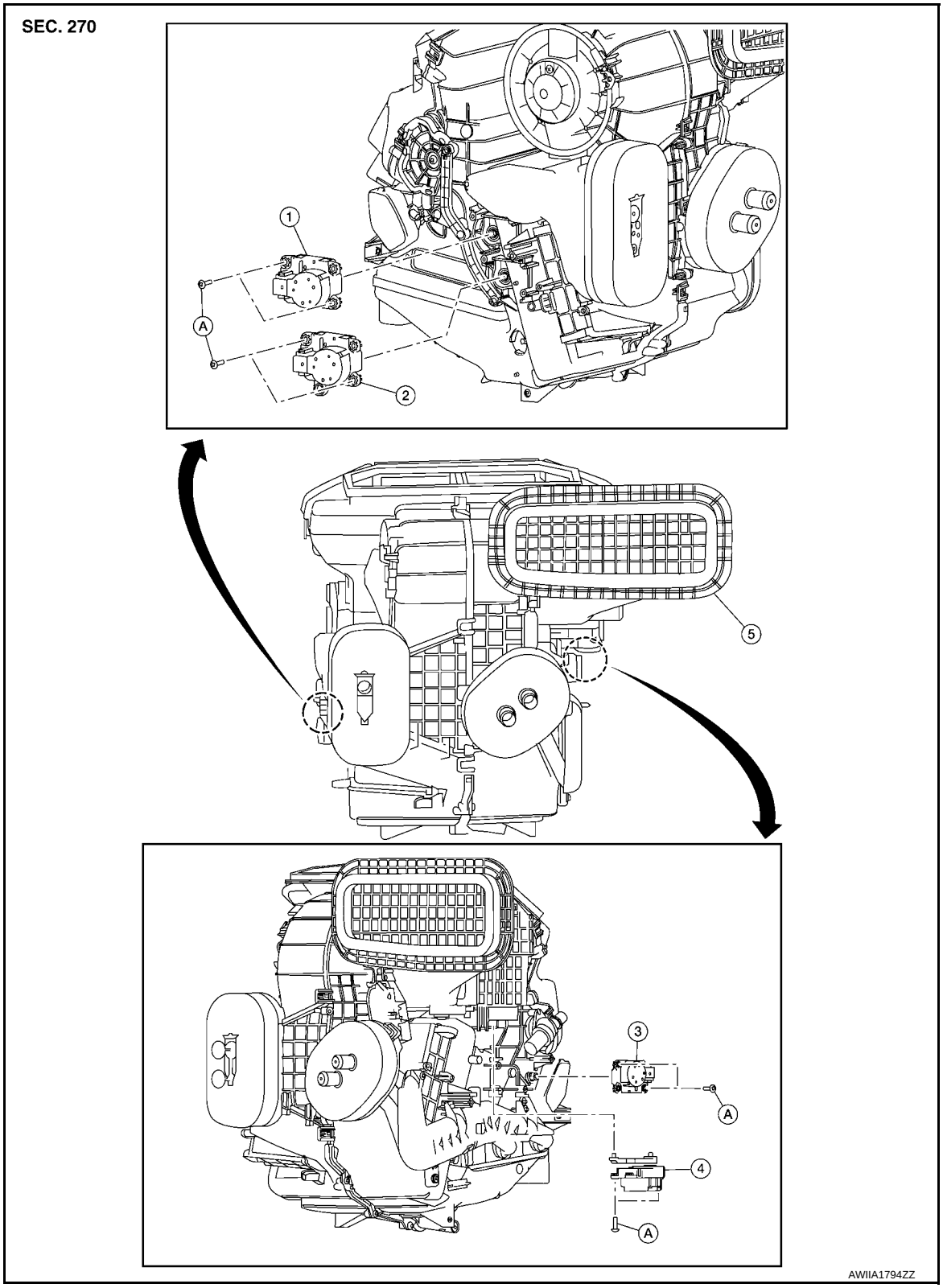
CAUTION:

- **Do not reuse O-ring.**
- **Apply A/C oil to new O-ring for installation.**
- **Charge refrigerant. Refer to HA-27, "Charge Refrigerant".**
- **After charging refrigerant, check for leaks. Refer to HA-25, "Leak Test".**

DOOR MOTOR

Exploded View

INFOID:0000000014626008



1. Mode door motor
2. Air mix door motor (RH)
3. Air mix door motor (LH)
4. Intake door motor
5. Heating and cooling unit assembly
A. Screw

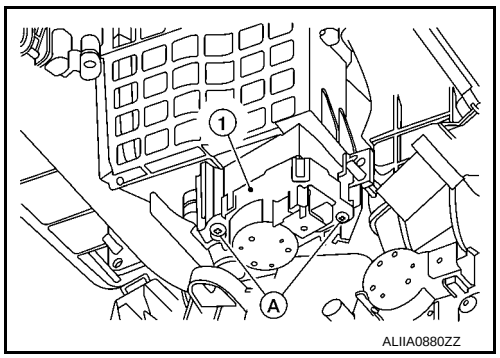
INTAKE DOOR MOTOR

INTAKE DOOR MOTOR : Removal and Installation

INFOID:0000000014626009

REMOVAL

1. Remove air mix door motor (LH). Refer to HAC-127, "AIR MIX DOOR MOTOR : Removal and Installation".
2. Disconnect the harness connector from the intake door motor.
3. Remove screws (A) and intake door motor (1).



