

HEATER & AIR CONDITIONER

SECTION HA

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When you read wiring diagrams:

- **Read G1 section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

When you perform trouble diagnoses, read G1 section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES".

PRECAUTIONS

Supplemental Restraint System "AIR BAG"

The Supplemental Restraint System "Air Bag" helps to reduce the risk or severity of injury to the driver in a frontal collision. The Supplemental Restraint System consists of an air bag (located in the center of the steering wheel), sensors, a control unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **BF section** of this Service Manual.

WARNING:

- a. To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized NISSAN dealer.
- b. Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.
- c. All SRS electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS "Air Bag".

Introduction

To prevent the ozone layer from being destroyed, the HFC-134a (R-134a) refrigerant has replaced the previously used CFC-12 (R-12).

The new and previous service tools, refrigerant, lubricant, etc. are not interchangeable due to differences in their physical properties and characteristics.

Always service the HFC-134a (R-134a) air conditioning system using the specified tools, lubricant and refrigerant, observing the following precautions:

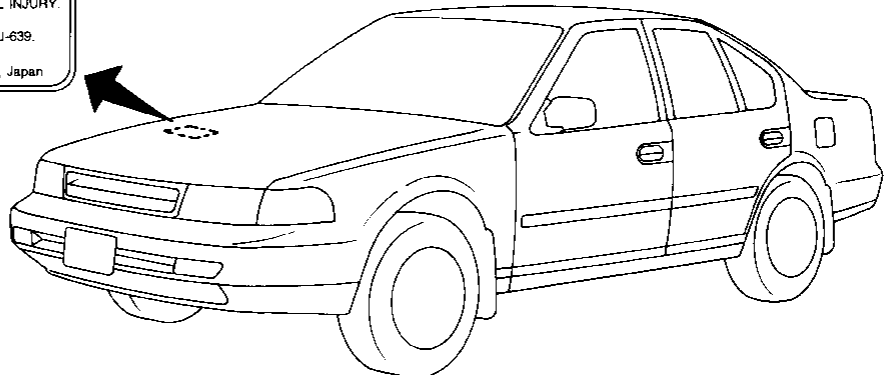
Identification

IDENTIFICATION LABEL FOR VEHICLE

AIR CONDITIONER		
	REFRIGERANT	COMPRESSOR LUBRICANT
TYPE (PART NO.)	R134a	①
AMOUNT	③	②
CAUTION		PRÉCAUTION
<ul style="list-style-type: none"> ● REFRIGERANT UNDER HIGH PRESSURE. ● SYSTEM TO BE SERVICED BY QUALIFIED PERSONNEL. ● IMPROPER SERVICE METHODS MAY CAUSE PERSONAL INJURY. ● CONSULT SERVICE MANUAL. ● THIS AIR CONDITIONER SYSTEM COMPLIES WITH SAE J-639. 		
Nissan Motor Co., Ltd., TOKYO, Japan		

This label is located under the hood.

- ① : Lubricant type and service part number
- ② : Amount of lubricant
- ③ : Amount of refrigerant



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PRECAUTIONS

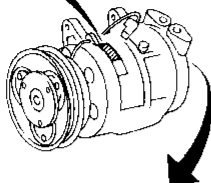
Identification (Cont'd)

PARTS IDENTIFICATION

1. Compressor label

R134a label

R134a用
USE FOR R134a



2. Other component parts label

R134a label

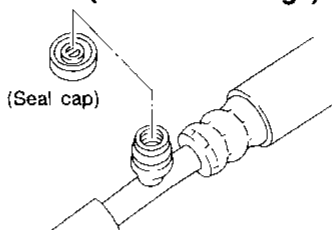
R134a用
USE FOR R134a

R134a用
USE FOR
R134a

Base color: Light blue

Part name	Identification
1. Compressor	R134a label or Compressor label
2. Cooling unit	R134a label
3. Expansion valve	Stamp
4. Condenser	R134a label
5. Liquid tank	R134a label
6. Hose or pipe	R134a label

3. Service valves (suction/discharge)



The service valves are specially designed for the HFC-134a (R134a) system. Those for the CFC-12 (R-12) system are different in size and configuration. Refer to "PREPARATION".

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

WARNING:

- CFC-12 (R-12) refrigerant and HFC-134a (R-134a) refrigerant must never be mixed, even in the smallest amounts, as they are incompatible with each other. If the refrigerants are mixed, compressor failure is likely to occur.
- Use only specified lubrication oil for the HFC-134a (R-134a) A/C system and HFC-134a (R-134a) components. If lubrication oil other than that specified is used, compressor failure is likely to occur.
- The specified HFC-134a (R-134a) lubrication oil absorbs moisture from the atmosphere at a rapid rate, therefore 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. Also, complete the connection of all refrigerant loop components as quickly as possible to minimize the entry of moisture into the system.
 - c: Use the specified lubrication oil from a sealed container only. Containers must be re-sealed immediately after dispensing the lubrication oil. Lubrication oil in containers which are not properly sealed will become moisture saturated, and such lubrication oil is no longer suitable for use and should be properly disposed of.
 - d: Avoid breathing A/C refrigerant and lubrication oil vapor or mist. Exposure may irritate eyes, nose and throat. Use only approved recovery/recycling equipment to discharge HFC-134a (R-134a) systems. If accidental system discharge occurs, ventilate work area before resuming work.
 - e: Do not allow lubrication oil (Nissan A/C System Oil Type S) to come in contact with styrofoam parts. Damage may result.

PRECAUTIONS

General Refrigerant Precautions

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 introduce compressed air to any refrigerant container or refrigerant component.

Precautions for Refrigerant Connection

WARNING:

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

CAUTION:

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

- Do not leave compressor on its side or upside down for more than 10 minutes, as compressor oil will enter low pressure chamber.
- When connecting tubes, always use a torque wrench and a back-up wrench.
- After disconnecting tubes, plug all openings immediately to prevent entrance of dirt and moisture.
- When installing an air conditioner in the vehicle, the pipes must be connected as the final stage of the operation. The seal caps of the pipes and other components must not be removed until their removal is required for connection.
- To prevent the condensation of moisture inside A/C components, components stored in cool areas should be allowed to warm to the working area temperature before removing the seal caps.
- Thoroughly remove moisture from the refrigeration system before charging the refrigerant.
- Always replace used O-rings.
- When connecting tube, apply lubrication oil to portions shown in illustration. Be careful not to apply oil to threaded portion.

Lubrication oil name: Nissan A/C System Oil Type S

Part number: KLH00-PAGS0

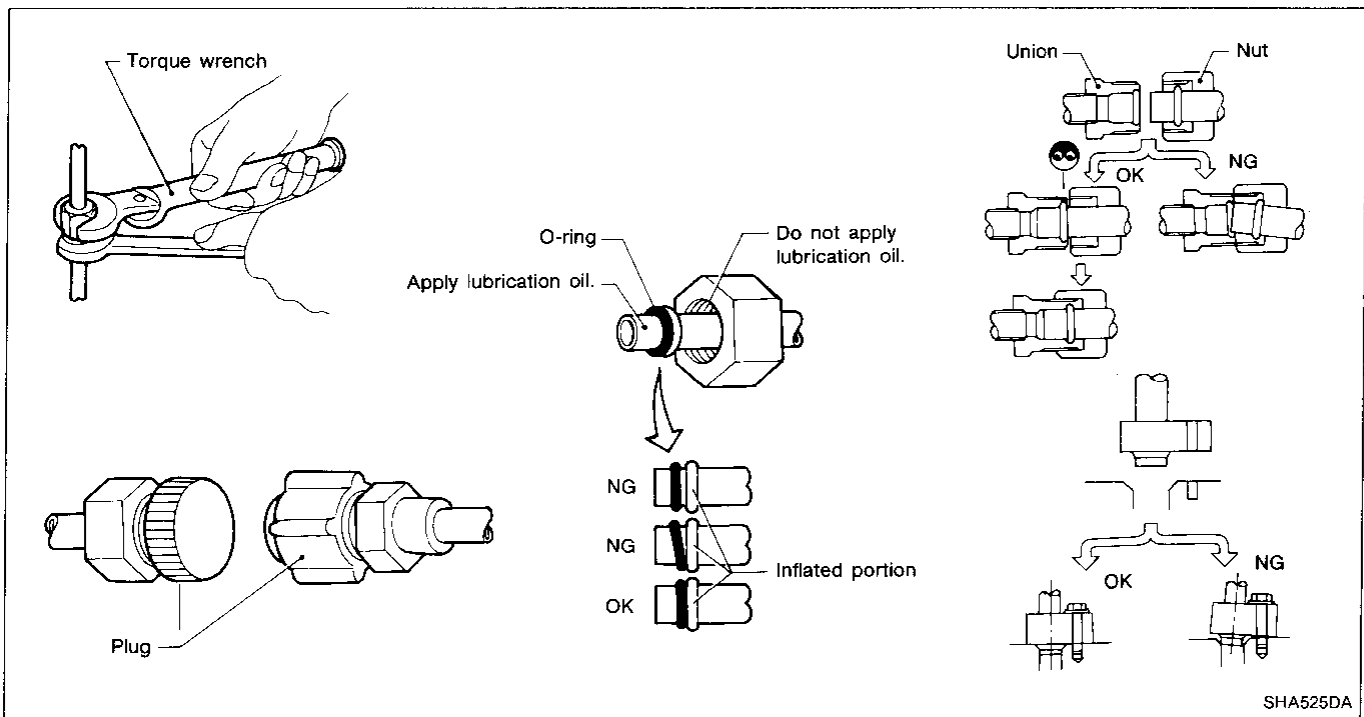
- O-ring must be closely attached to inflated portion of tube.
- After inserting tube into union until O-ring is no longer visible, tighten nut to specified torque.
- After connecting line, conduct leak test and make sure that there is no leakage from connections. When the gas leaking point is found, disconnect that line and replace the O-ring. Then tighten connections of seal seat to the specified torque.

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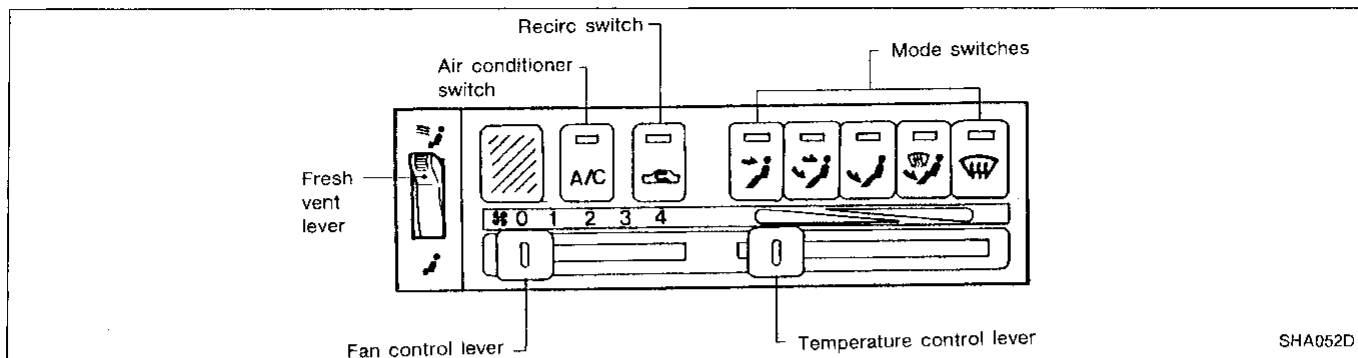
PRECAUTIONS



Precautions for Servicing Compressor

- Attach a blind plug to the suction port (low pressure) and discharge port (high pressure) of the compressor to prevent oil from leaking out and dust from getting inside.
- When the compressor is removed, store it in the same position as it was mounted on the car.
- When replacing the compressor, be sure to remove oil from the compressor and check the oil quantity extracted.
- When replacing with a new compressor, be sure to remove oil from the new compressor so that the quantity of oil remaining in the new compressor is equal to the quantity collected from the removed compressor. See the section "LUBRICATION OIL".
- Pay attention so as not to allow dirt and oil to attach on the friction surfaces between clutch and pulley. If the surface is contaminated with oil, wipe it off by using a clean waste cloth moistened with thinner.
- After completing the compressor service operation, be sure to rotate the compressor shaft more than five turns in both directions by hand to equalize oil distribution inside the compressor, then run the compressor for about one hour by idling the engine.

Control Operation — Manual Air Conditioner



FAN CONTROL LEVER

This lever controls fan speed. (The fan turns ON when the fan control lever is utilized in all but the OFF position.)

MODE SWITCHES

These switches allow you to select the outlet air flow.

When the MODE switch is moved to "DEF" or "F/D", the push control amplifier sets the intake door to "FRE (Fresh)". The compressor turns on when the MODE switch is moved to "DEF".

TEMPERATURE CONTROL LEVER

This lever allows you to adjust the temperature of the outlet air.

RECIRC SWITCH

OFF position:

Outside air is drawn into the passenger compartment when this switch is OFF.

ON position:

Interior air is recirculated inside the vehicle.

RECIRC is canceled when DEF or F/D are selected. RECIRC resumes when another mode is chosen.

AIR CONDITIONER SWITCH

Start the engine, move the fan control lever to the desired (1 to 4) position and push the air conditioner switch to turn ON the air conditioner. The indicator light will come on when the air conditioner is ON. To stop the air conditioner, push the switch again to return it to the original position.

The air conditioner cooling function operates only when the engine is running.

Fresh Vent

When the fresh vent lever is in the "ON" position, a small amount of air flows directly from the evaporator outlet to the vent (face) duct, bypassing the heater unit. This provides a small amount of cool air in the occupant head/face area even though warm air may be discharging through the foot or defroster outlets.

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Introduction — Auto Air Conditioner

The Automatic Temperature Control (ATC) system provides automatic regulation of the vehicles interior temperature based on the operator selected "set temperature", regardless of the outside temperature changes. This is done by utilizing a microcomputer, also referred to as the automatic amplifier, which receives input signals from several sensors. The automatic amplifier uses these input signals (including the set temperature) to automatically control the ATC system's outlet air volume, air temperature, and air distribution.

Features — Auto Air Conditioner

Air mix door control

The air mix door is automatically controlled so that in-vehicle temperature will reach, and be maintained at the operator selected "set temperature". For a given set temperature, the mix door position will depend on: Ambient temperature, in-vehicle temperature, amount of sunload, and intake air temperature.

Fan speed control

The blower speed is automatically controlled, with the actual speed (for a given set temperature) depending on: Ambient temperature, in-vehicle temperature, amount of sunload, intake air temperature, and mix door position. Additionally, when the system is turned on, the blower will start slowly and then increase speed (over a period of approximately 5 seconds) until the objective speed is reached. When cold starting in cold ambient temperatures, the blower operation will be delayed to prevent blowing cold air on the occupants feet.

Intake door control

The intake door position will be determined by: Ambient temperature, in-vehicle temperature, and whether the compressor is on or off.

Outlet door control

The outlet door position will be determined by: Ambient temperature, in-vehicle temperature, intake air temperature, and amount of sunload.

Compressor clutch control

The compressor operation (ON-OFF) is automatically controlled by the ambient sensor to prevent compressor damage in very cold ambient temperatures.

The ECM also considers the input signal from the throttle position sensor, and turns the magnet clutch ON or OFF. (Acceleration cut control)

Recirculation switch

If the operator does not want outside air, the RECIRC switch should be pushed. The passenger compartment air will be recirculated.

Self-diagnostic system

The self-diagnostic system consists of five steps. Each step can be accessed by pushing the switches on the automatic amplifier.

STEP 1: Checks LEDs and segments of the display.

STEP 2: Checks each sensor circuit for open or short circuit.

STEP 3: Checks mode door position.

STEP 4: Checks operation of each actuator.

STEP 5: Checks temperature detected by each sensor.

AUXILIARY TRIMMER MECHANISM: Set temperature trimmer.

Memory function

When the ignition switch is turned from "ON" to "OFF", the auto amplifier stores the set temperature and inputs of various switches in its memory. When the ignition switch is turned from "OFF" to "ON", the system begins operation with the information stored in the memory, then immediately compensates for the actual operating conditions.

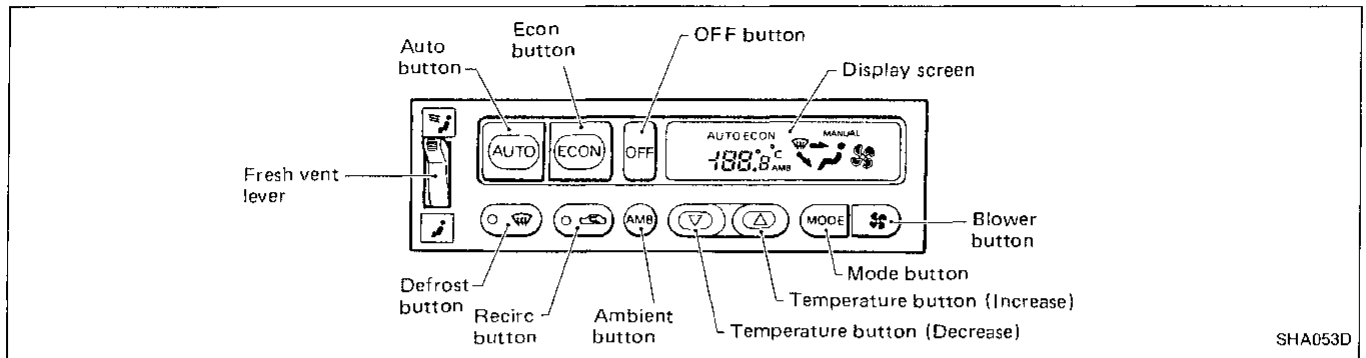
Refrigeration cycle

Refer to page HA-13 for the description of the refrigeration cycle.

Fresh Vent

When the fresh vent lever is in the "ON" position, a small amount of air flows directly from the evaporator outlet to the vent (face) duct, bypassing the heater unit. This provides a small amount of cool air in the occupant head/face area even though warm air may be discharging through the foot or defroster outlets.

Control Operation — Auto Air Conditioner



DISPLAY SCREEN
Displays the operational status of the system.



AUTO BUTTON
The compressor, air inlet door, 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.



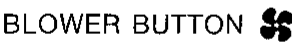
ECON BUTTON
Fully automatic control with the compressor off. With the compressor off, the system will not remove heat (cool) or de-humidify. The system will maintain the in-vehicle temperature at the set temperature when the set temperature is above the ambient (outside) temperature.



TEMPERATURE INCREASE/DECREASE BUTTON
Increases or decreases the set temperature.



OFF BUTTON
The compressor and blower are off, the air inlet door is set to the outside air position, and the air outlet doors are set to the foot (70% foot and 30% defrost) position. In the off position the ATC system uses the vehicle's "flow through" ventilation to try to maintain the interior temperature based on the temperature set when the system was last operating.



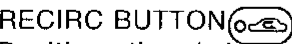
BLOWER BUTTON
Manual control of the blower speed. Four speeds are available for manual control (as shown on the display screen):
low, medium low, medium high, high

MODE BUTTON

Manual control of the air discharge outlets. There selections are available (as shown on the display screen):
face, bi-level, foot



AMBIENT BUTTON
Shows the ambient (outside) air temperature on the display screen for 5 seconds.



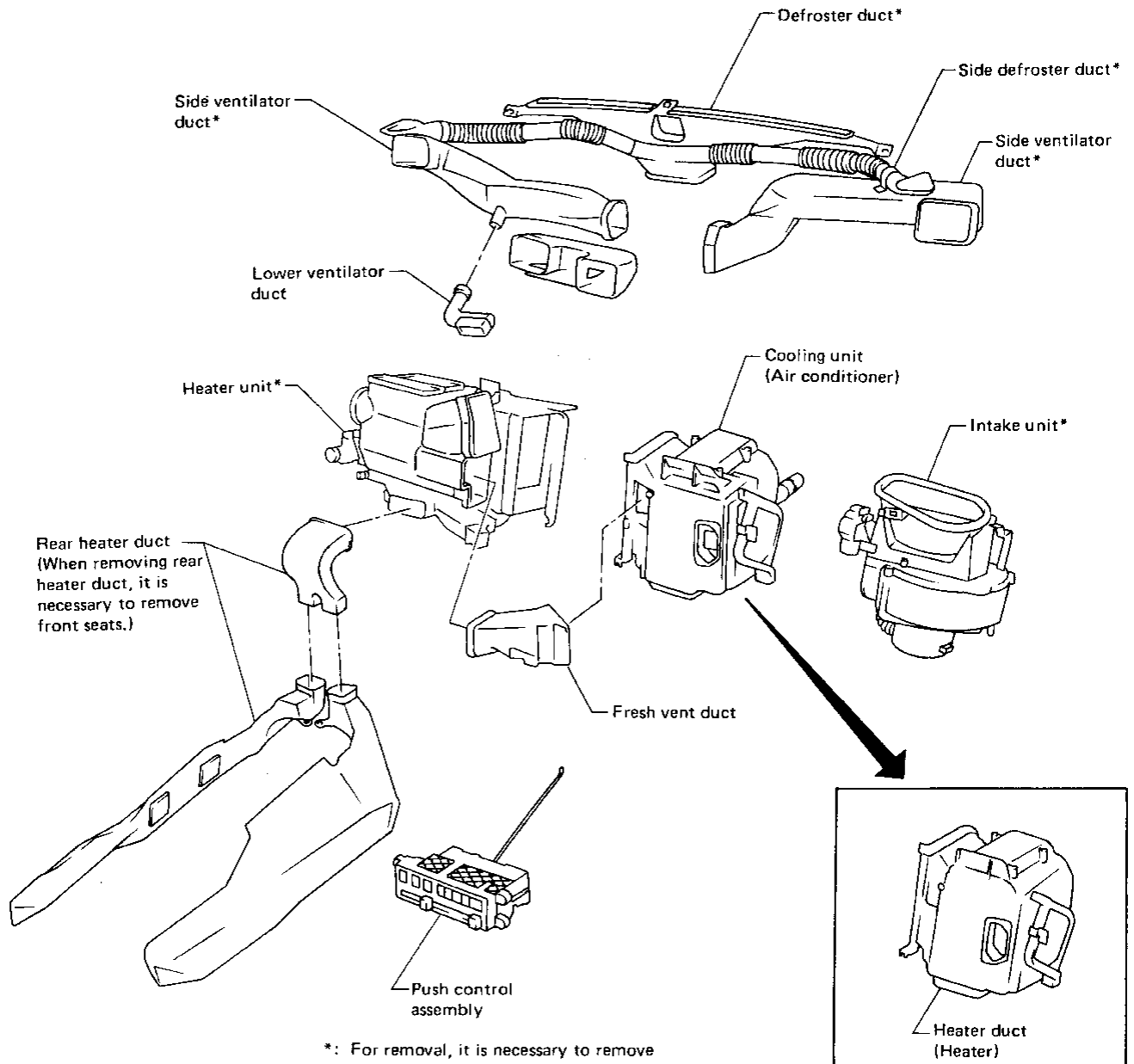
RECIRC BUTTON
Positions the air inlet door to the recirculation position.



DEFROST BUTTON
Positions the air discharge doors to the defrost position. Also positions the air inlet door to the outside air position. The compressor operates at ambient temperature approx. 2°C (35°F) or above.

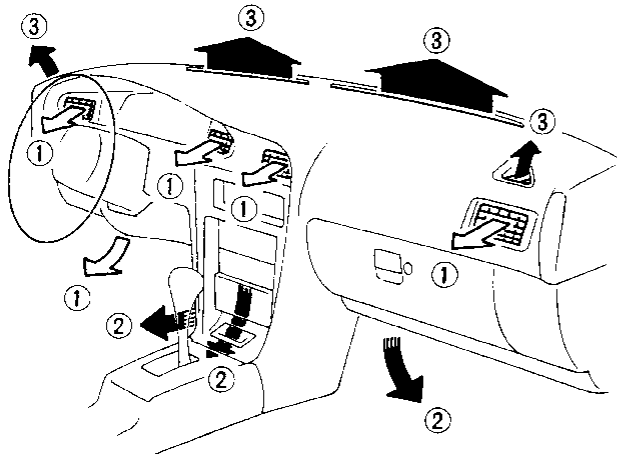
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Component Layout

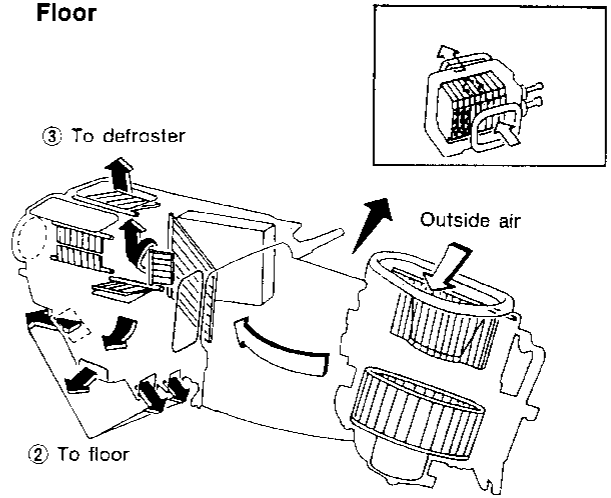


*: For removal, it is necessary to remove instrument assembly.

