# SECTION HAC

# HEATER & AIR CONDITIONING CONTROL SYSTEM

## CONTENTS

# BASIC INSPECTION

## DIAGNOSIS AND REPAIR WORKFLOW

### Work Flow

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DETAILED FLOW

#### 1.LISTEN TO CUSTOMER COMPLAINT

Listen to customer complaint. (Get detailed information about the conditions and environment when the symptom occurs.)

>> GO TO 2.

#### 2.VERIFY THE SYMPTOM WITH OPERATIONAL CHECK

Verify the symptom with operational check. Refer to HAC-5, "Description & Inspection".

>> GO TO 3.

#### 3.GO TO APPROPRIATE TROUBLE DIAGNOSIS

Go to appropriate trouble diagnosis (Refer to HAC-179, "Diagnosis Chart By Symptom" below).

>> GO TO 4.

#### 4.REPAIR OR REPLACE

Repair or replace the specific parts.

>> GO TO 5.

#### 5.FINAL CHECK

Final check.

Is the inspection result normal?

YES >> CHECK OUT
NO >> GO TO 3.

# INSPECTION AND ADJUSTMENT

## Description & Inspection

INFOID:0000000001162137

### DESCRIPTION

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

**Conditions : Engine running at normal operating temperature**

### INSPECTION PROCEDURE

Blower

1. Turn fan control dial to 1st speed. Blower should operate on low speed.
2. Turn fan control dial to 2nd speed, and continue checking blower speed until all speeds are checked.
3. Leave blower on max. speed.

If NG, go to trouble diagnosis procedure for HAC-54, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-58, "M9R : Diagnosis Procedure" (M9R).
If OK, continue the check.

Discharge Air

1. Turn mode control dial to each position.
2. Confirm that discharge air comes out according to the air distribution table. Refer to HAC-13, "System Description".

If NG, go to trouble diagnosis procedure for HAC-42, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-44, "M9R : Diagnosis Procedure" (M9R).
If OK, continue the check.

**NOTE:**
Confirm that the magnet clutch is engaged (sound or visual inspection) and intake door position is at FRE when the D/F or DEF is selected.

**Discharge air flow**

| Mode door position | Air outlet/distribution | | |
|---|---|---|---|
| | Vent | Foot | Defroster |
|  | 100% | – | – |
|  | 60% | 40% | – |
|  | 18% (22%) | 62% (78%) | 20% (–) |
|  | 15% | 40% | 45% |
|  | 22% | – | 78% |

( ) :Manually control

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Intake Air

1. Press intake switch. Recirculation LED should illuminate.
2. Press intake switch again. Fresh LED should illuminate.
3. Listen for intake door position change. (Slight change of blower sound can be heard.)

If NG, go to trouble diagnosis procedure for HAC-50, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-52, "M9R : Diagnosis Procedure" (M9R).
If OK, continue the check.

**NOTE:**
Confirm that the magnet clutch is engaged (sound or visual inspection) and intake door position is at FRE when the D/F or DEF is selected.

Temperature Decrease

1. Turn temperature control dial counterclockwise until 16°C.
2. Check for cold air at discharge air outlets.

If NG, go to trouble diagnosis procedure for HAC-180, "Inspection procedure".
If OK, continue the check.

Temperature Increase

1. Turn temperature control dial clockwise until 28°C.
2. Check for warm air at discharge air outlets.

If NG, go to trouble diagnosis procedure for HAC-183, "Inspection procedure".
If OK, continue the check.

A/C Switch

1. Turn fan control dial to AUTO position.

2. Press A/C switch. A/C switch LED should illuminate.
   - Confirm that the magnet clutch engages (sound or visual inspection). (Discharge air and blower speed depend on ambient, in-vehicle, and set temperatures.)

If NG, go to trouble diagnosis procedure for HAC-102, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-103, "M9R : Diagnosis Procedure" (M9R), then if necessary, trouble diagnosis procedure for HAC-62, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-66, "M9R : Diagnosis Procedure" (M9R).
Go to Incident Simulation Tests in GI-38, "Work Flow" and perform tests as outlined to simulate driving conditions environment if all operational checks are OK (symptom cannot be duplicated). Refer to HAC-179, "Diagnosis Chart By Symptom" and perform applicable trouble diagnosis procedures if symptom appears.

## AUXILIARY MECHANISM

### Temperature Setting Trimmer

The trimmer compensates for differences in range of ±3°C between temperature setting (temperature control dial position) and temperature felt by customer.

Operating procedures for this trimmer are as per the following:
1. Set fan control dial to OFF.
2. Turn ignition switch ON.
3. Set in self-diagnosis mode as per the following. Press intake switch for at least 5 seconds within 10 seconds after starting engine (ignition switch is turned ON.).
4. When intake switch is pressed, temperature shifts in following order: 0°C → 1°C → 2°C → 3°C → –3°C → –2°C → –1°C → return to 0°C.

| Setting temperature | LED status of each switch | | |
|---|---|---|---|
| | FRE | REC | A/C |
| 3°C | OFF | ON | ON |
| 2°C | OFF | ON | OFF |
| 1°C | OFF | OFF | ON |
| 0°C (Initial setting) | OFF | OFF | OFF |
| –1°C | ON | OFF | ON |
| –2°C | ON | ON | OFF |
| –3°C | ON | ON | ON |

**NOTE:**
When battery cable is disconnected or battery voltage is below 9 V, trimmer operation is canceled. Temperature set becomes that of initial condition, i.e. 0°C.

### Inlet Port Memory Function

When ignition switch is turned from OFF to ON, inlet port can be set to AUTO or manual.

Operating procedures for this trimmer are as per the following:
1. Set fan control dial to OFF.
2. Turn ignition switch ON.
3. Set in self-diagnosis mode as per the following. Press intake switch for at least 5 seconds within 10 seconds after starting engine (ignition switch is turned ON.).
4. Set fan control dial to 1st - 12th speed.
5. Press intake switch as desired.

| LED status of FRE switch | LED status of REC switch | Setting status | | Setting changeover method |
|---|---|---|---|---|
| | | FRE | REC | |
| OFF | ON | AUTO control (Initial setting) | Manual REC status is memorized. (Initial setting) | Intake switch: ON |
| ON | ON | Manual FRE status is memorized. | Manual REC status is memorized. | |
| ON | OFF | Manual FRE status is memorized. | AUTO control | |
| OFF | OFF | AUTO control | AUTO control | |

**NOTE:**

When battery cable is disconnected or battery voltage is below 9 V, memory function is canceled. Memory function set becomes that of initial condition.

# FUNCTION DIAGNOSIS

## COMPRESSOR CONTROL FUNCTION

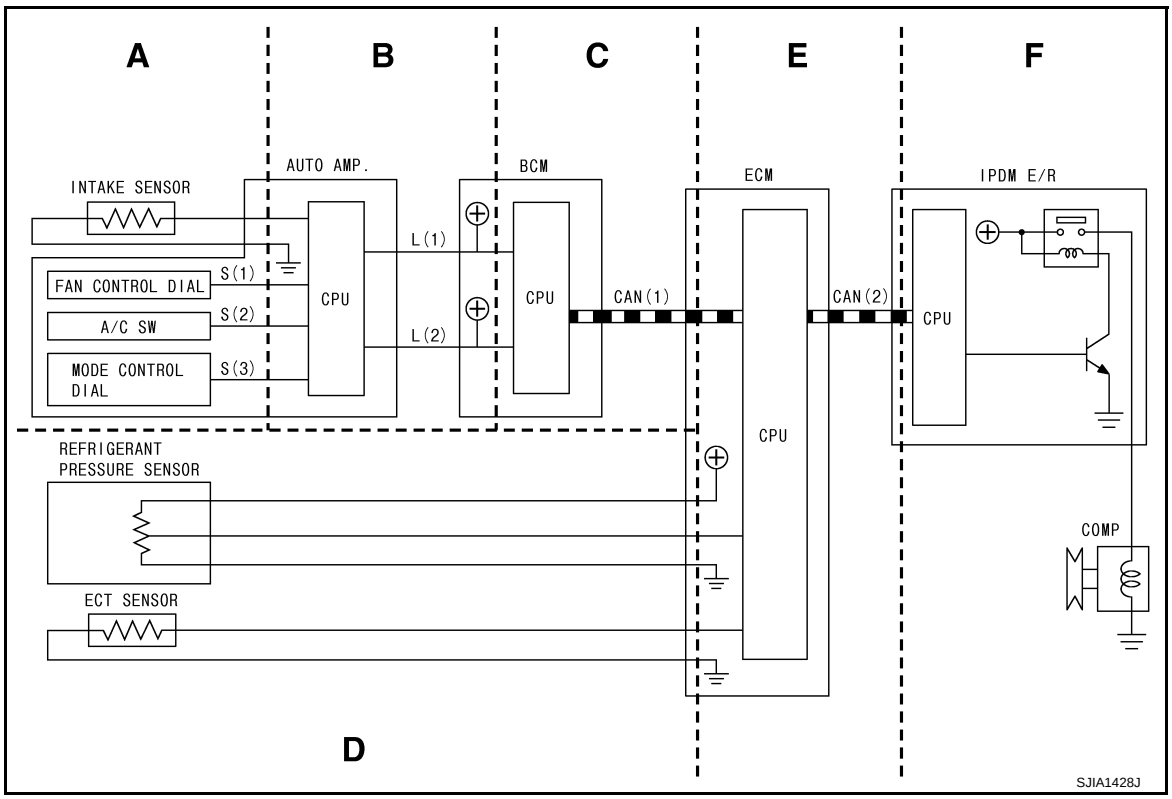
### Description

INFOID:0000000001162138

PRINCIPLE OF OPERATION

Compressor is not activated.

Functional circuit diagram




L (1) : Fan SW signal
L (2) : A/C SW signal
S (1) : Fan ON signal
S (2) : A/C SW signal
S (3) : Defogger signal
CAN (1) : A/C signal
CAN (2) : Compressor request signal

Functional initial inspection chart

| Location | | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|
| CONSULT-III | ECM DATA MONITOR | | | | Yes | Yes | |
| | BCM DATA MONITOR | | Yes | Yes | | | |
| | IPDM E/R DATA MONITOR | | | | | Yes | |
| AUTO ACTIVE TEST | | | | | | | Yes |
| Self-diagnosis function (except CAN diagnosis) | | Yes | Yes | | | | |

### Component Part Location

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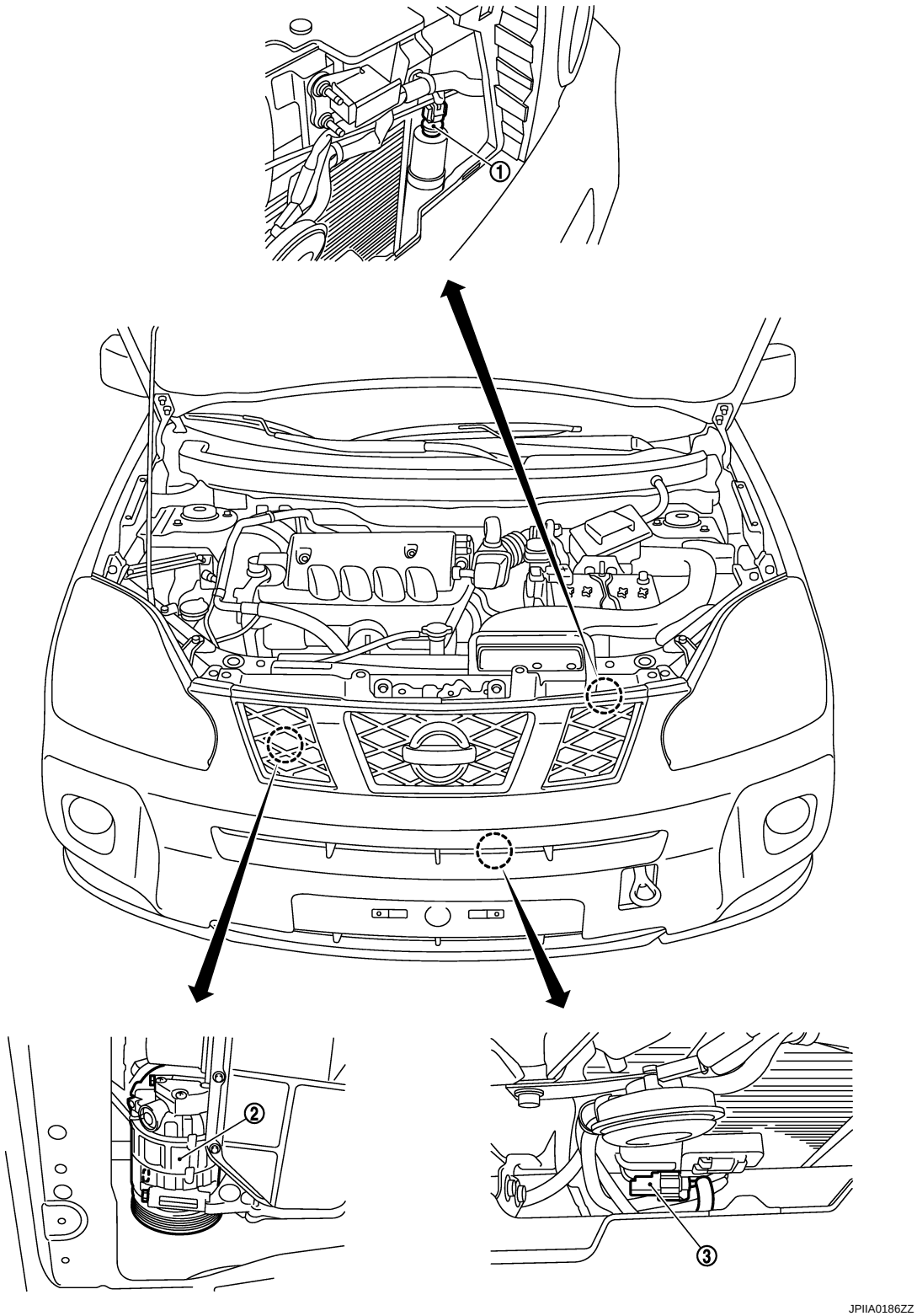
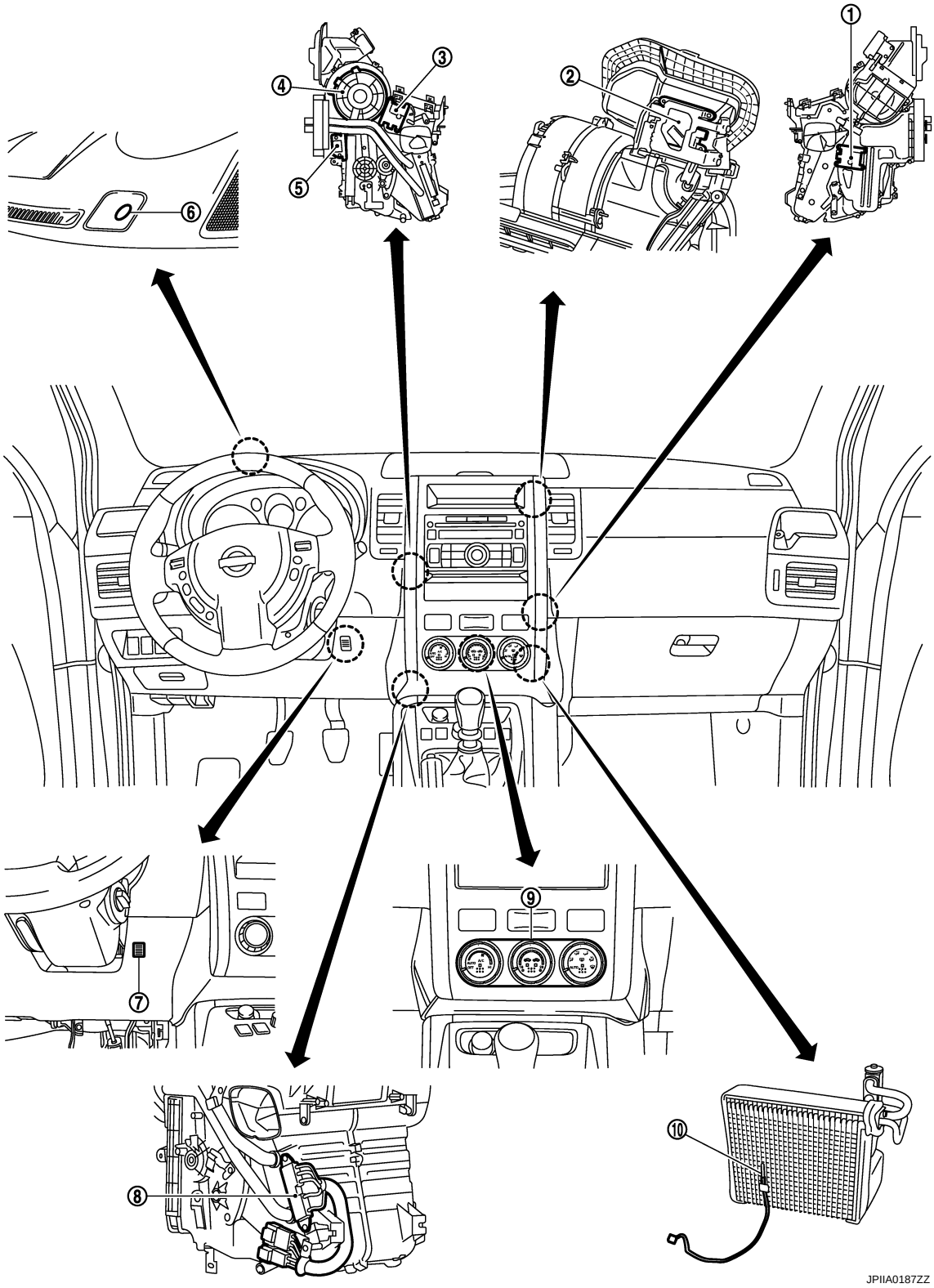
ENGINE COMPARTMENT




1. Refrigerant pressure sensor 2. Compressor 3. OAT sensor

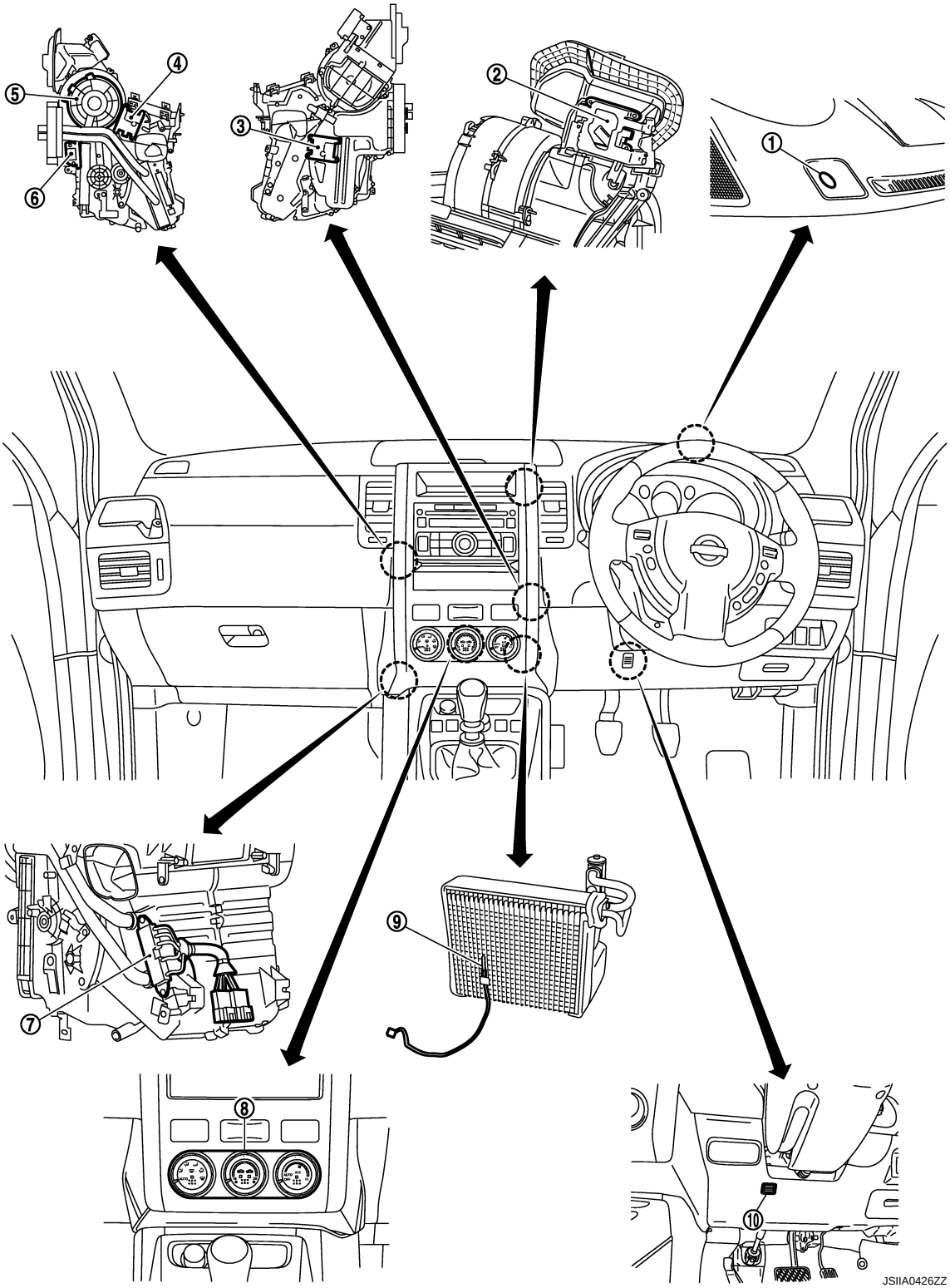
## PASSENGER COMPARTMENT

LHD Models




1. Air mix door motor
2. Intake door motor
3. Mode door motor
4. Blower motor
5. Fan control amp.
6. Sunload sensor
7. In-vehicle sensor
8. PTC heater (With M9R engine)
9. Auto amp.
10. Intake sensor

RHD Models




1. Sunload sensor
2. Intake door motor
3. Air mix door motor
4. Mode door motor
5. Blower motor
6. Fan control amp.
7. PTC heater (With M9R engine)
8. Auto amp.
9. Intake sensor
10. In-vehicle sensor

## Component Description

INFOID:0000000001162140

| Component | Reference |
|---|---|
| Air mix door motor | HAC-46, "MR20DE/QR25DE : Description" (MR20DE/QR25DE) or HAC-47, "M9R : Description" (M9R) |
| Auto amp. | HAC-101, "MR20DE/QR25DE : Description" (MR20DE/QR25DE) or HAC-102, "M9R : Description" (M9R) |
| Blower motor | HAC-54, "MR20DE/QR25DE : Description" (MR20DE/QR25DE) or HAC-58, "M9R : Description" (M9R) |
| Compressor | HAC-62, "MR20DE/QR25DE : Description" (MR20DE/QR25DE) or HAC-66, "M9R : Description" (M9R) |
| Fan control amp. | HAC-57, "MR20DE/QR25DE : Component Inspection" (MR20DE/QR25DE) or HAC-61, "M9R : Component Inspection" (M9R) |
| Intake door motor | HAC-50, "MR20DE/QR25DE : Description" (MR20DE/QR25DE) or HAC-51, "M9R : Description" (M9R) |
| Intake sensor | HAC-96, "MR20DE/QR25DE : Description" (MR20DE/QR25DE) or HAC-98, "M9R : Description" (M9R) |
| In-vehicle sensor | HAC-84, "MR20DE/QR25DE : Description" (MR20DE/QR25DE) or HAC-86, "M9R : Description" (M9R) |
| Mode door motor | HAC-42, "MR20DE/QR25DE : Description" (MR20DE/QR25DE) or HAC-44, "M9R : Description" (M9R) |
| OAT sensor | HAC-79, "MR20DE/QR25DE : Description" (MR20DE/QR25DE) or HAC-81, "M9R : Description" (M9R) |
| PTC heater | HAC-77, "Component Inspection" |
| Refrigerant pressure sensor | HAC-65, "MR20DE/QR25DE : Component Inspection" (MR20DE/QR25DE) or HAC-70, "M9R : Component Inspection" (M9R) |
| Sunload sensor | HAC-90, "MR20DE/QR25DE : Description" (MR20DE/QR25DE) or HAC-92, "M9R : Description" (M9R) |

# AUTOMATIC AIR CONDITIONER SYSTEM

## System Diagram

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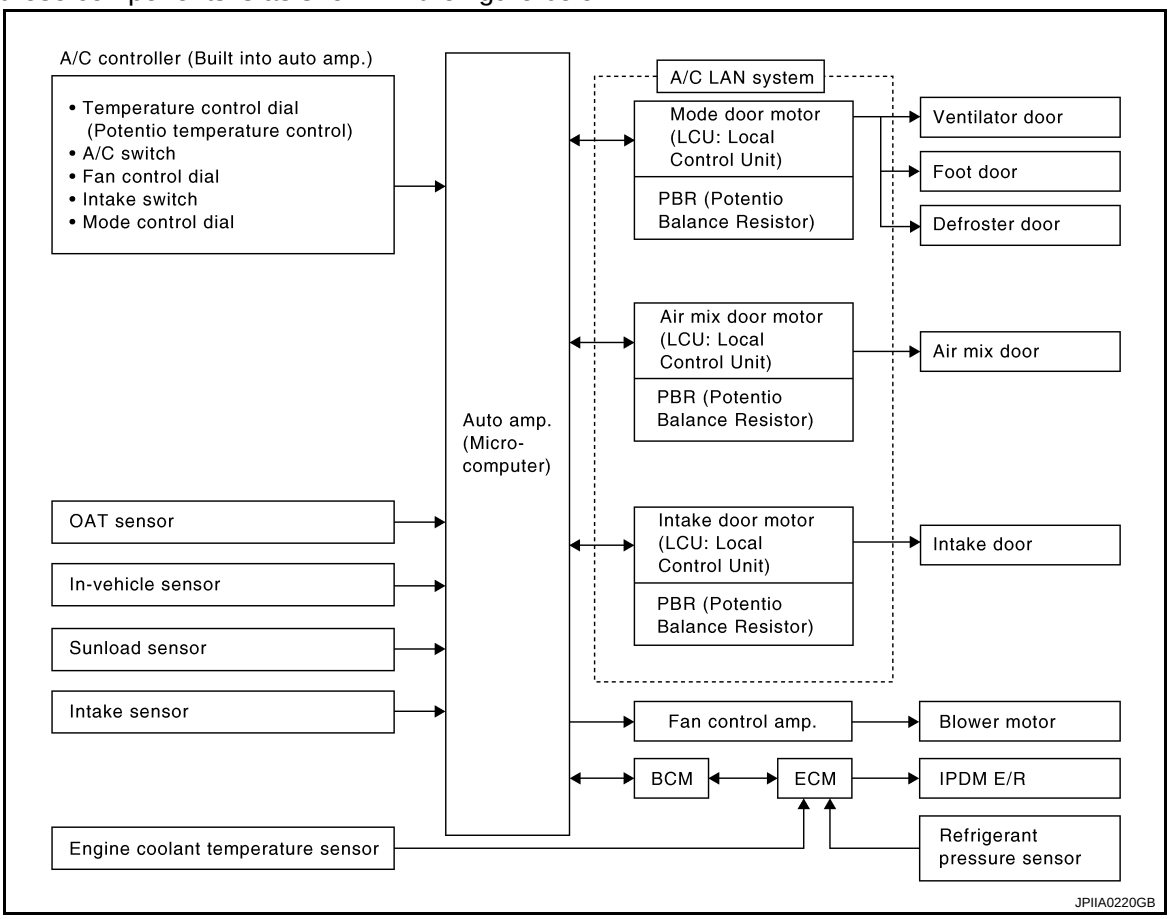
### CONTROL SYSTEM

The control system consists of input sensors, switches, auto amp. (microcomputer) and outputs. The relationship of these components is as shown in the figure below:



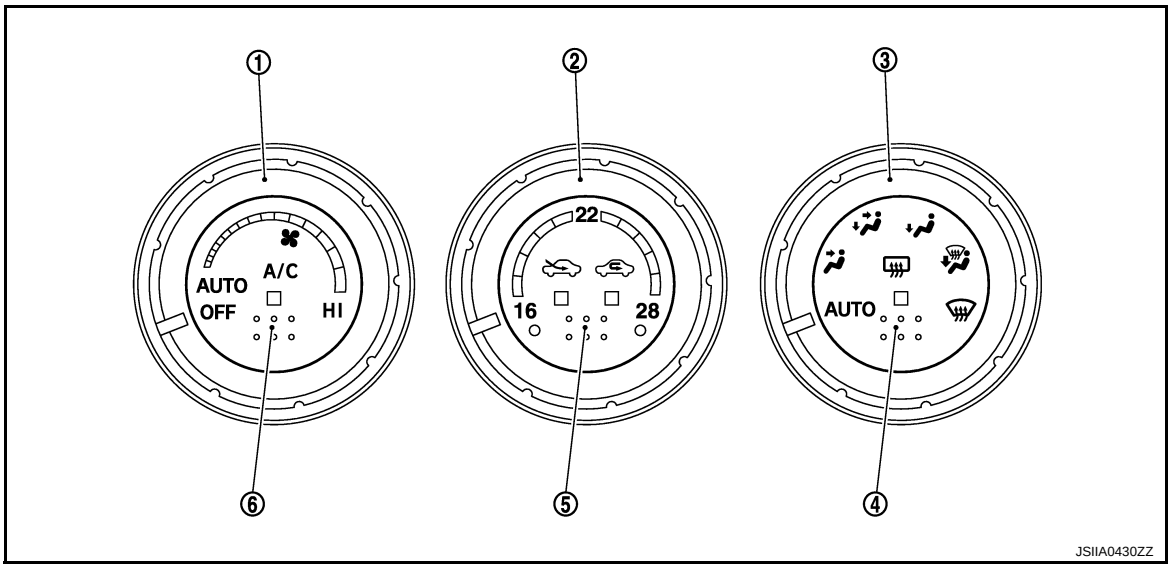

## System Description

INFOID:0000000001162142

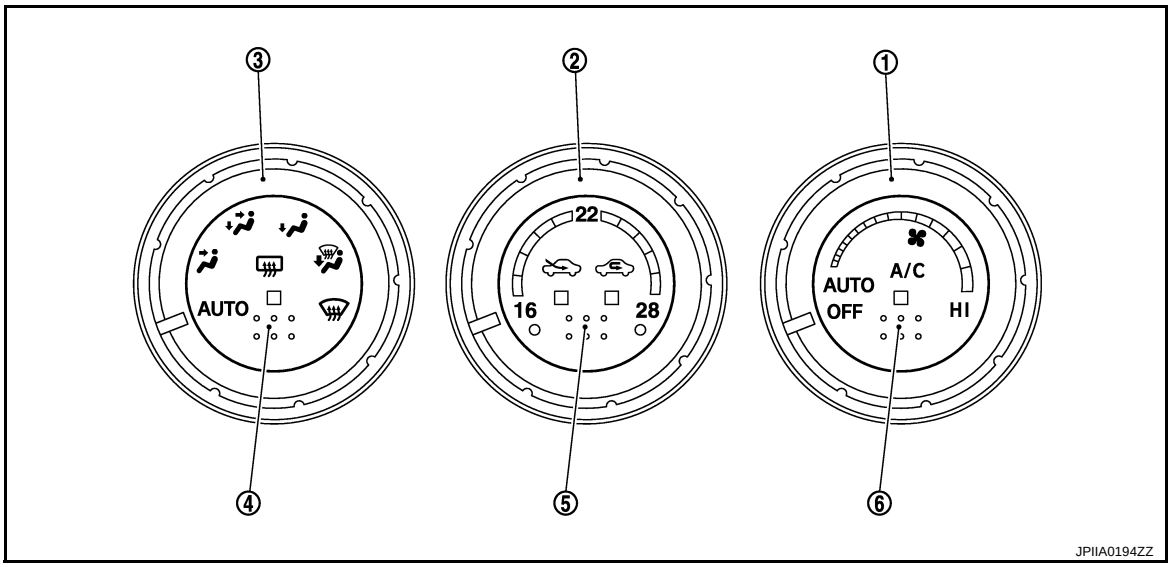
### CONTROL OPERATION

Controller

LHD models




RHD models




1. Fan Control Dial

The blower speed is automatically or manually controlled with this dial. Twenty-five speeds are available for manual control.

2. Temperature Control Dial (Potentio Temperature Control)

The set temperature is increased or decreased with this dial.

3. MODE Control Dial

The air discharge outlets is controlled with by this dial.

Mode doors are set to the defrost position with this dial. Also, intake doors are set to the outside air position.When shifting mode control dial to DEF (and D/F or D/F2: LHD models only) position under the following conditions, compressor is turned ON. (A/C LED ON)

- FAN: ON
- A/C: OFF

4. Rear Window Defogger Switch

When illumination is ON, rear window is defogged.

5. Intake Switch

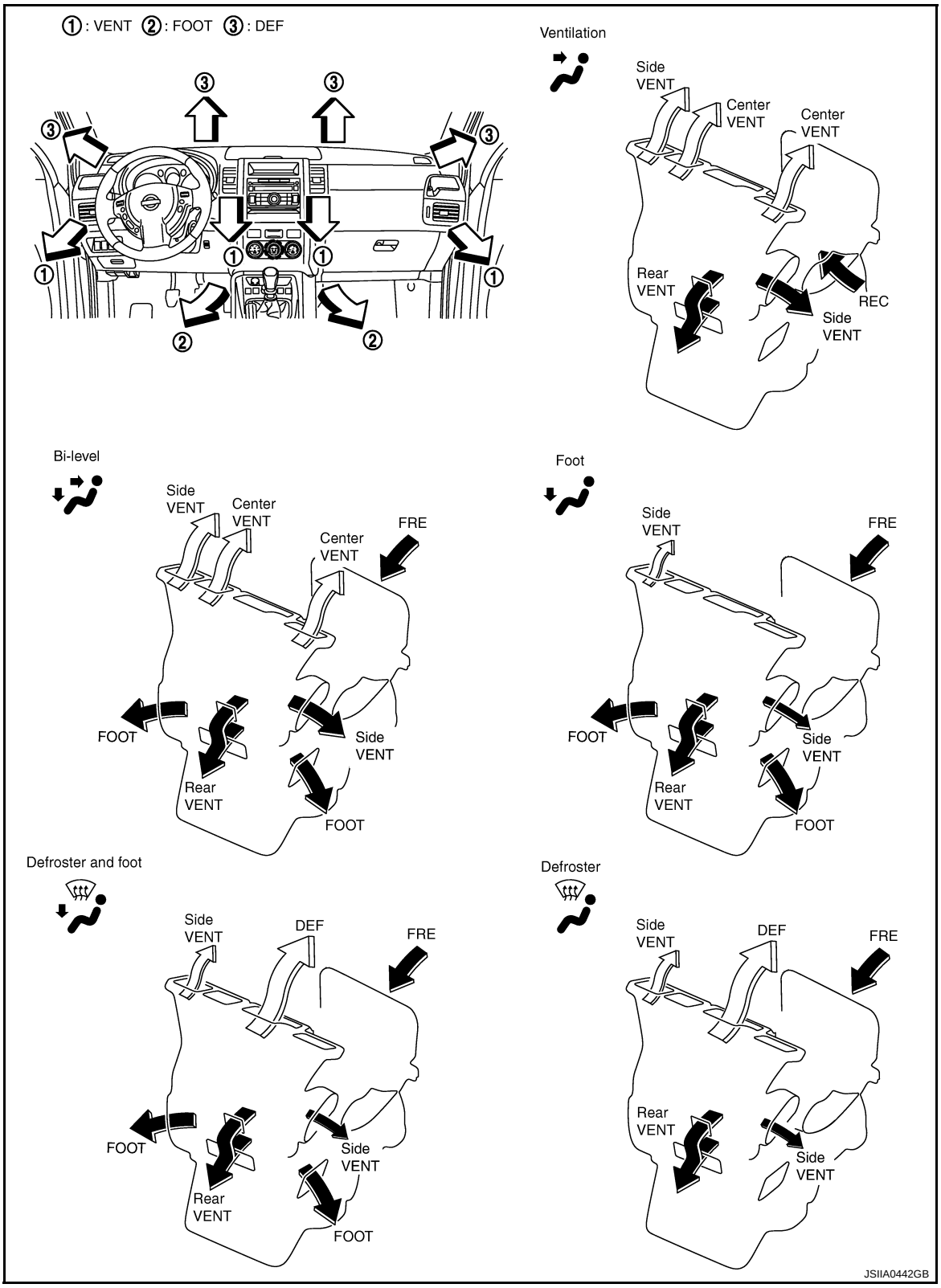
- When intake switch is ON, FRE LED turns ON, and air inlet is fixed to FRE.
- When intake switch is pressed again, REC LED turns ON, and air inlet is fixed to REC.
- When intake switch is pressed for approximately 1.5 seconds or longer, REC and FRE LEDs blink twice. Then, automatic control mode is entered. Inlet status is displayed even during automatic control.

- Intake switch is automatically fixed to FRE mode when mode control dial is turned in DEF (and D/F or D/F2: LHD models only), or when compressor is turned from ON to OFF. Press intake switch to enter REC mode.

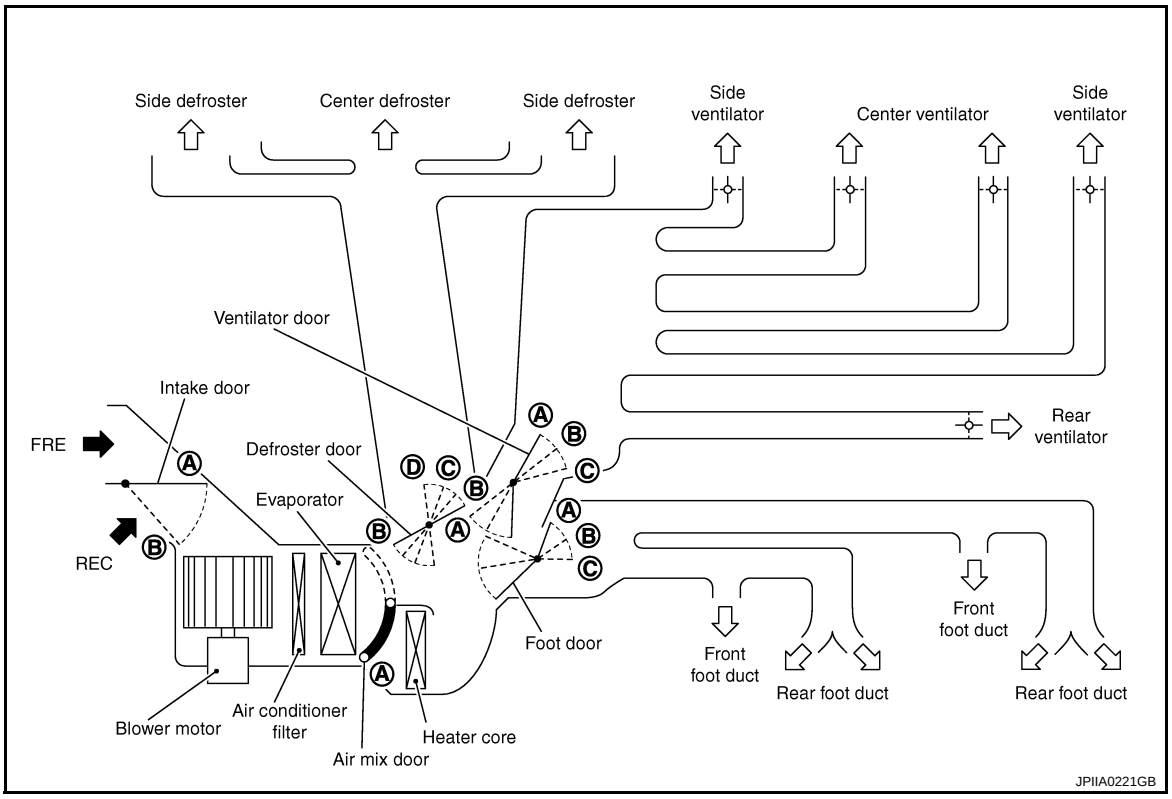
6. A/C Switch

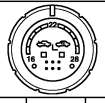
Compressor is ON or OFF with this switch.
(Pressing the A/C switch when the fan control dial is ON turns OFF the A/C switch and compressor.)

DISCHARGE AIR FLOW



## SWITCHES AND THEIR CONTROL FUNCTION




| Door \ Position or switch | MODE control dial | | | | | | | | Intake SW | | Temperature control dial | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | VENT | B/L | FOOT | FOOT2 | D/F | D/F2 | DEF | AUTO | | | | | |
| |  |  |  | — |  | — |  | — |  |  |  | | |
| | | | | | | | | |  |  | 16°C | ⇔ | 28°C |
| Ventilator door | Ⓐ | Ⓑ | Ⓒ | Ⓒ | Ⓒ | Ⓒ | Ⓒ | AUTO | — | | — | | |
| Foot door | Ⓐ | Ⓑ | Ⓒ | Ⓑ | Ⓒ | Ⓑ | Ⓐ | | — | | — | | |
| Defroster door | Ⓐ | Ⓐ | Ⓐ or Ⓑ *1 | Ⓑ–Ⓒ | Ⓒ | Ⓒ–Ⓓ | Ⓓ | | — | | — | | |
| Intake door | — | | | | | | Ⓑ | — | Ⓐ *2 AUTO | Ⓑ *2 AUTO | — | | |
| Air mix door | — | | | | | | — | AUTO | — | | Ⓐ | AUTO | Ⓑ |

*1: This door position is selected only when the mode door is automatically controlled.
*2: Inlet status is displayed during automatic control.

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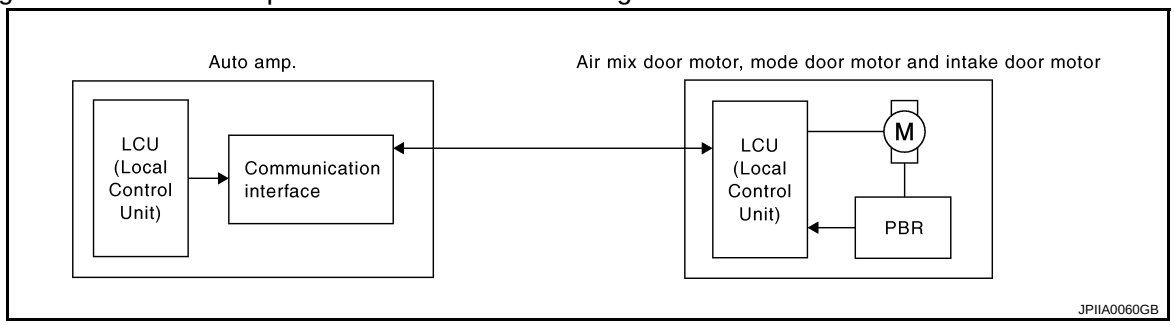
## AIR CONDITIONER LAN CONTROL SYSTEM

The LAN (Local Area Network) system consists of auto amp., mode door motor, air mix door motor and intake door motor.
A configuration of these components is as shown in the figure below.



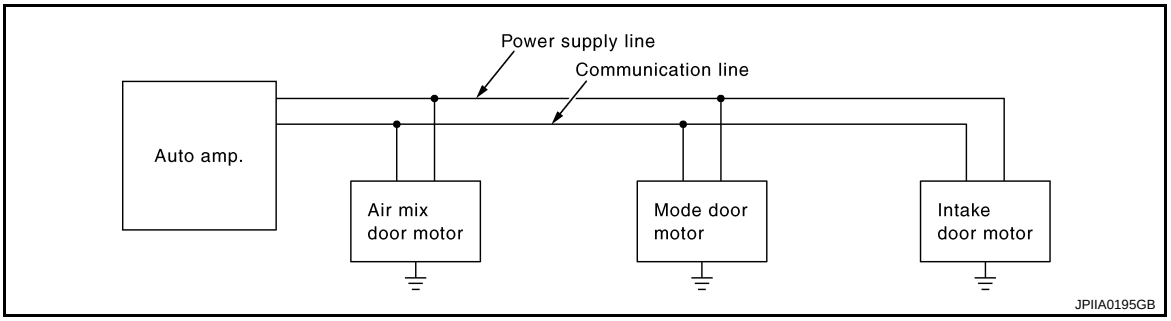
## SYSTEM CONSTRUCTION

A small network is constructed between the auto amp., mode door motor, air mix door motor and intake door motor. The auto amp. and motors are connected by data transmission lines and motor power supply lines. The LAN network is built through the ground circuits of each door motor.

Addresses, motor opening angle signals, motor stop signals and error checking messages are all transmitted through the data transmission lines connecting the auto amp. and each door motor.

The following functions are contained in LCUs built into the mode door motor, the air mix door motor and the intake door motor.

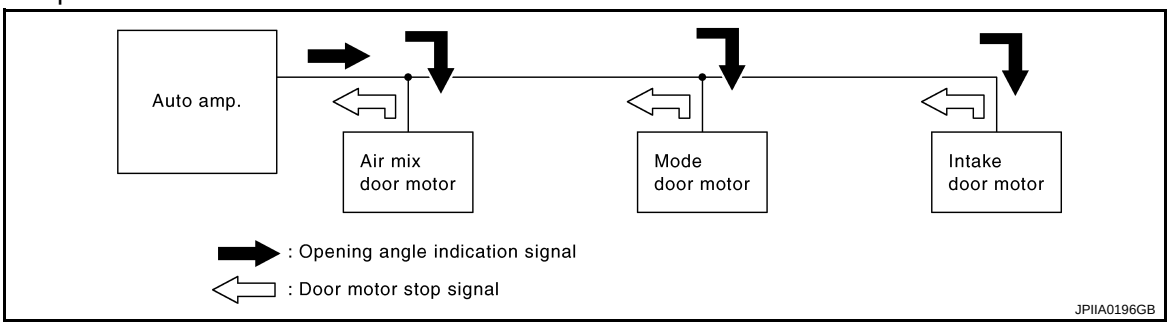
- Address
- Motor opening angle signals
- Data transmission
- Motor stop and drive decision
- Opening angle sensor (PBR function)
- Comparison
- Decision (Auto amp. indicated value and motor opening angle comparison)




Operation

The auto amp. receives data from each of the sensors. The auto amp. sends mode door, air mix door and intake door opening angle data to the mode door motor LCU, air mix door motor LCU and intake door motor LCU.

The mode door motor, air mix door motor and intake door motor read their respective signals according to the address signal. Opening angle indication signals received from the auto amp. and each of the motor position sensors is compared by the LCUs in each door motor with the existing decision and opening angles. Subsequently, HOT/COLD, DEF/VENT and FRE/REC operation is selected. The new selection data is returned to the auto amp.




Transmission Data and Transmission Order

Auto amp. data is transmitted consecutively to each of the doors motor following the form as shown in the figure below.

START:

- Initial compulsory signal is sent to each of the door motors.

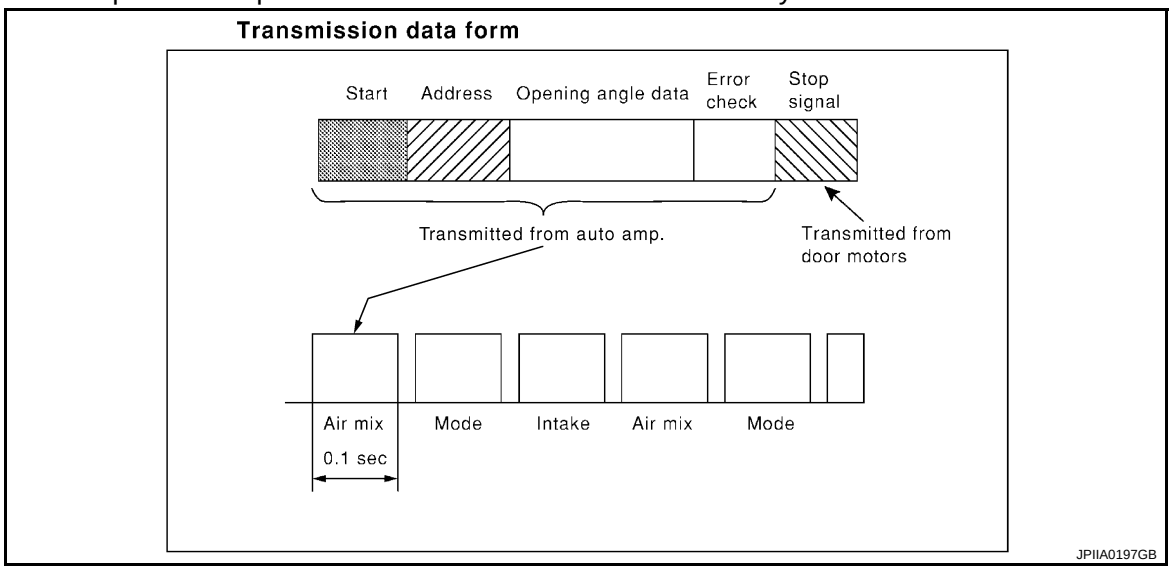
ADDRESS:

- Data sent from the auto amp. are selected according to data-based decisions made by the mode door motor, air mix door motor and intake door motor.
- If the addresses are identical, the opening angle data and error check signals are received by the door motor LCUs. The LCUs then make the appropriate error decision. If the opening angle data have no error, door control begins.
- If an error exists, the received data are rejected and corrected data received. Finally, door control is based upon the corrected opening angle data.

OPENING ANGLE:
• Data that shows the indicated door opening angle of each door motor.

ERROR CHECK:
• In this procedure, transmitted and received data is checked for errors. Error data are then compiled. The error check prevents corrupted data from being used by the mode door motor, the air mix door motor and the intake door motor. Error data can be related to the following symptoms.
- Malfunction of electrical frequency
- Poor electrical connections
- Signal leakage from transmission lines
- Signal level fluctuation

STOP SIGNAL:
• At the end of each transmission, a stop operation, in-operation, or internal malfunction message is delivered to the auto amp. This completes one data transmission and control cycle.




