

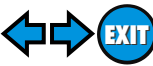
HEATER & AIR CONDITIONER

SECTION HA

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PRECAUTIONS

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

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

NHHA0153

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER" used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. The SRS system composition which is available to INFINITI I30 is as follows:

- For a frontal collision
The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
- For a side collision
The Supplemental Restraint System consists of front side air bag module (located in the outer side of front seat), satellite sensor, diagnosis sensor unit (one of components of air bags for a frontal collision), wiring harness, warning lamp (one of components of air bags for a frontal collision).

Information necessary to service the system safely is included in the **RS 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 should be performed by an authorized INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by intentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. Spiral cable and wiring harnesses covered with yellow insulation tape either just before the harness connectors or for the complete harness are related to the SRS.

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

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WARNING:

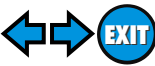
- CFC-12 (R-12) refrigerant and HFC-134a (R-134a) refrigerant are not compatible. If the refrigerants are mixed and compressor failure is likely to occur, refer to "CONTAMINATED REFRIGERANT" below. To determine the purity of HFC-134a (R-134a) in the vehicle and recovery tank, use Refrigerant Recovery/Recycling Recharging equipment (ACR4) (J-39500-INF) and Refrigerant Identifier.
- Use only specified lubricant for the HFC-134a (R-134a) A/C system and HFC-134a (R-134a) components. If lubricant other than that specified is used, compressor failure is likely to occur.
- The specified HFC-134a (R-134a) lubricant rapidly absorbs moisture from the atmosphere. The following handling precautions must be observed:
 - a) When removing refrigerant components from a vehicle, immediately cap (seal) the component to minimize the entry of moisture from the atmosphere.
 - b) 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.
 - c) Only use the specified lubricant from a sealed container. Immediately reseal containers of lubricant. Without proper sealing, lubricant will become moisture saturated and should not be used.
 - d) Avoid breathing A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose and throat. Remove R-134a from the A/C system, using certified service equipment meeting requirements of SAE J2210 (R-134a recycling equipment), or J2209 (R-134a recovery equipment). If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from refrigerant and lubricant manufacturers.
 - e) Do not allow lubricant (Nissan A/C System Oil Type S) to come in contact with styrofoam parts. Damage may result.

CONTAMINATED REFRIGERANT

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If a refrigerant other than pure 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.



PRECAUTIONS

Precautions for Working with HFC-134a (R-134a) (Cont'd)

- 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.

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General Refrigerant Precautions

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WARNING:

- **Do not release refrigerant into the air. Use approved recovery/recycling equipment to capture the refrigerant every time an air conditioning system is discharged.**
- **Always wear eye and hand protection (goggles and gloves) when working with any refrigerant or air conditioning system.**
- **Do not store or heat refrigerant containers above 52°C (125°F).**
- **Do not heat a refrigerant container with an open flame; if container warming is required, place the bottom of the container in a warm pail of water.**
- **Do not intentionally drop, puncture, or incinerate refrigerant containers.**
- **Keep refrigerant away from open flames: poisonous gas will be produced if refrigerant burns.**
- **Refrigerant will displace oxygen, therefore be certain to work in well ventilated areas to prevent suffocation.**
- **Do not pressure test or leak test HFC-134a (R-134a) service equipment and/or vehicle air conditioning systems with compressed air during repair. Some mixtures of air and R-134a have been shown to be combustible at elevated pressures. These mixtures, if ignited, may cause injury or property damage. Additional health and safety information may be obtained from refrigerant manufacturers.**

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Precautions for Refrigerant Connection

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A new type refrigerant connection has been introduced to all refrigerant lines except the following location.

- Expansion valve to cooling unit

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FEATURES OF NEW TYPE REFRIGERANT CONNECTION

- The O-ring has been relocated. It has also been provided with a groove for proper installation. This eliminates the chance of the O-ring being caught in, or damaged by, the mating part. The sealing direction of the O-ring is now set vertically in relation to the contacting surface of the mating part to improve sealing characteristics.
- The reaction force of the O-ring will not occur in the direction that causes the joint to pull out, thereby facilitating piping connections.

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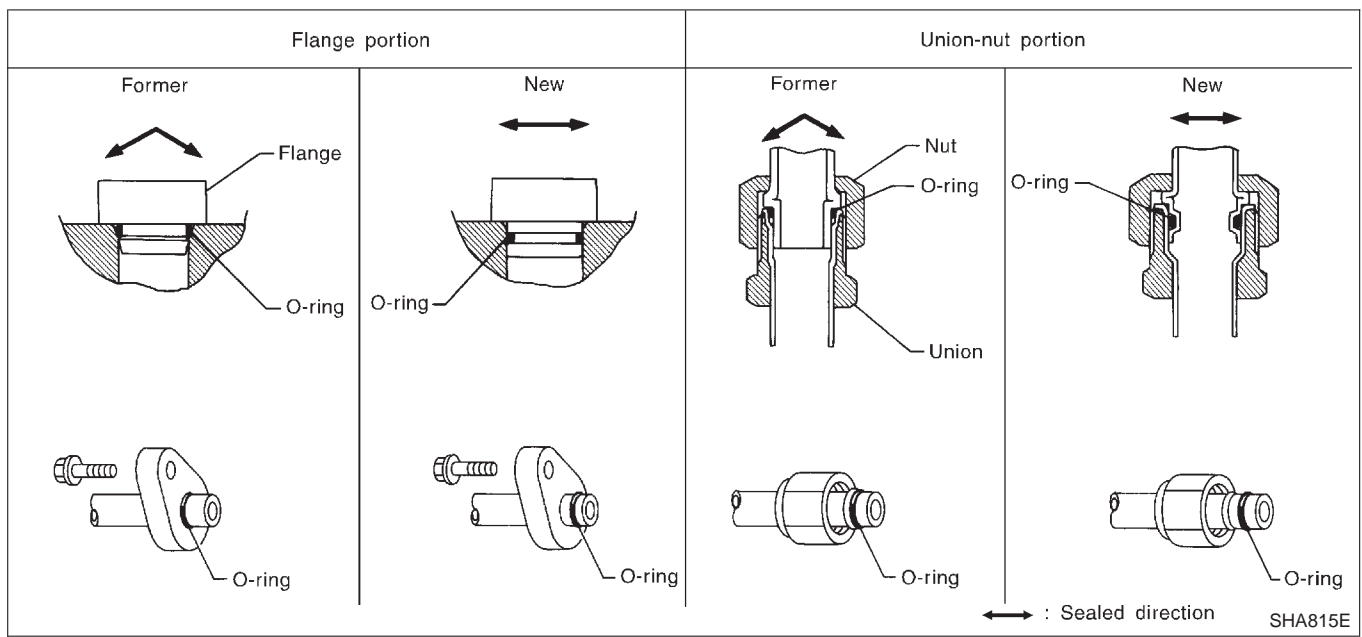
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PRECAUTIONS

Precautions for Refrigerant Connection (Cont'd)

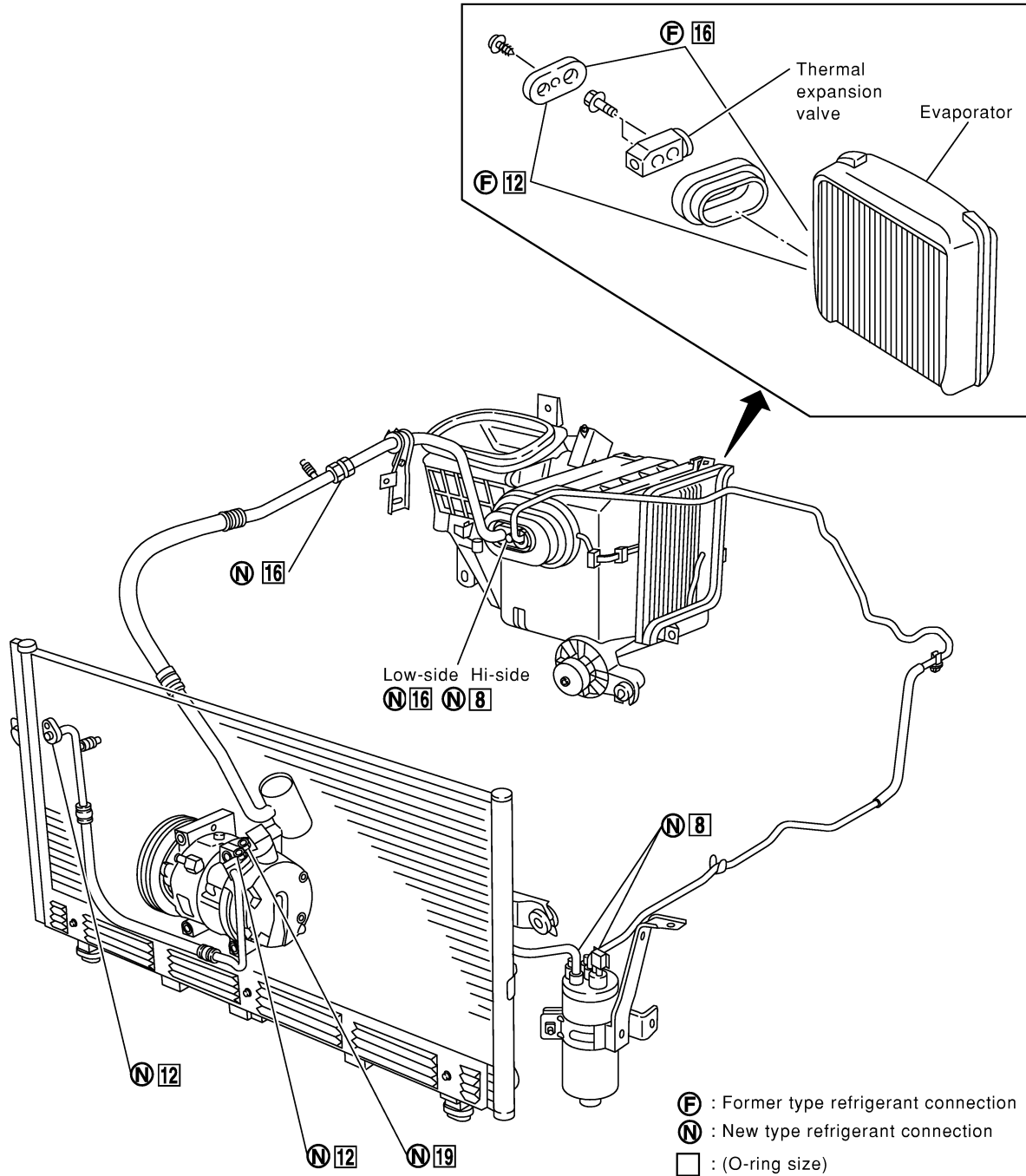


PRECAUTIONS

Precautions for Refrigerant Connection (Cont'd)

O-RING AND REFRIGERANT CONNECTION

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CAUTION:

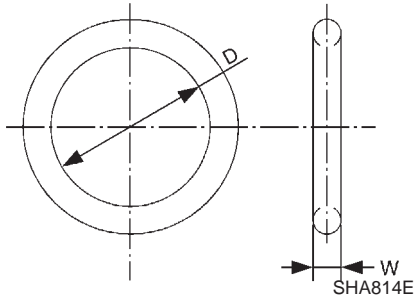
The new and former refrigerant connections use different O-ring configurations. Do not confuse O-rings since they are not interchangeable. If a wrong O-ring is installed, refrigerant will leak at, or around, the connection.

PRECAUTIONS

Precautions for Refrigerant Connection (Cont'd)

O-Ring Part Numbers and Specifications

NHHA0156S0201



Connection type	O-ring size	Part number	D mm (in)	W mm (in)
New	8	92471 N8210	6.8 (0.268)	1.85 (0.0728)
Former		92470 N8200	6.07 (0.2390)	1.78 (0.0701)
New	12	92472 N8210	10.9 (0.429)	2.43 (0.0957)
Former		92475 71L00	11.0 (0.433)	2.4 (0.094)
New	16	92473 N8210	13.6 (0.535)	2.43 (0.0957)
Former		92475 72L00	14.3 (0.563)	2.3 (0.0906)
New	19	92474 N8210	16.5 (0.650)	2.43 (0.0957)
Former		92477 N8200	17.12 (0.6740)	1.78 (0.0701)

WARNING:

Make sure all refrigerant is discharged into the recycling equipment and the pressure in the system is less than atmospheric pressure. Then gradually loosen the discharge side hose fitting and remove it.

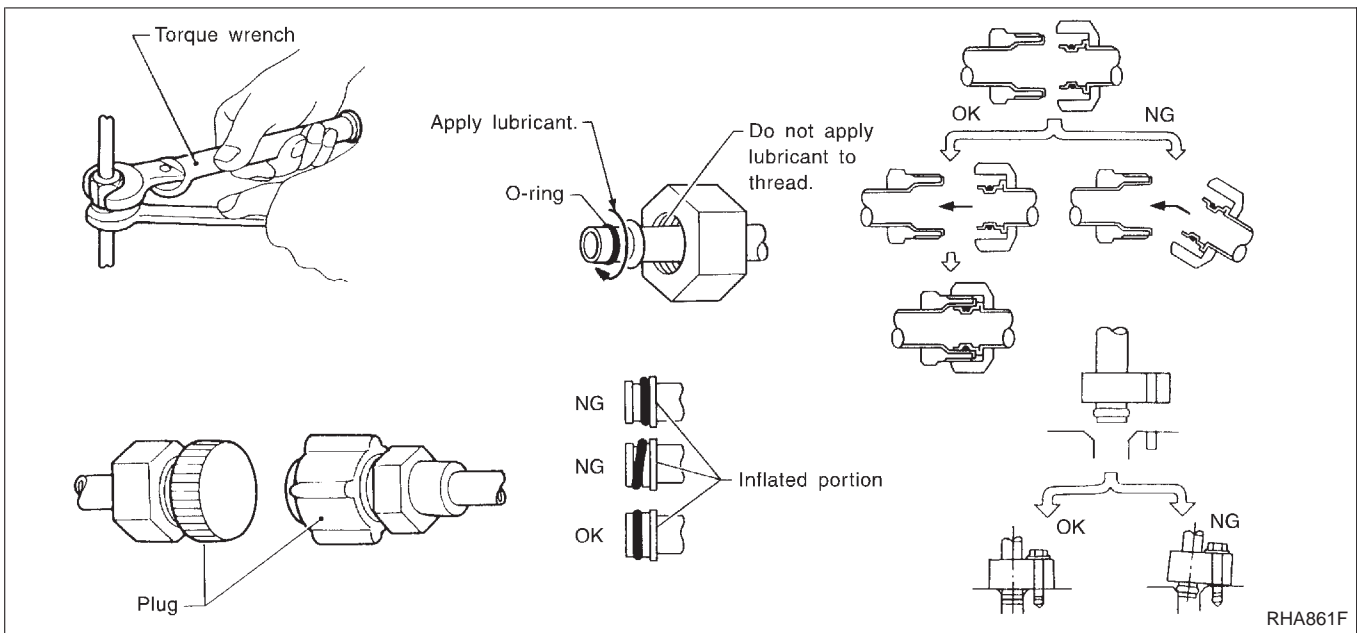
CAUTION:

When replacing or cleaning refrigerant cycle components, observe the following.

- When the compressor is removed, store it in the same position as it is when mounted on the car. Failure to do so will cause lubricant to enter the low pressure chamber.
- When connecting tubes, always use a torque wrench and a back-up wrench.
- After disconnecting tubes, immediately plug all openings to prevent entry of dirt and moisture.
- When installing an air conditioner in the vehicle, connect the pipes as the final stage of the operation. Do not remove the seal caps of pipes and other components until just before required for connection.
- Allow components stored in cool areas to warm to working area temperature before removing seal caps. This prevents condensation from forming inside A/C components.
- Thoroughly remove moisture from the refrigeration system before charging the refrigerant.
- Always replace used O-rings.
- When connecting tube, apply lubricant to circle of the O-rings shown in illustration. Be careful not to apply lubricant to threaded portion.
Lubricant name: Nissan A/C System Oil Type S
Part number: KLH00-PAGS0
- O-ring must be closely attached to dented portion of tube.
- When replacing the O-ring, be careful not to damage O-ring and tube.
- Connect tube until you hear it click, then tighten the nut or bolt by hand until snug. Make sure that the O-ring is installed to tube correctly.
- After connecting line, conduct leak test and make sure that there is no leakage from connections. When the gas leaking point is found, disconnect that line and replace the O-ring. Then tighten connections of seal seat to the specified torque.

PRECAUTIONS

Precautions for Refrigerant Connection (Cont'd)



Precautions for Servicing Compressor

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- Plug all openings to prevent moisture and foreign matter from entering.
- When the compressor is removed, store it in the same position as it is when mounted on the car.
- When replacing or repairing compressor, follow "Maintenance of Lubricant Quantity in Compressor" exactly. Refer to HA-109.
- Keep friction surfaces between clutch and pulley clean. If the surface is contaminated, with lubricant, wipe it off by using a clean waste cloth moistened with thinner.
- After compressor service operation, turn the compressor shaft by hand more than five turns in both directions. This will equally distribute lubricant inside the compressor. After the compressor is installed, let the engine idle and operate the compressor for one hour.
- After replacing the compressor magnet clutch, apply voltage to the new one and check for normal operation.

Precautions for Service Equipment RECOVERY/RECYCLING EQUIPMENT

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Be certain to follow the manufacturers instructions for machine operation and machine maintenance. Never introduce any refrigerant other than that specified into the machine.

ELECTRONIC LEAK DETECTOR

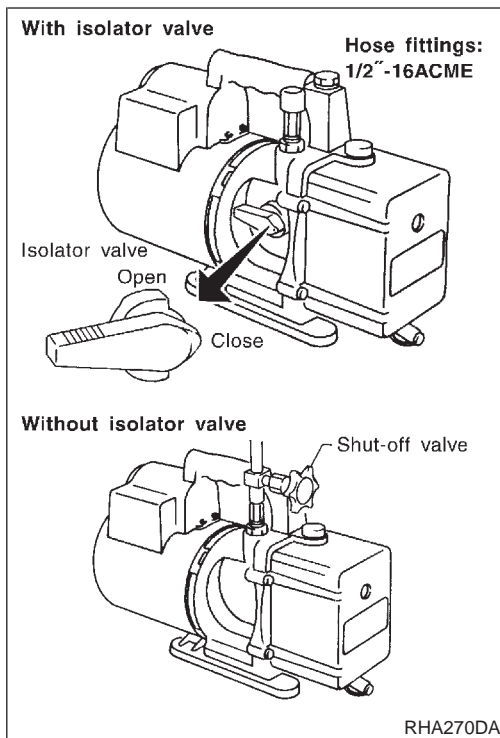
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Be certain to follow the manufacturer's instructions for tester operation and tester maintenance.

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PRECAUTIONS

Precautions for Service Equipment (Cont'd)



VACUUM PUMP

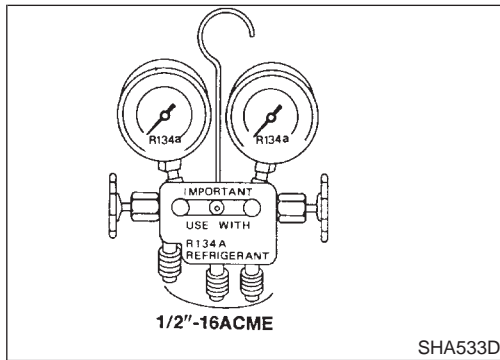
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The lubricant contained inside the vacuum pump is not compatible with the specified lubricant for HFC-134a (R-134a) A/C systems. The vent side of the vacuum pump is exposed to atmospheric pressure. So the vacuum pump lubricant may migrate out of the pump into the service hose. This is possible when the pump is switched off after evacuation (vacuuming) and hose is connected to it.

To prevent this migration, use a manual valve placed near the hose-to-pump connection, as follows.

- Usually vacuum pumps have a manual isolator valve as part of the pump. Close this valve to isolate the service hose from the pump.
- For pumps without an isolator, use a hose equipped with a manual shut-off valve near the pump end. Close the valve to isolate the hose from the pump.
- If the hose has an automatic shut off valve, disconnect the hose from the pump. As long as the hose is connected, the valve is open and lubricating oil may migrate.

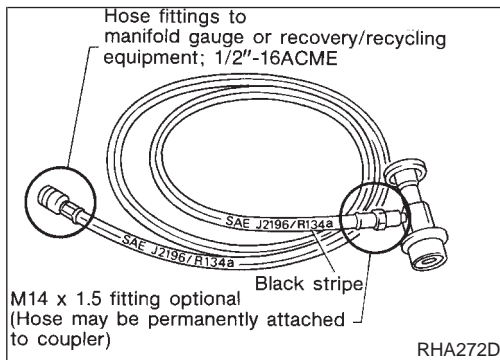
Some one-way valves open when vacuum is applied and close under a no vacuum condition. Such valves may restrict the pump's ability to pull a deep vacuum and are not recommended.



MANIFOLD GAUGE SET

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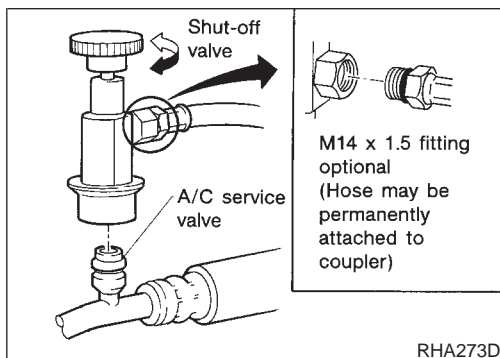
Be certain that the gauge face indicates R-134a or 134a. Be sure the gauge set has 1/2"-16 ACME threaded connections for service hoses. Confirm the set has been used only with refrigerant HFC-134a (R-134a) and specified lubricants.



SERVICE HOSES

NHHA0158S05

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



SERVICE COUPLERS

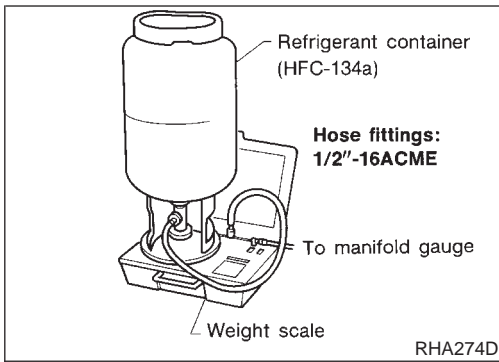
NHHA0158S06

Never attempt to connect HFC-134a (R-134a) service couplers to an 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

PRECAUTIONS

Precautions for Service Equipment (Cont'd)



REFRIGERANT WEIGHT SCALE

NHHA0158S07

Verify that no refrigerant other than HFC-134a (R-134a) and specified lubricants have been used with the scale. If the scale controls refrigerant flow electronically, the hose fitting must be 1/2"-16 ACME.

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CALIBRATING ACR4 WEIGHT SCALE

NHHA0158S08

Calibrate the scale every three months.

To calibrate the weight scale on the ACR4 (J-39500-INF):

1. Press **Shift/Reset** and **Enter** at the same time.
2. Press **8787**. "A1" will be displayed.
3. Remove all weight from the scale.
4. Press **0**, then press **Enter**. "0.00" will be displayed and change to "A2".
5. Place a known weight (dumbbell or similar weight), between 4.5 and 8.6 kg (10 and 19 lb) on the center of the weight scale.
6. Enter the known weight using four digits. (Example 10 lbs = 10.00, 10.5 lbs = 10.50)
7. Press **Enter** — the display returns to the vacuum mode.
8. Press **Shift/Reset** and **Enter** at the same time.
9. Press **6** — the known weight on the scale is displayed.
10. Remove the known weight from the scale. "0.00" will be displayed.
11. Press **Shift/Reset** to return the ACR4 to the program mode.

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CHARGING CYLINDER

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Using a charging cylinder is not recommended. Refrigerant may be vented into air from cylinder's top valve when filling the cylinder with refrigerant. Also, the accuracy of the cylinder is generally less than that of an electronic scale or of quality recycle/recharge equipment.

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Wiring Diagrams and Trouble Diagnosis

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When you read wiring diagrams, refer to the following:

- GI-11, "HOW TO READ WIRING DIAGRAMS"
- EL-11, "Wiring Diagram — POWER —"

When you perform trouble diagnosis, refer to the following:

- GI-35, "HOW TO FOLLOW TEST GROUP IN TROUBLE DIAGNOSIS"
- GI-25, "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT"

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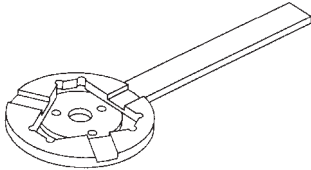
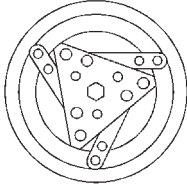
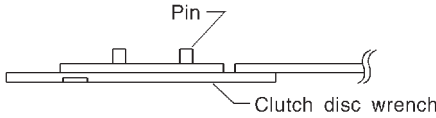
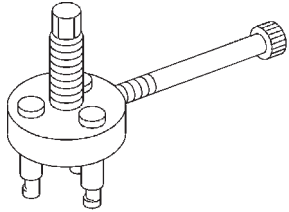
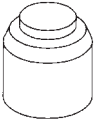
PREPARATION

Special Service Tools

Special Service Tools

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The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
KV99106100 (J-41260) Clutch disc wrench	<div style="display: flex; justify-content: space-between;"> <div data-bbox="407 520 477 548">NT232</div> <div data-bbox="950 327 1170 359">Removing center bolt</div> </div>   <p data-bbox="493 758 805 884">When replacing the magnet clutch in the above compressor, use a clutch disc wrench with the pin side on the clutch disc to remove it.</p>  <div style="display: flex; justify-content: space-between;"> <div data-bbox="407 1037 477 1062">NT378</div> </div>
KV99232340 (J-38874) or KV992T0001 (—) Clutch disc puller	<div style="display: flex; justify-content: space-between;"> <div data-bbox="407 1304 477 1329">NT376</div> <div data-bbox="950 1073 1170 1104">Removing clutch disc</div> </div> 
KV99106200 (J-41261) Pulley installer	<div style="display: flex; justify-content: space-between;"> <div data-bbox="407 1482 477 1507">NT235</div> <div data-bbox="950 1339 1105 1371">Installing pulley</div> </div> 

PREPARATION

HFC-134a (R-134a) Service Tools and Equipment

HFC-134a (R-134a) Service Tools and Equipment

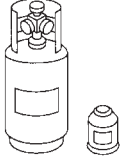

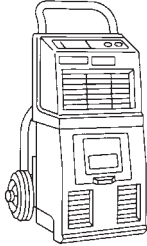
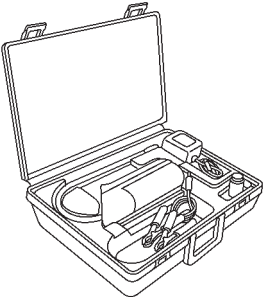
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Never mix HFC-134a refrigerant and/or its specified lubricant with CFC-12 (R-12) refrigerant and/or its lubricant.

Separate and non-interchangeable service equipment must be used for handling each type of refrigerant/lubricant.

Refrigerant container fittings, service hose fittings and service equipment fittings (equipment which handles refrigerant and/or lubricant) are different between CFC-12 (R-12) and HFC-134a (R-134a). This is to avoid mixed use of the refrigerants/lubricant.

Adapters that convert one size fitting to another must never be used: refrigerant/lubricant contamination will occur and compressor failure will result.

Tool number (Kent-Moore No.) Tool name	Description
HFC-134a (R-134a) refrigerant	 <p>Container color: Light blue Container marking: HFC-134a (R-134a) Fitting size: Thread size</p> <ul style="list-style-type: none"> ● Large container 1/2"-16 ACME <p>NT196</p>
KLH00-PAGS0 (—) Nissan A/C System Oil Type S	 <p>Type: Poly alkylene glycol oil (PAG), type S Application: HFC-134a (R-134a) swash plate (piston) compressors (Nissan only) Lubricity: 40 ml (1.4 US fl oz, 1.4 Imp fl oz)</p> <p>NT197</p>
(J-39500-INF) Recovery/Recycling Recharging equipment (ACR4)	 <p>Function: Refrigerant Recovery and Recycling and Recharging</p> <p>NT195</p>
(J-41995) Electrical leak detector	 <p>Power supply:</p> <ul style="list-style-type: none"> ● DC 12V (Cigarette lighter) <p>AHA281A</p>

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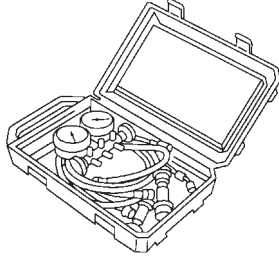
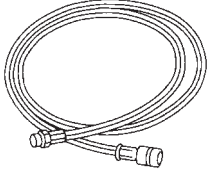
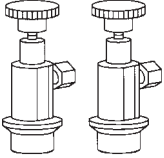
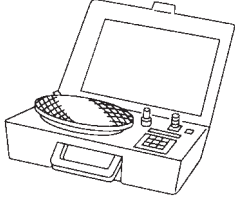
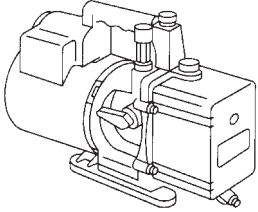
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PREPARATION

HFC-134a (R-134a) Service Tools and Equipment (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description
(J-39183) Manifold gauge set (with hoses and cou- plers)	<div style="display: flex; align-items: center;">  <div> <p>Identification:</p> <ul style="list-style-type: none"> ● The gauge face indicates R-134a. <p>Fitting size: Thread size</p> <ul style="list-style-type: none"> ● 1/2"-16 ACME </div> </div> <p style="text-align: center;">NT199</p>
Service hoses <ul style="list-style-type: none"> ● High side hose (J-39501-72) ● Low side hose (J-39502-72) ● Utility hose (J-39476-72) 	<div style="display: flex; align-items: center;">  <div> <p>Hose color:</p> <ul style="list-style-type: none"> ● Low hose: Blue with black stripe ● High hose: Red with black stripe ● Utility hose: Yellow with black stripe or green with black stripe <p>Hose fitting to gauge:</p> <ul style="list-style-type: none"> ● 1/2"-16 ACME </div> </div> <p style="text-align: center;">NT201</p>
Service couplers <ul style="list-style-type: none"> ● High side coupler (J-39500-20) ● Low side coupler (J-39500-24) 	<div style="display: flex; align-items: center;">  <div> <p>Hose fitting to service hose:</p> <ul style="list-style-type: none"> ● M14 x 1.5 fitting is optional or permanently attached. </div> </div> <p style="text-align: center;">NT202</p>
(J-39650) Refrigerant weight scale	<div style="display: flex; align-items: center;">  <div> <p>For measuring of refrigerant</p> <p>Fitting size: Thread size</p> <ul style="list-style-type: none"> ● 1/2"-16 ACME </div> </div> <p style="text-align: center;">NT200</p>
(J-39649) Vacuum pump (Including the isolator valve)	<div style="display: flex; align-items: center;">  <div> <p>Capacity:</p> <ul style="list-style-type: none"> ● Air displacement: 4 CFM ● Micron rating: 20 microns ● Oil capacity: 482 g (17 oz) <p>Fitting size: Thread size</p> <ul style="list-style-type: none"> ● 1/2"-16 ACME </div> </div> <p style="text-align: center;">NT203</p>

PREPARATION

HFC-134a (R-134a) Service Tools and Equipment (Cont'd)

COMMERCIAL SERVICE TOOL

NHHA0161S01

Tool name	Description
Refrigerant identifier equipment	<div data-bbox="527 262 901 609" data-label="Image"> </div> <p data-bbox="954 247 1469 300">For checking refrigerant purity and for system contamination</p> <p data-bbox="425 625 483 646">NT765</p>

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DESCRIPTION

Refrigeration System

REFRIGERATION CYCLE

NHHA0162

Refrigerant Flow

NHHA0162S01

The refrigerant flows in the standard pattern, that is, through the compressor, the condenser, the liquid tank, through the 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

NHHA0162S02

Under normal operating conditions, when the A/C is switched on, the compressor runs continuously, and the evaporator pressure, and therefore, temperature is controlled by the V-6 variable displacement compressor to prevent freeze up.

Refrigerant System Protection

NHHA0162S03

Refrigerant Pressure Sensor

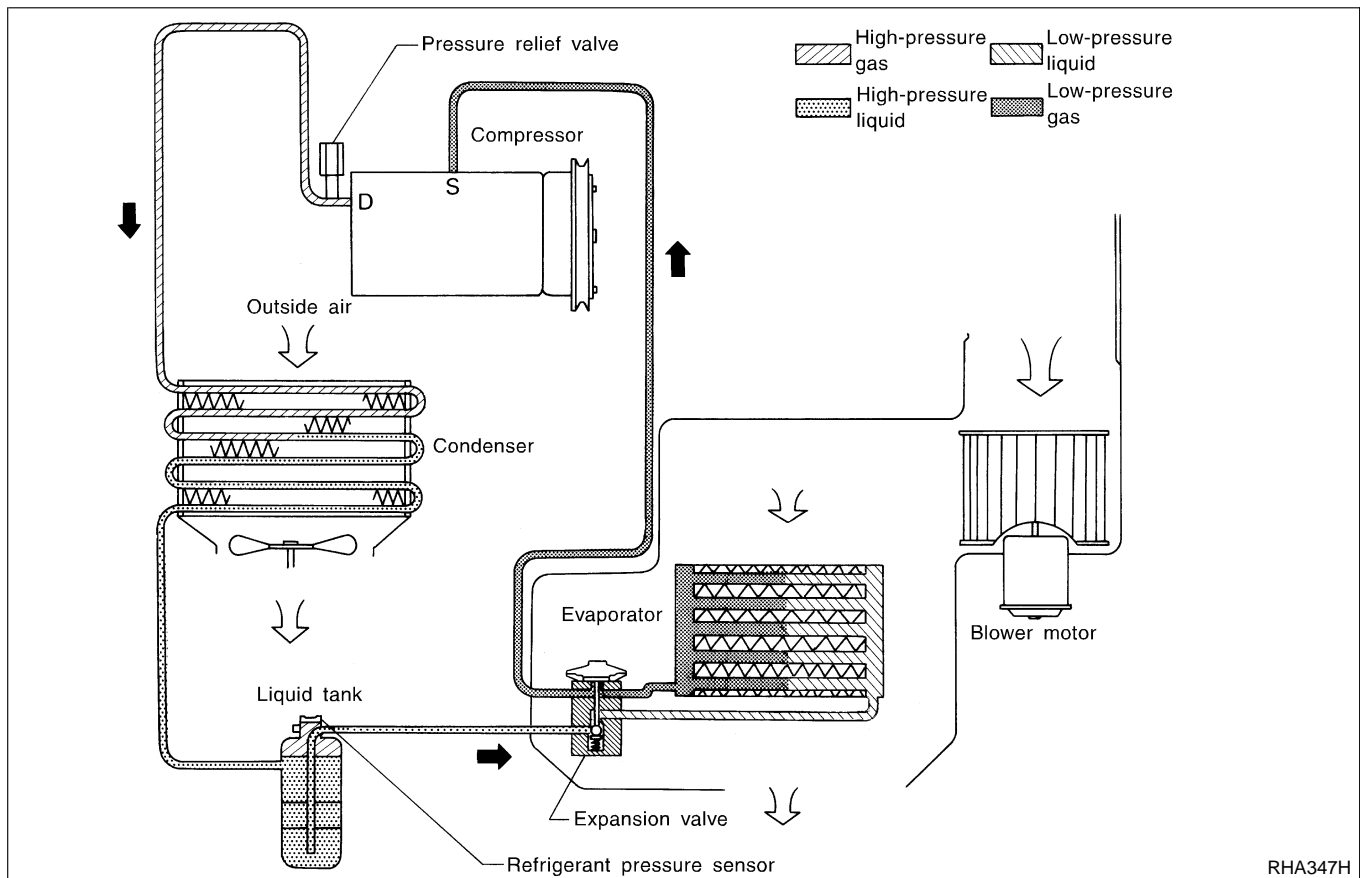
NHHA0162S0301

The refrigerant system is protected against excessively high or low pressures by the refrigerant pressure sensor, located on the liquid tank. If the system pressure rises above, or falls below the specifications, the refrigerant pressure sensor detects the pressure inside the refrigerant line and sends the voltage signal to the ECM. ECM makes the A/C relay go OFF and stops the compressor 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 177 kPa (1.8 kg/cm², 26 psi).

Pressure Relief Valve

NHHA0162S0302

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 3,727 kPa (38 kg/cm², 540 psi)], the release port on the pressure relief valve automatically opens and releases refrigerant into the atmosphere.



V-6 Variable Displacement Compressor

GENERAL INFORMATION

1. The V-6 variable compressor differs from previous units. The vent temperatures of the V-6 variable compressor do not drop too far below 5°C (41°F) when:
 - evaporator intake air temperature is less than 20°C (68°F)
 - engine is running at speeds less than 1,500 rpm.

This is because the V-6 compressor provides a means of “capacity” control.
2. The V-6 variable compressor provides refrigerant control under varying conditions. During cold winters, it may not produce high refrigerant pressure discharge (compared to previous units) when used with air conditioning systems.
3. A “clanking” sound may occasionally be heard during refrigerant charge. The sound indicates that the tilt angle of the swash plate has changed and is not a problem.
4. For air conditioning systems with the V-6 compressor, the clutch remains engaged unless: the system main switch, fan switch or ignition switch is turned OFF. When ambient (outside) temperatures are low or when the amount of refrigerant is insufficient, the clutch is disengaged to protect the compressor.
5. A constant range of suction pressure is maintained when engine speed is greater than a certain value. It normally ranges from 147 to 177 kPa (1.5 to 1.8 kg/cm², 21 to 26 psi) under varying conditions. In previous compressors, however, suction pressure was reduced with increases in engine speed.

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DESCRIPTION

V-6 Variable Displacement Compressor (Cont'd)

DESCRIPTION

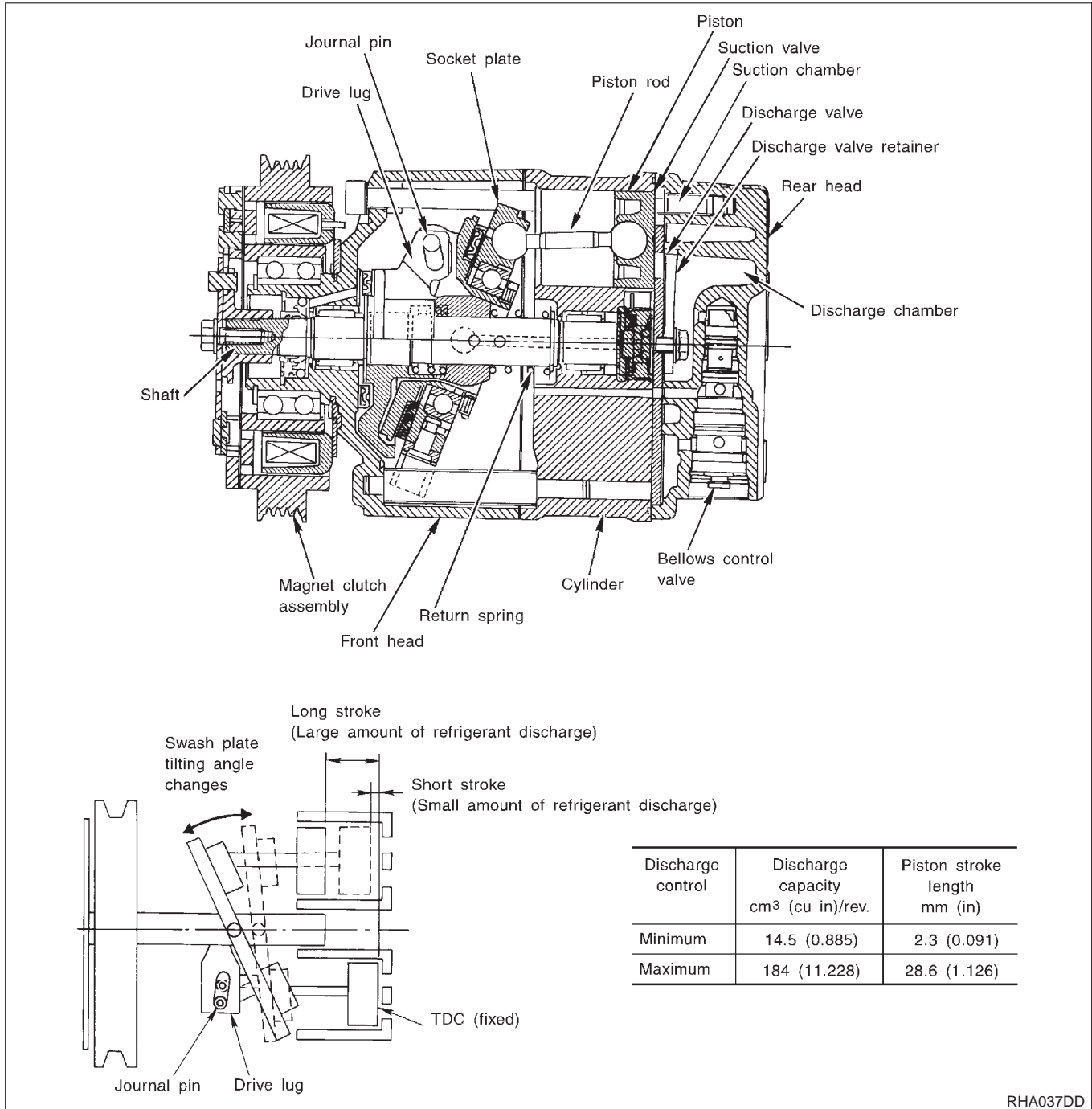
=NHHA0164

NHHA0164S01

General

The variable compressor is basically a swash plate type that changes piston stroke in response to the required cooling capacity.

The tilt of the swash plate allows the piston's stroke to change so that refrigerant discharge can be continuously changed from 14.5 to 184 cm³ (0.885 to 11.228 cu in).



RHA037DD

DESCRIPTION

V-6 Variable Displacement Compressor (Cont'd)

Operation

=NHHA0164S02

1. Operation Control Valve

NHHA0164S0201

Operation control valve is located in the suction port (low-pressure) side, and opens or closes in response to changes in refrigerant suction pressure.

Operation of the valve controls the internal pressure of the crankcase.

The angle of the swash plate is controlled between the crankcase's internal pressure and the piston cylinder pressure.

