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# **HEATER & AIR CONDITIONING CONTROL SYSTEM**

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# **DIAGNOSIS AND REPAIR WORKFLOW**

**FAUTOMATIC AIR CONDITIONER** 

< BASIC INSPECTION > L	AUTOMATIC AIR CONDITIONER]
BASIC INSPECTION	
DIAGNOSIS AND REPAIR WORKFLOW	A
How to Perform Trouble Diagnosis For Quick And Accura	ate Repair INFOID:00000005386575 B
WORK FLOW	
1.LISTEN TO CUSTOMER COMPLAINT	С
Listen to customer complaint. Get detailed information about the condition occurs.	ons and environment when the symp-
>> GO TO 2	
2.CHECK FOR SERVICE BULLETINS	Е
Check for any service bulletins.	_
>> GO TO 3.	F
3. VERIFY THE SYMPTOM WITH OPERATIONAL CHECK	
Verify the symptom with operational check. Refer to HAC-6, "Operational Check in the control of	Check".
Can a symptom be duplicated? YES >> GO TO 4	
NO >> GO TO 5	Н
4.GO TO APPROPRIATE TROUBLE DIAGNOSIS	
Go to appropriate trouble diagnosis. Refer to <a href="HAC-81">HAC-81</a> , "Symptom Matrix Can a symptom be duplicated?	Chart".
>> GO TO 5.	_
5.PERFORM THE FRONT AIR CONTROL SELF-DIAGNOSIS	J
Perform front air control self-diagnosis. Refer to HAC-21, "Front Air Cont	rol Self-Diagnosis".
>> If any diagnostic trouble codes set. Refer to HAC-21, "Fr	ont Air Control Self-Diagnosis Code
<ul><li><u>Chart"</u>.</li><li>&gt;&gt; Confirm the repair by performing operational check. Refer to</li></ul>	HAC-6, "Operational Check".
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#### **INSPECTION AND ADJUSTMENT**

< BASIC INSPECTION >

[AUTOMATIC AIR CONDITIONER]

## INSPECTION AND ADJUSTMENT

## **Operational Check**

INFOID:0000000005386576

The purpose of the operational check is to confirm that the system operates properly.

### Conditions : Engine running and at normal operating temperature

#### CHECKING MEMORY FUNCTION

- 1. Set the temperature to 32° (90°F).
- 2. Press the OFF switch.
- 3. Turn ignition switch OFF.
- 4. Turn ignition switch ON.
- 5. Press the AUTO switch.
- 6. Confirm that the set temperature remains at previous temperature.
- 7. Press the OFF switch.

If NG, go to trouble diagnosis procedure for HAC-93, "Memory Function Check".

If OK, continue with next check.

#### CHECKING BLOWER

- 1. Rotate the blower control dial clockwise once, blower should operate on low speed.
- 2. Rotate the blower control dial again, and continue checking blower speed until all speeds are checked.
- 3. Leave blower on maximum speed.

If NG, go to trouble diagnosis procedure for HAC-45, "Front Blower Motor Diagnosis Procedure".

If OK, continue with next check.

#### CHECKING DISCHARGE AIR

- Press each MODE switch and the DEF switch.
- Each MODE position indicator should illuminate.
- Confirm that discharge air comes out according to the air distribution table. Refer to <u>HAC-15, "Discharge Air Flow"</u>.

Mode door position is checked in the next step.

If NG, go to trouble diagnosis procedure for HAC-23, "Mode Door Motor Diagnosis Procedure".

If OK, continue the check.

#### NOTE:

Confirm that the compressor clutch is engaged (sound or visual inspection) and intake door position is at fresh when the DEF or D/F is selected.

#### CHECKING RECIRCULATION (♥, ♥ ONLY)

- 1. Press recirculation ( ) switch one time. Recirculation indicator should illuminate.
- 2. Press recirculation ( ) switch one more time. Recirculation indicator should go off.
- 3. Listen for intake door position change (blower sound should change slightly).

If NG, go to trouble diagnosis procedure for HAC-37, "Intake Door Motor Diagnosis Procedure".

If OK, continue the check.

#### NOTE:

Confirm that the compressor clutch is engaged (sound or visual inspection) and intake door position is at fresh when the DEF or D/F is selected. REC ( ) is not allowed in DEF ( ) D/F ( ) or FOOT ( ).

#### CHECKING TEMPERATURE DECREASE

- 1. Rotate temperature control dial (drive or passenger) counterclockwise until 18°C (60°F) is displayed.
- 2. Check for cold air at appropriate discharge air outlets.

If NG, listen for sound of air mix door motor operation. If OK, go to trouble diagnosis procedure for <u>HAC-82</u>, <u>"Component Function Check"</u>. If air mix door motor appears to be malfunctioning, go to <u>HAC-28</u>, <u>"Air Mix Door Motor (Driver) Component Function Check"</u>.

#### **INSPECTION AND ADJUSTMENT**

#### < BASIC INSPECTION >

#### [AUTOMATIC AIR CONDITIONER]

If OK, continue the check.

#### CHECKING TEMPERATURE INCREASE

- 1. Rotate temperature control dial clockwise (drive or passenger) until 32°C (90°F) is displayed.
- Check for hot air at appropriate discharge air outlets.

If NG, listen for sound of air mix door motor operation. If OK, go to trouble diagnosis procedure for <u>HAC-90</u>, <u>"Component Function Check"</u>. If air mix door motor appears to be malfunctioning, go to <u>HAC-28</u>, "Air Mix Door <u>Motor (Driver) Component Function Check"</u>.

If OK, continue with next check.

#### CHECK A/C SWITCH

- 1. Press A/C switch when AUTO switch is ON, or in manual mode.
- A/C switch indicator will turn ON.
  - Confirm that the compressor clutch engages (sound or visual inspection).

#### NOTE:

If current mode setting is DEF or D/F, compressor clutch will already be engaged and cannot be turned off. If NG, go to trouble diagnosis procedure for <u>HAC-50</u>, "<u>Magnet Clutch Diagnosis Procedure</u>". If OK, continue with next check.

#### CHECKING AUTO MODE

- 1. Press AUTO switch.
- 2. AUTO indicator should illuminate.
  - If ambient temperature is warm, and selected temperature is cool, confirm that the compressor clutch engages (sound or visual inspection). (Discharge air and blower speed will depend on ambient, in-vehicle, and set temperatures.)

If NG, go to trouble diagnosis procedure for <u>HAC-68</u>, "Front Air Control Power and Ground Diagnosis <u>Procedure"</u>, then if necessary, trouble diagnosis procedure for <u>HAC-50</u>, "Magnet Clutch Diagnosis Procedure".

If all operational checks are OK (symptom cannot be duplicated), go to malfunction Simulation Tests in <u>HAC-5</u>, "How to <u>Perform Trouble Diagnosis For Quick And Accurate Repair"</u> and perform tests as outlined to simulate driving conditions environment. If symptom appears. Refer to <u>HAC-81</u>, "Symptom Matrix Chart", and perform applicable trouble diagnosis procedures.

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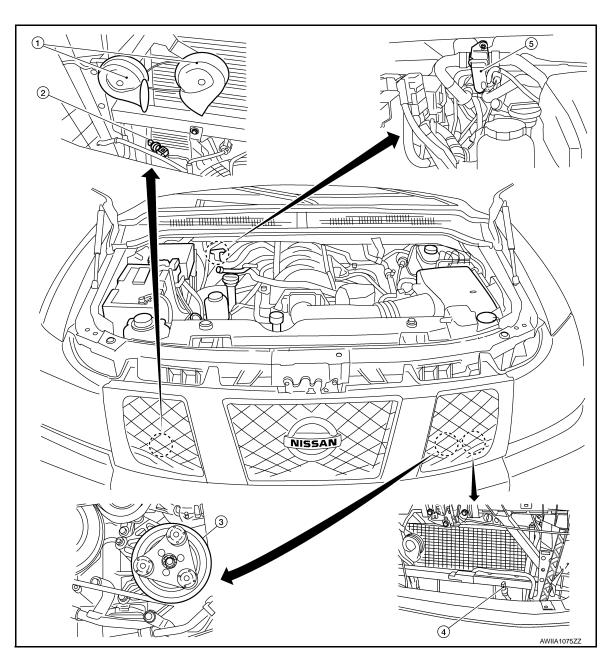
# **FUNCTION DIAGNOSIS**

# **FUNCTION INFORMATION**

**Component Part Location** 

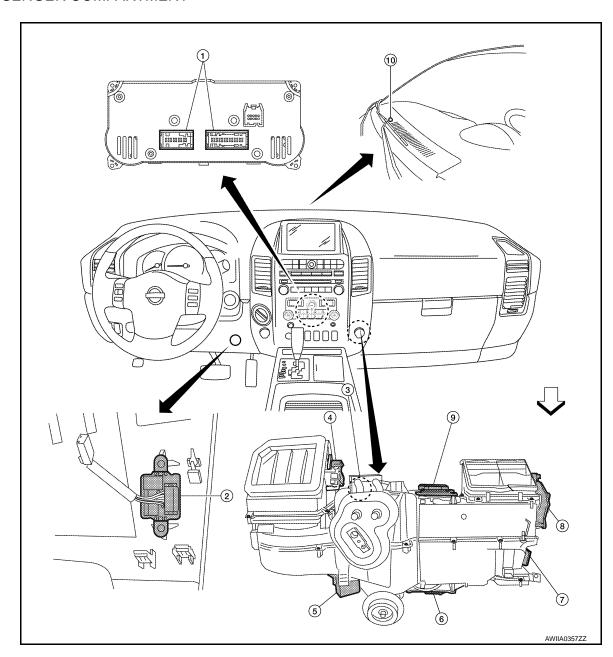
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#### **ENGINE COMPARTMENT**



- 1. Horn (view with grille removed)
- Ambient sensor E1 (view with grille removed)
- Refrigerant pressure sensor E48
- 5. Water valve F68
- 3. A/C compressor F3

#### PASSENGER COMPARTMENT



- 1. Front air control M49, M50
- 4. Intake door motor M58
- 7. Mode door motor M142
- 10. Optical sensor M302
- 2. In-vehicle sensor M32
- 5. Variable blower control M122
- 8. Defroster door motor M144

- 3. Intake sensor M146
- 6. Air mix door motor (Passenger) M143
- 9. Air mix door motor (driver) M147

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## **FUNCTION INFORMATION**

# < FUNCTION DIAGNOSIS >

# [AUTOMATIC AIR CONDITIONER]

Symptom Table

INFOID:0000000005386578

Symptom	Reference Page		
A/C system does not come on.	Go to Trouble Diagnosis Procedure for A/C System.	HAC-68	
A/C system cannot be controlled.	Go to Self-diagnosis Function.	HAC-21	
Air outlet does not change.	Co to Trouble Diagnosis Presedure for Mode Door Motor	HAC 22	
Mode door motor is malfunctioning.	Go to Trouble Diagnosis Procedure for Mode Door Motor.	<u>HAC-23</u>	
Discharge air temperature does not change.	Co to Trouble Diagnosis Broodlyre for Air Mix Door Mater	114.0.20	
Air mix door motor is malfunctioning.	Go to Trouble Diagnosis Procedure for Air Mix Door Motor.	<u>HAC-28</u>	
Intake door does not change.	Co to Trouble Diagnosis Presedure for Intake Dear Mater	HAC 27	
Intake door motor is malfunctioning.	Go to Trouble Diagnosis Procedure for Intake Door Motor.	<u>HAC-37</u>	
Defroster door motor is malfunctioning.	Go to Trouble Diagnosis Procedure for Defroster Door Motor.	<u>HAC-40</u>	
Front blower motor operation is malfunctioning.	Go to Trouble Diagnosis Procedure for Front Blower Motor.	<u>HAC-45</u>	
Magnet clutch does not engage.	Go to Trouble Diagnosis Procedure for Magnet Clutch.	HAC-50	
Insufficient cooling	Go to Trouble Diagnosis Procedure for Insufficient Cooling.	<u>HAC-82</u>	
Insufficient heating	Go to Trouble Diagnosis Procedure for Insufficient Heating.	HAC-90	
Noise	Go to Trouble Diagnosis Procedure for Noise.	<u>HAC-92</u>	
Self-diagnosis cannot be performed.	Go to Trouble Diagnosis Procedure for Self-diagnosis.	<u>HAC-21</u>	
Memory function does not operate.	Go to Trouble Diagnosis Procedure for Memory Function.	HAC-93	

#### REFRIGERATION SYSTEM

## < FUNCTION DIAGNOSIS >

[AUTOMATIC AIR CONDITIONER]

## REFRIGERATION SYSTEM

# Refrigerant Cycle

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#### REFRIGERANT FLOW

The refrigerant flows in the standard pattern, that is, through the compressor, the condenser with liquid tank, through the evaporator, and back to the compressor. The refrigerant evaporation through the evaporator coils are controlled by externally equalized expansion valve, located inside the evaporator case.

# Refrigerant System Protection

#### INFOID:0000000005613057

#### REFRIGERANT PRESSURE SENSOR

The refrigerant system is protected against excessively high or low pressures by the refrigerant pressure sensor, located on the condenser. If the system pressure rises above or falls below the specifications, the refrigerant pressure sensor detects the pressure inside the refrigerant line and sends a voltage signal to the ECM. The ECM de-energizes the A/C relay to disengage the magnetic compressor clutch when pressure on the high pressure side detected by refrigerant pressure sensor is over about 2,746 kPa (28 kg/cm², 398 psi), or below about 120 kPa (1.22 kg/cm², 17.4 psi).

### PRESSURE RELIEF VALVE

The refrigerant system is also protected by a pressure relief valve, located in the rear head of the compressor. When the pressure of refrigerant in the system increases to an abnormal level [more than 2,990 kPa (30.5 kg/

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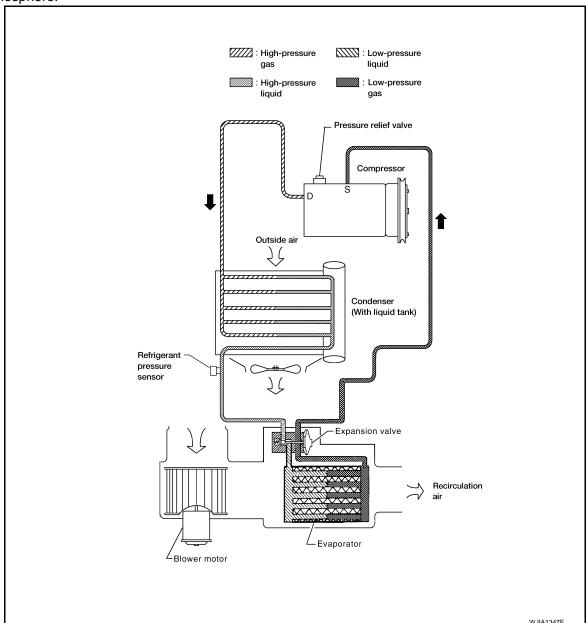
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cm<sup>2</sup>, 433.6 psi)], the release port on the pressure relief valve automatically opens and releases refrigerant into the atmosphere.



# **AUTOMATIC AIR CONDITIONER SYSTEM**

# Control System Diagram

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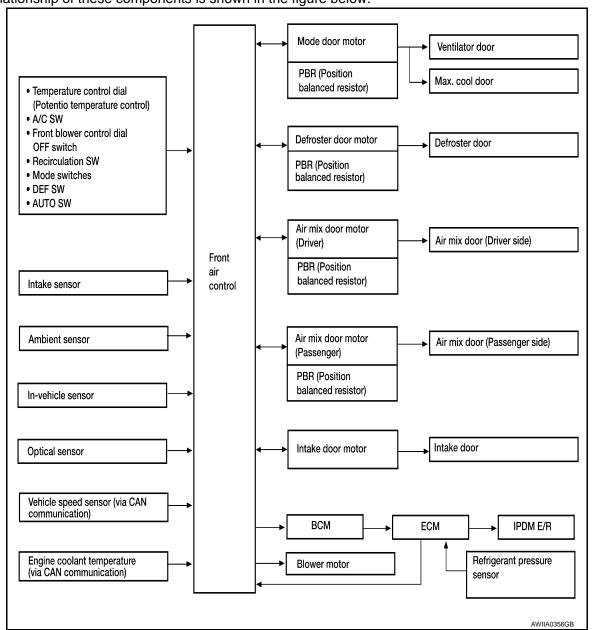
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#### **CONTROL SYSTEM**

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



Control System Description

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CONTROL OPERATION

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# Front air control Auto Auto Auto DUAL

#### **AUTO SWITCH**

- The compressor, intake door, air mix doors, outlet doors and blower speed are automatically controlled so
  that the in-vehicle temperature will reach, and be maintained at the set temperature selected by the operator.
- When pressing AUTO switch, air inlet, air outlet, blower speed, and discharge air temperature are automatically controlled.

#### TEMPERATURE CONTROL DIAL (DRIVER)

Increases or decreases the set temperature.

#### TEMPERATURE CONTROL DIAL (PASSENGER)

Increases or decreases the set temperature.

#### RECIRCULATION ( ) SWITCH

- When REC switch is ON, REC switch indicator turns ON, and air inlet is set to REC.
- When REC switch is turned OFF, or when compressor is turned from ON to OFF, REC switch is automatically turned OFF. REC mode can be re-entered by pressing REC switch again.
- REC switch is not operated when DEF switch is turned ON, at the D/F position, or in floor position.

#### DEFROSTER ( ) SWITCH

Positions the air outlet doors to the defrost position. Also positions the intake doors to the outside air position, and turns A/C compressor ON.

#### REAR WINDOW DEFOGGER SWITCH (CREW CAB)

When switch is ON, rear window and door mirrors are defogged.

#### **OFF SWITCH**

The compressor and blower are OFF, the intake doors are set to the outside air position, and the air outlet doors are set to the foot (75% foot and 25% defrost) position.

#### BLOWER CONTROL DIAL

The blower speed is manually controlled with this dial.

#### A/C SWITCH

The compressor is ON or OFF.

(Pressing the A/C switch when the AUTO switch is ON will turn off the A/C switch and compressor.)

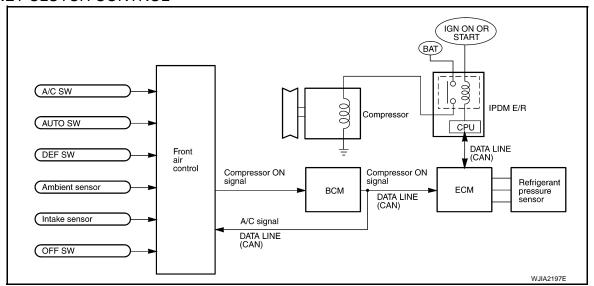
#### MODE SWITCHES

Controls the air discharge outlets.

#### **DUAL SWITCH**

- When the DUAL switch indicator is illuminated, the driver and passenger temperature can each be set independently.
- When the DUAL switch indicator is not illuminated, the driver temperature setting is applied to both sides.

#### MAGNET CLUTCH CONTROL



When A/C switch or DEF switch is pressed, front air control inputs compressor ON signal to BCM. BCM sends compressor ON signal to ECM and front air control, via CAN communication line.

ECM judges whether compressor can be turned ON, based on each sensor status (refrigerant pressure sensor signal, throttle angle sensor, etc.). If it judges compressor can be turned ON, it sends compressor ON signal to IPDM E/R, via CAN communication line.

Upon receipt of compressor ON signal from ECM, IPDM E/R turns air conditioner relay ON to operate compressor.

# Discharge Air Flow

		WJIA0540E	
Mode door position		Air outlet/distribution	
	Vant	Foot	Defractor

Mode door position	All outlet/distribution			
	Vent	Foot	Defroster	
~;	95%	5%	_	
Ÿ	60%	40%	_	
ن	_	70%	30%	
**	_	60%	40%	
<b>*</b>	_	10%	90%	

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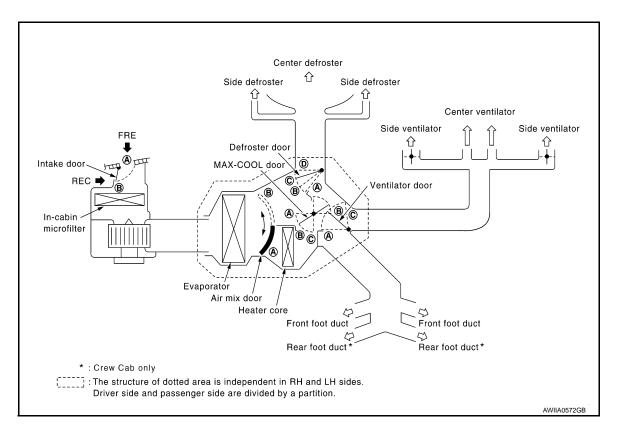
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# Switches And Their Control Function

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Position	MODE SW		DEF	sw	REC	SW	Tempera	ture con	trol dial	OFF		
or switch	VENT	B/L	FOOT	D/F	ON	OFF	ON	OFF	/		\	sw
Door	→ •	_⇒.•	_ •	<b>W</b> •	_	TMC	<b>(E)</b>		(II (AUTO)))		(PR)	
		+,~	<b>+</b> ~	+/~	-> ∳ <	0		0	COLD	~	нот	OFF B
Ventilator door	A	B	©	©	©		_	_				©
MAX-COOL door	<b>(A)</b>	B	B	B	©		_					B
Defroster door	<b>(D)</b>	<b>(D)</b>	<b>O</b> or <b>©</b>	B	<b>(A)</b>		_	_				©
Intake door		_	_		B		<b>(A)</b>	B			B	
Air mix door		_					— (A) AUTO (B)					

# **DIAGNOSIS SYSTEM (HVAC)**

#### < FUNCTION DIAGNOSIS >

## [AUTOMATIC AIR CONDITIONER]

# **DIAGNOSIS SYSTEM (HVAC)**

# CONSULT-III Function (HVAC)

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

Diagnostic mode	Description
SELF-DIAG RESULTS	Displays Front air control self-diagnosis results.
DATA MONITOR	Displays Front air control input/output data in real time.
CAN DIAG SUPPORT MNTR	The result of transmit/receive diagnosis of CAN communication can be read.
ECU PART NUMBER	Front air control part number can be read.

#### **SELF-DIAGNOSIS**

Display Item List

DTC	Description	Reference page
B2573	Battery voltage out of range	CHG-4, "Work Flow"
B2578	In-vehicle sensor circuit out of range (low)	HAC-60, "In-Vehicle Sensor Diagnosis Procedure"
B2579	In-vehicle sensor circuit out of range (high)	HAC-60, III-Verlicie Sensor Diagnosis Procedure
B257B	Ambient sensor circuit short	HAC-58, "Ambient Sensor Component Inspection"
B257C	Ambient sensor circuit open	HAC-36, Ambient Sensor Component inspection
B257F	Optical sensor (Driver) circuit open or short	HAC 62 "Optical Conser Diagnosis Procedure"
B2580	Optical sensor (Passenger) circuit open or short	HAC-63, "Optical Sensor Diagnosis Procedure".
B2581	Intake sensor circuit short	HAC-66, "Intake Sensor Component Inspection"
B2582	Intake sensor circuit open	11/10-00, Intake Sensor Component inspection
B2587	Stuck button	VTL-8, "Removal and Installation"
U1000	CAN bus fault	LAN-14, "Trouble Diagnosis Flow Chart"

#### **DATA MONITOR**

Display Item List

Monitor item	Value	Contents
BATT VIA CAN	"V"	Displays battery voltage signal.
IGN VIA CAN	"ON/OFF"	Displays ignition switch signal.
DVR SUNLD SEN	"w/m2"	Displays optical sensor (driver) signal.
PAS SUNLD SEN	"w/m2"	Displays optical sensor (passenger) signal.
AMB TEMP SEN	"°C"	Displays ambient sensor signal.
EVAP TEMP SEN	"°C"	Displays intake sensor signal.
INCAR TMP SEN	"°C"	Displays in-vehicle sensor signal.
MODE FDBCK	"V"	Displays mode door motor feedback signal.
DVR MIX FDBCK	"V"	Displays air mix door motor (driver) feedback signal.
PAS MIX FDBCK	"V"	Displays air mix door motor (passenger) feedback signal.
DEF FDBCK	"V"	Displays defroster door motor feedback signal.
RECIRC	"ON/OFF"	Displays recirculation switch signal.
DEFROST	"ON/OFF"	Displays defroster switch signal.
AUTO	"ON/OFF"	Displays AUTO switch signal.
A/C	"ON/OFF"	Displays A/C switch signal.

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# **DIAGNOSIS SYSTEM (HVAC)**

## < FUNCTION DIAGNOSIS >

# [AUTOMATIC AIR CONDITIONER]

Monitor item	Value	Contents
L TEMP UP	"ON/OFF"	Displays driver side temperature control dial (temp increase) signal.
L TEMP DOWN	"ON/OFF"	Displays driver side temperature control dial (temp decrease) signal.
R TEMP UP	"ON/OFF"	Displays passenger temperature control dial (temp increase) signal.
R TEMP DOWN	"ON/OFF"	Displays passenger temperature control dial (temp decrease) signal.
RR DEFOG	"ON/OFF"	Displays rear defroster request signal.
FAN UP	"ON/OFF"	Displays blower motor (blower speed increase) signal.
FAN DOWN	"ON/OFF"	Displays blower motor (blower speed decrease) signal.
MODE SELECT	"DTNT"	Displays selected mode position.
DUAL MODE	"ON/OFF"	Displays dual mode status.

## **DIAGNOSIS SYSTEM (BCM)**

< FUNCTION DIAGNOSIS >

## [AUTOMATIC AIR CONDITIONER]

# **DIAGNOSIS SYSTEM (BCM)**

# CONSULT-III Function (BCM - COMMON ITEM)

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#### APPLICATION ITEM

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

Diagnosis mode	Function Description	
WORK SUPPORT	Changes the setting for each system function.	
SELF DIAGNOSTIC RESULT	Displays the diagnosis results judged by BCM. Refer to BCS-49, "DTC Index".	
CAN DIAG SUPPORT MNTR	Monitors the reception status of CAN communication viewed from BCM.	
DATA MONITOR	The BCM input/output signals are displayed.	
ACTIVE TEST	The signals used to activate each device are forcibly supplied from BCM.	
ECU IDENTIFICATION	The BCM part number is displayed.	
CONFIGURATION	<ul> <li>Enables to read and save the vehicle specification.</li> <li>Enables to write the vehicle specification when replacing BCM.</li> </ul>	

#### 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.

Custom	Cub avatam adaption item	Diagnosis mode		
System	Sub system selection item	WORK SUPPORT	DATA MONITOR	ACTIVE TEST
BCM	BCM	×		
Door lock	DOOR LOCK	×	×	×
Rear window defogger	REAR DEFOGGER		×	×
Warning chime	BUZZER		×	×
Interior room lamp timer	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		×	
Combination switch	COMB SW		×	
Immobilizer	IMMU		×	×
Interior room lamp battery saver	BATTERY SAVER	×	×	×
RAP (retained accessory power)	RETAINED PWR	×	×	×
Signal buffer system	SIGNAL BUFFER		×	×
TPMS (tire pressure monitoring system)	AIR PRESSURE MONITOR	×	×	×
Vehicle security system	THEFT ALM	×	×	×

CONSULT-III Function (BCM - AUTO AIR CONDITIONER)

INFOID:0000000005613055

#### **DATA MONITOR**

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# **DIAGNOSIS SYSTEM (BCM)**

# [AUTOMATIC AIR CONDITIONER]

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

#### **SELF-DIAGNOSIS FUNCTION**

## **SELF-DIAGNOSIS FUNCTION**

## Front Air Control Self-Diagnosis

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#### A/C SYSTEM SELF-DIAGNOSIS FUNCTION

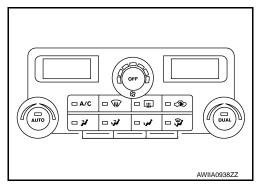
The self-diagnosis function is built into the front air control to quickly locate the cause of malfunctions.

#### **DESCRIPTION**

The self-diagnostic system diagnoses sensors, CAN system, and battery voltage on front air control Refer to applicable sections (items) for details. Fault codes (if any are present) will be displayed in the ambient temperature display area. Refer to <a href="HAC-21">HAC-21</a>, "Front Air Control Self-Diagnosis Code Chart".

#### SELF-DIAGNOSTIC MODE

- Press the OFF switch.
- 2. Press the FLOOR/DEF (\*) and DEF (\*) mode switches together and release on the front air control.
- 3. Press the REC ( ) to enter self diagnostic mode.
- 4. Turn ignition switch OFF to exit out of self-diagnostic mode.



INFOID:0000000005386589

## Front Air Control Self-Diagnosis Code Chart

#### SELF-DIAGNOSTIC CODE CHART

Code No.	Reference page		
03	Battery voltage out of range	CHG-4, "Work Flow"	
30	In-vehicle sensor circuit out of range (low)	HAC CO III VALLE COME BY A STREET OF THE STREET	
31	In-vehicle sensor circuit out of range (high)	HAC-60, "In-Vehicle Sensor Diagnosis Procedure"	
40	Ambient sensor circuit short	HAC 57 "Ambient Conser Diagnosis Dresedure"	
41	Ambient sensor circuit open	HAC-57, "Ambient Sensor Diagnosis Procedure"	
50	Optical sensor (Driver) circuit open or short	HAC-63, "Optical Sensor Diagnosis Procedure"	
52	Optical sensor (Passenger) circuit open or short		
56	Intake sensor circuit short	HAC-65, "Intake Sensor Diagnosis Procedure"	
57	Intake sensor circuit open	TAC-03, Intake Sensor Diagnosis Procedure	
80	CAN bus fault	LAN-14, "Trouble Diagnosis Flow Chart"	
90	Stuck button	VTL-8, "Removal and Installation"	

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# COMPONENT DIAGNOSIS

## MODE DOOR MOTOR

# System Description

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#### SYSTEM DESCRIPTION

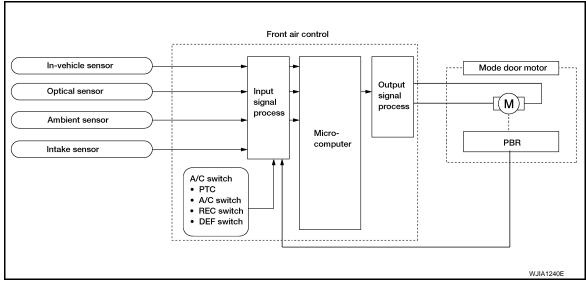
Component Parts

Mode door control system components are:

- Front air control
- Mode door motor
- PBR (built into mode door motor)
- In-vehicle sensor
- · Ambient sensor
- Optical sensor
- · Intake sensor

#### System Operation

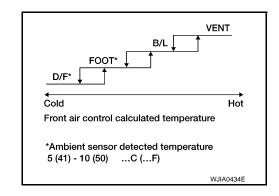
The mode door position (vent, B/L, foot, D/F, and defrost) is set by the front air control by means of the mode door motor. When a mode door position is selected on the front air control, voltage is applied to one circuit of the mode door motor while ground is applied to the other circuit, causing the mode door motor to rotate. The direction of rotation is determined by which circuit has voltage applied to it, and which one has ground applied to it. The front air control monitors the mode door position by measuring the voltage signal on the PBR circuit. In AUTO mode the mode door position is set by the front air control which determines the proper position based on inputs from the in-vehicle sensor, ambient sensor, optical sensor, intake sensor, and the temperature selected by the driver or passenger.



Mode Door Control Specification

#### COMPONENT DESCRIPTION

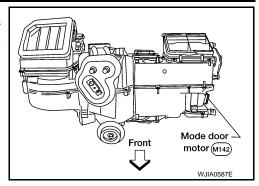
Mode Door Motor



#### < COMPONENT DIAGNOSIS >

#### [AUTOMATIC AIR CONDITIONER]

The mode door motor is attached to the heater & cooling unit assembly. It rotates so that air is discharged from the outlet as indicated by the front air control. Motor rotation is conveyed to a link which activates the mode door.



Mode Door Motor Component Function Check

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#### INSPECTION FLOW

# ${f 1}$ .CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - DISCHARGE AIR

- Press each mode switch and press the (DEF) switch. Each position indicator should illuminate.
- 2. Confirm that discharge air comes out according to the air distribution table. Refer to HAC-15, "Discharge Air Flow".

#### NOTE:

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

#### Is the inspection result normal?

YES >> Inspection End.

>> Go to diagnosis procedure. Refer to HAC-23, "Mode Door Motor Diagnosis Procedure". NO

## Mode Door Motor Diagnosis Procedure

INFOID:0000000005386592

Regarding Wiring Diagram information, refer to HAC-72, "Wiring Diagram".

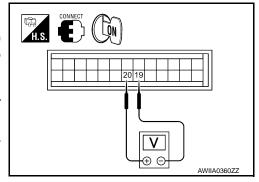
#### SYMPTOM:

- Air outlet does not change.
- Mode door motor does not operate normally.

# 1. CHECK FRONT AIR CONTROL FOR POWER AND GROUND

- Turn ignition switch ON.
- Press the B/L (3) mode switch.
- Check voltage between front air control harness connector M49 terminal 19 and terminal 20 while pressing the mode switch to the floor ( i) mode.

Connector	Te	erminals	Condition	Voltage (Approx.)
Connector	(+)	(-)	Condition	
Front air control: M49	20	19	Press mode switch	Battery voltage



#### Is the inspection result normal?

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

# 2.CHECK MODE DOOR MOTOR CIRCUITS FOR SHORT TO GROUND

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#### < COMPONENT DIAGNOSIS >

#### [AUTOMATIC AIR CONDITIONER]

- 1. Turn ignition switch OFF.
- Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M49 terminal 19, 20 and ground.

19 - Ground : Continuity should not exist.20 - Ground : Continuity should not exist.

#### Is the inspection result normal?

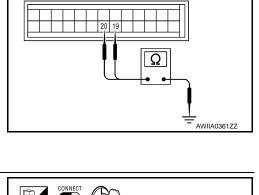
YES >> Replace front air control. Refer to <u>VTL-8</u>, "Removal and Installation".

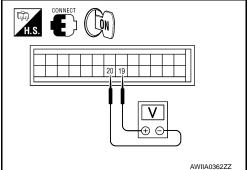
NO >> Repair or replace harness as necessary.

# 3.CHECK FRONT AIR CONTROL FOR GROUND AND POWER

- 1. Press the mode switch to the D/F (\*) mode.
- 2. Check voltage between front air control harness connector M49 terminal 19 and terminal 20 while pressing the mode switch to the vent (\*) mode.

Connector	Ti	Terminals Condition		Voltage
Connector	(+)	(-)	Condition	(Approx.)
Front air control: M49	19	20	Press mode switch	Battery voltage





#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace front air control. Refer to VTL-8, "Removal and Installation".

# 4. CHECK MODE DOOR MOTOR AND CIRCUITS FOR OPEN

- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M49 terminal 19 and terminal 20.

# Continuity should exist.

#### Is the inspection result normal?

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

# H.S. DISCONNECT OFF

# 5. CHECK MODE DOOR MOTOR CIRCUITS FOR OPEN

- 1. Disconnect the mode door motor harness connector.
- Check continuity between front air control harness connector M49 (A) terminal 19, 20 and the mode door motor harness connector M142 (B) terminal 5, 6.

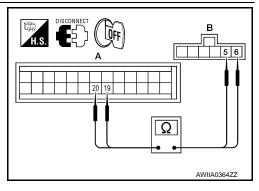
5 - 19 : Continuity should exist.6 - 20 : Continuity should exist.

#### Is the inspection result normal?

YES >> Replace mode door motor. Refer to <u>VTL-19</u>, "<u>Removal and Installation</u>".

NO >> Repair or replace harness as necessary.

# 6. CHECK FRONT AIR CONTROL FOR PBR POWER AND GROUND



#### < COMPONENT DIAGNOSIS >

#### [AUTOMATIC AIR CONDITIONER]

- 1. Reconnect front air control harness connector.
- 2. Turn ignition switch ON.
- 3. Check voltage between front air control harness connector M50 (A) terminal 28 and M49 (B) terminal 3.

Connector	Terr	Voltage (Ap-		
Connector	(+)	(-)	prox.)	
Front air control: M49, M50	28	3	5V	

# CONNECT CON B A A A AWIIA0365ZZ

#### Is the inspection result normal?

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

# 7.CHECK PBR REFERENCE VOLTAGE CIRCUIT FOR SHORT TO GROUND

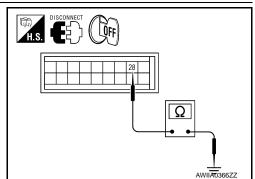
- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M50 terminal 28 and ground.

#### Continuity should not exist.

#### Is the inspection result normal?

YES >> Replace front air control Refer to <u>VTL-8</u>, "Removal and <u>Installation"</u>.

NO >> Repair or replace harness as necessary.



# 8. CHECK PBR REFERENCE VOLTAGE AND GROUND CIRCUITS

- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M50 (A) terminal 28 and M49 (B) terminal 3.

#### Continuity should exist.

#### Is the inspection result normal?

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

# PISCONNECT OFF B AWIIA0367ZZ

# 9. CHECK PBR REFERENCE VOLTAGE CIRCUIT FOR OPEN

- 1. Disconnect the mode door motor harness connector.
- Check continuity between mode door motor harness connector M142 (B) terminal 3, 1 and front air control harness connector M49 (C) terminal 3, M50 (A) terminal 28.

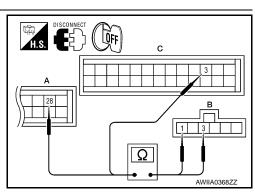
28 - 1 : Continuity should exist. 3 - 3 : Continuity should exist.

#### Is the inspection result normal?

YES >> Replace mode door motor. Refer to <u>VTL-19</u>, "<u>Removal and Installation</u>".

NO >> Repair or replace harness as necessary.

## 10.CHECK PBR FEEDBACK VOLTAGE



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#### < COMPONENT DIAGNOSIS >

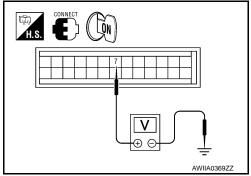
#### [AUTOMATIC AIR CONDITIONER]

- 1. Reconnect the front air control harness connector.
- 2. Turn ignition switch ON.
- Check voltage between front air control harness connector M49 terminal 7 and ground while cycling mode switch through all modes.

## Voltage : Approx. 1V - 4.5V

#### Is the inspection result normal?

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



# 11. CHECK PBR FEEDBACK SIGNAL CIRCUIT FOR SHORT TO GROUND

- 1. Turn ignition switch OFF.
- 2. Disconnect front air control harness connector.
- Check continuity between front air control harness connector M49 terminal 7 and ground.

#### Continuity should not exist.

#### Is the inspection result normal?

YES >> Replace front air control Refer to <u>VTL-8</u>, "Removal and Installation".

NO >> Repair or replace harness as necessary.



# 12.CHECK PBR FEEDBACK CIRCUIT FOR OPEN

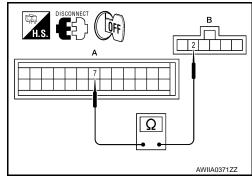
- Turn ignition switch OFF.
- Disconnect the mode door motor harness connector and front air control harness connector.
- Check continuity between mode door motor harness connector M142 (B) terminal 2 and front air control harness connector M49 (A) terminal 7.

#### Continuity should exist.

#### Is the inspection result normal?

YES >> Replace mode door motor. Refer to <u>VTL-19, "Removal and Installation"</u>.

NO >> Repair or replace harness as necessary.



AWIIA0370ZZ

# System Description

#### INFOID:0000000005386593

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#### SYSTEM DESCRIPTION

#### SYMPTOM:

- Discharge air temperature does not change.
- Air mix door motor does not operate.

#### SYSTEM DESCRIPTION

#### **Component Parts**

Air mix door control system components are:

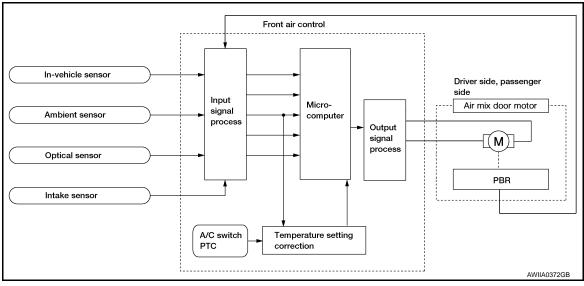
- Front air control
- Air mix door motors (driver, passenger)
- PBR (built-into air mix door motors)
- · In-vehicle sensor
- Ambient sensor
- · Optical sensor
- · Intake sensor

#### System Operation

The front air control receives data from the temperature selected by the driver side, passenger side, and rear. The front air control then applies a voltage to one circuit of the appropriate air mix door motor, while ground is applied to the other circuit, causing the appropriate air mix door motor to rotate. The direction of rotation is determined by which circuit has voltage applied to it, and which one has ground applied to it. The front air control monitors the air mix door positions by measuring the voltage signal on the PBR circuits of each door.

In AUTO mode the air mix, intake, mode door, and defrost door positions are set by the front air control which determines the proper position based on inputs from the in-vehicle sensor, ambient sensor, optical sensor, intake sensor, and the temperature selected by the driver and front and rear passengers.

Subsequently, HOT/COLD or DEFROST/VENT or FRESH/RECIRCULATION operation is selected. The new door position data is returned to the front air control



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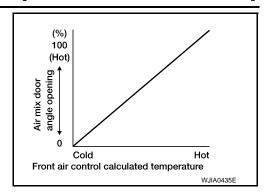
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#### [AUTOMATIC AIR CONDITIONER]

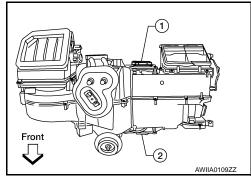
Air Mix Door Control Specification



#### COMPONENT DESCRIPTION

#### Air Mix Door Motors

The driver (1) and passenger (2) air mix door motors are attached to the front heater & cooling unit assembly. These motors rotate so that the air mix door is opened or closed to a position set by the front air control. Motor rotation is then conveyed through a shaft and the air mix door position is then fed back to the front air control by the PBR built into the air mix door motors.



Air Mix Door Motor (Driver) Component Function Check

INFOID:0000000005386594

#### **INSPECTION FLOW**

# 1. CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - TEMPERATURE INCREASE

- 1. Turn the temperature control dial (driver) clockwise until 32°C (90°F) is displayed.
- 2. Check for hot air at discharge air outlets.

>> GO TO 2.

# 2.confirm symptom by performing operational check - temperature decrease

- 1. Turn the temperature control dial (driver) counterclockwise until 18°C (60°F) is displayed.
- 2. Check for cold air at discharge air outlets.

#### Can a symptom be duplicated?

YES >> Inspection End.

NO >> Go to diagnosis procedure. Refer to HAC-28, "Air Mix Door Motor (Driver) Diagnosis Procedure".

# Air Mix Door Motor (Driver) Diagnosis Procedure

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Regarding Wiring Diagram information, refer to HAC-72, "Wiring Diagram".

#### SYMPTOM:

- Discharge air temperature does not change.
- Air mix door motor does not operate.

## DIAGNOSTIC PROCEDURE FOR AIR MIX DOOR MOTOR (DRIVER)

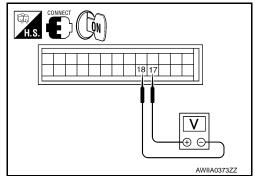
1. CHECK FRONT AIR CONTROL FOR POWER AND GROUND

#### < COMPONENT DIAGNOSIS >

#### [AUTOMATIC AIR CONDITIONER]

- Turn ignition switch ON.
- Rotate temperature control dial (driver) to 32°C (90°F).
- Check voltage between front air control harness connector M49 terminal 17 and terminal 18 while rotating temperature control dial (driver) to 18°C (60°F).

Connector	Te	erminals	Condition	Voltage	
Connector	(+)	(-)		(Approx.)	
Front air control: M49	17	18	Rotate temp control dial	Battery voltage	



#### Is the inspection result normal?

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

# 2.check air mix door motor (driver) circuits for short to ground

Turn ignition switch OFF.

Disconnect the front air control harness connector. 2.

3. Check continuity between front air control harness connector M49 terminal 17, 18 and ground.

17 - Ground : Continuity should not exist. 18 - Ground : Continuity should not exist.

#### Is the inspection result normal?

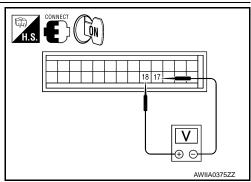
YES >> Replace front air control. Refer to VTL-8, "Removal and Installation".

NO >> Repair or replace harness as necessary.

# 3.check front air control for power and ground

- Turn ignition switch ON.
- Rotate temperature control dial (driver) to 32°C (90°F). 2.
- Check voltage between front air control harness connector M49 3. terminal 17 and terminal 18 while rotating temperature control dial (driver) to 18°C (60°F).

Connector	Te	erminals	Condition	Voltage (Approx.)
	(+)	(-)		
Front air control: M49	18	17	Rotate temp control dial	Battery voltage



#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace front air control. Refer to <u>VTL-8</u>, "Removal and Installation".

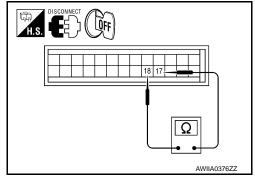
# 4.CHECK AIR MIX DOOR MOTOR (DRIVER) CIRCUITS FOR OPEN

- Turn ignition switch OFF.
- Disconnect the front air control harness connector. 2.
- Check continuity between front air control harness connector M49 terminal 17 and terminal 18.

#### Continuity should exist.

#### Is the inspection result normal?

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



 ${f 5.}$ CHECK AIR MIX DOOR MOTOR (DRIVER) CIRCUITS FOR OPEN

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#### < COMPONENT DIAGNOSIS >

#### [AUTOMATIC AIR CONDITIONER]

[6]

1. Disconnect the air mix door motor (driver) harness connector.

 Check continuity between front air control harness connector M49 (A) terminal 17, 18 and the air mix door motor (driver) harness connector M147 (B) terminal 1, 6.

> 17 - 1 : Continuity should exist. 18 - 6 : Continuity should exist.

#### Is the inspection result normal?

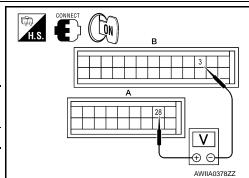
YES >> Replace air mix door motor (driver). Refer to <u>VTL-20.</u> "Removal and Installation".

NO >> Repair or replace harness as necessary.

# 6. CHECK FRONT AIR CONTROL FOR PBR POWER AND GROUND

- 1. Reconnect front air control harness connector.
- 2. Turn ignition switch ON.
- 3. Check voltage between front air control harness connector M50 (A) terminal 28 and M49 (B) terminal 3.

Connector	Terminals		Voltage (Ap-
	(+)	(-)	prox.)
Front air control: M50, M49	28	3	5V



### Is the inspection result normal?

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

# 7.CHECK PBR REFERENCE VOLTAGE CIRCUIT FOR SHORT TO GROUND

- Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- Check continuity between front air control harness connector M50 terminal 28 and ground.

#### Continuity should not exist.

#### Is the inspection result normal?

YES >> Replace front air control. Refer to <u>VTL-8</u>, "Removal and Installation".

NO >> Repair or replace harness as necessary.

# 8. CHECK PBR REFERENCE VOLTAGE AND GROUND CIRCUITS

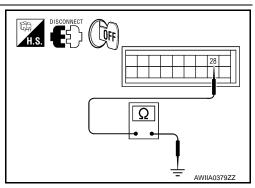
- Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- Check continuity between front air control harness connector M50 (A) terminal 28 and M49 (B) terminal 3.

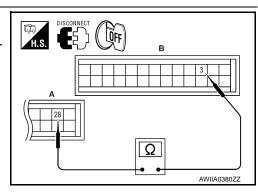
#### Continuity should exist.

#### Is the inspection result normal?

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

# 9. CHECK PBR REFERENCE VOLTAGE CIRCUIT FOR OPEN





#### < COMPONENT DIAGNOSIS >

#### [AUTOMATIC AIR CONDITIONER]

Disconnect the air mix door motor (driver) harness connector.

2. Check continuity between air mix door motor (driver) harness connector M147 (B) terminal 3, 2 and front air control harness connector M49 (C) terminal 3 and M50 (A) terminal 28.

> 28 - 3 : Continuity should exist. 3 - 2 : Continuity should exist.

#### Is the inspection result normal?

YES >> Replace air mix door motor (driver). Refer to VTL-20, "Removal and Installation".

NO >> Repair or replace harness as necessary.

# 10. CHECK PBR FEEDBACK VOLTAGE

- Reconnect the front air control harness connector.
- 2. Turn ignition switch ON.
- Check voltage between front air control harness connector M49 terminal 6 and ground while rotating temperature control dial from 32°C (90°F) to 18°C (60°F).

**Voltage** : Approx. .5V - 4.5V

#### Is the inspection result normal?

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

# 11. CHECK PBR FEEDBACK SIGNAL CIRCUIT FOR SHORT TO GROUND

- 1. Turn ignition switch OFF.
- Disconnect front air control harness connector.
- Check continuity between front air control harness connector M49 terminal 6 and ground.

#### Continuity should not exist.

#### Is the inspection result normal?

YES >> Replace front air control. Refer to VTL-8, "Removal and Installation"

NO >> Repair or replace harness as necessary.

# 12. CHECK PBR FEEDBACK CIRCUIT FOR OPEN

- 1. Turn ignition switch OFF.
- Disconnect the air mix door motor (driver) harness connector and front air control harness connector.
- 3. Check continuity between air mix door motor (driver) harness connector M147 (B) terminal 4 and front air control harness connector M49 (A) terminal 6.

#### Continuity should exist.

### Is the inspection result normal?

YES >> Replace air mix door motor (driver). Refer to VTL-20, "Removal and Installation".

NO >> Repair or replace harness as necessary.

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# Air Mix Door Motor (Passenger) Component Function Check

#### INSPECTION FLOW

# 1.CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - TEMPERATURE INCREASE

Turn the temperature control dial (passenger) clockwise until 32°C (90°F) is displayed.

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INFOID:0000000005642360

**HAC-31** 2010 Titan Revision: August 2009

#### < COMPONENT DIAGNOSIS >

Check for hot air at discharge air outlets.

>> GO TO 2.

# 2.CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - TEMPERATURE DECREASE

- 1. Turn the temperature control dial (passenger) counterclockwise until 18°C (60°F) is displayed.
- Check for cold air at discharge air outlets.

#### Can a symptom be duplicated?

YES >> Inspection End.

NO >> Go to diagnosis procedure. Refer to <u>HAC-32</u>, "Air Mix Door Motor (Passenger) Diagnosis Procedure".

## Air Mix Door Motor (Passenger) Diagnosis Procedure

INFOID:0000000005386596

Regarding Wiring Diagram information, refer to HAC-72, "Wiring Diagram".

#### SYMPTOM:

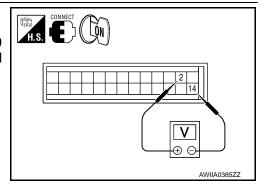
- Discharge air temperature does not change.
- Air mix door motor does not operate.

### DIAGNOSTIC PROCEDURE FOR AIR MIX DOOR MOTOR (PASSENGER)

# 1. CHECK FRONT AIR CONTROL FOR POWER AND GROUND

- Turn ignition switch ON.
- 2. Rotate temperature control dial (passenger) to 32°C (90°F).
- 3. Check voltage between front air control harness connector M49 terminal 14 and terminal 2 while rotating temperature control dial (passenger) to 18°C (60°F).

Connector	Terminals		Condition	Voltage
	(+)	(-)	Condition	(Approx.)
Front air control: M49	2	14	Rotate temp control dial	Battery voltage



#### Is the inspection result normal?

OK >> GO TO 3. NG >> GO TO 2.

# 2.check air mix door motor (passenger) circuits for short to ground

- 1. Turn ignition switch OFF.
- Disconnect the front air control harness connector.
- Check continuity between front air control harness connector M49 terminal 14, 2 and ground.

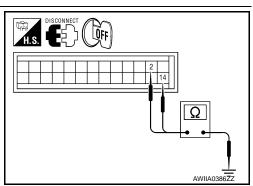
14 - Ground : Continuity should not exist.2 - Ground : Continuity should not exist.

#### Is the inspection result normal?

YES >> Replace front air control. Refer to <u>VTL-8, "Removal and Installation"</u>.

NO >> Repair or replace harness as necessary.

3.CHECK FRONT AIR CONTROL FOR POWER AND GROUND

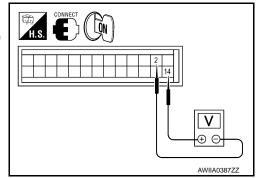


#### < COMPONENT DIAGNOSIS >

#### [AUTOMATIC AIR CONDITIONER]

- Turn ignition switch ON.
- Rotate temperature control dial (passenger) to 18°C (60°F). 2.
- Check voltage between front air control harness connector M49 terminal 14 and terminal 2 while rotating temperature control dial (passenger) to 32°C (90°F).

Connector	Terminals		Condition	Voltage
	(+)	(-)	Condition	(Approx.)
Front air control: M49	14	2	Rotate temp control dial	Battery voltage



#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace front air control. Refer to VTL-8, "Removal and Installation".

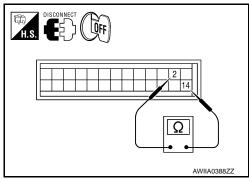
# 4.CHECK AIR MIX DOOR MOTOR (PASSENGER) CIRCUITS FOR OPEN

- Turn ignition switch OFF.
- Disconnect the front air control harness connector. 2.
- Check continuity between front air control harness connector M50 terminal 14 and terminal 2.

# Continuity should exist.

#### Is the inspection result normal?

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



# 5.CHECK AIR MIX DOOR MOTOR (PASSENGER) CIRCUITS FOR OPEN

- Disconnect the air mix door motor (passenger) harness connec-
- Check continuity between front air control harness connector M49 (A) terminal 14, 2 and the air mix door motor (passenger) harness connector M143 (B) terminal 1, 6.