## Component Part Location

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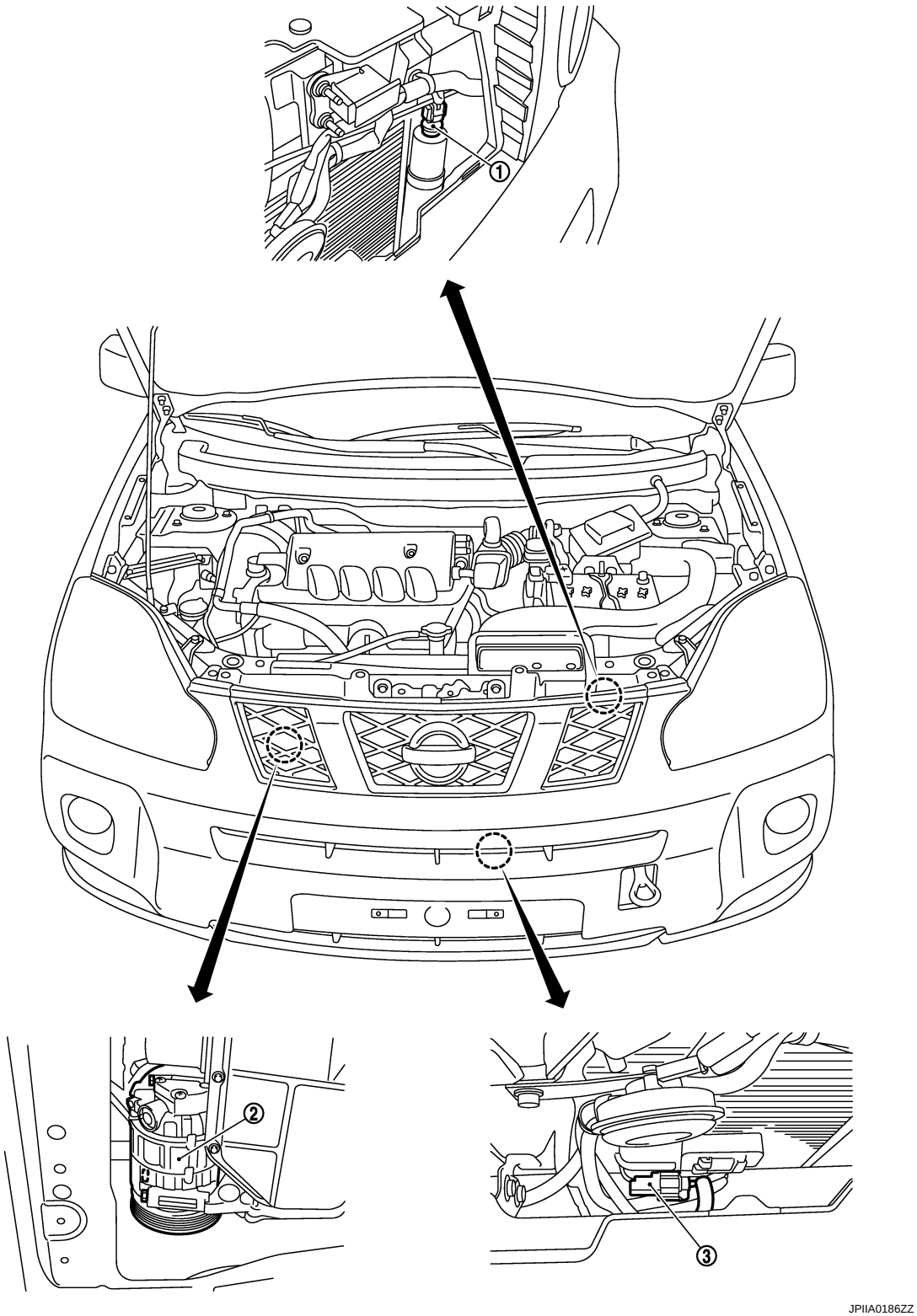
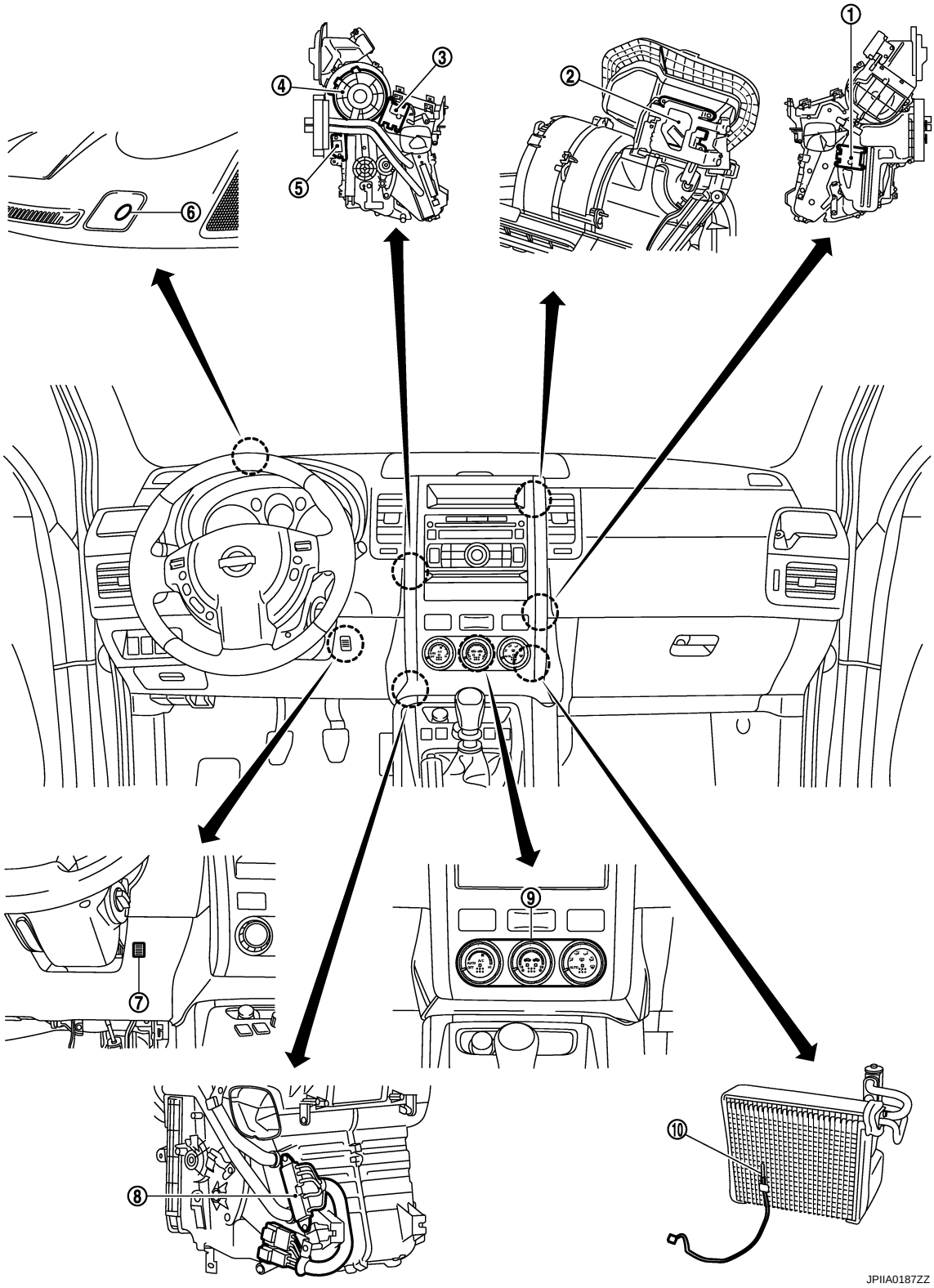
ENGINE COMPARTMENT




1. Refrigerant pressure sensor 2. Compressor 3. OAT sensor

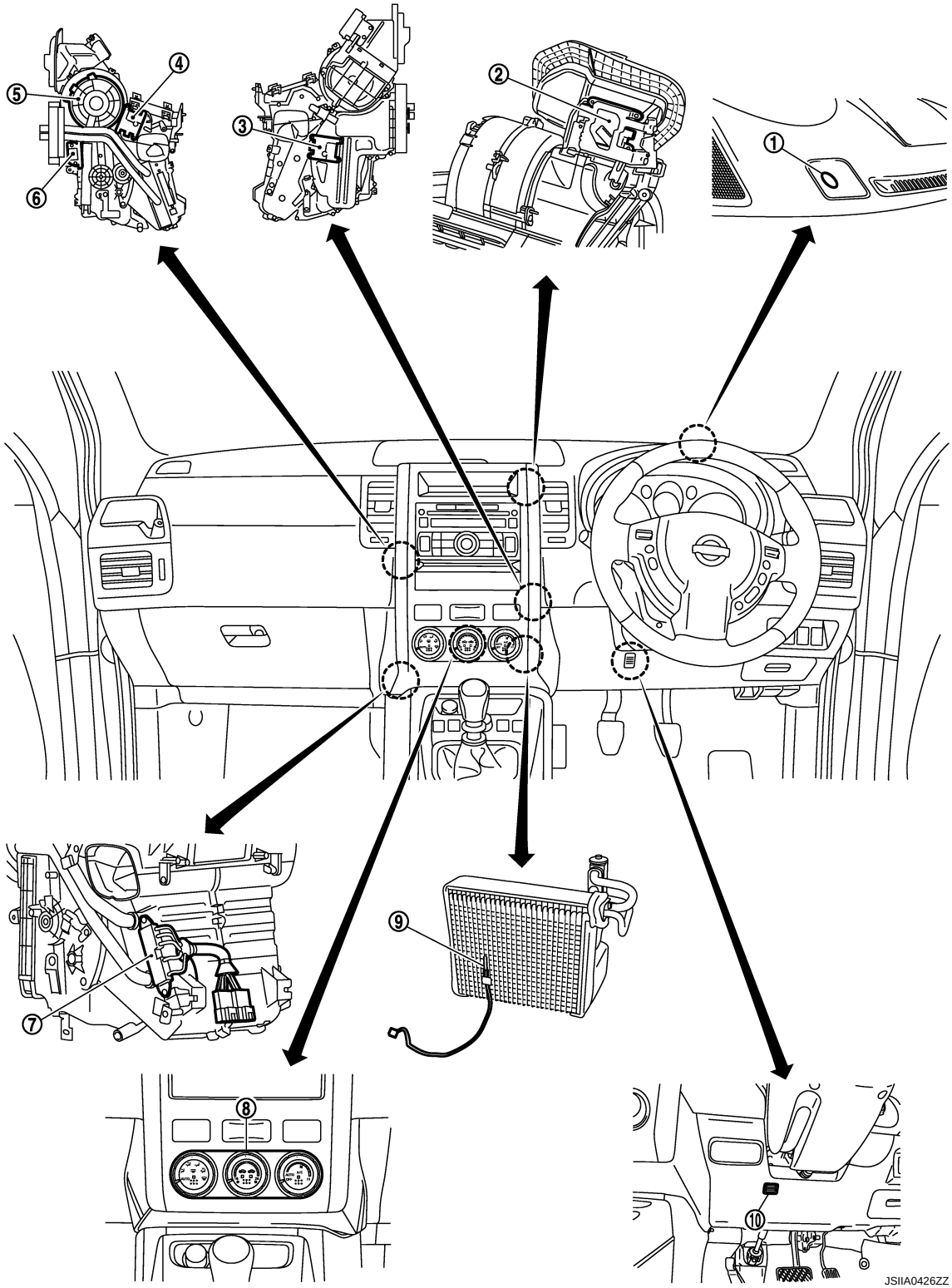
## PASSENGER COMPARTMENT

LHD Models




1. Air mix door motor
2. Intake door motor
3. Mode door motor
4. Blower motor
5. Fan control amp.
6. Sunload sensor
7. In-vehicle sensor
8. PTC heater (With M9R engine)
9. Auto amp.
10. Intake sensor

RHD Models




1. Sunload sensor
2. Intake door motor
3. Air mix door motor
4. Mode door motor
5. Blower motor
6. Fan control amp.
7. PTC heater (With M9R engine)
8. Auto amp.
9. Intake sensor
10. In-vehicle sensor

## Component Description

INFOID:0000000001301478

| Component | Reference |
|---|---|
| Air mix door motor | HAC-46, "MR20DE/QR25DE : Description" (MR20DE/QR25DE) or HAC-47, "M9R : Description" (M9R) |
| Auto amp. | HAC-101, "MR20DE/QR25DE : Description" (MR20DE/QR25DE) or HAC-102, "M9R : Description" (M9R) |
| Blower motor | HAC-54, "MR20DE/QR25DE : Description" (MR20DE/QR25DE) or HAC-58, "M9R : Description" (M9R) |
| Compressor | HAC-62, "MR20DE/QR25DE : Description" (MR20DE/QR25DE) or HAC-66, "M9R : Description" (M9R) |
| Fan control amp. | HAC-57, "MR20DE/QR25DE : Component Inspection" (MR20DE/QR25DE) or HAC-61, "M9R : Component Inspection" (M9R) |
| Intake door motor | HAC-50, "MR20DE/QR25DE : Description" (MR20DE/QR25DE) or HAC-51, "M9R : Description" (M9R) |
| Intake sensor | HAC-96, "MR20DE/QR25DE : Description" (MR20DE/QR25DE) or HAC-98, "M9R : Description" (M9R) |
| In-vehicle sensor | HAC-84, "MR20DE/QR25DE : Description" (MR20DE/QR25DE) or HAC-86, "M9R : Description" (M9R) |
| Mode door motor | HAC-42, "MR20DE/QR25DE : Description" (MR20DE/QR25DE) or HAC-44, "M9R : Description" (M9R) |
| OAT sensor | HAC-79, "MR20DE/QR25DE : Description" (MR20DE/QR25DE) or HAC-81, "M9R : Description" (M9R) |
| PTC heater | HAC-77, "Component Inspection" |
| Refrigerant pressure sensor | HAC-65, "MR20DE/QR25DE : Component Inspection" (MR20DE/QR25DE) or HAC-70, "M9R : Component Inspection" (M9R) |
| Sunload sensor | HAC-90, "MR20DE/QR25DE : Description" (MR20DE/QR25DE) or HAC-92, "M9R : Description" (M9R) |

# CAN COMMUNICATION SYSTEM

## System Description

INFOID:0000000001162145

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN-H line, CAN-L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only. For details, refer to LAN-21, "CAN System Specification Chart".

# DIAGNOSIS SYSTEM (AUTO AMP.)

## Diagnosis Description

INFOID:0000000001246518

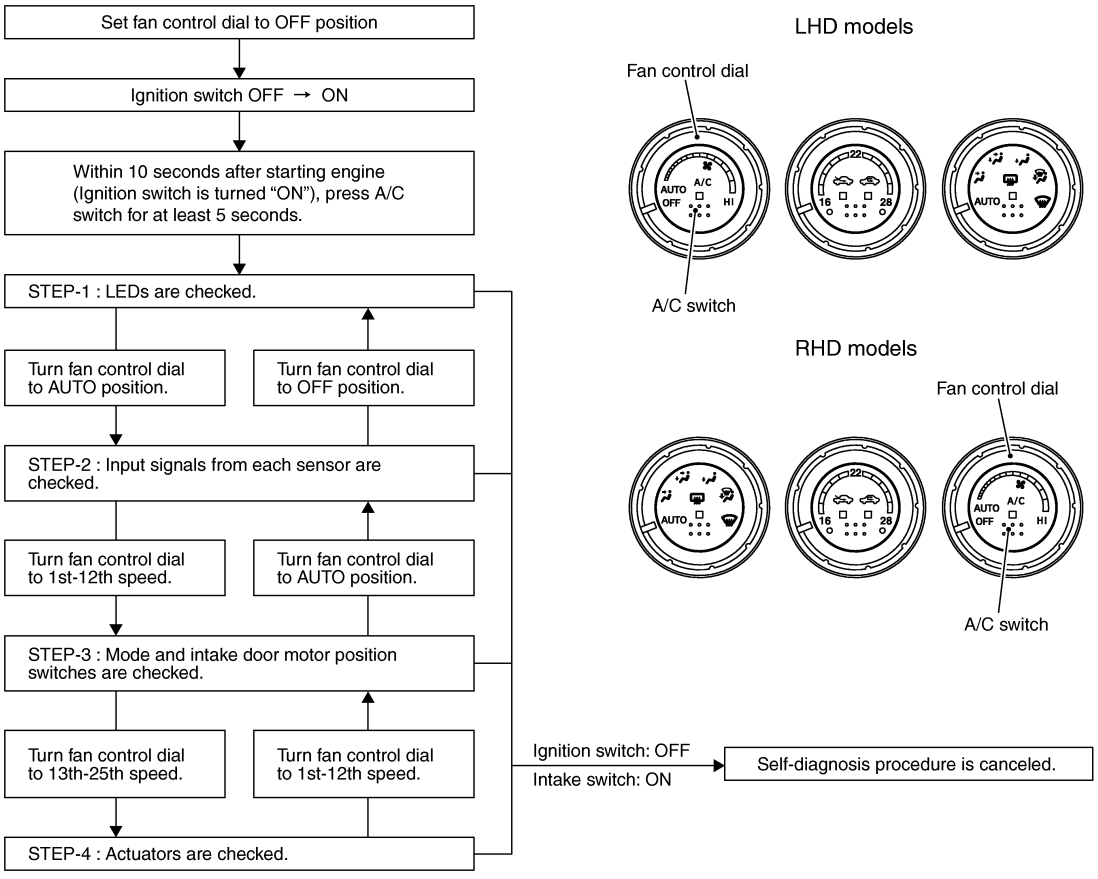
### SELF-DIAGNOSIS SYSTEM

The self-diagnosis system is built into the auto amp. to quickly locate the cause of malfunctions.

### SELF-DIAGNOSIS FUNCTION

The self-diagnosis system diagnoses sensors, door motors, blower motor, etc. by system line.

- Switching to self-diagnosis STEP-1 to 4.
  Shifting from normal control to the self-diagnosis system is accomplished by starting the engine (turning the ignition switch from OFF to ON) and pressing A/C switch for at least 5 seconds. The A/C switch must be pressed within 10 seconds after starting the engine (ignition switch is turned ON). This system is canceled by either pressing intake switch or turning the ignition switch OFF. Shifting to the next step is accomplished by means of turning fan control dial, as required.




JSIIA0446GB

### FUNCTION CONFIRMATION PROCEDURE

#### 1. SET IN SELF-DIAGNOSIS MODE

1. Set the fan control dial to OFF position.
2. Turn ignition switch ON.
3. Set in self-diagnosis mode as per the following. Press A/C switch for at least 5 seconds within 10 seconds after starting engine (ignition switch is turned ON.).

**CAUTION:**

**If battery voltage drops below 12 V during diagnosis STEP-3, door motor speed becomes slower and as a result, the system may generate an error even when operation is normal. Start engine before performing this diagnosis to avoid this.**

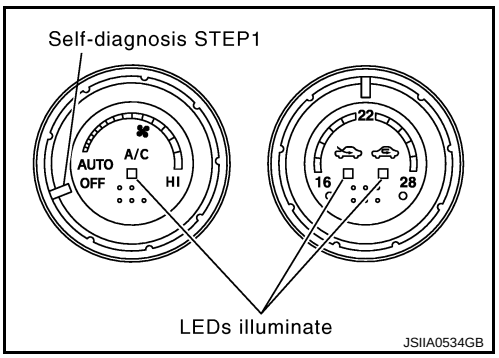
>> GO TO 2.

## 2. STEP-1: LEDS ARE CHECKED

Check LEDs illumination.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Malfunctioning fan control dial or auto amp. Refer to HAC-187, "Inspection procedure".

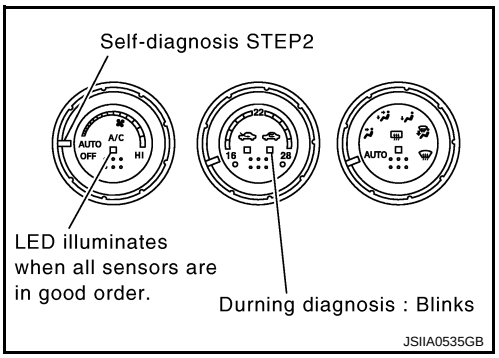



## 3. STEP-2: SENSOR CIRCUITS ARE CHECKED FOR OPEN OR SHORT CIRCUIT

1. Turn mode control dial to AUTO position.
2. Turn fan control dial to AUTO position.
   **CAUTION:**
   **When switched to STEP-2, LED of REC position blinks for approximately 25 seconds.**
3. Check A/C switch LED illumination.

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 7.

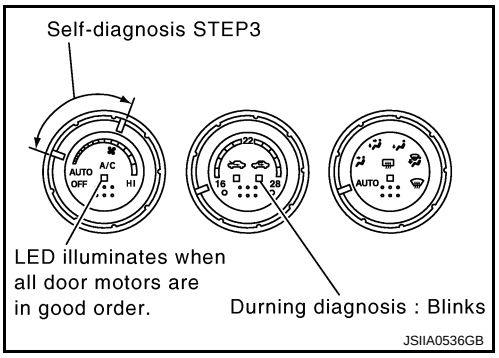



## 4. STEP-3: MODE DOOR AND INTAKE DOOR POSITIONS ARE CHECKED

1. Turn fan control dial to 1st - 12th speed.
   **CAUTION:**
   **When switched to STEP-3, LED of REC position blinks for approximately 50 seconds.**
2. Check A/C switch LED illumination.

Is the inspection result normal?

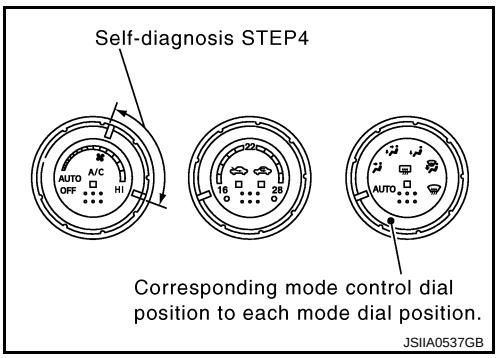
YES >> GO TO 5.
NO >> GO TO 8.




## 5. STEP-4: OPERATION OF EACH ACTUATOR IS CHECKED

1. Turn fan control dial to 13th - 25th speed.
2. Change operation status of air conditioner by changing mode control dial position.

>> GO TO 6.




## 6. CHECK ACTUATORS

Refer to the following chart and confirm discharge air flow, air temperature, blower motor voltage and compressor operation.

**Discharge air flow**

| Mode door position | Air outlet/distribution | | |
|---|---|---|---|
| | Vent | Foot | Defroster |
| | 100% | – | – |
| | 60% | 40% | – |
| | 18% (22%) | 62% (78%) | 20% (–) |
| | 15% | 40% | 45% |
| | 22% | – | 78% |

( ) :Manually control

JPIIA0218GB

| STEP-No.* | STEP-41 | STEP-42 | STEP-43 | STEP-44 | STEP-45 | STEP-46 |
|---|---|---|---|---|---|---|
| Mode control dial position | AUTO | VENT | B/L | FOOT | D/F | DEF |
| Mode door position | VENT | VENT | B/L | FOOT*2 | D/F | DEF |
| Intake door position | REC | REC | REC | FRE | FRE | FRE |
| Air mix door position | FULL COLD | FULL COLD | FULL COLD | FULL HOT | FULL HOT | FULL HOT |
| Blower motor voltage | Approx. 4.5 V | Approx. 10.5 V | Approx. 8.5 V | Approx. 8.5 V | Approx. 8.5 V | Approx. 12 V |
| Compressor | ON | ON | OFF | OFF | ON | ON |

Checks must be made visually, by listening to any noise, or by touching air outlets with hand, etc. for improper operation.
*: STEP-Nos. 41 to 46 are for differentiation and they are not displayed.

Is the inspection result normal?

YES >> 1. Turn ignition switch OFF or intake switch ON.
2. INSPECTION END

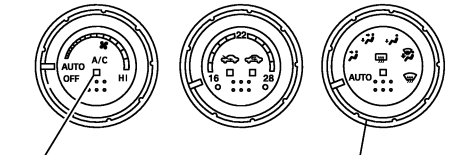
NO >>
- Air outlet does not change.
  Go to Mode Door Motor Circuit. Refer to HAC-42, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-44, "M9R : Diagnosis Procedure" (M9R).
- Intake door does not change.
  Go to Intake Door Motor Circuit. Refer toHAC-50, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-52, "M9R : Diagnosis Procedure" (M9R).
- Discharge air temperature does not change.
  Go to Air Mix Door Motor Circuit. Refer to HAC-46, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-48, "M9R : Diagnosis Procedure" (M9R).
- Blower motor operation is malfunctioning.
  Go to Blower Motor Circuit. Refer to HAC-54, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-58, "M9R : Diagnosis Procedure" (M9R).
- Magnet clutch does not engage.
  Go to Magnet Clutch Circuit. Refer to HAC-62, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-66, "M9R : Diagnosis Procedure" (M9R).

## 7. CHECK MALFUNCTIONING SENSOR

Refer to the following chart.

**CAUTION:**

**When switched to STEP-2, LED of REC position blinks for approximately 25 seconds.**




JSIIA0538GB

| Mode control dial position | Unusual | Malfunctioning sensor or motor (Including circuits) | Reference |
|---|---|---|---|
| VENT | A/C LED: OFF | OAT sensor | *2 |
| B/L | | In-vehicle sensor | *3 |
| FOOT | | Sunload sensor *1 | *4 |
| D/F | | Intake sensor | *5 |
| DEF | | Air mix door motor (LCU) PBR | *6 |

*1: Perform self-diagnosis STEP-2 under sunshine.
When performing indoors, aim a light (more than 60 W) at sunload sensor, otherwise LED of A/C switch does not indicate despite that sunload sensor is functioning normally.
*2: HAC-79, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-82, "M9R : Diagnosis Procedure" (M9R).
*3: HAC-85, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-87, "M9R : Diagnosis Procedure" (M9R).
*4: HAC-90, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-93, "M9R : Diagnosis Procedure" (M9R).
*5: HAC-96, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-99, "M9R : Diagnosis Procedure" (M9R).
*6: HAC-46, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-48, "M9R : Diagnosis Procedure" (M9R).

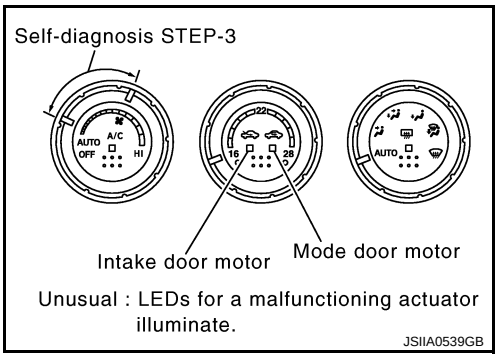
>> INSPECTION END

## 8. CHECK MALFUNCTIONING DOOR MOTOR POSITION SWITCH

Mode and/or intake door motor PBR (s) is/are malfunctioning.

**CAUTION:**

**When switched to STEP-3, LED of REC position blinks for approximately 50 seconds.**




| Unusual | Mode or intake door position | Reference |
|---|---|---|
| REC LED: ON | Mode door motor | *1 |
| FRE LED: ON | Intake door motor | *2 |

*1: HAC-42, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-44, "M9R : Diagnosis Procedure" (M9R).
*2: HAC-50, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-52, "M9R : Diagnosis Procedure" (M9R).

>> INSPECTION END

# CONSULT-III Function

INFOID:0000000001162147

## CONSULT-III APPLICATION ITEMS

CONSULT-III can display each diagnosis item using the diagnosis test modes shown as per the following.

| System part | Check item, diagnosis mode | Description |
|---|---|---|
| ECM | Data monitor | Displays ECM input data in real time. |
| BCM | Data monitor | Displays BCM input data in real time. |

## DATA MONITOR

Display Item List (ECM)

With Gasoline Engine

| Monitor Item | Condition | Value/Status |
|---|---|---|
| AC PRESS SEN | • Engine is running<br>• Warm-up condition<br>• Both A/C switch and blower fan motor switch: ON (Compressor operates.) | 1.0 - 4.0 V |

With Diesel Engine

| Monitor Item | Condition | Value/Status |
|---|---|---|
| RFRGERNT PRSS | • Engine is running<br>• Warm-up condition<br>• Air conditioner switch: OFF<br>• Shift lever: Neutral position<br>• No load | Approx. 5.7 bar |

Display Item List (BCM)

| Monitor Item | Condition | | Value/Status |
|---|---|---|---|
| IGN ON SW | Ignition switch OFF → ON | | Off → On |
| FAN ON SIG | Ignition switch ON | Blower fan motor switch ON | On |
| | | Blower fan motor switch OFF | Off |
| AIR COND SW | Ignition switch ON | Compressor ON | On |
| | | Compressor OFF | Off |

# DIAGNOSIS SYSTEM (HVAC)

## CONSULT-III Function (HVAC)

INFOID:0000000001283125

### APPLICATION ITEM

CONSULT-III performs the following functions via CAN communication with auto amp.

| Diagnosis mode | Function Description |
|---|---|
| DATA MONITOR | The auto amp. input/output signals are displayed. |
| ACTIVE TEST | The signals used to activate each device are forcibly supplied from auto amp. |

### SYSTEM APPLICATION

HVAC can perform the following functions for each system.

### DATA MONITOR

Display Item List

| Monitor Item [Unit] | Description |
|---|---|
| ELEC PWR CUT [OFF/FREEZ/INHBT] | Displays [OFF/FREEZ/INHBT] condition of the PTC heater states. |
| FAN ON SIG [On/Off] | Displays [FAN (ON)/FAN (OFF)] status as judged from blower fan motor signal. |
| ENGINE STATUS [STOP/STALL/RUN/CRA] | Displays [STOP/STALL/RUN/CRA] condition of the engine states. |
| ENG COOLNT T [°C] | The engine coolant temperature (judged by the signal voltage of the engine coolant temperature sensor) is displayed. |
| BATTERY VOLT [V] | The power supply voltage of BCM is displayed. |
| ENGINE RPM [rpm] | Displays the engine speed calculated from the signal of the crankshaft position sensor. |
| OUTSIDE TEMP [°C] | The outside air temperature (judged by the signal voltage of the OAT sensor) is displayed. |

### ACTIVE TEST

Test item

| Test Item | Operation | Description |
|---|---|---|
| PTC HEATER | OFF<br>PTC 1<br>PTC 2<br>PTC 3 | This test is able to check PTC heater operation. |

# DIAGNOSIS SYSTEM (BCM)

## COMMON ITEM

### COMMON ITEM : CONSULT-III Function (BCM - COMMON ITEM)

INFOID:0000000001403986

#### APPLICATION ITEM

CONSULT-III can display each diagnostic item using the diagnostic test modes shown following.

| Diagnosis mode | Function description |
|---|---|
| ECU Identification | BCM part number is displayed. |
| Self-Diagnostic Results | Displays the diagnosis results judged by BCM. Refer to BCS-65, "DTC Index". |
| Data Monitor | BCM input/output signals are displayed. |
| Active Test | The signals used to activate each device are forcibly supplied from BCM. |
| Work Support | Changes the setting for each system function. |
| Configuration | • Read and save the vehicle specification.<br>• Write the vehicle specification when replacing BCM. |
| CAN Diag Support Monitor | Monitors the reception status of CAN communication viewed from BCM. |

#### SYSTEM APPLICATION

BCM can perform the following functions for each system.

**NOTE:**

It can perform the diagnosis modes except the following for all sub system selection items.

×: Applicable item

| System | CONSULT-III sub system selection item | Diagnosis mode | | |
|---|---|---|---|---|
| | | WORK SUPPORT | DATA MONITOR | ACTIVE TEST |
| — | BCM | × | | |
| Door lock | DOOR LOCK | × | × | × |
| Rear window defogger | REAR DEFOGGER | × | × | × |
| Warning chime | BUZZER | | × | × |
| Interior room lamp control | INT LAMP | × | × | × |
| Remote keyless entry system | MULTI REMOTE ENT | × | × | × |
| Exterior lamp | HEAD LAMP | × | × | × |
| Wiper and washer | WIPER | × | × | × |
| Turn signal and hazard warning lamps | FLASHER | | × | × |
| Air conditioner | AIR CONDITONER | | × | |
| Intelligent Key system | INTELLIGENT KEY | | × | |
| Combination switch | COMB SW | | × | |
| Immobilizer | IMMU | | × | × |
| Interior room lamp battery saver | BATTERY SAVER | × | × | × |
| Back door open | TRUNK | | × | × |
| Vehicle security system | THEFT ALM | × | × | × |
| Signal buffer system | SIGNAL BUFFER | | × | × |
| — | PTC HEATER* | | | |

*: This item is displayed, but is not function.

## AIR CONDITIONER

### AIR CONDITIONER : CONSULT-III Function (BCM - AUTO AIR CONDITIONER)

INFOID:0000000001162149

#### DATA MONITOR

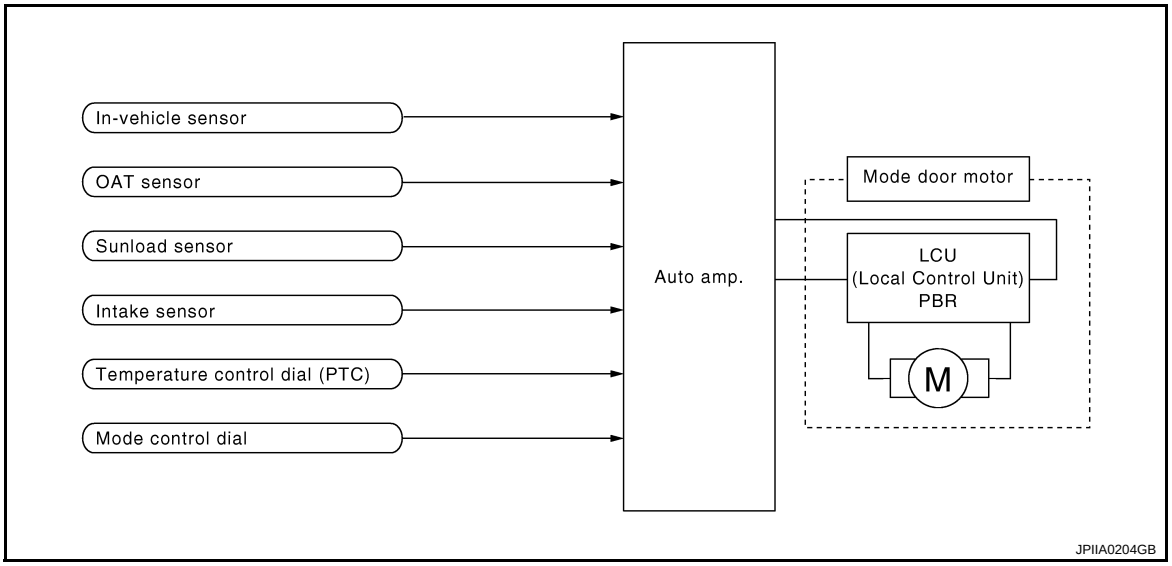
Display Item List

| Monitor Item [Unit] | | Contents |
|---|---|---|
| IGN SW | [On/Off] | Displays [ignition switch position (On)/(Off), ACC position (Off)] status as judged form ignition switch signal. |
| FAN ON SIG | [On/Off] | Displays [FAN (On)/FAN (Off)] status as judged form blower fan motor switch signal. |
| AIR COND SW | [On/Off] | Displays [COMP (On)/COMP (Off)] status as judged form air conditioner switch signal. |

# MODE DOOR CONTROL SYSTEM

## System Diagram

INFOID:0000000001306486




## System Description

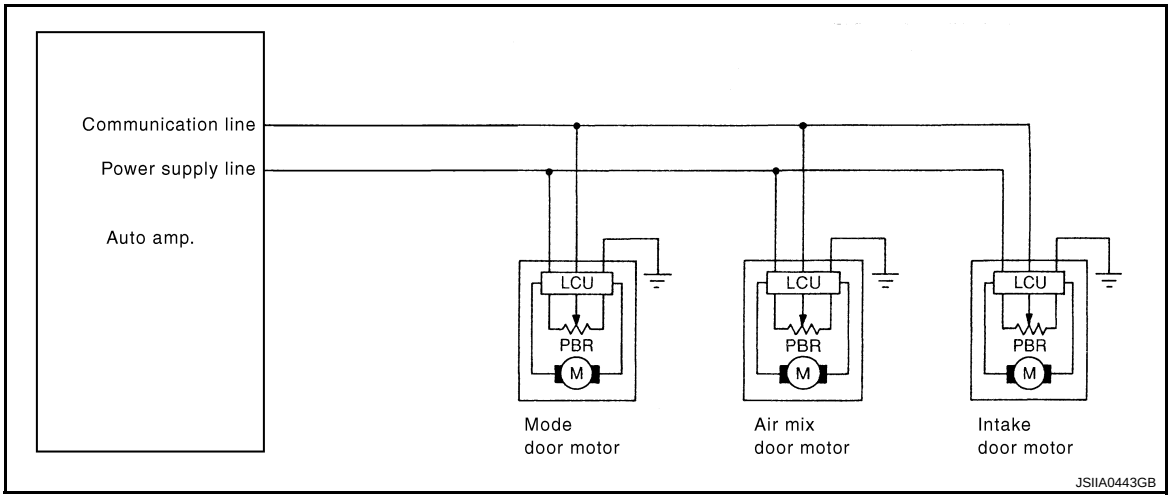
INFOID:0000000001162151

The mode door is automatically controlled by the temperature setting, ambient temperature, in-vehicle temperature, intake temperature and amount of sunload.

SYSTEM OPERATION

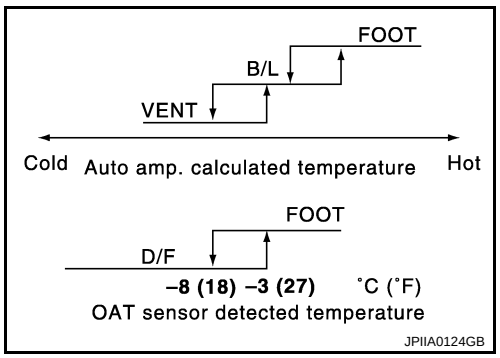
- The auto amp. receives data from each of the sensors.
- The auto amp. sends air mix door, mode door and intake door opening angle data to the air mix door motor LCU, mode door motor LCU and intake door motor LCU.
- The air mix door motor, mode door motor and intake door motor read their respective signals according to the address signal. Opening angle indication signals received from the auto amp. and each of the motor position sensors are compared by the LCUs in each door motor with the existing decision and opening angles.
- Subsequently, HOT/COLD, DEF/VENT and FRE/REC operation is selected. The new selection data are returned to the auto amp.

Door Motor Circuit




Mode Door Control Specification

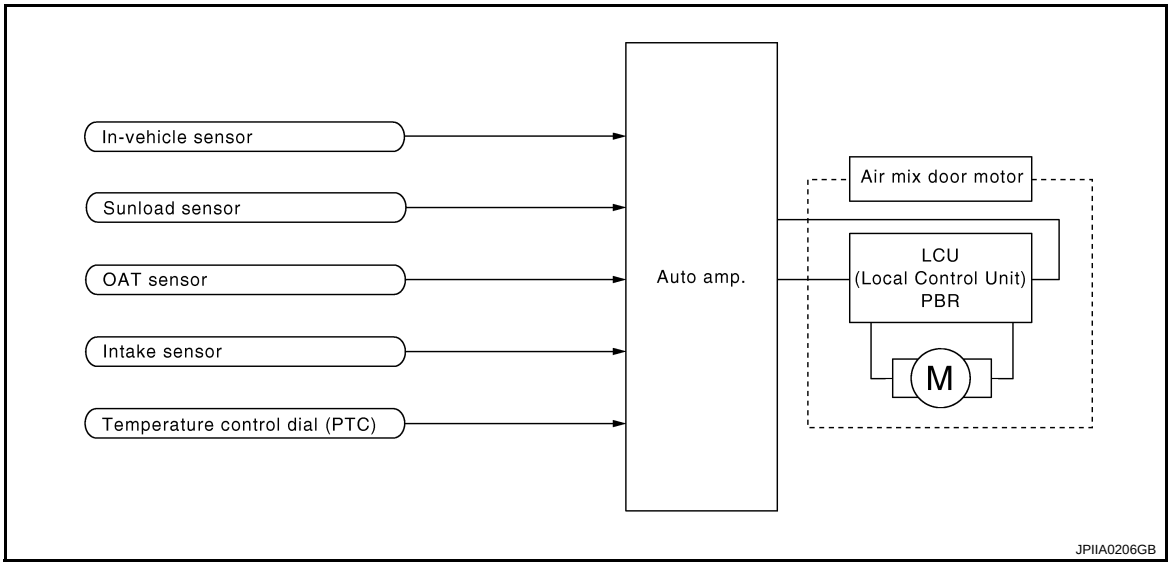
The mode position (auto-control or manual control) can be selected by mode control dial of the controller. Under automatic control, a mode door position (VENT, B/L, FOOT, or D/F) is selected depending on the (wind/air) temperature calculated by auto amp. based on a target air mix door opening angle and sunload. Also, D/F is selected to prevent windshield fogging especially when ambient temperature is extremely low with mode position FOOT.



# AIR MIX DOOR CONTROL SYSTEM

## System Diagram

INFOID:0000000001307365




## System Description

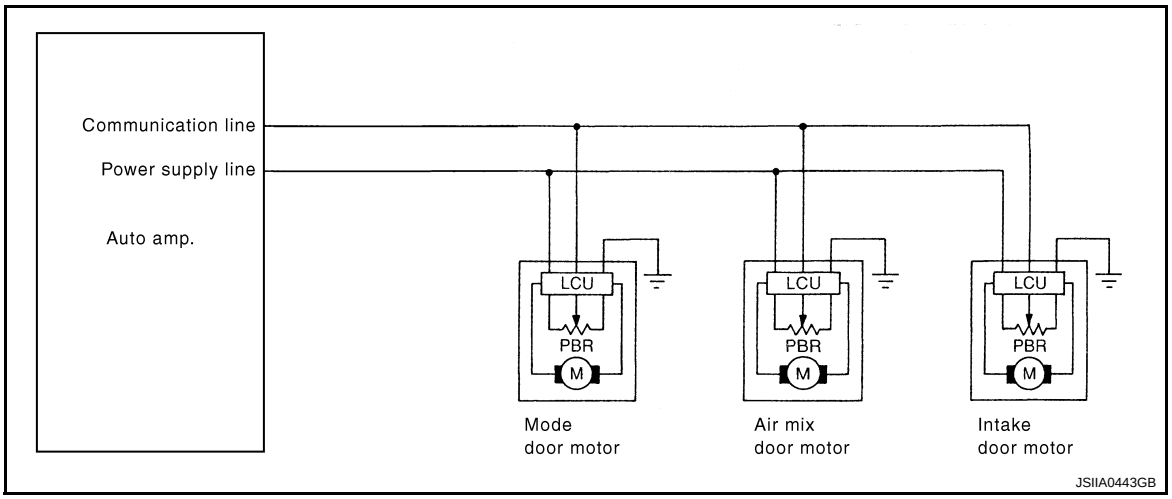
INFOID:0000000001162153

The air mix door is automatically controlled so that in-vehicle temperature is maintained at a preset value by the temperature setting, ambient temperature, intake temperature, in-vehicle temperature and amount of sunload.

SYSTEM OPERATION

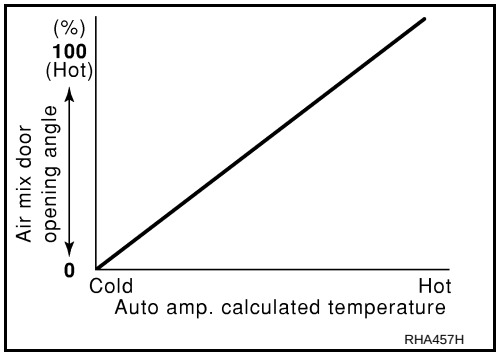
- The auto amp. receives data from each of the sensors.
- The auto amp. sends air mix door, mode door and intake door opening angle data to the air mix door motor LCU, mode door motor LCU and intake door motor LCU.
- The air mix door motor, mode door motor and intake door motor read their respective signals according to the address signal. Opening angle indication signals received from the auto amp. and each of the motor position sensors are compared by the LCUs in each door motor with the existing decision and opening angles.
- Subsequently, HOT/COLD, DEF/VENT and FRE/REC operation is selected. The new selection data are returned to the auto amp.

Door Motor Circuit




Air Mix Door Control Specification

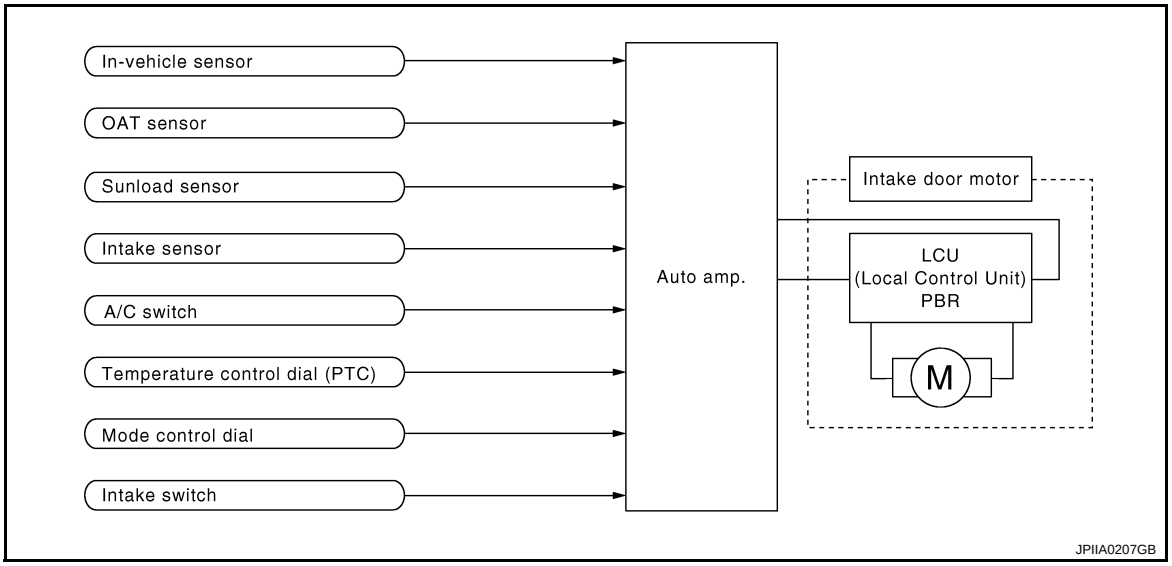
When ignition switch is ON, auto amp. continuously and automatically controls temperatures regardless of air conditioner operational condition. When setting a target temperature with temperature control dial, auto amp. corrects the set temperature and decides a target air mix door opening angle. Auto amp. controls air mix door according to the target air mix door opening angle and current air mix door opening angle for keeping an optimum air mix door opening angle. When a temperature is set at 16°C, air mix door is fixed at full cold, and when a temperature is set at 28°C, it is set at full hot.



# INTAKE DOOR CONTROL SYSTEM

## System Diagram

INFOID:0000000001307366




## System Description

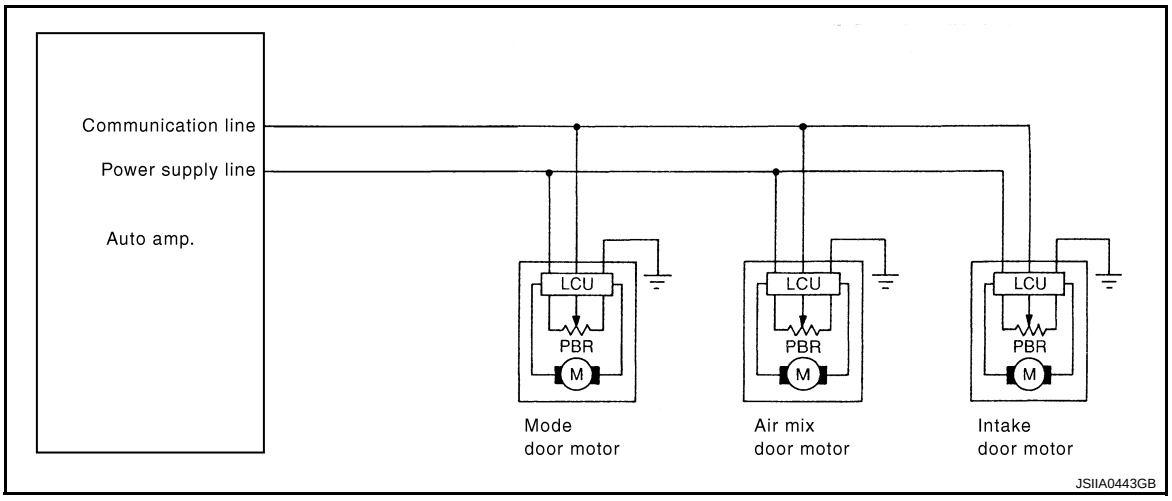
INFOID:0000000001162154

The intake doors are automatically controlled by the temperature setting, ambient temperature, in-vehicle temperature, intake temperature, amount of sunload and ON/OFF operation of the compressor.

SYSTEM OPERATION

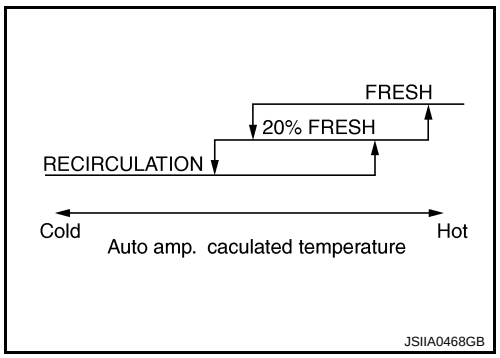
- The auto amp. receives data from each of the sensors.
- The auto amp. sends air mix door, mode door and intake door opening angle data to the air mix door motor LCU, mode door motor LCU and intake door motor LCU.
- The air mix door motor, mode door motor and intake door motor read their respective signals according to the address signal. Opening angle indication signals received from the auto amp. and each of the motor position sensors are compared by the LCUs in each door motor with the existing decision and opening angles.
- Subsequently, HOT/COLD, DEF/VENT and FRE/REC operation is selected. The new selection data are returned to the auto amp.
- The intake door control judges intake door position based on the ambient temperature, the intake air temperature and the in-vehicle temperature. When setting mode control dial to DEF (and D/F or D/F2: LHD models only) position, fan control dial OFF position, the auto amp. sets the intake door at the FRE position.

Door Motor Circuit




Intake Door Control Specification

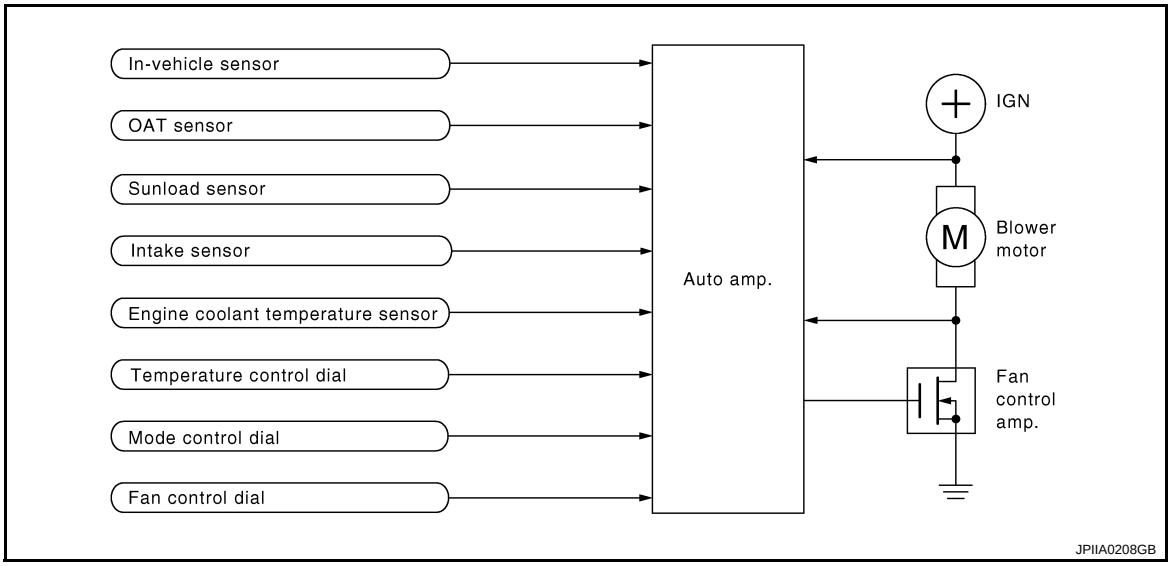
Intake door position is basically fixed at FRE when FRE LED of intake switch turn ON or mode control dial to DEF position, and fixed at REC when REC LED of intake switch turns ON.
Intake door automatic control selects FRE, 20%FRE, or REC depending on a target air mix door opening angle, based on in-vehicle temperature, ambient temperature, and sunload.



# BLOWER MOTOR CONTROL SYSTEM

## System Diagram

INFOID:0000000001307387




## System Description

INFOID:0000000001162155

Blower speed is automatically controlled by the temperature setting, ambient temperature, in-vehicle temperature, intake temperature, amount of sunload and air mix door position.
With shifting fan control dial to AUTO, the blower motor starts to increase gradually air flow volume.
When engine coolant temperature is low, the blower motor operation is delayed to prevent cool air from flowing.

### SYSTEM OPERATION

#### Automatic Mode

In the automatic mode, the blower motor speed is calculated by the auto amp. based on the input from the PBR, in-vehicle sensor, sunload sensor, intake sensor and OAT sensor.
The blower motor applied voltage ranges from approximately 4 V (lowest speed) to 12 V (highest speed).
The control blower speed (in the range of 4 to 12 V), auto amp. supplies a gate voltage to the fan control amp. Based on this voltage, fan control amp. control voltage supplied to the blower motor.

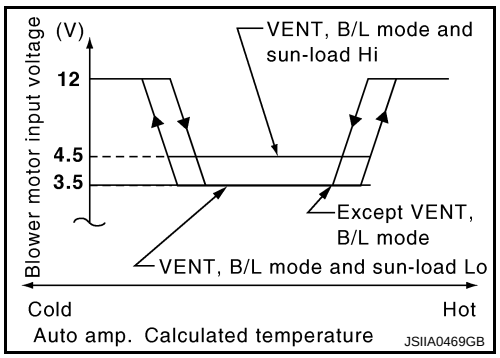
#### Starting Fan Speed Control

Start up from COLD SOAK Condition (Automatic mode)
In a cold start up condition where the engine coolant temperature is below 56°C (133°F), the blower does not operate for a short period of time (up to 150 seconds). The exact start delay time varies depending on the ambient and engine coolant temperature.
In the most extreme case (very low ambient temperature) the blower start delay is 150 seconds as described above. After this delay, the blower will operate at low speed until the engine coolant temperature rises above 56°C (133°F), and then the blower speed increases to the objective speed.
Start up from usual or HOT SOAK Condition (Automatic mode)
The blower will begin operation momentarily after the AUTO switch is pressed. The blower speed rises gradually to the objective speed over a time period of 3 seconds or less (actual time depends on the objective blower speed).

#### Blower Speed Compensation

Sunload
When the in-vehicle temperature and the set temperature are very close, the blower operates at low speed. The low speed varies depending on the sunload. During conditions of low or no sunload, the blower speed is low (approximately 4 V). During high sunload conditions, the auto amp. raise the blower speed (approximately 4.5 V).

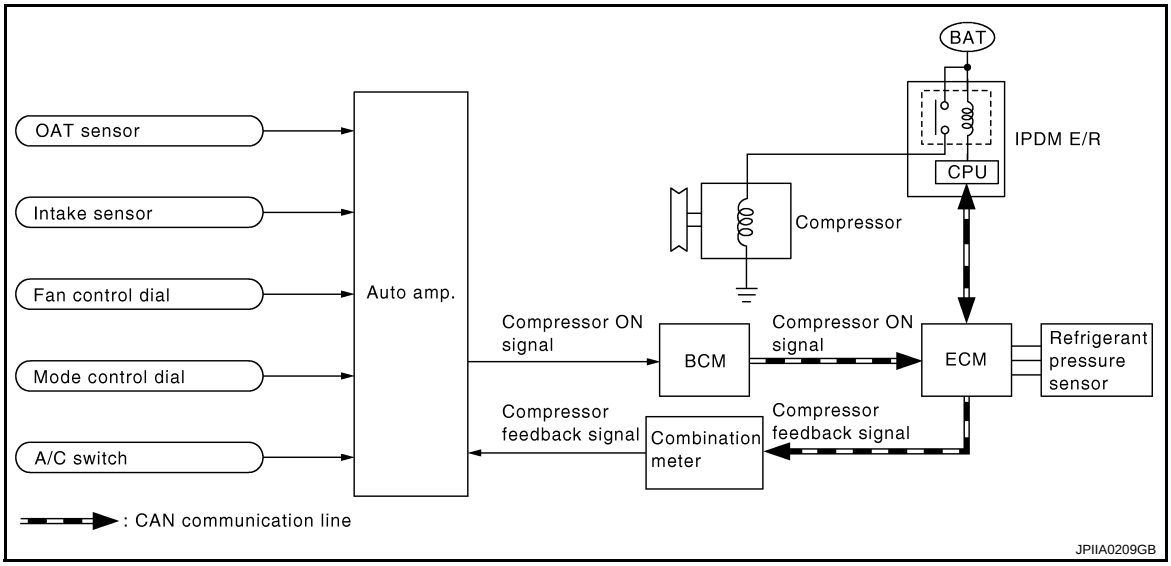
Fan Speed Control Specification



# MAGNET CLUTCH CONTROL SYSTEM

## System Diagram

INFOID:0000000001307755




## System Description

INFOID:0000000001162156

Auto amp. controls compressor operation by ambient temperature, intake air temperature and signal from ECM.

### SYSTEM OPERATION

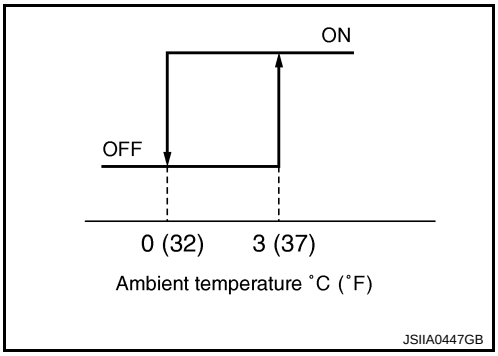
Turn fan control dial to ON or set mode control dial to DEF (and D/F or D/F2: LHD models only) position when A/C switch is pressed, auto amp. transmits compressor ON signal to BCM.
BCM sends compressor ON signal to ECM, via CAN communication.
ECM judges whether compressor can be turned ON, based on each sensor status (refrigerant-pressure sensor signal, throttle angle, etc.). If it judges compressor can be turned ON, it sends compressor ON signal to IPDM E/R, via CAN communication.
Upon receipt of compressor ON signal from ECM, IPDM E/R turns air conditioner relay ON to operate compressor.
When sending compressor ON signal to IPDM E/R via CAN communication, ECM simultaneously sends compressor feedback signal to auto amp. via CAN communication.
Auto amp., then, uses input compressor feedback signal to control air inlet.

#### Compressor Protection Control

When the high-pressure side detected by the refrigerant pressure sensor is either approximately 2.74 MPa (approximately 27.9 kg/cm$^2$·G) or more, or approximately 0.14 MPa (approximately 1.4 kg/cm$^2$·G) or less, ECM turns the A/C relay OFF and stops the compressor.

#### Low Temperature Protection Control

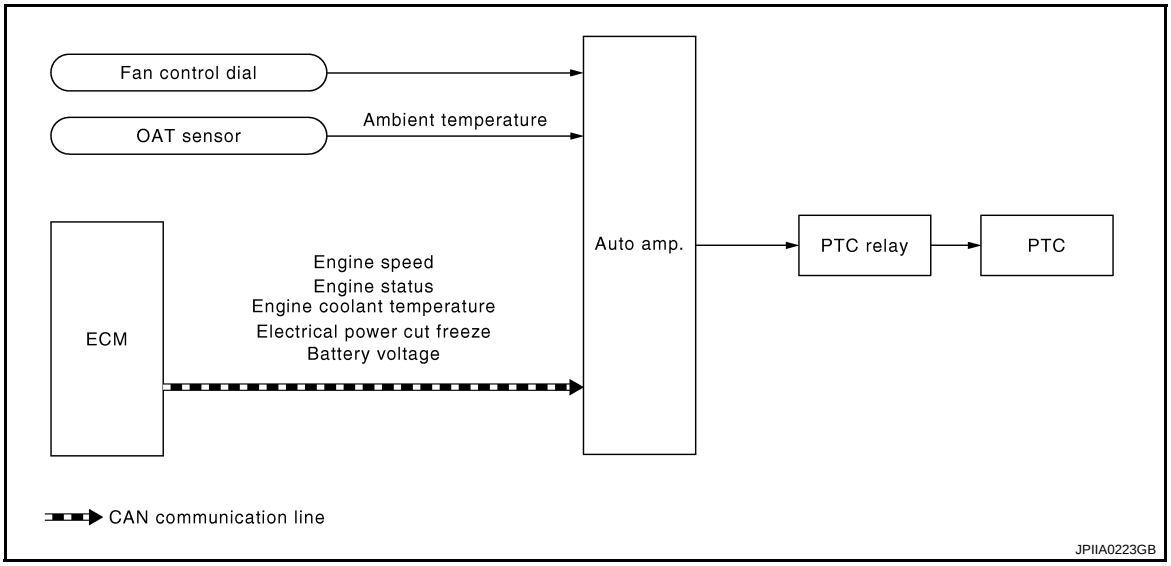
Auto amp. turns compressor ON or OFF as judged by a signal detected by OAT sensor and intake sensor.
When ambient temperature is higher than 3°C (37°F), the compressor turns ON. The compressor turns OFF when ambient temperature is lower than 0°C (32°F).



# PTC HEATER CONTROL SYSTEM

## System Diagram

INFOID:0000000001307820




## System Description

INFOID:0000000001162157

Auto amp. controls PTC (Positive Temperature Coefficient) heater correspond to fan ON signal, ambient temperature, engine coolant temperature, engine speed, engine status, electrical power cut freeze signal and battery voltage.
Auto amp. judges whether PTC can be turned ON, based on each sensor status (ambient temperature, engine speed, engine coolant temperature, etc.).

# COMPONENT DIAGNOSIS

## MODE DOOR MOTOR

## MR20DE/QR25DE

### MR20DE/QR25DE : Description

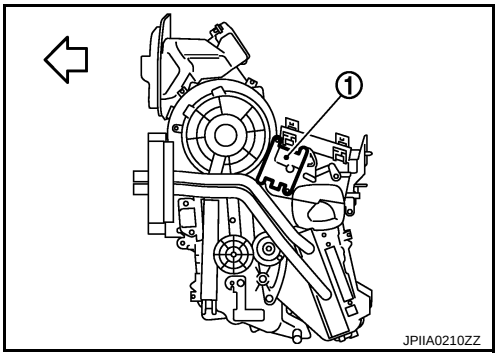
INFOID:0000000001162158

#### COMPONENT DESCRIPTION

Mode Door Motor

The mode door motor (1) is attached to the A/C unit assembly. It rotates so that air is discharged from the outlet set by the auto amp. Motor rotation is conveyed to a link which activates the mode door.