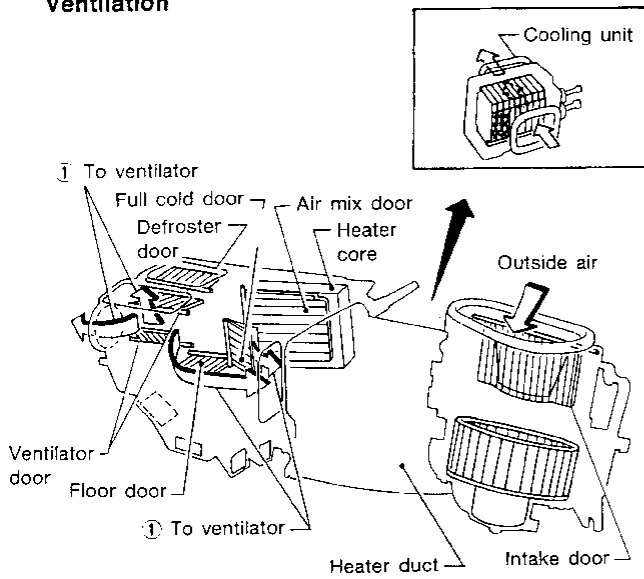
Air Flow



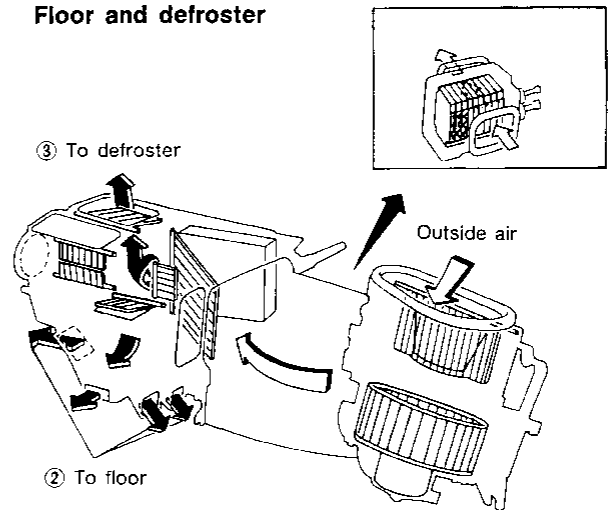
Floor



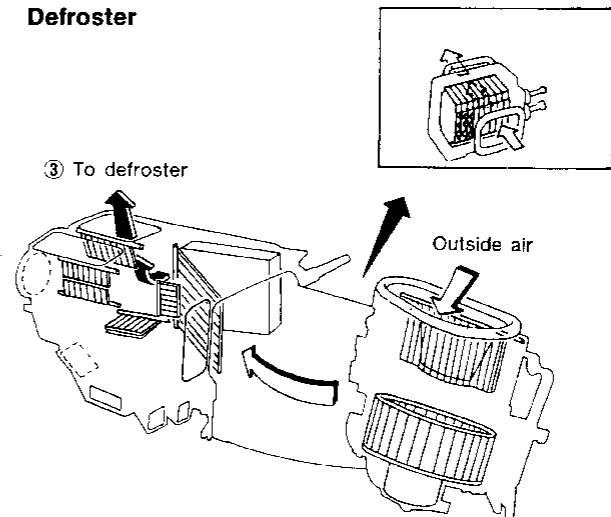
Ventilation



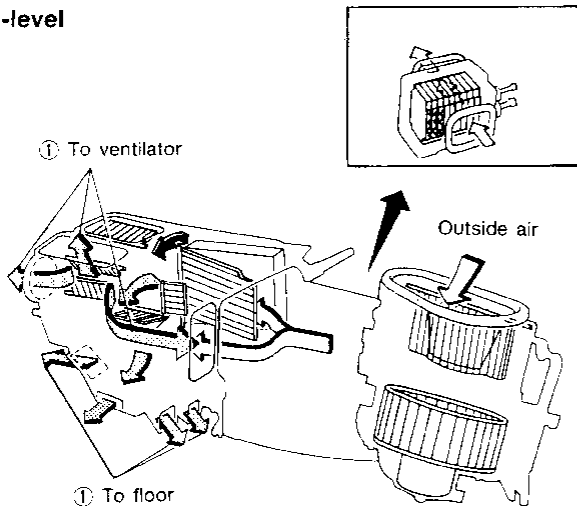
Floor and defroster



Defroster



Bi-level



- ← : Air passed through heater core
- ← + ← : Mixed air (← + ←)
- ← : Air not passed through heater core

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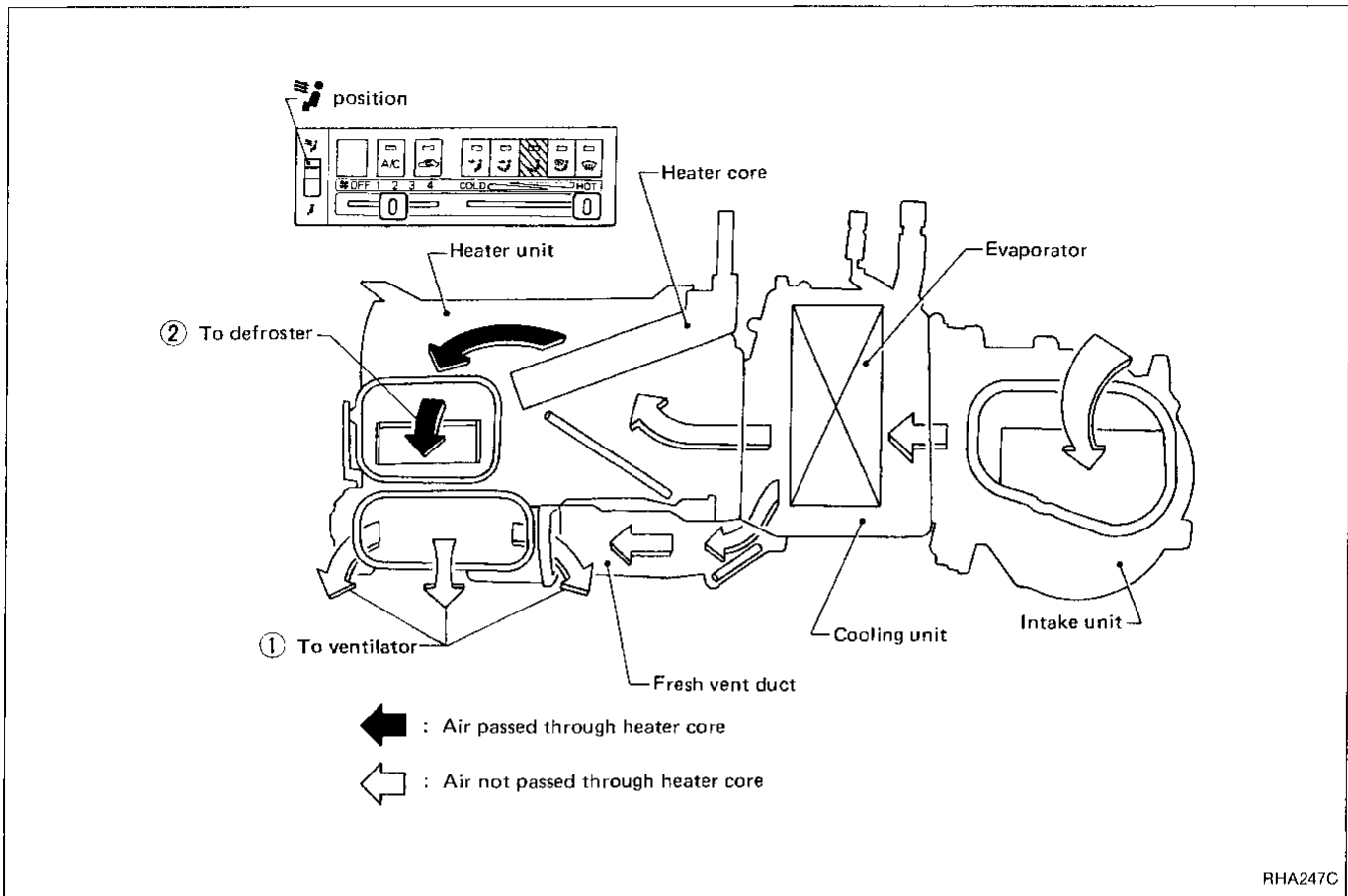
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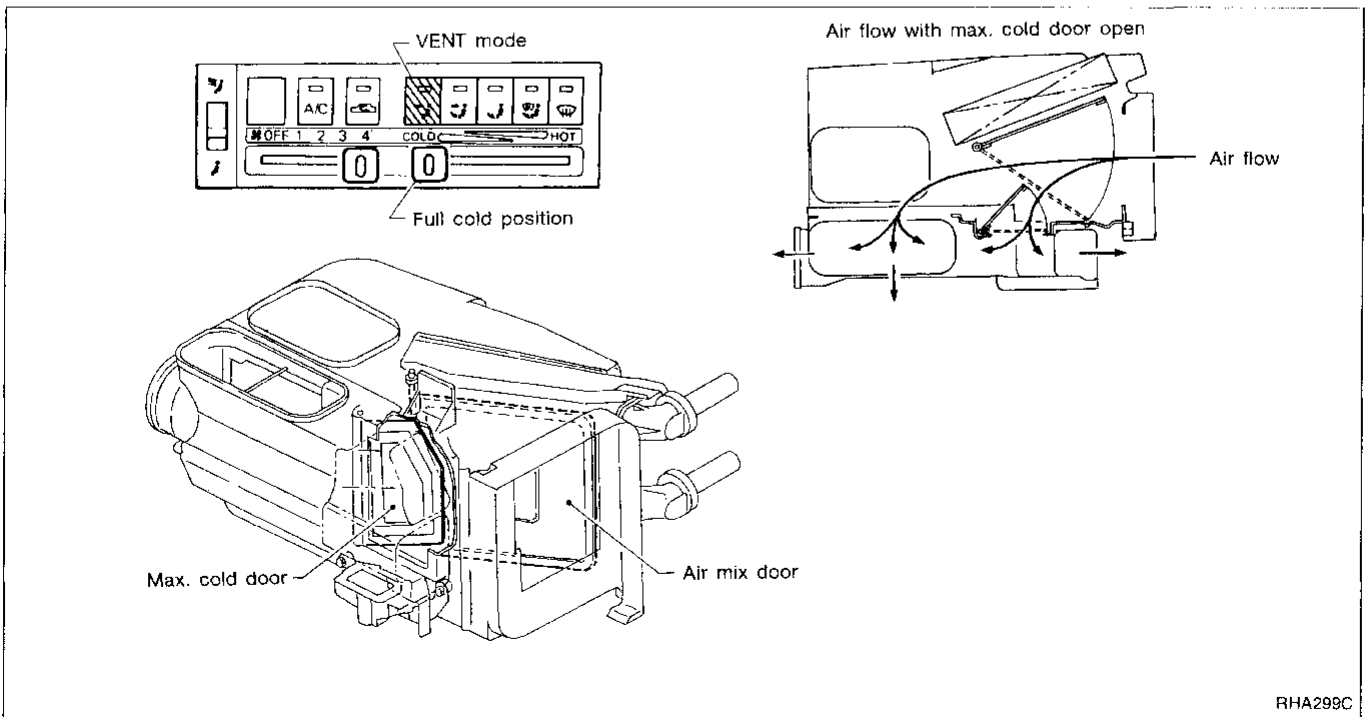
DESCRIPTION — Overall System

Air Flow — Fresh Vent System

FRESH VENT SYSTEM



Air Flow — Max. Cold Door Operation System



Refrigeration Cycle

REFRIGERANT FLOW

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

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

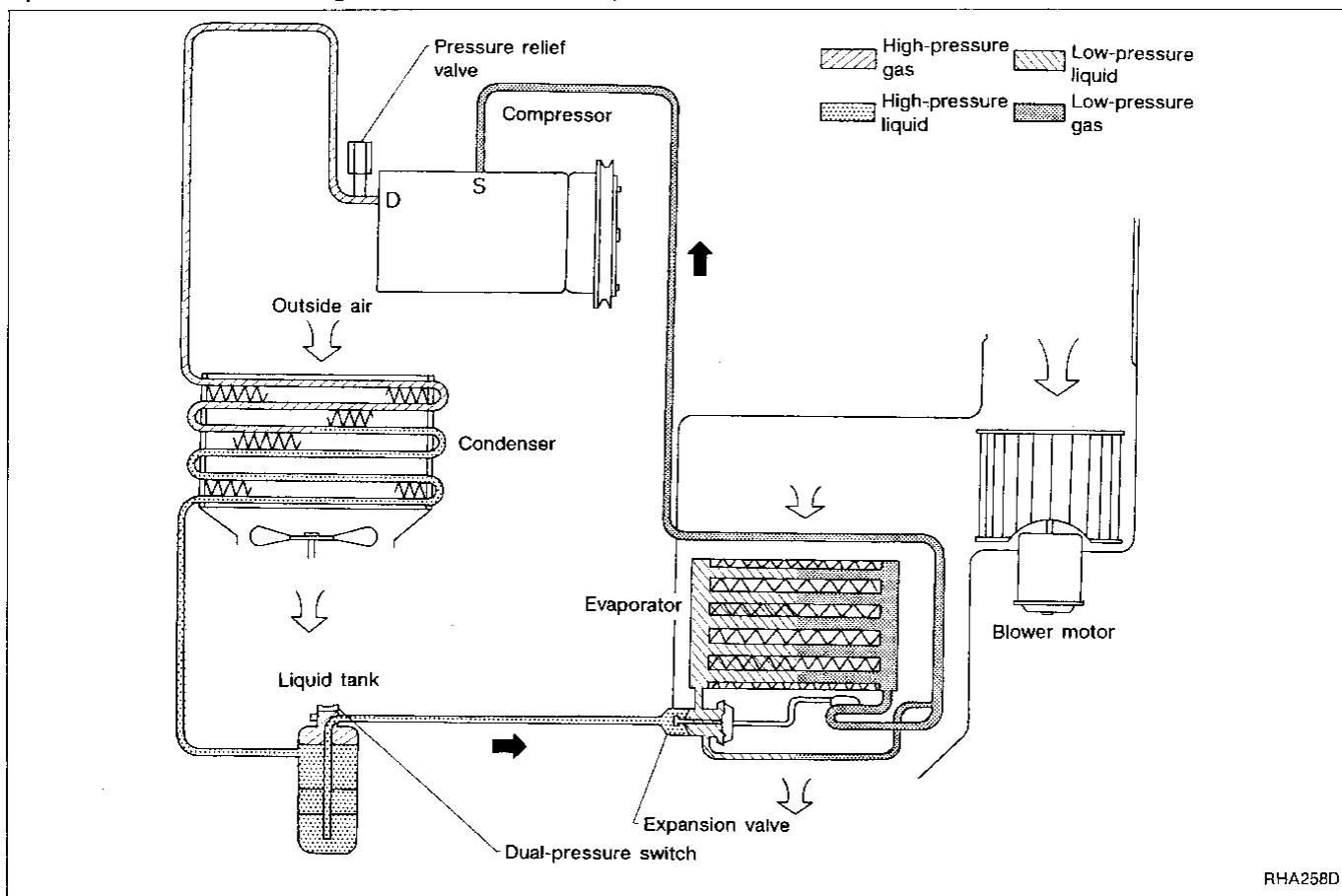
REFRIGERANT SYSTEM PROTECTION

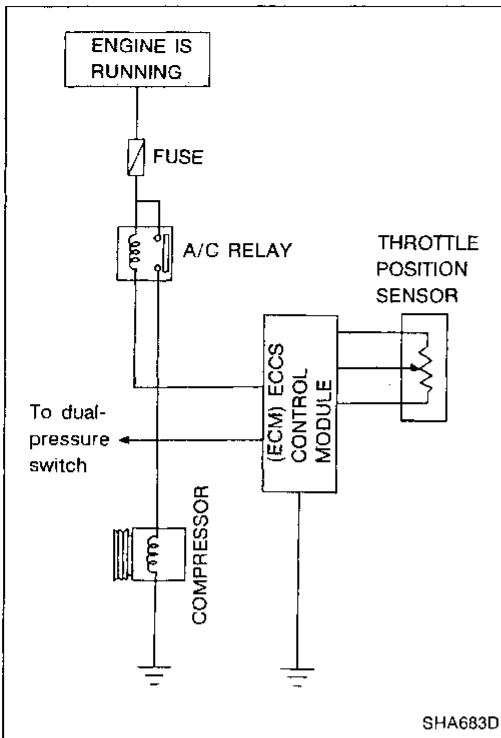
Dual-pressure switch

The refrigerant system is protected against excessively high or low pressures by the dual-pressure switch, located on the liquid tank. If the system pressure rises above, or falls below the specifications, the dual-pressure switch opens to interrupt the compressor operation.

Pressure relief valve

The refrigerant system is also protected by a pressure relief valve, located on the end of high flexible hose near 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.



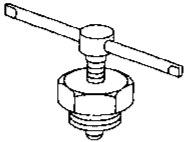

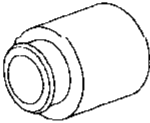
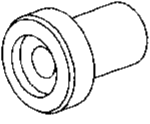
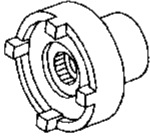


Acceleration Cut System — For Manual Air Conditioner

This system is controlled by the ECM (ECCS control module). When the engine is heavily overloaded, the compressor is turned off for several seconds to reduce overloading.

PREPARATION

SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.) Tool name	Description	
KV99232022 (J26571-A) Clutch disc puller	 NT210	Removing clutch disc GI MA EM
KV99231010 (J37877) Clutch disc wrench	 NT205	Removing shaft nut and clutch disc LC EF & EC
KV99233040 (J26720-A) Puller pilot	 NT213	Removing pulley FE CL MT
KV99234160 (J37879) Pulley installer	 NT209	Installing pulley AT FA
KV99235160 (J37882) Nut wrench	 NT212	Removing lock nut RA BR ST

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PREPARATION

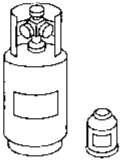

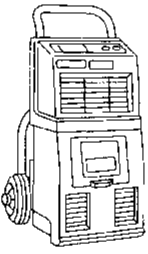
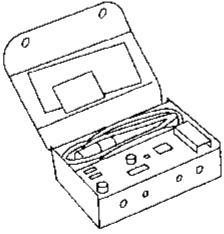
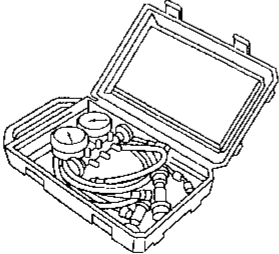
HFC-134a (R-134a) Service Tools and Equipment

It is important to understand that HFC-134a (R-134a) refrigerant, and the specified lubricant which must be used with HFC-134a (R-134a), must never be mixed with CFC-12 (R-12) refrigerant and/or the CFC-12 (R-12) lubricant.

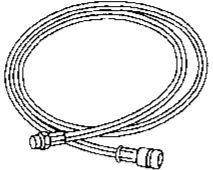
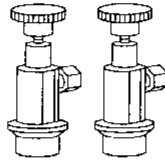

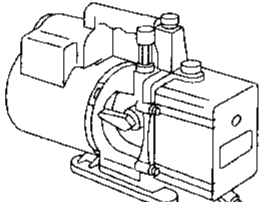
This means that separate and non-interchangeable service equipment must be used for handling each type of refrigerant/lubricant.

To prevent the mixing of refrigerants/lubricants, 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).

Adaptors to convert from one size fitting to the other must never be used: refrigerant/lubricant contamination will occur and compressor failure will result.

Tool number (Kent-Moore No.) Tool name	Description	Note
HFC-134a (R-134a) refrigerant	 NT196	Container color: Light blue Container marking: HFC-134a (R-134a) Fitting size: Thread size ● large container 1/2"-16 ACME
KLH00-PAGS0 (—) Nissan A/C System Oil Type S	 NT197	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)
(J-39500-INF) Recovery/Recycling equipment (ACR4)	 NT195	Function: Refrigerant Recovery and Recycling and Recharging
(J-39400) Electrical leak detector	 NT198	Power supply: ● DC 12 V (Cigarette lighter)
(J-39183) Manifold gauge set (with hoses and couplers)	 NT199	Identification: ● The gauge face indicates R-134a. Fitting size: Thread size ● 1/2"-16 ACME

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

Tool number (Kent-Moore No.) Tool name	Description	Note
Service hoses ● High side hose (J-39501-72) ● Low side hose (J-39502-72) ● Utility hose (J-39476-72)	 NT201	Hose color: ● Low hose: Blue with black stripe ● High hose: Red with black stripe ● Utility hose: Yellow with black stripe or green with black stripe Fitting size: Thread size ● 1/2"-16 ACME
Service couplers ● High side coupler (J-39500-20) ● Low side coupler (J-39500-24)	 NT202	Fitting size: ● M14 x 1.5 fitting is optional
(J-39650) Refrigerant weight scale	 NT200	For measuring of refrigerant Fitting size: Thread size ● 1/2"-16 ACME
(J-39649) Vacuum pump (Including the isolator valve)	 NT203	Capacity: ● Air displacement: 4 CFM ● Micron rating: 20 microns ● Oil capacity: 482 g (17 oz) Fitting size: Thread size ● 1/2"-16 ACME

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PREPARATION

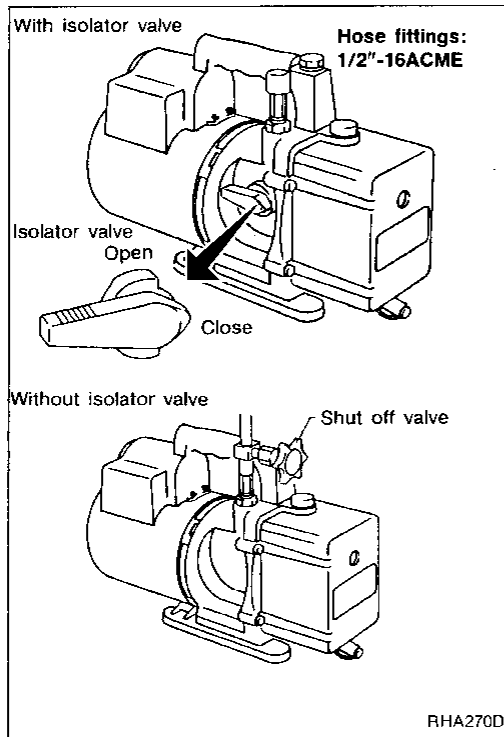
Precautions for Service Equipment

RECOVERY/RECYCLING EQUIPMENT

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

ELECTRICAL LEAK DETECTOR

Be certain to follow the manufactures instructions for tester operation and tester maintenance.



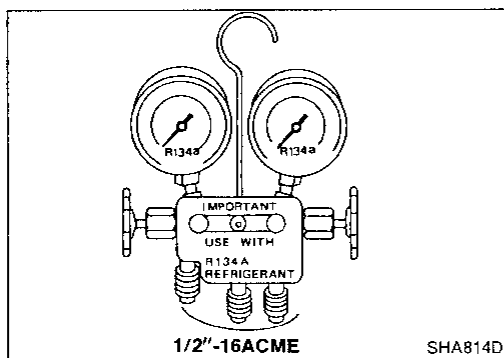
VACUUM PUMP

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

To prevent the migration of vacuum pump lubricant into service hoses, it is necessary to use a valve (which can be manually opened or closed) near the connection of the service hose to the pump.

- On a vacuum pump which is equipped with an isolator valve (usually part of the vacuum pump), closing this valve will isolate the service hose from the pump.
- For pumps without an isolator valve, be certain that the service hose is equipped with a manual shut off valve near the pump end of the hose.
- Hoses which contain an automatic shut off valve at the end of the service hose must be disconnected from the vacuum pump to prevent the migration of lubricant: as long as the hose is connected, the valve is open and lubricant may migrate.

One-way valves which open when vacuum is applied and close under a no vacuum condition are not recommended, because this valve may restrict the pump's ability to pull a deep vacuum.



MANIFOLD GAUGE SET

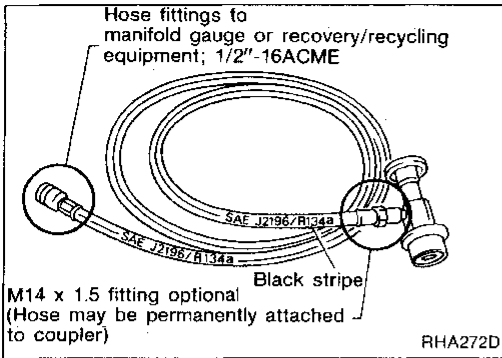
Be certain that the gauge face indicates R-134a or 134a. Be certain that the manifold gauge set has the 1/2\"-16 ACME threaded connections for service hoses, and that no refrigerants other than HFC-134a (R-134a) (along with only specified lubricants) have been used with the manifold gauge set.

PREPARATION

Precautions for Service Equipment (Cont'd)

SERVICE HOSES

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



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SERVICE COUPLERS

Never attempt to connect HFC-134a (R-134a) service couplers to an CFC-12 (R-12) A/C system. Although the HFC-134a (R-134a) couplers will not secure on to the CFC-12 (R-12) system, CFC-12 (R-12) refrigerant and lubricant will be discharged into the HFC-134a (R-134a) coupler, causing contamination.

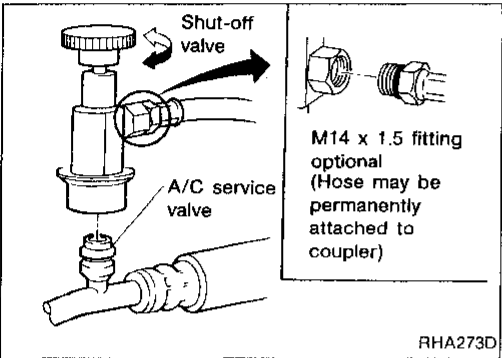
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Shut off valve rotation	A/C service valve
Clockwise	Open
Counterclockwise	Close

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REFRIGERANT WEIGHT SCALE

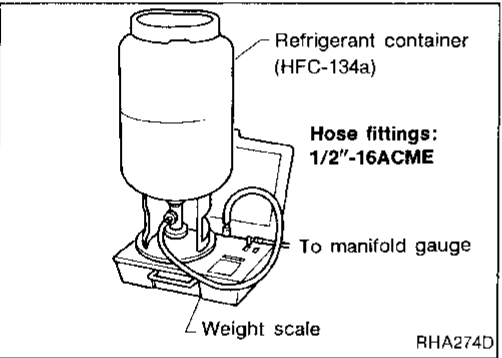
If the scale allows electronic control of the flow of refrigerant through the scale, be certain that the hose fitting size is 1/2"-16 ACME, and that no refrigerant other than HFC-134a (R-134a) (along with only specified lubricant) has been used with the scale.

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CHARGING CYLINDER

The charging cylinder is not recommended because refrigerant may be vented into the air from the top valve of the cylinder when filling the cylinder with refrigerant. Additionally, the accuracy of the cylinder is generally less than that of an electronic scale or of quality recycle/recharge equipment.