14 - 1 : Continuity should exist. 2 - 6 : Continuity should exist.

# Is the inspection result normal?

YES >> Replace air mix door motor (passenger). Refer to VTL-20, "Removal and Installation".

NO >> Repair or replace harness as necessary.

# 6.CHECK FRONT AIR CONTROL FOR PBR POWER AND GROUND

- Reconnect front air control harness connector.
- 2. Turn ignition switch ON.
- Check voltage between front air control harness connector M50 (A) terminal 28 and M49 (B) terminal 3.

Connector	Terminals		Voltage (Ap-
	(+)	(-)	prox.)
Front air control: M49	28	3	5V

#### Is the inspection result normal?

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

# .CHECK PBR REFERENCE VOLTAGE CIRCUIT FOR SHORT TO GROUND

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#### < COMPONENT DIAGNOSIS >

#### [AUTOMATIC AIR CONDITIONER]

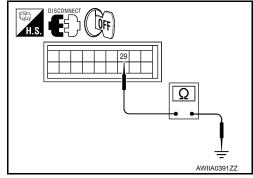
- Turn ignition switch OFF.
- Disconnect the front air control harness connector.
- Check continuity between front air control harness connector M49 terminal 29 and ground.

#### Continuity should not exist.

#### Is the inspection result normal?

YES >> Replace front air control. Refer to VTL-8, "Removal and Installation".

NO >> Repair or replace harness as necessary.



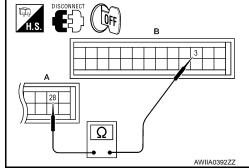
# 8. CHECK PBR REFERENCE VOLTAGE AND GROUND CIRCUITS

- 1. Turn ignition switch OFF.
- Disconnect the front air control harness connector.
- Check continuity between front air control harness connector M50 (A) terminal 28 and M49 (B) terminal 3.

#### Continuity should exist.

#### Is the inspection result normal?

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



# $9.\mathsf{CHECK}$ PBR REFERENCE VOLTAGE CIRCUIT FOR OPEN

- Disconnect the air mix door motor (passenger) harness connec-
- Check continuity between air mix door motor (passenger) harness connector M143 (B) terminal 3, 2 and front air control harness connector M49 (C) terminal 3 and M50 (A) terminal 28.

28 - 3 : Continuity should exist. 3 - 2 : Continuity should exist.

#### Is the inspection result normal?

YES >> Replace air mix door motor (passenger). Refer to VTL-20, "Removal and Installation".

NO >> Repair or replace harness as necessary.

# 10.CHECK PBR FEEDBACK VOLTAGE

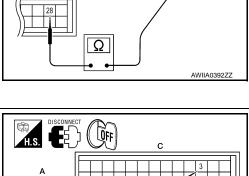
- Reconnect the front air control harness connector.
- Turn ignition switch ON. 2.
- Check voltage between front air control harness connector M50 terminal 29 and ground while rotating temperature control dial (passenger) from 32°C (90°F) to 18°C (60°F).

#### Voltage : Approx. .5V - 4.5V

#### Is the inspection result normal?

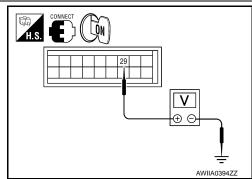
YES >> GO TO 12. NO >> GO TO 11.

11. CHECK PBR FEEDBACK SIGNAL CIRCUIT FOR SHORT TO GROUND



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#### < COMPONENT DIAGNOSIS >

#### [AUTOMATIC AIR CONDITIONER]

- 1. Turn ignition switch OFF.
- 2. Disconnect front air control harness connector.
- 3. Check continuity between front air control harness connector M50 terminal 29 and ground.

#### Continuity should not exist.

#### Is the inspection result normal?

YES >> Replace front air control. Refer to <u>VTL-8, "Removal and Installation"</u>.

NO >> Repair or replace harness as necessary.

# 12.CHECK PBR FEEDBACK CIRCUIT FOR OPEN

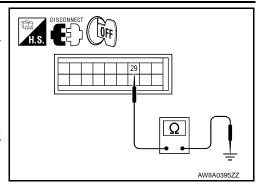
- 1. Turn ignition switch OFF.
- 2. Disconnect the air mix door motor (passenger) harness connector and front air control harness connector.
- 3. Check continuity between air mix door motor (passenger) harness connector M143 (B) terminal 4 and front air control harness connector M50 (A) terminal 29.

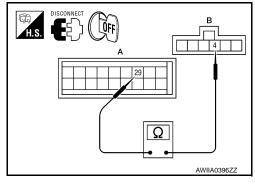
### Continuity should exist.

#### Is the inspection result normal?

YES >> Replace air mix door motor (passenger). Refer to <u>VTL-20. "Removal and Installation"</u>.

NO >> Repair or replace harness as necessary.





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# INTAKE DOOR MOTOR

## System Description

#### INFOID:0000000005386597

#### SYSTEM DESCRIPTION

#### SYMPTOM:

- Intake door motor does not operate normally.
- Intake door does not change.

#### SYSTEM DESCRIPTION

#### Component Parts

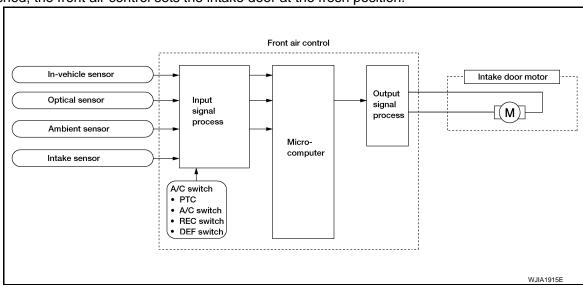
Intake door control system components are:

- Front air control
- Intake door motor (PRB built into the intake door motor)
- In-vehicle sensor
- · Ambient sensor
- Optical sensor
- · Intake sensor

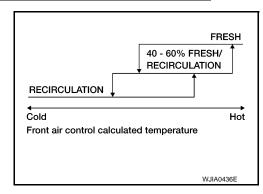
#### System Operation

The intake door control determines the intake door position based on the position of the recirculation switch. When the recirculation switch is depressed the intake door motor rotates closing off the fresh air inlet and recirculating the cabin air. If the recirculation switch is depressed again, the intake door motor rotates in the opposite direction, again allowing fresh air into the cabin.

In the AUTO mode, the front air control determines the intake door position based on the ambient temperature, the intake air temperature and the in-vehicle temperature. When the DEF, D/F, FLOOR or OFF switches are pushed, the front air control sets the intake door at the fresh position.



Intake Door Control Specification



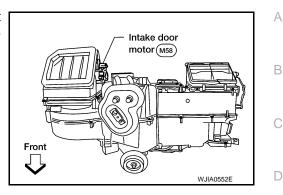
## **INTAKE DOOR MOTOR**

#### < COMPONENT DIAGNOSIS >

## [AUTOMATIC AIR CONDITIONER]

Intake door motor

The intake door motor is attached to the intake unit. It rotates so that air is drawn from inlets set by the front air control. Motor rotation is conveyed to a lever which activates the intake door.



## Intake Door Motor Component Function Check

INFOID:0000000005386598

## INSPECTION FLOW

## 1.CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - REC (lacksquare)

- Press the mode switch to vent mode(\*\*).
- 2. Press REC ( ) switch. The REC ( ) indicator should illuminate.
- Press REC ( ) switch again. The REC ( ) indicator should go out.
- Listen for intake door position change (you should hear blower sound change slightly).

#### Is the inspection result normal?

YES >> Inspection End.

>> Go to diagnosis procedure. Refer to HAC-37, "Intake Door Motor Diagnosis Procedure". NO

## Intake Door Motor Diagnosis Procedure

INFOID:0000000005386599

Regarding Wiring Diagram information, refer to HAC-72, "Wiring Diagram".

#### SYMPTOM:

- Intake door does not change.
- Intake door motor does not operate normally.

## DIAGNOSTIC PROCEDURE FOR INTAKE DOOR MOTOR

# 1. CHECK FRONT AIR CONTROL FOR POWER AND GROUND

- Turn ignition switch ON.
- Check voltage between front air control harness connector M49 terminal 21 and terminal 22 while placing the HVAC system into self-diagnostic mode.

Connector	Te	erminals	Condition	Voltage
Connector	(+)	(-)	Condition	(Approx.)
Front air control: M49	21	22	Self-diagnostic mode	Battery volt- age

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#### Is the inspection result normal?

OK >> GO TO 3. NO >> GO TO 2.

2.CHECK INTAKE DOOR MOTOR CIRCUITS FOR SHORT TO GROUND

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## **INTAKE DOOR MOTOR**

## < COMPONENT DIAGNOSIS >

## [AUTOMATIC AIR CONDITIONER]

- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M49 terminal 21, 22 and ground.

21 - Ground : Continuity should not exist. 22 - Ground : Continuity should not exist.

#### Is the inspection result normal?

OK >> Replace front air control. Refer to <u>VTL-8</u>, "Removal and Installation".

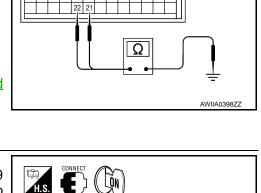
NO >> Repair or replace harness as necessary.

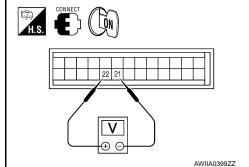
# 3.CHECK FRONT AIR CONTROL FOR GROUND AND POWER

Press the BACK button to back out of self-diagnostic mode.

Check voltage between front air control harness connector M49 terminal 21 and terminal 22 while placing the HVAC system into self-diagnostic mode.

Connector	Te	erminals	Condition	Voltage (Approx.)
Connector	(+)	(-)	Condition	
Front air control: M49	22	21	Self-diagnostic mode	Battery voltage





## Is the inspection result normal?

OK >> GO TO 4.

NO >> Replace front air control. Refer to <a href="VTL-8">VTL-8</a>, "Removal and Installation".

## 4. CHECK INTAKE DOOR MOTOR AND CIRCUITS FOR OPEN

- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- Check continuity between front air control harness connector M49 terminal 21 and terminal 22.

## Continuity should exist.

## Is the inspection result normal?

OK >> Replace intake door motor. Refer to <u>VTL-18</u>, "Removal and Installation".

NO >> GO TO 5.

# 5. CHECK INTAKE DOOR MOTOR CIRCUITS FOR OPEN

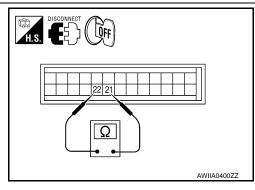
- 1. Disconnect the intake door motor harness connector.
- Check continuity between front air control harness connector M49 (A) terminal 21, 22 and the intake door motor harness connector M58 (B) terminal 1, 6.

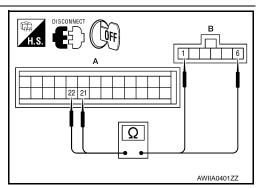
21 - 6 : Continuity should exist.22 - 1 : Continuity should exist.

#### Is the inspection result normal?

YES >> Replace intake door motor. Refer to <a href="VTL-18">VTL-18</a>, "Removal and Installation".

NO >> Repair or replace harness as necessary.





## System Description

#### INFOID:0000000005386600

## SYSTEM DESCRIPTION

#### Component Parts

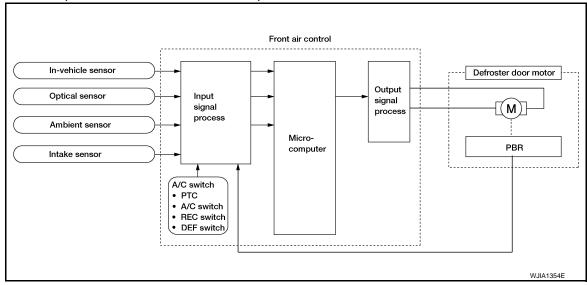
Defroster door control system components are:

- Front air control
- Defroster door motor
- PBR (Built into defroster door motor)
- In-vehicle sensor
- Ambient sensor
- Optical sensor
- · Intake sensor

## System Operation

The front air control determines defroster door position based on the position of the defroster switch. When the defroster switch is depressed, the defroster door motor rotates directing air to the defroster ducts. When any mode other than defroster is selected, the defroster motor rotates in the opposite direction closing off air flow to the defroster ducts.

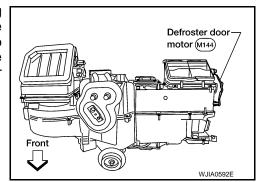
In the AUTO mode, the front air control determines defroster door position based on the ambient temperature, the intake air temperature and the in-vehicle temperature.



## COMPONENT DESCRIPTION

#### Defroster door motor

The defroster door motor is attached to the front heater & cooling unit assembly. The front air control sends a voltage to rotate to the defroster door directing the air flow either to the defroster ducts, or to the floor ducts, depending on which way the voltage and ground are applied to the motor leads. Motor rotation is conveyed to a lever which activates the defroster door.



Defroster Door Motor Component Function Check

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**INSPECTION FLOW** 

Revision: August 2009 HAC-39 2010 Titan

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#### < COMPONENT DIAGNOSIS >

[AUTOMATIC AIR CONDITIONER]

# 1.confirm symptom by performing operational check - defroster door

- 1. Select vent (\*) mode.
- 2. Press the defrost switch ( ). Defroster indicator should illuminate.
- 3. Listen for defroster door position change (blower sound should change slightly).

## Is the inspection result normal?

YES >> Inspection End.

NO >> Go to diagnosis procedure. Refer to <u>HAC-40</u>, "<u>Defroster Door Motor Diagnosis Procedure</u>".

## Defroster Door Motor Diagnosis Procedure

INFOID:0000000005386602

Regarding Wiring Diagram information, refer to HAC-72, "Wiring Diagram".

#### SYMPTOM:

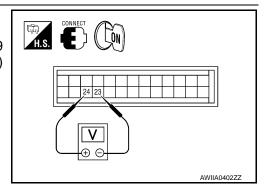
- · Defroster door does not change.
- Defroster door motor does not operate normally.

## DIAGNOSTIC PROCEDURE FOR DEFROSTER DOOR MOTOR

# 1. CHECK FRONT AIR CONTROL FOR POWER AND GROUND

- 1. Turn ignition switch ON.
- 2. Press the defroster switch ( ).
- Check voltage between front air control harness connector M49 terminal 24 and terminal 23 and press the defroster switch ( ) again.

Connector	Terr	ninals	Condition	Voltage
Connector	(+)	(-)	Condition	(Approx.)
Front air control: M49	24	23	Press defroster switch	Battery voltage



## Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

# 2.CHECK DEFROSTER DOOR MOTOR CIRCUITS FOR SHORT TO GROUND

- Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M49 terminal 23, 24 and ground.

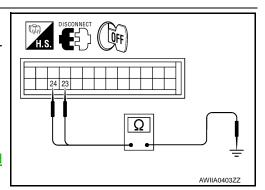
23 - Ground : Continuity should not exist.24 - Ground : Continuity should not exist.

#### Is the inspection result normal?

YES >> Replace front air control. Refer to <u>VTL-8</u>, "Removal and Installation".

NO >> Repair or replace harness as necessary.

3.CHECK FRONT AIR CONTROL FOR GROUND AND POWER

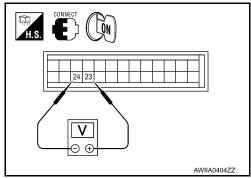


## < COMPONENT DIAGNOSIS >

## [AUTOMATIC AIR CONDITIONER]

- 1. Press the defroster switch ( ).
- 2. Check voltage between front air control harness connector M49 terminal 23 and terminal 24 and press the defroster switch ( ) again.

Connector	Te	erminals	Condition	Voltage
Connector	(+)	(-)	Condition	(Approx.)
Front air control: M49	23	24	Press de- froster switch	Battery voltage



#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace front air control. Refer to <u>VTL-8</u>, "Removal and Installation".

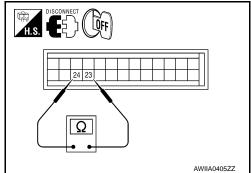
## 4. CHECK DEFROSTER DOOR MOTOR AND CIRCUITS FOR OPEN

- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M49 terminal 23 and terminal 24.

## Continuity should exist.

## Is the inspection result normal?

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



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## 5. CHECK DEFROSTER DOOR MOTOR CIRCUITS FOR OPEN

- 1. Disconnect the defroster door motor harness connector.
- 2. Check continuity between front air control harness connector M49 (A) terminal 23, 24 and the defroster door motor harness connector M144 (B) terminal 1, 6.

23 - 1 : Continuity should exist.

24 - 6 : Continuity should exist.

## Is the inspection result normal?

YES >> Replace defroster door motor. Refer to <u>VTL-17</u>, <u>"Removal and Installation"</u>.

NO >> Repair or replace harness as necessary.

## 6. CHECK FRONT AIR CONTROL FOR PBR POWER AND GROUND

- 1. Reconnect front air control harness connector.
- 2. Turn ignition switch ON.
- 3. Check voltage between front air control harness connector M50 (A) terminal 28 and M49 (B) terminal 3.

Connector	Terr	minals	Voltage (Ap-
Connector	(+)	(-)	prox.)
Front air control: M50, M49	28	3	5V

# H.S. CONNECT B A A A AWIIA040777

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## Is the inspection result normal?

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

.CHECK PBR REFERENCE VOLTAGE CIRCUIT FOR SHORT TO GROUND

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## < COMPONENT DIAGNOSIS >

## [AUTOMATIC AIR CONDITIONER]

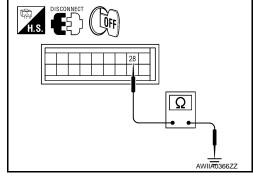
- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- Check continuity between front air control harness connector M50 terminal 28 and ground.

#### Continuity should not exist.

## Is the inspection result normal?

YES >> Replace front air control. Refer to <u>VTL-8</u>, "Removal and <u>Installation"</u>.

NO >> Repair or replace harness as necessary.



## 8. CHECK PBR REFERENCE VOLTAGE AND GROUND CIRCUITS

- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M50 (A) terminal 28 and M49 (B) terminal 3.

## Continuity should exist.

## Is the inspection result normal?

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

# H.S DISCONNECT OFF B

# 9. CHECK PBR REFERENCE VOLTAGE CIRCUIT FOR OPEN

- Disconnect the defroster door motor harness connector.
- Check continuity between defroster door motor harness connector M144 (B) terminal 3, 2 and front air control harness connector M50 (A) terminal 28, and M49 (C) terminal 3.

28 - 3 : Continuity should exist. 3 - 2 : Continuity should exist.

#### Is the inspection result normal?

YES >> Replace defroster door motor. Refer to <u>VTL-17</u>.

<u>"Removal and Installation"</u>.

NO >> Repair or replace harness as necessary.

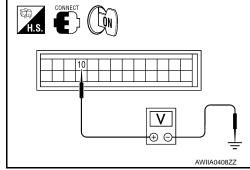
# 10. CHECK PBR FEEDBACK VOLTAGE

- Reconnect the front air control harness connector.
- 2. Turn ignition switch ON.
- Check voltage between front air control harness connector M49 terminal 10 and ground while cycling defroster switch on and off.

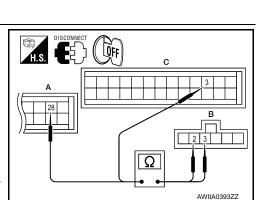
## Voltage : Approx. 1V - 4.5V

## Is the inspection result normal?

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



# 11. CHECK PBR FEEDBACK SIGNAL CIRCUIT FOR SHORT TO GROUND



## < COMPONENT DIAGNOSIS >

## [AUTOMATIC AIR CONDITIONER]

- 1. Turn ignition switch OFF.
- 2. Disconnect front air control harness connector.
- 3. Check continuity between front air control harness connector M49 terminal 10 and ground.

## Continuity should not exist.

#### Is the inspection result normal?

YES >> Replace front air control. Refer to <u>VTL-8, "Removal and</u> Installation".

NO >> Repair or replace harness as necessary.

# 12.CHECK PBR FEEDBACK CIRCUIT FOR OPEN

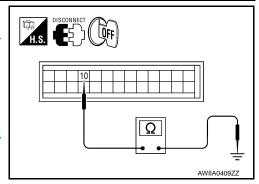
- 1. Turn ignition switch OFF.
- 2. Disconnect the defroster door motor harness connector and front air control harness connector.
- Check continuity between defroster door motor harness connector tor M144 (B) terminal 4 and front air control harness connector M49 (A) terminal 10

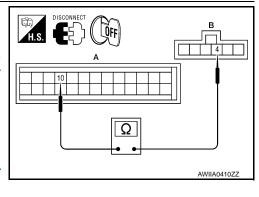
## Continuity should exist.

## Is the inspection result normal?

YES >> Replace defroster door motor. Refer to <u>VTL-17</u>, <u>"Removal and Installation"</u>.

NO >> Repair or replace harness as necessary.





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## System Description

#### INFOID:0000000005386603

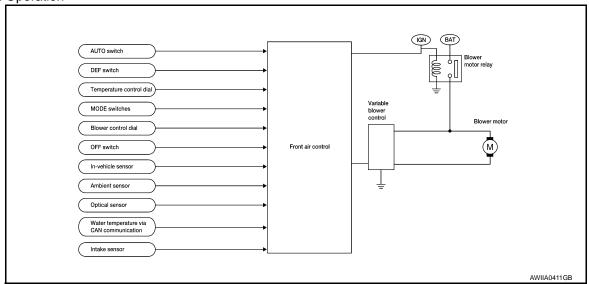
#### SYSTEM DESCRIPTION

## Component Parts

Blower speed control system components are:

- Front air control
- Variable blower control
- Front blower motor relay
- · Front blower motor
- In-vehicle sensor
- Ambient sensor
- · Optical sensor
- Intake sensor

#### System Operation



#### **Automatic Mode**

In the automatic mode, the blower motor speed is calculated by the front air control and variable blower control based on input from the in-vehicle sensor, optical sensor, intake sensor and ambient sensor, and potentio temperature control (PTC).

When the air flow is increased, the blower motor speed is adjusted gradually to prevent a sudden increase in air flow

In addition to manual air flow control and the usual automatic air flow control, starting air flow control, low water temperature starting control and high passenger compartment temperature starting control are available.

#### Starting Blower Speed Control

Start up from cold soak condition (Automatic mode).

In a cold start up condition where the engine coolant temperature is below 50°C (122°F), the blower will not operate at blower speed 1 for a short period of time (up to 210 seconds). The exact start delay time varies depending on the ambient and engine coolant temperatures.

In the most extreme case (very low ambient temperature) the blower starting delay will be 210 seconds as described above. After the coolant temperature reaches 50°C (122°F), or the 210 seconds has elapsed, the blower speed will increase to the objective blower speed.

Start up from usual operating or hot soak condition (Automatic mode).

The blower will begin operation momentarily after the AUTO switch is pushed. The blower speed will gradually rise to the objective speed over a time period of 3 seconds or less (actual time depends on the objective blower speed).

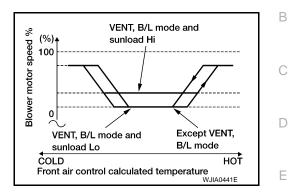
Blower Speed Compensation - Sunload

## < COMPONENT DIAGNOSIS >

## [AUTOMATIC AIR CONDITIONER]

When the in-vehicle temperature and the set temperature are very close, the blower will be operating at low speed. The speed will vary depending on the sunload. During conditions of low or no sunload, the blower operates at low speed. During high sunload conditions, the front air control causes the blower speed to increase.

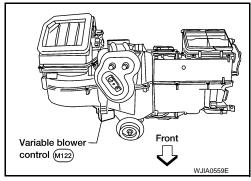
Blower Speed Control Specification



#### COMPONENT DESCRIPTION

#### Variable Blower Control

The variable blower control is located on the cooling unit. The variable blower control receives a gate voltage from the front air control to steplessly maintain the blower motor voltage in the 0 to 5 volt range (approx.).



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## Front Blower Motor Component Function Check

## INSPECTION FLOW

# 1.confirm symptom by performing operational check - front blower

- Rotate the blower control dial clockwise once. Blower motor should operate in low speed.
- Rotate the blower control dial clockwise, and continue checking blower speed until all speeds are checked.

## Is the inspection result normal?

YES >> Inspection End.

>> Go to diagnosis procedure. Refer to HAC-45, "Front Blower Motor Diagnosis Procedure". NO

## Front Blower Motor Diagnosis Procedure

Regarding Wiring Diagram information, refer to HAC-72, "Wiring Diagram".

SYMPTOM: Blower motor operation is malfunctioning.

DIAGNOSTIC PROCEDURE FOR BLOWER MOTOR

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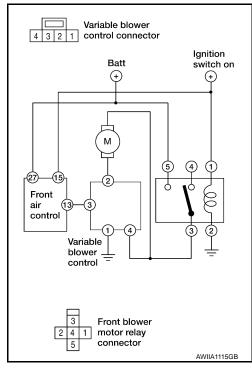
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**HAC-45** 2010 Titan Revision: August 2009

## < COMPONENT DIAGNOSIS >

[AUTOMATIC AIR CONDITIONER]

SYMPTOM: Blower motor operation is malfunctioning under starting blower speed control.



## 1. CHECK FUSES

Check 20A fuses [No. 24 and 27 (Located in the fuse and fusible link box)]. For fuse layout. Refer to PG-74. "Terminal Arrangement".

## Fuses are good.

## Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 9.

## 2. CHECK FRONT BLOWER MOTOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect front blower motor connector.
- 3. Turn ignition switch ON.
- 4. Press the A/C switch.
- 5. Rotate blower control dial to maximum speed.
- Check voltage between front blower motor harness connector M62 terminal 2 and ground.

## 2 - Ground : Battery voltage

## Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 3.

# 3.CHECK FRONT BLOWER MOTOR RELAY (SWITCH SIDE) POWER SUPPLY CIRCUIT

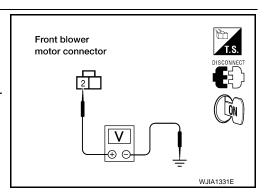
- 1. Turn ignition switch OFF.
- Disconnect front blower motor relay.
- 3. Check voltage between front blower motor relay harness connector M107 terminal 5 and ground.

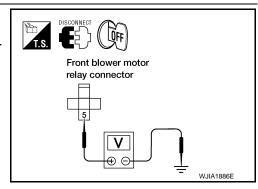
## 5 - Ground : Battery voltage

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair harness or connector.





## < COMPONENT DIAGNOSIS >

## 4. CHECK FRONT BLOWER MOTOR RELAY

Turn ignition switch OFF.

Check front blower motor relay. Refer to HAC-49, "Front Blower Motor Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace front blower motor relay.

## ${f 5.}$ CHECK FRONT BLOWER MOTOR RELAY (SWITCH SIDE) CIRCUIT FOR OPEN

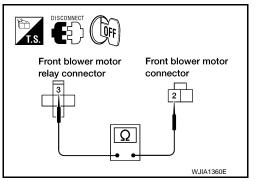
Check continuity between front blower motor relay harness connector M107 terminal 3 and front blower motor harness connector M62 terminal 2.

## 3 - 2 : Continuity should exist.

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair harness or connector.



## 6.CHECK VARIABLE BLOWER CONTROL POWER SUPPLY CIRCUIT FOR OPEN

1. Disconnect variable blower control harness connector.

Check continuity between front blower motor relay harness connector M107 (A) terminals 3 and variable blower control harness connector M122 (B) terminal 4.

## 3 - 4 : Continuity should exist.

#### Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair harness or connector.

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# 7.CHECK VARIABLE BLOWER CONTROL SIGNAL CIRCUIT

1. Disconnect front air control connector.

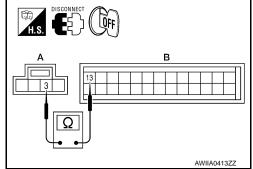
 Check continuity between front air control harness connector M49 (B) terminal 13 and variable blower control harness connector M122 (A) terminal 3.

## 13 - 3 : Continuity should exist.

#### Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair harness or connector.



## 8. CHECK FRONT BLOWER MOTOR RELAY (COIL SIDE) POWER SUPPLY

1. Turn ignition switch ON.

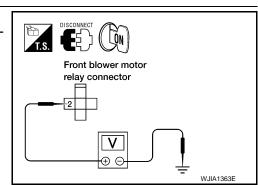
2. Check voltage between front blower motor relay harness connector M107 terminal 2 and ground.

## 2 - Ground : Battery voltage

#### Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair front blower motor ground circuit or connector.



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## < COMPONENT DIAGNOSIS >

## 9. REPLACE FUSES

- 1. Replace fuses.
- 2. Activate the front blower motor.

#### Does the fuse blow?

YES >> GO TO 10.

NO >> Inspection End.

## 10. CHECK FRONT BLOWER MOTOR POWER SUPPLY CIRCUIT FOR SHORT

- 1. Turn ignition switch OFF.
- 2. Disconnect front blower motor connector and variable blower control connector.
- 3. Check continuity between variable blower control harness connector M122 terminal 4 and ground.

## 4 - Ground : Continuity should not exist.

#### Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair harness or connector.

# 11. CHECK VARIABLE BLOWER CONTROL SIGNAL CIRCUIT

- 1. Disconnect front air control connector.
- Check continuity between front air control harness connector M49 (B) terminal 13 and variable blower control harness connector M122 (A) terminal 3.

## 13 - 3 : Continuity should exist.

## Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair harness or connector.

# 12. CHECK FRONT BLOWER MOTOR

Check front blower motor. Refer to <u>HAC-49</u>, "Front Blower Motor Component Inspection". Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace front blower motor. Refer to VTL-12, "Removal and Installation".

# 13. CHECK BLOWER MOTOR GROUND CIRCUIT

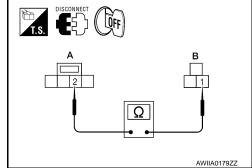
Check continuity between front blower motor harness connector M62 (B) terminal 1 and variable blower control harness connector M122 (A) terminal 2.

## 1 - 2 : Continuity should exist.

## Is the inspection result normal?

YES >> GO TO 14.

NO >> Repair harness or connector.



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# DISCONNECT OFF

# 14. CHECK VARIABLE BLOWER CONTROL GROUND CIRCUIT

## < COMPONENT DIAGNOSIS >

## [AUTOMATIC AIR CONDITIONER]

Check continuity between variable blower control harness connector M122 terminal 1 and ground.

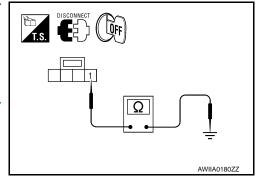
#### 1 - Ground

## : Continuity should exist.

## Is the inspection result normal?

YES >> Replace variable blower control. Refer to <u>VTL-22</u>. "Removal and Installation".

NO >> Repair harness or connector.



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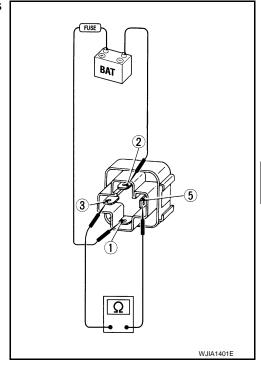
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## Front Blower Motor Component Inspection

## COMPONENT INSPECTION

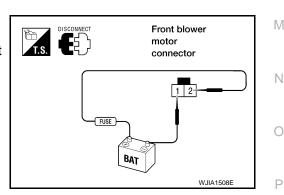
Check continuity between terminals 3, and 5 by supplying 12 volts and ground to coil side terminals 1 and 2 of relay.



Front Blower Motor

Confirm smooth rotation of the blower motor.

- Ensure that there are no foreign particles inside the blower unit.
- Apply 12 volts to terminal 2 and ground to terminal 1 and verify that the motor operates freely and quietly.



Revision: August 2009 HAC-49 2010 Titan

## System Description

INFOID:0000000005386607

#### SYSTEM DESCRIPTION

The front air control controls compressor operation based on ambient and intake temperature and a signal from ECM.

Low Temperature Protection Control

The front air control will turn the compressor ON or OFF as determined by a signal detected by the intake sensor and the ambient sensor.

When intake air temperature is higher than the preset value, the compressor turns ON. The compressor turns OFF when intake air temperature is lower than the preset value. That preset value is dependent on the ambient temperature, refer to the following table.

Ambient temperature °C (°F)	Compressor ON intake temperature °C (°F)	Compressor OFF intake temperature °C (°F)
0 (32)	5.5 (42)	5.0 (41)
10 (50)	5.5 (42)	5.0 (41)
20 (68)	5.5 (42)	5.0 (41)
30 (86)	4.0 (39)	3.5 (38)
40 (104)	3.5 (38)	3.0 (37)
50 (122)	3.5 (38)	3.0 (37)

## Magnet Clutch Component Function Check

INFOID:0000000005386608

#### INSPECTION FLOW

# 1.confirm symptom by performing operational check - magnet clutch

- 1. Turn ignition switch ON.
- 2. Press the A/C switch.
- 3. Press vent mode switch (\*).
- Confirm that the compressor clutch engages (sound or visual inspection). (Discharge air and blower speed will depend on ambient, in-vehicle and set temperatures.)

## Is the inspection result normal?

YES >> Inspection End.

NO >> Go to diagnosis procedure. Refer to <u>HAC-50</u>, "Magnet Clutch Diagnosis Procedure".

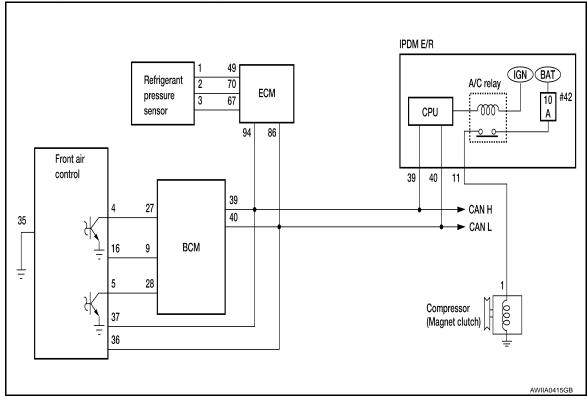
## Magnet Clutch Diagnosis Procedure

INFOID:0000000005386609

Regarding Wiring Diagram information, refer to HAC-72, "Wiring Diagram".

## DIAGNOSTIC PROCEDURE FOR MAGNET CLUTCH

SYMPTOM: Magnet clutch does not engage when A/C switch is ON.



## 1. CHECK INTAKE AND AMBIENT SENSOR CIRCUITS

Check intake and ambient sensors. Refer to <a href="HAC-21">HAC-21</a>, "Front Air Control Self-Diagnosis".

## Is the inspection result normal?

YES >> GO TO 2.

NO >> • Malfund

>> • Malfunctioning intake sensor. Refer to <a href="HAC-65">HAC-65">HAC-65</a>, "Intake Sensor Diagnosis Procedure".

• Malfunctioning ambient sensor. Refer to <u>HAC-57</u>, "Ambient Sensor Diagnosis Procedure".

## 2. PERFORM AUTO ACTIVE TEST

Refer to PCS-11, "Diagnosis Description".

#### Does magnet clutch operate?

YES >> • • WITH CONSULT-III GO TO 5.

• WITHOUT CONSULT-III GO TO 6.

NO >> Check 10A fuse (No. 42, located in IPDM E/R), and GO TO 3.

# 3.check circuit continuity between IPDM e/R and compressor

- 1. Turn ignition switch OFF.
- 2. Disconnect IPDM E/R connector and compressor (magnet clutch) connector.
- Check continuity between IPDM E/R harness connector E119 terminal 11 and A/C compressor harness connector F3 terminal 1.

## 11 – 1 : Continuity should exist.

## Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair harness or connector.

4. CHECK MAGNET CLUTCH CIRCUIT

IPDM E/R
connector

In the second connector

IPDM E/R
Compressor
Connector

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#### < COMPONENT DIAGNOSIS >

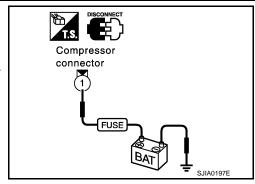
#### [AUTOMATIC AIR CONDITIONER]

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

#### Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to <u>PCS-30</u>, "Removal and Installation of IPDM E/R".

NO >> Replace magnet clutch. Refer to <u>HA-34</u>, "Removal and Installation for Compressor Clutch".



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

Check compressor ON/OFF signal. Refer to HAC-17, "CONSULT-III Function (HVAC)".

A/C SW ON : COMP ON SIG ON A/C SW OFF : COMP ON SIG OFF

#### Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 6.

## 6.CHECK CIRCUIT CONTINUITY BETWEEN BCM AND FRONT AIR CONTROL

- 1. Turn ignition switch OFF.
- 2. Disconnect BCM connector and front air control connector.
- Check continuity between BCM harness connector M18 (A) terminal 27 and front air control harness connector M49 (B) terminal 4.

## 27 - 4 Continuity should exist.

#### Is the inspection result normal?

YES >> GO TO 7.

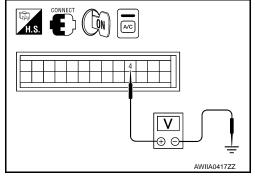
NO >> Repair harness or connector.

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## 7.CHECK VOLTAGE FOR FRONT AIR CONTROL (A/C COMPRESSOR ON SIGNAL)

- 1. Reconnect BCM connector and front air control connector.
- 2. Turn ignition switch ON.
- Check voltage between front air control harness connector M49 terminal 4 and ground.

Terminals				
(	+)			
Front air con- trol connec- tor	Terminal No.	(-)	Condition	Voltage
M49	4	Ground	A/C switch: ON	Approx. 0V
10149	4	Giodila	A/C switch: OFF	Approx. 5V



## Is the inspection result normal?

YES >> GO TO 8.

NO-1 >> If the voltage is approx. 5V when A/C switch is ON, replace front air control. Refer to <u>VTL-8</u>. "Removal and Installation".

NO-2 >> If the voltage is approx. 0V when A/C switch is OFF, replace BCM. Refer to <u>BCS-53</u>, "Removal and Installation".

## 8. CHECK REFRIGERANT PRESSURE SENSOR

1. Start engine.

## < COMPONENT DIAGNOSIS >

## [AUTOMATIC AIR CONDITIONER]

Check voltage between ECM harness connector F54 terminal 70 and ground.

Terminals				
(	+)		Condition	Voltage
ECM con- nector	Terminal No.	(-)		
F54	70	Ground	A/C switch: ON	Approx. 0.36 - 3.88V

ECM connector

14	13	12	11	10	9	8	7	6	
33	32	31	30	29	28	27	26	25	
53	52	51	50	49	48	47	46	45	44
72	71	70	69	68	67	66	65	64	63

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#### Is the inspection result normal?

YES >> GO TO 9.

NO >> Refer to EC-411, "Diagnosis Procedure".

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

Check FAN ON/OFF signal. Refer to HAC-17, "CONSULT-III Function (HVAC)".

FRONT BLOWER CONTROL : FAN ON SIG ON

**DIAL ON** 

FRONT BLOWER CONTROL : FAN ON SIG OFF

**DIAL OFF** 

## Is the inspection result normal?

YES >> GO TO 12. NO >> GO TO 10.

## 10.CHECK CIRCUIT CONTINUITY BETWEEN BCM AND FRONT AIR CONTROL

- 1. Turn ignition switch OFF.
- Disconnect BCM connector and front air control connector.
- Check continuity between BCM harness connector M18 (A) terminal 28 and front air control harness connector M49 (B) terminal 5.

## 28 - 5

## Continuity should exist.

## Is the inspection result normal?

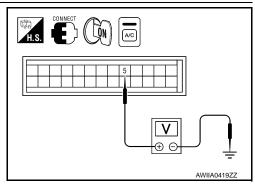
YES >> GO TO 11.

NO >> Repair harness or connector.

# 11. CHECK VOLTAGE FOR FRONT AIR CONTROL (FAN ON SIGNAL)

- Reconnect BCM connector and front air control connector.
- 2. Turn ignition switch ON.
- Check voltage between front air control harness connector M49 terminal 5 and ground.

Terminals				
(+)			Condition	Voltage
Front air con- trol connector	Terminal No.	(-)		Ü
M49	5	Ground	A/C switch: ON Blower motor operates	Approx. 0V
			A/C switch: OFF	Approx. 5V



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## Is the inspection result normal?

YES >> GO TO 12.

NO-1 >> If the voltage is approx. 5V when blower motor is ON, replace front air control. Refer to <u>VTL-8</u>, <u>"Removal and Installation"</u>.

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## < COMPONENT DIAGNOSIS >

[AUTOMATIC AIR CONDITIONER]

NO-2 >> If the voltage is approx. 0V when blower motor is OFF, replace BCM. Refer to <u>BCS-53</u>, "Removal and Installation".

# 12. CHECK CAN COMMUNICATION

Check CAN communication. Refer to LAN-4, "System Description".

- BCM ECM
- ECM IPDM E/R
- ECM Front air control

## Is the inspection result normal?

YES >> Inspection End.

NO >> Repair or replace malfunctioning part(s).

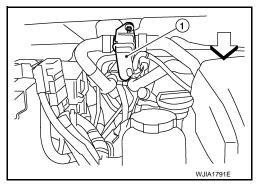
## WATER VALVE CIRCUIT

Description A

#### COMPONENT DESCRIPTION

#### Water Valve

The water valve (1) cuts the flow of engine coolant to the heater core to allow for maximum cooling during A/C operation. It is controlled by the front air control.



## Water Valve Diagnosis Procedure

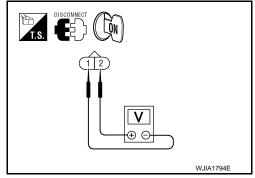
Regarding Wiring Diagram information, refer to <a href="HAC-72">HAC-72</a>, "Wiring Diagram".

## DIAGNOSTIC PROCEDURE FOR WATER VALVE

## 1. CHECK WATER VALVE POWER AND GROUND CIRCUITS

- 1. Disconnect water valve connector F68.
- 2. Turn ignition switch ON.
- 3. Rotate temperature control dial (driver) to 32°C (90°F).
- Check voltage between water valve harness connector F68 terminal 1 and terminal 2 while rotating temperature control dial (driver) to 18°C (60°F).

Connector	Terminals		Condition	Voltage
Connector	(+)	(-)	Condition	(Approx.)
Water valve: F68	2	1	Rotate temperature control dial	Battery voltage



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#### Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

# 2.check water valve control output circuit

- Turn ignition switch OFF.
- Disconnect front air control connector M50.
- Check continuity between water valve harness connector F68

   (A) terminal 2 and front air control harness connector M50 (B) terminal 42.

## 2 - 42 : Continuity should exist.

4. Check continuity between water valve harness connector F68 terminal 2 and ground.

## 2 - Ground : Continuity should not exist.

## Is the inspection result normal?

YES >> Replace front air control. Refer to <a href="VTL-8">VTL-8</a>, "Removal and Installation".

NO >> Repair harness or connector.

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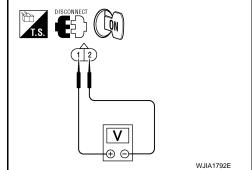
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## < COMPONENT DIAGNOSIS >

# $3. \mathsf{CHECK}$ WATER VALVE POWER AND GROUND CIRCUITS

- 1. Rotate temperature control dial (driver) to 18°C (60°F).
- 2. Check voltage between water valve harness connector F68 terminal 1 and terminal 2 while rotating temperature control dial (driver) to 32°C (90°F).

Connector	Terminals		Condition	Voltage
Connector	(+)	(-)	Condition	(Approx.)
Water valve: F68	1	2	Rotate temperature control dial	Battery voltage



## Is the inspection result normal?

YES >> Replace the water valve.

NO >> GO TO 4.

## 4. CHECK WATER VALVE CONTROL OUTPUT CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect front air control connector M50.
- Check continuity between water valve harness connector F68

   (A) terminal 1 and front air control harness connector M50 (B) terminal 41.

## 1 - 41 : Continuity should exist.

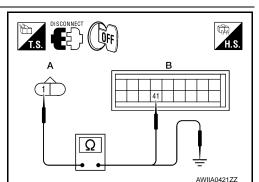
Check continuity between water valve harness connector F68
 (A) terminal 1 and ground.



## Is the inspection result normal?

YES >> Replace front air control. Refer to <u>VTL-8</u>, "Removal and Installation".

NO >> Repair harness or connector.



## AMBIENT SENSOR

## Component Description

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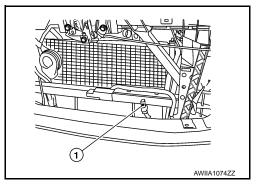
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#### COMPONENT DESCRIPTION

#### **Ambient Sensor**

The ambient sensor (1) is attached on the radiator core support (left side). It detects ambient temperature and converts it into a value which is then input into the front air control.



## AMBIENT TEMPERATURE INPUT PROCESS

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

This prevents constant adjustments due to momentary conditions, such as stopping after high speed driving. Although the actual ambient temperature has not changed, the temperature detected by the ambient sensor will increase. This is because the heat from the engine compartment can radiate to the front grille area, location of the ambient sensor.

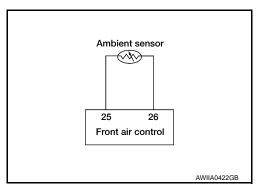
## Ambient Sensor Diagnosis Procedure

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Regarding Wiring Diagram information, refer to HAC-72, "Wiring Diagram".

#### DIAGNOSTIC PROCEDURE FOR AMBIENT SENSOR

SYMPTOM: Ambient sensor circuit is open or shorted. Using the Consult-III, DTC B257B or B257C is displayed. Without Consult-III, code 40 or 41 is indicated on front air control as a result of conducting the front air control self-diagnosis.



1. CHECK VOLTAGE BETWEEN AMBIENT SENSOR AND GROUND

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## AMBIENT SENSOR

## < COMPONENT DIAGNOSIS >

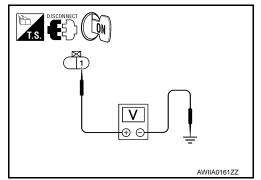
## [AUTOMATIC AIR CONDITIONER]

- Disconnect ambient sensor connector.
- Turn ignition switch ON.
- 3. Check voltage between ambient sensor harness connector E1 terminal 1 and ground.

#### 1 - Ground : Approx. 5V

## Is the inspection result normal?

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



# 2.CHECK CIRCUIT CONTINUITY BETWEEN AMBIENT SENSOR AND FRONT AIR CONTROL

- 1. Turn ignition switch OFF.
- Disconnect front air control connector.
- Check continuity between ambient sensor harness connector E1 (B) terminal 2 and front air control harness connector M49 (A) terminal 26.

#### 2 - 26 : Continuity should exist.

## Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair harness or connector.

# 3. CHECK AMBIENT SENSOR

Check the ambient sensor circuit. Refer to HAC-58, "Ambient Sensor Component Inspection".

## Is the inspection result normal?

- YES >> 1. Replace front air control. Refer to VTL-8, "Removal and Installation".
  - 2. GO TO HAC-21, "Front Air Control Self-Diagnosis" and perform self-diagnosis.
- NO >> 1. Replace ambient sensor. Refer to HA-45, "Removal and Installation".
  - GO TO HAC-21, "Front Air Control Self-Diagnosis" and perform self-diagnosis.

# f 4.CHECK CIRCUIT CONTINUITY BETWEEN AMBIENT SENSOR AND FRONT AIR CONTROL

- 1. Turn ignition switch OFF.
- 2. Disconnect front air control connector.
- 3. Check continuity between ambient sensor harness connector E1 (B) terminal 1 and front air control harness connector M49 (A) terminal 25.

#### 1 - 25 : Continuity should exist.

4. Check continuity between ambient sensor harness connector E1 (B) terminal 2 and ground.

## : Continuity should not exist.

## 1 - Ground

## Is the inspection result normal?

YES >> 1. Replace front air control. Refer to VTL-8, "Removal and Installation".

GO TO HAC-21, "Front Air Control Self-Diagnosis" and perform self-diagnosis.

NO >> Repair harness or connector.

## Ambient Sensor Component Inspection

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#### COMPONENT INSPECTION

**Ambient Sensor** 

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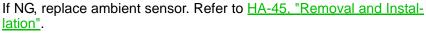
## **AMBIENT SENSOR**

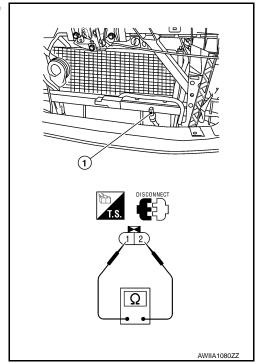
## < COMPONENT DIAGNOSIS >

## [AUTOMATIC AIR CONDITIONER]

After disconnecting ambient sensor (1) connector E1, measure resistance between terminals 1 and 2 at sensor component side, using the 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





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## **IN-VEHICLE SENSOR**

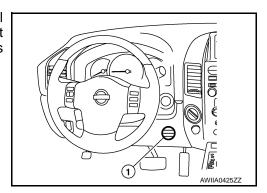
## Component Description

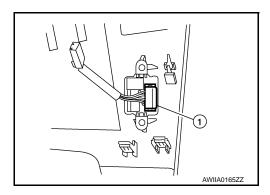
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#### COMPONENT DESCRIPTION

In-vehicle Sensor

The in-vehicle sensor (1) is located on the lower instrument panel LH. It converts variations in temperature of passenger compartment air (drawn in through the integrated fan) into a resistance value. It is then input into the front air control.





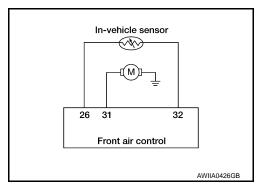
## In-Vehicle Sensor Diagnosis Procedure

INFOID:0000000005386616

Regarding Wiring Diagram information, refer to HAC-72, "Wiring Diagram".

## DIAGNOSTIC PROCEDURE FOR IN-VEHICLE SENSOR

SYMPTOM: In-vehicle sensor circuit is open or shorted. Using the CONSULT-III, DTC B2578 or B2579 is displayed. Without a CONSULT-III, code 30, 31 is indicated on front air control as a result of conducting self-diagnosis.



## 1. CHECK IN-VEHICLE SENSOR CIRCUIT

Is self-diagnosis DTC B2578 or B2579 (with CONSULT-III) or code 30, 31 (without CONSULT-III) present? YES or NO?

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

2.CHECK VOLTAGE BETWEEN IN-VEHICLE SENSOR AND GROUND

## **IN-VEHICLE SENSOR**

## < COMPONENT DIAGNOSIS >

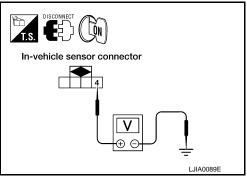
## [AUTOMATIC AIR CONDITIONER]

- 1. Disconnect in-vehicle sensor connector.
- 2. Turn ignition switch ON.
- 3. Check voltage between in-vehicle sensor harness connector M32 terminal 4 and ground.

## 4 - Ground : Approx. 5V.

## Is the inspection result normal?

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



# ${f 3.}$ CHECK CIRCUIT CONTINUITY BETWEEN IN-VEHICLE SENSOR AND FRONT AIR CONTROL

- 1. Turn ignition switch OFF.
- 2. Disconnect front air control connector M49.
- Check continuity between in-vehicle sensor harness connector M32 (B) terminal 1 and front air control harness connector M49 (A) terminal 26.

## 1 - 26 : Continuity should exist.

## Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair harness or connector.

## 4. CHECK IN-VEHICLE SENSOR

Check in-vehicle sensor. Refer to <a href="HAC-62">HAC-62</a>, "In-Vehicle Sensor Component Inspection".

## Is the inspection result normal?

YES >> 1. Replace front air control. Refer to <a href="VTL-8">VTL-8</a>, "Removal and Installation".

2. Go to <u>HAC-21</u>, "Front Air Control Self-Diagnosis" and perform self-diagnosis.

NO >> 1. Replace in-vehicle sensor. Refer to <u>VTL-9</u>, "Removal and Installation".

2. Go to HAC-21, "Front Air Control Self-Diagnosis" and perform self-diagnosis.

## ${f 5.}$ CHECK CIRCUIT CONTINUITY BETWEEN IN-VEHICLE SENSOR AND FRONT AIR CONTROL

- 1. Turn ignition switch OFF.
- 2. Disconnect front air control connector.
- Check continuity between in-vehicle sensor harness connector M32 (B) terminal 4 and front air control harness connector M50 (A) terminal 32.

## 4 - 32 : Continuity should exist.

4. Check continuity between in-vehicle sensor harness connector M32 (B) terminal 4 and ground.

## 4 - Ground Continuity should not exist.

## Is the inspection result normal?

YES >> 1. Replace front air control. Refer to <a href="VTL-8">VTL-8</a>, "Removal and Installation".

2. Go to <a href="HAC-21">HAC-21</a>, "Front Air Control Self-Diagnosis" and perform self-diagnosis.

NO >> Repair harness or connector.

 $oldsymbol{6}.$ CHECK CIRCUIT CONTINUITY BETWEEN IN-VEHICLE SENSOR MOTOR AND FRONT AIR CONTROL (SELF-DIAGNOSIS CODES 30, 31, 44, 46 OR DTC B2578, B2579)

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## **IN-VEHICLE SENSOR**

## < COMPONENT DIAGNOSIS >

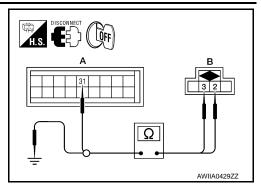
## [AUTOMATIC AIR CONDITIONER]

- 1. Turn ignition switch OFF.
- Disconnect front air control connector and in-vehicle sensor connector.
- Check continuity between in-vehicle sensor harness connector M32 (B) terminal 3 and front air control harness connector M50 (A) terminal 31.

3 - 31 : Continuity should exist.

 Check continuity between in-vehicle sensor harness connector M32 (B) terminal 3 and ground.

2 - Ground : Continuity should exist.3 - Ground : Continuity should not exist.



## Is the inspection result normal?

YES >> 1. Replace front air control. Refer to <a href="VTL-8">VTL-8</a>, "Removal and Installation".

