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# **HEATER & AIR CONDITIONING CONTROL SYSTEM**

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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 [with variable blower control (VBC)]	AWIIA0481ZZ
Manual A/C (Type 2)	Three Control Dial System [without variable blower con- trol (VBC)]	AWIIA1228ZZ

**DIAGNOSIS AND REPAIR WORKFLOW** [MANUAL A/C (TYPE 1)] < BASIC INSPECTION > DIAGNOSIS AND REPAIR WORKFLOW Α How to Perform Trouble Diagnosis For Quick And Accurate Repair INFOID:0000000007326812 **WORK FLOW** В 1.LISTEN TO CUSTOMER COMPLAINT Listen to customer complaint. Get detailed information about the conditions and environment when the symptom occurs. >> GO TO 2 D 2. CHECK FOR SERVICE BULLETINS Check for any service bulletins. Е >> GO TO 3. 3.VERIFY THE SYMPTOM WITH OPERATIONAL CHECK F Verify the symptom with operational check. Refer to HAC-6, "Operational Check". Can a symptom be duplicated? YES >> Go to trouble diagnosis. Refer to HAC-57, "Symptom Matrix Chart". NO >> GO TO 4.

Perform front air control self-diagnosis. Refer to <u>HAC-17</u>, "Front Air Control Self-Diagnosis".

f 4.PERFORM THE FRONT AIR CONTROL SELF-DIAGNOSIS

>> If any diagnostic trouble codes set. Refer to <a href="HAC-17">HAC-17</a>, "Front Air Control Self-Diagnosis Chart".

>> Confirm the repair by performing operational check. Refer to <a href="HAC-6">HAC-6</a>, "Operational Check".

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[MANUAL A/C (TYPE 1)]

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# INSPECTION AND ADJUSTMENT

Operational Check

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

The purpose of the operational check to to commit that the cyclom operation properly.

# Conditions : Engine running and at normal operating temperature

# CHECKING BLOWER

- Turn blower control dial clockwise. Blower should operate on low speed.
- 2. Turn the blower control dial again, and continue checking each blower speed until all speeds are checked.
- 3. Leave blower on HI speed.

If NG, go to trouble diagnosis procedure for HAC-32, "Front Blower Motor Diagnosis Procedure".

If OK, continue with next check.

### CHECKING DISCHARGE AIR

Press each mode switch and confirm that discharge air comes out according to the air distribution table. Refer tot <u>HAC-12</u>, "Discharge Air Flow".

Mode door position is checked in the next step.

If NG, go to trouble diagnosis procedure for HAC-20, "Mode Door Motor Diagnosis Procedure".

If OK, continue with next check.

### NOTE:

Confirm that the A/C compressor clutch is engaged (sound or visual inspection) and intake door position is at fresh when the DEF ( $\mathfrak{W}$ ) or D/F ( $\mathfrak{W}$ ) is selected.

# CHECKING RECIRCULATION

- 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-29, "Intake Door Motor Diagnosis Procedure".

If OK, continue with next 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 TEMPERATURE DECREASE

- Rotate temperature control dial counterclockwise.
- 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-58</u>, <u>"Component Function Check"</u>. If air mix door motor appears to be malfunctioning, go to <u>HAC-24</u>, "Air Mix Door <u>Motor Component Function Check"</u>.

If OK, continue with next check.

# CHECKING TEMPERATURE INCREASE

- 1. Rotate temperature control dial clockwise.
- 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-66</u>, <u>"Component Function Check"</u>. If air mix door motor (front) appears to be malfunctioning, go to <u>HAC-24</u>, <u>"Air Mix Door Motor Component Function Check"</u>.

If OK, continue with next check.

### CHECK A/C SWITCH

- Press A/C switch with the blower switch ON.
- A/C switch indicator will turn ON.
  - Confirm that the compressor clutch engages (sound or visual inspection).

If NG, go to trouble diagnosis procedure for HAC-37, "Magnet Clutch Diagnosis Procedure".

If OK, continue with next check.

# MANUAL A/C IDENTIFICATION TABLE

< SYSTEM DESCRIPTION >

[MANUAL A/C (TYPE 1)]

# SYSTEM DESCRIPTION

# MANUAL A/C IDENTIFICATION TABLE

Application Table

Manual A/C Type	Description	Visual Identification
Manual A/C (Type 1)	Two Control Dial System [with variable blower control (VBC)]	AWIIA0481ZZ
Manual A/C (Type 2)	Three Control Dial System [without variable blower con- trol (VBC)]	AWIIA1228ZZ

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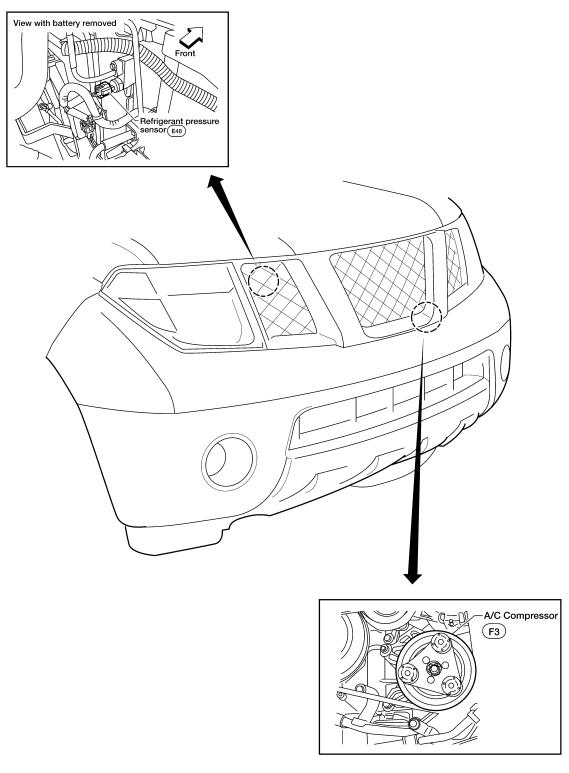
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# **FUNCTION INFORMATION**

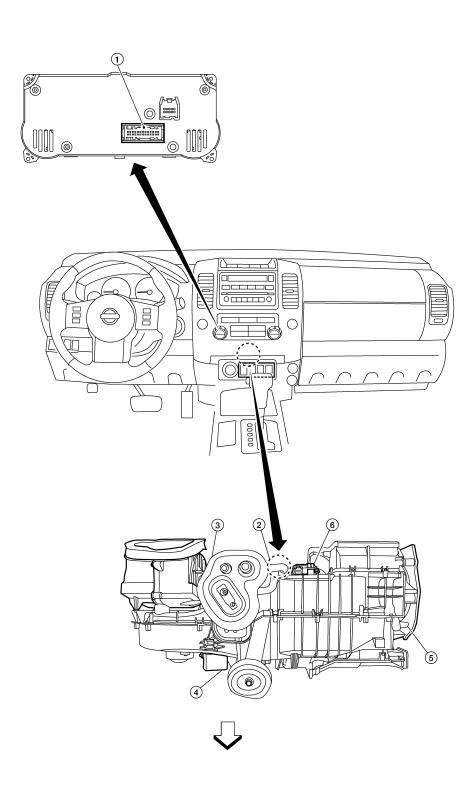
# **Component Part Location**

**ENGINE COMPARTMENT** 





# PASSENGER COMPARTMENT



AWIIA1198ZZ

- $\Rightarrow$  :Front
- 3. Intake door motor M58
- 6. Air mix door motor M147
- 1. Front air control M50
- 4. Variable blower control M121
- 2. Intake sensor M146
- 5. Mode door motor M142

Revision: October 2015 HAC-9 2012 Frontier NAM

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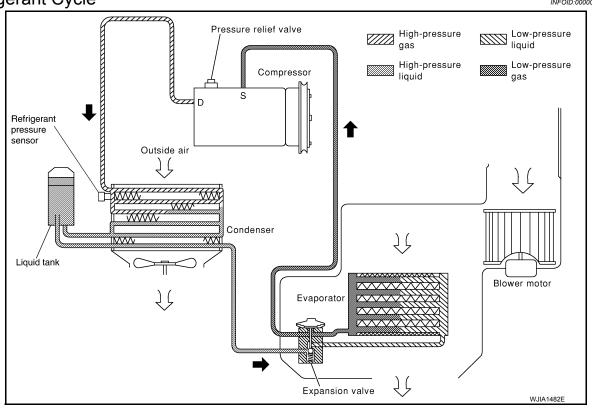
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# REFRIGERATION SYSTEM

# Refrigerant Cycle

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# REFRIGERANT FLOW

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

### FREEZE PROTECTION

The compressor cycles on and off to maintain the evaporator temperature within a specified range. When the evaporator coil temperature falls below a specified point, the intake sensor interrupts the compressor operation. When the evaporator coil temperature rises above the specification, the intake sensor allows compressor operation.

# Refrigerant System Protection

INFOID:0000000007326817

### 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/cm², 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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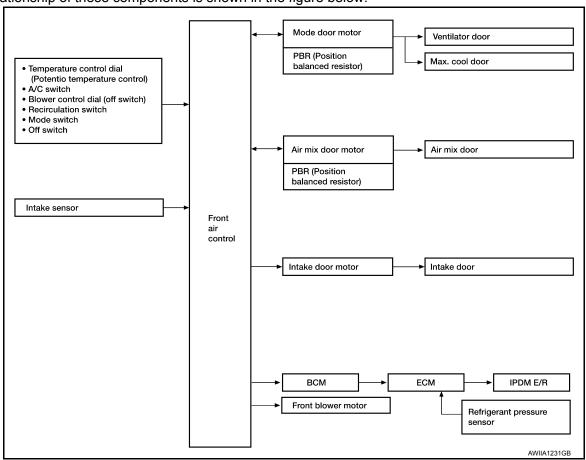
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# **CONTROL SYSTEM**

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

### INFOID:0000000007326819

# **CONTROL OPERATION**

# Front air control A/C AWIIIA1229ZZ

# MANUAL AIR CONDITIONER SYSTEM

< SYSTEM DESCRIPTION >

[MANUAL A/C (TYPE 1)]

# TEMPERATURE CONTROL DIAL (TEMPERATURE CONTROL)

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, or at the D/F or FOOT position.

# DEFROSTER ( ) SWITCH

Positions the air outlet doors to the defrost position. Also positions the intake doors to the outside air position.

# REAR WINDOW DEFOGGER SWITCH

When switch is ON, rear window is defogged.

# OFF SWITCH (BLOWER SPEED DIAL)

The compressor and blower are OFF.

### A/C SWITCH

The compressor is ON or OFF.

(Pressing the A/C switch will turn off the A/C switch and compressor.)

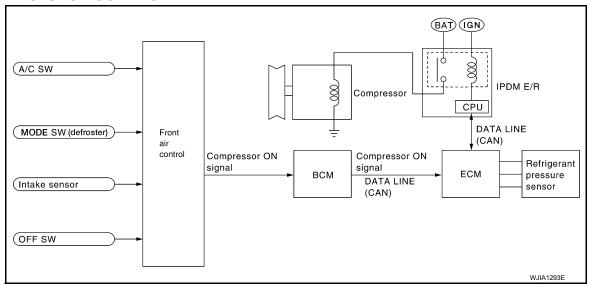
# MODE SWITCHES

Controls the air discharge outlets.

## FRONT BLOWER CONTROL DIAL

Manually controls the blower speed.

### MAGNET CLUTCH CONTROL



When the A/C switch is pressed, or the mode switch is pressed to the DEF or D/F position, the front air control outputs a compressor ON signal to BCM.

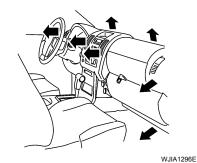
The BCM then sends a compressor ON signal to ECM, via CAN communication line.

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:0000000007326820



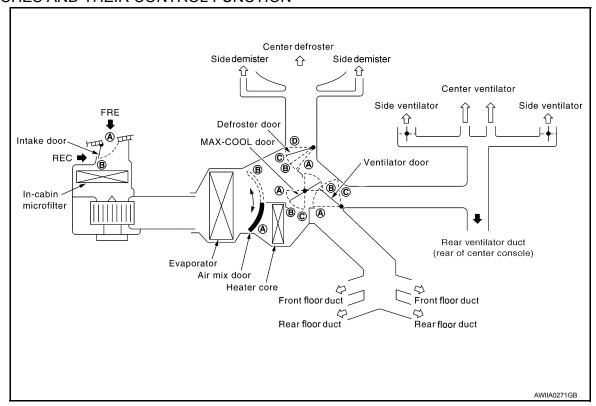
Mode door position		Air outlet/distribution	
·	Vent	Foot	Defroster
*;	95%	5%	_
ij	60%	40%	_
, j	20%	55%	25%
<b>*</b>	15%	50%	35%
₩	7%	15%	78%

Airflow always present at driver and passenger side demisters

Switches And Their Control Function

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# SWITCHES AND THEIR CONTROL FUNCTION



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Position		MOD	E SW		DEF	SW	REC	SW	Temp	erature	dial	OFF
or	VENT	B/L	FOOT	D/F	ON	OFF	ON OFF			SW		
switch	→ •	_+.		<b>W</b> •	FRONT		<b>E</b>		] ((	M/c )	((ע	1
		+7,1	<b>+</b> ~	+,~	> ♦ €	0	-> • <	0	COLD	~	нот	A/C •
Ventilator door	<b>(A)</b>	B	©	©	©		_	_		_		©
MAX-COOL door	A	B	B	B	©		_			_		B
Defroster door	<b>©</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		B	

# **DIAGNOSIS SYSTEM (BCM)**

< SYSTEM DESCRIPTION >

[MANUAL A/C (TYPE 1)]

# DIAGNOSIS SYSTEM (BCM)

**COMMON ITEM** 

COMMON ITEM: CONSULT Function (BCM - COMMON ITEM)

INFOID:0000000007808116

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# APPLICATION ITEM

CONSULT performs the following functions via CAN communication with BCM.

Direct Diagnostic Mode	Description
Ecu Identification	The BCM part number is displayed.
Self Diagnostic Result	The BCM self diagnostic results are displayed.
Data Monitor	The BCM input/output data is displayed in real time.
Active Test	The BCM activates outputs to test components.
Work support	The settings for BCM functions can be changed.
Configuration	<ul> <li>The vehicle specification can be read and saved.</li> <li>The vehicle specification can be written when replacing BCM.</li> </ul>
CAN Diag Support Mntr	The result of transmit/receive diagnosis of CAN communication is displayed.

# SYSTEM APPLICATION

BCM can perform the following functions.

				Direct D	Diagnosti	c Mode		
System	Sub System	Ecu Identification	Self Diagnostic Result	Data Monitor	Active Test	Work support	Configuration	CAN Diag Support Mntr
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 CONDITIONER			×				
Combination switch	COMB SW			×				
BCM	BCM	×	×			×	×	×
Immobilizer	IMMU		×	×	×			
Interior room lamp battery saver	BATTERY SAVER			×	×	×		
Vehicle security system	THEFT ALM			×	×	×		
RAP system	RETAINED PWR			×	×	×		
Signal buffer system	SIGNAL BUFFER			×	×			
TPMS	AIR PRESSURE MONITOR		×	×	×	×		
Panic alarm system	PANIC ALARM				×			

# **AIR CONDITIONER**

# **DIAGNOSIS SYSTEM (BCM)**

< SYSTEM DESCRIPTION >

[MANUAL A/C (TYPE 1)]

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

INFOID:0000000007808117

# **DATA MONITOR**

Monitor Item [Unit]	Description
IGN ON SW [On/Off]	Indicates condition of ignition switch ON position.
FAN ON SIG [On/Off]	Indicates condition of fan switch.
AIR COND SW [On/Off]	Indicates condition of A/C switch.

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# SELF-DIAGNOSIS FUNCTION

# Front Air Control Self-Diagnosis

# A/C SYSTEM SELF-DIAGNOSIS FUNCTION

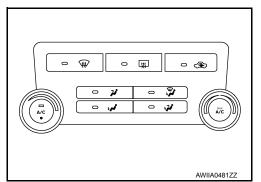
The self-diagnosis function is built into the front air control to quickly locate the cause of malfunctions.

# DESCRIPTION

The self-diagnostic system diagnoses sensors, CAN system, and battery voltage on front air control. Refer to applicable sections (items) for details. Malfunctions (if any are present) will be displayed in the form of turning ON the A/C, MAX A/C, DEF and Intake button LED's. Refer to HAC-17, "Front Air Control Self-Diagnosis Chart".

# SELF-DIAGNOSTIC MODE

- Turn ignition switch ON.
- Press the FLOOR/DEF (\$\mathbb{W}\$) and DEF (\$\mathbb{W}\$) mode switches at the same time and release on the front air control.
- 3. Press the FLOOR ( ) and intake ( ) buttons within two seconds to enter self diagnostic mode.
- 4. The mode (VENT, FLOOR/DEF, FLOOR and VENT/FLOOR) LED's start flashing in a clockwise sequence indicating that Self test is in progress. This takes about 17 seconds to complete.
- 5. All mode LED's stay ON once self test completes.
- Malfunctions (if any) will be displayed in the form of turning ON the A/C, MAX A/C, DEF and Intake button LED's. Refer to HAC-17, "Front Air Control Self-Diagnosis Chart".
- 7. To exit diagnostic mode, press any button on the front air control.



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# Front Air Control Self-Diagnosis Chart

SELF-DIAGNOSTIC CHART

Button LED	Description
A/C	Evap sensor open
MAX A/C	Evap sensor short
DEFROST	Air mix door motor circuit malfunctioning
INTAKE	Mode door motor circuit malfunctioning

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[MANUAL A/C (TYPE 1)]

# **DTC/CIRCUIT DIAGNOSIS**

# MANUAL A/C IDENTIFICATION TABLE

Application Table

Manual A/C Type	Description	Visual Identification
Manual A/C (Type 1)	Two Control Dial System [with variable blower control (VBC)]	AWIIA0481ZZ
Manual A/C (Type 2)	Three Control Dial System [without variable blower con- trol (VBC)]	AWIIA1228ZZ

# **MODE DOOR MOTOR**

# System Description

### INFOID:0000000007326827

# SYSTEM DESCRIPTION

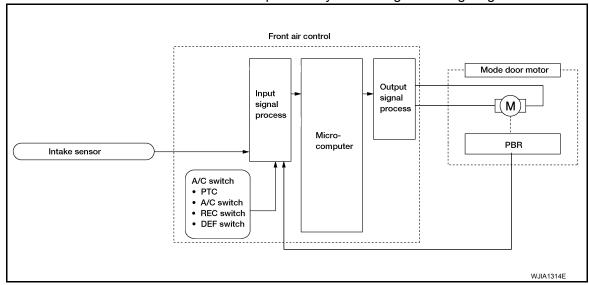
# Component Parts

Mode door control system components are:

- Front air control
- Mode door motor
- Position Balanced Resistor (PBR) (built into mode door motor)
- · Intake sensor

# System Operation

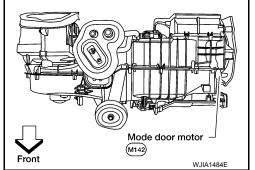
The mode door position (vent, B/L, foot, D/F, and defrost) is set by the front air control by means of the mode door motor. When a mode door position is selected on the front air control, voltage is applied to one circuit of the mode door motor while ground is applied to the other circuit, causing the 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 and 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:0000000007326828

### SYMPTOM:

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

# INSPECTION FLOW

Revision: October 2015 HAC-19 2012 Frontier NAM

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[MANUAL A/C (TYPE 1)]

# $1. {\hbox{\rm confirm symptom by performing operational check - discharge air}}\\$

- Turn blower control dial to HI speed.
- Press each mode switch and check all positions.
- Confirm that discharge air comes out according to the air distribution table. Refer to HAC-12, "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-20, "Mode Door Motor Diagnosis Procedure". NO

# Mode Door Motor Diagnosis Procedure

INFOID:0000000007326829

Regarding Wiring Diagram information, refer to HAC-49, "Wiring Diagram - With Type 1".

### SYMPTOM:

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

# $1.\mathsf{check}$ mode door motor circuits for open and short to ground

- Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector M50 (A) and the mode door motor harness connector M142 (B).
- Check continuity between front air control harness connector M50 (A) terminals 19, 20 and the mode door motor harness connector M142 (B) terminals 1, 6.

А		В		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
M50	20	M142	1	Yes	
IVIOU	19	101142	6	162	

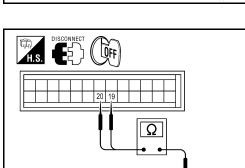
Check continuity between front air control harness connector M50 terminals 19, 20 and ground.

Connector	Terminal	_	Continuity
M50	19	Ground	No
WISO	20	Ground	INO

# Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness as necessary.

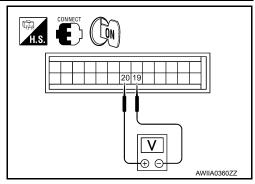


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H.S. DISCONNECT OFF	
H.S. <b>1</b> 20 19	
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# 2.CHECK FRONT AIR CONTROL FOR MODE DOOR MOTOR POWER AND GROUND

- Reconnect front air control harness connector.
- 2. Turn ignition switch ON.
- 3. Press the mode switch D/F ( ) mode.
- 4. Check voltage between front air control harness connector M50 terminal 19 and terminal 20 while pressing the VENT (\*\*) mode, and then the B/L (💝) mode.

Connector	Tern	ninals	Condition	Voltage (Approx.)	
Connector	(+)	(-)	Condition		
M50	20	19	While pressing the mode control from D/F ( ) mode to VENT ( ) mode	Battery voltage	
WIJU	19	20	While pressing the mode control from VENT (***) mode to B/L (****) mode	Battery voltage	



# Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace front air control. Refer to <a href="VTL-7">VTL-7</a>, "Removal and Installation".

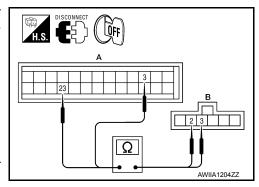
# 3.check mode door motor pbr circuits for open and short to ground

- Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector M50.
- Check continuity between front air control harness connector M50 (A) terminals 3, 23 and the mode door motor harness connector M142 (B) terminals 2, 3.

Α		В		Continuity
Connector	Terminal	Connector	Terminal	Continuity
M50	3	M142	2	Yes
IVISO	23	IVITAL	3	165

Check continuity between front air control harness connector

M50 terminals 3, 23 and ground.			
Connector	Terminal	_	Continuity
MEO (A)	3	Cround	No
M50 (A)	23	Ground	No



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Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace harness as necessary.

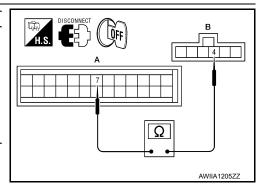
# f 4 .CHECK PBR FEEDBACK SIGNAL CIRCUIT FOR OPEN AND SHORT TO GROUND

1. Check continuity between front air control harness connector M50 (A) terminal 7 and mode door motor harness connector M142 (B) terminal 4.

A		В		Continuity
Connector	Terminal	Connector	Terminal	Continuity
M50	7	M142	4	Yes

Check continuity between front air control harness connector M50 (A) terminal 7 and ground.

Connector	Terminal	_	Continuity
M50 (A)	7	Ground	No



Is the inspection result normal?