2. Maximum Cooling

NHHA0164S0202

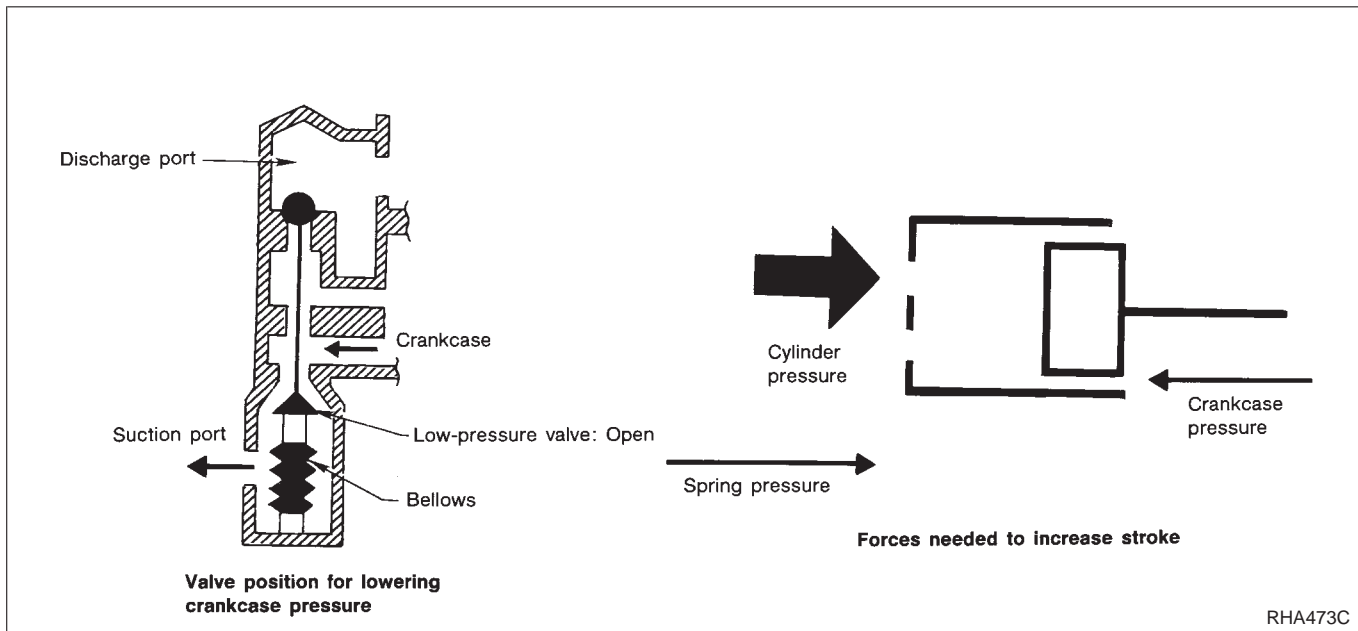
Refrigerant pressure on the low-pressure side increases with an increase in heat loads.

When this occurs, the control valve's bellows compress to open the low-pressure side valve and close the high-pressure side valve.

This causes the following pressure changes:

- the crankcase's internal pressure to equal the pressure on the low-pressure side;
- the cylinder's internal pressure to be greater than the crankcase's internal pressure.

Under this condition, the swash plate is set to the maximum stroke position.



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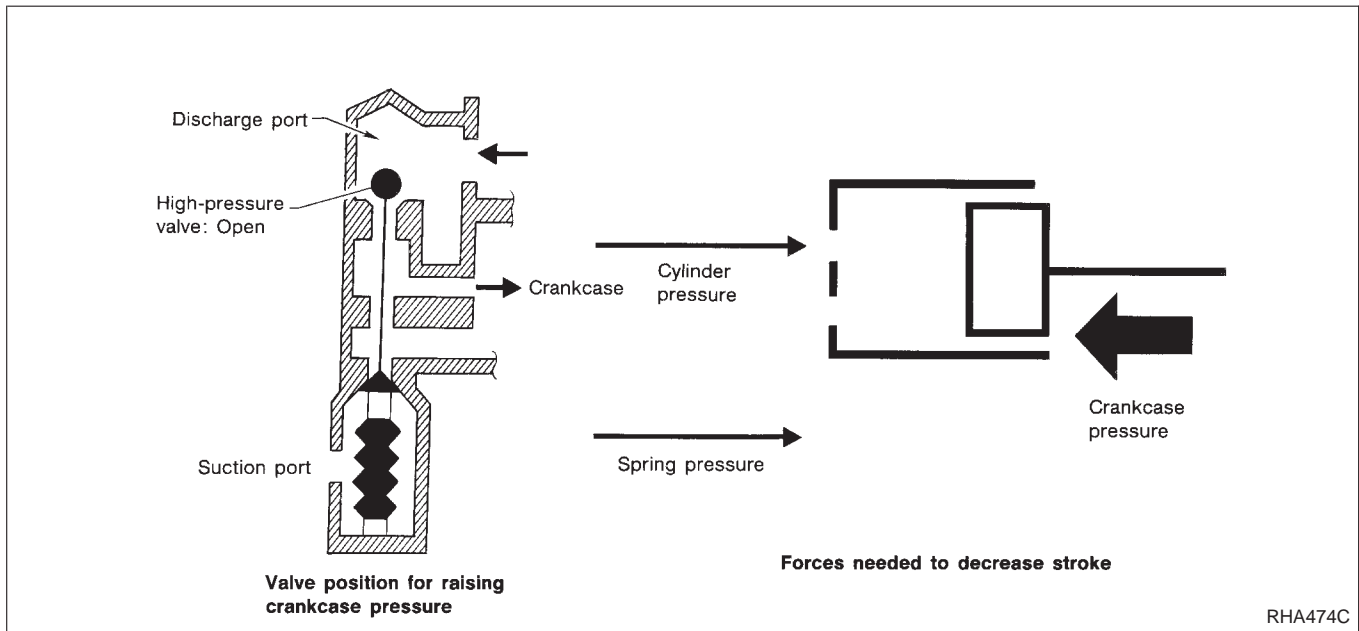
DESCRIPTION

V-6 Variable Displacement Compressor (Cont'd)

3. Capacity Control

=NHHA0164S0203

- Refrigerant pressure on suction side is low during high speed driving or when ambient or interior temperature is low.
- The bellows expands when refrigerant pressure on the suction pressure side drops below approximately 177 kPa (1.8 kg/cm², 26 psi). Since suction pressure is low, it makes the suction port close and the discharge port open. Thus, crankcase pressure becomes high as high pressure enters the crankcase.
- The force acts around the journal pin near the swash plate, and is generated by the pressure difference before and behind the piston. The drive lug and journal pin are located where the piston generates the highest pressure. Piston pressure is between suction pressure P_s and discharge pressure P_d , which is near suction pressure P_s . If crankcase pressure P_c rises due to capacity control, the force around the journal pin makes the swash plate angle decrease and also the piston stroke decrease. In other words, crankcase pressure increase triggers pressure difference between the piston and the crankcase. The pressure difference changes the angle of the swash plate.



IACV-AAC CONTROL SYSTEM

=NHHA0165

Operation

When the air conditioner is OFF, the ECM detects the load applied to the engine, and controls the IACV-AAC valve to adjust the engine idling speed to the appropriate rpm by supplying additional air from the IACV-AAC valve.

When the air conditioner is ON (A/C relay is ON), refrigerant-pressure sensor converts refrigeration-pressure on the high pressure side into the voltage value, which is output to ECM which protects refrigeration cycle and control idle speed by the output voltage data, and additional air is supplied to the engine. If the appropriate engine speed is not reached, the IACV-AAC valve supplies the additional air required to increase the engine rpm.

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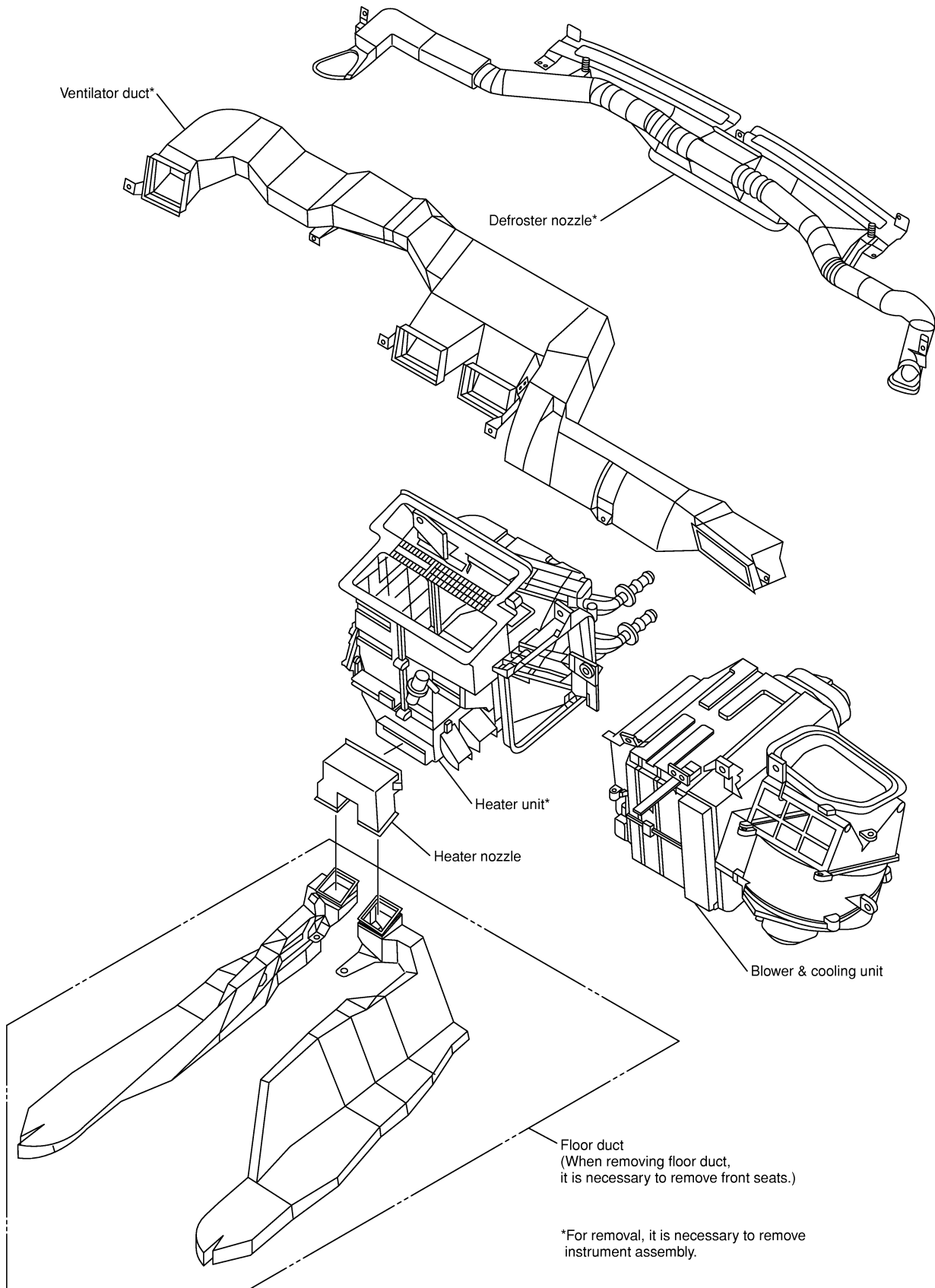
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DESCRIPTION

Component Layout

Component Layout

NHHA0166



RHA349H

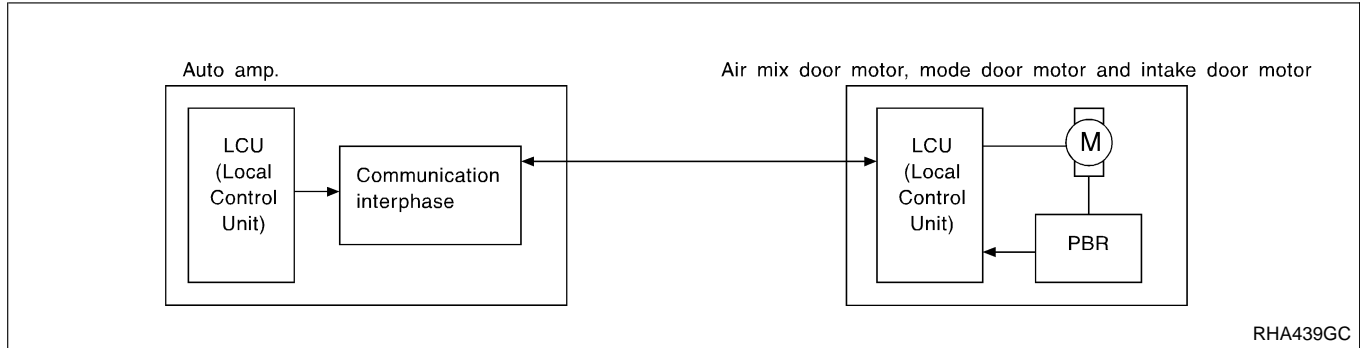
Introduction

AIR CONDITIONER LAN SYSTEM OVERVIEW CONTROL SYSTEM

NHHA0167

NHHA0167S01

The LAN system consists of auto amp., air mix door motor, mode door motor and intake door motor. A configuration of these components is shown in the diagram below.



Features

SYSTEM CONSTRUCTION (LAN)

NHHA0168

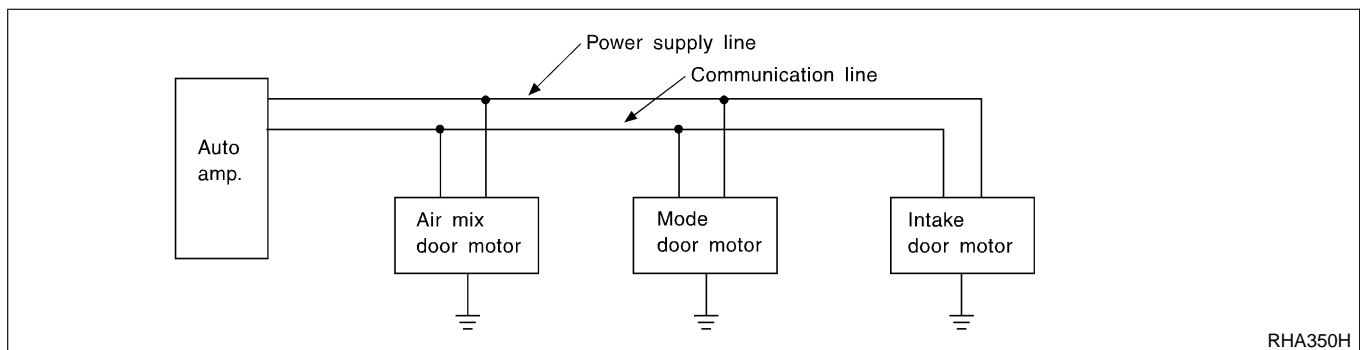
NHHA0168S01

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

Addresses, motor opening angle signals, motor stop signals and error checking messages are all transmitted through the data transmission lines connecting the auto amplifier and three motors.

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

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



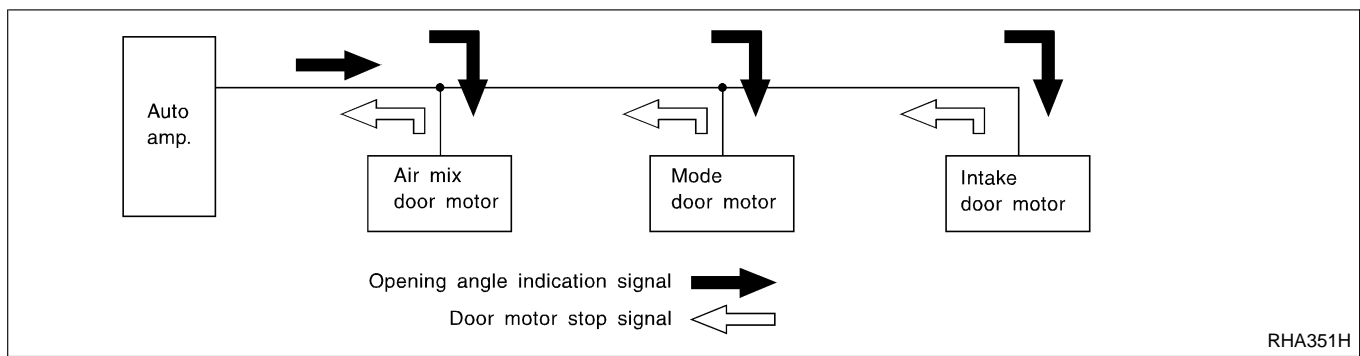
Operation

NHHA0168S0101

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

DESCRIPTION

Features (Cont'd)



Transmission Data and Transmission Order

NHHA0168S0102

Amplifier data is transmitted consecutively to each of the door motors following the form shown in figure below. Start: Initial compulsory signal sent to each of the door motors.

Address: Data sent from the auto amplifier is selected according to data-based decisions made by the air mix door motor, intake door motor and mode door motor.

If the addresses are identical, the opening angle data and error check signals are received by the door motor LCUs. The LCUs then make the appropriate error decision. If the opening angle data is normal, door control begins.

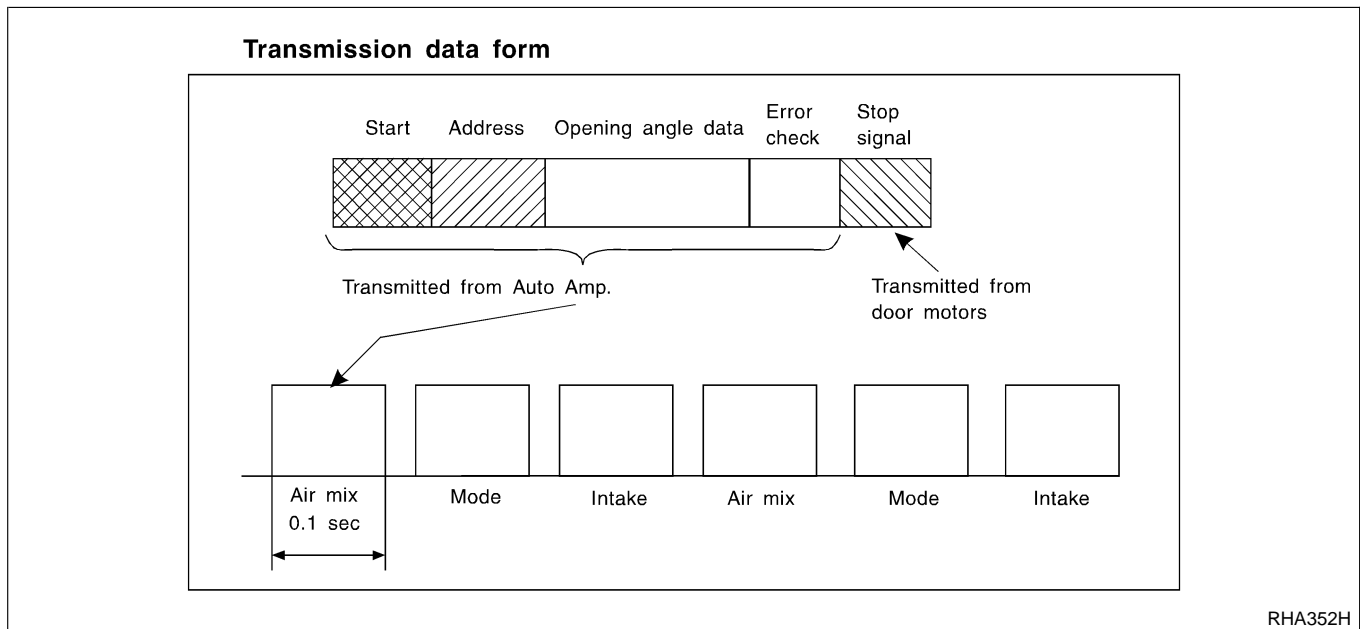
If an error exists, the received data is rejected and corrected data received. Finally, door control is based upon the corrected opening angle data.

Opening angle: Data that shows the indicated door opening angle of each door motor.

Error check: Procedure by which sent and received data is checked for errors. Error data is then compiled. The error check prevents corrupted data from being used by the air mix door motor, mode door motor and intake door motor. Error data can be related to the following problems.

- Abnormal electrical frequency
- Poor electrical connections
- Signal leakage from transmission lines
- Signal level fluctuation

Stop signal: At the end of each transmission, a stop operation, in-operation, or internal problem message is delivered to the auto amplifier. This completes one data transmission and control cycle.



Air Mix Door Control (Automatic Temperature Control)

NHHA0168S0103

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

Fan Speed Control

NHHA0168S0104

Blower speed is automatically controlled based on temperature setting, ambient temperature, in-vehicle temperature, intake temperature, amount of sunload and air mix door position.

With FAN switch set to "AUTO", the blower motor starts to gradually increase air flow volume.

When engine coolant temperature is low, the blower motor operation is delayed to prevent cool air from flowing.

GI

Intake Door Control

NHHA0168S0105

The intake doors are automatically controlled based on temperature setting, ambient temperature, in-vehicle temperature, intake temperature, amount of sunload, air mix door position and ON-OFF operation of the compressor.

MA

EM

Outlet Door Control

NHHA0168S0106

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

LC

Magnet Clutch Control

NHHA0168S0107

The ECM controls compressor operation using input signals from the throttle position sensor, refrigerant pressure sensor and auto amplifier.

EC

FE

Self-diagnostic System

NHHA0168S0108

The self-diagnostic system is built into the auto amplifier (LCU) to quickly locate the cause of problems.

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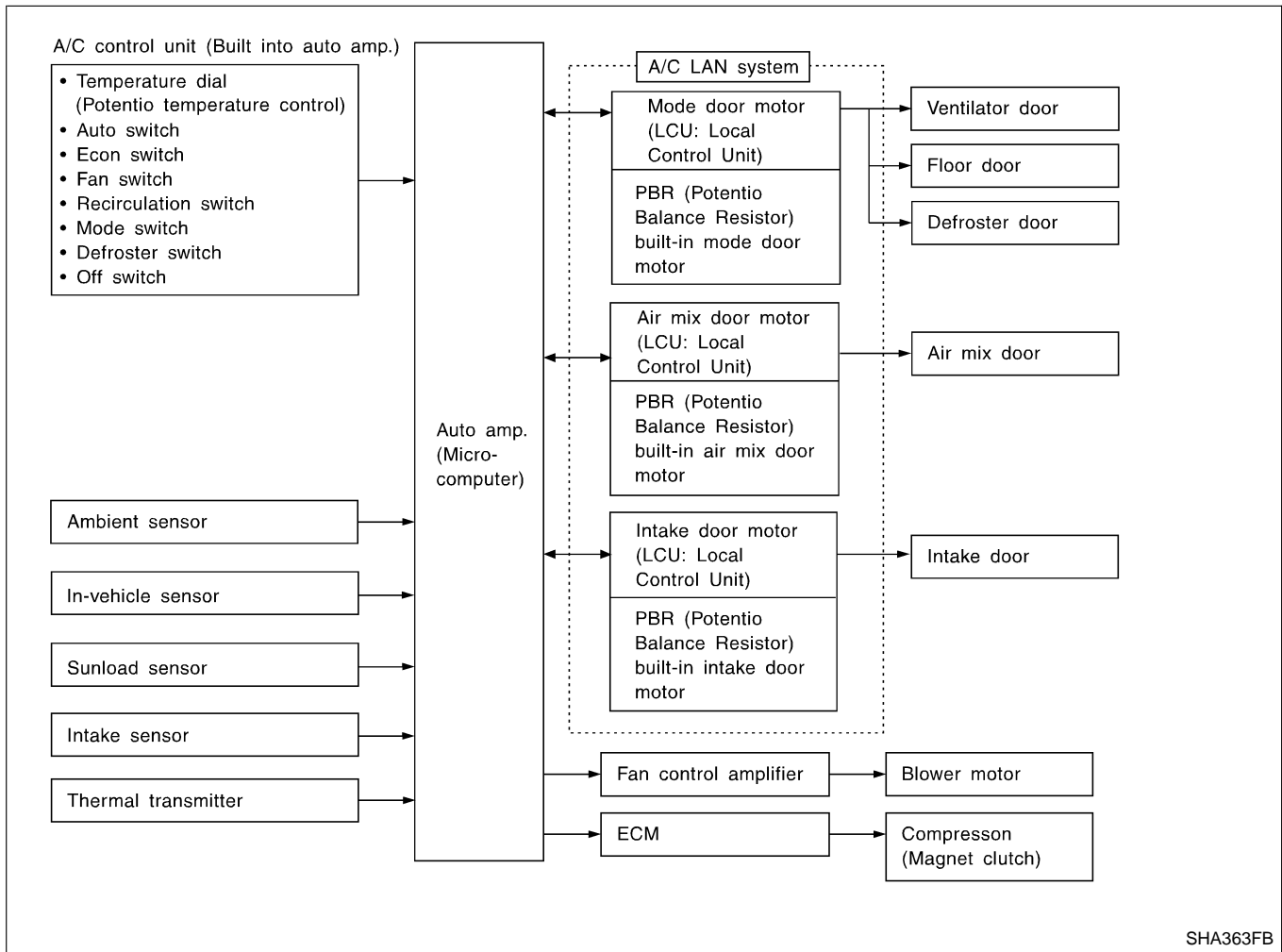
DESCRIPTION

Overview of Control System

Overview of Control System

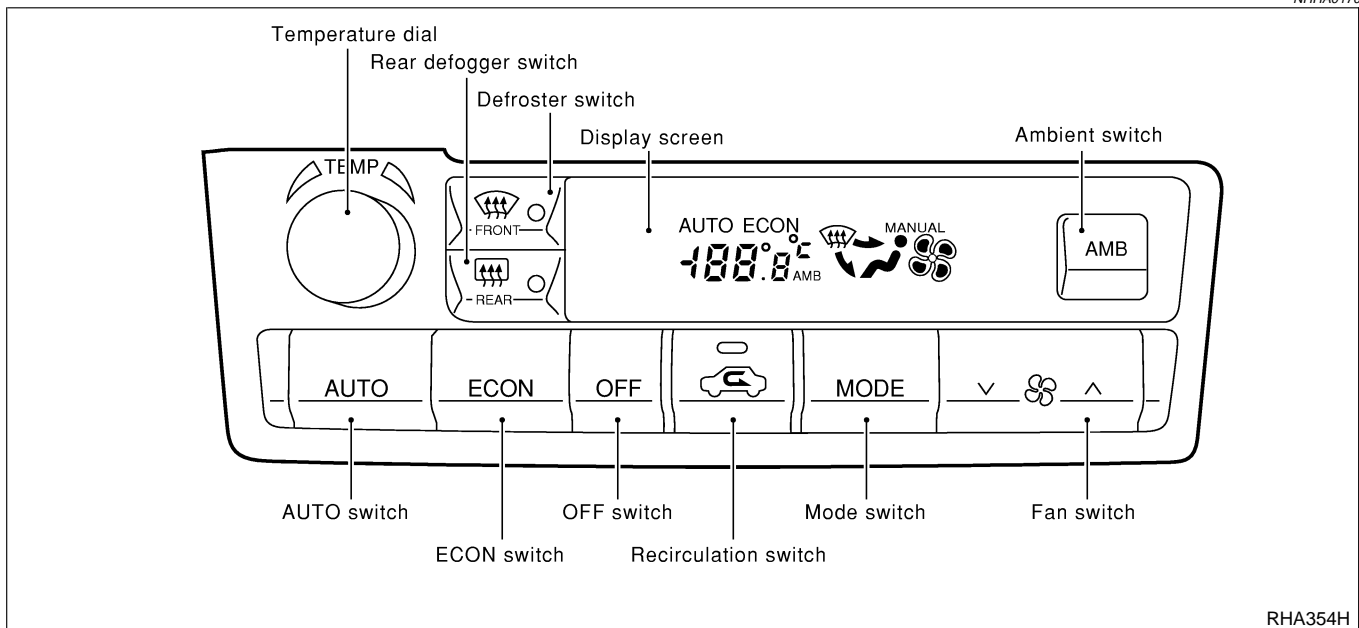
=NHHA0169

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



Control Operation

NHHA0170



DISPLAY SCREEN

Displays the operational status of the system.

NHHA0170S01

AUTO SWITCH

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

NHHA0170S02

GI

ECON SWITCH

By pressing the ECON switch, the display should indicate ECON and the compressor always turns OFF. With the compressor OFF, the system will not remove heat (cool) or de-humidify. The system will maintain the in-vehicle temperature at the set temperature when the set temperature is above the ambient (outside) temperature. The system will set the intake doors to the outside air position.

NHHA0170S03

MA

EM

TEMPERATURE DIAL (POTENTIO TEMPERATURE CONTROL)

Increases or decreases the set temperature.

NHHA0170S04

LC

OFF SWITCH

The compressor and blower are OFF, the intake doors are set to the outside air position, and the air outlet doors are set to the foot (80% foot and 20% defrost) position.

NHHA0170S05

EC

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FAN SWITCH

Manual control of the blower speed. Four speeds are available for manual control (as shown on the display screen):

NHHA0170S06

low  , medium low  , medium high  , high 

AT

RECIRCULATION (REC) SWITCH

OFF position: Outside air is drawn into the passenger compartment.
ON position: Interior air is recirculated inside the vehicle.

NHHA0170S07

AX

DEFROSTER (DEF) SWITCH

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

NHHA0170S08

SU

MODE SWITCH

Controls the air discharge outlets.

NHHA0170S09

BR

REAR WINDOW DEFOGGER SWITCH

When illumination is ON, rear window is defogged.

NHHA0170S10

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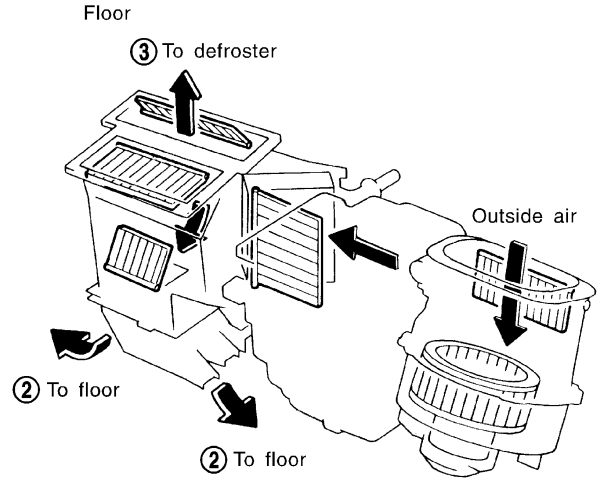
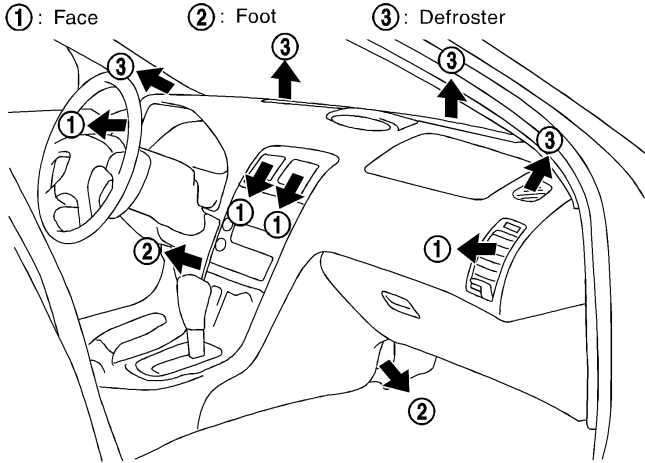
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DESCRIPTION

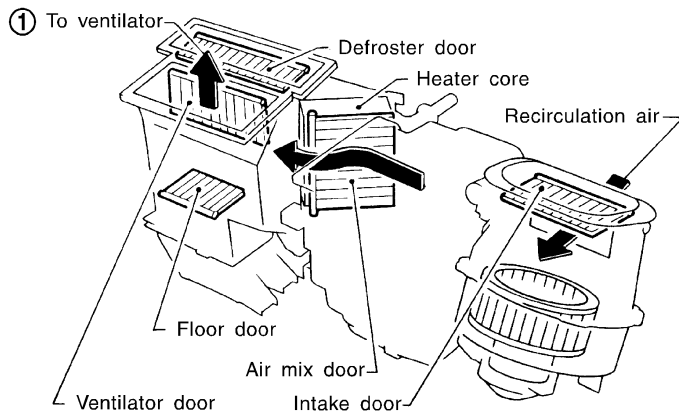
Discharge Air Flow

Discharge Air Flow

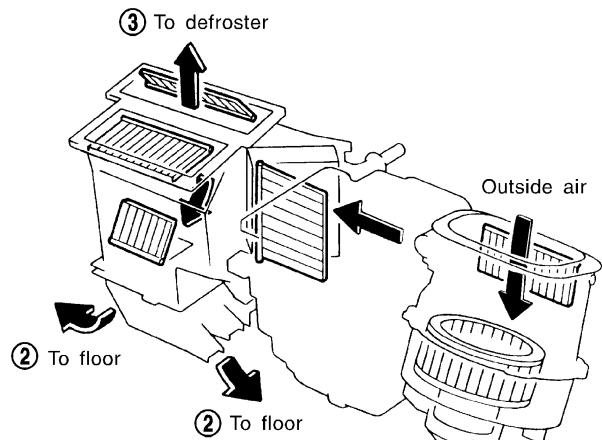
NHHA0171



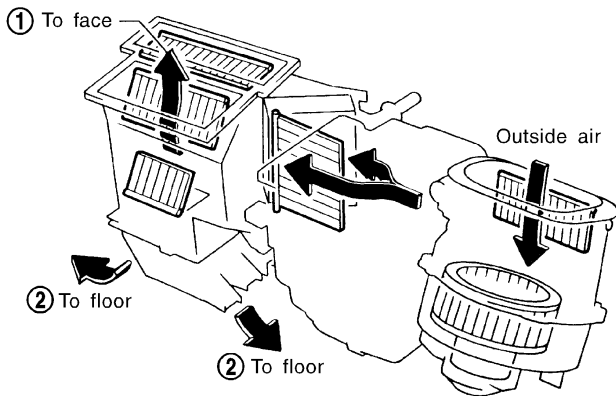
Face
(switch "ON")



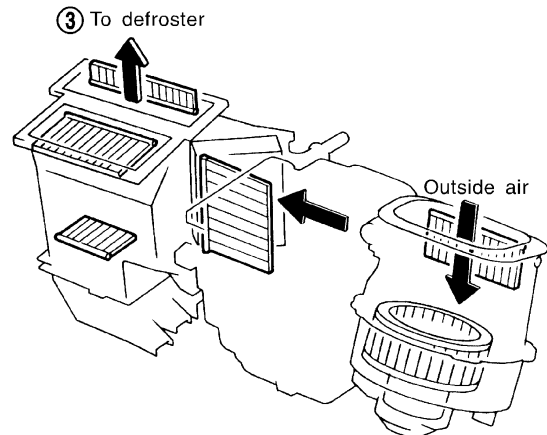
Floor and defroster



Bi-level
(switch "OFF")



Defroster



RHA355H

DESCRIPTION

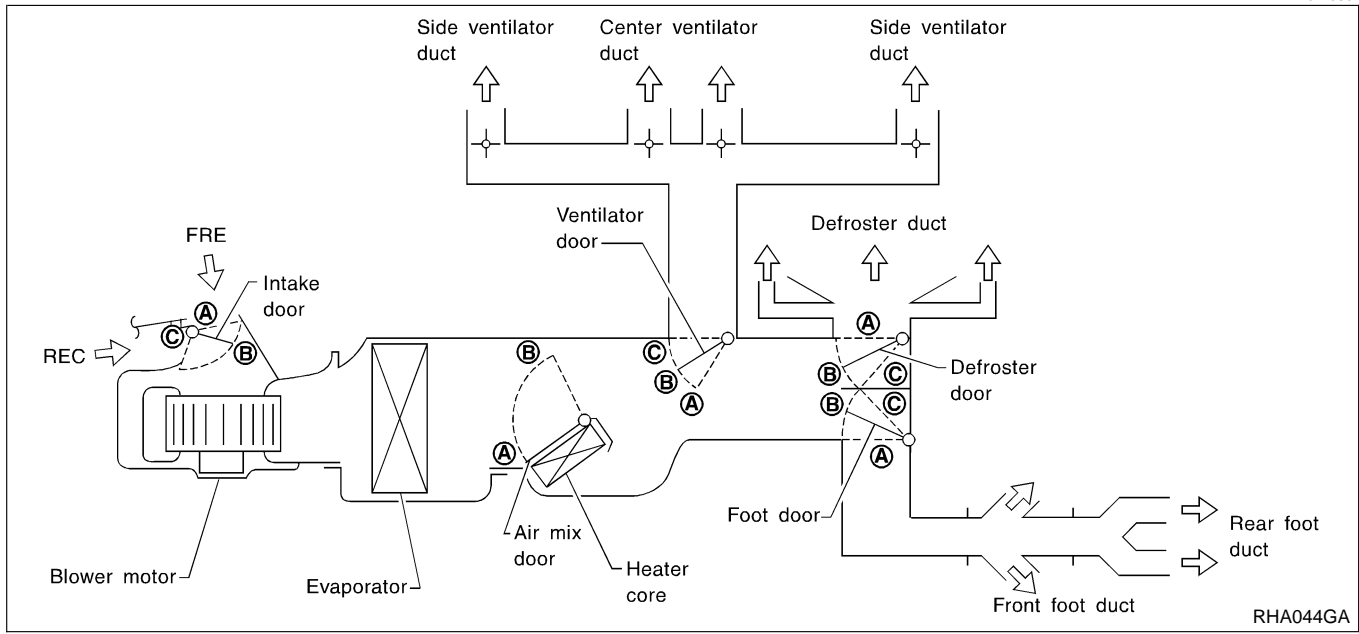
System Description

System Description

NHHA0246

SWITCHES AND THEIR CONTROL FUNCTIONS

NHHA0246S01



Position or switch	MODE SW				Front DEF SW		AUTO SW	ECON SW	REC SW		Temperature DIAL				
	VENT	B/L	FOOT	D/F	ON	OFF			ON	OFF	TEMP				
Door							AUTO	ECON			18.0°C (65°F)	—	32.0°C (85°F)		
Ventilator door	A	B	C	C	C	—	AUTO	AUTO	—	—	—				
Foot door	A	B	C	C	A	—			—	—	—				
Defroster door	A	A	B	C	C	—			—	—	—				
Air mix door	—				—	—			—	—	A	AUTO	B	—	
Intake door	—				C	—			A	AUTO*1	—				

*1: Automatically controlled when REC switch is OFF.