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SERVICE PROCEDURES

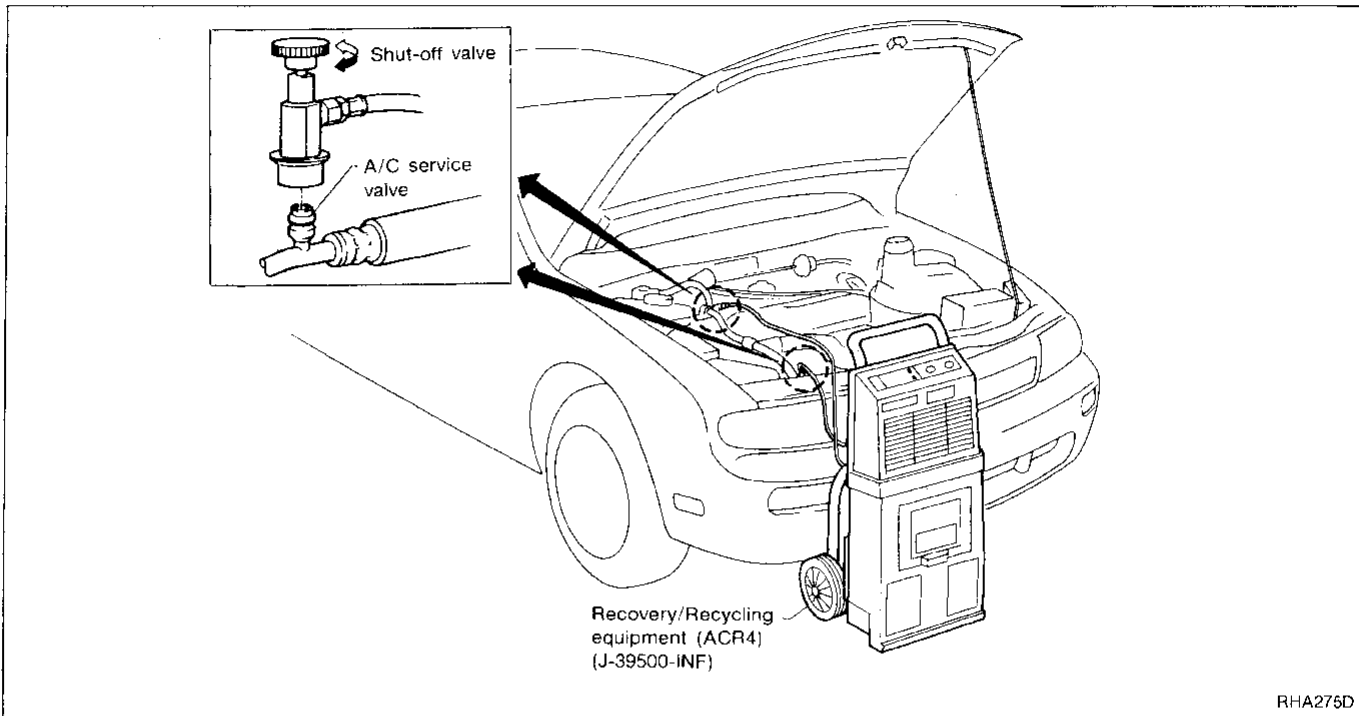
HFC-134a (R-134a) Service Procedure

SETTING OF SERVICE TOOLS AND EQUIPMENT

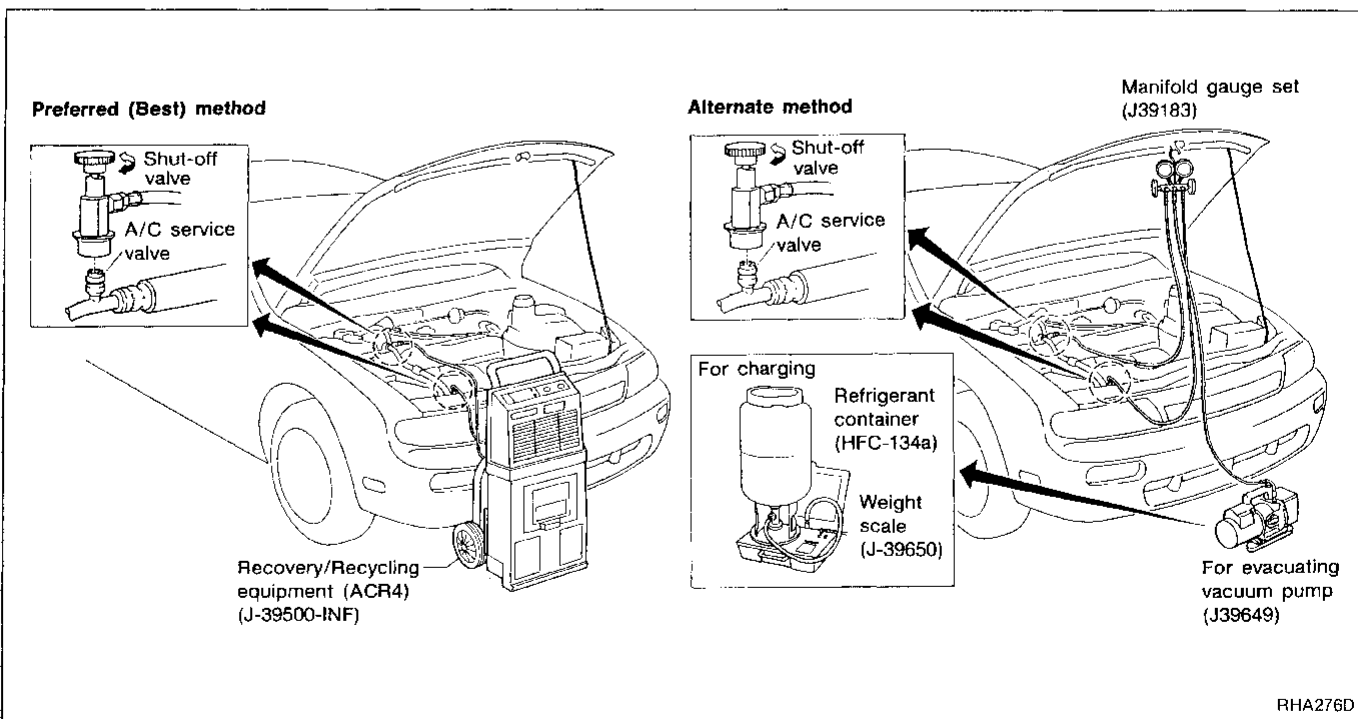
DISCHARGING REFRIGERANT

WARNING:

Avoid breathing A/C refrigerant and lubrication oil vapor or mist. Exposure may irritate eyes, nose and throat. Use only approved recovery/recycling equipment to discharge HFC-134a (R-134a) systems. If accidental system discharge occurs, ventilate work area before resuming work.



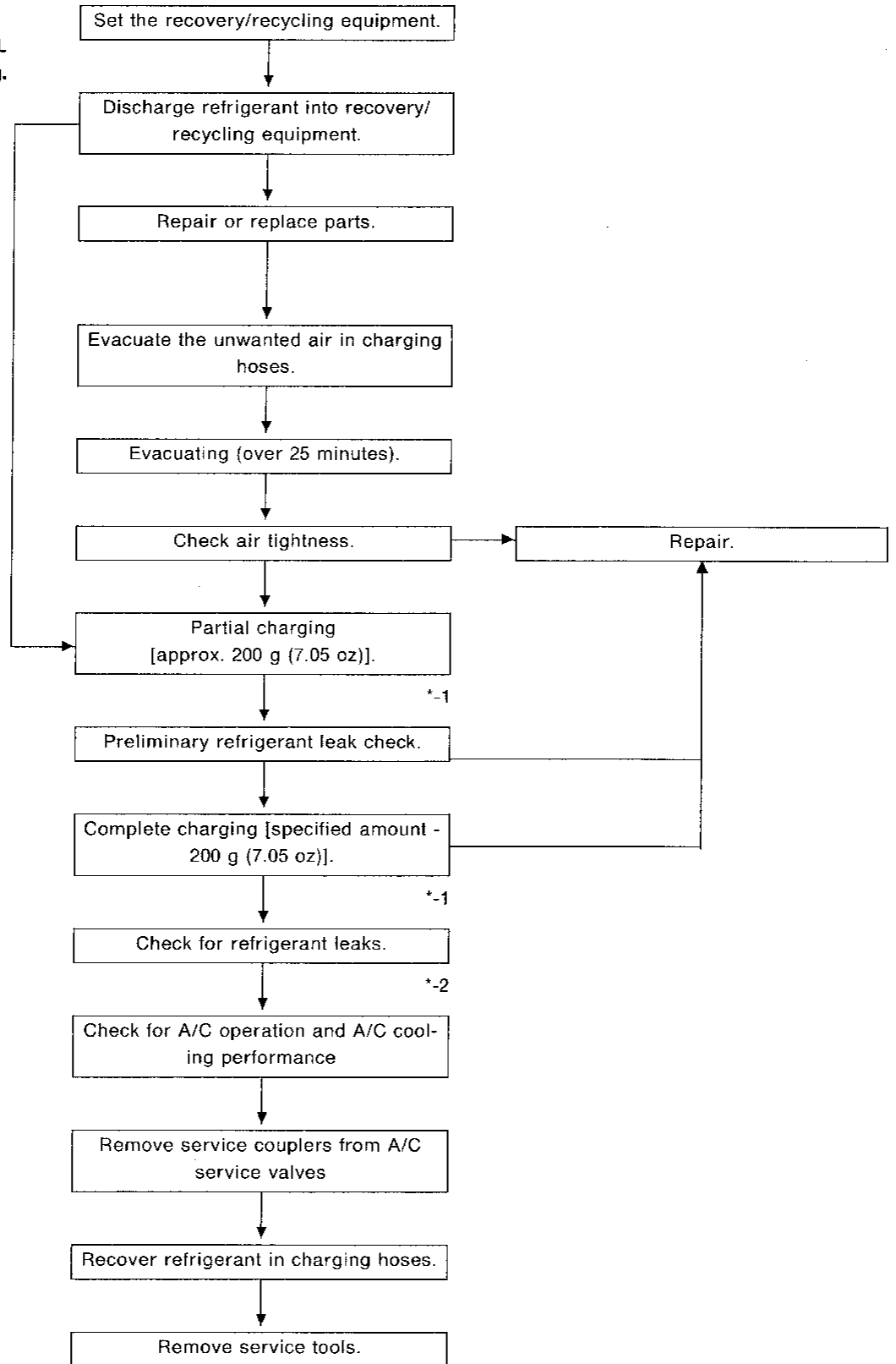
EVACUATING SYSTEM AND CHARGING REFRIGERANT



SERVICE PROCEDURES

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

Recovered lubrication oil
Refer to **LUBRICATION OIL**
— **Checking and Adjusting.**



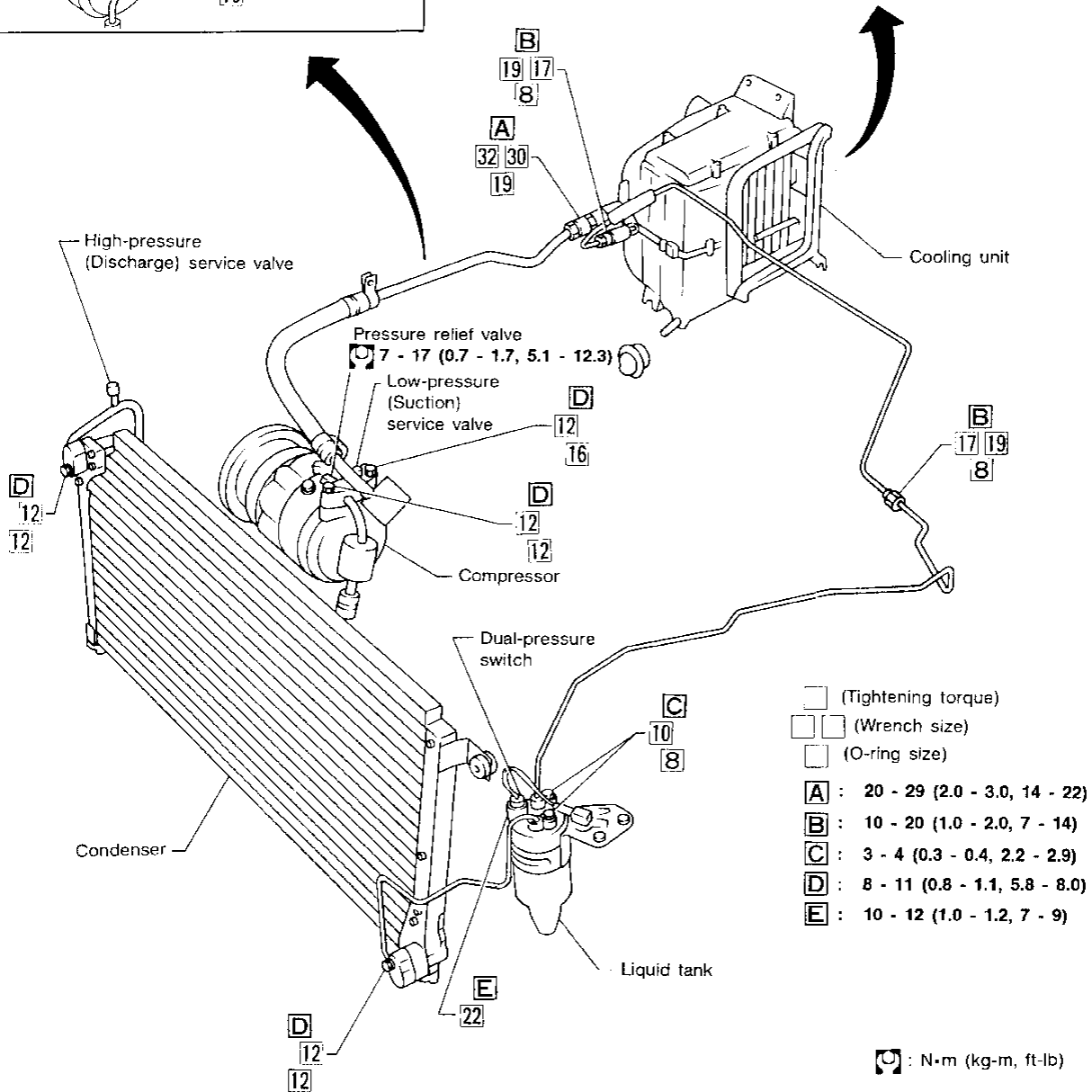
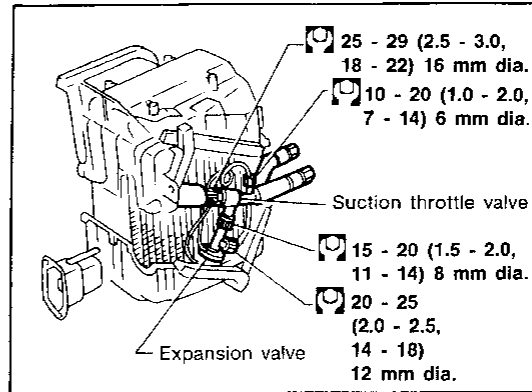
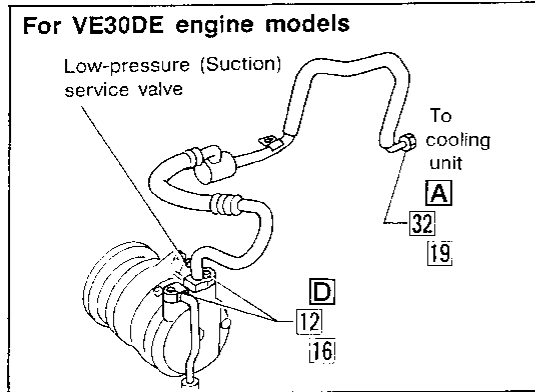
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Note: *-1 Before charging refrigerant, ensure engine is off.
*-2 Before checking for leaks, start engine to activate air conditioning system then turn in off.
Service valve caps must be attached to valves (to prevent leak).

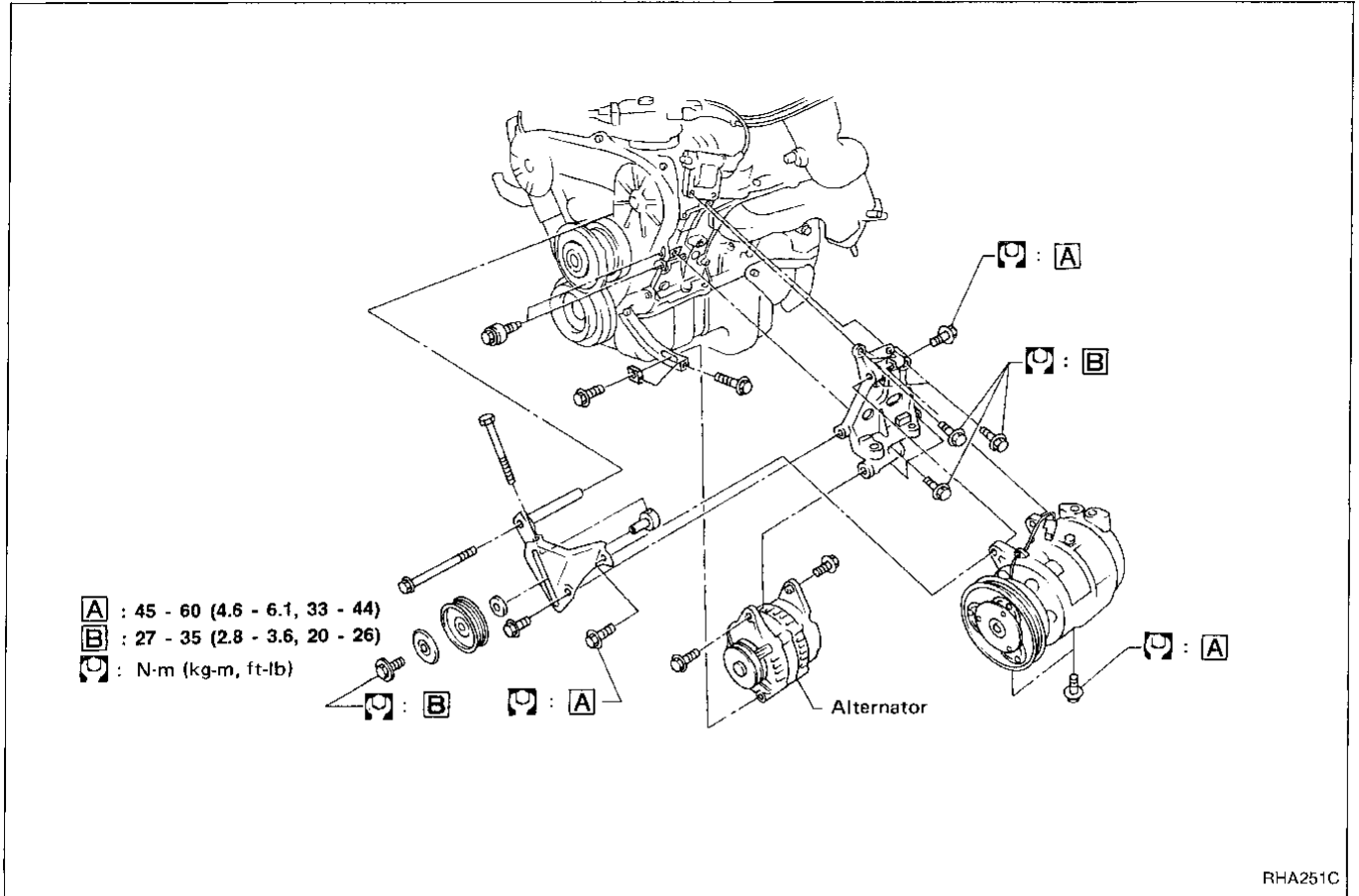
SERVICE PROCEDURES

Refrigerant Lines

- Refer to page HA-5 regarding "Precautions for Refrigerant Connections".



Compressor Mounting



Belt Tension

- Refer to “Checking Drive Belts” in MA section.

Fast Idle Control Device (FICD)

- Refer to EF & EC section.

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Lubrication Oil

Name: Nissan A/C System Oil Type S

Part number: KLH00-PAGS0

Maintenance of Oil Quantity in Compressor

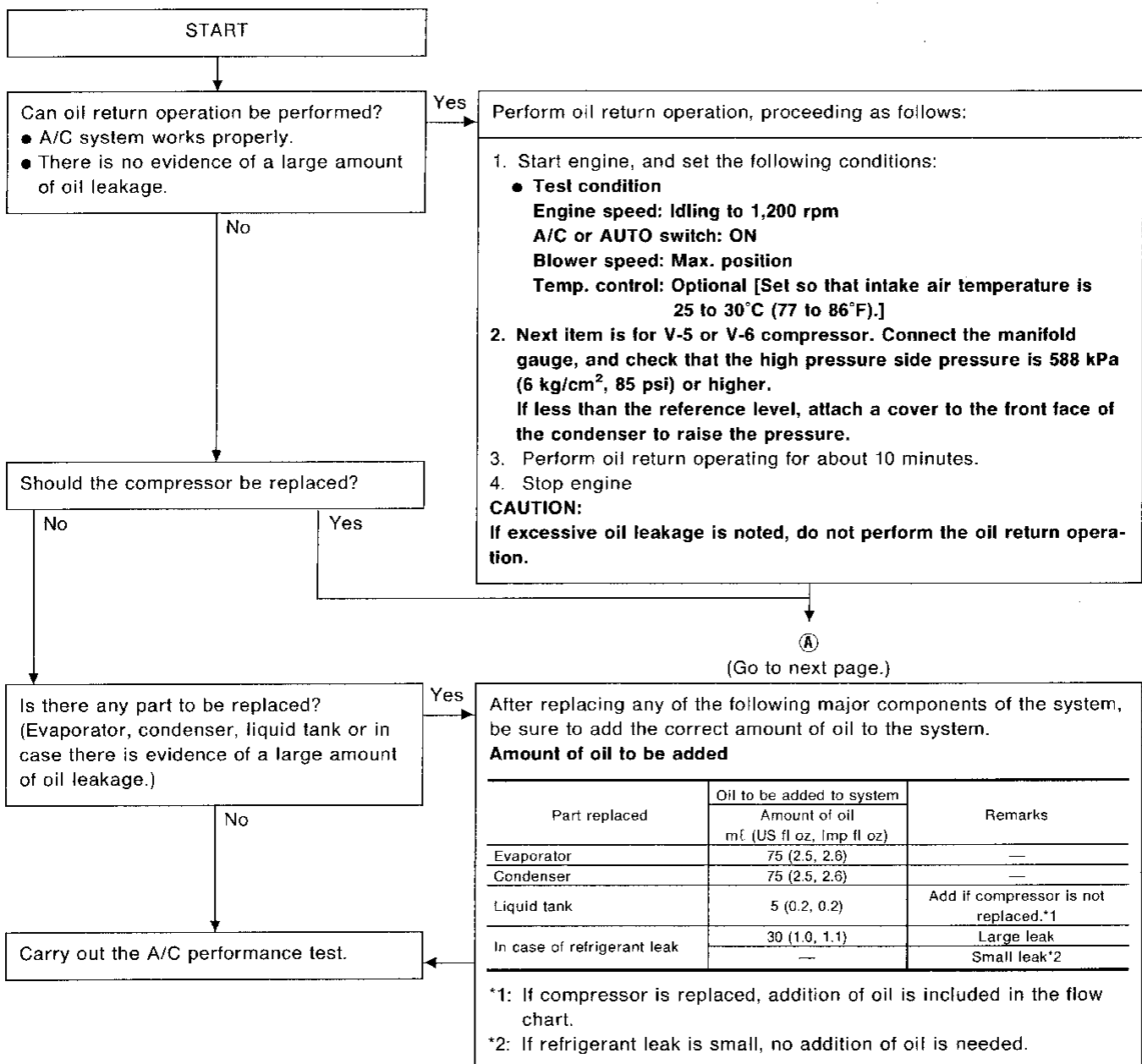
The oil used to lubricate the compressor circulates through the system with the refrigerant. Whenever any component of the system is replaced or a large amount of gas leakage occurs, add oil to the compressor to maintain the specified amount.

If oil quantity is not maintained properly, the following malfunctions may result:

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

Checking and Adjusting

Adjust the oil quantity according to the flowchart shown below.



LUBRICATION OIL — Checking and Adjusting

Checking and Adjusting (Cont'd)

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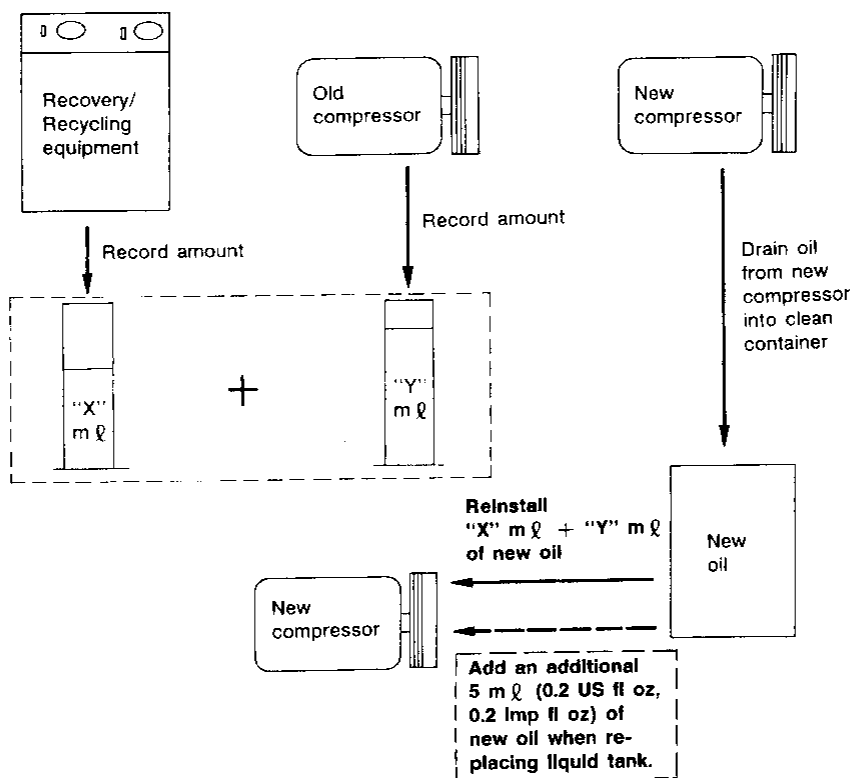
1. Discharge refrigerant into the refrigerant recovery/recycling equipment. Measure oil discharged into the recovery/recycling equipment.
2. Remove the drain plug (for V-5, V-6 or DKS-16H compressor) and drain the oil from the "old" (removed) compressor into a graduated container, and record the amount of oil drained.
3. Remove the drain plug and drain the oil from the "new" compressor into a separate, clean container.
4. Measure an amount of the new oil equivalent to that drained from the "old" compressor, and add this oil to the "new" compressor through the drain plug or suction port opening.
5. Measure an amount of the "new" oil equivalent to that recovered during discharging, and add this oil to the "new" compressor through the drain plug or suction port opening.
6. Torque the drain plug.

V-5 or V-6 compressor: 18 - 19 N·m (1.8 - 1.9 kg·m, 13 - 14 ft-lb)

DKS-16H compressor: 14 - 16 N·m (1.4 - 1.6 kg·m, 10 - 12 ft-lb)

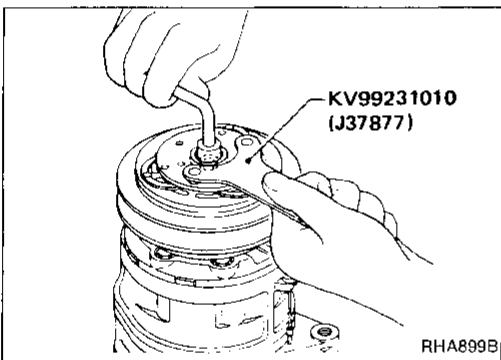
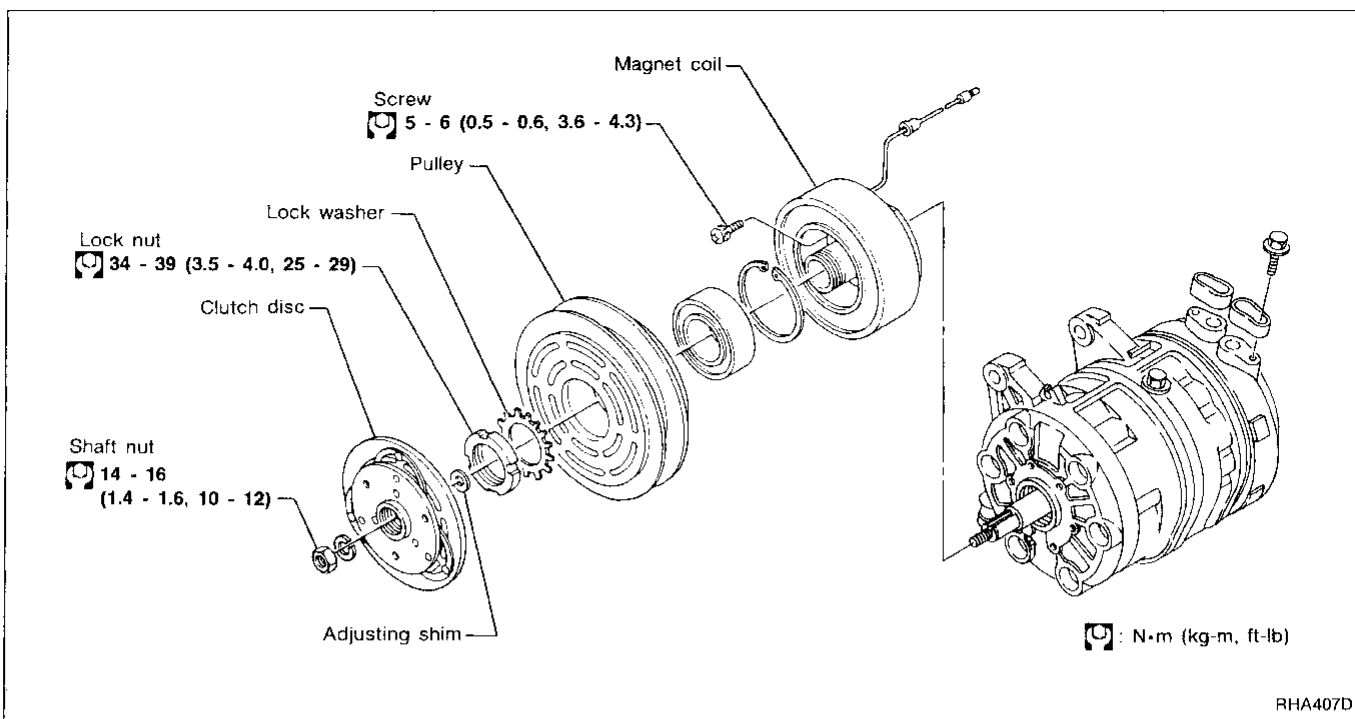
7. If the liquid tank also needs to be replaced, add an additional 5 mℓ (0.2 US fl oz, 0.2 Imp fl oz) of oil at this time.
Do not add this 5 mℓ (0.2 US fl oz, 0.2 Imp fl oz) of oil if only replacing the compressor.