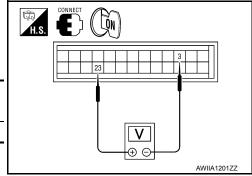
YES >> GO TO 6.

NO >> Repair or replace harness as necessary.

**5.**CHECK FRONT AIR CONTROL FOR 5 VOLT REFERENCE (VREF), VREF RETURN, AND FEEDBACK SIGNAL

- 1. Reconnect front air control harness connectors.
- 2. Turn ignition switch ON.
- 3. Check voltage between front air control harness connector M50 terminal 3 and terminal 23.

Connector	Terminals	Connector -	Terminals	Voltage (Approx.)
Connector	(+)		(-)	voitage (Approx.)
M50	3	M50	23	5 Volts



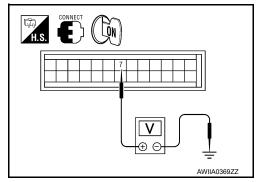
 Check voltage between front air control harness connector M50 terminal 7 and ground.

Connector	Terminal	_	Voltage (Approx.)
M50	7	Ground	0 Volts

# Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace front air control. Refer to <u>VTL-7</u>, "Removal and Installation".



# 6. CHECK FRONT AIR CONTROL FOR FEEDBACK SIGNAL

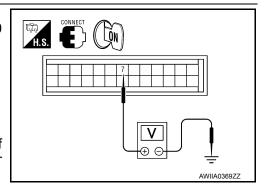
- Reconnect the mode door motor harness connector M142.
- 2. Check voltage between front air control harness connector M50 terminal 7 and ground.

Connector	Terminal	_	Voltage (Approx.)
M50	7	Ground	0.2 to 4.8 Volts

# Is the inspection result normal?

YES >> Inspect mode door for binding or mechanical failure. If mode door moves freely, replace front air control. Refer to <a href="VTL-7">VTL-7</a>, "Removal and Installation".

NO >> Replace the mode door motor. Refer to <u>VTL-19</u>. "Removal and Installation".



# System Description

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## SYSTEM DESCRIPTION

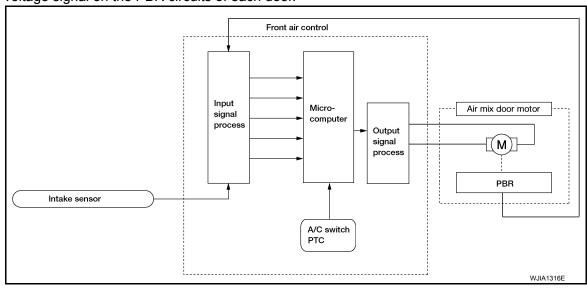
# Component Parts

Air mix door control system components are:

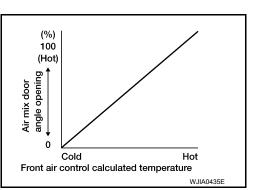
- Front air control
- Air mix door motor
- Position Balanced Resistor (PBR) (built into air mix door motor)
- · Intake sensor

# System Operation

The front air control receives data from the temperature selected by the driver. The front air control then applies a voltage to one circuit of the air mix door motor, while ground is applied to the other circuit, causing the 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

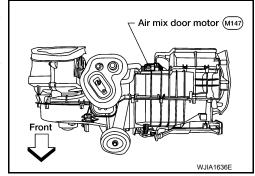
Air Mix Door Motor

Revision: October 2015 HAC-23 2012 Frontier NAM

# < DTC/CIRCUIT DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

The air mix door motor is attached to the heater and cooling unit assembly. This 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

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# INSPECTION FLOW

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

- Blower must be ON.
- 2. Turn the temperature control dial clockwise to maximum heat.
- 3. 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 <u>HAC-24</u>, "Air Mix Door Motor Diagnosis Procedure".

# Air Mix Door Motor Diagnosis Procedure

INFOID:0000000007326832

Regarding Wiring Diagram information, refer to HAC-49, "Wiring Diagram - With Type 1".

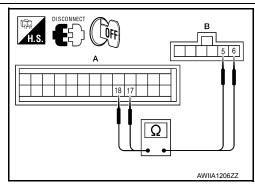
### SYMPTOM:

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

# 1. CHECK AIR MIX DOOR MOTOR CIRCUITS FOR OPEN AND SHORT TO GROUND

- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector M50 (A) and the air mix door motor harness connector M147 (B).
- 3. Check continuity between front air control harness connector M50 (A) terminals 17, 18 and the air mix door motor harness connector M147 (B) terminals 5, 6.

А		В		Continuity
Connector	Terminal	Connector	Terminal	Continuity
M50	18	M147	6	Yes
WIGO	17	101147	5	168



# < DTC/CIRCUIT DIAGNOSIS >

# [MANUAL A/C (TYPE 1)]

4. Check continuity between front air control harness connector M50 terminals 17, 18 and ground.

Connector	Terminal	_	Continuity
M50	17	Ground	No
WISO	18	Ground	140

# Is the inspection result normal?

YES >> GO TO 3.

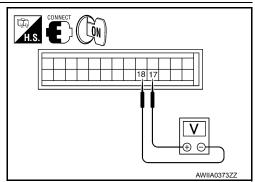
NO >> Repair or replace harness as necessary.

# DISCONNECT OFF

# 2.CHECK FRONT AIR CONTROL FOR AIR MIX DOOR MOTOR POWER AND GROUND

- 1. Reconnect front air control harness connector.
- 2. Turn ignition switch ON.
- 3. Press the mode switch D/F ( ) mode.
- 4. Check voltage between front air control harness connector M50 terminal 17 and terminal 18 while pressing the mode switch to VENT (\*\*), and then to B/L (\*\*) mode.

Connector	Tern	ninals	Condition	Voltage (Approx.)	
Connector	(+)	(-)	Condition		
M50	18	17	Pressing the mode switch from D/F (***) mode to VENT (***) mode	Battery voltage	
	17	18	Pressing the mode switch from VENT (**) mode to B/L (**) mode	Battery voltage	



# Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace front air control. Refer to VTL-7, "Removal and Installation".

# 3.CHECK AIR MIX DOOR MOTOR PBR CIRCUITS FOR OPEN AND SHORT TO GROUND

- Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector M50.
- Check continuity between front air control harness connector M50 (A) terminals 3, 23 and the air mix door motor harness connector M147 (B) terminals 1, 3.

A		В		Continuity
Connector	Terminal	Connector	Terminal	Continuity
M50	3	M147	3	Yes
	23	101147	1	165

 Check continuity between front air control harness connector M50 (A) terminals 3, 23 and ground.

H.S. DISCONNECT OFF	B 1 3
23	Δ AWIIA1207ZZ

Connector	Terminal	_	Continuity	
M50 (A)	3	Ground	No	
	23	Ground	140	

# Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace harness as necessary.

4. CHECK PBR FEEDBACK SIGNAL CIRCUIT FOR OPEN AND SHORT TO GROUND

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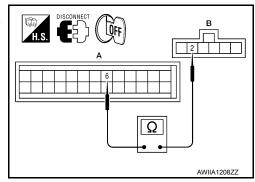
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 Check continuity between front air control harness connector M50 (A) terminal 6 and air mix door motor harness connector M147 (B) terminal 2.

A		В		Continuity
Connector	Terminal	Connector	Terminal	Continuity
M50	6	M147	2	Yes



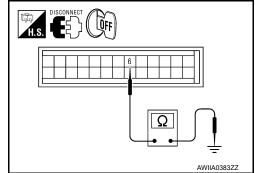
2. Check continuity between front air control harness connector M50 terminal 6 and ground.

Connector	Terminal	_	Continuity
M50	6	Ground	No

# Is the inspection result normal?

YES >> GO TO 6.

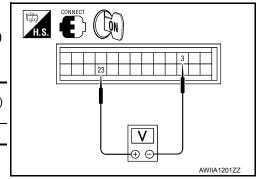
NO >> Repair or replace harness as necessary.



# 5.CHECK FRONT AIR CONTROL FOR 5 VOLT REFERENCE (VREF), VREF RETURN, AND FEEDBACK SIGNAL

- 1. Reconnect front air control harness connectors.
- 2. Turn ignition switch ON.
- 3. Check voltage between front air control harness connector M50 terminal 3 and terminal 23.

Connector	Terminals	Connector	Terminals	Voltage (Approx.)
Connector	(+)	Connector	(-)	voltage (Approx.)
M50	3	M50	23	5 Volts



4. Check voltage between front air control harness connector M50 terminal 6 and ground.

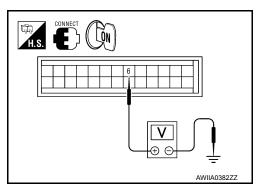
Connector	Terminal	_	Voltage (Approx.)
M50	6	Ground	0 Volts

# Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace front air control. Refer to <u>VTL-7</u>, "Removal and Installation".





# < DTC/CIRCUIT DIAGNOSIS >

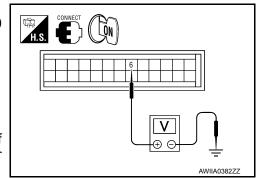
# [MANUAL A/C (TYPE 1)]

- 1. Reconnect the air mix door motor harness connector M147.
- 2. Check voltage between front air control harness connector M50 terminal 6 and ground.

Connector	Terminal	_	Voltage (Approx.)
M50	6	Ground	0.2 to 4.8 Volts

# Is the inspection result normal?

- YES >> Inspect air mix door for binding or mechanical failure. If air mix door moves freely, replace front air control. Refer to <a href="VTL-7">VTL-7</a>, "Removal and Installation".
- NO >> Replace the air mix door motor. Refer to <u>VTL-20</u>. "Removal and Installation".



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# INTAKE DOOR MOTOR

# System Description

### INFOID:0000000007326833

## SYSTEM DESCRIPTION

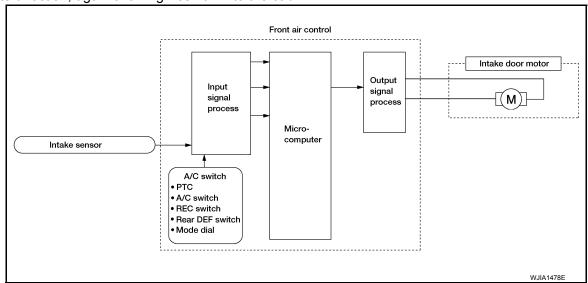
# Component Parts

Intake door control system components are:

- Front air control
- · Intake door motor
- · Intake sensor

# System Operation

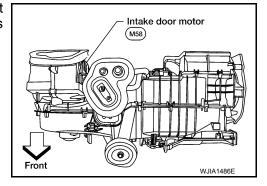
The intake door control determines the intake door position based on the position of the recirculation switch. When the recirculation switch is depressed the intake door motor rotates closing off the fresh air inlet and recirculating the cabin air. If the recirculation switch is depressed again, the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



# 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:0000000007326834

### SYMPTOM:

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

### INSPECTION FLOW

1.confirm symptom by performing operational check - rec (  $lap{\colored}$  )

1. Turn blower control dial to any speed.

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- Press vent mode (\*) switch.
- 3. Press REC ( ) switch.
- 4. Press REC ( ) switch again.
- 5. Listen for intake door position change (you should hear blower sound change slightly).

# Is the inspection result normal?

YES >> Inspection End.

NO >> Go to diagnosis procedure. Refer to <a href="HAC-29">HAC-29</a>, "Intake Door Motor Diagnosis Procedure".

# Intake Door Motor Diagnosis Procedure

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Regarding Wiring Diagram information, refer to HAC-49, "Wiring Diagram - With Type 1".

# DIAGNOSTIC PROCEDURE FOR INTAKE DOOR MOTOR

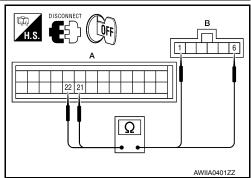
### SYMPTOM:

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

# 1. CHECK INTAKE DOOR MOTOR CIRCUITS FOR OPEN AND SHORT TO GROUND

- Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector M50 (A) and the intake door motor harness connector M58 (B).
- 3. Check continuity between front air control harness connector M50 (A) terminals 21, 22 and the intake door motor harness connector M58 (B) terminals 1, 6.

А		В		Continuity	
Connector	Terminal	Connector	Terminal	Continuity	
M50	21	M58	6	Yes	
	22	IVIOO	1	163	



 Check continuity between front air control harness connector M50 terminals 8, 7 and ground.

Connector	Terminal	_	Continuity	
M50	21	Ground	No	
	22	Giodila	NO	

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### Is the inspection result normal?

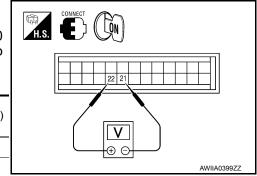
YES >> GO TO 3.

NO >> Repair or replace harness as necessary.

# 2.CHECK FRONT AIR CONTROL FOR INTAKE AIR DOOR MOTOR POWER AND GROUND

- Reconnect front air control harness connector.
- 2. Turn ignition switch ON.
- Check voltage between front air control harness connector M50 terminal 21 and terminal 22 while placing the HVAC system into self-diagnostic mode.

Connector	Tern	ninals	Condition	Voltage (Approx.)
Connector	(+)	(-)		
M50	22	21	Self-diagnostic mode (opening)	Battery voltage
IVIOU	21	22	Self-diagnostic mode (closing)	Battery voltage



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# **INTAKE DOOR MOTOR**

# < DTC/CIRCUIT DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

# Is the inspection result normal?

- YES >> Inspect intake air door for binding or mechanical failure. If intake air door moves freely, replace the intake air door motor. Refer to <a href="VTL-18">VTL-18</a>, "Removal and Installation".
- NO >> Replace front air control. Refer to <u>VTL-7</u>, "Removal and Installation".

# [MANUAL A/C (TYPE 1)]

# **BLOWER MOTOR**

# System Description

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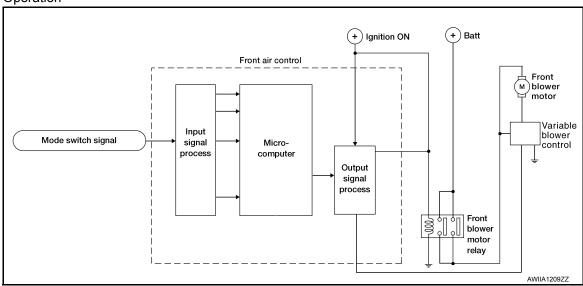
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# Component Parts

Blower speed control system components are:

- Front air control
- Variable blower control
- Front blower motor
- · Front blower motor relay

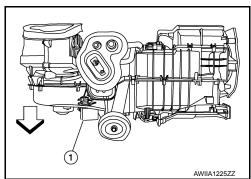
# System Operation



# COMPONENT DESCRIPTION

# Variable Blower Control

The variable blower control (1) is located on the heater and cooling unit assembly. 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.)  $\Rightarrow \downarrow$ :front.



# Front Blower Motor Component Function Check

INFOID:0000000007326837

# INSPECTION FLOW

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

- Rotate the blower control dial clockwise. Blower should operate.
- 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 <a href="HAC-32">HAC-32</a>, "Front Blower Motor Diagnosis Procedure".

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Revision: October 2015 **HAC-31** 2012 Frontier NAM

# Front Blower Motor Diagnosis Procedure

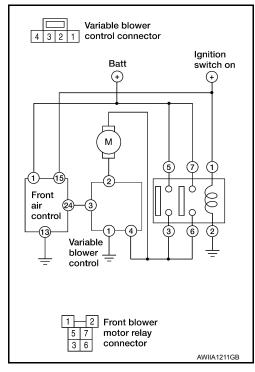
INFOID:0000000007326838

Regarding Wiring Diagram information, refer to HAC-49, "Wiring Diagram - With Type 1".

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 15A fuses [No. 24 and 27 (Located in the fuse and fusible link box)]. For fuse layout. Refer to <u>PG-77</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

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

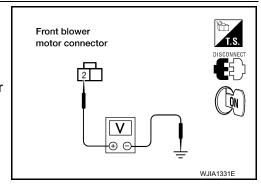
### 2 - Ground

# : Battery voltage

### Is the inspection result normal?

YES >> GO TO 12. NO >> GO TO 3.

 ${f 3.}$ CHECK FRONT BLOWER MOTOR RELAY (SWITCH SIDE) POWER SUPPLY CIRCUIT



[MANUAL A/C (TYPE 1)]

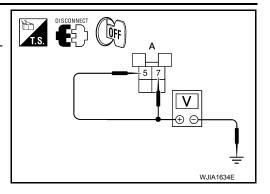
- Turn ignition switch OFF.
- 2. Disconnect front blower motor relay.
- 3. Check voltage between front blower motor relay harness connector E54 terminals 5.7 and ground.

### **5**, **7** - **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-35, "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

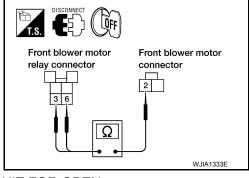
Check continuity between front blower motor relay harness connector E54 terminals 3, 6 and front blower motor harness connector M62 terminal 2.

### 3.6-2 : 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.

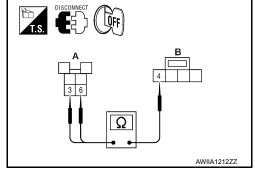
2. Check continuity between front blower motor relay harness connector E54 (A) terminals 3, 6 and variable blower control harness connector M121 (B) terminal 4.

### 3, 6 - 4 : Continuity should exist.

## Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair harness or connector.



# 7.CHECK FRONT BLOWER MOTOR RELAY (COIL SIDE) GROUND CIRCUIT

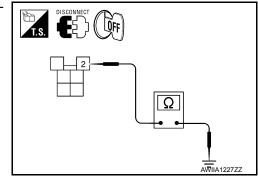
Check continuity between front blower motor relay harness connector E54 terminal 2 and ground.

### 2 - Ground : 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

**HAC-33** Revision: October 2015 2012 Frontier NAM Α

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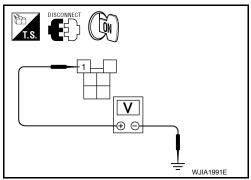
- Turn ignition switch ON.
- Check voltage between front blower motor relay harness connector E54 terminal 1 and ground.

### 1 - Ground : Battery voltage

# Is the inspection result normal?

>> Replace variable blower control. Refer to VTL-10, "Removal and Installation".

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



# 9.REPLACE FUSES

Replace fuses.

### Does the fuse blow?

>> • If fuse blows without activating the front blower motor, repair short between fuse and front blower motor relay.

If fuse blows activating the front blower motor, 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 2. control connector.
- Check continuity between variable blower control harness connector M121 terminal 4 and ground.

### : Continuity should not exist. 4 - Ground

# Is the inspection result normal?

YES >> GO TO 11.

NO >> Repair harness or connector.

# 11. CHECK FRONT BLOWER MOTOR

Check front blower motor. Refer to HAC-31, "Front Blower Motor Component Function Check".

# Is the inspection result normal?

YES >> Replace variable blower control. Refer to VTL-10, "Removal and Installation".

>> Replace front blower motor. Refer to VTL-9, "Removal and Installation". NO

# 12. CHECK FRONT BLOWER MOTOR

Check front blower motor. Refer to HAC-31, "Front Blower Motor Component Function Check".

## Is the inspection result normal?

YES >> GO TO 13.

NO >> Replace front blower motor. Refer to VTL-9, "Removal and Installation".

# 13. CHECK BLOWER MOTOR GROUND CIRCUIT

- Disconnect variable blower control harness connector.
- Check continuity between front blower motor harness connector M62 (B) terminal 1 and variable blower control harness connector M121 (A) terminal 2.

### 1 - 2 : Continuity should exist.

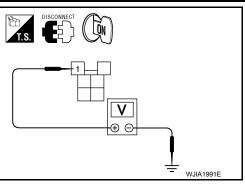
# Is the inspection result normal?

YES >> GO TO 14.

NO >> Repair harness or connector.

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[MANUAL A/C (TYPE 1)]

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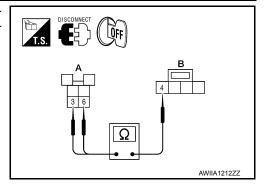
Check continuity between front blower motor relay harness connector E54 (A) terminals 3, 6 and variable blower control harness connector M121 (B) terminal 4.

3, 6 - 4 : Continuity should exist.

Is the inspection result normal?

YES >> GO TO 15.

NO >> Repair harness or connector.



# 15. CHECK VARIABLE BLOWER CONTROL GROUND CIRCUIT

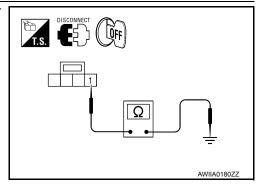
Check continuity between variable blower control harness connector M121 terminal 1 and ground.

1 - Ground : Continuity should exist.

Is the inspection result normal?

YES >> GO TO 16.

NO >> Repair harness or connector.



# 16. CHECK VARIABLE BLOWER CONTROL SIGNAL CIRCUIT

- 1. Reconnect all disconnected component connectors.
- 2. Disconnect front air control connector.
- 3. Turn ignition switch ON.
- 4. Turn blower control dial to maximum speed.
- 5. check voltage between front air control harness connector M50 terminal 24 and ground.

24 - Ground Approx.: 4.5V

Is the inspection result normal?

YES >> Replace front air control. Refer to <u>VTL-7</u>, "Removal and <u>Installation"</u>.

NO >> GO TO 17.

# 17. CHECK VARIABLE BLOWER CONTROL SIGNAL CIRCUIT

- 1. Turn ignition switch OFF.
- Disconnect variable blower control.
- Check continuity between front air control harness connector M50 (B) terminal 24 and variable blower control harness connector M121 (A) terminal 3.

24 - 3 : Continuity should exist.

Is the inspection result normal?

COMPONENT INSPECTION

YES >> Replace variable blower control. Refer to <u>VTL-10</u>, <u>"Removal and Installation"</u>.

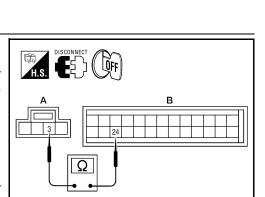
NO >> Repair harness or connector.

# Front Blower Motor Component Inspection

# Tont Blower Motor Component Inspectio

Front Blower Motor Relay

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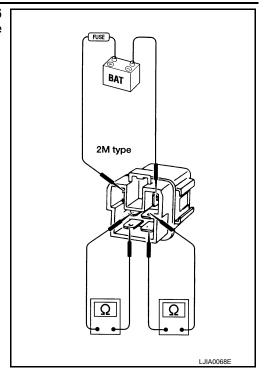


INFOID:0000000007326839

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Revision: October 2015 HAC-35 2012 Frontier NAM

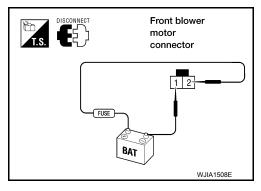
Check continuity between terminals 3 and 5 and terminals 7 and 6 by supplying 12 volts and ground to coil side terminals 1 and 2 of the relay.



# 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.



## MAGNET CLUTCH

# **System Description**

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## SYSTEM DESCRIPTION

The front air control controls compressor operation based on 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

When intake air temperature is higher than 3.5°C (38.3°F), the compressor turns ON. The compressor turns OFF when intake air temperature is lower than 2.5°C (36.5°F).