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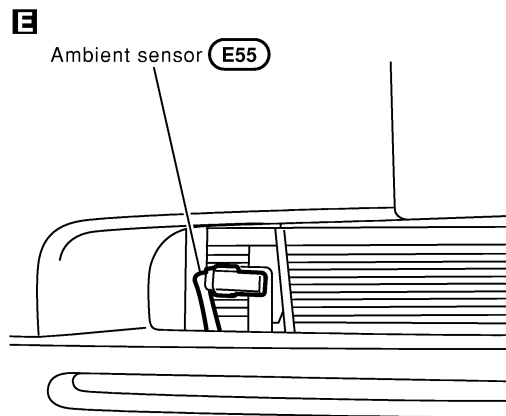
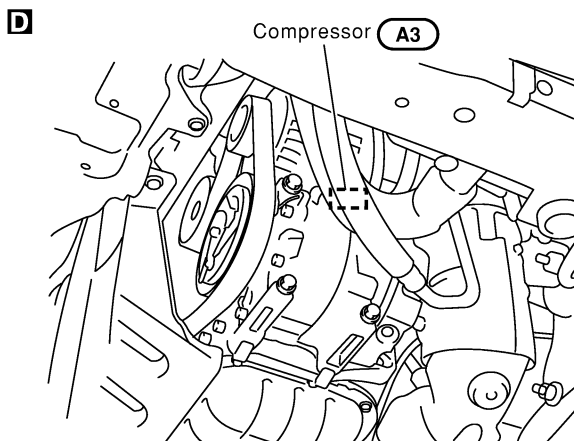
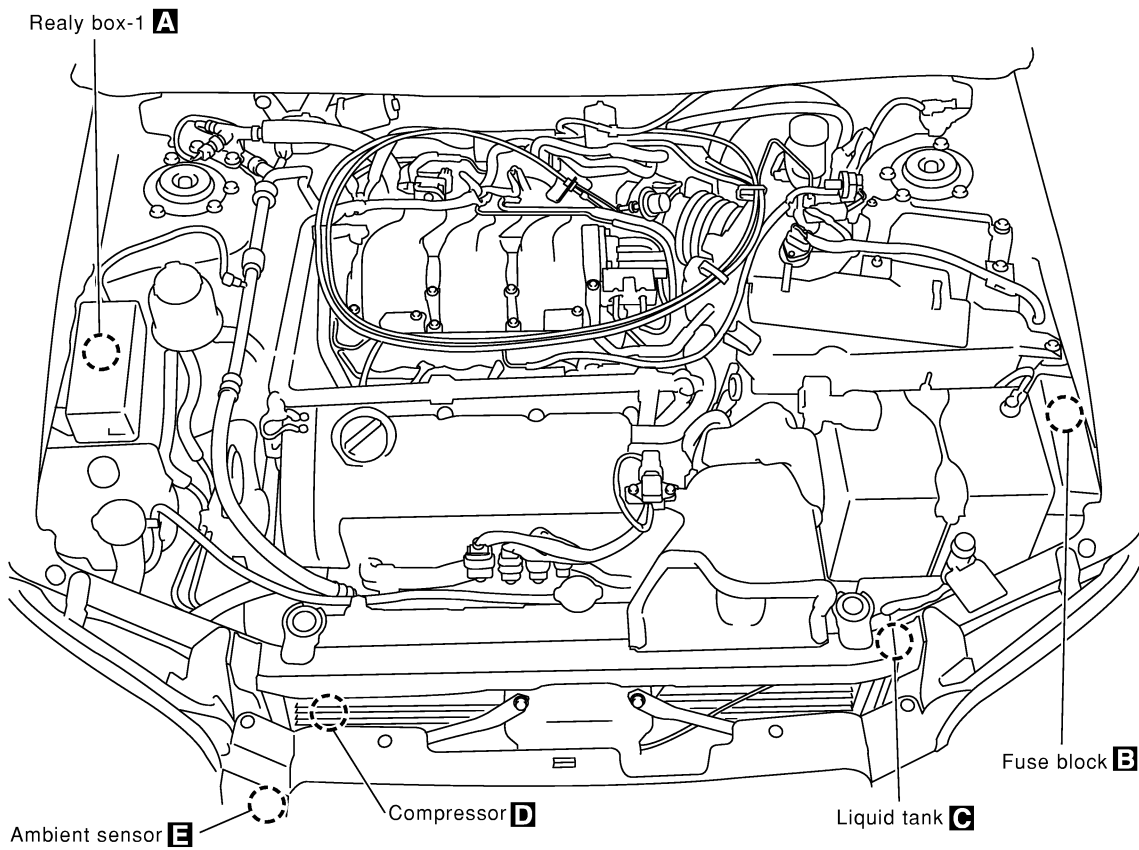
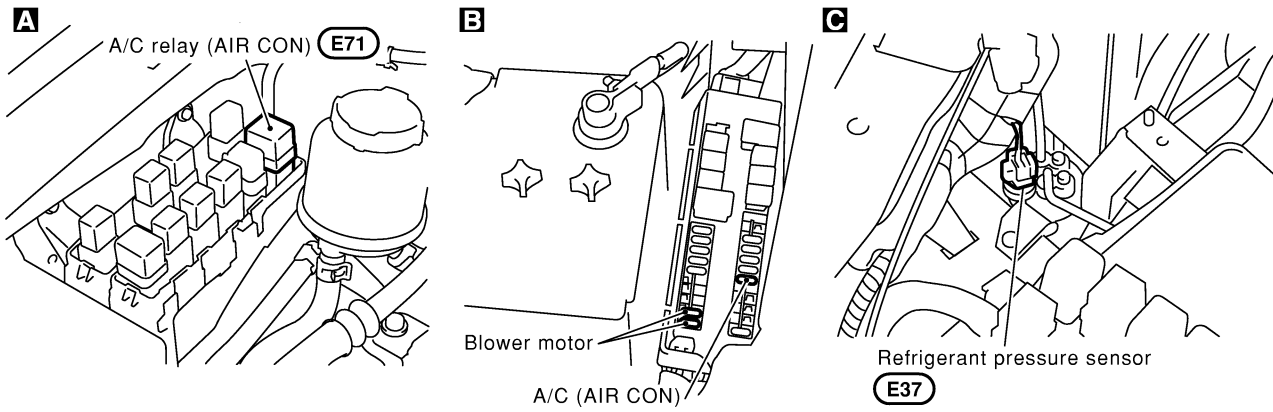
TROUBLE DIAGNOSES

Component Location

Component Location ENGINE COMPARTMENT

NHHA0172

NHHA0172S01



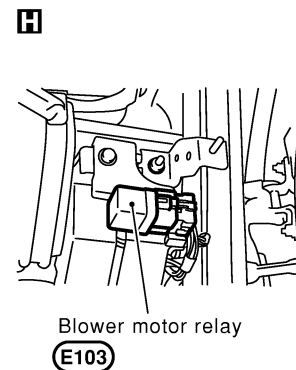
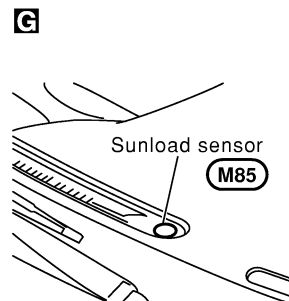
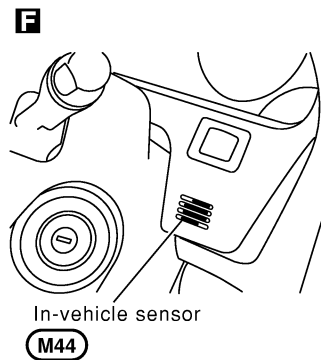
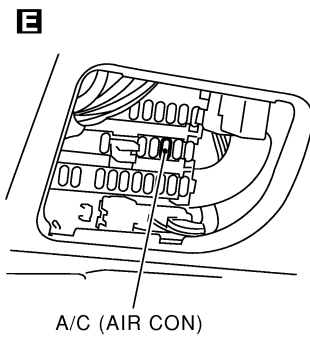
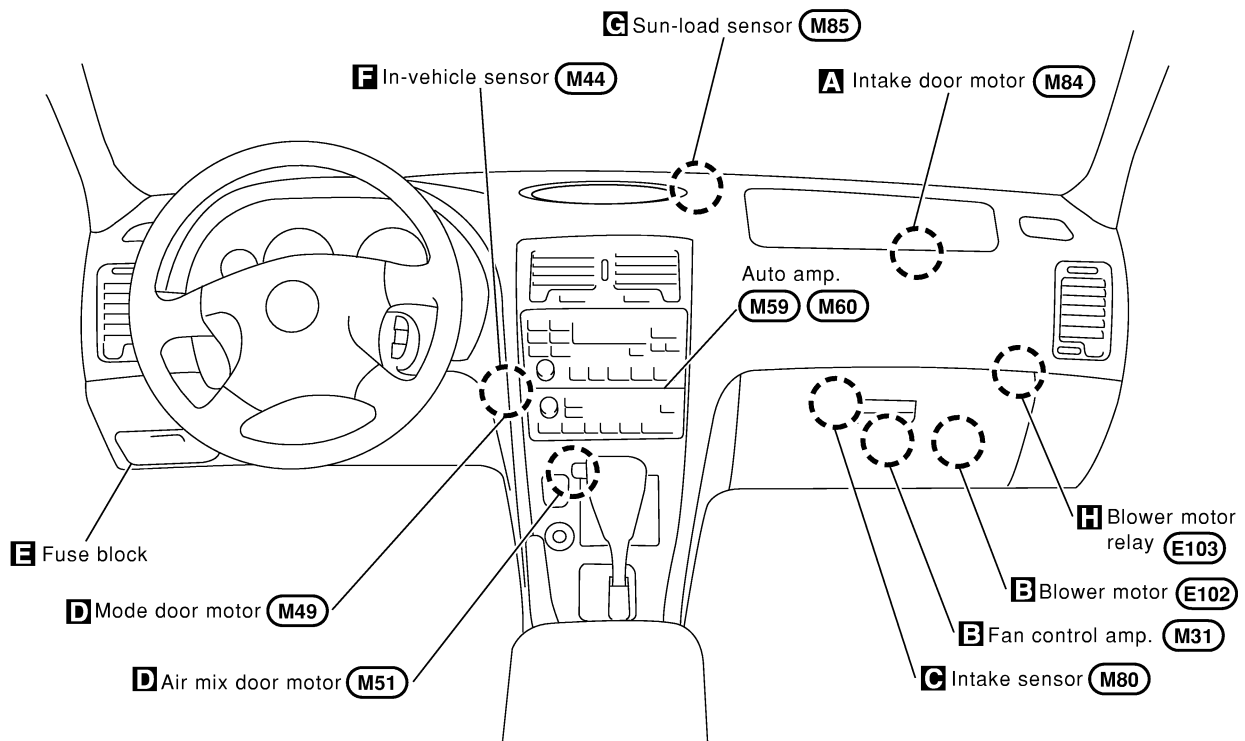
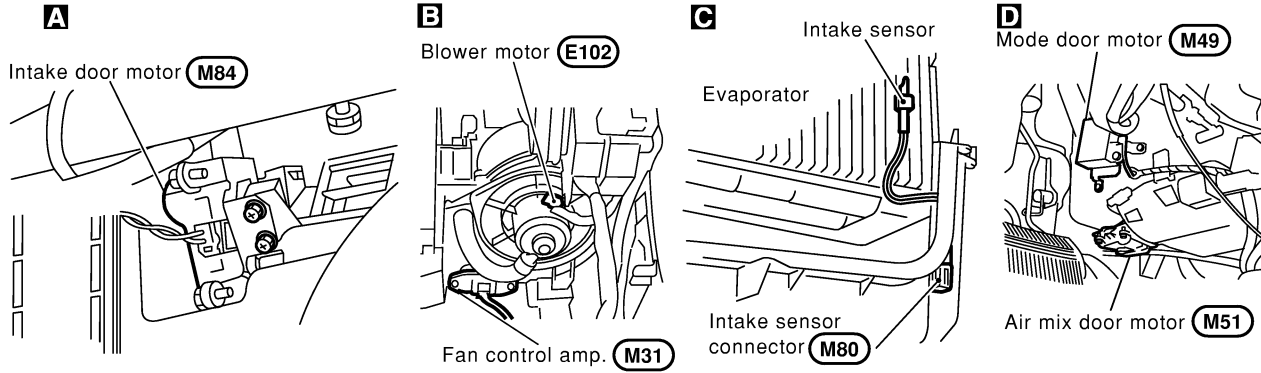
RHA453H

TROUBLE DIAGNOSES

Component Location (Cont'd)

PASSENGER COMPARTMENT

NHHA0172S02



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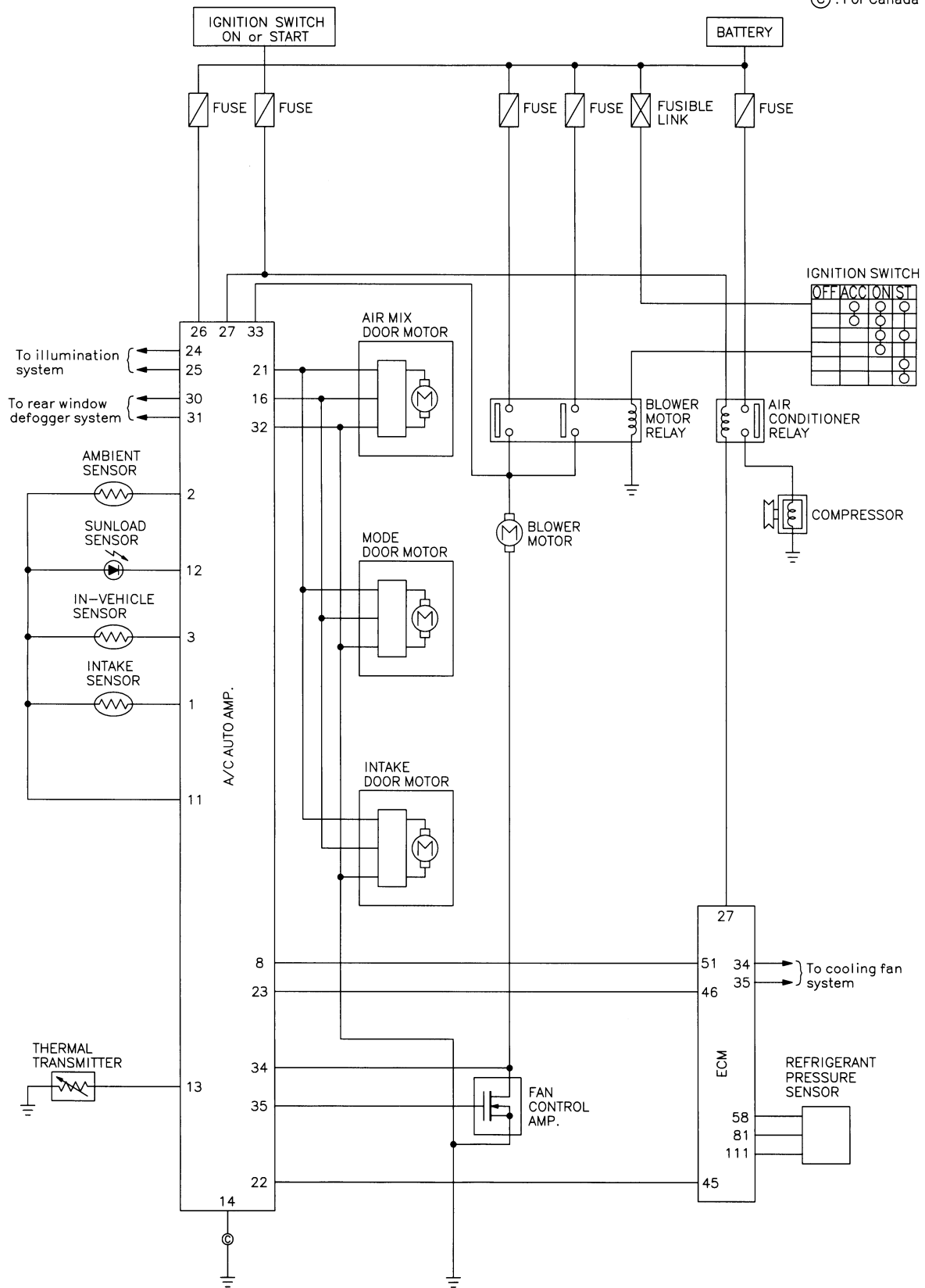
TROUBLE DIAGNOSES

Circuit Diagram

Circuit Diagram

NHHA0173

© : For Canada



MHA914A

TROUBLE DIAGNOSES

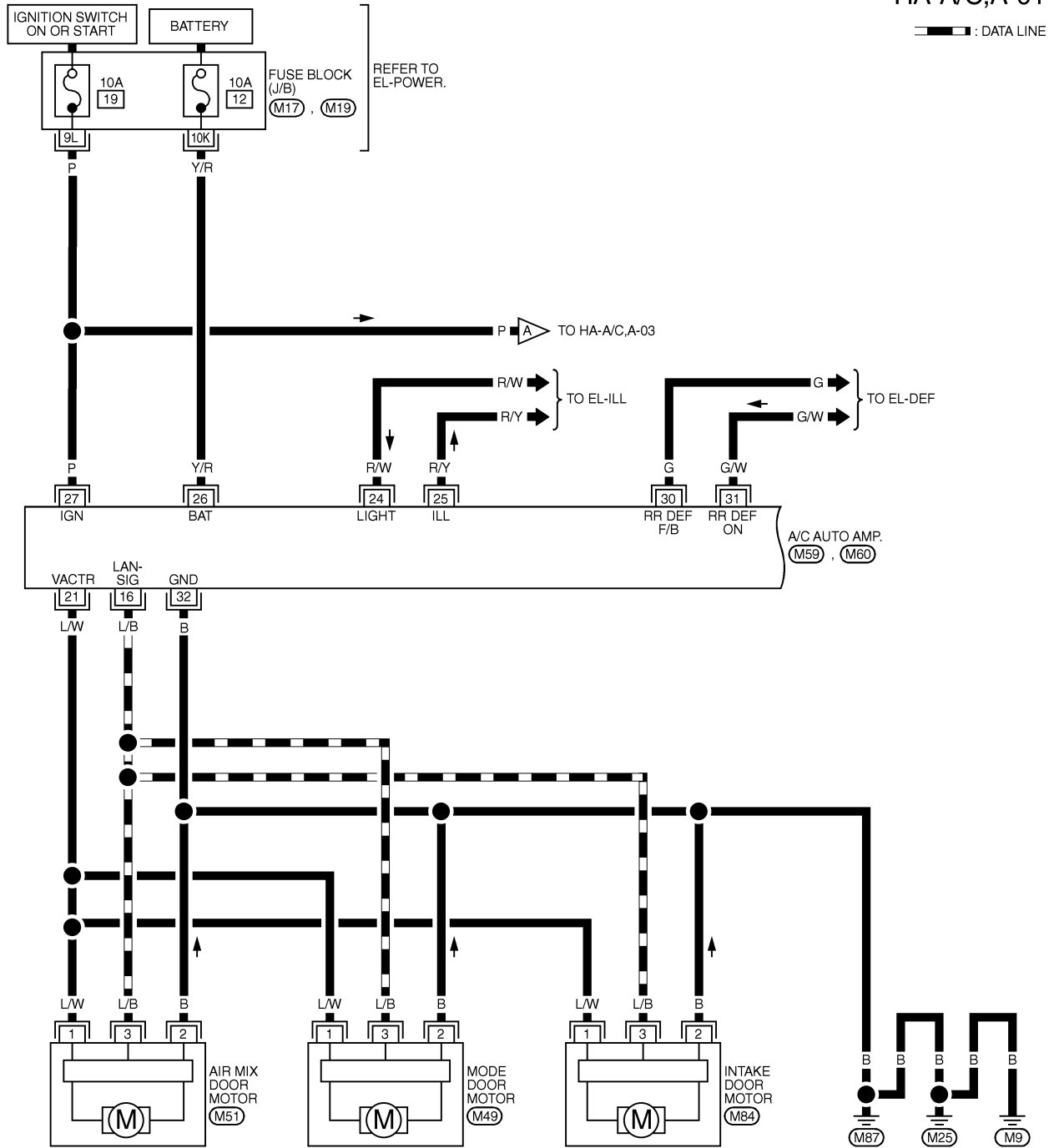
Wiring Diagram — A/C, A —

Wiring Diagram — A/C, A —

NHHA0174

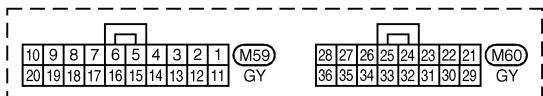
HA-A/C,A-01

— : DATA LINE



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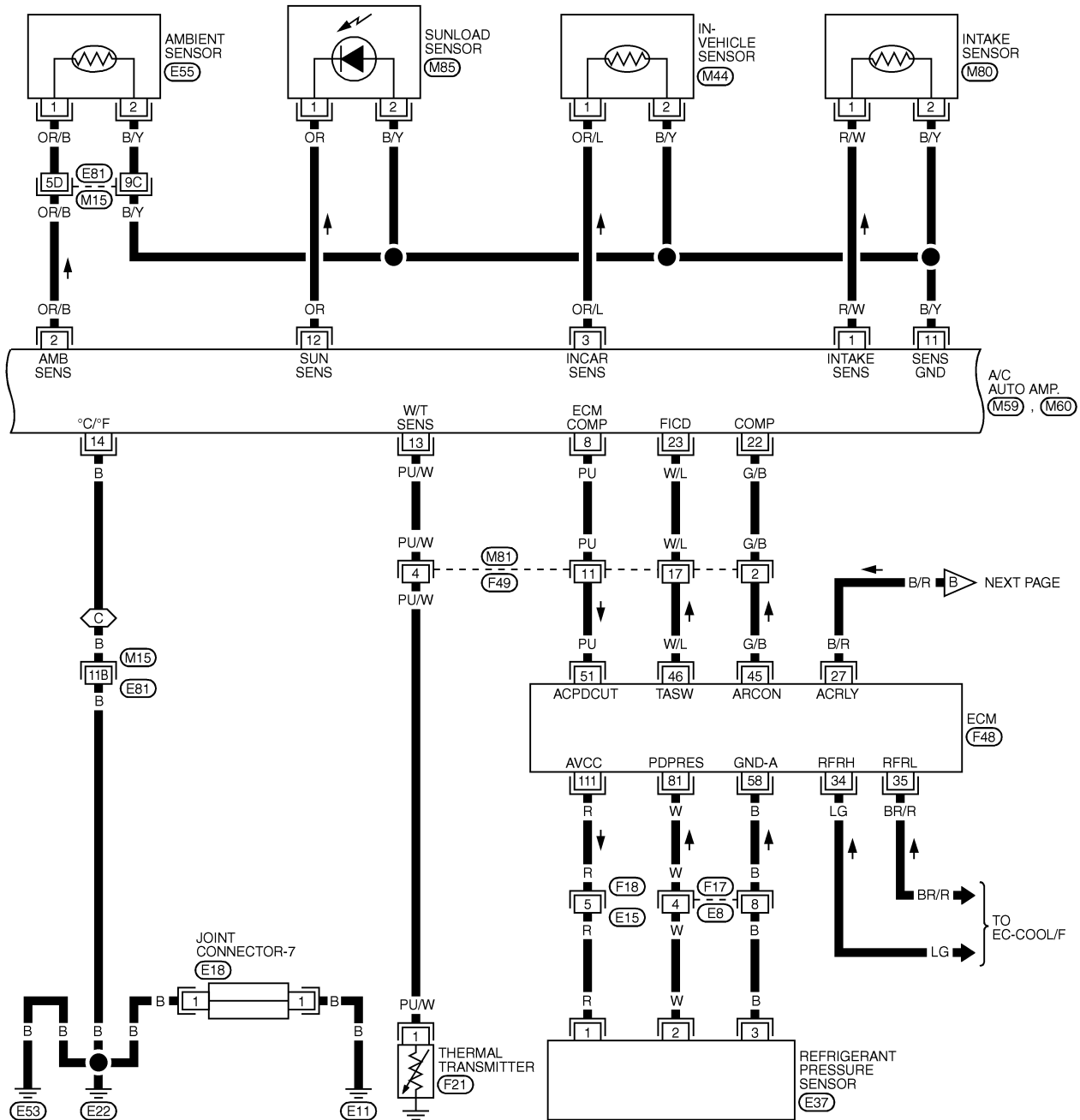
REFER TO THE FOLLOWING.
 (M17) , (M19) - FUSE BLOCK -
 JUNCTION BOX (J/B)

TROUBLE DIAGNOSES

Wiring Diagram — A/C, A — (Cont'd)

HA-A/C,A-02

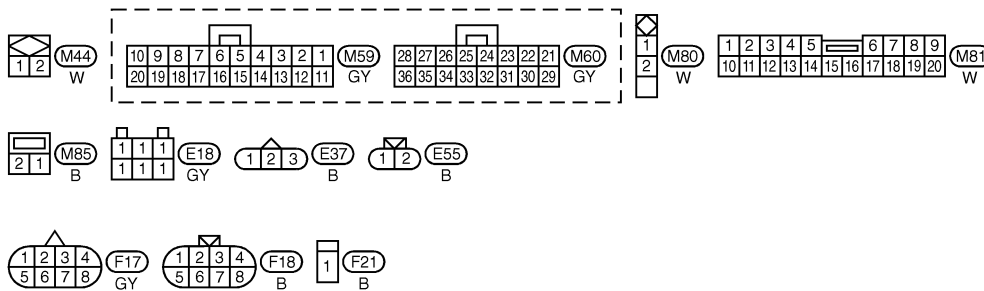
Ⓢ : FOR CANADA



A/C AUTO AMP. (M59), (M60)

▶ NEXT PAGE

TO EC-COOL/F

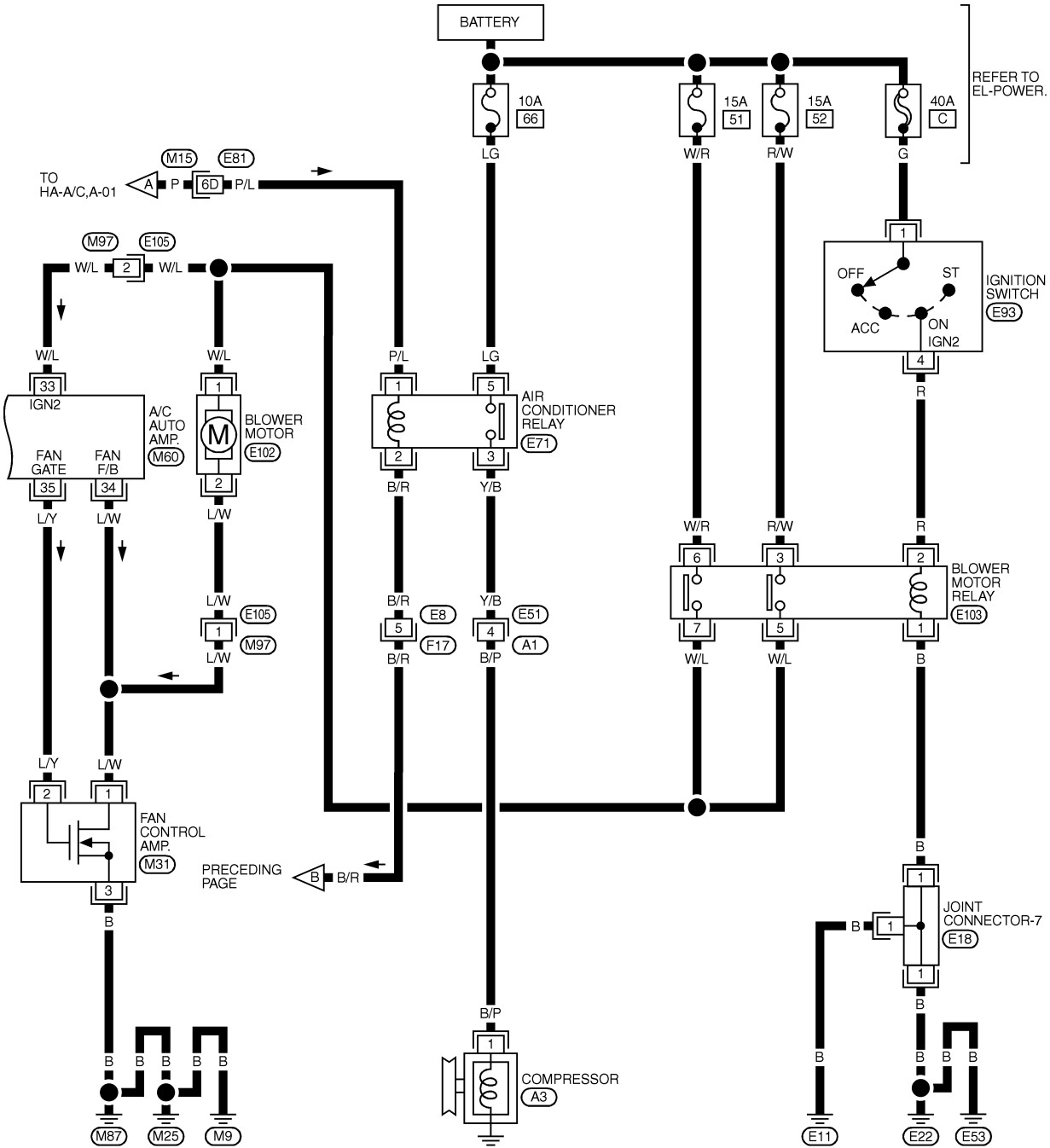


REFER TO THE FOLLOWING.
 (M15), (E81) - SUPER
 MULTIPLE JUNCTION (SMJ)
 (F48) - ELECTRICAL UNITS

TROUBLE DIAGNOSES

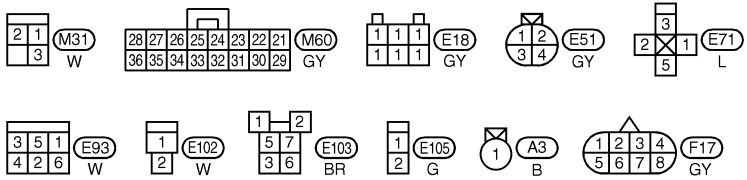
Wiring Diagram — A/C, A — (Cont'd)

HA-A/C,A-03



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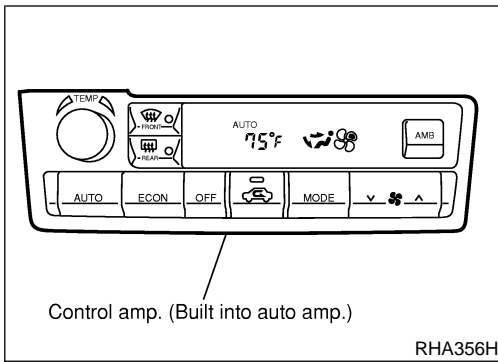
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REFER TO THE FOLLOWING.
(M15), (E81) - SUPER
MULTIPLE JUNCTION (SMJ)

TROUBLE DIAGNOSES

Auto Amp. Terminals and Reference Value



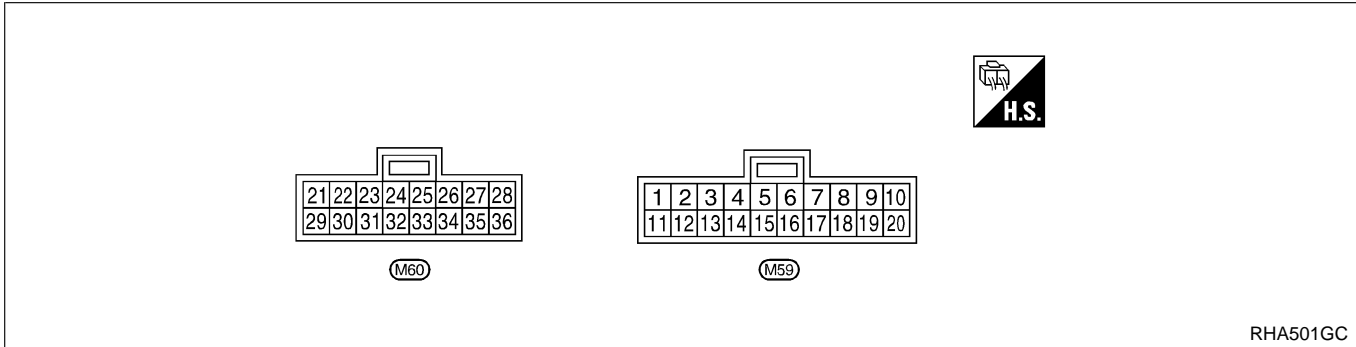
Auto Amp. Terminals and Reference Value INSPECTION OF AUTO AMP.

NHHA0175

NHHA0175S01

- Measure voltage between each terminal and body ground by following "AUTO AMP. INSPECTION TABLE".

- Pin connector terminal layout



AUTO AMP. INSPECTION TABLE

NHHA0175S02

TERMINAL NO.	ITEM	CONDITION		Voltage V	
1	Intake sensor	—		—	
2	Ambient sensor	—		—	
3	In-vehicle sensor	—		—	
8	ECM COMP		Compressor ON	Approximately 0	
			Compressor OFF	Approximately 4.6	
11	Sensor ground	—		Approximately 0	
12	Sunload sensor	—		—	
13	Thermal transmitter		Engine coolant temperature	Approximately 40°C (104°F)	Approximately 10.8
				Approximately 55°C (131°F)	Approximately 9.9
				Approximately 60°C (140°F)	Approximately 9.5
14	Ground (for Canada)	—		Approximately 0	
16	A/C LAN signal	—		Approximately 5.5	
21	Power supply for air mix door motor, mode door motor and intake door motor	—		Approximately 12	
22	Compressor ON signal		Compressor	ON	Approximately 0
				OFF	Approximately 4.6
26	Power supply for BAT	—		BATTERY VOLTAGE	

TROUBLE DIAGNOSES

Auto Amp. Terminals and Reference Value (Cont'd)

TERMINAL NO.	ITEM	CONDITION		Voltage V	
27	Power supply for IGN	—		Approximately 12	GI
30	Rear window defogger feed back	Rear window defogger switch	ON	Approximately 12	MA
			OFF	Approximately 0	
31	Rear window defogger ON signal	Rear window defogger switch	ON	Approximately 0	EM
			OFF	Approximately 12	
32	Ground	—		Approximately 0	
33	Power source for A/C	Ignition voltage feed back		Approximately 12	LC
34	Blower motor feed back	Fan speed: Low		Approximately 7 - 10	
35	Fan control AMP. control signal	Fan speed	Low, Middle low or Middle high	Approximately 2.5 - 3.0	EC
			High	Approximately 9 - 10	FE



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TROUBLE DIAGNOSES

Self-diagnosis

Self-diagnosis

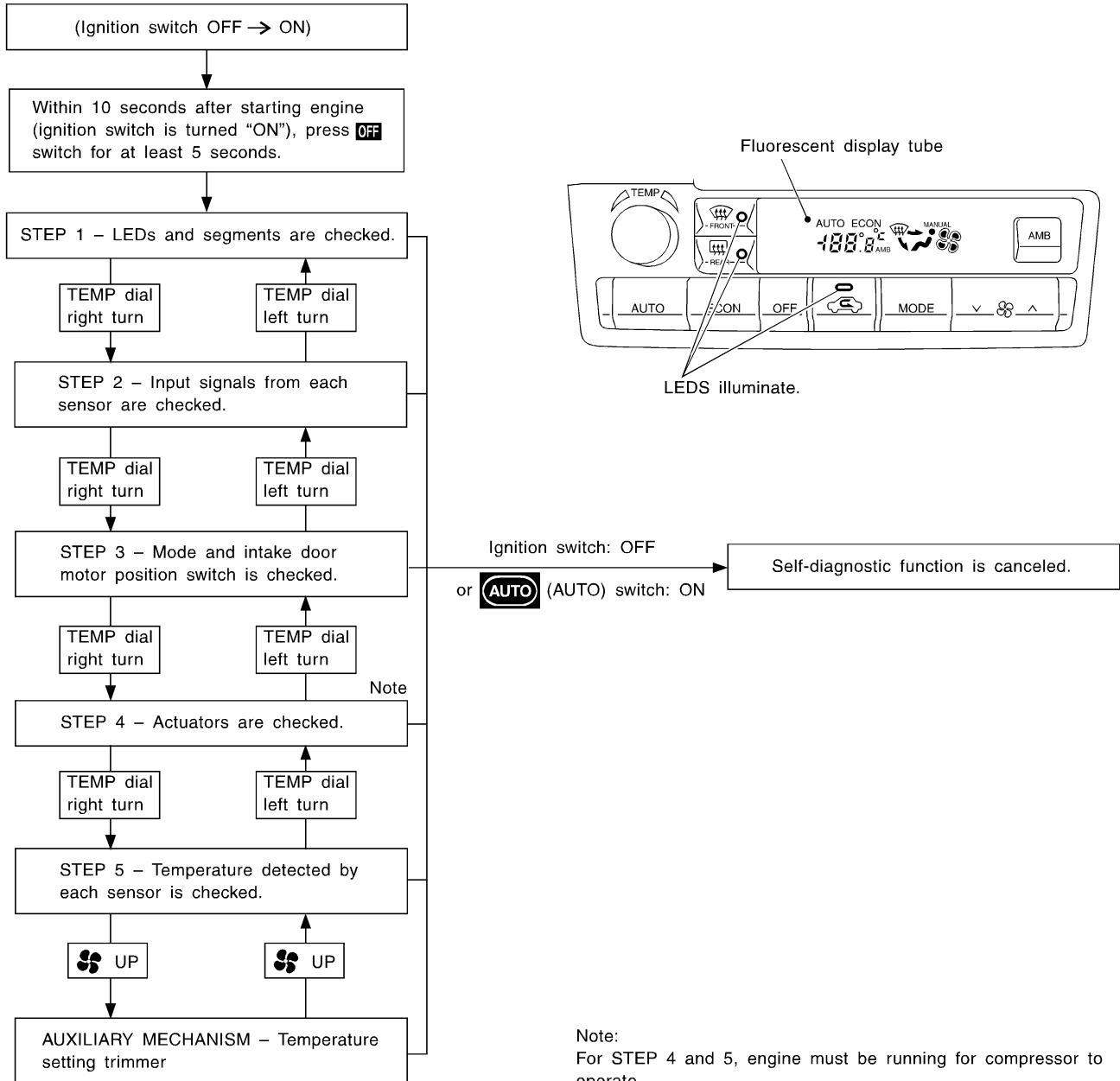
=NHHA0176

INTRODUCTION AND GENERAL DESCRIPTION

NHHA0176S01

The self-diagnostic system diagnoses sensors, door motors, blower motor, etc. by system line. Refer to applicable sections (items) for details. Shifting from normal control to the self-diagnostic system is accomplished by starting the engine (turning the ignition switch from "OFF" to "ON") and pressing "OFF" switch for at least 5 seconds. The "OFF" switch must be pressed within 10 seconds after starting the engine (ignition switch is turned "ON"). This system will be canceled by either pressing (AUTO) (AUTO) switch or turning the ignition switch "OFF". Shifting from one step to another is accomplished by means of pushing TEMP dial right turn or TEMP dial left turn switch, as required.

Additionally shifting from STEP 5 to AUXILIARY MECHANISM is accomplished by means of pushing (fan) UP switch.



RHA357H

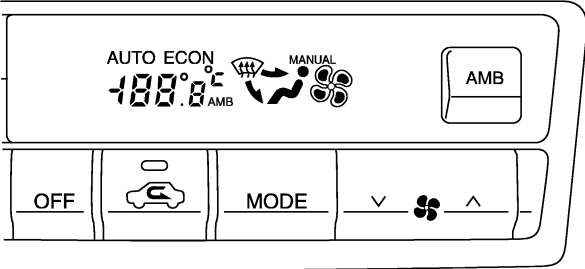
Perform all of the following tests to narrow the problem to a specific assembly, actuator, or function. Link to the Diagnostic Procedure which corresponds to malfunctions noted in these tests. If the A/C display screen has no display, check all power supply circuits to the A/C Auto Amp.

FUNCTION CONFIRMATION PROCEDURE

NHHA0176S02

1	ENTER SELF-DIAGNOSTIC MODE
<p>Perform steps 1 - 3</p> <ol style="list-style-type: none"> 1. Turn the ignition OFF. 2. Start the engine. 3. Immediately after starting the engine press and hold the OFF switch (for the auto A/C system) for at least 5 seconds. The A/C Auto Amp. should now be in Self Diagnosis mode. Self Diagnosis steps 1 - 5 can now be performed. Self Diagnosis step 1 will be displayed first. Shifting from one step to another is accomplished by pressing the temperature increase or decrease switch. 	
▶	GO TO 2.

GI
MA
EM

2	STEP 1 LED/DISPLAY CHECK
<p>Verify all segments illuminate. If all segments do not illuminate the fluorescent display tube is malfunctioning or the system has not entered self diagnosis which would indicate a malfunctioning OFF switch. Do all LEDs and segments illuminate?</p>	
<p>Display malfunction</p> 	
RHA358H	
Yes or No	
Yes	▶ GO TO 3.
No	▶ Malfunctioning OFF switch, LED or fluorescent display tube. Replace A/C auto amp.

LC
EC
FE
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HA

3	CHECK TO ADVANCE SELF-DIAGNOSIS STEP 2
<p>1. Turn the TEMP dial clockwise. 2. Advance to self-diagnosis STEP 2. If the system does not shift between step 1 and 2 a malfunctioning TEMP dial is indicated.</p>	
Yes or No	
Yes	▶ GO TO 4.
No	▶ Malfunctioning TEMP dial. Replace A/C auto amp.

SC
EL
IDX

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

4	CHECK TO RETURN SELF-DIAGNOSIS STEP 1	
<p>1. Turn the TEMP dial counterclockwise. 2. Return to self-diagnosis STEP 1. If the system does not shift between step 1 and 2 a malfunctioning TEMP dial is indicated.</p>		
Yes or No		
Yes	▶	GO TO 5.
No	▶	Malfunctioning TEMP dial. Replace A/C auto amp.

5	STEP 2 - SENSOR CIRCUITS ARE CHECKED FOR OPEN OR SHORT CIRCUIT	
<p>Turn the TEMP dial clockwise, advance to STEP 2: Wait (about 25 seconds) for two digit Code to appear. This is the Electronic Sensor Input Check which includes circuits. Does code No. 20 appear on the display?</p>		
<p>Display (when all sensors are in good order)</p> <p style="margin-left: 100px;">Illuminates 25 seconds after "2" is illuminated.</p> <p style="margin-left: 50px;">Illuminates</p> <div style="text-align: center;"> </div>		
RHA970DB		
Yes or No		
Yes	▶	GO TO 6.
No	▶	GO TO 13.

6	STEP 3 - MODE DOOR AND INTAKE DOOR POSITIONS ARE CHECKED	
<p>Turn the TEMP dial clockwise, advance to STEP 3. Wait (about 50 seconds) for two digit Code to appear. This is the Mode Door and Intake Door Position Switch input checks including circuits. Does code No. 30 appear on the display?</p>		
<p>Display (when all doors are in good order)</p> <p style="margin-left: 100px;">Illuminates 50 seconds after "3" is shown on display.</p> <p style="margin-left: 50px;">Illuminates</p> <div style="text-align: center;"> </div>		
RHA869DD		
Yes or No		
Yes	▶	GO TO 7.
No	▶	GO TO 14.

7	STEP 4 - OPERATION OF EACH ACTUATOR IS CHECKED
<p>Turn the TEMP dial clockwise, advance to STEP 4. Engine running. This is Heater and A/C system check. Code 41 will be displayed. Use the DEF switch to advance the code number from 41 to 46. After 46, the display will return to code 41 and can be advanced to 46 again.</p> <p style="text-align: center;">Changes from "1" to "6".</p> <div style="text-align: center;"></div> <p style="text-align: right;">RHA495A</p>	
▶	GO TO 8.

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TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

8	CHECK ACTUATORS																																																	
<p>Confirm operation of system components according to the following charts. Checks must be made visually, by listening to any noise, or by touching air outlets with your hand, etc. for improper operation.</p>																																																		
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Code No.</th> <th style="text-align: center;">41</th> <th style="text-align: center;">42</th> <th style="text-align: center;">43</th> <th style="text-align: center;">44</th> <th style="text-align: center;">45</th> <th style="text-align: center;">46</th> </tr> </thead> <tbody> <tr> <td>Actuator</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Mode door</td> <td style="text-align: center;">VENT</td> <td style="text-align: center;">B/L</td> <td style="text-align: center;">B/L</td> <td style="text-align: center;">FOOT</td> <td style="text-align: center;">D/F</td> <td style="text-align: center;">DEF</td> </tr> <tr> <td>Intake door</td> <td style="text-align: center;">REC</td> <td style="text-align: center;">REC</td> <td style="text-align: center;">20% FRE</td> <td style="text-align: center;">FRE</td> <td style="text-align: center;">FRE</td> <td style="text-align: center;">FRE</td> </tr> <tr> <td>Air mix door</td> <td style="text-align: center;">Full Cold</td> <td style="text-align: center;">Full Cold</td> <td style="text-align: center;">Full Hot</td> <td style="text-align: center;">Full Hot</td> <td style="text-align: center;">Full Hot</td> <td style="text-align: center;">Full Hot</td> </tr> <tr> <td>Blower motor</td> <td style="text-align: center;">4 - 5 V</td> <td style="text-align: center;">9 - 11 V</td> <td style="text-align: center;">7 - 9 V</td> <td style="text-align: center;">7 - 9 V</td> <td style="text-align: center;">7 - 9 V</td> <td style="text-align: center;">10 - 12 V</td> </tr> <tr> <td>Compressor</td> <td style="text-align: center;">ON</td> <td style="text-align: center;">ON</td> <td style="text-align: center;">OFF</td> <td style="text-align: center;">OFF</td> <td style="text-align: center;">ON</td> <td style="text-align: center;">ON</td> </tr> </tbody> </table>		Code No.	41	42	43	44	45	46	Actuator							Mode door	VENT	B/L	B/L	FOOT	D/F	DEF	Intake door	REC	REC	20% FRE	FRE	FRE	FRE	Air mix door	Full Cold	Full Cold	Full Hot	Full Hot	Full Hot	Full Hot	Blower motor	4 - 5 V	9 - 11 V	7 - 9 V	7 - 9 V	7 - 9 V	10 - 12 V	Compressor	ON	ON	OFF	OFF	ON	ON
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Compressor	ON	ON	OFF	OFF	ON	ON																																												
MTBL0314																																																		
<p>Operating condition of each actuator cannot be checked by indicators.</p>																																																		
<p>Discharge air flow</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="text-align: center;">Mode switch</th> <th colspan="3" style="text-align: center;">Air outlet/distribution</th> </tr> <tr> <th style="text-align: center;">Face</th> <th style="text-align: center;">Foot</th> <th style="text-align: center;">Defroster</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"></td> <td style="text-align: center;">100%</td> <td style="text-align: center;">—</td> <td style="text-align: center;">—</td> </tr> <tr> <td style="text-align: center;"></td> <td style="text-align: center;">60%</td> <td style="text-align: center;">40%</td> <td style="text-align: center;">—</td> </tr> <tr> <td style="text-align: center;"></td> <td style="text-align: center;">—</td> <td style="text-align: center;">80%</td> <td style="text-align: center;">20%</td> </tr> <tr> <td style="text-align: center;"></td> <td style="text-align: center;">—</td> <td style="text-align: center;">60%</td> <td style="text-align: center;">40%</td> </tr> <tr> <td style="text-align: center;"></td> <td style="text-align: center;">—</td> <td style="text-align: center;">—</td> <td style="text-align: center;">100%</td> </tr> </tbody> </table>		Mode switch	Air outlet/distribution			Face	Foot	Defroster		100%	—	—		60%	40%	—		—	80%	20%		—	60%	40%		—	—	100%																						
Mode switch	Air outlet/distribution																																																	
	Face	Foot	Defroster																																															
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MTBL0128																																																		
OK or NG																																																		
OK	▶	GO TO 9.																																																
NG	▶	<ul style="list-style-type: none"> ● Air outlet does not change. Go to "Mode Door Motor" (HA-53). ● Intake door does not change. Go to "Intake Door Motor" (HA-63). ● Blower motor operation is malfunctioning. Go to "Blower Motor" (HA-66). ● Magnet clutch does not engage. Go to "Magnet Clutch" (HA-75). ● Discharge air temperature does not change. Go to "Air Mix Door Motor" (HA-60). 																																																

9	STEP 5 - TEMPERATURE OF EACH SENSOR IS CHECKED
<p>Turn the TEMP dial clockwise, advance to STEP 5. This is Intake sensor, In Vehicle sensor and Ambient Sensor function check. Code 51 will be displayed.</p> <p>NOTE: Each sensor reading should be approximately the actual temperature.</p> <p style="text-align: center;">"51" appears on display.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">RHA359H</p>	
▶	GO TO 10.

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10	CHECK AMBIENT SENSOR
<p>Press DEF once, temperature detected by the Ambient Sensor is displayed.</p> <div style="text-align: center;"> <p style="text-align: center;">Temperature detected by ambient sensor.</p> <p style="text-align: center;">U.S.A. model Canada model</p> <p style="text-align: center;">Indicates negative temperature reading.</p> <p style="text-align: center;">OK or NG</p> </div> <p style="text-align: right;">RHA499G</p>	
OK ▶	GO TO 11.
NG ▶	Go to Ambient Sensor Circuit (HA-93).

11	CHECK IN-VEHICLE SENSOR
<p>Press DEF second time, temperature detected by the In Vehicle Sensor is displayed.</p> <div style="text-align: center;"> <p style="text-align: center;">Temperature detected by in-vehicle sensor.</p> <p style="text-align: center;">U.S.A. model Canada model</p> <p style="text-align: center;">Indicates negative temperature reading.</p> <p style="text-align: center;">OK or NG</p> </div> <p style="text-align: right;">RHA500G</p>	
OK ▶	GO TO 12.
NG ▶	Go to In-vehicle Sensor Circuit (HA-97).