⇦: Vehicle front




### MR20DE/QR25DE : Component Function Check

INFOID:0000000001162159

#### 1. CONFIRM SYMPTOM BY PERFORMING THE FOLLOWING OPERATIONAL CHECK

1. Turn mode control dial to each position.
2. Confirm that discharge air comes out according to the air distribution table at below. Refer to HAC-13, "System Description".

**NOTE:**

Confirm that the magnet clutch is engaged (Sound or visual inspection) and intake door position is at FRE when DEF or D/F is selected.

Is the inspection result normal?

YES >> END.
NO >> Go to diagnosis procedure. Refer to HAC-42, "MR20DE/QR25DE : Diagnosis Procedure".

### MR20DE/QR25DE : Diagnosis Procedure

INFOID:0000000001162160

#### 1. PERFORM SELF-DIAGNOSIS STEP-2

Perform self-diagnosis STEP-2. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 3.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to appropriate malfunctioning sensor circuit. Refer to HAC-24, "Diagnosis Description", see No. 7.

#### 2. PERFORM SELF-DIAGNOSIS STEP-3

Perform self-diagnosis STEP-3. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 4.

Is the inspection result normal?

YES >> GO TO 6.
NO-1 >> REC LED ON: GO TO 3.
NO-2 >> FRE LED ON: Go to Intake Door Motor Circuit. Refer to HAC-50, "MR20DE/QR25DE : Diagnosis Procedure".

#### 3. CHECK POWER SUPPLY FOR MODE DOOR MOTOR

Check voltage between mode door motor harness connector M310 terminal 1 and ground.

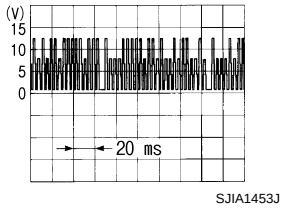
| (+) | | (–) | Voltage |
|---|---|---|---|
| Mode door motor | | — | |
| Connector | Terminal | | |
| M310 | 1 | Ground | Battery voltage |

Is the inspection result normal?

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

## 4. CHECK SIGNAL FOR MODE DOOR MOTOR

Confirm A/C LAN signal between mode door motor harness connector M310 terminal 2 and ground using an oscilloscope.

| (+) | | (–) | Voltage |
|---|---|---|---|
| Mode door motor | | — | |
| Connector | Terminal | | |
| M310 | 2 | Ground |  |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Is the inspection result normal?

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

## 5. CHECK MODE DOOR MOTOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect mode door motor connector.
3. Check continuity between mode door motor harness connector M310 terminal 3 and ground.

| Mode door motor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| M310 | 3 | Ground | Existed |

Is the inspection result normal?

YES >> Replace mode door motor.
NO >> Repair harness or connector.

## 6. PERFORM SELF-DIAGNOSIS STEP-4

Perform self-diagnosis STEP-4. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 6.

Is it operated normally?

YES >> END.
NO >> GO TO 7.

## 7. CHECK MODE DOOR CONTROL LINKAGE

Check mode door control linkage.

Is it installed normally?

YES >> Refer to VTL-25, "Exploded View" (LHD models) or VTL-71, "Exploded View" (RHD models).
NO >> Repair or adjust control linkage.

M9R

## M9R : Description

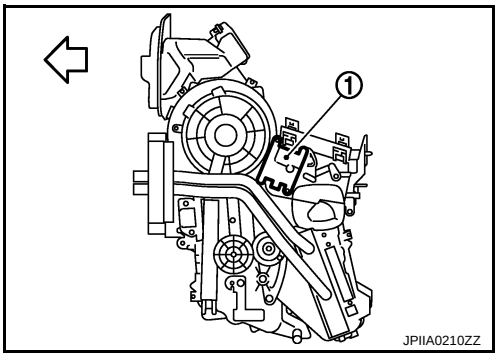
INFOID:0000000001303620

### COMPONENT DESCRIPTION

Mode Door Motor

The mode door motor (1) is attached to the A/C unit assembly. It rotates so that air is discharged from the outlet set by the auto amp. Motor rotation is conveyed to a link which activates the mode door.

⇦: Vehicle front




## M9R : Component Function Check

INFOID:0000000001303618

### 1. CONFIRM SYMPTOM BY PERFORMING THE FOLLOWING OPERATIONAL CHECK

1. Turn mode control dial to each position.
2. Confirm that discharge air comes out according to the air distribution table at below. Refer to HAC-13, "System Description".

**NOTE:**

Confirm that the magnet clutch is engaged (Sound or visual inspection) and intake door position is at FRE when DEF or D/F is selected.

Is the inspection result normal?

YES >> END.
NO >> Go to diagnosis procedure. Refer to HAC-44, "M9R : Diagnosis Procedure".

## M9R : Diagnosis Procedure

INFOID:0000000001303619

### 1. PERFORM SELF-DIAGNOSIS STEP-2

Perform self-diagnosis STEP-2. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 3.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to appropriate malfunctioning sensor circuit. Refer to HAC-24, "Diagnosis Description", see No. 7.

### 2. PERFORM SELF-DIAGNOSIS STEP-3

Perform self-diagnosis STEP-3. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 4.

Is the inspection result normal?

YES >> GO TO 6.
NO-1 >> REC LED ON: GO TO 3.
NO-2 >> FRE LED ON: Go to Intake Door Motor Circuit. Refer to HAC-52, "M9R : Diagnosis Procedure".

### 3. CHECK POWER SUPPLY FOR MODE DOOR MOTOR

Check voltage between mode door motor harness connector M310 terminal 1 and ground.

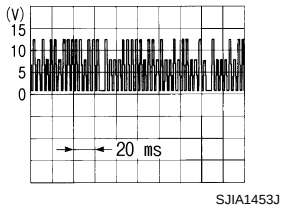
| (+) | | (–) | Voltage |
|---|---|---|---|
| Mode door motor | | — | |
| Connector | Terminal | | |
| M310 | 1 | Ground | Battery voltage |

Is the inspection result normal?

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

## 4. CHECK SIGNAL FOR MODE DOOR MOTOR

Confirm A/C LAN signal between mode door motor harness connector M310 terminal 2 and ground using an oscilloscope.

| (+) | | (–) | Voltage |
|---|---|---|---|
| Mode door motor | | — | |
| Connector | Terminal | | |
| M310 | 2 | Ground |  |



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Is the inspection result normal?

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

## 5. CHECK MODE DOOR MOTOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect mode door motor connector.
3. Check continuity between mode door motor harness connector M310 terminal 3 and ground.

| Mode door motor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| M310 | 3 | Ground | Existed |

Is the inspection result normal?

YES >> Replace mode door motor.
NO >> Repair harness or connector.

## 6. PERFORM SELF-DIAGNOSIS STEP-4

Perform self-diagnosis STEP-4. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 6.

Is it operated normally?

YES >> END.
NO >> GO TO 7.

## 7. CHECK MODE DOOR CONTROL LINKAGE

Check mode door control linkage.

Is it installed normally?

YES >> Refer to VTL-25, "Exploded View" (LHD models) or VTL-71, "Exploded View" (RHD models).
NO >> Repair or adjust control linkage.

# AIR MIX DOOR MOTOR
## MR20DE/QR25DE

### MR20DE/QR25DE : Description

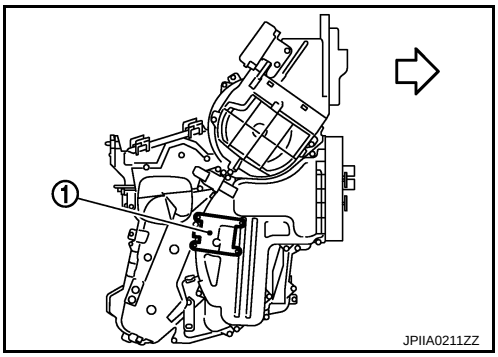
INFOID:0000000001162165

#### COMPONENT DESCRIPTION

Air Mix Door Motor

The air mix door motor (1) is attached to the A/C unit assembly. It rotates so that the air mix door is opened or closed to a position set by the auto amp. Motor rotation is then conveyed through a shaft and the air mix door position feedback is then sent to the auto amp. by PBR built-in air mix door motor.

⇦: Vehicle front




### MR20DE/QR25DE : Component Function Check

INFOID:0000000001162166

#### 1.CONFIRM SYMPTOM BY PERFORMING THE FOLLOWING OPERATIONAL CHECK

1. Turn temperature control dial clockwise until 28°C.
2. Check for hot air at discharge air outlets.
3. Turn temperature control dial counterclockwise until 16°C.
4. Check for cold air at discharge air outlets.

Is the inspection result normal?

YES >> END.
NO >> Go to diagnosis procedure. Refer to HAC-46, "MR20DE/QR25DE : Diagnosis Procedure".

### MR20DE/QR25DE : Diagnosis Procedure

INFOID:0000000001162167

#### 1.PERFORM SELF-DIAGNOSIS STEP-2

Perform self-diagnosis STEP-2. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 3.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to appropriate malfunctioning sensor circuit. Refer to HAC-24, "Diagnosis Description", see No. 7.

#### 2.PERFORM SELF-DIAGNOSIS STEP-4

Perform self-diagnosis STEP-4. Refer to HAC-24, "Diagnosis Description", see Nos.1 to 6.

Is it operated normally?

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

#### 3.CHECK AIR MIX DOOR MOTOR

Check air mix door motor. Refer to VTL-26, "Exploded View" (LHD models) or VTL-72, "Exploded View" (RHD models).

Is it installed normally?

YES >> GO TO 4.
NO >> Replace air mix door motor.

#### 4.CHECK POWER SUPPLY FOR AIR MIX DOOR MOTOR

Check voltage between air mix door motor harness connector M306 terminal 1 and ground.

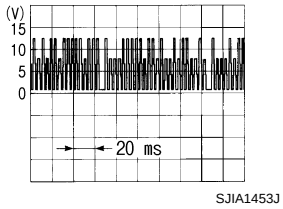
| (+) | | (–) | Voltage |
|---|---|---|---|
| Air mix door motor | | — | |
| Connector | Terminal | | |
| M306 | 1 | Ground | Battery voltage |

Is the inspection result normal?

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

## 5. CHECK SIGNAL FOR AIR MIX DOOR MOTOR

Confirm A/C LAN signal between air mix door motor harness connector M306 terminal 2 and ground using an oscilloscope.

| (+) | | (–) | Voltage |
|---|---|---|---|
| Air mix door motor | | — | |
| Connector | Terminal | | |
| M306 | 2 | Ground |  |



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Is the inspection result normal?

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

## 6. CHECK AIR MIX DOOR MOTOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect air mix door motor connector.
3. Check continuity between air mix door motor harness connector M306 terminal 3 and ground.

| Air mix door motor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| M306 | 3 | Ground | Existed |

Is the inspection result normal?

YES >> Replace air mix door motor.
NO >> Repair harness or connector.

# M9R

## M9R : Description

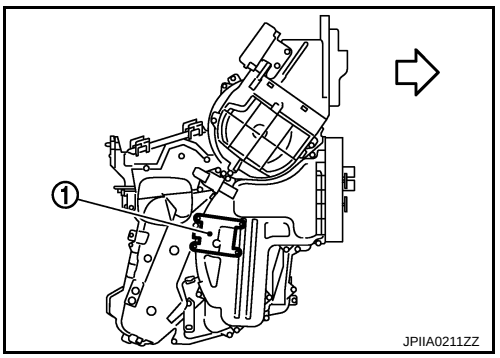
INFOID:0000000001298138

### COMPONENT DESCRIPTION

Air Mix Door Motor

The air mix door motor (1) is attached to the A/C unit assembly. It rotates so that the air mix door is opened or closed to a position set by the auto amp. Motor rotation is then conveyed through a shaft and the air mix door position feedback is then sent to the auto amp. by PBR built-in air mix door motor.

⇦: Vehicle front




## M9R : Component Function Check

INFOID:0000000001303621

### 1.CONFIRM SYMPTOM BY PERFORMING THE FOLLOWING OPERATIONAL CHECK

1. Turn temperature control dial clockwise until 28°C.
2. Check for hot air at discharge air outlets.
3. Turn temperature control dial counterclockwise until 16°C.
4. Check for cold air at discharge air outlets.

Is the inspection result normal?

YES >> END.
NO >> Go to diagnosis procedure. Refer to HAC-48, "M9R : Diagnosis Procedure".

## M9R : Diagnosis Procedure

INFOID:0000000001303622

### 1.PERFORM SELF-DIAGNOSIS STEP-2

Perform self-diagnosis STEP-2. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 3.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to appropriate malfunctioning sensor circuit. Refer to HAC-24, "Diagnosis Description", see No. 7.

### 2.PERFORM SELF-DIAGNOSIS STEP-4

Perform self-diagnosis STEP-4. Refer to HAC-24, "Diagnosis Description", see Nos.1 to 6.

Is it operated normally?

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

### 3.CHECK AIR MIX DOOR MOTOR

Check air mix door motor. Refer to VTL-26, "Exploded View" (LHD models) or VTL-72, "Exploded View" (RHD models).

Is it installed normally?

YES >> GO TO 4.
NO >> Replace air mix door motor.

### 4.CHECK POWER SUPPLY FOR AIR MIX DOOR MOTOR

Check voltage between air mix door motor harness connector M306 terminal 1 and ground.

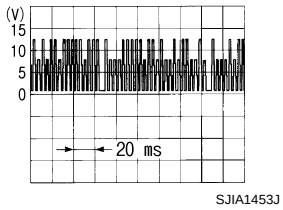
| (+) | | (–) | Voltage |
|---|---|---|---|
| Air mix door motor | | — | |
| Connector | Terminal | | |
| M306 | 1 | Ground | Battery voltage |

Is the inspection result normal?

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

## 5. CHECK SIGNAL FOR AIR MIX DOOR MOTOR

Confirm A/C LAN signal between air mix door motor harness connector M306 terminal 2 and ground using an oscilloscope.

| (+) | | (–) | Voltage |
|---|---|---|---|
| Air mix door motor | | — | |
| Connector | Terminal | | |
| M306 | 2 | Ground |  |



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Is the inspection result normal?

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

## 6. CHECK AIR MIX DOOR MOTOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect air mix door motor connector.
3. Check continuity between air mix door motor harness connector M306 terminal 3 and ground.

| Air mix door motor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| M306 | 3 | Ground | Existed |

Is the inspection result normal?

YES >> Replace air mix door motor.
NO >> Repair harness or connector.

# INTAKE DOOR MOTOR
## MR20DE/QR25DE

### MR20DE/QR25DE : Description

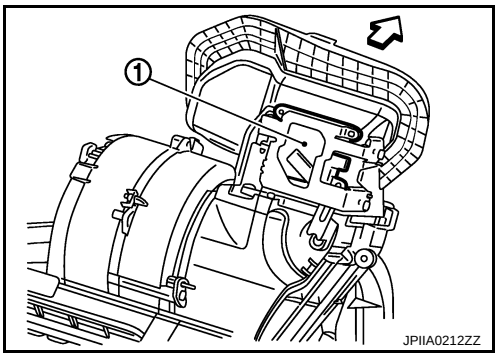
INFOID:0000000001162168

#### COMPONENT DESCRIPTION

Intake Door Motor

The intake door motor (1) is attached to the A/C unit assembly. It rotates so that air is drawn from inlets set by the auto amp. Motor rotation is conveyed to a lever which activates the intake door.

⇦: Vehicle front




### MR20DE/QR25DE : Component Function Check

INFOID:0000000001162169

#### 1. CONFIRM SYMPTOM BY PERFORMING THE FOLLOWING OPERATIONAL CHECK

1. Press intake switch.
2. REC LED should illuminate.
3. Listen for intake door position change. (Slight change of blower sound can be heard.)
4. Press intake switch again.
5. FRE LED should illuminate.

Is the inspection result normal?

YES >> END.
NO >> Go to diagnosis procedure. Refer to HAC-50, "MR20DE/QR25DE : Diagnosis Procedure".

### MR20DE/QR25DE : Diagnosis Procedure

INFOID:0000000001162170

#### 1. PERFORM SELF-DIAGNOSIS STEP-2

Perform self-diagnosis STEP-2. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 3.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to appropriate malfunctioning sensor circuit. Refer to HAC-24, "Diagnosis Description", see No. 7.

#### 2. PERFORM SELF-DIAGNOSIS STEP-3

Perform self-diagnosis STEP-3. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 4.

Is the inspection result normal?

YES >> GO TO 6.
NO-1 >> REC LED ON: Go to Mode Door Motor Circuit. Refer to HAC-42, "MR20DE/QR25DE : Diagnosis Procedure".
NO-2 >> FRE LED ON: GO TO 3.

#### 3. CHECK POWER SUPPLY FOR INTAKE DOOR MOTOR

Check voltage between intake door motor harness connector M304 terminal 1 and ground.

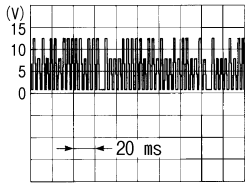
| (+) | | (–) | Voltage |
|---|---|---|---|
| Intake door motor | | — | |
| Connector | Terminal | | |
| M304 | 1 | Ground | Battery voltage |

Is the inspection result normal?

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

## 4. CHECK SIGNAL FOR INTAKE DOOR MOTOR

Confirm A/C LAN signal between intake door motor harness connector M304 terminal 2 and ground using an oscilloscope.

| (+) | | (–) | Voltage |
|---|---|---|---|
| Intake door motor | | — | |
| Connector | Terminal | | |
| M304 | 2 | Ground |  |



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Is the inspection result normal?

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

## 5. CHECK INTAKE DOOR MOTOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect intake door motor connector.
3. Check continuity between intake door motor harness connector M304 terminal 3 and ground.

| Intake door motor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| M304 | 3 | Ground | Existed |

Is the inspection result normal?

YES >> Replace intake door motor.
NO >> Repair harness or connector.

## 6. PERFORM SELF-DIAGNOSIS STEP-4

Perform self-diagnosis STEP-4. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 6.

Is the inspection result normal?

YES >> END.
NO-1 >> GO TO 7.

## 7. CHECK INTAKE DOOR CONTROL LINKAGE

Check intake door control linkage.

Is it installed normally?

YES >> Refer to VTL-27, "Exploded View" (LHD models) or VTL-73, "Exploded View" (RHD models).
NO >> Repair or adjust control linkage.

# M9R

## M9R : Description

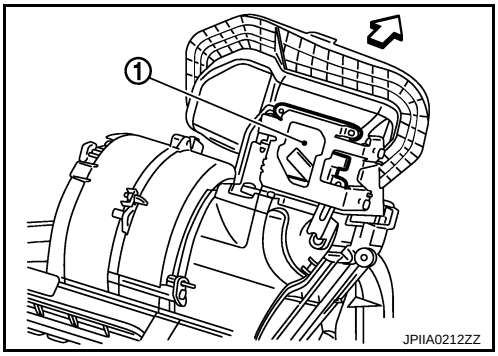
INFOID:0000000001298139

### COMPONENT DESCRIPTION

Intake Door Motor

The intake door motor (1) is attached to the A/C unit assembly. It rotates so that air is drawn from inlets set by the auto amp. Motor rotation is conveyed to a lever which activates the intake door.

⇦: Vehicle front




## M9R : Component Function Check

INFOID:0000000001303623

### 1.CONFIRM SYMPTOM BY PERFORMING THE FOLLOWING OPERATIONAL CHECK

1. Press intake switch.
2. REC LED should illuminate.
3. Listen for intake door position change. (Slight change of blower sound can be heard.)
4. Press intake switch again.
5. FRE LED should illuminate.

Is the inspection result normal?

YES >> END.
NO >> Go to diagnosis procedure. Refer to HAC-52, "M9R : Diagnosis Procedure".

## M9R : Diagnosis Procedure

INFOID:0000000001308684

### 1.PERFORM SELF-DIAGNOSIS STEP-2

Perform self-diagnosis STEP-2. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 3.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to appropriate malfunctioning sensor circuit. Refer to HAC-24, "Diagnosis Description", see No. 7.

### 2.PERFORM SELF-DIAGNOSIS STEP-3

Perform self-diagnosis STEP-3. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 4.

Is the inspection result normal?

YES >> GO TO 6.
NO-1 >> REC LED ON: Go to Mode Door Motor Circuit. Refer to HAC-44, "M9R : Diagnosis Procedure".
NO-2 >> FRE LED ON: GO TO 3.

### 3.CHECK POWER SUPPLY FOR INTAKE DOOR MOTOR

Check voltage between intake door motor harness connector M304 terminal 1 and ground.

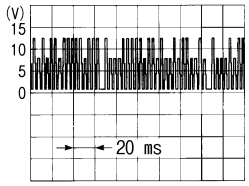
| (+) | | (–) | Voltage |
|---|---|---|---|
| Intake door motor | | — | |
| Connector | Terminal | | |
| M304 | 1 | Ground | Battery voltage |

Is the inspection result normal?

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

### 4.CHECK SIGNAL FOR INTAKE DOOR MOTOR

Confirm A/C LAN signal between intake door motor harness connector M304 terminal 2 and ground using an oscilloscope.

| (+) | | (–) | Voltage |
|---|---|---|---|
| Intake door motor | | — | |
| Connector | Terminal | | |
| M304 | 2 | Ground |  |



SJIA1453J

Is the inspection result normal?

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

## 5. CHECK INTAKE DOOR MOTOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect intake door motor connector.
3. Check continuity between intake door motor harness connector M304 terminal 3 and ground.

| Intake door motor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| M304 | 3 | Ground | Existed |

Is the inspection result normal?

YES >> Replace intake door motor.
NO >> Repair harness or connector.

## 6. PERFORM SELF-DIAGNOSIS STEP-4

Perform self-diagnosis STEP-4. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 6.

Is the inspection result normal?

YES >> END.
NO-1 >> GO TO 7.

## 7. CHECK INTAKE DOOR CONTROL LINKAGE

Check intake door control linkage.

Is it installed normally?

YES >> Refer to VTL-27, "Exploded View" (LHD models) or VTL-73, "Exploded View" (RHD models).
NO >> Repair or adjust control linkage.

# BLOWER MOTOR
## MR20DE/QR25DE

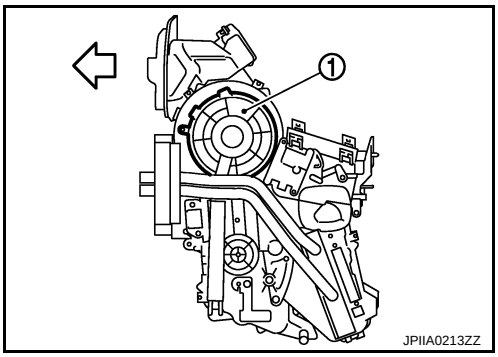
### MR20DE/QR25DE : Description

INFOID:0000000001162171

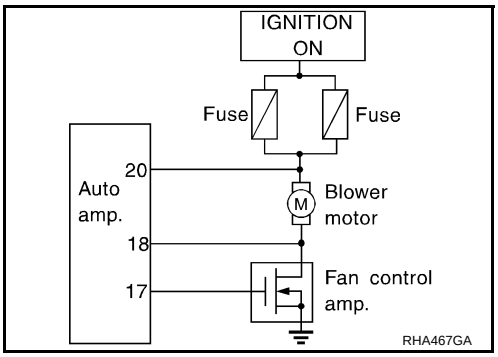
COMPONENT DESCRIPTION

The blower motor (1) utilizes a brush motor with a sirocco fan type.

⇦: Vehicle front




Blower motor circuit




### MR20DE/QR25DE : Component Function Check

INFOID:0000000001162172

#### 1. CONFIRM SYMPTOM BY PERFORMING THE FOLLOWING OPERATIONAL CHECK

1. Turn fan control dial clockwise to 1st speed. Blower should operate on low speed.
2. Turn fan control dial clockwise to 2nd speed, and continue checking blower speed until all speeds are checked.

Is the inspection result normal?

YES >> END.
NO >> Go to diagnosis procedure. Refer to HAC-54, "MR20DE/QR25DE : Diagnosis Procedure".

### MR20DE/QR25DE : Diagnosis Procedure

INFOID:0000000001162173

#### 1. PERFORM SELF-DIAGNOSIS STEP-2

Perform self-diagnosis STEP-2. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 3.

Is there any malfunction displayed?

YES >> Go to appropriate malfunctioning sensor circuit. Refer to HAC-24, "Diagnosis Description", see to No. 7.
NO >> GO TO 2.

#### 2. PERFORM SELF-DIAGNOSIS STEP-4

Perform self-diagnosis STEP-4. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 6.

| Code No. | 41 | 42 | 43 | 44 | 45 | 46 |
|---|---|---|---|---|---|---|
| Blower motor voltage | 4.5 V | 10.5 V | 8.5 V | | | 12.0 V |

Does blower motor speed change according to each code No.?

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

## 3. CHECK ENGINE COOLANT TEMPERATURE

Check engine coolant temperature.

Is engine coolant temperature below 56°C (133°F)?

YES >> GO TO 4.
NO >> Blower motor operation is normal.

## 4. CHECK BLOWER MOTOR OPERATING

Check blower motor operating.

Is blower motor operation under starting blower speed control?

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

## 5. CHECK POWER SUPPLY FOR BLOWER MOTOR

1. Turn ignition switch ON.
2. Check voltage between blower motor harness connector M312 terminal 1 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| Blower motor | | — | |
| Connector | Terminal | | |
| M312 | 1 | Ground | Battery voltage |

Is the inspection result normal?

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

## 6. CHECK POWER SUPPLY FOR FAN CONTROL AMP.

Check voltage between fan control amp. harness connector M311 terminal 1 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| Fan control amp. | | — | |
| Connector | Terminal | | |
| M311 | 1 | Ground | Battery voltage |

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 14.

## 7. CHECK BLOWER MOTOR CONTROL SIGNAL

1. Turn mode control dial to VENT.
2. Turn fan control dial to 1st speed.
3. Check voltage between fan control amp. harness connector M311 terminal 2 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| Fan control amp. | | — | |
| Connector | Terminal | | |
| M311 | 2 | Ground | Approx. 2.5 V |

Is the inspection result normal?

YES >> GO TO 8.
NO-1 >> In the case of less than approximately 2.5 V: GO TO 15.
NO-2 >> In the case of more than approximately 9 V: Replace auto amp.

## 8. CHECK FAN CONTROL AMP. GROUND CIRCUIT

1. Disconnect fan control amp. connector.

2. Check continuity between fan control amp. harness connector M311 terminal 3 and ground.

| Fan control amp. | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| M311 | 3 | Ground | Existed |

Is the inspection result normal?

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

## 9. CHECK BLOWER MOTOR FEEDBACK SIGNAL

1. Reconnect fan control amp. connector.
2. Turn ignition switch ON.
3. Turn fan control dial to 1st speed.
4. Check voltage between auto amp. harness connector M50 terminal 18 and ground.

| (+) | | (–) | Condition | Voltage |
|---|---|---|---|---|
| Auto amp. | | — | | |
| Connector | Terminal | | | |
| M50 | 18 | Ground | Blower speed: 1st (Blower motor operate.) | Approx. 10 V |

Is the inspection result normal?

YES >> Replace auto amp.
NO >> Repair harness or connector.

## 10. CHECK POWER VOLTAGE OF BLOWER RELAY

1. Turn ignition switch OFF.
2. Remove blower relay. Refer to PG-125, "Fuse, Connector and Terminal Arrangement".
3. Turn ignition switch ON.
4. Check voltage between blower relay fuse block terminals 1, 3 and ground. Refer to PG-123, "Description" for relay terminal assignment.

| (+) | (–) | Voltage |
|---|---|---|
| Blower relay | — | |
| 1 | Ground | Battery voltage |
| 3 | | |

Is the inspection result normal?

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

## 11. CHECK IGNITION SWITCH CIRCUIT

Check ignition switch circuit. Refer to SEC-61, "Diagnosis Procedure" (WITH INTELLIGENT KEY SYSTEM), SEC-268, "Diagnosis Procedure" (WITHOUT INTELLIGENT KEY SYSTEM).

Is the inspection result normal?

YES >> Repair harness or connector.
NG >> Replace malfunctioning parts.

## 12. CHECK BLOWER RELAY

1. Turn ignition switch OFF.
2. Install blower relay. Refer to PG-125, "Fuse, Connector and Terminal Arrangement".
3. Check operation sound of the blower relay after switching ignition switch ON.

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace blower relay.

## 13. CHECK FUSE

Check 15A fuse [Nos. 15 and 16, located in the fuse block (J/B)]. Refer to PG-125, "Fuse, Connector and Terminal Arrangement".

Is the inspection result normal?

YES >> Repair harness or connector.
NG >> Replace fuse.

## 14. CHECK CIRCUIT CONTINUITY BETWEEN BLOWER MOTOR AND FAN CONTROL AMP.

1. Turn ignition switch OFF.
2. Disconnect fan control amp. connector.
3. Check continuity between blower motor harness connector M312 terminal 2 and fan control amp. harness connector M311 terminal 1.

| Blower motor | | Fan control amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| M312 | 2 | M311 | 1 | Existed |

Is the inspection result normal?

YES >> Replace blower motor.
NO >> Repair harness or connector.

## 15. CHECK CIRCUIT FAN CONTROL AMP.

Check fan control amp. Refer to HAC-57, "MR20DE/QR25DE : Component Inspection".

Is the inspection result normal?

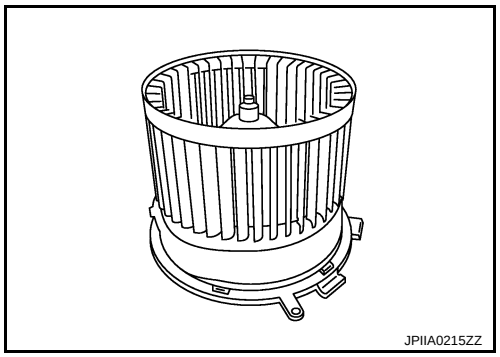
YES >> Replace auto amp.
NO >> Replace fan control amp.

## MR20DE/QR25DE : Component Inspection

INFOID:0000000001162174

### Blower motor

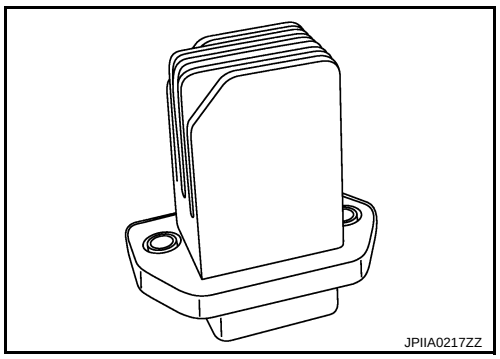
Confirm smooth rotation of the blower motor.




### Fan control amp.

Check continuity between terminal 3 and 2 using analog circuit tester.

| Terminal | | Continuity |
|---|---|---|
| (+) | (–) | |
| 3 | 2 | Existed |
| 2 | 3 | Not existed |




### M9R

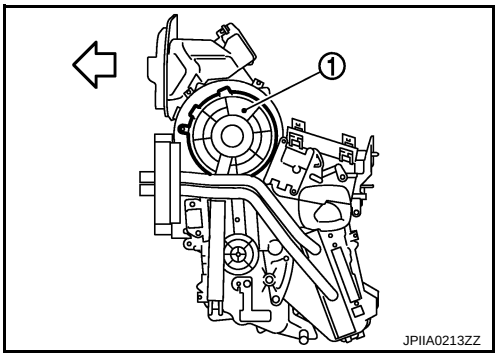
## M9R : Description

INFOID:0000000001298140

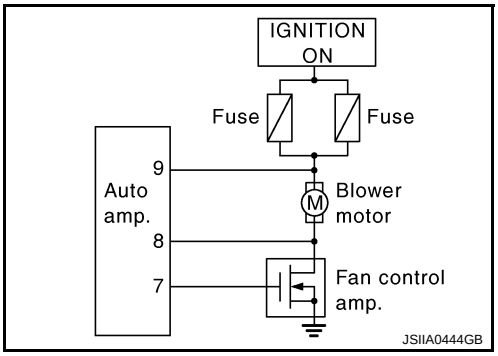
### COMPONENT DESCRIPTION

The blower motor (1) utilizes a brush motor with a sirocco fan type.

⇦: Vehicle front




Blower motor circuit




## M9R : Component Function Check

INFOID:0000000001298073

### 1. CONFIRM SYMPTOM BY PERFORMING THE FOLLOWING OPERATIONAL CHECK

1. Turn fan control dial clockwise. Blower should operate on low speed.
2. Turn fan control dial clockwise, and continue checking blower speed and fan LEDs until all speeds checked.

Is the inspection result normal?

YES >> END.
NO >> Go to diagnosis procedure. Refer to HAC-58, "M9R : Diagnosis Procedure".

## M9R : Diagnosis Procedure

INFOID:0000000001308690

### 1. PERFORM SELF-DIAGNOSIS STEP-2

Perform self-diagnosis STEP-2. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 3.

Is there any malfunction displayed?

YES >> Go to appropriate malfunctioning sensor circuit. Refer to HAC-24, "Diagnosis Description", see to No. 7.
NO >> GO TO 2.

### 2. PERFORM SELF-DIAGNOSIS STEP-4

Perform self-diagnosis STEP-4. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 6.

| Code No. | 41 | 42 | 43 | 44 | 45 | 46 |
|---|---|---|---|---|---|---|
| Blower motor voltage | 4.5 V | 10.5 V | 8.5 V | | | 12.0 V |

Does blower motor speed change according to each code No.?

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

### 3. CHECK ENGINE COOLANT TEMPERATURE

Check engine coolant temperature.

Is engine coolant temperature below 56°C (133°F)?

YES >> GO TO 4.
NO >> Blower motor operation is normal.

## 4. CHECK BLOWER MOTOR OPERATING

Check blower motor operating.

Is blower motor operation under starting blower speed control?

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

## 5. CHECK POWER SUPPLY FOR BLOWER MOTOR

1. Turn ignition switch ON.
2. Check voltage between blower motor harness connector M312 terminal 1 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| Blower motor | | — | |
| Connector | Terminal | | |
| M312 | 1 | Ground | Battery voltage |

Is the inspection result normal?

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

## 6. CHECK POWER SUPPLY FOR FAN CONTROL AMP.

Check voltage between fan control amp. harness connector M311 terminal 1 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| Fan control amp. | | — | |
| Connector | Terminal | | |
| M311 | 1 | Ground | Battery voltage |

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 14.

## 7. CHECK BLOWER MOTOR CONTROL SIGNAL

1. Turn mode control dial to VENT.
2. Turn fan control dial to 1st speed.
3. Check voltage between fan control amp. harness connector M311 terminal 2 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| Fan control amp. | | — | |
| Connector | Terminal | | |
| M311 | 2 | Ground | Approx. 2.5 V |

Is the inspection result normal?

YES >> GO TO 8.
NO-1 >> In the case of less than approximately 2.5 V: GO TO 15.
NO-2 >> In the case of more than approximately 9 V: Replace auto amp.

## 8. CHECK FAN CONTROL AMP. GROUND CIRCUIT

1. Disconnect fan control amp. connector.
2. Check continuity between fan control amp. harness connector M311 terminal 3 and ground.

| Fan control amp. | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| M311 | 3 | Ground | Existed |

Is the inspection result normal?

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

## 9. CHECK BLOWER MOTOR FEEDBACK SIGNAL

1. Reconnect fan control amp. connector.
2. Turn ignition switch ON.
3. Turn fan control dial to 1st speed.
4. Check voltage between auto amp. harness connector M53 terminal 8 and ground.

| (+) | | (–) | Condition | Voltage |
|---|---|---|---|---|
| Auto amp. | | — | | |
| Connector | Terminal | | | |
| M53 | 8 | Ground | Blower speed: 1st (Blower motor operate.) | Approx. 10 V |

Is the inspection result normal?

YES >> Replace auto amp.
NO >> Repair harness or connector.

## 10. CHECK POWER VOLTAGE OF BLOWER RELAY

1. Turn ignition switch OFF.
2. Remove blower relay. Refer to PG-125, "Fuse, Connector and Terminal Arrangement".
3. Turn ignition switch ON.
4. Check voltage between blower relay fuse block terminals 1, 3 and body ground. Refer to PG-123, "Description" for relay terminal assignment.

| (+) | (–) | Voltage |
|---|---|---|
| Blower relay | — | |
| 1 | Ground | Battery voltage |
| 3 | | |

Is the inspection result normal?

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

## 11. CHECK IGNITION SWITCH CIRCUIT

Check ignition switch circuit. Refer to SEC-61, "Diagnosis Procedure" (WITH INTELLIGENT KEY SYSTEM), SEC-268, "Diagnosis Procedure" (WITHOUT INTELLIGENT KEY SYSTEM).

Is the inspection result normal?

YES >> Repair harness or connector.
NG >> Replace malfunctioning parts.

## 12. CHECK BLOWER RELAY

1. Turn ignition switch OFF.
2. Install blower relay. Refer to PG-125, "Fuse, Connector and Terminal Arrangement".
3. Check operation sound of the blower relay after switching ignition switch ON.

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace blower relay.

## 13. CHECK FUSE

Check 15A fuse [Nos. 15 and 16, located in the fuse block (J/B)]. Refer to PG-125, "Fuse, Connector and Terminal Arrangement".

Is the inspection result normal?

YES >> Repair harness or connector.
NG >> Replace fuse.

## 14. CHECK CIRCUIT CONTINUITY BETWEEN BLOWER MOTOR AND FAN CONTROL AMP.

1. Turn ignition switch OFF.
2. Disconnect fan control amp. connector.
3. Check continuity between blower motor harness connector M312 terminal 2 and fan control amp. harness connector M311 terminal 1.

| Blower motor | | Fan control amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| M312 | 2 | M311 | 1 | Existed |

Is the inspection result normal?

YES >> Replace blower motor.
NO >> Repair harness or connector.

## 15. CHECK CIRCUIT FAN CONTROL AMP.

Check fan control amp. Refer to HAC-61, "M9R : Component Inspection".

Is the inspection result normal?

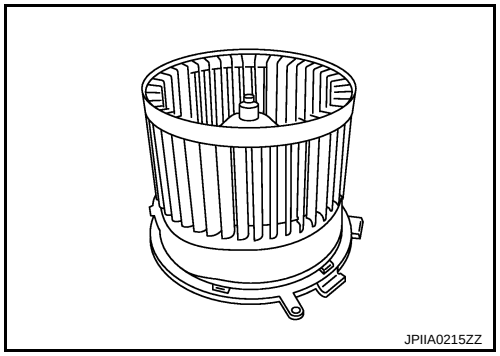
YES >> Replace auto amp.
NO >> Replace fan control amp.

## M9R : Component Inspection

INFOID:0000000001298141

### Blower motor

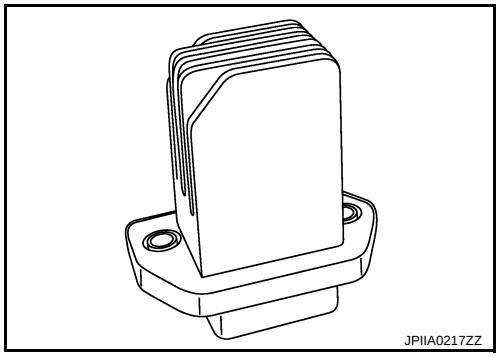
Confirm smooth rotation of the blower motor.


JPIIA0215ZZ

### Fan control amp.

Check continuity between terminal 3 and 2 using analog circuit tester.

| Terminal | | Continuity |
|---|---|---|
| (+) | (–) | |
| 3 | 2 | Existed |
| 2 | 3 | Not existed |


JPIIA0217ZZ

# MAGNET CLUTCH
## MR20DE/QR25DE

### MR20DE/QR25DE : Description

INFOID:0000000001162175

Magnet clutch drives a compressor, by a signal of IPDM E/R.

### MR20DE/QR25DE : Component Function Check

INFOID:0000000001162176

#### 1.CONFIRM SYMPTOM BY PERFORMING THE FOLLOWING OPERATIONAL CHECK

1. Turn fan control dial to AUTO position.
2. Press A/C switch.
3. A/C switch LED should illuminate. Confirm that the magnet clutch engages (sound or visual inspection). (Discharge air and blower speed depend on ambient, in-vehicle and set temperatures.)

Does the magnet clutch operate?

YES >> END.
NO >> Go to Diagnosis Procedure. Refer to HAC-62, "MR20DE/QR25DE : Diagnosis Procedure".

### MR20DE/QR25DE : Diagnosis Procedure

INFOID:0000000001162177

#### 1.PERFORM SELF-DIAGNOSIS STEP-2

Perform self-diagnosis STEP-2. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 3.

Is there any malfunction displayed?

YES >> Go to appropriate malfunctioning sensor circuit. Refer to HAC-24, "Diagnosis Description", see to No. 7.
NO >> GO TO 2.

#### 2.PERFORM SELF-DIAGNOSIS STEP-4

Perform self-diagnosis STEP-4. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 6.

Is it operated normally?

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

#### 3.PERFORM IPDM E/R AUTO ACTIVE TEST

Perform “IPDM E/R auto active test”. Refer to PCS-8, "Diagnosis Description".

Does the magnet clutch operate?

YES >> • WITH CONSULT-III: GO TO 7.
• WITHOUT CONSULT-III: GO TO 8.
NO >> Check 10A fuse (No. 53, located in IPDM E/R), and GO TO 4.

#### 4.CHECK CIRCUIT CONTINUITY BETWEEN IPDM E/R AND COMPRESSOR

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R connector and compressor connector.
3. Check continuity between IPDM E/R harness connector E13 terminal 23 and compressor harness connector F17 terminal 1.

| IPDM E/R | | Compressor | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| E13 | 23 | F17 | 1 | Existed |

Is the inspection result normal?

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

#### 5.CHECK CIRCUIT CONTINUITY BETWEEN COMPRESSOR GROUND

Check continuity between compressor harness connector F17 terminal 2 and ground.

| Compressor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| F17 | 2 | Ground | Existed |

Is the inspection result normal?

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

## 6. CHECK MAGNET CLUTCH CIRCUIT

Check for operation sound when applying battery voltage direct current to terminal.

Is the inspection result normal?

YES >> 1. Replace IPDM E/R.
2. Refer to self-diagnosis procedure HAC-24, "Diagnosis Description" and perform self-diagnosis STEP-4. Confirm that magnet clutch operation normal.

NO >> 1. Replace compressor.
2. Refer to self-diagnosis procedure HAC-24, "Diagnosis Description" and perform self-diagnosis STEP-4. Confirm that magnet clutch operation normal.

## 7. CHECK BCM INPUT (COMPRESSOR ON) SIGNAL

Check compressor ON/OFF signal in “Data monitor”. Refer to HAC-27, "CONSULT-III Function".

**A/C SW ON : AIR COND SW On**
**A/C SW OFF : AIR COND SW Off**

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 8.

## 8. CHECK CIRCUIT CONTINUITY BETWEEN BCM AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect BCM harness connector and auto amp. harness connector.
3. Check continuity between BCM harness connector M65 terminal 27 and auto amp. harness connector M50 terminal 4.

| BCM | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| M65 | 27 | M50 | 4 | Existed |

Is the inspection result normal?

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

## 9. CHECK BCM

1. Connect BCM harness connector.
2. Turn ignition switch ON.
3. Check voltage between BCM harness connector M65 terminal 27 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| BCM | | — | |
| Connector | Terminal | | |
| M65 | 27 | Ground | Battery voltage |

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace BCM. Refer to BCS-68, "Exploded View".

## 10. CHECK COMPRESSOR ON SIGNAL

1. Turn ignition switch OFF.
2. Connect auto amp. harness connector.
3. Turn ignition switch ON.
4. Check voltage between auto amp. harness connector M50 terminal 4 and ground.

| (+) | | (–) | Condition | Voltage |
|---|---|---|---|---|
| Auto amp. | | — | | |
| Connector | Terminal | | | |
| M50 | 4 | Ground | A/C switch: ON (Blower motor operates.) | Approx. 0 V |

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace auto amp.

## 11. CHECK REFRIGERANT PRESSURE SENSOR

Ⓜ WITH CONSULT-III

1. Start the engine.
2. Check voltage of refrigerant pressure sensor in “Data monitor”. Refer to ECM-308, "Reference Value" (MR20DE), ECQ-314, "Reference Value" [QR25DE (WITH EURO-OBD)], or ECQ-605, "Reference Value" [QR25DE (WITHOUT EURO-OBD)].

Ⓝ WITHOUT CONSULT-III

1. Start the engine.
2. Check voltage between ECM harness connector F8 terminal 41 (MR20DE engine) or F43 terminal 37 (QR25DE engine) and ground.

MR20DE engine

| (+) | | (–) | Condition | Voltage |
|---|---|---|---|---|
| ECM | | — | | |
| Connector | Terminal | | | |
| F8 | 41 | Ground | A/C switch: ON (Blower motor operates.) | Approx. 1.0 - 4.0 V |

QR25DE engine

| (+) | | (–) | Condition | Voltage |
|---|---|---|---|---|
| ECM | | — | | |
| Connector | Terminal | | | |
| F43 | 37 | Ground | A/C switch: ON (Blower motor operates.) | Approx. 1.0 - 4.0 V |

Is the inspection result normal?

YES >> • Ⓜ WITH CONSULT-III: GO TO 12.
• Ⓝ WITHOUT CONSULT-III: GO TO 13.
NO >> Refer to ECM-306, "Diagnosis Procedure" (MR20DE), ECQ-312, "Diagnosis Procedure" [QR25DE (WITH EURO-OBD)], or ECQ-603, "Diagnosis Procedure" [QR25DE (WITHOUT EURO-OBD)].

## 12. CHECK BCM INPUT (FAN ON) SIGNAL

Check FAN ON/OFF signal in “Data monitor”. Refer to HAC-27, "CONSULT-III Function".

**FAN CONTROL DIAL ON : FAN ON SIG On**
**FAN CONTROL DIAL OFF : FAN ON SIG Off**

Is the inspection result normal?

YES >> GO TO 16.
NO >> GO TO 13.

## 13. CHECK CIRCUIT CONTINUITY BETWEEN BCM AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect BCM connector and auto amp. connector.
3. Check continuity between BCM harness connector M65 terminal 26 and auto amp. harness connector M50 terminal 19.

| BCM | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| M65 | 26 | M50 | 19 | Existed |

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair harness or connector.

## 14. CHECK BCM

1. Connect BCM harness connector.
2. Turn ignition switch ON.
3. Check voltage between BCM harness connector M65 terminal 26 and ground.

| BCM | | — | Voltage |
|---|---|---|---|
| Connector | Terminal | | |
| M65 | 26 | Ground | Battery voltage |

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace BCM. Refer to BCS-68, "Exploded View".

## 15. CHECK FAN ON SIGNAL

1. Turn ignition switch OFF.
2. Connect auto amp. connector.
3. Turn ignition switch ON.
4. Check voltage between auto amp. harness connector M50 terminal 19 and ground.

| (+) | | (–) | Condition | Voltage |
|---|---|---|---|---|
| Auto amp. | | — | | |
| Connector | Terminal | | | |
| M50 | 19 | Ground | Fan control dial: ON | Approx. 0 V |

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace auto amp.

## 16. CHECK CAN COMMUNICATION

Check CAN communication. Refer to LAN-25, "CAN Communication Signal Chart".
- ECM – IPDM E/R
- ECM – BCM

Is the inspection result normal?

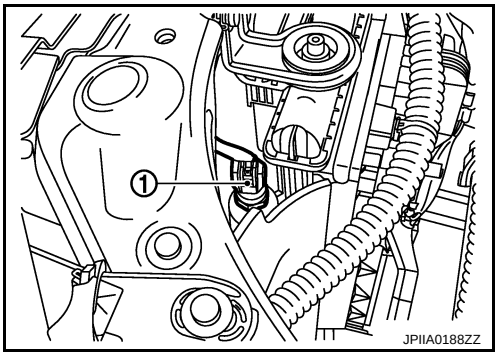
YES >> Replace ECM.
NO >> Repair or replace malfunctioning part(s).

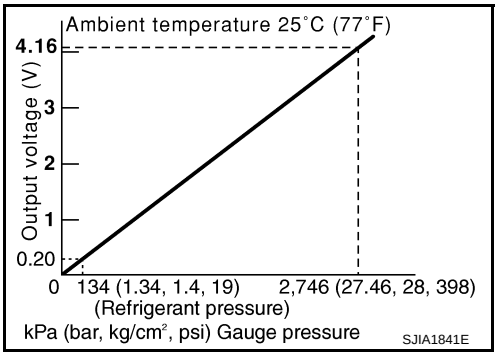
# MR20DE/QR25DE : Component Inspection

INFOID:0000000001162178

## Refrigerant Pressure Sensor

The refrigerant pressure sensor (1) is attached to the liquid tank.
Check that the A/C refrigerant pressure and the sensor output voltage are within the specified range as shown in the A/C operating condition figure. Refer to ECM-306, "Description" (MR20DE) or ECQ-312, "Description" [QR25DE (WITH EURO-OBD)] or ECQ-603, "Description" [QR25DE (WITHOUT EURO-OBD)].




## M9R

## M9R : Description

INFOID:0000000001298145

Magnet clutch drives a compressor, by a signal of IPDM E/R.

## M9R : Component Function Check

INFOID:0000000001298078

### 1.CONFIRM SYMPTOM BY PERFORMING THE FOLLOWING OPERATIONAL CHECK

1. Turn fan control dial to AUTO position.
2. Press A/C switch.
3. A/C switch LED should illuminate. Confirm that the magnet clutch engages (sound or visual inspection). (Discharge air and blower speed depend on ambient, in-vehicle and set temperatures.)

Does the magnet clutch operate?

YES >> END.
NO >> Go to Diagnosis Procedure. Refer to HAC-66, "M9R : Diagnosis Procedure".

## M9R : Diagnosis Procedure

INFOID:0000000001298079

### 1.PERFORM SELF-DIAGNOSIS STEP-2

Perform self-diagnosis STEP-2. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 3.

Is there any malfunction displayed?

YES >> Go to appropriate malfunctioning sensor circuit. Refer to HAC-24, "Diagnosis Description", see to No. 7.
NO >> GO TO 2.

### 2.PERFORM SELF-DIAGNOSIS STEP-4

Perform self-diagnosis STEP-4. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 6.

Is it operated normally?

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

### 3.PERFORM IPDM E/R AUTO ACTIVE TEST

Perform “IPDM E/R auto active test”. Refer to HAC-24, "Diagnosis Description".

Does the magnet clutch operate?

YES >> • WITH CONSULT-III: GO TO 7.
• WITHOUT CONSULT-III: GO TO 8.
NO >> Check 10A fuse (No. 53, located in IPDM E/R), and GO TO 4.

## 4. CHECK CIRCUIT CONTINUITY BETWEEN IPDM E/R AND COMPRESSOR

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R connector and compressor connector.
3. Check continuity between IPDM E/R harness connector E15 terminal 55 and compressor harness connector F17 terminal 1.

| IPDM E/R | | Compressor | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| E15 | 55 | F17 | 1 | Existed |

Is the inspection result normal?

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

## 5. CHECK CIRCUIT CONTINUITY BETWEEN COMPRESSOR GROUND

Check continuity between compressor harness connector F17 terminal 2 and ground.

| Compressor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| F17 | 2 | Ground | Existed |

Is the inspection result normal?

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

## 6. CHECK MAGNET CLUTCH CIRCUIT

Check for operation sound when applying battery voltage direct current to terminal.

Is the inspection result normal?

YES >> 1. Replace IPDM E/R.
2. Refer to self-diagnosis procedure HAC-24, "Diagnosis Description" and perform self-diagnosis STEP-4. Confirm that magnet clutch operation normal.
NO >> 1. Replace compressor.
2. Refer to self-diagnosis procedure HAC-24, "Diagnosis Description" and perform self-diagnosis STEP-4. Confirm that magnet clutch operation normal.

## 7. CHECK BCM INPUT (COMPRESSOR ON) SIGNAL

Check compressor ON/OFF signal in “Data monitor”. Refer to HAC-27, "CONSULT-III Function".

**A/C SW ON : AIR COND SW On**
**A/C SW OFF : AIR COND SW Off**

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 8.

## 8. CHECK CIRCUIT CONTINUITY BETWEEN BCM AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect BCM harness connector and auto amp. harness connector.
3. Check continuity between BCM harness connector M65 terminal 27 and auto amp. harness connector M53 terminal 13.

| BCM | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| M65 | 27 | M53 | 13 | Existed |

Is the inspection result normal?

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

## 9. CHECK BCM

1. Connect BCM harness connector.
2. Turn ignition switch ON.
3. Check voltage between BCM harness connector M65 terminal 27 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| BCM | | — | |
| Connector | Terminal | | |
| M65 | 27 | Ground | Battery voltage |

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace BCM. Refer to BCS-68, "Exploded View".

## 10. CHECK COMPRESSOR ON SIGNAL

1. Turn ignition switch OFF.
2. Connect auto amp. harness connector.
3. Turn ignition switch ON.
4. Check voltage between auto amp. harness connector M53 terminal 13 and ground.

| (+) | | (–) | Condition | Voltage |
|---|---|---|---|---|
| Auto amp. | | — | | |
| Connector | Terminal | | | |
| M53 | 13 | Ground | A/C switch: ON<br>(Blower motor operates.) | Approx. 0 V |

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace auto amp.

## 11. CHECK REFRIGERANT PRESSURE SENSOR

WITH CONSULT-III
1. Start the engine.
2. Check voltage of refrigerant pressure sensor in “Data monitor”. Refer to ECR-289, "Reference Value".

WITHOUT CONSULT-III
1. Start the engine.
2. Check voltage between ECM harness connector F85 terminal 31 and ground.

| (+) | | (–) | Condition | Voltage |
|---|---|---|---|---|
| ECM | | — | | |
| Connector | Terminal | | | |
| F85 | 31 | Ground | A/C switch: ON<br>(Blower motor operates.) | Approx. 2.3 V |

Is the inspection result normal?

YES >> • WITH CONSULT-III: GO TO 12.
• WITHOUT CONSULT-III: GO TO 13.
NO >> Refer to ECR-185, "Diagnosis Procedure".

## 12. CHECK BCM INPUT (FAN ON) SIGNAL

Check FAN ON/OFF signal in “Data monitor”. Refer to HAC-27, "CONSULT-III Function".

**FAN CONTROL DIAL ON : FAN ON SIG On**
**FAN CONTROL DIAL OFF : FAN ON SIG Off**

Is the inspection result normal?

YES >> GO TO 16.
NO >> GO TO 13.

## 13. CHECK CIRCUIT CONTINUITY BETWEEN BCM AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect BCM connector and auto amp. connector.
3. Check continuity between BCM harness connector M65 terminal 26 and auto amp. harness connector M53 terminal 12.

| BCM | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| M65 | 26 | M53 | 12 | Existed |

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair harness or connector.

## 14. CHECK BCM

1. Connect BCM harness connector.
2. Turn ignition switch ON.
3. Check voltage between BCM harness connector M65 terminal 26 and ground.

| BCM | | — | Voltage |
|---|---|---|---|
| Connector | Terminal | | |
| M65 | 26 | Ground | Battery voltage |

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace BCM. Refer to BCS-68, "Exploded View".

## 15. CHECK FAN ON SIGNAL

1. Turn ignition switch OFF.
2. Connect auto amp. connector.
3. Turn ignition switch ON.
4. Check voltage between auto amp. harness connector M53 terminal 12 and ground.

| (+) | | (–) | Condition | Voltage |
|---|---|---|---|---|
| Auto amp. | | — | | |
| Connector | Terminal | | | |
| M53 | 12 | Ground | Fan control dial: ON | Approx. 0 V |

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace auto amp.

## 16. CHECK CAN COMMUNICATION

Check CAN communication. Refer to LAN-25, "CAN Communication Signal Chart".
- ECM – IPDM E/R
- ECM – BCM

Is the inspection result normal?

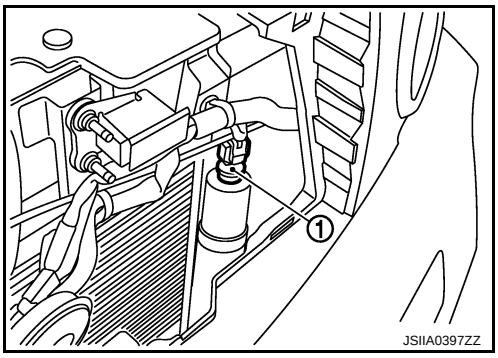
YES >> Replace ECM.
NO >> Repair or replace malfunctioning part(s).