# Magnet Clutch Component Function Check

INFOID:0000000007326841

SYMPTOM: Magnet clutch does not engage.

## INSPECTION FLOW

# 1.CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - MAGNET CLUTCH

- 1. Rotate blower control dial clockwise.
- 2. Press the vent (\*) mode switch.
- 3. Press A/C switch. 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-37</u>, "Magnet Clutch Diagnosis Procedure".

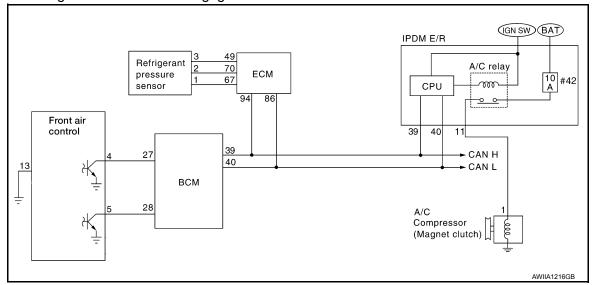
# Magnet Clutch Diagnosis Procedure

INFOID:0000000007326842

Regarding Wiring Diagram information, refer to <a href="HAC-49">HAC-49</a>. "Wiring Diagram - With Type 1".

## DIAGNOSTIC PROCEDURE FOR MAGNET CLUTCH

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



# 1.PERFORM IPDM E/R AUTO ACTIVE TEST

Perform IPDM E/R auto active test. Refer to PCS-11, "CONSULT Function (IPDM E/R)".

## Does magnet clutch operate?

YES >> • @WITH CONSULT GO TO 2.

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**GO TO 8.** 

NO >> Check 10A fuse (No. 42, located in IPDM E/R), and GO TO 12.

2.CHECK BCM INPUT (A/C COMPRESSOR ON) SIGNAL

Check A/C compressor ON/OFF signal. Refer to <u>BCS-20, "AIR CONDITIONER : CONSULT Function (BCM - AIR CONDITIONER)".</u>

A/C SW ON : AIR COND SW ON A/C SW OFF : AIR COND SW OFF

## Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 8.

3. CHECK REFRIGERANT PRESSURE SENSOR

Check refrigerant pressure sensor. Refer to <u>EC-440, "Diagnosis Procedure"</u> (QR25DE) or <u>EC-925, "Diagnosis Procedure"</u> (VQ40DE).

## Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace refrigerant pressure sensor. Refer to <u>HA-38</u>, "Removal and Installation for Refrigerant Pressure Sensor".

4. CHECK BCM INPUT (FAN ON) SIGNAL

Check FAN ON/OFF signal. Refer to <u>BCS-20</u>, "AIR CONDITIONER : CONSULT Function (<u>BCM - AIR CONDITIONER</u>)".

BLOWER CONTROL DIAL : FAN ON SIG ON

ON

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

**OFF** 

## Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 5.

# 5. 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 M50 (B) terminal 5.

А		В		
Connector	Terminal	Connector	Terminal	Continuity
BCM: M18	28	Front air control: M50	5	Yes

Check continuity between BCM harness connector M18 (A) terminal 28 and ground.

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	AWIIA0418ZZ

DISCONNECT OF

Connector	Terminal	Ground	Continuity
BCM: M18	28	Ground	No

## Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair harness or connector.

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

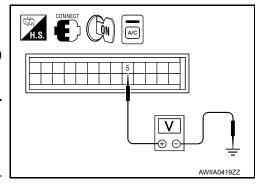
## **MAGNET CLUTCH**

## < DTC/CIRCUIT DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

- 1. Reconnect BCM connector and front air control connector.
- 2. Turn ignition switch ON.
- 3. Turn A/C switch ON.
- 4. Check voltage between front air control harness connector M50 terminal 5 and ground.

	Terminals			
(+)	)	(-)	Condition	Voltage
Front air con- trol connector	Terminal No.			(Approx.)
M50	5	Ground	A/C switch: ON Blower motor operates	0V
			A/C switch: OFF	Battery voltage



## Is the inspection result normal?

- YES >> Replace BCM. Refer to BCS-49, "Removal and Installation".
- NO-1 >> If the voltage is approx. 5V when blower motor is ON, replace front air control. Refer to <u>VTL-7</u>, <u>"Removal and Installation"</u>.
- NO-2 >> If the voltage is approx. 0V when blower motor is OFF, replace BCM. Refer to <u>BCS-49</u>, "Removal and Installation".

# 7.CHECK CAN COMMUNICATION

Check CAN communication. Refer to LAN-14, "Trouble Diagnosis Flow Chart".

## Is the inspection result normal?

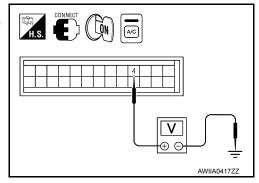
YES >> Inspection End.

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

# 8.check voltage for front air control (a/c compressor on signal)

- 1. Turn ignition switch ON.
- Check voltage between front air control harness connector M50 terminal 4 and ground.

	Terminals			
(	+)	(-)		Voltage
Front air control con- nector	Terminal No.		Condition	(Approx.)
			A/C switch: ON	0V
M50	4	Ground	A/C switch: OFF	Battery voltage



#### Is the inspection result normal?

YES >> GO TO 9.

NO-1 >> If the voltage is approx. 5V when A/C switch is ON, replace front air control. Refer to <a href="VTL-7">VTL-7</a>, <a href=""">"Removal and Installation"</a>.

NO-2 >> If the voltage is approx. 0V when A/C switch is OFF, replace BCM. Refer to <u>BCS-49</u>, "Removal and Installation".

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

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

H.S. DISCONNECT OFF

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## < DTC/CIRCUIT DIAGNOSIS >

- Turn ignition switch OFF.
- Disconnect BCM connector and front air control connector.
- Check continuity between BCM harness connector M18 terminal 27 and front air control harness connector M50 terminal 4.

#### 27 - 4 : Continuity should exist.

Check continuity between BCM harness connector M18 terminal 27 and ground.

#### 27 - ground : Continuity should not exist.

## Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair harness or connector.

# 10. CHECK INTAKE SENSOR CIRCUITS

Check intake sensor. Refer to HAC-42, "Intake Sensor Component Inspection".

## Is the inspection result normal?

>> GO TO 11. YES

NO >> Replace intake sensor. Refer to VTL-8, "Removal and Installation".

# 11. CHECK CAN COMMUNICATION

Check CAN communication. Refer to LAN-14, "Trouble Diagnosis Flow Chart".

## Is the inspection result normal?

YES >> Replace BCM. Refer to BCS-49, "Removal and Installation".

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

# 12. CHECK MAGNET CLUTCH CIRCUIT

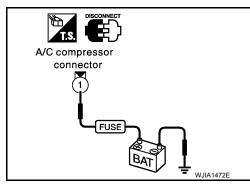
- Turn ignition switch OFF.
- Disconnect A/C compressor connector.
- Check for operation sound when applying battery voltage to A/C compressor terminal 1.

#### Is the inspection result normal?

>> GO TO 13. YES

NO

>> Replace magnet clutch. Refer to HA-30, "Removal and Installation for Compressor Clutch".



A/C compressor connector

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# 13.check circuit continuity between iPDM e/R and a/c compressor

- Disconnect IPDM E/R connector.
- Check continuity between IPDM E/R harness connector E119 terminal 11 and A/C compressor harness connector F3 terminal

#### 11 - 1: Continuity should exist.

Check continuity between IPDM E/R harness connector E119 terminal 11 and ground.

#### 11 - ground : Continuity should not exist.

## Is the inspection result normal?

Revision: October 2015

YES >> Replace IPDM E/R. Refer to PCS-28, "Removal and Installation of IPDM E/R".

NO >> Repair harness or connector. H.S.

IPDM E/R

connector

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

# **INTAKE SENSOR**

# System Description

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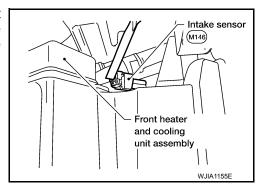
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## COMPONENT DESCRIPTION

## Intake Sensor

The intake sensor is located on top of the heater and cooling unit assembly next to the A/C evaporator cover. It converts temperature of air after it passes through the evaporator into a resistance value which is then input to the front air control.



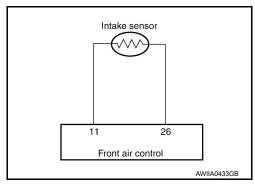
# Intake Sensor Diagnosis Procedure

INFOID:0000000007326844

Regarding Wiring Diagram information, refer to HAC-49, "Wiring Diagram - With Type 1".

## DIAGNOSTIC PROCEDURE FOR INTAKE SENSOR

SYMPTOM: Intake sensor circuit is open or shorted.



# 1. CHECK VOLTAGE BETWEEN INTAKE SENSOR AND GROUND

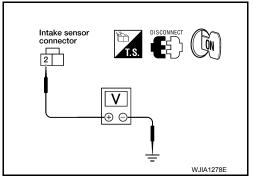
- Disconnect intake sensor connector.
- 2. Turn ignition switch ON.
- 3. Check voltage between intake sensor harness connector M146 terminal 2 and ground.

## 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

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## INTAKE SENSOR

## < DTC/CIRCUIT DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

- Turn ignition switch OFF.
- Disconnect front air control connector.
- Check continuity between intake sensor harness connector M146 (B) terminal 1 and front air control harness connector M50 (A) terminal 26.



## Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair harness or connector.

# 3. CHECK INTAKE SENSOR

Refer to HAC-42, "Intake Sensor Component Inspection".

## Is the inspection result normal?

YES >> Replace front air control. Refer to VTL-7, "Removal and Installation".

>> Replace intake sensor. Refer to VTL-8, "Removal and Installation". NO

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

- Turn ignition switch OFF.
- Disconnect front air control connector.
- Check continuity between intake sensor harness connector M146 (B) terminal 2 and front air control harness connector M50 (A) terminal 11.



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

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

#### Is the inspection result normal?

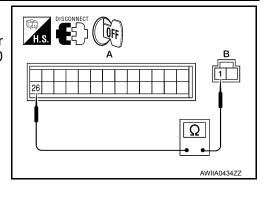
YES >> Replace front air control. Refer to VTL-7, "Removal and Installation".

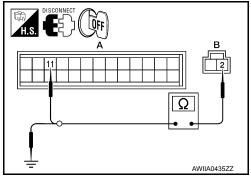
NO >> Repair harness or connector.

# Intake Sensor Component Inspection

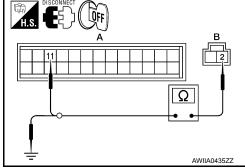
COMPONENT INSPECTION

Intake Sensor





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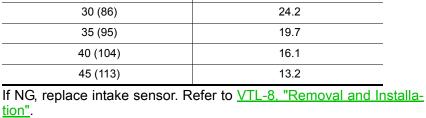
## **INTAKE SENSOR**

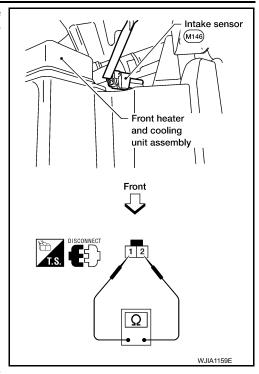
## < DTC/CIRCUIT DIAGNOSIS >

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

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

Temperature °C (°F)	Resistance k $\Omega$
-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

< DTC/CIRCUIT DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

# POWER SUPPLY AND GROUND CIRCUIT FOR CONTROLLER

# Component Description

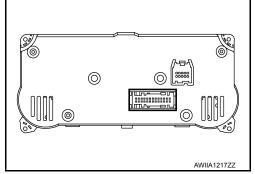
INFOID:0000000007326846

## COMPONENT DESCRIPTION

## Front Air Control

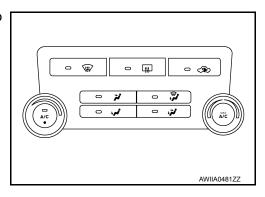
The front air control has a built-in microcomputer which processes information sent from various sensors needed for air conditioner operation. The air mix door motor, mode door motor, intake door motor, blower motor and compressor are then controlled.

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.



## 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 dial.



# Front Air Control Component Function Check

INFOID:0000000007326847

SYMPTOM: A/C system does not come on.

## INSPECTION FLOW

# 1. CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK

- 1. Turn blower motor ON, then press A/C switch.
- 2. 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-44, "Front Air Control Power and Ground Diagnosis Procedure".</u>

# Front Air Control Power and Ground Diagnosis Procedure

INFOID:0000000007326848

Regarding Wiring Diagram information, refer to HAC-49, "Wiring Diagram - With Type 1".

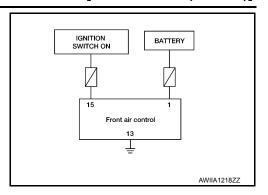
## DIAGNOSTIC PROCEDURE FOR A/C SYSTEM

# POWER SUPPLY AND GROUND CIRCUIT FOR CONTROLLER

< DTC/CIRCUIT DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

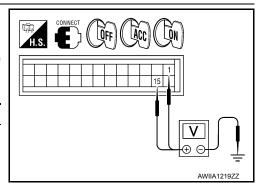
SYMPTOM: A/C system does not come on.



# 1. CHECK POWER SUPPLY CIRCUITS FOR FRONT AIR CONTROL

- Turn ignition switch OFF.
- 2. Disconnect front air control connector.
- Turn ignition switch ON.
- 4. Check voltage between front air control harness connector M50 terminals 1 and 15, and ground.

	Terminals		Ignit	tion switch pos	sition
	(+)				
Front air control connector	Terminal No.	(-)	OFF	ACC	ON
M50	15	Ground	Approx. 0V	Approx. 0V	Battery voltage
M50	1	Glound	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-76, "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 neces-

# 2.CHECK GROUND CIRCUIT FOR FRONT AIR CONTROL

- Turn ignition switch OFF.
- Check continuity between front air control harness connector M50 terminal 13 and ground.

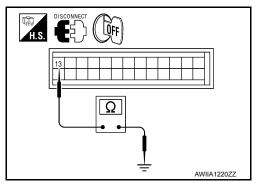
## 13 - Ground

: Continuity should exist.

## Is the inspection result normal?

YES >> Replace front air control. Refer to VTL-7, "Removal and Installation".

NO >> Repair harness or connector.



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# **ECU DIAGNOSIS INFORMATION**

# MANUAL A/C IDENTIFICATION TABLE

Application Table

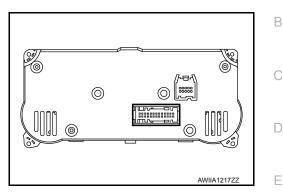
Manual A/C Type	Description	Visual Identification
Manual A/C (Type 1)	Two Control Dial System [with variable blower control (VBC)]	AWIIA0481ZZ
Manual A/C (Type 2)	Three Control Dial System [without variable blower con- trol (VBC)]	AWIIA1228ZZ

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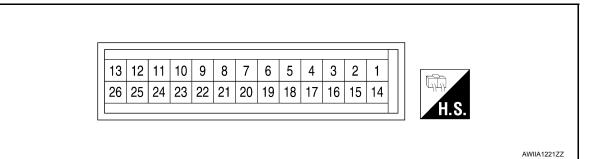
# AIR CONDITIONER CONTROL

# Front Air Control Terminals Reference Values

Measure voltage between each terminal and ground by following Terminals and Reference Values for front air control.



## 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	R/Y	Power supply for BAT	-	-	Battery voltage
3	Р	Ground for mode door motor and air mix door motor PBR	ON	-	0V
4	W	Compressor ON signal	ON	A/C switch OFF	5V
	V V		ON	A/C switch ON	0V
5	R	Front blower monitor	ON	Front blower motor OFF	Battery voltage
5	IX	TOTE DIOWEL HIUTIILUI	ON	Front blower motor ON	0V
6	SB	Air mix door motor feedback	ON	-	0 - 5V
7	V	Mode door motor feedback	ON	-	0 - 5V
8	G	Illumination +	ON	Park lamps ON	Battery voltage
9	BR	Illumination -	- 	Park lamps ON	(V) 15 10 5 0 200 ms
10	R	Rear defrost request	ON	-	Battery voltage
11	L	Intake sensor	ON	-	0 - 5V
13	В	Ground	-	-	0V
15	W/G	Power supply for IGN	ON	-	Battery voltage
16	Y	Rear defroster request	ON	-	Battery voltage

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# **AIR CONDITIONER CONTROL**

# < ECU DIAGNOSIS INFORMATION >

# [MANUAL A/C (TYPE 1)]

Terminal No.	Wire color	Item	Ignition switch	Condition	Voltage (V) (Approx.)
17	GR	Air mix door motor CCW	ON	Counterclockwise rotation	Battery voltage
18	0	Air mix door motor CW	ON	Clockwise rotation	Battery voltage
19	R	Mode door motor CCW	ON	Counterclockwise rotation	Battery voltage
20	BR	Mode door motor CW	ON	Clockwise rotation	Battery voltage
21	0	Intake door motor CCW	ON	Counterclockwise rotation	Battery voltage
22	Υ	Intake door motor CW	ON	Clockwise rotation	Battery voltage
23	G	Power supply for mode door motor and air mix door motor PBR	ON	-	5V
24	LG	Variable blower control	ON	Blower speed (low)	1.7V
24	LG	variable blower correction		Blower speed (hi)	4.5V
26	V	Sensor ground	ON	-	0 - 5V

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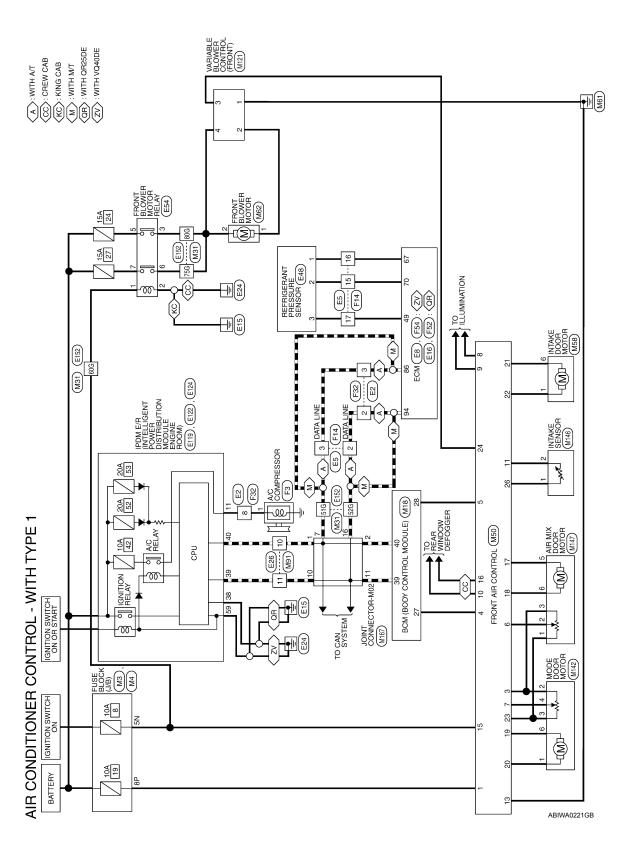
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# WIRING DIAGRAM

# AIR CONDITIONER CONTROL

Wiring Diagram - With Type 1



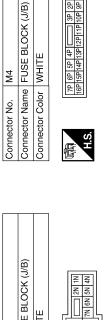
Connector Name BCM (BODY CONTROL MODULE) WHITE

Connector Color

Connector No. M18

# AIR CONDITIONER CONTROL CONNECTORS - WITH TYPE 1









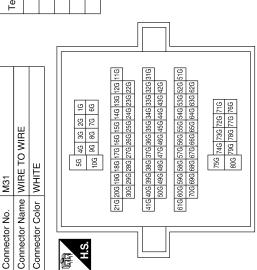


Signal Name	_
Color of Wire	W/G
Terminal No.	2N

Signal Name	AIRCON SW	BLOWER FAN SW	CAN-H	CAN-L
Color of Wire	8	ш	_	Ь
Terminal No. Wire	27	28	39	40

Signal Name	I	
Color of Wire	R/Y	
Terminal No.	8P	

Signal Name	1	1	-	_	1
Color of Wire	۵	٦	M/G	M/G	W/G
Terminal No.	51G	52G	60G	75G	80G



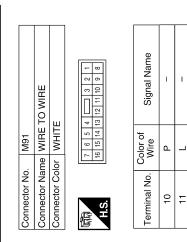
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				_	
Signal Name	MS HOOD SHISH	V REF ACTR (5V)	FR BLOWER MONITOR	_	SENS RETURN
Color of Wire	<b>\</b>	Э	ГG	ı	^
Terminal No.	22	23	54	25	56

Signal Name	ı	_	RR DEF STATUS	INTAKE SENSOR	-	GND	1	IGN	REAR DEFOGGER REQUEST	BLEND DR CCW	BLEND DR CW	MODE CCW	MODE CW	RECIRC DOOR CCW
Color of Wire	Э	BR	В	٦	_	В	-	W/G	Υ	GR	0	В	BR	0
Terminal No.	8	6	10	11	12	13	14	15	16	17	18	19	20	21

Connector No.	M50
Connector Name	Connector Name   FRONT AIR CONTROL (WITH TYPE 1)
Connector Color BLACK	BLACK
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-	4	Ш				_	<u> </u>		BLEND FEED BACK	NONE EEED BACK
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4	17		Signal Name	BATT	ו	MODE (GND)	A/C REQUEST	FAN ON	쁘	ļ
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Z,	FRONT BLOWER MOTOR	BLACK		of Signal Name	ı	1
M62				Color of Wire	_	J//W
Connector No.	Connector Name	Connector Color	雨 H.S.	Terminal No.	-	0

Connector No.	. M58	
Connector Na	ıme INTAI	Connector Name INTAKE DOOR MOTOR
Connector Color	lor BLACK	X
赋 H.S.	1 2	23456
Terminal No.	Color of Wire	Signal Name
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Connector No.	). M146	
Connector Name INTAKE SENSOR	ıme INTAK	(E SENSOR
Connector Color	lor GRAY	
是 H.S.	<u> </u>	
Terminal No.	Color of Wire	Signal Name
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			ı						
1	MODE DOOR MOTOR	CK	23456	Signal Name	Ι	_	_	-	-
7+11/1		lor BLACK		Color of Wire	BR	Ь	മ	۸	В
COLLICCIO NO.	Connector Name	Connector Color	原 H.S.	Terminal No.	1	2	3	4	9

VARIABLE BLOWER	WHITE	2 3 4	Signal Name	GND	MOT-	SETPOINT	MOT+
			Color of Wire	В	٦	ГG	M/G
Connector Name	Connector Color	H.S.	Terminal No.	ļ	7	3	4

Connector No.	. E2	
Connector Name WIRE TO WIRE	me WIR	E TO WIRE
Connector Color WHITE	or WHI	TE
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Terminal No.	Color of Wire	Signal Name
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. M167		lor BLUE		II ⊢	20 19 18	Color of Wire	Ь	Ь	۵	٦	٦	_
Connector No.	Connector Name	Connector Color		慢	H.S.	 Terminal No.	1	2	7	10	11	16