Oil adjusting procedure for compressor replacement



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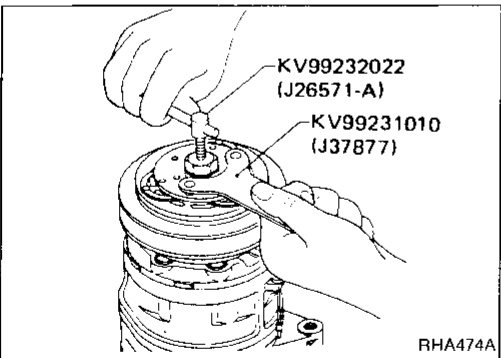
COMPRESSOR — Model DKS-16H (ZEXEL make)



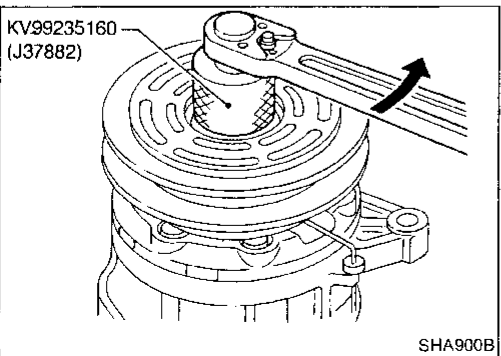
Compressor Clutch

REMOVAL

- When removing shaft nut, hold clutch disc with clutch disc wrench.



- Using clutch disc puller, clutch disc can be removed easily.

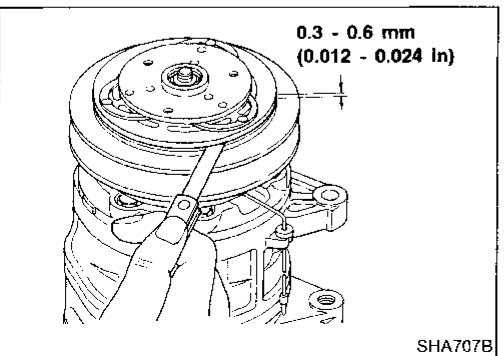
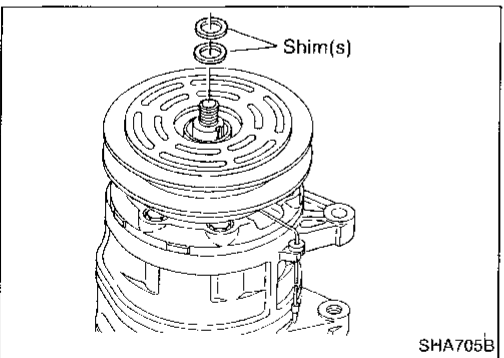
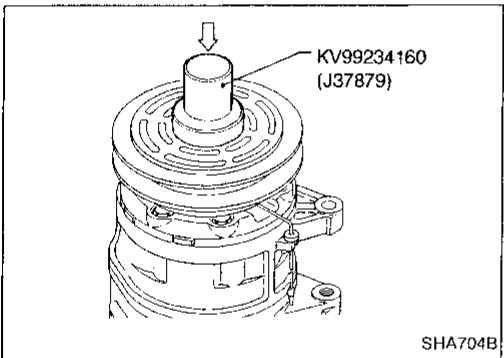
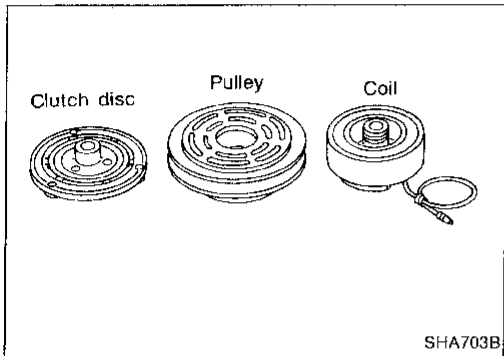
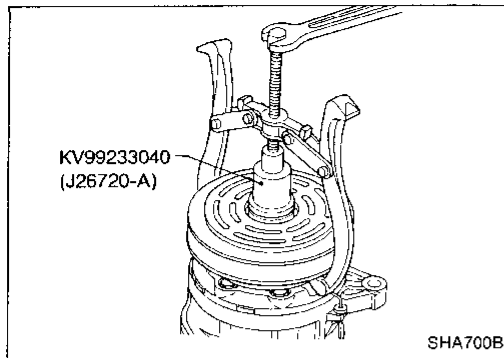


- Bend down pawl of lock washer.
- When removing pulley, remove lock nut with nut wrench.

COMPRESSOR — Model DKS-16H (ZEXEL make)

Compressor Clutch (Cont'd)

- Remove the pulley by hand. If difficult, use puller pilot.



INSPECTION

Clutch disc: If the contact surface shows signs of damage due to excessive heat, the drive plate and pulley should be replaced.

Pulley: Check the appearance of the pulley assembly. If the contact surface of the pulley shows signs of excessive grooving due to slippage, both the pulley and drive plate should be replaced. The contact surfaces of the pulley assembly should be cleaned with a suitable solvent before reinstallation.

Coil: Check coil for loose connection or cracked insulation.

INSTALLATION

- Install the key in the keyway on the compressor drive shaft.
- Install the coil to compressor (lead wire up) and tighten the mounting screws.
- Install the lead wire with its holder into the hold.

- Install lock washer and nut with nut wrench.
- Bend one pawl of the lock washer up against the nut to prevent the nut from loosening.

- Check to ensure that the clutch clearance is between 0.3 to 0.6 mm (0.012 to 0.024 in). Adjust the clearance using shim(s) as necessary.

BREAK-IN OPERATION

When replacing compressor clutch assembly, do not forget break-in operation, accomplished by engaging and disengaging the clutch about thirty times.

Break-in operation raises the level of transmitted torque.

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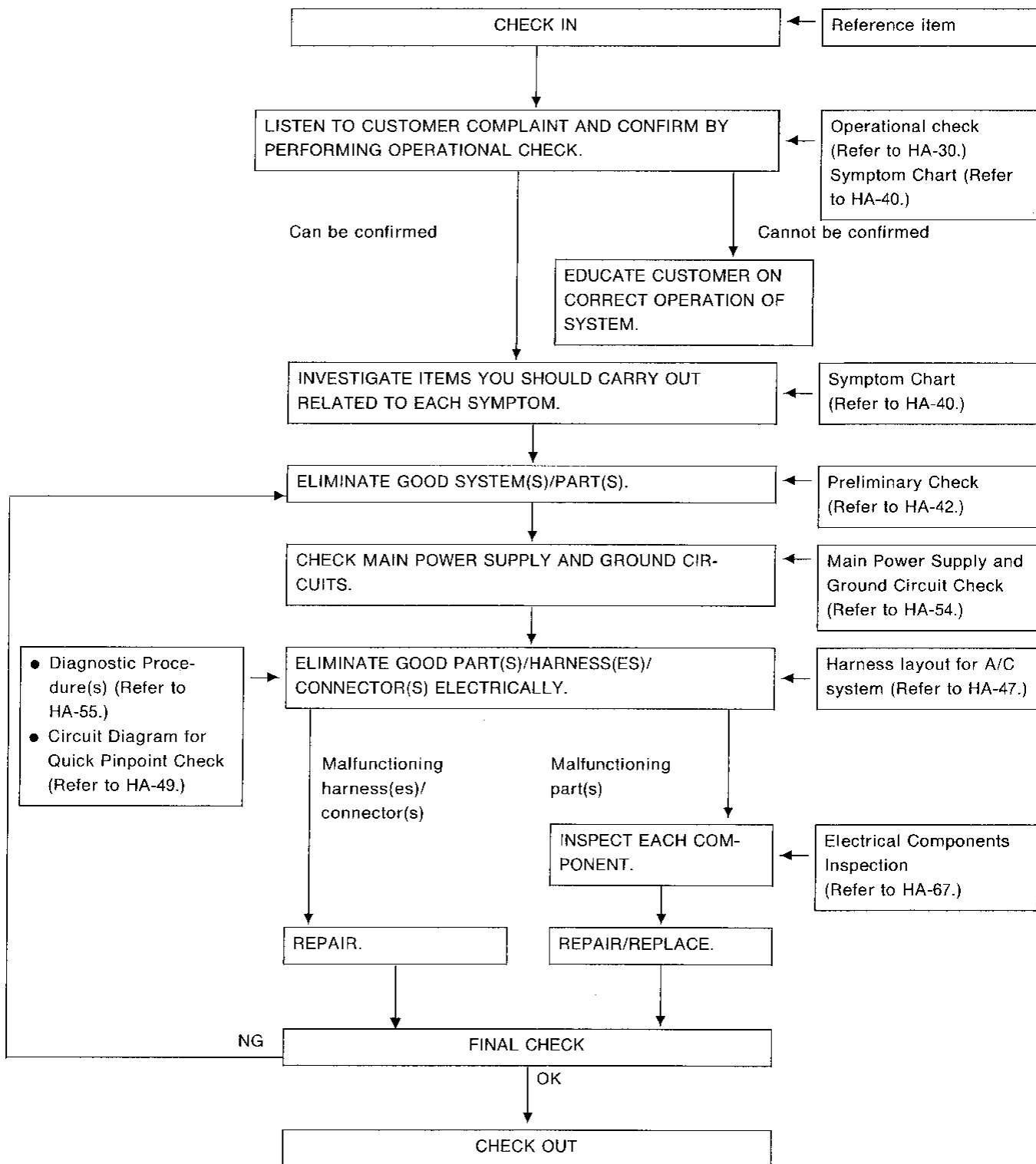
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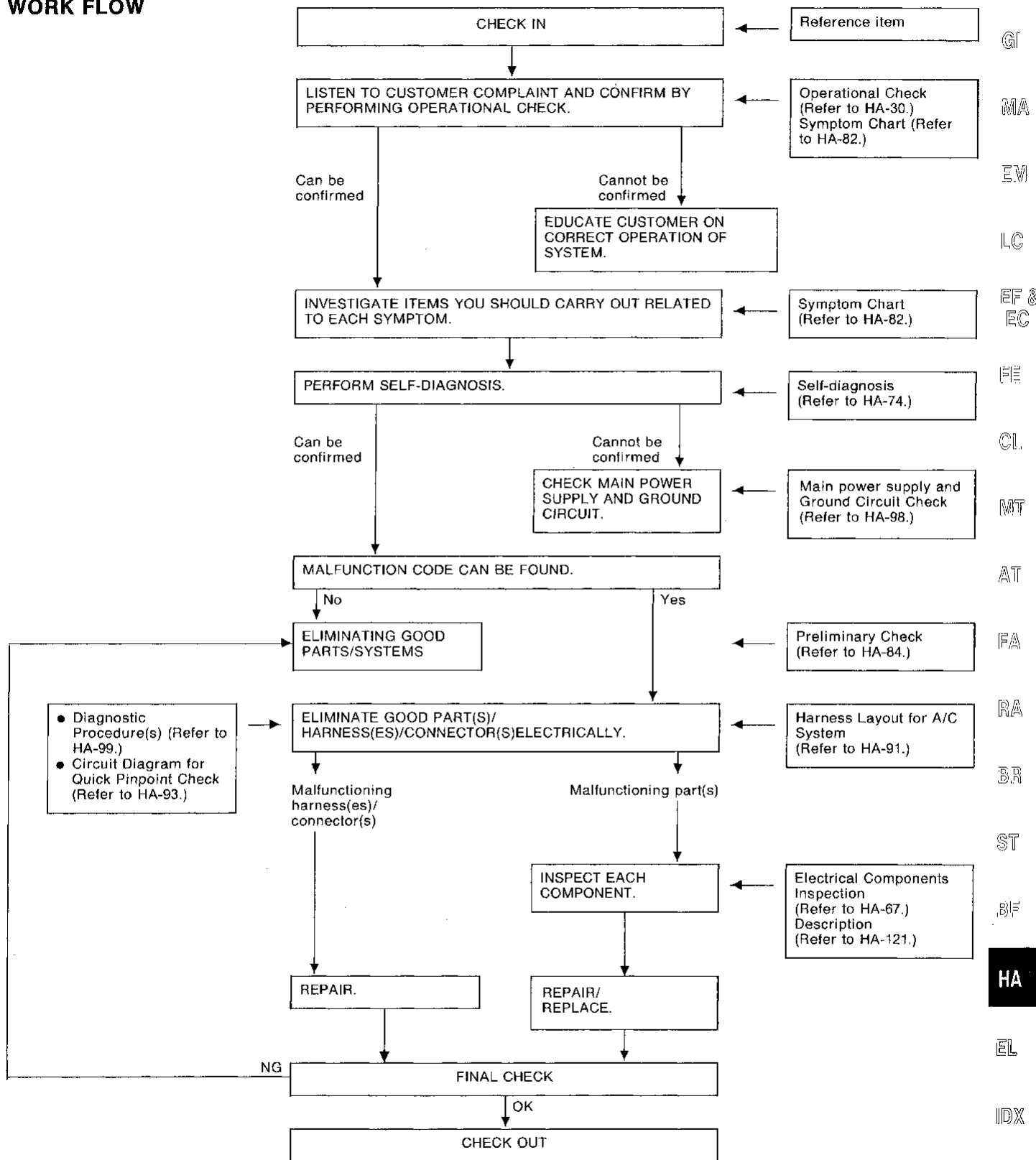
How to Perform Trouble Diagnoses for Quick and Accurate Repair — Manual Air Conditioner

WORK FLOW



How to Perform Trouble Diagnoses for Quick and Accurate Repair — Auto Air Conditioner

WORK FLOW



Operational Check


The purpose of the operational check is to confirm that the system is as it should be. The systems which will be checked are the blower, mode (discharge air), intake air, temperature decrease, temperature increase, A/C switch and the memory function (Auto air conditioner type only).

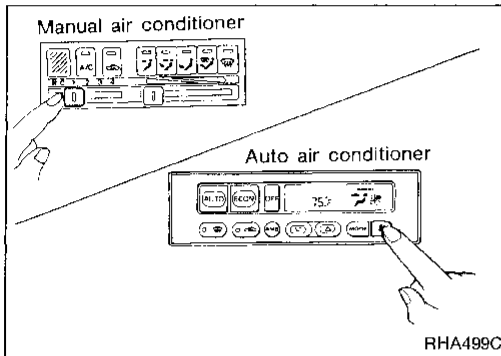
CONDITIONS:

- Engine running and at normal operating temperature.
- Fresh VENT "OFF"

PROCEDURE:

1. Check blower

- 1) Slide FAN lever to 1-speed or Press Fan button on time. Blower should operate on low speed. The Fan Symbol should have one blade lit . (Auto Air Conditioner type only)
- 2) Then slide fan lever to 2-speed or Press Fan button one more time.
- 3) Continue checking blower speed until all speeds are checked. Continue checking Fan Symbol until all speeds are checked (Auto Air Conditioner type only)
- 4) Leave blower on speed 4.



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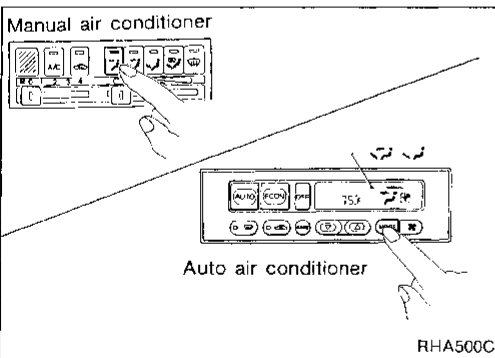
2. Check discharge air.

- 1) Press each mode button (Manual Air Conditioner type). Press mode button three times and def button (Auto Air Conditioner type).
- 2) Confirm that discharge air comes out according to the air distribution ratios table at left.

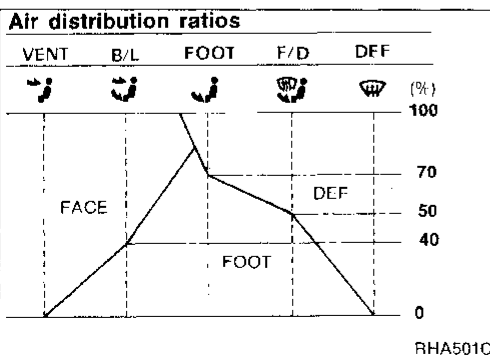
NOTE:

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

Confirm that the intake door position is at FRESH when the F/D button is pressed (Manual Air Conditioner type only).



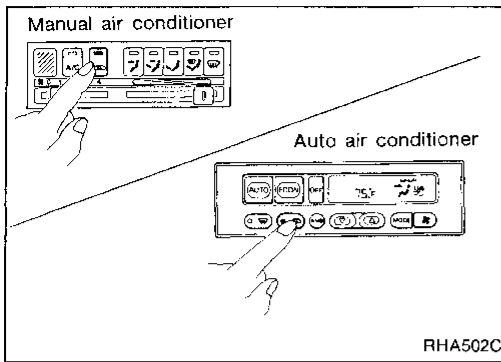
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DIAGNOSES — Overall System

Operational Check (Cont'd)



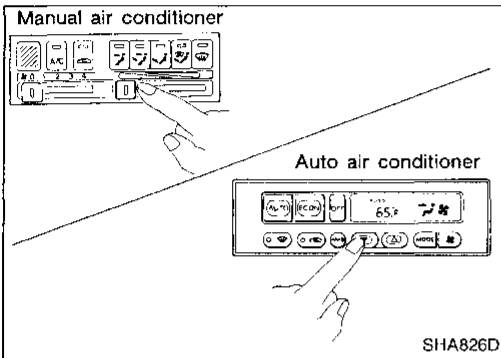
3. Check recirc

- 1) Press RECIRC button.
Recirc indicator should illuminate.
- 2) Listen for intake door position change (you should hear blower sound change slightly).

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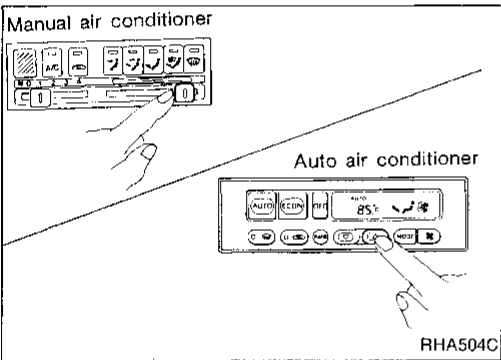
4. Check temperature decrease

- 1) Slide temperature control lever to full cold. (Manual Air Conditioner type)
Press the temperature decrease button until 18°C (65°F) is displayed (Auto Air Conditioner type).
- 2) Check for cold air at discharge air outlets.

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5. Check temperature increase

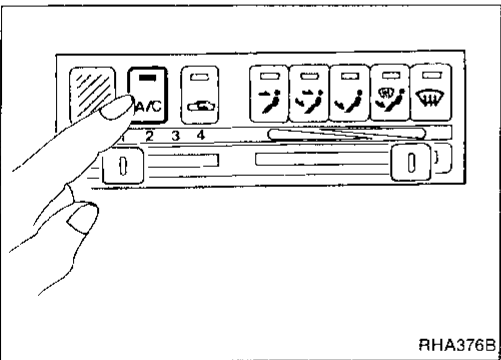
- 1) Slide temperature control lever to full hot. (Manual Air Conditioner type)
Press the temperature increase button until 32°C (85°F) is displayed (Auto Air Conditioner type).
- 2) Check for hot air at discharge air outlets.

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6. Check air conditioner switch (Manual Air Conditioner type only)

Move the fan control lever to the desired (1 to 4 speed) position and push the A/C button to turn ON the air conditioner.

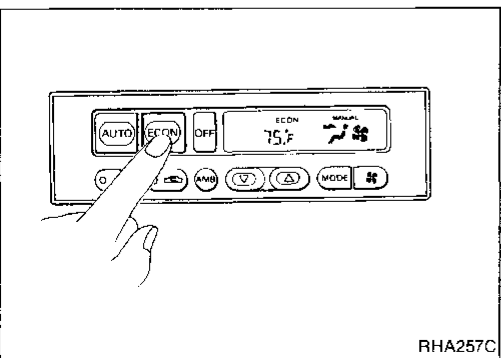
The indicator light should come on when air conditioner is ON.

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7. Check ECON mode (Auto Air Conditioner type only)

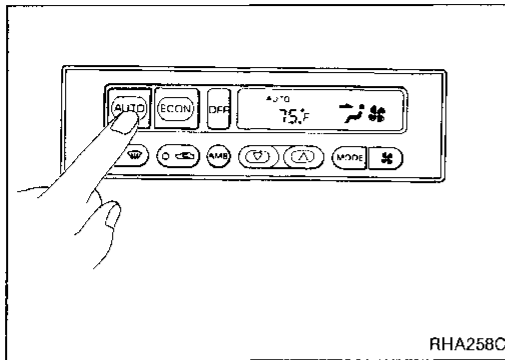
- 1) Press ECON button.
- 2) Display should indicate ECON (no AUTO, no MANUAL).
Confirm that the compressor clutch is not engaged (visual inspection).
(Discharge air will depend on ambient, in-vehicle, and set temperatures).

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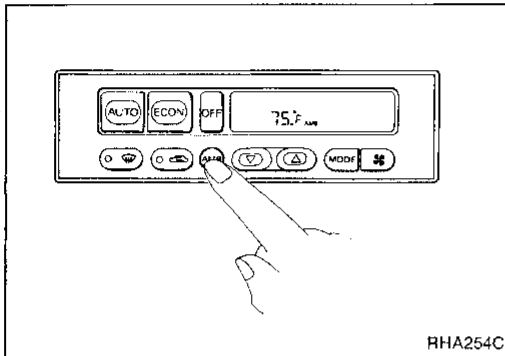
DIAGNOSES — Overall System

Operational Check (Cont'd)



8. Check AUTO mode (Auto Air Conditioner type only)

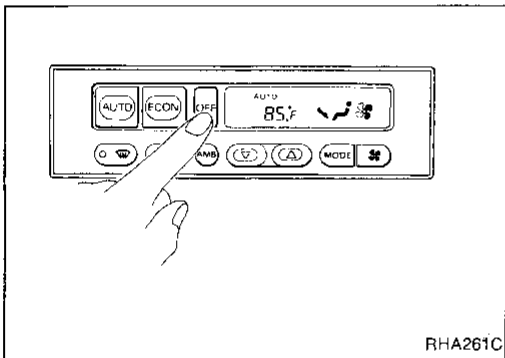
- 1) Press AUTO button.
- 2) Display should indicate AUTO (no ECON, no MANUAL). Confirm that the compressor clutch engages (audio or visual inspection). (Discharge air will depend on ambient, in-vehicle, and set temperatures).



9. Check ambient display (Auto Air Conditioner type only)

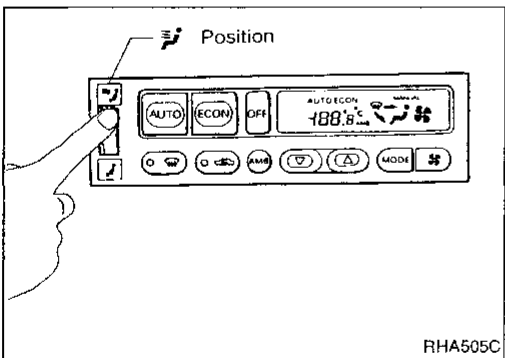
Press the AMB button.

Display should show the outside (ambient) temperature for approximately 5 seconds.




10. Check memory function (Auto Air Conditioner type only)

- 1) Press OFF button.
- 2) Turn the ignition off.
- 3) Wait 15 seconds.
- 4) Turn the ignition on.
- 5) Press the AUTO button.
- 6) Confirm that the set temperature remains at previous temperature.



11. Check fresh vent switch

- 1) Set temperature control to full hot.
- 2) Set mode position at DEF.
- 3) Turn the FRESH VENT on ( position).
- 4) Confirm that discharge air comes out of defroster vents, and that cool air comes from face vents.

Performance Chart

TEST CONDITION

For Auto Air Conditioner, before conducting performance test, disconnect ambient sensor harness connector and make short circuit using jumper cable.