HA
SC
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IDX

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

12	CHECK INTAKE SENSOR	
<p>Press DEF third time, temperature detected by the Intake Sensor is displayed.</p> <div style="text-align: center;"> </div> <p style="text-align: right;">RHA500G</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	<ol style="list-style-type: none"> 1. Press (DEF) switch the fourth time. Display returns to original presentation 51. 2. Turn ignition switch OFF or (AUTO) switch ON. 3. END
NG	▶	Go to Intake Sensor Circuit (HA-104).

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13 CHECK MALFUNCTIONING SENSOR

NOTE:

- A blinking mark (-) preceding the Code No. indicates a short circuit.
- If 2 or more items are malfunctioning the corresponding codes will alternately blink twice.
- A circuit will be detected as open or shorted and its code No. will be displayed when input signals correspond with conditions in the following chart.

Code No.	Sensor	Open circuit	Short circuit	Reference page
21	Ambient sensor	Less than -41.9°C (-43°F)	Greater than 100°C (212°F)	*3
-21				
22	In-vehicle sensor	Less than -41.9°C (-43°F)	Greater than 100°C (212°F)	*4
-22				
24	Intake sensor	Less than -43.8°C (-47°F)	Greater than 100°C (212°F)	*5
-24				
25	Sunload sensor*2	Less than 0.228 mA	Greater than 0.98 mA	*6
-25				
26	PBR*1	Greater than 95%	Less than 5%	*7
-26				

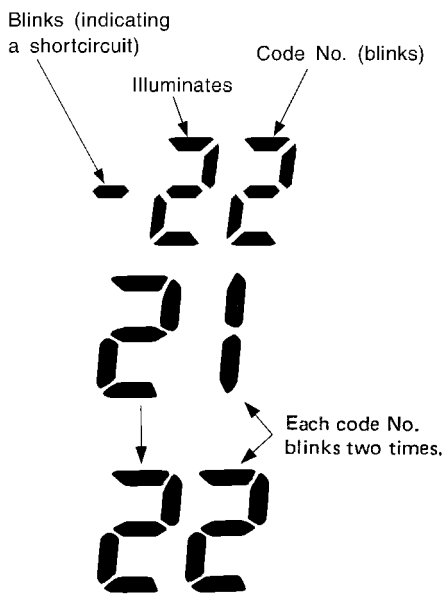
*1: "95%" and "5%" refer to percentage with respect to stroke of air mix door. (Full cold: 0%, Full hot: 100%)

*2: **Conduct self-diagnosis STEP 2 under sunshine.**

When conducting indoors, direct light (more than 60W) at sunload sensor.

*3: HA-93, *4: HA-97, *5: HA-104, *6: HA-100, *7: HA-106

Display (when sensor malfunctions)



MTBL0386

RHA455G

RHA501A

▶ INSPECTION END

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

14	CHECK MALFUNCTIONING DOOR MOTOR POSITION SWITCH
<p>30- Mode door and intake door position switches are in working order. Continue ot next step.</p> <p>31- Mode door circuit / switch in vent position switch is malfunctioning.</p> <p>32- Mode door circuit / switch in B/L position switch is malfunctioning.</p> <p>34- Mode door circuit / switch in Foot position switch is malfunctioning.</p> <p>35- Mode door circuit / switch in Foot Def. position switch is malfunctioning.</p> <p>36- Mode door circuit / switch in Def. position switch is malfunctioning.</p> <p>37- Intake door mode circuit / switch in Fresh Air position is malfunctioning.</p> <p>38- Intake door mode circuit / switch in 20% Fresh Air position is malfunctioning.</p> <p>39- Intake door mode circuit / switch in Recirculation Air position is malfunctioning.</p> <p>NOTE:</p> <ul style="list-style-type: none"> ● If 2 or more items are malfunctioning the corresponding codes will alternately blink twice. ● If the Mode Door Motor harness is disconnected repeated display pattern of 31 → 32 → 34 → 35 → 36 will occur. ● If Intake Door Motor harness is disconnected repeated display pattern of 37 → 38 → 39 will occur. ● If any Mode Door Motor Position Switch is malfunctioning the Mode Door Motor will also malfunction. 	
<p>Display (when a door is out of order)</p> <p>Code No. (blinks)</p> <p>Illuminates</p> <p>RHA168DA</p>	
<p>Each code No. blinks two times.</p> <p>RHA498A</p>	
▶	INSPECTION END

AUXILIARY MECHANISM: TEMPERATURE SETTING TRIMMER

=NHHA0176S03

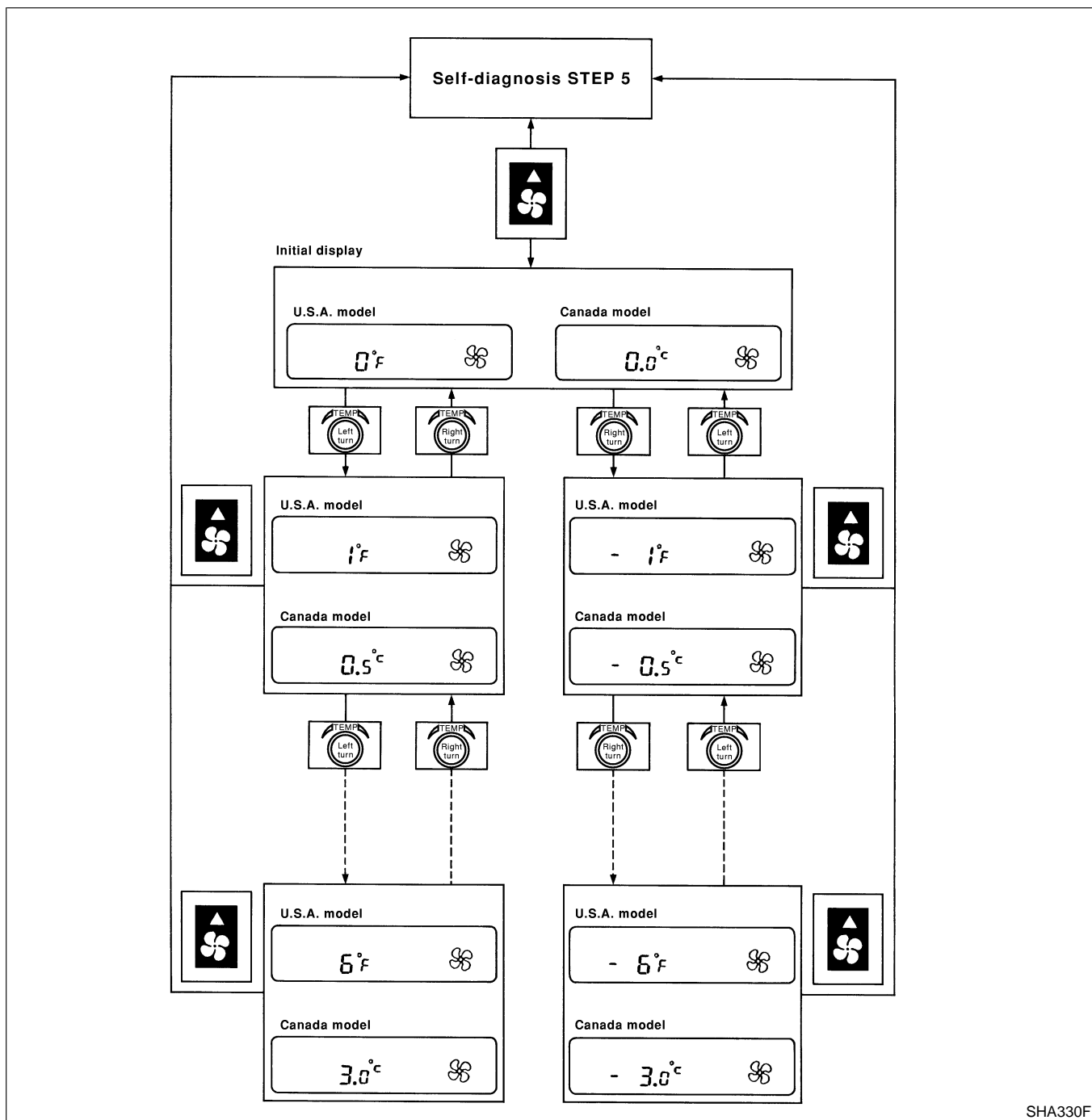
Unconfirmed Incidents

NHHA0176S0301

The customer may feel that the cabin temperature is not being controlled or regulated to the temperature indicated by the auto A/C display screen. To satisfy individual driver preference the Temperature Setting Trimmer may be used to compensate in a range of $\pm 3^{\circ}\text{C}$ ($\pm 6^{\circ}\text{F}$).

1. Enter Self Diagnosis mode and select STEP 5.
2. Press the Fan Up switch: This will set the A/C system in auxiliary mode and the display will show 61.
3. Turn the temperature dial clockwise or counterclockwise: The temperature will change at a rate of 0.5°C (1°F).

If power is lost to the A/C Auto Amp. trimmer setting is canceled and setting becomes that of initial condition, 0° .



SHA330F

When battery cable is disconnected, trimmer operation is canceled. Temperature set becomes that of initial condition, i.e. 0°C (0°F).

TROUBLE DIAGNOSES

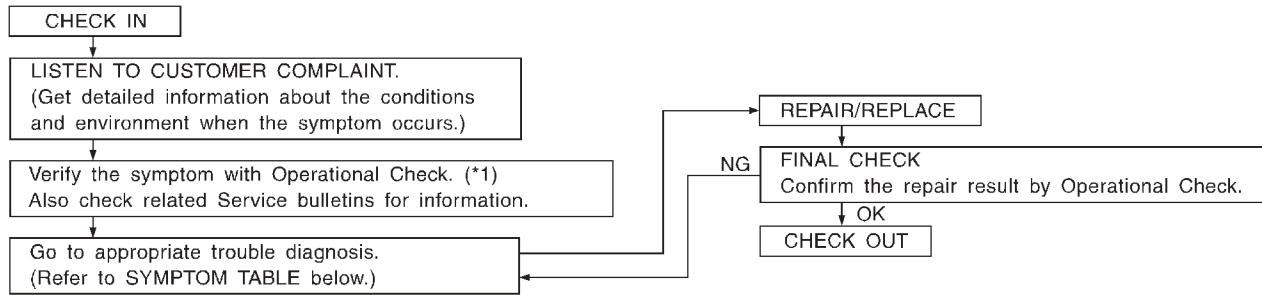
How to Perform Trouble Diagnoses for Quick and Accurate Repair

How to Perform Trouble Diagnoses for Quick and Accurate Repair

=NHHA0177

NHHA0177S01

WORK FLOW



SHA900E

*1: Operational Check (HA-47)

SYMPTOM TABLE

NHHA0177S02

Symptom	Reference Page
● A/C system does not come on.	● Go to Trouble Diagnosis Procedure for A/C system. HA-50
● Air outlet does not change.	● Go to Trouble Diagnosis Procedure for Mode Door Motor. (LAN) HA-53
● Mode door motor does not operate normally.	
● Discharge air temperature does not change.	● Go to Trouble Diagnosis Procedure for Air Mix Door Motor. (LAN) HA-60
● Air mix door motor does not operate normally.	
● Intake door does not change.	● Go to Trouble Diagnosis Procedure for Intake Door Motor. (LAN) HA-63
● Intake door motor does not operate normally.	
● Blower motor operation is malfunctioning.	● Go to Trouble Diagnosis Procedure for Blower Motor. HA-66
● Blower motor operation is malfunctioning under out of starting fan speed control.	
● Magnet clutch does not engage.	● Go to Trouble Diagnosis Procedure for Magnet Clutch. HA-75
● Insufficient cooling.	● Go to Trouble Diagnosis Procedure for Insufficient Cooling. HA-81
● Insufficient heating.	● Go to Trouble Diagnosis Procedure for Insufficient Heating. HA-89
● Noise.	● Go to Trouble Diagnosis Procedure for Noise. HA-90
● Self-diagnosis can not be performed.	● Go to Trouble Diagnosis Procedure for Self-diagnosis. HA-91
● Memory function does not operate.	● Go to Trouble Diagnosis Procedure for Memory Function. HA-92
● ECON mode does not operate.	● Go to Trouble Diagnosis Procedure for ECON (ECONOMY) — mode. HA-93

Operational Check

NHHA0178

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

CONDITIONS:

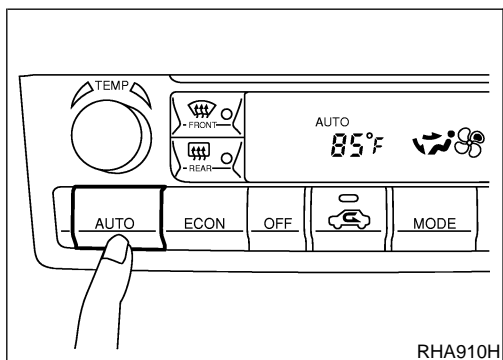
NHHA0178S01

- Engine running and at normal operating temperature.

GI

MA

EM



PROCEDURE:

NHHA0178S02

1. Check Memory Function

NHHA0178S0201

1. Set the temperature 85°F or 32°C.
2. Press OFF switch.
3. Turn the ignition off.
4. Turn the ignition on.
5. Press the AUTO switch.
6. Confirm that the set temperature remains at previous temperature.
7. Press OFF switch.

LC

EC

FE

AT

If NG, go to trouble diagnosis procedure for memory function (HA-92).

AX

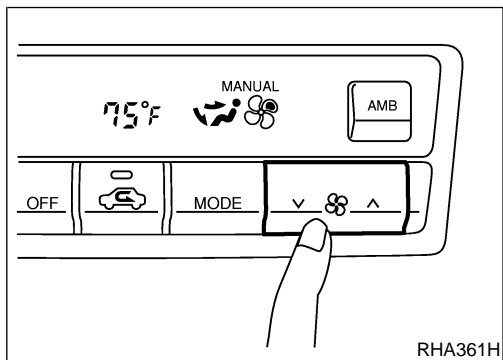
If OK, continue with next check.

SU

BR

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RS



2. Check Blower

NHHA0178S0202

1. Press fan switch (up side) one time. Blower should operate on low speed. The fan symbol should have one blade lit.
2. Press fan switch (up side) one more time, and continue checking blower speed and fan symbol until all speeds are checked.
3. Leave blower on MAX speed.

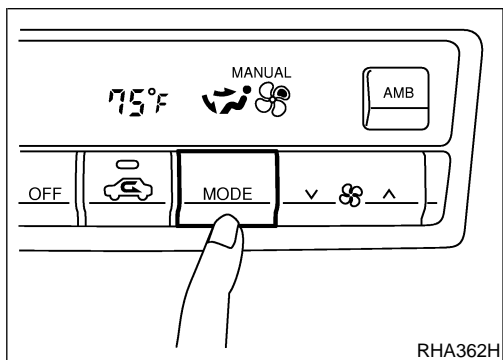
BT

HA

If NG, go to trouble diagnosis procedure for blower motor (HA-66).
If OK, continue with next check.

SC

EL



3. Check Discharge Air

NHHA0178S0203

1. Press mode switch four times and DEF button.
2. Each position indicator should change shape.

IDX

TROUBLE DIAGNOSES

Operational Check (Cont'd)

Discharge air flow

Mode control knob	Air outlet/distribution		
	Face	Foot	Defroster
	100%	-	-
	60%	40%	-
	-	80%	20%
	-	60%	40%
	-	-	100%

RHA654F

- Confirm that discharge air comes out according to the air distribution table at left.
Refer to "Discharge Air Flow" (HA-26).

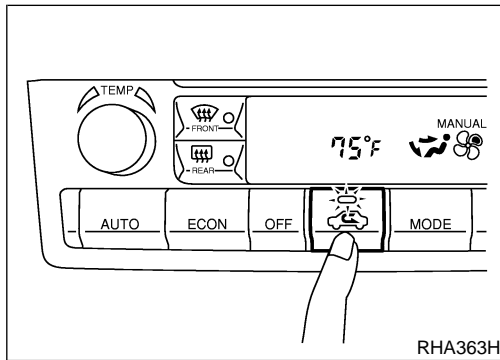
NOTE:

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

Intake door position is checked in the next step.

If NG, go to trouble diagnosis procedure for mode door motor (HA-53).

If OK, continue with next check.



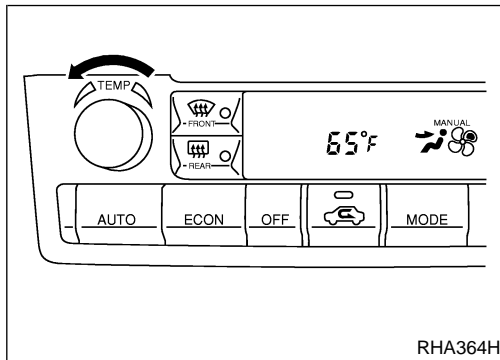
4. Check Recirculation

NHHA0178S0204

- Press REC switch.
Recirculation indicator should illuminate.
- Listen for intake door position change (you should hear blower sound change slightly).

If NG, go to trouble diagnosis procedure for intake door (HA-63).

If OK, continue with next check.



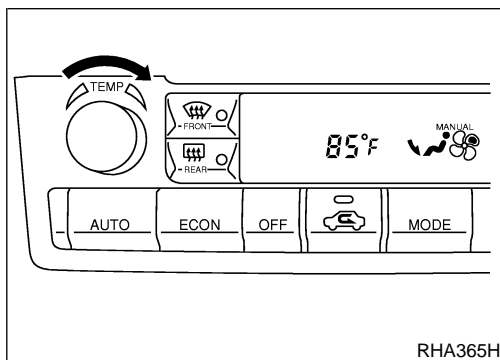
5. Check Temperature Decrease

NHHA0178S0205

- Turn the temperature dial counterclockwise until 18°C (65°F) is displayed.
- Check for cold air at discharge air outlets.

If NG, go to trouble diagnosis procedure for insufficient cooling (HA-81).

If OK, continue with next check.



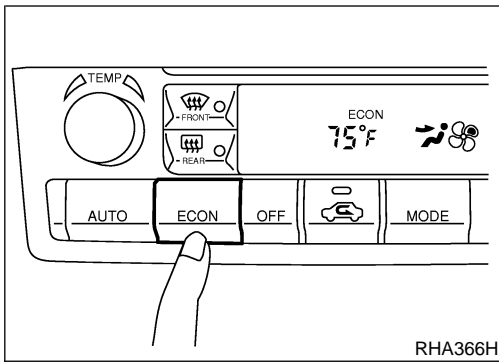
6. Check Temperature Increase

NHHA0178S0206

- Turn the temperature dial clockwise until 32°C (85°F) is displayed.
- Check for hot air at discharge air outlets.

If NG, go to trouble diagnosis procedure for insufficient heating (HA-89).

If OK, continue with next check.



7. Check ECON (Economy) Mode

NHHA0178S0207

1. Set the temperature 75°F or 25°C.
2. Press ECON switch.
3. Display should indicate ECON (no AUTO).
Confirm that the compressor clutch is not engaged (visual inspection).
(Discharge air and blower speed will depend on ambient, in-vehicle and set temperatures.)

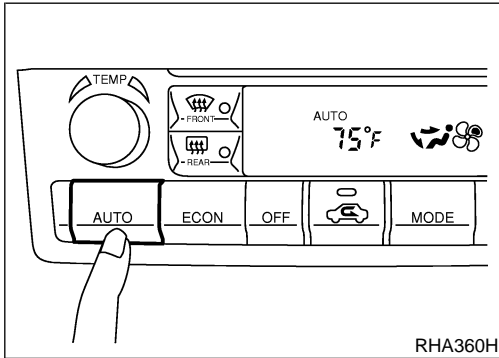
If NG, go to trouble diagnosis procedure for ECON (Economy) mode (HA-93).

If OK, continue with next check.

GI

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8. Check AUTO Mode

NHHA0178S0208

1. Press AUTO switch.
2. Display should indicate AUTO (no ECON).
Confirm that the compressor clutch engages (audio or visual inspection).
(Discharge air and blower speed will depend on ambient, in-vehicle and set temperatures.)

If NG, go to trouble diagnosis procedure for A/C system (HA-50), then if necessary, trouble diagnosis procedure for magnet clutch (HA-75).

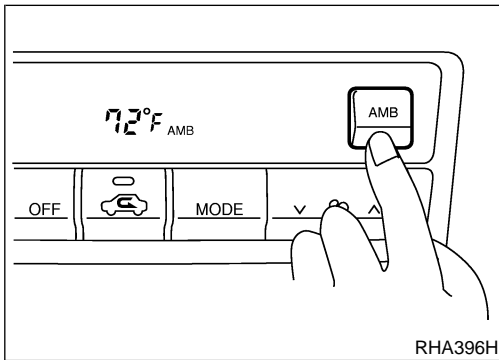
If OK, continue with next check.

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9. Check Ambient Display

NHHA0178S0209

1. Press AMB switch.
2. Display should show the outside (ambient) temperature for approximately 5 seconds.

If all operational check are OK (symptom can not be duplicated), go to "Incident Simulation Tests" (GI section) and perform tests as outlined to simulate driving conditions environment. If symptom appears, refer to "Symptom Table" (HA-46) and perform applicable trouble diagnosis procedures.

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TROUBLE DIAGNOSES

A/C System

A/C System

TROUBLE DIAGNOSIS PROCEDURE FOR A/C SYSTEM

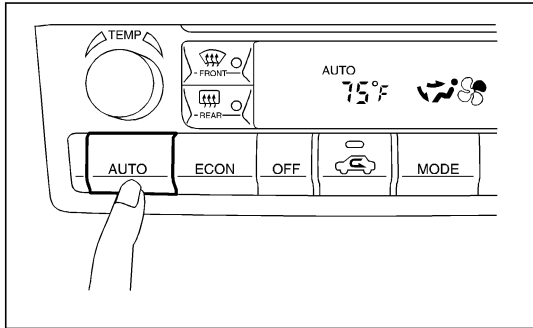
=NHHA0179

SYMPTOM:

- A/C system does not come on.

INSPECTION FLOW

1. Confirm symptom by performing the following operational check.



OPERATIONAL CHECK – AUTO mode

- Press AUTO switch.
- Display should indicate AUTO (not ECON). Confirm that the compressor clutch engages (audio or visual inspection). (Discharge air and blower speed will depend on ambient, in-vehicle, and temperatures switch.)

If OK (symptom cannot be duplicated), perform complete operational check (*2).
If NG (symptom is confirmed), continue with STEP-2 following.

2. Check for any service bulletins.

3. Check Main Power Supply and Ground Circuit. (*1)

OK

Go to A/C System Circuit. (*3)

OK

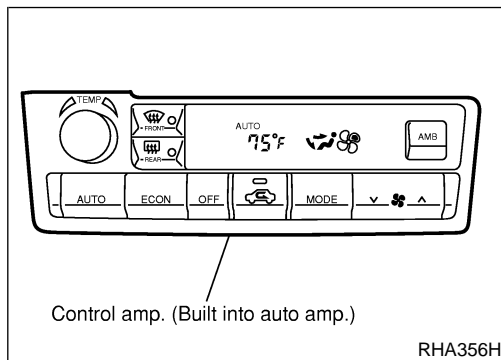
4. Replace auto amp.

RHA367H

*1: HA-51

*2: HA-47

*3: HA-51



COMPONENT DESCRIPTION

NHHA0247

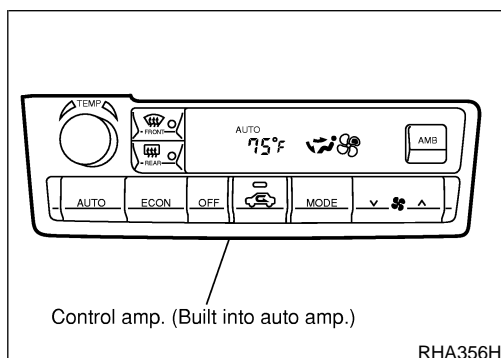
Automatic Amplifier (Auto Amp.)

NHHA0247S01

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

The auto amplifier is unitized with control mechanisms. Signals from various switches and Potentio Temperature Control (PTC) are directly entered into auto amplifier.

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



Potentio Temperature Control (PTC)

NHHA0247S02

The PTC is built into the A/C auto amp. It can be set at an interval of 0.5°C (1.0°F) in the 18°C (65°F) to 32°C (85°F) temperature range by pushing the temperature button. The set temperature is digitally displayed.

MAIN POWER SUPPLY AND GROUND CIRCUIT CHECK

Power Supply Circuit Check

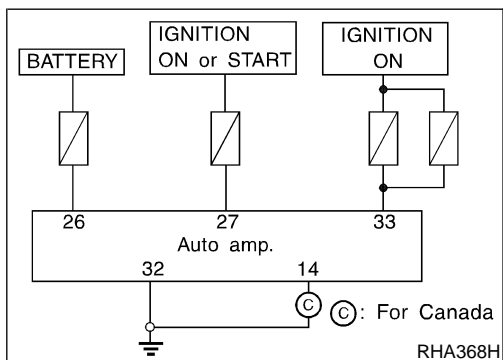
Check power supply circuit for air conditioner system.
Refer to EL-11, "Wiring Diagram — POWER —".

=NHHA0180
NHHA0180S03

GI

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DIAGNOSTIC PROCEDURE

SYMPTOM:

- A/C system does not come on.

NHHA0181

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1	CHECK POWER SUPPLY CIRCUIT FOR AUTO AMP.											
		Measure voltage across terminal Nos. 26, 27, 33 and body ground.										
		<div style="display: flex; align-items: center;"> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th colspan="2">Votmeter terminal</th> <th rowspan="2">Voltage</th> </tr> <tr> <th>(+)</th> <th>(-)</th> </tr> </thead> <tbody> <tr> <td>26</td> <td rowspan="3">Body ground</td> <td rowspan="3">Approx. 12V</td> </tr> <tr> <td>27</td> </tr> <tr> <td>33</td> </tr> </tbody> </table> </div>	Votmeter terminal		Voltage	(+)	(-)	26	Body ground	Approx. 12V	27	33
Votmeter terminal		Voltage										
(+)	(-)											
26	Body ground	Approx. 12V										
27												
33												
		<small>SHA319FA</small>										
OK or NG												
OK	▶	GO TO 2.										
NG	▶	Check auto amp. ground circuit. <ul style="list-style-type: none"> ● Check 10A fuse (No. 12 and 19, located in the fuse block) and 15A fuses (No. 51 and 52, located in the fuse block). ● If fuses are OK, check for open circuit in wiring harness. Repair or replace as necessary. ● If fuses are NG, replace fuse and check wiring harness for short circuit. Repair or replace as necessary. 										

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TROUBLE DIAGNOSES

A/C System (Cont'd)

2	CHECK BODY GROUND CIRCUIT FOR AUTO AMP.										
Does continuity exist between auto amp. Harness terminal Nos. 32, 14 and body ground?											
	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th colspan="2">Votmeter terminal</th> <th rowspan="2">Continuity</th> </tr> <tr> <th>(+)</th> <th>(-)</th> </tr> </thead> <tbody> <tr> <td>32</td> <td rowspan="2">Body ground</td> <td rowspan="2">Yes</td> </tr> <tr> <td>14 (Canada only)</td> </tr> </tbody> </table>		Votmeter terminal		Continuity	(+)	(-)	32	Body ground	Yes	14 (Canada only)
Votmeter terminal		Continuity									
(+)	(-)										
32	Body ground	Yes									
14 (Canada only)											
SHA320F											
Yes or No											
Yes	▶	Replace auto amp. INSPECTION END									
No	▶	Repair or replace harness.									

Mode Door Motor

TRouble DIAGNOSIS PROCEDURE FOR MODE DOOR MOTOR (LAN)

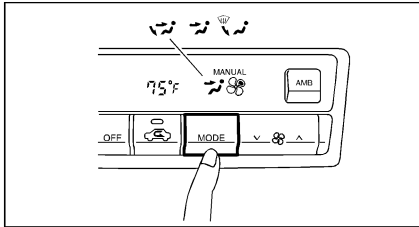
=NHHA0182

SYMPTOM:

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

INSPECTION FLOW

1. Confirm symptom by performing the following operational check.



OPERATIONAL CHECK – Discharge air

- Press mode switch four times and DEF button.
- Each position indicator should change shape.

Discharge air flow

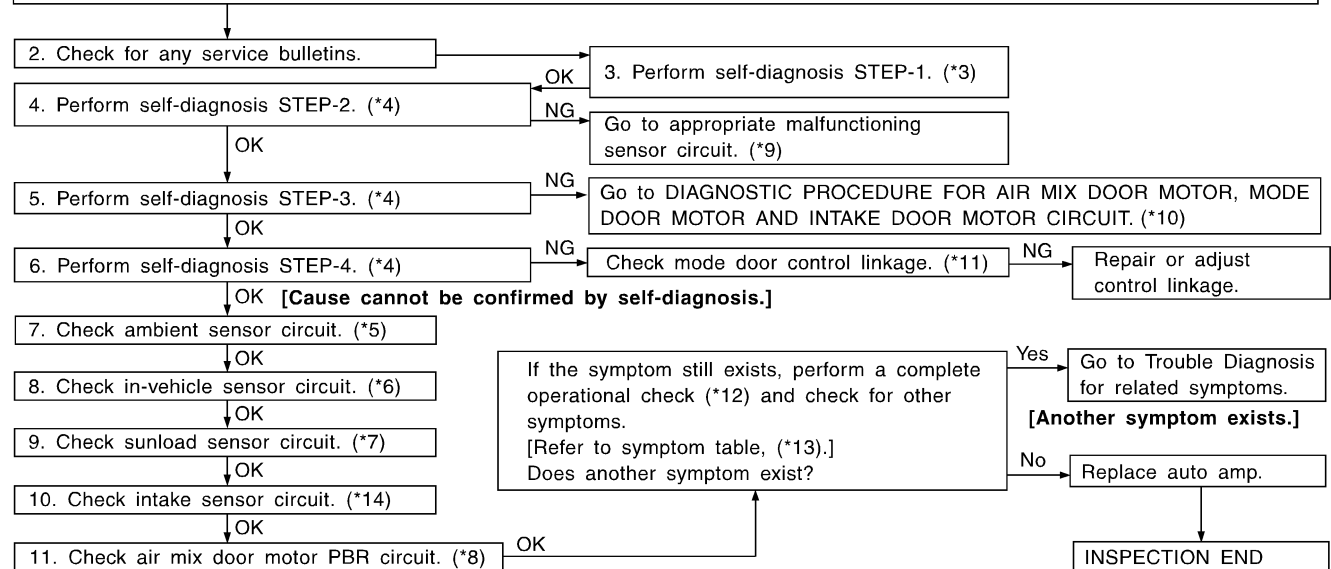
Mode control knob	Air outlet/distribution		
	Face	Foot	Defroster
	100%	–	–
	60%	40%	–
	–	80%	20%
	–	60%	40%
	–	–	100%

c. Confirm that discharge air comes out according to the air distribution table at left.

Refer to “Discharge Air Flow” (*1).

NOTE:

- If OK (symptom cannot be duplicated), perform complete operational check (*2).
- If NG (symptom is confirmed), continue with STEP-2 following.
- Confirm that the compressor clutch is engaged (visual inspection) and intake door position is at FRESH when DEF is selected. Intake door position is checked in the next step.



*1: HA-26
 *2: HA-47
 *3: HA-36
 *4: HA-37
 *5: HA-93
 *6: HA-97

*7: HA-100
 *8: HA-106
 *9: FUNCTION CONFIRMATION PROCEDURE (HA-37), see No. 13.
 *10: HA-55

*11: HA-58
 *12: HA-47
 *13: HA-46
 *14: HA-104

RHA370H

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TROUBLE DIAGNOSES

Mode Door Motor (Cont'd)

SYSTEM DESCRIPTION

Component Parts

=NHHA0183

NHHA0183S01

Mode door control system components are:

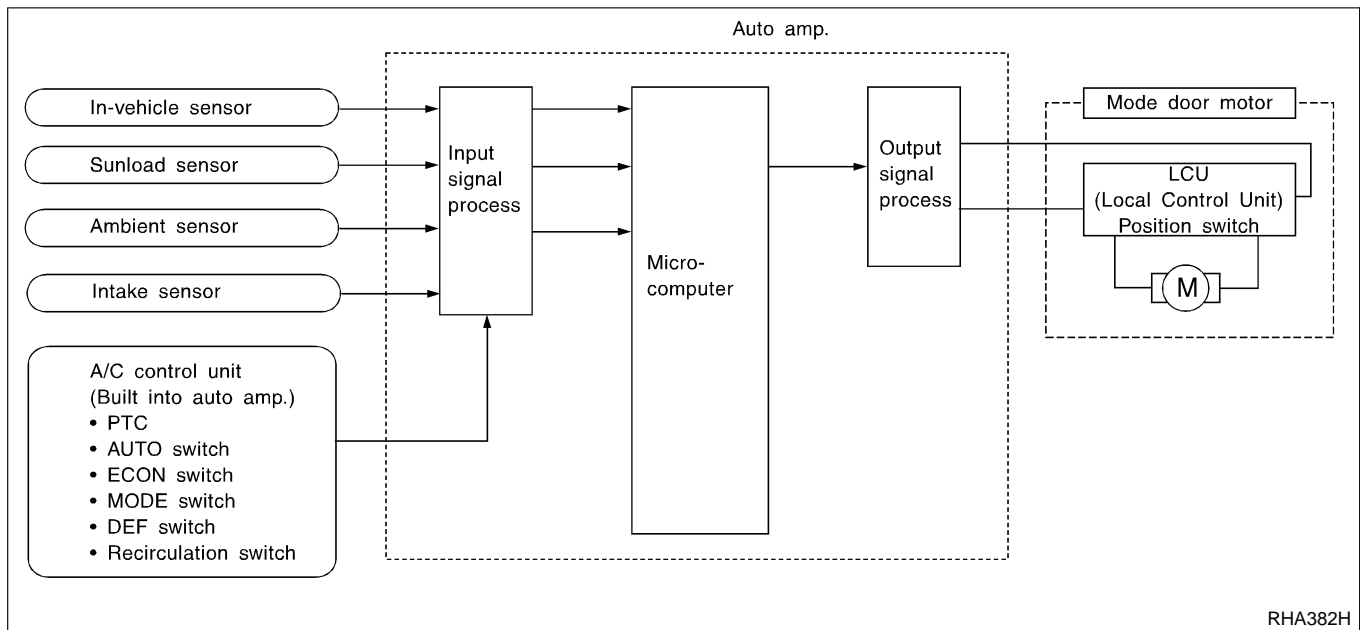
- 1) Auto amp.
- 2) Mode door motor (LCU)
- 3) In-vehicle sensor
- 4) Ambient sensor
- 5) Sunload sensor
- 6) Intake sensor

System Operation

NHHA0183S02

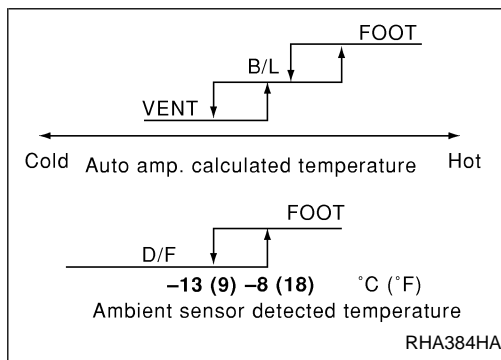
The auto amplifier receives data from each of the sensors. The amplifier sends air mix door, mode door and intake door opening angle data to the air mix door motor LCU, mode door motor LCU and intake door motor LCU.

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



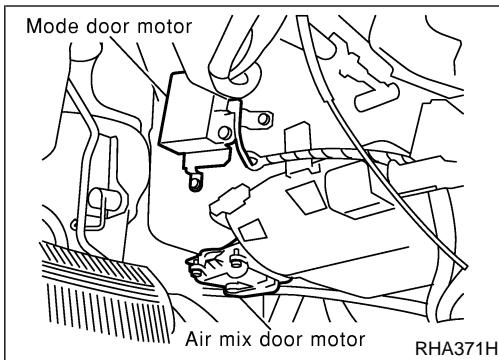
Mode Door Control Specification

NHHA0183S03



TROUBLE DIAGNOSES

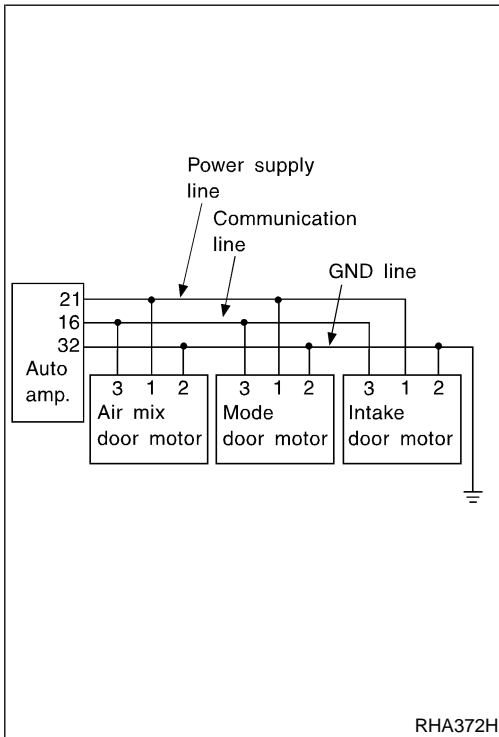
Mode Door Motor (Cont'd)



COMPONENT DESCRIPTION

The mode door motor is attached to the heater unit. It rotates so that air is discharged from the outlet set by the auto amplifier. Motor rotation is conveyed to a link which activates the mode door. NHHA0184

GI
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DIAGNOSTIC PROCEDURE FOR AIR MIX DOOR MOTOR, MODE DOOR MOTOR AND INTAKE DOOR MOTOR CIRCUIT

SYMPTOM: Air mix door motor, mode door motor and/or intake door motor does not operate normally. NHHA0185

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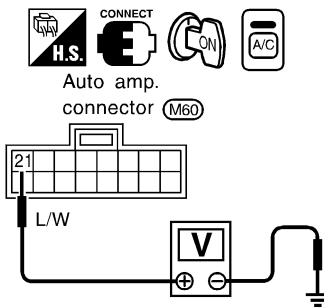
SC

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1 CHECK POWER SUPPLY FOR AUTO AMP. (LCU) SIDE

Do approx. 12 volts exist between auto amp. (LCU) harness terminal No. 21 and body ground?



NOTE:

If the result is NG or No after checking circuit continuity, repair harness or connector.

Yes or No

Yes ► GO TO 2.

No ► Replace auto amp. (LCU).

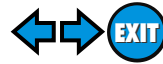
TROUBLE DIAGNOSES

Mode Door Motor (Cont'd)

2	CHECK SIGNAL FOR AUTO AMP. (LCU) SIDE						
<p>Do approx. 5.5 volts exist between auto amp. (LCU) terminal No. 16 and body ground?</p> <div style="text-align: center;"> <p>Auto amp. connector (M59)</p> </div> <p style="text-align: right;">RHA374H</p> <p>NOTE: If the result is NG or No after checking circuit continuity, repair harness or connector.</p> <p style="text-align: center;">Yes or No</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Yes</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 3.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>Replace auto amp. (LCU).</td> </tr> </table>		Yes	▶	GO TO 3.	No	▶	Replace auto amp. (LCU).
Yes	▶	GO TO 3.					
No	▶	Replace auto amp. (LCU).					

3	CHECK POWER SUPPLY FOR MOTOR SIDE						
<p>Do approx. 12 volts exist between door motor (LCU) harness terminal No. 1 and body ground?</p> <div style="text-align: center;"> <p>Mode door motor connector (M49) or air mix door motor connector (M51) Intake door motor connector (M84)</p> </div> <p style="text-align: right;">RHA375H</p> <p style="text-align: center;">Yes or No</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Yes</td> <td style="width: 5%; text-align: center;">▶</td> <td>GO TO 4.</td> </tr> <tr> <td>No</td> <td style="text-align: center;">▶</td> <td>Repair harness or connector.</td> </tr> </table>		Yes	▶	GO TO 4.	No	▶	Repair harness or connector.
Yes	▶	GO TO 4.					
No	▶	Repair harness or connector.					

TROUBLE DIAGNOSES



Mode Door Motor (Cont'd)

4	CHECK SIGNAL FOR MOTOR SIDE	
Do approx. 5.5 volts exist between door motor (LCU) terminal No. 3 and body ground?		
<p>Mode door motor connector (M49) or air mix door motor connector (M51) Intake door motor (M84)</p>		
RHA376HA		
Yes or No		
Yes	▶	GO TO 5.
No	▶	Repair harness or connector.

GI

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5	CHECK MOTOR GROUND CIRCUIT	
Does continuity exist between door motor (LCU) harness terminal No. 2 and body ground?		
<p>Mode door motor connector (M49) or air mix door motor connector (M51) Intake door motor (M84)</p>		
RHA377H		
Yes or No		
Yes	▶	GO TO 6.
No	▶	Repair harness or connector.

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6	CHECK MOTOR OPERATION	
Disconnect and reconnect the motor connector and confirm the motor operation.		
OK or NG		
OK (Return to operate normally.)	▶	Poor contacting the motor connector
NG (Does not operate normally.)	▶	GO TO 7.

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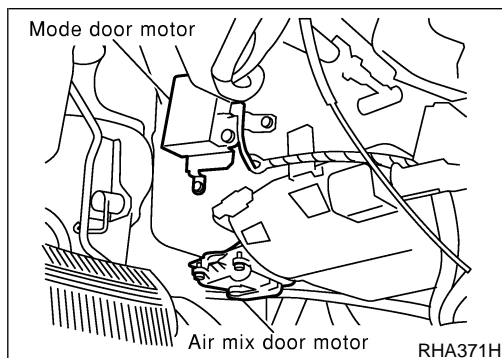
TROUBLE DIAGNOSES

Mode Door Motor (Cont'd)

7	CHECK MODE DOOR MOTOR AND AIR MIX DOOR MOTOR OPERATION	
1. Disconnect the intake door motor connector. 2. Reconnect the mode door motor and air mix door motor connector and confirm the mode door motor and air mix door motor operation.		
OK or NG		
OK (Mode door motor and air mix door motor operate normally.)	▶	Replace the intake door motor.
NG (Mode door motor and air mix door motor do not operate normally.)	▶	GO TO 8.

8	CHECK AIR MIX DOOR MOTOR AND INTAKE DOOR MOTOR OPERATION	
1. Disconnect the mode door motor connector. 2. Reconnect the intake door motor and confirm the air mix door motor and intake door motor operation.		
OK or NG		
OK (Air mix door motor and intake door motor operate normally.)	▶	Replace mode door motor.
NG (Air mix door motor and intake door motor do not operate normally.)	▶	GO TO 9.

9	CHECK INTAKE DOOR MOTOR AND MODE DOOR MOTOR OPERATION	
1. Disconnect the air mix door motor connector. 2. Reconnect the mode door motor and confirm the intake door motor and mode door motor operation.		
OK or NG		
OK (Intake door motor and mode door motor operate normally.)	▶	Replace air mix door motor.
NG (Intake door motor and mode door motor do not operate normally.)	▶	Replace auto amp.



CONTROL LINKAGE ADJUSTMENT

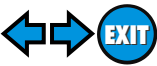
Mode Door

NHHA0186

NHHA0186S01

1. Install mode door motor on heater unit and connect it to main harness.
2. Set up code No. in Self-diagnosis STEP 4. Refer to HA-37.
3. Move side link by hand and hold mode door in DEF mode.
4. Attach mode door motor rod to side link rod holder.
5. Make sure mode door operates properly when changing from code No. 44 to 45 by pushing DEF switch.