/+	Connector Name   AIR MIX DOOR MOTOR	CK	213456	Signal Name	I	l	ı	_	- (WITH TYPE 1)
. M14/	me AIR	lor BLACK		Color of Wire	>	SB	۵	GR	0
Connector No.	Connector Na	Connector Color	H.S.	Terminal No.	-	2	ဇ	2	9

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Connector Name   COM/WITH VQ40DE)   Connector Name   Con	Connector No. E16 Connector Name ECM (WITH QR25DE) Connector Color BLACK	H.S. (1061/071/081/091/101/11/11/11/11/11/11/11/11/11/11/11/1	Terminal No. Color of Wire Signal Name 86 P CAN-L 94 L CAN-H	Connector No. E54  Connector Name FRONT BLOWER MOTOR RELAY Connector Color BROWN	H.S.	Terminal No. Wire Signal Name  1  W/G	A B C D
Name   Na	Connector No. E8 Connector Name ECM (WITH VQ40DE) Connector Color BLACK	(105   107   108   108   110   111   112   113	Color of Wire P		H.S.	Color of Wife B B B B B B B B B B B B B B B B B B B	F G
	Connector No. E5 Connector Name WIRE TO WIRE Connector Color WHITE	1 2 3 4 5 6 7 8 9 10 11	Color of Wire P P BB BB BB	Connector No. E26 Connector Name WIRE TO WIRE Connector Color WHITE	H.S.	Color of Wire P P	K L M

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Connector No. E124  Connector Name POWER DISTRIBUTION MODULE ENGINE ROOM)  Connector Color BLACK  Estate  Signal Name  Signal Name  Signal Name  Signal Name	Connector No. F3 Connector Name A/C COMPRESSOR Connector Color BLACK  H.S.  Terminal No. Color of Signal Name  1 Y -
Connector No. E122  Connector Name POWER DISTRIBUTION MODULE ENGINE ROOM) Connector Color WHITE  AS A	Terminal No. Wire Signal Name 51G P
Connector No. E119  Connector Name POWER DISTRIBUTION MODULE ENGINE ROOM)  Connector Color WHITE  LIST 16 15 14 13 12 11 10  Terminal No. Color of Signal Name  11 Y A/C COMPRESSOR	Connector No.   E152   Connector Name   WIRE TO WIRE   Connector Color   WHITE   Connector Color   C

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Connector No. F52  Connector Name ECM (WITH QR25DE)  Connector Color BLACK  4 5 24 22 21 20 19 18 17 16 15 14 13 3 2 5 15 10 10 18 17 16 15 14 13 3 2 5 15 10 10 18 17 10 10 10 10 10 10 10 10 10 10 10 10 10	Е
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Connector No.   F32	HAC
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[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 [with variable blower control (VBC)]	AWIIA0481ZZ
Manual A/C (Type 2)	Three Control Dial System [without variable blower con- trol (VBC)]	AWIIA1228ZZ

# **AIR CONDITIONER CONTROL**

# < SYMPTOM DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

# 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.	<u>HAC-44</u>	_
Air outlet does not change.	Go to Trouble Diagnosis Procedure for Mode Door Motor.	HAC-19	_
Mode door motor is malfunctioning.	Go to Trouble Diagnosis Procedure for Mode Door Motor.	<u>HAC-19</u>	
Discharge air temperature does not change.	Co to Trouble Diagnosis Procedure for Air Mix Door Motor	HAC-24	_
Air mix door motor is malfunctioning.	Go to Trouble Diagnosis Procedure for Air Mix Door Motor.	<u>HAC-24</u>	
Intake door does not change.	Co to Trouble Diagnosis Presedure for Intake Deer Meter	HAC-28	_
Intake door motor is malfunctioning.	Go to Trouble Diagnosis Procedure for Intake Door Motor.	<u> MAC-26</u>	
Front blower motor operation is malfunctioning.	Go to Trouble Diagnosis Procedure for Front Blower Motor.	HAC-31	_
Magnet clutch does not engage.	Go to Trouble Diagnosis Procedure for Magnet Clutch.	HAC-37	_
Insufficient cooling	Go to Trouble Diagnosis Procedure for Insufficient Cooling.	HAC-58	_
Insufficient heating	Go to Trouble Diagnosis Procedure for Insufficient Heating.	<u>HAC-66</u>	_
Noise	Go to Trouble Diagnosis Procedure for Noise.	HAC-68	_
Self-Diagnosis cannot be performed	Go to Trouble Diagnosis Procedure for Self-Diagnosis.	HAC-17	_

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[MANUAL A/C (TYPE 1)]

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## INSUFFICIENT COOLING

# Component Function Check

SYMPTOM: Insufficient cooling

## INSPECTION FLOW

# ${f 1}.$ confirm symptom by performing operational check - temperature decrease

- 1. 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-6, "Operational Check".

## Does another symptom exist?

YES >> Refer to HAC-57, "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-17, "Front Air Control Self-Diagnosis".

## Is the inspection result normal?

YES >> GO TO 5.

NO >> Check symptom chart. Refer to <u>HAC-57</u>, "Symptom Matrix Chart".

## CHECK DRIVE BELTS

Check compressor belt tension. Refer to <u>EM-14, "Checking Drive Belts"</u> (QR25DE) or <u>EM-128, "Checking Drive Belts"</u> (VQ40DE).

## Is the inspection result normal?

YES >> GO TO 6.

NO >> Adjust or replace compressor belt. Refer to <u>EM-14, "Adjustment"</u> (QR25DE) or <u>EM-128, "Adjustment"</u> (VQ40DE).

## 6.CHECK AIR MIX DOOR OPERATION

Check and verify air mix door mechanism for smooth operation.

## Does air mix door operate correctly?

YES >> GO TO 7.

NO >> Repair or replace air mix door control linkage.

# 7.CHECK COOLING FAN MOTOR OPERATION

Check and verify cooling fan motor for smooth operation. Refer to EC-902, "Component Inspection".

## Does cooling fan motor operate correctly?

YES >> GO TO 8.

NO >> Check cooling fan motor. Refer to <u>EC-340, "Diagnosis Procedure"</u> (QR25DE) or <u>EC-816, "Diagnosis Procedure"</u> (VQ40DE).

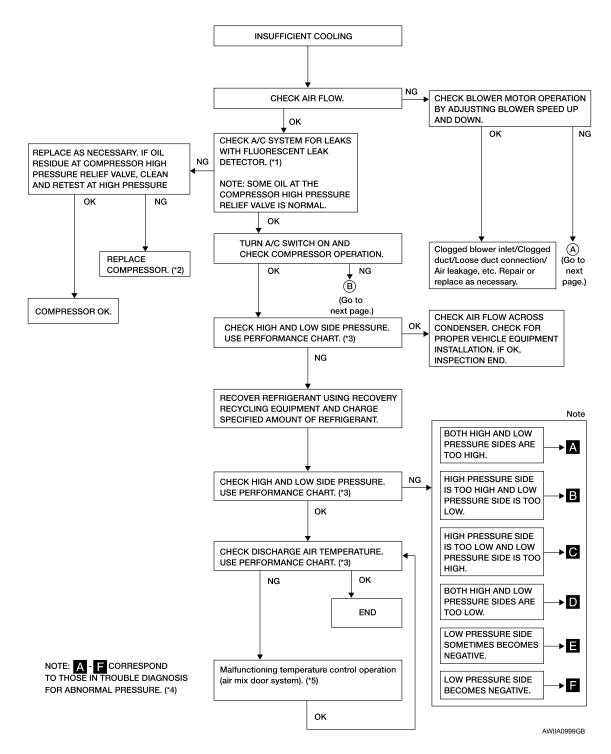
# 8. CHECK RECOVERY/RECYCLING EQUIPMENT BEFORE USAGE

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.

## INSUFFICIENT COOLING

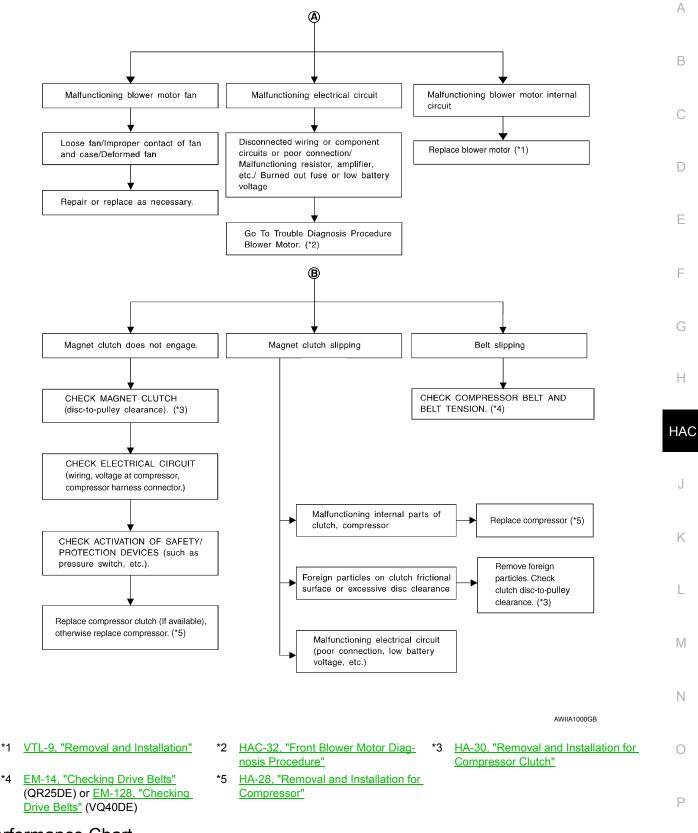
INSUFFICIENT COOLING	
< SYMPTOM DIAGNOSIS > [MANUAL A/C (TYPE 1)]	
>> GO TO 9.	-
9. CHECK REFRIGERANT PURITY	Α
<ol> <li>Connect recovery/recycling equipment to vehicle.</li> <li>Confirm refrigerant purity in supply tank using recovery/recycling and refrigerant identifier.</li> <li>Is the inspection result normal?</li> <li>YES &gt;&gt; GO TO 10.</li> </ol>	В
NO >> Check contaminated refrigerant. Refer to <u>HA-4, "Contaminated Refrigerant"</u> .	С
10.check for evaporator freeze up	_
Start engine and run A/C. Check for evaporator freeze up. <u>Does evaporator freeze up?</u> YES >> Perform diagnostic work flow. Refer to <u>HAC-59</u> , " <u>Diagnostic Work Flow</u> ".	D
NO >> GO TO 11.	Е
11. CHECK REFRIGERANT PRESSURE	
Check refrigerant pressure with manifold gauge connected. Refer to <a href="HAC-61">HAC-61</a> , "Performance Chart".  Is the inspection result normal?  YES >> Perform diagnostic work flow. Refer to <a href="HAC-59">HAC-59</a> , "Diagnostic Work Flow".	F
NO >> GO TO 12.  12. CHECK AIR DUCTS	G
Check ducts for air leaks.	-
Is the inspection result normal?	Н
YES >> System OK. NO >> Repair air leaks.	
Diagnostic Work Flow	5 HAC
Diagnostic Work Flow	5 11/40
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- Using the Fluorescent Dye Leak Detector"
- \*4 HAC-62, "Trouble Diagnoses for Ab- \*5 HAC-24, "Air Mix Door Motor Diagnonormal Pressure"
- \*1 HA-20, "Checking System for Leaks \*2 HA-28, "Removal and Installation for \*3 HAC-61, "Performance Chart" Compressor"
  - sis Procedure"

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## Performance Chart

## **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	air) at blower assembly inlet	Discharge oir temporature et conter ventileter
Relative humidity %	Air temperature °C (°F)	Discharge air temperature at center ventilator °C (°F)
	20 (68)	5.3 - 6.5 (42 - 44)
	25 (77)	9.7 - 11.5 (49 - 53)
50 - 60	30 (86)	13.8 - 16.3 (57 - 61)
	35 (95)	18.0 - 21.2 (64 - 70)
	40 (104)	22.2 - 25.7 (72 - 78)
	20 (68)	6.5 - 7.7 (44 - 46)
	25 (77)	11.5 - 13.3 (53 - 56)
60 - 70	30 (86)	16.3 - 18.8 (61 - 66)
	35 (95)	21.2 - 24.0 (70 - 75)
	40 (104)	25.7 - 29.2 (78 - 85)

## Ambient Air Temperature-to-operating Pressure Table

Ambie	ent 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)	680 - 840 (6.94 - 8.57, 98.6 - 121.8)	160 - 198 (1.63 - 2.02, 23.2 - 28.7)		
	25 (77)	800 - 985 (8.16 - 10.05, 116.0 - 142.8)	198 - 245 (2.02 - 2.50, 28.7 - 35.5)		
50 - 70	30 (86)	940 - 1,150 (9.59 - 11.73, 136.3 - 166.8)	225 - 278 (2.30 - 2.84, 32.6 - 40.3)		
	35 (95)	1,160 - 1,410 (11.83 - 14.38, 168.2 - 204.5)	273 - 335 (2.78 - 3.42, 39.6 - 48.6)		
	40 (104)	1,325 - 1,620 (13.52 - 16.52, 192.1 - 234.9)	325 - 398 (3.32 - 4.06, 47.1 - 57.7)		

# 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 >

[MANUAL A/C (TYPE 1)]

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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.
A	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.	<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>	Excessive liquid refrigerant on low-pressure side     Excessive refrigerant discharge flow     Expansion valve is open a little compared with the specification.	Replace expansion valve.
		Improper expansion valve adjustment	

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.	Check and repair or replace malfunctioning parts. Check oil for contamination.

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.	
(CO) 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-22, "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-41, "Intake Sensor Diagnosis Procedure". Replace compressor. Repair evaporator fins. Replace evaporator. Refer to HAC-31, "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 >

# [MANUAL A/C (TYPE 1)]

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.  Check oil for contamination.

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[MANUAL A/C (TYPE 1)]

## INSUFFICIENT HEATING

# Component Function Check

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SYMPTOM: Insufficient heating

## INSPECTION FLOW

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

- 1. Rotate blower control dial clockwise.
- 2. Turn the temperature control dial clockwise to maximum heat.
- Check for hot air at discharge air outlets.

## Can the symptom be duplicated?

YES >> GO TO 2.

NO >> Perform complete 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-17, "Front Air Control Self-Diagnosis".

## Is the inspection results normal?

YES >> GO TO 4.

NO >> Refer to HAC-57, "Symptom Matrix Chart".

# 4. CHECK ENGINE COOLING SYSTEM

- Check for proper engine coolant level. Refer to <u>CO-11, "System Inspection"</u> (QR25DE) or <u>CO-39, "System Inspection"</u> (VQ40DE).
- Check hoses for leaks or kinks.
- Check radiator cap. Refer to <u>CO-11, "System Inspection"</u> (QR25DE) or <u>CO-39, "System Inspection"</u> (VQ40DE).
- 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-24">HAC-24</a>, "Air Mix Door Motor Component Function <a href="Check">Check</a>".

## 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 >> Both hoses warm: GO TO 9.

## **INSUFFICIENT HEATING**

## < SYMPTOM DIAGNOSIS >

[MANUAL A/C (TYPE 1)]

# 8. CHECK ENGINE COOLANT SYSTEM

Check engine coolant temperature sensor. Refer to <u>EC-164, "Component Inspection"</u> (QR25DE) or <u>EC-627, "Component Inspection"</u> (VQ40DE).

## Is the inspection result normal?

YES >> System OK.

NO >> Repair or replace as necessary. Retest.

# 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.
- 3. Refill system with new engine coolant. Refer to <u>CO-12, "Changing Engine Coolant"</u> (QR25DE) or <u>CO-40, "Changing Engine Coolant"</u> (VQ40DE).
- GO TO 10 to retest.

# 10. 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 >> System OK.

NO >> Replace heater core. Refer to VTL-17, "Removal and Installation".

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# **NOISE**

# Component Function Check

INFOID:0000000007326859

SYMPTOM: Noise

INSPECTION FLOW

1. Confirm symptom by performing the following operational check. If OK (symptom can not be duplicated), perform complete operational check (\*1). If NG (symptom is confirmed), continue with STEP-2 following. 2. Check for any service bulletins. 3. Check where noise comes from. 4. Check compressor belt and belt tension. NG (\*2) 5. Check refrigerant high and low pressure. Use performance chart. (\*3) Belt Blower motor Compressor Expansion valve Refrigerant line Check for noise in Inspect the com-Replace expansion pressor clutch valve. (\*4) all modes and and pulley and temperature settings. idler pulley. Noise is OK NG constant Replace com-Check blower Check for The line is fixed The line is not motor for forrefrigerant pressor clutch fixed. directly to the body. eign particles. line-to-compressor and pulley or idler pulley (\*5) interference. Fix the line tightly. Check blower Check disc-to-pulley Fix the line with motor and fan clearance. (\*6) rubber or some vibration absorbfor wear. ΟK ing material. Check torque of compressor mounting bolts. (\*7) OK Check and adjust Loose Belt Side of belt is worn compressor oil. out. (\*8) OK Noise is Re-adjust belt tension. Inspect and repair intermittent. pulley alignment. Replace compressor (\*7) Check air discharge and liquid tank. (\*9) ducts for obstructions, foreign materials or air leakage. AWIIA1001GB

# **NOISE**

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# [MANUAL A/C (TYPE 1)]

311	VIF TOW DIAGNOSIS >				[	
*1	HAC-6, "Operational Check"	*2	EM-14. "Checking Drive Belts" (QR25DE) or EM-128. "Checking Drive Belts" (VQ40DE)	*3	HAC-61, "Performance Chart"	А
*4	HA-39, "Removal and Installation"	*5	HA-30, "Removal and Installation for Compressor Clutch"	*6	HA-30, "Removal and Installation for Compressor Clutch"	В
*7	HA-28, "Removal and Installation for Compressor"	*8	HA-18, "Maintenance of Oil Quantity in Compressor"	*9	HA-37, "Removal and Installation"	С
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# **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 three minutes before performing any service.

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

#### INFOID:0000000007326861

#### **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.

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

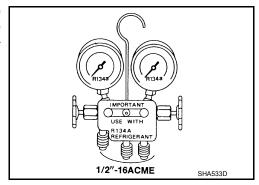
- Explain to the customer that environmental regulations prohibit the release of contaminated refrigerant into the atmosphere.
- Explain that recovery of the contaminated refrigerant could damage your service equipment and refrigerant supply.
- Suggest the customer return the vehicle to the location 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.

**HAC-71** 

# Precaution for Service Equipment

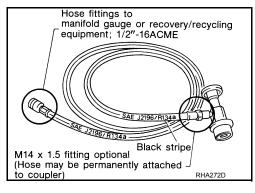
## MANIFOLD GAUGE SET

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

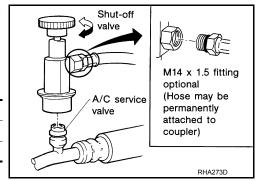
Be certain that the service hoses display the markings described (colored hose with black stripe). All hoses must include positive shutoff devices (either manual or automatic) near the end of the hoses opposite the manifold gauge.



## 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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2012 Frontier NAM

# **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 [with variable blower control (VBC)]	AWIIA0481ZZ
Manual A/C (Type 2)	Three Control Dial System [without variable blower con- trol (VBC)]	AWIIA1228ZZ

# DIAGNOSIS AND REPAIR WORKFLOW

DIAGNOSIS AND REPAIR WORKFLOW	
< BASIC INSPECTION > [MANUAL A/C (TYPE 2)]	
DIAGNOSIS AND REPAIR WORKFLOW	А
How to Perform Trouble Diagnosis For Quick And Accurate Repair	$\wedge$
WORK FLOW	В
1.LISTEN TO CUSTOMER COMPLAINT	
Listen to customer complaint. Get detailed information about the conditions and environment when the symptom occurs.	С
>> GO TO 2	D
2.CHECK FOR SERVICE BULLETINS	
Check for any service bulletins.	Е
>> GO TO 3.	
3. VERIFY THE SYMPTOM WITH OPERATIONAL CHECK	F
Verify the symptom with operational check. Refer to HAC-74, "Operational Check".	

>> Go to trouble diagnosis. Refer to <a href="HAC-128">HAC-128</a>, "Symptom Matrix Chart".

Can a symptom be duplicated?

>> System OK.

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# INSPECTION AND ADJUSTMENT

< BASIC INSPECTION >

[MANUAL A/C (TYPE 2)]

# INSPECTION AND ADJUSTMENT

Operational Check

INFOID:0000000007326865

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

Conditions : Engine running and at normal operating temperature

#### CHECKING BLOWER

- Turn blower control dial clockwise. Blower should operate on low speed.
- 2. Turn the blower control dial again, and continue checking each blower speed until all speeds are checked.
- 3. Leave blower on speed 4.

If NG, go to trouble diagnosis procedure for HAC-98, "Front Blower Motor Diagnosis Procedure".

If OK, continue with next check.

#### CHECKING DISCHARGE AIR

- 1. Turn the mode switch to each position.
- Confirm that discharge air comes out according to the air distribution table. Refer to <u>HAC-81, "Discharge Air Flow"</u>.

Mode door position is checked in the next step.

If NG, go to trouble diagnosis procedure for HAC-88, "Mode Door Motor Diagnosis Procedure".

If OK, continue with next check.

#### NOTE:

Confirm that the A/C compressor clutch is engaged (sound or visual inspection) and intake door position is at fresh when the DEF ( $\mathfrak{W}$ ) or D/F ( $\mathfrak{W}$ ) is selected.

#### CHECKING RECIRCULATION

- Press recirculation ( ) switch one time. Recirculation indicator should illuminate.
- 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-96, "Intake Door Motor Diagnosis Procedure".

If OK, continue with next 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 TEMPERATURE DECREASE

- Rotate temperature control dial counterclockwise.
- 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-129</u>. "Component Function Check". If air mix door motor appears to be malfunctioning, go to <u>HAC-92</u>, "Air Mix Door <u>Motor Component Function Check"</u>.

If OK, continue with next check.

## CHECKING TEMPERATURE INCREASE

- 1. Rotate temperature control dial clockwise.
- 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-137</u>. "Component Function Check". If air mix door motor (front) appears to be malfunctioning, go to <u>HAC-92</u>, "Air <u>Mix Door Motor Component Function Check"</u>.

If OK, continue with next check.

## CHECK A/C SWITCH (IF EQUIPPED)

- Press A/C switch with the blower switch ON.
- A/C switch indicator will turn ON.
  - Confirm that the compressor clutch engages (sound or visual inspection).