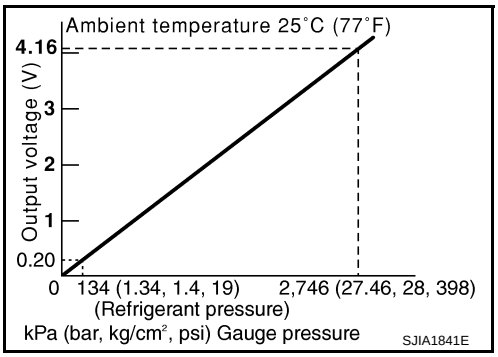
## M9R : Component Inspection

INFOID:0000000001298080

### Refrigerant Pressure Sensor

The refrigerant pressure sensor (1) is attached to the liquid tank.
Check that the A/C refrigerant pressure and the sensor output voltage are within the specified range as shown in the A/C operating condition figure. Refer to ECR-185, "Description".



# PTC HEATER

## Description

INFOID:0000000001162179

Auto amp. operate a PTC heater, by a signal of ECM.

## Component Function Check

INFOID:0000000001162180

### 1.CONFIRM SYMPTOM BY PERFORMING ACTIVE TEST

CONSULT-III ACTIVE TEST

1. Start engine.
2. Select “PTC HEATER” of BCM active test item.
   **CAUTION:**
   - **Engine must be cold.**
   - **Battery must be charged.**
3. Turn fan control dial clockwise.
4. Turn temperature control dial to full hot position.
5. Check PTC heater operation with operating the test item.
6. Check for warm air at discharge air outlet.

| | |
|---|---|
| **PTC 3** | **: PTC heater HI operation** |
| **PTC 2** | **: PTC heater MID operation** |
| **PTC 1** | **: PTC heater LO operation** |
| **OFF** | **: Stop the PTC heater operation** |

Does the PTC heater operate?

YES >> END.
NO >> Go to Diagnosis Procedure. Refer to HAC-71, "Diagnosis Procedure".

## Diagnosis Procedure

INFOID:0000000001162181

### 1.CHECK PTC HEATER-1 OPERATION

CONSULT -III ACTIVE TEST

1. Disconnect PTC heater connector.
2. Start engine.
3. Select “PTC HEATER” of BCM active test item.
4. Check voltage between PTC heater harness connector E117 terminal 3 and ground with operating the item.

| (+) | | (–) | Test item | Voltage |
|---|---|---|---|---|
| PTC heater | | — | PTC HEATER | |
| Connector | Terminal | | | |
| E117 | 3 | Ground | OFF | Approx. 0 V |
| | | | PTC 1 | Battery voltage |
| | | | PTC 2 | Approx. 0 V |
| | | | PTC 3 | Approx. 0 V |

In the inspection result normal?

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

### 2.CHECK GROUND CIRCUIT FOR PTC HEATER-1

1. Turn ignition switch OFF.
2. Check continuity between PTC heater harness connector E116 terminal 1 and ground.

| PTC heater | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| E116 | 1 | Ground | Existed |

Is the inspection result normal?

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

## 3.CHECK PTC HEATER-2 OPERATION

1. Start engine.
2. Select “PTC HEATER” of BCM active test item.
3. Check voltage between PTC heater harness connector E117 terminal 4 and ground with operating the item.

| (+) | | (–) | Test item | Voltage |
|---|---|---|---|---|
| PTC heater | | — | PTC HEATER | |
| Connector | Terminal | | | |
| E117 | 4 | Ground | OFF | Approx. 0 V |
| | | | PTC 1 | Battery voltage |
| | | | PTC 2 | Battery voltage |
| | | | PTC 3 | Approx. 0 V |

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 13.

## 4.CHECK GROUND CIRCUIT FOR PTC HEATER-2

1. Turn ignition switch OFF.
2. Check continuity between PTC heater harness connector E116 terminal 2 and ground.

| PTC heater | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| E116 | 2 | Ground | Existed |

Is the inspection result normal?

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

## 5.CHECK PTC HEATER-3 OPERATION

1. Start engine.
2. Select “PTC HEATER” of BCM active test item.
3. Check voltage between PTC heater harness connector E117 terminal 5 and ground with operating the item.

| (+) | | (–) | Test item | Voltage |
|---|---|---|---|---|
| PTC heater | | — | PTC HEATER | |
| Connector | Terminal | | | |
| E117 | 5 | Ground | OFF | Approx. 0 V |
| | | | PTC 1 | Battery voltage |
| | | | PTC 2 | Battery voltage |
| | | | PTC 3 | Battery voltage |

Is the inspection result normal?

YES >> Replace PTC heater.

NO >> GO TO 19.

## 6. CHECK VOLTAGE FOR PTC RELAY-1

1. Turn ignition switch OFF.
2. Disconnect PTC relay-1. Refer to PG-126, "Fuse and Fusible Link Arrangement".
3. Turn ignition switch ON.
4. Check voltage between PTC relay-1 harness connector E66 terminal 3 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| PTC relay-1 | | — | |
| Connector | Terminal | | |
| E66 | 3 | Ground | Battery voltage |

Is the inspection result normal?

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

## 7. CHECK FUSE

Check 30A fuse (No. 37, located in the fuse, fusible link and relay box). Refer to PG-126, "Fuse and Fusible Link Arrangement".

Is the inspection result normal?

YES >> Repair harness or connector.
NO >> Replace the blown fuse after repairing the affected circuit if a fuse is blown.

## 8. CHECK PTC RELAY-1

Check PTC relay-1. Refer to HAC-77, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace PTC relay-1.

## 9. CHECK CIRCUIT CONTINUITY BETWEEN PTC RELAY-1 AND PTC HEATER

Check continuity between PTC relay-1 harness connector E66 terminal 5 and PTC heater harness connector E117 terminal 3.

| PTC relay-1 | | PTC heater | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| E66 | 5 | E117 | 3 | Existed |

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair harness or connector.

## 10. CHECK POWER SUPPLY FOR PTC RELAY-1

1. Turn ignition switch ON.
2. Check voltage between PTC relay-1 harness connector E66 terminal 2 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| PTC relay-1 | | — | |
| Connector | Terminal | | |
| E66 | 2 | Ground | Battery voltage |

Is the inspection result normal?

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

## 11. CHECK FUSE

Check 10A fuse [No. 1, located in the fuse block (J/B)]. Refer to PG-125, "Fuse, Connector and Terminal Arrangement".

Is the inspection result normal?

YES >> Repair harness or connector.
NO >> Replace the blown fuse after repairing the affected circuit if a fuse is blown.

## 12. CHECK CIRCUIT CONTINUITY BETWEEN PTC RELAY-1 AND AUTO AMP.

Check continuity between PTC relay-1 harness connector E66 terminal 1 and auto amp. harness connector M53 terminal 4.

| PTC relay-1 | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| E66 | 1 | M53 | 4 | Existed |

Is the inspection result normal?

YES >> GO TO 25.
NO >> Repair harness or connector.

## 13. CHECK VOLTAGE FOR PTC RELAY-2

1. Turn ignition switch OFF.
2. Disconnect PTC relay-2. Refer to PG-126, "Fuse and Fusible Link Arrangement".
3. Turn ignition switch ON.
4. Check voltage between PTC relay-2 harness connector E67 terminal 3 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| PTC relay-2 | | — | |
| Connector | Terminal | | |
| E67 | 3 | Ground | Battery voltage |

Is the inspection result normal?

YES >> GO TO 15.
NO >> GO TO 14.

## 14. CHECK FUSE

Check 30A fuse (No. 36, located in the fuse, fusible link and relay box). Refer to PG-126, "Fuse and Fusible Link Arrangement".

Is the inspection result normal?

YES >> Repair harness or connector.
NO >> Replace the blown fuse after repairing the affected circuit if a fuse is blown.

## 15. CHECK PTC RELAY-2

Check PTC relay-2. Refer to HAC-77, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace PTC relay-2.

## 16. CHECK CIRCUIT CONTINUITY BETWEEN PTC RELAY-2 AND PTC HEATER

Check continuity between PTC relay-2 harness connector E67 terminal 5 and PTC heater harness connector E117 terminal 4.

| PTC relay-2 | | PTC heater | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| E67 | 5 | E117 | 4 | Existed |

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair harness or connector.

## 17. CHECK POWER SUPPLY FOR PTC RELAY-2

1. Turn ignition switch ON.
2. Check voltage between PTC relay-2 harness connector E67 terminal 2 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| PTC relay-2 | | — | |
| Connector | Terminal | | |
| E67 | 2 | Ground | Battery voltage |

Is the inspection result normal?

YES >> GO TO 18.
NO >> GO TO 11.

## 18. CHECK CIRCUIT CONTINUITY BETWEEN PTC RELAY-2 AND AUTO AMP.

Check continuity between PTC relay-2 harness connector E67 terminal 1 and auto amp. harness connector M53 terminal 5.

| PTC relay-1 | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| E67 | 1 | M53 | 5 | Existed |

Is the inspection result normal?

YES >> GO TO 25.
NO >> Repair harness or connector.

## 19. CHECK VOLTAGE FOR PTC RELAY-3

1. Turn ignition switch OFF.
2. Disconnect PTC relay-3. Refer to PG-126, "Fuse and Fusible Link Arrangement".
3. Turn ignition switch ON.
4. Check voltage between PTC relay-3 harness connector E68 terminal 3 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| PTC relay-3 | | — | |
| Connector | Terminal | | |
| E68 | 3 | Ground | Battery voltage |

Is the inspection result normal?

YES >> GO TO 21.
NO >> GO TO 20.

## 20. CHECK FUSE

Check 30A fuse (No. 21, located in the fuse, fusible link and relay box). Refer to PG-126, "Fuse and Fusible Link Arrangement".

Is the inspection result normal?

YES >> Repair harness or connector.
NO >> Replace the blown fuse after repairing the affected circuit if a fuse is blown.

## 21. CHECK PTC RELAY-3

Check PTC relay-3. Refer to HAC-77, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 22.
NO >> Replace PTC relay-3.

## 22. CHECK CIRCUIT CONTINUITY BETWEEN PTC RELAY-3 AND PTC HEATER

Check continuity between PTC relay-3 harness connector E68 terminal 5 and PTC heater harness connector E117 terminal 4.

| PTC relay-2 | | PTC heater | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| E68 | 5 | E117 | 5 | Existed |

Is the inspection result normal?

YES >> GO TO 23.
NO >> Repair harness or connector.

## 23. CHECK POWER SUPPLY FOR PTC RELAY-3

1. Turn ignition switch ON.
2. Check voltage between PTC relay-3 harness connector E68 terminal 2 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| PTC relay-2 | | — | |
| Connector | Terminal | | |
| E68 | 2 | Ground | Battery voltage |

Is the inspection result normal?

YES >> GO TO 24.
NO >> GO TO 11.

## 24. CHECK CIRCUIT CONTINUITY BETWEEN PTC RELAY-3 AND AUTO AMP.

Check continuity between PTC relay-3 harness connector E68 terminal 1 and auto amp. harness connector M53 terminal 27.

| PTC relay-1 | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| E68 | 1 | M53 | 27 | Existed |

Is the inspection result normal?

YES >> GO TO 25.
NO >> Repair harness or connector.

## 25. CHECK BCM INPUT (FAN ON) SIGNAL

Check FAN ON/OFF signal in “DATA MONITOR”. Refer to HAC-27, "CONSULT-III Function".

**FAN CONTROL DIAL ON : FAN ON SIG ON**
**FAN CONTROL DIAL OFF : FAN ON SIG OFF**

Is the inspection result normal?

YES >> GO TO 28.
NO >> GO TO 26.

## 26. CHECK FAN ON SIGNAL

1. Turn ignition switch ON.
2. Check voltage between auto amp. harness connector M53 terminal 12 and ground.

| (+) | | (–) | Condition | Voltage |
|---|---|---|---|---|
| Auto amp. | | — | | |
| Connector | Terminal | | | |
| M53 | 12 | Ground | Fan control dial: OFF | Approx. 12 |

3. Turn fan control dial clockwise.
4. Check voltage between auto amp. harness connector M53 terminal 12 and ground.

| (+) | | (–) | Condition | Voltage |
|---|---|---|---|---|
| Auto amp. | | — | | |
| Connector | Terminal | | | |
| M53 | 12 | Ground | Fan control dial: ON (Blower motor operates.) | Approx. 0 |

Is the inspection result normal?

YES >> GO TO 27.
NO >> Replace auto amp.

## 27. CHECK CIRCUIT CONTINUITY BETWEEN BCM AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect BCM harness connector.
3. Check continuity between BCM harness connector M65 terminal 26 and auto amp. harness connector M53 terminal 12.

| BCM | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| M65 | 26 | M53 | 12 | Existed |

Is the inspection result normal?

YES >> GO TO 28.
NO >> Repair harness or connector.

## 28. CHECK CAN COMMUNICATION

Check CAN communication. Refer to LAN-25, "CAN Communication Signal Chart".
- ECM – Auto amp.

Is the inspection result normal?

YES >> Replace auto amp.
NO >> Repair or replace malfunctioning part(s).

# Component Inspection

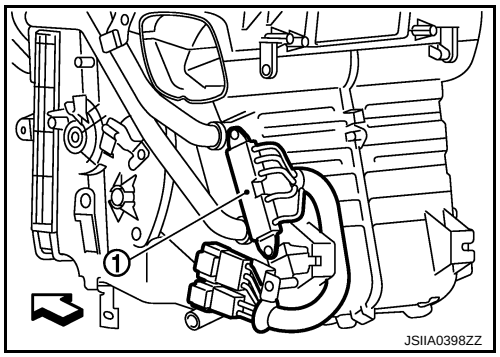
INFOID:0000000001162182

## PTC HEATER

The PTC heater (1) is attached to the A/C unit assembly.
It generates heat electrically.

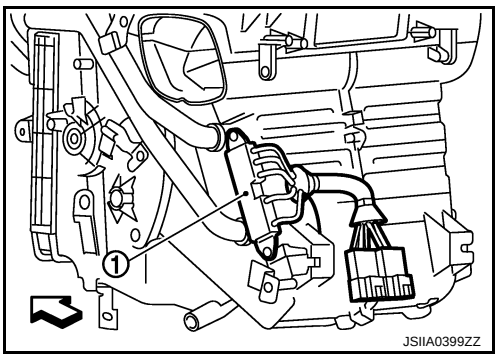
LHD models

⇦: Vehicle front




RHD models

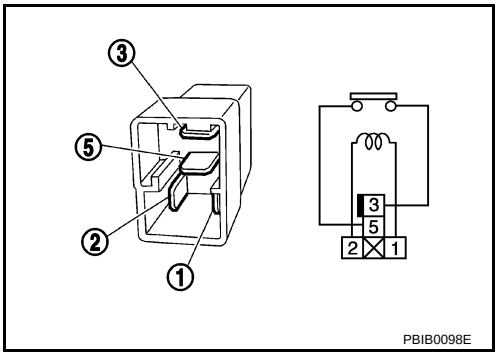
⇦: Vehicle front




PTC RELAY

Check continuity between terminal 3 and 5.

| Terminal | Condition | Continuity |
|---|---|---|
| 3 and 5 | 12V direct current supply between terminal 1 and 2 | Existed |
| | No current supply | Not existed |



# OAT SENSOR
## MR20DE/QR25DE

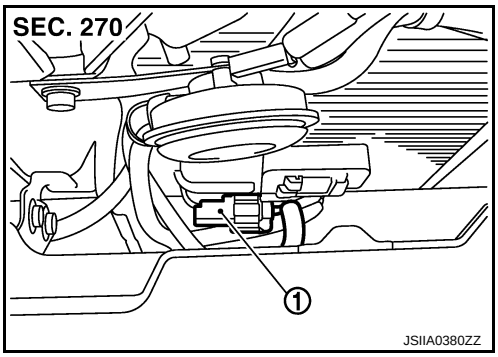
### MR20DE/QR25DE : Description

INFOID:0000000001162183

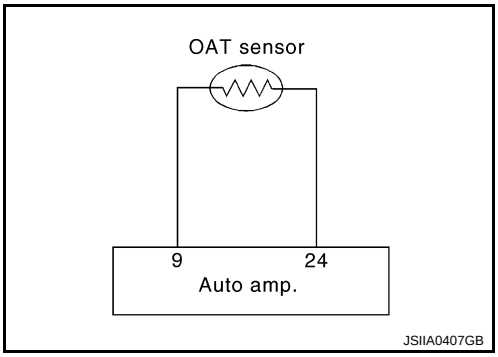
#### COMPONENT DESCRIPTION

OAT (Outside Air Temperature) Sensor

The OAT sensor (1) is attached on the radiator core support. It detects ambient temperature and converts it into a resistance value which is then input into the auto amp.




OAT Sensor Circuit




#### AMBIENT TEMPERATURE INPUT PROCESS

The auto amp. equips a processing circuit for the OAT sensor input. However, when the temperature detected by the OAT sensor increases quickly, the processing circuit retards the auto amp. function. It only allows the auto amp. to recognize an ambient temperature increase of 0.33°C (0.6°F) per 100 seconds.

As an example, consider stopping for a few minutes after high speed driving. Although the actual ambient temperature has not changed, the temperature detected by the OAT sensor increases. This is because the heat from the engine compartment can radiate to the front bumper area, location of the OAT sensor.

### MR20DE/QR25DE : Component Function Check

INFOID:0000000001162184

#### 1.PERFORM SELF-DIAGNOSIS STEP-2

Perform self-diagnosis STEP-2. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 3.

Is the inspection result normal?

YES >> Go to Diagnosis Procedure. Refer to HAC-79, "MR20DE/QR25DE : Diagnosis Procedure".
NO >> END.

### MR20DE/QR25DE : Diagnosis Procedure

INFOID:0000000001162185

#### 1.CHECK VOLTAGE BETWEEN OAT SENSOR AND GROUND

1. Disconnect OAT sensor connector.
2. Turn ignition switch ON.
3. Check voltage between OAT sensor harness connector E44 terminal 2 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| OAT sensor | | — | |
| Connector | Terminal | | |
| E44 | 2 | Ground | Approx. 5 |

Is the inspection result normal?

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

## 2.CHECK CIRCUIT CONTINUITY BETWEEN OAT SENSOR AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect auto amp. connector.
3. Check continuity between OAT sensor harness connector E44 terminal 1 and auto amp. harness connector M51 terminal 24.

| OAT sensor | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| E44 | 1 | M51 | 24 | Existed |

Is the inspection result normal?

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

## 3.CHECK OAT SENSOR

Refer to HAC-81, "MR20DE/QR25DE : Component Inspection".

Is the inspection result normal?

YES >> Replace auto amp.
NO >> Replace OAT sensor.

## 4.CHECK CIRCUIT CONTINUITY BETWEEN OAT SENSOR AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect auto amp. connector.
3. Check continuity between OAT sensor harness connector E44 terminal 2 and auto amp. harness connector M50 terminal 9.

| OAT sensor | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| E44 | 2 | M50 | 9 | Existed |

4. Check continuity between OAT sensor harness connector E44 terminal 2 and ground.

| OAT sensor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| E44 | 2 | Ground | Not existed |

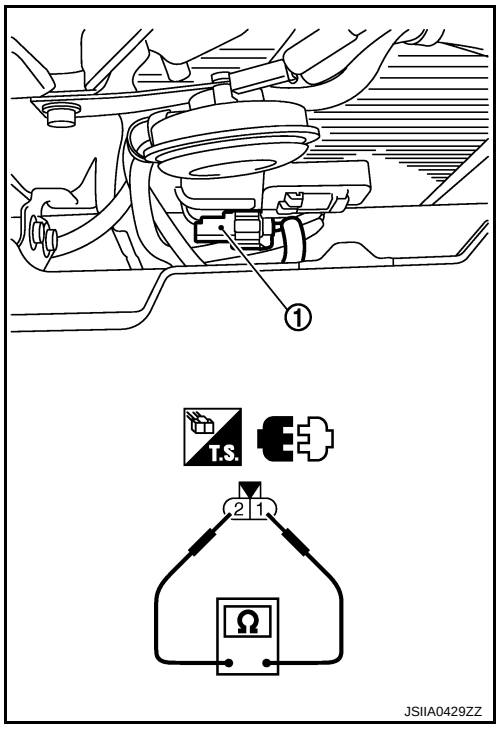
Is the inspection result normal?

YES >> Replace auto amp.
NO >> Repair harness or connector.

## MR20DE/QR25DE : Component Inspection

INFOID:0000000001162186

Measure resistance between terminals 1 and 2 at sensor side after disconnecting OAT sensor (1) connector E44. Refer to table below.




| Temperature °C (°F) | Resistance kΩ |
|---|---|
| –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 (90) | 1.51 |
| 40 (104) | 1.27 |
| 45 (113) | 1.07 |

If NG, replace OAT sensor.

## M9R

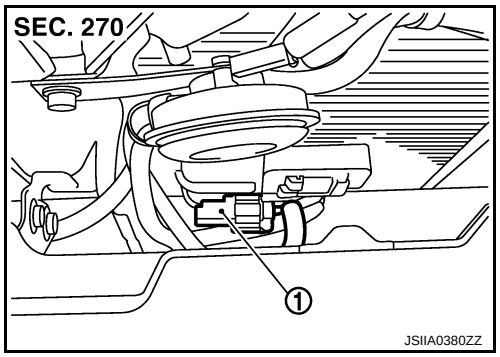
## M9R : Description

INFOID:0000000001298043

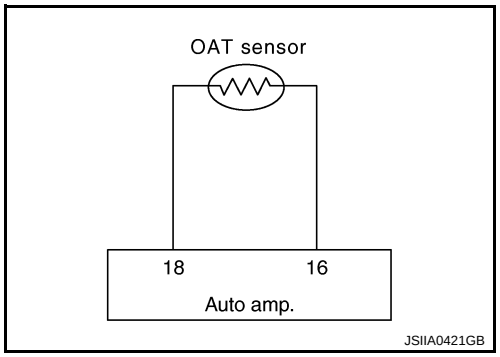
### COMPONENT DESCRIPTION

OAT (Outside Air Temperature) Sensor

The OAT sensor (1) is attached on the radiator core support. It detects ambient temperature and converts it into a resistance value which is then input into the auto amp.




OAT Sensor Circuit




### AMBIENT TEMPERATURE INPUT PROCESS

The auto amp. equips a processing circuit for the OAT sensor input. However, when the temperature detected by the OAT sensor increases quickly, the processing circuit retards the auto amp. function. It only allows the auto amp. to recognize an ambient temperature increase of 0.33°C (0.6°F) per 100 seconds.
As an example, consider stopping for a few minutes after high speed driving. Although the actual ambient temperature has not changed, the temperature detected by the OAT sensor increases. This is because the heat from the engine compartment can radiate to the front bumper area, location of the OAT sensor.

## M9R : Component Function Check

INFOID:0000000001298044

### 1.PERFORM SELF-DIAGNOSIS STEP-2

Perform self-diagnosis STEP-2. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 3.

Is the inspection result normal?

YES >> Go to Diagnosis Procedure. Refer to HAC-82, "M9R : Diagnosis Procedure".
NO >> END.

## M9R : Diagnosis Procedure

INFOID:0000000001298045

### 1.CHECK VOLTAGE BETWEEN OAT SENSOR AND GROUND

1. Disconnect OAT sensor connector.
2. Turn ignition switch ON.
3. Check voltage between OAT sensor harness connector E44 terminal 2 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| OAT sensor | | — | |
| Connector | Terminal | | |
| E44 | 2 | Ground | Approx. 5 |

Is the inspection result normal?

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

### 2.CHECK CIRCUIT CONTINUITY BETWEEN OAT SENSOR AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect auto amp. connector.
3. Check continuity between OAT sensor harness connector E44 terminal 1 and auto amp. harness connector M53 terminal 16.

| OAT sensor | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| E44 | 1 | M53 | 16 | Existed |

Is the inspection result normal?

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

### 3.CHECK OAT SENSOR

Refer to HAC-83, "M9R : Component Inspection".

Is the inspection result normal?

YES >> Replace auto amp.
NO >> Replace OAT sensor.

### 4.CHECK CIRCUIT CONTINUITY BETWEEN OAT SENSOR AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect auto amp. connector.
3. Check continuity between OAT sensor harness connector E44 terminal 2 and auto amp. harness connector M53 terminal 18.

| OAT sensor | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| E44 | 2 | M53 | 18 | Existed |

4. Check continuity between OAT sensor harness connector E44 terminal 2 and ground.

| OAT sensor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| E44 | 2 | Ground | Not existed |

Is the inspection result normal?

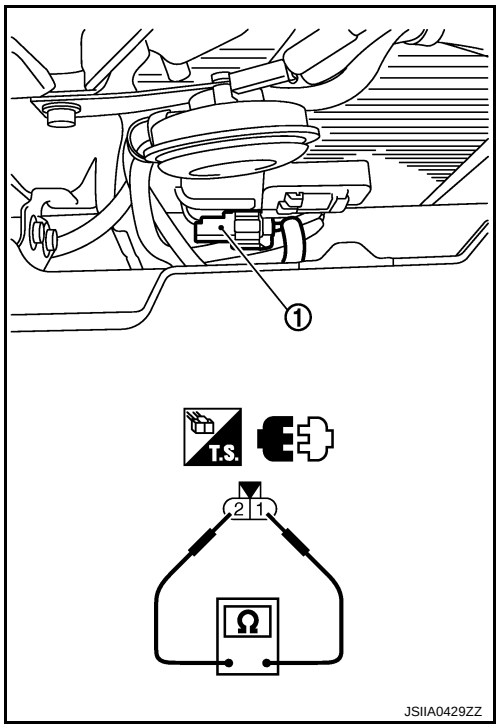
YES >> Replace auto amp.
NO >> Repair harness or connector.

## M9R : Component Inspection

INFOID:0000000001298147

Measure resistance between terminals 1 and 2 at sensor side after disconnecting OAT sensor (1) connector E44. Refer to table below.

| Temperature °C (°F) | Resistance kΩ |
|---|---|
| –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 (90) | 1.51 |
| 40 (104) | 1.27 |
| 45 (113) | 1.07 |




If NG, replace OAT sensor.

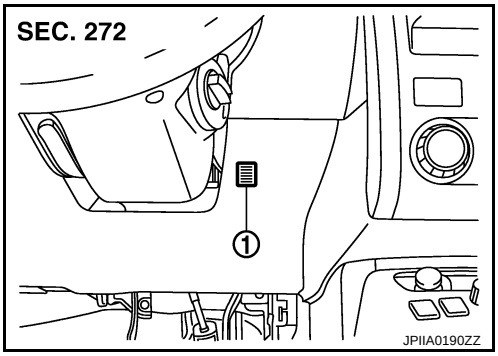
# IN-VEHICLE SENSOR
## MR20DE/QR25DE

### MR20DE/QR25DE : Description

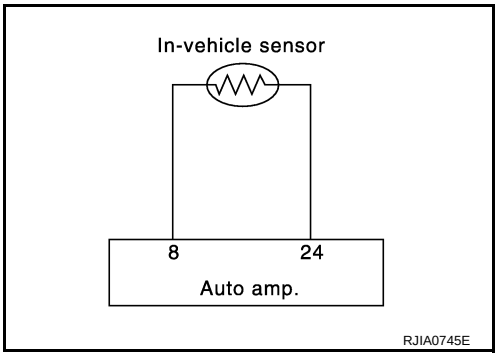
INFOID:0000000001162187

In-vehicle Sensor

The in-vehicle sensor (1) is located on lower instrument panel, driver side. It converts variations in compartment air temperature drawn from the aspirator into a resistance value. It is then input into the auto amp.



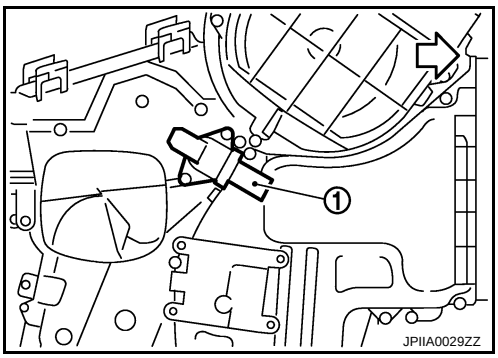

In-vehicle Sensor Circuit

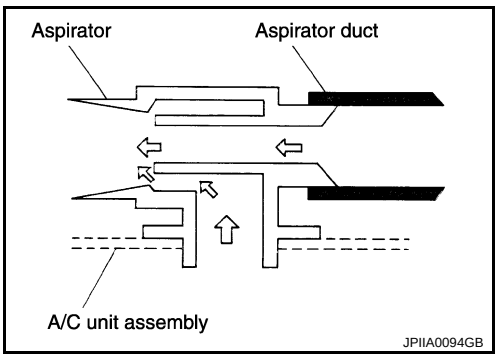



Aspirator

The aspirator (1) is located on right side of A/C unit assembly. It produces vacuum pressure due to air discharged from the A/C unit assembly, continuously taking compartment air in the aspirator.

⇦: Vehicle front



## MR20DE/QR25DE : Component Function Check

INFOID:0000000001162188

### 1. PERFORM SELF-DIAGNOSIS STEP-2

Perform self-diagnosis STEP-2. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 3.

Is the inspection result normal?

YES >> Go to Diagnosis Procedure. Refer to HAC-85, "MR20DE/QR25DE : Diagnosis Procedure".
NO >> END.

## MR20DE/QR25DE : Diagnosis Procedure

INFOID:0000000001162189

### 1. CHECK VOLTAGE BETWEEN IN-VEHICLE SENSOR AND GROUND

1. Disconnect in-vehicle sensor connector.
2. Turn ignition switch ON.
3. Check voltage between in-vehicle sensor harness connector M41 terminal 1 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| In-vehicle sensor | | — | |
| Connector | Terminal | | |
| M41 | 1 | Ground | Approx. 5 |

Is the inspection result normal?

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

### 2. CHECK CIRCUIT CONTINUITY BETWEEN IN-VEHICLE SENSOR AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect auto amp. connector.
3. Check continuity between in-vehicle sensor harness connector M41 terminal 2 and auto amp. harness connector M51 terminal 24.

| In-vehicle sensor | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| M41 | 2 | M51 | 24 | Existed |

Is the inspection result normal?

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

### 3. CHECK IN-VEHICLE SENSOR

Refer to HAC-86, "MR20DE/QR25DE : Component Inspection".

Is the inspection result normal?

YES >> Replace auto amp.
NO >> Replace in-vehicle sensor.

### 4. CHECK CIRCUIT CONTINUITY BETWEEN IN-VEHICLE SENSOR AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect auto amp. connector.
3. Check continuity between in-vehicle sensor harness connector M41 terminal 1 and auto amp. harness connector M50 terminal 8.

| In-vehicle sensor | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| M41 | 1 | M50 | 8 | Existed |

4. Check continuity between in-vehicle sensor harness connector M41 terminal 1 and ground.

| In-vehicle sensor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| M41 | 1 | Ground | Not existed |

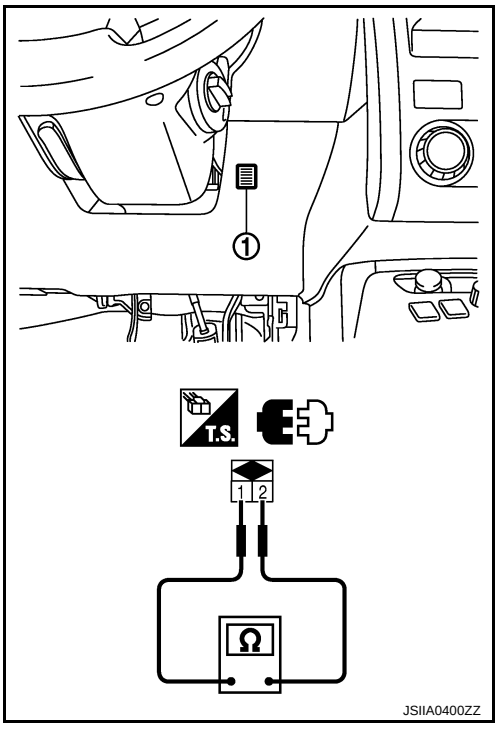
Is the inspection result normal?

YES >> Replace auto amp.
NO >> Repair harness or connector.

## MR20DE/QR25DE : Component Inspection

INFOID:0000000001162190

Measure resistance between terminals 1 and 2 at sensor side after disconnecting in-vehicle sensor (1) connector M41. Refer to table below.




| Temperature °C (°F) | Resistance kΩ |
|---|---|
| –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 |

If NG, replace in-vehicle sensor.

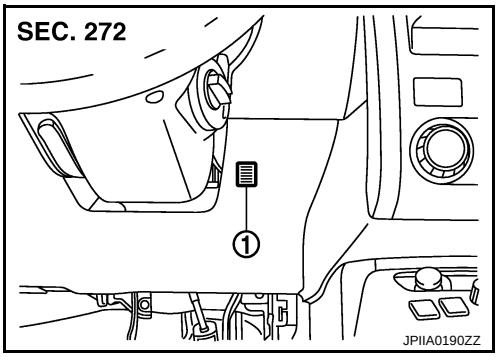
## M9R

## M9R : Description

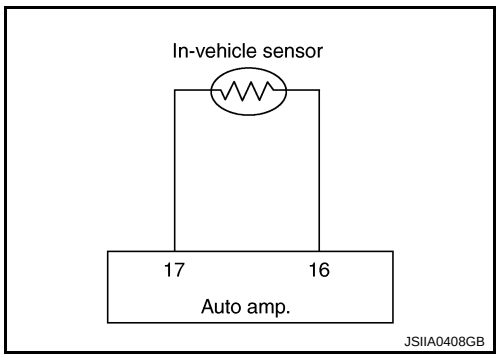
INFOID:0000000001298047

In-vehicle Sensor

The in-vehicle sensor (1) is located on lower instrument panel, driver side. It converts variations in compartment air temperature drawn from the aspirator into a resistance value. It is then input into the auto amp.



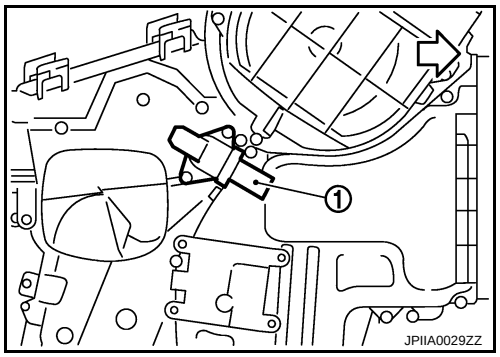
In-vehicle Sensor Circuit

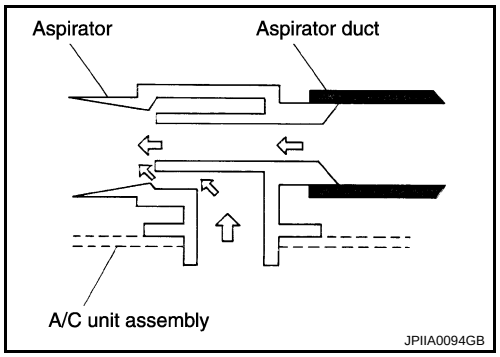



Aspirator

The aspirator (1) is located on right side of A/C unit assembly. It produces vacuum pressure due to air discharged from the A/C unit assembly, continuously taking compartment air in the aspirator.

⇦: Vehicle front




## M9R : Component Function Check

INFOID:0000000001298048

### 1. PERFORM SELF-DIAGNOSIS STEP-2

Perform self-diagnosis STEP-2. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 3.

Is the inspection result normal?

YES >> Go to Diagnosis Procedure. Refer to HAC-87, "M9R : Diagnosis Procedure".
NO >> END.

## M9R : Diagnosis Procedure

INFOID:0000000001298049

### 1. CHECK VOLTAGE BETWEEN IN-VEHICLE SENSOR AND GROUND

1. Disconnect in-vehicle sensor connector.
2. Turn ignition switch ON.
3. Check voltage between in-vehicle sensor harness connector M41 terminal 1 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| In-vehicle sensor | | — | |
| Connector | Terminal | | |
| M41 | 1 | Ground | Approx. 5 |

Is the inspection result normal?

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

## 2. CHECK CIRCUIT CONTINUITY BETWEEN IN-VEHICLE SENSOR AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect auto amp. connector.
3. Check continuity between in-vehicle sensor harness connector M41 terminal 2 and auto amp. harness connector M53 terminal 16.

| In-vehicle sensor | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| M41 | 2 | M53 | 16 | Existed |

Is the inspection result normal?

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

## 3. CHECK IN-VEHICLE SENSOR

Refer to HAC-89, "M9R : Component Inspection".

Is the inspection result normal?

YES >> Replace auto amp.
NO >> Replace in-vehicle sensor.

## 4. CHECK CIRCUIT CONTINUITY BETWEEN IN-VEHICLE SENSOR AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect auto amp. connector.
3. Check continuity between in-vehicle sensor harness connector M41 terminal 1 and auto amp. harness connector M53 terminal 17.

| In-vehicle sensor | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| M41 | 1 | M53 | 17 | Existed |

4. Check continuity between in-vehicle sensor harness connector M41 terminal 1 and ground.

| In-vehicle sensor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| M41 | 1 | Ground | Not existed |

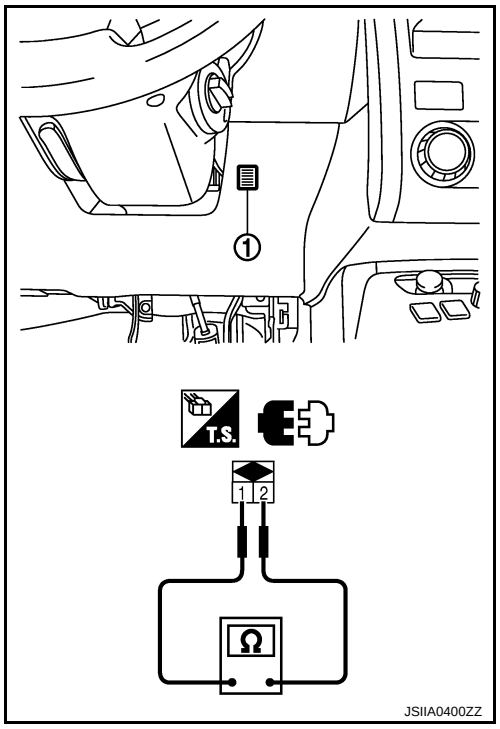
Is the inspection result normal?

YES >> Replace auto amp.
NO >> Repair harness or connector.

## M9R : Component Inspection

INFOID:0000000001298148

Measure resistance between terminals 1 and 2 at sensor side after disconnecting in-vehicle sensor (1) connector M41. Refer to table below.




| Temperature °C (°F) | Resistance kΩ |
|---|---|
| –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 |

If NG, replace in-vehicle sensor.

# SUNLOAD SENSOR
## MR20DE/QR25DE

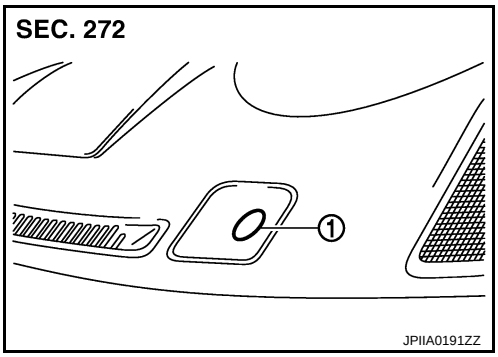
## MR20DE/QR25DE : Description

INFOID:0000000001162191

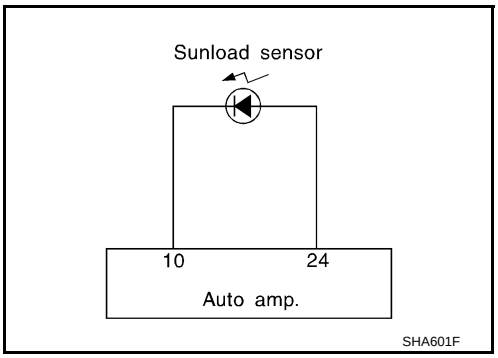
### COMPONENT DESCRIPTION

Sunload Sensor

The sunload sensor (1) is located on the instrument mask (driver side). It detects sunload entering through windshield by means of a photo diode. The sensor converts the sunload into a current value which is then input into the auto amp.




Sunload Sensor Circuit




### SUNLOAD INPUT PROCESS

The auto amp. also equips a processing circuit which averages the variations in detected sunload over a period of time. This prevents drastic swings in the HAC system operation due to small or quick variations in detected sunload.

For example, consider driving along a road bordered by an occasional group of large trees. The sunload detected by the sunload sensor varies whenever the trees obstruct the sunlight. The processing circuit averages the detected sunload over a period of time, so that the (insignificant) effect of the trees momentarily obstructing the sunlight does not cause any change in the HAC system operation. On the other hand, shortly after entering a long tunnel, the system recognizes the change in sunload, and the system reacts accordingly.

## MR20DE/QR25DE : Component Function Check

INFOID:0000000001162192

### 1.PERFORM SELF-DIAGNOSIS STEP-2

Perform self-diagnosis STEP-2. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 3.

Is the inspection result normal?

YES >> Go to Diagnosis Procedure. Refer to HAC-90, "MR20DE/QR25DE : Diagnosis Procedure".
NO >> END.

## MR20DE/QR25DE : Diagnosis Procedure

INFOID:0000000001162193

### 1.CHECK VOLTAGE BETWEEN SUNLOAD SENSOR AND GROUND

1. Disconnect sunload sensor connector.
2. Turn ignition switch ON.
3. Check voltage between sunload sensor harness connector M74 terminal 1 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| Sunload sensor | | — | |
| Connector | Terminal | | |
| M74 | 1 | Ground | Approx. 5 |

Is the inspection result normal?

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

## 2.CHECK CIRCUIT CONTINUITY BETWEEN SUNLOAD SENSOR AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect auto amp. connector.
3. Check continuity between sunload sensor harness connector M74 terminal 2 and auto amp. harness connector M51 terminal 24.

| Sunload sensor | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| M74 | 2 | M51 | 24 | Existed |

Is the inspection result normal?

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

## 3.CHECK SUNLOAD SENSOR

1. Reconnect sunload sensor connector and auto amp. connector.
2. Refer to HAC-92, "MR20DE/QR25DE : Component Inspection".

Is the inspection result normal?

YES >> Replace auto amp.
NO >> Replace sunload sensor.

## 4.CHECK CIRCUIT CONTINUITY BETWEEN SUNLOAD SENSOR AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect auto amp. connector.
3. Check continuity between sunload sensor harness connector M74 terminal 1 and auto amp. harness connector M50 terminal 10.

| Sunload sensor | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| M74 | 1 | M50 | 10 | Existed |

4. Check continuity between sunload sensor harness connector M74 terminal 1 and ground.

| Sunload sensor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| M74 | 1 | Ground | Not existed |

Is the inspection result normal?

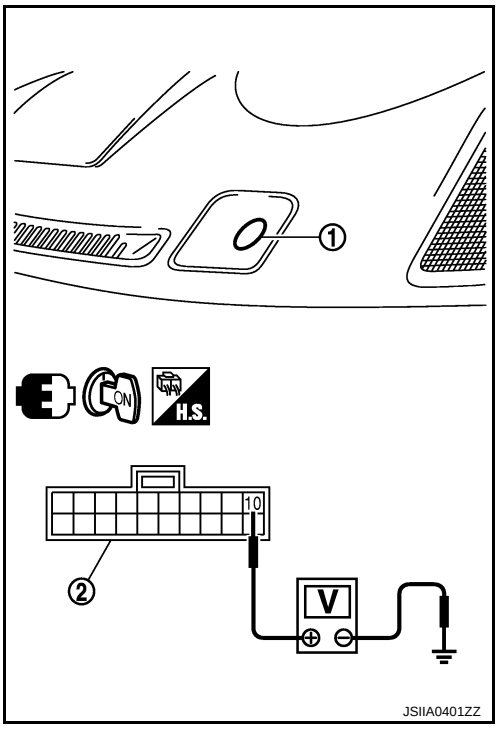
YES >> Replace auto amp.
NO >> Repair harness or connector.

## MR20DE/QR25DE : Component Inspection

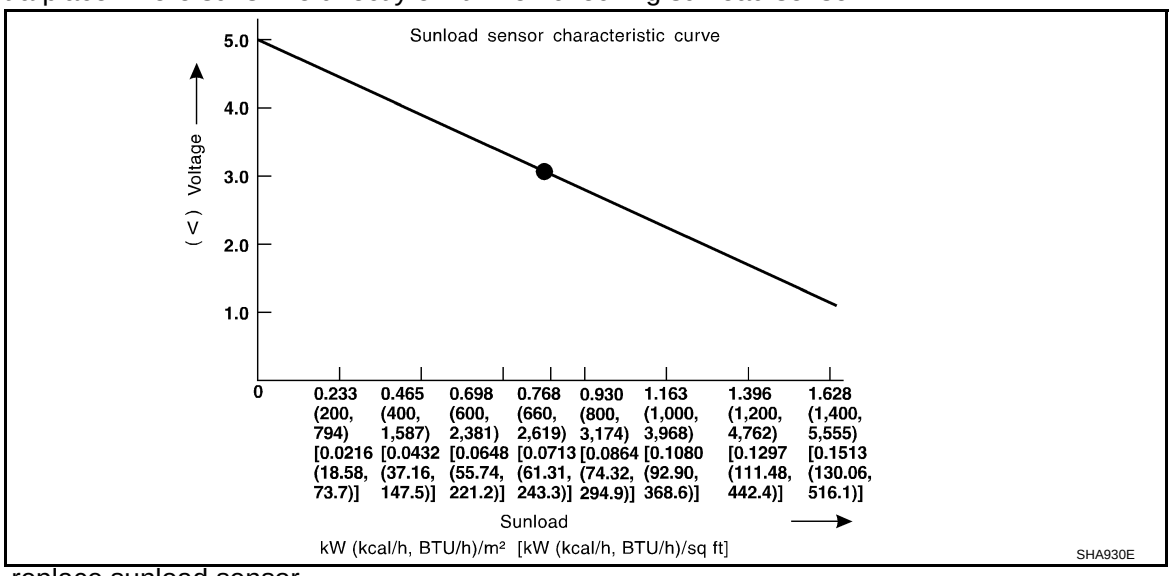
INFOID:0000000001162194

Measure voltage between auto amp. harness connector (2) M50 terminal 10 and ground.

1. Sunload sensor




- Select a place where sunshine directly on it when checking sunload sensor.




If NG, replace sunload sensor.

# M9R

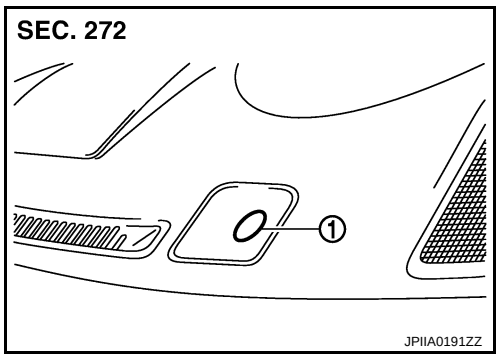
## M9R : Description

INFOID:0000000001298051

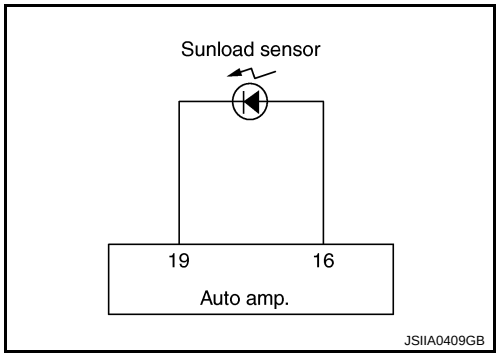
### COMPONENT DESCRIPTION

Sunload Sensor

The sunload sensor (1) is located on the instrument mask (driver side). It detects sunload entering through windshield by means of a photo diode. The sensor converts the sunload into a current value which is then input into the auto amp.




Sunload Sensor Circuit




SUNLOAD INPUT PROCESS

The auto amp. also equips a processing circuit which averages the variations in detected sunload over a period of time. This prevents drastic swings in the HAC system operation due to small or quick variations in detected sunload.

For example, consider driving along a road bordered by an occasional group of large trees. The sunload detected by the sunload sensor varies whenever the trees obstruct the sunlight. The processing circuit averages the detected sunload over a period of time, so that the (insignificant) effect of the trees momentarily obstructing the sunlight does not cause any change in the HAC system operation. On the other hand, shortly after entering a long tunnel, the system recognizes the change in sunload, and the system reacts accordingly.

## M9R : Component Function Check

INFOID:0000000001298052

### 1. PERFORM SELF-DIAGNOSIS STEP-2

Perform self-diagnosis STEP-2. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 3.

Is the inspection result normal?

YES >> Go to Diagnosis Procedure. Refer to HAC-93, "M9R : Diagnosis Procedure".
NO >> END.

## M9R : Diagnosis Procedure

INFOID:0000000001298053

### 1. CHECK VOLTAGE BETWEEN SUNLOAD SENSOR AND GROUND

1. Disconnect sunload sensor connector.
2. Turn ignition switch ON.
3. Check voltage between sunload sensor harness connector M74 terminal 1 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| Sunload sensor | | — | |
| Connector | Terminal | | |
| M74 | 1 | Ground | Approx. 5 |

Is the inspection result normal?

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

## 2.CHECK CIRCUIT CONTINUITY BETWEEN SUNLOAD SENSOR AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect auto amp. connector.
3. Check continuity between sunload sensor harness connector M74 terminal 2 and auto amp. harness connector M53 terminal 16.

| Sunload sensor | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| M74 | 2 | M53 | 16 | Existed |

Is the inspection result normal?

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

## 3.CHECK SUNLOAD SENSOR

1. Reconnect sunload sensor connector and auto amp. connector.
2. Refer to HAC-95, "M9R : Component Inspection".

Is the inspection result normal?

YES >> Replace auto amp.
NO >> Replace sunload sensor.

## 4.CHECK CIRCUIT CONTINUITY BETWEEN SUNLOAD SENSOR AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect auto amp. connector.
3. Check continuity between sunload sensor harness connector M74 terminal 1 and auto amp. harness connector M53 terminal 19.

| Sunload sensor | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| M74 | 1 | M53 | 19 | Existed |

4. Check continuity between sunload sensor harness connector M74 terminal 1 and ground.

| Sunload sensor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| M74 | 1 | Ground | Not existed |

Is the inspection result normal?

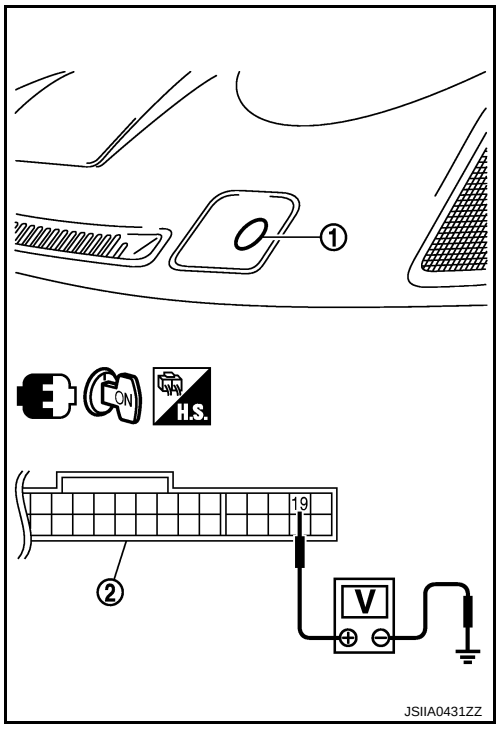
YES >> Replace auto amp.
NO >> Repair harness or connector.

## M9R : Component Inspection

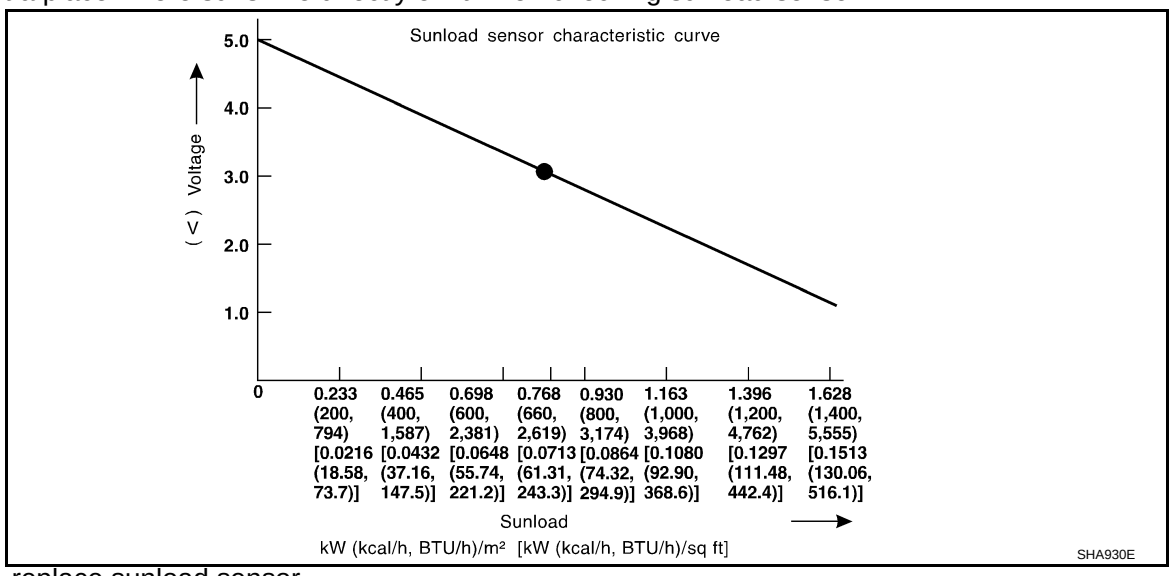
INFOID:0000000001298054

Measure voltage between auto amp. harness connector (2) M53 terminal 19 and ground.

1. Sunload sensor




- Select a place where sunshine directly on it when checking sunload sensor.



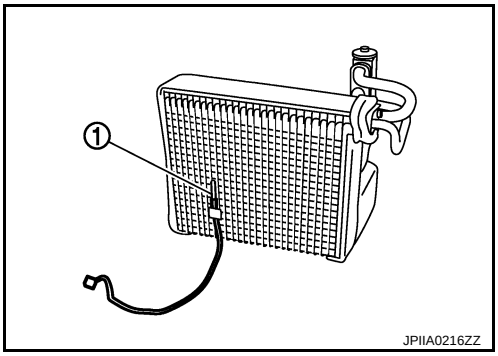

If NG, replace sunload sensor.

# INTAKE SENSOR
## MR20DE/QR25DE

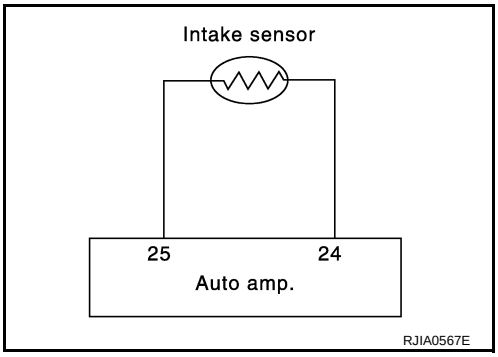
### MR20DE/QR25DE : Description

INFOID:0000000001162195

Intake Sensor
The intake sensor (1) is located on the A/C unit assembly. It converts air temperature after it passes through the evaporator into a resistance value which is then input to the auto amp.




Intake Sensor Circuit




### MR20DE/QR25DE : Component Function Check

INFOID:0000000001162196

#### 1.PERFORM SELF-DIAGNOSIS STEP-2

Perform self-diagnosis STEP-2. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 3.

Is the inspection result normal?

YES >> Go to Diagnosis Procedure. Refer to HAC-96, "MR20DE/QR25DE : Diagnosis Procedure".
NO >> END.

### MR20DE/QR25DE : Diagnosis Procedure

INFOID:0000000001162197

#### 1.CHECK VOLTAGE BETWEEN INTAKE SENSOR AND GROUND

1. Disconnect intake sensor connector.
2. Turn ignition switch ON.
3. Check voltage between intake sensor harness connector M42 terminal 1 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| Intake sensor | | — | |
| Connector | Terminal | | |
| M42 | 1 | Ground | Approx. 5 |

Is the inspection result normal?

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

#### 2.CHECK CIRCUIT CONTINUITY BETWEEN INTAKE SENSOR AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect auto amp. connector.

3. Check continuity between intake sensor harness connector M42 terminal 2 and auto amp. harness connector M51 terminal 24.

| Intake sensor | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| M42 | 2 | M51 | 24 | Existed |

Is the inspection result normal?

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

## 3. CHECK INTAKE SENSOR

Refer to HAC-98, "MR20DE/QR25DE : Component Inspection".

Is the inspection result normal?