2. Go to HAC-21, "Front Air Control Self-Diagnosis" and perform self-diagnosis.

NO >> Repair harness or connector.

## In-Vehicle Sensor Component Inspection

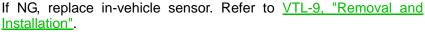
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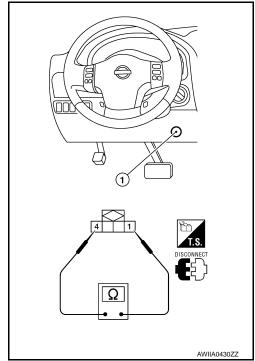
#### COMPONENT INSPECTION

In-vehicle Sensor

After disconnecting in-vehicle sensor connector M32, measure resistance between terminals 1 and 4 at sensor component side, using the table below.

Temperature °C (°F)	Resistance k $\Omega$
-15 (5)	21.40
-10 (14)	16.15
-5 (23)	12.29
0 (32)	9.41
5 (41)	7.27
10 (50)	5.66
15 (59)	4.45
20 (68)	3.51
25 (77)	2.79
30 (86)	2.24
35 (95)	1.80
40 (104)	1.45
45 (113)	1.18





## **OPTICAL SENSOR**

## Component Description

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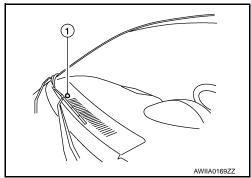
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#### COMPONENT DESCRIPTION

The optical sensor (1) is located in the center of the defroster grille. 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 front air control.



## **OPTICAL INPUT PROCESS**

The front air control includes a processing circuit which averages the variations in detected sunload over a period of time. This prevents adjustments in the ATC 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 optical sensor will vary 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 ATC system operation. On the other hand, shortly after entering a long tunnel, the system will recognize the change in sunload, and the system will react accordingly.

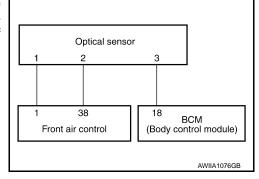
## Optical Sensor Diagnosis Procedure

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Regarding Wiring Diagram information, refer to <a href="HAC-72">HAC-72</a>, "Wiring Diagram".

#### DIAGNOSTIC PROCEDURE FOR OPTICAL SENSOR

SYMPTOM: Optical sensor circuit is open or shorted. Using the CONSULT-III, DTC B257F or B2580 is displayed. Without a CONSULT-III, code 50 or 52 is indicated on front air control as a result of conducting self-diagnosis.



# 1. CHECK CIRCUIT CONTINUITY BETWEEN OPTICAL SENSOR AND FRONT AIR CONTROL

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## **OPTICAL SENSOR**

## < COMPONENT DIAGNOSIS >

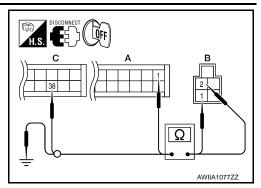
## [AUTOMATIC AIR CONDITIONER]

1. Turn ignition switch OFF.

- Disconnect front air control connector and optical sensor connector.
- 3. Check continuity between optical sensor harness connector M302 (B) terminals 1 and 2 and front air control harness connector M50 (C) terminal 38 and M49 (A) terminal 1.

1 - 1 : Continuity should exist.2 - 38 : Continuity should exist.

4. Check continuity between optical sensor harness connector M302 (B) terminal 1 and 2 and ground.



## 1, 2 - Ground : Continuity should not exist.

## Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair harness or connector.

# 2. CHECK CIRCUIT CONTINUITY BETWEEN OPTICAL SENSOR AND BCM

- 1. Disconnect BCM connector.
- Check continuity between optical sensor harness connector M302 (B) terminal 3 and BCM harness connector M18 (A) terminal 18.

3 - 18 : Continuity should exist.

Check continuity between optical sensor harness connector M302 (B) terminal 4 and ground.

3 - Ground : Continuity should not exist.

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#### Is the inspection result normal?

YES >> Replace optical sensor. Refer to <u>VTL-10</u>, "Removal and Installation".

NO >> Repair harness or connector.

## [AUTOMATIC AIR CONDITIONER]

## **INTAKE SENSOR**

## System Description

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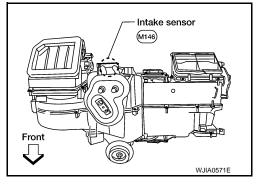
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#### COMPONENT DESCRIPTION

#### Intake Sensor

The intake sensor is located on the heater & cooling unit assembly. It converts temperature of air after if passes through the evaporator into a resistance value which is then input to the front air control.



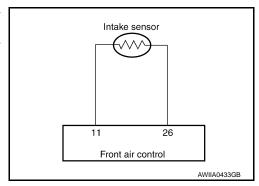
## Intake Sensor Diagnosis Procedure

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Regarding Wiring Diagram information, refer to HAC-72, "Wiring Diagram".

#### DIAGNOSTIC PROCEDURE FOR INTAKE SENSOR

SYMPTOM: Intake sensor circuit is open or shorted. Using the CONSULT-III, DTC B2581 or B2582 is displayed. Without a CONSULT-III, code 56 or 57 is indicated on front air control as a result of conducting self-diagnosis.



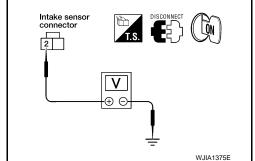
## ${f 1}$ .CHECK VOLTAGE BETWEEN INTAKE SENSOR AND GROUND

- Disconnect intake sensor connector.
- 2. Turn ignition switch ON.
- 3. Check voltage between intake sensor harness connector M146 terminal 2 and ground.

## 2 - Ground : Approx. 5V

## Is the inspection result normal?

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



# 2. CHECK CIRCUIT CONTINUITY BETWEEN INTAKE SENSOR AND FRONT AIR CONTROL

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Revision: August 2009 HAC-65 2010 Titan

## INTAKE SENSOR

## < COMPONENT DIAGNOSIS >

## [AUTOMATIC AIR CONDITIONER]

- 1. Turn ignition switch OFF.
- Disconnect front air control connector.
- 3. Check continuity between intake sensor harness connector M146 (B) terminal 1 and front air control harness connector M49 (A) terminal 26.

# 1 - 26 : Continuity should exist. Is the inspection result normal?

#### is the inspection result normal

YES >> GO TO 3.

NO >> Repair harness or connector.

# 3. CHECK INTAKE SENSOR

Check intake sensor. Refer to HAC-66, "Intake Sensor Component Inspection".

## Is the inspection result normal?

- YES >> 1. Replace front air control. Refer to <u>VTL-8</u>, "Removal and Installation".
  - 2. Go to HAC-21, "Front Air Control Self-Diagnosis" and perform self-diagnosis.
- NO >> 1. Replace intake sensor. Refer to VTL-11, "Removal and Installation".
  - 2. Go to HAC-21, "Front Air Control Self-Diagnosis" and perform self-diagnosis.

## ${f 4.}$ CHECK CIRCUIT CONTINUITY BETWEEN INTAKE SENSOR AND FRONT AIR CONTROL

- 1. Turn ignition switch OFF.
- 2. Disconnect front air control connector.
- Check continuity between intake sensor harness connector M146 (B) terminal 2 and front air control harness connector M49 (A) terminal 11.

## 2 - 11 : Continuity should exist.

 Check continuity between intake sensor harness connector M146 (B) terminal 2 and ground.

## 2 - Ground : Continuity should not exist.

## Is the inspection result normal?

- YES >> 1. Replace front air control. Refer to VTL-8, "Removal and Installation".
  - 2. Go to HAC-21, "Front Air Control Self-Diagnosis" and perform self-diagnosis.
- NO >> Repair harness or connector.

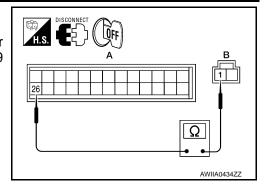
## Intake Sensor Component Inspection

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#### COMPONENT INSPECTION

Intake Sensor



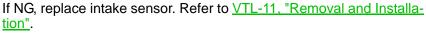
## **INTAKE SENSOR**

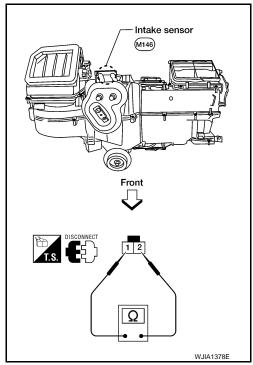
## < COMPONENT DIAGNOSIS >

## [AUTOMATIC AIR CONDITIONER]

After disconnecting intake sensor connector, measure resistance between terminals 1 and 2 at sensor harness side, using the table below.

Temperature °C (°F)	Resistance kΩ
-15 (5)	209.0
-10 (14)	160.0
-5 (23)	123.0
0 (32)	95.8
5 (41)	74.9
10 (50)	58.9
15 (59)	46.7
20 (68)	37.3
25 (77)	30.0
30 (86)	24.2
35 (95)	19.7
40 (104)	16.1
45 (113)	13.2





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## POWER SUPPLY AND GROUND CIRCUIT FOR CONTROLLER

< COMPONENT DIAGNOSIS >

[AUTOMATIC AIR CONDITIONER]

## POWER SUPPLY AND GROUND CIRCUIT FOR CONTROLLER

## Component Description

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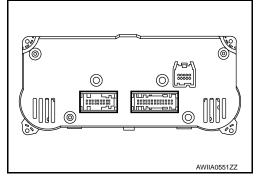
## COMPONENT DESCRIPTION

#### Front Air Control

The front air control has a built-in microcomputer which processes information sent from various sensors needed for air conditioner operation. The air mix door motors, mode door motor, intake door motor, defroster door motor, blower motor and compressor are then controlled.

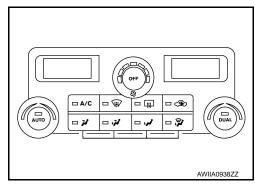
The front air control is unitized with control mechanisms. When the various switches and temperature dials are operated, data is input to the front air control.

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



## Potentio Temperature Control (PTC)

There are two PTCs (driver and passenger) built into the front air control. They can be set at an interval of 0.5°C (1.0°F) in the 18°C (60°F) to 32°C (90°F) temperature range by rotating the temperature dial. The set temperature is displayed.



## Front Air Control Component Function Check

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SYMPTOM: A/C system does not come on.

#### INSPECTION FLOW

# 1.confirm symptom by performing operational check - auto mode

- 1. Press AUTO switch.
- Confirm that the compressor clutch engages (sound or visual inspection). (Discharge air and blower speed will depend on ambient, in-vehicle and set temperatures.)

#### Is the inspection result normal?

YES >> Inspection End.

NO >> Go to diagnosis procedure. Refer to <u>HAC-68</u>, "Front Air Control Power and Ground Diagnosis <u>Procedure"</u>.

## Front Air Control Power and Ground Diagnosis Procedure

INFOID:0000000005386625

Regarding Wiring Diagram information, refer to HAC-72, "Wiring Diagram".

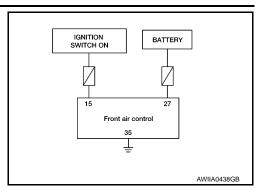
## DIAGNOSTIC PROCEDURE FOR A/C SYSTEM

# POWER SUPPLY AND GROUND CIRCUIT FOR CONTROLLER

## < COMPONENT DIAGNOSIS >

[AUTOMATIC AIR CONDITIONER]

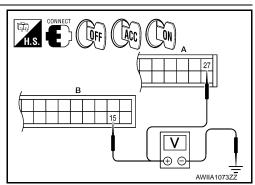
SYMPTOM: A/C system does not come on.



# 1. CHECK POWER SUPPLY CIRCUITS FOR FRONT AIR CONTROL

- Turn ignition switch ON.
- Check voltage between front air control harness connector M49 (B) terminal 15 and M50 (A) terminal 27, and ground.

Terminals			Ignition switch position		
(+)					
front air control connector	Terminal No.	(-)	OFF	ACC	ON
M49	15	Ground	Approx. 0V	Approx. 0V	Battery voltage
M50	27		Battery voltage	Battery voltage	Battery voltage



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## Is the inspection result normal?

YES >> GO TO 2.

NO >> Check 10A fuses [Nos. 8 and 19, located in the fuse block (J/B)]. Refer to PG-74, "Terminal Arrangement".

- If fuses are OK, check harness for open circuit. Repair or replace as necessary.
- If fuses are NG, replace fuse and check harness for short circuit. Repair or replace as necessary.

# 2. CHECK GROUND CIRCUIT FOR FRONT AIR CONTROL

- Turn ignition switch OFF.
- 2. Disconnect front air control connectors.
- Check continuity between front air control harness connector M50 terminal 35 and ground.

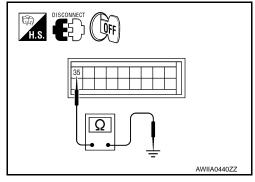
#### 35 - Ground

: Continuity should exist.

## Is the inspection result normal?

>> Replace front air control. Refer to VTL-8, "Removal and OK Installation".

NG >> Repair harness or connector.



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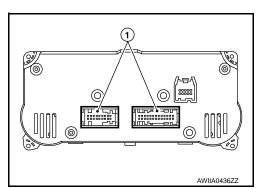
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# **ECU DIAGNOSIS**

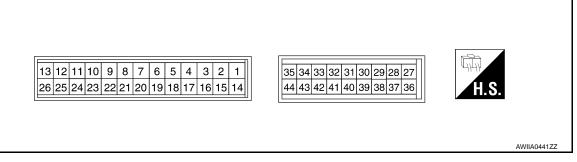
## AIR CONDITIONER CONTROL

## Front Air Control Terminals Reference Values

Measure voltage between each terminal and ground by following Terminals and Reference Value for front air control (1).



## FRONT AIR CONTROL HARNESS CONNECTOR TERMINAL LAYOUT



## TERMINALS AND REFERENCE VALUES FOR FRONT AIR CONTROL

Terminal No.	Wire color	Item	Ignition switch	Condition	Voltage (V) (Approx.)
1	G/O	Optical sensor (driver)	ON	-	0 - 5V
2	L	Air mix door motor (passenger) CCW	ON	-	Battery voltage
3	Р	V ref ACTR (ground)	ON	-	5V
4	W/R	Compressor ON signal	ON	A/C switch OFF	5V
4	VV/IX		ON	A/C switch ON	0V
E	L/R	Fan ON signal	ON	Blower switch OFF	5V
5 L/F	L/R		ON	Blower switch ON	0V
6	SB	Air mix door motor (driver) feedback	ON	-	0 - 5V
7	GR	Mode door motor feedback	ON	-	0 - 5V
8	R/L	Illumination +	ON	Park lamps ON	Battery voltage
9	BR	Illumination -	-	Park lamps ON	(V) 15 10 5 0 200 ms
10	LG/B	Defroster door motor feedback	ON	-	0 - 5V
11	L/B	Intake sensor	ON	-	0 - 5V
13	G/R	Variable blower control	ON	-	0 - 5V
14	G/W	Air mix door motor (passenger) CW	ON	Clockwise rotation	Battery voltage

## **AIR CONDITIONER CONTROL**

## < ECU DIAGNOSIS >

## [AUTOMATIC AIR CONDITIONER]

Terminal No.	Wire color	Item	Ignition switch	Condition	Voltage (V) (Approx.)
15	Y/G	Power supply for IGN	ON	-	Battery voltage
16	Y/B	Rear Defogger request *1	ON		Battery voltage
17	W/G	Air mix door motor (driver) CW	ON	Clockwise rotation	Battery voltage
18	G	Air mix door motor (driver) CCW	ON	Counterclockwise rotation	Battery voltage
19	BR/W	Mode door motor CW	ON	Clockwise rotation	Battery voltage
20	P/L	Mode door motor CCW	ON	Counterclockwise rotation	Battery voltage
21	G/B	Intake door motor CCW	ON	Counterclockwise rotation	Battery voltage
22	0	Intake door motor CW	ON	Clockwise rotation	Battery voltage
23	LG	Defroster door motor CW	ON	Clockwise rotation	Battery voltage
24	P/B	Defroster door motor CCW	ON	Counterclockwise rotation	Battery voltage
25	Р	Ambient sensor	ON	-	0 - 5V
26	V/R	Sensor ground	ON	-	0V
27	Y/R	Power supply for BAT	-	-	Battery voltage
28	Y	V ref ACTR (5V)	ON	-	0 - 5V
29	R/W	Air mix door motor (passenger) feed-back	ON	-	0 - 5V
31	BR/Y	In-vehicle sensor motor (+)	ON	-	Battery voltage
32	LG/R	In-vehicle sensor signal	ON	-	0 - 5V
35	В	Ground	-	-	0V
36	Р	CAN-L	ON	-	0 - 5V
37	L	CAN-H	ON	-	0 - 5V
38	W/V	Optical sensor (passenger)	ON	-	0 - 5V
44	Y/L	Water valve	ON	Water valve open	Battery voltage
41				Water valve closed	0V
42 W	W/C	W/G Water valve	ON	Water valve open	0V
	VV/G			Water valve closed	Battery voltage

<sup>\*1:</sup> If equipped

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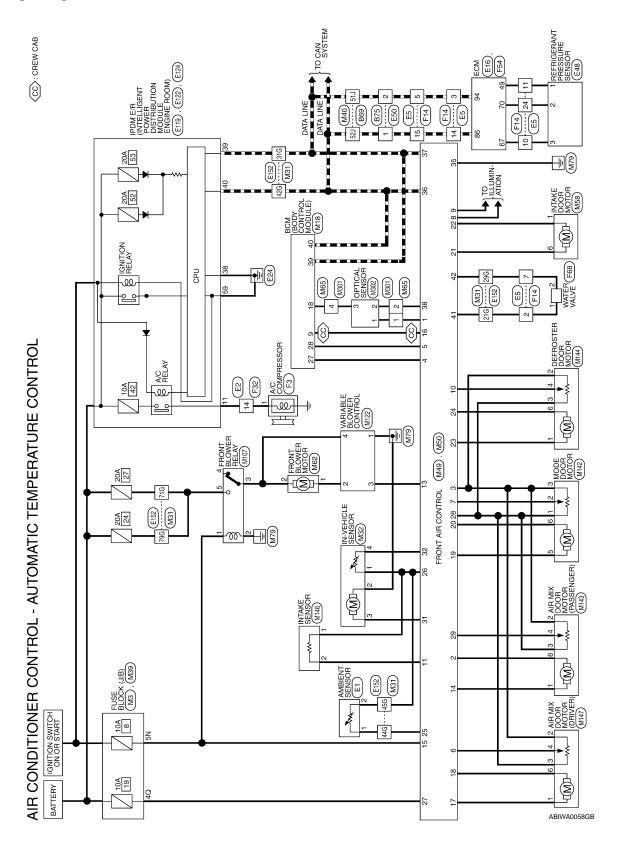
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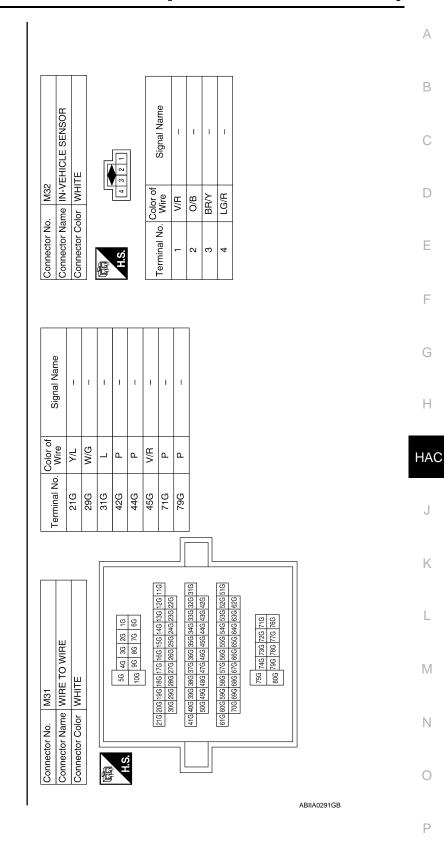
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Wiring Diagram



# AIR CONDITIONER CONTROL CONNECTORS - AUTOMATIC TEMPERATURE CONTROL

Connector No.	. M3		Connector No. M18	M18	L	Torming No Color of	color of	
Connector Name FUSE BL	me FUS	E BLOCK (J/B)	Connector Name	BCM (BODY CONTROL	<u> </u>	ا ا	Wire	Signal Ivalile
Connector Color WHIT	lor WHI	ш		MODÙLE)	6	_	Y/B	REAR DEFOGGER SW
			Connector Color WHITE	WHITE	18	· ·	۵	KEYLESS & AUTO LIGHT SENSOR GND
恒	NE NE	% % !!	é		27		M/R	AIRCON SW
H.S.	N8	7N 6N 5N 4N			28	8	L/R	BLOWER FAN SW
			H.S.		39	6	٦	CAN-H
	30,00			11 11 11 11 11 11 11 11 11 11 11 11 11	40	0	Ь	CAN-L
Terminal No. Wire	Wire	Signal Name	21 22 23 24 25 26 2	2 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40	101			
2N	Y/G	1			1			



Signal Name	I	ı						Signal Name	PNL/FLR DR B	RECIRC DR1 A	RECIRC DR1 B	DEFROST DR A	DEFROST DR B	AMBIENT TEMP SEN	SENSOR RETURN									
Color of Wire	7	Д						Color of Wire	P/L	G/B	0	LG	P/B	Д	N/R									
Terminal No.	51J	52J						Terminal No.	20	21	22	23	24	25	26									
M40 WIRE TO WIRE			41 32 23 13 98 72 63	21.0 [20.0 [30.1 [31.0 [17.0 [16.0 [15.0 [15.0 [17.0 [15.0 [1	300 230 350 370 360 350 340 350 320 310	50J 489 488 47.7 48.5 45.4 45.1 45.3 42.2 61.1 60J 59J 58J 57.7 56J 55J 55J 55J 55J 57J 70J 69J 68J 677 66J 65J 64J 63J 62.2	75J 74J 73J 72J 77J 80J 75J 76J 76J	Signal Name	DEFROST	FEEDBACK	EVAP TEMP SENSOR	1	FRONT BLWR SPEED	PASS BLND DR A	IGN REAR DEF REO	DRVR BLND DR A	DRVR BLND DR B	PNL/FLR DR A						
. M40 me WIRE	or WHITE	_	[3]	13 200 190 180	300 230 260	50J 49J 48J 1J 60J 59J 58J 70J 69J 68J	75.	Color of Wire	LG/B		L/B	T		M/5	7/B	M/G	ŋ	BR/W						
Connector No.	Connector Color		明.S.	[N]	4	6		Terminal No.	10		=	12	13	4 1	16	17	18	19						
M39 FUSE BLOCK (J/B)			2010 8040	Signal Name	ı				(WITH AUTOMATIC	ERATURE CONTROL)		F	7 6 5 4 3 2 1	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Signal Name	SIINIDSENIET		V REF RET	AC REQ	FAN ON	DRVR BLND DR FF	PNL/FLR DR FB	ILLUM +	ILLUM -
		-	30 20 10 80 70 60 50 40	Color of Wire	Y/R					-	IOI DEACK		12 11 10 9 8 35 24 23 23 24	27 27 27	Color of	all O/U	8 -	۵	W/R	L/R	SB	GR	R/L	BR
Connector No.	Connector Color		H.S.	Terminal No.	40			Connector No.	Connector Name				2 13	6	Terminal No	-	- 2	က	4	5	9	7	8	6
		_								•	_										AE	BIIAOO	10GE	3

	MOTOR			Signal Name	ı	1
M58	INTAKE DOOR MOTOR	BLACK	1 2 3 4 5 6	Color of Signa Wire	0	G/B
Connector No.	Connector Name	Connector Color	H.S.	Terminal No. Vo	-	9

Signal Name	IN-CAR TEMP SEN	_	-	GND	CAN-L	CAN-H	SUN LD SEN RGHT	-	-	WATER VALVE A	WATER VALVE B	1	_
Color of Wire	LG/R	1	-	В	Ь	L	W/V	1	1	J//	M/G	ı	_
Terminal No.	32	33	34	35	36	37	38	39	40	14	42	43	44

Connector No.	o. M50	
Connector Name	L OF	FRONT AIR CONTROL (WITH AUTOMATIC TEMPERATURE CONTROL)
Connector Color	olor BLUE	E
(南南 H.S.	35 34 33 44 43 42	33 32 32 31 30 29 28 27 36 43 40 39 38 37 36
Terminal No.	Color of Wire	Signal Name
27	Y/R	V BAT
28	>	5V REF VOLTAGE
29	B/W	PASS BLND DR FB
30	-	-
31	ВВ/У	IN-CAR TMP MTR+

			,						
20	FRONT BLOWER RELAY	BLACK	2 4 3	Signal Name	1	I	ı	ı	ı
. M107				Color of Wire	Y/G	В	M/L	ı	GR
Connector No.	Connector Name	Connector Color	H.S.	Terminal No.	-	2	3	4	2

Connector No.	). M65	ίδ
Connector Name		WIRE TO WIRE
Connector Color	_	WHITE
原动 H.S.	74	3 2 1
Terminal No. Wire	Color of Wire	Signal Name
1	0/9	ı
2	N/M	I
4	Ь	ı

	FRONT BLOWER MOTOR	*	رتا ا	Signal Name	ı	I
M62		BLACK		Color of Wire	N/	M/L
Connector No.	Connector Name	Connector Color	H.S.	Terminal No.	-	2

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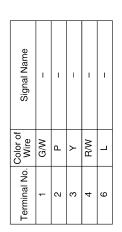


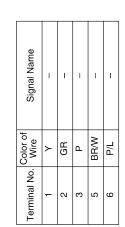
Connector Name MODE DOOR

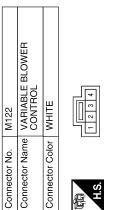
Connector No. M142

BLACK

Connector Color

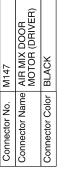






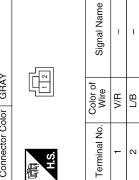


M147	Connector Name AIR MIX DOOR	
Connector No.	Connector Name	



Signal Name	
Color of Wire W/G Y Y Y SB SB	5
Color of	,

M146	Connector Name INTAKE SENSOR	GRAY	
Connector No.	Connector Name	Connector Color GRAY	



Connector No.	M144
Connector Name DEFROSTER DOOR MOTO	DEFROSTER DOOR MOTOR
Connector Color BLACK	BLACK

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Connector No.

1 2 3 4 5 6	Signal Name	_	1	ı	_	T
2	Color of Wire	bЛ	Ь	<b>\</b>	B/97	B/d
H.S.	Terminal No. Wire	1	2	3	4	9

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			Α
NSO	Signal Name	Signal Name  CAN-L  CAN-L  CAN-H  CAN-L  CAN-H  CAN	В
E1  AMBIENT SENSOR  GRAY		X	С
	Color of Wire P P V/R	Connector No. E16 Connector Name ECM Connector Color BLAC  H.S. (106   107   1	D
Connector No. Connector Name Connector Color	Terminal No.	Connector No. Connector Name Connector Name Connector Name Reg 99 99 99 99 99 99 99 99 99 99 99 99 99	Е
			F
SOR	Signal Name	Signal Name	G
M302 OPTICAL SENSOR WHITE			Н
9 5	Color of Wire G/O W/V PP	NA   E5   NA   NI   NI   NI   NI   NI   NI   NI	HA
Connector No. Connector Color	Terminal No.	Connector No. E5  Connector Name WIRE TO WIRE  Connector Color WHITE  Terminal No. Wire Signa  2 Y/L  3 L  5 L  7 W/G  11 R/Y  14 P  15 P  24 B/W	J
			K
HE HE	Signal Name	WIRE   15   6   7	L
M301 WHRE TO WIRE WHITE		RE TO WIF	M
	No. Wire G/O G/O W/V	1   1   1   1   1   1   1   1   1   1	N
Connector No. Connector Name Connector Color	Terminal No. 1 1 2 2 4 4	Connector No. Connector Nan Connector Nan Connector Nan 14	0
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Revision: August 2009 HAC-77 2010 Titan

Connector No.	). E119	9
Connector Name		IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color WHITE	olor WH	TE
原 H.S.	9 8 7 6 18 17 16 15	18   77   16   15   14   13   12   11   10
Terminal No.	Color of Wire	Signal Name
=	Y/B	AC COMPRESSOR

o S S S S S S S S S S S S S S S S S S S	E119	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)	or WHITE	9 8 7 6 6 6 4 3	Color of Signal Name	V/B AC COMPRESSOR
Connector Connector H.S.	Connector No.	Connector Name	Connector Color WHITE	原动 H.S.	Terminal No.	÷

NAR SECTION OF THE SE		E TO WIRE	NMO		Signal Name	1	
Color Wir	. E50	me WIR	lor BRC		Color of Wire	Ь	-
Connector No. E50 Connector Color BROWN  H.S.  Terminal No. Wire  Terminal No. Wire  Terminal No. Wire  Terminal No. Wire	Connector No	Connector Na	Connector Co	H.S.	Terminal No.	-	c

I	I		4	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM
Ь	_		E124	
				ame
1	2		Connector No.	Connector Name
		•		

IPDM E/R (INTELLIG POWER DISTRIBUT MODULE ENGINE F	CK	S9 58 57 62 61 60	Signal Nam	GND (POWE
	or BLA		Color of Wire	В
Connector Name	Connector Color BLACK	崎 H.S.	Terminal No.	69
		<u> </u>		

Connector No.	). E48	80
Connector Name		REFRIGERANT PRESSURE SENSOR
Connector Color		BLACK
管		
H.S.		
Terminal No.	Color of Wire	Signal Name
-	R/Υ	ı
2	B/W	ı
က	В	ı

2	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)		41 40 39 38 37 47 46 45 44 43	Signal Name	GND (SIGNAL)	CAN-H	CAN-L
. E122		lor WHITE	42 41	Color of Wire	В	_	Д
Connector No.	Connector Name	Connector Color	原动 H.S.	Terminal No.	38	39	40

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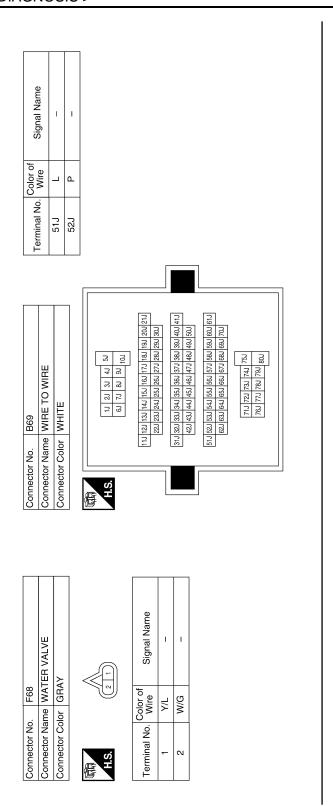
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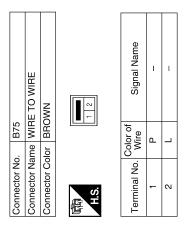
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Connector No. F3 Connector Name A/C COMPRESSOR Connector Color BLACK	H.S. Color of Signal Name			Connector Color   BLACK	H.S.   3   42  41  40  39  39  57  58  55  54  53  22  31  30  29  28  27  26  25  59  55  54  53  22  51  50  49  48  47  48  45  44  48  45  44  48  45  44  48  45  44  48  45  44  48  45  44  48  47  47  47  47  47  47  47  47  47  47	Terminal No. Wire Signal Name		B	/U B/W PDPRESS					
Signal Name	1 1 1 1 1		TO WIRE	4	[14   13   12   11   10   9   8   Signal Namo	ביים ביים ביים ביים ביים ביים ביים ביים								
Terminal No. Wire 21G Y/L 29G W/G	42G P 44G P 45G V/R 71G GR	_		E      ω	H.S. [16 15 1]									
Connector No. E152 Connector Name WIRE TO WIRE Connector Color WHITE	H.S. 16 26 36 46 56 66 76 86 96 106 106 106 106 106 106 106 106 106 10	31G   32G   33G   34G   35G   35G   35G   35G   40G   41G     42G   43G   44G   45G   46G   47G   48G   49G   50G     51G   52G   53G   54G   55G   55G   57G   58G   59G   60G   61G     62G   63G   64G   65G   66G   67G   68G   69G   70G     71G   72G   73G   74G   73G   74G   73G   77G   77	F14 WIRE TO WIRE	7	H.S.   24   25   22   27   20   19   18   77   16   15   14   13   12	1/\r	П I	5/M	10 B -	11 R/Y –	14 P –	15 P –	24 B/W –	





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# AIR CONDITIONER CONTROL

< SYMPTOM DIAGNOSIS >

# [AUTOMATIC AIR CONDITIONER]

# SYMPTOM DIAGNOSIS

# AIR CONDITIONER CONTROL

# Symptom Matrix Chart

# **SYMPTOM TABLE**

Symptom	Reference Page	
A/C system does not come on.	Go to Trouble Diagnosis Procedure for A/C System.	<u>HAC-68</u>
A/C system cannot be controlled.	Go to Self-diagnosis Function.	<u>HAC-21</u>
Air outlet does not change.	Co to Trouble Diagnosis Precedure for Made Dear Meter	HAC 22
Mode door motor is malfunctioning.	Go to Trouble Diagnosis Procedure for Mode Door Motor.	<u>HAC-23</u>
Discharge air temperature does not change.	Co to Trouble Diagnosis Presedure for Air Mix Door Motor	HAC-28
Air mix door motor is malfunctioning.	Go to Trouble Diagnosis Procedure for Air Mix Door Motor.	<u> MAC-26</u>
Intake door does not change.	Go to Trouble Diagnosis Procedure for Intake Door Motor.	HAC-37
Intake door motor is malfunctioning.	Go to Houble Diagnosis Procedure for make Door Motor.	<u>HAC-37</u>
Defroster door motor is malfunctioning.	Go to Trouble Diagnosis Procedure for Defroster Door Motor.	HAC-39
Front blower motor operation is malfunctioning.	Go to Trouble Diagnosis Procedure for Front Blower Motor.	HAC-45
Magnet clutch does not engage.	Go to Trouble Diagnosis Procedure for Magnet Clutch.	HAC-50
Insufficient cooling	Go to Trouble Diagnosis Procedure for Insufficient Cooling.	HAC-82
Insufficient heating	Go to Trouble Diagnosis Procedure for Insufficient Heating.	<u>HAC-90</u>
Noise	Go to Trouble Diagnosis Procedure for Noise.	<u>HAC-92</u>
Self-diagnosis cannot be performed.	Go to Trouble Diagnosis Procedure for Self-diagnosis.	HAC-68
Memory function does not operate.	Go to Trouble Diagnosis Procedure for Memory Function.	<u>HAC-93</u>

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#### INSUFFICIENT COOLING

## Component Function Check

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[AUTOMATIC AIR CONDITIONER]

SYMPTOM: Insufficient cooling

#### INSPECTION FLOW

# 1. CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - TEMPERATURE DECREASE

- 1. Press the AUTO switch.
- 2. Turn temperature control dial (driver) counterclockwise until 18°C (60°F) is displayed.
- 3. Check for cold air at discharge air outlets.

#### Can the symptom be duplicated?

YES >> GO TO 3.

NO >> GO TO 2.

# 2.CHECK FOR ANY SYMPTOMS

Perform a complete operational check for any symptoms. Refer to HAC-6, "Operational Check".

#### Does another symptom exist?

YES >> Refer to <u>HAC-81</u>, "Symptom Matrix Chart".

NO >> System OK.

# 3.CHECK FOR SERVICE BULLETINS

Check for any service bulletins.

>> GO TO 4.

# 4. PERFORM SELF-DIAGNOSIS

Perform self-diagnosis Refer to HAC-21, "Front Air Control Self-Diagnosis".

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> Refer to HAC-21, "Front Air Control Self-Diagnosis Code Chart".

# 5.CHECK DRIVE BELTS

Check compressor belt tension. Refer to EM-13, "Checking Drive Belts".

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> Adjust or replace compressor belt. Refer to EM-13, "Removal and Installation".

#### 6.CHECK AIR MIX DOOR OPERATION

Check and verify air mix door mechanism for smooth operation. Refer to <u>HAC-28</u>, "Air <u>Mix Door Motor (Driver)</u> Component Function Check".

#### Does air mix door operate correctly?

YES >> GO TO 7.

NO >> Check air mix door motor circuit. Refer to <u>HAC-28</u>, "Air Mix Door Motor (Driver) <u>Diagnosis Procedure"</u> or <u>HAC-32</u>, "Air Mix Door Motor (Passenger) <u>Diagnosis Procedure"</u>.

# 7.CHECK COOLING FAN MOTOR OPERATION

Check and verify cooling fan motor for smooth operation. Refer to EC-385, "Component Inspection".

#### Does cooling fan motor operate correctly?

YES >> GO TO 8.

NO >> Check cooling fan motor. Refer to EC-385, "Diagnosis Procedure".

#### 8.CHECK WATER VALVE OPERATION

Check and verify water valve for smooth operation. Refer to <u>HAC-55</u>, "Description".

#### Does water valve operate correctly?

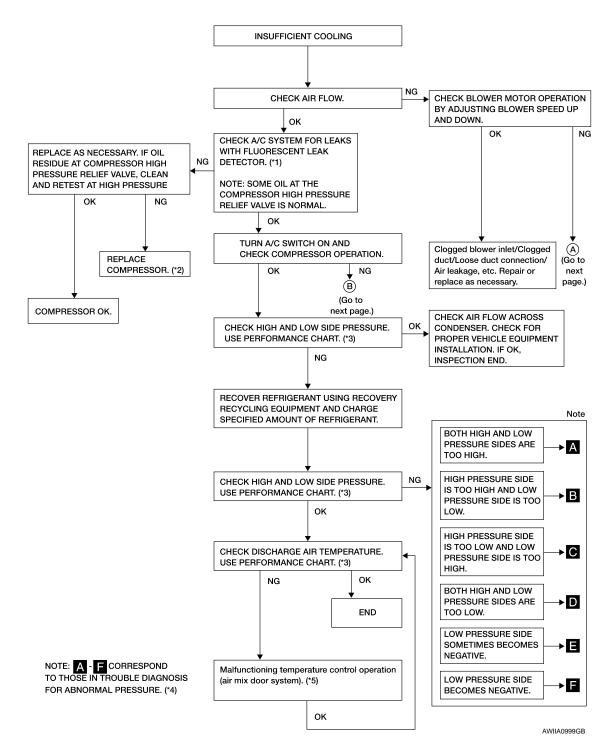
YES >> GO TO 9.

#### **INSUFFICIENT COOLING**

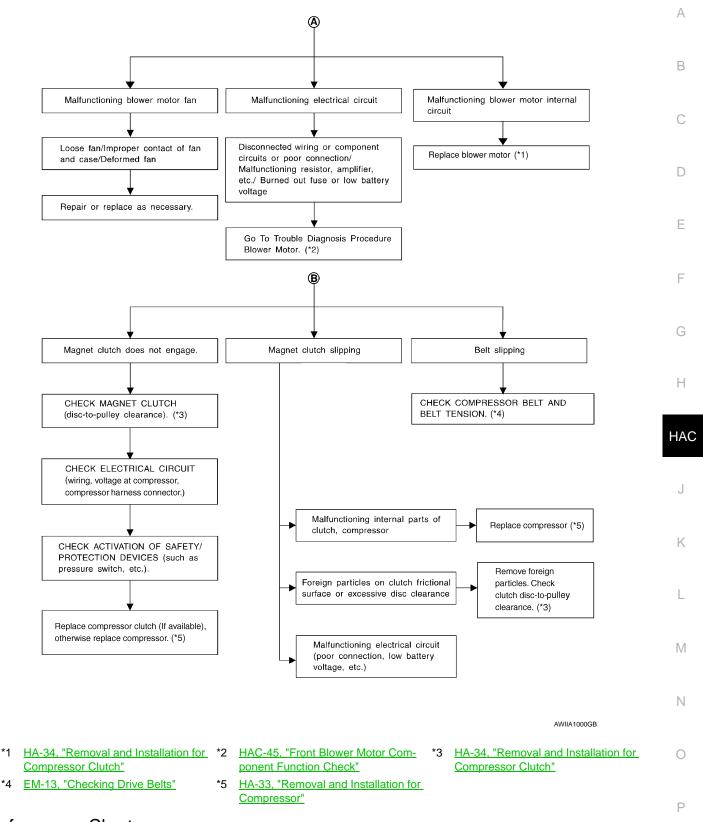
#### < SYMPTOM DIAGNOSIS >

#### [AUTOMATIC AIR CONDITIONER]

NO >> Check water valve circuit. Refer to HAC-55, "Water Valve Diagnosis Procedure". 9. CHECK RECOVERY/RECYCLING EQUIPMENT BEFORE USAGE Α Check recovery/recycling equipment before connecting to vehicle. Verify there is no pressure in the recovery/ recycling equipment by checking the gauges. If pressure exists, recover refrigerant from equipment lines. В >> GO TO 10. 10. CHECK REFRIGERANT PURITY Connect recovery/recycling equipment to vehicle. 2. Confirm refrigerant purity in supply tank using recovery/recycling and refrigerant identifier. D Is the inspection result normal? >> GO TO 11. YES NO >> Check contaminated refrigerant. Refer to HAC-94, "Working with HFC-134a (R-134a)". Е 11. CHECK FOR EVAPORATOR FREEZE UP Start engine and run A/C. Check for evaporator freeze up. Does evaporator freeze up? F YES >> Perform performance test diagnoses. Refer to HAC-83, "Diagnostic Work Flow". NO >> GO TO 12. 12. CHECK REFRIGERANT PRESSURE Check refrigerant pressure with manifold gauge connected. Refer to HAC-85, "Performance Chart". Is the inspection result normal? Н YES >> Perform performance test diagnoses. Refer to HAC-83, "Diagnostic Work Flow". NO >> GO TO 13. 13. CHECK AIR DUCTS HAC Check ducts for air leaks. Is the inspection result normal? YES >> System OK. NO >> Repair air leaks. Diagnostic Work Flow INFOID:0000000005386630 L M N Р



- Using the Fluorescent Dye Leak Detector"
- \*4 HAC-86, "Trouble Diagnoses for Ab- \*5 HAC-28, "Air Mix Door Motor (Driver) normal Pressure"
- \*1 HA-25, "Checking System for Leaks \*2 HA-34, "Removal and Installation for \*3 HAC-85, "Performance Chart" Compressor Clutch"
  - Component Function Check"



#### Performance Chart

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#### **TEST CONDITION**

Testing must be performed as follows:

#### < SYMPTOM DIAGNOSIS >

Closed
Open
Open
Max. COLD
(Ventilation) set
(Recirculation) set
Max. speed set
Idle speed

#### Recirculating-to-discharge Air Temperature Table

Inside air (Recirculating a	air) at blower assembly inlet	Disabarga air tamparatura at contar vantilatar
Relative humidity %	Air temperature °C (°F)	Discharge air temperature at center ventilator °C (°F)
	20 (68)	9.9 - 13.9 (50 - 57)
	25 (77)	14.6 - 18.6 (58 - 65)
50 - 60	30 (86)	16.8 - 21.8 (62 - 71)
	35 (95)	21.1 - 27.1 (70 - 81)
	40 (104)	25.3 - 31.5 (78 - 89)
	20 (68)	11.4 - 15.2 (53 - 59)
	25 (77)	15.5 - 20.0 (60 - 68)
60 - 70	30 (86)	19.9 - 25.0 (68 - 77)
	35 (95)	24.5 - 29.6 (76 - 85)
	40 (104)	28.7 - 34.9 (84 - 95)

#### Ambient Air Temperature-to-operating Pressure Table

Ambient air		High-pressure (Discharge side)	Low-pressure (Suction side)	
Relative humidity %	Air temperature °C (°F)	kPa (kg/cm <sup>2</sup> , psi)	kPa (kg/cm <sup>2</sup> , psi)	
	20 (68)	1020 - 1250 (10.4 - 12.7, 147.9 - 181.3)	160 - 190 (1.63 - 1.94, 23.2 - 27.6)	
	25 (77)	1236 - 1510 (12.6 - 15.4, 179.2 - 219)	206 - 245 (2.1 - 2.5, 29.9 - 35.6)	
50 - 70	30 (86)	1569 - 1,922 (16.0 - 19.6, 227.6 - 278.8)	265 - 324 (2.7 - 3.3, 38.4 - 46.9)	
	35 (95)	1,697 - 2079 (17.3 - 21.2, 246.1 - 301.5)	304 - 363 (3.1 - 3.7, 44.1 - 52.6)	
	40 (104)	1971 - 2403 (20.1 - 24.5, 285.9 - 348.5)	373 - 451 (3.8 - 4.6, 54.0 - 65.4)	

# Trouble Diagnoses for Abnormal Pressure

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Whenever system's high and/or low side pressure is abnormal, diagnose using a manifold gauge. The marker above the gauge scale in the following tables indicates the standard (usual) pressure range. Since the standard (usual) pressure, however, differs from vehicle to vehicle, refer to above table (Ambient air temperature-to-operating pressure table).

# **INSUFFICIENT COOLING**

# < SYMPTOM DIAGNOSIS >

# [AUTOMATIC AIR CONDITIONER]

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Both High- and Low-pressure Sides are Too High

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
	Pressure is reduced soon after water is splashed on condenser.	Excessive refrigerant charge in refrigeration cycle	Reduce refrigerant until speci- fied pressure is obtained.
Α	Air suction by cooling fan is insufficient.	Insufficient condenser cooling performance  ↓  1. Condenser fins are clogged.  2. Improper fan rotation of cooling fan	Clean condenser. Check and repair cooling fan if necessary.
Both high- and low-pressure sides are too high.	Low-pressure pipe is not cold.     When compressor is stopped high-pressure value quickly drops by approximately 196 kPa (2 kg/cm², 28 psi). It then decreases gradually thereafter.	Poor heat exchange in condenser (After compressor operation stops, high-pressure decreases too slowly.)  Air in refrigeration cycle	Evacuate and recharge system.
	Engine tends to overheat.	Engine cooling systems mal- function.	Check and repair engine cooling system.
	<ul> <li>An area of the low-pressure pipe is colder than areas near the evaporator outlet.</li> <li>Plates are sometimes covered with frost.</li> </ul>	<ul> <li>Excessive liquid refrigerant on low-pressure side</li> <li>Excessive refrigerant discharge flow</li> <li>Expansion valve is open a little compared with the specification.</li> <li>Improper expansion valve adjustment</li> </ul>	Replace expansion valve.

High-pressure Side is Too High and Low-pressure Side is Too Low

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
High-pressure side is too high and low-pressure side is too low.	Upper side of condenser and high-pressure side are hot, however, liquid tank is not so hot.	High-pressure tube or parts located between compressor and condenser are clogged or crushed.	<ul> <li>Check and repair or replace malfunctioning parts.</li> <li>Check oil for contamination.</li> </ul>

High-pressure Side is Too Low and Low-pressure Side is Too High

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
High-pressure side is too low and low-pressure side is too high.	High- and low-pressure sides become equal soon after compressor operation stops.	Compressor pressure operation is improper.  Understand the compressor packings.	Replace compressor.
(IO HI)  AC356A	No temperature difference between high- and low-pressure sides.	Compressor pressure operation is improper.  ↓  Damaged inside compressor packings.	Replace compressor.

Both High- and Low-pressure Sides are Too Low

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
	<ul> <li>There is a big temperature difference between liquid tank outlet and inlet. Outlet temperature is extremely low.</li> <li>Liquid tank inlet and expansion valve are frosted.</li> </ul>	Liquid tank inside is slightly clogged.	<ul><li>Replace liquid tank.</li><li>Check oil for contamination.</li></ul>
	Temperature of expansion valve inlet is extremely low as compared with areas near liquid tank. Expansion valve inlet may be frosted. Temperature difference occurs somewhere in high-pressure side.	High-pressure pipe located between liquid tank and expansion valve is clogged.	Check and repair malfunctioning parts. Check oil for contamination.
Both high- and low-pressure sides are too low.	Expansion valve and liquid tank are warm or only cool when touched.	Low refrigerant charge.  ↓ Leaking fittings or components.	Check refrigerant system for leaks. Refer to HA-23, "Checking of Refrigerant Leaks".
	There is a big temperature difference between expansion valve inlet and outlet while the valve itself is frosted.	Expansion valve closes a little compared with the specification.  1. Improper expansion valve adjustment. 2. Malfunctioning expansion valve. 3. Outlet and inlet may be clogged.	<ul> <li>Remove foreign particles by using compressed air.</li> <li>Check oil for contamination.</li> </ul>
	An area of the low-pressure pipe is colder than areas near the evaporator outlet.	Low-pressure pipe is clogged or crushed.	Check and repair malfunctioning parts.     Check oil for contamination.
	Air flow volume is too low.	Evaporator is frozen.	Check intake sensor circuit. Refer to HAC-65, "Intake Sensor Diagnosis Procedure". Repair evaporator fins. Replace evaporator. Refer to HAC-45, "Front Blower Motor Component Function Check".

# Low-pressure Side Sometimes Becomes Negative

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Low-pressure side sometimes becomes negative.	<ul> <li>Air conditioning system does not function and does not cy- clically cool the compart- ment air.</li> <li>The system constantly func- tions for a certain period of time after compressor is stopped and restarted.</li> </ul>	Refrigerant does not discharge cyclically.  ↓  Moisture is frozen at expansion valve outlet and inlet.  ↓  Water is mixed with refrigerant.	Drain water from refrigerant or replace refrigerant.     Replace liquid tank.

Low-pressure Side Becomes Negative

# **INSUFFICIENT COOLING**

# < SYMPTOM DIAGNOSIS >

# [AUTOMATIC AIR CONDITIONER]

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Low-pressure side becomes negative.	Liquid tank or front/rear side of expansion valve's pipe is frosted or dewed.	High-pressure side is closed and refrigerant does not flow. ↓ Expansion valve or liquid tank is frosted.	Leave the system at rest until no frost is present. Start it again to check whether or not the malfunction is caused by water or foreign particles.  If water is the cause, initially cooling is okay. Then the water freezes causing a blockage. Drain water from refrigerant or replace refrigerant.  If due to foreign particles, remove expansion valve and remove the particles with dry and compressed air (not shop air).  If either of the above methods cannot correct the malfunction, replace expansion valve.  Replace liquid tank.

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#### INSUFFICIENT HEATING

# Component Function Check

INFOID:0000000005386633

SYMPTOM: Insufficient heating

#### INSPECTION FLOW

# 1. CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - TEMPERATURE INCREASE

- 1. Press the AUTO switch.
- 2. Turn the temperature control dial (driver) clockwise until 32°C (90°F) is displayed.
- 3. Check for hot air at discharge air outlets.

#### Can this symptom be duplicated?

YES >> GO TO 2.

NO >> Perform complete system operational check. Refer to <a href="HAC-6">HAC-6</a>, "Operational Check".

### 2.CHECK FOR SERVICE BULLETINS

Check for any service bulletins.

>> GO TO 3.

# 3. PERFORM SELF-DIAGNOSIS

Perform self-diagnosis. Refer to HAC-21, "Front Air Control Self-Diagnosis".

#### Is the inspection results normal?

YES >> GO TO 4.

NO >> Refer to HAC-21, "Front Air Control Self-Diagnosis Code Chart".

# 4. CHECK ENGINE COOLING SYSTEM

- Check for proper engine coolant level. Refer to <u>CO-10, "Inspection"</u>.
- 2. Check hoses for leaks or kinks.
- Check radiator cap. Refer to CO-10, "Inspection".
- 4. Check for air in cooling system.

>> GO TO 5.

# CHECK AIR MIX DOOR OPERATION

Check the operation of the air mix door.

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> Check the air mix door motor circuit. Refer to <a href="HAC-28">HAC-28</a>, "Air Mix Door Motor (Driver) Component Function Check".

#### **6.**CHECK AIR DUCTS

Check for disconnected or leaking air ducts.

#### Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair all disconnected or leaking air ducts.

# 7. CHECK HEATER HOSE TEMPERATURES

- 1. Start engine and warm it up to normal operating temperature.
- Touch both the inlet and outlet heater hoses. The inlet hose should be hot and the outlet hose should be warm.

#### Is the inspection result normal?

YES >> Hot inlet hose and a warm outlet hose: GO TO 8.

NO >> • Inlet hose cold: GO TO 11.

• Both hoses warm: GO TO 9.