# **INSPECTION AND ADJUSTMENT**

[MANUAL A/C (TYPE 2)] < BASIC INSPECTION > If NG, go to trouble diagnosis procedure for HAC-104, "Magnet Clutch Diagnosis Procedure". If OK, continue with next check. Α В С  $\mathsf{D}$ Е F G Н J

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[MANUAL A/C (TYPE 2)]

# SYSTEM DESCRIPTION

# MANUAL A/C IDENTIFICATION TABLE

Application Table

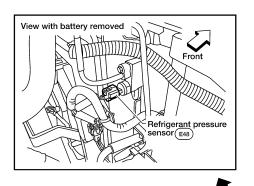
Manual A/C Type	Description	Visual Identification
Manual A/C (Type 1)	Two Control Dial System [with variable blower control (VBC)]	AWIIA0481ZZ
Manual A/C (Type 2)	Three Control Dial System [without variable blower con- trol (VBC)]	AWIIA1228ZZ

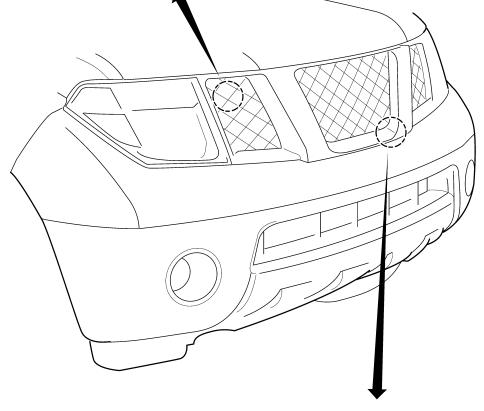
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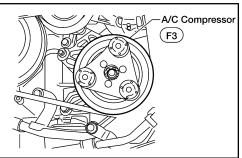
# **FUNCTION INFORMATION**

# **Component Part Location**

**ENGINE COMPARTMENT** 







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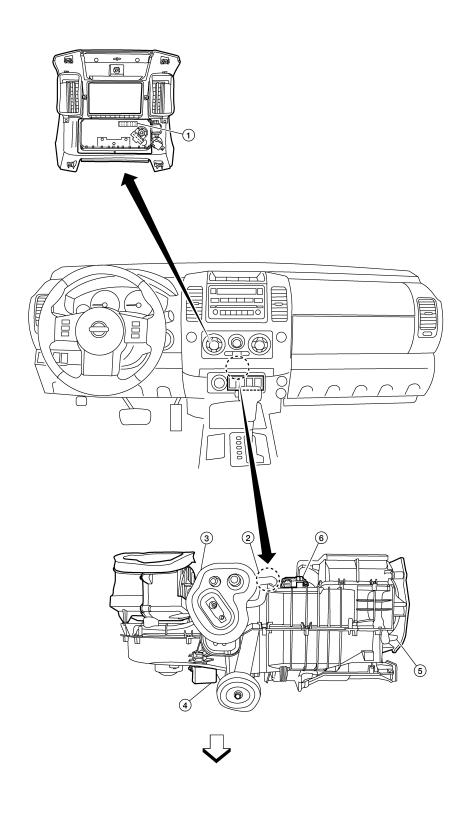
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# PASSENGER COMPARTMENT



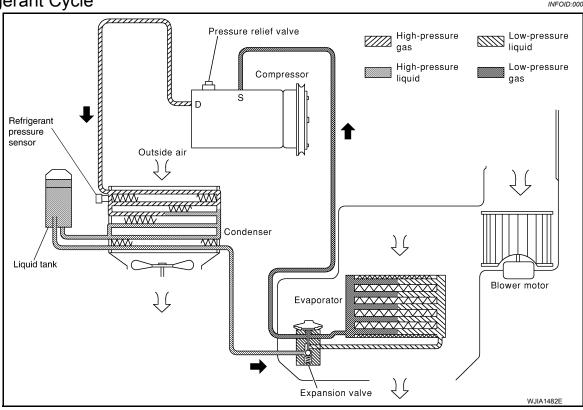
AWIIA0724ZZ

- :Front
- 3. Intake door motor M58
- Air mix door motor M147
- Front air control M49
- Front blower motor resistor M122 5. Mode door motor M142
- Intake sensor M146

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# REFRIGERATION SYSTEM

# Refrigerant Cycle



## REFRIGERANT FLOW

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

#### FREEZE PROTECTION

The compressor cycles on and off to maintain the evaporator temperature within a specified range. When the evaporator coil temperature falls below a specified point, the intake sensor interrupts the compressor operation. When the evaporator coil temperature rises above the specification, the intake sensor allows compressor operation.

# Refrigerant System Protection

#### 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/cm², 433.6 psi)], the release port on the pressure relief valve automatically opens and releases refrigerant into the atmosphere.

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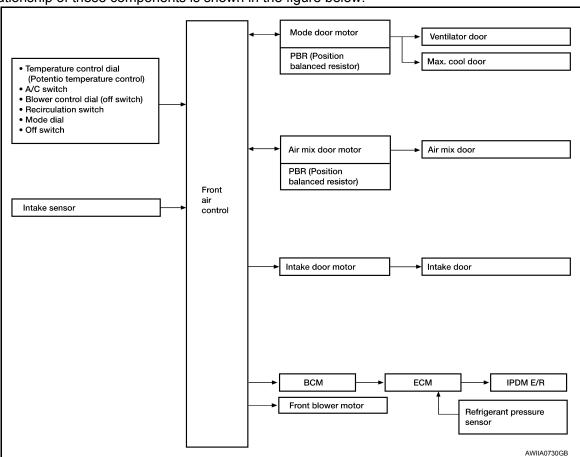
# MANUAL AIR CONDITIONER SYSTEM

# Control System Diagram

#### INFOID:0000000007326870

## **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:

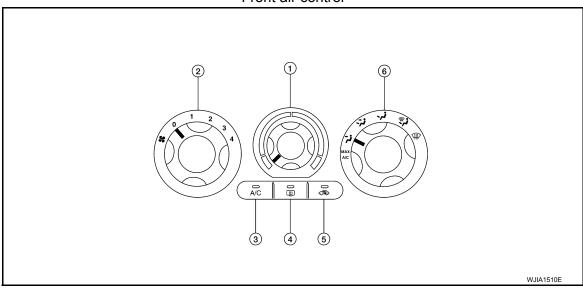


# **Control System Description**

#### INFOID:0000000007326871

## **CONTROL OPERATION**

# Front air control



## MANUAL AIR CONDITIONER SYSTEM

## < SYSTEM DESCRIPTION >

[MANUAL A/C (TYPE 2)]

- 1. Temperature control dial
- 2. Blower control dial
- 3. A/C switch (if equipped)

- 4. Rear window defogger switch (if equipped)
- 5. Recirculation switch
- 6. Mode dial

# TEMPERATURE CONTROL DIAL (TEMPERATURE CONTROL)

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, or at the D/F or FOOT position.

# REAR WINDOW DEFOGGER SWITCH (IF EQUIPPED)

When switch is ON, rear window is defogged.

# OFF SWITCH (BLOWER SPEED SET TO 0)

The compressor and blower are OFF.

# A/C SWITCH (IF EQUIPPED)

The compressor is ON or OFF.

(Pressing the A/C switch will turn off the A/C switch and compressor.)

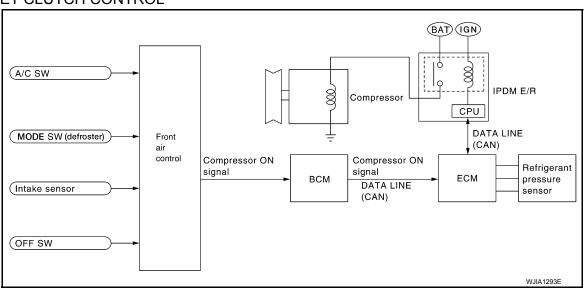
#### MODE DIAL

Controls the air discharge outlets.

#### FRONT BLOWER CONTROL DIAL

Manually controls the four blower speeds.

# MAGNET CLUTCH CONTROL



When the A/C switch is pressed, or the mode dial is turned to the DEF or D/F position, the front air control outputs a compressor ON signal to BCM.

The BCM then sends a compressor ON signal to ECM, 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

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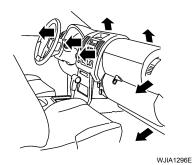
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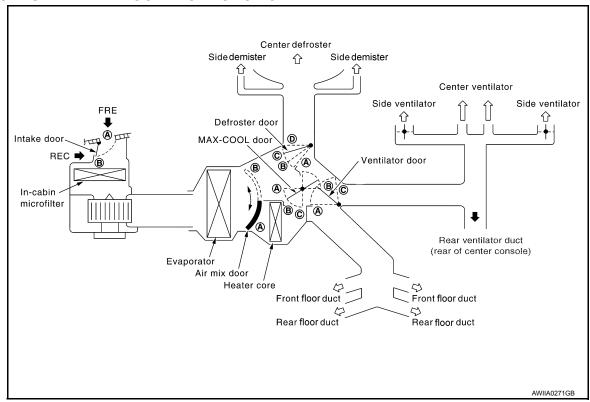


Mode door position	Air outlet/distribution				
	Vent	Foot	Defroster		
*;	95%	5%	_		
<b>*</b>	60%	40%	_		
ن	20%	55%	25%		
<b>**</b>	15%	50%	35%		
₩	7%	15%	78%		

# Switches And Their Control Function

INFOID:0000000007326873

# SWITCHES AND THEIR CONTROL FUNCTION



# MANUAL AIR CONDITIONER SYSTEM

< SYSTEM DESCRIPTION >

[MANUAL A/C (TYPE 2)]

Position		MOD	ESW		DEF	sw	REC	SW	Temp	erature	e dial	OFF
or switch	VENT	B/L	FOOT	D/F	ON	OFF	ON	OFF				sw
Door	→ •	_⇒.*		₩•	_	SNT \$\$	€	<b>₹</b> >				
		+~	<b>+,~</b>	+_~		0	-> ф <-	0	COLD	~	нот	OFF
Ventilator door	<b>(A)</b>	B	0	0	©		_	_		_		©
MAX-COOL door	A	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		_	_				_	_	<b>(A)</b>		B	

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# **DIAGNOSIS SYSTEM (BCM)**

< SYSTEM DESCRIPTION >

[MANUAL A/C (TYPE 2)]

# DIAGNOSIS SYSTEM (BCM)

**COMMON ITEM** 

COMMON ITEM: CONSULT Function (BCM - COMMON ITEM)

INFOID:0000000007808118

## APPLICATION ITEM

CONSULT performs the following functions via CAN communication with BCM.

Direct Diagnostic Mode	Description
Ecu Identification	The BCM part number is displayed.
Self Diagnostic Result	The BCM self diagnostic results are displayed.
Data Monitor	The BCM input/output data is displayed in real time.
Active Test	The BCM activates outputs to test components.
Work support	The settings for BCM functions can be changed.
Configuration	<ul> <li>The vehicle specification can be read and saved.</li> <li>The vehicle specification can be written when replacing BCM.</li> </ul>
CAN Diag Support Mntr	The result of transmit/receive diagnosis of CAN communication is displayed.

# SYSTEM APPLICATION

BCM can perform the following functions.

				Direct D	Diagnosti	c Mode		<u> </u>
System	Sub System	Ecu Identification	Self Diagnostic Result	Data Monitor	Active Test	Work support	Configuration	CAN Diag Support Mntr
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 CONDITIONER			×				
Combination switch	COMB SW			×				
BCM	BCM	×	×			×	×	×
Immobilizer	IMMU		×	×	×			
Interior room lamp battery saver	BATTERY SAVER			×	×	×		
Vehicle security system	THEFT ALM			×	×	×		
RAP system	RETAINED PWR			×	×	×		
Signal buffer system	SIGNAL BUFFER			×	×			
TPMS	AIR PRESSURE MONITOR		×	×	×	×		
Panic alarm system	PANIC ALARM				×			

# **AIR CONDITIONER**

# **DIAGNOSIS SYSTEM (BCM)**

< SYSTEM DESCRIPTION >

[MANUAL A/C (TYPE 2)]

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

#### INFOID:0000000007808119

# **DATA MONITOR**

Monitor Item [Unit]	Description
IGN ON SW [On/Off]	Indicates condition of ignition switch ON position.
FAN ON SIG [On/Off]	Indicates condition of fan switch.
AIR COND SW [On/Off]	Indicates condition of A/C switch.

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[MANUAL A/C (TYPE 2)]

# **DTC/CIRCUIT DIAGNOSIS**

# MANUAL A/C IDENTIFICATION TABLE

Application Table

Manual A/C Type	Description	Visual Identification
Manual A/C (Type 1)	Two Control Dial System [with variable blower control (VBC)]	AWIIA0481ZZ
Manual A/C (Type 2)	Three Control Dial System [without variable blower con- trol (VBC)]	AWIIA1228ZZ

# MODE DOOR MOTOR

# System Description

#### INFOID:0000000007326877

#### SYSTEM DESCRIPTION

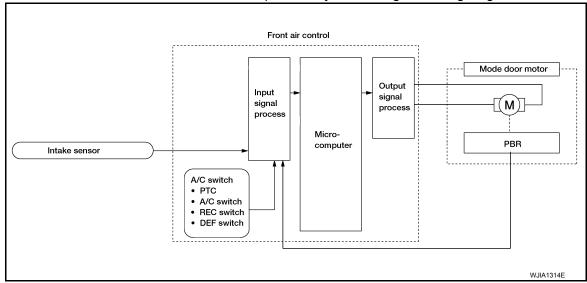
#### Component Parts

Mode door control system components are:

- Front air control
- Mode door motor
- Position Balanced Resistor (PBR) (built into mode door motor)
- · Intake sensor

## System Operation

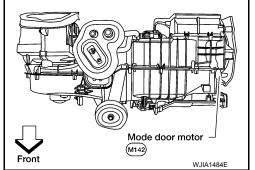
The mode door position (vent, B/L, foot, D/F, and defrost) is set by the front air control by means of the mode door motor. When a mode door position is selected on the front air control, voltage is applied to one circuit of the mode door motor while ground is applied to the other circuit, causing the 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 and 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:0000000007326878

#### SYMPTOM:

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

## INSPECTION FLOW

Revision: October 2015 HAC-87 2012 Frontier NAM

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# $1. {\hbox{\rm confirm symptom by performing operational check - discharge air}}\\$

- Turn blower control dial to 4.
- Turn the mode dial and check all positions.
- Confirm that discharge air comes out according to the air distribution table. Refer to <u>HAC-81, "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 the diagnosis procedure. Refer to <u>HAC-88</u>, "Mode Door Motor Diagnosis Procedure".

# Mode Door Motor Diagnosis Procedure

INFOID:0000000007326879

Regarding Wiring Diagram information, refer to <u>HAC-116</u>, "Wiring Diagram - With Type 2" or <u>HAC-123</u>, "Wiring <u>Diagram - Heater Control"</u>.

#### SYMPTOM:

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

# $1.\mathsf{check}$ mode door motor circuits for open and short to ground

- 1. Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector M49 and the mode door motor harness connector M142.
- Check continuity between front air control harness connector M49 terminals 1, 14 and the mode door motor harness connector M142 terminals 1, 6.

Connector	Terminal	Connector	Terminal	Continuity
M49	1	M142	1	Yes
IVI <del>4</del> 9	14	IVITAZ	6	163

 Check continuity between front air control harness connector M49 terminals 1, 14 and ground.

T.S. DISCONNECT (OFF)  Front air control connector
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
14
Mode door
motor connector
6 1 1
Ω
WJIA1241E

Connector	Terminal		Continuity
M49	1	Ground	No
IVI49	14	Ground	INO

#### Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness as necessary.

# 2.CHECK FRONT AIR CONTROL FOR MODE DOOR MOTOR POWER AND GROUND

- 1. Reconnect front air control harness connector.
- Turn ignition switch ON.
- 3. Rotate the mode switch to the D/F ( ) mode.
- 4. Check voltage between front air control harness connector M49 terminal 1 and terminal 14 while rotating the mode control dial to the VENT (\*), and then the B/L (\*) mode.

#### < DTC/CIRCUIT DIAGNOSIS >

Connector	Tern	ninals	Condition	Voltage (Approx.)
Connector	(+)	(-)	Condition	voltage (Approx.)
M49	1 14		Rotating the mode control dial from D/F ( ) mode to VENT ( ) mode	Battery voltage
IVITS	14	1	Rotating the mode control dial from VENT (***) mode to B/L (****) mode	Battery voltage

#### Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace front air control. Refer to <u>VTL-7</u>, "Removal and Installation".

# 3.check mode door motor pbr circuits for open and short to ground

- Turn ignition switch OFF.
- 2. Disconnect the front air control harness connector M49 (A).
- Check continuity between front air control harness connector M49 (A) terminals 23, 26 and the mode door motor harness connector M142 (B) terminals 1, 3.

Α		В		Continuity
Connector	Terminal	Connector	Terminal	
M49	23	M142	3	Yes
10149	26	IVI142	2	res

4. Check continuity between front air control harness connector M49 (A) terminals 23, 26 and ground.

Connector	Terminal	_	Continuity
M49 (A)	23	Ground	No
	26	Giouna	140

#### Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace harness as necessary.

# 4.CHECK PBR FEEDBACK SIGNAL CIRCUIT FOR OPEN AND SHORT TO GROUND

 Check continuity between front air control harness connector M49 terminal 21 and mode door motor harness connector M142 terminal 4.

Connector	Terminal	Connector	Terminal	Continuity
M49	21	M142	4	Yes

Check continuity between front air control harness connector M49 terminal 16 and ground.

Connector	Terminal	_	Continuity
M49	21	Ground	No

# Front air control connector Output Mode door motor connector Output WJIA1089E

#### Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace harness as necessary.

# 5.CHECK FRONT AIR CONTROL FOR 5 VOLT REFERENCE (VREF), VREF RETURN, AND FEEDBACK SIGNAL

- Reconnect front air control harness connectors.
- 2. Turn ignition switch ON.
- 3. Check voltage between front air control harness connector M49 terminal 23 and terminal 26.

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Connector	Terminals	Connector	Terminals	Voltage (Approx.)
Connector	(+)	Connector	(-)	voltage (Approx.)
M49	23	M49	26	5 Volts

4. Check voltage between front air control harness connector M49 terminal 21 and ground.

Connector	Terminal	_	Voltage (Approx.)
M49	21	Ground	0 Volts

# Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace front air control. Refer to <a href="VTL-7">VTL-7</a>, "Removal and Installation".

# Front air control connector V WJIA1088E

# 6. CHECK FRONT AIR CONTROL FOR FEEDBACK SIGNAL

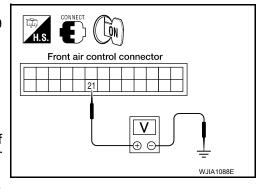
- Reconnect the mode door motor harness connector M142.
- 2. Check voltage between front air control harness connector M49 terminal 21 and ground.

Connector	Terminal	_	Voltage (Approx.)
M49	21	Ground	0.2 to 4.8 Volts

# Is the inspection result normal?

YES >> Inspect mode door for binding or mechanical failure. If mode door moves freely, replace front air control. Refer to <a href="VTL-7">VTL-7</a>, "Removal and Installation".

NO >> Replace the mode door motor. Refer to <u>VTL-19</u>, "Removal and Installation".



# **System Description**

#### INFOID:0000000007326880

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#### SYSTEM DESCRIPTION

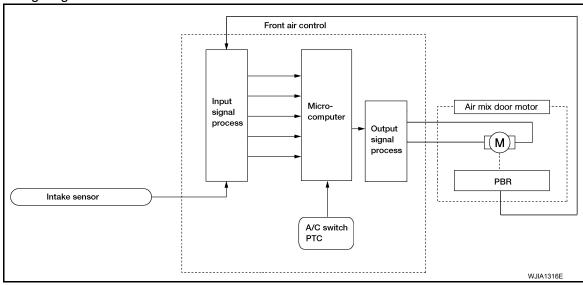
## Component Parts

Air mix door control system components are:

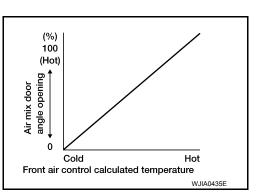
- Front air control
- Air mix door motor
- Position Balanced Resistor (PBR) (built into air mix door motor)
- · Intake sensor

# System Operation

The front air control receives data from the temperature selected by the driver. The front air control then applies a voltage to one circuit of the air mix door motor, while ground is applied to the other circuit, causing the 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

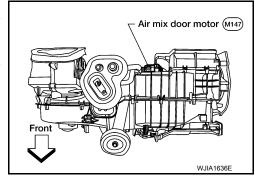
Air Mix Door Motor

Revision: October 2015 HAC-91 2012 Frontier NAM

## < DTC/CIRCUIT DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

The air mix door motor is attached to the heater and cooling unit assembly. This 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:0000000007326881

# INSPECTION FLOW

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

- Blower must be on (1, 2, 3, 4).
- 2. Turn the temperature control dial clockwise to maximum heat.
- 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.
- Check for cold air at discharge air outlets.

# Is the inspection result normal?

YES >> Inspection End.

NO >> Go to diagnosis procedure. Refer to <u>HAC-92</u>, "Air Mix Door Motor Diagnosis Procedure".

# Air Mix Door Motor Diagnosis Procedure

INFOID:0000000007326882

Regarding Wiring Diagram information, refer to <u>HAC-116</u>, "Wiring <u>Diagram - With Type 2"</u> or <u>HAC-123</u>, "Wiring <u>Diagram - Heater Control"</u>.

#### SYMPTOM:

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

# 1. CHECK AIR MIX DOOR MOTOR CIRCUITS FOR OPEN AND SHORT TO GROUND

- 1. Turn ignition switch OFF.
- Disconnect the front air control harness connector M49 and the air mix door motor harness connector M147.
- 3. Check continuity between front air control harness connector M49 terminals 3, 2 and the air mix door motor harness connector M147 terminals 5, 6.

Connector	Terminal	Connector	Terminal	Continuity
M49	2	M147	6	Yes
	3	IVII 47	5	163

4. Check continuity between front air control harness connector M49 terminals 3, 2 and ground.

[MANUAL A/C (TYPE 2)]

#### < DTC/CIRCUIT DIAGNOSIS >

Connector	Terminal	_	Continuity
M49	3	Ground	No
	2	Ground	NO

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## Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness as necessary.

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# 2.CHECK FRONT AIR CONTROL FOR AIR MIX DOOR MOTOR POWER AND GROUND

- Reconnect front air control harness connector.
- 2. Turn ignition switch ON.
- 3. Rotate the mode switch to the D/F ( ) mode.
- 4. Check voltage between front air control harness connector M49 terminal 3 and terminal 2 while rotating the mode control dial to the VENT (\*), and then the B/L (\*) mode.

Connector	Tern	ninals	Condition	Voltage (Approx.)
Connector	(+)	(-)	Condition	voitage (Approx.)
M49	2	3	Rotating the mode control dial from D/F ( ) mode to VENT ( ) mode	Battery voltage
IVI+3	3	2	Rotating the mode control dial from VENT (**) mode to B/L (**) mode	Battery voltage

## Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace front air control. Refer to <a href="VTL-7">VTL-7</a>, "Removal and Installation".

# 3.check air mix door motor pbr circuits for open and short to ground

1. Turn ignition switch OFF.

2. Disconnect the front air control harness connector M49.

3. Check continuity between front air control harness connector M49 terminals 23, 26 and the air mix door motor harness connector M147 terminals 1, 3.

Connector	Terminal	Connector	Terminal	Continuity
M49	26	M147	3	Yes
	23	IVI 147	1	res

4. Check continuity between front air control harness connector M49 terminals 23, 26 and ground.

Connector	Terminal	_	Continuity
M49	23	Ground	No
	26	Giodila	No

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#### Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace harness as necessary.

# 4.CHECK PBR FEEDBACK SIGNAL CIRCUIT FOR OPEN AND SHORT TO GROUND

Check continuity between front air control harness connector M49 terminal 22 and air mix door motor harness connector M147 terminal 2.