YES >> Replace auto amp.
NO >> Replace intake sensor.

## 4. CHECK CIRCUIT CONTINUITY BETWEEN INTAKE SENSOR AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect auto amp. connector.
3. Check continuity between intake sensor harness connector M42 terminal 1 and auto amp. harness connector M51 terminal 25.

| Intake sensor | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| M42 | 1 | M51 | 25 | Existed |

4. Check continuity between intake sensor harness connector M42 terminal 1 and ground.

| Intake sensor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| M42 | 1 | Ground | Not existed |

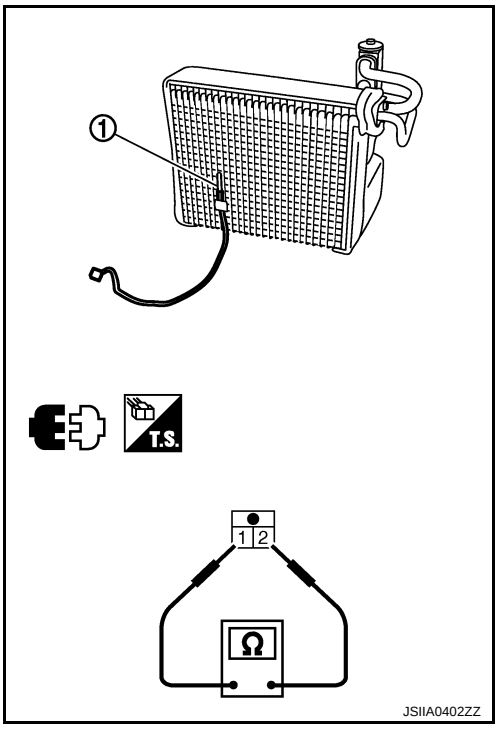
Is the inspection result normal?

YES >> Replace auto amp.
NO >> Repair harness or connector.

## MR20DE/QR25DE : Component Inspection

INFOID:0000000001162198

Measure resistance between terminals 1 and 2 at sensor side after disconnecting intake sensor (1) connector M42. Refer to table below.




| Temperature °C (°F) | Resistance kΩ |
|---|---|
| –15 (5) | 12.34 |
| –10 (14) | 9.62 |
| –5 (23) | 7.56 |
| 0 (32) | 6.00 |
| 5 (41) | 4.80 |
| 10 (50) | 3.87 |
| 15 (59) | 3.15 |
| 20 (68) | 2.57 |
| 25 (77) | 2.12 |
| 30 (86) | 1.76 |
| 35 (95) | 1.47 |
| 40 (104) | 1.23 |
| 45 (113) | 1.04 |

If NG, replace intake sensor.

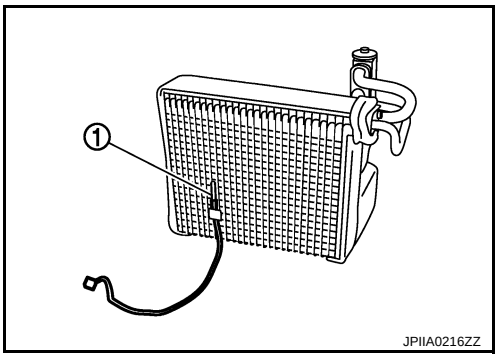
# M9R

## M9R : Description

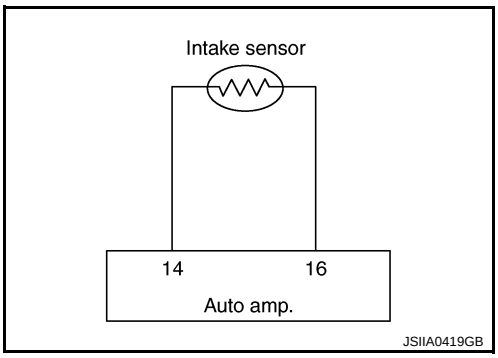
INFOID:0000000001298055

Intake Sensor

The intake sensor (1) is located on the A/C unit assembly. It converts air temperature after it passes through the evaporator into a resistance value which is then input to the auto amp.




Intake Sensor Circuit




## M9R : Component Function Check

INFOID:0000000001298056

### 1. PERFORM SELF-DIAGNOSIS STEP-2

Perform self-diagnosis STEP-2. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 3.

Is the inspection result normal?

YES >> Go to Diagnosis Procedure. Refer to HAC-99, "M9R : Diagnosis Procedure".
NO >> END.

## M9R : Diagnosis Procedure

INFOID:0000000001298057

### 1. CHECK VOLTAGE BETWEEN INTAKE SENSOR AND GROUND

1. Disconnect intake sensor connector.
2. Turn ignition switch ON.
3. Check voltage between intake sensor harness connector M42 terminal 1 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| Intake sensor | | — | |
| Connector | Terminal | | |
| M42 | 1 | Ground | Approx. 5 |

Is the inspection result normal?

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

### 2. CHECK CIRCUIT CONTINUITY BETWEEN INTAKE SENSOR AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect auto amp. connector.
3. Check continuity between intake sensor harness connector M42 terminal 2 and auto amp. harness connector M53 terminal 16.

| Intake sensor | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| M42 | 2 | M53 | 16 | Existed |

Is the inspection result normal?

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

### 3. CHECK INTAKE SENSOR

Refer to HAC-100, "M9R : Component Inspection".

Is the inspection result normal?

YES >> Replace auto amp.
NO >> Replace intake sensor.

### 4. CHECK CIRCUIT CONTINUITY BETWEEN INTAKE SENSOR AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect auto amp. connector.
3. Check continuity between intake sensor harness connector M42 terminal 1 and auto amp. harness connector M53 terminal 14.

| Intake sensor | | Auto amp. | | Continuity |
|---|---|---|---|---|
| Connector | Terminal | Connector | Terminal | |
| M42 | 1 | M53 | 14 | Existed |

4. Check continuity between intake sensor harness connector M42 terminal 1 and ground.

| Intake sensor | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| M42 | 1 | Ground | Not existed |

Is the inspection result normal?

YES >> Replace auto amp.

NO >> Repair harness or connector.

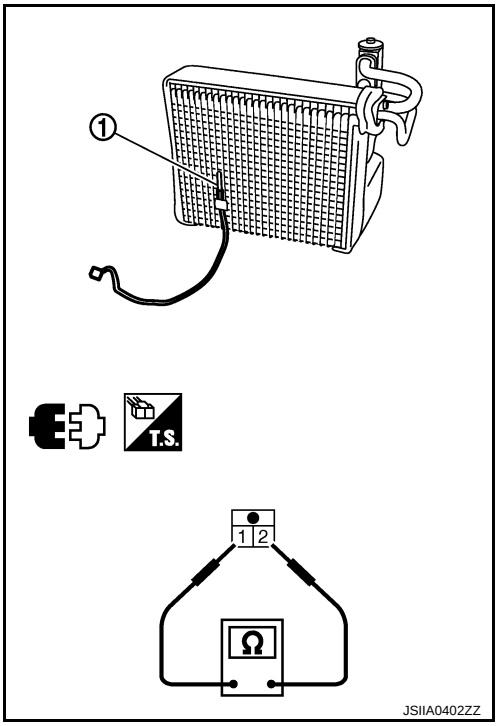
## M9R : Component Inspection

INFOID:0000000001298149

Measure resistance between terminals 1 and 2 at sensor side after disconnecting intake sensor (1) connector M42. Refer to table below.

| Temperature °C (°F) | Resistance kΩ |
|---|---|
| –15 (5) | 12.34 |
| –10 (14) | 9.62 |
| –5 (23) | 7.56 |
| 0 (32) | 6.00 |
| 5 (41) | 4.80 |
| 10 (50) | 3.87 |
| 15 (59) | 3.15 |
| 20 (68) | 2.57 |
| 25 (77) | 2.12 |
| 30 (86) | 1.76 |
| 35 (95) | 1.47 |
| 40 (104) | 1.23 |
| 45 (113) | 1.04 |

If NG, replace intake sensor.



# POWER SUPPLY AND GROUND CIRCUIT FOR AUTO AMP. MR20DE/QR25DE

## MR20DE/QR25DE : Description

INFOID:0000000001162199

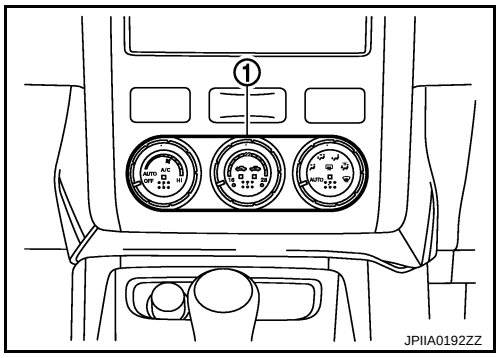
### COMPONENT DESCRIPTION

Auto Amp. (Automatic Amplifier)

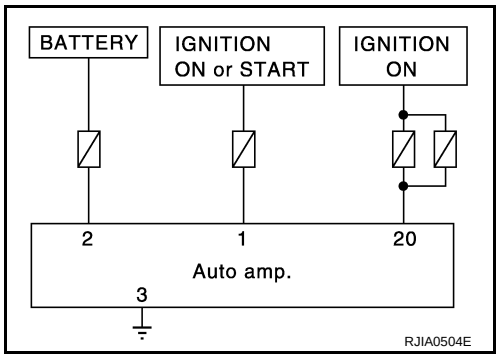
The auto amp. (1) has a built-in microcomputer which processes information sent from various sensors needed for air conditioner operation. The air mix door motor, mode door motor, intake door motor, blower motor and compressor are then controlled.

The auto amp. is unitized with control mechanisms. Signal from various switches and potentio temperature control (PTC) are directly entered into auto amp.

Self-diagnosis functions are also built into auto amp. to provide quick check of malfunctions in the auto air conditioner system.

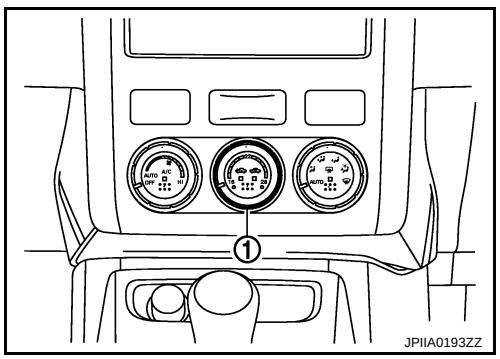



Power Supply and Ground Circuit for Auto Amp.




Potentio Temperature Control (PTC)

The PTC (1) is built into the auto amp. It can be set at an interval of 1°C in the 16°C to 28°C temperature range by turning temperature control dial.




## MR20DE/QR25DE : Component Function Check

INFOID:0000000001162200

### 1. CONFIRM SYMPTOM BY PERFORMING THE FOLLOWING OPERATIONAL CHECK

1. Turn fan control dial to AUTO position.
2. Press A/C switch.
3. A/C switch LED turns ON. Confirm that the magnet clutch engages (sound or visual inspection). (Discharge air and blower speed depend on ambient, in-vehicle and set temperatures.)

Does magnet clutch engaged?

YES >> END.
NO >> Go to Diagnosis Procedure. Refer to HAC-102, "MR20DE/QR25DE : Diagnosis Procedure".

## MR20DE/QR25DE : Diagnosis Procedure

INFOID:0000000001162201

### 1.CHECK POWER SUPPLY CIRCUIT FOR AUTO AMP.

1. Disconnect auto amp. connector.
2. Check voltage between auto amp. harness connector M50 terminals 1, 2 and 20 and ground.

| (+) | | (–) | Ignition switch position | | |
|---|---|---|---|---|---|
| Auto amp. | | — | OFF | ACC | ON |
| Connector | Terminal | | | | |
| M50 | 1 | Ground | Approx. 0 V | Approx. 0 V | Battery voltage |
| | 2 | | Battery voltage | Battery voltage | Battery voltage |
| | 20 | | Approx. 0 V | Approx. 0 V | Battery voltage |

Is the inspection result normal?

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

### 2.CHECK FUSE

Check 10A fuses [Nos. 4, 8 and 17, located in the fuse block (J/B)]. Refer to PG-125, "Fuse, Connector and Terminal Arrangement".

Is the inspection result normal?

YES >> Check harness for open circuit. Repair or replace if necessary.
NO >> Replace the blown fuse after repairing the affected circuit if a fuse is blown.

### 3.CHECK GROUND CIRCUIT FOR AUTO AMP.

1. Turn ignition switch OFF.
2. Check continuity between auto amp. harness connector M50 terminal 3 and ground.

| Auto amp. | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| M50 | 3 | Ground | Existed |

Is the inspection result normal?

YES >> Replace auto amp.
NO >> Repair harness or connector.

## M9R

## M9R : Description

INFOID:0000000001298059

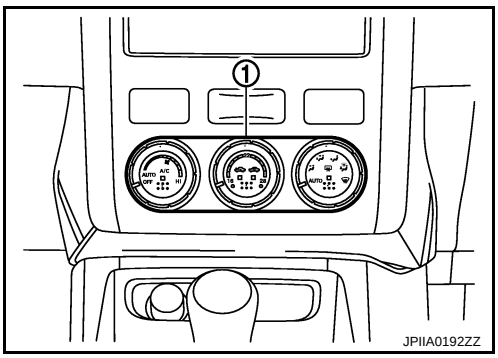
### COMPONENT DESCRIPTION

Auto Amp. (Automatic Amplifier)

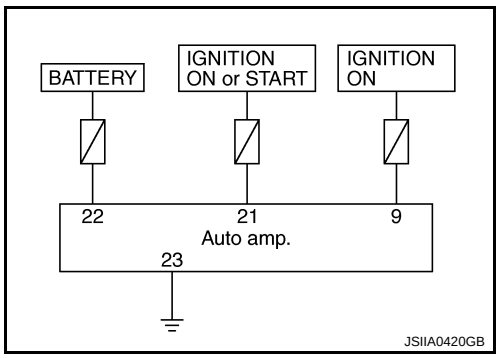
The auto amp. (1) has a built-in microcomputer which processes information sent from various sensors needed for air conditioner operation. The air mix door motor, mode door motor, intake door motor, blower motor and compressor are then controlled.

The auto amp. is unitized with control mechanisms. Signal from various switches and potentio temperature control (PTC) are directly entered into auto amp.

Self-diagnosis functions are also built into auto amp. to provide quick check of malfunctions in the auto air conditioner system.

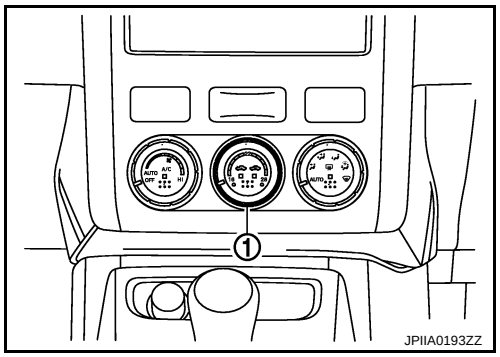


Power Supply and Ground Circuit for Auto Amp.




Potentio Temperature Control (PTC)

The PTC (1) is built into the auto amp. It can be set at an interval of 1°C in the 16°C to 28°C temperature range by turning temperature control dial.




## M9R : Component Function Check

INFOID:0000000001298060

### 1. CONFIRM SYMPTOM BY PERFORMING THE FOLLOWING OPERATIONAL CHECK

1. Turn fan control dial to AUTO position.
2. Press A/C switch.
3. A/C switch LED turns ON. Confirm that the magnet clutch engages (sound or visual inspection). (Discharge air and blower speed depend on ambient, in-vehicle and set temperatures.)

Does magnet clutch engaged?

YES >> END.
NO >> Go to Diagnosis Procedure. Refer to HAC-103, "M9R : Diagnosis Procedure".

## M9R : Diagnosis Procedure

INFOID:0000000001298061

### 1. CHECK POWER SUPPLY CIRCUIT FOR AUTO AMP.

1. Disconnect auto amp. connector.
2. Check voltage between auto amp. harness connector M53 terminals 9, 21 and 22 and ground.

| (+) | | (–) | Ignition switch position | | |
|---|---|---|---|---|---|
| Auto amp. | | — | OFF | ACC | ON |
| Connector | Terminal | | | | |
| M53 | 9 | Ground | Approx. 0 V | Approx. 0 V | Battery voltage |
| | 21 | | Approx. 0 V | Approx. 0 V | Battery voltage |
| | 22 | | Battery voltage | Battery voltage | Battery voltage |

Is the inspection result normal?

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

### 2. CHECK FUSE

Check 10A fuses [Nos. 4, 8 and 17, located in the fuse block (J/B)]. Refer to PG-125, "Fuse, Connector and Terminal Arrangement".

Is the inspection result normal?

YES >> Check harness for open circuit. Repair or replace if necessary.
NO >> Replace the blown fuse after repairing the affected circuit if a fuse is blown.

## 3. CHECK GROUND CIRCUIT FOR AUTO AMP.

1. Turn ignition switch OFF.
2. Check continuity between auto amp. harness connector M53 terminal 23 and ground.

| Auto amp. | | — | Continuity |
|---|---|---|---|
| Connector | Terminal | | |
| M53 | 23 | Ground | Existed |

Is the inspection result normal?

YES >> Replace auto amp.
NO >> Repair harness or connector.

# ECU DIAGNOSIS

## ECM

## MR20DE

## MR20DE : Reference Value

INFOID:0000000001323006

### VALUES ON THE DIAGNOSIS TOOL

Remarks:

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.

* Specification data may not be directly related to their components signals/values/operations.

I.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. this IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

| Monitor Item | Condition | | Values/Status |
|---|---|---|---|
| ENG SPEED | • Run engine and compare CONSULT-III value with the tachometer indication. | | Almost the same speed as the tachometer indication. |
| MAS A/F SE-B1 | See ECM-97, "Diagnosis Procedure". | | |
| B/FUEL SCHDL | See ECM-97, "Diagnosis Procedure". | | |
| A/F ALPHA-B1 | See ECM-97, "Diagnosis Procedure". | | |
| COOLAN TEMP/S | • Engine: After warming up | | More than 70°C (158°F) |
| HO2S1 (B1) | • Engine: After warming up | Maintaining engine speed at 2,000 rpm | 0 - 0.3V ←→ Approx. 0.6 - 1.0V |
| HO2S2 (B1) | • Revving engine from idle up to 3,000 rpm quickly after the following conditions are met.<br>- Engine: After warming up<br>- After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load | | 0 - 0.3V ←→ Approx. 0.6 - 1.0V |
| HO2S2 MNTR (B1) | • Engine: After warming up | Maintaining engine speed at 2,000 rpm | LEAN ←→→RICH<br>Change more than 5 times during 10 seconds. |
| HO2S2 MNTR (B1) | • Revving engine from idle up to 3,000 rpm quickly after the following conditions are met.<br>- Engine: After warming up<br>- After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load | | LEAN ←→ RICH |
| VHCL SPEED SE | • Turn drive wheels and compare CONSULT-III value with the speedometer indication. | | Almost the same speed as speedometer indication |
| BATTERY VOLT | • Ignition switch: ON (Engine stopped) | | 11 - 14V |
| ACCEL SEN 1 | • Ignition switch: ON (Engine stopped) | Accelerator pedal: Fully released | 0.5 - 1.0V |
| | | Accelerator pedal: Fully depressed | 4.2 - 4.8V |
| ACCEL SEN 2* | • Ignition switch: ON (Engine stopped) | Accelerator pedal: Fully released | 0.5 - 1.0V |
| | | Accelerator pedal: Fully depressed | 4.2 - 4.8V |
| THRL SEN 1-B1 | • Ignition switch: ON (Engine stopped)<br>• Shift lever: D (CVT), 1st (M/T) | Accelerator pedal: Fully released | More than 0.36V |
| | | Accelerator pedal: Fully depressed | Less than 4.75V |
| THRL SEN 2-B1* | • Ignition switch: ON (Engine stopped)<br>• Shift lever: D (CVT), 1st (M/T) | Accelerator pedal: Fully released | More than 0.36V |
| | | Accelerator pedal: Fully depressed | Less than 4.75V |
| INT/A TEMP SE | • Ignition switch: ON | | Indicates intake air temperature |
| START SIGNAL | • Ignition switch: ON → START → ON | | OFF → ON → OFF |
| CLSD THL POS | • Ignition switch: ON (Engine stopped) | Accelerator pedal: Fully released | ON |
| | | Accelerator pedal: Slightly depressed | OFF |

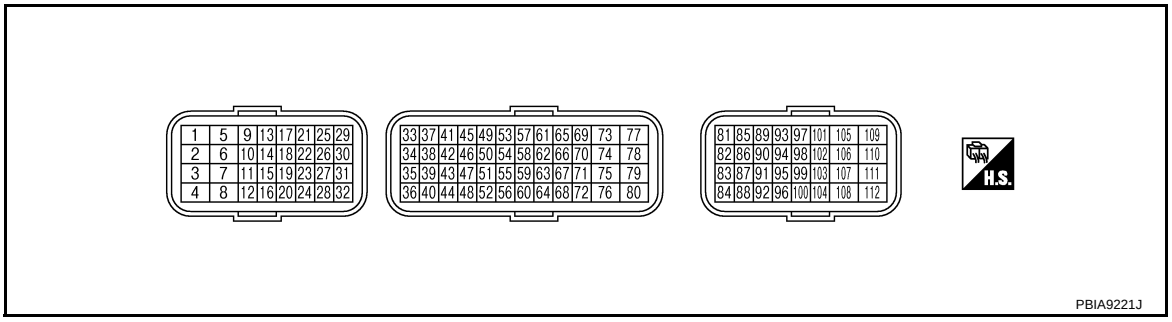
| Monitor Item | Condition | | Values/Status |
|---|---|---|---|
| AIR COND SIG | • Engine: After warming up, idle the engine | Air conditioner switch: OFF | OFF |
| | | Air conditioner switch: ON (Compressor operates.) | ON |
| P/N POSI SW | • Ignition switch: ON | Shift lever: P or N (CVT), Neutral (M/T) | ON |
| | | Selector lever: Except above | OFF |
| PW/ST SIGNAL | • Engine: After warming up, idle the engine | Steering wheel: Not being turned | OFF |
| | | Steering wheel: Being turned | ON |
| LOAD SIGNAL | • Ignition switch: ON | Rear window defogger switch: ON and/or Lighting switch: 2nd position | ON |
| | | Rear window defogger switch and lighting switch: OFF | OFF |
| IGNITION SW | • Ignition switch: ON → OFF → ON | | ON → OFF → ON |
| HEATER FAN SW | • Engine: After warming up, idle the engine | Heater fan switch: ON | ON |
| | | Heater fan switch: OFF | OFF |
| BRAKE SW | • Ignition switch: ON | Brake pedal: Fully released | OFF |
| | | Brake pedal: Slightly depressed | ON |
| INJ PULSE-B1 | • Engine: After warming up<br>• Shift lever: P or N (CVT), Neutral (M/T)<br>• Air conditioner switch: OFF<br>• No load | Idle | 2.0 - 3.0 msec |
| | | 2,000 rpm | 1.9 - 2.9 msec |
| IGN TIMING | • Engine: After warming up<br>• Shift lever: P or N (CVT), Neutral (M/T)<br>• Air conditioner switch: OFF<br>• No load | Idle | 10° - 20° BTDC |
| | | 2,000 rpm | 25° - 45° BTDC |
| PURG VOL C/V | • Engine: After warming up<br>• Shift lever: P or N (CVT), Neutral (M/T)<br>• Air conditioner switch: OFF<br>• No load | Idle (Accelerator pedal: Not depressed even slightly, after engine starting.) | 0% |
| | | 2,000 rpm | 20% - 90% |
| INT/V TIM (B1) | • Engine: After warming up<br>• Shift lever: P or N (CVT), Neutral (M/T)<br>• Air conditioner switch: OFF<br>• No load | Idle | –5° - 5°CA |
| | | 2,000 rpm | Approx. 0° - 20°CA |
| INT/V SOL (B1) | • Engine: After warming up<br>• Shift lever: P or N (CVT), Neutral (M/T)<br>• Air conditioner switch: OFF<br>• No load | Idle | 0% |
| | | 2,000 rpm | Approx. 0% - 60% |
| AIR COND RLY | • Engine: After warming up, idle the engine | Air conditioner switch: OFF | OFF |
| | | Air conditioner switch: ON (Compressor operates) | ON |
| FUEL PUMP RLY | • For 1 seconds after turning ignition switch: ON<br>• Engine running or cranking | | ON |
| | • Except above | | OFF |
| THRTL RELAY | • Ignition switch: ON | | ON |

| Monitor Item | Condition | | Values/Status |
|---|---|---|---|
| COOLING FAN | • Engine: After warming up, idle the engine<br>• Air conditioner switch: OFF | Engine coolant temperature is 94 °C (201°F) or less. | OFF |
| | | Engine coolant temperature is between 95°C (203°F) and 99°C (210°F) | LOW*2 |
| | | Engine coolant temperature is 100°C (212°F) or more | HIGH*2 |
| HO2S1 HTR (B1) | • Engine: After warming up<br>• Engine speed: Above 3,600 rpm | | ON |
| | Engine speed: Above 3,600 rpm | | OFF |
| HO2S2 HTR (B1) | • Engine speed: Below 3,600 rpm after the following conditions are met.<br>- Engine: After warming up<br>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load | | ON |
| | • Engine speed: Above 3,600 rpm | | OFF |
| VEHICLE SPEED | • Turn drive wheels and compare CONSULT-III value with the speedometer indication. | | Almost the same speed as the speedometer indication |
| IDL A/V LEARN | • Engine: running | Idle air volume learning has not been performed yet. | YET |
| | | Idle air volume learning has already been performed successfully. | CMPLT |
| O2SEN HTR DTY | • Engine coolant temperature when engine started: More than 80°C (176°F)<br>• Engine speed: below 3,600 rpm | | Approx. 30% |
| AC PRESS SEN | • Engine: Idle<br>• Both A/C switch and blower fan switch: ON (Compressor operates) | | 1.0 - 4.0V |
| VHCL SPEED SE | • Turn drive wheels and compare CONSULT-III value with the speedometer indication. | | Almost the same speed as the speedometer indication |
| SET VHCL SPD | • Engine: Running | ASCD: Operating | The preset vehicle speed is displayed |
| MAIN SW | • Ignition switch: ON | MAIN switch: Pressed | ON |
| | | MAIN switch: Released | OFF |
| CANCEL SW | • Ignition switch: ON | CANCEL switch: Pressed | ON |
| | | CANCEL switch: Released | OFF |
| RESUME/ACC SW | • Ignition switch: ON | RESUME/ACCELERATE switch: Pressed | ON |
| | | RESUME/ACCELERATE switch: Released | OFF |
| SET SW | • Ignition switch: ON | SET/COAST switch: Pressed | ON |
| | | SET/COAST switch: Released | OFF |
| BRAKE SW1 (ASCD brake switch) | • Ignition switch: ON | • Brake pedal: Fully released (CVT)<br>• Brake pedal and clutch pedal: Fully released (M/T) | ON |
| | | • Brake pedal: Slightly depressed (CVT)<br>• Brake pedal and/or clutch pedal: Slightly depressed (M/T) | OFF |
| BRAKE SW2 (Stop lamp switch) | • Ignition switch: ON | Brake pedal: Fully released | OFF |
| | | Brake pedal: Slightly depressed | ON |
| VHCL SPD CUT | • Ignition switch: ON | | NON |
| LO SPEED CUT | • Ignition switch: ON | | NON |
| AT OD MONITOR | • Ignition switch: ON | | OFF |
| AT OD CANCEL | • Ignition switch: ON | | OFF |

| Monitor Item | Condition | | Values/Status |
|---|---|---|---|
| CRUISE LAMP | • Ignition switch: ON | MAIN switch: Pressed at the 1st time → at the 2nd time | ON → OFF |
| SET LAMP | • MAIN switch: ON<br>• When vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH) | ASCD: Operating | ON |
| | | ASCD: Not operating | OFF |

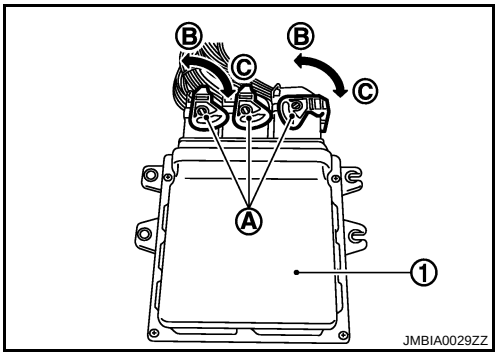
*: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

## TERMINAL LAYOUT



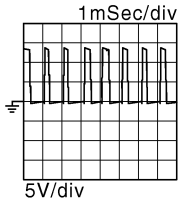

## PHYSICAL VALUES

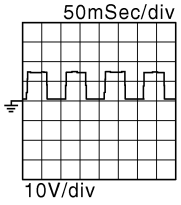
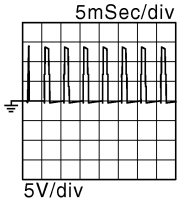
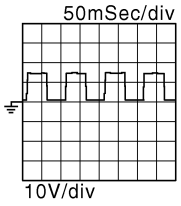
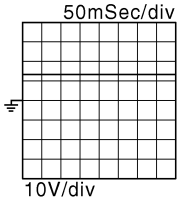
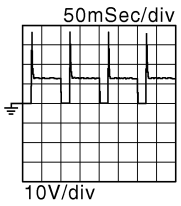
**NOTE:**
- ECM is located in the engine room left side near battery.
- When disconnecting ECM harness connector (A), loosen (C) it with levers as far as they will go as shown in the figure.

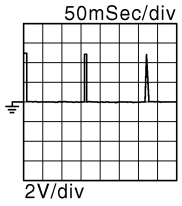
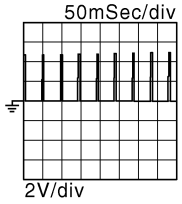
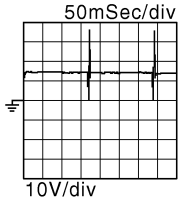
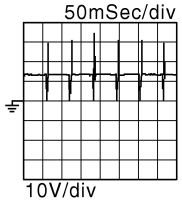



1 : ECM
B : Fasten

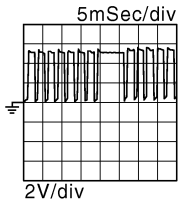
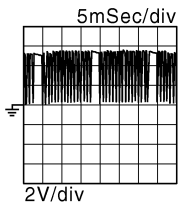
- Connect a break-out box (EG17550000) and harness adapter (EG17550400) between the ECM and ECM harness connector.
- Use extreme care not to 2 pins at one time.
- Data is for comparison and may not be exact.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.

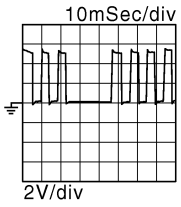
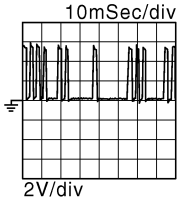
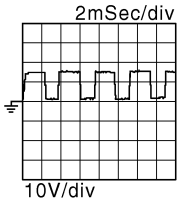
| Terminal No. | | Wire color | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|---|
| + | – | | Signal name | Input/ Output | | |
| 1 | Ground | L | Throttle control motor (Open) | Output | [Ignition switch: ON]<br>• Engine stopped<br>• Shift lever: D (CVT), 1st (M/T)<br>• Accelerator pedal: Fully depressed | 3.2V★<br>  <br><br>JMBIA0324GB |
| 2 | Ground | Y/R | Throttle control motor relay power supply | Input | [Ignition switch: ON] | BATTERY VOLTAGE (11 - 14V) |

| Terminal No. + | Terminal No. – | Wire color | Description Signal name | Description Input/ Output | Condition | Value (Approx.) |
|---|---|---|---|---|---|---|
| 3 | Ground | BR/Y | Heated oxygen sensor 1 heater | Output | [Engine is running]<br>• Warm-up condition<br>• Engine speed: Below 3,600 rpm | 2.9 - 8.8V★<br>  <br><br>JMBIA0325GB |
| | | | | | [Ignition switch: ON]<br>• Engine stopped<br>[Engine is running]<br>• Engine speed: below 3,600 rpm | BATTERY VOLTAGE (11-14V) |
| 4 | Ground | P | Throttle control motor (Close) | Output | [Ignition switch: ON]<br>• Engine stopped<br>• Shift lever: D (CVT), 1st (M/T)<br>• Accelerator pedal: Fully released | 1.8V★<br>  <br><br>JMBIA0326GB |
| 5 | Ground | R | Heated oxygen sensor 2 heater | Output | [Engine is running]<br>• Engine speed: Below 3,600 rpm after the following conditions are met<br>- Engine: after warming up<br>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load | 10V★<br>  <br><br>JMBIA0325GB |
| | | | | | [Ignition switch: ON]<br>• Engine stopped<br>[Engine is running]<br>• Engine speed: Above 3,600 rpm | BATTERY VOLTAGE (11 - 14V) |
| 9 | Ground | W/D | EVAP canister purge volume control solenoid valve | Output | [Engine is running]<br>• Idle speed<br>• Accelerator pedal: Not depressed even slightly, after engine starting | BATTERY VOLTAGE (11 - 14V)★<br>  <br><br>JMBIA0327GB |
| | | | | | [Engine is running]<br>• Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.) |  <br><br>JMBIA0328GB |
| 10<br>11 | Ground | B | ECM ground | — | [Engine is running]<br>• Idle speed | Body ground |

| Terminal No. + | Terminal No. − | Wire color | Description: Signal name | Description: Input/Output | Condition | Value (Approx.) |
|---|---|---|---|---|---|---|
| 15 | Ground | G | Throttle control motor relay | Output | [Ignition switch: OFF] | BATTERY VOLTAGE (11 - 14V) |
| | | | | | [Ignition switch: ON] | 0 - 1.0V |
| 17<br>18<br>21<br>22 | Ground | V<br>BR/Y<br>O<br>Y | Ignition signal No. 1<br>Ignition signal No. 2<br>Ignition signal No. 4<br>Ignition signal No. 3 | Output | [Engine is running]<br>• Warm-up condition<br>• Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle | 0 - 0.3V★<br>  <br><br>JMBIA0329GB |
| | | | | | [Engine is running]<br>• Warm-up condition<br>• Engine speed: 2,000 rpm | 0.2 - 0.5V★<br>  <br><br>JMBIA0330GB |
| 23 | Ground | B/O | Fuel pump relay | Output | [Ignition switch: ON]<br>• For 1 second after turning ignition switch ON<br>[Engine is running] | 0 - 1.0V |
| 25<br>29<br>30<br>31 | Ground | R<br>U<br>GR<br>L | Fuel injector No. 4<br>Fuel injector No. 3<br>Fuel injector No. 2<br>Fuel injector No. 1 | Output | [Engine is running]<br>• Warm-up condition<br>• Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle | BATTERY VOLTAGE (11 - 14V)★<br>  <br><br>JMBIA0331GB |
| | | | | | [Engine is running]<br>• Warm-up condition<br>• Engine speed: 2,000 rpm | BATTERY VOLTAGE (11 - 14V)★<br>  <br><br>JMBIA0332GB |
| 32 | Ground | R/B | ECM relay (Self shut-off) | Output | [Engine is running]<br>[Ignition switch: OFF]<br>• A few seconds after turning ignition switch OFF | 0 - 1.0V |
| | | | | | [Ignition switch: OFF]<br>• More than a few seconds after turning ignition switch OFF | BATTERY VOLTAGE (11 - 14V) |

| Terminal No. + | Terminal No. – | Wire color | Description Signal name | Description Input/ Output | Condition | Value (Approx.) |
|---|---|---|---|---|---|---|
| 33 | Ground | Y | Throttle position sensor 1 | Input | [Ignition switch: ON]<br>• Engine stopped<br>• Shift lever: D (CVT), 1st (M/T)<br>• Accelerator pedal: Fully released | More than 0.36V |
| | | | | | [Ignition switch: ON]<br>• Engine stopped<br>• Shift lever: D (CVT), 1st (M/T)<br>• Accelerator pedal: Fully depressed | Less than 4.75V |
| 34 | Ground | R | Throttle position sensor 2 | Input | [Ignition switch: ON]<br>• Engine stopped<br>• Shift lever: D (CVT), 1st (M/T)<br>• Accelerator pedal: Fully released | Less than 4.75V |
| | | | | | [Ignition switch: ON]<br>• Engine stopped<br>• Shift lever: D (CVT), 1st (M/T)<br>• Accelerator pedal: Fully depressed | More than 0.36V |
| 36 | Ground | B | Sensor ground (Throttle position sensor) | — | [Engine is running]<br>• Warm-up condition<br>• Idle speed | 0V |
| 37 | Ground | W | Knock sensor | Input | [Engine is running]<br>• Idle speed | 2.5V |
| 38 | Ground | P | Engine coolant temperature sensor | Input | [Engine is running] | 0 - 4.8V<br>Output voltage varies with engine coolant temperature. |
| 40 | Ground | B | Sensor ground (Knock sensor) | — | [Engine is running]<br>• Warm-up condition<br>• Idle speed | 0V |
| 41 | Ground | G | Refrigerant pressure sensor | Input | [Engine is running]<br>• Warm-up condition<br>• Both A/C switch and blower fan motor switch: ON (Compressor operates) | 1.0 - 4.0V |
| 44 | Ground | O | Sensor ground (Engine coolant temperature sensor) | — | [Engine is running]<br>• Warm-up condition<br>• Idle speed | 0V |
| 45 | Ground | BR | Mass air flow sensor | Input | [Engine is running]<br>• Warm-up condition<br>• Idle speed | 0.9 - 1.2V |
| | | | | | [Engine is running]<br>• Warm-up condition<br>• Engine speed: 2,500 rpm | 1.5 - 1.8V |
| 46 | Ground | Y | Intake air temperature sensor | Input | [Engine is running] | 0 - 4.8V<br>Output voltage varies with intake air temperature. |
| 48 | Ground | R/B | Sensor ground (Refrigerant pressure sensor) | — | [Engine is running]<br>• Warm-up condition<br>• Idle speed | 0V |

| Terminal No. | | Wire color | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|---|
| + | – | | Signal name | Input/ Output | | |
| 49 | Ground | Y | Heated oxygen sensor 1 | Input | [Engine is running]<br>• Warm-up condition<br>• Engine speed: 2,000 rpm | 0 - 1.0V |
| 50 | Ground | Y | Heated oxygen sensor 2 | Input | [Engine is running]<br>• Revving engine from idle to 3,000 rpm quickly after the following conditions are met<br>- Engine: after warming up<br>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load | 0 - 1.0V |
| 52 | Ground | LG | Sensor ground (Mass air flow sensor) | — | [Engine is running]<br>• Warm-up condition<br>• Idle speed | 0V |
| 55 | Ground | O | Sensor power supply (Intake air temperature sensor) | — | [Engine is running]<br>• Warm-up condition<br>• Idle speed | 0V |
| 56 | Ground | B | Sensor ground (Heated oxygen sensor 1) | — | [Engine is running]<br>• Warm-up condition<br>• Idle speed | 0 - 4.8V<br>Output voltage varies with engine coolant temperature. |
| 59 | Ground | SB | Sensor ground (Heated oxygen sensor 2) | — | [Engine is running]<br>• Warm-up condition<br>• Idle speed | 0V |
| 61 | Ground | Y | Crankshaft position sensor (POS) | Input | [Engine is running]<br>• Warm-up condition<br>• Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle | 4.0V★<br>  <br><br>JMBIA0333GB |
| | | | | | [Engine is running]<br>• Engine speed: 2,000 rpm | 4.0V★<br>  <br><br>JMBIA0334GB |
| 62 | Ground | B | Sensor ground [Crankshaft position sensor (POS)] | — | [Engine is running]<br>• Warm-up condition<br>• Idle speed | 0V |
| 63 | Ground | B | Sensor ground [Camshaft position sensor (PHASE)] | — | [Engine is running]<br>• Warm-up condition<br>• Idle speed | 0V |

| Terminal No. + | Terminal No. – | Wire color | Description Signal name | Description Input/ Output | Condition | Value (Approx.) |
|---|---|---|---|---|---|---|
| 65 | Ground | R | Camshaft position sensor (PHASE) | Input | [Engine is running]<br>• Warm-up condition<br>• Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle | 1.0 - 2.0★<br>  <br><br>JMBIA0335GB |
| | | | | | [Engine is running]<br>• Engine speed is 2,000 rpm | 1.0 - 2.0★<br>  <br><br>JMBIA0336GB |
| 69 | Ground | W/B | PNP switch | Input | [Ignition switch: ON]<br>• Shift lever: P or N (CVT), Neutral (M/T) | BATTERY VOLTAGE (11 - 14V) |
| | | | | | [Ignition switch: ON]<br>• Shift lever: Except above | 0V |
| 72 | Ground | L | Sensor power supply (Throttle position sensor) | — | [Ignition switch: ON] | 5V |
| 73 | Ground | Y/R | Intake valve timing control solenoid valve | Output | [Engine is running]<br>• Warm-up condition<br>• Idle speed | 0V |
| | | | | | [Engine is running]<br>• Warm-up condition<br>• Engine speed: 2,000rpm | 7 - 10V★<br>  <br><br>JMBIA0337GB |
| 74 | Ground | L | Sensor power supply (Refrigerant pressure sensor) | Input | [Ignition switch: ON] | 5V |
| 75 | Ground | G | Sensor power supply [Crankshaft position sensor (POS)] | — | [Ignition switch: ON] | 5V |
| 78 | Ground | LG | Sensor power supply [Camshaft position sensor (PHASE)] | — | [Ignition switch: ON] | 5V |
| 83 | Ground | P | CAN communication line | Input/ Output | — | — |
| 84 | Ground | L | CAN communication line | Input/ Output | — | — |
| 88 | Ground | O | Data link connector | Input/ Output | [Ignition switch: ON]<br>• CONSULT-III or GST: Disconnected | 10.5V |
| 93 | Ground | W/L | Ignition switch | Input | [Ignition switch: OFF] | 0V |
| | | | | | [Ignition switch: ON] | BATTERY VOLTAGE (11 - 14V) |

| Terminal No. | | Wire color | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|---|
| + | – | | Signal name | Input/ Output | | |
| 94 | Ground | V | ASCD steering switch | Input | [Ignition switch: ON]<br>• ASCD steering switch: OFF | 4V |
| | | | | | [Ignition switch: ON]<br>• MAIN switch: Pressed | 0V |
| | | | | | [Ignition switch: ON]<br>• CANCEL switch: Pressed | 1V |
| | | | | | [Ignition switch: ON]<br>• RESUME/ACCELERATE switch: Pressed | 3V |
| | | | | | [Ignition switch: ON]<br>• SET/COAST switch: Pressed | 2V |
| 95 | Ground | B | Sensor ground (ASCD steering switch) | — | [Engine is running]<br>• Warm-up condition<br>• Idle speed | 0V |
| 99 | Ground | R/W | Stop lamp switch | Input | [Ignition switch: OFF]<br>• Brake pedal: Fully released | 0V |
| | | | | | [Ignition switch: OFF]<br>• Brake pedal: Slightly depressed | BATTERY VOLTAGE (11 - 14V) |
| 100 | Ground | G/B | ASCD brake switch | Input | [Ignition switch: ON]<br>• Brake pedal: Slightly depressed (CVT)<br>• Brake pedal and clutch pedal: Slightly depressed (M/T) | 0V |
| | | | | | [Ignition switch: ON]<br>• Brake pedal: Fully released (CVT)<br>• Brake pedal and/or clutch pedal: Fully released (M/T) | BATTERY VOLTAGE (11 - 14V) |
| 102 | Ground | BR/Y | Sensor power supply (Accelerator pedal position sensor 2) | — | [Ignition switch: ON] | 5V |
| 104 | Ground | B | Sensor ground (Accelerator pedal position sensor 2) | — | [Engine is running]<br>• Warm-up condition<br>• Idle speed | 0V |
| 105 | Ground | G | Power supply for ECM | Input | [Ignition switch: ON] | BATTERY VOLTAGE (11 - 14V) |
| 106 | Ground | O | Sensor power supply (Accelerator pedal position sensor 1) | — | [Ignition switch: ON] | 5V |
| 108 | Ground | B | ECM ground | — | [Engine is running]<br>• Idle speed | Body ground |
| 110 | Ground | R | Accelerator pedal position sensor 1 | Input | [Ignition switch: ON]<br>• Engine stopped<br>• Accelerator pedal: Fully released | 0.6 - 0.9V |
| | | | | | [Ignition switch: ON]<br>• Engine stopped<br>• Accelerator pedal: Fully depressed | 3.9 - 4.7V |

| Terminal No. | | Wire color | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|---|
| + | – | | Signal name | Input/ Output | | |
| 103 | Ground | GR | Accelerator pedal position sensor 2 | Input | [Ignition switch: ON]<br>• Engine stopped<br>• Accelerator pedal: Fully released | 0.3 - 0.6V |
| | | | | | [Ignition switch: ON]<br>• Engine stopped<br>• Accelerator pedal: Fully depressed | 1.95 - 2.4V |
| 111 | Ground | B/Y | Sensor ground (Accelerator pedal position sensor 1) | — | [Engine is running]<br>• Warm-up condition<br>• Idle speed | 0V |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# QR25DE

## QR25DE : Reference Value

INFOID:0000000001323003

### VALUES ON THE DIAGNOSIS TOOL

Remarks:

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.

* Specification data may not be directly related to their components signals/values/operations.

I.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. this IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

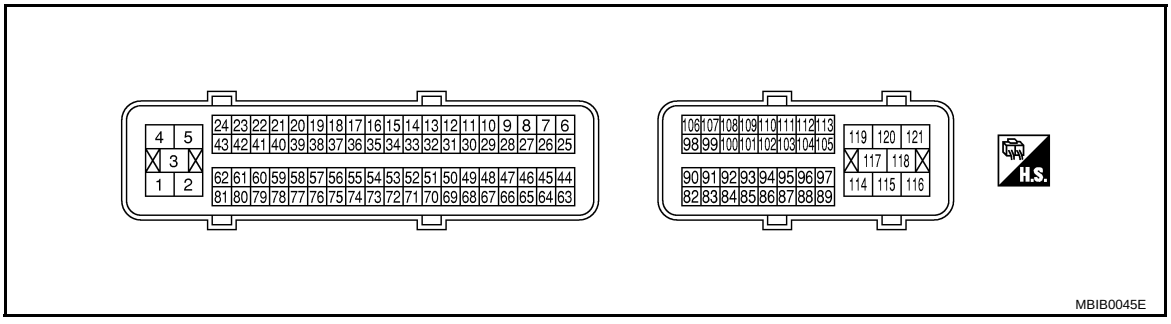
| Monitor Item | Condition | | Values/Status |
|---|---|---|---|
| ENG SPEED | • Run engine and compare CONSULT-III value with the tachometer indication. | | Almost the same speed as the tachometer indication. |
| MAS A/F SE-B1 | See ECQ-99, "Diagnosis Procedure". | | |
| B/FUEL SCHDL | See ECQ-99, "Diagnosis Procedure". | | |
| A/F ALPHA-B1 | See ECQ-99, "Diagnosis Procedure". | | |
| COOLAN TEMP/S | • Engine: After warming up | | More than 70°C (158°F) |
| A/F SEN1 (B1) | • Engine: After warming up | Maintaining engine speed at 2,000 rpm | Fluctuates around 2.2 V |
| HO2S2 (B1) | • Revving engine from idle up to 3,000 rpm quickly after the following conditions are met.<br>- Engine: After warming up<br>- After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load | | 0 - 0.3V ←→ Approx. 0.6 - 1.0V |
| VHCL SPEED SE | • Turn drive wheels and compare CONSULT-III value with the speedometer indication. | | Almost the same speed as speedometer indication |
| BATTERY VOLT | • Ignition switch: ON (Engine stopped) | | 11 - 14V |
| ACCEL SEN 1 | • Ignition switch: ON (Engine stopped) | Accelerator pedal: Fully released | 0.6 - 0.9V |
| | | Accelerator pedal: Fully depressed | 4.0 - 4.8V |
| ACCEL SEN 2*1 | • Ignition switch: ON (Engine stopped) | Accelerator pedal: Fully released | 0.6 - 0.9V |
| | | Accelerator pedal: Fully depressed | 3.9 - 4.8V |
| THRL SEN 1-B1 | • Ignition switch: ON (Engine stopped)<br>• Shift lever: D (CVT), 1st (M/T) | Accelerator pedal: Fully released | More than 0.36V |
| | | Accelerator pedal: Fully depressed | Less than 4.75V |
| THRL SEN 2-B1*1 | • Ignition switch: ON (Engine stopped)<br>• Shift lever: D (CVT), 1st (M/T) | Accelerator pedal: Fully released | More than 0.36V |
| | | Accelerator pedal: Fully depressed | Less than 4.75V |
| INT/A TEMP SE | • Ignition switch: ON | | Indicates intake air temperature |

| Monitor Item | Condition | | Values/Status |
|---|---|---|---|
| START SIGNAL | • Ignition switch: ON → START → ON | | OFF → ON → OFF |
| CLSD THL POS | • Ignition switch: ON (Engine stopped) | Accelerator pedal: Fully released | ON |
| | | Accelerator pedal: Slightly depressed | OFF |
| AIR COND SIG | • Engine: After warming up, idle the engine | Air conditioner switch: OFF | OFF |
| | | Air conditioner switch: ON (Compressor operates.) | ON |
| P/N POSI SW | • Ignition switch: ON | Shift lever: P or N (CVT), Neutral (M/T) | ON |
| | | Selector lever: Except above | OFF |
| LOAD SIGNAL | • Ignition switch: ON | Rear window defogger switch: ON and/or Lighting switch: 2nd position | ON |
| | | Rear window defogger switch and lighting switch: OFF | OFF |
| IGNITION SW | • Ignition switch: ON → OFF → ON | | ON → OFF → ON |
| BRAKE SW | • Ignition switch: ON | Brake pedal: Fully released | OFF |
| | | Brake pedal: Slightly depressed | ON |
| INJ PULSE-B1 | • Engine: After warming up<br>• Shift lever: P or N (CVT), Neutral (M/T)<br>• Air conditioner switch: OFF<br>• No load | Idle | 2.0 - 3.0 msec |
| | | 2,000 rpm | 1.9 - 2.9 msec |
| IGN TIMING | • Engine: After warming up, idle the engine | | BTDC 9.75° |
| CAL/LD VALUE | • Engine: After warming up<br>• Shift lever: P or N (CVT), Neutral (M/T)<br>• Air conditioner switch: OFF<br>• No load | Idle | 10% - 35% |
| | | 2,500 rpm | 10% - 35% |
| MASS AIRFLOW | • Engine: After warming up<br>• Shift lever: P or N (CVT), Neutral (M/T)<br>• Air conditioner switch: OFF<br>• No load | Idle | 1.0 - 4.0 g·m/s |
| | | 2,500 rpm | 4.0 - 10.0 g·m/s |
| PURG VOL C/V | • Engine: After warming up<br>• Shift lever: P or N (CVT), Neutral (M/T)<br>• Air conditioner switch: OFF<br>• No load | Idle (Accelerator pedal: Not depressed even slightly, after engine starting.) | 0% |
| | | 2,000 rpm | 20% - 90% |
| INT/V TIM (B1) | • Engine: After warming up<br>• Shift lever: P or N (CVT), Neutral (M/T)<br>• Air conditioner switch: OFF<br>• No load | Idle | –5° - 5°CA |
| | | 2,000 rpm | Approx. 0° - 20°CA |
| INT/V SOL (B1) | • Engine: After warming up<br>• Shift lever: P or N (CVT), Neutral (M/T)<br>• Air conditioner switch: OFF<br>• No load | Idle | 0% |
| | | 2,000 rpm | Approx. 0% - 60% |
| AIR COND RLY | • Engine: After warming up, idle the engine | Air conditioner switch: OFF | OFF |
| | | Air conditioner switch: ON (Compressor operates) | ON |
| FUEL PUMP RLY | • For 1 seconds after turning ignition switch: ON<br>• Engine running or cranking | | ON |
| | • Except above | | OFF |
| THRTL RELAY | • Ignition switch: ON | | ON |

| Monitor Item | Condition | | Values/Status |
|---|---|---|---|
| COOLING FAN | • Engine: After warming up<br>• Air conditioner switch: OFF | Engine coolant temperature is 94°C (201°F)or less. | OFF |
| | | Engine coolant temperature is between94°C (203°F) and 99°C (210°F) | LOW |
| | | Engine coolant temperature is between94°C (203°F) and 99°C (210°F) | MID |
| | | Engine coolant temperature is 100°C (212°F) or more | HIGH |
| HO2S2 HTR (B1) | • After the following conditions are met.<br>- Engine: After warming up<br>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load | | ON |
| | • For 2 minutes after starting engine | | OFF |
| I/P PULLY SPD | • Vehicle speed: More than 20 km/h (12 MPH) | | Almost the same speed as the tachometer indication |
| A/F LEARN-B1 | • Engine: After warming up, idle the engine | | –16.500 - 10.359% |
| VEHICLE SPEED | • Turn drive wheels and compare CONSULT-III value with the speedometer indication. | | Almost the same speed as the speedometer indication |
| TRVL AFTER MIL | • Ignition switch: ON | Vehicle has traveled after MI has turned ON. | 0 - 65,535 km<br>(0 - 40,723 miles) |
| A/F S1 HTR (B1) | • Engine: After warming up, idle the engine<br>(More than 140 seconds after starting engine.) | | 4 - 100% |
| AC PRESS SEN | • Engine: Idle<br>• Both A/C switch and blower fan switch: ON (Compressor operates) | | 1.0 - 4.0V |
| VHCL SPEED SE | • Turn drive wheels and compare CONSULT-III value with the speedometer indication. | | Almost the same speed as the speedometer indication |
| SET VHCL SPD | • Engine: Running | ASCD: Operating | The preset vehicle speed is displayed |

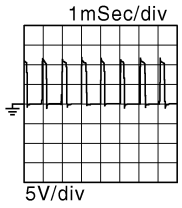
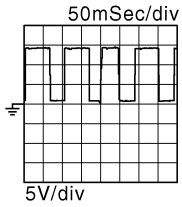
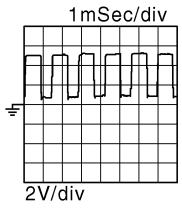
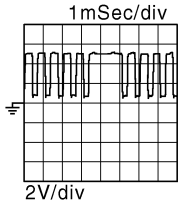
*1: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

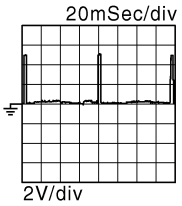
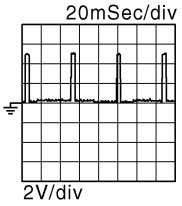
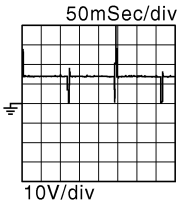
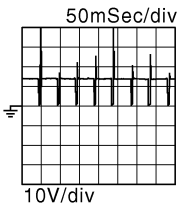
## TERMINAL LAYOUT

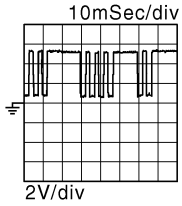
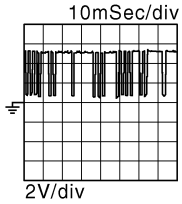
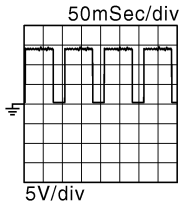


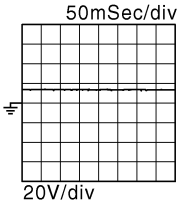
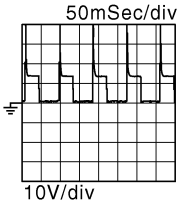
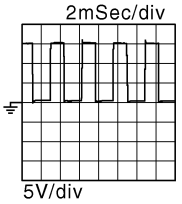