# 8. CHECK ENGINE COOLANT SYSTEM

#### **INSUFFICIENT HEATING**

#### < SYMPTOM DIAGNOSIS >

#### [AUTOMATIC AIR CONDITIONER]

Check engine coolant temperature sensor. Refer to EC-126, "Component Inspection". Α Is the inspection result normal? YES >> System OK. NO >> Repair or replace as necessary. Retest. В 9. CHECK HEATER HOSES Check heater hoses for proper installation. Is the inspection result normal? YES >> System OK. NO >> 1. Back flush heater core. 2. Drain the water from the system. D 3. Refill system with new engine coolant. Refer to CO-11, "Changing Engine Coolant". 4. GO TO 10 to retest. 10.check heater hose temperatures Е Start engine and warm it up to normal operating temperature. Touch both the inlet and outlet heater hoses. The inlet hose should be hot and the outlet hose should be warm. F Is the inspection result normal? YES >> System OK. NO >> Replace heater core. Refer to VTL-15, "Removal and Installation". 11. CHECK WATER VALVE Check the operation of the water valve. Refer to HAC-55, "Water Valve Diagnosis Procedure". Н Is the inspection result normal? YES >> System OK. NO >> Replace water valve. HAC K L M Ν Р

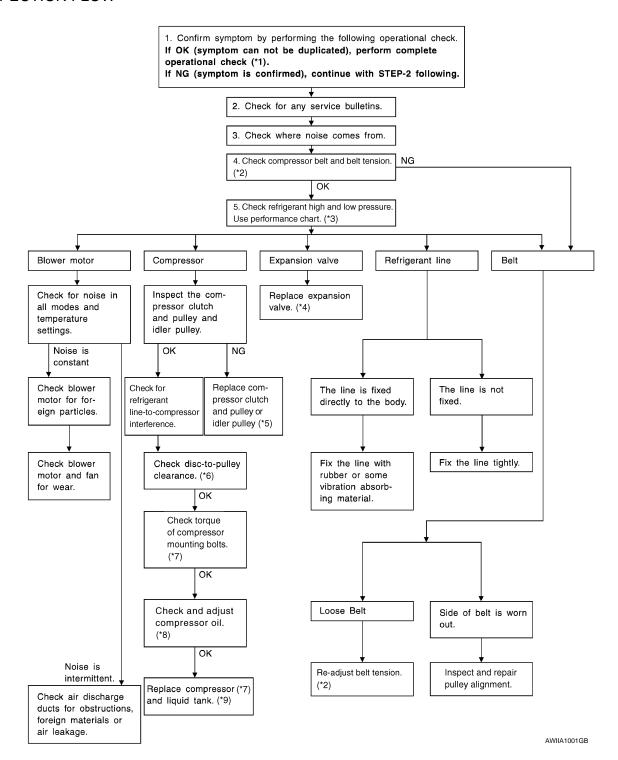
**HAC-91** 2010 Titan Revision: August 2009

## NOISE

# Component Function Check

INFOID:0000000005386634

SYMPTOM: Noise INSPECTION FLOW



- \*1 HAC-6, "Operational Check"
- **Expansion Valve**"
- Compressor"
- \*2 EM-13, "Checking Drive Belts"
- HA-44, "Removal and Installation for \*5 HA-34, "Removal and Installation for \*6 HA-34, "Removal and Installation for Compressor Clutch"
  - Compressor"
- \*3 HAC-85, "Performance Chart"
- Compressor Clutch"
- \*7 HA-33, "Removal and Installation for \*8 HA-33, "Removal and Installation for \*9 HA-42, "Removal and Installation for Condenser"

#### **MEMORY FUNCTION DOES NOT OPERATE**

< SYMPTOM DIAGNOSIS >

[AUTOMATIC AIR CONDITIONER]

#### MEMORY FUNCTION DOES NOT OPERATE Α Memory Function Check INFOID:0000000005386635 SYMPTOM: Memory function does not operate. В INSPECTION FLOW 1.confirm symptom by performing operational check - memory function Set the temperature to 32°C (90°F). 2. Rotate the front blower control dial (driver) to turn system OFF. Turn ignition switch OFF. 3. D 4. Turn ignition switch ON. 5. Press the AUTO switch. 6. Confirm that the set temperature remains at previous temperature. Е 7. Press the OFF switch. Can the symptom be duplicated? YES >> GO TO 3. >> GO TO 2. NO 2.PERFORM COMPLETE OPERATIONAL CHECK Perform a complete operational check and check for any symptoms. Refer to HAC-6, "Operational Check". Can a symptom be duplicated? YES >> Refer to HAC-5, "How to Perform Trouble Diagnosis For Quick And Accurate Repair". NO >> System OK. Н 3.CHECK FOR SERVICE BULLETINS Check for any service bulletins. HAC >> GO TO 4. 4. PERFORM SELF-DIAGNOSIS Perform self-diagnosis to check for any codes. Refer to HAC-21, "Front Air Control Self-Diagnosis". Are any self-diagnosis codes present? K YES >> Refer to HAC-21, "Front Air Control Self-Diagnosis Code Chart". NO >> GO TO 5. ${f 5.}$ CHECK POWER AND GROUND CIRCUIT Check main power supply and ground circuit. Refer to HAC-68, "Front Air Control Component Function Check". Is the inspection result normal? M YES >> GO TO 6. NO >> Repair or replace as necessary. **6.** RECHECK FOR SYMPTOMS Ν Perform a complete operational check for any symptoms. Refer to HAC-6, "Operational Check". Does another symptom exist? YES >> Refer to HAC-5, "How to Perform Trouble Diagnosis For Quick And Accurate Repair". >> Replace front air control. Refer to VTL-8, "Removal and Installation". NO Р

INFOID:0000000005386637

# **PRECAUTION**

#### **PRECAUTIONS**

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

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

#### **WARNING:**

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

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

#### **WARNING:**

- When working near the Airbag Diagnosis Sensor Unit or other Airbag System sensors with the Ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the Ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Working with HFC-134a (R-134a)

#### **WARNING:**

- CFC-12 (R-12) refrigerant and HFC-134a (R-134a) refrigerant are not compatible. If the refrigerants are mixed compressor failure is likely to occur. Refer to <a href="HA-4">HA-4</a>, "Contaminated Refrigerant". To determine the purity of HFC-134a (R-134a) in the vehicle and recovery tank, use Refrigerant Recovery/Recycling Recharging equipment and Refrigerant Identifier.
- Use only specified oil for the HFC-134a (R-134a) A/C system and HFC-134a (R-134a) components. If oil other than that specified is used, compressor failure is likely to occur.
- The specified HFC-134a (R-134a) oil rapidly absorbs moisture from the atmosphere. The following handling precautions must be observed:
- When removing refrigerant components from a vehicle, immediately cap (seal) the component to minimize the entry of moisture from the atmosphere.
- When installing refrigerant components to a vehicle, do not remove the caps (unseal) until just before connecting the components. Connect all refrigerant loop components as quickly as possible to minimize the entry of moisture into system.
- Only use the specified oil from a sealed container. Immediately reseal containers of oil. Without proper sealing, oil will become moisture saturated and should not be used.
- Avoid breathing A/C refrigerant and oil vapor or mist. Exposure may irritate eyes, nose and throat. Remove HFC-134a (R-134a) from the A/C system using certified service equipment meeting requirements of SAE J2210 [HFC-134a (R-134a) recycling equipment], or J2209 [HFC-134a (R-134a) recycling equipment], If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from refrigerant and oil manufacturers
- Do not allow A/C oil to come in contact with styrofoam parts. Damage may result.

CONTAMINATED REFRIGERANT

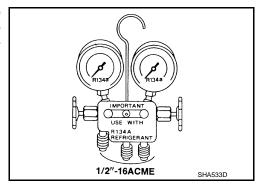
#### If a refrigerant other than pure HFC-134a (R-134a) is identified in a vehicle, your options are:

- Explain to the customer that environmental regulations prohibit the release of contaminated refrigerant into the atmosphere.
- Explain that recovery of the contaminated refrigerant could damage your service equipment and refrigerant supply.
- Suggest the customer return the vehicle to the location of previous service where the contamination may have occurred.
- If you choose to perform the repair, recover the refrigerant using only dedicated equipment and containers. Do not recover contaminated refrigerant into your existing service equipment. If your facility does not have dedicated recovery equipment, you may contact a local refrigerant product retailer for available service. This refrigerant must be disposed of in accordance with all federal and local regulations. In addition, replacement of all refrigerant system components on the vehicle is recommended.
- If the vehicle is within the warranty period, the air conditioner warranty is void. Please contact NISSAN Customer Affairs for further assistance.

# Precaution for Service Equipment

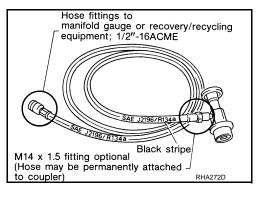
#### MANIFOLD GAUGE SET

Be certain that the gauge face indicates R-134a or 134a. Make 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) along with specified oil.



#### SERVICE HOSES

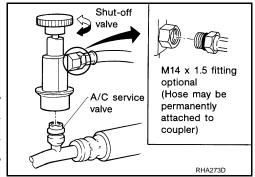
Be certain that the service hoses display the markings described (colored hose with black stripe). All hoses must include positive shutoff devices (either manual or automatic) near the end of the hoses opposite the manifold gauge.



#### 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 will 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	



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[MANUAL A/C (TYPE 1)]

# **BASIC INSPECTION**

# MANUAL A/C IDENTIFICATION TABLE

Application Table

Manual A/C Type	Description	Visual Identification
Manual A/C (Type 1)	Two Control Dial System	AWIIA0481ZZ
Manual A/C (Type 2)	Three Control Dial System [with variable blower control (VBC)]	AWIIA0478ZZ

#### DIAGNOSIS AND REPAIR WORKFLOW

DIAGNOSIS AND REPAIR WORKFLOW	
< BASIC INSPECTION > [MANUAL A/C (TYPE 1)]	_
DIAGNOSIS AND REPAIR WORKFLOW	
How to Perform Trouble Diagnosis For Quick And Accurate Repair	1
WORK 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.CHECK FOR SERVICE BULLETINS	
Check for any service bulletins.	
>> GO TO 3.	
3. VERIFY THE SYMPTOM WITH OPERATIONAL CHECK	
Verify the symptom with operational check. Refer to <u>HAC-98</u> , "Operational Check".	
>> GO TO 4	
4.GO TO APPROPRIATE TROUBLE DIAGNOSIS	
Go to appropriate trouble diagnosis. Refer to <u>HAC-165, "Symptom Matrix Chart"</u> .	
>> If equipped with NAVI, GO TO 5. >> If equipped without NAVI, GO TO 6.	Н
5. PERFORM THE FRONT AIR CONTROL SELF-DIAGNOSIS	
Perform front air control self-diagnosis. Refer to <u>HAC-21, "Front Air Control Self-Diagnosis"</u> .	
>> If any diagnostic trouble codes set. Refer to <a href="HAC-21">HAC-21</a> , "Front Air Control Self-Diagnosis Code Chart".	
>> Confirm the repair by performing operational check. Refer to <u>HAC-6, "Operational Check"</u> .	
6. REPAIR OR REPLACE	
Repair or replace the specific parts.	
>> GO TO 7	ı
7. FINAL CHECK	-
Final check.	
Is the inspection result normal?	
YES >> Inspection End NO >> GO TO 4	
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#### **INSPECTION AND ADJUSTMENT**

< BASIC INSPECTION >

[MANUAL A/C (TYPE 1)]

# INSPECTION AND ADJUSTMENT

Operational Check

The purpose of the operational check is to confirm that the system operates properly.

#### Conditions : Engine running and at normal operating temperature

#### CHECKING BLOWER

- 1. Rotate the blower control dial clockwise once, blower should operate on low speed.
- 2. Rotate the blower control dial again, and continue checking blower speed until all speeds are checked.
- 3. Leave blower on maximum speed.

If NG, go to trouble diagnosis procedure for <u>HAC-133</u>, <u>"Front Blower Motor Diagnosis Procedure"</u>. If OK, continue with next check.

#### CHECKING DISCHARGE AIR

- Press each MODE switch and the DEF switch.
- 2. Each MODE position indicator should illuminate.
- Confirm that discharge air comes out according to the air distribution table. Refer to <u>HAC-108</u>, "<u>Discharge Air Flow</u>".

Mode door position is checked in the next step.

If NG, go to trouble diagnosis procedure for <u>HAC-115</u>, "<u>Mode Door Motor Diagnosis Procedure</u>". If OK, continue the check.

#### NOTE:

Confirm that the compressor clutch is engaged (sound or visual inspection) and intake door position is at fresh when the DEF or D/F is selected.

#### CHECKING RECIRCULATION (♥, ♥ ONLY)

- Press recirculation ( ) switch one time. Recirculation indicator should illuminate.
- 2. Press recirculation ( ) switch one more time. Recirculation indicator should go off.
- 3. Listen for intake door position change (blower sound should change slightly).

If NG, go to trouble diagnosis procedure for <u>HAC-126</u>, "Intake <u>Door Motor Diagnosis Procedure"</u>. If OK, continue the check.

#### NOTE:

Confirm that the compressor clutch is engaged (sound or visual inspection) and intake door position is at fresh when the DEF or D/F is selected. REC ( ) is not allowed in DEF ( ) D/F ( ) or FOOT ( ).

#### CHECKING TEMPERATURE DECREASE

- 1. Rotate temperature control dial counterclockwise until maximum cold.
- 2. Check for cold air at appropriate discharge air outlets.

If NG, listen for sound of air mix door motor operation. If OK, go to trouble diagnosis procedure for <u>HAC-166</u>. "Component Function Check". If air mix door motor appears to be malfunctioning, go to <u>HAC-121</u>. "Air Mix <u>Door Motor Diagnosis Procedure</u>".

If OK, continue the check.

#### CHECKING TEMPERATURE INCREASE

- 1. Rotate temperature control dial clockwise until maximum hot.
- 2. Check for hot air at appropriate discharge air outlets.

If NG, listen for sound of air mix door motor operation. If OK, go to trouble diagnosis procedure for <u>HAC-174</u>. "Component Function Check". If air mix door motor appears to be malfunctioning, go to <u>HAC-120</u>. "Air Mix <u>Door Motor Component Function Check"</u>.

If OK, continue with next check.

#### CHECK A/C SWITCH

- Press A/C switch.
- A/C switch indicator will turn ON.

#### **INSPECTION AND ADJUSTMENT**

#### < BASIC INSPECTION >

[MANUAL A/C (TYPE 1)]

• Confirm that the compressor clutch engages (sound or visual inspection).

#### NOTE:

If current mode setting is DEF or D/F, compressor clutch will already be engaged and cannot be turned off. If NG, go to trouble diagnosis procedure for <a href="HAC-138">HAC-138</a>, "Magnet Clutch Diagnosis Procedure".

If all operational checks are OK (symptom cannot be duplicated), go to <a href="HAC-97">HAC-97</a>, "How to Perform Trouble Diagnosis For Quick And Accurate Repair" and perform tests as outlined. If symptom appears, refer to <a href="HAC-165">HAC-165</a>, "Symptom Matrix Chart" and perform applicable trouble diagnosis procedures.

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# **FUNCTION DIAGNOSIS**

# MANUAL A/C IDENTIFICATION TABLE

Application Table

Manual A/C Type	Description	Visual Identification
Manual A/C (Type 1)	Two Control Dial System	AWIIA0481ZZ
Manual A/C (Type 2)	Three Control Dial System [with variable blower control (VBC)]	AVIIA0478ZZ

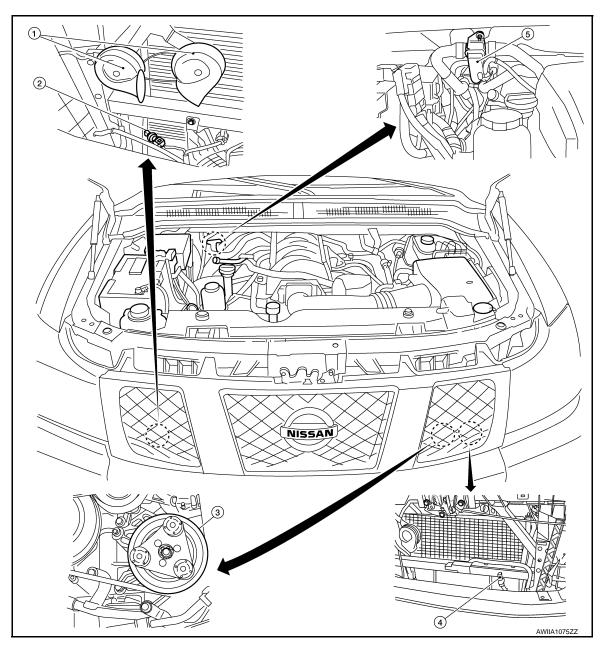
# [MANUAL A/C (TYPE 1)]

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# **FUNCTION INFORMATION**

# **Component Part Location**

#### **ENGINE COMPARTMENT**



- 1. Horn (view with grille removed)
- 4. Ambient sensor E1 (view with grille removed)
- Refrigerant pressure sensor E48 (view with grille removed)
- 5. Water valve F68

3. A/C compressor F3

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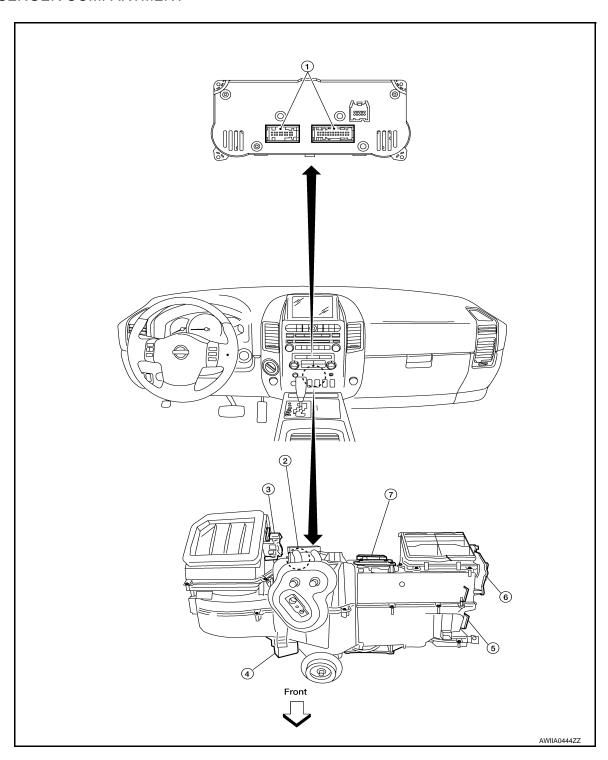
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#### PASSENGER COMPARTMENT



- 1. Front air control M180, M50
- 4. Variable blower control M122
- 7. Air mix door motor (front) M147
- 2. Intake sensor M146
- 5. Mode door motor M142
- 3. Intake door motor M58
- 6. Defroster door motor M144

INFOID:0000000005386644

# Symptom Table

Symptom	Reference Page	
A/C system does not come on.	Go to Trouble Diagnosis Procedure for A/C System.	HAC-151
A/C system cannot be controlled.	Go to Self-diagnosis Function.	HAC-113
Air outlet does not change.	Go to Trouble Diagnosis Procedure for Mode Door Motor.	HAC-115
Mode door motor is malfunctioning.		
Discharge air temperature does not change.	Go to Trouble Diagnosis Procedure for Air Mix Door Motor.	HAC-120
Air mix door motor is malfunctioning.		
Intake door does not change.	Go to Trouble Diagnosis Procedure for Intake Door Motor.	HAC-126
Intake door motor is malfunctioning.		
Defroster door motor is malfunctioning.	Go to Trouble Diagnosis Procedure for Defroster Door Motor.	HAC-128
Front blower motor operation is malfunctioning.	Go to Trouble Diagnosis Procedure for Front Blower Motor.	HAC-133
Magnet clutch does not engage.	Go to Trouble Diagnosis Procedure for Magnet Clutch.	HAC-138
Insufficient cooling	Go to Trouble Diagnosis Procedure for Insufficient Cooling.	HAC-166
Insufficient heating	Go to Trouble Diagnosis Procedure for Insufficient Heating.	HAC-174
Noise	Go to Trouble Diagnosis Procedure for Noise.	HAC-176
Self-diagnosis cannot be performed.	Go to Trouble Diagnosis Procedure for Self-diagnosis.	HAC-113

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#### REFRIGERATION SYSTEM

< FUNCTION DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

#### REFRIGERATION SYSTEM

Refrigerant Cycle

#### REFRIGERANT FLOW

The refrigerant flows in the standard pattern, that is, through the compressor, the condenser with liquid tank, through the evaporator, and back to the compressor. The refrigerant evaporation through the evaporator coils are controlled by externally equalized expansion valve, located inside the evaporator case.

# Refrigerant System Protection

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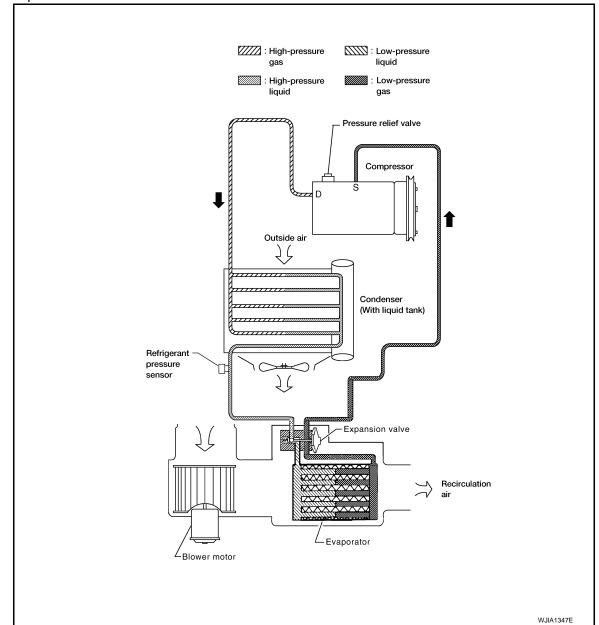
#### REFRIGERANT PRESSURE SENSOR

The refrigerant system is protected against excessively high or low pressures by the refrigerant pressure sensor, located on the condenser. If the system pressure rises above or falls below the specifications, the refrigerant pressure sensor detects the pressure inside the refrigerant line and sends a voltage signal to the ECM. The ECM de-energizes the A/C relay to disengage the magnetic compressor clutch when pressure on the high pressure side detected by refrigerant pressure sensor is over about 2,746 kPa (28 kg/cm², 398 psi), or below about 120 kPa (1.22 kg/cm², 17.4 psi).

# PRESSURE RELIEF VALVE

The refrigerant system is also protected by a pressure relief valve, located in the rear head of the compressor. When the pressure of refrigerant in the system increases to an abnormal level [more than 2,990 kPa (30.5 kg/

 $cm^2$ , 433.6 psi)], the release port on the pressure relief valve automatically opens and releases refrigerant into the atmosphere.



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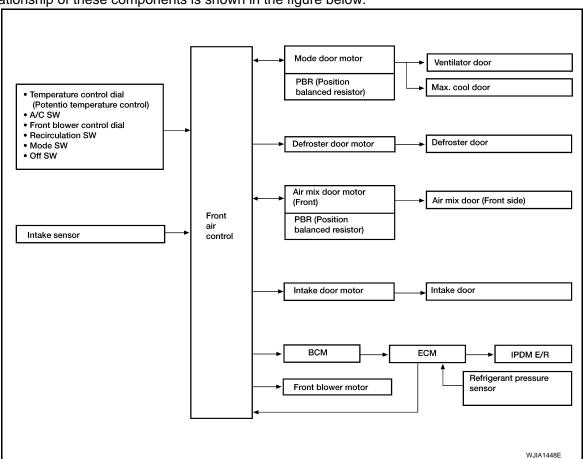
# MANUAL AIR CONDITIONER SYSTEM

# Control System Diagram

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#### **CONTROL SYSTEM**

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

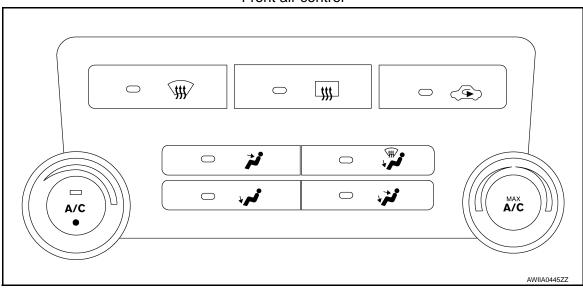


# **Control System Description**

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#### **CONTROL OPERATION**

#### Front air control



#### MANUAL AIR CONDITIONER SYSTEM

#### < FUNCTION DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

#### TEMPERATURE CONTROL DIAL

Increases or decreases the set temperature.

#### RECIRCULATION ( ) SWITCH

- When REC switch is ON, REC switch indicator turns ON, and air inlet is set to REC.
- When REC switch is turned OFF, or when compressor is turned from ON to OFF, REC switch is automatically turned OFF. REC mode can be re-entered by pressing REC switch again.
- REC switch is not operated when DEF switch is turned ON, at the D/F position, or in floor position.

#### DEFROSTER ( ) SWITCH

Positions the air outlet doors to the defrost position. Also positions the intake doors to the outside air position, and turns A/C compressor ON.

#### REAR WINDOW DEFOGGER SWITCH (IF EQUIPPED)

When switch is ON, rear window and door mirrors are defogged.

#### **OFF SWITCH**

The compressor and blower are OFF, the intake doors are set to the outside air position, and the air outlet doors are set to the foot (75% foot and 25% defrost) position.

#### **BLOWER CONTROL DIAL/OFF SWITCH**

- The blower speed is manually controlled with this dial.
- The compressor and blower are OFF, the intake doors are set to the outside air position, and the air outlet doors are set to the foot position.

#### A/C SWITCH

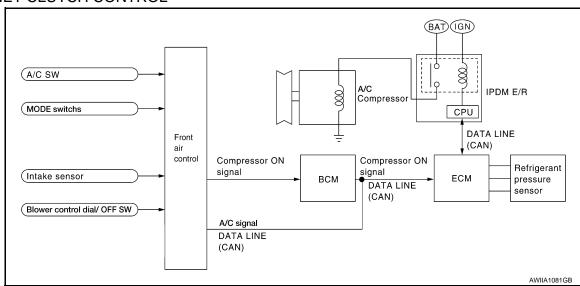
The compressor is ON or OFF.

(Pressing the A/C switch when the AUTO switch is ON will turn off the A/C switch and compressor.)

#### MODE SWITCHES

Controls the air discharge outlets.

#### MAGNET CLUTCH CONTROL



When A/C switch or DEF switch is pressed, front air control inputs compressor ON signal to BCM. BCM sends compressor ON signal to ECM and front air control, via CAN communication line.

ECM judges whether compressor can be turned ON, based on each sensor status (refrigerant pressure sensor signal, throttle angle sensor, etc.). If it judges compressor can be turned ON, it sends compressor ON signal to IPDM E/R, via CAN communication line.

Upon receipt of compressor ON signal from ECM, IPDM E/R turns air conditioner relay ON to operate compressor.

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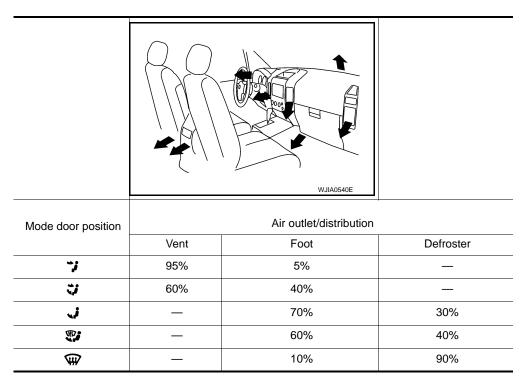
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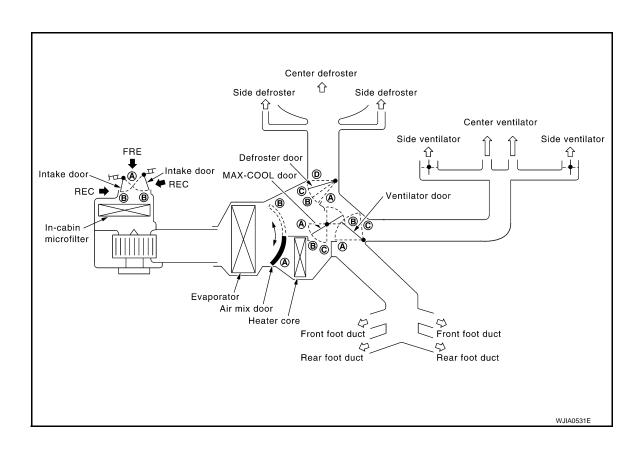
Discharge Air Flow

INFOID:0000000005386649



# Switches And Their Control Function

INFOID:0000000005386650



## MANUAL AIR CONDITIONER SYSTEM

< FUNCTION DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

\ Position		MOD	E SW		DEF	SW	REC	SW	Tempe	rature	switch	
or switch	VENT	B/L	FOOT	D/F	ON	OFF	ON	OFF			<i>M</i>	SW
Door	<b>→</b> •	نڼ		(III)		TANC	<€	<b>₹</b> >		MAX A/C	'))	1
		<b>+</b> //-		<b>+</b> //-	-> ∳ <	0	<u>-</u>	0	COLD	~	нот	A/C
Ventilator door	<b>(A)</b>	B	©	©	©		_					©
MAX-COOL door	<b>(A)</b>	B	B	B	©		_	_				B
Defroster door	<b>(D)</b>	<b>(D)</b>	<b>O</b> or <b>©</b>	B	A		_	_				©
Intake door		_	_		B		<b>(A)</b>	B				B
Air mix door		_	_				_	_	<b>(A)</b>		B	

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# **DIAGNOSIS SYSTEM (HVAC)**

< FUNCTION DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

# DIAGNOSIS SYSTEM (HVAC)

# CONSULT-III Function (HVAC)

INFOID:0000000005386651

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

Diagnostic mode	Description
SELF-DIAG RESULTS	Displays Front air control self-diagnosis results.
DATA MONITOR	Displays Front air control input/output data in real time.
CAN DIAG SUPPORT MNTR	The result of transmit/receive diagnosis of CAN communication can be read.
ECU PART NUMBER	Front air control part number can be read.

#### **SELF-DIAGNOSIS**

#### Display Item List

DTC	Description	Reference page
B2573	Battery voltage out of range	CHG-4, "Work Flow"
B257B	Ambient sensor circuit short	HAC-145, "Ambient Sensor Diagnosis Procedure"
B257C	Ambient sensor circuit open	TIAC-143. Allibient Sensor Diagnosis Procedure
B2581	Intake sensor circuit short	HAC-148, "Intake Sensor Diagnosis Procedure"
B2582	Intake sensor circuit open	TINO-170, Illiane delisor Diagnosis Procedure
U1000	CAN bus fault	LAN-14, "Trouble Diagnosis Flow Chart"

#### **DATA MONITOR**

#### Display Item List

Monitor item	Value	Contents
BATT VIA CAN	"V"	Displays battery voltage signal.
IGN VIA CAN	"ON/OFF"	Displays ignition switch signal.
AMB TEMP SEN	"°C"	Displays ambient sensor signal.
EVAP TEMP SEN	"°C"	Displays intake sensor signal.
MODE FDBCK	"V"	Displays mode door motor feedback signal.
DVR MIX FDBCK	"V"	Displays air mix door motor feedback signal.
DEF FDBCK	"V"	Displays defroster door motor feedback signal.
RECIRC	"ON/OFF"	Displays recirculation switch signal.
DEFROST	"ON/OFF"	Displays defroster switch signal.
A/C	"ON/OFF"	Displays A/C switch signal.
L TEMP UP	"ON/OFF"	Displays driver side temperature control dial (temp increase) signal.
L TEMP DOWN	"ON/OFF"	Displays driver side temperature control dial (temp decrease) signal.
RR DEFOG	"ON/OFF"	Displays rear defroster request signal.
FAN UP	"ON/OFF"	Displays blower motor (blower speed increase) signal.
FAN DOWN	"ON/OFF"	Displays blower motor (blower speed decrease) signal.
MODE SELECT	"DTNT"	Displays blower motor (blower speed decrease) signal.
FAN DOWN	"ON/OFF"	Displays blower motor (blower speed decrease) signal.

## **DIAGNOSIS SYSTEM (BCM)**

#### < FUNCTION DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

# **DIAGNOSIS SYSTEM (BCM)**

# CONSULT-III Function (BCM - COMMON ITEM)

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#### APPLICATION ITEM

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

Diagnosis mode	Function Description
WORK SUPPORT	Changes the setting for each system function.
SELF DIAGNOSTIC RESULT	Displays the diagnosis results judged by BCM. Refer to BCS-49, "DTC Index".
CAN DIAG SUPPORT MNTR	Monitors the reception status of CAN communication viewed from BCM.
DATA MONITOR	The BCM input/output signals are displayed.
ACTIVE TEST	The signals used to activate each device are forcibly supplied from BCM.
ECU IDENTIFICATION	The BCM part number is displayed.
CONFIGURATION	<ul> <li>Enables to read and save the vehicle specification.</li> <li>Enables to write the vehicle specification when replacing BCM.</li> </ul>

#### 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.

Cuatam	Cub quatam a alactica itam	Diagnosis mode			
System	Sub system selection item	WORK SUPPORT	DATA MONITOR	ACTIVE TEST	
BCM	BCM	×			
Door lock	DOOR LOCK	×	×	×	
Rear window defogger	REAR DEFOGGER		×	×	
Warning chime	BUZZER		×	×	
Interior room lamp timer	INT LAMP	×	×	×	
Remote keyless entry system	MULTI REMOTE ENT	×	×	×	
Exterior lamp	Exterior lamp HEAD LAMP		×	×	
Wiper and washer WIPER		×	×	×	
Turn signal and hazard warning lamps	FLASHER		×	×	
Air conditioner	AIR CONDITONER		×		
Combination switch	COMB SW		×		
Immobilizer	IMMU		×	×	
Interior room lamp battery saver	BATTERY SAVER	×	×	×	
RAP (retained accessory power)	RETAINED PWR	×	×	×	
Signal buffer system	SIGNAL BUFFER		×	×	
TPMS (tire pressure monitoring system)	AIR PRESSURE MONITOR	×	×	×	
Vehicle security system	THEFT ALM	×	×	×	

CONSULT-III Function (BCM - AUTO AIR CONDITIONER)

INFOID:0000000005615326

**DATA MONITOR** 

# **DIAGNOSIS SYSTEM (BCM)**

## < FUNCTION DIAGNOSIS >

# [MANUAL A/C (TYPE 1)]

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

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

INFOID:0000000005386653

#### **DATA MONITOR**

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

#### [MANUAL A/C (TYPE 1)]

## **SELF-DIAGNOSIS FUNCTION**

## Front Air Control Self-Diagnosis

#### INFOID:0000000005386654

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#### A/C SYSTEM SELF-DIAGNOSIS FUNCTION

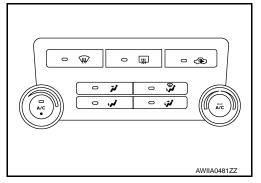
The self-diagnosis function is built into the front air control to quickly locate the cause of malfunctions.

#### **DESCRIPTION**

The self-diagnostic system diagnoses sensors, CAN system, and battery voltage on front air control Refer to applicable sections (items) for details. Fault codes (if any are present) will be displayed in the ambient temperature display area (if equipped). Refer to <a href="HAC-113">HAC-113</a>, "Front Air Control Self-Diagnosis Code Chart".

#### SELF-DIAGNOSTIC MODE

- Rotate the blower control dial counterclockwise to the OFF position.
- Press the FLOOR/DEF (\*) and DEF (\*) mode switches together and release on the front air control.
- 3. Press the REC ( ) to enter self diagnostic mode.
- 4. Turn ignition switch OFF to exit out of self-diagnostic mode.



INFOID:0000000005386655

## Front Air Control Self-Diagnosis Code Chart

#### SELF-DIAGNOSTIC CODE CHART

Code No.	Reference page		
03	Battery voltage out of range	CHG-4, "Work Flow"	
40	Ambient sensor circuit short	LIAC 57 Nambiant Conseq Discussis Broad wall	
41	Ambient sensor circuit open	HAC-57, "Ambient Sensor Diagnosis Procedure"	
56	Intake sensor circuit short	HAC-65, "Intake Sensor Diagnosis Procedure"	
57	Intake sensor circuit open	nac-os, intake Sensor Diagnosis Procedure	
80	CAN bus fault	LAN-14, "Trouble Diagnosis Flow Chart"	
90	Stuck button	VTL-8, "Removal and Installation"	

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# **COMPONENT DIAGNOSIS**

# MANUAL A/C IDENTIFICATION TABLE

Application Table

Manual A/C Type	Description	Visual Identification
Manual A/C (Type 1)	Two Control Dial System	AWIIA0481ZZ
Manual A/C (Type 2)	Three Control Dial System [with variable blower control (VBC)]	AWIIA0478ZZ

## System Description

#### INFOID:0000000005386657

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#### SYSTEM DESCRIPTION

#### **Component Parts**

Mode door control system components are:

- Front air control
- Mode door motor
- PBR (built into mode door motor)
- Intake sensor

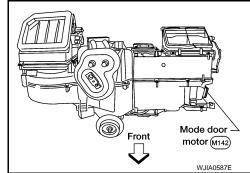
#### System Operation

The mode door position (vent, B/L, foot, D/F, and defrost) is set by the front air control by means of the mode door motor. When a mode door position is selected on the front air control, voltage is applied to one circuit of the mode door motor while ground is applied to the other circuit, causing the mode door motor to rotate. The direction of rotation is determined by which circuit has voltage applied to it, and which one has ground applied to it. The front air control monitors the mode door position by measuring the voltage signal on the PBR circuit.

#### COMPONENT DESCRIPTION

#### Mode Door Motor

The mode door motor is attached to the heater & cooling unit assembly. It rotates so that air is discharged from the outlet as indicated by the front air control. Motor rotation is conveyed to a link which activates the mode door.



# Mode Door Motor Component Function Check

#### INFOID:0000000005386658

#### INSPECTION FLOW

# ${f 1}$ .CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - DISCHARGE AIR

- Press each mode switch and press the 🗰 (DEF) switch. Each position indicator should illuminate.
- Confirm that discharge air comes out according to the air distribution table. Refer to <u>HAC-108</u>, "<u>Discharge</u> Air Flow".

#### NOTE:

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

#### Is the inspection result normal?

YES >> Inspection End.

NO >> Go to diagnosis procedure. Refer to HAC-115, "Mode Door Motor Diagnosis Procedure".

# Mode Door Motor Diagnosis Procedure

#### INFOID:0000000005386659

Regarding Wiring Diagram information, refer to HAC-156, "Wiring Diagram".

#### SYMPTOM:

- Air outlet does not change.
- Mode door motor does not operate normally.

**HAC-115** 2010 Titan Revision: August 2009

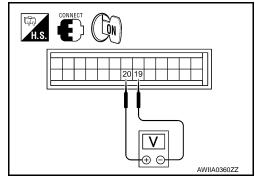
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# 1.CHECK FRONT AIR CONTROL FOR POWER AND GROUND

- 1. Turn ignition switch ON.
- 2. Press the B/L (🕻) mode switch.
- Check voltage between front air control harness connector M180 terminal 19 and terminal 20 while pressing the mode switch to the floor ( ) mode.

Connector	Te	erminals	Condition	Voltage (Approx.)	
Connector	(+)	(-)	Condition		
Front air control: M180	20	19	Press mode switch	Battery voltage	



#### Is the inspection result normal?

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

# 2.CHECK MODE DOOR MOTOR CIRCUITS FOR SHORT TO GROUND

- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- Check continuity between front air control harness connector M180 terminal 19, 20 and ground.

19 - Ground : Continuity should not exist.20 - Ground : Continuity should not exist.

#### Is the inspection result normal?

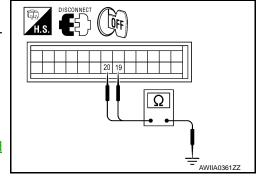
YES >> Replace front air control. Refer to <u>VTL-8</u>, "Removal and Installation".

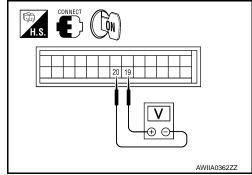
NO >> Repair or replace harness as necessary.

# 3.CHECK FRONT AIR CONTROL FOR GROUND AND POWER

- 1. Press the mode switch to the D/F ( ) mode.
- Check voltage between front air control harness connector M180 terminal 19 and terminal 20 while pressing the mode switch to the vent (\*) mode.

Connector	To	erminals	Condition	Voltage (Approx.)	
Connector	(+)	(-)	Condition		
Front air control: M180	19	20	Press mode switch	Battery voltage	





#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace front air control. Refer to <a href="VTL-8">VTL-8</a>, "Removal and Installation".

4. CHECK MODE DOOR MOTOR AND CIRCUITS FOR OPEN

#### < COMPONENT DIAGNOSIS >

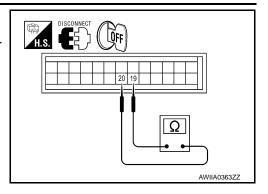
#### [MANUAL A/C (TYPE 1)]

- Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M180 terminal 19 and terminal 20.

#### Continuity should exist.

#### Is the inspection result normal?

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



# 5.check mode door motor circuits for open

- Disconnect the mode door motor harness connector.
- 2. Check continuity between front air control harness connector M180 (A) terminal 19, 20 and the mode door motor harness connector M142 (B) terminal 5, 6.

5 - 19 : Continuity should exist. 6 - 20: Continuity should exist.

#### Is the inspection result normal?

YES >> Replace mode door motor. Refer to VTL-19, "Removal and Installation".

NO >> Repair or replace harness as necessary.

# 6.CHECK FRONT AIR CONTROL FOR PBR POWER AND GROUND

- Reconnect front air control harness connector.
- Turn ignition switch ON.
- Check voltage between front air control harness connector M50 (A) terminal 28 and M180 (B) terminal 3.

Connector	Terminals		Voltage (Ap-
Connector	(+)	(-)	prox.)
Front air control: M180, M50	28	3	5V

#### Is the inspection result normal?

YFS >> GO TO 8.

NO >> GO TO 7.

# 7.CHECK PBR REFERENCE VOLTAGE CIRCUIT FOR SHORT TO GROUND

- Turn ignition switch OFF.
- Disconnect the front air control harness connector. 2.
- Check continuity between front air control harness connector M50 terminal 28 and ground.

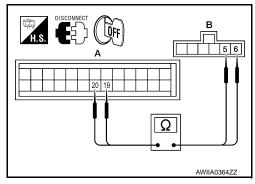
#### Continuity should not exist.

#### Is the inspection result normal?

YES >> Replace front air control Refer to VTL-8, "Removal and Installation".

NO >> Repair or replace harness as necessary.

# 8.CHECK PBR REFERENCE VOLTAGE AND GROUND CIRCUITS



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**HAC-117** 2010 Titan Revision: August 2009

#### < COMPONENT DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

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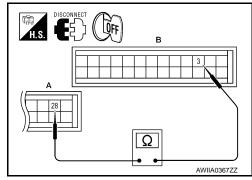
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- Turn ignition switch OFF.
- Disconnect the front air control harness connector.
- Check continuity between front air control harness connector M50 (A) terminal 28 and M180 (B) terminal 3.

#### Continuity should exist.

#### Is the inspection result normal?

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



# 9. CHECK PBR REFERENCE VOLTAGE CIRCUIT FOR OPEN

- Disconnect the mode door motor harness connector.
- 2. Check continuity between mode door motor harness connector M142 (B) terminal 3, 1 and front air control harness connector M180 (C) terminal 3, M50 (A) terminal 28.

28 - 1 : Continuity should exist. 3 - 3 : Continuity should exist.

#### Is the inspection result normal?

YES >> Replace mode door motor. Refer to VTL-19, "Removal and Installation".

NO >> Repair or replace harness as necessary.

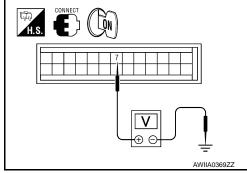
# 10. CHECK PBR FEEDBACK VOLTAGE

- Reconnect the front air control harness connector.
- Turn ignition switch ON.
- Check voltage between front air control harness connector M180 terminal 7 and ground while cycling mode switch through all modes.

#### : Approx. 1V - 4.5V Voltage

#### Is the inspection result normal?

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



# 11. CHECK PBR FEEDBACK SIGNAL CIRCUIT FOR SHORT TO GROUND

- Turn ignition switch OFF.
- Disconnect front air control harness connector.
- Check continuity between front air control harness connector M180 terminal 7 and ground.

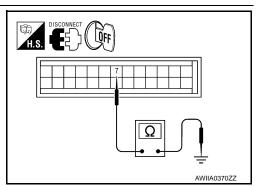
#### Continuity should not exist.

#### Is the inspection result normal?

YES >> Replace front air control Refer to VTL-8, "Removal and Installation".

NO >> Repair or replace harness as necessary.

# 12. CHECK PBR FEEDBACK CIRCUIT FOR OPEN



#### < COMPONENT DIAGNOSIS >

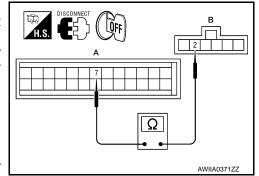
#### [MANUAL A/C (TYPE 1)]

- 1. Turn ignition switch OFF.
- 2. Disconnect the mode door motor harness connector and front air control harness connector.
- Check continuity between mode door motor harness connector M142 (B) terminal 2 and front air control harness connector M180 (A) terminal 7.

#### Continuity should exist.

#### Is the inspection result normal?

- YES >> Replace mode door motor. Refer to <u>VTL-19</u>, "Removal and Installation".
- NO >> Repair or replace harness as necessary.



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#### AIR MIX DOOR MOTOR

## System Description

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#### SYSTEM DESCRIPTION

#### SYMPTOM:

- Discharge air temperature does not change.
- Air mix door motor does not operate.

#### SYSTEM DESCRIPTION

#### Component Parts

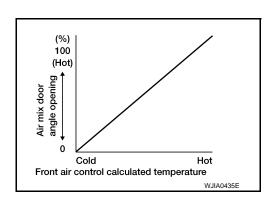
Air mix door control system components are:

- Front air control
- Air mix door motor
- PBR (built-into air mix door motors)
- · Intake sensor

#### System Operation

The front air control receives data from the temperature selected by the driver side, passenger side, and rear. The front air control then applies a voltage to one circuit of the appropriate air mix door motor, while ground is applied to the other circuit, causing the appropriate air mix door motor to rotate. The direction of rotation is determined by which circuit has voltage applied to it, and which one has ground applied to it. The front air control monitors the air mix door positions by measuring the voltage signal on the PBR circuits of each door.

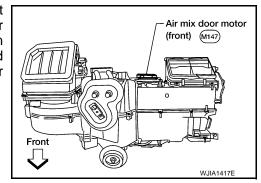
Air Mix Door Control Specification



#### COMPONENT DESCRIPTION

#### Air Mix Door Motors

The air mix door motor is attached to the front heater & cooling unit assembly. The motor rotates so that the air mix door is opened or closed to a position set by the front air control. Motor rotation is then conveyed through a shaft and the air mix door position is then fed back to the front air control by the PBR built into the air mix door motor.



# Air Mix Door Motor Component Function Check

INFOID:0000000005386661

#### INSPECTION FLOW

# 1.confirm symptom by performing operational check - temperature increase

- Turn the temperature control dial clockwise to maximum hot.
- Check for hot air at discharge air outlets.

>> GO TO 2.

# 2.confirm symptom by performing operational check - temperature decrease

1. Turn the temperature control dial counterclockwise to maximum cold.

2. Check for cold air at discharge air outlets.

#### Is the inspection result normal?

YES >> Inspection End.

NO >> Go to diagnosis procedure. Refer to HAC-121, "Air Mix Door Motor Diagnosis Procedure".

## Air Mix Door Motor Diagnosis Procedure

Regarding Wiring Diagram information, refer to HAC-156, "Wiring Diagram".

#### SYMPTOM:

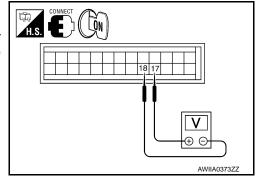
- Discharge air temperature does not change.
- Air mix door motor does not operate.

#### DIAGNOSTIC PROCEDURE FOR AIR MIX DOOR MOTOR

# 1. CHECK FRONT AIR CONTROL FOR POWER AND GROUND

- Turn ignition switch ON.
- 2. Rotate temperature control dial to maximum hot.
- Check voltage between front air control harness connector M180 terminal 17 and terminal 18 while rotating temperature control dial to maximum cold.

Connector	Te	erminals	Condition	
Confidential	(+)	(-)	Condition	(Approx.)
Front air control: M180	17	18	Rotate temp control dial	Battery voltage



#### Is the inspection result normal?

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

# 2.CHECK AIR MIX DOOR MOTOR CIRCUITS FOR SHORT TO GROUND

- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M180 terminal 17, 18 and ground.

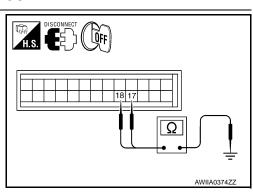
17 - Ground : Continuity should not exist.18 - Ground : Continuity should not exist.

#### Is the inspection result normal?

YES >> Replace front air control. Refer to <a href="VTL-8">VTL-8</a>, "Removal and Installation".

NO >> Repair or replace harness as necessary.

3.CHECK FRONT AIR CONTROL FOR POWER AND GROUND



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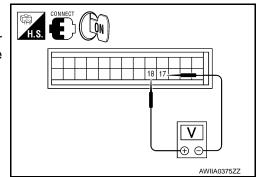
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#### < COMPONENT DIAGNOSIS >

- Turn ignition switch ON.
- 2. Rotate temperature control dial to maximum hot.
- Check voltage between front air control harness connector M180 terminal 17 and terminal 18 while rotating temperature control dial to maximum cold.

Connector	Terminals		Condition	Voltage
Connector	(+)	(-)	Condition	(Approx.)
Front air control: M180	18	17	Rotate temp control dial	Battery voltage



#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace front air control. Refer to <a href="VTL-8">VTL-8</a>, "Removal and Installation".

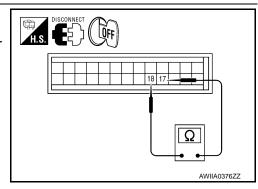
# 4. CHECK AIR MIX DOOR MOTOR CIRCUITS FOR OPEN

- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- Check continuity between front air control harness connector M180 terminal 17 and terminal 18.

#### Continuity should exist.

#### Is the inspection result normal?

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



# 5. CHECK AIR MIX DOOR MOTOR CIRCUITS FOR OPEN

- 1. Disconnect the air mix door motor harness connector.
- 2. Check continuity between front air control harness connector M180 (A) terminal 17, 18 and the air mix door motor harness connector M147 (B) terminal 1, 6.

17 - 1 : Continuity should exist.

18 - 6 : Continuity should exist.

#### Is the inspection result normal?

YES >> Replace air mix door motor. Refer to <u>VTL-20, "Removal and Installation"</u>.

NO >> Repair or replace harness as necessary.

# 6. CHECK FRONT AIR CONTROL FOR PBR POWER AND GROUND

- 1. Reconnect front air control harness connector.
- 2. Turn ignition switch ON.
- 3. Check voltage between front air control harness connector M50 (A) terminal 28 and M180 (B) terminal 3.

Connector	Terminals		Voltage (Ap-	
Connector	(+)	(-)	prox.)	
Front air control: M50, M180	28	3	5V	

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#### Is the inspection result normal?

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

7.CHECK PBR REFERENCE VOLTAGE CIRCUIT FOR SHORT TO GROUND

#### AIR MIX DOOR MOTOR

#### < COMPONENT DIAGNOSIS >

#### [MANUAL A/C (TYPE 1)]

- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M50 terminal 28 and ground.

#### Continuity should not exist.

#### Is the inspection result normal?

YES >> Replace front air control. Refer to <a href="VTL-8">VTL-8</a>, "Removal and Installation".

NO >> Repair or replace harness as necessary.

# 8.CHECK PBR REFERENCE VOLTAGE AND GROUND CIRCUITS

- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M50 (A) terminal 28 and M180 (B) terminal 3.

#### Continuity should exist.

#### Is the inspection result normal?

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

# 9. CHECK PBR REFERENCE VOLTAGE CIRCUIT FOR OPEN

- 1. Disconnect the air mix door motor harness connector.
- Check continuity between air mix door motor harness connector M147 (B) terminal 3, 2 and front air control harness connector M180 (C) terminal 3 and M50 (A) terminal 28.

28 - 3 : Continuity should exist. 3 - 2 : Continuity should exist.

#### Is the inspection result normal?

YES >> Replace air mix door motor. Refer to <a href="VTL-20">VTL-20</a>, "Removal and Installation".

NO >> Repair or replace harness as necessary.

# 10. CHECK PBR FEEDBACK VOLTAGE

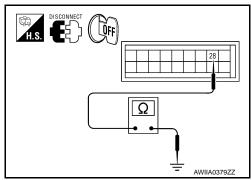
- 1. Reconnect the front air control harness connector.
- 2. Turn ignition switch ON.
- Check voltage between front air control harness connector M180 terminal 6 and ground while rotating temperature control dial from maximum hot to maximum cold.

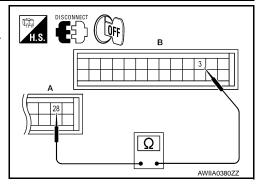
#### Voltage : Approx. .5V - 4.5V

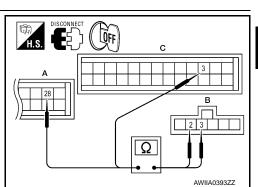
#### Is the inspection result normal?

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

11. CHECK PBR FEEDBACK SIGNAL CIRCUIT FOR SHORT TO GROUND







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#### **AIR MIX DOOR MOTOR**

#### < COMPONENT DIAGNOSIS >

#### [MANUAL A/C (TYPE 1)]

- 1. Turn ignition switch OFF.
- 2. Disconnect front air control harness connector.
- Check continuity between front air control harness connector M180 terminal 6 and ground.

#### Continuity should not exist.

#### Is the inspection result normal?

YES >> Replace front air control. Refer to <u>VTL-8</u>, "Removal and <u>Installation"</u>.

NO >> Repair or replace harness as necessary.

# 12.CHECK PBR FEEDBACK CIRCUIT FOR OPEN

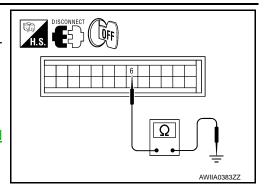
- 1. Turn ignition switch OFF.
- 2. Disconnect the air mix door motor harness connector and front air control harness connector.
- Check continuity between air mix door motor harness connector M147 (B) terminal 4 and front air control harness connector M180 (A) terminal 6.

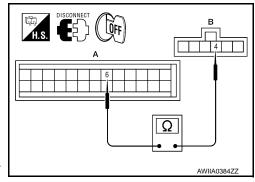


#### Is the inspection result normal?

YES >> Replace air mix door motor. Refer to <u>VTL-20, "Removal and Installation"</u>.

NO >> Repair or replace harness as necessary.





## **INTAKE DOOR MOTOR**

# System Description

#### INFOID:0000000005386663

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#### SYSTEM DESCRIPTION

#### SYMTOM:

- Intake door motor does not operate normally.
- Intake door does not change.