TROUBLE DIAGNOSES



Mode Door Motor (Cont'd)

41	42	43	44	45	46
VENT	B/L	B/L	FOOT	D/F	DEF

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TROUBLE DIAGNOSES

Air Mix Door Motor

Air Mix Door Motor

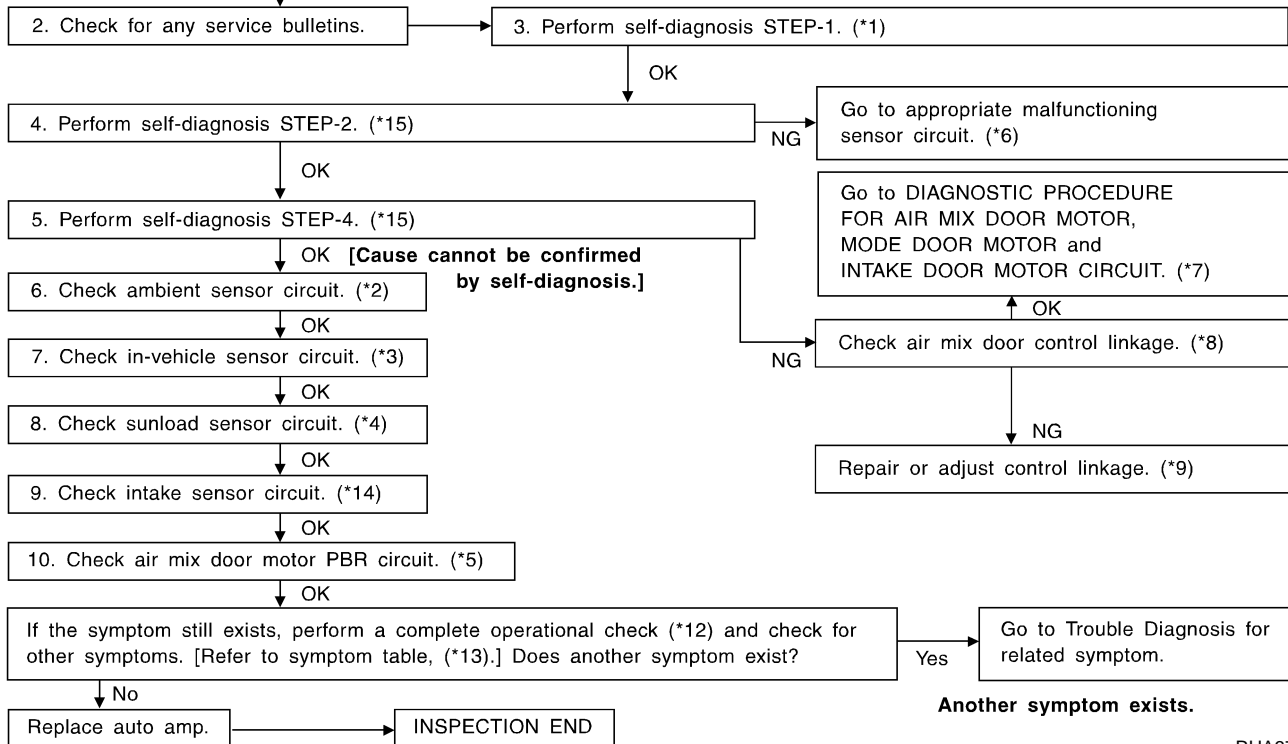
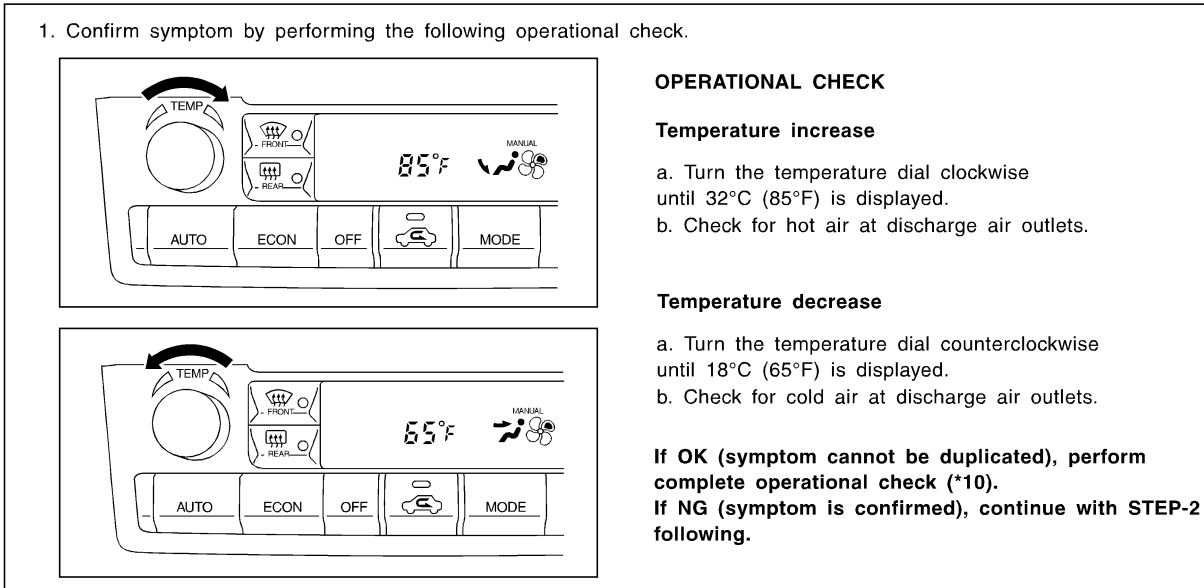
TROUBLE DIAGNOSIS PROCEDURE FOR AIR MIX DOOR (LAN)

=NHHA0187

SYMPTOM:

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

INSPECTION FLOW



*1: HA-36

*2: HA-93

*3: HA-97

*4: HA-100

*5: HA-106

*6: FUNCTION CONFIRMATION PROCEDURE (HA-37), see No. 13.

*7: HA-55

*8: HA-62

*9: HA-62

*10: HA-47

*12: HA-47

*13: HA-46

*14: HA-104

*15: HA-37

Another symptom exists.

RHA378H

SYSTEM DESCRIPTION

Component Parts

=NHHA0188

NHHA0188S01

Air mix door control system components are:

- 1) Auto amp.
- 2) Air mix door motor (LCU)
- 3) In-vehicle sensor
- 4) Ambient sensor
- 5) Sunload sensor
- 6) Intake sensor

GI

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System Operation

NHHA0188S02

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

LC

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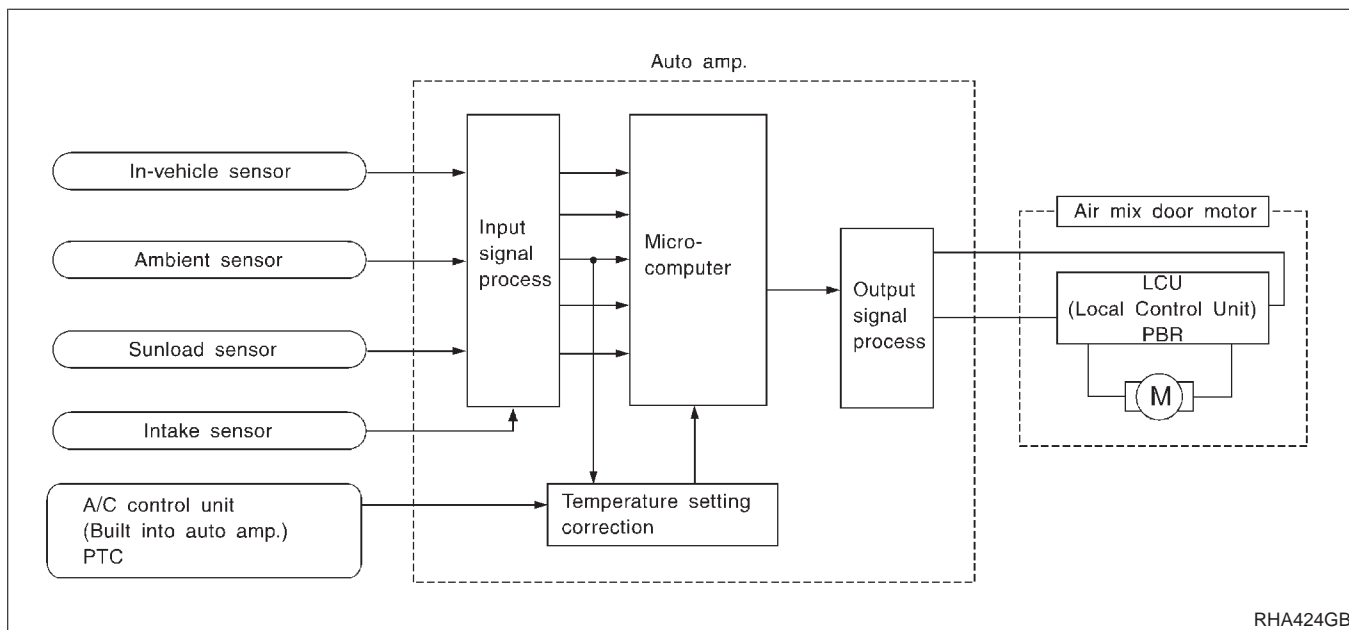
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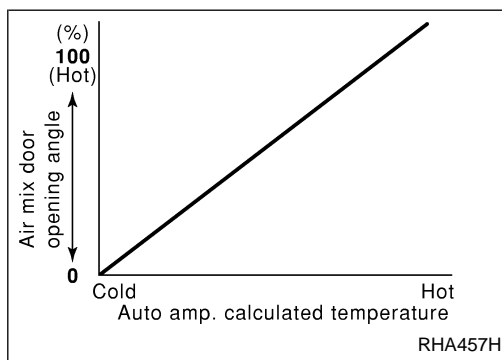
BT



RHA424GB

Air Mix Door Control Specification

NHHA0188S03



RHA457H

HA

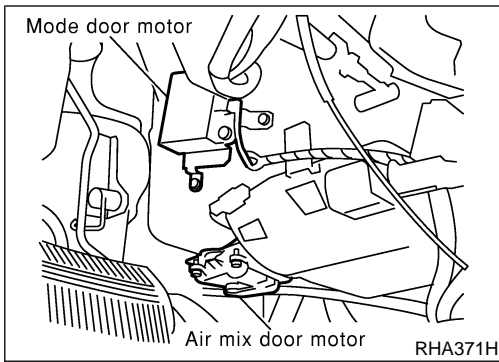
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TROUBLE DIAGNOSES

Air Mix Door Motor (Cont'd)



COMPONENT DESCRIPTION

NHHA0189

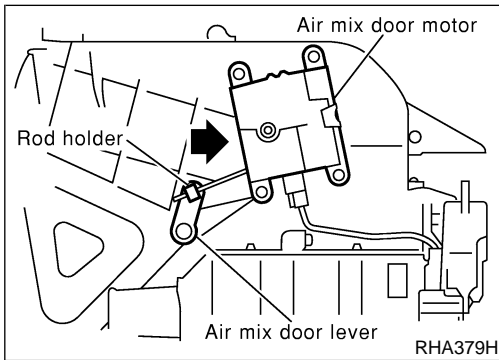
The air mix door motor is attached to the heater unit. It rotates so that the air mix door is opened or closed to a position set by the auto amplifier. Motor rotation is then conveyed through a shaft and the air mix door position is then fed back to the auto amplifier by PBR built-in air mix door motor.

DIAGNOSTIC PROCEDURE

NHHA0248

SYMPTOM: Discharge air temperature does not change.

- Refer to HA-55.



CONTROL LINKAGE ADJUSTMENT

NHHA0190

Air Mix Door

NHHA0190S01

1. Install air mix door motor on heater unit and connect it to main harness.
2. Set up code No. 41 in Self-diagnosis STEP 4. Refer to HA-36.
3. Move air mix door lever by hand and hold it in full cold position.
4. Attach air mix door lever to rod holder.
5. Make sure air mix door operates properly when changing from code No. 41 to 46 by pushing DEF switch.

41	42	43	44	45	46
Full cold			Full hot		

Intake Door Motor

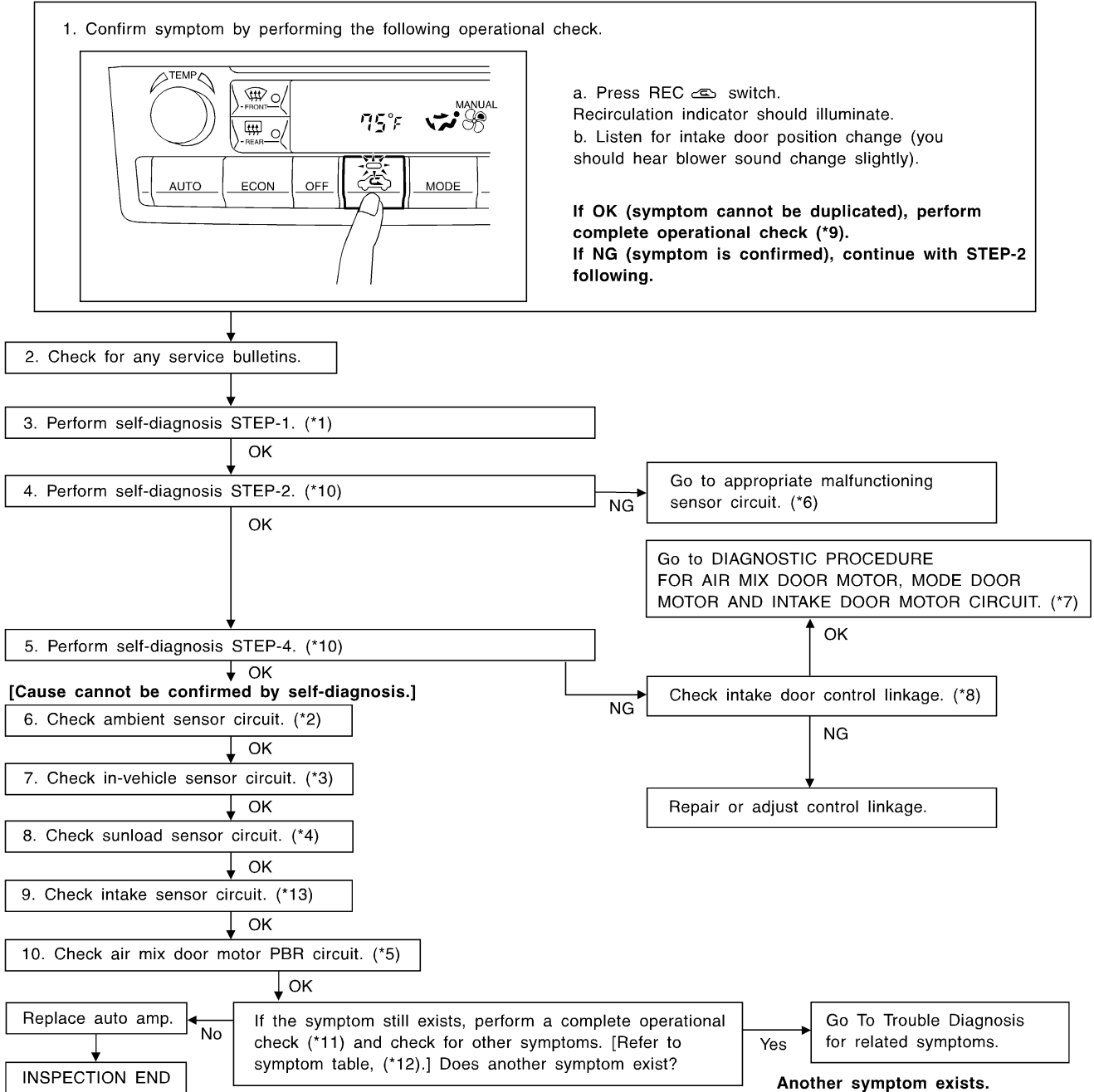
TROUBLE DIAGNOSIS PROCEDURE FOR INTAKE DOOR (LAN)

=NHHA0191

SYMPTOM:

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

INSPECTION FLOW



*1: HA-36
 *2: HA-93
 *3: HA-97
 *4: HA-100
 *5: HA-106

*6: FUNCTION CONFIRMATION PROCEDURE (HA-37), see No. 13.
 *7: HA-65
 *8: HA-65

*9: HA-47
 *10: HA-37
 *11: HA-47
 *12: HA-46
 *13: HA-104

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TROUBLE DIAGNOSES

Intake Door Motor (Cont'd)

SYSTEM DESCRIPTION

Component Parts

=NHHA0192

Intake door control system components are:

NHHA0192S01

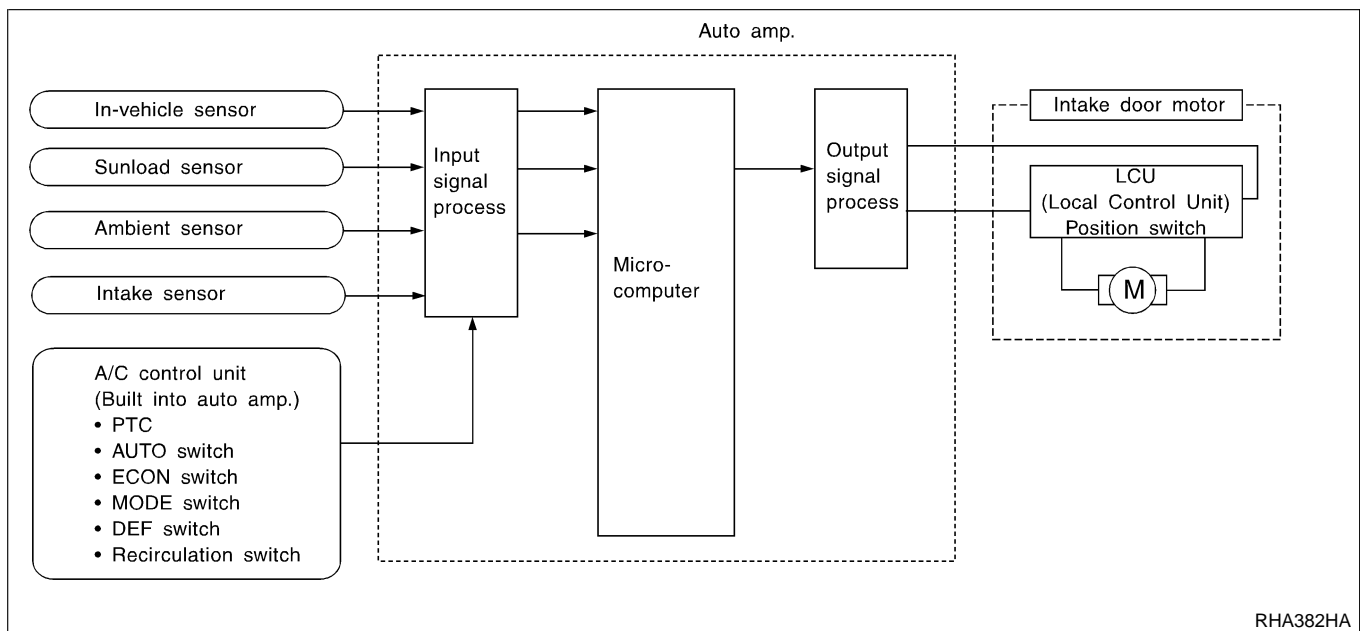
- 1) Auto amp.
- 2) Intake door motor
- 3) In-vehicle sensor
- 4) Ambient sensor
- 5) Sunload sensor
- 6) Intake sensor

System Operation

NHHA0192S02

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

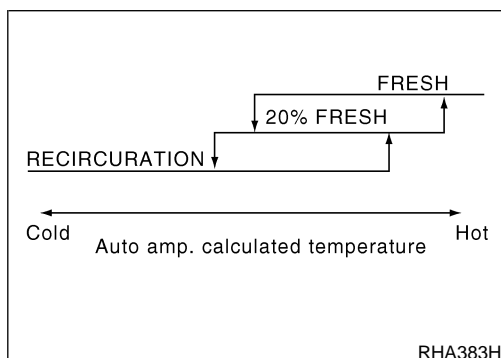
The air mix door motor, mode door motor and intake door motor read their respective signals according to the address signal. Opening angle indication signals received from the auto amplifier and each of the motor position sensors are compared by the LCUs in each motor with the existing decision and opening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



RHA382HA

Intake Door Control Specification

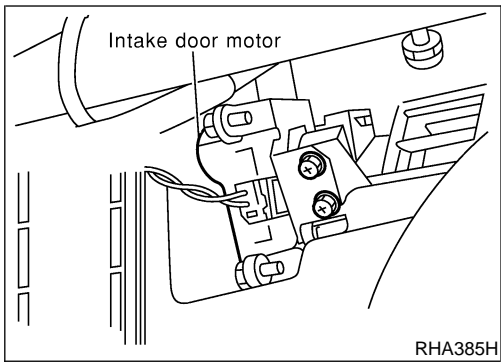
NHHA0192S03



RHA383H

TROUBLE DIAGNOSES

Intake Door Motor (Cont'd)



COMPONENT DESCRIPTION

The intake door motor is attached to the intake unit. It rotates so that air is drawn from inlets set by the auto amplifier. Motor rotation is conveyed to a lever which activates the intake door. NHHA0193

GI

MA

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DIAGNOSTIC PROCEDURE

SYMPTOM: Intake door motor does not operate normally. NHHA0194

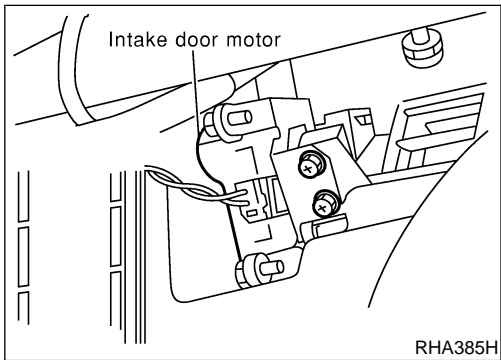
- Refer to HA-55.

LC

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CONTROL LINKAGE ADJUSTMENT

Intake Door

1. Install intake door motor on intake unit and connect it to main harness. NHHA0195
2. Set up code No. 41 in Self-diagnosis STEP 4. Refer to HA-37. NHHA0195S01
3. Make sure intake door operates properly when changing from code No. 41 to 46 by pushing DEF switch.

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41	42	43	44	45	46
REC	20% FRE	FRE			

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TROUBLE DIAGNOSES

Blower Motor

Blower Motor

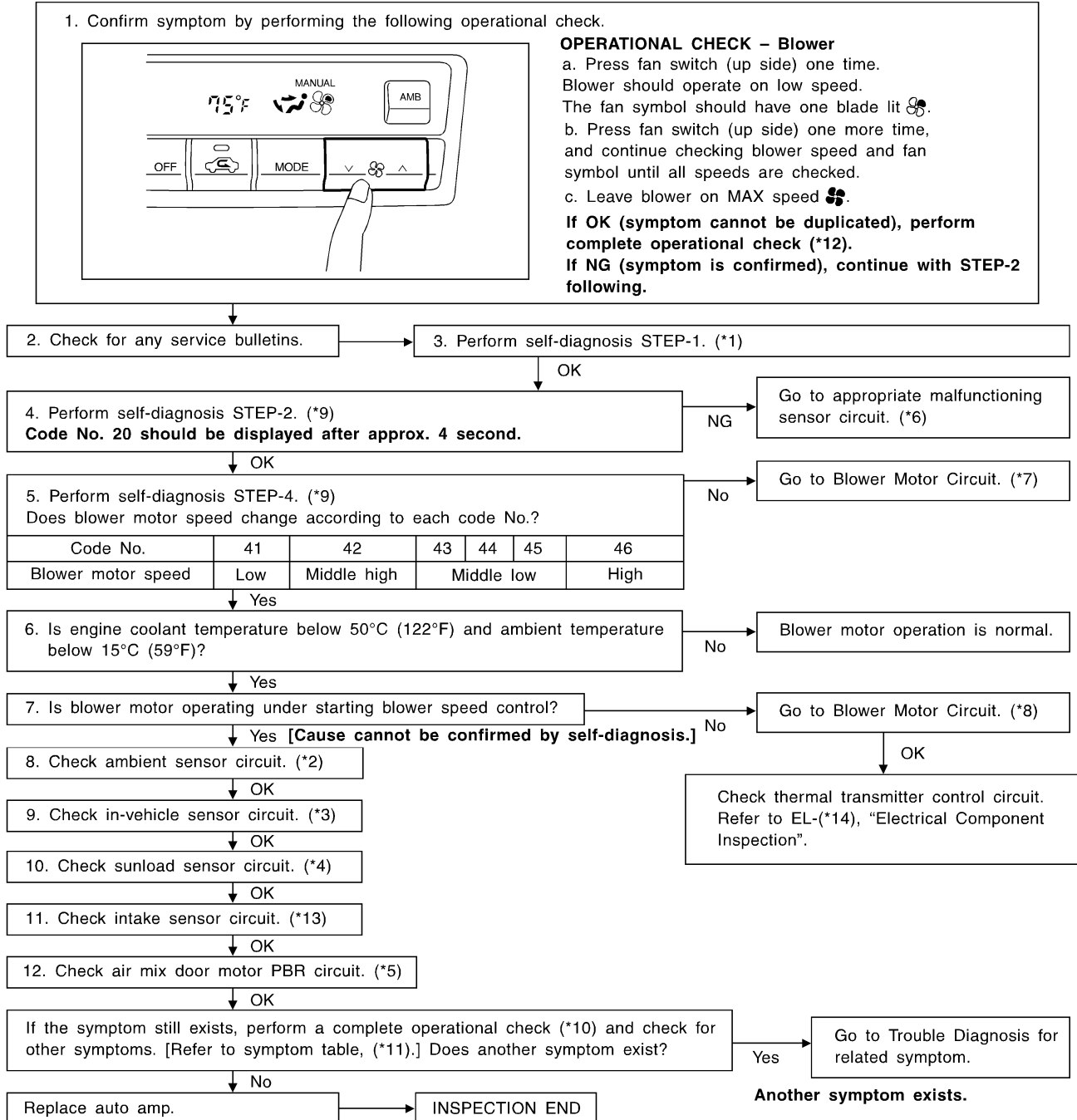
TROUBLE DIAGNOSIS PROCEDURE FOR BLOWER MOTOR

=NHHA0196

SYMPTOM:

- Blower motor operation is malfunctioning.
- Blower motor operation is malfunctioning under out of starting fan speed control.

INSPECTION FLOW



*1: HA-36

*2: HA-93

*3: HA-97

*4: HA-100

*5: HA-106

*6: FUNCTION CONFIRMATION PROCEDURE (HA-37), see No. 13.

*7: HA-69

*8: HA-69

*9: HA-37

*10: HA-47

*11: HA-46

*12: HA-47

*13: HA-104

*14: EL-157

RHA387H

SYSTEM DESCRIPTION

Component parts

=NHHA0197

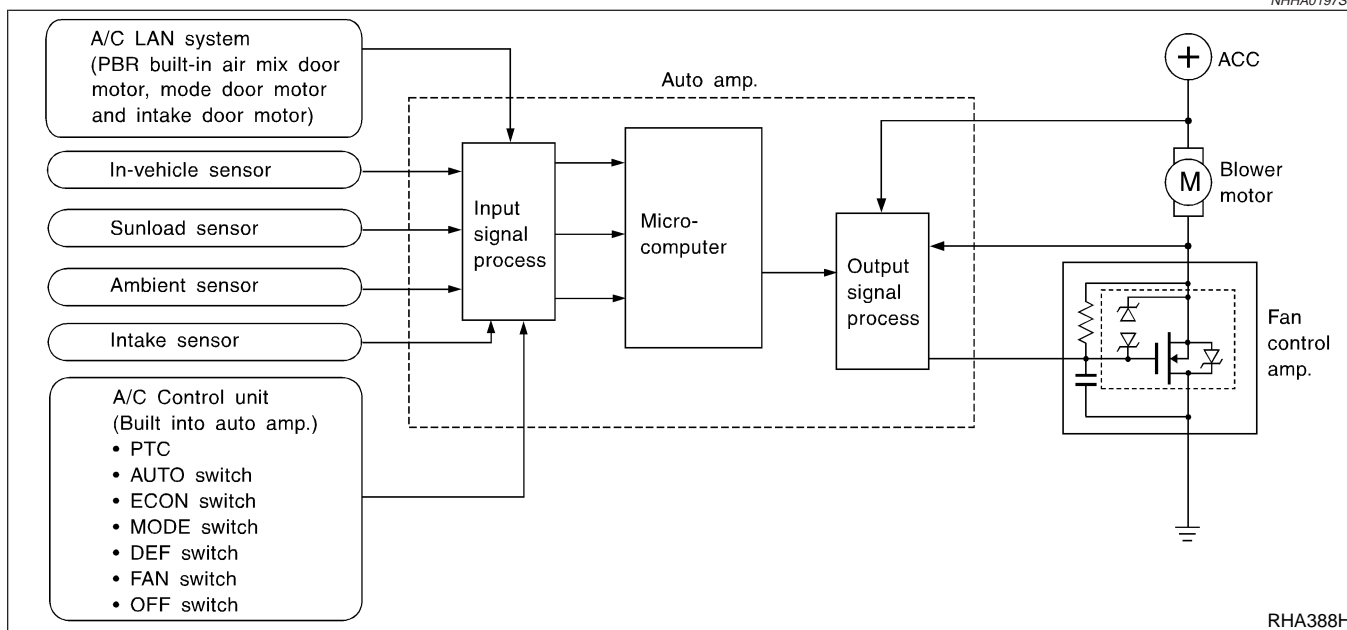
NHHA0197S01

Fan speed control system components are:

- 1) Auto amp.
- 2) Fan control amp.
- 3) A/C LAN system (PBR built-in air mix door motor, mode door motor and intake door motor)
- 4) In-vehicle sensor
- 5) Ambient sensor
- 6) Sunload sensor
- 7) Intake sensor

System Operation

NHHA0197S02



Automatic Mode

NHHA0197S03

In the automatic mode, the blower motor speed is calculated by the automatic amplifier based on inputs from the PBR, in-vehicle sensor, sunload sensor, intake sensor and ambient sensor. The blower motor applied voltage ranges from approximately 5 volts (lowest speed) to 12 volts (highest speed).

The control blower speed (in the range of 5 to 12V), the automatic amplifier supplies a gate voltage to the fan control amplifier. Based on this voltage, the fan control amplifier controls the voltage supplied to the blower motor.

Starting Fan Speed Control

Start Up From "COLD SOAK" Condition (Automatic mode)

NHHA0197S04

NHHA0197S0401

In a cold start up condition where the engine coolant temperature is below 50°C (122°F), the blower will not operate for a short period of time (up to 126 seconds). The exact start delay time varies depending on the ambient and engine coolant temperature.

In the most extreme case (very low ambient) the blower starting delay will be 126 seconds as described above. After this delay, the blower will operate at low speed until the engine coolant temperature rises above 55°C (131°F), at which time the blower speed will increase to the objective speed.

TROUBLE DIAGNOSES

Blower Motor (Cont'd)

Start Up From Normal or "HOT SOAK" Condition (Automatic mode)

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

NHHA0197S0402

Blower Speed Compensation

Sunload

When the in-vehicle temperature and the set temperature are very close, the blower will be operating at low speed. The low speed will vary depending on the sunload. During conditions of high sunload, the blower low speed is "normal" low speed (approx. 6V). During low or no sunload conditions, the low speed will drop to "low" low speed (approx. 5V).

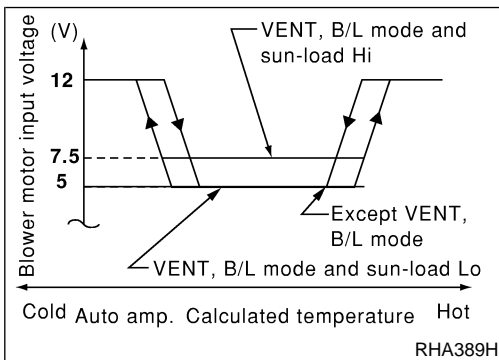
NHHA0197S05

NHHA0197S0501

Ambient

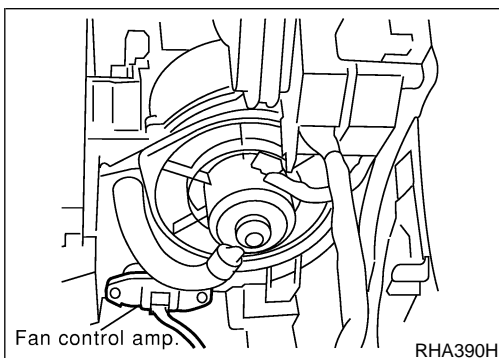
When the ambient temperature is in the "moderate" range [10 - 15°C (50 - 59°F)], the computed blower voltage will be compensated (reduced) by up to 3.5V (depending on the blower speed). In the "extreme" ambient ranges [below 0°C (32°F) and above 20°C (68°F)] the computed objective blower voltage is not compensated at all. In the ambient temperature ranges between "moderate" and "extreme" [0 - 10°C (32 - 50°F) and 15 - 20°C (59 - 68°F)], the amount of compensation (for a given blower speed) varies depending on the ambient temperature.

NHHA0197S0502



Fan Speed Control Specification

NHHA0197S06



COMPONENT DESCRIPTION

Fan Control Amplifier

The fan control amplifier is located on the cooling unit. The fan control amp. receives a gate voltage from the auto amp. to steplessly maintain the blower fan motor voltage in the 5 to 12 volt range (approx.).

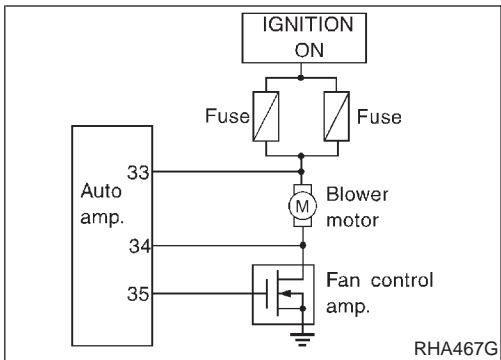
NHHA0198

NHHA0198S01

TROUBLE DIAGNOSES

Blower Motor (Cont'd)

NHHA0199



DIAGNOSTIC PROCEDURE

SYMPTOM: Blower motor operation is malfunctioning under Starting Fan Speed Control.

1	CHECK POWER SUPPLY FOR FAN CONTROL AMP.	
<p>Disconnect fan control amp. harness connector. Do approx. 12 volts exist between fan control amp. harness terminal No. 1 and body ground?</p>		
RHA392H		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 8.

2	CHECK BODY GROUND CIRCUIT FOR FAN CONTROL AMP.	
<p>Does continuity exist between fan control amp. harness terminal No. 3 and body ground?</p>		
RHA393H		
Yes or No		
Yes	▶	Reconnect fan control amp. harness connector. And GO TO 3.
No	▶	Repair harness or connector.

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TROUBLE DIAGNOSES

Blower Motor (Cont'd)

3	CHECK VOLTAGE FOR FAN CONTROL AMP.	
<p>Set up Self-diagnosis STEP 4. Measure voltage across fan control amp. harness terminal No. 2 and body ground.</p>		
RHA786H		
OK or NG		
OK	▶	GO TO 5.
NG	▶	<ul style="list-style-type: none"> ● The result is less than 2.5V: Replace fan control amp. ● The result is more than 3.0V: GO TO 4.

4	CHECK FAN CONTROL AMP.	
Refer to HA-74.		
OK or NG		
OK	▶	GO TO 5.
NG	▶	<ol style="list-style-type: none"> 1. Replace fan control amp. 2. Go to "FUNCTION CONFIRMATION PROCEDURE", HA-37 and perform self-diagnosis STEP-4. Confirm that blower motor operation is normal.

5	CHECK FAN CONTROL AMP. CIRCUIT BETWEEN FAN CONTROL AMP. AND AUTO AMP. (LCU)
<p>1. Disconnect auto amp. (LCU) and fan control amp. harness connector. 2. Check circuit continuity between auto amp. (LCU) harness terminal No. 35 and fan control amp. harness terminal No. 2.</p>	
SHA375F	
<p>Continuity should exist. If OK, check harness for short.</p> <p style="text-align: center;">OK or NG</p>	
OK	▶ GO TO 6.
NG	▶ Repair harness or connector.

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6	CHECK FAN FEED BACK CIRCUIT
<p>Reconnect auto amp. (LCU) harness connector. Do approx. 12 volts exist between auto amp. (LCU) harness terminal No. 33 and body ground?</p>	
SHA371F	
Yes or No	
Yes	▶ GO TO 7.
No	<p>▶ Check power supply circuit and 15A fuses (No. 51 and 52, located in the fuse block). Refer to EL-11, "Wiring Diagram — POWER —".</p> <ul style="list-style-type: none"> ● If OK, check for open circuit in wiring harness. Repair or replace as necessary. ● If NG, replace fuse and check wiring harness for short circuit. Repair or replace as necessary.

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TROUBLE DIAGNOSES

Blower Motor (Cont'd)

7	CHECK POWER SUPPLY FOR AUTO AMP.	
<p>Do approx. 12 volts exist between auto amp. harness terminal No. 34 and body ground?</p> <div style="text-align: center;"> </div> <p style="text-align: right;">SHA370F</p> <p style="text-align: center;">Yes or No</p>		
Yes	▶	<ol style="list-style-type: none"> 1. Replace auto amp. 2. Go to "FUNCTION CONFIRMATION PROCEDURE", "Self-diagnosis", HA-37 and perform self-diagnosis STEP-4. Confirm that blower motor operation is normal.
No	▶	GO TO 10.

8	CHECK POWER SUPPLY FOR BLOWER MOTOR	
<p>Disconnect blower motor harness connector.</p> <p>Do approx. 12 volts exist between blower motor harness terminal No. 1 and body ground?</p> <div style="text-align: center;"> </div> <p style="text-align: right;">RHA091GE</p> <p style="text-align: center;">Yes or No</p>		
Yes	▶	GO TO 9.
No	▶	<p>Check power supply circuit and 15A fuses (No. 51 and 52, located in the fuse block).</p> <ul style="list-style-type: none"> ● Check blower motor relay. ● If OK, check for open circuit in wiring harness. Repair or replace as necessary. ● If NG, replace fuse and check wiring harness for short circuit. Repair or replace as necessary.

9	CHECK CIRCUIT CONTINUITY BETWEEN BLOWER MOTOR AND FAN CONTROL AMP.	
<p>Disconnect blower motor connector and auto amp. (LCU) connector. Check circuit continuity between blower motor harness terminal No. 2 and fan control amp. harness terminal No. 1.</p>		
RHA397H		
OK or NG		
OK	▶	<p>Check blower motor. (Refer to HA-74.)</p> <ol style="list-style-type: none"> 1. If NG, replace blower motor. 2. Go to "FUNCTION CONFIRMATION PROCEDURE", "Self-diagnosis", HA-37 and perform self-diagnosis STEP-4. Confirm that blower motor operation is normal.
NG	▶	Repair harness or connector.

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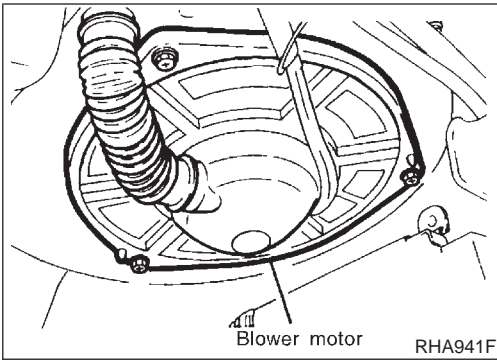
10	CHECK BLOWER MOTOR CIRCUIT BETWEEN BLOWER MOTOR AND AUTO AMP. (LCU)	
<p>Check circuit continuity between blower motor harness terminal No. 2 and auto amp. (LCU) harness terminal No. 34.</p>		
SHA372F		
OK or NG		
Continuity should exist.		
OK	▶	Check harness for short.
NG	▶	Repair harness or connector.

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TROUBLE DIAGNOSES

Blower Motor (Cont'd)



COMPONENT INSPECTION

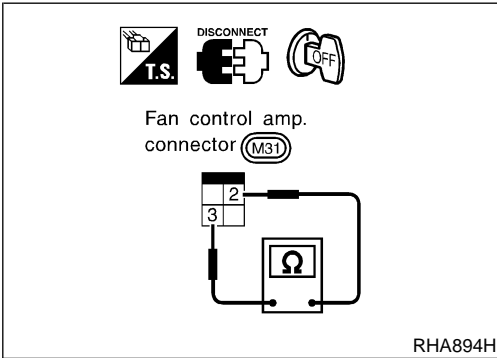
Blower Motor

NHHA0200

NHHA0200S01

Confirm smooth rotation of the blower motor.

- Ensure that there are no foreign particles inside the intake unit.



RHA894H

Fan Control Amp.

NHHA0200S02

Check continuity between terminals.

Terminal Nos.	Continuity
2 - 3	Yes

Magnet Clutch

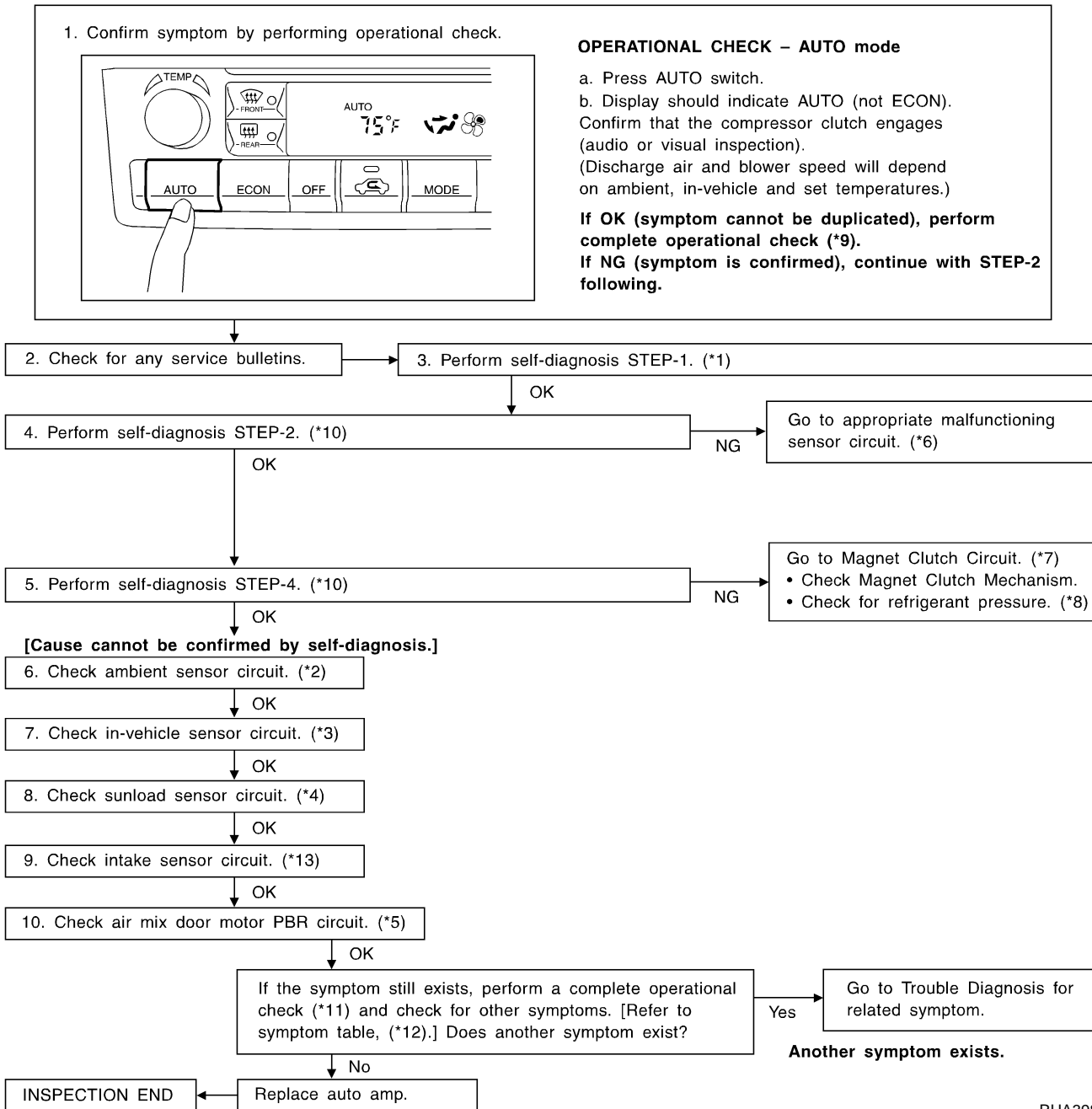
TROUBLE DIAGNOSIS PROCEDURE FOR MAGNET CLUTCH

=NHHA0201

SYMPTOM:

- Magnet clutch does not engage.