## PHYSICAL VALUES

**NOTE:**
- ECM is located near the battery in the engine room.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.

| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 1 (L/Y) | 121 (B) | Throttle control motor (Open) | Output | [Ignition switch: ON]<br>• Engine stopped<br>• Shift lever: D (CVT), 1st (M/T)<br>• Accelerator pedal: Fully depressed | 0 - 14V★<br>  <br><br>JMBIA0083GB |
| 2 (R) | 121 (B) | Throttle control motor relay power supply | Input | [Ignition switch: ON] | BATTERY VOLTAGE (11 - 14V) |
| 3 (P) | 121 (B) | Throttle control motor (Close) | Output | [Ignition switch: ON]<br>• For 10 second after turning ignition switch ON<br>• Engine stopped<br>• Shift lever: D (CVT), 1st (M/T)<br>• Accelerator pedal: Fully released | 0 - 14V★ |
| 4 (R) | 121 (B) | A/F sensor 1 heater | Output | [Engine is running]<br>• Warm-up condition<br>• Idle speed | 0 - 14V★<br>  <br><br>JMBIA0082GB |
| 5 (B) | — | ECM ground | — | — | — |
| 6 (W) | 121 (B) | Crankshaft position sensor (POS) | Input | [Engine is running]<br>• Warm-up condition<br>• Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle | 1.0 - 4.0V★<br>  <br><br>JMBIA0091GB |
| | | | | [Engine is running]<br>• Engine speed: 2,000 rpm | 1.0 - 4.0V★<br>  <br><br>JMBIA0092GB |

| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 9 (R)<br>10 (SB)<br>28 (W)<br>29 (G) | 121 (B) | Ignition signal No. 3<br>Ignition signal No. 2<br>Ignition signal No. 1<br>Ignition signal No. 4 | Output | [Engine is running]<br>• Warm-up condition<br>• Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle | 0 - 4.0V★<br>  <br><br>JMBIA0085GB |
| | | | | [Engine is running]<br>• Warm-up condition<br>• Engine speed: 2,000 rpm | 0 - 4.0V★<br>  <br><br>JMBIA0086GB |
| 11 (B) | — | Sensor ground [Crankshaft position sensor (POS)] | — | — | — |
| 12 (P) | 121 (B) | Sensor power supply [Crankshaft position sensor (POS)] | — | [Ignition switch: ON] | 5V |
| 15 (L) | 121 (B) | Sensor power supply (Refrigerant pressure sensor) | — | [Ignition switch: ON] | 5V |
| 18 (V) | — | Sensor ground (Refrigerant pressure sensor) | — | — | — |
| 20 (G) | 121 (B) | ECM relay (Self shut-off) | Output | [Engine is running]<br>[Ignition switch: OFF]<br>• A few seconds after turning ignition switch OFF | 0 - 1.5V |
| | | | | [Ignition switch: OFF]<br>• More than a few seconds after turning ignition switch OFF | BATTERY VOLTAGE (11 - 14V) |
| 21 (P)<br>23 (BR)<br>59 (GR)<br>60 (LG) | 121 (B) | Fuel injector No. 4<br>Fuel injector No. 3<br>Fuel injector No. 2<br>Fuel injector No. 1 | Output | [Engine is running]<br>• Warm-up condition<br>• Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle | BATTERY VOLTAGE (11 - 14V)★<br>  <br><br>JMBIA0089GB |
| | | | | [Engine is running]<br>• Warm-up condition<br>• Engine speed: 2,000 rpm | BATTERY VOLTAGE (11 - 14V)★<br>  <br><br>JMBIA0090GB |

| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 22 (LG) | 121 (B) | Throttle control motor relay | Output | [Ignition switch: ON → OFF] | 0 - 1.5V<br>↓<br>BATTERY VOLTAGE (11 - 14V) |
| | | | | [Ignition switch: ON] | 0 - 1.0V |
| 25 (G) | 121 (B) | Camshaft position sensor (PHASE) | Input | [Engine is running]<br>• Warm-up condition<br>• Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle | 1.0 - 4.0★<br>  <br><br>JMBIA0093GB |
| | | | | [Engine is running]<br>• Engine speed is 2,000 rpm | 1.0 - 4.0★<br>  <br><br>JMBIA0094GB |
| 27 (LG) | 121 (B) | PNP switch | Input | [Ignition switch: ON]<br>• Shift lever: P or N (CVT), Neutral (M/T) | BATTERY VOLTAGE (11 - 14V) |
| | | | | [Ignition switch: ON]<br>• Shift lever: Except above | 0V |
| 30 (Y) | — | Sensor ground [Camshaft position sensor (PHASE)] | — | — | — |
| 33 (P) | 121 (B) | Sensor power supply [Camshaft position sensor (PHASE)] | — | [Ignition switch: ON] | 5V |
| 34 (W) | 121 (B) | Sensor power supply (Throttle position sensor) | — | [Ignition switch: ON] | 5V |
| 37 (LG) | 18 (V) | Refrigerant pressure sensor | Input | [Engine is running]<br>• Warm-up condition<br>• Both A/C switch and blower fan motor switch: ON (Compressor operates) | 1.0 - 4.0V |
| 39 (Y) | 121 (B) | Heated oxygen sensor 2 heater | Output | [Engine is running]<br>• After the following conditions are met<br>- Engine: after warming up<br>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load | 0 - 14V★<br>  <br><br>JMBIA0037GB |
| | | | | [Ignition switch: ON]<br>• Engine stopped<br>[Engine is running]<br>• For 2 minutes after starting engine<br>• Idle speed | BATTERY VOLTAGE (11 - 14V) |

| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 42 (Y) | 121 (B) | EVAP canister purge volume control solenoid valve | Output | [Engine is running]<br>• Idle speed | BATTERY VOLTAGE (11 - 14V)★<br>  <br><br>JMBIA0087GB |
| | | | | [Engine is running]<br>• Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.) | BATTERY VOLTAGE (11 - 14V)★<br>  <br><br>JMBIA0088GB |
| 44 (O) | 121 (B) | Knock sensor 2 | — | [Engine is running]<br>• Warm-up condition<br>• Idle speed | 2.4V |
| 46 (L) | — | Sensor ground (Heated oxygen sensor 2) | — | — | — |
| 48 (Y) | — | Sensor ground ( Intake air temperature sensor) | — | — | — |
| 51 (L) | — | Sensor ground (Mass air flow sensor) | — | — | — |
| 52 (R) | — | Sensor ground (Throttle position sensor) | — | — | — |
| 53 (LG) | 121 (B) | A/F sensor 1 | Input | [Engine is running]<br>• Warm-up condition<br>• Engine speed: 2,000 rpm | 1.8V<br>Output voltage varies with air fuel ratio. |
| 54 (Y) | 121 (B) | A/F sensor 1 (bank 1) | Input | [Ignition switch: ON] | 2.2V |
| 56 (O) | — | Sensor ground (Engine coolant temperature sensor) | — | — | — |
| 62 (O) | 121 (B) | Intake valve timing control solenoid valve | Output | [Engine is running]<br>• Warm-up condition<br>• Idle speed | BATTERY VOLTAGE (11 - 14V) |
| | | | | [Engine is running]<br>• Warm-up condition<br>• Engine speed: 2,000rpm | 0 - 14V★<br>  <br><br>JMBIA0095GB |
| 63 (W) | 121 (B) | Knock sensor 1 | Input | [Engine is running]<br>• Idle speed | 2.4V |

| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 65 (P) | 46 (L) | Heated oxygen sensor 2 | Input | [Engine is running]<br>• Revving engine from idle to 3,000 rpm quickly after the following conditions are met<br>- Engine: after warming up<br>- Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load | 0 - 1.0V |
| 67 (W) | 48 (Y) | Intake air temperature sensor | Input | [Engine is running] | 0 - 4.8V<br>Output voltage varies with intake air temperature. |
| 71 (G) | 52 (R) | Throttleposition sensor 1 | Input | [Ignition switch: ON]<br>• Engine stopped<br>• Shift lever: D (CVT), 1st (M/T)<br>• Accelerator pedal: Fully released | More than 0.36V |
| | | | | [Ignition switch: ON]<br>• Engine stopped<br>• Shift lever: D (CVT), 1st (M/T)<br>• Accelerator pedal: Fully depressed | Less than 4.75V |
| 72 (B) | 52 (R) | Throttle position sensor 2 | Input | [Ignition switch: ON]<br>• Engine stopped<br>• Shift lever: D (CVT), 1st (M/T)<br>• Accelerator pedal: Fully released | Less than 4.75V |
| | | | | [Ignition switch: ON]<br>• Engine stopped<br>• Shift lever: D (CVT), 1st (M/T)<br>• Accelerator pedal: Fully depressed | More than 0.36V |
| 73 (P) | 51 (L) | Mass air flow sensor | Input | [Engine is running]<br>• Warm-up condition<br>• Idle speed | 0.9 - 1.1V |
| | | | | [Engine is running]<br>• Warm-up condition<br>• Engine speed: 2,500 rpm | 1.4 - 1.7V |
| 75 (P) | 56 (O) | Engine coolant temperature sensor | Input | [Engine is running] | 0 - 4.8V<br>Output voltage varies with engine coolant temperature. |
| 78 (L) | 121 (B) | Fuel pump relay | Output | [Ignition switch: ON]<br>• For 1 second after turning ignition switch ON<br>[Engine is running] | 0 - 1.5V |
| | | | | [Ignition switch: ON]<br>• More than 1 second after turning ignition switch ON | BATTERY VOLTAGE<br>(11 - 14V) |
| 82 (L) | 121 (B) | CAN communication line | Input/ Output | — | — |
| 84 (R) | 121 (B) | Stop lamp switch | Input | [Ignition switch: OFF]<br>• Brake pedal: Fully released | 0V |
| | | | | [Ignition switch: OFF]<br>• Brake pedal: Slightly depressed | BATTERY VOLTAGE<br>(11 - 14V) |

| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 87 (Y) | 121 (B) | Data link connector | Input/ Output | [Ignition switch: ON]<br>• CONSULT-III or GST: Disconnected | BATTERY VOLTAGE (11 - 14V) |
| 89 (O) | 121 (B) | Power supply for ECM (Back-up) | Input | [Ignition switch: OFF] | BATTERY VOLTAGE (11 - 14V) |
| 90 (P) | 121 (B) | CAN communication line | Input/ Output | — | — |
| 93 (O) | 121 (B) | Ignition switch | Input | [Ignition switch: OFF] | 0V |
| | | | | [Ignition switch: ON] | BATTERY VOLTAGE (11 - 14V) |
| 94 (GR) | 121 (B) | ASCD brake switch | Input | [Ignition switch: ON]<br>• Brake pedal: Slightly depressed (CVT)<br>• Brake pedal or clutch pedal: Slightly depressed (M/T) | 0V |
| | | | | [Ignition switch: ON]<br>• Brake pedal: Fully released (CVT)<br>• Brake pedal and clutch pedal: Fully released (M/T) | BATTERY VOLTAGE (11 - 14V) |
| 98 (B) | — | Sensor ground (Accelerator pedal position sensor 2) | — | — | — |
| 99 (W) | — | Sensor ground (Accelerator pedal position sensor 1) | — | — | — |
| 100 (B) | — | Sensor ground (ASCD steering switch) | — | — | — |
| 105 (V) | 121 (B) | Sensor power supply (Accelerator pedal position sensor 2) | — | [Ignition switch: ON] | 5V |
| 106 (G) | 99 (W) | Accelerator pedal position sensor 2 | Input | [Ignition switch: ON]<br>• Engine stopped<br>• Accelerator pedal: Fully released | 0.3 - 0.6V |
| | | | | [Ignition switch: ON]<br>• Engine stopped<br>• Accelerator pedal: Fully depressed | 1.95 - 2.4V |
| 107 (R) | 98 (B) | Accelerator pedal position sensor 1 | Input | [Ignition switch: ON]<br>• Engine stopped<br>• Accelerator pedal: Fully released | 0.6 - 0.9V |
| | | | | [Ignition switch: ON]<br>• Engine stopped<br>• Accelerator pedal: Fully depressed | 3.9 - 4.7V |

| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 108 (V) | 100 (B) | ASCD steering switch | Input | [Ignition switch: ON]<br>• ASCD steering switch: OFF | 4V |
| | | | | [Ignition switch: ON]<br>• MAIN switch: Pressed | 0V |
| | | | | [Ignition switch: ON]<br>• CANCEL switch: Pressed | 1V |
| | | | | [Ignition switch: ON]<br>• RESUME/ACCELERATE switch: Pressed | 3V |
| | | | | [Ignition switch: ON]<br>• SET/COAST switch: Pressed | 2V |
| 113 (LG) | 121 (B) | Sensor power supply (Accelerator pedal position sensor 1) | — | [Ignition switch: ON] | 5V |
| 115 (R) | 121 (B) | Power supply for ECM | Input | [Ignition switch: ON] | BATTERY VOLTAGE (11 - 14V) |
| 118 (B)<br>119 (B)<br>120 (B)<br>121 (B) | — | ECM ground | — | — | — |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

# M9R

## M9R : Reference Value

INFOID:0000000001529819

### VALUES ON THE DIAGNOSIS TOOL

Remarks:

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.

* Specification data may not be directly related to their components signals/values/operations.

I.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. this IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

| Monitor item | condition | | Values/Status |
|---|---|---|---|
| IGN SW | • Ignition switch: ON → OFF → ON | | PRESENT → ABSENT → PRESENT |
| GLOW CONT | • Engine: Running (Less than 60 seconds after starting engine.) | Engine coolant: Less than 50°C (122°F) | ACTIV |
| | | Engine coolant: More than 80°C (176°F) | INACT |
| CLUTCH STATUS | • Ignition switch: ON | Clutch pedal: Fully released | NO |
| | | Clutch pedal: Slightly depressed | YES |
| A/C RELAY | • Engine: After warming up, idle the engine | Air conditioner switch: OFF | NODON |
| | | Air conditioner switch: ON | DONE |
| ENGINE STATUS | • Ignition switch: ON | | +APC |
| | • Engine: Running (Less than 60 seconds after starting engine.) | | RUN |
| | • Ignition switch: OFF (A few seconds after turning ignition switch OFF) | | OFF |

| Monitor item | condition | | Values/Status |
|---|---|---|---|
| BPP SW | • Ignition switch: ON | Brake pedal: Fully released | RELSD |
| | | Brake pedal: Slightly depressed | PRSSD |
| A/C APPLD | • Engine: After warming up, idle the engine | Air conditioner switch: OFF | NO |
| | | Air conditioner switch: ON | YES |
| GLOW CONT SIGNAL | • Engine: Running (Less than 60 seconds after starting engine.) | Engine coolant: Less than 50°C (122°F) | PRESENT |
| | | Engine coolant: More than 80°C (176°F) | ABSENT |
| COOLING FAN LOW | • Engine: After warming up, idle the engine<br>• Air conditioner switch: OFF | Engine coolant: 99°C (210°F) or less | ACTIV |
| | | Engine coolant: 102°C (216°F) or more | INACT |
| COOLING FAN HIGH | • Engine: After warming up, idle the engine<br>• Air conditioner switch: OFF | Engine coolant: 99°C (210°F) or less | INACT |
| | | Engine coolant: 102°C (216°F) or more | ACTIV |
| ECM-TCM COMM | • Ignition switch: ON | ECM-TCM communication: Communicated | PRESENT |
| | | ECM-TCM communication: Not communicated | ABSENT |
| A/C COMP | • Engine: After warming up, idle the engine | Air conditioner switch: OFF | INACT |
| | | Air conditioner switch: ON | ACTIV |
| NATS CODE RGST | • Ignition switch: ON | NATS code registration: Not registered. | NO |
| | | NATS code registration: Registered. | YES |
| CPP SW | • Ignition switch: ON | Clutch pedal: Fully released | INACT |
| | | Clutch pedal: Slightly depressed | ACTIV |
| EGR BYPAS S/V | • Engine Running | Not warm-up condition | INACT |
| | | Warm-up condition | ACTIV |
| TURBO COOL PUMP | • Engine Running | Engine coolant temperature: Less than 79°C (174°) | INACT |
| | | Engine coolant temperature: More than 80°C (176°) | ACTIV |
| RGN INCMP STAT1 | • Ignition switch: ON | Incomplete condition of DPF regeneration: Ignition switch ON | +APC |
| | | Incomplete condition of DPF regeneration: Engine is running. | RUN |
| | | Incomplete condition of DPF regeneration: During self shut-off | OFF |
| RGN INCMP STAT2 | • Ignition switch: ON | Incomplete condition of DPF regeneration: Ignition switch ON | +APC |
| | | Incomplete condition of DPF regeneration: Engine is running. | RUN |
| | | Incomplete condition of DPF regeneration: During self shut-off | OFF |
| RGN INCMP STAT3 | • Ignition switch: ON | Incomplete condition of DPF regeneration: Ignition switch ON | +APC |
| | | Incomplete condition of DPF regeneration: Engine is running. | RUN |
| | | Incomplete condition of DPF regeneration: During self shut-off | OFF |

| Monitor item | condition | | Values/Status |
|---|---|---|---|
| RGN INCMP STAT4 | • Ignition switch: ON | Incomplete condition of DPF regeneration: Ignition switch ON | +APC |
| | | Incomplete condition of DPF regeneration: Engine is running. | RUN |
| | | Incomplete condition of DPF regeneration: During self shut-off | OFF |
| RGN INCMP STAT5 | • Ignition switch: ON | Incomplete condition of DPF regeneration: Ignition switch ON | +APC |
| | | Incomplete condition of DPF regeneration: Engine is running. | RUN |
| | | Incomplete condition of DPF regeneration: During self shut-off | OFF |
| RGN INCMP STAT6 | • Ignition switch: ON | Incomplete condition of DPF regeneration: Ignition switch ON | +APC |
| | | Incomplete condition of DPF regeneration: Engine is running. | RUN |
| | | Incomplete condition of DPF regeneration: During self shut-off | OFF |
| RGN INCMP STAT7 | • Ignition switch: ON | Incomplete condition of DPF regeneration: Ignition switch ON | +APC |
| | | Incomplete condition of DPF regeneration: Engine is running. | RUN |
| | | Incomplete condition of DPF regeneration: During self shut-off | OFF |
| RGN INCMP STAT8 | • Ignition switch: ON | Incomplete condition of DPF regeneration: Ignition switch ON | +APC |
| | | Incomplete condition of DPF regeneration: Engine is running. | RUN |
| | | Incomplete condition of DPF regeneration: During self shut-off | OFF |
| RGN INCMP STAT9 | • Ignition switch: ON | Incomplete condition of DPF regeneration: Ignition switch ON | +APC |
| | | Incomplete condition of DPF regeneration: Engine is running. | RUN |
| | | Incomplete condition of DPF regeneration: During self shut-off | OFF |
| RGN INCMP STAT10 | • Ignition switch: ON | Incomplete condition of DPF regeneration: Ignition switch ON | +APC |
| | | Incomplete condition of DPF regeneration: Engine is running. | RUN |
| | | Incomplete condition of DPF regeneration: During self shut-off | OFF |
| RGN REQ STAT1 | • Ignition switch: ON | Incomplete condition of DPF regeneration: Engine stopped | STAT1 |
| | | Incomplete condition of DPF regeneration: Engine starting | STAT2 |
| | | Incomplete condition of DPF regeneration: Engine running | STAT3 |
| | | Incomplete condition of DPF regeneration: During self shut-off | STAT4 |

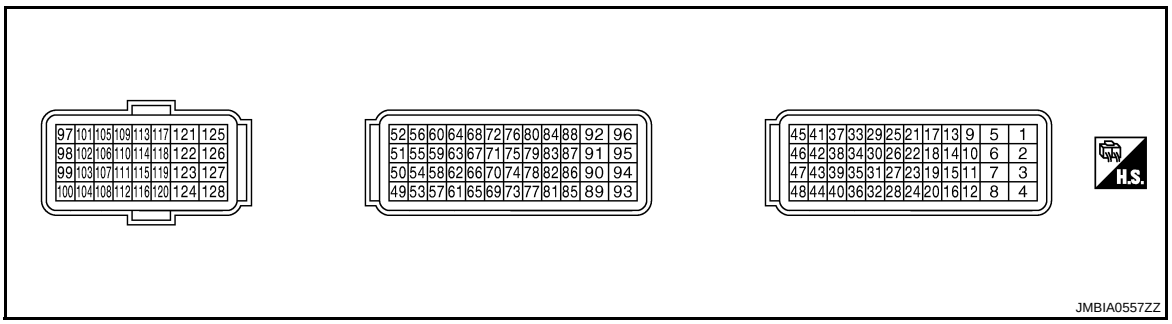
| Monitor item | condition | | Values/Status |
|---|---|---|---|
| RGN REQ STAT2 | • Ignition switch: ON | Incomplete condition of DPF regeneration: Engine stopped | STAT1 |
| | | Incomplete condition of DPF regeneration: Engine starting | STAT2 |
| | | Incomplete condition of DPF regeneration: Engine running | STAT3 |
| | | Incomplete condition of DPF regeneration: During self shut-off | STAT4 |
| RGN REQ STAT3 | • Ignition switch: ON | Incomplete condition of DPF regeneration: Engine stopped | STAT1 |
| | | Incomplete condition of DPF regeneration: Engine starting | STAT2 |
| | | Incomplete condition of DPF regeneration: Engine running | STAT3 |
| | | Incomplete condition of DPF regeneration: During self shut-off | STAT4 |
| RGN REQ STAT4 | • Ignition switch: ON | Incomplete condition of DPF regeneration: Engine stopped | STAT1 |
| | | Incomplete condition of DPF regeneration: Engine starting | STAT2 |
| | | Incomplete condition of DPF regeneration: Engine running | STAT3 |
| | | Incomplete condition of DPF regeneration: During self shut-off | STAT4 |
| RGN REQ STAT5 | • Ignition switch: ON | Incomplete condition of DPF regeneration: Engine stopped | STAT1 |
| | | Incomplete condition of DPF regeneration: Engine starting | STAT2 |
| | | Incomplete condition of DPF regeneration: Engine running | STAT3 |
| | | Incomplete condition of DPF regeneration: During self shut-off | STAT4 |
| RGN REQ STAT6 | • Ignition switch: ON | Incomplete condition of DPF regeneration: Engine stopped | STAT1 |
| | | Incomplete condition of DPF regeneration: Engine starting | STAT2 |
| | | Incomplete condition of DPF regeneration: Engine running | STAT3 |
| | | Incomplete condition of DPF regeneration: During self shut-off | STAT4 |
| RGN REQ STAT7 | • Ignition switch: ON | Incomplete condition of DPF regeneration: Engine stopped | STAT1 |
| | | Incomplete condition of DPF regeneration: Engine starting | STAT2 |
| | | Incomplete condition of DPF regeneration: Engine running | STAT3 |
| | | Incomplete condition of DPF regeneration: During self shut-off | STAT4 |

| Monitor item | condition | | Values/Status |
|---|---|---|---|
| RGN REQ STAT8 | • Ignition switch: ON | Incomplete condition of DPF regeneration: Engine stopped | STAT1 |
| | | Incomplete condition of DPF regeneration: Engine starting | STAT2 |
| | | Incomplete condition of DPF regeneration: Engine running | STAT3 |
| | | Incomplete condition of DPF regeneration: During self shut-off | STAT4 |
| RGN REQ STAT9 | • Ignition switch: ON | Incomplete condition of DPF regeneration: Engine stopped | STAT1 |
| | | Incomplete condition of DPF regeneration: Engine starting | STAT2 |
| | | Incomplete condition of DPF regeneration: Engine running | STAT3 |
| | | Incomplete condition of DPF regeneration: During self shut-off | STAT4 |
| RGN REQ STAT10 | • Ignition switch: ON | Incomplete condition of DPF regeneration: Engine stopped | STAT1 |
| | | Incomplete condition of DPF regeneration: Engine starting | STAT2 |
| | | Incomplete condition of DPF regeneration: Engine running | STAT3 |
| | | Incomplete condition of DPF regeneration: During self shut-off | STAT4 |
| EGR COOL BYPAS/V | • Engine Running | Not warm-up condition | INACT |
| | | Warm-up condition | ACTIV |
| EGR/V TRG ANGLE | • Ignition switch: ON | | Less than 1% |
| | • Engine idle | | Approx. 20 - 30% |
| TRG RAIL PRES | • Engine Running | | Approx. 10 bar |
| TRG BOOST PRES | • Engine Running | Idle speed | ApproxApprox. Atmospheric pressure |
| | | Engine speed: 2000 rpm | Approx. 10 bar (1000 mbar) |
| INJ VOLUME | • Engine Running | Idle speed | Approx. 5 - 10 mg/cp |
| | | Engine speed: 2000 rpm | Approx. 5 - 10 mg/cp |
| ACCEL PDL POS | • Ignition switch: ON | Accelerator pedal: Fully released | 0% |
| | | Accelerator pedal: Fully depressed | 100% |
| BARO PRES | • Ignition switch: ON | | Altitude<br>Approx. 0 m: Approx. 1.0062 bar (100.62 mbar, 1.062kg / $cm^2$, 14.59 psi)<br>Approx. 1,000 m: Approx. 0.8895 bar (88.95 mbar, 0.907kg /$cm^2$, 12.90 psi)<br>Approx. 1,500 m: Approx. 0.8316 bar (93.16 mbar, 0.848 kg /$cm^2$, 12.06 psi)<br>Approx. 2,000 m: Approx. 0.7836 bar (78.36 mbar, 0.799 kg /$cm^2$, 11.36 psi) |
| FUEL RAIL PRES | • Engine Running | | Approx. 9 - 11 bar |

| Monitor item | condition | | Values/Status |
|---|---|---|---|
| TC BOOST PRES | • Engine Running | Idle speed | Approx. Atmospheric pressure |
| | | Engine speed: 2000 rpm | Approx. 10 bar (1000 mbar) |
| EGR VALVE POS | • Engine idle | | Approx. 20 - 90% |
| ENG SPEED | • Run engine and compare CONSULT-III value with the tachometer indication. | | Almost the same speed as the tachometer indication |
| INT AIR TEMP | • Ignition switch: ON | | Indicates intake air temperature |
| EXT AIR TEMP | • Ignition switch: ON | | Indicates external air temperature |
| FUEL TEMP | • Ignition switch: ON | | Indicates fuel temperature |
| ENG COOLAN TEMP | • Ignition switch: ON | | Indicates engine coolant temperature |
| BAT VOLT | • Ignition switch: ON | | 11 - 14V |
| EGR POS/S VOLT | • Engine idle | | Approx. 1 - 4.2V |
| FRP SEN VOLT | • Engine Running | Idle speed | Approx. 1V (1000 mV) |
| | | Engine speed: 2000 rpm | Approx. 1.8V (1800 mV) |
| FUEL TEMP/S VOLT | • Engine Running | | 0.3 - 5.0V (300 - 5000 mV)<br>Output voltage varies with fuel temperature. |
| IAT SEN VOLT | • Engine Running | | 0.3 - 5.0V (300 - 5000 mV)<br>Output voltage varies with intake air temperature. |
| ECT SEN VOLT | • Engine Running | | 0.3 - 5.0V (300 - 5000 mV)<br>Output voltage varies with engine coolant temperature. |
| APP SEN1 VOLT | • Ignition switch: ON | Accelerator pedal: Fully released | 0.6 - 4.6V (600 - 4600 mV) |
| | | Accelerator pedal: Fully depressed | Less than 5V (5000 mV) |
| APP SEN2 VOLT | • Ignition switch: ON | Accelerator pedal: Fully released | More than 0.3V (300 mV) |
| | | Accelerator pedal: Fully depressed | Less than 2.5V (2500 mV) |
| TRG IDLE SPD | • Engine: After warming up, idle the engine | | 750 ± 50 tr/min |
| TC BST PR/S VOLT | • Engine Running | Idle speed | Approx. 1.2V (1200 mV) |
| | | Engine speed: 2000 rpm | Approx. 1.8V (1800 mV) |
| MAF SEN VOLT | • Engine: After warming up<br>• Air conditioner switch: OFF<br>• Shift lever: P or N (A/T), Neutral (M/T)<br>• No load | Ignition switch: ON<br>(Engine stopped) | Approx. 0.4V (400 mV) |
| | | Idle speed | 1.1 - 1.4V (1100 - 1400 mV) |
| | | Engine is revving form idle to about 4,000 rpm | 1.1 - 1.4V (1100 - 1400 mV) to 4.0V (40000 mV)<br>(Check for liner voltage rise in response to engine being increased to about 4,000 rpm.) |
| RFRG PRE/S VOLT | • Engine: After warming up<br>• Both A/C switch and blower fan switch: ON<br>(Compressor operates) | | 1 - 1.25 V (1000 - 1250 mV) |
| INJ1 ADJ VALUE | • Engine Running | Idle speed | Approx. 5- 10 mg/cp |
| | | Engine speed: 2000 rpm | Approx. 5- 10 mg/cp |
| INJ2 ADJ VALUE | • Engine Running | Idle speed | Approx. 5- 10 mg/cp |
| | | Engine speed: 2000 rpm | Approx. 5- 10 mg/cp |
| INJ3 ADJ VALUE | • Engine Running | Idle speed | Approx. 5- 10 mg/cp |
| | | Engine speed: 2000 rpm | Approx. 5- 10 mg/cp |

| Monitor item | condition | | Values/Status |
|---|---|---|---|
| INJ4 ADJ VALUE | • Engine Running | Idle speed | Approx. 5- 10 mg/cp |
| | | Engine speed: 2000 rpm | Approx. 5- 10 mg/cp |
| EXH GAS TEMP2 | • Engine: After warming up<br>• Drive the vehicle at a speed of 120 km/h (75 MPH) for at least 2 minutes | | Approx. 60°C (140°F) - 950°C (1742°F) |
| EXH GAS TEMP3 | • Engine: After warming up<br>• Reving engine from idle up to 3000rpm at least 60 seconds. | | Approx. 230°C (446°F) - 950°C (1742°F) |
| DIFF EXH PRES | • Engine: 2000 rpm | | Approx. 30 mbar |
| ASCD SET SPEED | • Engine Running | ASCD: Operating | Almost the same speed as the tachometer indication. |
| EX GAS PR/S VOLT | • Engine Running | Idle speed | Approx. 1 V (1000 mV) |
| | | Engine speed: 2000 rpm | Approx. 1.4 V (1400 mV) |
| A/T GEAR POS | • Ignition switch: ON | A/T gear position: Neutral | STAT1 |
| | | A/T gear position: 1st gear | STAT1 |
| | | A/T gear position: 2nd gear | STAT2 |
| | | A/T gear position: 3rd gear | STAT3 |
| | | A/T gear position: 4th gear | STAT4 |
| | | A/T gear position: 5th gear | STAT5 |
| | | A/T gear position: 6th gear | STAT6 |
| | | A/T gear position: Reverse gear | BACK |

## TERMINAL LAYOUT



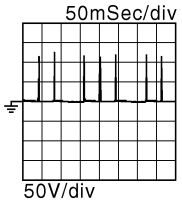
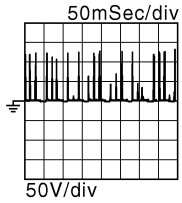
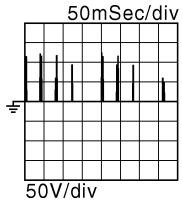
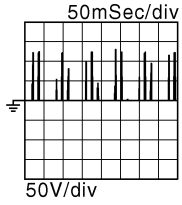
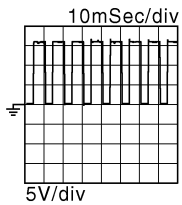

## PHYSICAL VALUES

**NOTE:**

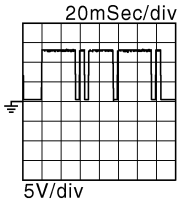
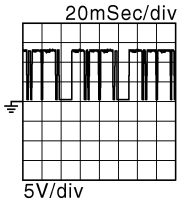
- ECM is located near the battery in the engine room.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT-III.

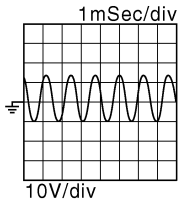
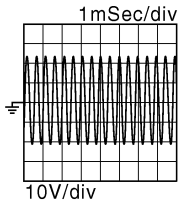
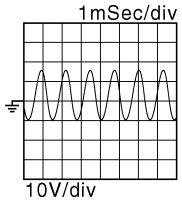
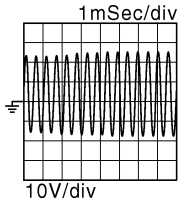
**CAUTION:**

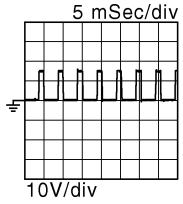
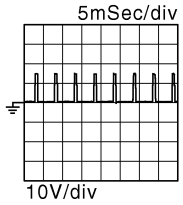
**Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.**

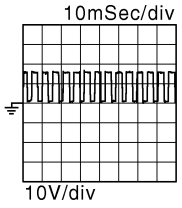
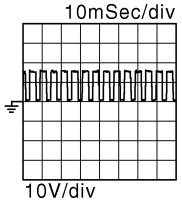
| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 1 (GR) | 128 (B) | Fuel injector No. 4 | Input | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle. | 0 - 5 V★<br>  <br><br>JMBIA0530GB |
| 2 (W) | | Fuel injector No. 1 | | | |
| 3 (Y) | | Fuel injector No. 2 | | **[Engine is running]**<br>• **Warm-up condition**<br>• Engine speed: 2,000 rpm | 5 - 8 V★<br>  <br><br>JMBIA0531GB |
| 4 (G) | | Fuel injector No. 3 | | | |
| 5 (O) | 128 (B) | Fuel injector power supply No. 4 | Output | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle. | 0 - 4 V★<br>  <br><br>JMBIA0532GB |
| 6 (R) | | Fuel injector power supply No. 1 | | | |
| 7 (L) | | Fuel injector power supply No. 2 | | **[Engine is running]**<br>• **Warm-up condition**<br>• Engine speed: 2,000 rpm | 4 - 6 V★<br>  <br><br>JMBIA0533GB |
| 8 (BR) | | Fuel injector power supply No. 3 | | | |
| 9 (B) | 128 (B) | Glow control unit ground | — | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed | 0 V |
| 10 (Y) | — | Sensor ground (Exhaust gas temperature sensor 1) | — | — | — |
| 12 (P) | 128 (B) | Air fuel ratio sensor heater | Output | **[Engine is running]**<br>• After the vehicle is driven for 6 minutes under the following conditions<br>- Warm-up condition<br>- Vehicle speed: 80 km/h<br>- Shift lever: Suitable gear position | 6 - 14 V★<br>  <br><br>JMBIA0534GB |
| | | | | **[Ignition switch ON]**<br>• Engine: Stopped | BATTERY VOLTAGE (11 - 14 V) |
| 14 (SB) | 10 (Y) | Exhaust gas temperature sensor 1 | Input | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed | 0.3 - 5.0 V<br>Output voltage varies with exhaust gas temperature. |

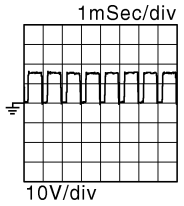
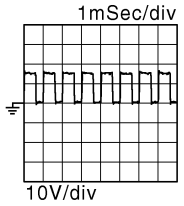
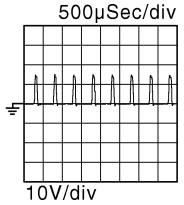
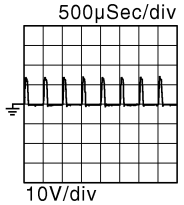
| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 16 (Y) | — | Sensor ground (Exhaust gas pressure sensor) | — | — | — |
| 17 (O) | — | Sensor ground (Turbocharger boost sensor) | — | — | — |
| 18 (LG) | 17 (O) | Turbocharger boost sensor | Input | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed | 1.2 V |
| | | | | **[Engine is running]**<br>• **Warm-up condition**<br>• Engine speed: 2,000 rpm | 1.3 V |
| 19 (G) | 23 (Y) | Exhaust gas temperature sensor 3 | Input | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed | 0.3 - 5.0 V<br>Output voltage varies with exhaust gas temperature. |
| 20 (R) | 25 (O) | Exhaust gas pressure sensor | Input | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed | 1 V |
| | | | | **[Engine is running]**<br>• **Warm-up condition**<br>• Engine speed: 2,000 rpm | 1.4 V |
| 21 (BR) | 17 (O) | Sensor power supply (Turbocharger boost sensor) | — | **[Ignition switch: ON]** | 5 V |
| 22 (W) | — | Sensor ground (Fuel temperature sensor) | — | — | — |
| 23 (Y) | — | Sensor ground (Exhaust gas temperature sensor 3) | — | — | — |
| 24 (O) | — | Sensor ground (Engine coolant temperature sensor) | — | — | — |
| 25 (SB) | 16 (Y) | Sensor power supply (Exhaust gas pressure sensor) | — | **[Ignition switch: ON]** | 5 V |
| 26 (V) | 22 (W) | Fuel temperature sensor | Input | **[Engine is running]**<br>• **Warm-up condition** | 0.3 - 5.0 V<br>Output voltage varies with fuel temperature. |
| 27 (GR) | 39 (L) | Exhaust gas temperature sensor 2 | Input | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed | 0.3 - 5.0 V<br>Output voltage varies with exhaust gas temperature. |
| 28 (P) | 24 (O) | Engine coolant temperature sensor | Input | **[Engine is running]**<br>• **Warm-up condition** | 0.3 - 5.0 V<br>Output voltage varies with engine coolant temperature. |
| 29 (G) | 34 (Y) | Sensor power supply (Fuel rail pressure sensor) | — | **[Ignition switch: ON]** | 5 V |
| 30 (L) | 34 (Y) | Fuel rail pressure sensor | Input | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed | 1 V |
| | | | | **[Engine is running]**<br>• **Warm-up condition**<br>• Engine speed: 2,000 rpm | 1.8 V |

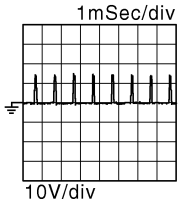
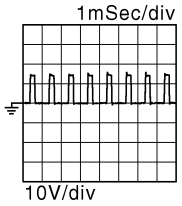
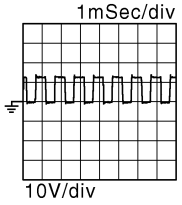
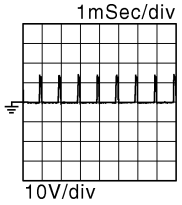
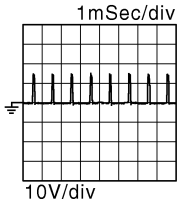
| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 31 (SB) | 35 (V) | Refrigerant pressure sensor | Input | **[Engine is running]**<br>• **Warm-up condition**<br>• Both A/C switch and blower fan switch: ON (Compressor operates) | 1 - 2.5 V |
| 32 (BR) | 36 (R) | EGR volume control valve control position sensor | Input | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed | 1 - 4.2 V |
| 33 (GR) | 36 (R) | Sensor power supply (EGR volume control valve control position sensor) | — | **[Ignition switch: ON]** | 5 V |
| 34 (Y) | — | Sensor ground (Fuel rail pressure sensor) | — | — | — |
| 35 (V) | — | Sensor ground (Refrigerant pressure sensor) | — | — | — |
| 36 (R) | — | Sensor ground (EGR volume control valve control position sensor) | — | — | — |
| 37 (W) | 42 (R) | Sensor power supply (Differential exhaust pressure sensor) | — | **[Ignition switch: ON]** | 5 V |
| 38 (LG) | 42 (R) | Differential exhaust pressure sensor | Input | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed | 1.6 - 4.9 V |
| 39 (L) | — | Sensor ground (Exhaust gas temperature sensor 2) | — | — | — |
| 41 (L) | 35 (V) | Sensor power supply (Refrigerant pressure sensor) | — | **[Ignition switch: ON]** | 5 V |
| 42 (R) | — | Sensor ground (Differential exhaust pressure sensor) | — | — | — |
| 46 (B) | — | Sensor ground (Camshaft position sensor) | — | — | — |
| 48 (Y) | 46 (B) | Camshaft position sensor | Input | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle. | 0 - 14 V★<br>  <br><br>JMBIA0535GB |
| | | | | **[Engine is running]**<br>• **Warm-up condition**<br>• Engine speed: 2,000 rpm | 0 - 14 V★<br>  <br><br>JMBIA0536GB |

| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 49 (L) | 128 (B) | Crankshaft position sensor (+) | Input | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed<br>**NOTE:**<br>The pulse cycle changes depending on rpm at idle. | 0 - 3 V★<br>  <br><br>JMBIA0537GB |
| | | | | **[Engine is running]**<br>• **Warm-up condition**<br>• Engine speed: 2,000 rpm | 2.5 V★<br>  <br><br>JMBIA0538GB |
| 50 (Y) | 128 (B) | Crankshaft position sensor (–) | — | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed | 0 - 4 V★<br>  <br><br>JMBIA0539GB |
| | | | | **[Engine is running]**<br>• **Warm-up condition**<br>• Engine speed: 2,000 rpm | 2.5 V★<br>  <br><br>JMBIA0540GB |
| 53 (GR) | 128 (B) | Glow control unit | Output | **[Engine is running]**<br>• Idle speed<br>• Engine coolant temperature: Less than 50 °C (122 °F) | BATTERY VOLTAGE (11 - 14 V) |
| | | | | **[Engine is running]**<br>• Idle speed<br>• Engine coolant temperature: More than 80 °C (176 °F) | BATTERY VOLTAGE (11 - 14 V) |
| 56 (R) | 128 (B) | Turbocharger cooling pump relay | Output | **[Engine is running]**<br>• **Warm-up condition**<br>(Engine coolant temperature is more than 80 °C)<br>• Idle speed (For 5 minutes) | 0 - 1 V |
| | | | | Except above conditions | BATTERY VOLTAGE (11 - 14 V) |

| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 57 (V) | 128 (B) | Turbocharger boost control solenoid valve | Output | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed | 0 - 5 V★<br>  <br><br>JMBIA0541GB |
| | | | | **[Engine is running]**<br>• **Warm-up condition**<br>• Engine speed: 2,000 rpm | 0 - 5 V★<br>  <br><br>JMBIA0542GB |
| 59 (SB) | 128 (B) | EGR cooler bypass valve control solenoid valve | Output | **[Engine is running]**<br>• **Not warm-up condition**<br>• Idle speed | 1.5 V |
| | | | | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed | BATTERY VOLTAGE (11 - 14 V) |
| 62 (W) | 128 (B) | ECM relay (Self shut-off) | Output | **[Ignition switch: ON]**<br>**[Ignition switch: OFF]**<br>• For 20 seconds after turning ignition switch OFF | 0 - 1 V |
| | | | | **[Ignition switch: OFF]**<br>• More than 20 seconds after turning ignition switch OFF | BATTERY VOLTAGE (11-14 V) |
| 63 (O) | 128 (B) | Glow control unit | Output | **[Engine is running]**<br>• Idle speed<br>• Engine coolant temperature: Less than 50 °C (122 °F) | Less than 12 V |
| | | | | **[Engine is running]**<br>• Idle speed<br>• Engine coolant temperature: More than 80 °C (176 °F) | BATTERY VOLTAGE (11 - 14 V) |
| 75 (BR) | 85 (P) | Sensor power supply (Throttle position sensor) | — | **[Ignition switch: ON]** | 5 V |
| 77 (O) | 128 (B) | Air fuel ratio sensor | Input | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed | 3 V |
| | | | | **[Engine is running]**<br>• **Warm-up condition**<br>• Engine speed: 2,000 rpm | 3 V |
| 78 (GR) | 128 (B) | Air fuel ratio sensor | Input | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed | 2.5 V |
| | | | | **[Engine is running]**<br>• **Warm-up condition**<br>• Engine speed: 2,000 rpm | 2.5 V |

| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 80 (R) | 87 (W) | Mass air flow sensor | Input | **[Ignition switch: ON]**<br>• Engine stopped | 0.4 V |
| | | | | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed | 1.1 - 1.4 V |
| | | | | **[Engine is running]**<br>• **Warm-up condition**<br>• Engine is revving from idle to about 4,000 rpm | 1.1 - 1.4 V to 4.0 V<br>(Check for linear voltage rise in response to engine being increased to about 4,000 rpm.) |
| 81 (SB) | 128 (B) | Air fuel ratio sensor | Input | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed | 3.1 V |
| | | | | **[Engine is running]**<br>• **Warm-up condition**<br>• Engine speed: 2,000 rpm | 3.1 V |
| 82 (V) | 128 (B) | Air fuel ratio sensor | Input | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed | 3.2 V |
| | | | | **[Engine is running]**<br>• **Warm-up condition**<br>• Engine speed: 2,000 rpm | 3.2 V |
| 83 (V) | 85 (P) | Throttle position sensor | Input | **[Ignition switch: OFF]**<br>• For 20 seconds after turning ignition switch OFF | 0 - 5 V<br>Output voltage fluctuates between 0 V and 5 V. |
| | | | | **[Ignition switch: OFF]**<br>• More than 20 seconds after turning ignition switch OFF | 0.7 V |
| 84 (B) | 87 (W) | Intake air temperature sensor | Input | **[Engine is running]**<br>• **Warm-up condition** | 0.3 - 5.0 V<br>Output voltage varies with intake air temperature. |
| 85 (P) | — | Sensor ground (Throttle position sensor) | — | — | — |
| 87 (W) | — | Sensor ground (Mass air flow sensor/ Intake air temperature sensor) | — | — | — |
| 89 (BR) | 128 (B) | Fuel pump | Output | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed | 11 - 14 V★<br>  <br><br>JMBIA0543GB |
| | | | | **[Engine is running]**<br>• **Warm-up condition**<br>• Engine speed: 2,000 rpm | 8 - 10 V★<br>  <br><br>JMBIA0544GB |

| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 90 (GR) | 128 (B) | Fuel rail pressure control valve | Output | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed | 0.4 V★<br>  <br><br>JMBIA0545GB |
| | | | | **[Engine is running]**<br>• **Warm-up condition**<br>• Engine speed: 2,000 rpm | 0.4 V★<br>  <br><br>JMBIA0546GB |
| 91 (SB) | 128 (B) | Throttle control motor (+) | Output | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed | 0 - 2 V★<br>  <br><br>JMBIA0547GB |
| | | | | **[Ignition switch: OFF]**<br>• For 20 seconds after turning ignition switch OFF | 0 - 2 V★<br>  <br><br>JMBIA0548GB |
| | | | | **[Ignition switch: OFF]**<br>• More than 20 seconds after turning ignition switch OFF | 0.1 V |
| 92 (LG) | 128 (B) | Throttle control motor (–) | — | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed | 0 V |
| 93 (G)<br>94 (V) | 128 (B) | Power supply for ECM | — | **[Ignition switch: ON]** | BATTERY VOLTAGE (11 - 14 V) |

| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 95 (P) | 128 (B) | EGR volume control valve (DC motor) | Output | **[Ignition switch: OFF]**<br>• For 20 seconds after the following conditions are met and ignition switch is turned OFF.<br>- Warm-up condition<br>- Start engine and let it idle for 3 minutes. | 0 - 1 V★<br>  <br><br>JMBIA0549GB |
| | | | | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed<br>**NOTE:**<br>The duty cycle changes depending on EGR volume control valve operation. | 0 - 5 V★<br>  <br><br>JMBIA0550GB |
| 96 (O) | 128 (B) | EGR volume control valve (DC motor) | Output | **[Ignition switch: ON]**<br>• For 3 seconds after ignition switch is turned ON | 0 - 1 V★<br>  <br><br>JMBIA0551GB |
| | | | | **[Ignition switch: ON]**<br>• More than 3 seconds after ignition switch is turned ON | 0 - 1 V★<br>  <br><br>JMBIA0552GB |
| | | | | **[Engine is running]**<br>• **Warm-up condition**<br>• Idle speed<br>**NOTE:**<br>The duty cycle changes depending on EGR volume control valve operation. | 0 - 5 V★<br>  <br><br>JMBIA0553GB |
| 99 (P) | — | CAN signal (low) | — | — | — |
| 100 (L) | — | CAN signal (high) | — | — | — |
| 104 (Y) | 128 (B) | Data link connector | — | **[Ignition switch: ON]**<br>• GST: Disconnected | BATTERY VALTAGE (11 - 14 V) |
| 108 (G)*1 (SB)*2 | 128 (B) | Clutch pedal position switch | Input | **[Ignition switch: ON]**<br>• Clutch pedal: Slightly depressed | 0 V |
| | | | | **[Ignition switch: ON]**<br>• Clutch pedal: Fully released | BATTERY VOLTAGE (11 - 14 V) |

| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 109 (LG) | 128 (B) | Ignition switch | Input | **[Ignition switch: OFF]** | 0 V |
| | | | | **[Ignition switch: ON]** | BATTERY VOLATGE (11 - 14 V) |
| 110 (V) | 111 (B) | ASCD steering switch | Input | **[Ignition switch: ON]**<br>• ASCD steering switch: OFF | 4 V |
| | | | | **[Ignition switch: ON]**<br>• MAIN switch: Pressed | 0 V |
| | | | | **[Ignition switch: ON]**<br>• CANCEL switch: Pressed | 1 V |
| | | | | **[Ignition switch: ON]**<br>• RESUME/ACCELERATE switch: Pressed | 3 V |
| | | | | **[Ignition switch: ON]**<br>• SET/COAST switch: Pressed | 2 V |
| 111 (B) | — | ASCD steering switch ground | — | — | — |
| 116 (GR) | 128 (B) | Brake pedal position switch | Input | **[Ignition switch: ON]**<br>• Brake pedal: Slightly depressed | 0V |
| | | | | **[Ignition switch: ON]**<br>• Brake pedal: Fully released | BATTERY VAOLTAGE (11 - 14 V) |
| 118 (L) | 120 (P) | Sensor power supply (Accelerator pedal position sensor 2) | — | **[Ignition switch: ON]** | 5 V |
| 119 (V) | 120 (P) | Accelerator pedal position sensor 2 | Input | **[Ignition switch: ON]**<br>• Engine stopped<br>• Accelerator pedal: Fully released | More than 0.3 V |
| | | | | **[Ignition switch: ON]**<br>• Engine stopped<br>• Accelerator pedal: Fully depressed | Less than 2.5 V |
| 120 (P) | — | Sensor ground (Accelerator pedal position sensor 2) | — | — | — |
| 122 (G) | 127 (Y) | Sensor power supply (Accelerator pedal position sensor 1) | — | **[Ignition switch: ON]** | 5 V |
| 123 (B)<br>124 (B)<br>125 (B) | — | ECM ground | — | — | — |
| 126 (W) | 127 (Y) | Accelerator pedal position sensor 1 | Input | **[Ignition switch: ON]**<br>• Engine stopped<br>• Accelerator pedal: Fully released | 0.6 - 4.6 V |
| | | | | **[Ignition switch ON]**<br>• Engine stopped<br>• Accelerator pedal: Fully depressed | Less than 5 V |
| 127 (Y) | — | Sensor ground (Accelerator pedal position sensor 1) | — | — | — |
| 128 (B) | — | ECM ground | — | — | — |

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

*1: M/T models with ESP

*2: M/T models without ESP

# BCM (BODY CONTROL MODULE)

## Reference Value

INFOID:0000000001298753

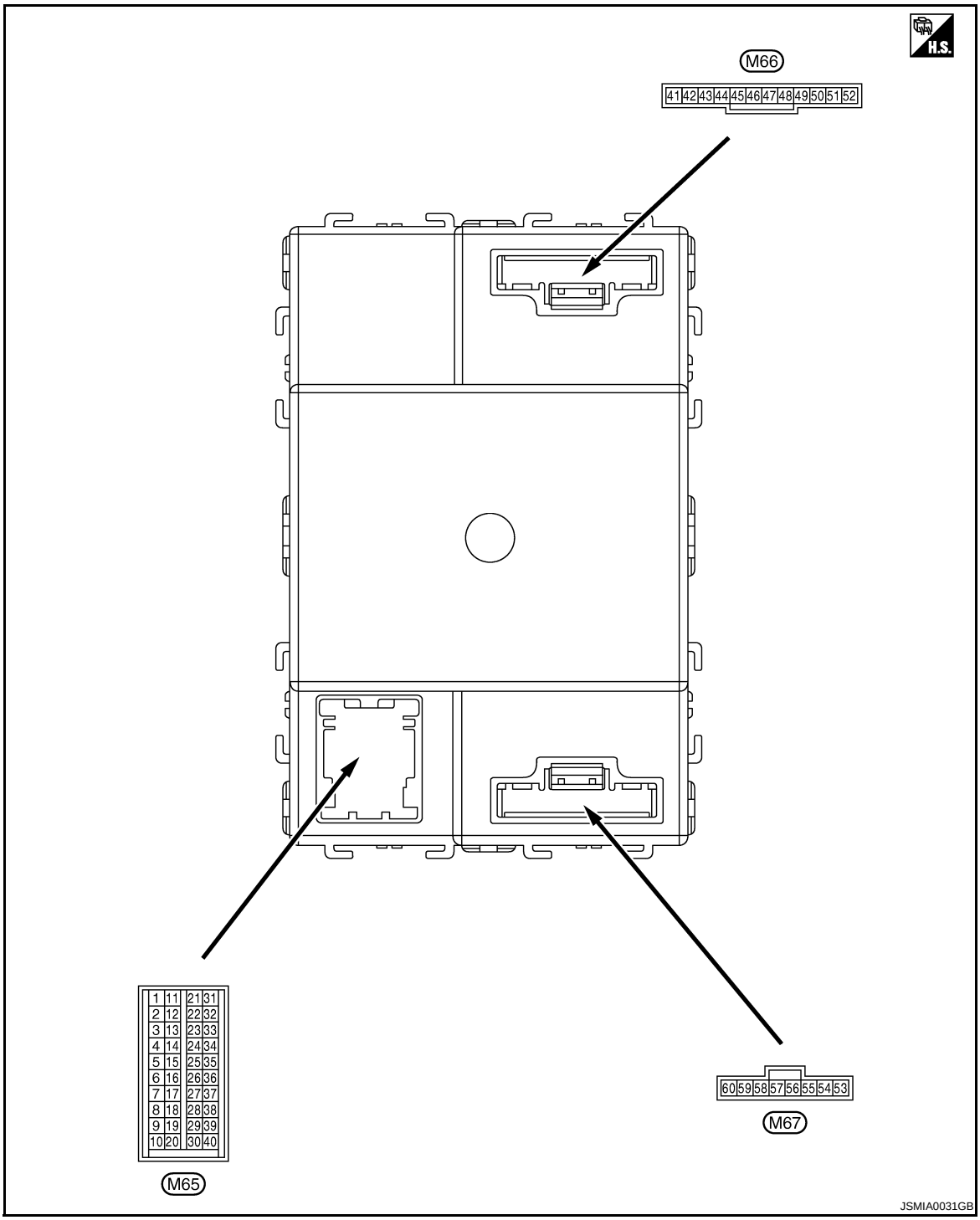
### VALUES ON THE DIAGNOSIS TOOL

| Monitor Item | Condition | Value/Status |
|---|---|---|
| VEHICLE SPEED | While driving | Equivalent to speedometer reading |
| IGN ON SW | Ignition switch OFF or ACC | Off |
| | Ignition switch ON | On |
| KEY ON SW | Mechanical key is removed from key cylinder | Off |
| | Mechanical key is inserted to key cylinder | On |
| CDL LOCK SW | Door lock/unlock switch does not operate | Off |
| | Press door lock/unlock switch to the lock side | On |
| CDL UNLOCK SW | Door lock/unlock switch does not operate | Off |
| | Press door lock/unlock switch to the unlock side | On |
| DOOR SW-DR | Driver's door closed | Off |
| | Driver's door opened | On |
| DOOR SW-AS | Passenger door closed | Off |
| | Passenger door opened | On |
| DOOR SW-RR | Rear RH door closed | Off |
| | Rear RH door opened | On |
| DOOR SW-RL | Rear LH door closed | Off |
| | Rear LH door opened | On |
| BACK DOOR SW | Back door closed | Off |
| | Back door opened | On |
| I-KEY LOCK | “LOCK” button of Intelligent Key or door request switch are not pressed | Off |
| | “LOCK” button of Intelligent Key or door request switch are pressed | On |
| I-KEY UNLOCK | “UNLOCK” button of Intelligent Key or door request switch are not pressed | Off |
| | “UNLOCK” button of Intelligent Key or door request switch are pressed | On |
| PUSH SW | Return to ignition switch to “LOCK” position | Off |
| | Press ignition switch | On |
| KEYLESS LOCK | “LOCK” button of key fob is not pressed | Off |
| | “LOCK” button of key fob is pressed | On |
| KEYLESS UNLOCK | “UNLOCK” button of key fob is not pressed | Off |
| | “UNLOCK” button of key fob is pressed | On |
| SHOCK SENSOR | Ignition switch ON | NOMAL |
| | After the reception of air bag deployment signal from air bag diagnosis sensor unit | Off |
| | During the reception of air bag deployment signal from air bag diagnosis sensor unit | On |
| UNLOCK SHOCK | Other than the following | Off |
| | During the unlock operation interlocked with air bag | On |
| UNLOCK WITH DR | **NOTE:** The item is indicated, but not monitored | On |
| | | Off |

| Monitor Item | Condition | Value/Status |
|---|---|---|
| LOCK WITH SPEED | Vehicle speed sensing auto door lock function does not operate | Off |
| | Vehicle speed sensing auto door lock function is operating | On |
| ACC ON SW | Ignition switch OFF | Off |
| | Ignition switch ACC or ON | On |
| REAR DEF SW | Rear window defogger switch OFF | Off |
| | Rear window defogger switch ON | On |
| TAIL LAMP SW | Lighting switch OFF | Off |
| | Lighting switch 1ST | On |
| TURN SIGNAL R | Turn signal switch OFF | Off |
| | Turn signal switch RH | On |
| TURN SIGNAL L | Turn signal switch OFF | Off |
| | Turn signal switch LH | On |
| HI BEAM SW | Lighting switch OFF | Off |
| | Lighting switch HI | On |
| HEAD LAMP SW 1 | Lighting switch OFF | Off |
| | Lighting switch 2ND | On |
| HEAD LAMP SW 2 | Lighting switch OFF | Off |
| | Lighting switch 2ND | On |
| PASSING SW | Other than lighting switch PASS | Off |
| | Lighting switch PASS | On |
| AUTO LIGHT SW | Lighting switch OFF | Off |
| | Lighting switch AUTO | On |
| FR FOG SW | Front fog lamp switch OFF | Off |
| | Front fog lamp switch ON | On |
| RR FOG SW | Rear fog lamp switch OFF | Off |
| | Rear fog lamp switch ON | On |
| ENGINE RUN | Engine stopped | Off |
| | Engine running | On |
| LIT-SEN FAIL | Light & rain sensor is in normal condition | OK |
| | Light & rain sensor is with error | NOTOK |
| AUT LIGHT SYS | Outside of the room is dark | On |
| | Outside of the room is bright | Off |
| HD LIGHT TIME | — | Displays a setting time of the follow me home function set by the work support |
| IGN SW CAN | Ignition switch OFF or ACC | Off |
| | Ignition switch ON | On |
| FR WIPER HI | Front wiper switch OFF | Off |
| | Front wiper switch HI | On |
| FR WIPER LOW | Front wiper switch OFF | Off |
| | Front wiper switch LO | On |
| FR WIPER INT | Front wiper switch OFF | Off |
| | Front wiper switch INT | On |
| FR WASHER SW | Front washer switch OFF | Off |
| | Front washer switch ON | On |

| Monitor Item | Condition | Value/Status |
|---|---|---|
| INT VOLUME | Wiper intermittent dial is in a dial position 1 - 7 | 1 - 7 |
| FR WIPER STOP | Any position other than front wiper stop position | Off |
| | Front wiper stop position | On |
| RR WIPER ON | Rear wiper switch OFF | Off |
| | Rear wiper switch ON | On |
| RR WIPER INT | Rear wiper switch OFF | Off |
| | Rear wiper switch INT | On |
| RR WIPER STOP | Rear wiper stop position | Off |
| | Other than rear wiper stop position | On |
| RR WASHER SW | Rear washer switch OFF | Off |
| | Rear washer switch ON | On |
| REVERSE SW CAN | **NOTE:**<br>The item is indicated, but not monitored | Off |
| | | On |
| H/L WASH SW | When headlamp washer switch is not pressed | Off |
| | When headlamp washer switch is pressed | On |
| FAN ON SIG | Blower fan motor switch OFF | Off |
| | Blower fan motor switch ON (other than OFF) | On |
| AIR COND SW | Compressor ON is not requested from auto amp.<br>(A/C indicator OFF, blower fan motor switch OFF or etc.) | Off |
| | Compressor ON is requested from auto amp.<br>(A/C indicator ON and blower fan motor switch ON). | On |
| HAZARD SW | Hazard switch OFF | Off |
| | Hazard switch ON | On |
| BRAKE SW | Brake pedal is not depressed | Off |
| | Brake pedal is depressed | On |
| TRNK OPNR SW | When back door opener switch is not pressed | Off |
| | When back door opener switch is pressed | On |
| HOOD SW | Close the hood<br>**NOTE:**<br>Vehicles without theft warning system are OFF-fixed | Off |
| | Open the hood | On |
| AUTO RELOCK | Auto lock function does not operate | Off |
| | Auto lock function is operating | On |
| GLS BREAK SEN | The vehicle without glass break sensor | Off |
| | The vehicle with glass break sensor | On |
| OIL PRESS SW | • Ignition switch OFF or ACC<br>• Engine running | Off |
| | Ignition switch ON | On |