#### SYSTEM DESCRIPTION

#### Component Parts

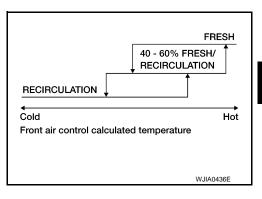
Intake door control system components are:

- Front air control
- Intake door motor (PRB built into the intake door motor)
- · Ambient sensor
- · Intake sensor

#### System Operation

The intake door control determines the intake door position based on the position of the recirculation switch. When the recirculation switch is depressed the intake door motor rotates closing off the fresh air inlet and recirculating the cabin air. If the recirculation switch is depressed again, the intake door motor rotates in the opposite direction, again allowing fresh air into the cabin.

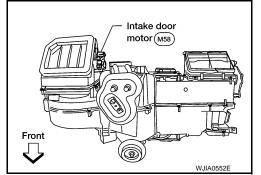
Intake Door Control Specification



#### COMPONENT DESCRIPTION

#### Intake door motor

The intake door motor is attached to the intake unit. It rotates so that air is drawn from inlets set by the front air control. Motor rotation is conveyed to a lever which activates the intake door.



# Intake Door Motor Component Function Check

#### INFOID:0000000005386664

#### INSPECTION FLOW

# 1.CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - REC ( )

- Press the vent mode switch (\*).
- 2. Press REC ( ) switch. The REC ( ) indicator should illuminate.
- 3. Press REC ( ) switch again. The REC ( ) indicator should go out.
- 4. Listen for intake door position change (you should hear blower sound change slightly).

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Revision: August 2009 HAC-125 2010 Titan

#### < COMPONENT DIAGNOSIS >

#### Is the inspection result normal?

YES >> Inspection End.

NO >> Go to diagnosis procedure. Refer to HAC-126, "Intake Door Motor Diagnosis Procedure".

## Intake Door Motor Diagnosis Procedure

INFOID:0000000005386665

Regarding Wiring Diagram information, refer to HAC-156, "Wiring Diagram".

#### SYMPTOM:

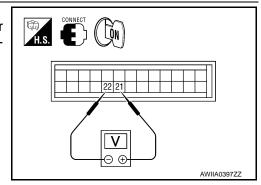
- Intake door does not change.
- Intake door motor does not operate normally.

#### DIAGNOSTIC PROCEDURE FOR INTAKE DOOR MOTOR

# ${f 1}$ .CHECK FRONT AIR CONTROL FOR POWER AND GROUND

- Turn ignition switch ON.
- Check voltage between front air control harness connector M180 terminal 21 and terminal 22 while placing the HVAC system into self-diagnostic mode.

Connector	Te	erminals	Condition	Voltage	
Connector	(+)	(-)	Condition	(Approx.)	
front air control: M180	21	22	Self-diagnostic mode	Battery volt- age	



#### Is the inspection result normal?

OK >> GO TO 3.

NO >> GO TO 2.

# 2.CHECK INTAKE DOOR MOTOR CIRCUITS FOR SHORT TO GROUND

- Turn ignition switch OFF.
- Disconnect the front air control harness connector.
- Check continuity between front air control harness connector M180 terminal 21, 22 and ground.

21 - Ground : Continuity should not exist. 22 - Ground : Continuity should not exist.

#### Is the inspection result normal?

>> Replace front air control. Refer to VTL-8, "Removal and OK Installation".

NO >> Repair or replace harness as necessary.

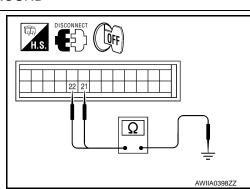
# 3.CHECK FRONT AIR CONTROL FOR GROUND AND POWER

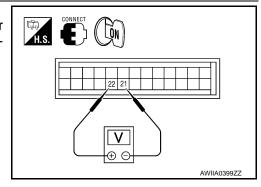
- 1. Press the BACK button to back out of self-diagnostic mode.
- 2. Check voltage between front air control harness connector M180 terminal 21 and terminal 22 while placing the HVAC system into self-diagnostic mode.

Connector	Terminals		Condition	Voltage
Connector	(+)	(-)	Condition	(Approx.)
front air control: M180	22	21	Self-diagnostic mode	Battery voltage

#### Is the inspection result normal?

OK >> GO TO 4.





#### **INTAKE DOOR MOTOR**

#### < COMPONENT DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

NO >> Replace front air control. Refer to <u>VTL-8</u>, "Removal and Installation".

# 4.CHECK INTAKE DOOR MOTOR AND CIRCUITS FOR OPEN

- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- Check continuity between front air control harness connector M180 terminal 21 and terminal 22.

#### Continuity should exist.

#### Is the inspection result normal?

OK >> Replace intake door motor. Refer to <u>VTL-18</u>, "Removal and Installation".

NO >> GO TO 5.

# 5. CHECK INTAKE DOOR MOTOR CIRCUITS FOR OPEN

1. Disconnect the intake door motor harness connector.

 Check continuity between front air control harness connector M180 (A) terminal 21, 22 and the intake door motor harness connector M58 (B) terminal 1, 6.

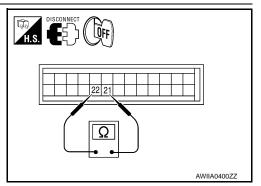
21 - 6 : Continuity should exist.

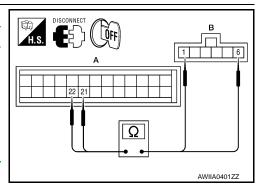
22 - 1 : Continuity should exist.

#### Is the inspection result normal?

YES >> Replace intake door motor. Refer to <u>VTL-18. "Removal and Installation"</u>.

NO >> Repair or replace harness as necessary.





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#### **DEFROSTER DOOR MOTOR CIRCUIT**

< COMPONENT DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

## DEFROSTER DOOR MOTOR CIRCUIT

## System Description

INFOID:0000000005386666

#### SYSTEM DESCRIPTION

#### Component Parts

Defroster door control system components are:

- Front air control
- Defroster door motor
- PBR (Built into defroster door motor)
- Ambient sensor
- · Intake sensor

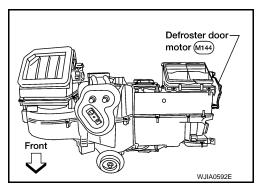
#### System Operation

The front air control determines defroster door position based on the position of the defroster switch. When the defroster switch is depressed, the defroster door motor rotates directing air to the defroster ducts. When any mode other than defroster is selected, the defroster motor rotates in the opposite direction closing off air flow to the defroster ducts.

#### COMPONENT DESCRIPTION

#### Defroster door motor

The defroster door motor is attached to the front heater & cooling unit assembly. The front air control sends a voltage to rotate to the defroster door directing the air flow either to the defroster ducts, or to the floor ducts, depending on which way the voltage and ground are applied to the motor leads. Motor rotation is conveyed to a lever which activates the defroster door.



Defroster Door Motor Component Function Check

INFOID:0000000005386667

#### INSPECTION FLOW

# 1. CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - DEFROSTER DOOR

- 1. Select vent (\*) mode.
- 2. Press the defrost switch ( ). Defroster indicator should illuminate.
- 3. Listen for defroster door position change (blower sound should change slightly).

#### Is the inspection result normal?

YES >> Inspection End.

NO >> Go to diagnosis procedure. Refer to <u>HAC-128</u>, "<u>Defroster Door Motor Diagnosis Procedure</u>"

#### Defroster Door Motor Diagnosis Procedure

INFOID:0000000005386668

Regarding Wiring Diagram information, refer to HAC-156, "Wiring Diagram".

#### SYMPTOM:

- Defroster door does not change.
- Defroster door motor does not operate normally.

#### DIAGNOSTIC PROCEDURE FOR DEFROSTER DOOR MOTOR

#### **DEFROSTER DOOR MOTOR CIRCUIT**

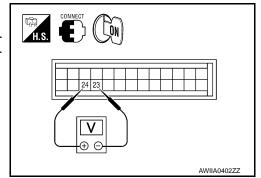
#### < COMPONENT DIAGNOSIS >

#### [MANUAL A/C (TYPE 1)]

# 1.CHECK FRONT AIR CONTROL FOR POWER AND GROUND

- 1. Turn ignition switch ON.
- Press the defroster switch ( ). 2.
- Check voltage between front air control harness connector M180 terminal 24 and terminal 23 and then press the defroster switch ( ) again.

Connector	Terminals		Condition	Voltage
Connector	(+)	(-)	Condition	(Approx.)
Front air control: M180	24	23	Press defroster switch	Battery voltage



#### Is the inspection result normal?

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

# 2.CHECK DEFROSTER DOOR MOTOR CIRCUITS FOR SHORT TO GROUND

- Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- Check continuity between front air control harness connector M180 terminal 23, 24 and ground.

23 - Ground : Continuity should not exist. 24 - Ground : Continuity should not exist.

#### Is the inspection result normal?

YES >> Replace front air control. Refer to VTL-8, "Removal and Installation".

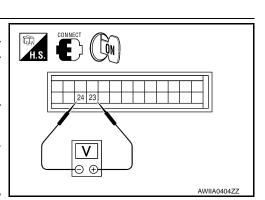
NO >> Repair or replace harness as necessary.

# 3.CHECK FRONT AIR CONTROL FOR GROUND AND POWER

Press the defroster switch ( ).

Check voltage between front air control harness connector M180 terminal 23 and terminal 24 and the press the defroster switch ( ) again.

Connector	Terminals		Condition	Voltage
Connector	(+)	(-)	(Approx	
Front air control: M180	23	24	Press de- froster switch	Battery voltage



#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace front air control. Refer to VTL-8, "Removal and Installation".

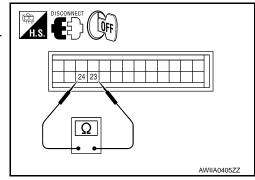
## f 4.CHECK DEFROSTER DOOR MOTOR AND CIRCUITS FOR OPEN

- Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- Check continuity between front air control harness connector M180 terminal 23 and terminal 24.

#### Continuity should exist.

#### Is the inspection result normal?

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



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#### < COMPONENT DIAGNOSIS >

# 5. CHECK DEFROSTER DOOR MOTOR CIRCUITS FOR OPEN

- 1. Disconnect the defroster door motor harness connector.
- 2. Check continuity between front air control harness connector M180 (A) terminal 23, 24 and the defroster door motor harness connector M144 (B) terminal 1, 6.

23 - 1 : Continuity should exist.24 - 6 : Continuity should exist.

#### Is the inspection result normal?

YES >> Replace defroster door motor. Refer to <u>VTL-17</u>. "Removal and Installation".

NO >> Repair or replace harness as necessary.

## 6.CHECK FRONT AIR CONTROL FOR PBR POWER AND GROUND

- 1. Reconnect front air control harness connector.
- 2. Turn ignition switch ON.
- Check voltage between front air control harness connector M50

   (A) terminal 28 and M180 (B) terminal 3.

Connector	Teri	Voltage (Ap-	
Connector	(+)	(-)	prox.)
Front air control: M50, M180	28	3	5V

# H.S. CONNECT B A A A AWIIA0407ZZ

## Is the inspection result normal?

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

# 7.CHECK PBR REFERENCE VOLTAGE CIRCUIT FOR SHORT TO GROUND

- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- Check continuity between front air control harness connector M50 terminal 28 and ground.

#### Continuity should not exist.

#### Is the inspection result normal?

YES >> Replace front air control. Refer to <a href="VTL-8">VTL-8</a>, "Removal and Installation".

NO >> Repair or replace harness as necessary.

# 8. CHECK PBR REFERENCE VOLTAGE AND GROUND CIRCUITS

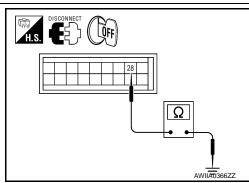
- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M50 (A) terminal 28 and M180 (B) terminal 3.

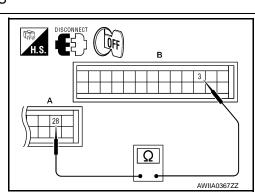
#### Continuity should exist.

#### Is the inspection result normal?

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

9. CHECK PBR REFERENCE VOLTAGE CIRCUIT FOR OPEN





#### **DEFROSTER DOOR MOTOR CIRCUIT**

#### < COMPONENT DIAGNOSIS >

#### [MANUAL A/C (TYPE 1)]

1. Disconnect the defroster door motor harness connector.

Check continuity between defroster door motor harness connector M144 (B) terminal 3, 2 and front air control harness connector M50 (A) terminal 28, and M180 (C) terminal 3.

28 - 3 : Continuity should exist. 3 - 2 : Continuity should exist.

#### Is the inspection result normal?

YES >> Replace defroster door motor. Refer to <u>VTL-17.</u> "Removal and Installation".

NO >> Repair or replace harness as necessary.

# 10. CHECK PBR FEEDBACK VOLTAGE

- 1. Reconnect the front air control harness connector.
- 2. Turn ignition switch ON.
- Check voltage between front air control harness connector M180 terminal 10 and ground while cycling defroster switch on and off.

Voltage : Approx. 1V - 4.5V

#### Is the inspection result normal?

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

# 11. CHECK PBR FEEDBACK SIGNAL CIRCUIT FOR SHORT TO GROUND

- 1. Turn ignition switch OFF.
- 2. Disconnect front air control harness connector.
- 3. Check continuity between front air control harness connector M180 terminal 10 and ground.

## Continuity should not exist.

#### Is the inspection result normal?

YES >> Replace front air control. Refer to <a href="VTL-8">VTL-8</a>, "Removal and <a href="Installation"</a>.

NO >> Repair or replace harness as necessary.

# 12. CHECK PBR FEEDBACK CIRCUIT FOR OPEN

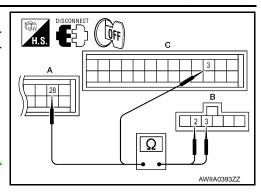
- 1. Turn ignition switch OFF.
- 2. Disconnect the defroster door motor harness connector and front air control harness connector.
- Check continuity between defroster door motor harness connector tor M144 (B) terminal 4 and front air control harness connector M180 (A) terminal 10.

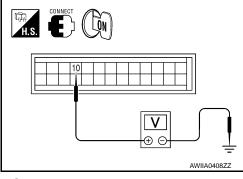
#### Continuity should exist.

#### Is the inspection result normal?

YES >> Replace defroster door motor. Refer to <u>VTL-17</u>, <u>"Removal and Installation"</u>.

NO >> Repair or replace harness as necessary.





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[MANUAL A/C (TYPE 1)]

## **BLOWER MOTOR CONTROL SYSTEM**

# System Description

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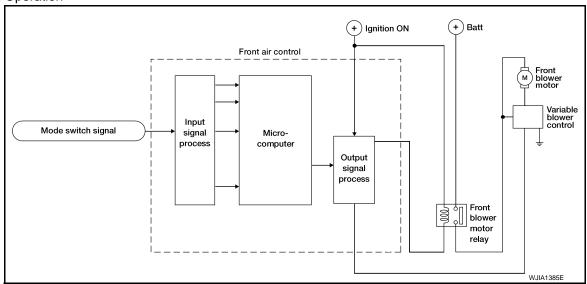
#### SYSTEM DESCRIPTION

#### Component Parts

Blower speed control system components are:

- Front air control
- Variable blower control
- Front blower motor relay
- · Front blower motor
- · Ambient sensor
- · Intake sensor

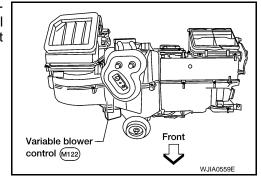
#### System Operation



#### COMPONENT DESCRIPTION

#### Variable Blower Control

The variable blower control is located on the cooling unit. The variable blower control receives a gate voltage from the front air control to steplessly maintain the blower motor voltage in the 0 to 5 volt range (approx.).



# Front Blower Motor Component Function Check

INFOID:0000000005386670

#### INSPECTION FLOW

## 1. CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - FRONT BLOWER

- 1. Rotate the blower control dial clockwise once. Blower motor should operate in low speed.
- 2. Rotate the blower control dial clockwise, and continue checking blower speed until all speeds are checked.

#### Is the inspection result normal?

YES >> Inspection End.

#### < COMPONENT DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

NO >> Go to diagnosis procedure. Refer to HAC-133, "Front Blower Motor Diagnosis Procedure".

## Front Blower Motor Diagnosis Procedure

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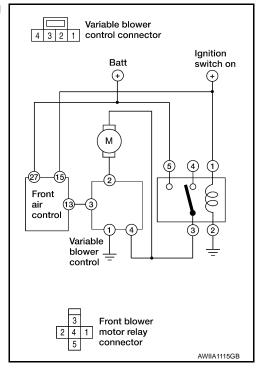
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Regarding Wiring Diagram information, refer to <a href="HAC-156">HAC-156</a>, "Wiring Diagram".

SYMPTOM: Blower motor operation is malfunctioning.

#### DIAGNOSTIC PROCEDURE FOR BLOWER MOTOR

SYMPTOM: Blower motor operation is malfunctioning under starting blower speed control.



# 1. CHECK FUSES

Check 20A fuses [No. 24 and 27 (Located in the fuse and fusible link box)]. For fuse layout. Refer to <u>PG-73, "Terminal Arrangement"</u>.

#### Fuses are good.

#### Is the inspection result normal?

YES >> GO TO 2. NO >> GO TO 9.

# 2.CHECK FRONT BLOWER MOTOR POWER SUPPLY CIRCUIT

- 1. Turn ignition switch OFF.
- 2. Disconnect front blower motor connector.
- 3. Turn ignition switch ON.
- 4. Press the A/C switch.
- Rotate blower control dial to maximum speed.
- 6. Check voltage between front blower motor harness connector M62 terminal 2 and ground.

#### 2 - Ground

#### : Battery voltage

#### Is the inspection result normal?

YES >> GO TO 11. NO >> GO TO 3.

3.CHECK FRONT BLOWER MOTOR RELAY (SWITCH SIDE) POWER SUPPLY CIRCUIT

Front blower motor connector

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#### [MANUAL A/C (TYPE 1)]

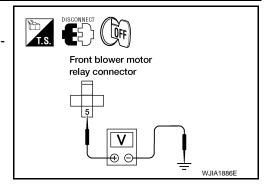
- 1. Turn ignition switch OFF.
- 2. Disconnect front blower motor relay.
- 3. Check voltage between front blower motor relay harness connector M107 terminal 5 and ground.

#### 5 - Ground : Battery voltage

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair harness or connector.



## 4. CHECK FRONT BLOWER MOTOR RELAY

Turn ignition switch OFF.

Check front blower motor relay. Refer to HAC-136, "Front Blower Motor Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace front blower motor relay.

## ${f 5.}$ CHECK FRONT BLOWER MOTOR RELAY (SWITCH SIDE) CIRCUIT FOR OPEN

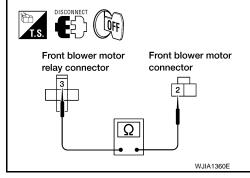
Check continuity between front blower motor relay harness connector M107 terminal 3 and front blower motor harness connector M62 terminal 2.

#### 3 - 2 : Continuity should exist.

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair harness or connector.



## 6.CHECK VARIABLE BLOWER CONTROL POWER SUPPLY CIRCUIT FOR OPEN

- Disconnect variable blower control harness connector.
- Check continuity between front blower motor relay harness connector M107 (A) terminals 3 and variable blower control harness connector M122 (B) terminal 4.

#### 3 - 4 : Continuity should exist.

#### Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair harness or connector.

# T.S. DISCONNECT OFF

## 7. CHECK VARIABLE BLOWER CONTROL SIGNAL CIRCUIT

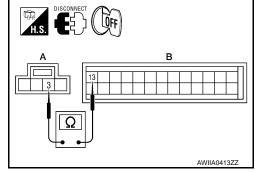
- 1. Disconnect front air control connector.
- Check continuity between front air control harness connector M180 (B) terminal 13 and variable blower control harness connector M122 (A) terminal 3.



#### Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair harness or connector.



# 8. CHECK FRONT BLOWER MOTOR RELAY (COIL SIDE) POWER SUPPLY

#### < COMPONENT DIAGNOSIS >

#### [MANUAL A/C (TYPE 1)]

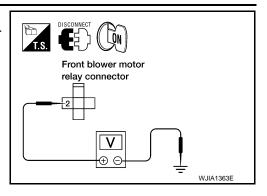
- 1. Turn ignition switch ON.
- Check voltage between front blower motor relay harness connector M107 terminal 2 and ground.

#### 2 - Ground : Battery voltage

#### Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair front blower motor ground circuit or connector.



# 9. REPLACE FUSES

- 1. Replace fuses.
- 2. Activate the front blower motor.

#### Does the fuse blow?

YES >> GO TO 10.

NO >> Inspection End.

# 10. CHECK FRONT BLOWER MOTOR POWER SUPPLY CIRCUIT FOR SHORT

- Turn ignition switch OFF.
- Disconnect front blower motor connector and variable blower control connector.
- Check continuity between variable blower control harness connector M122 terminal 4 and ground.

## 4 - Ground : Continuity should not exist.

#### Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair harness or connector.

# 11. CHECK VARIABLE BLOWER CONTROL SIGNAL CIRCUIT

- Disconnect front air control connector.
- Check continuity between front air control harness connector M180 (B) terminal 13 and variable blower control harness connector M122 (A) terminal 3.

## 13 - 3 : Continuity should exist.

#### Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair harness or connector.

# 12. CHECK FRONT BLOWER MOTOR

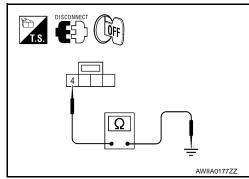
Check front blower motor. Refer to HAC-132, "Front Blower Motor Component Function Check".

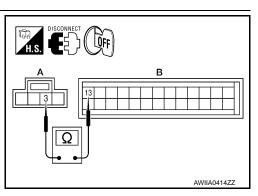
#### Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace front blower motor. Refer to VTL-12, "Removal and Installation".

# 13.check blower motor ground circuit





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#### < COMPONENT DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

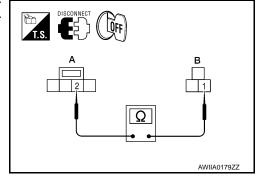
Check continuity between front blower motor harness connector M62 (B) terminal 1 and variable blower control harness connector M122 (A) terminal 2.

1 - 2 : Continuity should exist.

Is the inspection result normal?

YES >> GO TO 14.

NO >> Repair harness or connector.



# 14. CHECK VARIABLE BLOWER CONTROL GROUND CIRCUIT

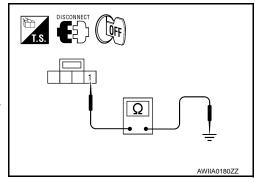
Check continuity between variable blower control harness connector M122 terminal 1 and ground.

1 - Ground : Continuity should exist.

Is the inspection result normal?

YES >> Replace variable blower control. Refer to <u>VTL-22</u>, <u>"Removal and Installation"</u>.

NO >> Repair harness or connector.

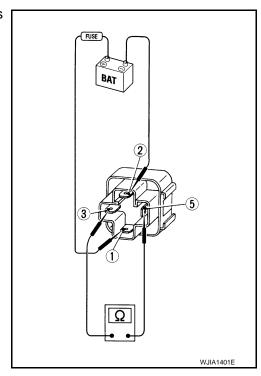


INFOID:0000000005386672

# Front Blower Motor Component Inspection

#### COMPONENT INSPECTION

Check continuity between terminals 3 and 5 by supplying 12 volts and ground to coil side terminals 1 and 2 of the relay.



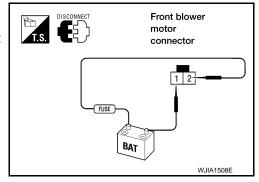
Front Blower Motor

#### < COMPONENT DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

Confirm smooth rotation of the blower motor.

- Ensure that there are no foreign particles inside the blower unit.
- Apply 12 volts to terminal 2 and ground to terminal 1 and verify that the motor operates freely and quietly.



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## MAGNET CLUTCH

## **System Description**

INFOID:0000000005386673

#### SYSTEM DESCRIPTION

The front air control controls compressor operation based on ambient and intake temperature and a signal from ECM.

Low Temperature Protection Control

The front air control will turn the compressor ON or OFF as determined by a signal detected by the intake sensor and the ambient sensor.

When intake air temperature is higher than the preset value, the compressor turns ON. The compressor turns OFF when intake air temperature is lower than the preset value. That preset value is dependent on the ambient temperature, refer to the following table.

Ambient temperature °C (°F)	Compressor ON intake temperature °C (°F)	Compressor OFF intake temperature °C (°F)
0 (32)	5.5 (42)	5.0 (41)
10 (50)	5.5 (42)	5.0 (41)
20 (68)	5.5 (42)	5.0 (41)
30 (86)	4.0 (39)	3.5 (38)
40 (104)	3.5 (38)	3.0 (37)
50 (122)	3.5 (38)	3.0 (37)

## Magnet Clutch Component Function Check

INFOID:0000000005386674

#### INSPECTION FLOW

# 1.confirm symptom by performing operational check - magnet clutch

- 1. Turn ignition switch ON.
- 2. Turn the blower control dial to low speed and press the A/C switch.
- 3. Press vent mode switch (\*\*).
- 4. Confirm that the compressor clutch engages (sound or visual inspection). (Discharge air and blower speed will depend on ambient, in-vehicle and set temperatures.)

#### Is the inspection result normal?

YES >> Inspection End.

NO >> Go to diagnosis procedure. Refer to <u>HAC-138, "Magnet Clutch Diagnosis Procedure"</u>.

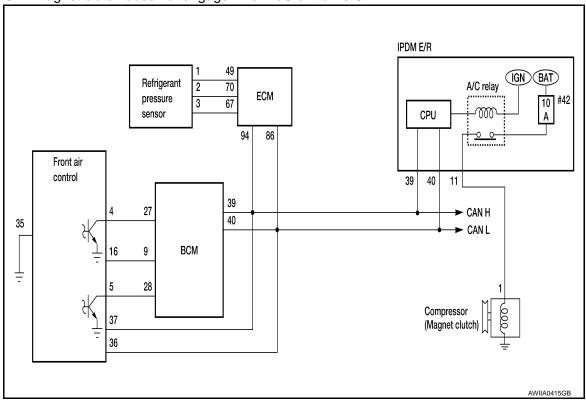
# Magnet Clutch Diagnosis Procedure

INFOID:0000000005386675

Regarding Wiring Diagram information, refer to HAC-156, "Wiring Diagram".

#### DIAGNOSTIC PROCEDURE FOR MAGNET CLUTCH

SYMPTOM: Magnet clutch does not engage when A/C switch is ON.



# 1. CHECK INTAKE AND AMBIENT SENSOR CIRCUITS

Check intake and ambient sensors. Refer to HAC-113, "Front Air Control Self-Diagnosis".

### Is the inspection result normal?

YES >> GO TO 2.

NO

>> • Malfunctioning intake sensor. Refer to HAC-148, "Intake Sensor Diagnosis Procedure".

• Malfunctioning ambient sensor. Refer to HAC-145, "Ambient Sensor Diagnosis Procedure".

## 2. PERFORM AUTO ACTIVE TEST

Refer to PCS-11, "Diagnosis Description".

#### Does magnet clutch operate?

YES >> • (P)WITH CONSULT-III **GO TO 5.** 

> • NWITHOUT CONSULT-III GO TO 6.

NO >> Check 10A fuse (No. 42, located in IPDM E/R), and GO TO 3.

# 3.check circuit continuity between IPDM e/R and compressor

Turn ignition switch OFF.

- 2. Disconnect IPDM E/R connector and compressor (magnet clutch) connector.
- Check continuity between IPDM E/R harness connector E119 terminal 11 and A/C compressor harness connector F3 terminal 1.

#### 11 - 1: Continuity should exist.

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair harness or connector.

4. CHECK MAGNET CLUTCH CIRCUIT

IPDM E/R Compressor connector connector Ω WJIA0560E HAC

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#### [MANUAL A/C (TYPE 1)]

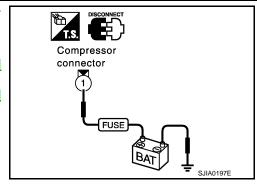
#### < COMPONENT DIAGNOSIS >

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

#### Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to <u>PCS-30</u>, "Removal and <u>Installation of IPDM E/R"</u>.

NO >> Replace magnet clutch. Refer to <u>HA-34</u>, "Removal and Installation for Compressor Clutch".



# ${f 5.}$ CHECK BCM INPUT (COMPRESSOR ON) SIGNAL

Check compressor ON/OFF signal. Refer to HAC-110, "CONSULT-III Function (HVAC)".

A/C SW ON : COMP ON SIG ON A/C SW OFF : COMP ON SIG OFF

#### Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 6.

#### 6. CHECK CIRCUIT CONTINUITY BETWEEN BCM AND FRONT AIR CONTROL

- 1. Turn ignition switch OFF.
- 2. Disconnect BCM connector and front air control connector.
- Check continuity between BCM harness connector M18 (A) terminal 27 and front air control harness connector M180 (B) terminal 4.

# 27 - 4

#### Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair harness or connector.

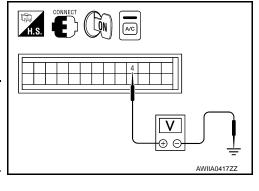
# DISCONNECT OFF A A AWIIA0416ZZ

# 7.CHECK VOLTAGE FOR FRONT AIR CONTROL (A/C COMPRESSOR ON SIGNAL)

Continuity should exist.

- 1. Reconnect BCM connector and front air control connector.
- 2. Turn ignition switch ON.
- Check voltage between front air control harness connector M180 terminal 4 and ground.

	Terminals			
(-	+)			
front air con- trol connec- tor	Terminal No.	(-)	Condition	Voltage
M180	4	Ground	A/C switch: ON	Approx. 0V
IVITOU	4	Ground	A/C switch: OFF	Approx. 5V



#### Is the inspection result normal?

YES >> GO TO 8.

NO-1 >> If the voltage is approx. 5V when A/C switch is ON, replace front air control. Refer to <u>VTL-8</u>. "Removal and Installation".

NO-2 >> If the voltage is approx. 0V when A/C switch is OFF, replace BCM. Refer to <u>BCS-53, "Removal and Installation"</u>.

## 8. CHECK REFRIGERANT PRESSURE SENSOR

1. Start engine.

#### **MAGNET CLUTCH**

#### < COMPONENT DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

2. Check voltage between ECM harness connector F54 terminal 70 and ground.

	Terminals			
(	+)		Condition	Voltage
ECM con- nector	Terminal No.	(-)		3.0
F54	70	Ground	A/C switch: ON	Approx. 0.36 - 3.88V

ECM connector

14	13	12	11	10	9	8	7	6	
33	32	31	30	29	28	27	26	25	
53	52	51	50	49	48	47	46	45	44
72	71	70	69	68	67	66	65	64	63

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#### Is the inspection result normal?

YES >> GO TO 9.

NO >> Refer to EC-411, "Diagnosis Procedure".

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

Check FAN ON/OFF signal. Refer to HAC-110, "CONSULT-III Function (HVAC)".

FRONT BLOWER CONTROL : FAN ON SIG ON

**DIAL ON** 

FRONT BLOWER CONTROL : FAN ON SIG OFF

**DIAL OFF** 

#### Is the inspection result normal?

YES >> GO TO 12. NO >> GO TO 10.

# 10.CHECK CIRCUIT CONTINUITY BETWEEN BCM AND FRONT AIR CONTROL

- 1. Turn ignition switch OFF.
- Disconnect BCM connector and front air control connector.
- Check continuity between BCM harness connector M18 (A) terminal 28 and front air control harness connector M180 (B) terminal 5.

# 28 - 5

Continuity should exist.

#### Is the inspection result normal?

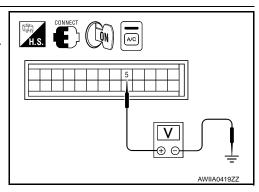
YES >> GO TO 11.

NO >> Repair harness or connector.

# 11. CHECK VOLTAGE FOR FRONT AIR CONTROL (FAN ON SIGNAL)

- Reconnect BCM connector and front air control connector.
- 2. Turn ignition switch ON.
- 3. Check voltage between front air control harness connector M180 terminal 5 and ground.

	Terminals	Condition	Voltage	
(+)				
front air con- trol connector	Terminal No.	(-)		
M180	5	Ground	A/C switch: ON Blower motor operates	Approx. 0V
			A/C switch: OFF	Approx. 5V



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### Is the inspection result normal?

YES >> GO TO 12.

NO-1 >> If the voltage is approx. 5V when blower motor is ON, replace front air control. Refer to <u>VTL-8</u>, <u>"Removal and Installation"</u>.

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#### **MAGNET CLUTCH**

#### < COMPONENT DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

NO-2 >> If the voltage is approx. 0V when blower motor is OFF, replace BCM. Refer to <u>BCS-53</u>, "Removal and Installation".

# 12. CHECK CAN COMMUNICATION

Check CAN communication. Refer to LAN-4, "System Description".

- BCM ECM
- ECM IPDM E/R
- ECM Front air control

#### Is the inspection result normal?

- YES >> Inspection End.
- NO >> Repair or replace malfunctioning part(s).

#### [MANUAL A/C (TYPE 1)]

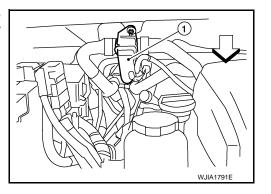
#### WATER VALVE CIRCUIT

Description INFOID:0000000005386676

#### COMPONENT DESCRIPTION

#### Water Valve

The water valve (1) cuts the flow of engine coolant to the heater core to allow for maximum cooling during A/C operation. It is controlled by the front air control.



# Water Valve Diagnosis Procedure

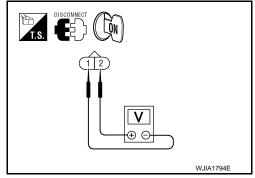
Regarding Wiring Diagram information, refer to <a href="HAC-156">HAC-156</a>, "Wiring Diagram".

#### DIAGNOSTIC PROCEDURE FOR WATER VALVE

# 1. CHECK WATER VALVE POWER AND GROUND CIRCUITS

- 1. Disconnect water valve connector F68.
- 2. Turn ignition switch ON.
- 3. Rotate temperature control dial to maximum heat.
- Check voltage between water valve harness connector F68 terminal 1 and terminal 2 while rotating temperature control dial to maximum cold.

Connector	Terminals		Condition	Voltage
	(+)	(-)	Condition	(Approx.)
Water valve: F68	2	1	Rotate temperature control dial	Battery voltage



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#### Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

# 2.check water valve control output circuit

- Turn ignition switch OFF.
- Disconnect front air control connector M50.
- Check continuity between water valve harness connector F68

   (A) terminal 2 and front air control harness connector M50 (B) terminal 42.

#### 2 - 42 : Continuity should exist.

Check continuity between water valve harness connector F68
 (A) terminal 2 and ground.

#### 2 - Ground : Continuity should not exist.

#### Is the inspection result normal?

YES >> Replace front air control. Refer to VTL-8, "Removal and Installation".

NO >> Repair harness or connector.

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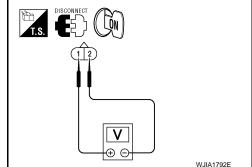
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# ${f 3.}$ CHECK WATER VALVE POWER AND GROUND CIRCUITS

- 1. Rotate temperature control dial to maximum cold.
- 2. Check voltage between water valve harness connector F68 terminal 1 and terminal 2 while rotating temperature control dial to maximum heat.

Connector	Terminals		Condition	Voltage
Connector	(+)	(-)	Condition	(Approx.)
Water valve: F68	1	2	Rotate temperature control dial	Battery voltage



#### Is the inspection result normal?

YES >> Replace the water valve.

NO >> GO TO 4.

# 4. CHECK WATER VALVE CONTROL OUTPUT CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect front air control connector M50.
- Check continuity between water valve harness connector F68

   (A) terminal 1 and front air control harness connector M50 (B) terminal 41.

## 1 - 41 : Continuity should exist.

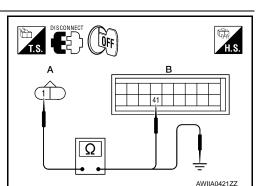
4. Check continuity between water valve harness connector F68 (A) terminal 1 and ground.



#### Is the inspection result normal?

YES >> Replace front air control. Refer to <a href="VTL-8">VTL-8</a>, "Removal and Installation".

NO >> Repair harness or connector.



# AMBIENT SENSOR

# Component Description

#### INFOID:0000000005386678

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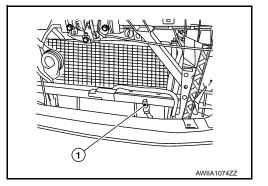
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#### COMPONENT DESCRIPTION

#### **Ambient Sensor**

The ambient sensor (1) is attached on the radiator core support (left side). It detects ambient temperature and converts it into a value which is then input into the front air control.



## AMBIENT TEMPERATURE INPUT PROCESS

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

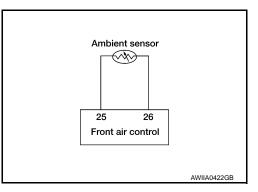
This prevents constant adjustments due to momentary conditions, such as stopping after high speed driving. Although the actual ambient temperature has not changed, the temperature detected by the ambient sensor will increase. This is because the heat from the engine compartment can radiate to the front grille area, location of the ambient sensor.

# Ambient Sensor Diagnosis Procedure

INFOID:0000000005386679

Regarding Wiring Diagram information, refer to HAC-156, "Wiring Diagram".

## DIAGNOSTIC PROCEDURE FOR AMBIENT SENSOR SYMPTOM: Ambient sensor circuit is open or shorted.



 ${f 1}$  .CHECK VOLTAGE BETWEEN AMBIENT SENSOR AND GROUND

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**HAC-145** 2010 Titan Revision: August 2009

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## AMBIENT SENSOR

## < COMPONENT DIAGNOSIS >

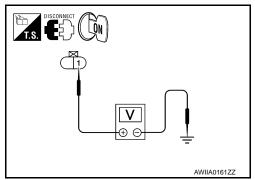
[MANUAL A/C (TYPE 1)]

- 1. Disconnect ambient sensor connector.
- 2. Turn ignition switch ON.
- 3. Check voltage between ambient sensor harness connector E1 terminal 1 and ground.

## 1 - Ground : Approx. 5V

## Is the inspection result normal?

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



# 2.CHECK CIRCUIT CONTINUITY BETWEEN AMBIENT SENSOR AND FRONT AIR CONTROL

- 1. Turn ignition switch OFF.
- 2. Disconnect front air control connector.
- 3. Check continuity between ambient sensor harness connector E1 (B) terminal 2 and front air control harness connector M180 (A) terminal 26.

# 2 - 26 : Continuity should exist.

## Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair harness or connector.

# 3. CHECK AMBIENT SENSOR

Check the ambient sensor circuit. Refer to <u>HAC-145</u>, "Ambient Sensor Diagnosis Procedure".

## Is the inspection result normal?

- YES >> 1. Replace front air control. Refer to VTL-8, "Removal and Installation".
  - 2. GO TO HAC-113, "Front Air Control Self-Diagnosis" and perform self-diagnosis.
- NO >> 1. Replace ambient sensor. Refer to <u>HA-45, "Removal and Installation"</u>.
  - 2. GO TO HAC-113, "Front Air Control Self-Diagnosis" and perform self-diagnosis.

# 4. CHECK CIRCUIT CONTINUITY BETWEEN AMBIENT SENSOR AND FRONT AIR CONTROL

- Turn ignition switch OFF.
- 2. Disconnect front air control connector.
- Check continuity between ambient sensor harness connector E1 (B) terminal 1 and front air control harness connector M180 (A) terminal 25.

# 1 - 25 : Continuity should exist.

4. Check continuity between ambient sensor harness connector E1 (B) terminal 1 and ground.

# 1 - Ground : Continuity should not exist.

# DISCONNECT OFF A B B B A A B B A A A B B A A A B B A A A B B A A A B B A A A B B A A A A B B A A A A B B A A A A B B A A A A B B A A A A B B A A B A B A

## Is the inspection result normal?

YES >> 1. Replace front air control. Refer to VTL-8, "Removal and Installation".

2. GO TO HAC-113, "Front Air Control Self-Diagnosis" and perform self-diagnosis.

NO >> Repair harness or connector.

# Ambient Sensor Component Inspection

INFOID:0000000005386680

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#### COMPONENT INSPECTION

**Ambient Sensor** 

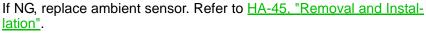
# **AMBIENT SENSOR**

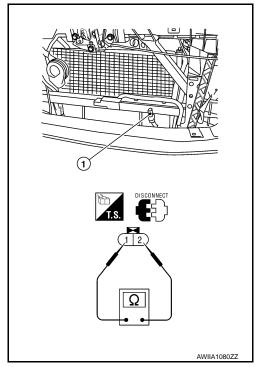
## < COMPONENT DIAGNOSIS >

## [MANUAL A/C (TYPE 1)]

After disconnecting ambient sensor (1) connector E1, measure resistance between terminals 1 and 2 at sensor component side, using the 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





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# INTAKE SENSOR

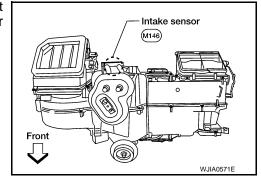
# System Description

#### INFOID:0000000005386681

## COMPONENT DESCRIPTION

## Intake Sensor

The intake sensor is located on the heater & cooling unit assembly. It converts temperature of air after if passes through the evaporator into a resistance value which is then input to the front air control.



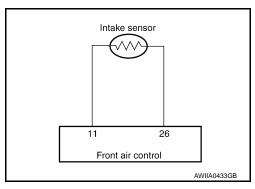
# Intake Sensor Diagnosis Procedure

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Regarding Wiring Diagram information, refer to HAC-156, "Wiring Diagram".

## DIAGNOSTIC PROCEDURE FOR INTAKE SENSOR

SYMPTOM: Intake sensor circuit is open or shorted.



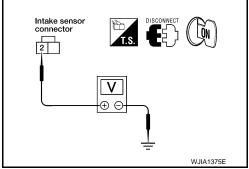
# 1. CHECK VOLTAGE BETWEEN INTAKE SENSOR AND GROUND

- Disconnect intake sensor connector.
- 2. Turn ignition switch ON.
- 3. Check voltage between intake sensor harness connector M146 terminal 2 and ground.

## 2 - Ground : Approx. 5V

## Is the inspection result normal?

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



# 2.CHECK CIRCUIT CONTINUITY BETWEEN INTAKE SENSOR AND FRONT AIR CONTROL

## INTAKE SENSOR

## < COMPONENT DIAGNOSIS >

## [MANUAL A/C (TYPE 1)]

- 1. Turn ignition switch OFF.
- 2. Disconnect front air control connector.
- Check continuity between intake sensor harness connector M146 (B) terminal 1 and front air control harness connector M180 (A) terminal 26.

# 1 - 26 : Continuity should exist.

## Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair harness or connector.

# 3. CHECK INTAKE SENSOR

Check intake sensor. Refer to HAC-149, "Intake Sensor Component Inspection".

## Is the inspection result normal?

YES >> 1. Replace front air control. Refer to <u>VTL-8</u>, "Removal and Installation".

2. Go to <u>HAC-113</u>, "Front Air Control Self-Diagnosis" and perform self-diagnosis.

NO >> 1. Replace intake sensor. Refer to <u>VTL-11, "Removal and Installation"</u>.

2. Go to HAC-113, "Front Air Control Self-Diagnosis" and perform self-diagnosis.

# 4.CHECK CIRCUIT CONTINUITY BETWEEN INTAKE SENSOR AND FRONT AIR CONTROL

- Turn ignition switch OFF.
- 2. Disconnect front air control connector.
- Check continuity between intake sensor harness connector M146 (B) terminal 2 and front air control harness connector M180 (A) terminal 11.

## 2 - 11 : Continuity should exist.

4. Check continuity between intake sensor harness connector M146 (B) terminal 2 and ground.

## 2 - Ground : Continuity should not exist.

Is the inspection result normal?

YES >> 1. Replace front air control. Refer to <a href="VTL-8">VTL-8</a>, "Removal and Installation".

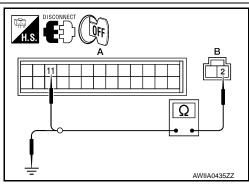
2. Go to HAC-113, "Front Air Control Self-Diagnosis" and perform self-diagnosis.

NO >> Repair harness or connector.

# Intake Sensor Component Inspection

## COMPONENT INSPECTION

Intake Sensor



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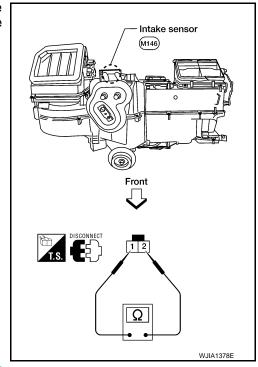
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## < COMPONENT DIAGNOSIS >

After disconnecting intake sensor connector, measure resistance between terminals 1 and 2 at sensor harness side, using the table below.

Temperature °C (°F)	Resistance kΩ
-15 (5)	209.0
-10 (14)	160.0
-5 (23)	123.0
0 (32)	95.8
5 (41)	74.9
10 (50)	58.9
15 (59)	46.7
20 (68)	37.3
25 (77)	30.0
30 (86)	24.2
35 (95)	19.7
40 (104)	16.1
45 (113)	13.2



If NG, replace intake sensor. Refer to  $\underline{\text{VTL-11}}$  , "Removal and Installation".

# POWER SUPPLY AND GROUND CIRCUIT FOR CONTROLLER

< COMPONENT DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

# POWER SUPPLY AND GROUND CIRCUIT FOR CONTROLLER

# Component Description

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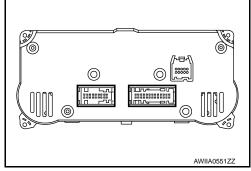
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## COMPONENT DESCRIPTION

#### Front Air Control

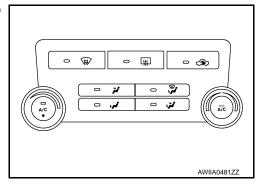
The front air control has a built-in microcomputer which processes information sent from various sensors needed for air conditioner operation. The air mix door motor, mode door motor, intake door motor, defroster door motor, blower motor and A/C compressor are then controlled.

The front air control is unitized with control mechanisms. When the various switches and temperature dials are operated, data is input to the front air control.



## Potentio Temperature Control (PTC)

The PTC is built into the front air control. It can be set from cold to hot or any intermediate position by rotating the temperature control dial.



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# Front Air Control Component Function Check

SYMPTOM: A/C system does not come on.

## INSPECTION FLOW

# 1.confirm symptom by performing operational check - auto mode

- Turn the blower control dial clockwise to low speed.
- 2. Press the A/C Turn the blower control dial clockwise to low speed.
- 3. Confirm that the compressor clutch engages (sound or visual inspection). (Discharge air and blower speed will depend on ambient, in-vehicle and set temperatures.)

## Is the inspection result normal?

YES >> Inspection End.

NO >> Go to diagnosis procedure. Refer to <u>HAC-151</u>, "Front Air Control Power and Ground Diagnosis <u>Procedure"</u>.

# Front Air Control Power and Ground Diagnosis Procedure

INFOID:0000000005386686

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Regarding Wiring Diagram information, refer to <a href="HAC-156">HAC-156</a>, "Wiring Diagram".

#### DIAGNOSTIC PROCEDURE FOR A/C SYSTEM

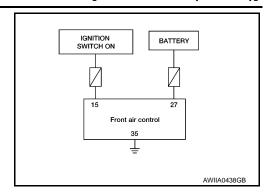
Revision: August 2009 HAC-151 2010 Titan

# POWER SUPPLY AND GROUND CIRCUIT FOR CONTROLLER

< COMPONENT DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

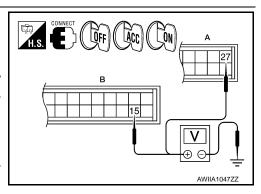
SYMPTOM: A/C system does not come on.



# 1. CHECK POWER SUPPLY CIRCUITS FOR FRONT AIR CONTROL

- 1. Turn ignition switch ON.
- 2. Check voltage between front air control harness connector M180 (B) terminal 15 and M50 (A) terminal 27, and ground.

	Terminals		Ignit	sition		
	(+)					
Front air control connector	Terminal No.	(-)	OFF	ACC	ON	
M180	15	Ground	Approx. 0V	Approx. 0V	Battery voltage	
M50	27	Ground -	Battery voltage	Battery voltage	Battery voltage	



## Is the inspection result normal?

YES >> GO TO 2.

NO

>> Check 10A fuses [Nos. 8 and 19, located in the fuse block (J/B)]. Refer to <a href="PG-73">PG-73</a>, "Terminal Arrangement".

- If fuses are OK, check harness for open circuit. Repair or replace as necessary.
- If fuses are NG, replace fuse and check harness for short circuit. Repair or replace as necessary.

# 2. CHECK GROUND CIRCUIT FOR FRONT AIR CONTROL

- Turn ignition switch OFF.
- Disconnect front air control connectors.
- Check continuity between front air control harness connector M50 terminal 35 and ground.

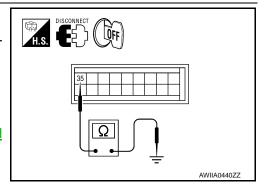
## 35 - Ground

## : Continuity should exist.

## Is the inspection result normal?

OK >> Replace front air control. Refer to <u>VTL-8, "Removal and Installation"</u>.

NG >> Repair harness or connector.



[MANUAL A/C (TYPE 1)]

# **ECU DIAGNOSIS**

# MANUAL A/C IDENTIFICATION TABLE

Application Table

Manual A/C Type	Description	Visual Identification
Manual A/C (Type 1)	Two Control Dial System	AWIIA0481ZZ
Manual A/C (Type 2)	Three Control Dial System [with variable blower control (VBC)]	AWIIA0478ZZ

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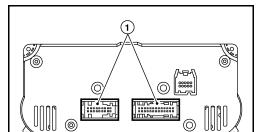
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AWIIA0436ZZ

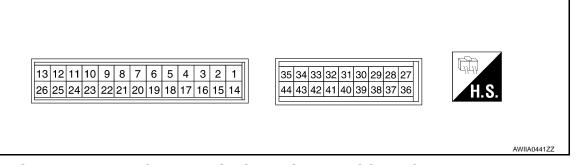
# AIR CONDITIONER CONTROL

# Front Air Control Terminals Reference Values

Measure voltage between each terminal and ground by following Terminals and Reference Value for front air control (1).