INSPECTION FLOW



*1: FUNCTION CONFIRMATION PROCEDURE (HA-37)
 *2: HA-93
 *3: HA-97
 *4: HA-100
 *5: HA-106

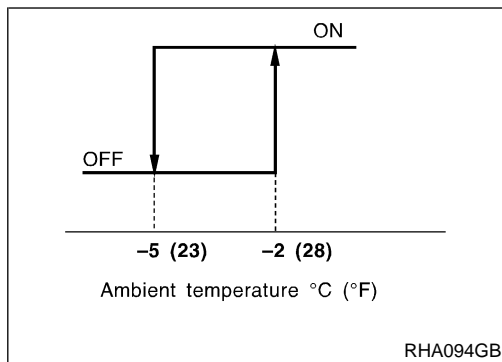
*6: FUNCTION CONFIRMATION PROCEDURE (HA-37), see No. 13.
 *7: HA-76
 *8: HA-84
 *9: HA-47

*10: HA-37
 *11: HA-47
 *12: HA-46
 *13: HA-104

RHA398H

TROUBLE DIAGNOSES

Magnet Clutch (Cont'd)

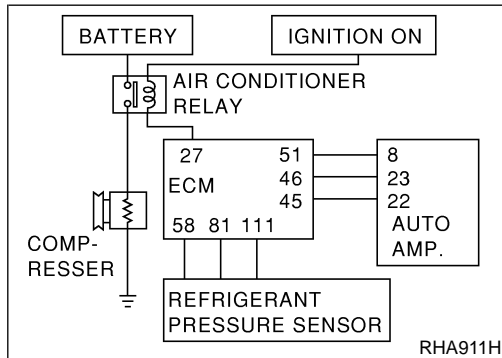


SYSTEM DESCRIPTION

Auto amplifier controls compressor operation by ambient temperature and signal from ECM. =NHHA0202

Low Temperature Protection Control

Auto amplifier will turn the compressor "ON" or "OFF" as determined by a signal detected by ambient sensor. NHHA0202S01
 When ambient temperatures are greater than -2°C (28°F), the compressor turns "ON". The compressor turns "OFF" when ambient temperatures are less than -5°C (23°F).

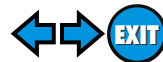


DIAGNOSTIC PROCEDURE

SYMPTOM: Magnet clutch does not engage when AUTO switch is ON. NHHA0203

1	CHECK POWER SUPPLY FOR COMPRESSOR
<p>Disconnect compressor harness connector. Do approx. 12 volts exist between compressor harness terminal No. 1 and body ground?</p> <div style="text-align: center;"> <p>Compressor connector (A3)</p> </div> <p style="text-align: right;">RHA096GC</p> <p style="text-align: center;">Yes or No</p>	
Yes	<p>► Check magnet clutch coil.</p> <ol style="list-style-type: none"> If NG, replace magnet clutch. Refer to HA-112. Go to "FUNCTION CONFIRMATION PROCEDURE", "Self-diagnosis", HA-37 and perform self-diagnosis STEP-4. Confirm that magnet clutch operation is normal.
No	<p>► Disconnect A/C relay. And GO TO 2.</p>

TROUBLE DIAGNOSES



Magnet Clutch (Cont'd)

2	CHECK CIRCUIT CONTINUITY BETWEEN A/C RELAY HARNESS TERMINAL NO. 3 AND COMPRESSOR HARNESS TERMINAL NO. 1	
<p>Compressor connector (A3) A/C relay connector (E71)</p> <p style="text-align: right;">RHA400H</p>		
<p>Continuity should exist. If OK, check harness for short.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 3.
NG	▶	Repair harness or connector.

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3	CHECK POWER SUPPLY FOR A/C RELAY	
<p>Disconnect A/C relay. Do approx. 12 volts exist between A/C relay harness terminal Nos. 1, 5 and body ground?</p> <p style="text-align: center;"> </p> <p style="text-align: center;">A/C relay connector (E71)</p> <p style="text-align: right;">RHA401H</p>		
Yes or No		
Yes	▶	GO TO 4.
No	▶	<p>Check power supply circuit and 10A (No. 19, 66) fuse at fuse block. Refer to EL-11, EL-15, "Wiring Diagram — POWER —".</p> <ul style="list-style-type: none"> ● If OK, check for open circuit in wiring harness. Repair or replace as necessary. ● If NG, replace fuse and check wiring harness for short circuit. Repair or replace as necessary.

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4	CHECK A/C RELAY AFTER DISCONNECTING IT	
Refer to HA-80.		
OK or NG		
OK	▶	Reconnect A/C relay. And GO TO 5.
NG	▶	<ol style="list-style-type: none"> 1. Replace A/C relay. 2. Go to "FUNCTION CONFIRMATION PROCEDURE", "Self-diagnosis", HA-37 and perform self-diagnosis STEP-4. <p>Confirm that magnet clutch operation is normal.</p>

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TROUBLE DIAGNOSES

Magnet Clutch (Cont'd)

5	CHECK COIL SIDE CIRCUIT OF A/C RELAY	
Do approx. 12 volts exist between ECM harness terminal No. 27 and body ground?		
RHA482GF		
Yes or No		
Yes	▶	GO TO 6.
No	▶	Disconnect A/C relay. Disconnect ECM harness connector. GO TO 9.

6	CHECK VOLTAGE FOR ECM	
Do approx. 12 volts exist between ECM harness terminal No. 45 and body ground?		
RHA701FI		
Yes or No		
Yes	▶	Disconnect ECM harness connector. Disconnect refrigerant pressure sensor harness connector. GO TO 7.
No	▶	Check ECM. Refer to EC-145, "ECM Terminals and Reference Value".

7	CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL	
Do approx. 0 volts exist between ECM harness terminal No. 51 and ground?		
<p style="text-align: center;">ECM connector (F48)</p>		
SHA373F		
Yes or No		
Yes	▶	GO TO 8.
No	▶	1. Repair harness or connector. 2. Go to "FUNCTION CONFIRMATION PROCEDURE", "Self-diagnosis", HA-37 and perform self-diagnosis STEP-4. Confirm that magnet clutch operation is normal.

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8	CHECK REFRIGERANT PRESSURE SENSOR	
Refer to HA-80.		
OK or NG		
OK	▶	GO TO 9.
NG	▶	Replace refrigerant pressure sensor.

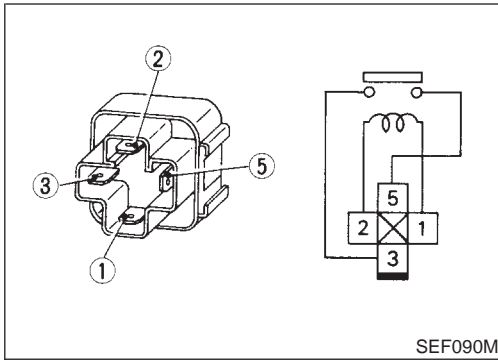
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9	CHECK CIRCUIT CONTINUITY BETWEEN A/C RELAY HARNESS TERMINAL NO. 2 AND ECM HARNESS TERMINAL NO. 27	
<p style="text-align: center;">A/C relay connector (E71) ECM connector (F48)</p>		
RHA403H		
Continuity should exist.		
OK or NG		
OK	▶	Check harness for short. Check ECM.
NG	▶	Repair harness or connector. Replace auto amp.

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TROUBLE DIAGNOSES

Magnet Clutch (Cont'd)



COMPONENT INSPECTION

A/C Relay

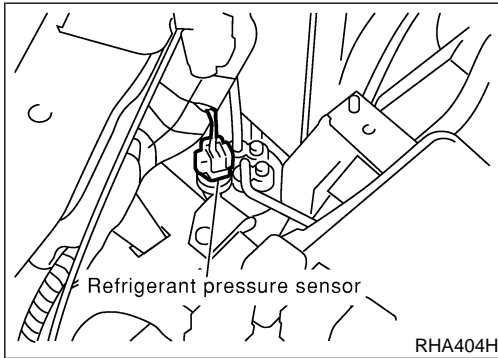
NHHA0204

NHHA0204S01

Check continuity between terminal Nos. 3 and 5.

Conditions	Continuity
12V direct current supply between terminal Nos. 1 and 2	Yes
No current supply	No

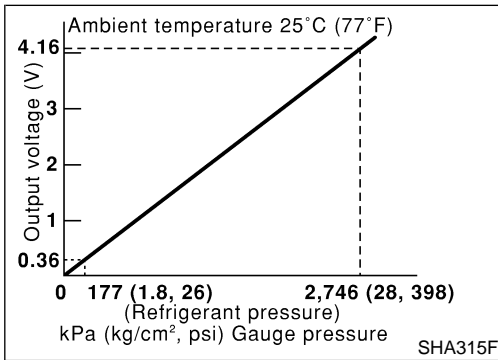
If NG, replace relay.



Refrigerant Pressure Sensor

NHHA0204S02

Make sure that higher A/C refrigerant pressure results in higher refrigerant-pressure sensor output voltage.



Insufficient Cooling

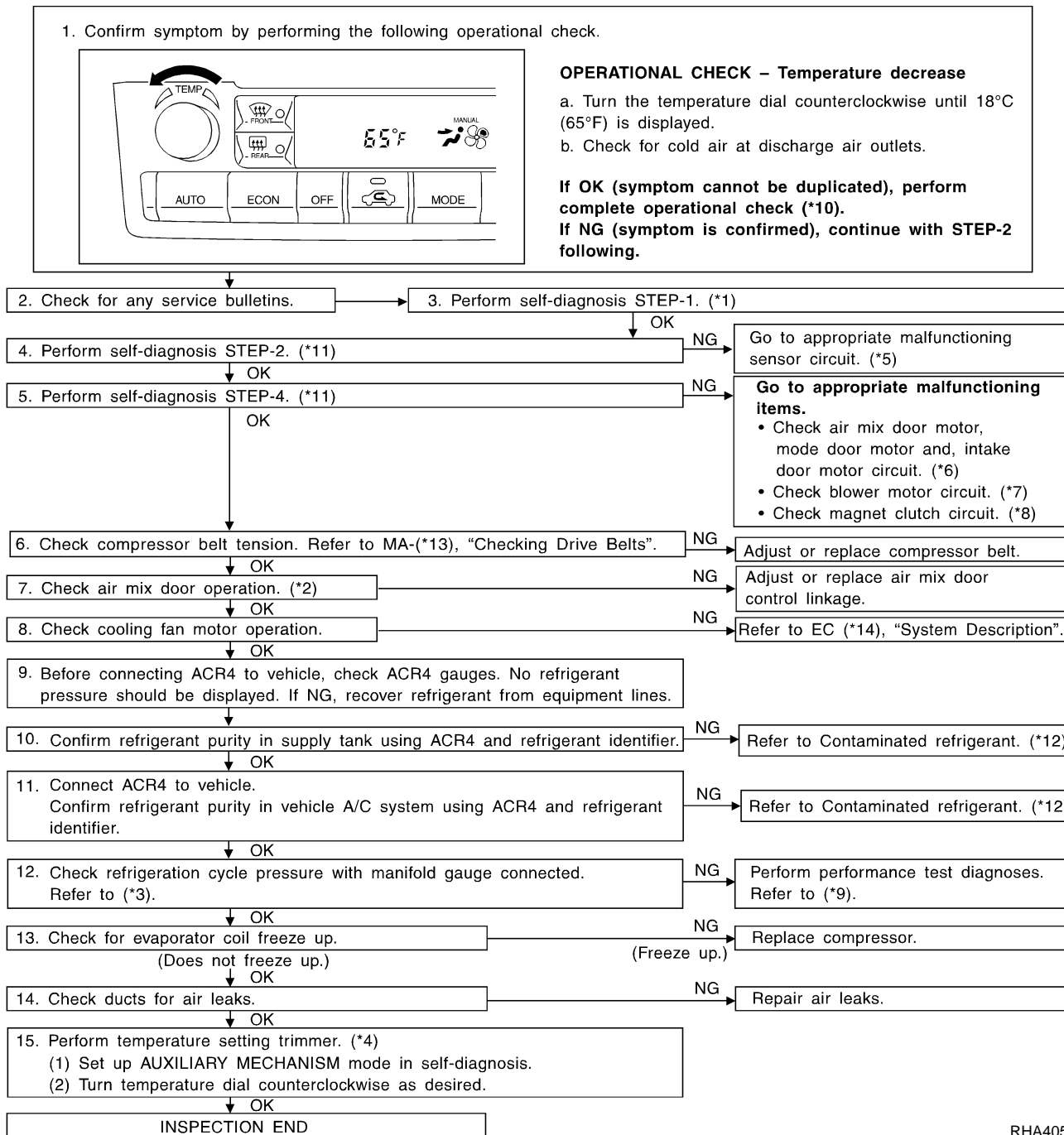
TROUBLE DIAGNOSIS PROCEDURE FOR INSUFFICIENT COOLING

=NHHA0205

SYMPTOM:

- Insufficient cooling

INSPECTION FLOW



*1: HA-36

*2: HA-62

*3: HA-84

*4: HA-45

*5: FUNCTION CONFIRMATION PROCEDURE (HA-37), see No. 13.

*6: HA-55

*7: HA-67

*8: HA-76

*9: HA-82

*10: HA-47

*11: HA-37

*12: HA-2

*13: MA-13

*14: EC-520

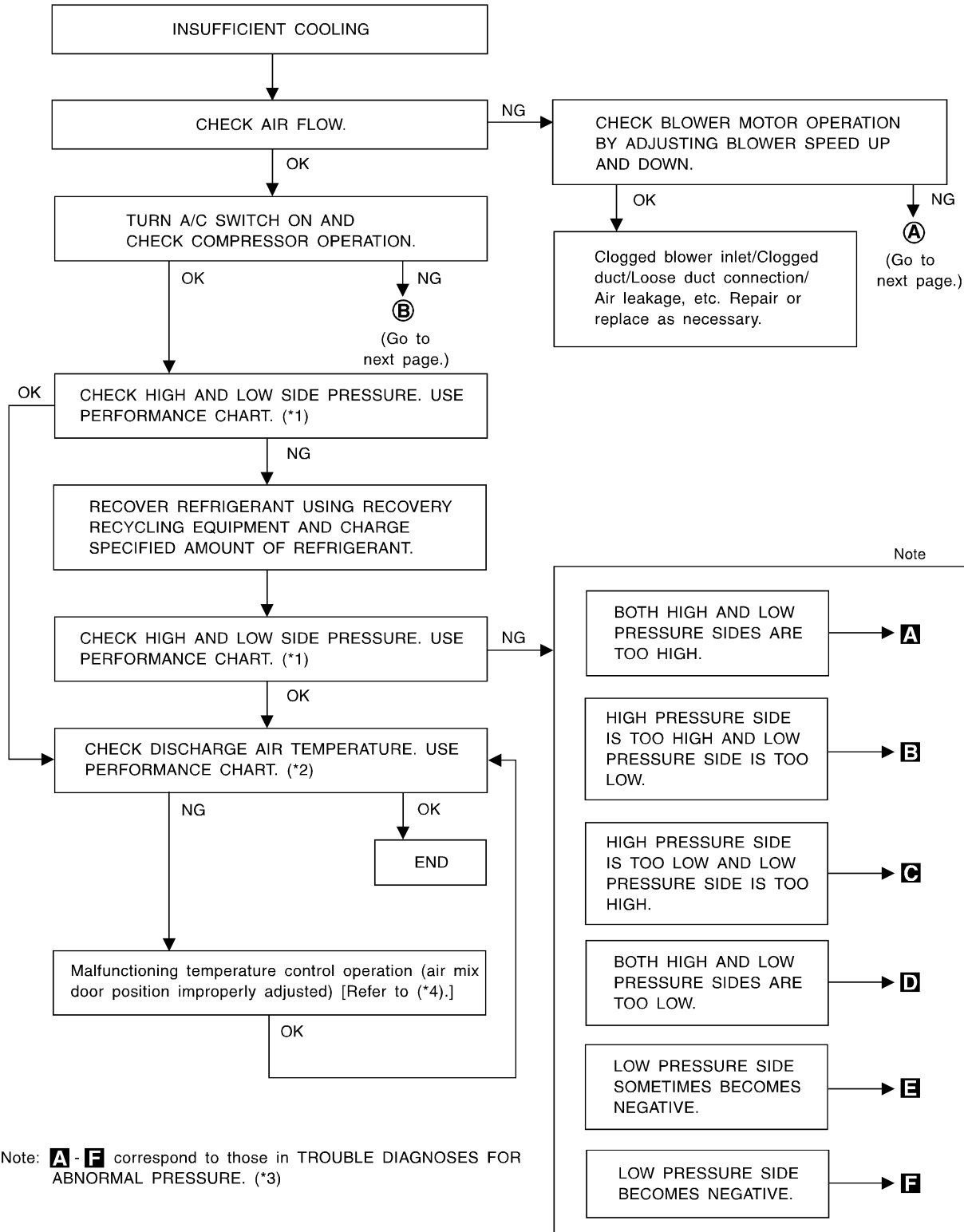
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TROUBLE DIAGNOSES

Insufficient Cooling (Cont'd)

PERFORMANCE TEST DIAGNOSES

NHHA0206



SHA344F

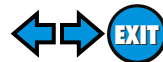
*1: HA-84

*3: HA-85

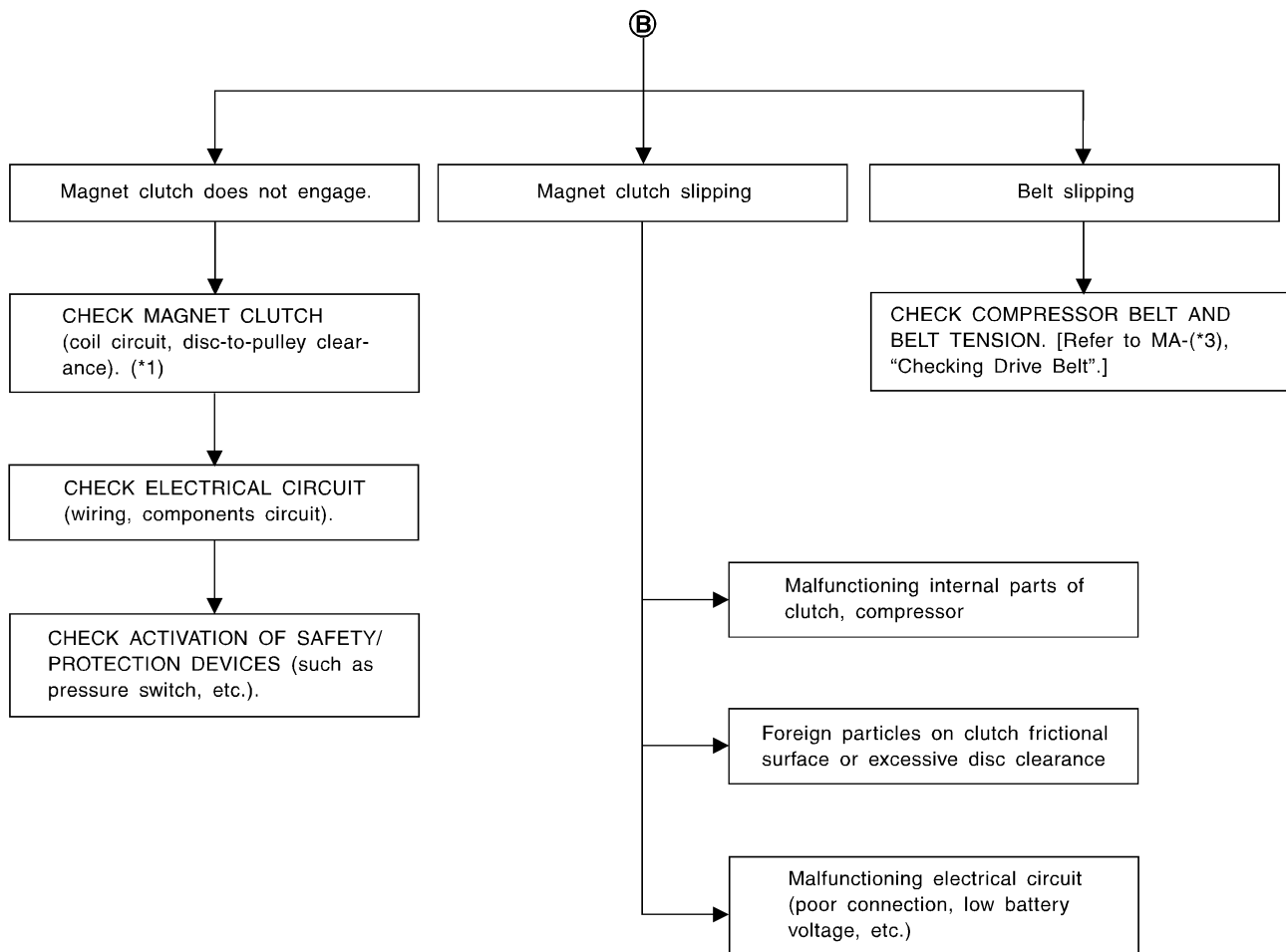
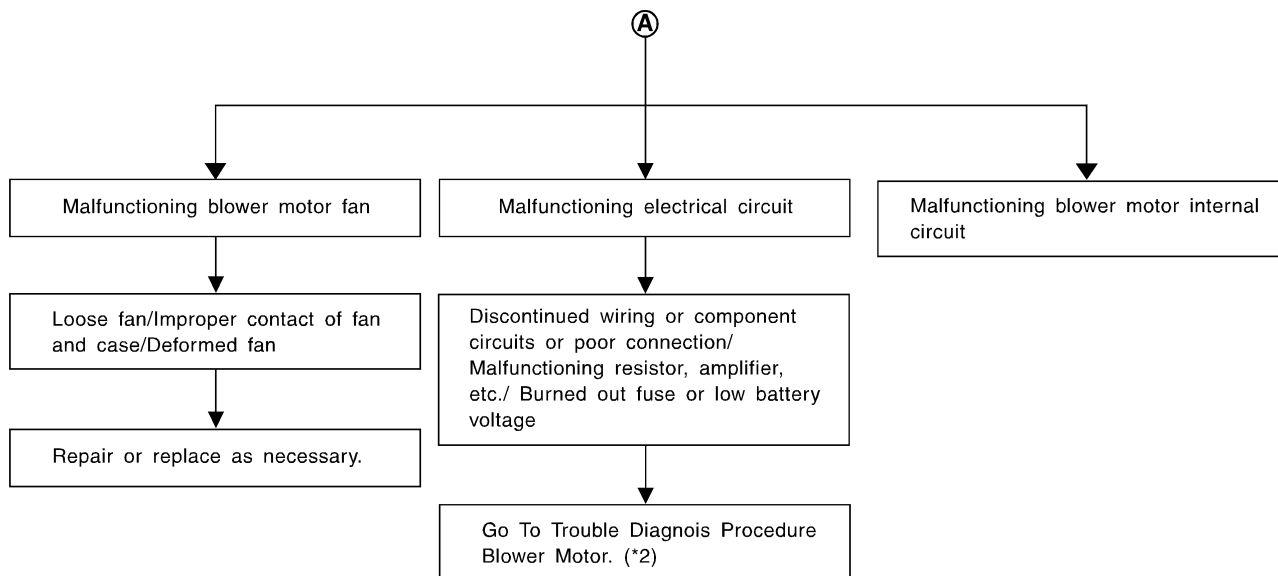
*4: HA-61

*2: HA-84

TROUBLE DIAGNOSES



Insufficient Cooling (Cont'd)



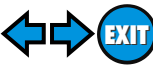
*1: HA-112

*2: HA-66

*3: MA-13

SHA329F

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TROUBLE DIAGNOSES

Insufficient Cooling (Cont'd)




PERFORMANCE TEST

NHHA0207

Test Condition

NHHA0207S01

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
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

NHHA0207S02

Recirculating-to-discharge Air Temperature Table

NHHA0207S0201

Inside air (Recirculating air) at blower assembly inlet		Discharge air temperature at center ventilator °C (°F)
Relative humidity %	Air temperature °C (°F)	
50 - 60	15 (59)	3.5 - 5.4 (38 - 42)
	20 (68)	6.6 - 8.9 (44 - 48)
	25 (77)	9.5 - 12.6 (49 - 55)
	30 (86)	13.4 - 16.5 (56 - 62)
	35 (95)	17.6 - 21.3 (64 - 70)
60 - 70	15 (59)	5.4 - 7.1 (42 - 45)
	20 (68)	8.9 - 11.0 (48 - 52)
	25 (77)	12.6 - 15.4 (55 - 60)
	30 (86)	16.5 - 20.0 (62 - 68)
	35 (95)	21.3 - 24.8 (70 - 77)

Ambient Air Temperature-to-operating Pressure Table

NHHA0207S0202

Ambient air		High-pressure (Discharge side) kPa (kg/cm ² , psi)	Low-pressure (Suction side) kPa (kg/cm ² , psi)
Relative humidity %	Air temperature °C (°F)		
50 - 70	15 (59)	539 - 657 (5.5 - 6.7, 78 - 95)	177 - 216 (1.8 - 2.2, 26 - 31)
	20 (68)	677 - 824 (6.9 - 8.4, 98 - 119)	167 - 206 (1.7 - 2.1, 24 - 30)
	25 (77)	843 - 1,030 (8.6 - 10.5, 122 - 149)	177 - 226 (1.8 - 2.3, 26 - 33)
	30 (86)	1,030 - 1,275 (10.5 - 13.0, 149 - 185)	216 - 255 (2.2 - 2.6, 31 - 37)
	35 (95)	1,245 - 1,520 (12.7 - 15.5, 181 - 220)	265 - 324 (2.7 - 3.3, 38 - 47)

TROUBLE DIAGNOSES

Insufficient Cooling (Cont'd)

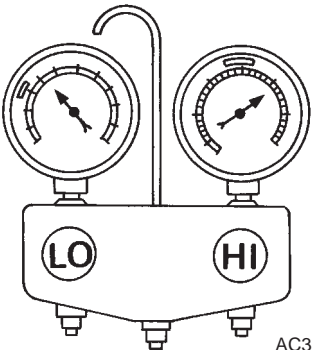
TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE

NHHA0208

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 (normal) pressure range. Since the standard (normal) pressure, however, differs from vehicle to vehicle, refer to HA-84 ("Ambient air temperature-to-operating pressure table").

Both High and Low-pressure Sides are Too High.

NHHA0208S01

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
<p>Both high and low-pressure sides are too high.</p> <p>A</p>  <p>AC359A</p>	<ul style="list-style-type: none"> Pressure is reduced soon after water is splashed on condenser. 	<p>Excessive refrigerant charge in refrigeration cycle</p>	<p>Reduce refrigerant until specified pressure is obtained.</p>
	<p>Air suction by cooling fan is insufficient.</p>	<p>Insufficient condenser cooling performance</p> <p>↓</p> <ol style="list-style-type: none"> Condenser fins are clogged. Improper fan rotation of cooling fan 	<ul style="list-style-type: none"> Clean condenser. Check and repair cooling fan as necessary.
	<ul style="list-style-type: none"> 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. 	<p>Poor heat exchange in condenser (After compressor operation stops, high pressure decreases too slowly.)</p> <p>↓</p> <p>Air in refrigeration cycle</p>	<p>Evacuate repeatedly and recharge system.</p>
	<p>Engine tends to overheat.</p>	<p>Engine cooling systems malfunction.</p>	<p>Check and repair each engine cooling system.</p>
	<ul style="list-style-type: none"> An area of the low-pressure pipe is colder than areas near the evaporator outlet. Plates are sometimes covered with frost. 	<ul style="list-style-type: none"> Excessive liquid refrigerant on low-pressure side Excessive refrigerant discharge flow Expansion valve is open a little compared with the specification. <p>↓</p> <ol style="list-style-type: none"> Improper thermal valve installation Improper expansion valve adjustment 	<p>Replace expansion valve.</p>

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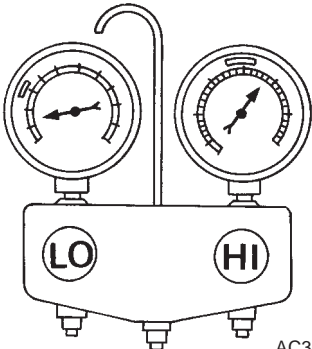
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TROUBLE DIAGNOSES

Insufficient Cooling (Cont'd)

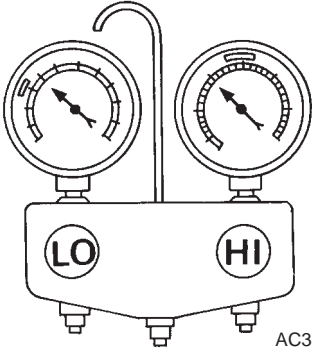
High-pressure Side is Too High and Low-pressure Side is Too Low.

NHHA0208S02

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
<p>High-pressure side is too high and low-pressure side is too low.</p> <p>B</p>  <p style="text-align: right; font-size: small;">AC360A</p>	<p>Upper side of condenser and high-pressure side are hot, however, liquid tank is not so hot.</p>	<p>High-pressure tube or parts located between compressor and condenser are clogged or crushed.</p>	<ul style="list-style-type: none"> ● Check and repair or replace malfunctioning parts. ● Check lubricant for contamination.

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

NHHA0208S03

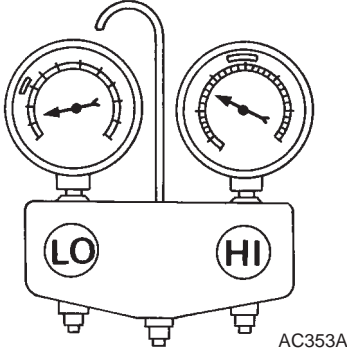
Gauge indication	Refrigerant cycle	Probable cause	Corrective action
<p>High-pressure side is too low and low-pressure side is too high.</p> <p>C</p>  <p style="text-align: right; font-size: small;">AC356A</p>	<p>High and low-pressure sides become equal soon after compressor operation stops.</p>	<p>Compressor pressure operation is improper.</p> <p style="text-align: center;">↓</p> <p>Damaged inside compressor packings</p>	<p>Replace compressor.</p>
	<p>No temperature difference between high and low-pressure sides</p>	<p>Compressor pressure operation is improper.</p> <p style="text-align: center;">↓</p> <p>Damaged inside compressor packings.</p>	<p>Replace compressor.</p>

TROUBLE DIAGNOSES

Insufficient Cooling (Cont'd)

NHHA0208S04

Both High- and Low-pressure Sides are Too Low.

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
<p>Both high- and low-pressure sides are too low.</p> <p>D</p> 	<ul style="list-style-type: none"> There is a big temperature difference between receiver drier outlet and inlet. Outlet temperature is extremely low. Liquid tank inlet and expansion valve are frosted. 	<p>Compressor discharge capacity does not change. (Compressor stroke is set at maximum.)</p>	<ul style="list-style-type: none"> Replace liquid tank. Check lubricant for contamination.
	<ul style="list-style-type: none"> 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 	<p>High-pressure pipe located between receiver drier and expansion valve is clogged.</p>	<ul style="list-style-type: none"> Check and repair malfunctioning parts. Check lubricant for contamination.
	<ul style="list-style-type: none"> Expansion valve and liquid tank are warm or only cool when touched. 	<p>Low refrigerant charge</p> <p style="text-align: center;">↓</p> <p>Leaking fittings or components</p>	<p>Check refrigerant for leaks. Refer to "Checking Refrigerant Leaks", HA-119.</p>
	<p>There is a big temperature difference between expansion valve inlet and outlet while the valve itself is frosted.</p>	<p>Expansion valve closes a little compared with the specification.</p> <p style="text-align: center;">↓</p> <ol style="list-style-type: none"> Improper expansion valve adjustment Malfunctioning thermal valve Outlet and inlet may be clogged. 	<ul style="list-style-type: none"> Remove foreign particles by using compressed air. Check lubricant for contamination.
	<p>An area of the low-pressure pipe is colder than areas near the evaporator outlet.</p>	<p>Low-pressure pipe is clogged or crushed.</p>	<ul style="list-style-type: none"> Check and repair malfunctioning parts. Check lubricant for contamination.
	<p>Air flow volume is not enough or is too low.</p>	<p>Evaporator is frozen.</p> <p style="text-align: center;">↓</p> <p>Compressor discharge capacity does not change. (Compressor stroke is set at maximum length.)</p>	<p>Replace compressor.</p>

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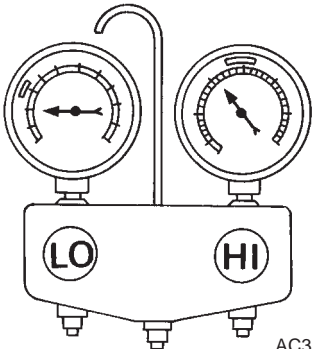
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TROUBLE DIAGNOSES

Insufficient Cooling (Cont'd)

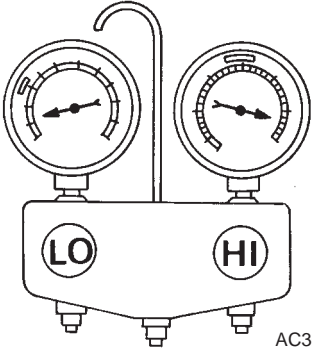
Low-pressure Side Sometimes Becomes Negative.

NHHA0208S05

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
<p>Low-pressure side sometimes becomes negative.</p> <p>E</p>  <p>AC354A</p>	<ul style="list-style-type: none"> • Air conditioning system does not function and does not cyclically cool the compartment air. • The system constantly functions for a certain period of time after compressor is stopped and restarted. 	<p>Refrigerant does not discharge cyclically.</p> <p>↓</p> <p>Moisture is frozen at expansion valve outlet and inlet.</p> <p>↓</p> <p>Water is mixed with refrigerant.</p>	<ul style="list-style-type: none"> • Drain water from refrigerant or replace refrigerant. • Replace liquid tank.

Low-pressure Side Becomes Negative.

NHHA0208S06

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
<p>Low-pressure side becomes negative.</p> <p>F</p>  <p>AC362A</p>	<p>Liquid tank or front/rear side of expansion valve's pipe is frosted or dewed.</p>	<p>High-pressure side is closed and refrigerant does not flow.</p> <p>↓</p> <p>Expansion valve or liquid tank is frosted.</p>	<p>Leave the system at rest until no frost is present. Start it again to check whether or not the problem is caused by water or foreign particles.</p> <ul style="list-style-type: none"> • 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 problem, replace expansion valve. • Replace liquid tank. • Check lubricant for contamination.

Insufficient Heating

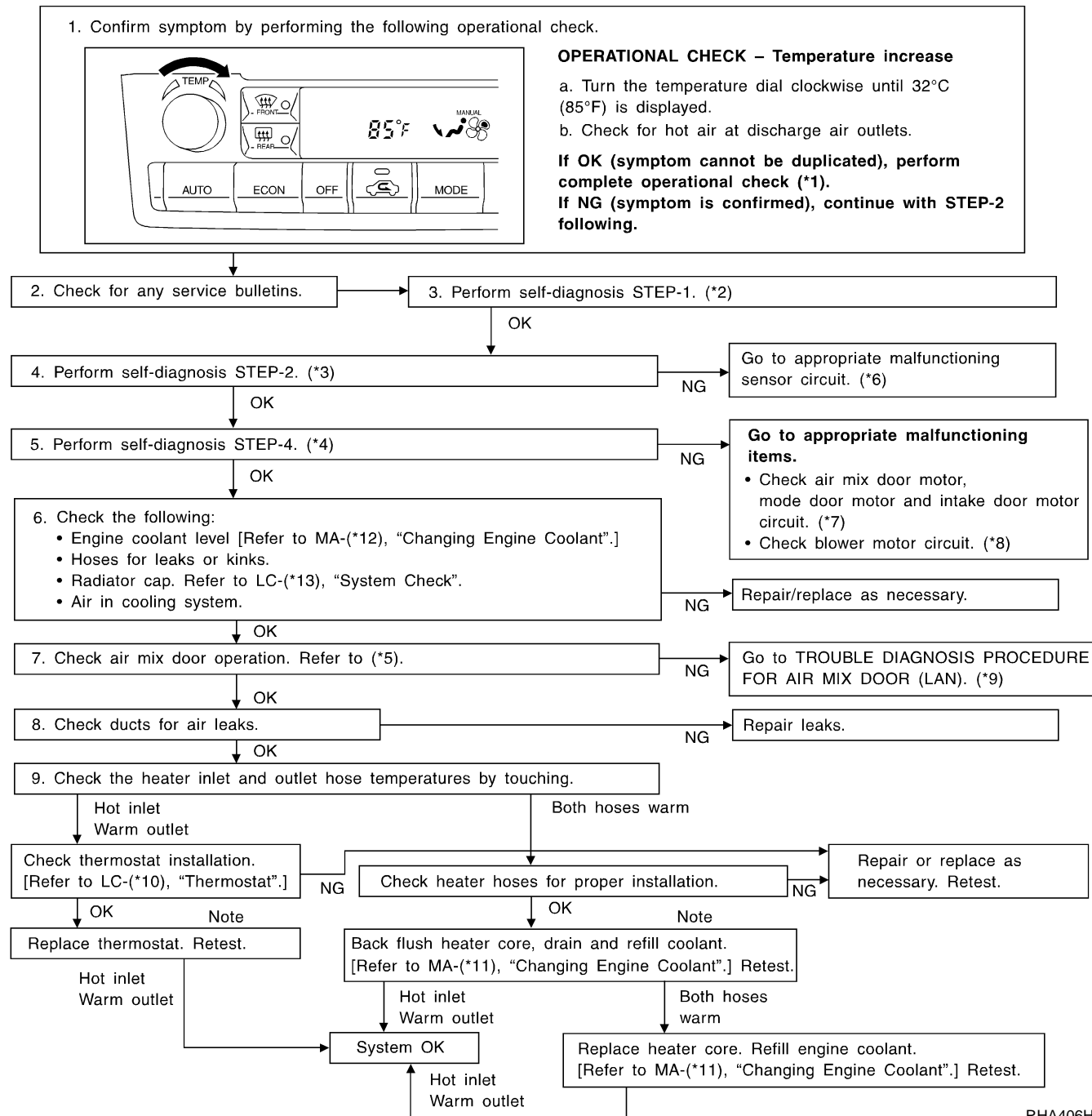
TROUBLE DIAGNOSIS PROCEDURE FOR INSUFFICIENT HEATING

=NHHA0209

SYMPTOM:

- Insufficient heating

INSPECTION FLOW



*1: HA-47
 *2: HA-36
 *3: HA-37
 *4: HA-37
 *5: HA-62

*6: FUNCTION CONFIRMATION PROCEDURE (HA-37), see No. 13.
 *7: HA-55
 *8: HA-69

*9: HA-60
 *10: LC-14
 *11: MA-14
 *12: MA-14
 *13: LC-9

RHA406HA

TROUBLE DIAGNOSES

Noise

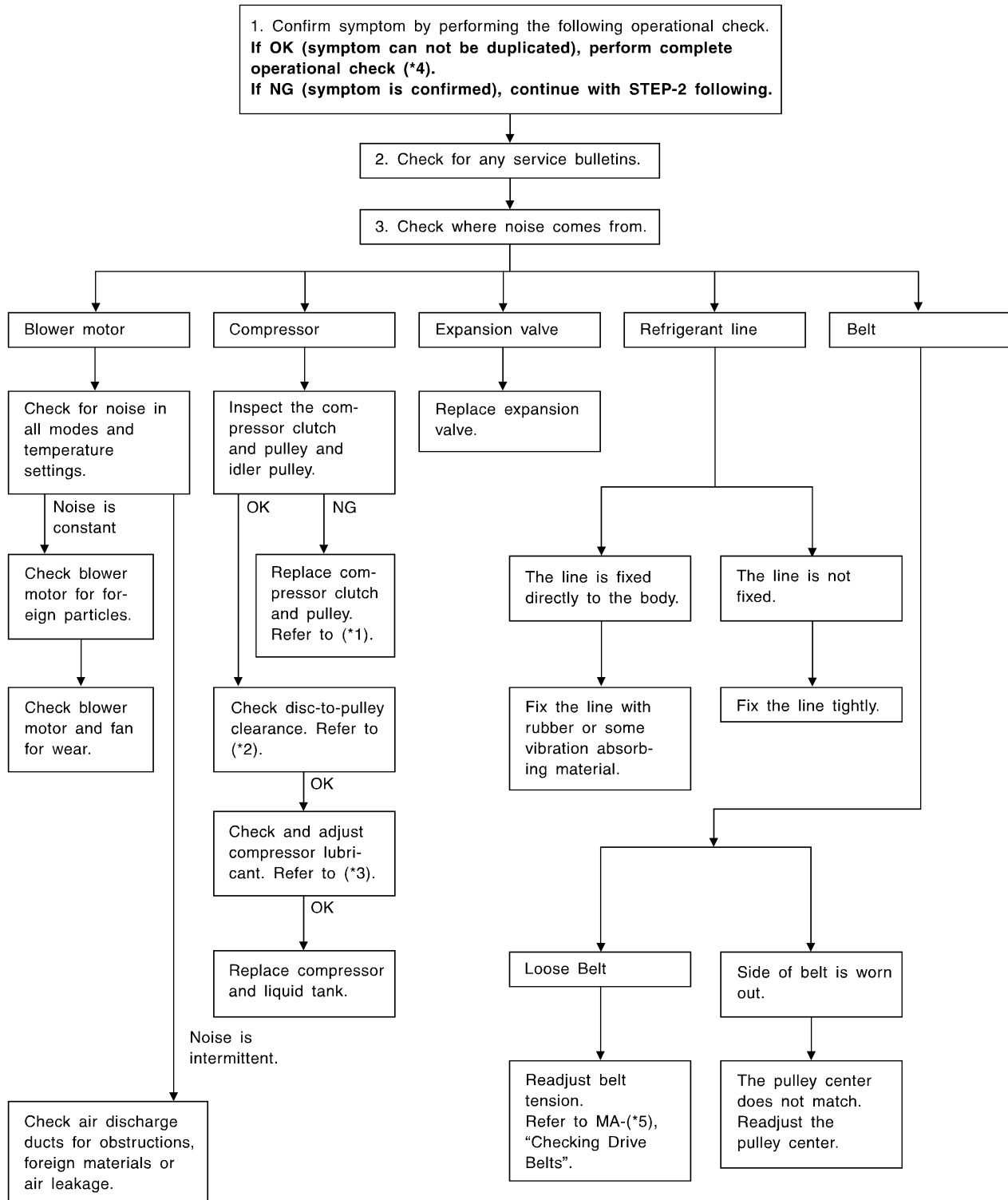
Noise

TROUBLE DIAGNOSIS PROCEDURE FOR NOISE

=NHHA0210

SYMPTOM:

- Noise



*1: HA-112
*2: HA-114

*3: HA-109
*4: HA-47

*5: MA-13

SHA331F

Self-diagnosis

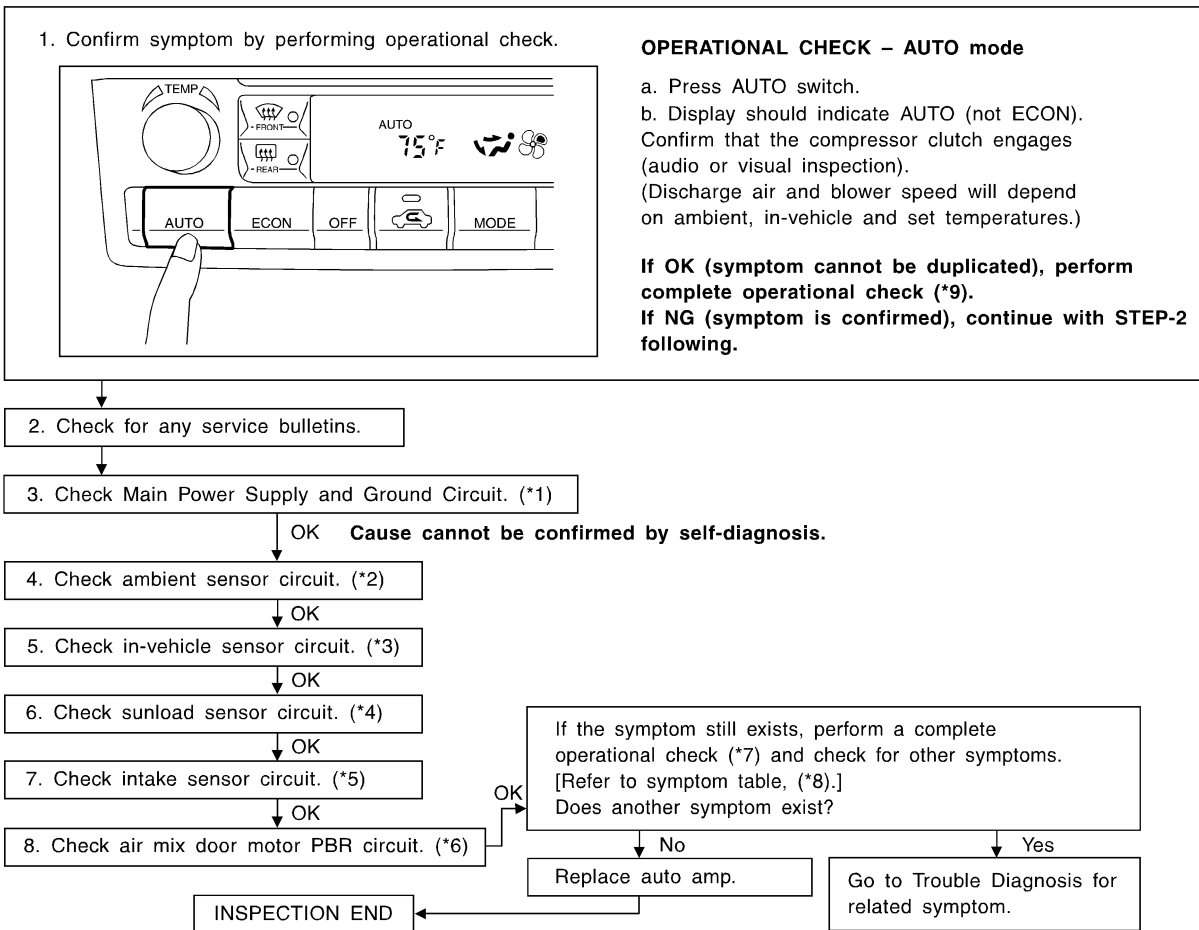
TROUBLE DIAGNOSIS PROCEDURE FOR SELF-DIAGNOSIS

=NHHA0211

SYMPTOM:

- Self-diagnosis cannot be performed.