Connector	Terminal	Connector	Terminal	Continuity
M49	22	M147	2	Yes

2. Check continuity between front air control harness connector M49 terminal 22 and ground.

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Revision: October 2015 HAC-93 2012 Frontier NAM

< DTC/CIRCUIT DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

Connector	Terminal	_	Continuity
M49	22	Ground	No

# Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair or replace harness as necessary.

5. CHECK FRONT AIR CONTROL FOR 5 VOLT REFERENCE (VREF), VREF RETURN, AND FEEDBACK SIGNAL

- 1. Reconnect front air control harness connectors.
- 2. Turn ignition switch ON.
- 3. Check voltage between front air control harness connector M49 terminal 23 and terminal 26.

Connector	Terminals	Connector	Terminals	Voltage (Approx.)
Connector	(+)	Connector	(-)	voltage (Approx.)
M49	23	M49	26	5 Volts

4. Check voltage between front air control harness connector M49 terminal 22 and ground.

Connector	Terminal	_	Voltage (Approx.)
M49	22	Ground	0 Volts

## Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace front air control. Refer to <a href="VTL-7">VTL-7</a>, "Removal and Installation".

# 6.CHECK FRONT AIR CONTROL FOR FEEDBACK SIGNAL

- 1. Reconnect the air mix door motor harness connector M147.
- 2. Check voltage between front air control harness connector M49 terminal 22 and ground.

Connector	Terminal	_	Voltage (Approx.)
M49	22	Ground	0.2 to 4.8 Volts

# Is the inspection result normal?

- YES >> Inspect air mix door for binding or mechanical failure. If air mix door moves freely, replace front air control. Refer to <a href="VTL-7">VTL-7</a>, "Removal and Installation".
- NO >> Replace the air mix door motor. Refer to <a href="VTL-20">VTL-20</a>, "Removal and Installation".

# INTAKE DOOR MOTOR

# System Description

#### INFOID:0000000007326883

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## SYSTEM DESCRIPTION

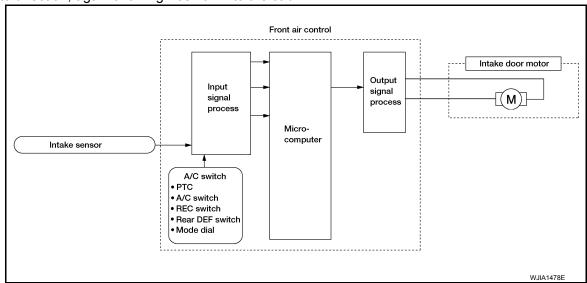
#### Component Parts

Intake door control system components are:

- Front air control
- Intake door motor
- Intake sensor

## System Operation

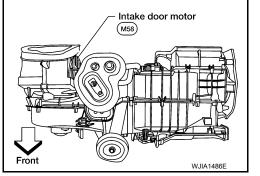
The intake door control determines the intake door position based on the position of the recirculation switch. When the recirculation switch is depressed the intake door motor rotates closing off the fresh air inlet and recirculating the cabin air. If the recirculation switch is depressed again, the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



## 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:0000000007326884

## SYMPTOM:

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

#### INSPECTION FLOW

# 1.CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - REC ( $lap{(4)}$

Turn blower control dial to 4.

**HAC-95** Revision: October 2015 2012 Frontier NAM

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## INTAKE DOOR MOTOR

#### < DTC/CIRCUIT DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

- Turn mode dial to vent mode (\*).
- Press REC ( ) switch.
- Press REC ( ) switch again.
- Listen for intake door position change (you should hear blower sound change slightly).

# Is the inspection result normal?

YES >> Inspection End.

NO >> Go to diagnosis procedure. Refer to HAC-96, "Intake Door Motor Diagnosis Procedure".

# Intake Door Motor Diagnosis Procedure

INFOID:0000000007326885

Regarding Wiring Diagram information, refer to HAC-116, "Wiring Diagram - With Type 2".

## DIAGNOSTIC PROCEDURE FOR INTAKE DOOR MOTOR

#### SYMPTOM:

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

# ${f 1}.$ CHECK INTAKE DOOR MOTOR CIRCUITS FOR OPEN AND SHORT TO GROUND

- Turn ignition switch OFF.
- Disconnect the front air control harness connector M49 and the intake door motor harness connector M58.
- 3. Check continuity between front air control harness connector M49 terminals 4, 5 and the intake door motor harness connector M58 terminals 1, 6.

Connector	Terminal	Connector	Terminal	Continuity
M49	4	M58	1	Yes
	5	IVISO	6	165

Check continuity between front air control harness connector M49 terminals 4, 5 and ground.

Connector	Terminal	_	Continuity
M49	4	Ground	No
	5	Ground	140

# Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace harness as necessary.

# 2.CHECK FRONT AIR CONTROL FOR INTAKE AIR DOOR MOTOR POWER AND GROUND

- Reconnect front air control harness connector.
- Turn ignition switch ON.
- Check voltage between front air control harness connector M49 terminal 4 and terminal 5 while placing the HVAC system into self-diagnostic mode.

Connector	Tern	ninals	Condition	Voltage (Approx.)	
Connector	(+)	(-)	Condition	voltage (Approx.)	
M49	5	4	Self-diagnostic mode (opening)	Battery voltage	
IVI <del>4</del> 3	4	5	Self-diagnostic mode (closing)	Battery voltage	

# Is the inspection result normal?

YES >> Inspect intake air door for binding or mechanical failure. If intake air door moves freely, replace the intake air door motor. Refer to <u>VTL-18</u>, "Removal and Installation". >> Replace front air control. Refer to <u>VTL-7</u>, "Removal and Installation".

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# **BLOWER MOTOR**

# System Description

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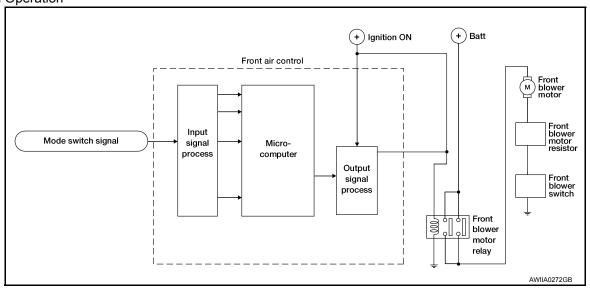
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#### Component Parts

Blower speed control system components are:

- Front air control
- Front blower motor resistor
- Front blower motor
- · Front blower relay
- · Front blower switch

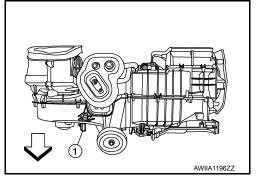
# System Operation



## COMPONENT DESCRIPTION

# Blower Motor Resistor

The front blower motor resistor (1) is located on the heater and cooling unit assembly. The front blower motor resistor grounds the front blower motor through a series of 1, 2, or 3 resistors, depending upon speed selected. For high speed operation the front blower motor resistor is circumvented and the front blower motor grounds directly.



# Front Blower Motor Component Function Check

INFOID:0000000007326887

# INSPECTION FLOW

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

- Rotate the blower control dial clockwise. Blower should operate.
- 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-98, "Front Blower Motor Diagnosis Procedure".

**HAC-97** Revision: October 2015 2012 Frontier NAM M

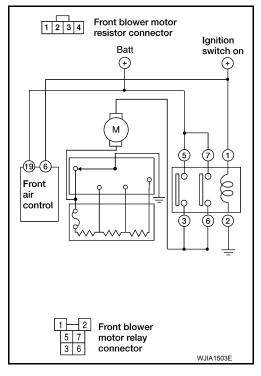
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# Front Blower Motor Diagnosis Procedure

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Regarding Wiring Diagram information, refer to HAC-116, "Wiring Diagram - With Type 2" or HAC-123, "Wiring Diagram - Heater Control".

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



# 1. DIAGNOSTIC PROCEDURE

- Turn ignition switch ON.
- Turn the front blower switch to each of its four speeds. Does blower motor rotate normally at each speed?

## YES or NO

YES >> Inspection End.

NO >> 1. Does not rotate at any speed, GO TO 2.

- 2. Does not rotate at 1 3 speed, GO TO 13.
- 3. Does not rotate at 4 speed, GO TO 16.

# 2. CHECK FUSES

- Check 15A fuses (Nos. 24 and 27, located in the fuse and fusible link box). Refer to PG-77, "Terminal Arrangement".
- Check 10A fuse [No. 8, located in the fuse block (J/B)]. Refer to PG-76, "Terminal Arrangement".

#### Is inspection result normal?

YES >> GO TO 3.

NO >> GO TO 8.

3.CHECK FRONT BLOWER MOTOR POWER SUPPLY

## **BLOWER MOTOR**

#### < DTC/CIRCUIT DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

- 1. Turn ignition switch OFF.
- 2. Disconnect front blower motor harness connector.
- 3. Turn ignition switch ON.
- 4. Select any front blower speed except OFF.
- 5. Check voltage between front blower motor harness connector M62 terminal 2 and ground.

## 2 - Ground

## : Battery voltage

# Is inspection result normal?

YES >> GO TO 12.

NO >> GO TO 4.

# 4. CHECK FRONT BLOWER MOTOR RELAY

- 1. Turn Ignition switch OFF.
- 2. Check front blower motor relay. Refer to HAC-101, "Front Blower Motor Component Inspection".

#### Is inspection result normal?

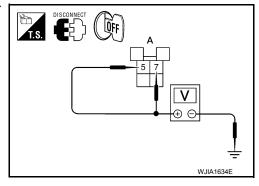
YES >> GO TO 5.

NO >> Replace front blower motor relay.

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

Check voltage between front blower motor relay harness connector E54 terminals 7 and 5 and ground.

(+)	A		Condition	Voltage (Ap- prox.)
Front air control connector	Terminal	(-)		
E54	5	Ground	Blower motor relay power supply	Battery voltage
E54	7	Ground	Blower motor relay power supply	Battery voltage



#### Is inspection result normal?

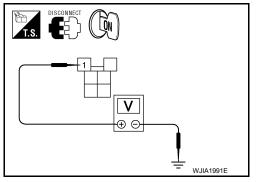
YES >> GO TO 6.

NO >> Repair harness or connector.

# $oldsymbol{6}$ .CHECK FRONT BLOWER MOTOR RELAY POWER SUPPLY (COIL SIDE)

- Turn ignition switch ON.
- Check voltage between front blower motor relay harness connector E54 terminal 1 and ground.

	Α		Voltage (Ap-	
(+)			Condition	prox.)
Front air control connector	Terminal	(-)		
E54	1	Ground	Blower motor relay power supply (coil side)	Battery voltage



# Is inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace harness as necessary.

CHECK FRONT BLOWER MOTOR POWER FROM RELAY TO FRONT BLOWER MOTOR

Front blower motor connector

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## < DTC/CIRCUIT DIAGNOSIS >

- 1. Turn ignition switch OFF.
- Check continuity between front blower motor relay harness connector E54 terminals 6 and 3 and front blower motor harness connector M62 terminal 2.

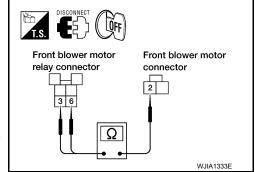
# 3, 6 - 2

# : Continuity should exist.

#### Is inspection result normal?

YES >> Repair the blower motor ground circuit as necessary.

NO >> Repair harness or connector between the front blower motor relay and the front blower motor.



# 8. REPLACE FUSE

# Refer to PG-77, "Terminal Arrangement".

Does fuse No. 24 or 27 open when the front blower motor is turned on?

# YES or NO

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

# 9.REPLACE FUSE

# Refer to PG-76, "Terminal Arrangement".

Does fuse No. 8 open when the ignition switch is turned ON?

#### YES or NO

YES >> Repair or replace harness as necessary.

NO >> Inspection End.

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

- 1. Turn ignition switch OFF.
- Disconnect front blower motor connector.
- Check continuity between front blower motor harness connector M62 terminal 2 and ground.

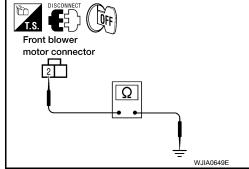
: Continuity should not exist.

# Is inspection result normal?

2 - Ground

YES >> GO TO 11.

NO >> Repair or replace harness as necessary.



# 11. CHECK FRONT BLOWER MOTOR RELAY (SWITCH SIDE) POWER SUPPLY CIRCUIT FOR SHORT

- 1. Disconnect front blower motor relay connector.
- 2. Check continuity between the front blower motor relay harness connector E54 terminal 7 and terminal 5 and ground.

# 7, 5 - Ground : Continuity should not exist.

## Is inspection result normal?

YES >> Check front blower motor. Refer to <u>HAC-98</u>, "Front <u>Blower Motor Diagnosis Procedure"</u>.

NO >> Repair harness or connector.

# Front blower motor relay connector

# 12. CHECK FRONT BLOWER MOTOR

- 1. Turn ignition switch OFF.
- Check front blower motor. Refer to HAC-101, "Front Blower Motor Component Inspection".

## Is inspection result normal?

#### < DTC/CIRCUIT DIAGNOSIS >

YES >> GO TO 13.

NO >> Replace front blower motor. Refer to <u>VTL-9</u>, "Removal and Installation".

# 13. CHECK FRONT BLOWER MOTOR RESISTOR

Check front blower motor resistor. Refer to HAC-101, "Front Blower Motor Component Inspection".

# Is inspection result normal?

YES >> GO TO 14.

NO >> Replace front blower motor resistor. Refer to <u>VTL-11</u>, "Removal and Installation".

# 14. CHECK FRONT BLOWER SWITCH

Check front blower switch. Refer to HAC-101, "Front Blower Motor Component Inspection".

# Is inspection result normal?

YES >> GO TO 15.

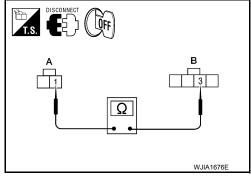
NO >> Replace front blower switch. Refer to VTL-7, "Removal and Installation".

# 15.check front blower motor ground circuit to front blower motor resistor

1. Disconnect front blower motor resistor harness connector.

 Check continuity between front blower motor connector M62 (A) terminal 1 and front blower motor resistor harness connector M122 (B) terminal 3.

A		В		
Connector	Terminal	Connector	Terminal	Continuity
Front blower motor: M62	1	Front blower motor resistor: M122	3	Yes



# Is inspection result normal?

YES >> Repair harness or connector between front blower switch connector M51 terminal 8 and ground.

NO >> Repair harness or connector between front blower motor resistor and front blower motor.

# 16. CHECK FRONT BLOWER SWITCH

Check front blower switch. Refer to HAC-101, "Front Blower Motor Component Inspection".

# Is inspection result normal?

YES >> Repair harness or connector between front blower motor switch connector M51 terminal 8 and front blower motor resistor connector M122 terminal 3.

NO >> Replace front blower switch. Refer to VTL-7, "Removal and Installation".

SYMPTOM: Blower motor operation is malfunctioning.

# Front Blower Motor Component Inspection

COMPONENT INSPECTION

Front Blower Motor Relay

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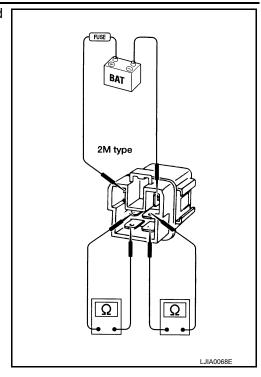
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Revision: October 2015 HAC-101 2012 Frontier NAM

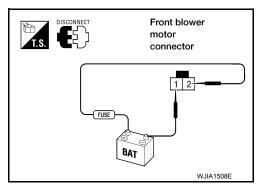
Check continuity between terminals by supplying 12 volts and ground to coil side terminals of relay.



## Front Blower Motor

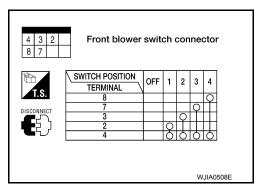
Confirm smooth rotation of the blower motor.

- 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.



# Front Blower Switch

Check continuity between terminals at each front blower speed position.



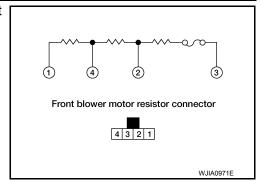
Front Blower Motor Resistor

# **BLOWER MOTOR**

# < DTC/CIRCUIT DIAGNOSIS >

# [MANUAL A/C (TYPE 2)]

Check continuity between terminals. There will be resistance, but there should not be an open or short between any two terminals.



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# MAGNET CLUTCH

# System Description

INFOID:0000000007326890

#### SYSTEM DESCRIPTION

The front air control controls compressor operation based on 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.

When intake air temperature is higher than 3.5°C (38.3°F), the compressor turns ON. The compressor turns OFF when intake air temperature is lower than 2.5°C (36.5°F).

# Magnet Clutch Component Function Check

INFOID:0000000007326891

SYMPTOM: Magnet clutch does not engage.

#### INSPECTION FLOW

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

- Rotate blower control dial clockwise.
- 2. Rotate mode dial to vent (\*) position.
- 3. Press A/C switch. 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 <a href="HAC-104">HAC-104</a>, "Magnet Clutch Diagnosis Procedure".

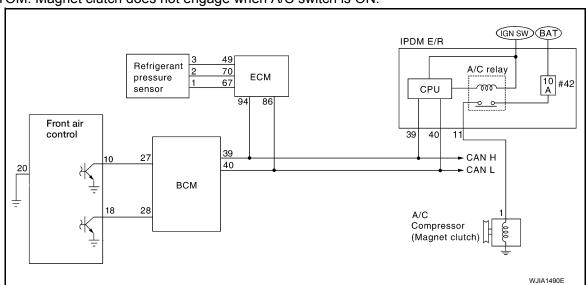
# Magnet Clutch Diagnosis Procedure

INFOID:0000000007326892

Regarding Wiring Diagram information, refer to HAC-116. "Wiring Diagram - With Type 2".

# DIAGNOSTIC PROCEDURE FOR MAGNET CLUTCH

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



# 1.PERFORM IPDM E/R AUTO ACTIVE TEST

Refer to PCS-11, "CONSULT Function (IPDM E/R)".

## Does magnet clutch operate?

YES >> •

>> • ®WITH CONSULT GO TO 2.

 \( \mathbb{R} \) WITHOUT CONSULT

GO TO 8.

NO >> Check 10A fuse (No. 42, located in IPDM E/R), and GO TO 12.

2.CHECK BCM INPUT (A/C COMPRESSOR ON) SIGNAL

Check A/C compressor ON/OFF signal. Refer to BCS-20, "AIR CONDITIONER: CONSULT Function (BCM - AIR CONDITIONER)".

A/C SW ON : AIR COND SW ON A/C SW OFF : AIR COND SW OFF

Is the inspection result normal?

YES >> GO TO 3. NO >> GO TO 8.

3. CHECK REFRIGERANT PRESSURE SENSOR

Check refrigerant pressure sensor. Refer to <u>EC-440, "Diagnosis Procedure"</u> (QR25DE) or <u>EC-925, "Diagnosis Procedure"</u> (VQ40DE).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace refrigerant pressure sensor. Refer to <u>HA-38</u>, "Removal and Installation for Refrigerant <u>Pressure Sensor"</u>.

4. CHECK BCM INPUT (FAN ON) SIGNAL

Check FAN ON/OFF signal. Refer to <u>BCS-20</u>, "AIR CONDITIONER: CONSULT Function (BCM - AIR CONDITIONER)".

BLOWER CONTROL DIAL : FAN ON SIG ON

ON

BLOWER CONTROL DIAL : FAN ON SIG OFF

**OFF** 

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 5.

# ${f 5.}$ CHECK CIRCUIT CONTINUITY BETWEEN BCM AND FRONT AIR CONTROL

1. Turn ignition switch OFF.

- 2. Disconnect BCM connector and front air control connector.
- 3. Check continuity between BCM harness connector M18 (A) terminal 28 and front air control harness connector M49 (B) terminal 18.

Α		В		
Connector	Terminal	Connector	Terminal	Continuity
BCM: M18	28	Front air control: M49	18	Yes

Check continuity between BCM harness connector M18 (A) terminal 28 and ground.

Cannastan	Townsia		Continuity
Connector	Terminal	Ground	Continuity
BCM: M18	28	Ground	No

# Is the inspection result normal?

YES >> GO TO 6.

NO >> Repair harness or connector.

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

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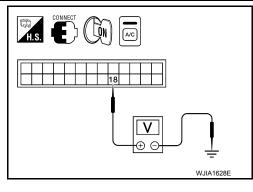
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Revision: October 2015 HAC-105 2012 Frontier NAM

## < DTC/CIRCUIT DIAGNOSIS >

- 1. Reconnect BCM connector and front air control connector.
- 2. Turn ignition switch ON.
- 3. Turn A/C switch ON.
- 4. Check voltage between front air control harness connector M49 terminal 18 and ground.

Terminals				
(+)		(-)	Condition	Voltage
Front air con- trol connector	Terminal No.			(Approx.)
M49	18	Ground	A/C switch: ON Blower motor operates	0V
			A/C switch: OFF	Battery voltage



#### Is the inspection result normal?

YES >> Replace BCM. Refer to BCS-49, "Removal and Installation".

NO-1 >> If the voltage is approx. 5V when blower motor is ON, replace front air control. Refer to <a href="VTL-7">VTL-7</a>. <a href="">"Removal and Installation"</a>.

NO-2 >> If the voltage is approx. 0V when blower motor is OFF, replace BCM. Refer to <u>BCS-49</u>, "Removal and Installation".

# 7. CHECK CAN COMMUNICATION

Check CAN communication. Refer to LAN-14, "Trouble Diagnosis Flow Chart".

#### Is the inspection result normal?

YES >> Inspection End.

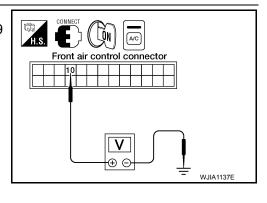
NO >> Repair or replace malfunctioning part(s).

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

1. Turn ignition switch ON.

2. Check voltage between front air control harness connector M49 terminal 10 and ground.

Terminals				
(+)		(-)	0 1	Voltage
Front air control con- nector	Terminal No.		Condition	(Approx.)
M49 10		Ground	A/C switch: ON	0V
	10		A/C switch: OFF	Battery voltage



#### Is the inspection result normal?

YES >> GO TO 9.

NO-1 >> If the voltage is approx. 5V when A/C switch is ON, replace front air control. Refer to <u>VTL-7</u>, "Removal and Installation".

NO-2 >> If the voltage is approx. 0V when A/C switch is OFF, replace BCM. Refer to <u>BCS-49</u>, "Removal and Installation".

9. CHECK CIRCUIT CONTINUITY BETWEEN BCM AND FRONT AIR CONTROL

# **MAGNET CLUTCH**

# < DTC/CIRCUIT DIAGNOSIS >

# [MANUAL A/C (TYPE 2)]

Front air control connector

WJIA1136E

BCM connector

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- Turn ignition switch OFF.
- Disconnect BCM connector and front air control connector.
- Check continuity between BCM harness connector M18 terminal 27 and front air control harness connector M49 terminal 10.

#### 27 - 10 : Continuity should exist.

Check continuity between BCM harness connector M18 terminal 27 and ground.