# FRONT AIR CONTROL HARNESS CONNECTOR TERMINAL LAYOUT



## TERMINALS AND REFERENCE VALUES FOR FRONT AIR CONTROL

Terminal No.	Wire color	ltem	Ignition switch	Condition	Voltage (V) (Approx.)
3	Р	V ref ACTR (ground)	ON	-	5V
4	W/R	Compressor ON signal	ON	A/C switch OFF	5V
4	VV/R	Compressor ON signal	ON	A/C switch ON	0V
5	L/R	Fan ON signal	ON	Blower switch OFF	5V
5	L/K	Fan ON signal	ON	Blower switch ON	0V
6	SB	Air mix door motor feedback	ON	-	0 - 5V
7	GR	Mode door motor feedback	ON	-	0 - 5V
8	R/L	Illumination +	ON	Park lamps ON	Battery voltage
9	BR	Illumination -	-	Park lamps ON	(V) 15 10 5 0 200 ms
10	LG/B	Defroster door motor feedback	ON	-	0 - 5V
11	L/B	Intake sensor	ON	-	0 - 5V
13	G/R	Variable blower control	ON	-	0 - 5V
15	Y/G	Power supply for IGN	ON	-	Battery voltage
16	Y/B	Rear defogger request *1	ON	-	Battery voltage
17	W/G	Air mix door motor CW	ON	Clockwise rotation	Battery voltage
18	G	Air mix door motor CCW	ON	Counterclockwise rotation	Battery voltage

# **AIR CONDITIONER CONTROL**

# < ECU DIAGNOSIS >

# [MANUAL A/C (TYPE 1)]

Terminal No.	Wire color	Item	Ignition switch	Condition	Voltage (V) (Approx.)
19	BR/W	Mode door motor CW	ON	Clockwise rotation	Battery voltage
20	P/L	Mode door motor CCW	ON	Counterclockwise rotation	Battery voltage
21	G/B	Intake door motor CCW	ON	Counterclockwise rotation	Battery voltage
22	0	Intake door motor CW	ON	Clockwise rotation	Battery voltage
23	LG	Defroster door motor CW	ON	Clockwise rotation	Battery voltage
24	P/B	Defroster door motor CCW	ON	Counterclockwise rotation	Battery voltage
25	Р	Ambient sensor	ON	-	0 - 5V
26	V/R	Sensor ground	ON	-	0V
27	Y/R	Power supply for BAT	-	-	Battery voltage
28	Υ	V ref ACTR (5V)	ON	-	0 - 5V
35	В	Ground	-	-	0V
36	Р	CAN-L	ON	-	0 - 5V
37	L	CAN-H	ON	-	0 - 5V
41	Y/L	Water valve	ON	Water valve open	Battery voltage
41	1/L	water valve	ON	Water valve closed	0V
42	W/G	Water valve	ON	Water valve open	0V
42	W/G	vvalci valve	ON	Water valve closed	Battery voltage

<sup>\*1:</sup> If equipped

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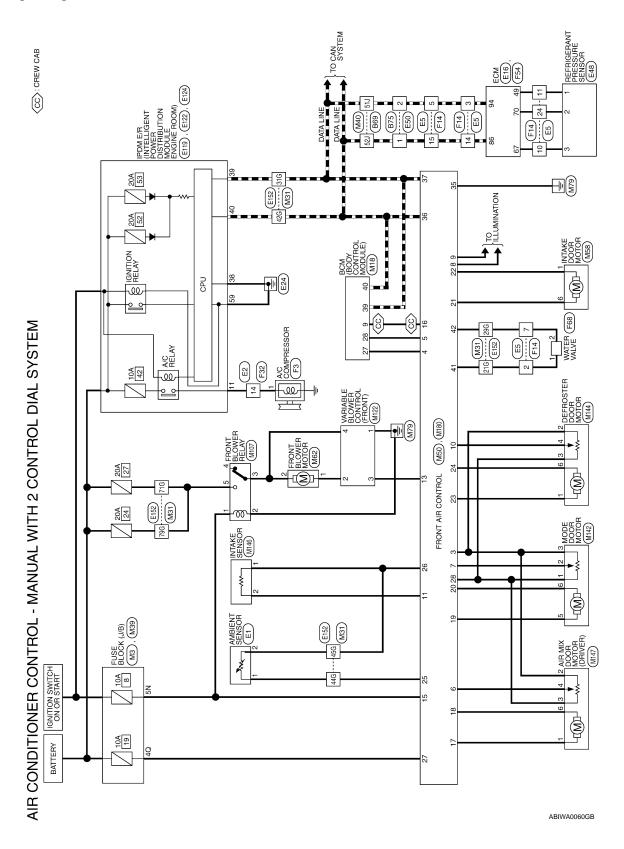
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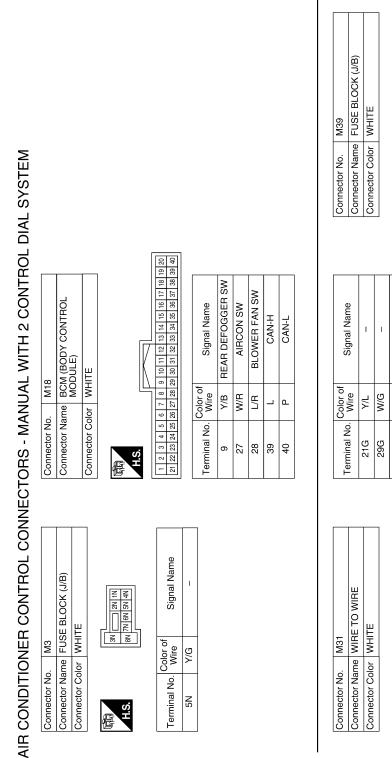
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Wiring Diagram





	А
Name	В
Connector No. M39 Connector Color HITE Connector Color WHITE  #S. Signal Name  #AQ Y/R –   Connector No. Wire Signal Name	С
in M39 FUSE E Color of WHITE Wire Wire Y/R	D
Connector No. Connector Name Connector Color H.S.  Terminal No. V 4Q  AQ  AQ  AQ  AQ  AQ  AQ  AQ  AQ  AQ	Е
	F
Range	G
Signal Name	Н
Color of Wire W//S W//S W//S W//S W//S W//S W//S W//	HAG
Color of Terminal No.   Wire 21G   W/G 29G   W/G 31G   L 42G   P 44G   P 45G   V/R 71G   P 79G   P 7	J
	K
M31	L
M31   M31   Connector Name   WIRE TO WIRE	M
No.   M31	Ν
Connector No. Connector Name Connector Color H.S.  416 616	0
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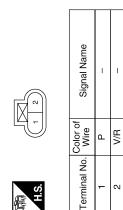
		Connector No.		COTINGO	Terminal No.	Color of Wire	Signal Name
Connector Name WIRE I	WIRE IO WIRE	Connector Name		(WITH MANUAL 2 CONTROL	33	ı	ı
-		2000	_	(YSTEM)	34	ı	1
		Occimiecto	$\dashv$		35	В	GND
	2   3   2   1	•	35 34 33 32	31 30 29 28 27	36	۵	CAN-L
	90 80 73		44 43 42 41 40	39 38 37	37	_	CAN-H
					38	ı	-
21.0 20.0 19.0 1	21.3 20.0 19.0 18.0 17.0 16.0 15.0 14.0 13.0 12.0 11.0				39	ı	ı
300 230 2	30. [29. [28. [28. [28. [28. [28. ]	Terminal No.	Color of Wire	Signal Name	40	1	ı
41J 40J 39J 3	410 400 390 380 373 360 353 341 333 322 313	22	2 //2	V BAT	41	A/L	WATER VALVE A
200 1881	300 489 486 477 489 489 449 489 429	58	<u>:</u> >	5V RFE VOI TAGE	42	M/G	WATER VALVE B
61.0 60.0 59.0 5	61.1 60.1 59.1 58.1 57.1 56.1 55.1 54.1 53.1 52.1 51.1	53	ı		43	I	1
) nsa n/	/W 68J 68J 67J 66J 65J 65J 65J 65J	G 08	ı		44	1	-
	75J 74J 73J 72J 71J	31	ı	ı			
	80, 79, 78, 77, 76,	32	ı	1			
Terminal No. Wire	Signal Name						
51J L	ı						
52J P	ı						
ME8		oly rotocoaco	Mea		Connector No	NO M107	
9	NE DOOB MOTOB	Connector Name	- 1	EBONT BI OWER MOTOR	Connector Name		NT BLOWER RELAY
Connector Color BLACK	OK OK	Connector Color			Connector Color	- 1	
		唇			E		
H.S.	3 4 5 6	H.S.			H.S.	4 0	
Terminal No. Wire	Signal Name	Terminal No.	Color of Wire	Signal Name	Terminal No.	Color of Wire	Signal Name
1 0	ı	-	I/W	1	-	Y/G	ı
6 G/B	ı	2	M/L	1	2	В	ı
					3	M/L	_
					4	1	_
					2	GR	1

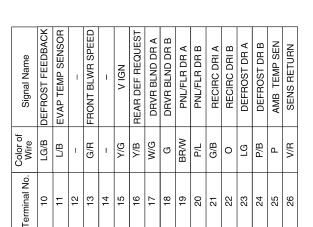
	А
Signal Name	В
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	D
Connector No.  Connector Name Connector Color  Terminal No. What is a second se	Е
	F
Connector No. M142  Connector Name MODE DOOR MOTOR  Connector Color of Signal Name  1	G
M142   M142   MODE DOOR MOO   MODE DOOR MOO	Н
Connector No.   M14	HA
Connector No Conne	J
	К
Connector Name VARIABLE BLOWER CONTROL (FRONT)  Connector Color WHITE  Terminal No. Wire Signal Name  2 L/W	L
Color of Wire WILE WILE WILE WILE WILE WILE WILE WILE	M
Connector No.  Connector Name Connector Color  1 By 1 By 3 Gy 4 W  Connector Name Connector No.  Connector No.  Connector No.  Connector No.  Connector No.  1 W  1 W  1 V  1 V  2 L  2 L  2 L  4 W  4 W  4 W  Connector No.  Connector Color  Terminal No.  1 V  1 V  1 V  2 L  1 V  1 V  1 V  2 L  1 V  1 V  1 V  2 L  1 V  1 V  1 V  2 L  1 V  1 V  1 V  1 V  1 V  2 L  1 V  1 V  1 V  1 V  1 V  1 V  1 V  1	N
Connec Connec Connec Connec Connec	0

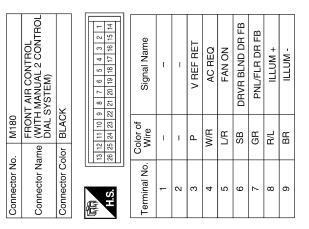
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Revision: August 2009 HAC-159 2010 Titan

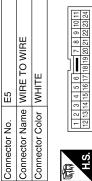
tor No. E1	Connector Name AMBIENT SENSOR	Connector Color GRAY	
Connector No.	Connector N	Connector C	



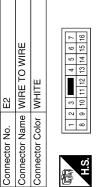




Signal Name	ı	1	ı	ı	ı	ı	ı	I	-
Color of Wire	Y/L	7	7	M/G	В	R/Y	Ь	Ь	B/W
Terminal No. Wire	2	က	2	7	10	+	14	15	24







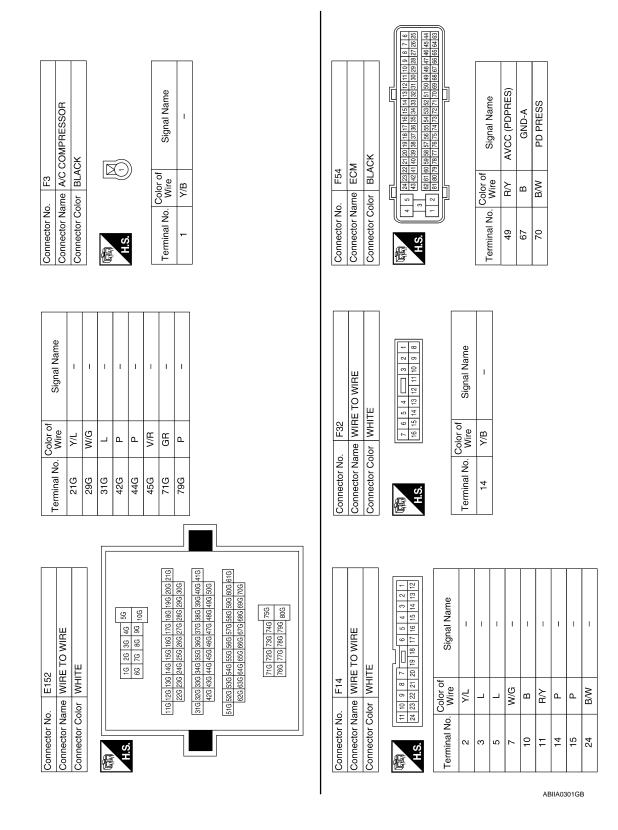
Signal Name	_	
Color of Wire	A/B	
Terminal No.	14	

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Connector No. E50 Connector Name WIRE TO WIRE Connector Color BROWN	Terminal No. Color of Signal Name	Connector No. E124 Connector Name POWER DISTRIBUTION MODULE ENGINE ROOM) Connector Color BLACK  E2 61 60 Terminal No. Wire Signal Name  59 B GND (POWER)	A B C D
Connector No. E48 Connector Name REFRIGERANT PRESSURE SENSOR Connector Color BLACK	Terminal No.         Color of Wire         Signal Name           1         R/Y         -           2         B/W         -           3         B         -	Connector No. E122  Connector Name POWER DISTRIBUTION MODULE ENGINE ROOM)  Connector Color WHITE  A.S. Terminal No. Wire Signal Name  38 B GND (SIGNAL)  39 L CAN-H  40 P CAN-H	F G H
Connector No. E16  Connector Name ECM  Connector Color BLACK  (106 107 108 109 1101 1111 112 113 119 120 121 118 119 120 121 118 119 120 121 118 119 120 121 118 119 120 121 118 119 120 121 118 120 121 118 120 121 118 120 121 118 120 121 118 120 121 118 120 121 118 120 121 118 120 121 118 120 121 118 120 121 118 120 121 121 118 120 121 121 121 121 121 121 121 121 121	Terminal No. Wire Signal Name 86 P CAN-L 94 L CAN-H	Connector No. E119  Connector Name POWER DISTRIBUTION MODULE ENGINE ROOM)  Connector Color WHITE  Terminal No. Wire Signal Name  11 Y/B A/C COMPRESSOR	K L M

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Revision: August 2009 HAC-161 2010 Titan



																	Α
																	В
Signal Name		1															С
Color of	al N	<u>a</u>															D
Terminal No	51J	52J															Е
		_						7									F
			57	8J 19J 20J 21J 8J 29J 30J	8J 39J 40J 41J 8J 49J 50J	8J 59J 60J 61J 8J 69J 70J	2 2										G
	E TO WIRE	1	1.1 2.1 3.1 4.1 5.1 6.1 7.1 8.1 9.1 10.1		31J 32J 33J 34J 35J 36J 37J 38J 39J 40J 41J 42J 43J 44J 45J 46J 47J 48J 48J 50J	51) 52) 53) 54) 55) 56) 57) 58) 59) 60) 61) 62) 63) 64) 65) 66) 67) 68) 69) 70)	71J 72J 73J 74J 75J 76J 77J 78J 79J 80J										Н
. No. B69	Connector Name WIRE TO WIRE			11.0 12.0 13.0	31.) 32.) 33.) 42.) 43.)	51J 52J 53J 62J 63J	7 2										HAC
Connector No.	Connector Name		H.S.														J
																	K
	ш			Signal Name						ш			Signal Name	1	1		L
88	Connector Name WATER VALVE	3	\(\frac{2}{1}\)						75	Connector Name WIRE TO WIRE	BROWN	- R					M
tor No. F68	Connector Name W			Color of Wire	A/L W/G				or No.   B75	tor Name W	Connector Color BF		Color of Wire	۵	_		Ν
Connector No.	Connec		师 H.S.	Terminal No.	- 2				Connector No.	Connect	Connec	师 H.S.	Terminal No.	-	2		0
									•							ABIIA0447GB	Р

[MANUAL A/C (TYPE 1)]

# SYMPTOM DIAGNOSIS

# MANUAL A/C IDENTIFICATION TABLE

Application Table

Manual A/C Type	Description	Visual Identification
Manual A/C (Type 1)	Two Control Dial System	AWIIA0481ZZ
Manual A/C (Type 2)	Three Control Dial System [with variable blower control (VBC)]	AVIIA0478ZZ

# **AIR CONDITIONER CONTROL**

# < SYMPTOM DIAGNOSIS >

# [MANUAL A/C (TYPE 1)]

# AIR CONDITIONER CONTROL

# Symptom Matrix Chart

#### INFOID:0000000005386691

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# **SYMPTOM TABLE**

Symptom	Reference Page				
A/C system does not come on.	Go to Trouble Diagnosis Procedure for A/C System.	HAC-151			
A/C system cannot be controlled.	Go to Self-diagnosis Function.	HAC-113			
Air outlet does not change.	Co to Trouble Diagnosis Presedure for Made Deer Mater	1100 445			
Mode door motor is malfunctioning.	Go to Trouble Diagnosis Procedure for Mode Door Motor.	<u>HAC-115</u>			
Discharge air temperature does not change.	Go to Trouble Diagnosis Procedure for Air Mix Door Motor.	HAC-120			
Air mix door motor is malfunctioning.	Go to Houble Diagnosis Procedure for All Mix Door Motor.	11AC-12U			
Intake door does not change.	Go to Trouble Diagnosis Procedure for Intake Door Motor.	HAC-125			
Intake door motor is malfunctioning.	Go to Houble Diagnosis Procedure for make Door Motor.	<u>11AO-125</u>			
Defroster door motor is malfunctioning.	Go to Trouble Diagnosis Procedure for Defroster Door Motor.	HAC-128			
Front blower motor operation is malfunctioning.	Go to Trouble Diagnosis Procedure for Front Blower Motor.	HAC-132			
Magnet clutch does not engage.	Go to Trouble Diagnosis Procedure for Magnet Clutch.	HAC-138			
Insufficient cooling	Go to Trouble Diagnosis Procedure for Insufficient Cooling.	HAC-166			
Insufficient heating	Go to Trouble Diagnosis Procedure for Insufficient Heating.	HAC-174			
Noise	Go to Trouble Diagnosis Procedure for Noise.	HAC-176			
Self-diagnosis cannot be performed.	Go to Trouble Diagnosis Procedure for Self-diagnosis.	HAC-68			

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[MANUAL A/C (TYPE 1)]

INFOID:000000005386692

## INSUFFICIENT COOLING

# Component Function Check

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SYMPTOM: Insufficient cooling

## INSPECTION FLOW

# 1. CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - TEMPERATURE DECREASE

- 1. Rotate the blower control dial to the low speed.
- 2. Turn temperature control dial counterclockwise to maximum cold.
- Check for cold air at discharge air outlets.

## Can the symptom be duplicated?

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

# 2.CHECK FOR ANY SYMPTOMS

Perform a complete operational check for any symptoms. Refer to HAC-98, "Operational Check".

# Does another symptom exist?

YES >> Refer to HAC-165, "Symptom Matrix Chart".

NO >> System OK.

## 3. CHECK FOR SERVICE BULLETINS

Check for any service bulletins.

>> If equipped with NAVI, GO TO 4.

>> If not equipped with NAVI, GO TO 5.

# 4. PERFORM SELF-DIAGNOSIS

Perform self-diagnosis Refer to HAC-113, "Front Air Control Self-Diagnosis".

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> Refer to HAC-165, "Symptom Matrix Chart".

## **5.**CHECK DRIVE BELTS

Check compressor belt tension. Refer to EM-13, "Checking Drive Belts".

## Is the inspection result normal?

YES >> GO TO 6.

NO >> Adjust or replace compressor belt. Refer to EM-13, "Removal and Installation".

## 6.CHECK AIR MIX DOOR OPERATION

Check and verify air mix door mechanism for smooth operation. Refer to <u>HAC-120, "Air Mix Door Motor Component Function Check"</u>.

#### Does air mix door operate correctly?

YES >> GO TO 7.

NO >> Check air mix door motor circuit. Refer to HAC-121, "Air Mix Door Motor Diagnosis Procedure".

## 7. CHECK COOLING FAN MOTOR OPERATION

Check and verify cooling fan motor for smooth operation. Refer to EC-304, "Overall Function Check".

## Does cooling fan motor operate correctly?

YES >> GO TO 8.

NO >> Check cooling fan motor. Refer to <u>EC-305</u>, "<u>Diagnosis Procedure</u>".

## 8.CHECK WATER VALVE OPERATION

Check and verify water valve for smooth operation. Refer to <u>HAC-143</u>, "Description".

## Does water valve operate correctly?

YES >> GO TO 9.

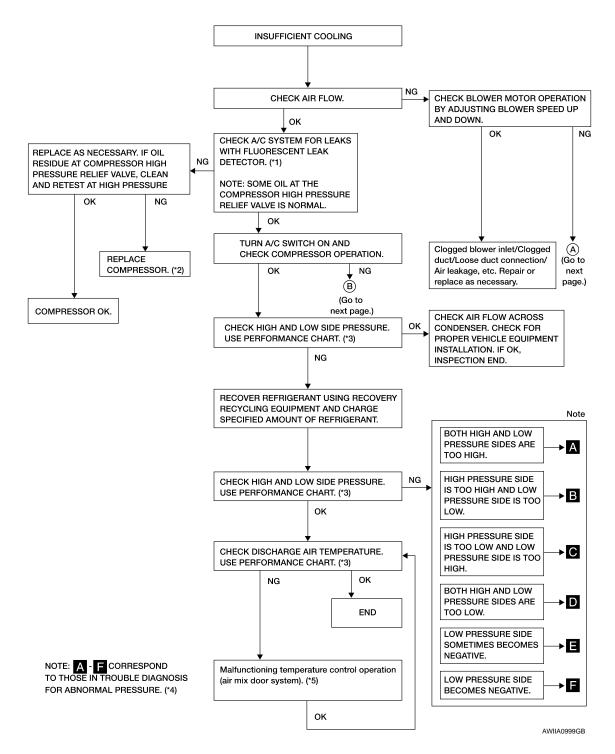
## INSUFFICIENT COOLING [MANUAL A/C (TYPE 1)] < SYMPTOM DIAGNOSIS > NO >> Check water valve circuit. Refer to HAC-143, "Water Valve Diagnosis Procedure". Α 9.CHECK RECOVERY/RECYCLING EQUIPMENT BEFORE USAGE Check recovery/recycling equipment before connecting to vehicle. Verify there is no pressure in the recovery/ recycling equipment by checking the gauges. If pressure exists, recover refrigerant from equipment lines. В >> GO TO 10. 10.CHECK REFRIGERANT PURITY Connect recovery/recycling equipment to vehicle. 2. Confirm refrigerant purity in supply tank using recovery/recycling and refrigerant identifier. D Is the inspection result normal? >> GO TO 11. YES NO >> Check contaminated refrigerant. Refer to HAC-177, "Working with HFC-134a (R-134a)". Е 11. CHECK FOR EVAPORATOR FREEZE UP Start engine and run A/C. Check for evaporator freeze up. Does evaporator freeze up? F YES >> Perform performance test diagnoses. Refer to HAC-167, "Diagnostic Work Flow". NO >> GO TO 12. 12. CHECK REFRIGERANT PRESSURE Check refrigerant pressure with manifold gauge connected. Refer to HAC-169, "Performance Chart". Is the inspection result normal? Н YES >> Perform performance test diagnoses. Refer to HAC-167, "Diagnostic Work Flow". NO >> GO TO 13. 13. CHECK AIR DUCTS HAC Check ducts for air leaks. Is the inspection result normal? YES >> System OK. NO >> Repair air leaks. Diagnostic Work Flow INFOID:0000000005386693 L

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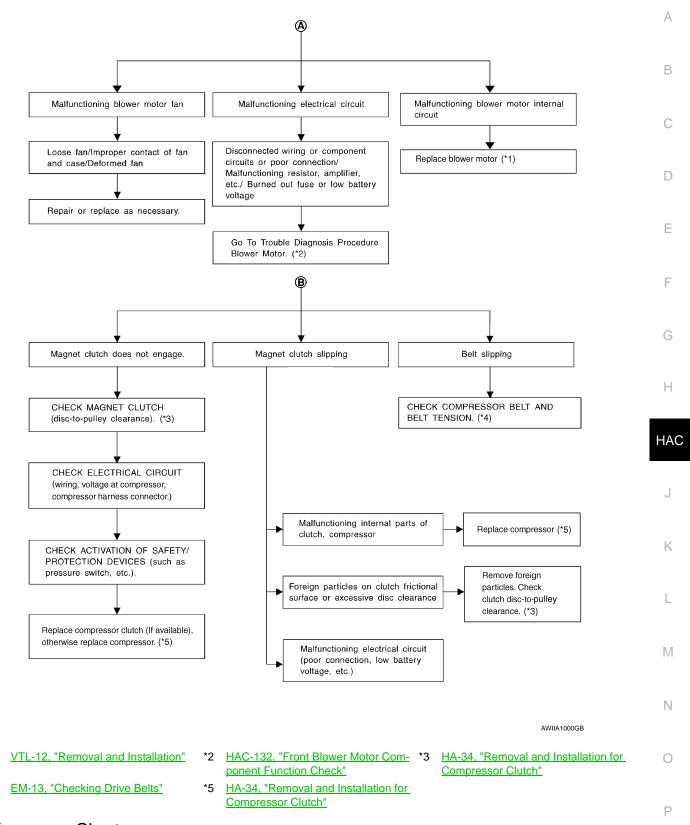
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Revision: August 2009 HAC-167 2010 Titan



- Using the Fluorescent Dye Leak Detector"
- \*4 HAC-170, "Trouble Diagnoses for Abnormal Pressure"
- \*1 HA-25, "Checking System for Leaks \*2 HA-34, "Removal and Installation for \*3 HAC-169, "Performance Chart" Compressor Clutch"
  - \*5 HAC-120, "Air Mix Door Motor Component Function Check"



# **Performance Chart**

INFOID:0000000005386694

## **TEST CONDITION**

Testing must be performed as follows:

Vehicle location	Indoors or in the shade (in a well-ventilated place)
Doors	Closed
Door window	Open
Hood	Open
TEMP.	Max. COLD
Mode switch	(Ventilation) set
Recirculation (REC) switch	(Recirculation) set
\$ Blower speed	Max. speed set
Engine speed	Idle speed
Operate the air conditioning system	for 10 minutes before taking measurements.

# TEST READING Recirculating-to-discharge Air Temperature Table

Inside air (Recirculating a	air) at blower assembly inlet	Disabarga air tamparatura at cantar vantilatar
Relative humidity %	Air temperature °C (°F)	Discharge air temperature at center ventilator °C (°F)
	20 (68)	9.9 - 13.9 (50 - 57)
	25 (77)	14.6 - 18.6 (58 - 65)
50 - 60	30 (86)	16.8 - 21.8 (62 - 71)
	35 (95)	21.1 - 27.1 (70 - 81)
	40 (104)	25.3 - 31.5 (78 - 89)
	20 (68)	11.4 - 15.2 (53 - 59)
	25 (77)	15.5 - 20.0 (60 - 68)
60 - 70	30 (86)	19.9 - 25.0 (68 - 77)
	35 (95)	24.5 - 29.6 (76 - 85)
	40 (104)	28.7 - 34.9 (84 - 95)

## Ambient Air Temperature-to-operating Pressure Table

Ambient air		High-pressure (Discharge side)	Low-pressure (Suction side)	
Relative humidity %	Air temperature °C (°F)	kPa (kg/cm <sup>2</sup> , psi)	kPa (kg/cm <sup>2</sup> , psi)	
	20 (68)	1020 - 1250 (10.4 - 12.7, 147.9 - 181.3)	160 - 190 (1.63 - 1.94, 23.2 - 27.6)	
	25 (77)	1236 - 1510 (12.6 - 15.4, 179.2 - 219)	206 - 245 (2.1 - 2.5, 29.9 - 35.6)	
50 - 70	30 (86)	1569 - 1,922 (16.0 - 19.6, 227.6 - 278.8)	265 - 324 (2.7 - 3.3, 38.4 - 46.9)	
	35 (95)	1,697 - 2079 (17.3 - 21.2, 246.1 - 301.5)	304 - 363 (3.1 - 3.7, 44.1 - 52.6)	
	40 (104)	1971 - 2403 (20.1 - 24.5, 285.9 - 348.5)	373 - 451 (3.8 - 4.6, 54.0 - 65.4)	

# Trouble Diagnoses for Abnormal Pressure

INFOID:0000000005386695

Whenever system's high and/or low side pressure is abnormal, diagnose using a manifold gauge. The marker above the gauge scale in the following tables indicates the standard (usual) pressure range. Since the stan-

# **INSUFFICIENT COOLING**

## < SYMPTOM DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

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dard (usual) pressure, however, differs from vehicle to vehicle, refer to above table (Ambient air temperature-to-operating pressure table).

Both High- and Low-pressure Sides are Too High

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
	Pressure is reduced soon after water is splashed on condenser.	Excessive refrigerant charge in refrigeration cycle	Reduce refrigerant until specified pressure is obtained.
Α	Air suction by cooling fan is insufficient.	Insufficient condenser cooling performance  ↓  1. Condenser fins are clogged.  2. Improper fan rotation of cooling fan	<ul> <li>Clean condenser.</li> <li>Check and repair cooling fan if necessary.</li> </ul>
Both high- and low-pressure sides are too high.	<ul> <li>Low-pressure pipe is not cold.</li> <li>When compressor is stopped high-pressure value quickly drops by approximately 196 kPa (2 kg/cm², 28 psi). It then decreases gradually thereafter.</li> </ul>	Poor heat exchange in condenser (After compressor operation stops, high-pressure decreases too slowly.)  Air in refrigeration cycle	Evacuate and recharge system.
AC359A	Engine tends to overheat.	Engine cooling systems mal- function.	Check and repair engine cooling system.
	<ul> <li>An area of the low-pressure pipe is colder than areas near the evaporator outlet.</li> <li>Plates are sometimes covered with frost.</li> </ul>	<ul> <li>Excessive liquid refrigerant on low-pressure side</li> <li>Excessive refrigerant discharge flow</li> <li>Expansion valve is open a little compared with the specification.</li> <li>Improper expansion valve adjustment</li> </ul>	Replace expansion valve.

High-pressure Side is Too High and Low-pressure Side is Too Low

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
High-pressure side is too high and low-pressure side is too low.	Upper side of condenser and high-pressure side are hot, however, liquid tank is not so hot.	High-pressure tube or parts located between compressor and condenser are clogged or crushed.	<ul> <li>Check and repair or replace malfunctioning parts.</li> <li>Check oil for contamination.</li> </ul>

High-pressure Side is Too Low and Low-pressure Side is Too High

Revision: August 2009 HAC-171 2010 Titan

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
High-pressure side is too low and low-pressure side is too high.	High- and low-pressure sides become equal soon after compressor operation stops.	Compressor pressure operation is improper.  Understand the compressor packings.	Replace compressor.
(IO) HI)  AC356A	No temperature difference between high- and low-pressure sides.	Compressor pressure operation is improper.  Understand the compressor packings.	Replace compressor.

# Both High- and Low-pressure Sides are Too Low

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
	There is a big temperature difference between liquid tank outlet and inlet. Outlet temperature is extremely low. Liquid tank inlet and expansion valve are frosted.	Liquid tank inside is slightly clogged.	Replace liquid tank.     Check oil for contamination.
	Temperature of expansion valve inlet is extremely low as compared with areas near liquid tank. Expansion valve inlet may be frosted. Temperature difference occurs somewhere in highpressure side.	High-pressure pipe located between liquid tank and expansion valve is clogged.	Check and repair malfunctioning parts.     Check oil for contamination.
Both high- and low-pressure sides are too low.	Expansion valve and liquid tank are warm or only cool when touched.	Low refrigerant charge.  Leaking fittings or components.	Check refrigerant system for leaks. Refer to HA-23, "Checking of Refrigerant Leaks".
	There is a big temperature difference between expansion valve inlet and outlet while the valve itself is frosted.	Expansion valve closes a little compared with the specification.  1. Improper expansion valve adjustment. 2. Malfunctioning expansion valve. 3. Outlet and inlet may be clogged.	Remove foreign particles by using compressed air. Check oil for contamination.
	An area of the low-pressure pipe is colder than areas near the evaporator outlet.	Low-pressure pipe is clogged or crushed.	Check and repair malfunctioning parts.     Check oil for contamination.
	Air flow volume is too low.	Evaporator is frozen.	Check intake sensor circuit. Refer to HAC-148, "Intake Sensor Diagnosis Procedure". Repair evaporator fins. Replace evaporator. Refer to HAC-132, "Front Blower Motor Component Function Check".

Low-pressure Side Sometimes Becomes Negative

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Low-pressure side sometimes becomes negative.	<ul> <li>Air conditioning system does not function and does not cyclically cool the compartment air.</li> <li>The system constantly functions for a certain period of time after compressor is stopped and restarted.</li> </ul>	Refrigerant does not discharge cyclically.  ↓  Moisture is frozen at expansion valve outlet and inlet.  ↓  Water is mixed with refrigerant.	<ul> <li>Drain water from refrigerant or replace refrigerant.</li> <li>Replace liquid tank.</li> </ul>

# Low-pressure Side Becomes Negative

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Low-pressure side becomes negative.	Liquid tank or front/rear side of expansion valve's pipe is frosted or dewed.	High-pressure side is closed and refrigerant does not flow. ↓ Expansion valve or liquid tank is frosted.	Leave the system at rest until no frost is present. Start it again to check whether or not the malfunction is caused by water or foreign particles.  If water is the cause, initially cooling is okay. Then the water freezes causing a blockage. Drain water from refrigerant or replace refrigerant.  If due to foreign particles, remove expansion valve and remove the particles with dry and compressed air (not shop air).  If either of the above methods cannot correct the malfunction, replace expansion valve.  Replace liquid tank.

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[MANUAL A/C (TYPE 1)]

## INSUFFICIENT HEATING

# Component Function Check

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SYMPTOM: Insufficient heating

## INSPECTION FLOW

# ${f 1}$ .CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - TEMPERATURE INCREASE

- 1. Turn the blower control dial to low speed.
- 2. Turn the temperature control dial clockwise to maximum heat
- Check for hot air at discharge air outlets.

## Can this symptom be duplicated?

YES >> GO TO 2.

NO >> Perform complete system operational check. Refer to <a href="HAC-98">HAC-98</a>, "Operational Check".

# 2.CHECK FOR SERVICE BULLETINS

Check for any service bulletins.

- >> If equipped with NAVI, GO TO 3.
- >> If not equipped with NAVI, GO TO 4.

# 3.PERFORM SELF-DIAGNOSIS

Perform self-diagnosis. Refer to HAC-113, "Front Air Control Self-Diagnosis".

## Is the inspection results normal?

YES >> GO TO 4.

NO >> Refer to HAC-165, "Symptom Matrix Chart".

# 4. CHECK ENGINE COOLING SYSTEM

- Check for proper engine coolant level. Refer to <u>CO-10, "Inspection"</u>.
- Check hoses for leaks or kinks.
- 3. Check radiator cap. Refer to CO-10, "Inspection".
- 4. Check for air in cooling system.

>> GO TO 5.

# 5. CHECK AIR MIX DOOR OPERATION

Check the operation of the air mix door.

## Is the inspection result normal?

YES >> GO TO 6.

NO >> Check the air mix door motor circuit. Refer to <a href="HAC-120">HAC-120</a>, "Air Mix Door Motor Component Function Check".

# 6.CHECK AIR DUCTS

Check for disconnected or leaking air ducts.

## Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair all disconnected or leaking air ducts.

# 7.CHECK HEATER HOSE TEMPERATURES

- 1. Start engine and warm it up to normal operating temperature.
- 2. Touch both the inlet and outlet heater hoses. The inlet hose should be hot and the outlet hose should be warm.

#### Is the inspection result normal?

YES >> Hot inlet hose and a warm outlet hose: GO TO 8.

NO >> • Inlet hose cold: GO TO 11.

· Both hoses warm: GO TO 9.

# **INSUFFICIENT HEATING**

# < SYMPTOM DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

8. CHECK ENGINE COOLANT SYSTEM	^
Check engine control temperature sensor. Refer to <u>EC-126</u> . "Component Inspection".	Α
Is the inspection result normal?	
YES >> System OK.	В
NO >> Repair or replace as necessary. Retest.	
9.CHECK HEATER HOSES	
Check heater hoses for proper installation.	C
Is the inspection result normal?	
YES >> System OK.	Г
NO >> 1. Back flush heater core.	
2. Drain the water from the system.	
<ol> <li>Refill system with new engine coolant. Refer to <u>CO-11, "Changing Engine Coolant"</u>.</li> <li>GO TO 10 to retest.</li> </ol>	Е
10.check heater hose temperatures	
Start engine and warm it up to normal operating temperature.	
2. Touch both the inlet and outlet heater hoses. The inlet hose should be hot and the outlet hose should be	F
warm.	
Is the inspection result normal?	
YES >> System OK.	(
NO >> Replace heater core. Refer to <u>VTL-15, "Removal and Installation"</u> .	

Check the operation of the water valve. Refer to HAC-143, "Water Valve Diagnosis Procedure".

## Is the inspection result normal?

11. CHECK WATER VALVE

YES >> System OK.

NO >> Replace water valve.

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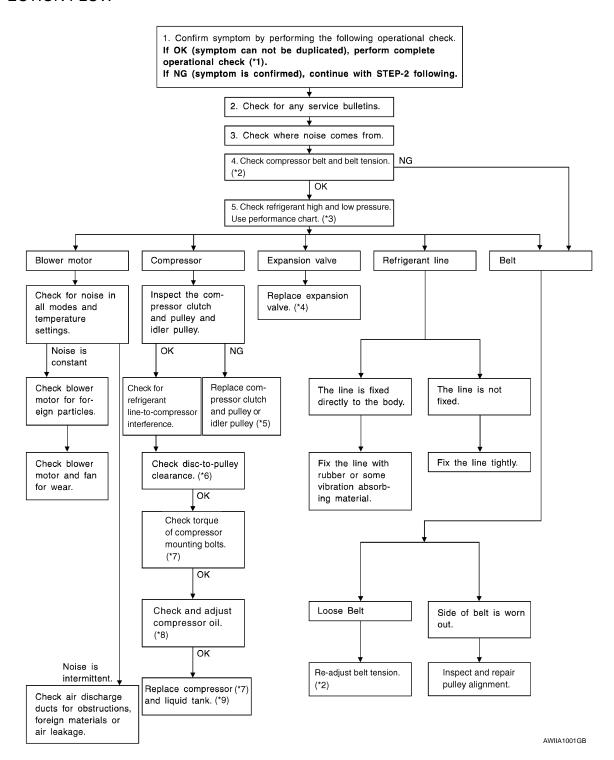
## NOISE

# Component Function Check

< SYMPTOM DIAGNOSIS >

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SYMPTOM: Noise INSPECTION FLOW



- \*1 HAC-98, "Operational Check"
- **Expansion Valve**"
- Compressor"
- \*2 EM-13, "Checking Drive Belts"
- Compressor Clutch"
  - Compressor"
- \*3 EM-13, "Checking Drive Belts"
- HA-44, "Removal and Installation for \*5 HA-34, "Removal and Installation for \*6 HA-34, "Removal and Installation for Compressor Clutch"
- \*7 HA-33, "Removal and Installation for \*8 HA-33, "Removal and Installation for \*9 HA-42, "Removal and Installation for Condenser"

# **PRECAUTION**

## **PRECAUTIONS**

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

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

#### **WARNING:**

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

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

#### **WARNING:**

- When working near the Airbag Diagnosis Sensor Unit or other Airbag System sensors with the Ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the Ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Working with HFC-134a (R-134a)

#### **WARNING:**

- CFC-12 (R-12) refrigerant and HFC-134a (R-134a) refrigerant are not compatible. If the refrigerants are mixed compressor failure is likely to occur. Refer to <a href="HA-4">HA-4</a>, "Contaminated Refrigerant". To determine the purity of HFC-134a (R-134a) in the vehicle and recovery tank, use Refrigerant Recovery/Recycling Recharging equipment and Refrigerant Identifier.
- Use only specified oil for the HFC-134a (R-134a) A/C system and HFC-134a (R-134a) components. If oil other than that specified is used, compressor failure is likely to occur.
- The specified HFC-134a (R-134a) oil rapidly absorbs moisture from the atmosphere. The following handling precautions must be observed:
- When removing refrigerant components from a vehicle, immediately cap (seal) the component to minimize the entry of moisture from the atmosphere.
- When installing refrigerant components to a vehicle, do not remove the caps (unseal) until just before connecting the components. Connect all refrigerant loop components as quickly as possible to minimize the entry of moisture into system.
- Only use the specified oil from a sealed container. Immediately reseal containers of oil. Without proper sealing, oil will become moisture saturated and should not be used.
- Avoid breathing A/C refrigerant and oil vapor or mist. Exposure may irritate eyes, nose and throat. Remove HFC-134a (R-134a) from the A/C system using certified service equipment meeting requirements of SAE J2210 [HFC-134a (R-134a) recycling equipment], or J2209 [HFC-134a (R-134a) recycling equipment], If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from refrigerant and oil manufacturers.
- Do not allow A/C oil to come in contact with styrofoam parts. Damage may result.

CONTAMINATED REFRIGERANT

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## If a refrigerant other than pure HFC-134a (R-134a) is identified in a vehicle, your options are:

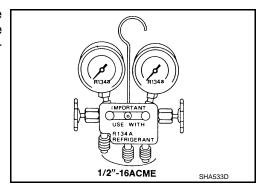
- Explain to the customer that environmental regulations prohibit the release of contaminated refrigerant into the atmosphere.
- Explain that recovery of the contaminated refrigerant could damage your service equipment and refrigerant supply.
- Suggest the customer return the vehicle to the location of previous service where the contamination may have occurred.
- If you choose to perform the repair, recover the refrigerant using only dedicated equipment and containers. Do not recover contaminated refrigerant into your existing service equipment. If your facility does not have dedicated recovery equipment, you may contact a local refrigerant product retailer for available service. This refrigerant must be disposed of in accordance with all federal and local regulations. In addition, replacement of all refrigerant system components on the vehicle is recommended.
- If the vehicle is within the warranty period, the air conditioner warranty is void. Please contact NISSAN Customer Affairs for further assistance.

# Precaution for Service Equipment

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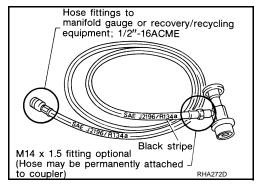
#### MANIFOLD GAUGE SET

Be certain that the gauge face indicates R-134a or 134a. Make 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) along with specified oil.



## SERVICE HOSES

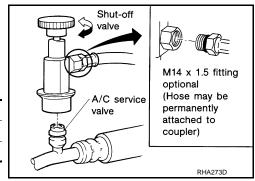
Be certain that the service hoses display the markings described (colored hose with black stripe). All hoses must include positive shutoff devices (either manual or automatic) near the end of the hoses opposite the manifold gauge.



## 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 will 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	



# **BASIC INSPECTION**

# MANUAL A/C IDENTIFICATION TABLE

Application Table

Manual A/C Type	Description	Visual Identification
Manual A/C (Type 1)	Two Control Dial System	AWIIA0481ZZ
Manual A/C (Type 2)	Three Control Dial System [with variable blower control (VBC)]	AWIIA0478ZZ

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## **DIAGNOSIS AND REPAIR WORKFLOW**

< BASIC INSPECTION >

[MANUAL A/C (TYPE 2)]

# DIAGNOSIS AND REPAIR WORKFLOW

How to Perform Trouble Diagnosis For Quick And Accurate Repair

INFOID:0000000005386702

**WORK 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. CHECK FOR SERVICE BULLETINS

Check for any service bulletins.

>> GO TO 3.

# 3. VERIFY THE SYMPTOM WITH OPERATIONAL CHECK

Verify the symptom with operational check. Refer to HAC-181, "Operational Check".

>> GO TO 4

# 4.GO TO APPROPRIATE TROUBLE DIAGNOSIS

Go to appropriate trouble diagnosis. Refer to HAC-243, "Symptom Matrix Chart".

>> GO TO 5.

# 5. REPAIR OR REPLACE

Repair or replace the specific parts.

>> GO TO 7

## 6. FINAL CHECK

Final check.

## Is the inspection result normal?

YES >> Inspection End.

NO >> GO TO 4

### INSPECTION AND ADJUSTMENT

< BASIC INSPECTION >

[MANUAL A/C (TYPE 2)]

### **INSPECTION AND ADJUSTMENT**

Operational Check

The purpose of the operational check is to confirm that the system operates properly.

### Conditions : Engine running and at normal operating temperature

### CHECKING BLOWER

- 1. Rotate the blower control dial clockwise once, blower should operate on low speed.
- 2. Rotate the blower control dial again, and continue checking blower speed until all speeds are checked.
- 3. Leave blower on maximum speed.

If NG, go to trouble diagnosis procedure for <u>HAC-214</u>, "Front Blower Motor Diagnosis Procedure". If OK, continue with next check.

### CHECKING DISCHARGE AIR

- 1. Rotate MODE control dial to each position and the DEF m mode.
- Confirm that discharge air comes out according to the air distribution table. Refer to <u>HAC-190</u>. "<u>Discharge Air Flow</u>".

Mode door position is checked in the next step.

If NG, go to trouble diagnosis procedure for <u>HAC-196</u>, "<u>Mode Door Motor Diagnosis Procedure</u>". If OK, continue the check.

### NOTE:

Confirm that the compressor clutch is engaged (sound or visual inspection) and intake door position is at fresh when the DEF or D/F is selected.

### CHECKING RECIRCULATION (♥, ♥ ONLY)

- 1. Press recirculation ( ) switch one time. Recirculation indicator should illuminate.
- Press recirculation ( ) switch one more time. Recirculation indicator should go off.
- Listen for intake door position change (blower sound should change slightly).

If NG, go to trouble diagnosis procedure for <u>HAC-207</u>, "Intake <u>Door Motor Diagnosis Procedure"</u>. If OK, continue the check.

### NOTE

Confirm that the compressor clutch is engaged (sound or visual inspection) and intake door position is at fresh when the DEF or D/F is selected. REC ( ) is not allowed in DEF ( ) D/F ( ) or FOOT ( ).

### CHECKING TEMPERATURE DECREASE

- Rotate temperature control dial counterclockwise until maximum cold.
- Check for cold air at appropriate discharge air outlets.

If NG, listen for sound of air mix door motor operation. If OK, go to trouble diagnosis procedure for <a href="HAC-244">HAC-244</a>, <a href="Tomponent Function Check">"Component Function Check"</a>. If air mix door motor appears to be malfunctioning, go to <a href="HAC-202">HAC-202</a>, "Air Mix <a href="Door Motor Diagnosis Procedure">Door Motor Diagnosis Procedure</a>.

If OK, continue the check.

### CHECKING TEMPERATURE INCREASE

- 1. Rotate temperature control dial clockwise until maximum hot.
- 2. Check for hot air at appropriate discharge air outlets.

If NG, listen for sound of air mix door motor operation. If OK, go to trouble diagnosis procedure for <u>HAC-252</u>. "Component Function Check". If air mix door motor appears to be malfunctioning, go to <u>HAC-202</u>, "Air Mix <u>Door Motor Diagnosis Procedure"</u>.

If OK, continue with next check.

### CHECK A/C SWITCH

- Press A/C switch.
- Confirm that the compressor clutch engages (sound or visual inspection).

### NOTE:

If current mode setting is DEF or D/F, compressor clutch will already be engaged and cannot be turned off.

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### **INSPECTION AND ADJUSTMENT**

### < BASIC INSPECTION >

[MANUAL A/C (TYPE 2)]

If NG, go to trouble diagnosis procedure for <u>HAC-219</u>, <u>"Magnet Clutch Diagnosis Procedure"</u>. If all operational checks are OK (symptom cannot be duplicated), go to <u>HAC-180</u>, <u>"How to Perform Trouble Diagnosis For Quick And Accurate Repair"</u> and perform tests as outlined. If symptom appears, refer to <u>HAC-243</u>, <u>"Symptom Matrix Chart"</u> and perform applicable trouble diagnosis procedures.

[MANUAL A/C (TYPE 2)]

### **FUNCTION DIAGNOSIS**

### MANUAL A/C IDENTIFICATION TABLE

Application Table

Manual A/C Type	Description	Visual Identification
Manual A/C (Type 1)	Two Control Dial System	AWIIA0481ZZ
Manual A/C (Type 2)	Three Control Dial System [with variable blower control (VBC)]	AWIIA0478ZZ

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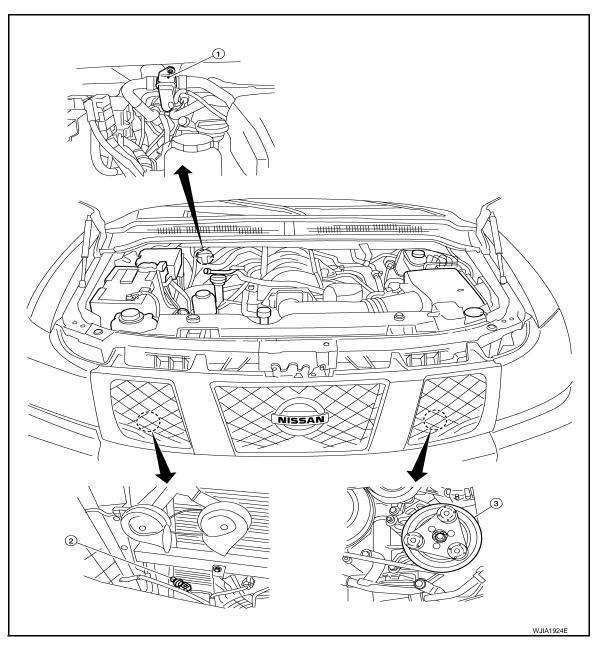
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### **FUNCTION INFORMATION**

### Component Part Location

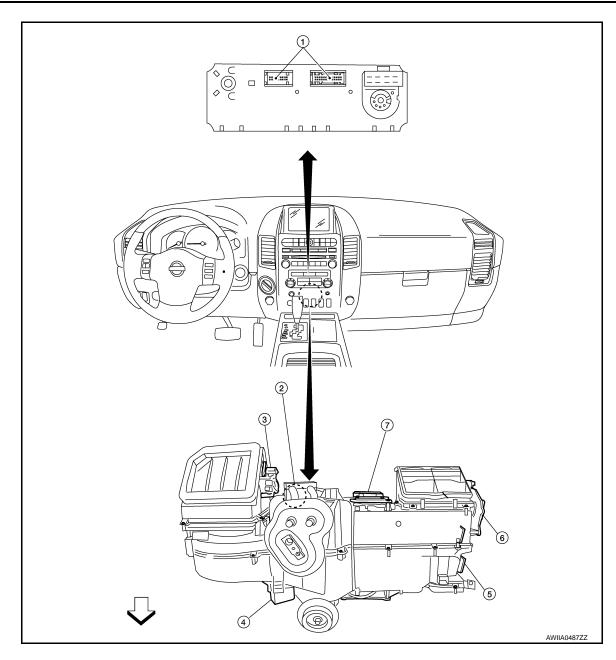
**ENGINE COMPARTMENT** 

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1. Water valve F68

- Refrigerant pressure sensor E48 (view with grille removed)
- 3. A/C compressor F3



- 1. Front air control M176, M177
- 4. Variable blower control M122
- 7. Air mix door motor (front) M147
- 2. Intake sensor M146
- 5. Mode door motor M142
- 3. Intake door motor M58
- 6. Defroster door motor M144

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### **FUNCTION INFORMATION**

### < FUNCTION DIAGNOSIS >

### [MANUAL A/C (TYPE 2)]

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Symptom Table

Symptom	Reference Page	
A/C system does not come on.	Go to Trouble Diagnosis Procedure for A/C System.	HAC-229
Air outlet does not change.	Go to Trouble Diagnosis Procedure for Mode Door Motor.	HAC-196
Mode door motor is malfunctioning.	Go to Trouble Diagnosis Procedure for Mode Door Motor.	<u>HAC-190</u>
Discharge air temperature does not change.	Go to Trouble Diagnosis Procedure for Air Mix Door Motor.	HAC-201
Air mix door motor is malfunctioning.	Go to Houble Diagnosis Procedure for All Mix Door Motor.	<u>HAC-201</u>
Intake door does not change.	Go to Trouble Diagnosis Procedure for Intake Door Motor.	HAC-206
Intake door motor is malfunctioning.	Go to Housie Diagnosis Procedure for intake Door Motor.	<u>11AC-200</u>
Defroster door motor is malfunctioning.	Go to Trouble Diagnosis Procedure for Defroster Door Motor.	HAC-209
Front blower motor operation is malfunctioning.	Go to Trouble Diagnosis Procedure for Front Blower Motor.	HAC-213
Magnet clutch does not engage.	Go to Trouble Diagnosis Procedure for Magnet Clutch.	HAC-219
Insufficient cooling	Go to Trouble Diagnosis Procedure for Insufficient Cooling.	HAC-244
Insufficient heating	Go to Trouble Diagnosis Procedure for Insufficient Heating.	HAC-252
Noise	Go to Trouble Diagnosis Procedure for Noise.	HAC-254

### REFRIGERATION SYSTEM

### < FUNCTION DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

### REFRIGERATION SYSTEM

### Refrigerant Cycle

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### REFRIGERANT FLOW

The refrigerant flows in the standard pattern, that is, through the compressor, the condenser with liquid tank, through the evaporator, and back to the compressor. The refrigerant evaporation through the evaporator coils are controlled by externally equalized expansion valve, located inside the evaporator case.

### Refrigerant System Protection

### INFOID:0000000005640825

### REFRIGERANT PRESSURE SENSOR

The refrigerant system is protected against excessively high or low pressures by the refrigerant pressure sensor, located on the condenser. If the system pressure rises above or falls below the specifications, the refrigerant pressure sensor detects the pressure inside the refrigerant line and sends a voltage signal to the ECM. The ECM de-energizes the A/C relay to disengage the magnetic compressor clutch when pressure on the high pressure side detected by refrigerant pressure sensor is over about 2,746 kPa (28 kg/cm<sup>2</sup>, 398 psi), or below about 120 kPa (1.22 kg/cm<sup>2</sup>, 17.4 psi).

### PRESSURE RELIEF VALVE

The refrigerant system is also protected by a pressure relief valve, located in the rear head of the compressor. When the pressure of refrigerant in the system increases to an abnormal level [more than 2,990 kPa (30.5 kg/

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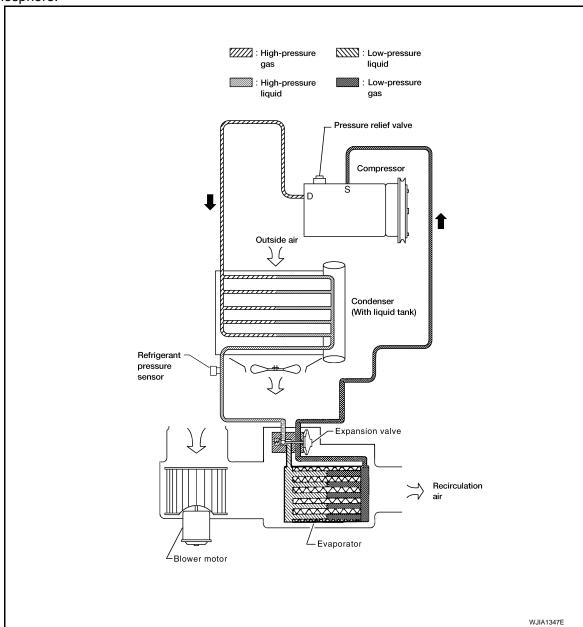
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cm<sup>2</sup>, 433.6 psi)], the release port on the pressure relief valve automatically opens and releases refrigerant into the atmosphere.



### MANUAL AIR CONDITIONER SYSTEM

### Control System Diagram

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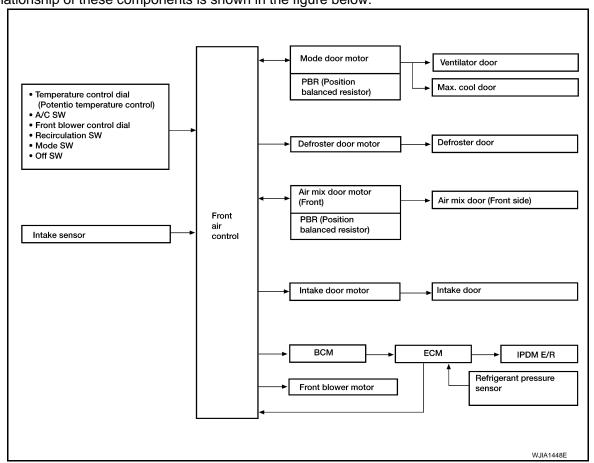
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### **CONTROL SYSTEM**

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



### Control System Description

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### **CONTROL OPERATION**

# Front air control A/C WJIA1405E

### MANUAL AIR CONDITIONER SYSTEM

### < FUNCTION DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

### TEMPERATURE CONTROL DIAL

Increases or decreases the set temperature.