Testing must be performed as follows:

Vehicle location: Indoors or in the shade (in a well-ventilated place)

Doors: Closed

Door window: Open (Front driver side only)

Hood: Open

TEMP.: Max. COLD

Discharge Air: Face Vent

REC switch: (Recirculation) set

FAN speed: 4

Engine speed: 1,500 rpm

Time required before starting testing after air conditioner starts operating: More than 10 minutes

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TEST READING

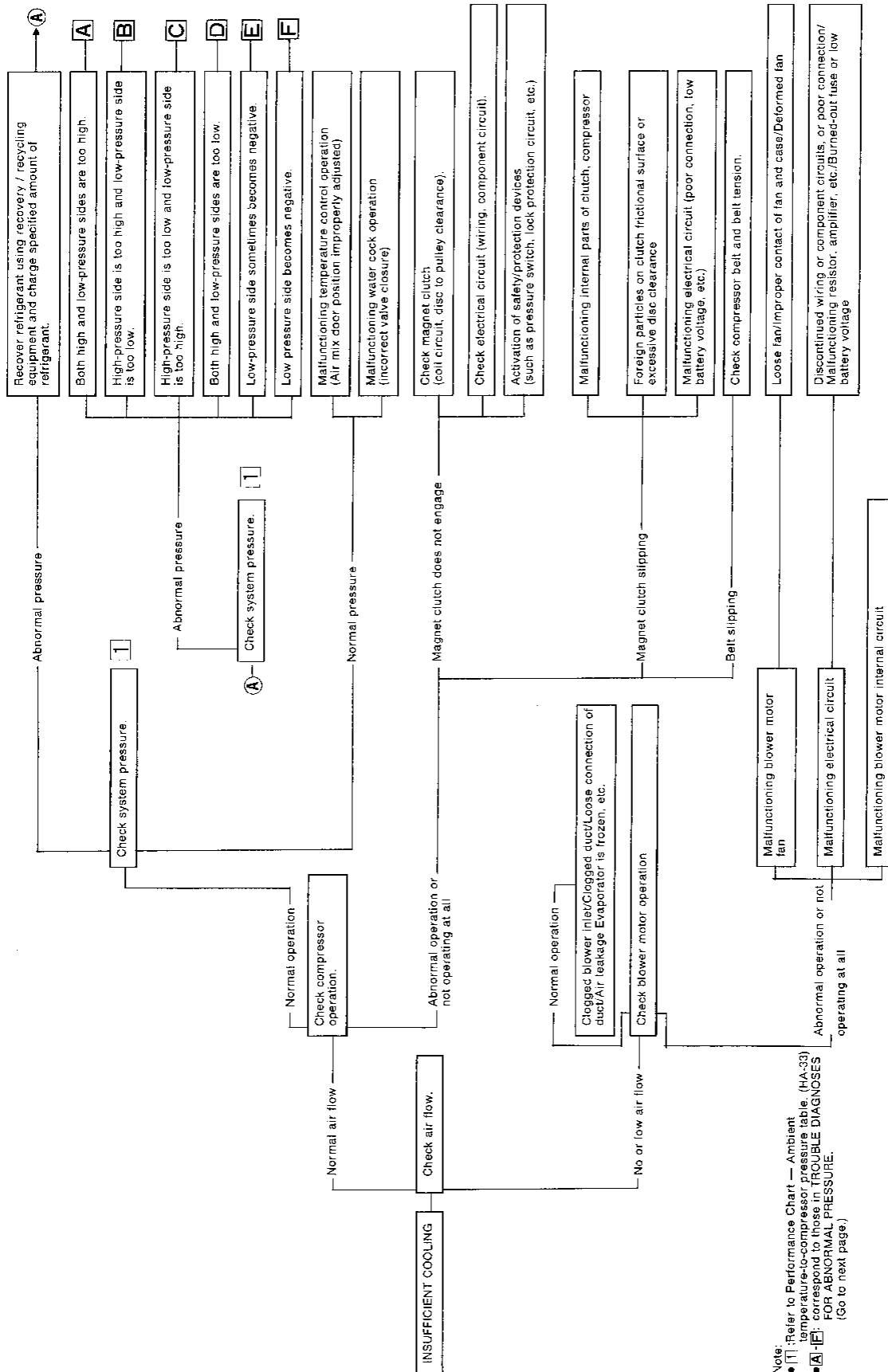
Recirculating-to-discharge air temperature table

Inside air (Recirculating air) at blower assembly inlet		Discharge air temperature at center ventilator °C (°F)
Relative humidity %	Air temperature °C (°F)	
50 - 60	20 (68)	3.0 - 3.7 (37 - 39)
	25 (77)	5.4 - 6.8 (42 - 44)
	30 (86)	8.5 - 10.6 (47 - 51)
	35 (95)	14.2 - 17.8 (58 - 64)
60 - 70	20 (68)	3.7 - 4.6 (39 - 40)
	25 (77)	6.8 - 8.0 (44 - 46)
	30 (86)	10.6 - 12.8 (51 - 55)
	35 (95)	17.8 - 21.4 (64 - 71)

Ambient air temperature-to-compressor pressure table

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	20 (68)	1,079 - 1,334 (11.0 - 13.6, 156 - 193)	108 - 137 (1.1 - 1.4, 16 - 20)
	25 (77)	1,295 - 1,589 (13.2 - 16.2, 188 - 230)	127 - 157 (1.3 - 1.6, 18 - 23)
	30 (86)	1,491 - 1,844 (15.2 - 18.8, 216 - 267)	147 - 177 (1.5 - 1.8, 21 - 26)
	35 (95)	1,706 - 2,099 (17.4 - 21.4, 247 - 304)	177 - 216 (1.8 - 2.2, 26 - 31)
	40 (104)	1,903 - 2,354 (19.4 - 24.0, 276 - 341)	216 - 265 (2.2 - 2.7, 31 - 38)

Performance Test Diagnoses
INSUFFICIENT COOLING



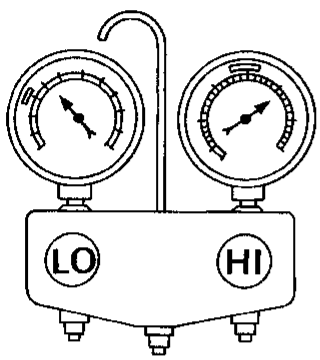
Note:
 • [T]: refer to Performance Chart — Ambient temperature-to-compressor pressure table. (HA-33)
 • [A], [E]: correspond to those in TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE. (Go to next page.)

DIAGNOSES — Overall System

Performance Test Diagnoses (Cont'd)

TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE

Whenever abnormal pressure of high and/or low sides of the system is noted, diagnosis must be conducted by using a manifold gauge. The large-line zone on the gauge scale (see illustrations.) shown in the following table refers to the standard (normal) pressure range for the corresponding pressure side (high or low). Since the standard (normal) pressure, however, differs from vehicle to vehicle, refer to the "Ambient Temperature-Pressure Characteristics" chart.

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
<p>Both high and low-pressure sides are too high.</p> <p>A</p>  <p style="text-align: center;">AC359A</p>	<ul style="list-style-type: none"> ● Pressure is reduced soon after water is splashed on condenser. 	Excessive refrigerant charge in refrigeration cycle	Reduce refrigerant until specified pressure is obtained.
	<p>Air suction by cooling fan is insufficient.</p>	<p>Insufficient condenser cooling performance</p> <p style="text-align: center;">↓</p> <p>① Cooling fan is clogged. ② Improper rotation of cooling fan</p>	<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 style="text-align: center;">↓</p> <p>Air in refrigeration cycle</p>	Evacuate repeatedly and recharge system.
	<p>Engine tends to overheat.</p>	<p>Engine cooling systems malfunction.</p>	Check and repair each engine cooling system.
	<ul style="list-style-type: none"> ● Areas near low-pressure pipe connection and service valves are considerably cold compared with areas near expansion valve outlet or evaporator. ● 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 style="text-align: center;">↓</p> <p>① Improper thermal valve installation ② Improper expansion valve adjustment</p>	Replace expansion valve.

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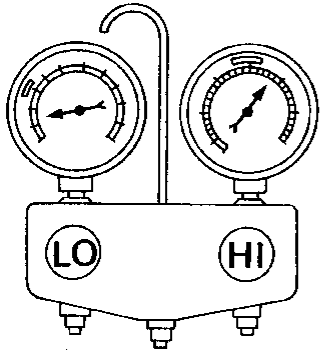
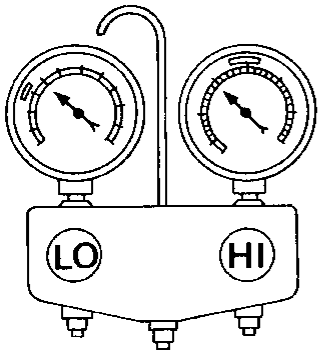
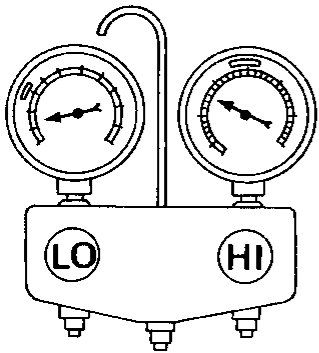
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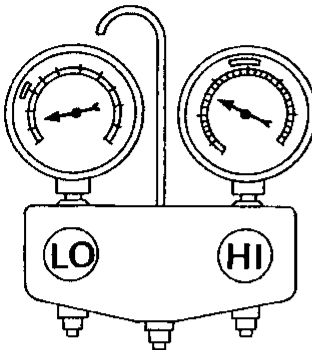
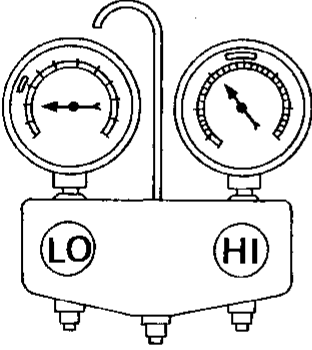
DIAGNOSES — Overall System

Performance Test Diagnoses (Cont'd)

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 compressor oil for contamination.
<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 discharge capacity does not change. (Compressor stroke is set at maximum.)</p>	<p>Replace compressor.</p>
<p>Both high-and low-pressure sides are too low.</p> <p>D</p>  <p style="text-align: right; font-size: small;">AC353A</p>	<ul style="list-style-type: none"> ● There is a big temperature difference between liquid tank outlet and inlet. Outlet temperature is extremely low. ● Liquid tank inlet and expansion valve are frosted. 	<p>Liquid tank inside is clogged a little.</p>	<ul style="list-style-type: none"> ● Replace liquid tank ● Check compressor oil 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 liquid tank and expansion valve is clogged.</p>	<ul style="list-style-type: none"> ● Check and repair malfunctioning parts. ● Check compressor oil for contamination.

DIAGNOSES — Overall System

Performance Test Diagnoses (Cont'd)

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
<p>Both high and low-pressure sides are too low.</p> <p>D</p>  <p style="text-align: right;">AC353A</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> <p>① Improper expansion valve adjustment</p> <p>② Malfunctioning thermal valve</p> <p>③ Outlet and inlet may be clogged.</p>	<ul style="list-style-type: none"> ● Remove foreign particles by using compressed air. ● Check compressor oil for contamination.
	<p>Areas near low-pressure pipe connection and service valve are extremely cold as compared with areas near expansion valve outlet and evaporator.</p>	<p>Low-pressure pipe is clogged or crushed.</p>	<ul style="list-style-type: none"> ● Check and repair malfunctioning parts. ● Check compressor oil 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>
<p>Low-pressure side sometimes becomes negative.</p> <p>E</p>  <p style="text-align: right;">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 style="text-align: center;">↓</p> <p>Moisture is frozen at expansion valve outlet and inlet.</p> <p style="text-align: center;">↓</p> <p>Water is mixed with refrigerant.</p>	<ul style="list-style-type: none"> ● Drain water from refrigerant or replace refrigerant. ● Replace liquid tank.

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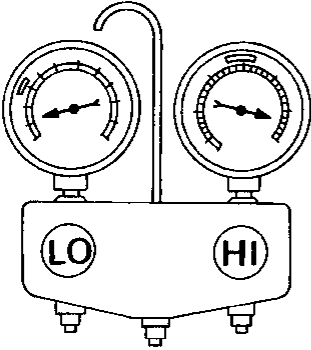
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DIAGNOSES — Overall System

Performance Test Diagnoses (Cont'd)

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
<p>Low-pressure side becomes negative.</p> <p>F</p>  <p style="text-align: right;">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 style="text-align: center;">↓</p> <p>Expansion valve or liquid tank is frosted.</p>	<p>After the system is left at rest, start it again in order to confirm whether or not problem is caused by water or foreign particles.</p> <ul style="list-style-type: none"> ● If the problem is due to water, drain water from refrigerant or replace refrigerant. ● If it is due to foreign particles, remove expansion valve and remove them with dry and compressed air. ● If either of the above methods cannot correct the problem, replace expansion valve. ● Replace liquid tank. ● Check compressor oil for contamination.

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PRELIMINARY CHECK 3 (Magnet clutch does not engage in DEF mode.)	HA-44	
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Symptom Chart

DIAGNOSTIC TABLE

PROCEDURE	Preliminary Check						Diagnostic Procedure					Main Power Supply and Ground Circuit Check				
	HA-42	HA-43	HA-44	HA-44	HA-45	HA-46	HA-55	HA-58	HA-60	HA-61	HA-65	HA-54	HA-54	HA-54	HA-54	HA-54
REFERENCE PAGE																
SYMPTOM	Preliminary check 1	Preliminary check 2	Preliminary check 3	Preliminary check 4	Preliminary check 5	Preliminary check 6	Diagnostic procedure 1	Diagnostic procedure 2	Diagnostic procedure 3	Diagnostic procedure 4	Diagnostic procedure 5	15A Fuses (#4 - #5)	10A Fuse (#10)	10A Fuse (#20)	Push control unit	Thermo control amp.
A/C does not blow cold air.		①					○			○		○	○			
Insufficient heating.				①			○				○					
Blower motor does not rotate.		①					②					○				
Air outlet does not change.					①			②					○		○	
Intake door does not change in VENT, B/L or FOOT mode.									①				○		○	
Intake door is not set at "FRESH" in DEF or F/D mode.	①								○				○		○	
Magnet clutch does not engage with A/C switch and fan switch are ON.		①								②			○	○		○
Magnet clutch does not engage in DEF mode.		①	②							○			○	○		
Water cock does not operate.											①		○			
Noise						①										

①, ② : The number means checking order.

○ : As for checking order, refer to each flow chart. (It depends on malfunctioning portion.)

TROUBLE DIAGNOSES — Manual Air Conditioner

Symptom Chart (Cont'd)

Electrical Components Inspection

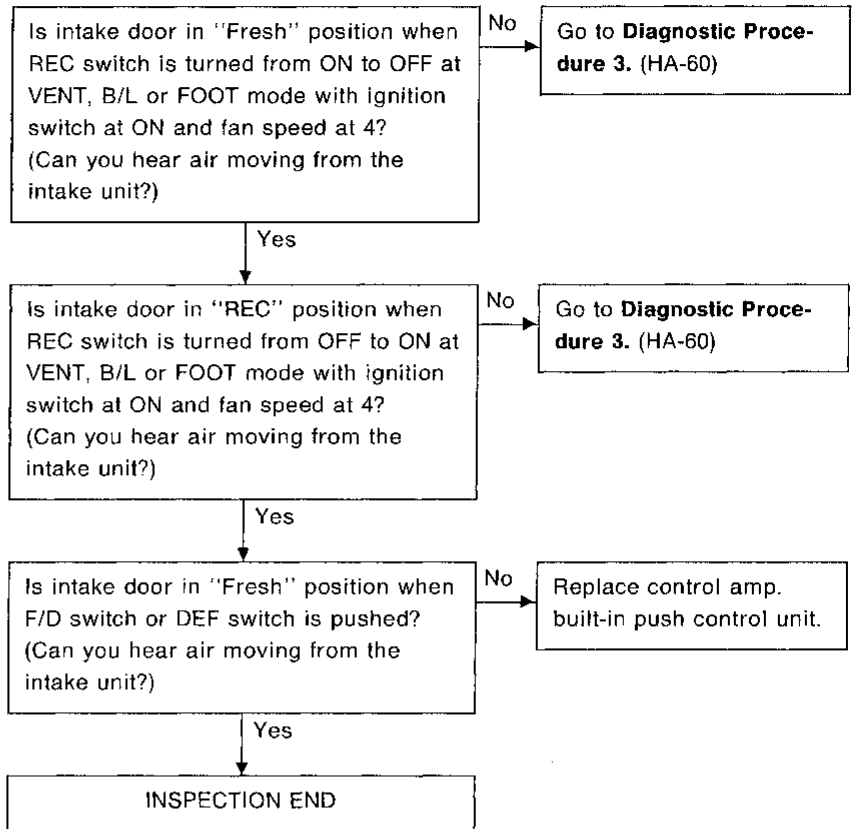
Symptom		HA-68	HA-67	HA-67	HA-68														
<input type="radio"/>	Blower relay																		
<input type="radio"/>	Blower motor																		
<input type="radio"/>	Resistor																		
<input type="radio"/>	A/C switch																		
<input type="radio"/>	REC switch																		
<input type="radio"/>	VENT switch																		
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<input type="radio"/>	DEF switch																		
<input type="radio"/>	Fan switch																		
<input type="radio"/>	Full cold switch																		
	Mode door motor																		
	Intake door motor																		
<input type="radio"/>	A/C relay																		
<input type="radio"/>	Dual-pressure switch																		
<input type="radio"/>	Compressor (Magnet clutch)																		
	Thermo control amp.																		
	Water cock solenoid valve																		
<input type="radio"/>	(ECM)ECCS control module																		
	Illumination system																		
	Knob illumination																		
<input type="radio"/>	Harness																		

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Preliminary Check

PRELIMINARY CHECK 1

Intake door is set at "FRESH" in DEF or F/D mode.

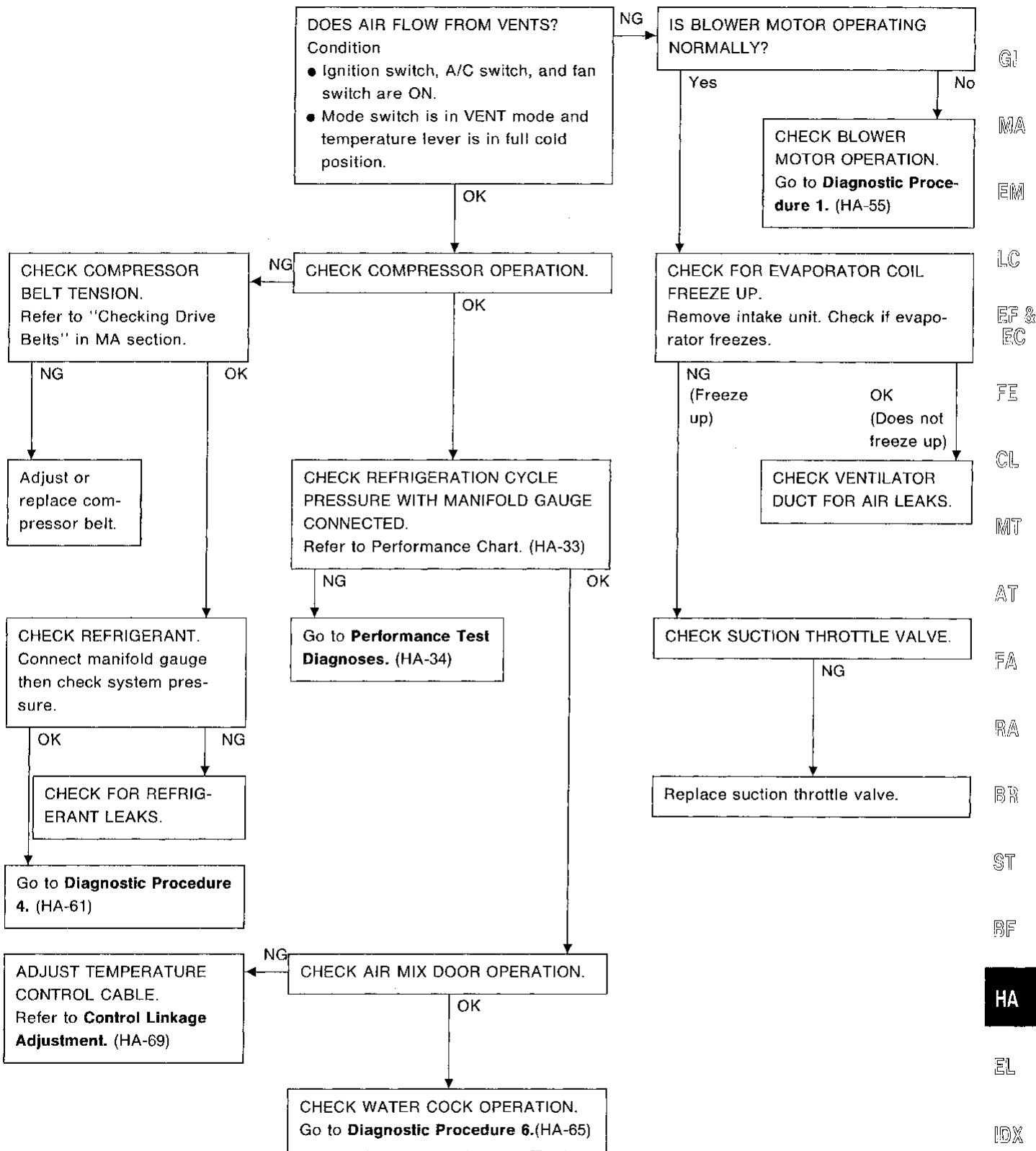


TROUBLE DIAGNOSES — Manual Air Conditioner

Preliminary Check (Cont'd)

PRELIMINARY CHECK 2

A/C does not blow cold air.



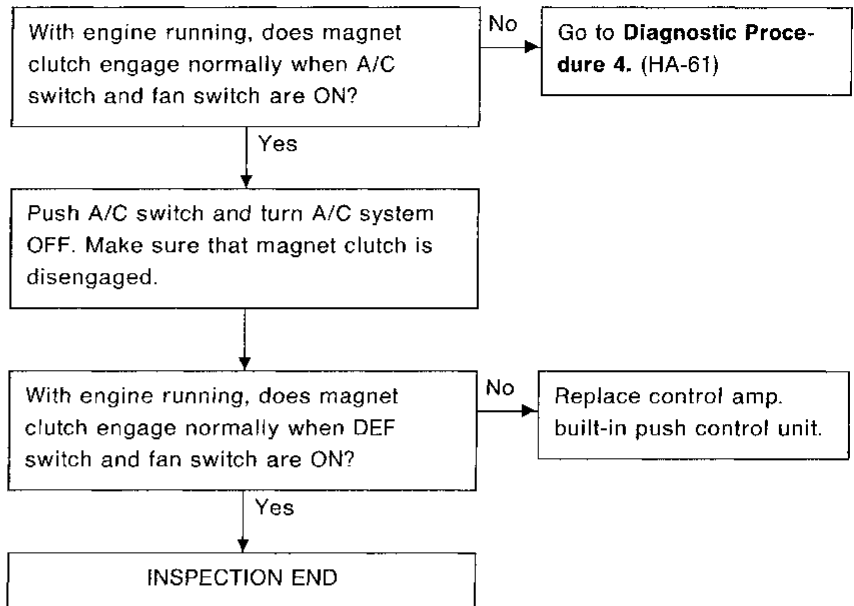
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Preliminary Check (Cont'd)

PRELIMINARY CHECK 3

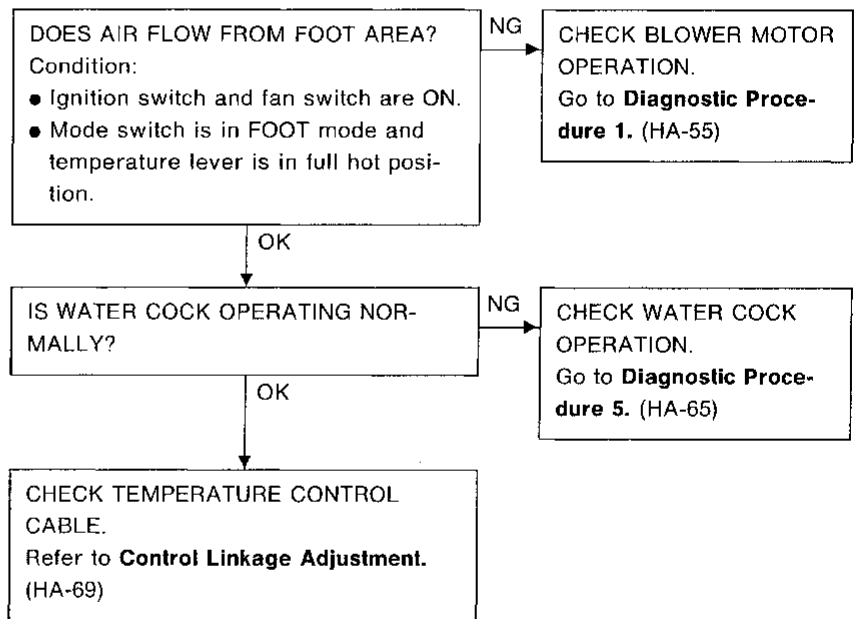
Magnet clutch does not engage in DEF mode.

- Perform PRELIMINARY CHECK 2 before referring to the following flow chart.



PRELIMINARY CHECK 4

Insufficient heating



TROUBLE DIAGNOSES — Manual Air Conditioner

Preliminary Check (Cont'd)

PRELIMINARY CHECK 5

Air outlet does not change.

DOES AIR COME OUT FROM EACH DUCT NORMALLY WHEN EACH MODE SWITCH IS PUSHED WITH IGNITION SWITCH AT ON?

Switch		Indicator illuminates					Air outlet
Mode		○					VENT
			○				FOOT & VENT
				○			FOOT & DEF
					○		FOOT & DEF
						○	DEF

No →

Go to **Diagnostic Procedure 2.** (HA-58)

Air distribution ratios

VENT	B/L	FOOT	F/D	DEF	
					(%)

Yes ↓

INSPECTION END

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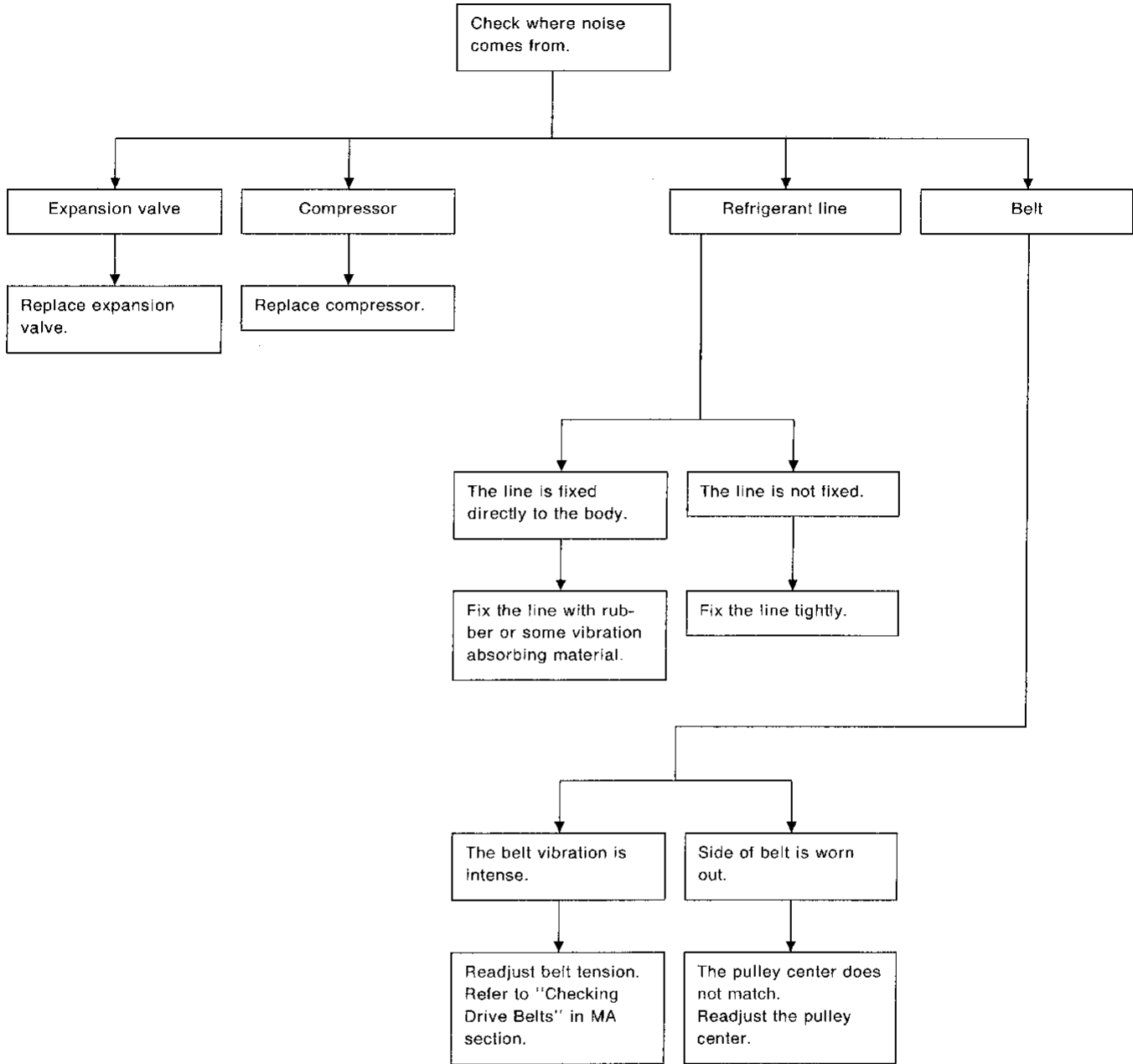
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Preliminary Check (Cont'd)