INSTALLATION

Installation is in the reverse order of removal.

CAUTION:

After installing the intake door motor, perform the door motor starting position reset. Refer to HAC-63, "Description".

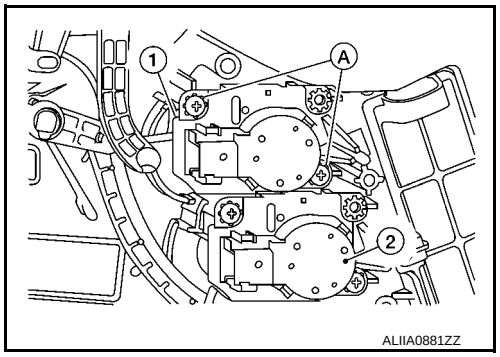
MODE DOOR MOTOR

MODE DOOR MOTOR : Removal and Installation

INFOID:0000000014626010

REMOVAL

1. Remove air mix door motor (RH). Refer to HAC-127, "AIR MIX DOOR MOTOR : Removal and Installation".
2. Disconnect the harness connector from the mode door motor.
3. Remove screws (A) and mode door motor (1).
   (2): Air mix door motor (RH)



INSTALLATION

Installation is in the reverse order of removal.

CAUTION:

After installing mode door motor, perform the door motor starting position reset. Refer to HAC-63, "Description".

AIR MIX DOOR MOTOR

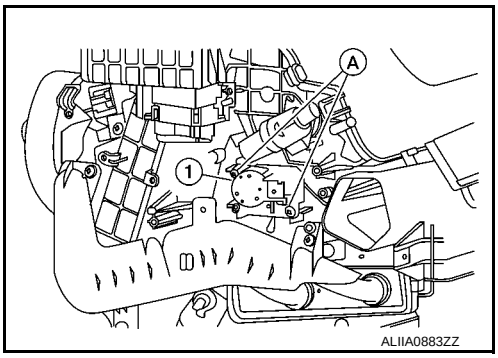
AIR MIX DOOR MOTOR : Removal and Installation

INFOID:0000000014626011

REMOVAL

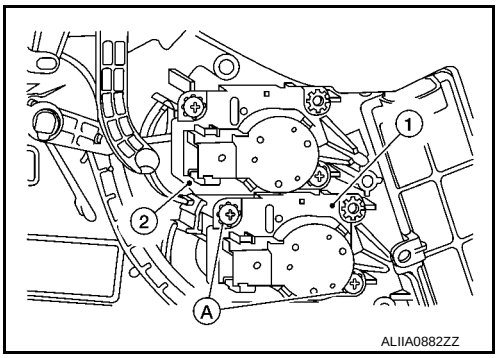
Air Mix Door Motor (LH)

1. Remove front foot duct (LH). Refer to VTL-10, "FRONT FOOT DUCT : Removal and Installation".
2. Disconnect the harness connector from the air mix door motor (LH).
3. Remove screws (A) and air mix door motor (LH) (1).



Air Mix Door Motor (RH)

1. Remove front foot duct (RH). Refer to VTL-10, "FRONT FOOT DUCT : Removal and Installation".
2. Disconnect the harness connector from the air mix door motor (RH).
3. Remove screws (A) and air mix door motor (RH) (1).
   (2): Mode door motor



INSTALLATION

Installation is in the reverse order of removal.

CAUTION:

After installing air mix door (LH) (RH), perform the door motor starting position reset. Refer to HAC-63, "Description".

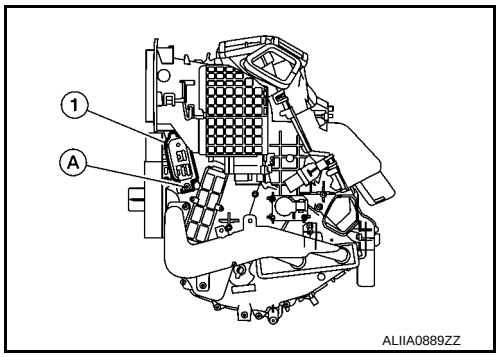
VARIABLE BLOWER CONTROL

Removal and Installation

INFOID:0000000014626012

REMOVAL

1. Remove center console side finisher (LH). Refer to IP-18, "Exploded View".
2. Disconnect the harness connector from the variable blower control.
3. Remove screw (A) and variable blower control (1).



INSTALLATION

Installation is in the reverse order of removal.