#### 27 - ground : Continuity should not exist.

# Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair harness or connector.

# 10.CHECK INTAKE SENSOR CIRCUITS

Check intake sensor. Refer to HAC-109, "Intake Sensor Component Inspection".

#### Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace intake sensor. Refer to VTL-8, "Removal and Installation".

# 11. CHECK CAN COMMUNICATION

Check CAN communication. Refer to LAN-14, "Trouble Diagnosis Flow Chart".

## Is the inspection result normal?

YES >> Replace BCM. Refer to BCS-49, "Removal and Installation".

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

# 12. CHECK MAGNET CLUTCH CIRCUIT

- Turn ignition switch OFF.
- 2. Disconnect A/C compressor connector.
- Check for operation sound when applying battery voltage to A/C compressor terminal 1.

#### Is the inspection result normal?

>> GO TO 13. YES

NO >> Replace magnet clutch. Refer to HA-30, "Removal and Installation for Compressor Clutch".

# A/C compressor connector **FUSE** WJIA1472E

# 13. CHECK CIRCUIT CONTINUITY BETWEEN IPDM E/R AND A/C COMPRESSOR

- Disconnect IPDM E/R 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.

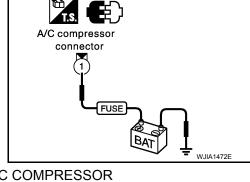
Check continuity between IPDM E/R harness connector E119 terminal 11 and ground.

#### 11 - ground : Continuity should not exist.

#### Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-28, "Removal and Installation of IPDM E/R".

NO >> Repair harness or connector.



IPDM E/R

connector

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A/C compressor

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# **INTAKE SENSOR**

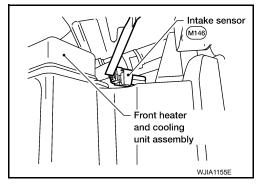
# System Description

#### INFOID:0000000007326893

#### COMPONENT DESCRIPTION

#### Intake Sensor

The intake sensor is located on top of the heater and cooling unit assembly next to the A/C evaporator cover. It converts temperature of air after it passes through the evaporator into a resistance value which is then input to the front air control.



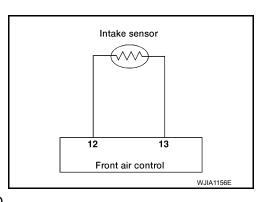
# Intake Sensor Diagnosis Procedure

INFOID:0000000007326894

Regarding Wiring Diagram information, refer to HAC-116, "Wiring Diagram - With Type 2".

# DIAGNOSTIC PROCEDURE FOR INTAKE SENSOR

SYMPTOM: Intake sensor circuit is open or shorted.



# 1. CHECK VOLTAGE BETWEEN INTAKE SENSOR AND GROUND

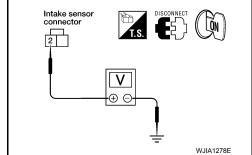
- Disconnect intake sensor connector.
- 2. Turn ignition switch ON.
- 3. Check voltage between intake sensor harness connector M146 terminal 2 and ground.

#### 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

#### < DTC/CIRCUIT DIAGNOSIS >

#### [MANUAL A/C (TYPE 2)]

Intake sensor

- 1. Turn ignition switch OFF.
- 2. Disconnect front air control connector.
- Check continuity between intake sensor harness connector M146 terminal 1 and front air control harness connector M49 terminal 13.

#### 1 - 13 : Continuity should exist.

#### Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair harness or connector.

# 3. CHECK INTAKE SENSOR

Refer to HAC-109, "Intake Sensor Component Inspection".

#### Is the inspection result normal?

YES >> Replace front air control. Refer to <a href="VTL-7">VTL-7</a>, "Removal and Installation".

NO >> Replace intake sensor. Refer to <a href="VTL-8">VTL-8</a>, "Removal and Installation".

# 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 terminal 2 and front air control harness connector M49 terminal 12.

#### 2 - 12 : Continuity should exist.

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

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

#### Is the inspection result normal?

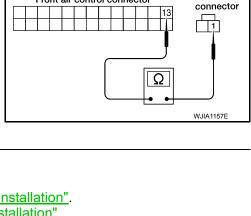
YES >> Replace front air control. Refer to VTL-7, "Removal and Installation".

NO >> Repair harness or connector.

## Intake Sensor Component Inspection

#### COMPONENT INSPECTION

Intake Sensor



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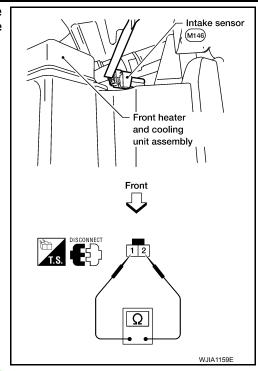
#### **INTAKE SENSOR**

#### < DTC/CIRCUIT DIAGNOSIS >

#### [MANUAL A/C (TYPE 2)]

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

Temperature °C (°F)	Resistance k $\Omega$
-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  $\underline{\text{VTL-8.}}$  "Removal and Installation".

# POWER SUPPLY AND GROUND CIRCUIT FOR CONTROLLER

< DTC/CIRCUIT DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

# POWER SUPPLY AND GROUND CIRCUIT FOR CONTROLLER

# Component Description

#### INFOID:0000000007326896

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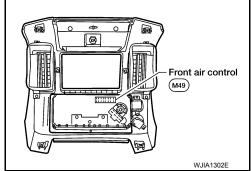
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#### COMPONENT DESCRIPTION

#### Front Air Control

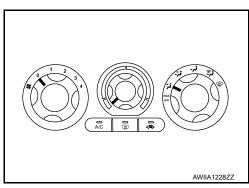
The front air control has a built-in microcomputer which processes information sent from various sensors needed for air conditioner operation. The air mix door motor, mode door motor, intake door motor, defroster door motor, blower motor and compressor are then controlled.

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 dial.



## HAC

# Front Air Control Component Function Check

SYMPTOM: A/C system does not come on. (if equipped)

#### INSPECTION FLOW

# 1. CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK

- Turn blower control dial to position 1-4, then press A/C switch. 1.
- Confirm that the compressor clutch engages (sound or visual inspection).

#### Is the inspection result normal?

YES >> Inspection End.

>> Go to diagnosis procedure. Refer to HAC-111, "Front Air Control Power and Ground Diagnosis NO Procedure".

## Front Air Control Power and Ground Diagnosis Procedure

Regarding Wiring Diagram information, refer to HAC-116, "Wiring Diagram - With Type 2" or HAC-123, "Wiring Diagram - Heater Control".

DIAGNOSTIC PROCEDURE FOR A/C SYSTEM

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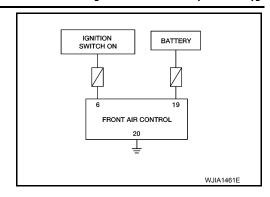
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# POWER SUPPLY AND GROUND CIRCUIT FOR CONTROLLER

< DTC/CIRCUIT DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

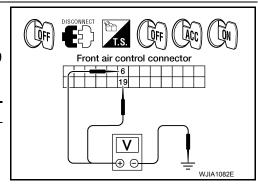
SYMPTOM: A/C system does not come on. (if equipped)



# 1. CHECK POWER SUPPLY CIRCUITS FOR FRONT AIR CONTROL

- 1. Turn ignition switch OFF.
- 2. Disconnect front air control connector.
- 3. Turn ignition switch ON.
- 4. Check voltage between front air control harness connector M49 terminals 6 and 19, and ground.

	Terminals		Ignit	tion switch pos	sition
	(+)				
Front air control connector	Terminal No.	(-)	OFF	ACC	ON
M49	6	Ground	Approx. 0V	Approx. 0V	Battery voltage
M49	19	Giodila	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 <u>PG-76, "Terminal Arrangement".</u>
  - 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

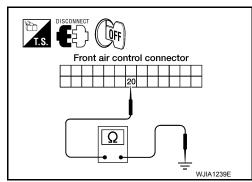
- 1. Turn ignition switch OFF.
- 2. Check continuity between front air control harness connector M49 terminal 20 and ground.

#### 20 - Ground

: Continuity should exist.

#### Is the inspection result normal?

- YES >> Replace front air control. Refer to <u>VTL-7</u>, "Removal and <u>Installation"</u>.
- NO >> Repair harness or connector.



## MANUAL A/C IDENTIFICATION TABLE

< ECU DIAGNOSIS INFORMATION >

[MANUAL A/C (TYPE 2)]

# **ECU DIAGNOSIS INFORMATION**

# MANUAL A/C IDENTIFICATION TABLE

Application Table

Manual A/C Type	Description	Visual Identification
Manual A/C (Type 1)	Two Control Dial System [with variable blower control (VBC)]	AWIIA0481ZZ
Manual A/C (Type 2)	Three Control Dial System [without variable blower con- trol (VBC)]	AWIIA1228ZZ

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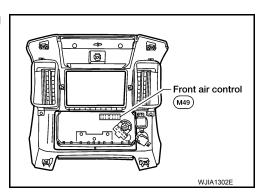
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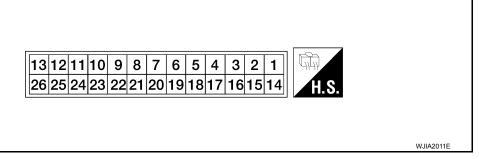
## AIR CONDITIONER CONTROL

#### Front Air Control Terminals Reference Values

Measure voltage between each terminal and ground by following Terminals and Reference Values for front air control.



# 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	BR	Mode door motor CW	ON	Clockwise rotation	Battery voltage		
2	W	Air mix door motor CW	ON	Clockwise rotation	Battery voltage		
3	GR	Air mix door motor CCW	ON	Counterclockwise rotation	Battery voltage		
4	Υ	Intake door motor CW	ON	Clockwise rotation	Battery voltage		
5	0	Intake door motor CCW	ON	Counterclockwise rotation	Battery voltage		
6	W/G	Power supply for IGN	ON	-	Battery voltage		
8	G	Illumination +	ON	Park lamps ON	Battery voltage		
9	BR	Illumination -	-	Park lamps ON	(V) 15 10 5 0 200 ms		
10	W	Compressor ON signal	ON	A/C switch OFF	5V		
10	vv	Compressor ON signal	ON	A/C switch ON	0V		
11	Υ	Door defractor request	ON	Rear defroster switch ON	Battery voltage		
11	ĭ	Rear defroster request	ON	Rear defroster switch OFF	0V		
12	L	Intake sensor	ON	-	0 - 5V		
13	V	Sensor ground	ON	-	0 - 5V		
14	R	Mode door motor CCW	ON	Counterclockwise rotation	Battery voltage		

# AIR CONDITIONER CONTROL

## < ECU DIAGNOSIS INFORMATION >

# [MANUAL A/C (TYPE 2)]

Terminal No.	Wire color	Item	Ignition switch	Condition	Voltage (V) (Approx.)
18	BR	Front blower monitor	ON	Front blower motor OFF	Battery voltage
10	DK	Front blower monitor	ON	Front blower motor ON	0V
19	R/Y	Power supply for BAT	-	-	Battery voltage
20	В	Ground	-	-	0V
21	V	Mode door motor feedback	ON	-	0 - 5V
22	SB	Air mix door motor feedback	ON	-	0 - 5V
23	G	Power supply for mode door motor and air mix door motor PBR	ON	-	5V
25	R	Door defrector request	ON	Rear defroster switch ON	Battery voltage
25	ĸ	Rear defroster request	ON	Rear defroster switch OFF	0V
26	Р	Ground for mode door motor and air mix door motor PBR	ON	-	0V

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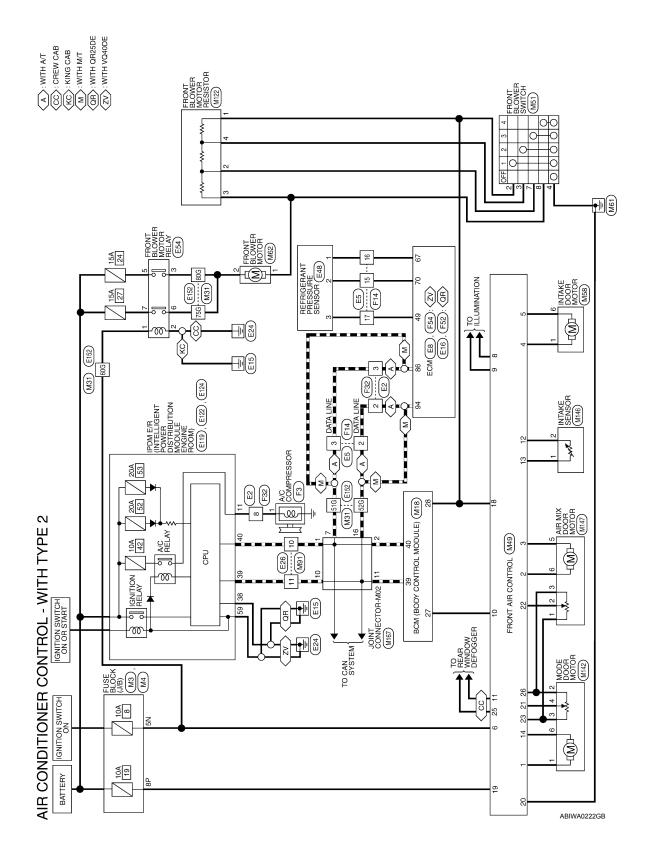
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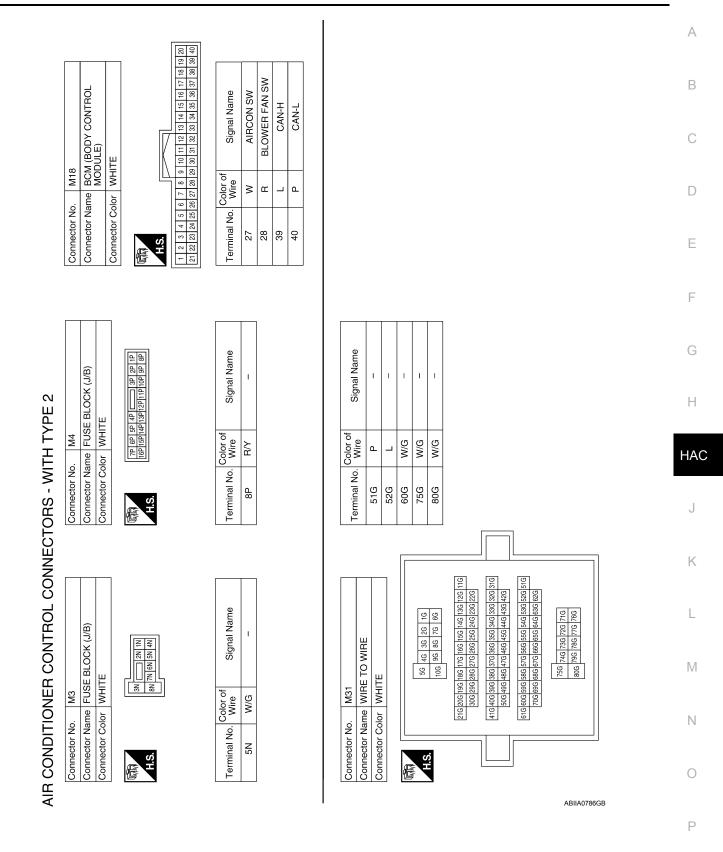
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# WIRING DIAGRAM

# AIR CONDITIONER CONTROL

Wiring Diagram - With Type 2





Signal Name	FR BLOWER MONITOR	BATT	GND	MODE FEED BACK	BLEND FEED BACK	V REF ACTR (5V)	-	RR DEF STATUS	MODE (GND)
Color of Wire	BR	R∕	В	>	SB	ŋ	ı	В	۵
Terminal No.	18	19	50	21	22	23	54	52	56

Signal Name	IGN	1	ı	ı	A/C REQUEST	REAR DEFOGGER REQUEST	INTAKE SENSOR	SENS RETURN	MODE CCW	1	ı	1
Color of Wire	M/G	_	ŋ	BB	8	>	Τ	۸	۳	_	-	1
Terminal No.	9	7	80	6	10	#	12	13	14	15	16	17

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	25 22 11	(WI BL 12 11 10 25 24 23	Or BLAC	Connector Color BLACK  13 12 11 10 9 8  14.S.   12 12 12 12 12 12 12 12 12 12 12 12 12	Olor BLACK  13 12 11 10 9 8 7  18 25 24 23 22 21 20	WITH TYPE 2  N BLACK    2   11   10   9   8   7   6   6   6   6   6   6   6   6   6	(WITH TYPE 2)  T BLACK    2	(WITH TYPE 2)  PLACK    BLACK	(WITH TYPE 2)  T BLACK    2   11   10   9   8   7   6   5   4   9   1   10   10   10   10   10   10	(WITH TYPE 2)	20lor BLACK 18   12   11   10   9   8   7   6   5   4   3   2   1   1   1   1   1   1   2   2   2

Signal Name	MODE CW	BLEND DR CW	BLEND DR CCW	RECIRC DOOR CW	RECIRC DOOR CCW
Color of Wire	BR	Μ	GR	У	0
Terminal No.	1	2	3	4	5

Connector No.	. M62	
Connector Na	me FRON	Connector Name FRONT BLOWER MOTOR
Connector Color BLACK	lor BLACI	X
H.S.	년	
Terminal No.	Color of Wire	Signal Name
-	٦	_
2	M/G	_

	Connector Name   INTAKE DOOR MOTOR	Х	23456	Signal Name	ı	1
M58	ne   INTAK	or BLAC	112	Color of Wire	>	0
Connector No.	Connector Nar	Connector Color BLACK	赋 H.S.	Terminal No.	-	9

	FRONT BLOWER SWITCH	IIE	4 8 8 7 7 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	Signal Name	I	_	_	I	_
LCIM	me FR	lor WHITE		Color of Wire	BB	SB	В	>	Μ
Connector No.	Connector Name	Connector Color	H.S.	Terminal No.	2	3	4	7	8

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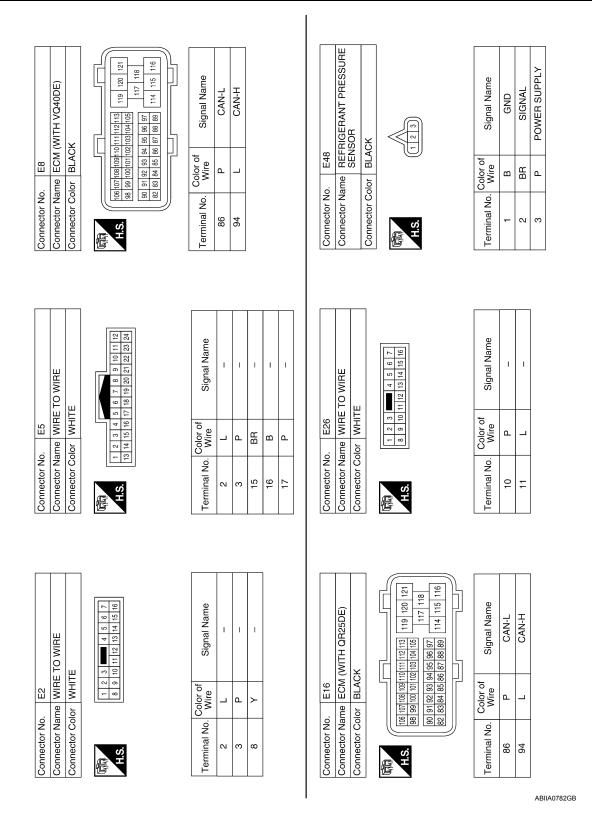
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MODE DOOR MOTOR BLACK  123456	Signal Name	Connector No. M167  Connector Name JOINT CONNECTOR-M02  Connector Color BLUE	Signal Name
	Color of Wire BR BR C C C C C C C C C C C C C C C C C	o. M167 ame JOINT olor BLUE	Color of Wire P
Connector Name Connector Color H.S.	Terminal No. 1 1 2 2 3 4 4 6 6	Connector No. Connector Name Connector Color	Terminal No.  2 2 7 10 11 11
ш П			
FRONT BLOWER MOTOR RESISTOR WHITE	Signal Name	Connector No. M147 Connector Name AIR MIX DOOR MOTOR Connector Color BLACK  ITZ3456  H.S.	Signal Name
	Color of Wire B R Y Y SB	M147 or BLACK	Color of Wire SB SB GB W
Connector Name Connector Color	Terminal No. 2 2 3 4	Connector No. Connector Color Connector Color	7 Cerminal No. 3 3 5 5 5 6
WHRE TO WIRE WHITE 6 5 4   3 2 1   1   1   1   1   1   1   1   1   1	Signal Name	Connector No. M146 Connector Name INTAKE SENSOR Connector Color GRAY	Signal Name
<del>                                     </del>	Color of Wire P	M146 INTAKE	Color of Wire
Connector Name Connector Color H.S.	Terminal No. 10 11	Connector No. Connector Name Connector Color	Terminal No.

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		А
PDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) WHITE  ### ### ############################	Signal Name GND (SIGNAL) CAN-H CAN-L	В
	Color of Wire P P W//G W//G W//G W//G W//G W//G W//G	С
Connector No. Connector Name Connector Color	Terminal No. Co	D
5 5 5 E		E
E W	906 806 616 706	F
PET19 IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) WHITE	Signal Name   Signal Name	G
E119 IPDM E/R (INT POWER DISTF MODULE ENG WHITE  8 7 6	11   Y   A/C CON   Sign   Sign   A/C CON   Sign   A/C CON   A/C	Н
0 r	No. Wire Wire or Name WIRE or Color WHR wire 116 126 136 136 136 136 136 136 136 136 136 13	НА
Connector No  Connector Color  Connector Color  H.S.	Connector No. Connector No. Connector Name Connector Name Connector Color III	J
		K
R MOTOR	Name LIGENT SUTION E ROOM)  Mame OWER)	L
E54 FRONT BLOWER M RELAY BROWN  2 1 1   2   1   1   1   1   1   1   1	rr of Signal Name G	M
		N
Connector No. Connector Color Connector Color H.S.	Connector Color  Colo	0
	ABIIA0783GB	
		Р

Connector No. F32 Connector Name WIRE TO WIRE Connector Color WHITE	(南) 7 6 5 4	Terminal No. Wire Signal Name	n ⊗					
Connector No. F14 Connector Name WIRE TO WIRE Connector Color WHITE	H.S. [12   11   10   9   8   7   6   5   4   3   2   1	Terminal No. Wire Signal Name 2 L –	3 P	16 B – 17 P – 17	Connector No. F54 Connector Name ECM (WITH VQ40DE) Connector Color BLACK	4 5 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 7 6 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	Terminal No. Wire Signal Name 49 P AVCC (PDPRES)	67 B GND-A 70 BR PDPRESS
Connector No.         F3           Connector Name         A/C COMPRESSOR           Connector Color         BLACK	H.S.	Terminal No. Wire Signal Name			Connector No. F52 Connector Name ECM (WITH QR25DE) Connector Color BLACK	Company   Comp	Terminal No. Wire Signal Name 49 P AVCC (PDPRES)	67 B GND-A 70 BR PDPRESS

Wiring Diagram - Heater Control

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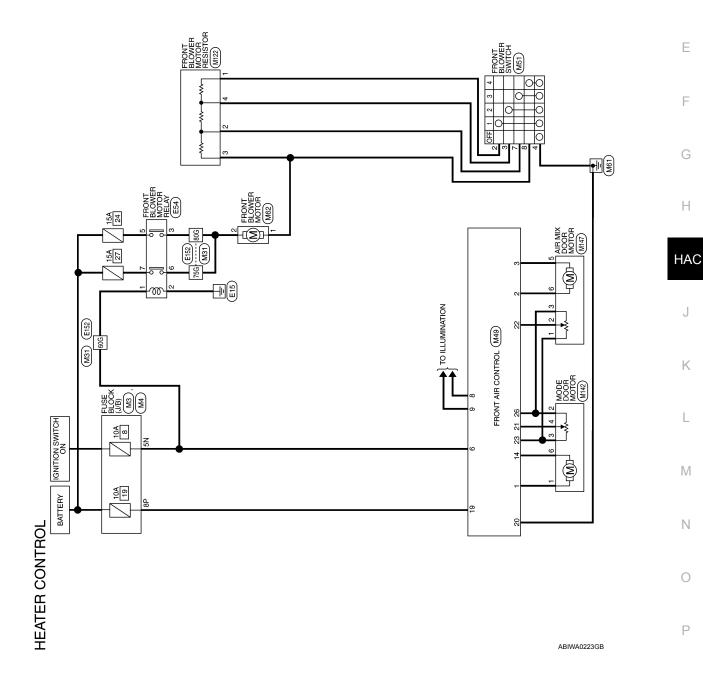
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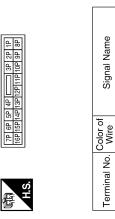
# HEATER CONTROL CONNECTORS

Connector No.	МЗ
Connector Name	Connector Name FUSE BLOCK (J/B)
Connector Color WHITE	WHITE
H.S.	3N

Connector Name FUSE BLOCK (J/B)

Connector No.