### RECIRCULATION ( ) SWITCH

- When REC switch is ON, REC switch indicator turns ON, and air inlet is set to REC.
- When REC switch is turned OFF, or when compressor is turned from ON to OFF, REC switch is automatically turned OFF. REC mode can be re-entered by pressing REC switch again.
- REC switch is not operated when DEF switch is turned ON, at the D/F position, or in floor position.

### DEFROSTER ( ) SWITCH

Positions the air outlet doors to the defrost position. Also positions the intake doors to the outside air position, and turns A/C compressor ON.

### REAR WINDOW DEFOGGER SWITCH (IF EQUIPPED)

When switch is ON, rear window and door mirrors are defogged.

### **BLOWER CONTROL DIAL/OFF SWITCH**

- The blower speed is manually controlled with this dial.
- The compressor and blower are OFF, the intake doors are set to the outside air position, and the air outlet doors are set to the foot position.

### A/C SWITCH

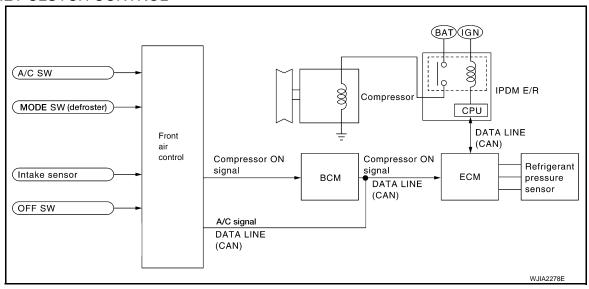
The compressor is ON or OFF.

(Pressing the A/C switch when the AUTO switch is ON will turn off the A/C switch and compressor.)

### MODE CONTROL DIAL

Controls the air discharge outlets.

### MAGNET CLUTCH CONTROL



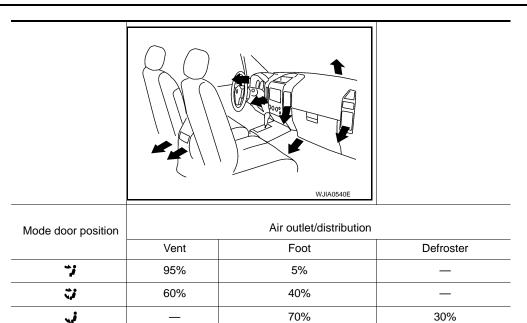
When A/C switch or DEF switch is pressed, front air control inputs compressor ON signal to BCM. BCM sends compressor ON signal to ECM and front air control, via CAN communication line.

ECM judges whether compressor can be turned ON, based on each sensor status (refrigerant pressure sensor signal, throttle angle sensor, etc.). If it judges compressor can be turned ON, it sends compressor ON signal to IPDM E/R, via CAN communication line.

Upon receipt of compressor ON signal from ECM, IPDM E/R turns air conditioner relay ON to operate compressor.

### Discharge Air Flow

INFOID:0000000005386711



60%

10%

### Switches And Their Control Function

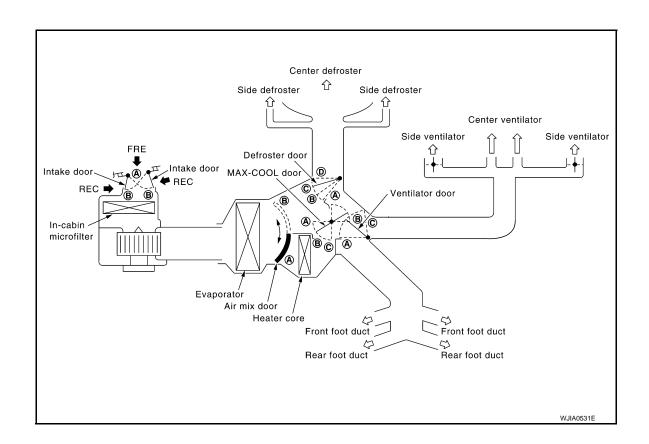
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### MANUAL AIR CONDITIONER SYSTEM

[MANUAL A/C (TYPE 2)]

Position		MOD	ESW		DEF	sw	REC	SW	Tempe	rature	switch	0
or switch	VENT	B/L	FOOT	D/F	ON	OFF	ON	OFF	(-)			SW
Door	<b>→</b>	, <b>,</b> ,	•	₩•	_	\$\$	<b>E</b>		()(A/C)()		))	
	~	<b>?</b>	•	+/~	-> ∳ =	0	÷ • :	0	COLD	~	нот	
Ventilator door	<b>(A)</b>	B	©	©	©		_	_	_		<b>©</b>	
MAX-COOL door	<b>(A)</b>	B	B	$^{f B}$	©		_				lacksquare	
Defroster door	<b>©</b>	<b>(D)</b>	<b>O</b> or <b>©</b>	B	<b>(A)</b>		_	_				©
Intake door		_			B		<b>(A)</b>	B				₿
Air mix door		_					_	— (A) (B)				
Air mix door		_	_				_	_	(A)		B	

### **DIAGNOSIS SYSTEM (BCM)**

### < FUNCTION DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

### **DIAGNOSIS SYSTEM (BCM)**

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

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### APPLICATION ITEM

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

Diagnosis mode	Function Description
WORK SUPPORT	Changes the setting for each system function.
SELF DIAGNOSTIC RESULT	Displays the diagnosis results judged by BCM. Refer to BCS-49, "DTC Index".
CAN DIAG SUPPORT MNTR	Monitors the reception status of CAN communication viewed from BCM.
DATA MONITOR	The BCM input/output signals are displayed.
ACTIVE TEST	The signals used to activate each device are forcibly supplied from BCM.
ECU IDENTIFICATION	The BCM part number is displayed.
CONFIGURATION	<ul> <li>Enables to read and save the vehicle specification.</li> <li>Enables to write the vehicle specification when replacing BCM.</li> </ul>

### 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.

Custom	Cub avatam adaption item		Diagnosis mode	
System	Sub system selection item	WORK SUPPORT	DATA MONITOR	ACTIVE TEST
BCM	BCM	×		
Door lock	DOOR LOCK	×	×	×
Rear window defogger	REAR DEFOGGER		×	×
Warning chime	BUZZER		×	×
Interior room lamp timer	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		×	
Combination switch	COMB SW		×	
Immobilizer	IMMU		×	×
Interior room lamp battery saver	BATTERY SAVER	×	×	×
RAP (retained accessory power)	RETAINED PWR	×	×	×
Signal buffer system	SIGNAL BUFFER		×	×
TPMS (tire pressure monitoring system)	AIR PRESSURE MONITOR	×	×	×
Vehicle security system	THEFT ALM	×	×	×

CONSULT-III Function (BCM - AUTO AIR CONDITIONER)

INFOID:0000000005640979

**DATA MONITOR** 

### **DIAGNOSIS SYSTEM (BCM)**

### [MANUAL A/C (TYPE 2)]

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

### MANUAL A/C IDENTIFICATION TABLE

< COMPONENT DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

### **COMPONENT DIAGNOSIS**

### MANUAL A/C IDENTIFICATION TABLE

Application Table

Manual A/C Type	Description	Visual Identification
Manual A/C (Type 1)	Two Control Dial System	AWIIA0481ZZ
Manual A/C (Type 2)	Three Control Dial System [with variable blower control (VBC)]	AWIIA0478ZZ

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### MODE DOOR MOTOR

### System Description

INFOID:000000005386716

### SYSTEM DESCRIPTION

### Component Parts

Mode door control system components are:

- Front air control
- Mode door motor
- PBR (built into mode door motor)
- · Intake sensor

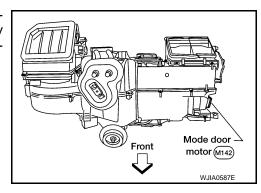
### System Operation

The mode door position (vent, B/L, foot, D/F, and defrost) is set by the front air control by means of the mode door motor. When a mode door position is selected on the front air control, voltage is applied to one circuit of the mode door motor while ground is applied to the other circuit, causing the mode door motor to rotate. The direction of rotation is determined by which circuit has voltage applied to it, and which one has ground applied to it. The front air control monitors the mode door position by measuring the voltage signal on the PBR circuit.

### COMPONENT DESCRIPTION

### Mode Door Motor

The mode door motor is attached to the heater & cooling unit assembly. It rotates so that air is discharged from the outlet as indicated by the front air control. Motor rotation is conveyed to a link which activates the mode door.



### Mode Door Motor Component Function Check

INFOID:0000000005386717

### INSPECTION FLOW

### 1.CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - DISCHARGE AIR

- 1. Rotate the mode control dial and check each position and press the 🗰 (DEF) mode.
- Confirm that discharge air comes out according to the air distribution table. Refer to <u>HAC-190, "Discharge Air Flow"</u>.

### NOTE:

Confirm that the compressor clutch is engaged (visual inspection) and intake door position is at FRESH when DEF ( $\mathfrak{P}$ ) or D/F ( $\mathfrak{P}$ ) is selected.

### Is the inspection result normal?

YES >> Inspection End.

NO >> Go to diagnosis procedure. Refer to <a href="HAC-196">HAC-196</a>, "Mode Door Motor Diagnosis Procedure".

### Mode Door Motor Diagnosis Procedure

INFOID:0000000005386718

Regarding Wiring Diagram information, refer to HAC-234, "Wiring Diagram".

### SYMPTOM:

- Air outlet does not change.
- Mode door motor does not operate normally.

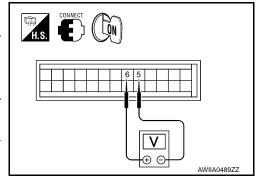
Revision: August 2009 HAC-196 2010 Titan

### < COMPONENT DIAGNOSIS >

### 1.CHECK FRONT AIR CONTROL FOR POWER AND GROUND

- 1. Turn ignition switch ON.
- 2. Press the B/L (\*) mode switch.
- 3. Check voltage between front air control harness connector M176 terminal 5 and terminal 6 while pressing the mode switch to the floor ( ) mode.

Connector	Terminals		Condition	Voltage (Approx.)
Connector	(+)	(-)	Condition	(Approx.)
Front air control: M176	6	5	Press mode switch	Battery voltage



### Is the inspection result normal?

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

### 2.CHECK MODE DOOR MOTOR CIRCUITS FOR SHORT TO GROUND

1. Turn ignition switch OFF.

- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M176 terminal 5, 6 and ground.

5 - Ground : Continuity should not exist.6 - Ground : Continuity should not exist.

### Is the inspection result normal?

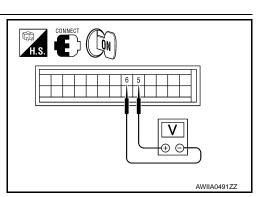
YES >> Replace front air control. Refer to <u>VTL-8</u>, "Removal and Installation".

NO >> Repair or replace harness as necessary.

### 3.CHECK FRONT AIR CONTROL FOR GROUND AND POWER

- Press the mode switch to the D/F ( ) mode.
- Check voltage between front air control harness connector M176 terminal 5 and terminal 6 while pressing the mode switch to the vent (\*) mode.

Connector	To	Terminals		Voltage
Connector	(+)	(-)	Condition	(Approx.)
Front air control: M176	5	6	Press mode switch	Battery voltage



### Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace front air control. Refer to <a href="VTL-8">VTL-8</a>, "Removal and Installation".

### f 4.CHECK MODE DOOR MOTOR AND CIRCUITS FOR OPEN

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### [MANUAL A/C (TYPE 2)]

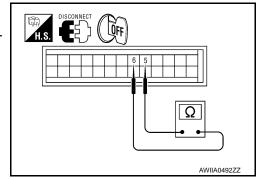
### < COMPONENT DIAGNOSIS >

- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M176 terminal 5 and terminal 6.

### Continuity should exist.

### Is the inspection result normal?

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



### 5. CHECK MODE DOOR MOTOR CIRCUITS FOR OPEN

- 1. Disconnect the mode door motor harness connector.
- 2. Check continuity between front air control harness connector M176 (A) terminal 5, 6 and the mode door motor harness connector M142 (B) terminal 5, 6.

5 - 5 : Continuity should exist.6 - 6 : Continuity should exist.

### Is the inspection result normal?

YES >> Replace mode door motor. Refer to <u>VTL-19</u>, "Removal and Installation".

NO >> Repair or replace harness as necessary.

### 6.CHECK FRONT AIR CONTROL FOR PBR POWER AND GROUND

- 1. Reconnect front air control harness connector.
- 2. Turn ignition switch ON.
- Check voltage between front air control harness connector M176 terminal 2 and 15.

Connector	Ter	Voltage (Ap-	
Connector	(+)	(-)	prox.)
Front air control: M176	2	15	5V

# CONNECT CON H.S. E 15 15 AWIIA0495ZZ

AWIIA049377

### Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

### 7.CHECK PBR REFERENCE VOLTAGE CIRCUIT FOR SHORT TO GROUND

- Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- Check continuity between front air control harness connector M176 terminal 2 and ground.

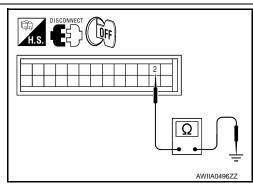
### Continuity should not exist.

### Is the inspection result normal?

YES >> Replace front air control Refer to <u>VTL-8</u>, "Removal and <u>Installation"</u>.

NO >> Repair or replace harness as necessary.

### 8. CHECK PBR REFERENCE VOLTAGE AND GROUND CIRCUITS



### **MODE DOOR MOTOR**

### < COMPONENT DIAGNOSIS >

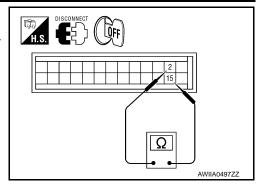
### [MANUAL A/C (TYPE 2)]

- Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M176 terminal 2 and terminal 15.

### Continuity should exist.

### Is the inspection result normal?

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



### 9.check pbr reference voltage circuit for open

- Disconnect the mode door motor harness connector.
- 2. Check continuity between mode door motor harness connector M142 (B) terminal 3, 1 and front air control harness connector M176 (A) terminals 2, 15.

2 - 3 : Continuity should exist. 15 - 1 : Continuity should exist.

### Is the inspection result normal?

YES >> Replace mode door motor. Refer to VTL-19, "Removal and Installation".

NO >> Repair or replace harness as necessary.

### 10. CHECK PBR FEEDBACK VOLTAGE

- Reconnect the front air control harness connector.
- Turn ignition switch ON.
- Check voltage between front air control harness connector M176 terminal 16 and ground while cycling mode switch through all modes.

### : Approx. 1V - 4.5V Voltage

### Is the inspection result normal?

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

### 11. CHECK PBR FEEDBACK SIGNAL CIRCUIT FOR SHORT TO GROUND

- Turn ignition switch OFF.
- 2. Disconnect front air control harness connector.
- Check continuity between front air control harness connector M176 terminal 16 and ground.

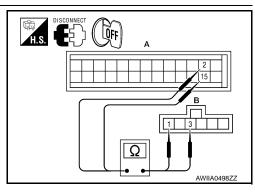
### Continuity should not exist.

### Is the inspection result normal?

YES >> Replace front air control Refer to VTL-8, "Removal and Installation".

NO >> Repair or replace harness as necessary.

### 12. CHECK PBR FEEDBACK CIRCUIT FOR OPEN



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**HAC-199** 2010 Titan Revision: August 2009

### **MODE DOOR MOTOR**

### < COMPONENT DIAGNOSIS >

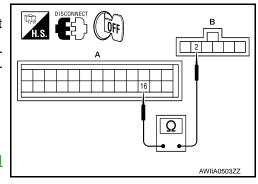
### [MANUAL A/C (TYPE 2)]

- 1. Turn ignition switch OFF.
- 2. Disconnect the mode door motor harness connector and front air control harness connector.
- Check continuity between mode door motor harness connector M142 (B) terminal 2 and front air control harness connector M176 (A) terminal 16.

### Continuity should exist.

### Is the inspection result normal?

- YES >> Replace mode door motor. Refer to <u>VTL-19</u>, "Removal and Installation".
- NO >> Repair or replace harness as necessary.



### AIR MIX DOOR MOTOR

### System Description

### INFOID:0000000005386719

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### SYSTEM DESCRIPTION

### SYMPTOM:

- Discharge air temperature does not change.
- Air mix door motor does not operate.

### SYSTEM DESCRIPTION

### Component Parts

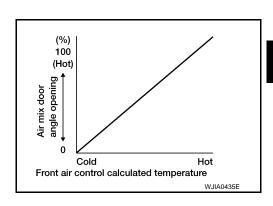
Air mix door control system components are:

- Front air control
- Air mix door motor
- PBR (built-into air mix door motors)
- · Intake sensor

### System Operation

The front air control receives data from the temperature selected by the driver side, passenger side, and rear. The front air control then applies a voltage to one circuit of the appropriate air mix door motor, while ground is applied to the other circuit, causing the appropriate air mix door motor to rotate. The direction of rotation is determined by which circuit has voltage applied to it, and which one has ground applied to it. The front air control monitors the air mix door positions by measuring the voltage signal on the PBR circuits of each door.

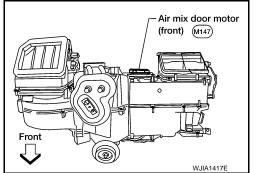
Air Mix Door Control Specification



### COMPONENT DESCRIPTION

### Air Mix Door Motors

The air mix door motor is attached to the front heater & cooling unit assembly. The motor rotates so that the air mix door is opened or closed to a position set by the front air control. Motor rotation is then conveyed through a shaft and the air mix door position is then fed back to the front air control by the PBR built into the air mix door motor.



Air Mix Door Motor Component Function Check

### INFOID:0000000005386720

### INSPECTION FLOW

### 1. CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - TEMPERATURE INCREASE

- 1. Turn the temperature control dial clockwise to maximum hot.
- Check for hot air at discharge air outlets.

Revision: August 2009 HAC-201 2010 Titan

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### 2.confirm symptom by performing operational check - temperature decrease

- Turn the temperature control dial counterclockwise to maximum cold.
- 2. Check for cold air at discharge air outlets.

### Is the inspection result normal?

YES >> Inspection End.

NO >> Go to diagnosis procedure. Refer to HAC-202, "Air Mix Door Motor Diagnosis Procedure".

### Air Mix Door Motor Diagnosis Procedure

INFOID:0000000005386721

Regarding Wiring Diagram information, refer to HAC-234, "Wiring Diagram".

### SYMPTOM:

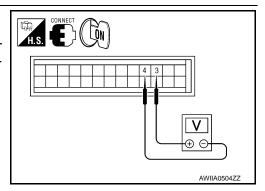
- Discharge air temperature does not change.
- Air mix door motor does not operate.

### DIAGNOSTIC PROCEDURE FOR AIR MIX DOOR MOTOR

### 1. CHECK FRONT AIR CONTROL FOR POWER AND GROUND

- Turn ignition switch ON.
- 2. Rotate temperature control dial to maximum hot.
- Check voltage between front air control harness connector M176 terminal 3 and terminal 4 while rotating temperature control dial to maximum cold.

Connector	Terminals		Condition	Voltage
Connector	(+)	(-)	Condition	(Approx.)
Front air control: M176	3	4	Rotate temp control dial	Battery voltage



### Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

### 2.CHECK AIR MIX DOOR MOTOR CIRCUITS FOR SHORT TO GROUND

- Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- Check continuity between front air control harness connector M176 terminal 3, 4 and ground.

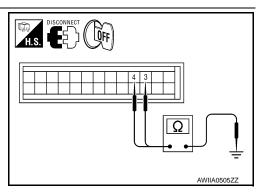
3 - Ground : Continuity should not exist.4 - Ground : Continuity should not exist.

### Is the inspection result normal?

YES >> Replace front air control. Refer to <u>VTL-8</u>, "Removal and Installation".

NO >> Repair or replace harness as necessary.

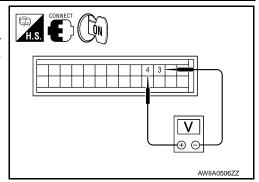
3.CHECK FRONT AIR CONTROL FOR POWER AND GROUND



### < COMPONENT DIAGNOSIS >

- 1. Turn ignition switch ON.
- 2. Rotate temperature control dial to maximum hot.
- Check voltage between front air control harness connector M176 terminal 3 and terminal 4 while rotating temperature control dial to maximum cold.

Connector	Terminals		Condition	Voltage
Connector	(+)	(-)	Condition	(Approx.)
Front air control: M176	4	3	Rotate temp control dial	Battery voltage



### Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace front air control. Refer to <a href="VTL-8">VTL-8</a>, "Removal and Installation".

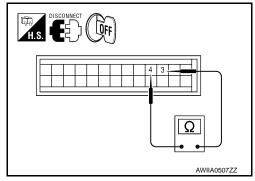
### 4.CHECK AIR MIX DOOR MOTOR CIRCUITS FOR OPEN

- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M176 terminal 3 and terminal 4.

### Continuity should exist.

### Is the inspection result normal?

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



### 5. CHECK AIR MIX DOOR MOTOR CIRCUITS FOR OPEN

1. Disconnect the air mix door motor harness connector.

 Check continuity between front air control harness connector M176 (A) terminal 3, 4 and the air mix door motor harness connector M147 (B) terminal 1, 6.

3 - 1 : Continuity should exist.

4 - 6 : Continuity should exist.

### Is the inspection result normal?

YES >> Replace air mix door motor. Refer to <u>VTL-20, "Removal and Installation"</u>.

NO >> Repair or replace harness as necessary.

### 6. CHECK FRONT AIR CONTROL FOR PBR POWER AND GROUND

- 1. Reconnect front air control harness connector.
- 2. Turn ignition switch ON.
- Check voltage between front air control harness connector M176 terminal 2 and 15

Connector	Terr	Voltage (Ap-	
	(+)	(-)	prox.)
Front air control: M176	2	15	5V

### H.S. CONNECT ON 22 115 115 115 AWIIA050927

### Is the inspection result normal?

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

7.CHECK PBR REFERENCE VOLTAGE CIRCUIT FOR SHORT TO GROUND

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### AIR MIX DOOR MOTOR

### < COMPONENT DIAGNOSIS >

### [MANUAL A/C (TYPE 2)]

- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M176 terminal 2 and ground.

### Continuity should not exist.

### Is the inspection result normal?

YES >> Replace front air control. Refer to <u>VTL-8</u>, "Removal and Installation".

NO >> Repair or replace harness as necessary.

### 8. CHECK PBR REFERENCE VOLTAGE AND GROUND CIRCUITS

- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M176 terminal 2 and 15.

### Continuity should exist.

### Is the inspection result normal?

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

### AWIIA0511ZZ

### 9. CHECK PBR REFERENCE VOLTAGE CIRCUIT FOR OPEN

- 1. Disconnect the air mix door motor harness connector.
- Check continuity between air mix door motor harness connector M147 (B) terminal 3, 2 and front air control harness connector M176 (A) terminal 2 and 15.

2 - 3 : Continuity should exist. 15 - 2 : Continuity should exist.

### Is the inspection result normal?

YES >> Replace air mix door motor. Refer to <u>VTL-20, "Removal and Installation"</u>.

NO >> Repair or replace harness as necessary.

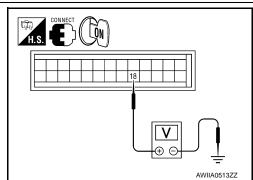
### 10. CHECK PBR FEEDBACK VOLTAGE

- 1. Reconnect the front air control harness connector.
- 2. Turn ignition switch ON.
- 3. Check voltage between front air control harness connector M176 terminal 18 and ground while rotating temperature control dial from maximum hot to maximum cold.

### Voltage : Approx. .5V - 4.5V

### Is the inspection result normal?

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



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### 11. CHECK PBR FEEDBACK SIGNAL CIRCUIT FOR SHORT TO GROUND

### AIR MIX DOOR MOTOR

### < COMPONENT DIAGNOSIS >

### [MANUAL A/C (TYPE 2)]

- 1. Turn ignition switch OFF.
- Disconnect front air control harness connector.
- Check continuity between front air control harness connector M176 terminal 18 and ground.

### Continuity should not exist.

### Is the inspection result normal?

YES >> Replace front air control. Refer to <u>VTL-8, "Removal and Installation"</u>.

NO >> Repair or replace harness as necessary.

### 12.CHECK PBR FEEDBACK CIRCUIT FOR OPEN

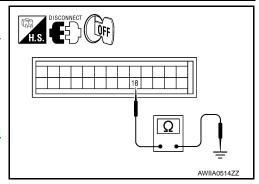
- 1. Turn ignition switch OFF.
- 2. Disconnect the air mix door motor harness connector and front air control harness connector.
- Check continuity between air mix door motor harness connector M147 (B) terminal 4 and front air control harness connector M176 (A) terminal 18.

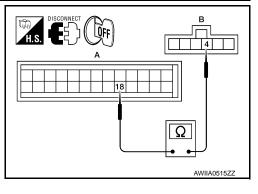
### **Continuity should exist.**

### Is the inspection result normal?

YES >> Replace air mix door motor. Refer to <u>VTL-20, "Removal and Installation"</u>.

NO >> Repair or replace harness as necessary.





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### INTAKE DOOR MOTOR

### System Description

### INFOID:0000000005386722

### SYSTEM DESCRIPTION

### SYMTOM:

- Intake door motor does not operate normally.
- Intake door does not change.

### SYSTEM DESCRIPTION

### Component Parts

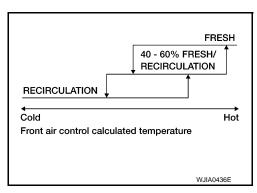
Intake door control system components are:

- Front air control
- Intake door motor (PBR built into the intake door motor)
- · Intake sensor

### System Operation

The intake door control determines the intake door position based on the position of the recirculation switch. When the recirculation switch is depressed the intake door motor rotates closing off the fresh air inlet and recirculating the cabin air. If the recirculation switch is depressed again, the intake door motor rotates in the opposite direction, again allowing fresh air into the cabin.

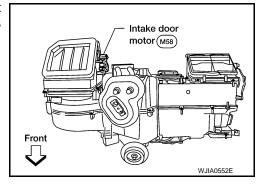
Intake Door Control Specification



### COMPONENT DESCRIPTION

### Intake door motor

The intake door motor is attached to the intake unit. It rotates so that air is drawn from inlets set by the front air control. Motor rotation is conveyed to a lever which activates the intake door.



### Intake Door Motor Component Function Check

INFOID:0000000005386723

### INSPECTION FLOW

### 1. CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - REC ( )

- 1. Press the vent mode switch (\*\*).
- 2. Press REC ( ) switch. The REC ( ) indicator should illuminate.
- 3. Press REC ( ) switch again. The REC ( ) indicator should go out.
- 4. Listen for intake door position change (you should hear blower sound change slightly).

INFOID:0000000005386724

### < COMPONENT DIAGNOSIS >

### Is the inspection result normal?

YES >> Inspection End.

NO >> Go to diagnosis procedure. Refer to HAC-207, "Intake Door Motor Diagnosis Procedure"

### Intake Door Motor Diagnosis Procedure

Regarding Wiring Diagram information, refer to HAC-234, "Wiring Diagram".

### SYMPTOM:

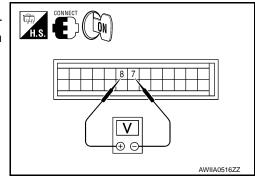
- Intake door does not change.
- Intake door motor does not operate normally.

### DIAGNOSTIC PROCEDURE FOR INTAKE DOOR MOTOR

### 1. CHECK FRONT AIR CONTROL FOR POWER AND GROUND

- 1. Turn ignition switch ON.
- Check voltage between front air control harness connector M176 terminal 8 and terminal 7 while placing the HVAC system into self-diagnostic mode.

Connector	Terminals		Condition	Voltage
	(+)	(-)	Condition	(Approx.)
front air control: M176	8	7	Self-diagnostic mode	Battery volt- age



### Is the inspection result normal?

OK >> GO TO 3. NO >> GO TO 2.

### 2.CHECK INTAKE DOOR MOTOR CIRCUITS FOR SHORT TO GROUND

Turn ignition switch OFF.

- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M176 terminal 8, 7 and ground.

8 - Ground : Continuity should not exist.7 - Ground : Continuity should not exist.

### Is the inspection result normal?

OK >> Replace front air control. Refer to <u>VTL-8</u>, "Removal and <u>Installation"</u>.

NO >> Repair or replace harness as necessary.

### 3.CHECK FRONT AIR CONTROL FOR GROUND AND POWER

- 1. Press the BACK button to back out of self-diagnostic mode.
- Check voltage between front air control harness connector M176 terminal 8 and terminal 7 while placing the HVAC system into self-diagnostic mode.

Connector	Terminals		Condition	Voltage
Connector	(+)	(-)	Condition	(Approx.)
front air control: M176	7	8	Self-diagnostic mode	Battery voltage

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### Is the inspection result normal?

OK >> GO TO 4.

NO >> Replace front air control. Refer to <u>VTL-8</u>, "<u>Removal and Installation</u>".

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### **INTAKE DOOR MOTOR**

### < COMPONENT DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

### 4. CHECK INTAKE DOOR MOTOR AND CIRCUITS FOR OPEN

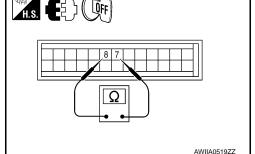
- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M176 terminal 8 and terminal 7.

### Continuity should exist.

### Is the inspection result normal?

OK >> Replace intake door motor. Refer to <u>VTL-18</u>, "Removal and Installation".

NO >> GO TO 5.



### 5. CHECK INTAKE DOOR MOTOR CIRCUITS FOR OPEN

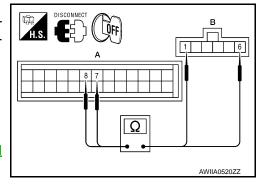
- 1. Disconnect the intake door motor harness connector.
- Check continuity between front air control harness connector M176 (A) terminal 7, 8 and the intake door motor harness connector M58 (B) terminal 1, 6.

8 - 6 : Continuity should exist.7 - 1 : Continuity should exist.

### Is the inspection result normal?

YES >> Replace intake door motor. Refer to <u>VTL-18, "Removal and Installation"</u>.

NO >> Repair or replace harness as necessary.



### < COMPONENT DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

### DEFROSTER DOOR MOTOR CIRCUIT

### System Description

### INFOID:0000000005386725

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### SYSTEM DESCRIPTION

### Component Parts

Defroster door control system components are:

- Front air control
- Defroster door motor
- PBR (Built into defroster door motor)
- Intake sensor

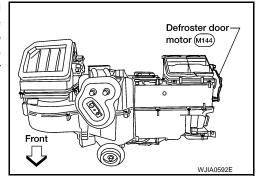
### System Operation

The front air control determines defroster door position based on the position of the defroster switch. When the defroster switch is depressed, the defroster door motor rotates directing air to the defroster ducts. When any mode other than defroster is selected, the defroster motor rotates in the opposite direction closing off air flow to the defroster ducts.

### COMPONENT DESCRIPTION

### Defroster door motor

The defroster door motor is attached to the front heater & cooling unit assembly. The front air control sends a voltage to rotate to the defroster door directing the air flow either to the defroster ducts, or to the floor ducts, depending on which way the voltage and ground are applied to the motor leads. Motor rotation is conveyed to a lever which activates the defroster door.



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### Defroster Door Motor Component Function Check

### INFOID:0000000005386726

### INSPECTION FLOW

### 1.confirm symptom by performing operational check - defroster door

- Select vent (\*) mode.
- Rotate mode control dial to defrost mode ( ). 2.
- Listen for defroster door position change (blower sound should change slightly).

### Is the inspection result normal?

YES >> Inspection End.

>> Go to diagnosis procedure. Refer to HAC-209, "Defroster Door Motor Diagnosis Procedure". NO

### Defroster Door Motor Diagnosis Procedure

INFOID:0000000005386727

Regarding Wiring Diagram information, refer to HAC-234, "Wiring Diagram".

### SYMPTOM:

- Defroster door does not change.
- Defroster door motor does not operate normally.

### DIAGNOSTIC PROCEDURE FOR DEFROSTER DOOR MOTOR

### ${f 1}$ .CHECK FRONT AIR CONTROL FOR POWER AND GROUND

**HAC-209** 2010 Titan Revision: August 2009

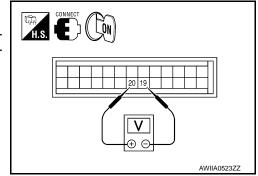
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### < COMPONENT DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

- 1. Turn ignition switch ON.
- 2. Rotate the mode control dial to defrost mode ( ).
- Check voltage between front air control harness connector M176 terminal 20 and terminal 19 and then press the defroster switch (₩) again.

Connector	Terminals		Condition	Voltage
	(+)	(-)	Condition	(Approx.)
Front air control: M176	20	19	Press defroster switch	Battery voltage



### Is the inspection result normal?

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

### 2.CHECK DEFROSTER DOOR MOTOR CIRCUITS FOR SHORT TO GROUND

Turn ignition switch OFF.

- 2. Disconnect the front air control harness connector.
- Check continuity between front air control harness connector M176 terminal 19, 20 and ground.

19 - Ground : Continuity should not exist.20 - Ground : Continuity should not exist.



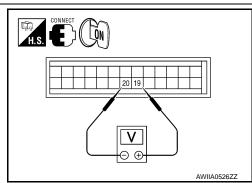
YES >> Replace front air control. Refer to <u>VTL-8, "Removal and</u> Installation".

NO >> Repair or replace harness as necessary.

### 3.CHECK FRONT AIR CONTROL FOR GROUND AND POWER

- 1. Press the defroster switch ( ).
- Check voltage between front air control harness connector M176 terminal 19 and terminal 20 and the press the defroster switch (\(\vec{\vec{w}}\)) again.

Connector	Terminals		Condition	Voltage
	(+)	(-)	Condition	(Approx.)
Front air control: M176	19	20	Press de- froster switch	Battery voltage



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### Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace front air control. Refer to <a href="VTL-8">VTL-8</a>, "Removal and Installation".

### 4. CHECK DEFROSTER DOOR MOTOR AND CIRCUITS FOR OPEN

- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M176 terminal 19 and terminal 20.

### Continuity should exist.

### Is the inspection result normal?

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

## DISCONNECT OFF

### 5. CHECK DEFROSTER DOOR MOTOR CIRCUITS FOR OPEN

### < COMPONENT DIAGNOSIS >

### [MANUAL A/C (TYPE 2)]

- 1. Disconnect the defroster door motor harness connector.
- 2. Check continuity between front air control harness connector M176 (A) terminal 19, 20 and the defroster door motor harness connector M144 (B) terminal 1, 6.

19 - 1 : Continuity should exist. 20 - 6 : Continuity should exist.

### Is the inspection result normal?

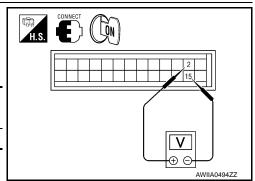
YES >> Replace defroster door motor. Refer to <u>VTL-17</u>, "Removal and Installation".

NO >> Repair or replace harness as necessary.

### 6. CHECK FRONT AIR CONTROL FOR PBR POWER AND GROUND

- 1. Reconnect front air control harness connector.
- 2. Turn ignition switch ON.
- 3. Check voltage between front air control harness connector M176 terminal 2 and 15.

Connector	Terr	Voltage (Ap-	
	(+)	(-)	prox.)
Front air control: M176	2	15	5V



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### Is the inspection result normal?

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

### 7.CHECK PBR REFERENCE VOLTAGE CIRCUIT FOR SHORT TO GROUND

- Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- Check continuity between front air control harness connector M176 terminal 2 and ground.

### Continuity should not exist.

### Is the inspection result normal?

YES >> Replace front air control. Refer to <a href="VTL-8">VTL-8</a>, "Removal and Installation".

NO >> Repair or replace harness as necessary.

### 8. CHECK PBR REFERENCE VOLTAGE AND GROUND CIRCUITS

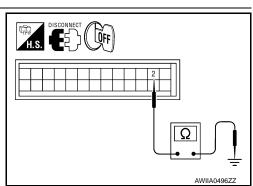
- Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector.
- 3. Check continuity between front air control harness connector M176 terminal 2 and 15.

### Continuity should exist.

### Is the inspection result normal?

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

### 9. CHECK PBR REFERENCE VOLTAGE CIRCUIT FOR OPEN



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### < COMPONENT DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

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1. Disconnect the defroster door motor harness connector.

2. Check continuity between defroster door motor harness connector M144 (B) terminal 3, 2 and front air control harness connector M176 (A) terminal 2, and 15.

2 - 3 : Continuity should exist. 15 - 2 : Continuity should exist.

### Is the inspection result normal?

YES >> Replace defroster door motor. Refer to <u>VTL-17</u>, <u>"Removal and Installation"</u>.

NO >> Repair or replace harness as necessary.

### 10. CHECK PBR FEEDBACK VOLTAGE

- 1. Reconnect the front air control harness connector.
- 2. Turn ignition switch ON.
- Check voltage between front air control harness connector M176 terminal 25 and ground while cycling defroster switch on and off.



### Is the inspection result normal?

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

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### 11. CHECK PBR FEEDBACK SIGNAL CIRCUIT FOR SHORT TO GROUND

- 1. Turn ignition switch OFF.
- 2. Disconnect front air control harness connector.
- Check continuity between front air control harness connector M176 terminal 25 and ground.

### Continuity should not exist.

### Is the inspection result normal?

YES >> Replace front air control. Refer to <u>VTL-8</u>, "Removal and <u>Installation"</u>.

NO >> Repair or replace harness as necessary.

### 12. CHECK PBR FEEDBACK CIRCUIT FOR OPEN

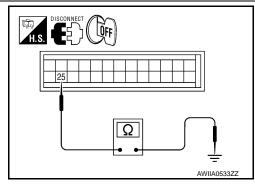
- 1. Turn ignition switch OFF.
- 2. Disconnect the defroster door motor harness connector and front air control harness connector.
- Check continuity between defroster door motor harness connector tor M144 (B) terminal 4 and front air control harness connector M176 (A) terminal 25.

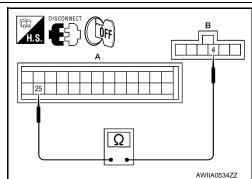
### Continuity should exist.

### Is the inspection result normal?

YES >> Replace defroster door motor. Refer to <u>VTL-17</u>, <u>"Removal and Installation"</u>.

NO >> Repair or replace harness as necessary.





### **BLOWER MOTOR CONTROL SYSTEM**

### System Description

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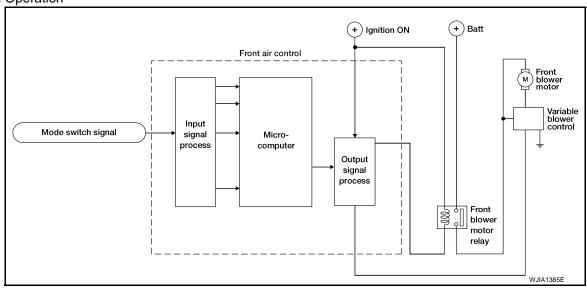
### SYSTEM DESCRIPTION

### Component Parts

Blower speed control system components are:

- Front air control
- Variable blower control
- Front blower motor relay
- Front blower motor
- · Intake sensor

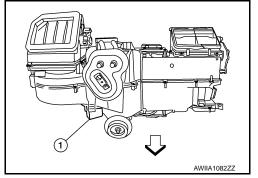
### System Operation



### COMPONENT DESCRIPTION

### Variable Blower Control

The variable blower control is located on the cooling unit. The variable blower control (1) receives a gate voltage from the front air control to steplessly maintain the blower motor voltage in the 0 to 5 volt range (approx.).



### Front Blower Motor Component Function Check

### INFOID:0000000005386729

### INSPECTION FLOW

### 1.CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - FRONT BLOWER

- Rotate the blower control dial clockwise once. Blower motor should operate in low speed.
- 2. Rotate the blower control dial clockwise, and continue checking blower speed until all speeds are checked.

### Is the inspection result normal?

YES >> Inspection End.

NO >> Go to diagnosis procedure. Refer to HAC-214, "Front Blower Motor Diagnosis Procedure"

**HAC-213** 2010 Titan Revision: August 2009

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### Front Blower Motor Diagnosis Procedure

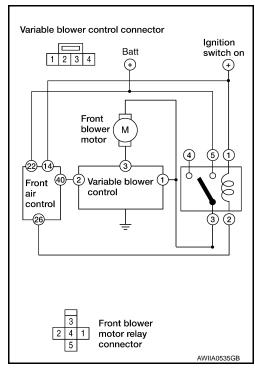
INFOID:0000000005386730

Regarding Wiring Diagram information, refer to <a href="HAC-234">HAC-234</a>, "Wiring Diagram".

SYMPTOM: Blower motor operation is malfunctioning.

### DIAGNOSTIC PROCEDURE FOR BLOWER MOTOR

SYMPTOM: Blower motor operation is malfunctioning under starting blower speed control.



### 1. CHECK FUSES

Check 20A fuses [No. 24 and 27 (Located in the fuse and fusible link box)]. For fuse layout. Refer to <u>PG-73</u>, "Terminal Arrangement".

### Fuses are good.

### Is the inspection result normal?

YES >> GO TO 2.

NO >> GO TO 9.

### 2. CHECK FRONT BLOWER MOTOR POWER SUPPLY CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect front blower motor connector.
- 3. Turn ignition switch ON.
- 4. Press the A/C switch.
- 5. Rotate blower control dial to maximum speed.
- Check voltage between front blower motor harness connector M62 terminal 2 and ground.

### 2 - Ground

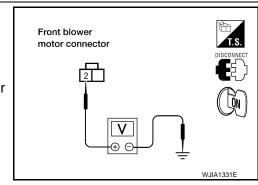
### : Battery voltage

### Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 3.

3.CHECK FRONT BLOWER MOTOR RELAY (SWITCH SIDE) POWER SUPPLY CIRCUIT



### **BLOWER MOTOR CONTROL SYSTEM**

### < COMPONENT DIAGNOSIS >

### [MANUAL A/C (TYPE 2)]

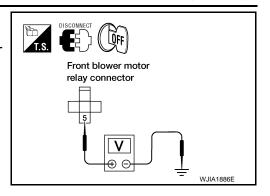
- Turn ignition switch OFF.
- 2. Disconnect front blower motor relay.
- 3. Check voltage between front blower motor relay harness connector M107 terminal 5 and ground.

### 5 - Ground : Battery voltage

### Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair harness or connector.



### f 4.CHECK FRONT BLOWER MOTOR RELAY

Turn ignition switch OFF.

Check front blower motor relay. Refer to HAC-217, "Front Blower Motor Component Inspection".

### Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace front blower motor relay.

### ${f 5.}$ CHECK FRONT BLOWER MOTOR RELAY (SWITCH SIDE) CIRCUIT FOR OPEN

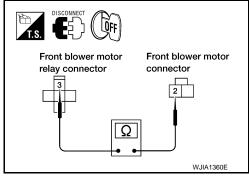
Check continuity between front blower motor relay harness connector M107 terminal 3 and front blower motor harness connector M62 terminal 2.

### 3 - 2 : Continuity should exist.

### Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair harness or connector.



### 6.CHECK VARIABLE BLOWER CONTROL POWER SUPPLY CIRCUIT FOR OPEN

- Disconnect variable blower control harness connector.
- 2. Check continuity between front blower motor relay harness connector M107 (A) terminals 3 and variable blower control harness connector M122 (B) terminal 1.

### 3 - 1 : Continuity should exist.

### Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair harness or connector.

### 7. CHECK VARIABLE BLOWER CONTROL SIGNAL CIRCUIT

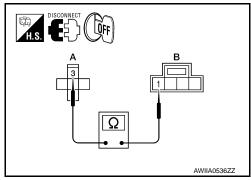
- Disconnect front air control connector.
- Check continuity between front air control harness connector M177 (B) terminal 40 and variable blower control harness connector M122 (A) terminal 2.



### Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair harness or connector.



### 8.CHECK FRONT BLOWER MOTOR RELAY (COIL SIDE) POWER SUPPLY

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### **BLOWER MOTOR CONTROL SYSTEM**

### < COMPONENT DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

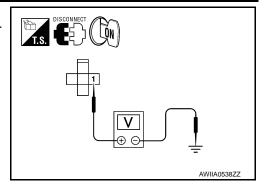
- 1. Turn ignition switch ON.
- Check voltage between front blower motor relay harness connector M107 terminal 1 and ground.

### 1 - Ground : Battery voltage

### Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair front blower motor ground circuit or connector.



### 9. REPLACE FUSES

- 1. Replace fuses.
- Activate the front blower motor.

### Does the fuse blow?

YES >> GO TO 10.

NO >> Inspection End.

### 10. CHECK FRONT BLOWER MOTOR POWER SUPPLY CIRCUIT FOR SHORT

- Turn ignition switch OFF.
- 2. Disconnect front blower motor connector and variable blower control connector.
- 3. Check continuity between variable blower control harness connector M122 terminal 1 and ground.

### 1 - Ground : Continuity should not exist.

### Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair harness or connector.

### 11. CHECK VARIABLE BLOWER CONTROL SIGNAL CIRCUIT

- 1. Disconnect front air control connector.
- Check continuity between front air control harness connector M177 (B) terminal 40 and variable blower control harness connector M122 (A) terminal 2.

### 40 - 2 : Continuity should exist.

### Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair harness or connector.

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### 12. CHECK FRONT BLOWER MOTOR

Check front blower motor. Refer to <u>HAC-213</u>, "Front Blower Motor Component Function Check".

### Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace front blower motor. Refer to VTL-12, "Removal and Installation".

### 13. CHECK BLOWER MOTOR GROUND CIRCUIT

# **BLOWER MOTOR CONTROL SYSTEM**

# < COMPONENT DIAGNOSIS >

# [MANUAL A/C (TYPE 2)]

Check continuity between front blower motor harness connector M62 (B) terminal 1 and variable blower control harness connector M122 (A) terminal 3.

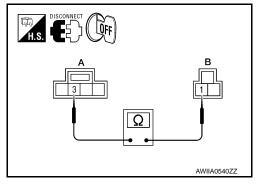
1 - 3

: Continuity should exist.

Is the inspection result normal?

YES >> GO TO 14.

NO >> Repair harness or connector.



# 14. CHECK VARIABLE BLOWER CONTROL GROUND CIRCUIT

Check continuity between variable blower control harness connector M122 terminal 4 and ground.

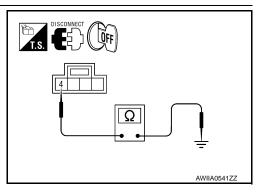
4 - Ground

: Continuity should exist.

Is the inspection result normal?

YES >> Replace variable blower control. Refer to <u>VTL-22</u>, "Removal and Installation".

NO >> Repair harness or connector.

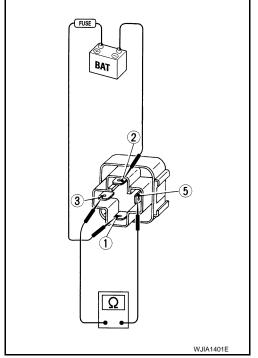


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# Front Blower Motor Component Inspection

# COMPONENT INSPECTION

Check continuity between terminals by supplying 12 volts and ground to coil side terminals of relay.



Front Blower Motor

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Revision: August 2009 HAC-217 2010 Titan

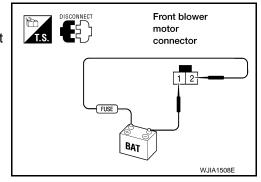
# **BLOWER MOTOR CONTROL SYSTEM**

# < COMPONENT DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

Confirm smooth rotation of the blower motor.

- Ensure that there are no foreign particles inside the blower unit.
- Apply 12 volts to terminal 2 and ground to terminal 1 and verify that the motor operates freely and quietly.



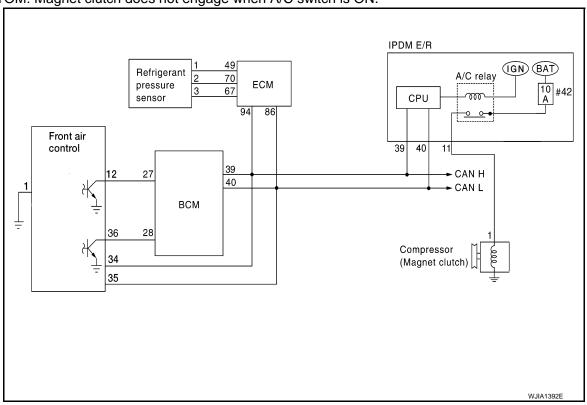
MAGNET CLUTCH	
< COMPONENT DIAGNOSIS > [MANUAL A/C (TYP	E 2)]
MAGNET CLUTCH	Α
System Description	)005386732
SYSTEM DESCRIPTION  The front air control controls compressor operation based on ambient and intake temperature and a from ECM.	B signal
Low Temperature Protection Control  The front air control will turn the compressor ON or OFF as determined by a signal detected by the intake sor.	e sen-
When intake air temperature is higher than the preset value, the compressor turns ON. The compressor OFF when intake air temperature is lower than the preset value.	turns D
Magnet Clutch Component Function Check	0005386733 E
INSPECTION FLOW  1. CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - MAGNET CLUTCH	F
<ol> <li>Turn ignition switch ON.</li> <li>Turn the blower control dial to low speed and press the A/C switch.</li> <li>Rotate mode control dial to vent mode (*).</li> <li>Confirm that the compressor clutch engages (sound or visual inspection). (Discharge air and be speed will depend on ambient, in-vehicle and set temperatures.)</li> </ol>	olower <sup>G</sup>
Is the inspection result normal?  YES >> Inspection End.  NO >> Go to diagnosis procedure. Refer to HAC-219, "Magnet Clutch Diagnosis Procedure".	Н
Magnet Clutch Diagnosis Procedure	0005386734 HA
Regarding Wiring Diagram information, refer to HAC-234, "Wiring Diagram".	J
DIAGNOSTIC PROCEDURE FOR MAGNET CLUTCH	K

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SYMPTOM: Magnet clutch does not engage when A/C switch is ON.



# 1. CHECK INTAKE SENSOR CIRCUIT

Check intake sensors. Refer to HAC-227, "Intake Sensor Component Inspection".

### Is the inspection result normal?

YES >> GO TO 2.

NO >> Check malfunctioning intake sensor. Refer to <a href="HAC-226">HAC-226</a>, "Intake Sensor Diagnosis Procedure".

# 2. PERFORM AUTO ACTIVE TEST

Refer to PCS-11, "Diagnosis Description".

### Does magnet clutch operate?

YES >> • • WITH CONSULT-III GO TO 5.

• WWITHOUT CONSULT-III GO TO 6.

NO >> Check 10A fuse (No. 42, located in IPDM E/R), and GO TO 3.

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

- 1. Turn ignition switch OFF.
- Disconnect IPDM E/R connector and compressor (magnet clutch) connector.
- Check continuity between IPDM E/R harness connector E119 terminal 11 and A/C compressor harness connector F3 terminal 1.

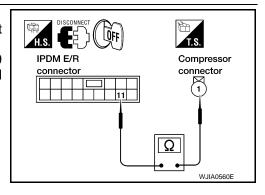
# 11 – 1 : Continuity should exist.

# Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair harness or connector.

4. CHECK MAGNET CLUTCH CIRCUIT



### < COMPONENT DIAGNOSIS >

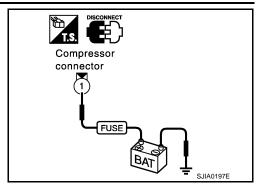
[MANUAL A/C (TYPE 2)]

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

### Is the inspection result normal?

>> Replace IPDM E/R. Refer to PCS-30, "Removal and YES Installation of IPDM E/R".

NO >> Replace magnet clutch. Refer to HA-34, "Removal and Installation for Compressor Clutch".



# ${f 5.}$ CHECK BCM INPUT (COMPRESSOR ON) SIGNAL

Check compressor ON/OFF signal. Refer to HAC-193, "CONSULT-III Function (BCM - COMMON ITEM)".

A/C SW ON : COMP ON SIG ON A/C SW OFF : COMP ON SIG OFF

### Is the inspection result normal?

YES >> GO TO 8. NO >> GO TO 6.

# $\mathsf{6}.\mathsf{check}$ circuit continuity between BCM and front air control

- Turn ignition switch OFF.
- Disconnect BCM connector and front air control connector. 2.
- Check continuity between BCM harness connector M18 (A) terminal 27 and front air control harness connector M176 (B) terminal 12.

### 27 - 12 Continuity should exist.

### Is the inspection result normal?

YES >> GO TO 7.

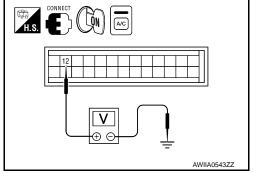
NO >> Repair harness or connector.

# H.S. E. (III) Ω

# 7.CHECK VOLTAGE FOR FRONT AIR CONTROL (A/C COMPRESSOR ON SIGNAL)

- 1. Reconnect BCM connector and front air control connector.
- Turn ignition switch ON. 2.
- Check voltage between front air control harness connector M176 terminal 12 and ground.

1	Terminals			
(	(+)		0 11	
front air con- trol connec- tor	Terminal No.	(-)	Condition	Voltage Approx. 0V
M176	12	Ground	A/C switch: ON	Approx. 0V
WITTO	12	Giodila	A/C switch: OFF	Approx. 5V



# Is the inspection result normal?

YES >> GO TO 8.

NO-1 >> If the voltage is approx. 5V when A/C switch is ON, replace front air control. Refer to VTL-8, "Removal and Installation".

NO-2 >> If the voltage is approx. 0V when A/C switch is OFF, replace BCM. Refer to BCS-53, "Removal and Installation".

**HAC-221** 

# f 8.CHECK REFRIGERANT PRESSURE SENSOR

Start engine.