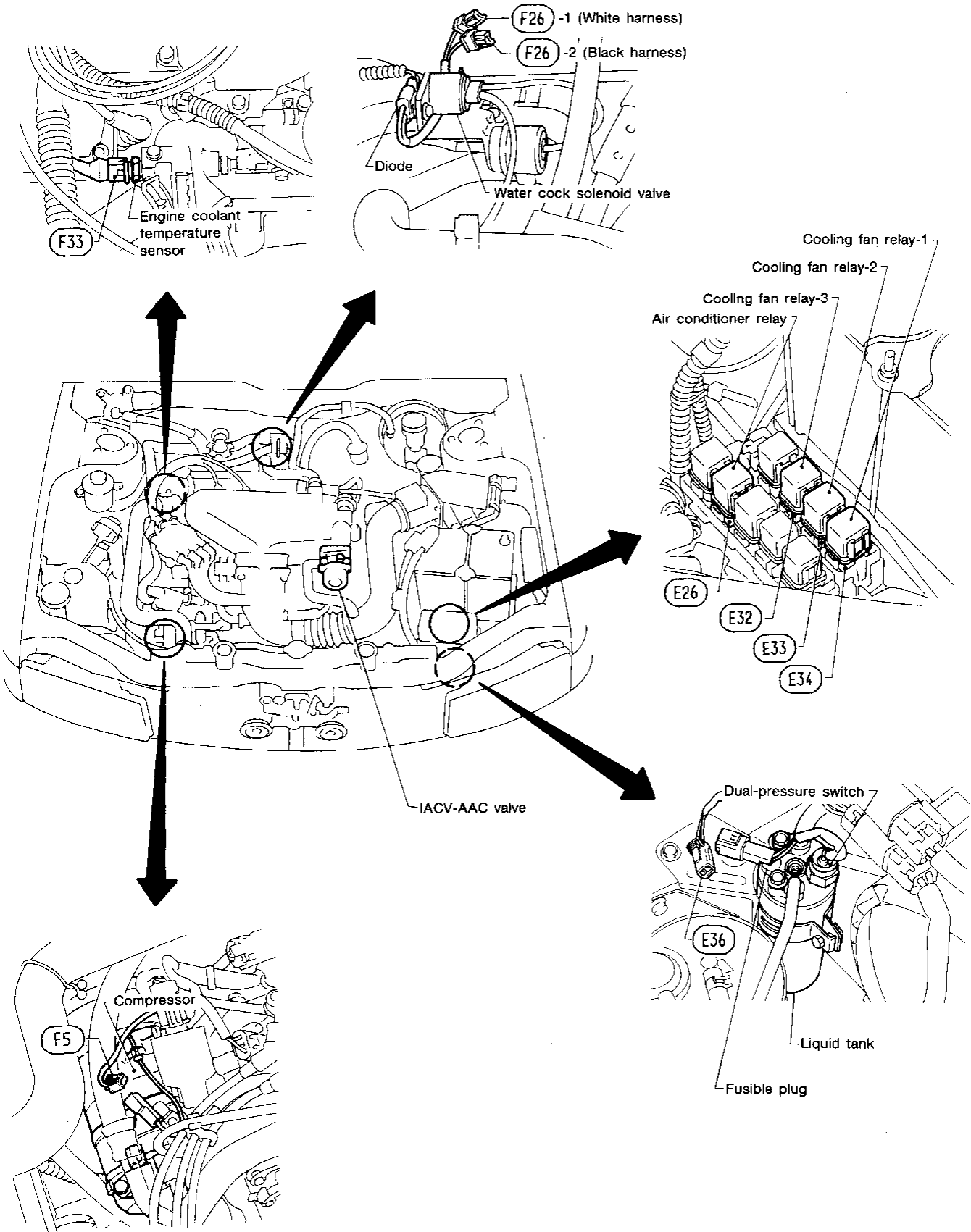
PRELIMINARY CHECK 6

Noise



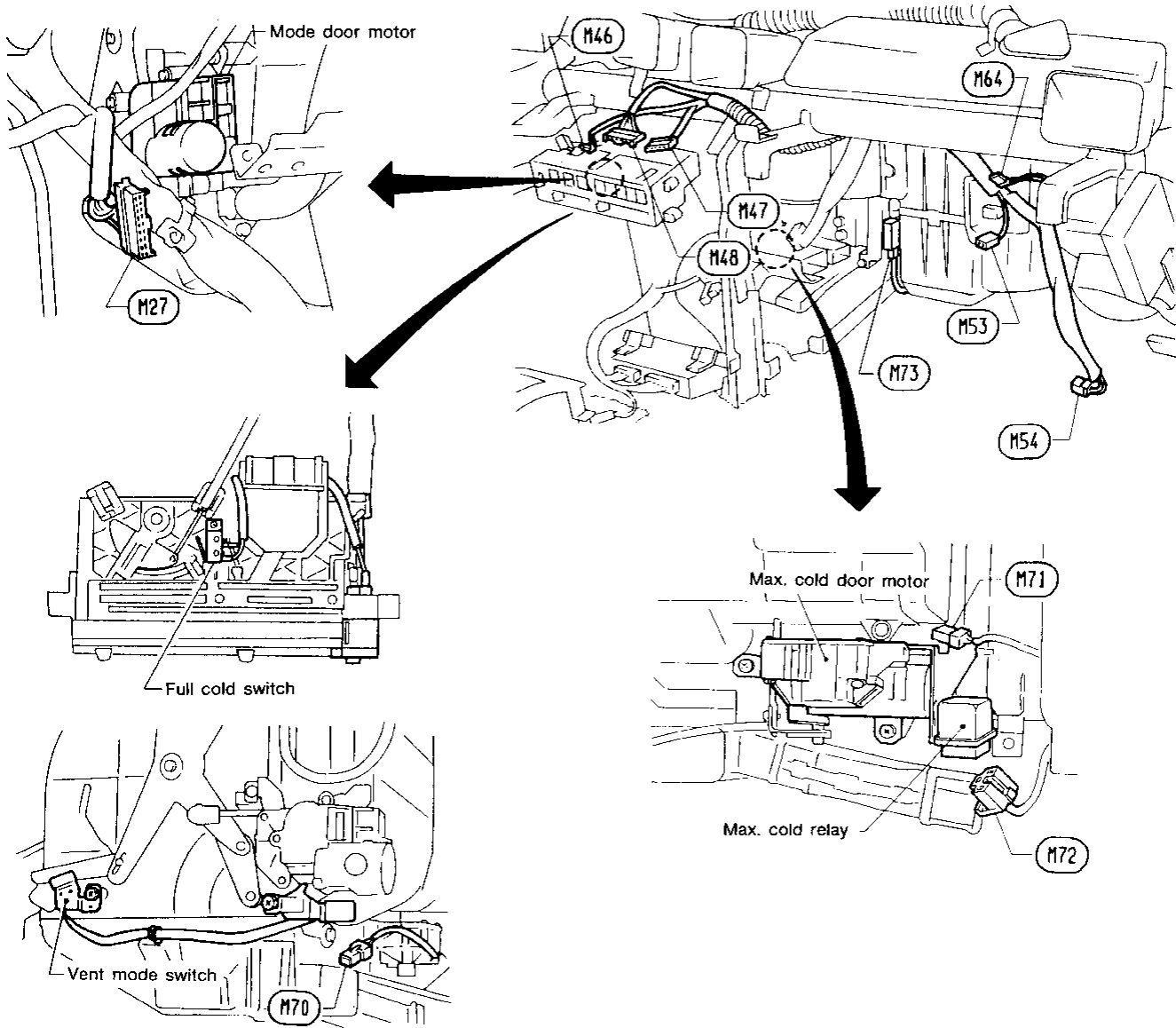
Harness Layout for A/C System

Engine compartment



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Passenger compartment



Main harness

- (M27) : Mode door motor
- (M46) : Full cold switch and illumination
- (M47) : Push control unit
- (M48) : Fan switch
- (M53) : Resistor
- (M54) : Blower motor
- (M64) : Intake door motor
- (M71) : Max. cold door motor
- (M72) : Max. cold relay
- (M73) : Thermo control amp.

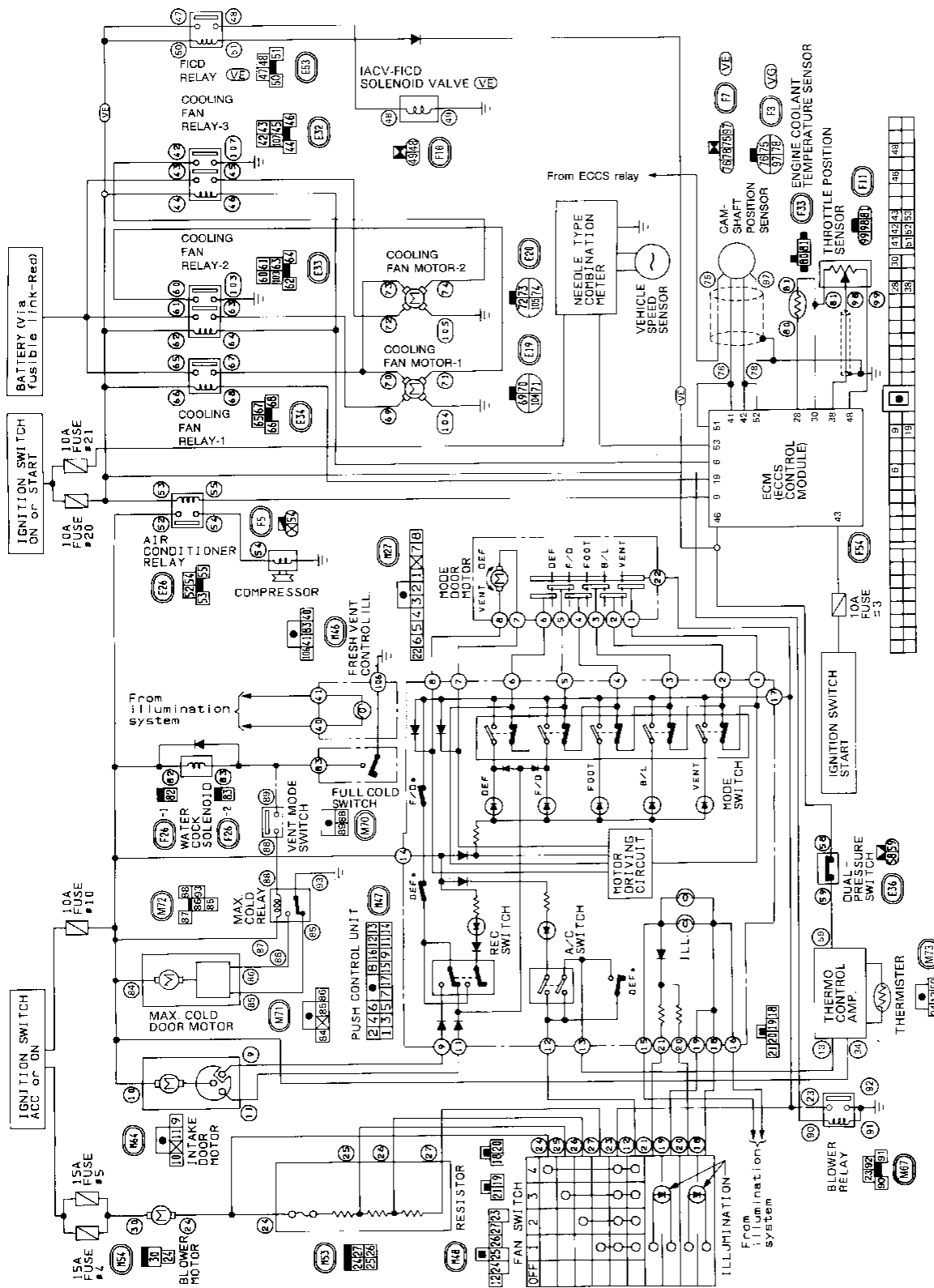
Engine room harness

- (E26) : A/C relay
- (E32) : Cooling fan relay-3
- (E33) : Cooling fan relay-2
- (E34) : Cooling fan relay-1
- (E36) : Dual-pressure switch

Engine control harness

- (F5) : Compressor
- (F26) -1 : Water cock solenoid valve
- (F26) -2 : Water cock solenoid valve
- (F33) : Engine coolant temperature sensor

Circuit Diagram for Quick Pinpoint Check



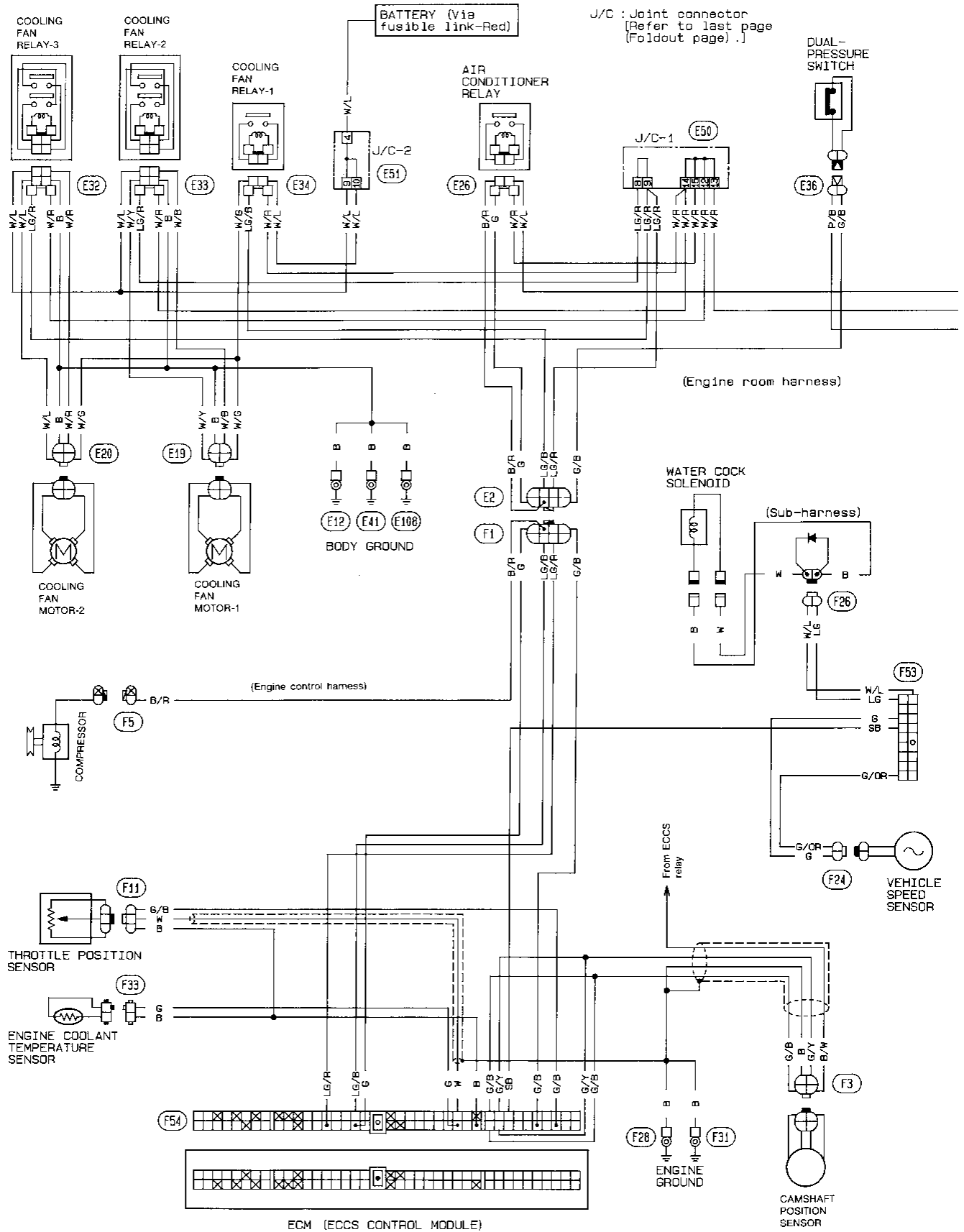
- All connectors shown in this illustration are unit side connectors.
- The unit side connectors with a double circle "⊖" are connected to the harness side connectors shown in the "Harness Layout for A/C System". (See pages HA-47, HA-48.)
- The terminal numbers in the connector coincide with the circuit numbers surrounded by a single circle "○".
- *: These switches are built into push control unit and mechanically linked to corresponding switches.

⊖ : VG engine model
 ○ : VE engine model

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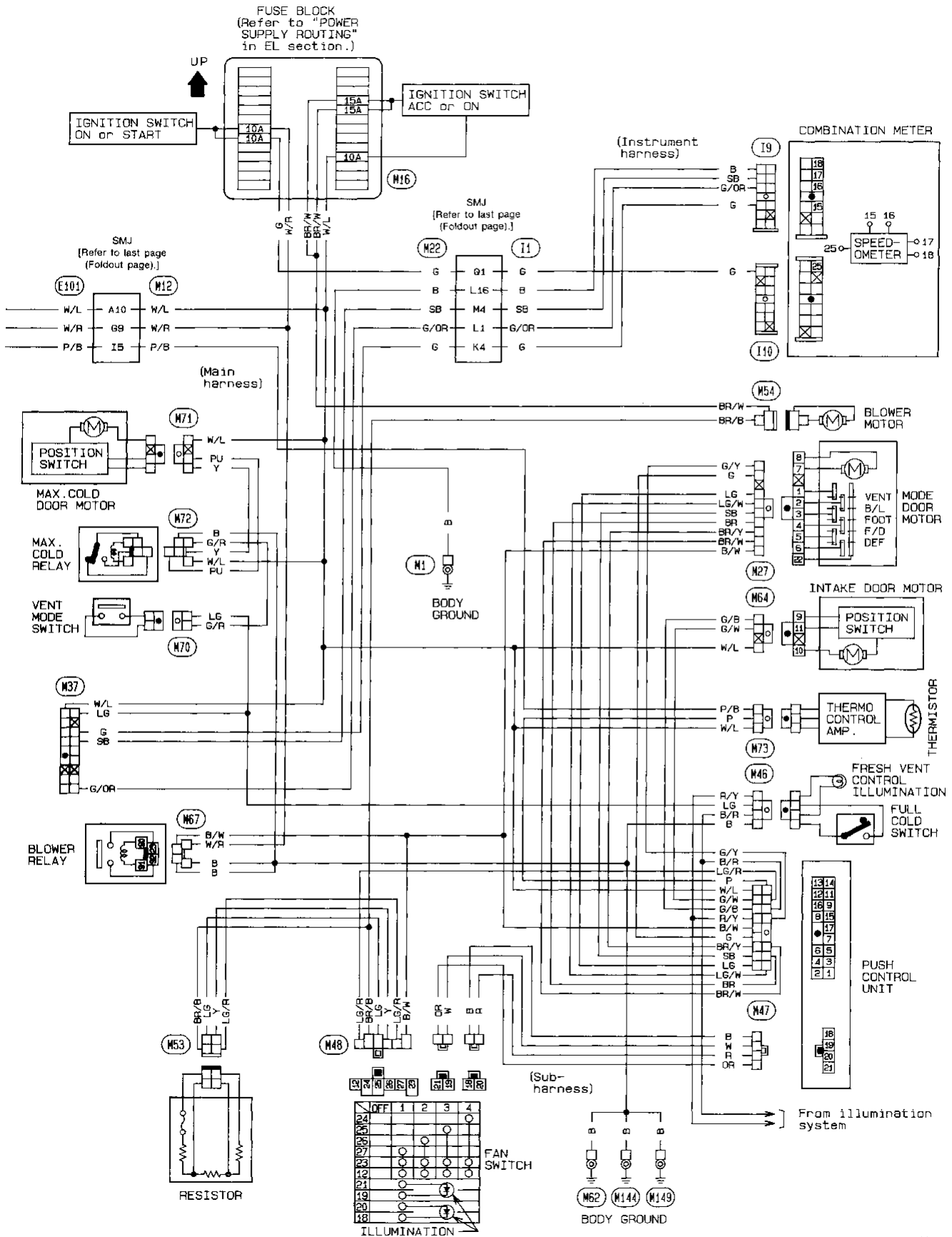
Wiring Diagram — Manual Air Conditioner

VG ENGINE MODEL



TROUBLE DIAGNOSES — Manual Air Conditioner

Wiring Diagram — Manual Air Conditioner (Cont'd)

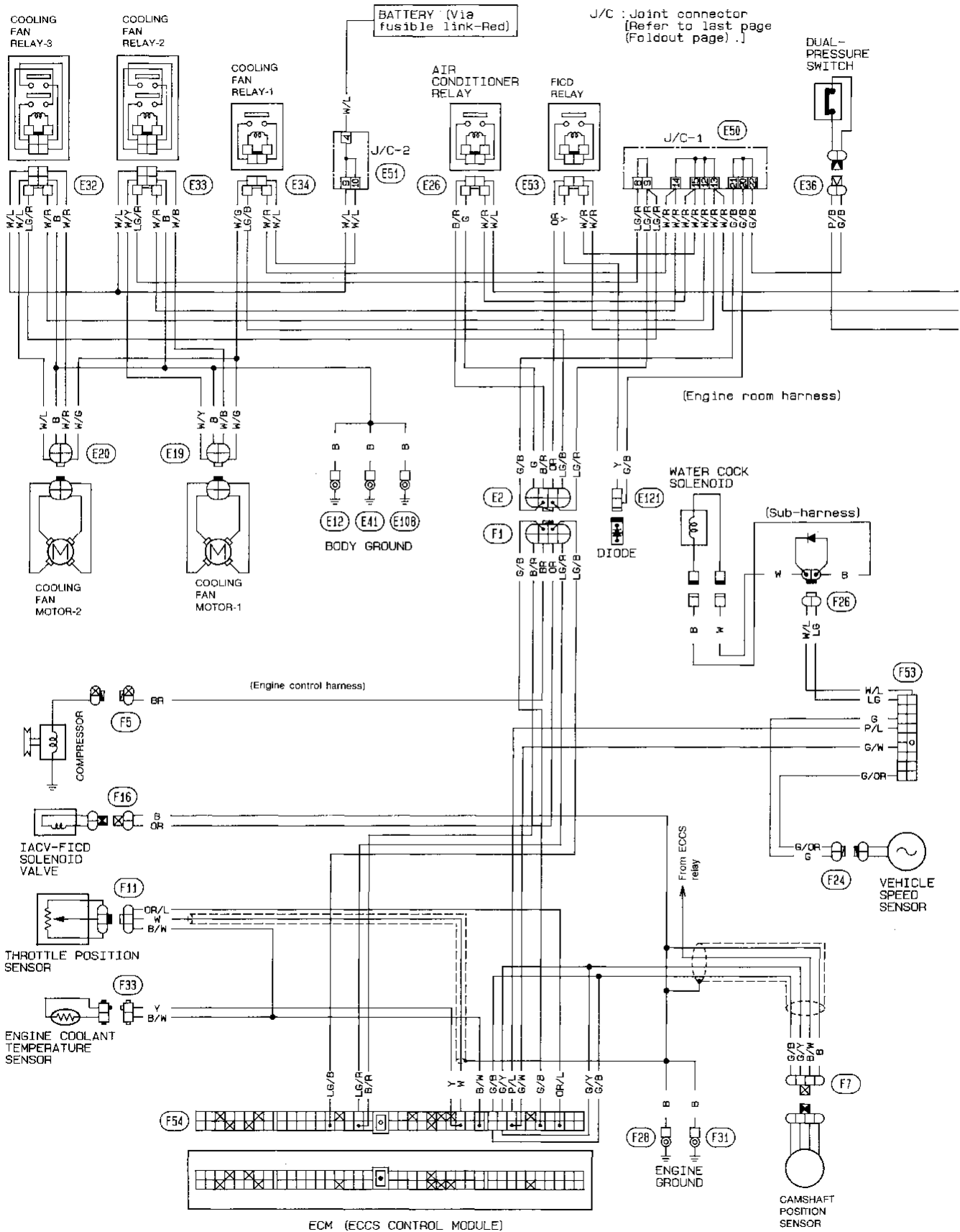


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TROUBLE DIAGNOSES — Manual Air Conditioner

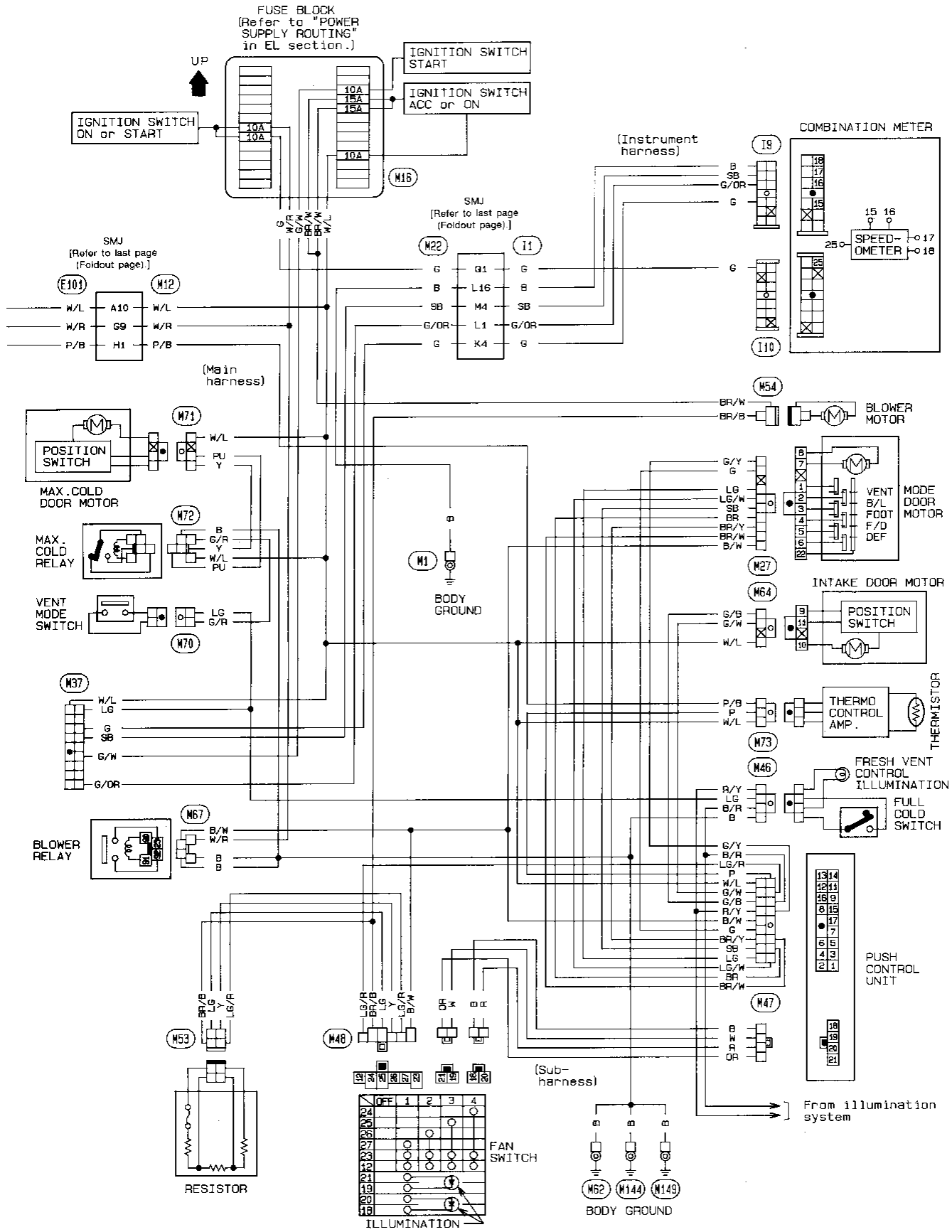
Wiring Diagram — Manual Air Conditioner (Cont'd)

VE ENGINE MODEL



TROUBLE DIAGNOSES — Manual Air Conditioner

Wiring Diagram — Manual Air Conditioner (Cont'd)

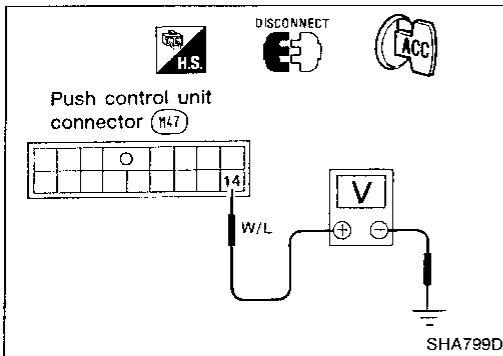


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Main Power Supply and Ground Circuit Check POWER SUPPLY CIRCUIT CHECK FOR A/C SYSTEM.