TERMINAL LAYOUT

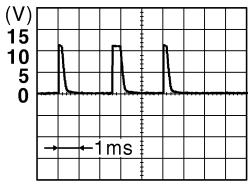
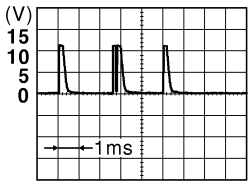
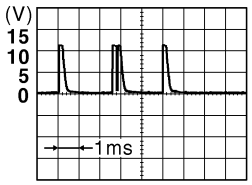
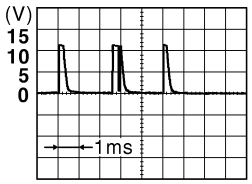
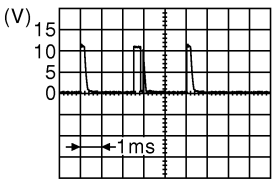


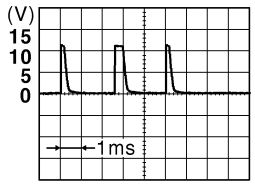
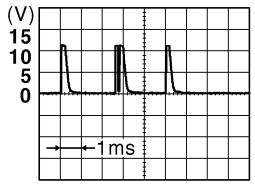
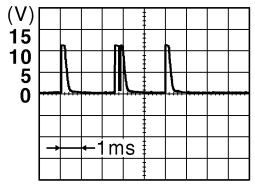
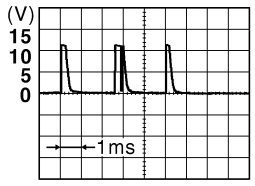
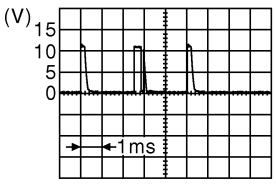

PHYSICAL VALUES

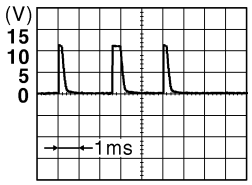
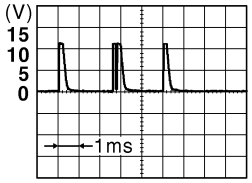
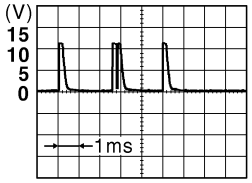
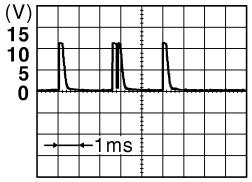
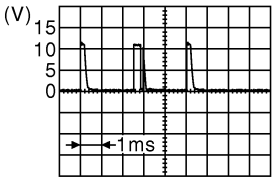
**CAUTION:**

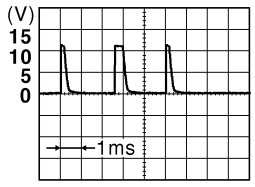
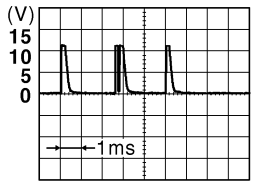
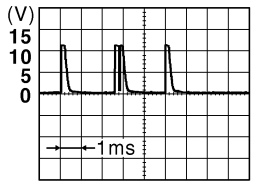
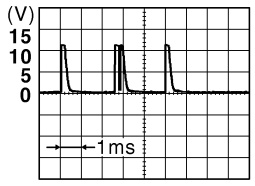
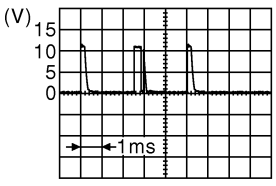
- **Check combination switch system terminal waveform under the loaded condition with lighting switch, turn signal switch and wiper switch OFF is not to be fluctuated by being overloaded.**
- **Turn wiper intermittent dial position to 4 except when checking waveform or voltage of wiper intermittent dial position. Wiper intermittent dial position can be confirmed on CONSULT-III. Refer to BCS-28, "COMB SW : CONSULT-III Function (BCM - COMB SW)".**
- **BCM reads the status of the combination switch at 10 ms internal normally. Refer to BCS-9, "System Description".**

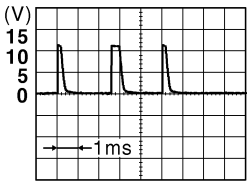
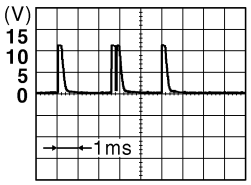
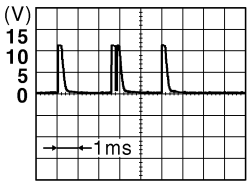
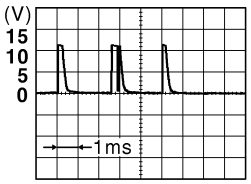
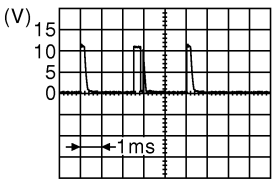
| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| | | Signal name | Input/ Output | | |
| + | – | | | | |
| 1 (W) | Ground | NATS antenna amp. | Input/ Output | Insert mechanical key into ignition key cylinder | Just after Insert mechanical key into ignition key cylinder. Pointer of tester should move |
| 2 (G) | Ground | NATS antenna amp. | Input/ Output | Insert mechanical key into ignition key cylinder | Just after Insert mechanical key into ignition key cylinder. Pointer of tester should move |
| 3 (W) | Ground | Ignition power supply | Input | Ignition switch OFF or ACC | 0 V |
| | | | | Ignition switch ON or START | Battery voltage |
| 4 (SB) | Ground | ACC power supply | Input | Ignition switch OFF | 0 V |
| | | | | Ignition switch ON or ACC | Battery voltage |
| 5 (LG)*1 (R)*2 | Ground | Key switch | Input | Insert mechanical key into ignition key cylinder | Battery voltage |
| | | | | Remove mechanical key from ignition key cylinder | 0 V |

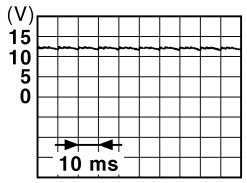
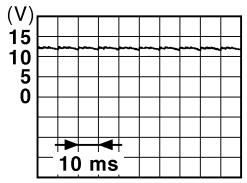
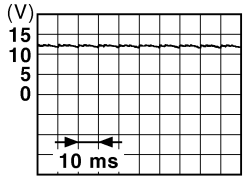
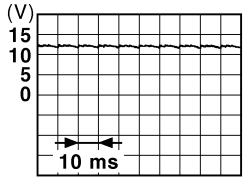
| Terminal No. (Wire color) | | Description | | Condition | | Value (Approx.) |
|---|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | | |
| 6 (L) | Ground | Combination switch INPUT 3 | Input | Combination switch | All switch OFF (Wiper intermittent dial 4) |  JPMIA0165GB 1.4 V |
| | | | | | Lighting switch HI (Wiper intermittent dial 4) |  JPMIA0166GB 1.3 V |
| | | | | | Lighting switch 2ND (Wiper intermittent dial 4) |  JPMIA0167GB 1.3 V |
| | | | | | Rear washer switch ON |  JPMIA0169GB 1.3 V |
| | | | | | Any of the condition below with all switch OFF<br>• Wiper intermittent dial 1<br>• Wiper intermittent dial 2<br>• Wiper intermittent dial 3 |  JPMIA0196GB 1.3 V |

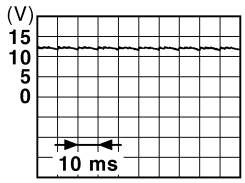
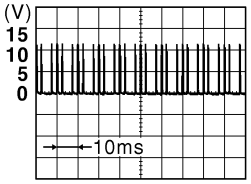
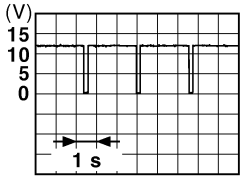
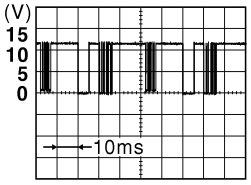
| Terminal No. (Wire color) | | Description | | Condition | | Value (Approx.) |
|---|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | | |
| 7 (GR) | Ground | Combination switch INPUT 4 | Input | Combination switch | All switch OFF (Wiper intermittent dial 4) |  JPMIA0165GB 1.4 V |
| | | | | | Lighting switch 1ST (Wiper intermittent dial 4) |  JPMIA0166GB 1.3 V |
| | | | | | Lighting switch AUTO (Wiper intermittent dial 4) |  JPMIA0168GB 1.3 V |
| | | | | | Any of the condition below with all switch OFF<br>• Wiper intermittent dial 1<br>• Wiper intermittent dial 6 |  JPMIA0169GB 1.3 V |
| | | | | | Rear wiper INT (Wiper intermittent dial 4) |  JPMIA0196GB 1.3 V |

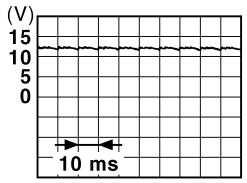
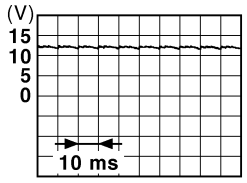
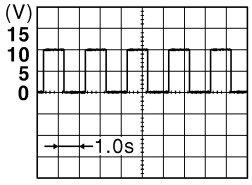
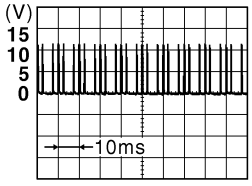
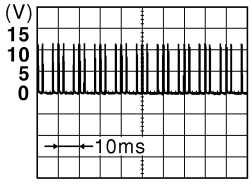
| Terminal No. (Wire color) | | Description | | Condition | | Value (Approx.) |
|---|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | | |
| 8 (V) | Ground | Combination switch INPUT 1 | Input | Combination switch (Wiper intermittent dial 4) | All switch OFF |  JPMIA0165GB 1.4 V |
| | | | | | Turn signal switch RH |  JPMIA0166GB 1.3 V |
| | | | | | Turn signal switch LH |  JPMIA0167GB 1.3 V |
| | | | | | Front wiper switch LO |  JPMIA0168GB 1.3 V |
| | | | | | Front washer switch ON |  JPMIA0196GB 1.3 V |

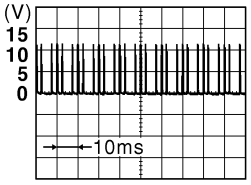
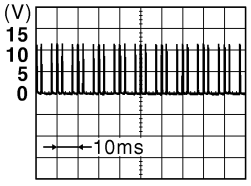
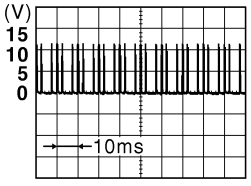
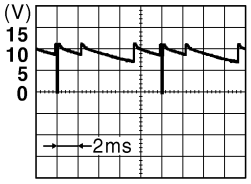
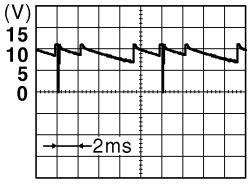
| Terminal No. (Wire color) | | Description | | Condition | | Value (Approx.) |
|---|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | | |
| 9 (G)*3 (B)*4 | Ground | Combination switch INPUT 2 | Input | Combination switch (Wiper intermittent dial 4) | All switch OFF |  JPMIA0165GB 1.4 V |
| | | | | | Lighting switch 2ND |  JPMIA0166GB 1.3 V |
| | | | | | Lighting switch PASS |  JPMIA0167GB 1.3 V |
| | | | | | Front wiper switch INT |  JPMIA0168GB 1.3 V |
| | | | | | Front wiper switch HI |  JPMIA0196GB 1.3 V |

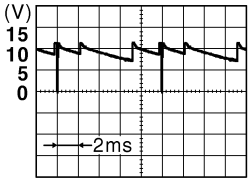
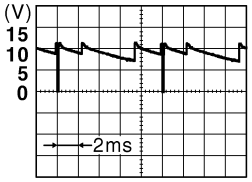
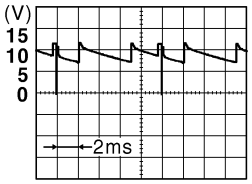
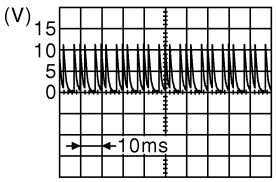
| Terminal No. (Wire color) | | Description | | Condition | | Value (Approx.) |
|---|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | | |
| 10 (BR) | Ground | Combination switch INPUT 5 | Input | Combination switch | All switch OFF (Wiper intermittent dial 4) |  JPMIA0165GB 1.3 V |
| | | | | | Front fog lamp switch ON (Wiper intermittent dial 4) |  JPMIA0167GB 1.3 V |
| | | | | | Rear fog lamp switch ON (Wiper intermittent dial 4) |  JPMIA0168GB 1.3 V |
| | | | | | Rear wiper switch ON (Wiper intermittent dial 4) |  JPMIA0169GB 1.3 V |
| | | | | | Any of the condition below with all switch OFF<br>• Wiper intermittent dial 1<br>• Wiper intermittent dial 2<br>• Wiper intermittent dial 6<br>• Wiper intermittent dial 7 |  JPMIA0196GB 1.3 V |
| 11 (B) | Ground | Audio link | Input/ Output | — | — | — |

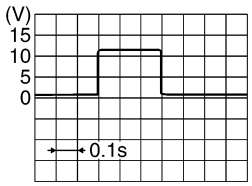
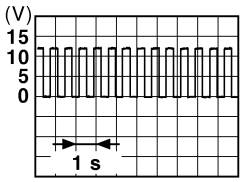
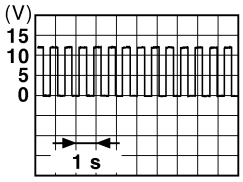
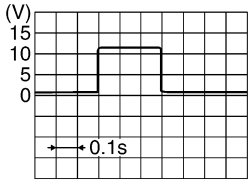
| Terminal No. (Wire color) | | Description | | Condition | | Value (Approx.) |
|---|---|---|---|---|---|---|
| | | Signal name | Input/ Output | | | |
| + | – | | | | | |
| 12 (LG) | Ground | Rear door switch RH | Input | Rear door switch RH | OFF (When rear door RH closed) |  PKID0924E 11.2 V |
| | | | | | ON (When rear door RH opened) | 0 V |
| 13 (V) | Ground | Back door switch | Input | Back door switch | OFF (When back door closed) |  PKID0924E 11.2 V |
| | | | | | ON (When back door opened) | 0 V |
| 14 (P)*3 (BR)*4 | Ground | Passenger door switch | Input | Passenger door switch | OFF (When passenger door closed) |  PKID0924E 11.2 V |
| | | | | | ON (When passenger door opened) | 0 V |
| 15 (BR)*3 (P)*4 | Ground | Driver door switch | Input | Driver door switch | OFF (When driver door closed) |  PKID0924E 11.2 V |
| | | | | | ON (When driver door opened) | 0 V |

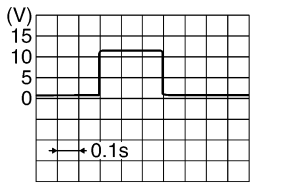
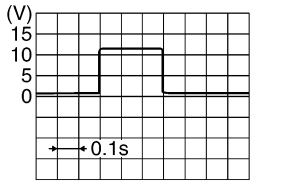
| Terminal No. (Wire color) | | Description | | Condition | | Value (Approx.) |
|---|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | | |
| 16 (GR) | Ground | Rear door switch LH | Input | Rear door switch LH | OFF (When rear door LH closed) |  PKID0924E<br>11.2 V |
| | | | | | ON (When rear door LH opened) | 0 V |
| 17 (L) | Ground | Door lock status indicator | Output | Door lock status indicator | ON | 12 V |
| | | | | | OFF | 0 V |
| 20 (SB) | Ground | Rear window defogger switch | Input | Rear window defogger switch | Not pressed |  JPMIA0154GB<br>1.1 V |
| | | | | | While pressing | 0 V |
| 21 (P) | — | CAN-L | Input/ Output | — | | — |
| 22 (L) | — | CAN-H | Input/ Output | — | | — |
| 23 (V) | Ground | Security indicator | Output | Security indicator | ON | 0 V |
| | | | | | Blinking |  JPMIA0014GB<br>10.3 V |
| | | | | | OFF | 12 V |
| 24 (GR) | Ground | Light & rain sensor serial link | Input/ Output | Ignition switch OFF or ACC | | 12 V |
| | | | | Ignition switch ON | |  JPMIA0156GB<br>8.7 V |
| 25 (G) | Ground | Alarm link | Output | — | | — |

| Terminal No. (Wire color) | | Description | | Condition | | Value (Approx.) |
|---|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | | |
| 26 (GR)*5 (LG)*6 | Ground | Blower fan motor switch | Input | Blower fan motor switch | OFF |  PKID0924E 11.2 V |
| | | | | | ON (other than OFF) | 0 V |
| 27 (P)*5 (Y)*6 | Ground | A/C switch | Input | Ignition switch ON | Compressor ON is not requested from auto amp. (A/C indicator OFF, blower fan motor switch OFF or etc.) |  PKID0924E 11.2 V |
| | | | | | Compressor ON is requested from auto amp. (A/C indicator ON and blower fan motor switch ON). | 0 V |
| 28 (LG)*7 (R)*8 | Ground | Shock detect sensor | Input | Ignition switch OFF or ACC | | 0 V |
| | | | | Ignition switch ON | |  JPMIA0155GB 6.0 V |
| 29 (LG)*3 (O)*4 | Ground | Back door opener switch | Input | Back door opener switch | Not pressed |  JPMIA0154GB 1.2 V |
| | | | | | Pressed | 0 V |
| 32 (BR) | Ground | Door lock/unlock switch (Unlock) | Input | Door lock/unlock switch | Not pressed |  JPMIA0154GB 1.2 V |
| | | | | | Pressed to the unlock side | 0 V |

| Terminal No. (Wire color) | | Description | | Condition | | Value (Approx.) |
|---|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | | |
| 33 (W)*9 (Y)*10 | Ground | Hazard switch | Input | Hazard switch | OFF |  JPMIA0154GB 1.3 V |
| | | | | | ON | 0 V |
| 34 (SB)*3 (P)*4 | Ground | Door lock/unlock switch (Lock) | Input | Door lock/un-lock switch | Not pressed |  JPMIA0154GB 1.2 V |
| | | | | | Pressed to the lock side | 0 V |
| 35 (G) | Ground | Headlamp washer switch | Input | Headlamp washer switch | Not pressed |  JPMIA0154GB 1.2 V |
| | | | | | Pressed to the lock side | 0 V |
| 36 (G) | Ground | Combination switch OUTPUT 5 | Output | Combination switch (Wiper intermit-tent dial 4) | All switch OFF | 0 V |
| | | | | | Turn signal switch RH |  JPMIA0164GB 9.1 V |
| | | | | | Lighting switch 2ND | |
| | | | | | Lighting switch HI | |
| | | | | | Lighting switch 1ST | |
| 37 (R) | Ground | Combination switch OUTPUT 2 | Output | Combination switch | All switch OFF (Wiper intermittent dial 4) | 0 V |
| | | | | | Front washer switch ON (Wiper intermittent dial 4) |  JPMIA0161GB 9.1 V |
| | | | | | Rear washer switch ON (Wiper intermittent dial 4) | |
| | | | | | Any of the condition below with all switch OFF<br>• Wiper intermittent dial 1<br>• Wiper intermittent dial 5<br>• Wiper intermittent dial 6 | |
| | | | | | Rear wiper switch ON (Wiper intermittent dial 4) | |

| Terminal No. (Wire color) | | Description | | Condition | | Value (Approx.) |
|---|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | | |
| 38 (W) | Ground | Combination switch OUTPUT 3 | Output | Combination switch (Wiper intermittent dial 4) | All switch OFF | 0 V |
| | | | | | Front wiper switch LO |  JPMIA0162GB 9.3 V |
| | | | | | Front wiper switch MIST | |
| | | | | | Front wiper switch INT | |
| | | | | | Lighting switch AUTO | |
| | | | | | Rear fog lamp switch ON | |
| 39 (Y) | Ground | Combination switch OUTPUT 4 | Output | Combination switch (Wiper intermittent dial 4) | All switch OFF | 0 V |
| | | | | | Turn signal switch LH |  JPMIA0163GB 9.3 V |
| | | | | | Lighting switch PASS | |
| | | | | | Lighting switch 2ND | |
| | | | | | Front fog lamp switch ON | |
| 40 (P) | Ground | Combination switch OUTPUT 1 | Output | Combination switch | All switch OFF (Wiper intermittent dial 4) | 0 V |
| | | | | | Front wiper switch HI (Wiper intermittent dial 4) |  JPMIA0160GB 9.1 V |
| | | | | | Any of the condition below with all switch OFF<br>• Wiper intermittent dial 1<br>• Wiper intermittent dial 2<br>• Wiper intermittent dial 3<br>• Wiper intermittent dial 6<br>• Wiper intermittent dial 7 | |
| | | | | | Rear wiper switch INT (Wiper intermittent dial 4) | |
| 41 (LG) | Ground | Battery power supply | Input | Ignition switch OFF | | Battery voltage |
| 42 (V) | Ground | Interior room lamp power supply | Output | Interior room lamp battery saver activation | | 0 V |
| | | | | Interior room lamp battery saver no activation | | 12 V |
| 43 (SB) | Ground | Rear wiper motor | Output | Rear wiper switch OFF | | 0 V |
| | | | | Rear wiper switch ON | | 12 V |
| 44 (B) | Ground | Rear wiper auto stop | Input | Ignition switch ON | Rear wiper stop position |  JPMIA0197GB |
| | | | | | Any position other than rear wiper stop position | 0 V |

| Terminal No. (Wire color) | | Description | | Condition | | Value (Approx.) |
|---|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | | |
| 45 (V) | Ground | Back door lock actuator | Output | Back door opener switch | Pressed |  SKIA9232E |
| | | | | | Not pressed | 0 V |
| 47 (BR) | Ground | Turn signal LH | Output | Ignition switch ON | Turn signal switch OFF | 0 V |
| | | | | | Turn signal switch LH |  PKID0926E<br>6.5 V |
| 48 (GR) | Ground | Turn signal RH | Output | Ignition switch ON | Turn signal switch OFF | 0 V |
| | | | | | Turn signal switch RH |  PKID0926E<br>6.5 V |
| 49 (Y) | Ground | Rear fog lamp | Output | Rear fog lamp | OFF | 0 V |
| | | | | | ON | 12 V |
| 50 (G) | Ground | Unlock sensor | Input | Driver's door | Unlock | 5 V |
| | | | | | lock | 0 V |
| 51 (R) | Ground | Stop lamp switch | Input | Depress the brake pedal | | Battery voltage |
| | | | | Release the brake pedal | | 0 V |
| 52 (R) | Ground | Room lamp timer control | Output | Interior room lamp | OFF | 12 V |
| | | | | | ON | 0 V |
| 53 (L) | Ground | Power window power supply (IGN) | Output | Ignition switch | OFF or ACC | 0 V |
| | | | | | ON | 12 V |
| 54 (O) | Ground | Door unlock (All other than driver's door) | Output | Door lock/unlock switch | Pressed to the unlock side |  SKIA9232E |
| | | | | | Not pressed | 0 V |
| 55 (B) | Ground | Ground | — | Ignition switch ON | | 0 V |

| Terminal No. (Wire color) | | Description | | Condition | | Value (Approx.) |
|---|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | | |
| 56 (V) | Ground | Door lock (All) and fuel lid lock | Output | Door lock/unlock switch | Not pressed | 0 V |
| | | | | | Pressed to the lock side |  SKIA9232E |
| 57 (Y) | Ground | Battery power supply | Input | Ignition switch OFF | | Battery voltage |
| 58 (P) | Ground | Power window power supply (BAT) | Output | Ignition switch OFF | | 12 V |
| 59 (R) | Ground | Super lock | Output | When lock button of key fob or Intelligent Key is not pressed | | 0 V |
| | | | | When lock button of key fob or Intelligent Key is pressed | | 12 V |
| 60 (G) | Ground | Driver's door unlock and fuel lid unlock | Output | Door lock/unlock switch | Pressed to the unlock side |  SKIA9232E |
| | | | | | Not pressed | 0 V |

*1: With Intelligent Key
*2: Without Intelligent Key
*3: RHD models
*4: LHD models
*5: With gasoline engine
*6: With diesel engine
*7: RHD models with side air bag
*8: LHD models with side air bag
*9: With xenon headlamp and daytime light system
*10: Except with xenon headlamp and daytime light system

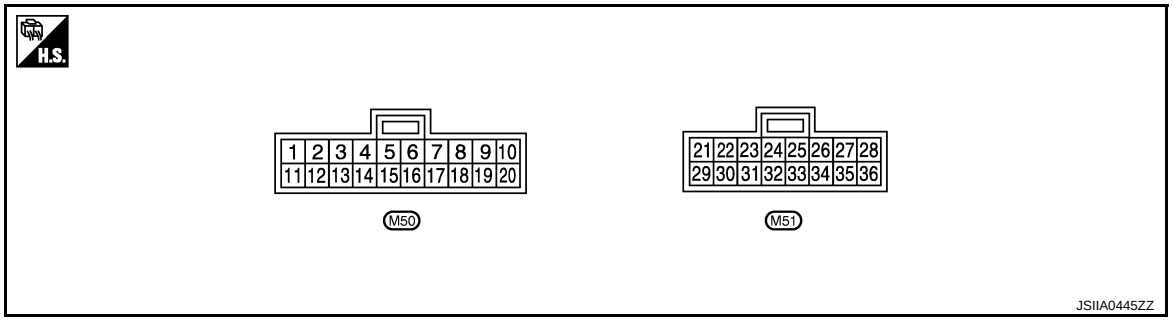
# AUTO AMP.

## MR20DE/QR25DE

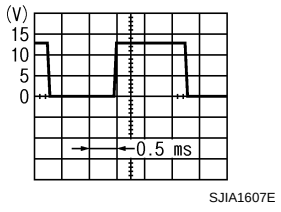
### MR20DE/QR25DE : Reference Value

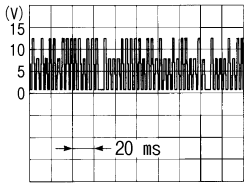
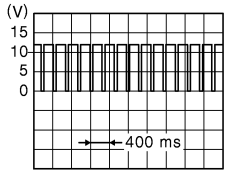
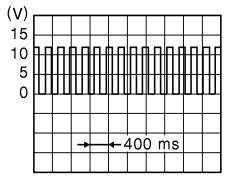
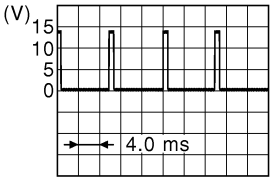
INFOID:0000000001162206

TERMINAL LAYOUT




PHYSICAL VALUES

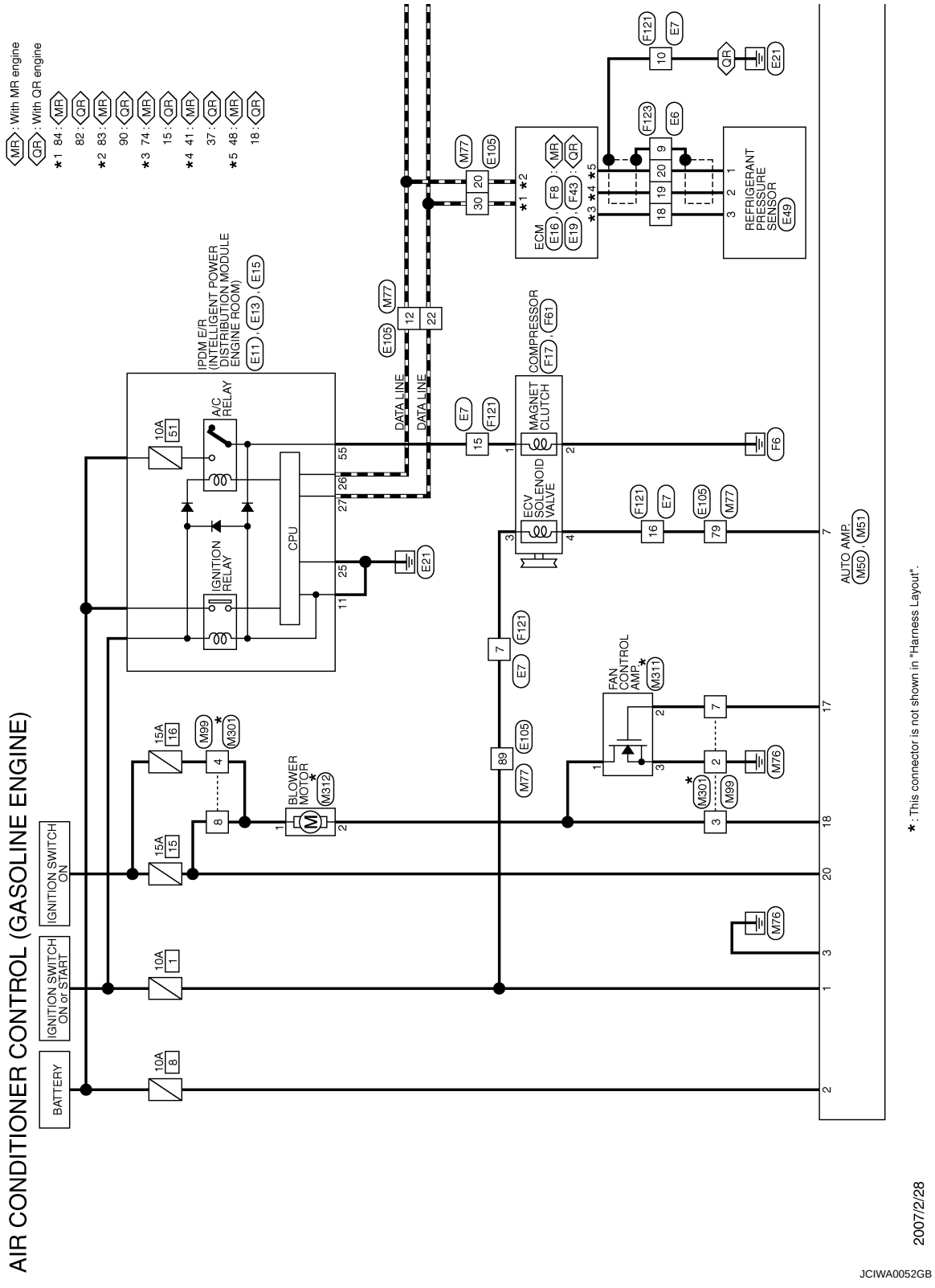
| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 1 (W) | Ground | Power supply for IGN | — | Ignition switch ON | Battery voltage |
| 2 (Y) | Ground | Power supply for BATT | — | Ignition switch OFF | Battery voltage |
| 3 (B) | Ground | Ground | — | Ignition switch ON | 0 V |
| 4 (P) | Ground | A/C (Compressor ON) signal | Output | Compressor OFF | 12 V |
| | | | | Compressor ON | 0 V |
| 5 (W) | Ground | Power supply for each door motor | — | Ignition switch ON | Battery voltage |
| 7 (GR) | Ground | ECV (Electrical Control Valve) | Input | • Ignition switch ON<br>• Self-diagnosis: STEP4 (Code No.45) |  SJIA1607E |
| 8 (LG) | Ground | In-vehicle sensor | Input | — | — |
| 9 (BR) | Ground | OAT sensor | Input | — | — |
| 10 (Y) | Ground | Sunload sensor | Input | — | — |
| 11 (B) | Ground | Illumination ground | — | Light switch ON | 0 V |
| 12 (GR) | Ground | Power supply for illumination | — | Light switch OFF | 0 V |
| | | | | Light switch ON | 12 V |

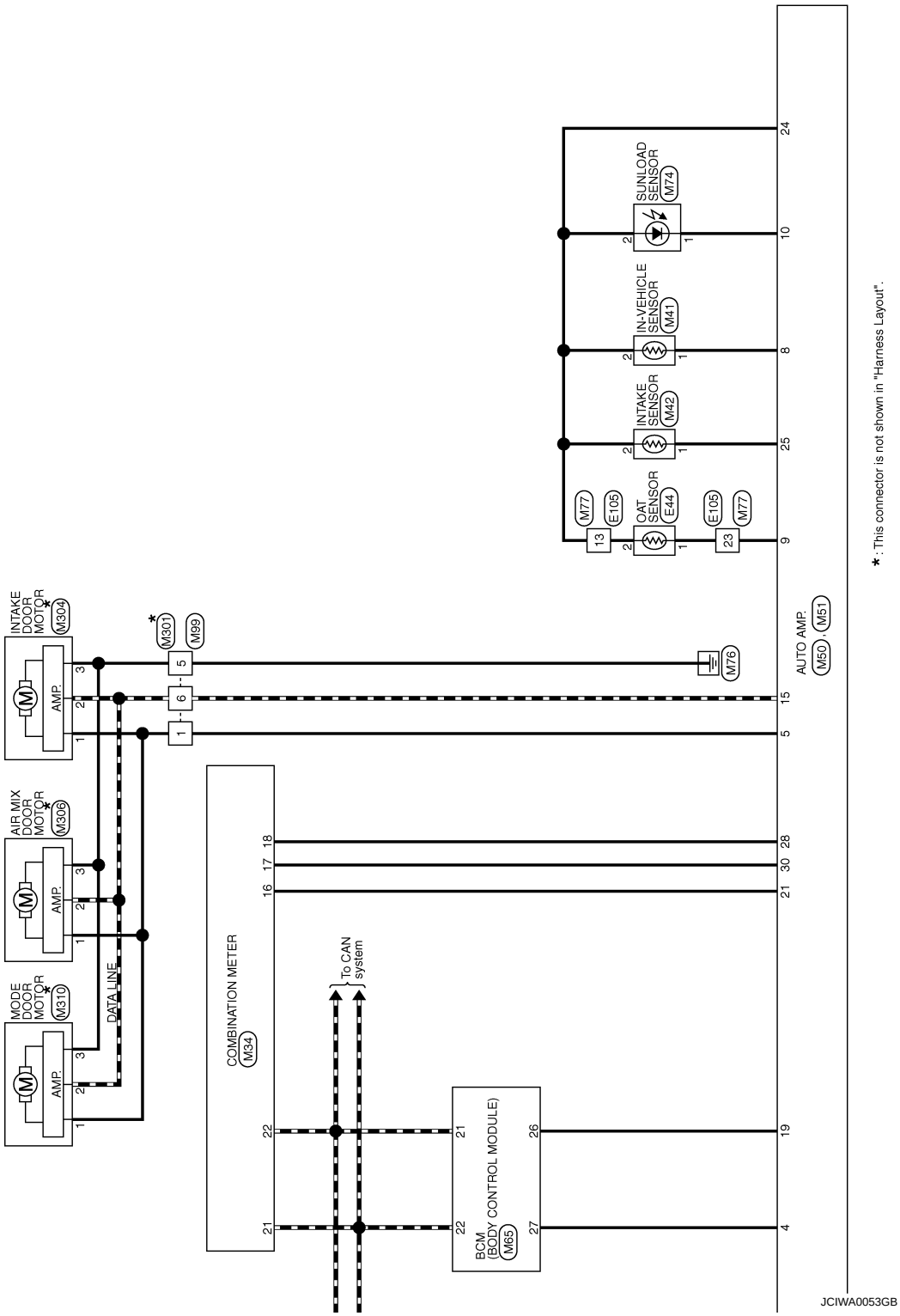
| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 15 (V) | Ground | LAN signal | — | — |  SJIA1453J |
| 17 (L) | Ground | Fan control amp. control signal | Output | • Ignition switch ON<br>• Blower speed: OFF | 0 V |
| | | | | • Ignition switch ON<br>• Blower speed: 1st - 23rd | 2.5 - 3.5 V |
| | | | | • Ignition switch ON<br>• Blower speed: 24th - 25th | 10 V |
| 18 (R) | Ground | Blower motor feedback | Input | • Ignition switch ON<br>• Blower speed: OFF | Battery voltage |
| | | | | • Ignition switch ON<br>• Blower speed: 1st | 10 V |
| | | | | • Ignition switch ON<br>• Blower speed: 25th | 0 V |
| 19 (GR) | Ground | Blower motor ON signal | Output | Fan control dial: OFF | 12 V |
| | | | | Fan control dial: ON<br>(Blower motor operate.) | 0 V |
| 20 (Y) | Ground | Power supply from IGN 2 | — | Ignition switch ON | Battery voltage |
| 21 (O) | Ground | Engine coolant temperature sensor | Input | At idle [after warming up, approx. 20°C (68°F)]<br>NOTE: The wave forms vary depending on coolant temperature. |  JSIIA0459GB |
| | | | | At idle [after warming up, approx. 80°C (176°F)]<br>NOTE: The wave forms vary depending on coolant temperature. |  JSIIA0460GB |
| 22 (SB) | Ground | Rear window defogger ON signal | Output | When rear window defogger switch is released. |  JPIIA0013GB |
| | | | | When rear window defogger switch is being pressed. | 0 V |

| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 23 (G) | Ground | Rear window defogger feed-back signal | Input | Rear window defogger switch: OFF | 0 V |
| | | | | Rear window defogger switch: ON | 12 V |
| 24 (R) | Ground | Sensor ground | — | Ignition switch ON | 0 V |
| 25 (G) | Ground | Intake sensor | Input | — | — |
| 28 (BR) | Ground | Power supply for ambient temperature display | Output | Ignition switch ON | 5 V |
| 30 (SB) | Ground | Compressor feedback signal | Input | Ignition switch ON | 0 V |

## MR20DE/QR25DE : Wiring Diagram — AIR CONDITIONER CONTROL SYSTEM —

INFOID:0000000001162207




SUNLOAD SENSOR M74
IN-VEHICLE SENSOR M41
INTAKE SENSOR M42
OAT SENSOR E44
M77
E105
13
23
INTAKE DOOR MOTOR M304
AIR MIX DOOR MOTOR M306
MODE DOOR MOTOR M310
AMP.
M301
M99
M76
AUTO AMP. M50, M51
DATA LINE
COMBINATION METER M34
To CAN system
BCM (BODY CONTROL MODULE) M65
*: This connector is not shown in "Harness Layout".
JCIWA0053GB

AIR CONDITIONER CONTROL (GASOLINE ENGINE)

| Connector No. | E6 |
|---|---|
| Connector Name | WIRE TO WIRE |
| Connector Type | TK24MW-1V |

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 |

| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 9 | SHIELD | -[With QR engine] |
| 18 | L | - |
| 19 | SB | -[Without QR engine] |
| 19 | LG | -[With QR engine] |
| 20 | V | - |

| Connector No. | E7 |
|---|---|
| Connector Name | WIRE TO WIRE |
| Connector Type | NS18MW-CS |

H.S.

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

| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 7 | V | -[With gasoline engine] |
| 10 | B | - |
| 15 | O | - |
| 16 | GR | - |

| Connector No. | E11 |
|---|---|
| Connector Name | IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) |
| Connector Type | M06FB-LC |

H.S.

| 11 | 10 | 9 |
|---|---|---|
| 14 | 13 | 12 |

| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 11 | B | - |

| Connector No. | E13 |
|---|---|
| Connector Name | IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) |
| Connector Type | TH12FW-NH |

H.S.

| 28 | 27 | 26 | 25 | 24 | 23 |
|---|---|---|---|---|---|
| 34 | 33 | 32 | 31 | 30 | 29 |

| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 25 | B | - |
| 26 | P | - |
| 27 | L | - |

| Connector No. | E15 |
|---|---|
| Connector Name | IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) |
| Connector Type | NS16FW-CS |

H.S.

| 53 | 52 | 51 | 50 | | 49 | 48 | 47 |
|---|---|---|---|---|---|---|---|
| 62 | 61 | 60 | 59 | 58 | 57 | 56 | 55 | 54 |

| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 55 | O | - |

| Connector No. | E16 |
|---|---|
| Connector Name | ECM |
| Connector Type | MAA24FB-MEA8-LH |

H.S.

| 81 | 85 | 89 | 93 | 97 | 101 | 105 | 109 |
|---|---|---|---|---|---|---|---|
| 82 | 86 | 90 | 94 | 98 | 102 | 106 | 110 |
| 83 | 87 | 91 | 95 | 99 | 103 | 107 | 111 |
| 84 | 88 | 92 | 96 | 100 | 104 | 108 | 112 |

| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 83 | P | CAN-L1 |
| 84 | L | CAN-H1 |

| Connector No. | E19 |
|---|---|
| Connector Name | ECM |
| Connector Type | BAA32FB-AHY8 |

H.S.

| 116 | 115 | 114 | | 89 | 88 | 87 | 86 | 85 | 84 | 83 | 82 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 97 | 96 | 95 | 94 | 93 | 92 | 91 | 90 |
| | | 118 | 117 | | | | | | | | |
| | | | | 105 | 104 | 103 | 102 | 101 | 100 | 99 | 98 |
| 121 | 120 | 119 | | 113 | 112 | 111 | 110 | 109 | 108 | 107 | 106 |

| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 82 | L | VEHCAN-H |
| 90 | P | VEHCAN-L |

| Connector No. | E44 |
|---|---|
| Connector Name | OAT SENSOR |
| Connector Type | RS02FB |

H.S.

| 2 | 1 |
|---|---|

| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | BR | - |
| 2 | R | - |

JCIWA0054GB

AIR CONDITIONER CONTROL (GASOLINE ENGINE)

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

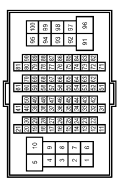




| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | V | – |
| 2 | SB | –[Without QR engine] |
| 2 | LG | –[With QR engine] |
| 3 | L | – |

| Connector No. | E105 |
|---|---|
| Connector Name | WIRE TO WIRE |
| Connector Type | TH80FW-CS16-TM4 |





| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 12 | P | – |
| 13 | R | – |
| 20 | P | – |
| 22 | L | – |
| 23 | BR | – |
| 30 | L | – |
| 79 | GR | – |
| 89 | V | – |

| Connector No. | F43 |
|---|---|
| Connector Name | ECM |
| Connector Type | BAA76FB-AHY5 |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 15 | L | AVCC-PDPRES |
| 18 | V | GNDA-PDPRES |
| 37 | LG | PDPRES |

| Connector No. | F61 |
|---|---|
| Connector Name | COMPRESSOR |
| Connector Type | RK02FGY |

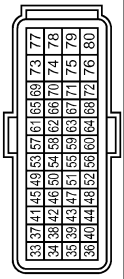




| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 3 | W | – |
| 4 | GR | – |

| Connector No. | F8 |
|---|---|
| Connector Name | ECM |
| Connector Type | MAA40FBR-MEAB-LH |





| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 41 | SB | PDPRES |
| 48 | V | GNDA-PDPRES |
| 74 | L | AVCC-PDPRES |

| Connector No. | F121 |
|---|---|
| Connector Name | WIRE TO WIRE |
| Connector Type | NS16FW-CS |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 7 | W | – |
| 10 | B | – |
| 15 | Y | – |
| 16 | GR | – |

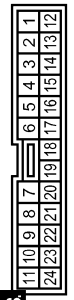
| Connector No. | F17 |
|---|---|
| Connector Name | COMPRESSOR |
| Connector Type | RH02FB |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | Y | – |
| 2 | B | – |

| Connector No. | F123 |
|---|---|
| Connector Name | WIRE TO WIRE |
| Connector Type | TK24FW-1V |





| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 9 | SHIELD | –[With QR engine] |
| 18 | L | – |
| 19 | SB | –[Without QR engine] |
| 19 | LG | –[With QR engine] |
| 20 | V | – |

JCIWA0055GB

AIR CONDITIONER CONTROL (GASOLINE ENGINE)

| Connector No. | M34 |
|---|---|
| Connector Name | COMBINATION METER |
| Connector Type | SAB40FW |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 16 | O | WATER TEMP OUT |
| 17 | SB | A/C PD OUT |
| 18 | BR | OUTSIDE TEMP POWER |
| 21 | L | CAN-H |
| 22 | P | CAN-L |

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

| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | LG | – |
| 2 | R | – |

| Connector No. | M42 |
|---|---|
| Connector Name | INTAKE SENSOR |
| Connector Type | C02FW |

| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | G | – |
| 2 | R | – |

| Connector No. | M50 |
|---|---|
| Connector Name | AUTO AMP. |
| Connector Type | TK20FGY |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | W | IGN |
| 2 | Y | BAT |
| 3 | B | GND(POWER) |
| 4 | P | COMP ON |
| 5 | W | LAN(+) |
| 7 | GR | ECV OUT |
| 8 | LG | INCAR SENS |
| 9 | BR | AMB SENS |
| 10 | Y | SUN SENS |
| 15 | V | LAN(–) |
| 17 | L | FR/FAN OUT |
| 18 | R | FR/FAN F/B |
| 19 | GR | FAN ON |
| 20 | Y | FR/IGN 2 |

| Connector No. | M51 |
|---|---|
| Connector Name | AUTO AMP. |
| Connector Type | TK16FGY |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 21 | O | WATER TEMP |
| 24 | R | SENS GND |
| 25 | G | INT SENS |
| 28 | BR | OUTSIDETEMPPOWER |
| 30 | SB | PD CUT |

| Connector No. | M65 |
|---|---|
| Connector Name | BCM (BODY CONTROL MODULE) |
| Connector Type | AAB40FB |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 21 | P | CAN-L |
| 22 | L | CAN-H |
| 26 | GR | BLOWER FAN SW |
| 27 | P | AIRCON SW(With gasoline engine) |

JCIWA0056GB

AIR CONDITIONER CONTROL (GASOLINE ENGINE)

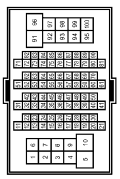
| Connector No. | M74 |
|---|---|
| Connector Name | SUNLOAD SENSOR |
| Connector Type | K02FB |

H.S.

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

| Connector No. | M77 |
|---|---|
| Connector Name | WIRE TO WIRE |
| Connector Type | TH80MW-CS16-TM4 |

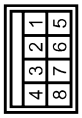
H.S.



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 12 | P | – |
| 13 | R | – |
| 20 | P | – |
| 22 | L | – |
| 23 | BR | – |
| 30 | L | – |
| 79 | GR | – |
| 89 | W | – |

| Connector No. | M99 |
|---|---|
| Connector Name | WIRE TO WIRE |
| Connector Type | M08FW-GY-LC |

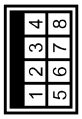
H.S.



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | W | – |
| 2 | B | – |
| 3 | R | – |
| 4 | LG | – |
| 5 | B | – |
| 6 | V | – |
| 7 | L | – |
| 8 | Y | – |

| Connector No. | M301 |
|---|---|
| Connector Name | WIRE TO WIRE |
| Connector Type | M08MW-GY-LC |

H.S.



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | W | – |
| 2 | B | – |
| 3 | R | – |
| 4 | Y | – |
| 5 | B | – |
| 6 | V | – |
| 7 | L | – |
| 8 | Y | – |

| Connector No. | M304 |
|---|---|
| Connector Name | INTAKE DOOR MOTOR |
| Connector Type | A03FW |

H.S.

| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | W | – |
| 2 | V | – |
| 3 | B | – |

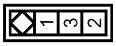
| Connector No. | M306 |
|---|---|
| Connector Name | AIR MIX DOOR MOTOR |
| Connector Type | A03FW |

H.S.

| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | W | – |
| 2 | V | – |
| 3 | B | – |

| Connector No. | M310 |
|---|---|
| Connector Name | MODE DOOR MOTOR |
| Connector Type | A03FW |

H.S.



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | W | – |
| 2 | V | – |
| 3 | B | – |

| Connector No. | M311 |
|---|---|
| Connector Name | FAN CONTROL AMP. |
| Connector Type | M04FW-LC |

H.S.