INSPECTION FLOW



*1: HA-51
*2: HA-93
*3: HA-97

*4: HA-100
*5: HA-104
*6: HA-106

*7: HA-47
*8: HA-46
*9: HA-47

RHA407H

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TROUBLE DIAGNOSES

Memory Function

Memory Function

TROUBLE DIAGNOSIS PROCEDURE FOR MEMORY FUNCTION

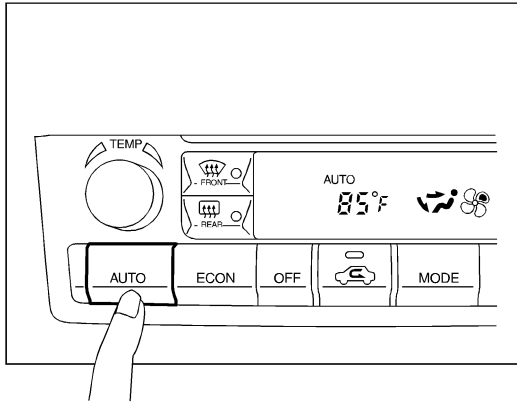
=NHHA0212

SYMPTOM:

- Memory function does not operate.

INSPECTION FLOW

1. Confirm symptom by performing the following operational check.

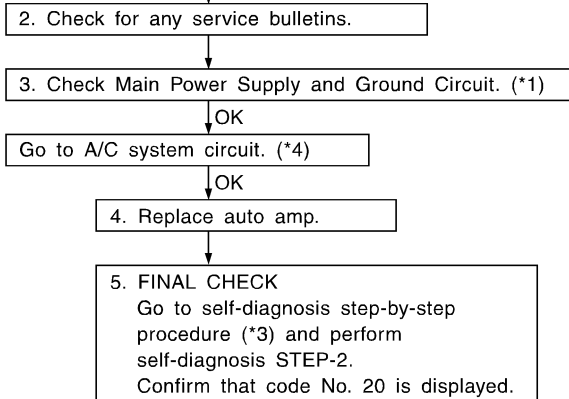


OPERATIONAL CHECK – Memory function

- Set the temperature 85°F or 32°C.
- Press OFF switch.
- Turn the ignition off.
- Turn the ignition on.
- Press the AUTO switch.
- Confirm that the set temperature remains at previous temperature.
- Press OFF switch.

If OK (symptom cannot be duplicated), perform complete operational check (*2).

If NG (symptom is confirmed), continue with STEP-2 following.



RHA912H

*1: HA-51

*3: HA-37

*4: HA-51

*2: HA-47

ECON (ECONOMY) Mode

TROUBLE DIAGNOSIS PROCEDURE FOR ECON (ECONOMY) MODE

=NHHA0213

SYMPTOM:

- ECON mode does not operate.

INSPECTION FLOW

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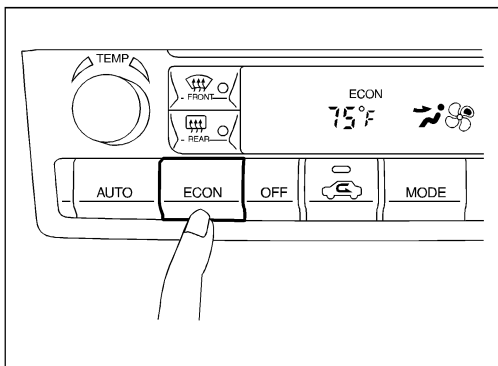
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1. Confirm symptom by performing the following operational check.



OPERATIONAL CHECK – ECON (ECONOMY) mode

- a. Set the temperature 75°F or 25°C.
- b. Press ECON switch.
- c. Display should indicate ECON (not AUTO).
Confirm that the compressor clutch is not engaged (visual inspection).
(Discharge air and blower speed will depend on ambient, in-vehicle, and set temperatures.)

If OK (symptom cannot be duplicated), perform complete operational check (*2).
If NG (symptom is confirmed), continue with STEP-2 following.

2. Check for any service bulletins.

3. Check Main Power Supply and Ground Circuit. (*1)

OK

Go to A/C system circuit. (*4)

OK

4. Replace auto amp.

5. FINAL CHECK

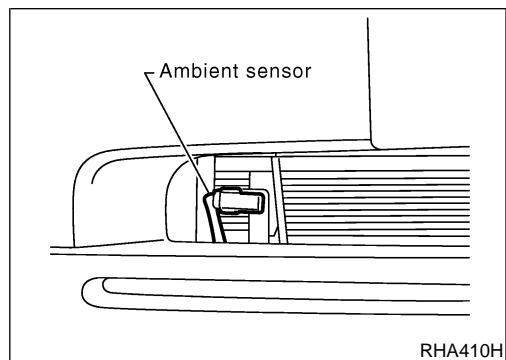
Go to self-diagnosis step-by-step procedure (*3) and perform self-diagnosis STEP-2.
Confirm that code No. 20 is displayed.

*1: HA-51

*3: HA-37

*4: HA-51

*2: HA-47



RHA410H

Ambient Sensor Circuit COMPONENT DESCRIPTION

NHHA0214

The ambient sensor is attached in front of the right side condenser. It detects ambient temperature and converts it into a resistance value which is then input into the auto amplifier.

TROUBLE DIAGNOSES

Ambient Sensor Circuit (Cont'd)

AMBIENT TEMPERATURE INPUT PROCESS

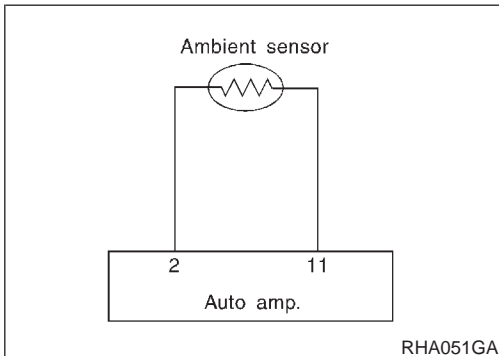
NHHA0215

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

DIAGNOSTIC PROCEDURE

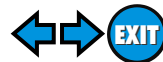
NHHA0216

SYMPTOM: Ambient sensor circuit is open or shorted. ($\overline{2}$! or $\overline{2}$! is indicated on the display as a result of conducting Self-diagnosis STEP 2.)



1	CHECK VOLTAGE BETWEEN AMBIENT SENSOR HARNESS CONNECTOR AND BODY GROUND
<p>Disconnect ambient sensor harness connector. Do approx. 5 volts exist between ambient sensor harness terminal No. 1 and body ground?</p> <div style="text-align: center;"> </div> <p style="text-align: right;">RHA052GE</p>	
Yes or No	
Yes	▶ GO TO 2.
No	▶ GO TO 4.

TROUBLE DIAGNOSES



Ambient Sensor Circuit (Cont'd)

2	CHECK AMBIENT SENSOR CIRCUIT BETWEEN AMBIENT SENSOR AND AUTO AMP. (LCU)	
<p>1. Disconnect auto amp. (LCU) harness connector. 2. Check circuit continuity between ambient sensor harness terminal No. 2 and auto amp. (LCU) harness terminal No. 11.</p>		
RHA475GC		
<p>Continuity should exist. If OK, check harness for short.</p>		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair harness or connector.

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3	CHECK AMBIENT SENSOR	
Refer to HA-96.		
OK or NG		
OK	▶	1. Replace auto amp. (LCU). 2. Go to "FUNCTION CONFIRMATION PROCEDURE", "Self-diagnosis", HA-37 and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.
NG	▶	Replace ambient sensor.

TROUBLE DIAGNOSES

Ambient Sensor Circuit (Cont'd)

4	CHECK AMBIENT SENSOR CIRCUIT BETWEEN AMBIENT SENSOR AND AUTO AMP. (LCU)
<ol style="list-style-type: none"> 1. Disconnect auto amp. (LCU) harness connector. 2. Check circuit continuity between ambient sensor harness terminal No. 1 and auto amp. (LCU) harness terminal No. 2. 	
SHA374F	
<p>Continuity should exist. If OK, check harness for short.</p>	
OK or NG	
OK	<ol style="list-style-type: none"> 1. Replace auto amp. (LCU). 2. Go to "FUNCTION CONFIRMATION PROCEDURE", "Self-diagnosis", HA-37 and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.
NG	Repair harness or connector.

Ambient sensor

RHA411H

COMPONENT INSPECTION

NHHA0217

Ambient Sensor

NHHA0217S01

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

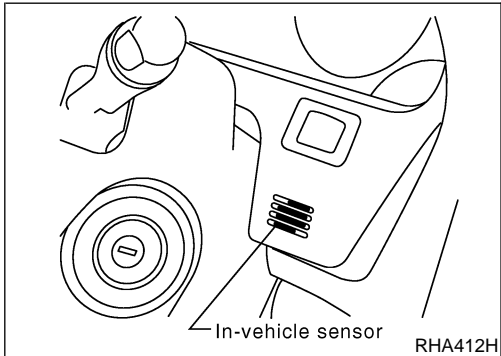
Temperature °C (°F)	Resistance kΩ
-15 (5)	12.73
-10 (14)	9.92
-5 (23)	7.80
0 (32)	6.19
5 (41)	4.95
10 (50)	3.99
15 (59)	3.24
20 (68)	2.65
25 (77)	2.19
30 (86)	1.81

TROUBLE DIAGNOSES

Ambient Sensor Circuit (Cont'd)

Temperature °C (°F)	Resistance kΩ
35 (95)	1.51
40 (104)	1.27
45 (113)	1.07

If NG, replace ambient sensor.

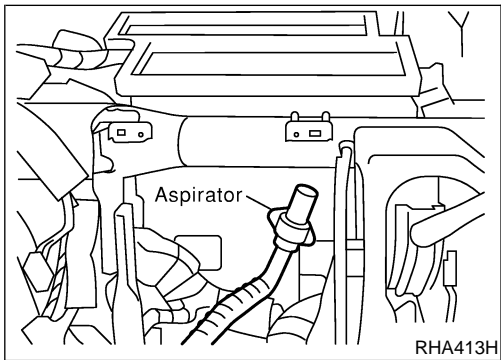


In-vehicle Sensor Circuit COMPONENT DESCRIPTION In-vehicle sensor

NHHA0218

NHHA0218S01

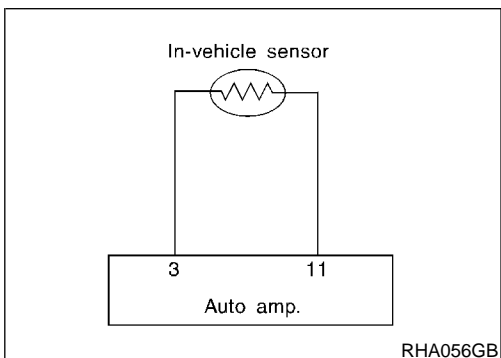
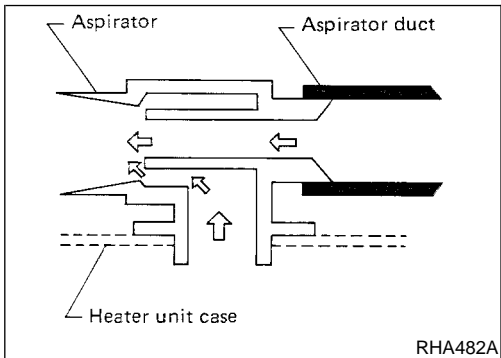
The in-vehicle sensor is located on instrument lower panel. It converts variations in temperature of compartment air drawn from the aspirator into a resistance value. It is then input into the auto amplifier.



Aspirator

NHHA0218S02

The aspirator is located in front of heater unit. It produces vacuum pressure due to air discharged from the heater unit, continuously taking compartment air in the aspirator.



DIAGNOSTIC PROCEDURE

NHHA0219

SYMPTOM: In-vehicle sensor circuit is open or shorted. (22 or -22 is indicated on the display as a result of conducting Self-diagnosis STEP 2.)

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TROUBLE DIAGNOSES

In-vehicle Sensor Circuit (Cont'd)

1	CHECK IN-VEHICLE SENSOR CIRCUIT BETWEEN IN-VEHICLE SENSOR AND BODY GROUND	
<p>Disconnect in-vehicle sensor harness connector. Do approx. 5 volts exist between in-vehicle sensor harness terminal No. 1 and body ground?</p>		
SHA318F		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 4.

2	CHECK IN-VEHICLE SENSOR CIRCUIT BETWEEN IN-VEHICLE SENSOR AND AUTO AMP. (LCU)	
<p>1. Disconnect auto amp. (LCU) harness connector. 2. Check circuit continuity between in-vehicle sensor harness terminal No. 2 and auto amp. (LCU) harness terminal No. 11.</p>		
RHA478GC		
Continuity should exist.		
If OK, check harness for short.		
OK or NG		
OK	▶	GO TO 3.
NG	▶	Repair harness or connector.

TROUBLE DIAGNOSES

In-vehicle Sensor Circuit (Cont'd)

3	CHECK IN-VEHICLE SENSOR	
Refer to HA-100.		
OK or NG		
OK	▶	1. Replace auto amp. 2. Go to "FUNCTION CONFIRMATION PROCEDURE", "Self-diagnosis", HA-37 and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.
NG	▶	1. Replace in-vehicle sensor. 2. Go to "FUNCTION CONFIRMATION PROCEDURE", "Self-diagnosis", HA-37 and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.

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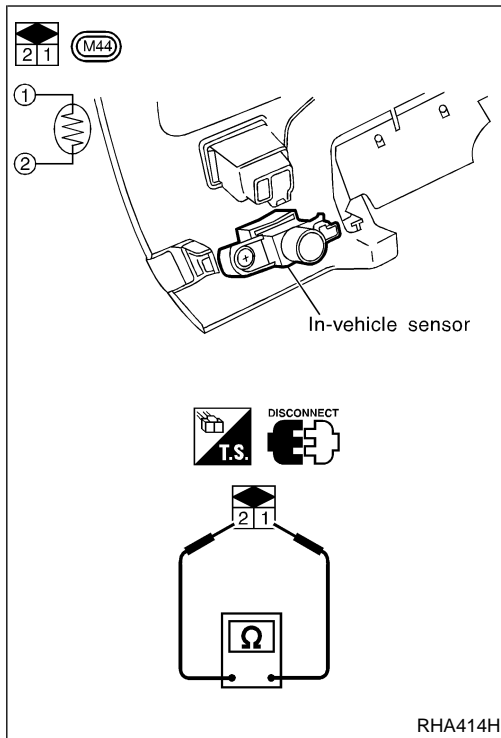
4	CHECK IN-VEHICLE SENSOR CIRCUIT BETWEEN IN-VEHICLE SENSOR AND AUTO AMP. (LCU)	
1. Disconnect auto amp. (LCU) harness connector. 2. Check circuit continuity between in-vehicle sensor harness terminal No. 1 and auto amp. (LCU) harness terminal No. 3.		
<p>Continuity should exist. If OK, check harness for short.</p> <p style="text-align: right;">RHA479GC</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	1. Replace auto amp. (LCU). 2. Go to "FUNCTION CONFIRMATION PROCEDURE", "Self-diagnosis", HA-37 and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.
NG	▶	Repair harness or connector.

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TROUBLE DIAGNOSES

In-vehicle Sensor Circuit (Cont'd)



COMPONENT INSPECTION

In-vehicle Sensor

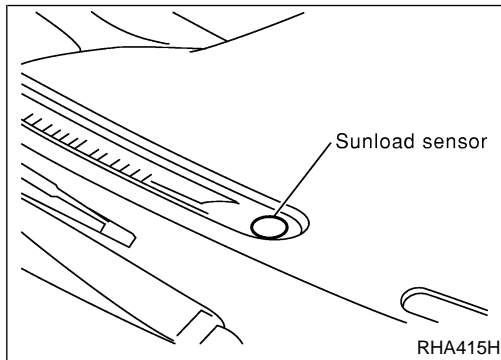
NHHA0220

NHHA0220S01

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

Temperature °C (°F)	Resistance kΩ
-15 (5)	12.73
-10 (14)	9.92
-5 (23)	7.80
0 (32)	6.19
5 (41)	4.95
10 (50)	3.99
15 (59)	3.24
20 (68)	2.65
25 (77)	2.19
30 (86)	1.81
35 (95)	1.51
40 (104)	1.27
45 (113)	1.07

If NG, replace in-vehicle sensor.



Sunload Sensor Circuit

COMPONENT DESCRIPTION

NHHA0221

The sunload sensor is located on the right defroster grille. It detects sunload entering through windshield by means of a photo diode. The sensor converts the sunload into a current value which is then input into the auto amplifier.

SUNLOAD INPUT PROCESS

NHHA0222

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

For example, consider driving along a road bordered by an occasional group of large trees. The sunload detected by the sunload sensor will vary whenever the trees obstruct the sunlight. The processing circuit averages the detected sunload over a period of time, so that the (insignificant) effect of the trees momentarily

TROUBLE DIAGNOSES

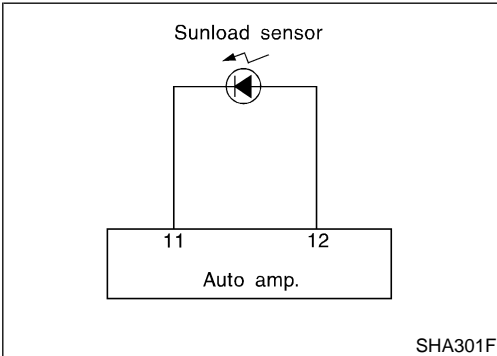
Sunload Sensor Circuit (Cont'd)

obstructing the sunlight does not cause any change in the ATC system operation. On the other hand, shortly after entering a long tunnel, the system will recognize the change in sunload, and the system will react accordingly.

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DIAGNOSTIC PROCEDURE

SYMPTOM: Sunload sensor circuit is open or shorted. (25 or -25 is indicated on the display as a result of conducting Self-diagnosis STEP 2.)

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1	CHECK SUNLOAD SENSOR CIRCUIT BETWEEN SUNLOAD SENSOR AND BODY GROUND	
<p>Disconnect sunload sensor harness connector. Do approx. 5 volts exist between sunload sensor harness terminal No. 1 and body ground?</p> <div style="text-align: center;"> </div> <p style="text-align: right;">RHA062GD</p>		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 4.

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TROUBLE DIAGNOSES

Sunload Sensor Circuit (Cont'd)

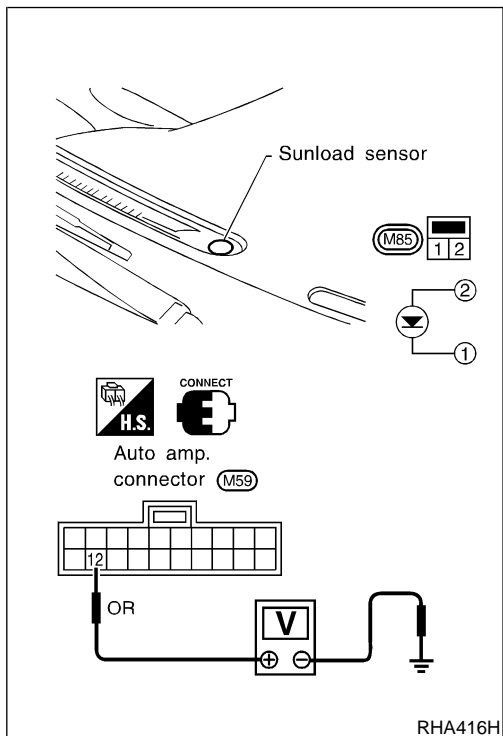
2	CHECK SUNLOAD SENSOR CIRCUIT BETWEEN SUNLOAD SENSOR AND AUTO AMP. (LCU)	
<ol style="list-style-type: none"> 1. Disconnect auto amp. (LCU) harness connector. 2. Check circuit continuity between sunload sensor harness terminal No. 2 and auto amp. (LCU) harness terminal No. 11. 		
RHA483GC		
<p>Continuity should exist. If OK, check harness for short.</p> <p style="text-align: center;">OK or NG</p>		
OK	▶	GO TO 3.
NG	▶	Repair harness or connector.

3	CHECK SUNLOAD SENSOR	
Refer to HA-103.		
OK or NG		
OK	▶	<ol style="list-style-type: none"> 1. Replace auto amp. (LCU). 2. Go to "FUNCTION CONFIRMATION PROCEDURE", "Self-diagnosis", HA-37 and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.
NG	▶	<ol style="list-style-type: none"> 1. Replace sunload sensor. 2. Go to "FUNCTION CONFIRMATION PROCEDURE", "Self-diagnosis", HA-37 and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.

4	CHECK SUNLOAD SENSOR CIRCUIT BETWEEN SUNLOAD SENSOR AND AUTO AMP. (LCU)
<p>1. Disconnect auto amp. (LCU) harness connector. 2. Check circuit continuity between sunload sensor harness terminal No. 1 and auto amp. (LCU) harness terminal No. 12.</p> <div style="text-align: center;"> <p>Auto amp. (LCU) connector (M59) Sunload sensor connector (M85)</p> </div> <p style="text-align: right;">RHA484GC</p> <p>Continuity should exist. If OK, check harness for short.</p> <p style="text-align: center;">OK or NG</p>	
OK	<p>▶ 1. Replace auto amp. 2. Go to "FUNCTION CONFIRMATION PROCEDURE", "Self-diagnosis", HA-37 and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.</p>
NG	<p>▶ Repair harness or connector.</p>

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COMPONENT INSPECTION

Sunload Sensor

NHHA0224

NHHA0224S01

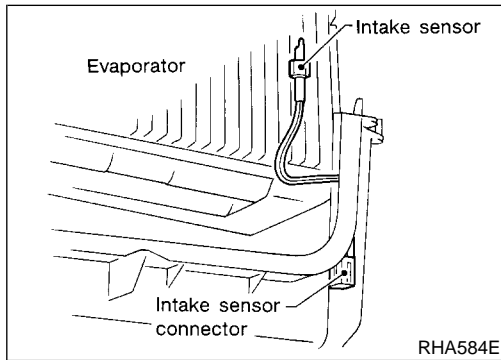
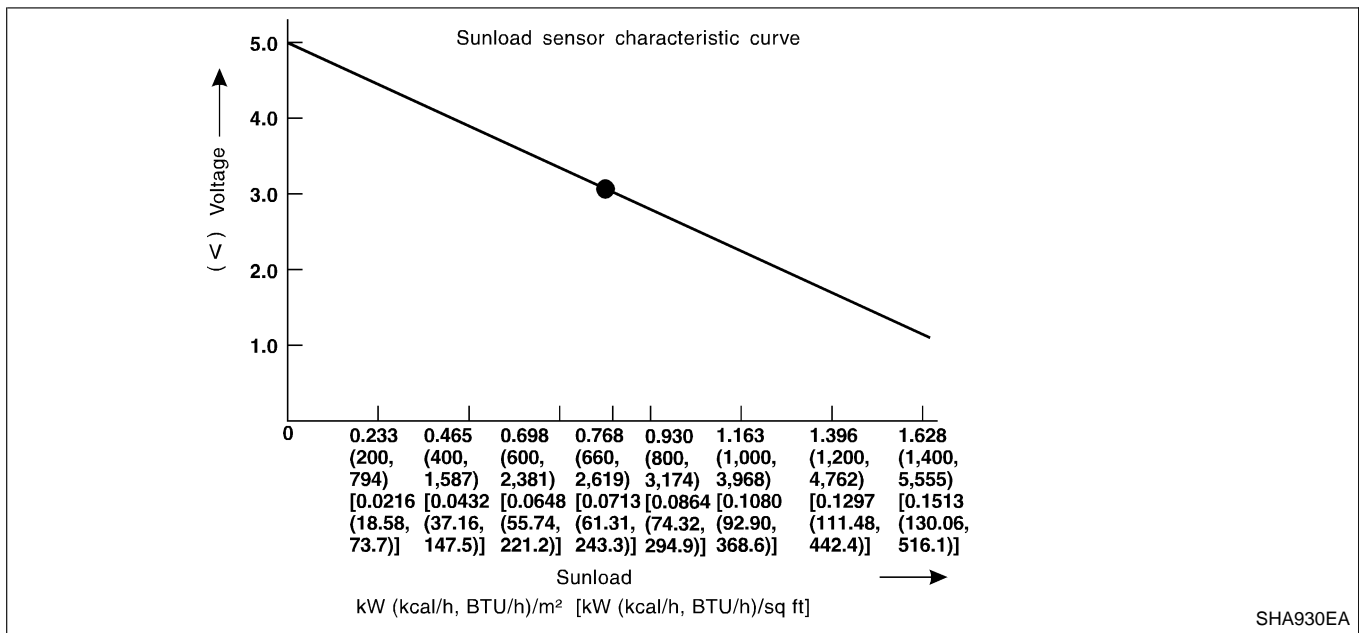
Measure voltage between auto amp. terminal 12 and body ground.
If NG, replace sunload sensor.

- **When checking sunload sensor, select a place where sun shines directly on it.**

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TROUBLE DIAGNOSES

Sunload Sensor Circuit (Cont'd)



Intake Sensor Circuit COMPONENT DESCRIPTION Intake Sensor

NHHA0225

NHHA0225S01

The intake sensor is located on the cooling unit. It converts temperature of air after it passes through the evaporator into a resistance value which is then input to the auto amp.

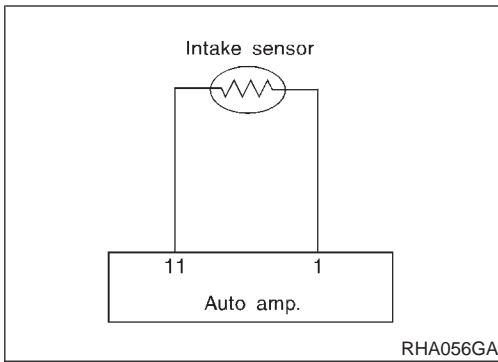
After disconnecting intake sensor harness connector, measure resistance between terminals 1 and 2 at sensor harness side, using the table below.

Temperature °C (°F)	Resistance kΩ
-15 (5)	12.73
-10 (14)	9.92
-5 (23)	7.80
0 (32)	6.19
5 (41)	4.95
10 (50)	3.99
15 (59)	3.24
20 (68)	2.65
25 (77)	2.19
30 (86)	1.81
35 (95)	1.51
40 (104)	1.27
45 (113)	1.07

If NG, replace intake sensor.

TROUBLE DIAGNOSES

Intake Sensor Circuit (Cont'd)



DIAGNOSTIC PROCEDURE

SYMPTOM: Intake sensor circuit is open or shorted. (24 or -24 is indicated on the display as a result of conducting Self-diagnosis STEP 2.) NHHA0226

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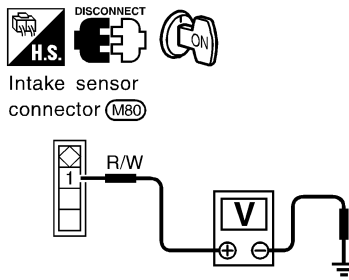
EL

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1 CHECK INTAKE SENSOR CIRCUIT BETWEEN INTAKE SENSOR AND BODY GROUND

Disconnect intake sensor harness connector.

Do approx. 5 volts exist between intake sensor harness terminal No. 1 and body ground?



Yes or No

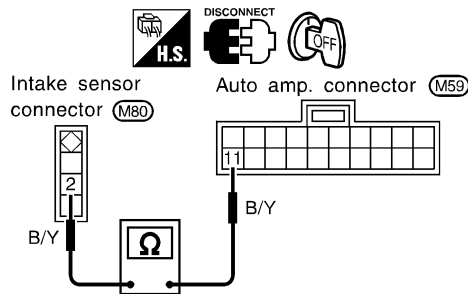
Yes ► GO TO 2.

No ► GO TO 4.

2 CHECK INTAKE SENSOR CIRCUIT BETWEEN INTAKE SENSOR AND AUTO AMP. (LCU)

1. Disconnect auto amp. (LCU) harness connector.

2. Check circuit continuity between intake sensor harness terminal No. 2 and auto amp. (LCU) harness terminal No. 11.



Continuity should exist.

If OK, check harness for short.

OK or NG

OK ► GO TO 3.

NG ► Repair harness or connector.

TROUBLE DIAGNOSES

Intake Sensor Circuit (Cont'd)

3	CHECK INTAKE SENSOR	
Refer to HA-104.		
OK or NG		
OK	▶	<ol style="list-style-type: none"> 1. Replace auto amp. 2. Go to "FUNCTION CONFIRMATION PROCEDURE", "Self-diagnosis", HA-37 and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.
NG	▶	<ol style="list-style-type: none"> 1. Replace intake sensor. 2. Go to "FUNCTION CONFIRMATION PROCEDURE", "Self-diagnosis", HA-37 and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.

4	CHECK INTAKE SENSOR CIRCUIT BETWEEN INTAKE SENSOR AND AUTO AMP. (LCU)	
<ol style="list-style-type: none"> 1. Disconnect auto amp. (LCU) harness connector. 2. Check circuit continuity between intake sensor harness terminal No. 1 and auto amp. (LCU) harness terminal No. 1. 		
<p style="color: blue;">Continuity should exist.</p> <p>If OK, check harness for short.</p>		
OK or NG		
OK	▶	<ol style="list-style-type: none"> 1. Replace auto amp. 2. Go to "FUNCTION CONFIRMATION PROCEDURE", "Self-diagnosis", HA-37 and perform self-diagnosis STEP-2. Confirm that code No. 20 is displayed.
NG	▶	Repair harness or connector.

Air Mix Door Motor PBR Circuit DIAGNOSTIC PROCEDURE

NHHA0227

For description of air mix door motor, mode door motor and intake door motor circuit, refer to HA-61.

SYMPTOM: If PBR circuit is open or shorted. (-26 or 26 is indicated on the display as a result of conducting Self-diagnosis STEP 2.)

Perform diagnostic procedure for air mix door motor, mode door motor and intake. Refer to HA-55.

HFC-134a (R-134a) Service Procedure

NHHA0228

NHHA0228S01

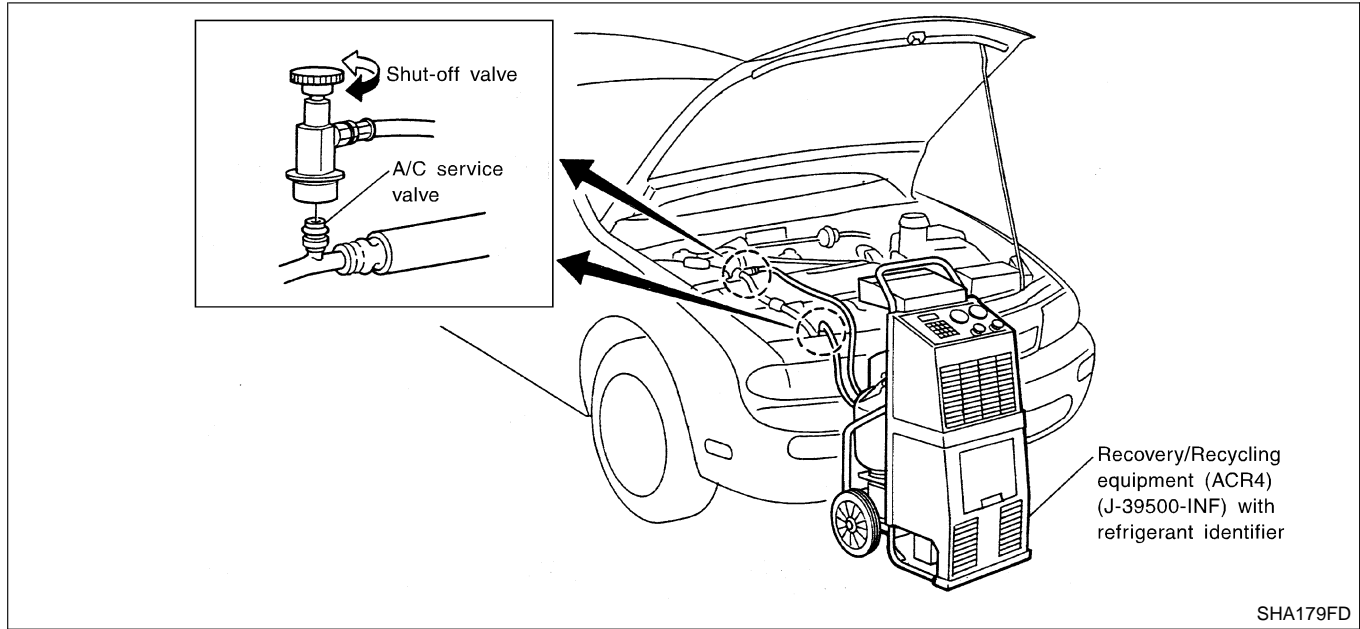
NHHA0228S0101

SETTING OF SERVICE TOOLS AND EQUIPMENT

Discharging Refrigerant

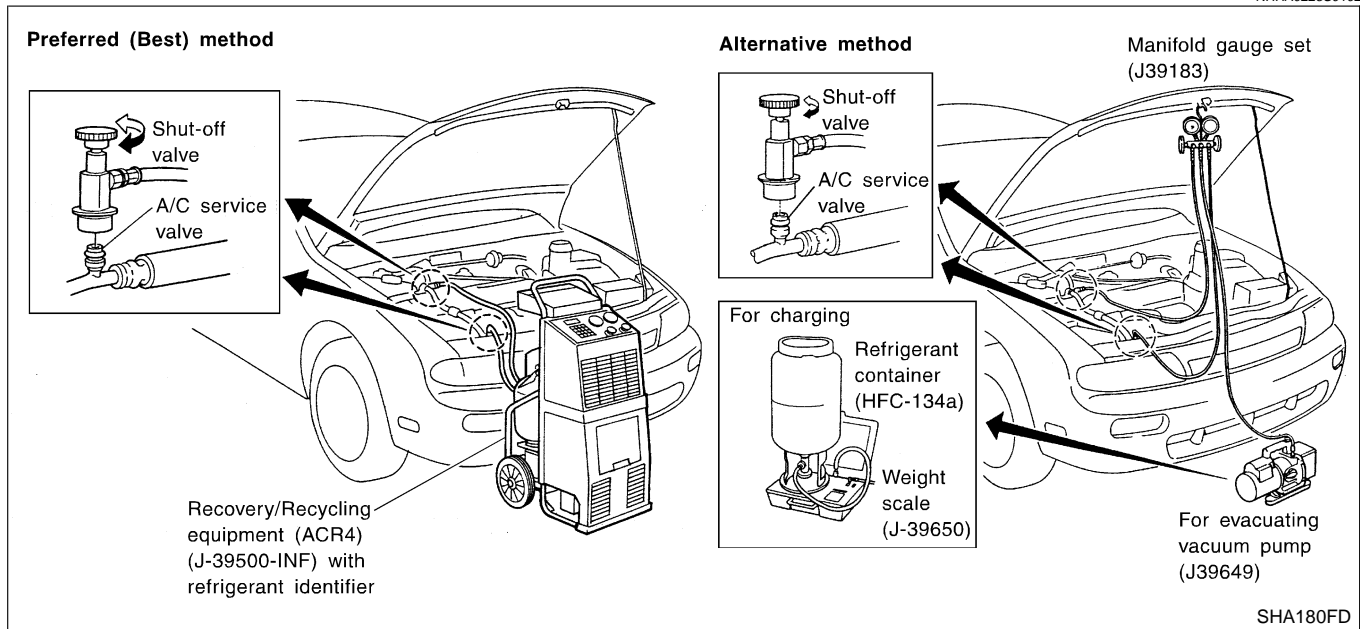
WARNING:

Avoid breathing A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose and throat. Remove HFC-134a (R-134a) from A/C system using certified service equipment meeting requirements of SAE J2210 (R-134a recycling equipment) or J2209 (R-134a recovery equipment). If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from refrigerant and lubricant manufacturers.



Evacuating System and Charging Refrigerant

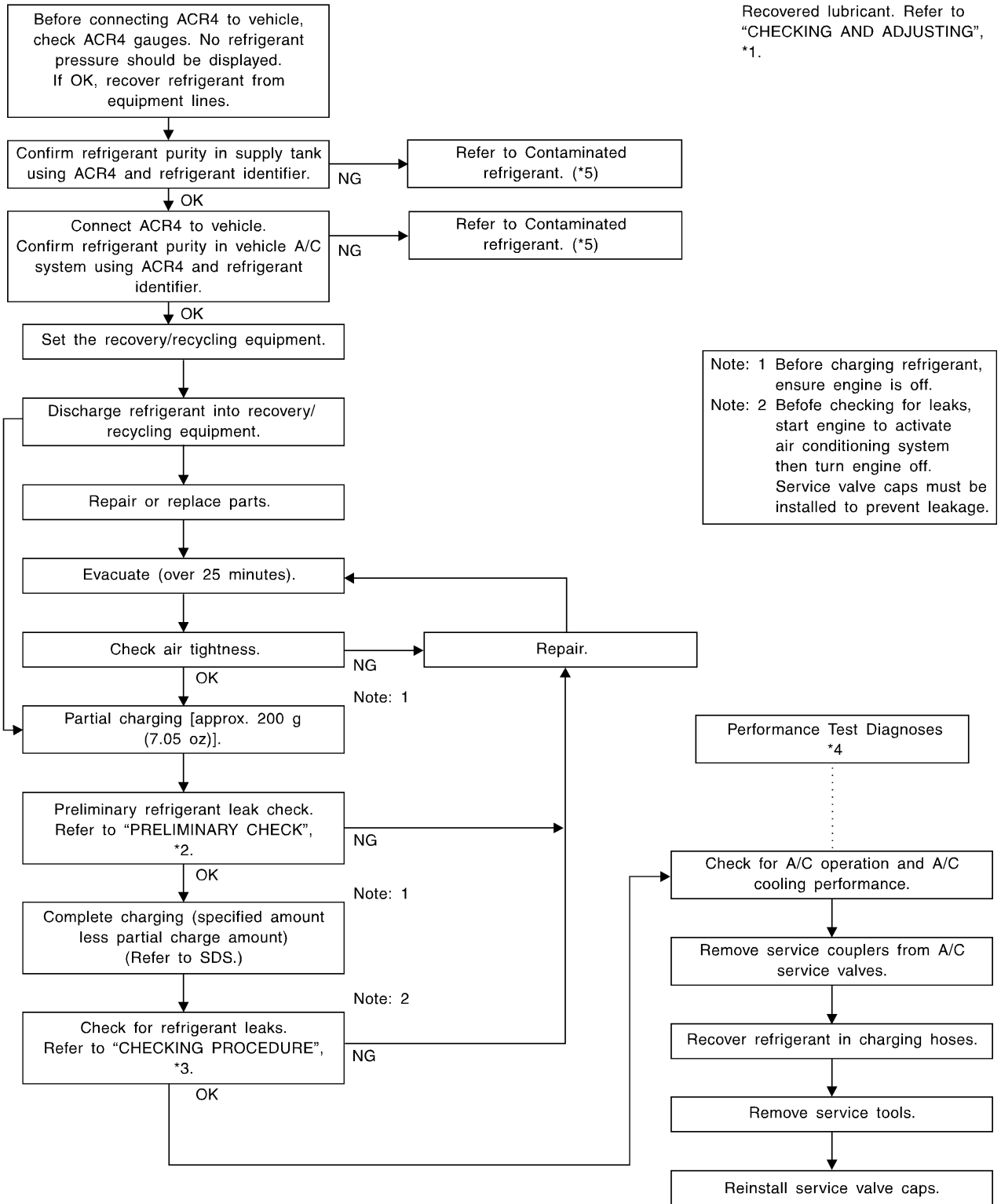
NHHA0228S0102



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SERVICE PROCEDURE

HFC-134a (R-134a) Service Procedure (Cont'd)



SHA251F

*1: HA-109
 *2: HA-119

*3: HA-120
 *4: HA-82

*5: HA-2

Maintenance of Lubricant Quantity in Compressor

NHHA0229

The lubricant in the compressor circulates through the system with the refrigerant. Add lubricant to compressor when replacing any component or after a large gas leakage occurred. It is important to maintain the specified amount. If lubricant quantity is not maintained properly, the following malfunctions may result:

- Lack of lubricant: May lead to a seized compressor
- Excessive lubricant: Inadequate cooling (thermal exchange interference)

LUBRICANT

NHHA0229S01

Name: Nissan A/C System Oil Type S
Part number: KLH00-PAGSO

CHECKING AND ADJUSTING

NHHA0229S02

Adjust the lubricant quantity according to the test group shown below.