Check power supply circuit for air conditioning system.

Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.

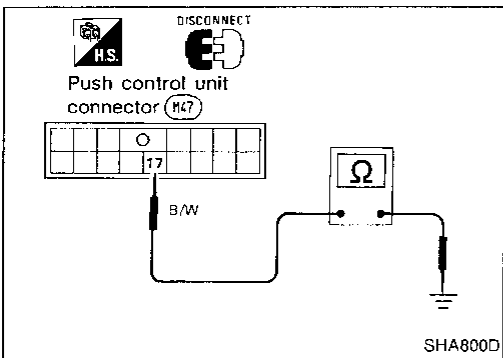


PUSH CONTROL UNIT CHECK

Check power supply circuit for push control unit with ignition switch at ACC.

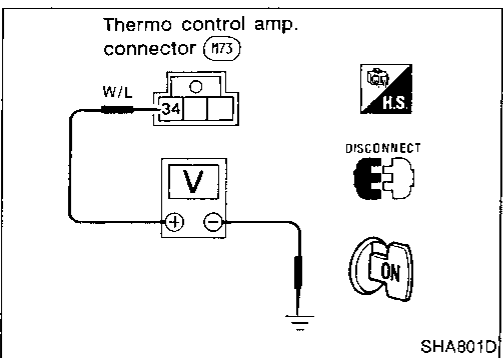
1. Disconnect push control unit harness connector.
2. Measure voltage across terminal No. ⑭ and body ground.

Voltmeter terminal		Voltage
⊕	⊖	
⑭	Body ground	Approx. 12V



Check body ground circuit for push control unit with ignition switch ON.

1. Disconnect push control unit harness connector.
2. Check for continuity between terminal No. ⑰ and body ground.

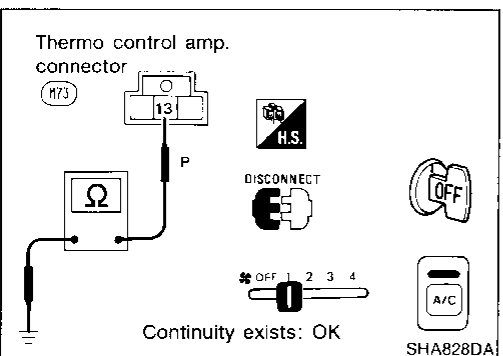


THERMO CONTROL AMP. CHECK

Check power supply circuit for thermo control amp. with ignition switch ON.

1. Disconnect thermo control amp. harness connector.
2. Measure voltage across terminal No. ⑳ and body ground.

Voltmeter terminal		Voltage
⊕	⊖	
⑳	Body ground	Approx. 12V



Check body ground circuit for thermo control amp. with ignition switch OFF, A/C switch ON and fan switch ON.

1. Disconnect thermo control amp. harness connector.
2. Check for continuity between terminal No. ⑬ and body ground.

Ohmmeter terminal		Continuity
⊕	⊖	
⑬	Body ground	Yes

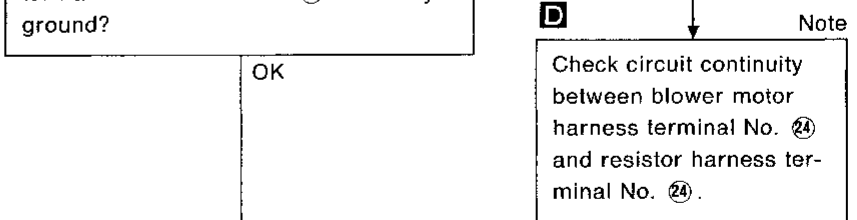
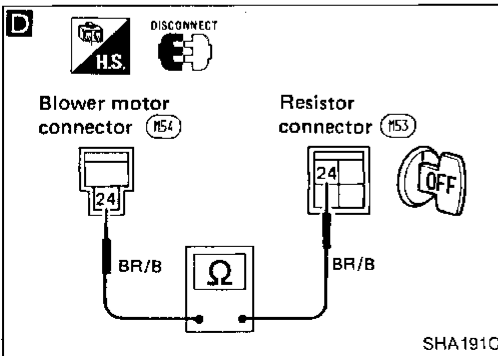
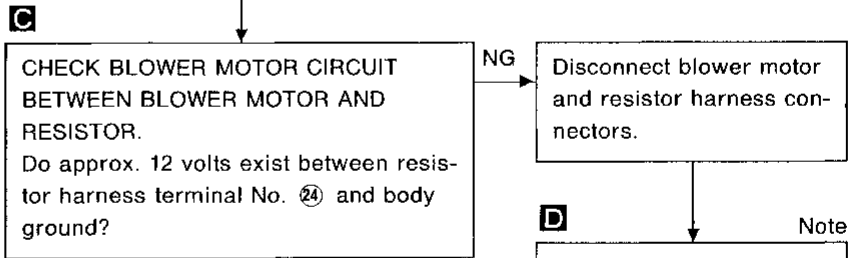
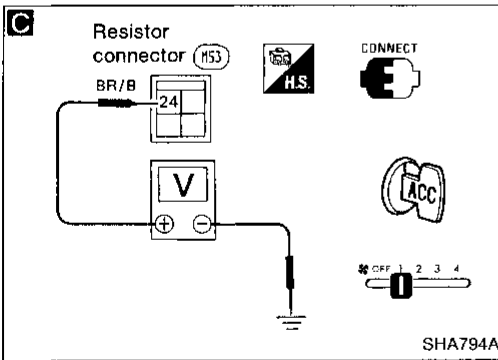
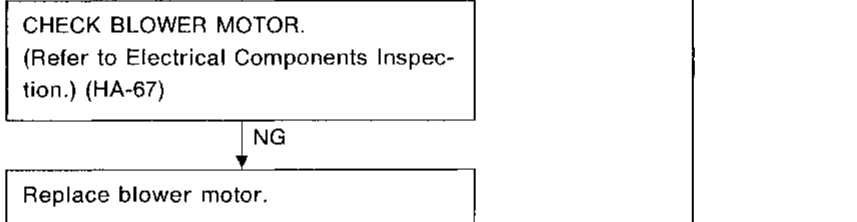
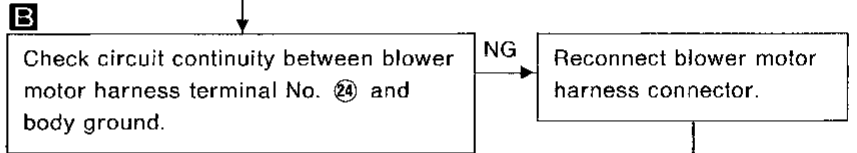
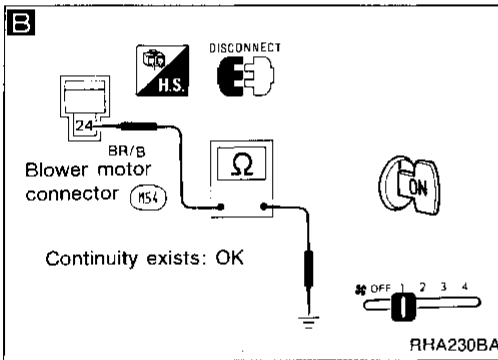
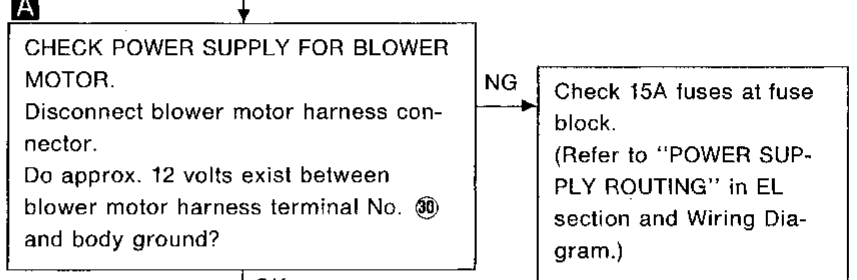
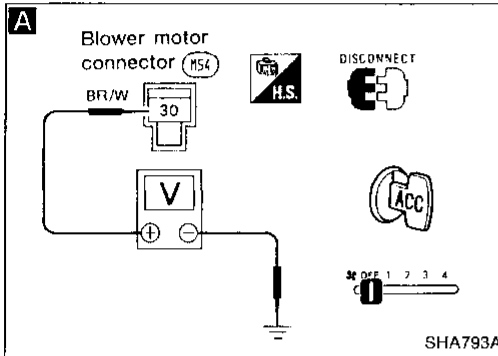
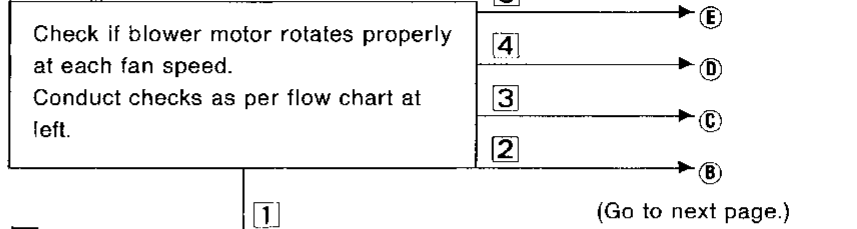
TROUBLE DIAGNOSES — Manual Air Conditioner

	INCIDENT	Flow chart No.
1	Fan fails to rotate.	1
2	Fan does not rotate at 1-speed.	2
3	Fan does not rotate at 2-speed.	3
4	Fan does not rotate at 3-speed.	4
5	Fan does not rotate at 4-speed.	5

Diagnostic Procedure 1

SYMPTOM: Blower motor does not rotate.

● Perform **PRELIMINARY CHECK 2** before referring to the following flow chart.

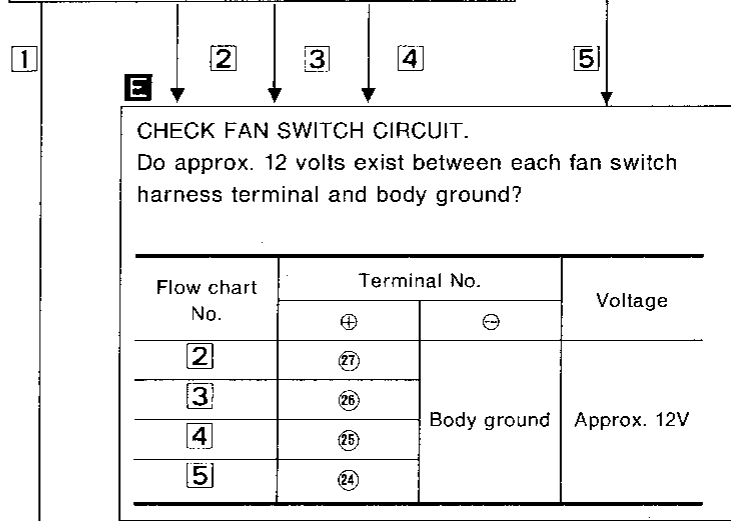
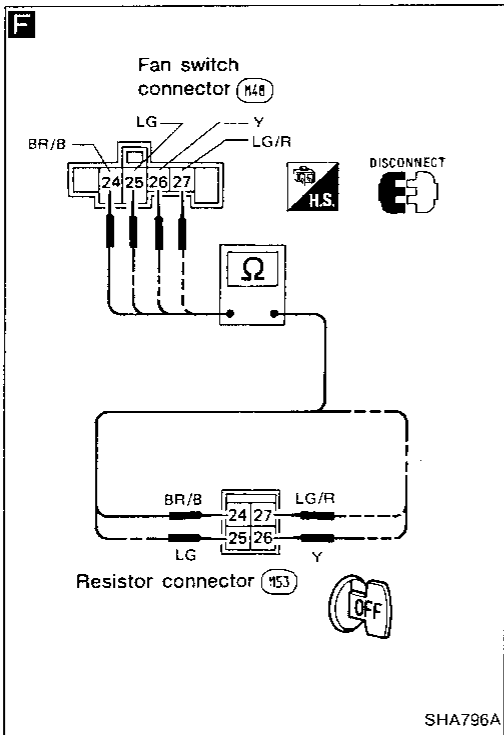
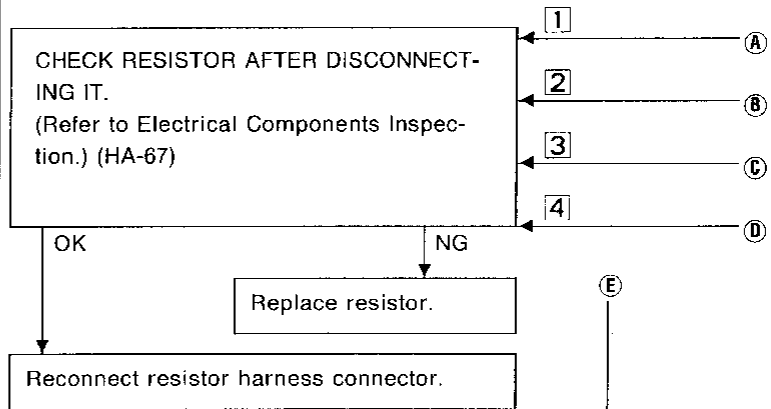
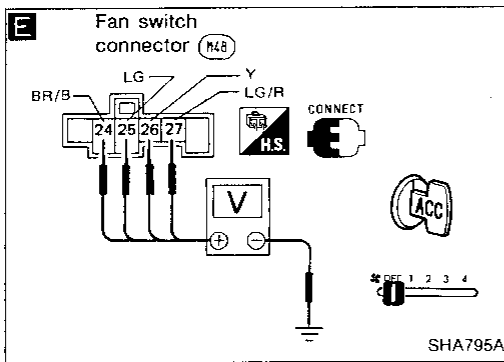


(Go to next page.)

Note:
If the result is NG after checking circuit continuity, repair harness or connector.

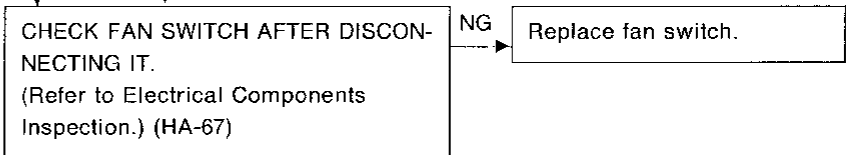
TROUBLE DIAGNOSES — Manual Air Conditioner

Diagnostic Procedure 1 (Cont'd)



F Note

Check circuit continuity between fan switch and resistor.



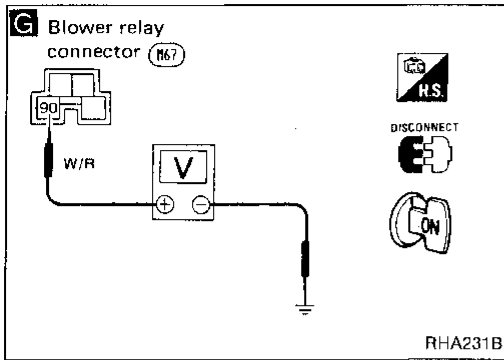
F

(Go to next page.)

Note:
if the result is NG after checking circuit continuity, repair harness or connector.

TROUBLE DIAGNOSES — Manual Air Conditioner

Diagnostic Procedure 1 (Cont'd)

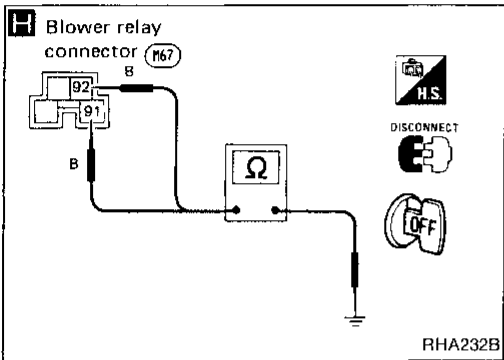


G

ⓕ

CHECK POWER SUPPLY FOR BLOWER RELAY.
Disconnect blower relay harness connector.
Do approx. 12 volts exist between blower relay harness terminal No. ⑨⑩ and body ground?

NG → Check 10A fuse at fuse block.
(Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)



H

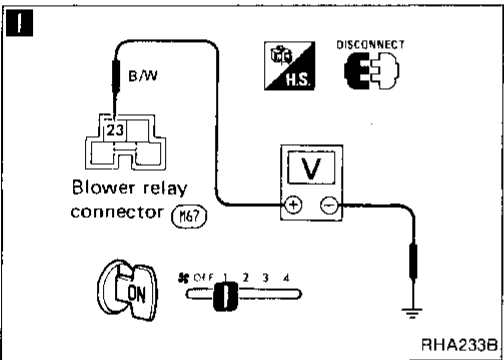
OK

Note

Check circuit continuity between blower relay harness terminal No. ⑨①, ⑨② and body ground.

OK

Reconnect fan switch harness connector.



I

Ⓛ

CHECK FAN SWITCH CIRCUIT BETWEEN FAN SWITCH AND BLOWER RELAY.
Do approx. 12 volts exist between blower relay harness terminal No. ②③ and body ground?

NG → Disconnect fan switch harness connector.

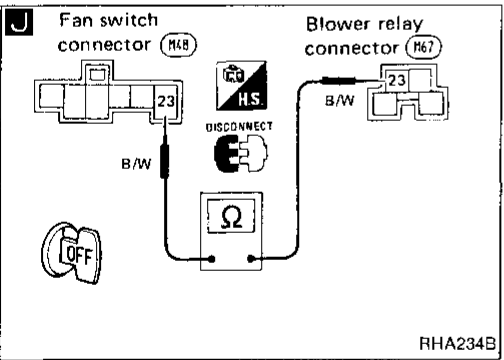
OK

NG → Disconnect fan switch harness connector.

J

Note

Check circuit continuity between fan switch harness terminal No. ②③ and blower relay harness terminal No. ②③.



J

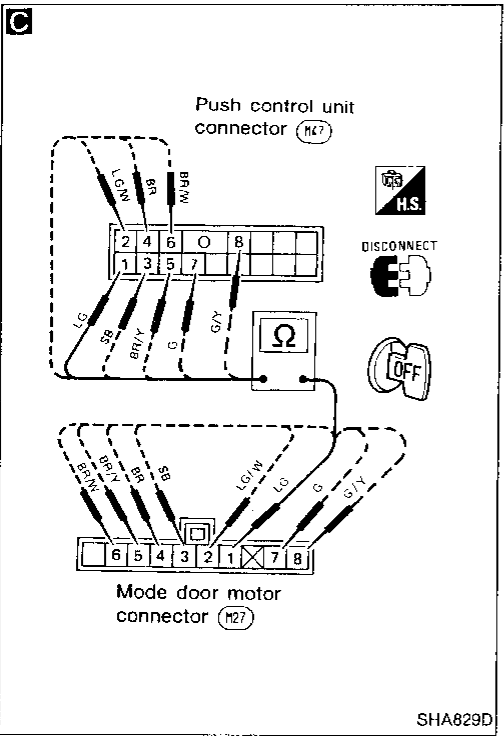
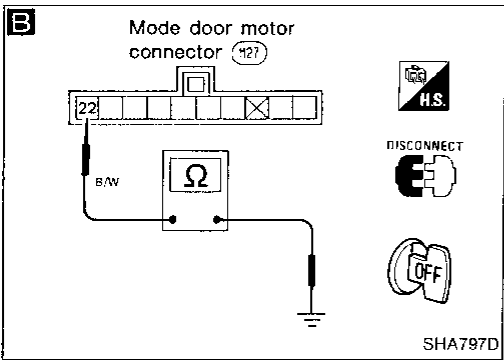
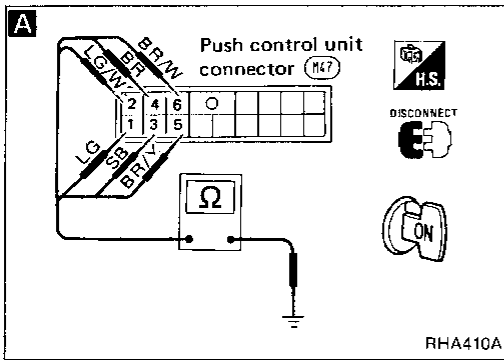
CHECK BLOWER RELAY AFTER DISCONNECTING IT.
(Refer to Electrical Components Inspection.) (HA-68)

NG

Replace blower relay.

Note:
If the result is NG after checking circuit continuity, repair harness or connector.

GI
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Diagnostic Procedure 2

SYMPTOM: Air outlet does not change.

- Perform PRELIMINARY CHECK 4 and Main Power Supply and Ground Circuit Check before referring to the following flow chart.

A

CHECK MODE DOOR MOTOR POSITION SWITCH.

1. Turn VENT switch ON with ignition switch at ON position.
2. Turn ignition switch OFF.
Disconnect push control unit connector.
3. Turn ignition switch ON.
Check if continuity exists between terminal No. ① or ② of push control unit harness connector and body ground.
4. Using above procedures, check for continuity in any other mode, as indicated in chart.

Mode switch	Terminal No.		Continuity
	⊕	⊖	
VENT	① or ②	Body ground	Yes
B/L	② or ③		
FOOT	③ or ④		
F/D	④ or ⑤		
DEF	⑤ or ⑥		

OK

CHECK SIDE LINK.
Refer to **Control Linkage Adjustment.** (HA-69)

B

Disconnect mode door motor harness connector.

B Note

CHECK BODY GROUND CIRCUIT FOR MODE DOOR MOTOR.
Does continuity exist between mode door motor harness terminal No. ②② and body ground?

OK

C Note

Check circuit continuity between each terminal on push control unit and on mode door motor.

Terminal No.		Continuity
⊕	⊖	
Push control unit	Mode door motor	Yes
①	①	
②	②	
③	③	
④	④	
⑤	⑤	
⑥	⑥	
⑦	⑦	
⑧	⑧	

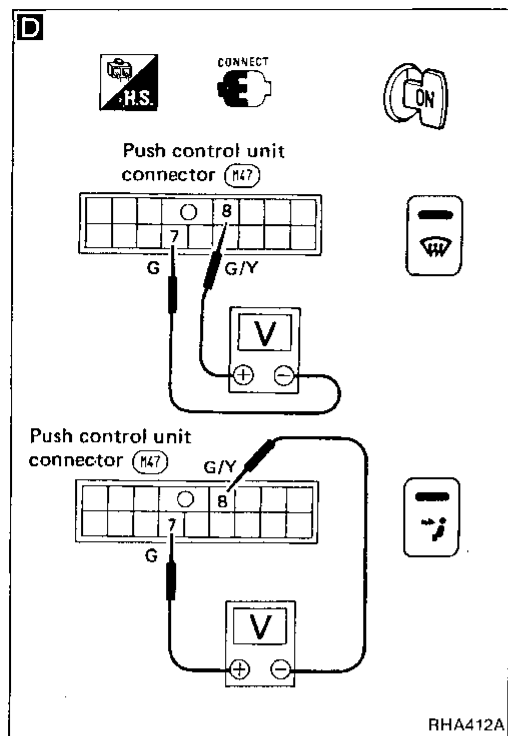
OK

A

(Go to next page.)

Note:
If the result is NG after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 2 (Cont'd)



RHA412A

(A)
Reconnect push control unit and mode door motor harness connectors.

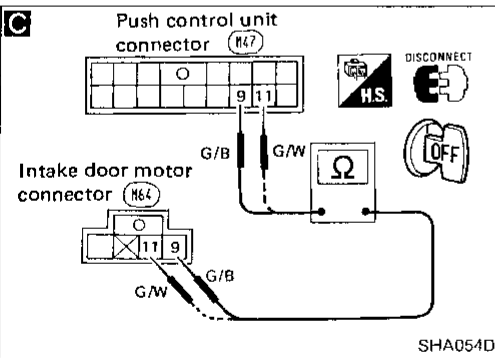
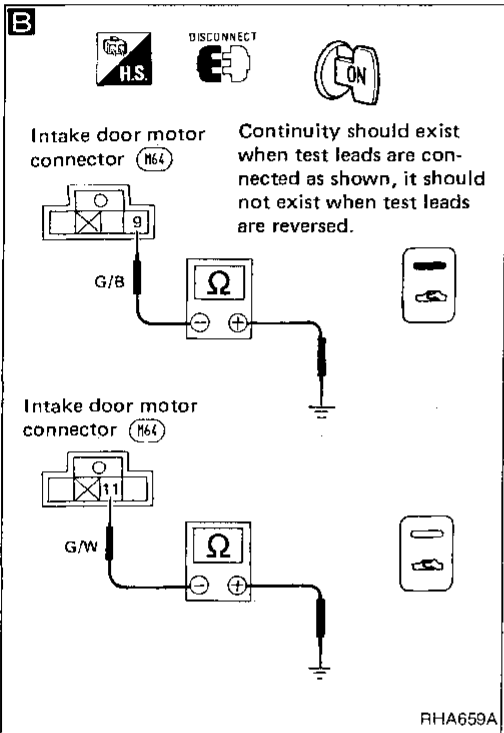
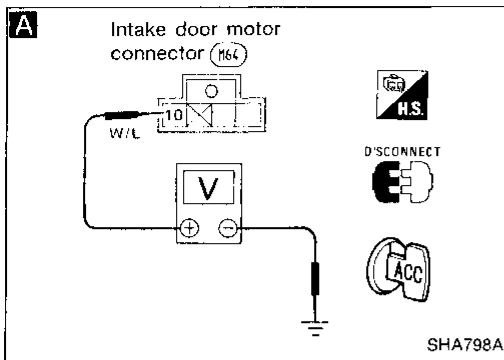
D
CHECK FOR OUTPUT OF PUSH CONTROL UNIT.
Do approx. 12 volts exist between push control unit harness terminal No. ⑦ and ⑧ when mode is switched from "VENT" to "DEF" or when mode is switched from "DEF" to "VENT"?

Terminal No.		Mode door motor	
⑦	⑧	Mode door operation	Direction of linkage rotation
-	-	Stop	Stop
⊖	⊕	VENT → DEF	Clockwise
⊕	⊖	DEF → VENT	Counterclockwise

NG → Replace control amp. built-in push control unit.

OK
Replace mode door motor.