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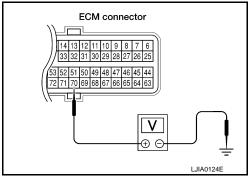
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# [MANUAL A/C (TYPE 2)]

### < COMPONENT DIAGNOSIS >

Check voltage between ECM harness connector F54 terminal 70 and ground.

	Terminals			
(	+)		Condition	Voltage
ECM con- nector	Terminal No.	(-)		3.70
F54	70	Ground	A/C switch: ON	Approx. 0.36 - 3.88V



### Is the inspection result normal?

YES >> GO TO 9.

NO >> Refer to EC-411, "Diagnosis Procedure".

# 9. CHECK BCM INPUT (FAN ON) SIGNAL

Check FAN ON/OFF signal. Refer to <u>BCS-15, "COMMON ITEM : CONSULT-III Function (BCM - COMMON ITEM)"</u>.

FRONT BLOWER CONTROL : FAN ON SIG ON

**DIAL ON** 

FRONT BLOWER CONTROL : FAN ON SIG OFF

**DIAL OFF** 

### Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 10.

# 10. CHECK CIRCUIT CONTINUITY BETWEEN BCM AND FRONT AIR CONTROL

Continuity should exist.

- 1. Turn ignition switch OFF.
- 2. Disconnect BCM connector and front air control connector.
- Check continuity between BCM harness connector M18 (A) terminal 28 and front air control harness connector M177 (B) terminal 36.

Is the inspection result normal?

YES >> GO TO 11.

28 - 36

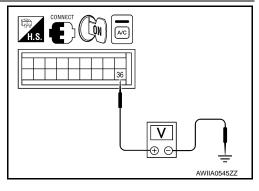
NO >> Repair harness or connector.

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# 11. CHECK VOLTAGE FOR FRONT AIR CONTROL (FAN ON SIGNAL)

- 1. Reconnect BCM connector and front air control connector.
- 2. Turn ignition switch ON.
- Check voltage between front air control harness connector M177 terminal 36 and ground.

	Terminals			
(-	+)		Condition	Voltage
front air con- trol connector	Terminal No.	No. (-) A/C switch: ON		
M177	36	Ground	A/C switch: ON Blower motor operates	Approx. 0V
			A/C switch: OFF	Approx. 5V



### Is the inspection result normal?

YES >> GO TO 12.

NO-1 >> If the voltage is approx. 5V when blower motor is ON, replace front air control. Refer to <u>VTL-8</u>, "Removal and Installation".

# **MAGNET CLUTCH**

# < COMPONENT DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

NO-2 >> If the voltage is approx. 0V when blower motor is OFF, replace BCM. Refer to <u>BCS-53, "Removal and Installation"</u>.

# 12. CHECK CAN COMMUNICATION

Check CAN communication. Refer to LAN-4, "System Description".

- BCM ECM
- ECM IPDM E/R
- ECM Front air control

### Is the inspection result normal?

- YES >> Inspection End.
- NO >> Repair or replace malfunctioning part(s).

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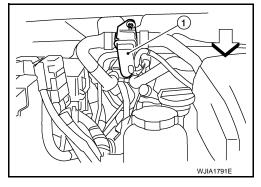
# WATER VALVE CIRCUIT

**Description** 

### COMPONENT DESCRIPTION

### Water Valve

The water valve (1) cuts the flow of engine coolant to the heater core to allow for maximum cooling during A/C operation. It is controlled by the front air control.



# Water Valve Diagnosis Procedure

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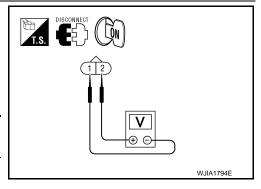
Regarding Wiring Diagram information, refer to HAC-234, "Wiring Diagram".

# DIAGNOSTIC PROCEDURE FOR WATER VALVE

# 1. CHECK WATER VALVE POWER AND GROUND CIRCUITS

- 1. Disconnect water valve connector F68.
- 2. Turn ignition switch ON.
- 3. Rotate temperature control dial to maximum heat.
- Check voltage between water valve harness connector F68 terminal 1 and terminal 2 while rotating temperature control dial to maximum cold.

Connector	Te	erminals	Condition	Voltage (Approx.)	
Connector	(+)	(-)	Condition		
Water valve: F68	2	1	Rotate temperature control dial	Battery voltage	



# Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

# 2. CHECK WATER VALVE CONTROL OUTPUT CIRCUIT

- Turn ignition switch OFF.
- Disconnect front air control connector M177.
- Check continuity between water valve harness connector F68

   (A) terminal 2 and front air control harness connector M177 (B) terminal 30.

# 2 - 30 : Continuity should exist.

4. Check continuity between water valve harness connector F68 terminal 2 and ground.

# 2 - Ground : Continuity should not exist.

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# Is the inspection result normal?

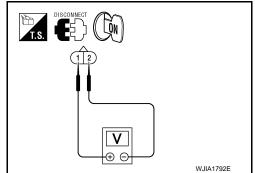
YES >> Replace front air control. Refer to <a href="VTL-8">VTL-8</a>, "Removal and Installation".

NO >> Repair harness or connector.

# 3. CHECK WATER VALVE POWER AND GROUND CIRCUITS

- 1. Rotate temperature control dial to maximum cold.
- 2. Check voltage between water valve harness connector F68 terminal 1 and terminal 2 while rotating temperature control dial to maximum heat.

Connector	Te	rminals	Condition	Voltage	
Connector	(+)	(-)	Condition	(Approx.)	
Water valve: F68	1	2	Rotate temperature control dial	Battery voltage	



# Is the inspection result normal?

YES >> Replace the water valve.

NO >> GO TO 4.

# 4. CHECK WATER VALVE CONTROL OUTPUT CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect front air control connector M177.
- Check continuity between water valve harness connector F68

   (A) terminal 1 and front air control harness connector M177 (B) terminal 29.

# 1 - 29 : Continuity should exist.

Check continuity between water valve harness connector F68

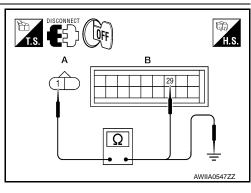
 (A) terminal 1 and ground.

# 1 - Ground : Continuity should not exist.

# Is the inspection result normal?

YES >> Replace front air control. Refer to <u>VTL-8</u>, "Removal and Installation".

NO >> Repair harness or connector.



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# **INTAKE SENSOR**

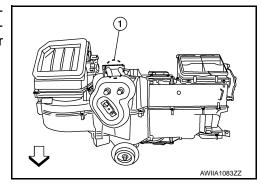
# System Description

### INFOID:0000000005386737

### COMPONENT DESCRIPTION

# Intake Sensor

The intake sensor (1) is located on the heater & cooling unit assembly. It converts temperature of air after if passes through the evaporator into a resistance value which is then input to the front air control.



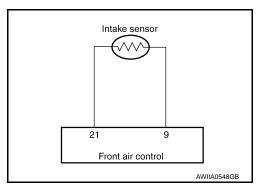
# Intake Sensor Diagnosis Procedure

INFOID:0000000005386738

Regarding Wiring Diagram information, refer to HAC-234, "Wiring Diagram".

# DIAGNOSTIC PROCEDURE FOR INTAKE SENSOR

SYMPTOM: Intake sensor circuit is open or shorted.



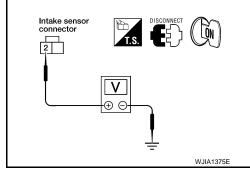
# 1. CHECK VOLTAGE BETWEEN INTAKE SENSOR AND GROUND

- Disconnect intake sensor connector.
- 2. Turn ignition switch ON.
- 3. Check voltage between intake sensor harness connector M146 terminal 2 and ground.

# 2 - Ground : Approx. 5V

# Is the inspection result normal?

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



# 2. CHECK CIRCUIT CONTINUITY BETWEEN INTAKE SENSOR AND FRONT AIR CONTROL

# **INTAKE SENSOR**

# < COMPONENT DIAGNOSIS >

# [MANUAL A/C (TYPE 2)]

- Turn ignition switch OFF.
- Disconnect front air control connector. 2.
- Check continuity between intake sensor harness connector M146 (B) terminal 1 and front air control harness connector M176 (A) terminal 21.

### 1 - 21 : Continuity should exist.

# Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair harness or connector.

# 3. CHECK INTAKE SENSOR

Check intake sensor. Refer to HAC-227, "Intake Sensor Component Inspection".

### Is the inspection result normal?

YES >> Replace front air control. Refer to <a href="VTL-8">VTL-8</a>, "Removal and Installation".

>> Replace intake sensor. Refer to VTL-11, "Removal and Installation". NO

# 4.CHECK CIRCUIT CONTINUITY BETWEEN INTAKE SENSOR AND FRONT AIR CONTROL

- Turn ignition switch OFF.
- 2. Disconnect front air control connector.
- Check continuity between intake sensor harness connector M146 (B) terminal 2 and front air control harness connector M176 (A) terminal 9.

### 2 - 9 : Continuity should exist.

4. Check continuity between intake sensor harness connector M146 (B) terminal 2 and ground.

### 2 - Ground : Continuity should not exist.

# Is the inspection result normal?

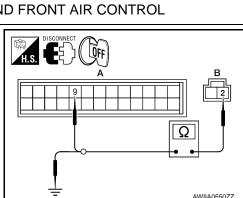
YES >> Replace front air control. Refer to VTL-8, "Removal and Installation".

NO >> Repair harness or connector.

# Intake Sensor Component Inspection

### COMPONENT INSPECTION

Intake Sensor



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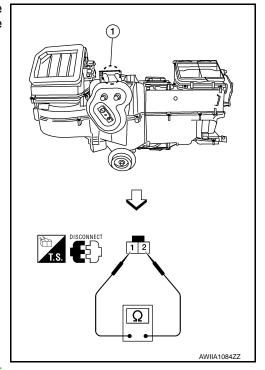
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# < COMPONENT DIAGNOSIS >

After disconnecting intake sensor (1) connector, measure resistance between terminals 1 and 2 at sensor harness side, using the table below.

Temperature °C (°F)	Resistance kΩ
-15 (5)	209.0
-10 (14)	160.0
-5 (23)	123.0
0 (32)	95.8
5 (41)	74.9
10 (50)	58.9
15 (59)	46.7
20 (68)	37.3
25 (77)	30.0
30 (86)	24.2
35 (95)	19.7
40 (104)	16.1
45 (113)	13.2



If NG, replace intake sensor. Refer to  $\underline{\text{VTL-11}}$  , "Removal and Installation".

# POWER SUPPLY AND GROUND CIRCUIT FOR CONTROLLER

# < COMPONENT DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

# POWER SUPPLY AND GROUND CIRCUIT FOR CONTROLLER

# Component Description

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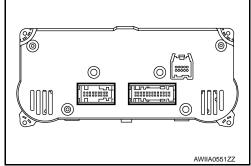
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### COMPONENT DESCRIPTION

### Front Air Control

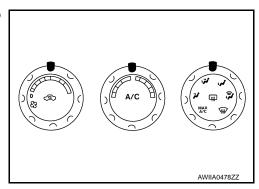
The front air control has a built-in microcomputer which processes information sent from various sensors needed for air conditioner operation. The air mix door motor, mode door motor, intake door motor, defroster door motor, blower motor and A/C compressor are then controlled.

The front air control is unitized with control mechanisms. When the various switches and temperature dials are operated, data is input to the front air control.



# Potentio Temperature Control (PTC)

The PTC is built into the front air control. It can be set from cold to hot or any intermediate position by rotating the temperature control dial.



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# Front Air Control Component Function Check

SYMPTOM: A/C system does not come on.

# INSPECTION FLOW

# 1. CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK

- 1. Turn the blower control dial clockwise to low speed.
- Press the A/C switch.
- 3. Confirm that the compressor clutch engages (sound or visual inspection).

### Is the inspection result normal?

YES >> Inspection End.

NO >> Go to diagnosis procedure. Refer to <u>HAC-229</u>, "Front Air Control Power and Ground Diagnosis <u>Procedure"</u>.

# Front Air Control Power and Ground Diagnosis Procedure

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INFOID:0000000005386741

Regarding Wiring Diagram information, refer to HAC-234, "Wiring Diagram".

# DIAGNOSTIC PROCEDURE FOR A/C SYSTEM

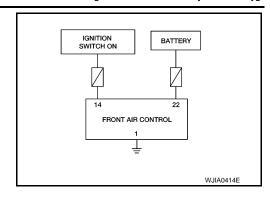
Revision: August 2009 HAC-229 2010 Titan

# POWER SUPPLY AND GROUND CIRCUIT FOR CONTROLLER

< COMPONENT DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

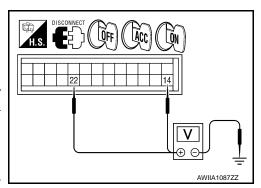
SYMPTOM: A/C system does not come on.



# 1. CHECK POWER SUPPLY CIRCUITS FOR FRONT AIR CONTROL

- 1. Turn ignition switch OFF.
- 2. Disconnect front air control connectors.
- 3. Turn ignition switch ON.
- 4. Check voltage between front air control harness connector M176 terminals 14, 22, and ground.

	Terminals			Ignition switch position	
	(+)				
front air control connector	Terminal No.	(-)	OFF	ACC	ON
M176	14	Ground	Approx. 0V	Approx. 0V	Battery voltage
WITTO	22	Ground	Battery voltage	Battery voltage	Battery voltage



### Is the inspection result normal?

YES >> GO TO 2.

NO

- >> Check 10A fuses [Nos. 8 and 19, located in the fuse block (J/B)]. Refer to PG-73, "Terminal Arrangement".
  - If fuses are OK, check harness for open circuit. Repair or replace as necessary.
  - If fuses are NG, replace fuse and check harness for short circuit. Repair or replace as necessary.

# 2. CHECK GROUND CIRCUIT FOR FRONT AIR CONTROL

- 1. Turn ignition switch OFF.
- 2. Check continuity between front air control harness connector M176 terminal 1 and ground.

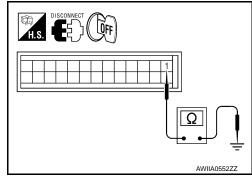
# 1 - Ground

: Continuity should exist.

### Is the inspection result normal?

OK >> Replace front air control. Refer to <u>VTL-8</u>, "Removal and Installation".

NG >> Repair harness or connector.



[MANUAL A/C (TYPE 2)]

# **ECU DIAGNOSIS**

# MANUAL A/C IDENTIFICATION TABLE

Application Table

Manual A/C Type	Description	Visual Identification
Manual A/C (Type 1)	Two Control Dial System	AWIIA0481ZZ
Manual A/C (Type 2)	Three Control Dial System [with variable blower control (VBC)]	AWIIA0478ZZ

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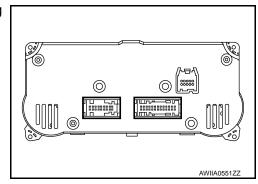
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# AIR CONDITIONER CONTROL

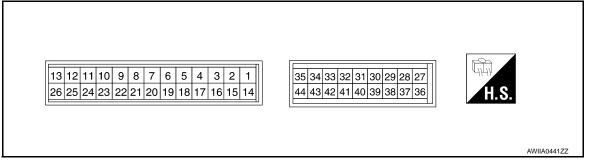
# Front Air Control Terminals Reference Values

INFOID:0000000005386744

Measure voltage between each terminal and ground by following Terminals and Reference Value for front air control (1).



# FRONT AIR CONTROL HARNESS CONNECTOR TERMINAL LAYOUT



# TERMINALS AND REFERENCE VALUES FOR FRONT AIR CONTROL

Terminal No.	Wire color	Item	Ignition switch	Condition	Voltage (V) (Approx.)
1	В	Ground	-	-	0V
2	Υ	V ref ACTR (5V)	ON	-	0 - 5V
3	W/G	Air mix door motor CW	ON	Clockwise rotation	Battery voltage
4	G	Air mix door motor CCW	ON	Counterclockwise rotation	Battery voltage
5	BR/W	Mode door motor CW	ON	Clockwise rotation	Battery voltage
6	P/L	Mode door motor CCW	ON	Counterclockwise rotation	Battery voltage
7	0	Intake door motor CW	ON	Clockwise rotation	Battery voltage
8	G/B	Intake door motor CCW	ON	Counterclockwise rotation	Battery voltage
9	L/B	Intake sensor	ON	-	0 - 5V
11	Y/B	Rear defogger request *1	ON	-	Battery voltage
12	W/R	Compressor ON signal	ON	A/C switch OFF	5V
12	VV/K	Compressor ON signal	ON	A/C switch ON	0V
14	Y/G	Power supply for IGN	ON	-	Battery voltage
15	Р	V ref ACTR (ground)	ON	-	5V
16	GR	Mode door motor feedback	ON	-	0 - 5V
18	SB	Air mix door motor feedback	ON	-	0 - 5V
19	LG	Defroster door motor CW	ON	Clockwise rotation	Battery voltage
20	P/B	Defroster door motor CCW	ON	Counterclockwise rotation	Battery voltage
21	V/R	Sensor ground	ON	-	0V
22	Y/R	Power supply for BAT	-	-	Battery voltage
23	R/L	Illumination +	ON	Park lamps ON	Battery voltage

# **AIR CONDITIONER CONTROL**

# < ECU DIAGNOSIS >

# [MANUAL A/C (TYPE 2)]

Terminal No.	Wire color	Item	Ignition switch	Condition	Voltage (V) (Approx.)
24	BR	Illumination -	-	Park lamps ON	(V) 15 10 5 0 200 ms
25	LG/B	Defroster door motor feedback	ON	-	0 - 5V
26	R/B	Front blower request	ON	Front blower motor OFF	Battery voltage
20	K/D	Front blower request	ON	Front blower motor ON	0V
29	Y/L	Water valve	ON	Water valve open	Battery voltage
29	1/∟	water valve	ON	Water valve closed	OV
30	W/G	Water valve	ON	Water valve open	OV
30	W/G	water valve	ON	Water valve closed	Battery voltage
34	L	CAN-H	ON	-	0 - 5V
35	Р	CAN-L	ON	-	0 - 5V
36	L/R	For ON signal	ON	Blower switch OFF	5V
36	L/K	Fan ON signal	ON	Blower switch ON	0V
40	G/R	Variable blower control	ON	-	0 - 5V

<sup>\*1:</sup> If equipped

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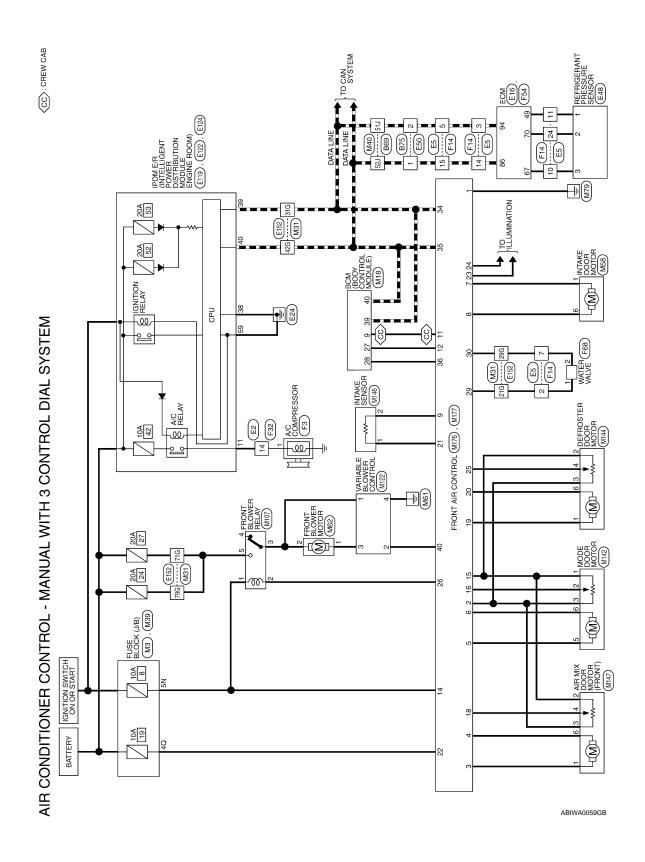
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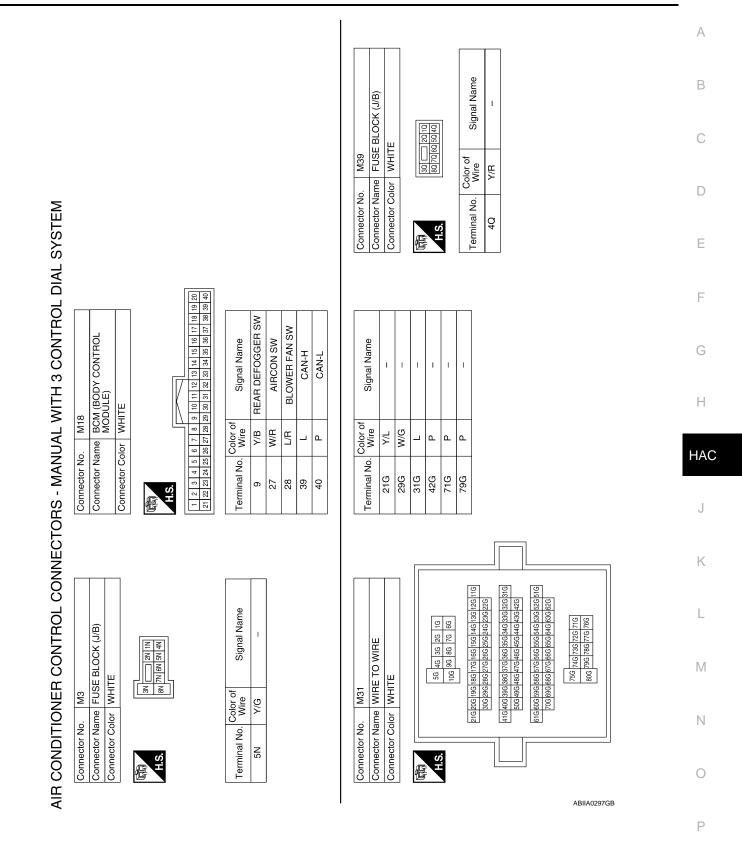
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Wiring Diagram





M40   WIRE TO WIRE	2 GR -	GR B		Terminal No. Wire Signal Name	H.S.	Connector Name   MODE DOOR MOTOR Connector Color   BLACK				2 W/L -	Terminal No. Color of Signal Name	H.S.	Connector Color BLACK	Connector Name FRONT BLOWER MOTOR
me me	G/R –			Color of Wire			II I				Color of Wire	3 4 5	-	
WHITE  WHITE  WHITE  WHITE  WHITE  WHITE  WHITE  So an in	N ω	L 0	-	Terminal I	是 H.S.	Connecto	Connecto	7		-   0	Terminal	H.S.	Connecto	Connecto
첫   ∑   첫	1 1	1 1	1		E 4 2	ONT BLOWER RELAY ACK	20		684   673   684   683   684   683   682   784   784   773   774   778   774   778   774   778	J 481     473     463     454     433     423       J 581     573     563     554     533     522     513		4.1 3.1 2.1 9.1 8.1 7.1	HTE	RE TO WIRE
Connector No  Connector Name V.  Land Anti-Autor Color V.  Sau St. J.  Sau St. J.  Connector Name F.  Connector Name F.  Connector Name F.  Connector Color F.  Terminal No. Color Terminal No. Wire V./G.  Termina	2 R/B 3 W/L		1 Y/G	rminal No. Wire	o;	-		Color of Wire   51J   L   52J   P	700 (990	50. 493	21.J 20J 19J 30J 29J 41.J 40J 39J	S. T.	$\vdash$	

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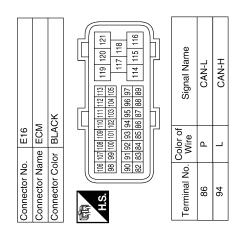
Connector Name AIR MIX DOOR MOTOR (FRONT)	Connector Color BLACK	(1) 2 3 4 5 6 H.S.	Terminal No. Wire Signal Name	1 W/G	2 P	> 8	4 SB –	5 9											7				CK	~~	
KE SENSOR		47	Signal Name	1	ı				Signal Name	AC REQUEST	1	V IGN	V REF RETURN	PANEL/FLOOR FEEDBACK	1	DRIVER BLEND FEEDBACK	DEFROST CW	DEFROST CCW	SENSOR RETURN	V BAT	+ MNTII	- ILLUM -	DEFROST FEEDBACK	FRONT BLOWER	REQUEST
ne INTAKI		년	Color of Wire	N/R	L/B				Color of Wire	M/R	1	Y/G	Ь	GR	1	SB	5	P/B	N/R	Y/R	R/L	BR	LG/B	Ç	ם ל
Connector Name INTAKE SENSOR		H.S.	Terminal No.	-	2				Terminal No.	12	13	14	15	16	17	18	19	20	21	22	23	24	25	ď	0.7
DEFROSTER DOOR MOTOR		( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )	Signal Name	1	ı	ı	ı	ı	I CONTROL	ANUAL 3 CONTROL	O I EIVI )		F	6 5 4 3 2 1 1 19 18 17 16 15 14		Signal Name GND	V REF ACTUATOR 5	DRIVER BLEND CW	DRIVER BLEND WCW	PANEL/FLOOR CW	PANEL/FLOOR CCW	RECIRC 1 CW	RECIRC 1 CCW	EVAP TEMP SENS	ı
	lor BLACK	1 2 3 4	Color of Wire	LG	۵	>	LG/B	P/B		me (WITH MANUAL		lor BLACK		13 12 11 10 9 8 7 26 25 24 23 22 21 20	Color of	Wire	> >	W/G D		BR/W P	P/L   Þ/	0	G/B	L/B	1
Connector Name	Connector Color	H.S.	Terminal No.	-	2	8	4	9	Connector No.	Connector Name		Connector Color		H.S. 26 28		l erminal No.	2	3	4	2	9	7	80	6	10

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Signal Name	I	1	I	
Color of Wire	ı	_	ı	_
Terminal No.	41	42	43	44

	Á										⊢
Signal Name	WATER VALVE CLOSE -	ı	-	_	H-NYO	CAN-L	FAN ON	_	Ī	_	VBC OUTPUT
Color of Wire	M/G	1	ı	ı	٦	۵	L/R	ı	ı	ı	G/R
Terminal No.	30	31	32	33	34	35	36	37	38	39	40

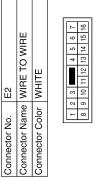
Connector No.	· o	M177	
Connector Name	ame	FRO WIT	FRONT AIR CONTROL (WITH MANUAL 3 CONTROL DIAL SYSTEM)
Connector Color	olor	BLUE	
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Connector No. E48
Connector Name REFRIGERANT PRESSURE SENSOR

Connector Color BLACK

Signal Name

Terminal No. Wire

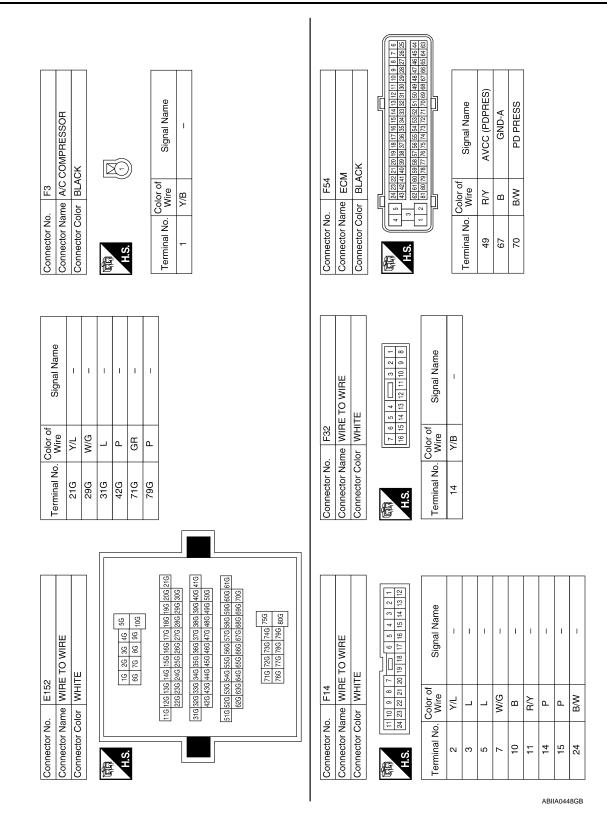
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# SYMPTOM DIAGNOSIS

# MANUAL A/C IDENTIFICATION TABLE

Application Table

Manual A/C Type	Description	Visual Identification
Manual A/C (Type 1)	Two Control Dial System	AWIIA0481ZZ
Manual A/C (Type 2)	Three Control Dial System [with variable blower control (VBC)]	AWIIA0478ZZ

# **AIR CONDITIONER CONTROL**

# < SYMPTOM DIAGNOSIS >

# [MANUAL A/C (TYPE 2)]

# AIR CONDITIONER CONTROL

# Symptom Matrix Chart

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# **SYMPTOM TABLE**

Symptom	Reference Page	
A/C system does not come on.	Go to Trouble Diagnosis Procedure for A/C System.	HAC-229
Air outlet does not change.	Go to Trouble Diagnosis Procedure for Mode Door Motor.	HAC 106
Mode door motor is malfunctioning.	Go to Trouble Diagnosis Procedure for Mode Door Motor.	<u>HAC-196</u>
Discharge air temperature does not change.	Co to Trouble Diagnosis Precedure for Air Mix Door Motor	HAC 201
Air mix door motor is malfunctioning.	Go to Trouble Diagnosis Procedure for Air Mix Door Motor.	<u>HAC-201</u>
Intake door does not change.	Co to Trouble Diagnosis Presedure for Inteles Deer Meter	HAC-206
Intake door motor is malfunctioning.	Go to Trouble Diagnosis Procedure for Intake Door Motor.	
Defroster door motor is malfunctioning.	Go to Trouble Diagnosis Procedure for Defroster Door Motor. HAC	
Front blower motor operation is malfunctioning.	Go to Trouble Diagnosis Procedure for Front Blower Motor.	HAC-213
Magnet clutch does not engage.	Go to Trouble Diagnosis Procedure for Magnet Clutch.	HAC-219
Insufficient cooling	Go to Trouble Diagnosis Procedure for Insufficient Cooling.	HAC-244
Insufficient heating	Go to Trouble Diagnosis Procedure for Insufficient Heating.	HAC-252
Noise	Go to Trouble Diagnosis Procedure for Noise.	HAC-254

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[MANUAL A/C (TYPE 2)]

# INSUFFICIENT COOLING

# Component Function Check

INFOID:0000000005386748

SYMPTOM: Insufficient cooling

### INSPECTION FLOW

# 1. CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - TEMPERATURE DECREASE

- 1. Rotate the blower control dial to the low speed.
- 2. Turn temperature control dial counterclockwise to maximum cold.
- 3. Check for cold air at discharge air outlets.

### Can the symptom be duplicated?

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

# 2.CHECK FOR ANY SYMPTOMS

Perform a complete operational check for any symptoms. Refer to HAC-181, "Operational Check".

# Does another symptom exist?

YES >> Refer to HAC-243, "Symptom Matrix Chart".

NO >> System OK.

# 3. CHECK FOR SERVICE BULLETINS

Check for any service bulletins.

>> GO TO 4.

# 4. CHECK DRIVE BELTS

Check compressor belt tension. Refer to EM-13, "Checking Drive Belts".

# Is the inspection result normal?

YES >> GO TO 5.

NO >> Adjust or replace compressor belt. Refer to EM-13, "Removal and Installation".

# $\mathbf{5}.$ CHECK AIR MIX DOOR OPERATION

Check and verify air mix door mechanism for smooth operation. Refer to <u>HAC-201</u>, "Air Mix Door Motor Component Function Check".

### Does air mix door operate correctly?

YES >> GO TO 6.

NO >> Check air mix door motor circuit. Refer to HAC-202, "Air Mix Door Motor Diagnosis Procedure".

# 6.CHECK COOLING FAN MOTOR OPERATION

Check and verify cooling fan motor for smooth operation. Refer to EC-385, "Component Inspection".

# Does cooling fan motor operate correctly?

YES >> GO TO 7.

NO >> Check cooling fan motor. Refer to EC-385, "Diagnosis Procedure".

# 7. CHECK WATER VALVE OPERATION

Check and verify water valve for smooth operation. Refer to HAC-224, "Description".

# Does water valve operate correctly?

YES >> GO TO 8.

NO >> Check water valve circuit. Refer to HAC-224, "Water Valve Diagnosis Procedure".

# 8.CHECK RECOVERY/RECYCLING EQUIPMENT BEFORE USAGE

Check recovery/recycling equipment before connecting to vehicle. Verify there is no pressure in the recovery/recycling equipment by checking the gauges. If pressure exists, recover refrigerant from equipment lines.

>> GO TO 9.

# **INSUFFICIENT COOLING**

[MANUAL A/C (TYPE 2)] < SYMPTOM DIAGNOSIS > 9. CHECK REFRIGERANT PURITY Α Connect recovery/recycling equipment to vehicle. Confirm refrigerant purity in supply tank using recovery/recycling and refrigerant identifier. Is the inspection result normal? В YES >> GO TO 10. NO >> Check contaminated refrigerant. Refer to HAC-255, "Working with HFC-134a (R-134a)". 10.CHECK FOR EVAPORATOR FREEZE UP Start engine and run A/C. Check for evaporator freeze up. Does evaporator freeze up? D >> Perform performance test diagnoses. Refer to HAC-245, "Diagnostic Work Flow". NO >> GO TO 11. 11. CHECK REFRIGERANT PRESSURE Е Check refrigerant pressure with manifold gauge connected. Refer to HAC-247, "Performance Chart". Is the inspection result normal? F YES >> Perform performance test diagnoses. Refer to HAC-245, "Diagnostic Work Flow". NO >> GO TO 12.

12. CHECK AIR DUCTS

Check ducts for air leaks.

Is the inspection result normal?

YES >> System OK.

NO >> Repair air leaks.

Diagnostic Work Flow

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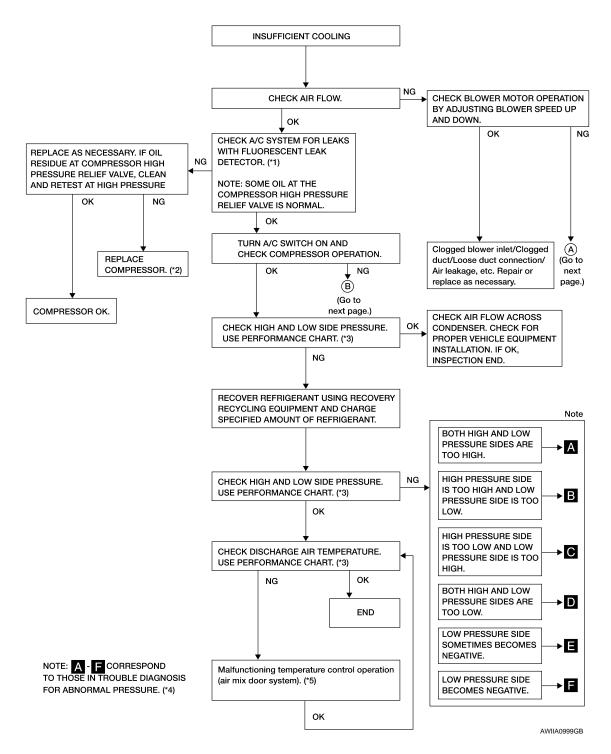
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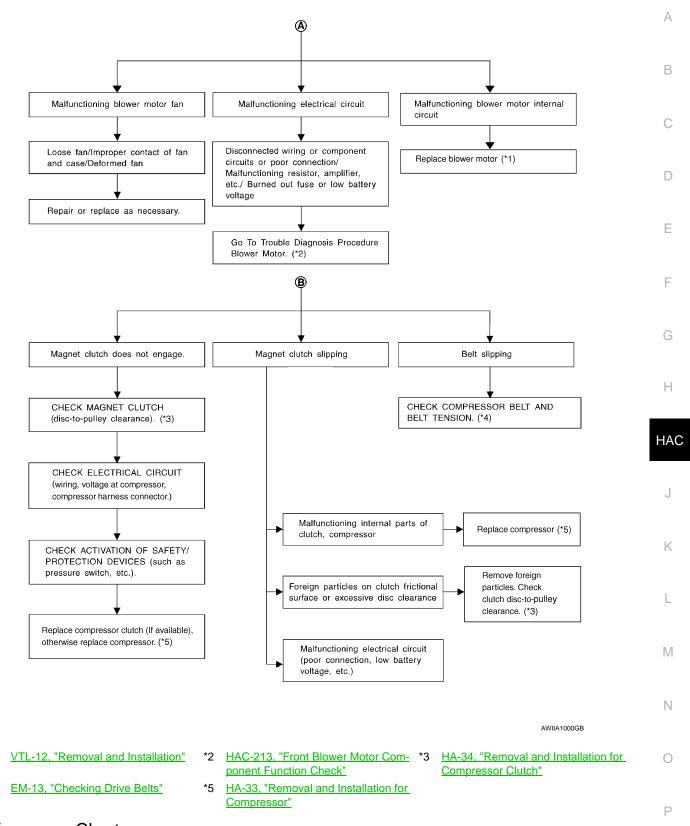
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- Using the Fluorescent Dye Leak Detector"
- \*4 HAC-248, "Trouble Diagnoses for Abnormal Pressure"
- \*1 HA-25, "Checking System for Leaks \*2 HA-34, "Removal and Installation for \*3 HAC-247, "Performance Chart" Compressor Clutch"
  - \*5 HAC-201, "Air Mix Door Motor Component Function Check"



# Performance Chart

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# **TEST CONDITION**

Testing must be performed as follows:

Vehicle location	Indoors or in the shade (in a well-ventilated place)
Doors	Closed
Door window	Open
Hood	Open
TEMP.	Max. COLD
Mode control dial	(Ventilation) set
Recirculation (REC) switch	(Recirculation) set
# Blower speed	Max. speed set
Engine speed	Idle speed

# **TEST READING**

Recirculation-to-discharge Air Temperature Table

Inside air (Recirculating a	air) at blower assembly inlet	Discharge air temperature at center ventilator	
Relative humidity %	Air temperature °C (°F)	°C (°F)	
	20 (68)	9.9 - 13.9 (50 - 57)	
	25 (77)	14.6 - 18.6 (58 - 65)	
50 - 60	30 (86)	16.8 - 21.8 (62 - 71)	
	35 (95)	21.1 - 27.1 (70 - 81)	
	40 (104)	25.3 - 31.5 (78 - 89)	
	20 (68)	11.4 - 15.2 (53 - 59)	
	25 (77)	15.5 - 20.0 (60 - 68)	
60 - 70	30 (86)	19.9 - 25.0 (68 - 77)	
	35 (95)	24.5 - 29.6 (76 - 85)	
	40 (104)	28.7 - 34.9 (84 - 95)	

# Ambient Air Temperature-to-operating Pressure Table

Ambient air		High-pressure (Discharge side)	Low-pressure (Suction side)	
Relative humidity %	Air temperature °C (°F)	kPa (kg/cm <sup>2</sup> , psi)	kPa (kg/cm <sup>2</sup> , psi)	
	20 (68)	1020 - 1250 (10.4 - 12.7, 147.9 - 181.3)	160 - 190 (1.63 - 1.94, 23.2 - 27.6)	
	25 (77)	1236 - 1510 (12.6 - 15.4, 179.2 - 219)	206 - 245 (2.1 - 2.5, 29.9 - 35.6)	
50 - 70	30 (86)	1569 - 1,922 (16.0 - 19.6, 227.6 - 278.8)	265 - 324 (2.7 - 3.3, 38.4 - 46.9)	
	35 (95)	1,697 - 2079 (17.3 - 21.2, 246.1 - 301.5)	304 - 363 (3.1 - 3.7, 44.1 - 52.6)	
	40 (104)	1971 - 2403 (20.1 - 24.5, 285.9 - 348.5)	373 - 451 (3.8 - 4.6, 54.0 - 65.4)	

# Trouble Diagnoses for Abnormal Pressure

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Whenever system's high and/or low side pressure is abnormal, diagnose using a manifold gauge. The marker above the gauge scale in the following tables indicates the standard (usual) pressure range. Since the standard (usual)

# **INSUFFICIENT COOLING**

# < SYMPTOM DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

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dard (usual) pressure, however, differs from vehicle to vehicle, refer to above table (Ambient air temperature-to-operating pressure table).

Both High- and Low-pressure Sides are Too High

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
	Pressure is reduced soon after water is splashed on condenser.	Excessive refrigerant charge in refrigeration cycle	Reduce refrigerant until speci- fied pressure is obtained.
	Air suction by cooling fan is insufficient.	Insufficient condenser cooling performance  ↓  1. Condenser fins are clogged.  2. Improper fan rotation of cooling fan	<ul> <li>Clean condenser.</li> <li>Check and repair cooling fan if necessary.</li> </ul>
Both high- and low-pressure sides are too high.	Low-pressure pipe is not cold.     When compressor is stopped high-pressure value quickly drops by approximately 196 kPa (2 kg/cm², 28 psi). It then decreases gradually thereafter.	Poor heat exchange in condenser (After compressor operation stops, high-pressure decreases too slowly.)  Air in refrigeration cycle	Evacuate and recharge system.
AC359A	Engine tends to overheat.	Engine cooling systems mal- function.	Check and repair engine cooling system.
	<ul> <li>An area of the low-pressure pipe is colder than areas near the evaporator outlet.</li> <li>Plates are sometimes covered with frost.</li> </ul>	<ul> <li>Excessive liquid refrigerant on low-pressure side</li> <li>Excessive refrigerant discharge flow</li> <li>Expansion valve is open a little compared with the specification.</li> <li>Improper expansion valve adjustment</li> </ul>	Replace expansion valve.

High-pressure Side is Too High and Low-pressure Side is Too Low

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
High-pressure side is too high and low-pressure side is too low.	Upper side of condenser and high-pressure side are hot, however, liquid tank is not so hot.	High-pressure tube or parts located between compressor and condenser are clogged or crushed.	<ul> <li>Check and repair or replace malfunctioning parts.</li> <li>Check oil for contamination.</li> </ul>

High-pressure Side is Too Low and Low-pressure Side is Too High

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# < SYMPTOM DIAGNOSIS >

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
High-pressure side is too low and low-pressure side is too high.	High- and low-pressure sides become equal soon after compressor operation stops.	Compressor pressure operation is improper.  Understand the compressor packings.	Replace compressor.
LO (HI)  AC356A	No temperature difference between high- and low-pressure sides.	Compressor pressure operation is improper.  Understand the compressor packings.	Replace compressor.

# Both High- and Low-pressure Sides are Too Low

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
	<ul> <li>There is a big temperature difference between liquid tank outlet and inlet. Outlet temperature is extremely low.</li> <li>Liquid tank inlet and expansion valve are frosted.</li> </ul>	Liquid tank inside is slightly clogged.	Replace liquid tank.     Check oil for contamination.
	Temperature of expansion valve inlet is extremely low as compared with areas near liquid tank. Expansion valve inlet may be frosted. Temperature difference occurs somewhere in highpressure side.	High-pressure pipe located between liquid tank and expansion valve is clogged.	Check and repair malfunctioning parts.     Check oil for contamination.
Both high- and low-pressure sides are too low.	Expansion valve and liquid tank are warm or only cool when touched.	Low refrigerant charge. ↓ Leaking fittings or components.	Check refrigerant system for leaks. Refer to HA-23, "Checking of Refrigerant Leaks".
(O) HI)  W W AC353A	There is a big temperature difference between expansion valve inlet and outlet while the valve itself is frosted.	Expansion valve closes a little compared with the specification.   1. Improper expansion valve adjustment. 2. Malfunctioning expansion valve. 3. Outlet and inlet may be clogged.	<ul> <li>Remove foreign particles by using compressed air.</li> <li>Check oil for contamination.</li> </ul>
	An area of the low-pressure pipe is colder than areas near the evaporator outlet.	Low-pressure pipe is clogged or crushed.	<ul><li>Check and repair malfunctioning parts.</li><li>Check oil for contamination.</li></ul>
	Air flow volume is too low.	Evaporator is frozen.	Check intake sensor circuit. Refer to HAC-226, "Intake Sensor Diagnosis Procedure". Repair evaporator fins. Replace evaporator. Refer to HAC-213, "Front Blower Motor Component Function Check".

Low-pressure Side Sometimes Becomes Negative

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Low-pressure side sometimes becomes negative.	Air conditioning system does not function and does not cyclically cool the compartment air.     The system constantly functions for a certain period of time after compressor is stopped and restarted.	Refrigerant does not discharge cyclically.   Moisture is frozen at expansion valve outlet and inlet.  Water is mixed with refrigerant.	Drain water from refrigerant or replace refrigerant.     Replace liquid tank.

# Low-pressure Side Becomes Negative

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Low-pressure side becomes negative.	Liquid tank or front/rear side of expansion valve's pipe is frosted or dewed.	High-pressure side is closed and refrigerant does not flow. ↓ Expansion valve or liquid tank is frosted.	Leave the system at rest until no frost is present. Start it again to check whether or not the malfunction is caused by water or foreign particles.  If water is the cause, initially cooling is okay. Then the water freezes causing a blockage. Drain water from refrigerant or replace refrigerant.  If due to foreign particles, remove expansion valve and remove the particles with dry and compressed air (not shop air).  If either of the above methods cannot correct the malfunction, replace expansion valve.  Replace liquid tank.

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[MANUAL A/C (TYPE 2)]

# INSUFFICIENT HEATING

# Component Function Check

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SYMPTOM: Insufficient heating

### INSPECTION FLOW

# 1.confirm symptom by performing operational check - temperature increase

- Turn the blower control dial to low speed.
- Turn the temperature control dial clockwise to maximum heat
- 3. Check for hot air at discharge air outlets.

### Can this symptom be duplicated?

YES >> GO TO 2.

NO >> Perform complete system operational check. Refer to <a href="HAC-181">HAC-181</a>, "Operational Check".

# 2.CHECK FOR SERVICE BULLETINS

Check for any service bulletins.

>> GO TO 3.

# 3.CHECK ENGINE COOLING SYSTEM

- 1. Check for proper engine coolant level. Refer to CO-10, "Inspection".
- 2. Check hoses for leaks or kinks.
- 3. Check radiator cap. Refer to CO-10, "Inspection".
- 4. Check for air in cooling system.

>> GO TO 4.

# 4. CHECK AIR MIX DOOR OPERATION

Check the operation of the air mix door.

### Is the inspection result normal?

YES >> GO TO 5.

NO >> Check the air mix door motor circuit. Refer to <u>HAC-201</u>, "Air Mix Door Motor Component Function Check".

# 5. CHECK AIR DUCTS

Check for disconnected or leaking air ducts.

### Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair all disconnected or leaking air ducts.

# 6. CHECK HEATER HOSE TEMPERATURES

- 1. Start engine and warm it up to normal operating temperature.
- Touch both the inlet and outlet heater hoses. The inlet hose should be hot and the outlet hose should be warm.

# Is the inspection result normal?

YES >> Hot inlet hose and a warm outlet hose: GO TO 7.

NO >> • Inlet hose cold: GO TO 10.

Both hoses warm: GO TO 8.

# .CHECK ENGINE COOLANT SYSTEM

Check engine coolant temperature sensor. Refer to EC-126, "Component Inspection".

### Is the inspection result normal?

YES >> System OK.

NO >> Repair or replace as necessary. Retest.

# 8.CHECK HEATER HOSES

# **INSUFFICIENT HEATING**

[MANUAL A/C (TYPE 2)] < SYMPTOM DIAGNOSIS > Check heater hoses for proper installation. Α Is the inspection result normal? YES >> System OK. NO >> 1. Back flush heater core. 2. Drain the water from the system. В 3. Refill system with new engine coolant. Refer to CO-11, "Changing Engine Coolant". 4. GO TO 9 to retest. 9. CHECK HEATER HOSE TEMPERATURES C Start engine and warm it up to normal operating temperature. 2. Touch both the inlet and outlet heater hoses. The inlet hose should be hot and the outlet hose should be D Is the inspection result normal? YES >> System OK. Е NO >> Replace heater core. Refer to VTL-15, "Removal and Installation". 10. CHECK WATER VALVE Check the operation of the water valve. Refer to HAC-224, "Water Valve Diagnosis Procedure". F Is the inspection result normal? YES >> System OK. NO >> Replace water valve. Н

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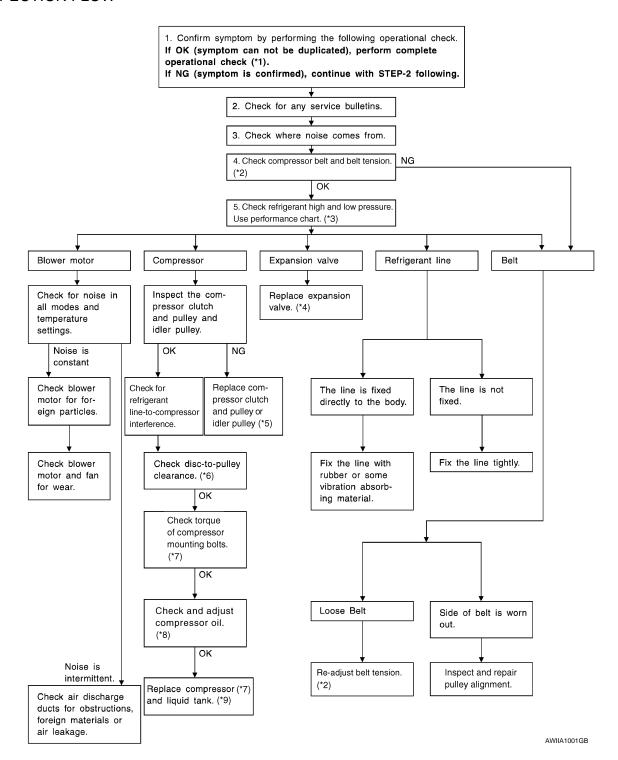
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# NOISE

# Component Function Check

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SYMPTOM: Noise INSPECTION FLOW



- \*1 HAC-181, "Operational Check"
- **Expansion Valve**"
- Compressor"
- \*2 EM-13, "Checking Drive Belts"
- HA-44, "Removal and Installation for \*5 HA-34, "Removal and Installation for \*6 HA-34, "Removal and Installation for Compressor Clutch"
  - in Compressor"
- \*3 HAC-247, "Performance Chart"
- Compressor Clutch"
- \*7 HA-33, "Removal and Installation for \*8 HA-20, "Maintenance of Oil Quantity \*9 HA-42, "Removal and Installation for Condenser"

# **PRECAUTION**

# **PRECAUTIONS**

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

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

### **WARNING:**

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

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

### **WARNING:**

- When working near the Airbag Diagnosis Sensor Unit or other Airbag System sensors with the Ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.
- When using air or electric power tools or hammers, always switch the Ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.

Working with HFC-134a (R-134a)

### **WARNING:**

- CFC-12 (R-12) refrigerant and HFC-134a (R-134a) refrigerant are not compatible. If the refrigerants are mixed compressor failure is likely to occur. Refer to <a href="HA-4">HA-4</a>, "Contaminated Refrigerant". To determine the purity of HFC-134a (R-134a) in the vehicle and recovery tank, use Refrigerant Recovery/Recycling Recharging equipment and Refrigerant Identifier.
- Use only specified oil for the HFC-134a (R-134a) A/C system and HFC-134a (R-134a) components. If oil other than that specified is used, compressor failure is likely to occur.
- The specified HFC-134a (R-134a) oil rapidly absorbs moisture from the atmosphere. The following handling precautions must be observed:
- When removing refrigerant components from a vehicle, immediately cap (seal) the component to minimize the entry of moisture from the atmosphere.
- When installing refrigerant components to a vehicle, do not remove the caps (unseal) until just before connecting the components. Connect all refrigerant loop components as quickly as possible to minimize the entry of moisture into system.
- Only use the specified oil from a sealed container. Immediately reseal containers of oil. Without proper sealing, oil will become moisture saturated and should not be used.
- Avoid breathing A/C refrigerant and oil vapor or mist. Exposure may irritate eyes, nose and throat. Remove HFC-134a (R-134a) from the A/C system using certified service equipment meeting requirements of SAE J2210 [HFC-134a (R-134a) recycling equipment], or J2209 [HFC-134a (R-134a) recycling equipment], If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from refrigerant and oil manufacturers.
- Do not allow A/C oil to come in contact with styrofoam parts. Damage may result.

CONTAMINATED REFRIGERANT

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# < PRECAUTION >

If a refrigerant other than pure HFC-134a (R-134a) is identified in a vehicle, your options are:

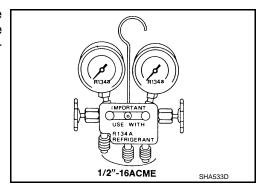
- Explain to the customer that environmental regulations prohibit the release of contaminated refrigerant into the atmosphere.
- Explain that recovery of the contaminated refrigerant could damage your service equipment and refrigerant supply.
- Suggest the customer return the vehicle to the location of previous service where the contamination may have occurred.
- If you choose to perform the repair, recover the refrigerant using only dedicated equipment and containers. Do not recover contaminated refrigerant into your existing service equipment. If your facility does not have dedicated recovery equipment, you may contact a local refrigerant product retailer for available service. This refrigerant must be disposed of in accordance with all federal and local regulations. In addition, replacement of all refrigerant system components on the vehicle is recommended.
- If the vehicle is within the warranty period, the air conditioner warranty is void. Please contact NISSAN Customer Affairs for further assistance.

# Precaution for Service Equipment

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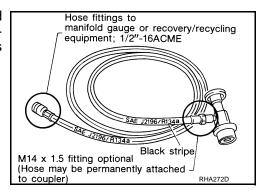
### MANIFOLD GAUGE SET

Be certain that the gauge face indicates R-134a or 134a. Make 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) along with specified oil.



# SERVICE HOSES

Be certain that the service hoses display the markings described (colored hose with black stripe). All hoses must include positive shutoff devices (either manual or automatic) near the end of the hoses opposite 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 will 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	