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

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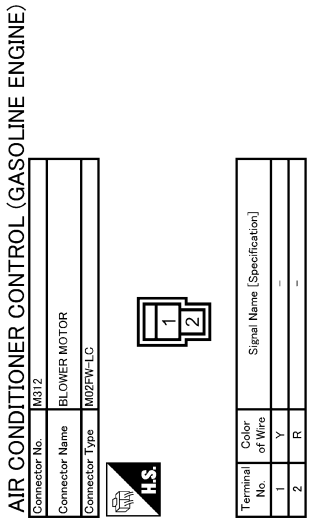


JCIWA0058GB

M9R

M9R : Reference Value

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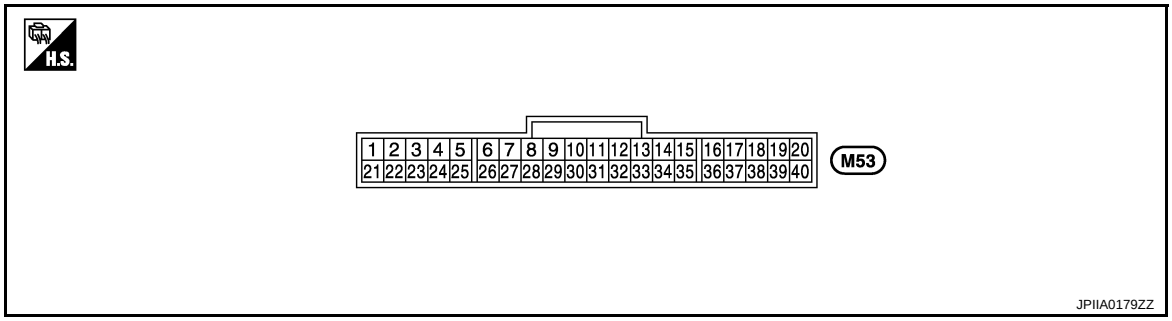
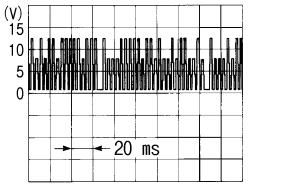
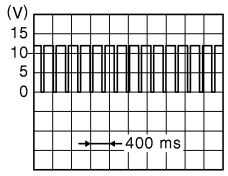
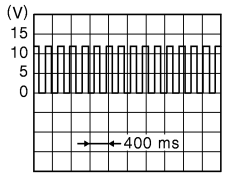
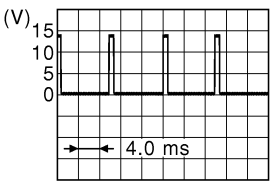
TERMINAL LAYOUT




## PHYSICAL VALUES

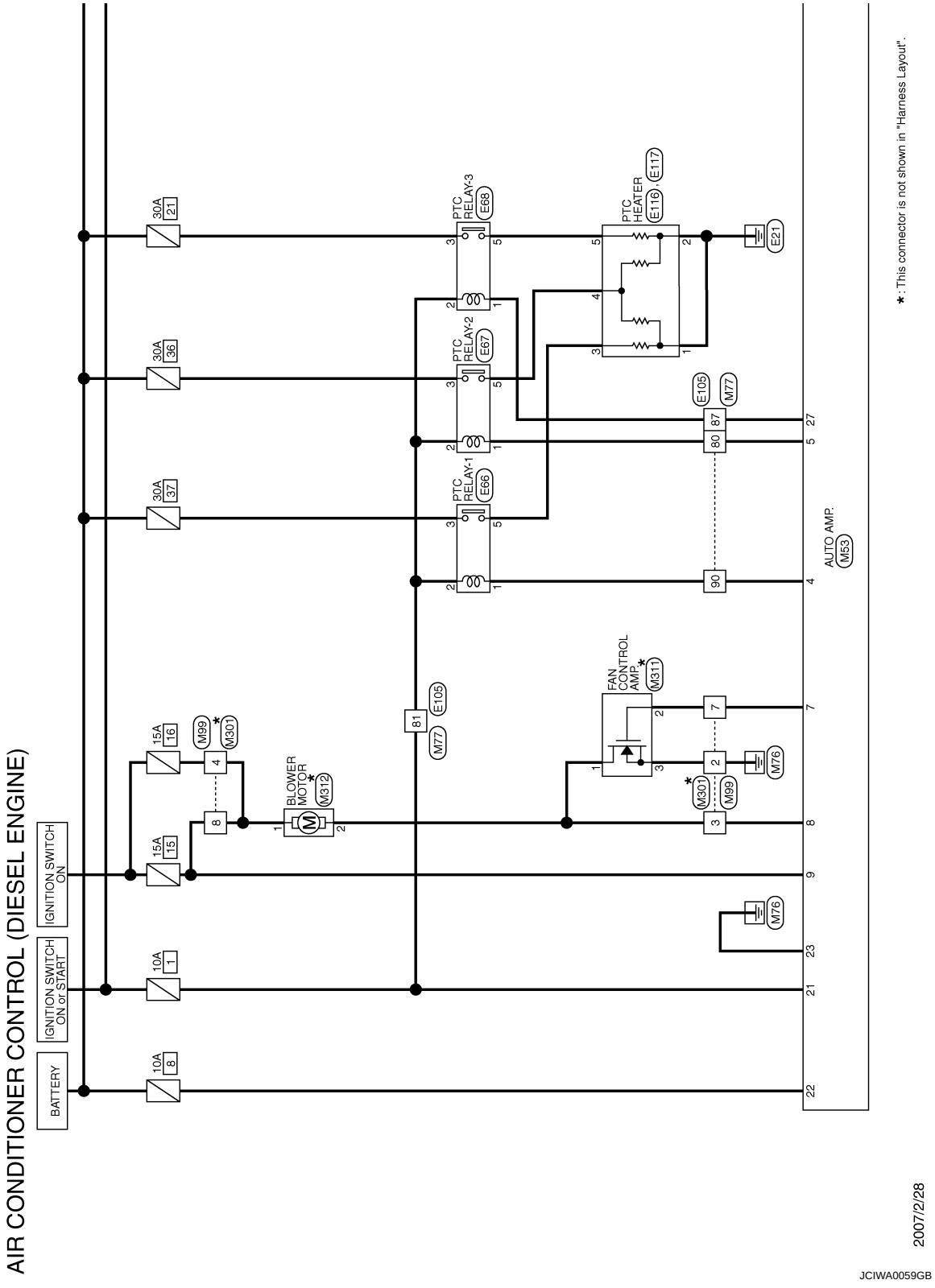
| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 2 (B) | Ground | Illumination ground | — | Light switch ON | 0 V |
| 3 (R) | Ground | Power supply for illumination | — | Light switch OFF | 0 V |
| | | | | Light switch ON | 12 V |
| 4 (Y) | Ground | PTC 1 | — | PTC heater 1: OFF | 12 V |
| | | | | PTC heater 1: ON | 0 V |
| 5 (O) | Ground | PTC 2 | — | PTC heater 1: OFF | 12 V |
| | | | | PTC heater 1: ON | 0 V |
| 6 (V) | Ground | LAN signal | — | — |  SJIA1453J |
| 7 (L) | Ground | Fan control amp. control signal | Output | • Ignition switch ON<br>• Blower speed: OFF | 0 V |
| | | | | • Ignition switch ON<br>• Blower speed: 1st - 23rd | 2.5 - 3.5 V |
| | | | | • Ignition switch ON<br>• Blower speed: 24th - 25th | 10 V |
| 8 (R) | Ground | Blower motor feedback | Input | • Ignition switch ON<br>• Blower speed: OFF | Battery voltage |
| | | | | • Ignition switch ON<br>• Blower speed: 1st | 10 V |
| | | | | • Ignition switch ON<br>• Blower speed: 25th | 0 V |
| 9 (Y) | Ground | Power supply from IGN 2 | — | Ignition switch ON | Battery voltage |
| 10 (GR) | Ground | Compressor feedback signal | Input | Ignition switch ON | 0 V |
| 11 (BR) | Ground | Power supply for ambient temperature display | Output | Ignition switch ON | 5 V |
| 12 (LG) | Ground | Blower motor ON signal | Output | Fan control dial: OFF | 12 V |
| | | | | Fan control dial: ON (Blower motor operate) | 0 V |

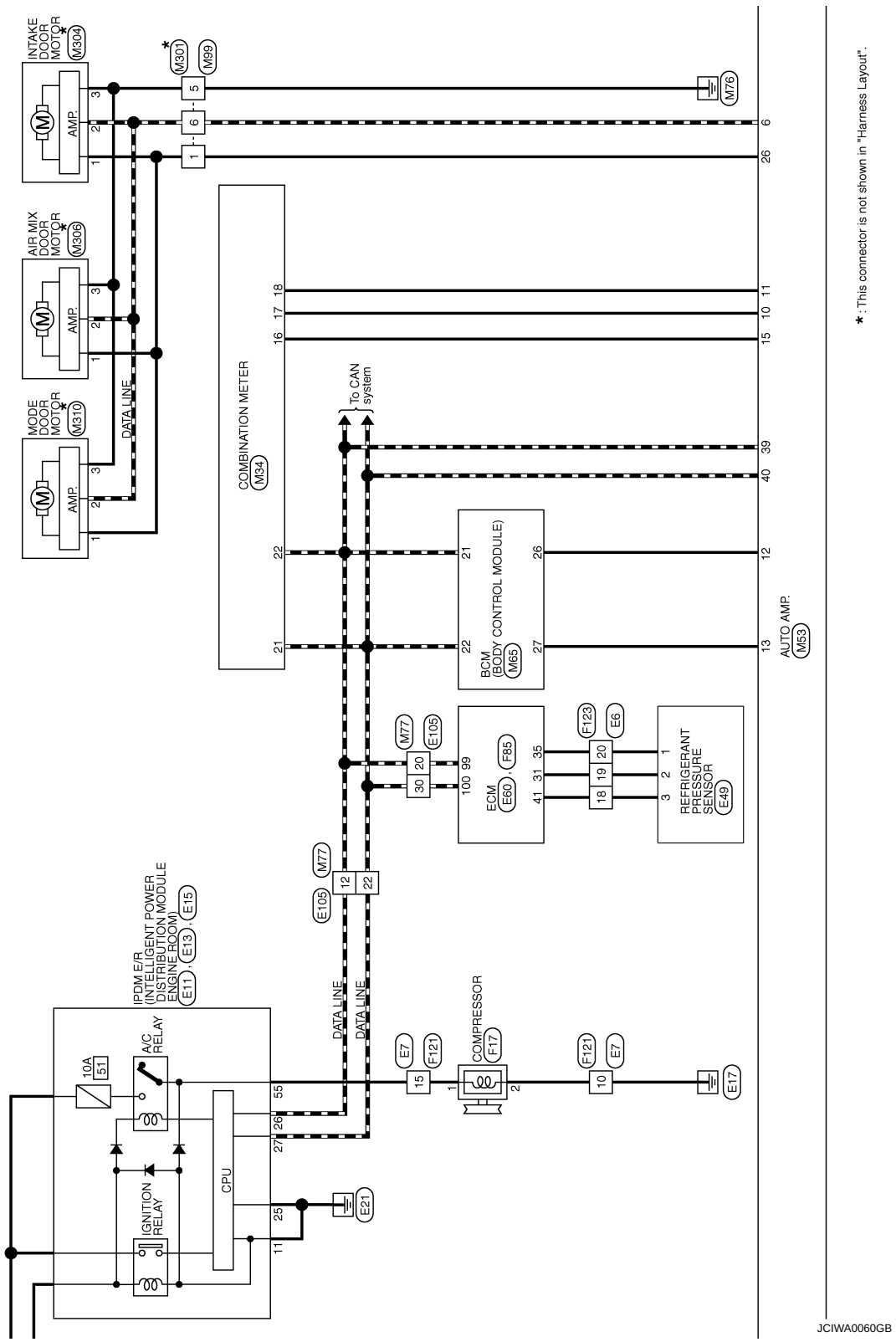
| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 13 (Y) | Ground | A/C (Compressor ON) signal | Output | Compressor OFF | 12 V |
| | | | | Compressor ON | 0 V |
| 14 (O) | Ground | Intake sensor | Input | — | — |
| 15 (O) | Ground | Engine coolant temperature sensor | Input | At idle [after warming up, approx. 20°C (68°F)]<br>NOTE: The wave forms vary depending on coolant temperature. |  <br>JSIIA0459GB |
| | | | | At idle [after warming up, approx. 80°C (176°F)]<br>NOTE: The wave forms vary depending on coolant temperature. |  <br>JSIIA0460GB |
| 16 (R) | Ground | Sensor ground | — | Ignition switch ON | 0 V |
| 17 (LG) | Ground | In-vehicle sensor | Input | — | — |
| 18 (BR) | Ground | OAT sensor | Input | — | — |
| 19 (Y) | Ground | Sunload sensor | Input | — | — |
| 21 (W) | Ground | Power supply for IGN | — | Ignition switch ON | Battery voltage |
| 22 (Y) | Ground | Power supply for BATT | — | Ignition switch OFF | Battery voltage |
| 23 (B) | Ground | Ground | — | Ignition switch ON | 0 V |
| 24 (G) | Ground | Rear window defogger feedback signal | Input | Rear window defogger switch: OFF | 0 V |
| | | | | Rear window defogger switch: ON | 12 V |
| 25 (SB) | Ground | Rear window defogger ON signal | Output | When rear window defogger switch is released. |  <br>JPIIA0013GB |
| | | | | When rear window defogger switch is being pressed. | 0 V |
| 26 (W) | Ground | Power supply for each door motor | — | Ignition switch ON | Battery voltage |

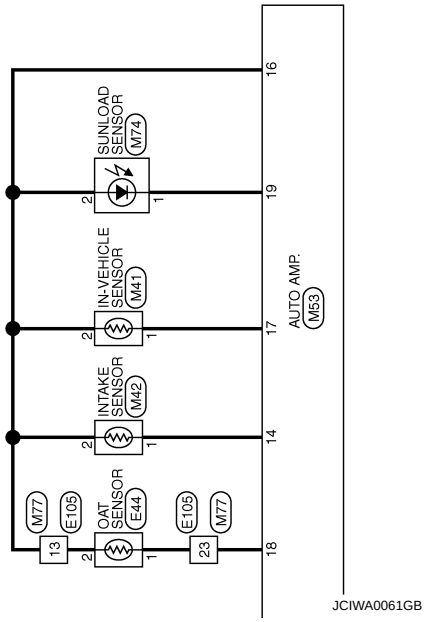
| Terminal No. (Wire color) | | Description | | Condition | Value (Approx.) |
|---|---|---|---|---|---|
| + | – | Signal name | Input/ Output | | |
| 27 (V) | Ground | PTC 3 | — | PTC heater 1: OFF | 12 V |
| | | | | PTC heater 1: ON | 0 V |
| 39 (P) | Ground | CAN-L | — | — | — |
| 40 (L) | Ground | CAN-H | — | — | — |

## M9R : Wiring Diagram — AIR CONDITIONER CONTROL SYSTEM —

INFOID:0000000001204219




INTAKE DOOR MOTOR M304
AIR MIX DOOR MOTOR M306
MODE DOOR MOTOR M310
AMP.
DATA LINE
*M301
M99
M76
COMBINATION METER M34
To CAN system
BCM (BODY CONTROL MODULE) M65
AUTO AMP. M53
M77
E105
ECM E60, F85
F123
E6
REFRIGERANT PRESSURE SENSOR E49
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) E11, E13, E15
10A 51
A/C RELAY
IGNITION RELAY
CPU
E7
F121
COMPRESSOR F17
E17
E21
*: This connector is not shown in "Harness Layout".
JCIWA0060GB


SUNLOAD SENSOR M74
IN-VEHICLE SENSOR M41
INTAKE SENSOR M42
OAT SENSOR E44
M77
E105
13
E105
M77
23
AUTO AMP. M53
16
19
17
14
18
JCIWA0061GB

AIR CONDITIONER CONTROL (DIESEL ENGINE)

| Connector No. | E6 |
|---|---|
| Connector Name | WIRE TO WIRE |
| Connector Type | TK24MW-1V |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 18 | L | – |
| 19 | SB | –[Without QR engine] |
| 20 | V | – |

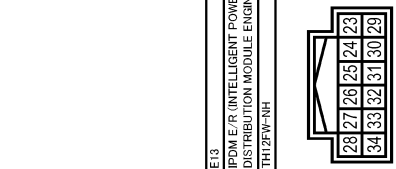
| Connector No. | E7 |
|---|---|
| Connector Name | WIRE TO WIRE |
| Connector Type | NS16MW-CS |

| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 10 | B | – |
| 15 | O | – |

| Connector No. | E11 |
|---|---|
| Connector Name | IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) |
| Connector Type | M06FB-LC |

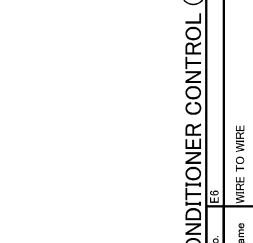
| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 11 | B | – |

| Connector No. | E13 |
|---|---|
| Connector Name | IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) |
| Connector Type | TH12FW-NH |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 25 | B | – |
| 26 | P | – |
| 27 | L | – |

| Connector No. | E15 |
|---|---|
| Connector Name | IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) |
| Connector Type | NS16FW-CS |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 55 | O | – |

| Connector No. | E44 |
|---|---|
| Connector Name | OAT SENSOR |
| Connector Type | RS02FB |

| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | BR | – |
| 2 | R | – |

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



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | V | – |
| 2 | SB | –[Without QR engine] |
| 3 | L | – |

| Connector No. | E60 |
|---|---|
| Connector Name | ECM |
| Connector Type | MAA24FB-MEA8-LH |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 99 | P | MAIN CAN-L(BODY) |
| 100 | L | MAIN CAN-H(BODY) |

JCIWA0062GB

AIR CONDITIONER CONTROL (DIESEL ENGINE)

| Connector No. | E66 |
|---|---|
| Connector Name | PTC RELAY-1 |
| Connector Type | MS02FL-M2 |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | Y | – |
| 2 | W | – |
| 3 | GR | – |
| 5 | L | – |

| Connector No. | E67 |
|---|---|
| Connector Name | PTC RELAY-2 |
| Connector Type | MS02FL-M2 |

| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | O | – |
| 2 | W | – |
| 3 | P | – |
| 5 | G | – |

| Connector No. | E68 |
|---|---|
| Connector Name | PTC RELAY-3 |
| Connector Type | MS02FL-M2 |

| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | V | – |
| 2 | W | – |
| 3 | O | – |
| 5 | Y | – |

| Connector No. | E105 |
|---|---|
| Connector Name | WIRE TO WIRE |
| Connector Type | TH80FW-CS16-TM4 |

| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 12 | P | – |
| 13 | R | – |
| 20 | P | – |
| 22 | L | – |
| 23 | BR | – |
| 30 | L | – |
| 80 | O | – |
| 81 | W | – |
| 87 | V | – |
| 90 | Y | – |

| Connector No. | E116 |
|---|---|
| Connector Name | PTC HEATER |
| Connector Type | SNA02FW-1V |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | B | – |
| 2 | B | – |

| Connector No. | E117 |
|---|---|
| Connector Name | PTC HEATER |
| Connector Type | SNA03FW |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 3 | L | – |
| 4 | G | – |
| 5 | Y | – |

| Connector No. | F17 |
|---|---|
| Connector Name | COMPRESSOR |
| Connector Type | RH02FB |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | Y | – |
| 2 | B | – |

| Connector No. | F85 |
|---|---|
| Connector Name | ECM |
| Connector Type | MAA40FB-MEA8-RH |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 31 | SB | FREON PRESS |
| 35 | V | GND FREON PRESS |
| 41 | L | AVCC-FREON PRESS |

JCIWA0063GB

AIR CONDITIONER CONTROL (DIESEL ENGINE)

| Connector No. | F121 |
|---|---|
| Connector Name | WIRE TO WIRE |
| Connector Type | NS16FW-CS |







| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 10 | B | – |
| 15 | Y | – |

| Connector No. | F123 |
|---|---|
| Connector Name | WIRE TO WIRE |
| Connector Type | TK24FW-1Y |







| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 18 | L | – |
| 19 | SB | –[Without QR engine] |
| 20 | V | – |

| Connector No. | M34 |
|---|---|
| Connector Name | COMBINATION METER |
| Connector Type | SAB40FW |







| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 16 | O | WATER TEMP OUT |
| 17 | SB | A/C PD CUT |
| 18 | BR | OUTSIDE TEMP POWER |
| 21 | L | CAN-H |
| 22 | P | CAN-L |

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







| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | LG | – |
| 2 | R | – |

| Connector No. | M42 |
|---|---|
| Connector Name | INTAKE SENSOR |
| Connector Type | C02FW |







| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | G | – |
| 2 | R | – |

| Connector No. | M53 |
|---|---|
| Connector Name | AUTO AMP. |
| Connector Type | SAB40FW |







| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 4 | Y | PTC1 |
| 5 | O | PTC2 |
| 6 | V | LAN(–) |
| 7 | L | FR/FAN OUT |
| 8 | R | FR/FAN F/B |
| 9 | Y | FR/IGN 2 |
| 10 | SB | PD CUT |
| 11 | BR | OUTSIDE TEMP POWER |
| 12 | GR | FAN ON |
| 13 | P | COMP ON |
| 14 | G | INT SENS |
| 15 | O | WATER TEMP |
| 16 | R | SENS GND |
| 17 | LG | INCAR SENS |
| 18 | BR | AMB SENS |
| 19 | Y | SUN SENS |
| 21 | W | IGN |
| 22 | Y | BAT |
| 23 | B | GND(POWER) |
| 26 | W | LAN(+) |
| 27 | V | PTC3 |
| 39 | P | CAN-L |
| 40 | L | CAN-H |

| Connector No. | M65 |
|---|---|
| Connector Name | BCM (BODY CONTROL MODULE) |
| Connector Type | AAB40FB |







| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 21 | P | CAN-L |
| 22 | L | CAN-H |
| 26 | GR | BLOWER FAN SW |
| 27 | Y | AIRCON SW[With diesel engine] |

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AIR CONDITIONER CONTROL (DIESEL ENGINE)

| Connector No. | M74 |
|---|---|
| Connector Name | SUNLOAD SENSOR |
| Connector Type | K02FB |



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

| Connector No. | M77 |
|---|---|
| Connector Name | WIRE TO WIRE |
| Connector Type | TH80MW-CS16-TM4 |

| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 12 | P | – |
| 13 | R | – |
| 20 | P | – |
| 22 | L | – |
| 23 | BR | – |
| 30 | L | – |
| 80 | O | – |
| 81 | W | – |
| 87 | V | – |
| 90 | Y | – |

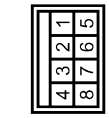
| Connector No. | M304 |
|---|---|
| Connector Name | INTAKE DOOR MOTOR |
| Connector Type | A03FW |

| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | W | – |
| 2 | V | – |
| 3 | B | – |

| Connector No. | M306 |
|---|---|
| Connector Name | AIR MIX DOOR MOTOR |
| Connector Type | A03FW |

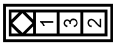
| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | W | – |
| 2 | V | – |
| 3 | B | – |

| Connector No. | M99 |
|---|---|
| Connector Name | WIRE TO WIRE |
| Connector Type | M08FW-GY-LC |



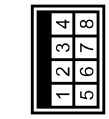
| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | W | – |
| 2 | B | – |
| 3 | R | – |
| 4 | LG | – |
| 5 | B | – |
| 6 | V | – |
| 7 | L | – |
| 8 | Y | – |

| Connector No. | M310 |
|---|---|
| Connector Name | MODE DOOR MOTOR |
| Connector Type | A03FW |



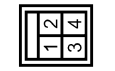
| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | W | – |
| 2 | V | – |
| 3 | B | – |

| Connector No. | M301 |
|---|---|
| Connector Name | WIRE TO WIRE |
| Connector Type | M08MW-GY-LC |



| Terminal No. | Color of Wire | Signal Name [Specification] |
|---|---|---|
| 1 | W | – |
| 2 | B | – |
| 3 | R | – |
| 4 | Y | – |
| 5 | B | – |
| 6 | V | – |
| 7 | L | – |
| 8 | Y | – |

| Connector No. | M311 |
|---|---|
| Connector Name | FAN CONTROL AMP. |
| Connector Type | M04FW-LC |



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

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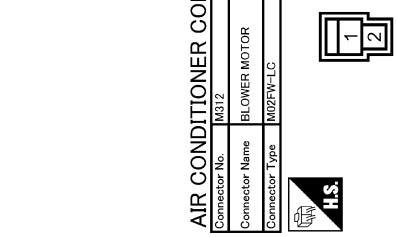
AIR CONDITIONER CONTROL (DIESEL ENGINE)

| Connector No. | M312 |
|---|---|
| Connector Name | BLOWER MOTOR |
| Connector Type | M02FW-LC |




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

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# SYMPTOM DIAGNOSIS

## AIR CONDITIONER CONTROL

### Diagnosis Chart By Symptom

INFOID:0000000001162208

| Symptom | Reference | |
|---|---|---|
| A/C system does not come on. | Go to Trouble Diagnosis Procedure for A/C System. | HAC-102, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-103, "M9R : Diagnosis Procedure" (M9R) |
| Air outlet does not change.<br>Mode door motor does not operate normally. | Go to Trouble Diagnosis Procedure for Mode Door Motor. (LAN) | HAC-42, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-44, "M9R : Diagnosis Procedure" (M9R) |
| Discharge air temperature does not change.<br>Air mix door motor does not operate normally. | Go to Trouble Diagnosis Procedure for Air Mix Door Motor. (LAN) | HAC-46, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-48, "M9R : Diagnosis Procedure" (M9R) |
| Intake door does not change.<br>Intake door motor does not operate normally. | Go to Trouble Diagnosis Procedure for Intake Door Motor. (LAN) | HAC-50, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-52, "M9R : Diagnosis Procedure" (M9R) |
| Blower motor operation is malfunctioning. | Go to Trouble Diagnosis Procedure for Blower Motor. | HAC-54, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-58, "M9R : Diagnosis Procedure" (M9R) |
| Magnet clutch does not engage. | Go to Trouble Diagnosis Procedure for Magnet Clutch. | HAC-62, "MR20DE/QR25DE : Diagnosis Procedure" (MR20DE/QR25DE) or HAC-66, "M9R : Diagnosis Procedure" (M9R) |
| Insufficient cooling | Go to Trouble Diagnosis Procedure for Insufficient Cooling. | HAC-180, "Inspection procedure" |
| Insufficient heating | Go to Trouble Diagnosis Procedure for Insufficient Heating. | HAC-183, "Inspection procedure" |
| Noise | Go to Trouble Diagnosis Procedure for Noise. | HAC-185, "Inspection procedure" |
| Self-diagnosis cannot be performed. | Go to Trouble Diagnosis Procedure for Self-diagnosis. | HAC-187, "Inspection procedure" |

# INSUFFICIENT COOLING

## Description

INFOID:0000000001162209

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

## Inspection procedure

INFOID:0000000001162210

### 1.CHECK WITH A GAUGE OF ACR4

Connect the ACR4 to the vehicle and perform the pressure inspection with the gauge.

Is there refrigerant?

YES >> GO TO 2.
NO-1 >> Check for refrigerant leakages with the refrigerant leakage detecting fluorescent leak detector. Refer to HA-31, "Inspection".
NO-2 >> GO TO 2 after repairing or replacing the parts according to the inspection results.

### 2.CHECK CHARGED REFRIGERANT AMOUNT

1. Connect ACR4 to the vehicle and discharge the refrigerant.
2. Recharge with the proper amount of refrigerant and perform the inspection with the refrigerant leakage detecting fluorescent leak detector. Refer to HA-31, "Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Refill the refrigerant and repair or replace the parts according to the inspection results.

### 3.CHECK REFRIGERANT CYCLE PRESSURE

Connect ACR4 to the vehicle and perform the performance test. Refer to HA-27, "MR20DE/QR25DE : Performance Chart".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform the diagnosis with the gauge pressure. Refer to HA-9, "Trouble Diagnosis For Unusual Pressure".

### 4.CHECK SETTING OF TEMPERATURE SETTING TRIMMER

Check the setting of temperature setting trimmer. Refer to HAC-5, "Description & Inspection".

1. Check that the temperature setting trimmer is set to “+ direction”.
   **NOTE:**
   The control temperature can be set with the setting of temperature setting trimmer.
2. Set temperature control dial to “0”.

Are the symptoms solved?

YES >> Perform the setting separately if necessary. END.
NO >> GO TO 5.

### 5.PERFORM SELF-DIAGNOSIS STEP-2

Perform self-diagnosis STEP-2. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 3.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Go to appropriate malfunctioning sensor circuit. Refer to HAC-24, "Diagnosis Description", see No. 7.

### 6.PERFORM SELF-DIAGNOSIS STEP-4

Perform self-diagnosis STEP-4. Refer to HAC-24, "Diagnosis Description", see Nos.1 to 6.

Is it operated normally?

YES >> GO TO 7.
NO >> Perform the diagnosis applicable to each output device.

## 7. CHECK A/C COMPRESSOR BELT

Check the A/C compressor belt. Refer to EM-15, "Checking" (MR20DE), EM-138, "Checking" (QR25DE) or EM-257, "Checking" (M9R).

Is the inspection result normal?

YES >> GO TO 8.
NO >> Adjust or replace the A/C compressor belt.

## 8. CHECK AIR LEAKAGE FROM DUCT

Check duct and nozzle, etc. of A/C system for air leakage.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace parts according to the inspection results.

## 9. CHECK POWER SUPPLY FOR ECV (ELECTRIC CONTROL VALVE)

1. Disconnect compressor (ECV) connector.
2. Turn ignition switch ON.
3. Check voltage between compressor (ECV) harness connector F61 terminal 3 and ground.

| (+) | | (–) | Voltage |
|---|---|---|---|
| Compressor (ECV) | | — | |
| Connector | Terminal | | |
| F61 | 3 | Ground | Battery voltage |

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 10.

## 10. CHECK FUSE

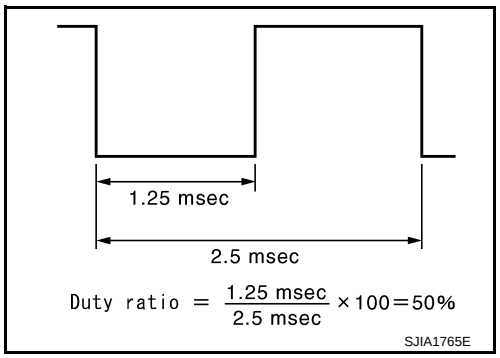
Check power supply circuit and 10A fuse [No. 1, located in the fuse block (J/B)]. Refer to PG-125, "Fuse, Connector and Terminal Arrangement".

Is the inspection result normal?

YES >> Check harness for open circuit. Repair or replace if necessary.
NO >> Replace fuse and check harness for short circuit. Repair or replace if necessary.

## 11. CHECK ECV CONTROL SIGNAL

1. Turn ignition switch OFF.
2. Reconnect compressor (ECV) connector.
3. Perform self-diagnosis. Refer to HAC-24, "Diagnosis Description".
4. Set in self-diagnosis STEP-4 (Code No. 45).
5. Confirm ECV control signal between auto amp. harness connector M50 terminal 7 and ground using an oscilloscope.




Is the inspection result normal?

YES >> Replace compressor.
NO >> GO TO 12.

## 12. CHECK CIRCUIT CONTINUITY BETWEEN ECV AND AUTO AMP.

1. Turn ignition switch OFF.
2. Disconnect compressor (ECV) connector and auto amp.connector.
3. Check continuity between compressor (ECV) harness connector F61 terminals 4 and auto amp. harness connector M50 terminal 7.

| (+) | | (–) | | Continuity |
|---|---|---|---|---|
| Compressor (ECV) | | Auto amp. | | |
| Connector | Terminal | Connector | Terminal | |
| F61 | 4 | M50 | 7 | Existed |

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair the harnesses or connectors.

## 13.CHECK ECV

Check continuity between compressor (ECV) connector F61 terminals 3 and 4.

| (+) | | (–) | | Continuity |
|---|---|---|---|---|
| Compressor (ECV) | | Compressor (ECV) | | |
| Connector | Terminal | Connector | Terminal | |
| F61 | 3 | F61 | 4 | Existed |

Is the inspection result normal?

YES >> Replace the auto amp.
NO >> Replace the compressor.

# INSUFFICIENT HEATING

## Description

INFOID:0000000001162211

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

## Inspection procedure

INFOID:0000000001162212

### 1. CHECK COOLING SYSTEM

1. Check engine coolant level and check for leakage. Refer to CO-10, "Inspection" (MR20DE), CO-41, "Inspection" (QR25DE) or CO-68, "Inspection" (M9R).
2. Check radiator cap. Refer to CO-14, "RADIATOR CAP : Inspection" (MR20DE), CO-45, "RADIATOR CAP : Inspection" (QR25DE) or CO-71, "RESERVOIR TANK CAP : Inspection" (M9R).
3. Check water flow sounds of engine coolant. Refer to CO-11, "Refilling" (MR20DE), CO-42, "Refilling" (QR25DE) or CO-69, "Refilling" (M9R).

Is the inspection result normal?

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

### 2. CHECK SETTING OF TEMPERATURE SETTING TRIMMER

1. Check the setting of temperature setting trimmer. Refer to HAC-5, "Description & Inspection".
2. Check that the temperature setting trimmer is set to “– direction”.
   **NOTE:**
   The control temperature can be set with the setting of temperature setting trimmer.
3. Set temperature control dial to “0”.

Are the symptoms solved?

YES >> Perform the setting separately if necessary. END.
NO >>
- WITH DIESEL ENGINE: GO TO 3.
- WITH GASOLINE ENGINE: GO TO 4.

### 3. CHECK PTC HEATER OPERATION

Check PTC heater. Refer to HAC-71, "Component Function Check".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace malfunctioning part(s).

### 4. CHECK OPERATION

1. Turn temperature control dial and raise temperature setting to 28°C after warming up the engine.
2. Check that warm air blows from outlets.

Is the inspection result normal?

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

### 5. PERFORM SELF-DIAGNOSIS STEP-2

Perform self-diagnosis STEP-2. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 3.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Go to appropriate malfunctioning sensor circuit. Refer to HAC-24, "Diagnosis Description", see No. 7.

### 6. PERFORM SELF-DIAGNOSIS STEP-4

Perform self-diagnosis STEP-4. Refer to HAC-24, "Diagnosis Description", see Nos. 1 to 6.

Is it installed normally?

YES >> GO TO 7.
NO >> Perform the diagnosis applicable to each output device.

## 7. CHECK AIR LEAKAGE FROM DUCT

Check duct and nozzle, etc. of A/C system for air leakage.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace parts according to the inspection results.

## 8. CHECK HEATER HOSE INSTALLATION CONDITION

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace parts according to the inspection results.

## 9. CHECK TEMPERATURE OF HEATER HOSE

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

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace the heater core after performing the procedures after the cooling system inspection again. GO TO 1.

## 10. REPLACE HEATER CORE

Replace the heater core. Refer to VTL-35, "Exploded View" (LHD models) or VTL-81, "Exploded View" (RHD models).

Are the symptoms solved?

YES >> END.
NO >> Perform the procedures after the cooling system inspection again. GO TO 1.

# NOISE

## Description

INFOID:0000000001162213

Symptom
- Noise
- Noise is heard when the A/C system operates.

## Inspection procedure

INFOID:0000000001162214

### 1.CHECK OPERATION

1. Operate the A/C system and check the operation. Refer to HAC-5, "Description & Inspection".
2. Check the parts where noise is occurring.

Can the parts where noise is occurring be checked?

YES-1 >> Noise from blower fan motor: GO TO 2.
YES-2 >> Noise from compressor: GO TO 3.
YES-3 >> Noise from expansion valve: GO TO 4.
YES-4 >> Noise from A/C piping (pipe, flexible hose): GO TO 6.
YES-5 >> Noise from A/C compressor belt: GO TO 7.
NO >> END.

### 2.CHECK BLOWER FAN MOTOR

1. Remove blower fan motor. Refer to VTL-33, "Removal and Installation" (LHD models) or VTL-79, "Removal and Installation" (RHD models).
2. Remove foreign materials that are in the A/C unit assembly.
3. Check the noise from blower fan motor again.

Is the inspection result normal?

YES >> END.
NO >> Replace blower fan motor.

### 3.REPLACE COMPRESSOR

1. Correct the refrigerant with ACR4.
2. Recharge with the proper amount of the collected refrigerant after recycling or new refrigerant.
3. Check for the noise from compressor again.

Is the inspection result normal?

YES >> END.
NO >> Replace compressor.

### 4.CHECK WITH GAUGE PRESSURE

Perform the diagnosis with the gauge pressure. Refer to HA-9, "Trouble Diagnosis For Unusual Pressure".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace malfunctioning part(s).

### 5.REPLACE EXPANSION VALVE

1. Correct the refrigerant with ACR4.
2. Recharge with the proper amount of the collected refrigerant after recycling or new refrigerant.
3. Check for the noise from expansion valve again.

Are the symptoms solved?

YES >> END.
NO >> Replace expansion valve.

### 6.CHECK A/C PIPING (PIPE, FLEXIBLE HOSE)

1. Check A/C piping [pipe, flexible hose (for deformation and damage, etc.)].
2. Check the installation condition of clips and brackets, etc. of A/C piping (pipe, flexible hose).

Is the inspection result normal?

YES >> Fix the line with rubber or come vibration absorbing material.

NO >> Repair or replace parts according to the inspection results.

## 7. CHECK A/C COMPRESSOR BELT

Check tension of the A/C compressor belt. Refer to EM-15, "Checking" (MR20DE), EM-138, "Checking" (QR25DE) or EM-257, "Checking" (M9R).

Is the inspection result normal?

YES >> Check the noise from compressor: GO TO 3.
NO >> Adjust or replace the A/C compressor belt according to the inspection results.

# SELF-DIAGNOSIS CANNOT BE PERFORMED

## Description

INFOID:0000000001162215

Symptom: Self-diagnosis function does not operate normally.

## Inspection procedure

INFOID:0000000001162216

### 1. CHECK SELF-DIAGNOSIS FUNCTION

1. Set the fan control dial to OFF position.
2. Turn ignition switch ON.
3. Set in self-diagnosis mode as per the following. Within 10 seconds after starting engine (ignition switch is turned ON.), press A/C switch for at least 5 seconds.

**NOTE:**
If battery voltage drops below 12 V during diagnosis STEP-3, door motor speed becomes slower and as a result, the system may generate an error even when operation is normal. Start engine before performing this diagnosis to avoid this.

Does self-diagnosis function operate?

YES >> END.
NO >> GO TO 2.

### 2. CHECK POWER SUPPLY AND GROUND CIRCUIT OF AUTO AMP.

Check power supply and ground circuit of auto amp. Refer to HAC-101, "MR20DE/QR25DE : Component Function Check" (MR20DE/QR25DE) or HAC-103, "M9R : Component Function Check" (M9R).

Is the inspection result normal?

YES >> Replace auto amp.
NO >> Repair or replace malfunctioning part(s).

# PRECAUTION

## PRECAUTIONS

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

INFOID:0000000001555660

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

**WARNING:**

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the “SRS AIRBAG”.**
- **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.**

### Precaution Necessary for Steering Wheel Rotation After Battery Disconnect

INFOID:0000000001555661

**NOTE:**

- This Procedure is applied only to models with Intelligent Key system and NATS (NISSAN ANTI-THEFT SYSTEM).
- Remove and install all control units after disconnecting both battery cables with the ignition knob in the ″LOCK″ position.
- Always use CONSULT-III to perform self-diagnosis as a part of each function inspection after finishing work. If DTC is detected, perform trouble diagnosis according to self-diagnostic results.

For models equipped with the Intelligent Key system and NATS, an electrically controlled steering lock mechanism is adopted on the key cylinder.

For this reason, if the battery is disconnected or if the battery is discharged, the steering wheel will lock and steering wheel rotation will become impossible.

If steering wheel rotation is required when battery power is interrupted, follow the procedure below before starting the repair operation.

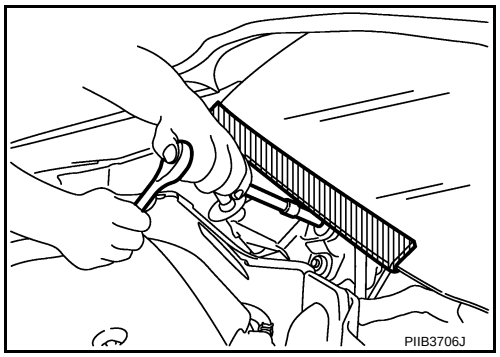
#### OPERATION PROCEDURE

1. Connect both battery cables.
   **NOTE:**
   Supply power using jumper cables if battery is discharged.
2. Use the Intelligent Key or mechanical key to turn the ignition switch to the ″ACC″ position. At this time, the steering lock will be released.
3. Disconnect both battery cables. The steering lock will remain released and the steering wheel can be rotated.
4. Perform the necessary repair operation.
5. When the repair work is completed, return the ignition switch to the ″LOCK″ position before connecting the battery cables. (At this time, the steering lock mechanism will engage.)
6. Perform a self-diagnosis check of all control units using CONSULT-III.

## Precaution for Procedure without Cowl Top Cover

INFOID:0000000001555683

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




## Precautions For Xenon Headlamp Service

INFOID:0000000001555705

**WARNING:**

**Comply with the following warnings to prevent any serious accident.**

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

**CAUTION:**

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

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

## Working with HFC-134a (R-134a)

INFOID:0000000001280610

**CAUTION:**

- **CFC-12 (R-12) refrigerant and HFC-134a (R-134a) refrigerant are not compatible. These refrigerants must never be mixed, even in the smallest amounts. Compressor malfunction is likely occur if the refrigerants are mixed.**
- **Use only specified lubricant for the HFC-134a (R-134a) A/C system and HFC-134a (R-134a) components. Compressor malfunction is likely to occur if lubricant other than that specified is used.**
- **The specified HFC-134a (R-134a) lubricant rapidly absorbs moisture from the atmosphere. The following handling precautions must be observed:**
- **Cap (seal) immediately the component to minimize the entry of moisture from the atmosphere when removing refrigerant components from a vehicle.**
- **Never remove the caps (unseal) until just before connecting the components when installing refrigerant components to a vehicle. Connect all refrigerant loop components as quickly as possible to minimize the entry of moisture into system.**
- **Use only the specified lubricant from a sealed container. Reseal immediately containers of lubricant. Lubricant becomes moisture saturated and should not be used without proper sealing.**
- **Never allow lubricant (Nissan A/C System Oil Type S) to come in contact with styrene foam parts. Damage may result.**

## General Refrigerant Precaution

INFOID:0000000001280611

**WARNING:**

- **Never breath A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose and throat. Use only approved recovery/recycling equipment to discharge HFC-134a (R-134a) refrigerant.**

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

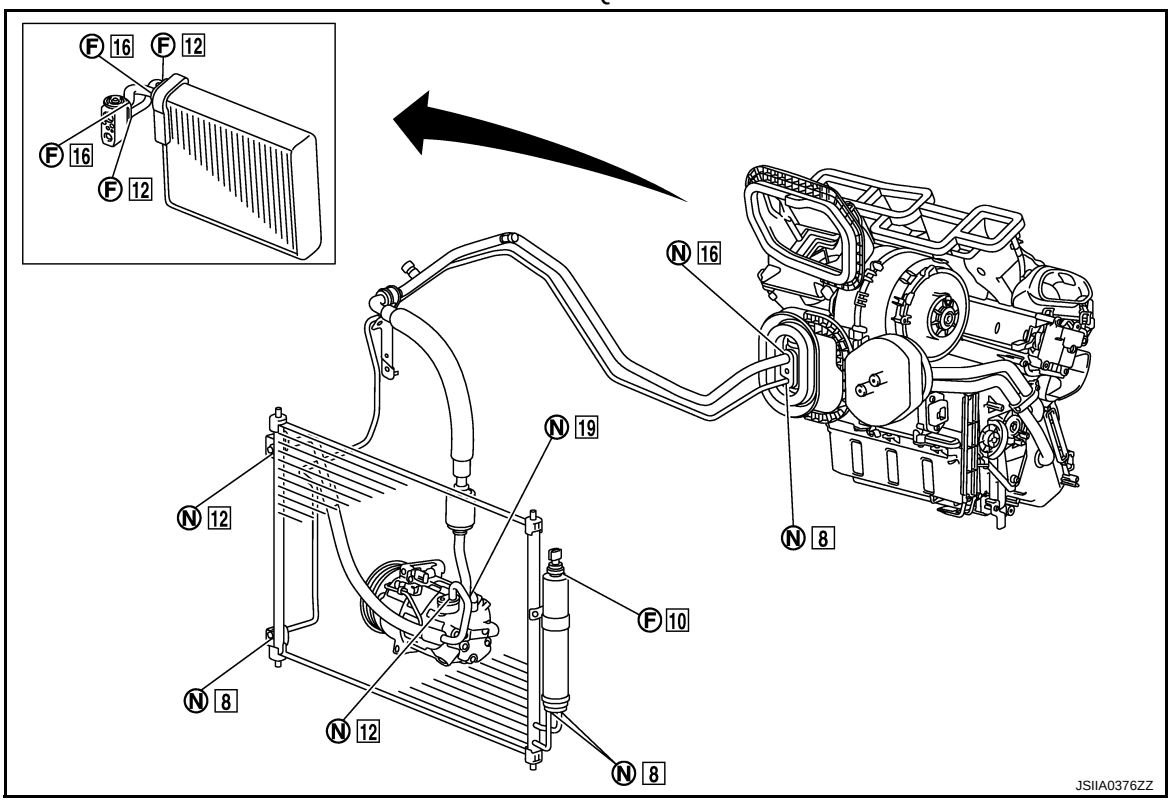
## Refrigerant Connection

INFOID:0000000001280612

A new type refrigerant connection has been introduced to all refrigerant lines except the following location.
- Expansion valve to evaporator
- Refrigerant pressure sensor to liquid tank

### O-RING AND REFRIGERANT CONNECTION

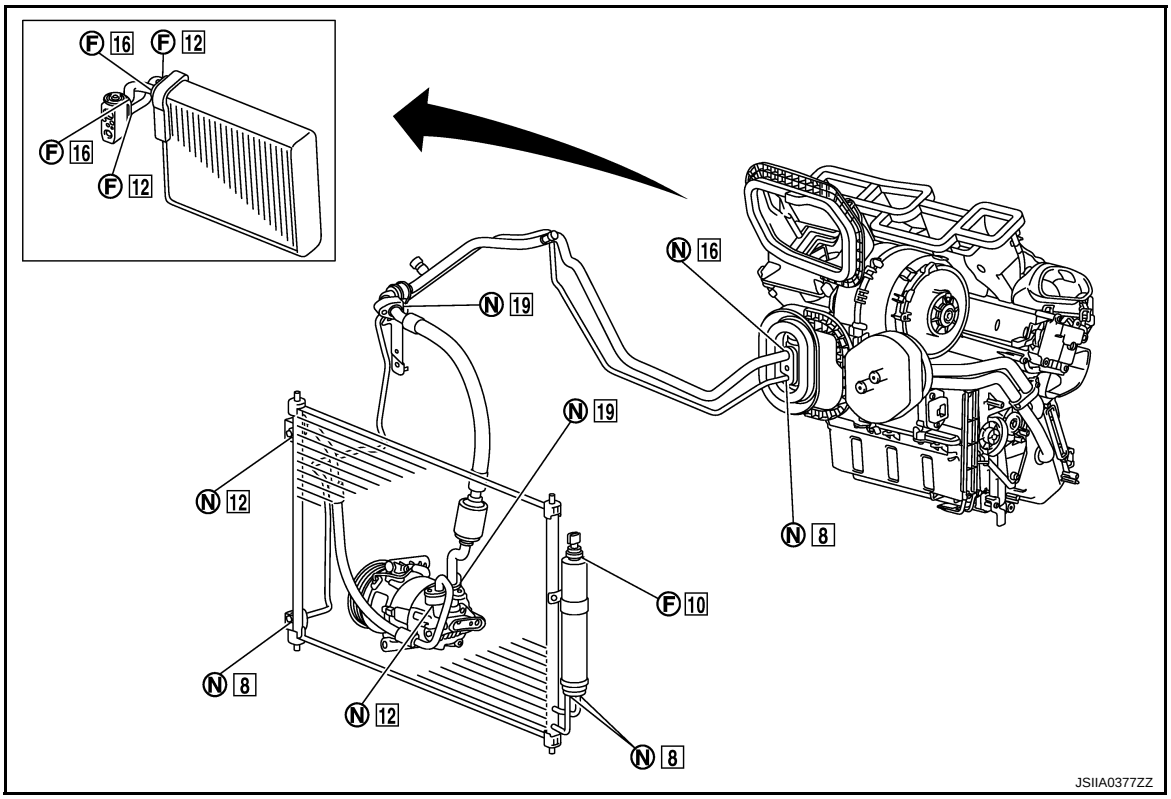
MR20DE/QR25DE




F. Former type refrigerant connection N. New type refrigerant connection

□: O-ring size

M9R




F. Former type refrigerant connection N. New type refrigerant connection

□: O-ring size

**CAUTION:**

**The new and former refrigerant connections use different O-ring configurations. Never confuse O-rings since they are not interchangeable. Refrigerant may leak at the connection if a wrong O-ring is installed.**

O-Ring Part Numbers and Specifications

| Connection type | Piping connection point | | Part number | QTY | O-ring size |
|---|---|---|---|---|---|
| New | Low-pressure flexible hose to expansion valve | | 92473 N8210 | 1 | 16 |
| | Low-pressure flexible hose to low-pressure pipe (M9R) | | 92474 N8210 | 1 | 19 |
| | Low-pressure pipe to expansion valve (M9R) | | 92473 N8210 | 1 | 16 |
| | Compressor to low-pressure flexible hose | | 92474 N8210 | 1 | 19 |
| | Compressor to high-pressure flexible hose | | 92472 N8210 | 1 | 12 |
| | Condenser to high-pressure flexible hose | | 92472 N8210 | 1 | 12 |
| | Condenser to high-pressure pipe | | 92471 N8210 | 1 | 8 |
| | High-pressure pipe to expansion valve | | 92471 N8210 | 1 | 8 |
| | Liquid tank to condenser | Inlet | 92471 N8210 | 1 | 8 |
| | | Outlet | | 1 | |
| Former | Refrigerant pressure sensor to liquid tank | | J2476 89956 | 1 | 10 |
| | Cooler pipe assembly | High-pressure side | 92475 71L00 | 1 | 12 |
| | | Low-pressure side | 92475 72L00 | 1 | 16 |

**WARNING:**

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

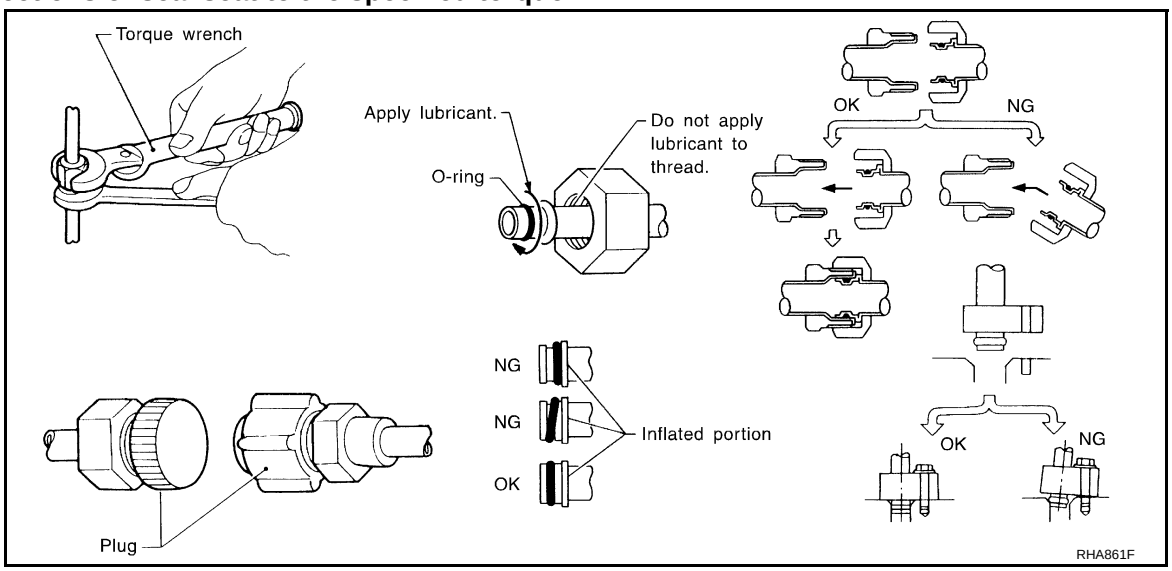
**CAUTION:**

**Observe the following when replacing or cleaning refrigerant cycle components.**

- **Store it in the same way at it is when mounted on the car when the compressor is removed. Failure to do so causes lubricant to enter the low-pressure chamber.**
- **Use always a torque wrench and a back-up wrench when connecting tubes.**
- **Plug immediately all openings to prevent entry of dust and moisture after disconnecting tubes.**
- **Connect the pipes at the final stage of the operation when installing an air conditioner in the vehicle. Never remove the seal caps of pipes and other components until just before required for connection.**
- **Allow components stored in cool areas to warm to working area temperature before removing seal caps. This prevents condensation from forming inside A/C components.**
- **Remove thoroughly moisture from the refrigeration system before charging the refrigerant.**
- **Replace always used O-rings.**
- **Apply lubricant to circle of the O-rings shown in illustration when connecting tube. Be careful not to apply lubricant to threaded portion.**

**Name : Nissan A/C System Oil Type S**

- **O-ring must be closely attached to the groove portion of tube.**
- **Be careful not to damage O-ring and tube when replacing the O-ring.**
- **Connect tube until a click can be heard. Then tighten the nut or bolt by hand. Check that the O-ring is installed to tube correctly.**
- **Perform leakage test and make sure that there is no leakage from connections after connecting line. Disconnect that line and replace the O-ring when the refrigerant leaking point is found. Then tighten connections of seal seat to the specified torque.**




## Service Equipment

INFOID:0000000001280613

### RECOVERY/RECYCLING EQUIPMENT

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

### ELECTRICAL LEAK DETECTOR

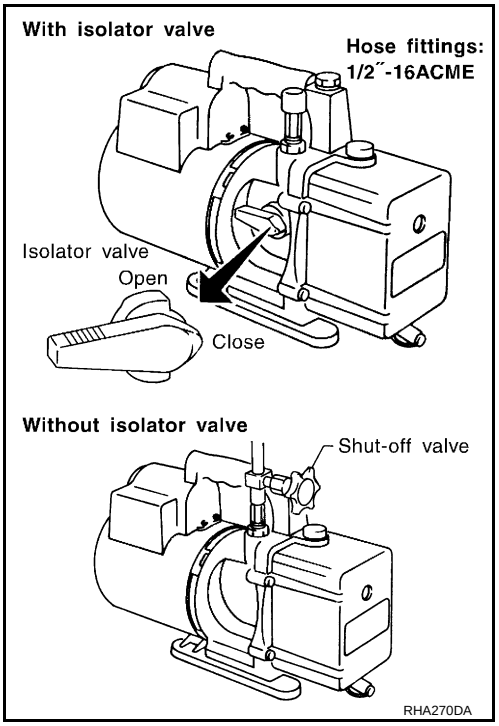
Be certain to follow the manufacturer’s instructions for tester operation and tester maintenance.

### VACUUM PUMP

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

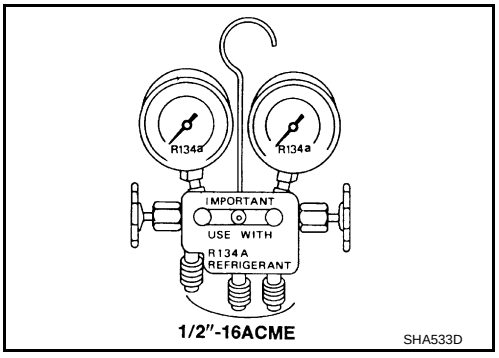
- Vacuum pumps usually have a manual isolator valve as part of the pump. Close this valve to isolate the service hose from the pump.
- Use a hose equipped with a manual shut-off valve near the pump end for pumps without an isolator. Close the valve to isolate the hose from the pump.
- Disconnect the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

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



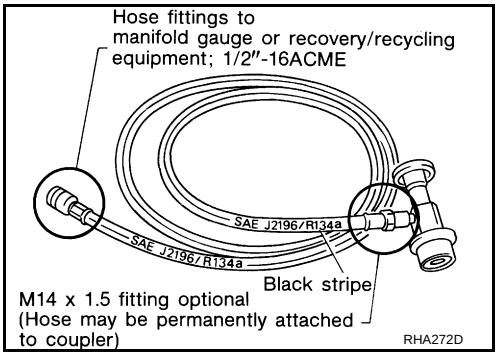

## MANIFOLD GAUGE SET

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




## SERVICE HOSES

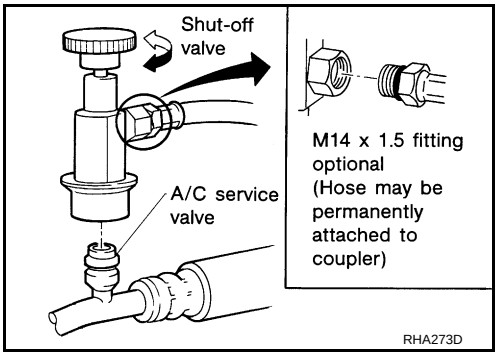
Be certain that the service hoses display the markings described (colored hose with black stripe). All hoses must equip positive shut-off devices (either manual or automatic) near the end of the hoses opposite to the manifold gauge.




## SERVICE COUPLERS

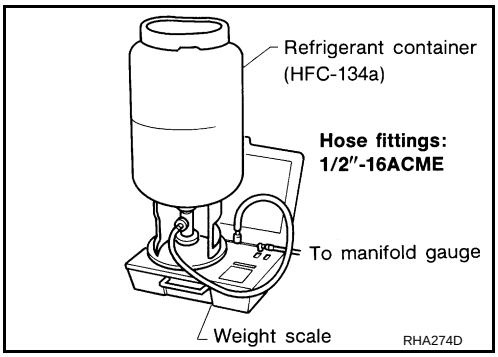
Never attempt to connect HFC-134a (R-134a) service couplers to a CFC-12 (R-12) A/C system. The HFC-134a (R-134a) couplers do not properly connect to the CFC-12 (R-12) system. However, if an improper connection is attempted, discharging and contamination may occur.

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




## REFRIGERANT WEIGHT SCALE

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




## CALIBRATING ACR4 WEIGHT SCALE

Calibrate the scale each three month.
To calibrate the weight scale on the ACR4:

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

## CHARGING CYLINDER

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

# COMPRESSOR

## General Precautions

INFOID:0000000001280614

**CAUTION:**

- **Plug all openings to prevent moisture and foreign matter from entering.**
- **Store it in the same way at it is when mounted on the car when the compressor is removed.**
- **Follow “LUBRICANT ADJUSTING PROCEDURE FOR COMPRESSOR REPLACEMENT” exactly when replacing or repairing compressor. Refer toHA-25, "Adjustment".**
- **Keep friction surfaces between clutch and pulley clean. Wipe it off by using a clean waste cloth moistened with thinner if the surface is contaminated with lubricant.**
- **Turn the compressor shaft by hand more than five turns in both directions after compressor service operation. This distributes equally lubricant inside the compressor. Let the engine idle and operate the compressor for one hour after the compressor is installed.**
- **Apply voltage to the new one and check for normal operation after replacing the compressor magnet clutch.**

# FLUORESCENT LEAK DETECTOR

## General Precautions

INFOID:0000000001280615

**CAUTION:**

- **The A/C system contains a fluorescent leak detection dye used for locating refrigerant leakages. An ultraviolet (UV) lamp is required to illuminate the dye when inspecting for leakages.**
- **Wear always fluorescence enhancing UV safety goggles to protect eyes and enhance the visibility of the fluorescent dye.**
- **The fluorescent dye leak detector is not a replacement for an electrical leak detector (SST). The fluorescent dye leak detector should be used in conjunction with an electrical leak detector (SST) to pinpoint refrigerant leakages.**
- **Read and follow all manufacture's operating instructions and precautions prior to performing the work for the purpose of safety and customer's satisfaction.**
- **A compressor shaft seal should not necessarily be repaired because of dye seepage. The compressor shaft seal should only be repaired after confirming the leakage with an electrical leak detector (SST).**
- **Remove always any remaining dye from the leakage area after repairs are completed to avoid a misdiagnosis during a future service.**
- **Never allow dye to come into contact with painted body panels or interior components. Clean immediately with the approved dye cleaner if dye is spilled. Fluorescent dye left on a surface for an extended period of time cannot be removed.**
- **Never spray the fluorescent dye cleaning agent on hot surfaces (engine exhaust manifold, etc.).**
- **Never use more than one refrigerant dye bottle (1/4 ounce /7.4 cc) per A/C system.**
- **Leak detection dyes for HFC-134a (R-134a) and CFC-12 (R-12) A/C systems are different. Never use HFC-134a (R-134a) leak detection dye in CFC-12 (R-12) A/C system, or CFC-12 (R-12) leak detection dye in HFC-134a (R-134a) A/C system, or A/C system damage may result.**
- **The fluorescent properties of the dye remains for three years or a little over unless a compressor malfunction occurs.**

### IDENTIFICATION

**NOTE:**

Vehicles with factory installed fluorescent dye have a green label.
Vehicles without factory installed fluorescent dye have a blue label.

### IDENTIFICATION LABEL FOR VEHICLE

Vehicles with factory installed fluorescent dye have the identification label on the front side of hood.