1	CHECK LUBRICANT RETURN OPERATION	
Can lubricant return operation be performed?		
<ul style="list-style-type: none"> ● A/C system works properly. ● There is no evidence of a large amount of lubricant leakage. 		
Yes or No		
Yes	▶	GO TO 2.
No	▶	GO TO 3.

2	PERFORM LUBRICANT RETURN OPERATION, PROCEEDING AS FOLLOWS:	
1. Start engine, and set the following conditions:		
Test condition		
Engine speed: Idling to 1,200 rpm		
A/C or AUTO switch: ON		
Blower speed: Max. position		
Temp. control: Optional [Set so that intake air temperature is 25 to 30°C (77 to 86°F).]		
2. Next item is for V-6 compressor. Connect the manifold gauge, and check that the high pressure side pressure is 588 kPa (6 kg/cm², 85 psi) or higher.		
If less than the reference level, attach a cover to the front face of the condenser to raise the pressure.		
3. Perform lubricant return operation for about 10 minutes.		
4. Stop engine.		
CAUTION:		
If excessive lubricant leakage is noted, do not perform the lubricant return operation.		
OK	▶	GO TO 3.

3	CHECK COMPRESSOR	
Should the compressor be replaced?		
Yes or No		
Yes	▶	Go to "Lubricant Adjustment Procedure for Compressor Replacement", (HA-110).
No	▶	GO TO 4.

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SERVICE PROCEDURE

Maintenance of Lubricant Quantity in Compressor (Cont'd)

4 CHECK ANY PART	
Is there any part to be replaced? (Evaporator, condenser, liquid tank or in case there is evidence of a large amount of lubricant leakage.)	
Yes or No	
Yes	▶ Go to "Lubricant Adjusting Procedure for Components Replacement Except Compressor", (HA-110).
No	▶ Carry out the A/C performance test.

Lubricant Adjusting Procedure for Components Replacement Except Compressor

NHH-0229S0201

After replacing any of the following major components, add the correct amount of lubricant to the system.

Amount of lubricant to be added

Part replaced	Lubricant to be added to system	Remarks
	Amount of lubricant ml (US fl oz, Imp fl oz)	
Evaporator	75 (2.5, 2.6)	—
Condenser	75 (2.5, 2.6)	—
Liquid tank	5 (0.2, 0.2)	Add if compressor is not replaced. *1
In case of refrigerant leak	30 (1.0, 1.1)	Large leak
	—	Small leak *2

*1: If compressor is replaced, addition of lubricant is included in the table.

*2: If refrigerant leak is small, no addition of lubricant is needed.

Lubricant Adjusting Procedure for Compressor Replacement

NHH-0229S0202

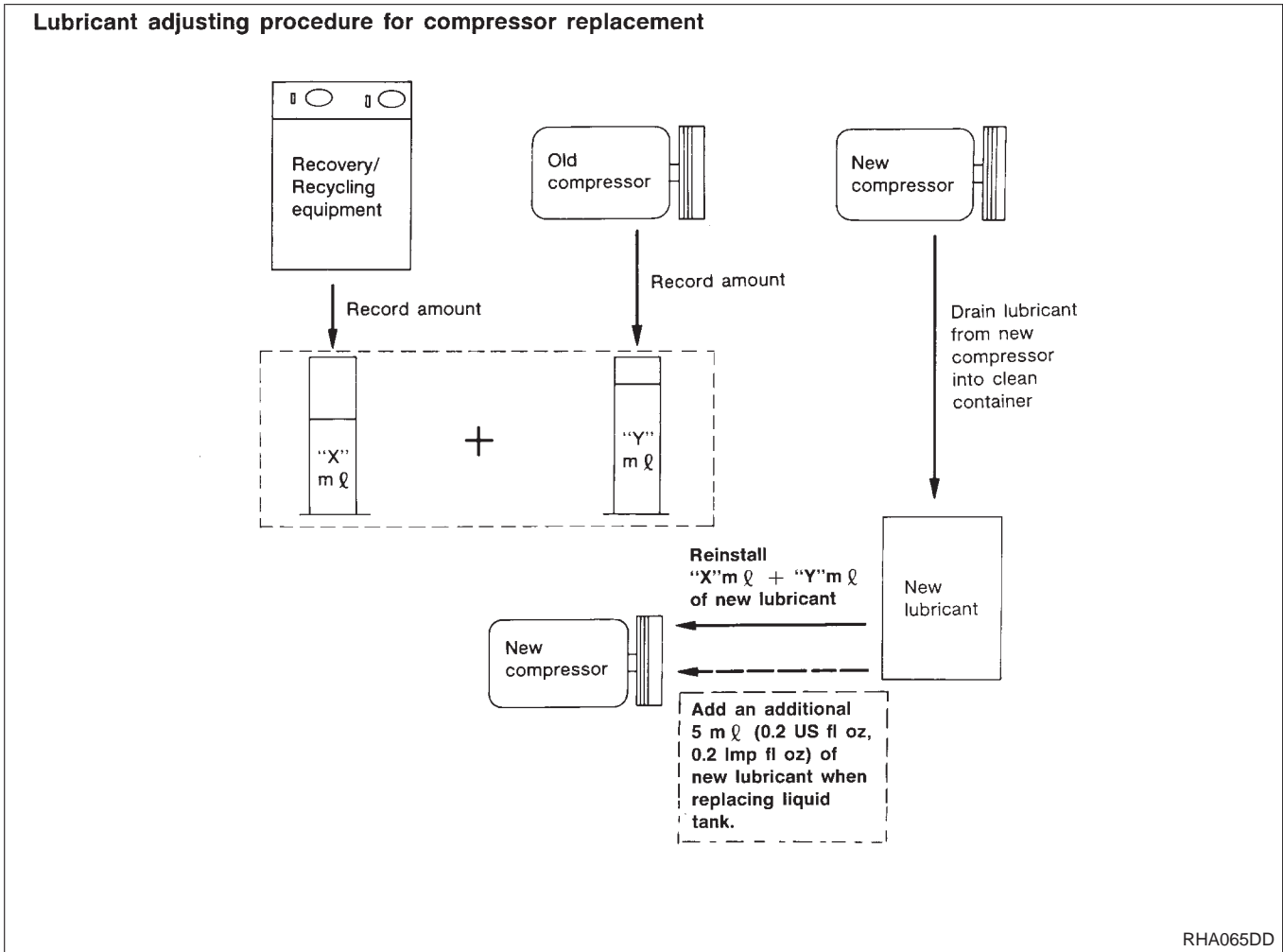
1. Before connecting ACR4 to vehicle, check ACR4 gauges. No refrigerant pressure should be displayed. If NG, recover refrigerant from equipment lines.
2. Connect ACR4 to vehicle. Confirm refrigerant purity in supply tank using ACR4 and refrigerant identifier. If NG, refer to "CONTAMINATED REFRIGERANT", HA-2.
3. Confirm refrigerant purity in vehicle A/C system using ACR4 and refrigerant identifier. If NG, refer to "CONTAMINATED REFRIGERANT", HA-2.
4. Discharge refrigerant into the refrigerant recovery/recycling equipment. Measure lubricant discharged into the recovery/recycling equipment.
5. Remove the drain plug of the "old" (removed) compressor. Drain the lubricant into a graduated container and record the amount of drained lubricant.
6. Remove the drain plug and drain the lubricant from the "new" compressor into a separate, clean container.
7. Measure an amount of new lubricant installed equal to amount drained from "old" compressor. Add this lubricant to "new" compressor through the suction port opening.
8. Measure an amount of new lubricant equal to the amount recovered during discharging. Add this lubricant to "new" compressor through the suction port opening.
9. Torque the drain plug.

18 - 19 N·m (1.8 - 1.9 kg·m, 13 - 14 ft·lb)

SERVICE PROCEDURE

Maintenance of Lubricant Quantity in Compressor (Cont'd)

- If the liquid tank also needs to be replaced, add an additional 5 mℓ (0.2 US fl oz, 0.2 Imp fl oz) of lubricant at this time. Do not add this 5 mℓ (0.2 US fl oz, 0.2 Imp fl oz) of lubricant if only replacing the compressor.



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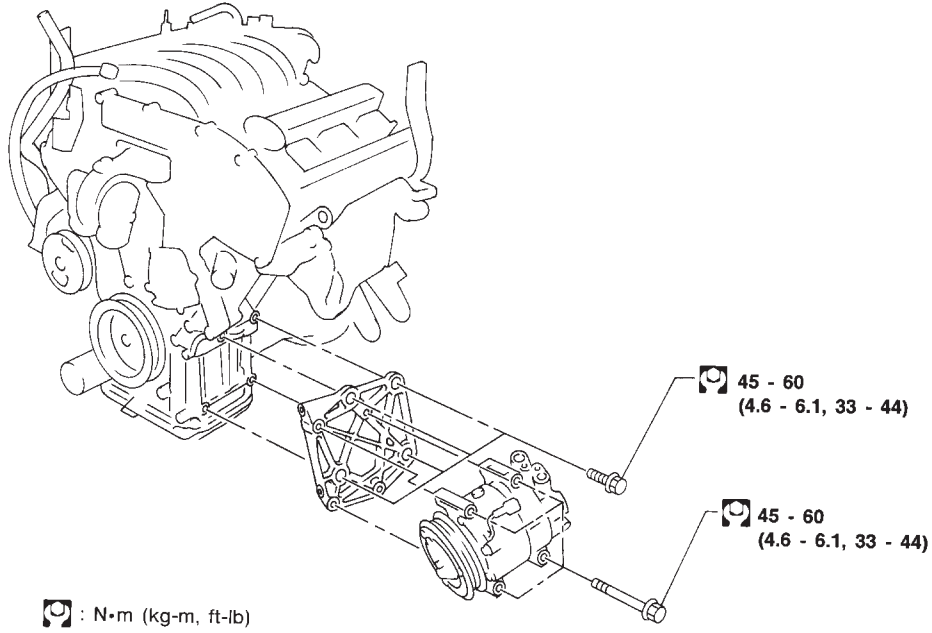
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Compressor REMOVAL AND INSTALLATION

NHHA0230

SEC. 274-275

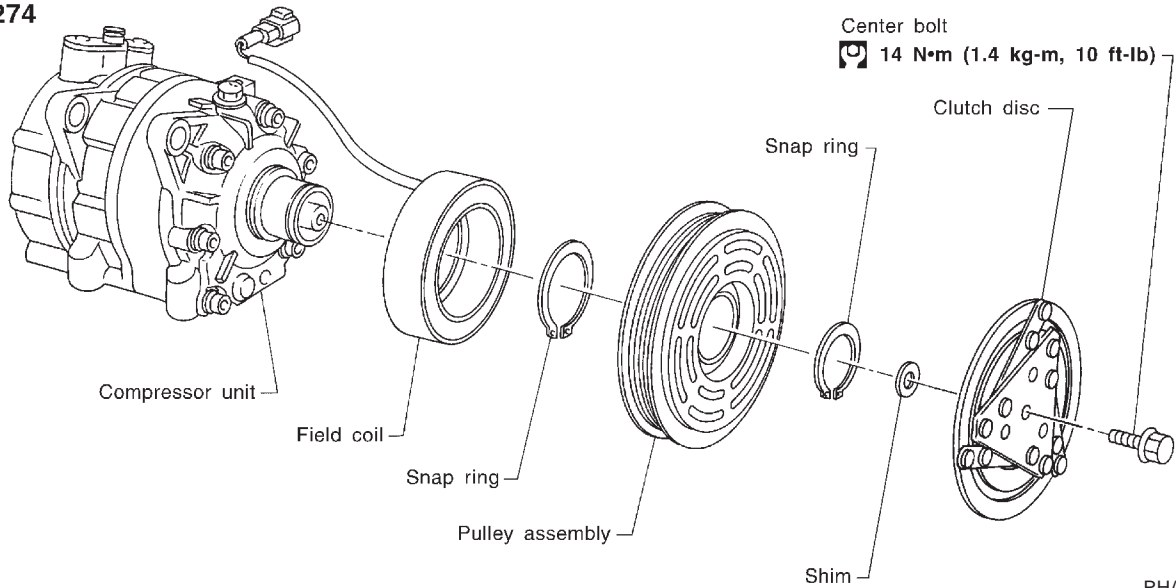


RHA463E

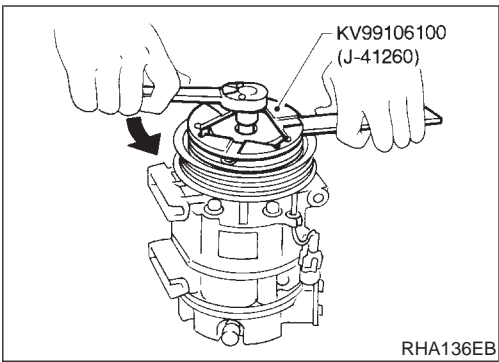
Compressor Clutch OVERHAUL

NHHA0231

SEC. 274

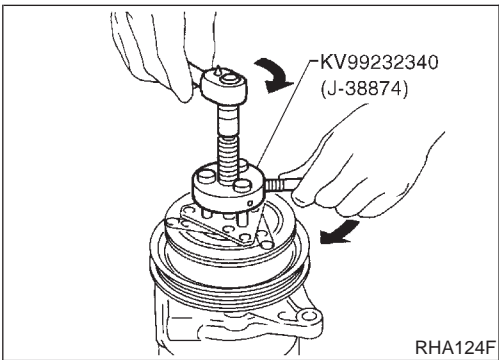
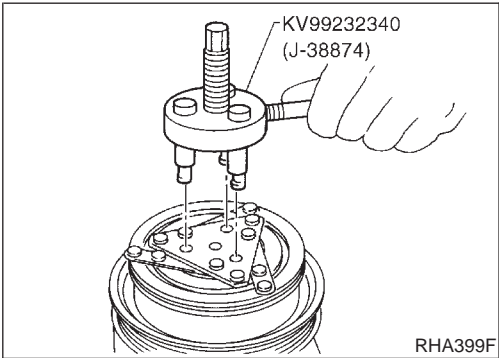


RHA122F

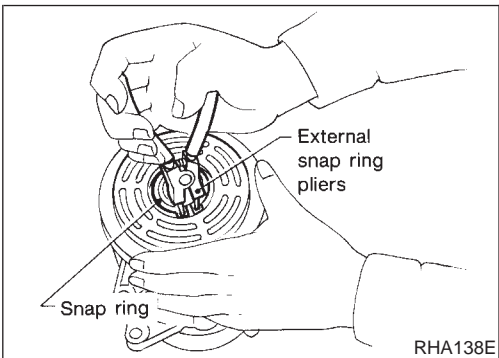


REMOVAL

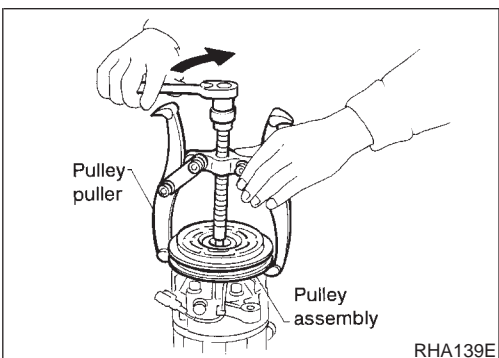
- When removing center bolt, hold clutch disc with clutch disc wrench. NHHA0232



- Remove the clutch disc using the clutch disc puller. Insert the holder's three pins into the holes in the clutch disc. Rotate the holder clockwise to hook it onto the plate. Then, tighten the center bolt to remove the clutch disc. After removing the clutch disc, remove the shims from either the drive shaft or the clutch disc.



- Remove the snap ring using external snap ring pliers.



- Pulley removal**
Position the center pulley puller on the end of the drive shaft, and remove the pulley assembly using any commercially available pulley puller.
To prevent the pulley groove from being deformed, the puller claws should be positioned onto the edge of the pulley assembly.

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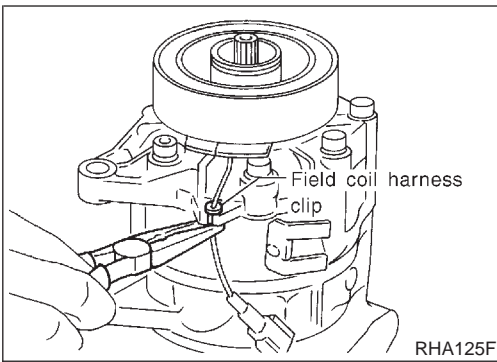
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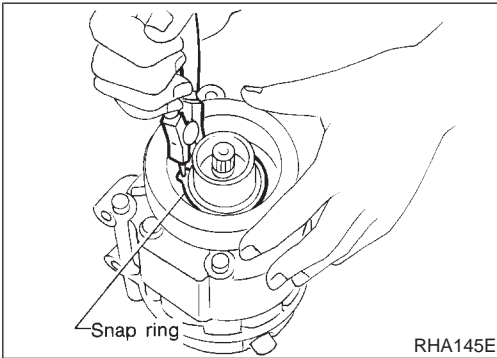
IDX

SERVICE PROCEDURE

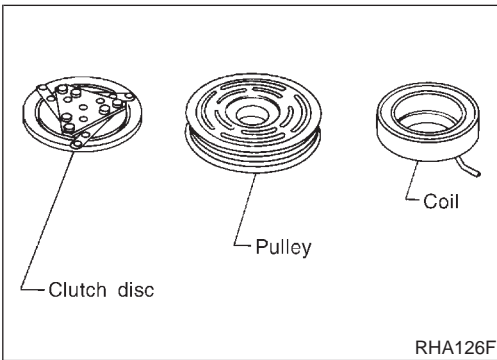
Compressor Clutch (Cont'd)



- Remove the field coil harness clip using a pair of pliers.



- Remove the snap ring using external snap ring pliers.



INSPECTION

NHHA0233

Clutch Disc

NHHA0233S01

If the contact surface shows signs of damage due to excessive heat, replace clutch disc and pulley.

Pulley

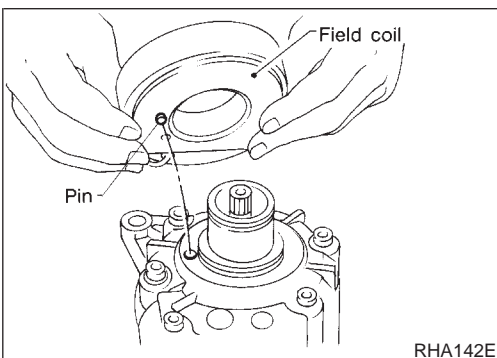
NHHA0233S02

Check the appearance of the pulley assembly. If the contact surface of pulley shows signs of excessive grooving, replace clutch disc and pulley. The contact surfaces of the pulley assembly should be cleaned with a suitable solvent before reinstallation.

Coil

NHHA0233S03

Check coil for loose connection or cracked insulation.



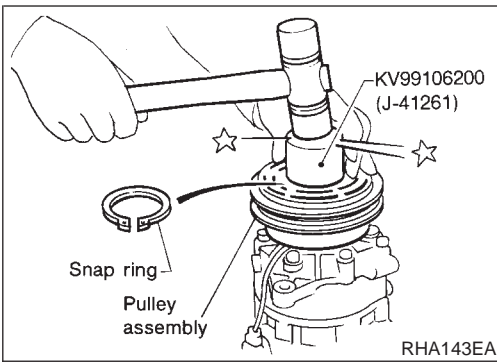
INSTALLATION

NHHA0234

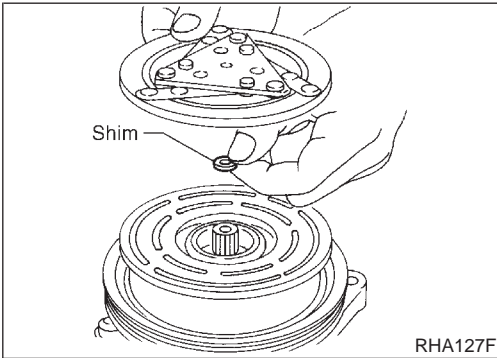
- Install the field coil.
Be sure to align the coil's pin with the hole in the compressor's front head.
- Install the field coil harness clip using a screwdriver.

SERVICE PROCEDURE

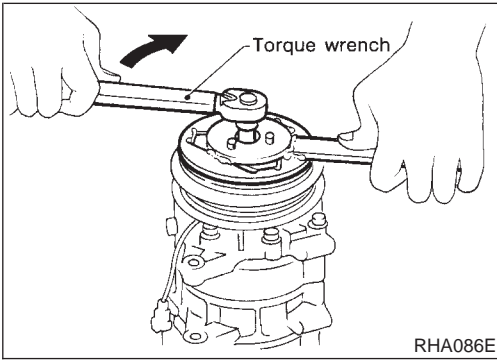
Compressor Clutch (Cont'd)



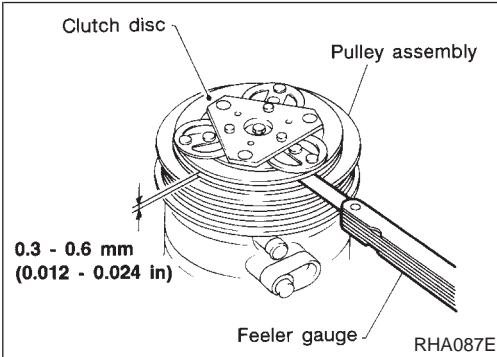
- Install the pulley assembly using the installer and a hand press, and then install the snap ring using snap ring pliers.



- Install the clutch disc on the drive shaft, together with the original shim(s). Press the clutch disc down by hand.



- Using the holder to prevent clutch disc rotation, tighten the bolt to 14 N·m (1.4 kg·m, 10 ft·lb) torque. **After tightening the bolt, check that the pulley rotates smoothly.**



- Check clearance around the entire periphery of clutch disc. **Disc-to-pulley clearance: 0.3 - 0.6 mm (0.012 - 0.024 in)**
If the specified clearance is not obtained, replace adjusting spacer and readjust.

Break-in Operation

When replacing compressor clutch assembly, always carry out the break-in operation. This is done by engaging and disengaging the clutch about thirty times. Break-in operation raises the level of transmitted torque.

NHHA0234S01

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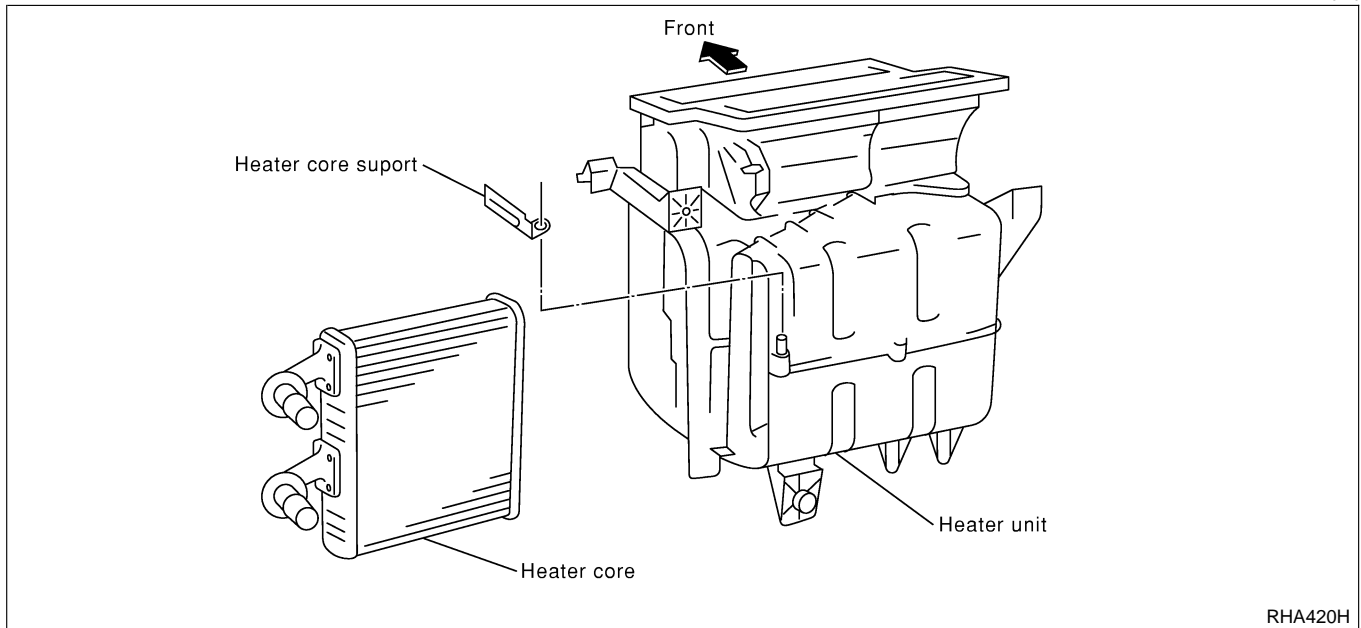
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SERVICE PROCEDURE

Heater Unit (Heater Core)

Heater Unit (Heater Core) REMOVAL

NHHA0249



RHA420H

1. Drain the cooling system. Refer to MA-14, "Changing Engine Coolant".
2. Disconnect the two heater hoses from inside the engine compartment.
3. Remove the Blower and cooling unit. Refer to HA-117.
4. Remove the steering member assembly. Refer to BT-28, "Instrument Panel Assembly".
5. Remove the heater unit.
6. Remove the heater core.

INSTALLATION

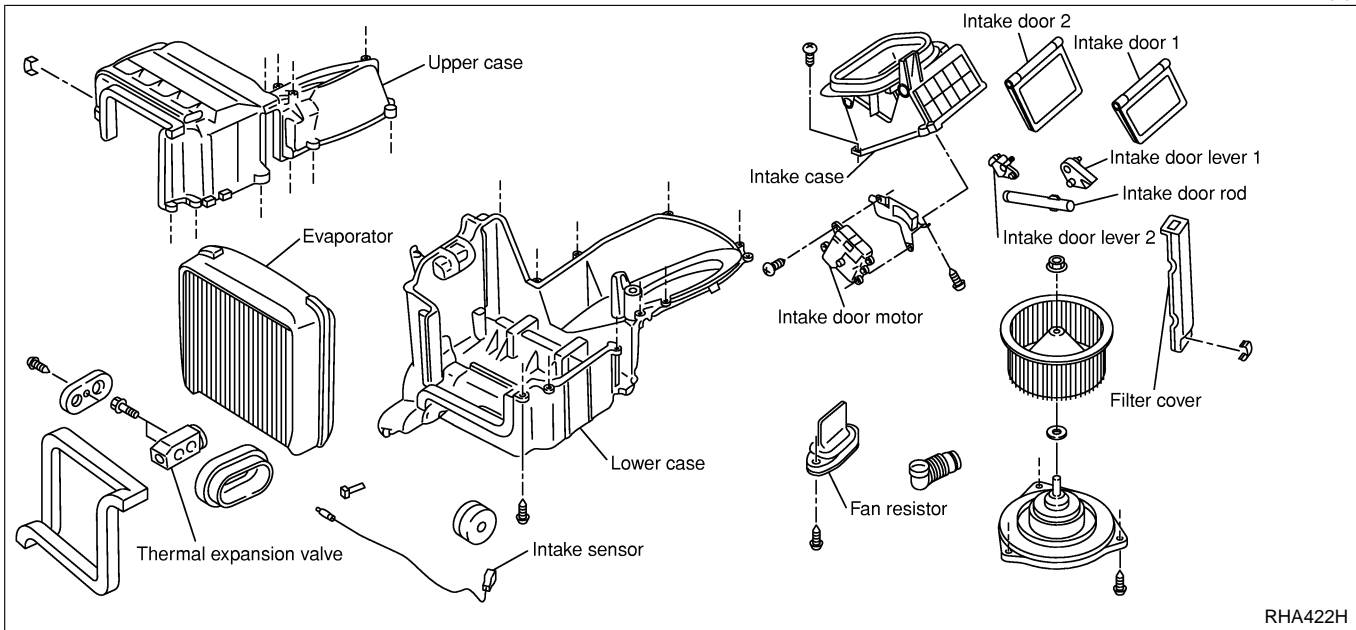
NHHA0250

Installation is basically the reverse order of removal.

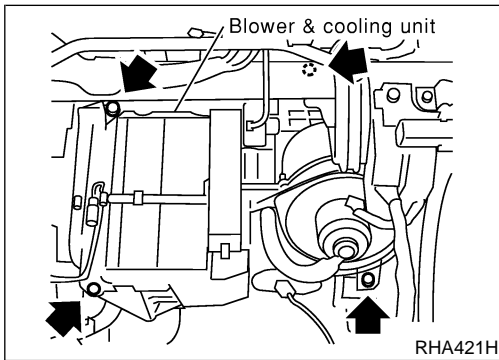
When filling radiator with coolant, refer to MA-14, "Changing Engine Coolant".

Blower and Cooling Unit (A/C Evaporator) REMOVAL

NHHA0251



RHA422H



RHA421H

1. Discharge the A/C system. Refer to HA-107.
2. Disconnect the two refrigerant lines from the engine compartment.
Cap the A/C lines to prevent moisture from entering the system.
3. Remove the glove box and mating trim. Refer to BT-28, "Instrument Panel Assembly".
4. Disconnect the thermal amp. connector.
5. Disconnect the intake sensor connector.
6. Disconnect the fan control amp. and blower motor connector.
7. Remove the blower and cooling unit.
8. Separate the blower and cooling unit case, and remove the evaporator.
9. Remove the three bolts and then remove the motor from the blower case.

INSTALLATION

Installation is basically the reverse order of removal.
Recharge the A/C system. Refer to HA-107.

NHHA0252

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SERVICE PROCEDURE

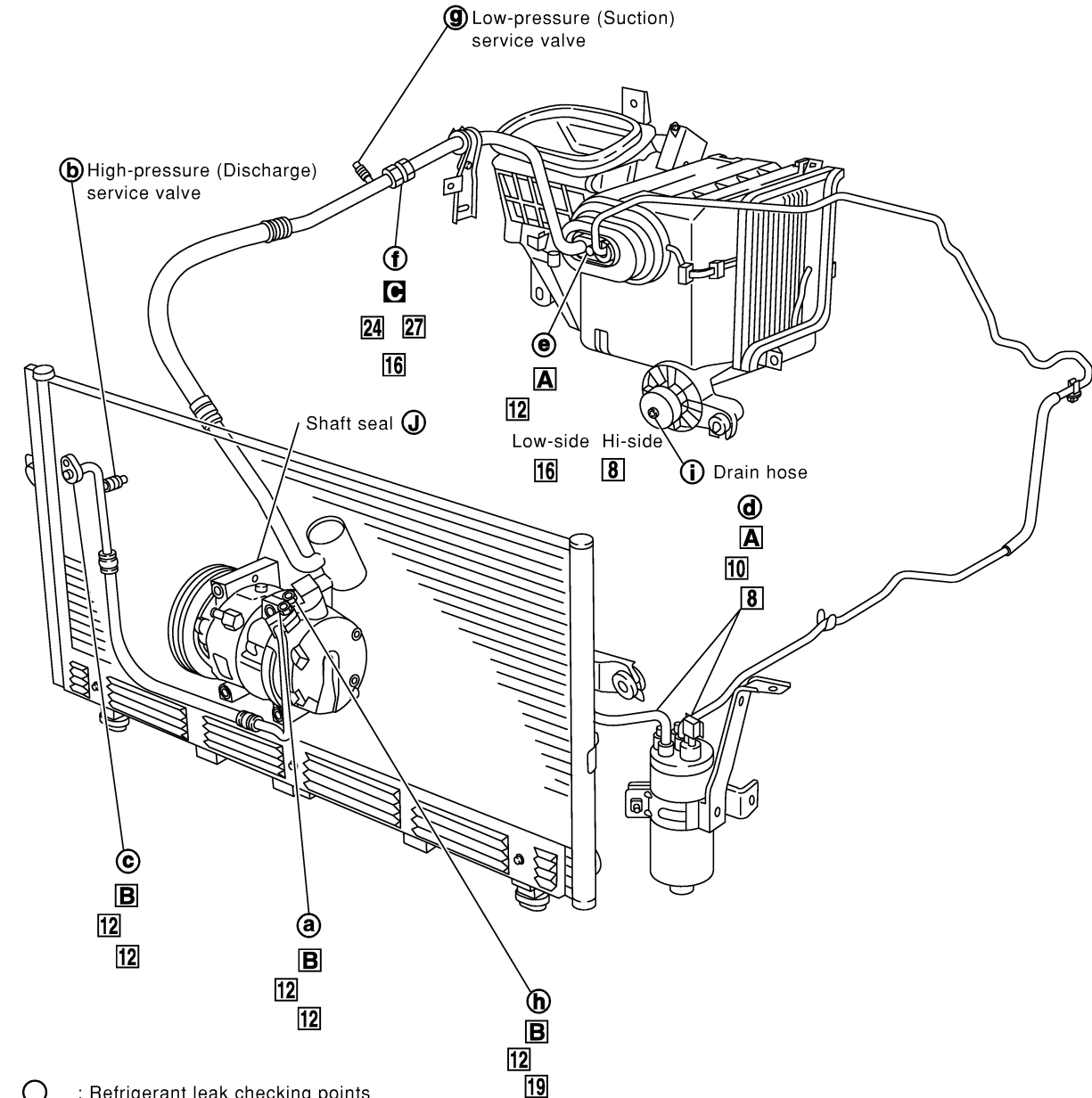
Refrigerant Lines

Refrigerant Lines

REMOVAL AND INSTALLATION

=NHHA0235

- Refer to page HA-3 regarding "Precautions for Refrigerant Connection".



- : Refrigerant leak checking points
- : (Tightening torque)
- □ : (Wrench size)
- : (O-ring size)
- ⊕ : N·m (kg-m, in-lb)
- ⊖ : N·m (kg-m, ft-lb)
- A** : 2.9 - 5.9 (0.29 - 0.61, 26 - 52)
- B** : 7.8 - 19.6 (0.78 - 2.00, 68 - 173)
- C** : 15 - 24 (1.5 - 2.4, 11 - 18)

RHA423HC

CHECKING REFRIGERANT LEAKS

NHHA0236

Preliminary Check

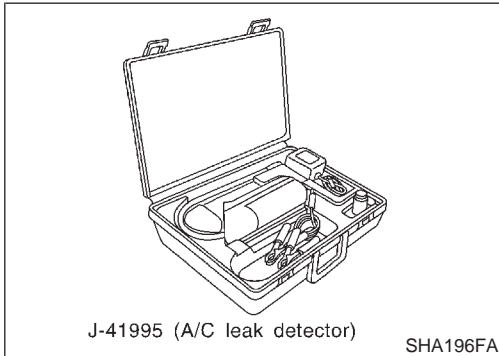
NHHA0236S01

Perform a visual inspection of all refrigeration parts, fittings, hoses, and components for signs of A/C lubricant leakage, damage and corrosion. Take note of the areas with A/C lubricant leakage to allow extra time in these areas with electronic leak detector.

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Precautions for Handling Leak Detector

NHHA0236S02

When performing a refrigerant leak check, use a J-41995 A/C leak detector or equivalent. Ensure that the instrument is calibrated and set properly per the operating instructions.

The leak detector is a delicate device. In order to use the leak detector properly, read the operating instructions and perform any specified maintenance.

Other gases in the work area or substances on the A/C components, for example, anti-freeze, windshield washer fluid, solvents and lubricants, may falsely trigger the leak detector. Make sure the surfaces to be checked are clean. Clean with a dry cloth or blow off with shop air. Do not allow the sensor tip of the detector to contact with any substance. This can also cause false readings and may damage the detector.

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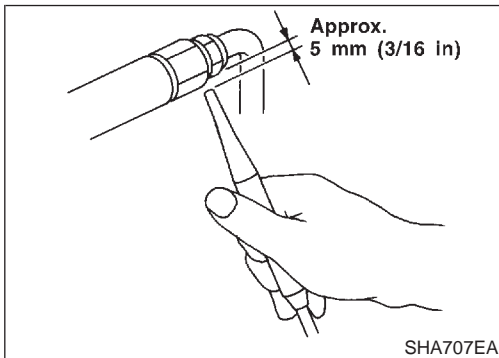
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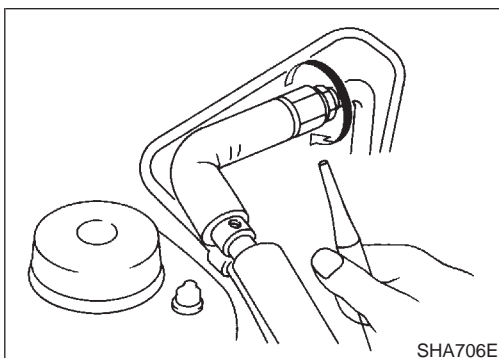
1. Position probe approximately 5 mm (3/16 in) away from point to be checked.

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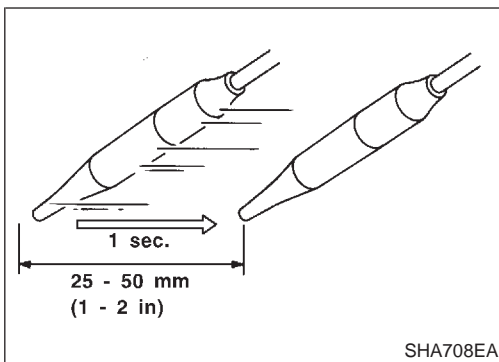
2. When testing, circle each fitting completely with probe.

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SERVICE PROCEDURE

Refrigerant Lines (Cont'd)



3. Move probe along component approximately 25 to 50 mm (1 to 2 in)/sec.

Checking Procedure

NHHA0236S03
To prevent inaccurate or false readings, make sure there is no refrigerant vapor, shop chemicals, or cigarette smoke in the vicinity of the vehicle. Perform the leak test in calm area (low air/wind movement) so that the leaking refrigerant is not dispersed.

1. Turn engine off.
2. Connect a suitable A/C manifold gauge set to the A/C service ports.
3. Check if the A/C refrigerant pressure is at least 345 kPa (3.52 kg/cm², 50 psi) above 16°C (61°F). If less than specification, recover/evacuate and recharge the system with the specified amount of refrigerant.

NOTE:

At temperatures below 16°C (61°F), leaks may not be detected since the system may not reach 345 kPa (3.52 kg/cm², 50 psi).

4. Conduct the leak test from the high side (compressor discharge **a** to evaporator inlet **e**) to the low side (evaporator discharge **e** to shaft seal **j**). Refer to HA-118. Perform a leak check for the following areas carefully. Clean the component to be checked and move the leak detector probe completely around the connection/component.

- **Compressor**
Check the fitting of high and low pressure hoses, relief valve and shaft seal.
- **Liquid tank**
Check the pressure switch, tube fitting, weld seams and the fusible plug mount.
- **Service valves**
Check all around the service valves. Ensure service valve caps are secured on the service valves (to prevent leaks).

NOTE:

After removing A/C manifold gauge set from service valves, wipe any residue from valves to prevent any false readings by leak detector.

- **Cooling unit (Evaporator)**
With engine OFF, turn blower fan on "High" for at least 15 seconds to dissipate any refrigerant trace in the cooling unit. Wait a minimum of 10 minutes accumulation time (refer to the manufacturer's recommended procedure for actual wait time) before inserting the leak detector probe into the drain hose. Keep the probe inserted for at least ten seconds. Use caution not to contaminate the probe tip with water or dirt that may be in the drain hose.

5. If a leak detector detects a leak, verify at least once by blowing compressed air into area of suspected leak, then repeat check as outlined above.
6. Do not stop when one leak is found. Continue to check for additional leaks at all system components. If no leaks are found, perform steps 7 - 10.
7. Start engine.
8. Set the heater A/C control as follows:
 - 1) A/C switch ON.
 - 2) Face mode
 - 3) Recirculation switch ON
 - 4) Max cold temperature
 - 5) Fan speed high
9. Run engine at 1,500 rpm for at least 2 minutes.
10. Turn engine off and perform leak check again following steps 4 through 6 above.

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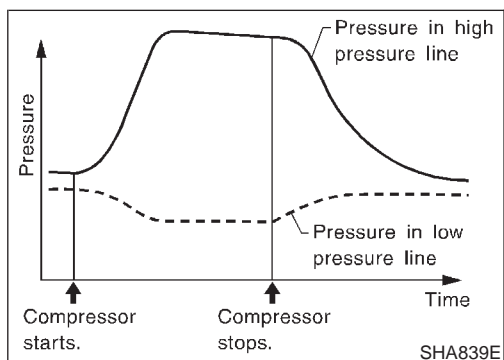
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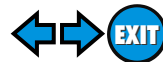
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Refrigerant leaks should be checked immediately after stopping the engine. Begin with the leak detector at the compressor. The pressure on the high pressure side will gradually drop after refrigerant circulation stops and pressure on the low pressure side will gradually rise, as shown in the graph. Some leaks are more easily detected when pressure is high.

11. Before connecting ACR4 to vehicle, check ACR4 gauges. No refrigerant pressure should be displayed. If pressure is displayed, recover refrigerant from equipment lines and then check refrigerant purity.
12. Confirm refrigerant purity in supply tank using ACR4 and refrigerant identifier.
13. Confirm refrigerant purity in vehicle A/C system using ACR4 and refrigerant identifier.
14. Discharge A/C system using approved refrigerant recovery equipment. Repair the leaking fitting or component as necessary.
15. Evacuate and recharge A/C system and perform the leak test to confirm no refrigerant leaks.
16. Conduct A/C performance test to ensure system works properly.



Belt

Belt

TENSION ADJUSTMENT

- Refer to MA-13, “Checking Drive Belt”.

NHHA0237

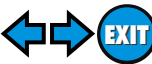
Idle Air Control Valve (IACV) — Auxiliary Air Control (AAC) Valve

INSPECTION

- Refer to EC-458, and HA-19, “Description”.

NHHA0238

SERVICE DATA AND SPECIFICATIONS (SDS)



Compressor

Compressor

NHHA0241

Model		CALSONIC make V-6
Type		V-6 variable displacement
Displacement cm ³ (cu in)/rev.	Max.	184 (11.228)
	Min.	14.5 (0.885)
Cylinder bore x stroke mm (in)		37 (1.46) x [2.3 - 28.6 (0.091 - 1.126)]
Direction of rotation		Clockwise (viewed from drive end)
Drive belt		Poly V

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Lubricant

NHHA0242

Model		CALSONIC make V-6
Name		Nissan A/C System Oil Type S
Part number		KLH00-PAGS0
Capacity mℓ (US fl oz, Imp fl oz)	Total in system	200 (6.8, 7.0)
	Compressor (Service part) charging amount	200 (6.8, 7.0)

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Refrigerant

NHHA0243

Type	HFC-134a (R-134a)
Capacity kg (lb)	0.60 - 0.70 (1.32 - 1.54)

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Engine Idling Speed (When A/C is ON)

NHHA0244

- Refer to EC-700, "Idle Speed and Ignition Timing".

Belt Tension

NHHA0245

- Refer to MA-13, "Checking Drive Belts".

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