Connector Color WHITE

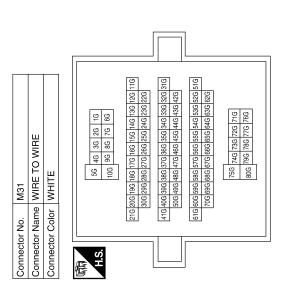




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Signal Name	1	I	ı
Color of Wire	M/G	M/G	M/G
Ferminal No.	60G	75G	80G



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Signal Name	ı	BATT	GND	MODE FEED BACK	BLEND FEED BACK	V REF ACTR (5V)	_	1	MODE (GND)
Color of Wire	-	R/Y	В	>	SB	G	1	1	Ь
Terminal No. Wire	18	19	20	21	22	23	24	25	26

Signal Name	IGN	ı	ı	I	ı	ı	I	ı	MODE CCW	ı	ı	_
Color of Wire	M/G	ı	G	BR	ı	ı	1	ı	Œ	1	1	ı
Terminal No. Wire	9	7	8	6	10	11	12	13	14	15	16	17

M49 FRONT AIR CONTROL (WITHOUT VBC)	BLACK		9     8     7     6     5     4     3     2     1       22     21     20     19     18     17     16     15     14	Signal Name	MODE CW	BLEND DR CW	BLEND DR CCW	ı	1
e	-		12 11 10 25 24 23	Color of Wire	BB	8	GR	1	1
Connector No. Connector Name	Connector Color	   	(中中 H.S. 26	Terminal No.	-	2	3	4	5

Connector No.	<u>.</u>	M122	
Connector Name	ıme	FRONT BLO	FRONT BLOWER MOTOR RESISTOR
Connector Color		WHITE	
是 H.S.		4	211
Terminal No.	Color of Wire	of	Signal Name
-	Œ		I
2	>		I
3	_		1
4	SB		ı

Connector No.	. M62	
Connector Na	me FRON	Connector Name   FRONT BLOWER MOTOR
Connector Color	lor BLACK	X
H.S.		
Terminal No.	Color of Wire	Signal Name
-	٦	1
2	W/G	1

Connector No.	). M51	
Connector Name		FRONT BLOWER SWITCH
Connector Color	olor WHITE	111111111111111111111111111111111111111
E	4	3 2 1
H.S.	80	8 8
Terminal No.	Color of Wire	Signal Name
0	BR	ı
က	SB	ı
4	В	ı
7	Υ	I
8	8	I

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PESATONT BROWN  PELAY		3 MOTOR			Vame						
	4	ONT BLOWEF LAY	OWN		Signal Name	I	I	I	I	I	ı
onnector No onnector No onnector No onnector No onnector Co onnector Co onnector Co onnector Co onnector No onnect				2	Color of Wire	M/G	В	M/G		M/G	GR
ŭ ŭ  ŭ    <b>'</b>	Connector No.	Connector Na	Connector Co	雨 H.S.	Terminal No.	-	2	က	2	9	7

o. M147 ame AIR MIX DOOR MOTOR Jor BLACK
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Connector Name MODE DOOR MOTOR

Connector No. M142

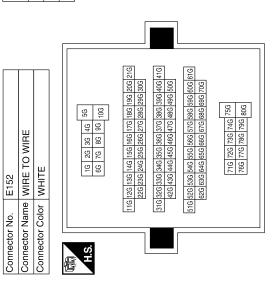
Connector Color BLACK



Signal Name	I	I	_	I	1
Color of Wire	BR	۵	Э	۸	Ж
Š.					

Signal Name	ı	ı	_	ı	ı
Color of Wire	BR	Д	В	>	В
Color of Wire	-	2	3	4	9

Signal Name	1	Ι	I	
Color of Wire	M/G	M/G	M/G	
Terminal No.	909	75G	80G	



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[MANUAL A/C (TYPE 2)]

# 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 [with variable blower control (VBC)]	AWIIA0481ZZ
Manual A/C (Type 2)	Three Control Dial System [without variable blower con- trol (VBC)]	AWIIA1228ZZ

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## 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-111
Air outlet does not change.	Go to Trouble Diagnosis Procedure for Mode Door Motor.	HAC-87
Mode door motor is malfunctioning.	Go to Housie Diagnosis Procedure for Mode Door Motor.	<u>11AC-01</u>
Discharge air temperature does not change.	Go to Trouble Diagnosis Procedure for Air Mix Door Motor.	HAC-92
Air mix door motor is malfunctioning.	Go to Housie Diagnosis Procedure for All Mix Door Motor.	<u>11AC-92</u>
Intake door does not change.	Go to Trouble Diagnosis Procedure for Intake Door Motor.	HAC-95
Intake door motor is malfunctioning.	Go to Housie Diagnosis Procedure for Illiane Door Motor.	<u>11AC-95</u>
Front blower motor operation is malfunctioning.	Go to Trouble Diagnosis Procedure for Front Blower Motor.	HAC-97
Magnet clutch does not engage.	Go to Trouble Diagnosis Procedure for Magnet Clutch.	HAC-104
Insufficient cooling	Go to Trouble Diagnosis Procedure for Insufficient Cooling.	
Insufficient heating	Go to Trouble Diagnosis Procedure for Insufficient Heating. HAC-	
Noise	Go to Trouble Diagnosis Procedure for Noise.	HAC-139

# **INSUFFICIENT COOLING**

< SYMPTOM DIAGNOSIS >	[MANUAL A/C (TYPE 2)]
INSUFFICIENT COOLING	
Component Function Check	INFOID:000000007326905
SYMPTOM: Insufficient cooling	
INSPECTION FLOW	
1.CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHE	CK - TEMPERATURE DECREASE
<ol> <li>Turn temperature control dial counterclockwise to maximum co</li> <li>Check for cold air at discharge air outlets.</li> </ol>	old.
Can the symptom be duplicated?	
YES >> GO TO 3.	
NO >> GO TO 2.  2.CHECK FOR ANY SYMPTOMS	
	UAC 6 "Operational Check"
Perform a complete operational check for any symptoms. Refer to Does another symptom exist?	MAC-6. Operational Check.
YES >> Refer to HAC-57, "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-14, "Checking Drive	e Belts" (OR25DE) or EM-128 "Checking
Drive Belts" (VQ40DE).	e Belts" (QR25DE) or EM-128, "Checking
Is the inspection result normal?	
YES >> GO TO 5.  NO >> Adjust or replace compressor belt. Refer to EM-14, "A ment" (VQ40DE).	djustment" (QR25DE) or EM-128, "Adjust-
5. CHECK AIR MIX DOOR OPERATION	
Check and verify air mix door mechanism for smooth operation.	
Does air mix door operate correctly?	
YES >> GO TO 6.	
NO >> Repair or replace air mix door control linkage.	
6.CHECK COOLING FAN MOTOR OPERATION	
Check and verify cooling fan motor for smooth operation. Refer to I	EC-902, "Component Inspection".
<u>Does cooling fan motor operate correctly?</u> YES >> GO TO 7.	
NO >> Check cooling fan motor. Refer to <u>EC-340, "Diagnosis la sis Procedure"</u> (VQ40DE).	Procedure" (QR25DE) or EC-816. "Diagno-
7. CHECK RECOVERY/RECYCLING EQUIPMENT BEFORE USA	AGE
Check recovery/recycling equipment before connecting to vehicle. recycling equipment by checking the gauges. If pressure exists, rec	
>> GO TO 8.	
8.CHECK REFRIGERANT PURITY	
<ol> <li>Connect recovery/recycling equipment to vehicle.</li> <li>Confirm refrigerant purity in supply tank using recovery/recycling</li> </ol>	ng and refrigerant identifier.
La thankan and a manufacture of the same alo	G : 5 G: 5 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -

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Is the inspection result normal?

#### **INSUFFICIENT COOLING**

#### < SYMPTOM DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

YES >> GO TO 9.

NO >> Check contaminated refrigerant. Refer to HA-4, "Contaminated Refrigerant".

# 9. CHECK FOR EVAPORATOR FREEZE UP

Start engine and run A/C. Check for evaporator freeze up.

#### Does evaporator freeze up?

YES >> Perform diagnostic work flow. Refer to <u>HAC-130, "Diagnostic Work Flow"</u>.

NO >> GO TO 10.

# 10. CHECK REFRIGERANT PRESSURE

Check refrigerant pressure with manifold gauge connected. Refer to <u>HAC-132</u>, "<u>Performance Chart</u>". <u>Is the inspection result normal?</u>

YES >> Perform diagnostic work flow. Refer to <u>HAC-130</u>, "<u>Diagnostic Work Flow</u>".

NO >> GO TO 11.

# 11. CHECK AIR DUCTS

Check ducts for air leaks.

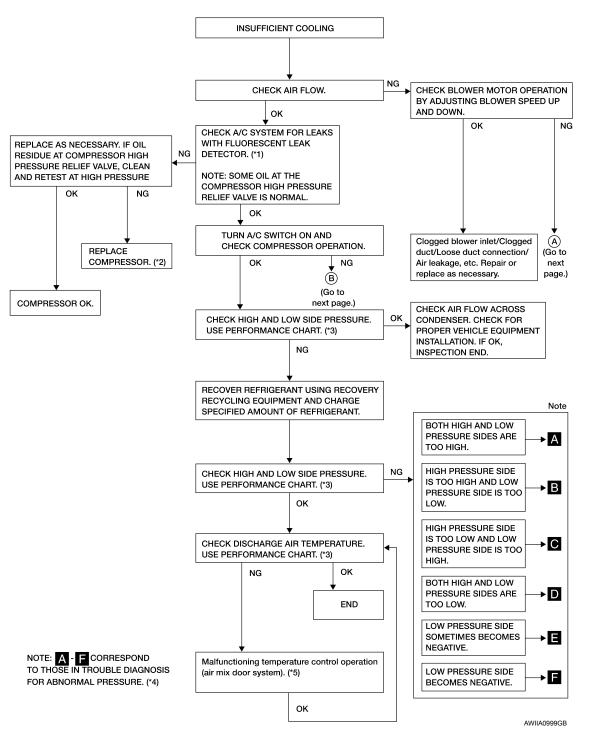
#### Is the inspection result normal?

YES >> System OK.

NO >> Repair air leaks.

## Diagnostic Work Flow

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- \*4 HAC-133, "Trouble Diagnoses for Abnormal Pressure"
- 2 HA-28, "Removal and Installation for \*3 HAC-132, "Performance Chart" Compressor"
- \*5 HAC-92, "Air Mix Door Motor Diagnosis Procedure"

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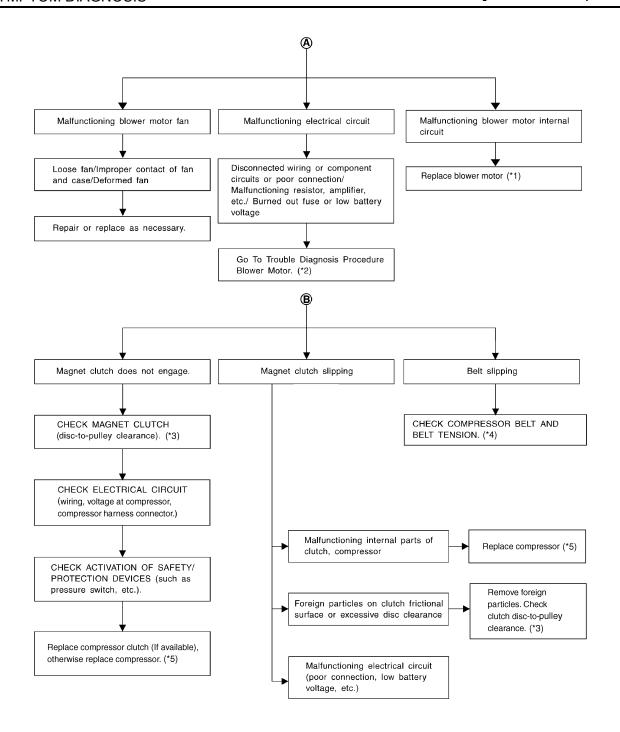
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- \*1 VTL-9, "Removal and Installation"
- \*4 EM-14, "Checking Drive Belts"
  (QR25DE) or EM-128, "Checking
  Drive Belts" (VQ40DE)
- \*2 HAC-32, "Front Blower Motor Diagnosis Procedure"
- \*5 <u>HA-28, "Removal and Installation for Compressor"</u>
- \*3 HA-30, "Removal and Installation for Compressor Clutch"

#### **Performance Chart**

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#### **TEST CONDITION**

Testing must be performed as follows:

#### **INSUFFICIENT COOLING**

< SYMPTOM DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

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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

#### **TEST READING**

Recirculating-to-discharge Air Temperature Table

Inside air (Recirculating a	nir) at blower assembly inlet	Discharge oir temporature at conter ventilator
Relative humidity %	Air temperature °C (°F)	Discharge air temperature at center ventilator °C (°F)
	20 (68)	5.3 - 6.5 (42 - 44)
	25 (77)	9.7 - 11.5 (49 - 53)
50 - 60	30 (86)	13.8 - 16.3 (57 - 61)
	35 (95)	18.0 - 21.2 (64 - 70)
	40 (104)	22.2 - 25.7 (72 - 78)
	20 (68)	6.5 - 7.7 (44 - 46)
	25 (77)	11.5 - 13.3 (53 - 56)
60 - 70	30 (86)	16.3 - 18.8 (61 - 66)
	35 (95)	21.2 - 24.0 (70 - 75)
	40 (104)	25.7 - 29.2 (78 - 85)

#### 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)	680 - 840 (6.94 - 8.57, 98.6 - 121.8)	160 - 198 (1.63 - 2.02, 23.2 - 28.7)
	25 (77)	800 - 985 (8.16 - 10.05, 116.0 - 142.8)	198 - 245 (2.02 - 2.50, 28.7 - 35.5)
50 - 70	30 (86)	940 - 1,150 (9.59 - 11.73, 136.3 - 166.8)	225 - 278 (2.30 - 2.84, 32.6 - 40.3)
	35 (95)	1,160 - 1,410 (11.83 - 14.38, 168.2 - 204.5)	273 - 335 (2.78 - 3.42, 39.6 - 48.6)
	40 (104)	1,325 - 1,620 (13.52 - 16.52, 192.1 - 234.9)	325 - 398 (3.32 - 4.06, 47.1 - 57.7)

# Trouble Diagnoses for Abnormal Pressure

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 temperatureto-operating pressure table).

**HAC-133** Revision: October 2015 2012 Frontier NAM

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Both High- and Low-pressure Sides are Too High

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Both high- and low-pressure sides are too high.	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	Clean condenser. Check and repair cooling fan if necessary.
	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.	Check and repair or replace malfunctioning parts. Check oil for contamination.

# 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.
(O) (H) AC356A	No temperature difference between high- and low-pressure sides.	Compressor pressure operation is improper.  Understand the compressor packings.	Replace compressor.

## **INSUFFICIENT COOLING**

< SYMPTOM DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

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.
	<ul> <li>Temperature of expansion valve inlet is extremely low as compared with areas near liquid tank.</li> <li>Expansion valve inlet may be frosted.</li> <li>Temperature difference occurs somewhere in highpressure side.</li> </ul>	High-pressure pipe located be- tween liquid tank and expan- sion valve is clogged.	<ul> <li>Check and repair malfunctioning parts.</li> <li>Check oil for contamination.</li> </ul>
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-22, "Checking of Refrigerant Leaks".
LO (HI)  W AC353A	There is a big temperature dif- ference 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-41. "Intake Sensor Diagnosis Procedure". Replace compressor. Repair evaporator fins. Replace evaporator. Refer to HAC-31, "Front Blower Motor Component Function Check".
ow-pressure Side Sometimes I	Becomes Negative		
Gauge indication	Refrigerant cycle	Probable cause	Corrective action
<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

# **INSUFFICIENT COOLING**

## < SYMPTOM DIAGNOSIS >

# [MANUAL A/C (TYPE 2)]

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.

# **INSUFFICIENT HEATING**

INSUFFICIENT REATING	
< SYMPTOM DIAGNOSIS >	[MANUAL A/C (TYPE 2)]
INSUFFICIENT HEATING	
Component Function Check	INFOID:000000007326909
SYMPTOM: Insufficient heating	
INSPECTION FLOW	
1.CONFIRM SYMPTOM BY PERFORMING OPERATIONAL CHECK - T	EMPERATURE INCREASE
<ol> <li>Rotate blower control dial clockwise.</li> <li>Turn the temperature control dial clockwise to maximum heat.</li> <li>Check for hot air at discharge air outlets.</li> <li>Can the symptom be duplicated?</li> <li>YES &gt;&gt; GO TO 2.</li> <li>NO &gt;&gt; Perform complete operational check. Refer to HAC-74. "Operational Check for SERVICE BULLETINS</li> </ol>	ational Check".
Check for any service bulletins.	
>> GO TO 3.  3. CHECK ENGINE COOLING SYSTEM	15-11 (OD05D5) - 1 00 00 110 - 1-1-1
<ol> <li>Check for proper engine coolant level. Refer to <u>CO-11</u>, "<u>System Inspection</u>" (VQ40DE).</li> <li>Check hoses for leaks or kinks.</li> <li>Check radiator cap. Refer to <u>CO-11</u>, "<u>System Inspection</u>" (QR25D (VQ40DE).</li> <li>Check for air in cooling system.</li> </ol>	
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 HAC-92, "Air M	ix 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	
<ol> <li>Start engine and warm it up to normal operating temperature.</li> <li>Touch both the inlet and outlet heater hoses. The inlet hose should b warm.</li> </ol>	e hot and the outlet hose should be
Is the inspection result normal?  YES >> Hot inlet hose and a warm outlet hose: GO TO 7.	
NO >> Both hoses warm: GO TO 8.	
7. CHECK ENGINE COOLANT SYSTEM	
Check engine coolant temperature sensor. Refer to EC-164, "Componen "Component Inspection" (VQ40DE).	t Inspection" (QR25DE) or EC-627,
<u>Is the inspection result normal?</u> YES >> System OK.	
NO >> Repair or replace as necessary. Retest.	

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#### **INSUFFICIENT HEATING**

#### < SYMPTOM DIAGNOSIS >

[MANUAL A/C (TYPE 2)]

# 8. 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.
  - 3. Refill system with new engine coolant. Refer to <u>CO-12, "Changing Engine Coolant"</u> (QR25DE) or <u>CO-40, "Changing Engine Coolant"</u> (VQ40DE).
  - 4. GO TO 9 to retest.

# 9. 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 >> System OK.

NO >> Replace heater core. Refer to <a href="VTL-17">VTL-17</a>, "Removal and Installation".

#### [MANUAL A/C (TYPE 2)] < SYMPTOM DIAGNOSIS > **NOISE** Α Component Function Check INFOID:0000000007326910 SYMPTOM: Noise В INSPECTION FLOW 1. Confirm symptom by performing the following operational check. If OK (symptom can not be duplicated), perform complete operational check (\*1). If NG (symptom is confirmed), continue with STEP-2 following. D 2. Check for any service bulletins. Е 3. Check where noise comes from 4. Check compressor belt and belt tension. (\*2) 5. Check refrigerant high and low pressure. Use performance chart. (\*3) Blower motor Compressor Expansion valve Refrigerant line Belt Check for noise in Inspect the com-Н Replace expansion pressor clutch all modes and valve. (\*4) and pulley and temperature settings. idler pulley. HAC Noise is OK NG constant Replace com-Check blower Check for The line is fixed The line is not motor for forrefrigerant pressor clutch fixed. directly to the body. eign particles. line-to-compressor and pulley or idler pulley (\*5) interference Fix the line tightly. Check blower Check disc-to-pulley Fix the line with motor and fan rubber or some clearance. (\*6) for wear vibration absorb-OK ing material. Check torque of compressor mounting bolts. (\*7) ΟK Check and adjust Loose Belt Ν Side of belt is worn compressor oil. out. (\*8) OK Noise is Re-adjust belt tension. Inspect and repair intermittent.

Replace compressor (\*7)

and liquid tank. (\*9)

Check air discharge

foreign materials or air leakage.

ducts for obstructions,

pulley alignment.

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# **NOISE**

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# [MANUAL A/C (TYPE 2)]

*1	HAC-6, "Operational Check"	*2	EM-14, "Checking Drive Belts" (QR25DE) or EM-128, "Checking Drive Belts" (VQ40DE)	*3	HAC-132, "Performance Chart"
*4	HA-39, "Removal and Installation"	*5	HA-30, "Removal and Installation for Compressor Clutch"	*6	HA-30, "Removal and Installation for Compressor Clutch"
*7	HA-28, "Removal and Installation for Compressor"	*8	HA-18, "Maintenance of Oil Quantity in Compressor"	*9	HA-37, "Removal and Installation"

# **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 three 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:

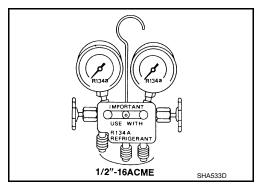
- Explain to the customer that environmental regulations prohibit the release of contaminated refrigerant into the atmosphere.
- Explain that recovery of the contaminated refrigerant could damage your service equipment and refrigerant supply.
- Suggest the customer return the vehicle to the location 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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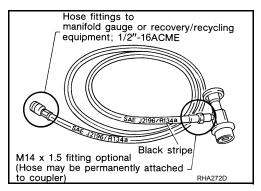
#### MANIFOLD GAUGE SET

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