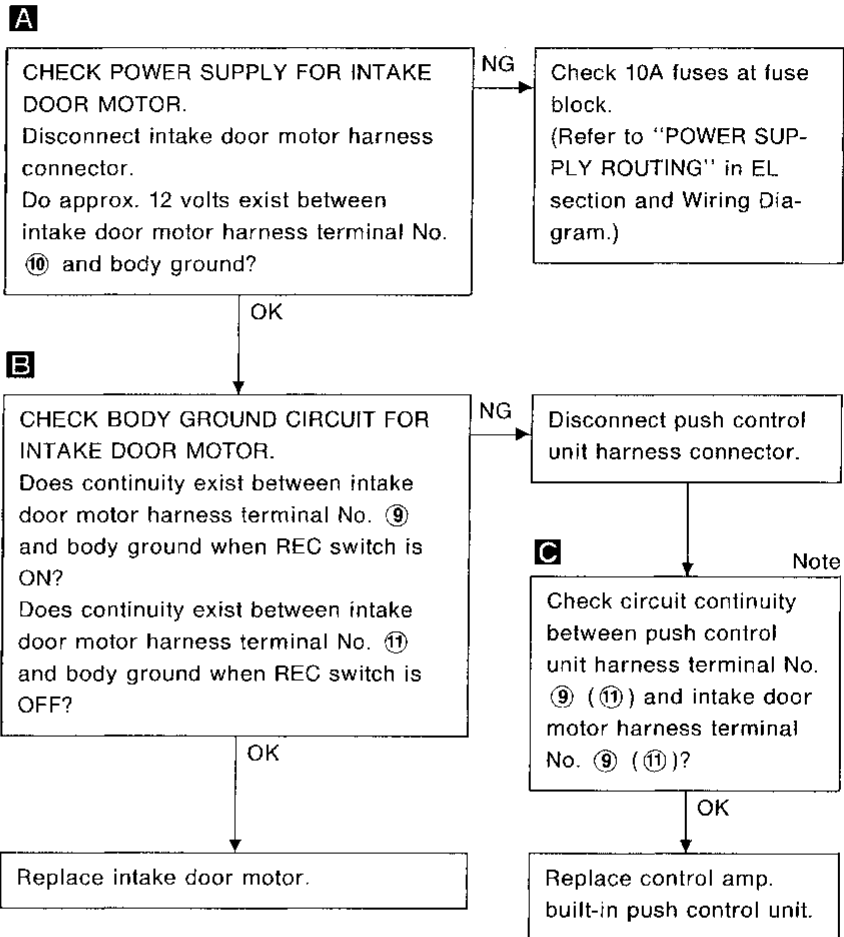
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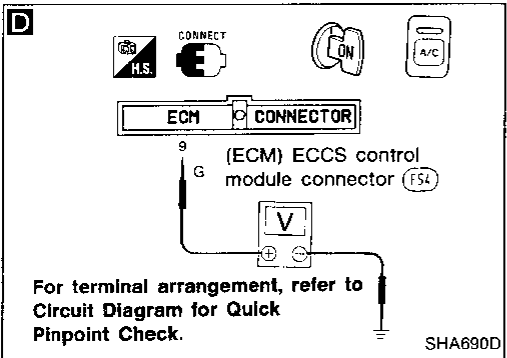
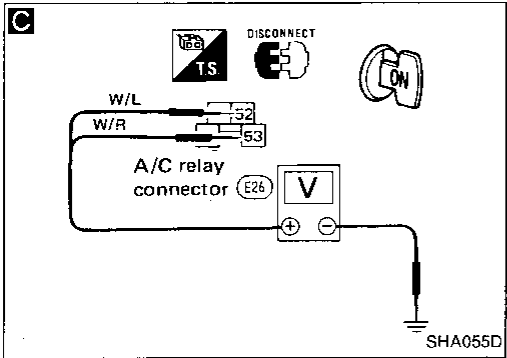
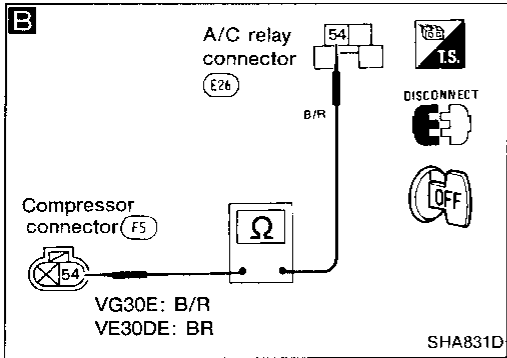
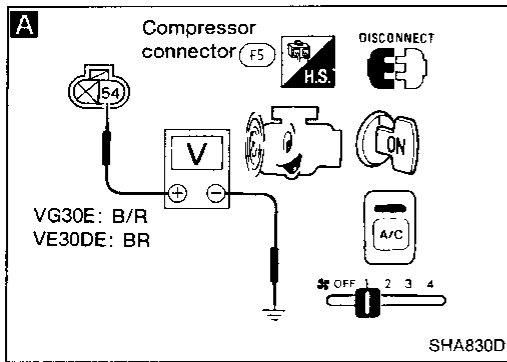
Diagnostic Procedure 3

SYMPTOM: Intake door does not change in VENT, B/L or FOOT mode.

- Perform **PRELIMINARY CHECK 1** and **Main Power Supply and Ground Circuit Check** before referring to the following flow chart.



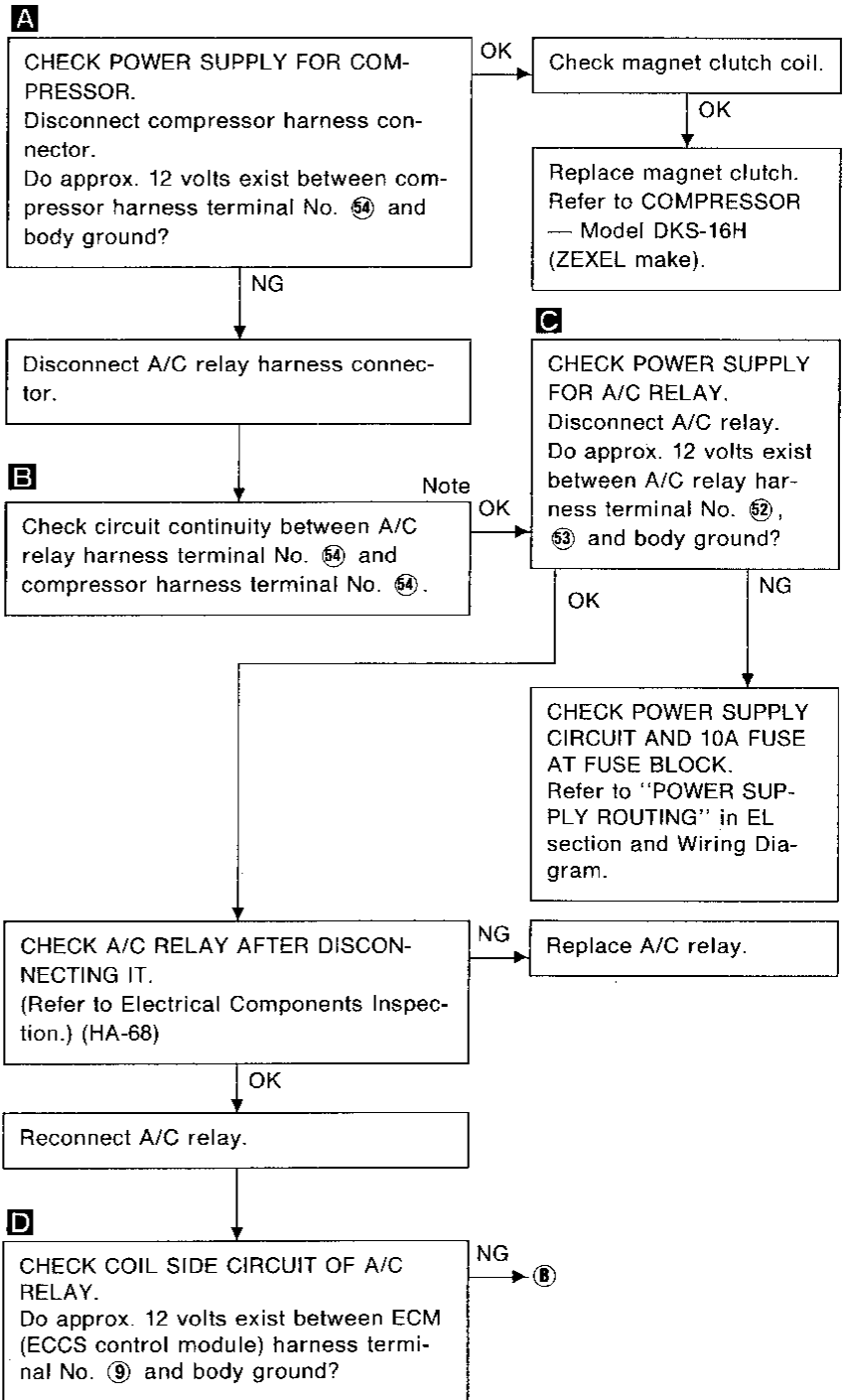
Note:
If the result is NG after checking circuit continuity, repair harness or connector.



Diagnostic Procedure 4

SYMPTOM: Magnet clutch does not engage with A/C switch and fan switch are ON.

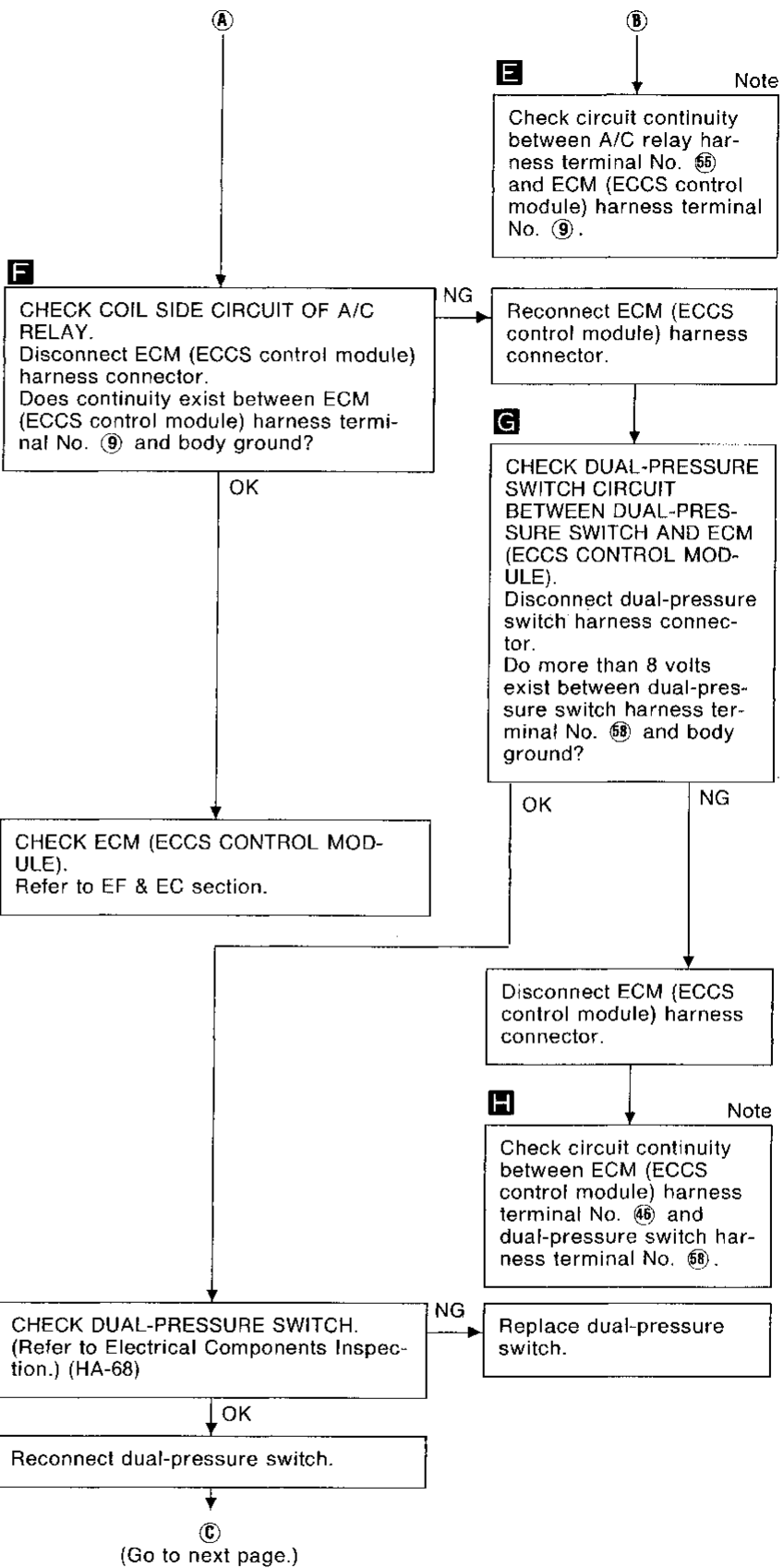
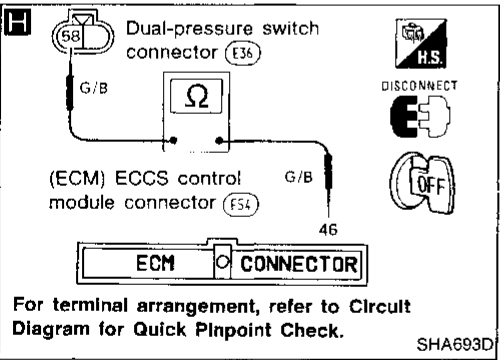
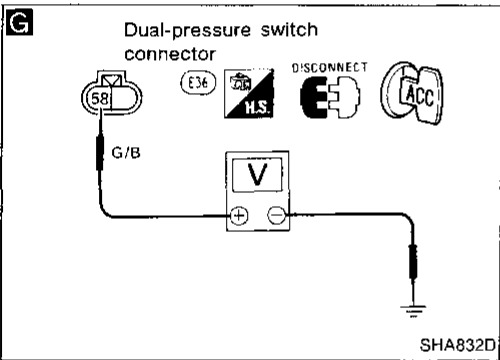
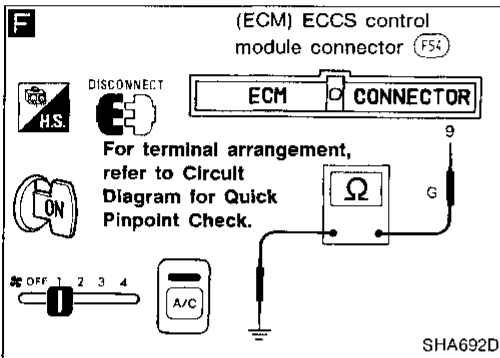
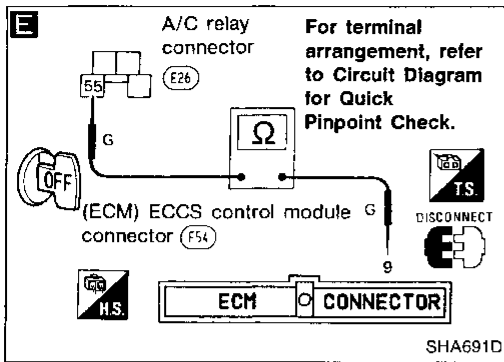
- Perform PRELIMINARY CHECK 2 before referring to the following flow chart.



Note:
If the result is NG after checking circuit continuity, repair harness or connector.

TROUBLE DIAGNOSES — Manual Air Conditioner

Diagnostic Procedure 4 (Cont'd)

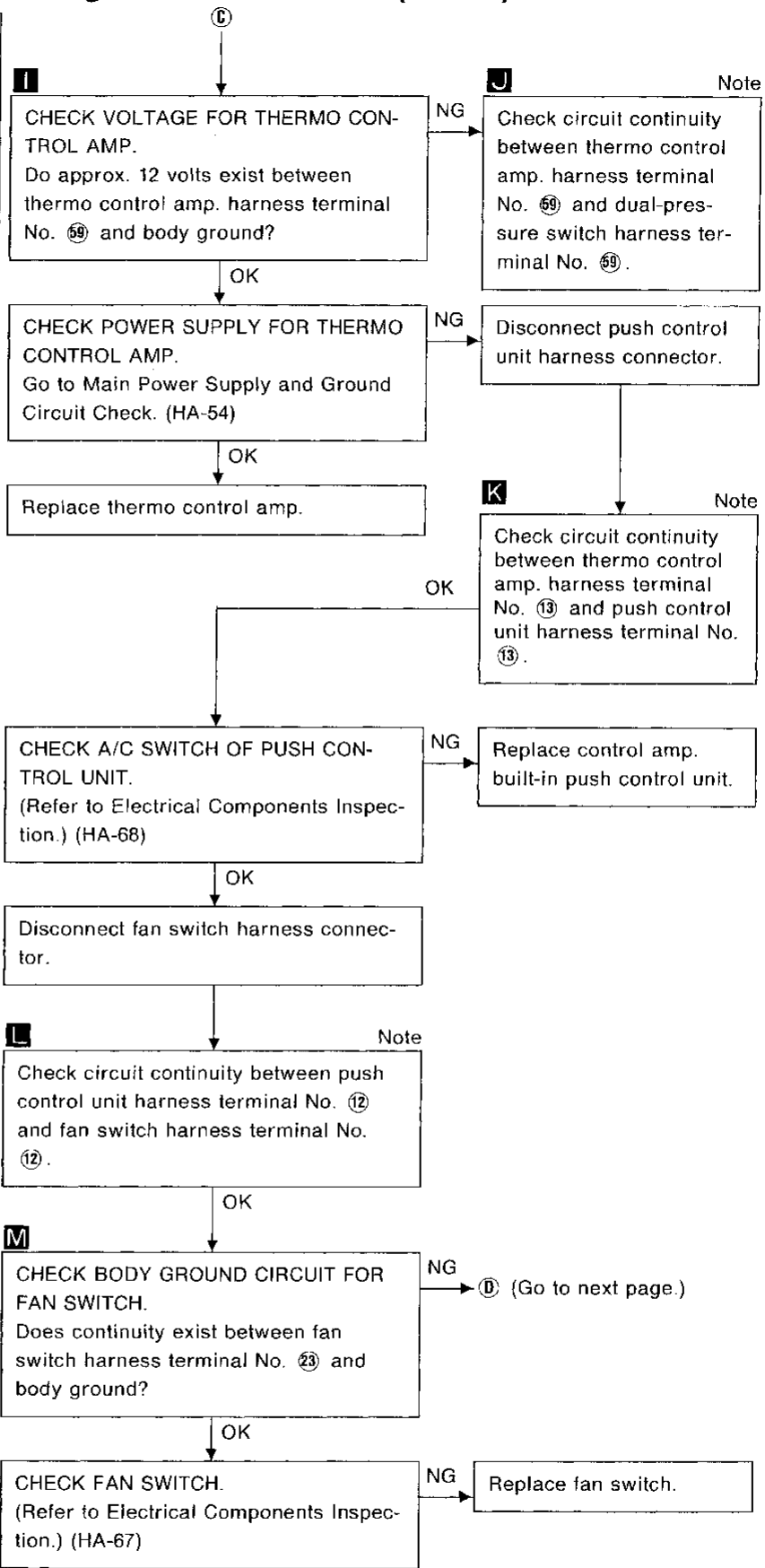
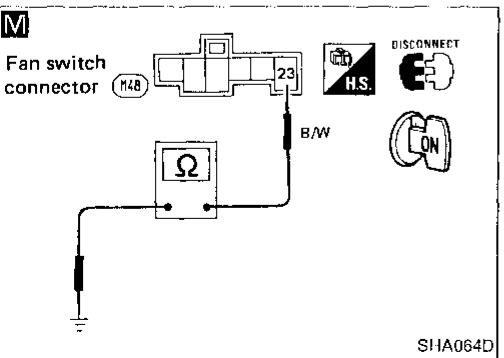
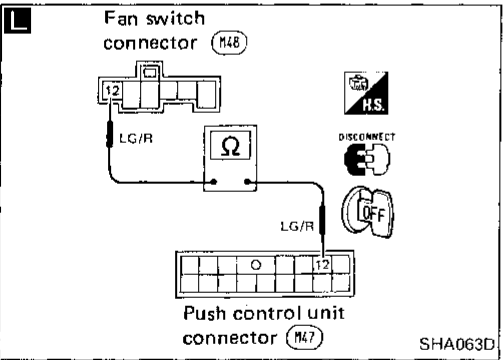
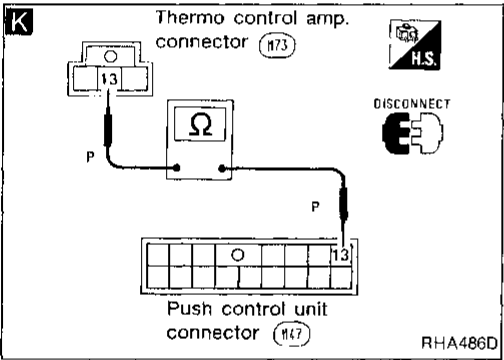
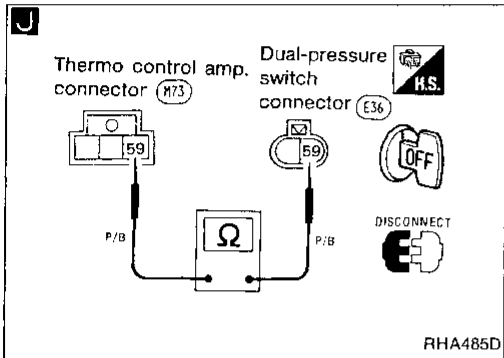
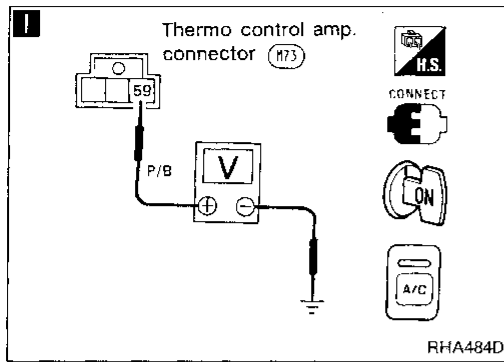


Note:

If the result is NG after checking circuit continuity, repair harness or connector.

TROUBLE DIAGNOSES — Manual Air Conditioner

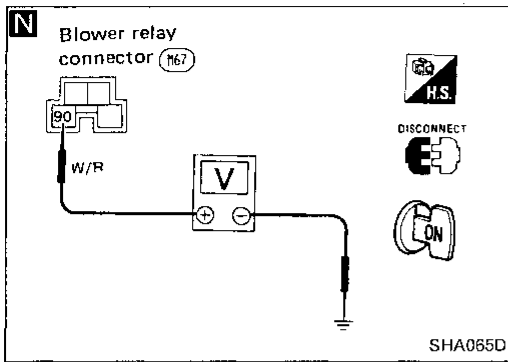
Diagnostic Procedure 4 (Cont'd)



Note:
If the result is NG after checking circuit continuity, repair harness or connector.

TROUBLE DIAGNOSES — Manual Air Conditioner

Diagnostic Procedure 4 (Cont'd)



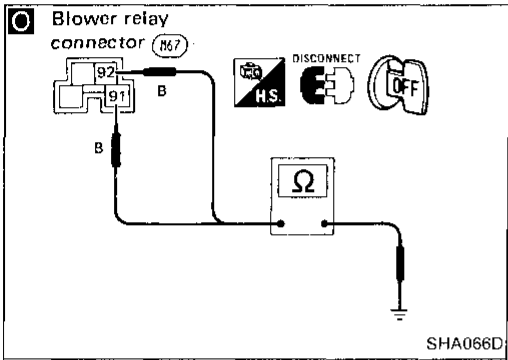
D

N

CHECK POWER SUPPLY FOR BLOWER RELAY.
Disconnect blower relay harness connector.
Do approx. 12 volts exist between blower relay harness terminal No. ⑩ and body ground?

NG

Check 10A fuse at fuse block.
(Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)



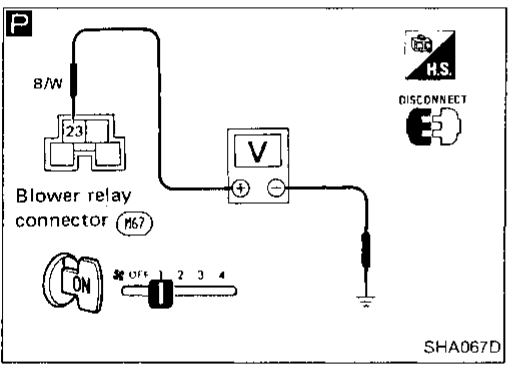
O

Note

Check circuit continuity between blower relay harness terminal No. ⑪, ⑫ and body ground.

OK

Reconnect fan switch harness connector.



P

CHECK FAN SWITCH CIRCUIT BETWEEN FAN SWITCH AND BLOWER RELAY.
Do approx. 12 volts exist between blower relay harness terminal No. ⑬ and body ground?

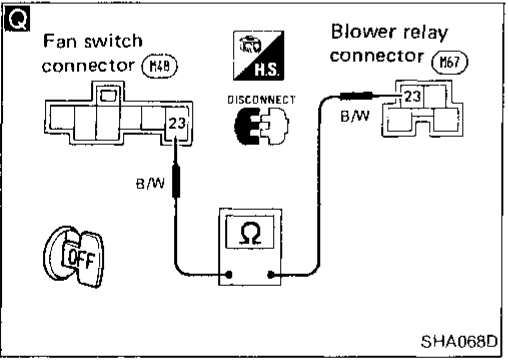
NG

Disconnect fan switch harness connector.

Q

Note

Check circuit continuity between fan switch harness terminal No. ⑬ and blower relay harness terminal No. ⑬.



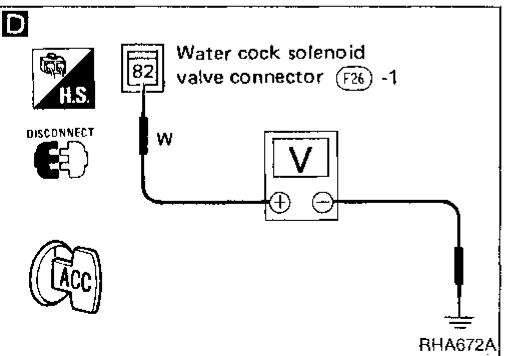
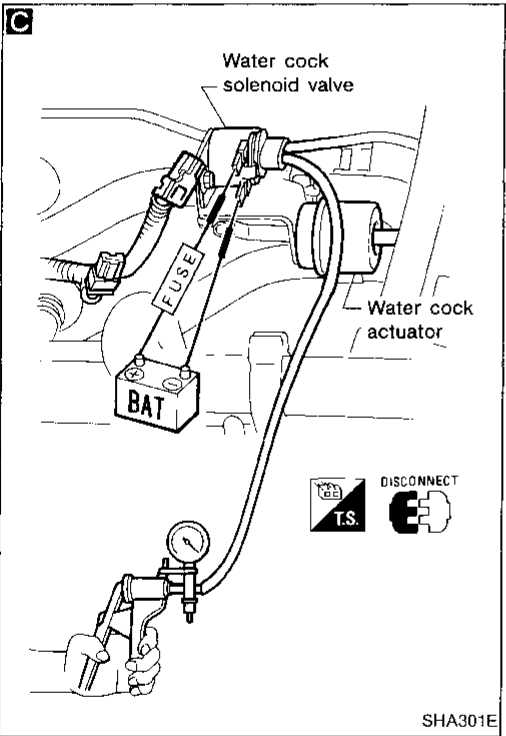
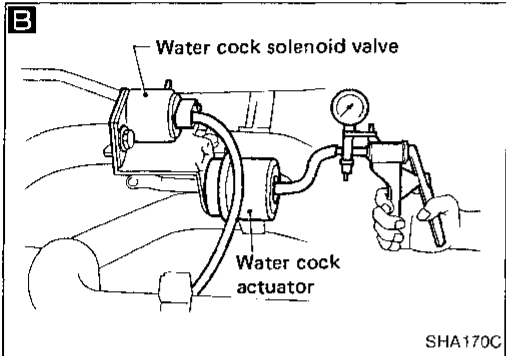
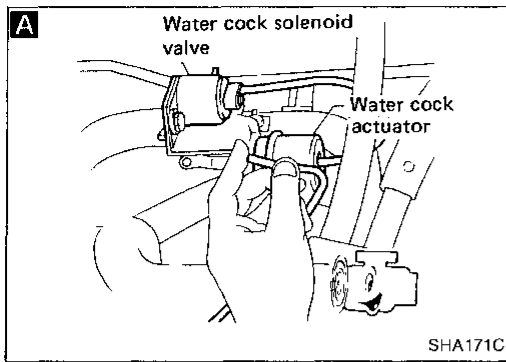
OK

CHECK BLOWER RELAY AFTER DISCONNECTING IT.
(Refer to Electrical Components Inspection.) (HA-68)

NG

Replace blower relay.

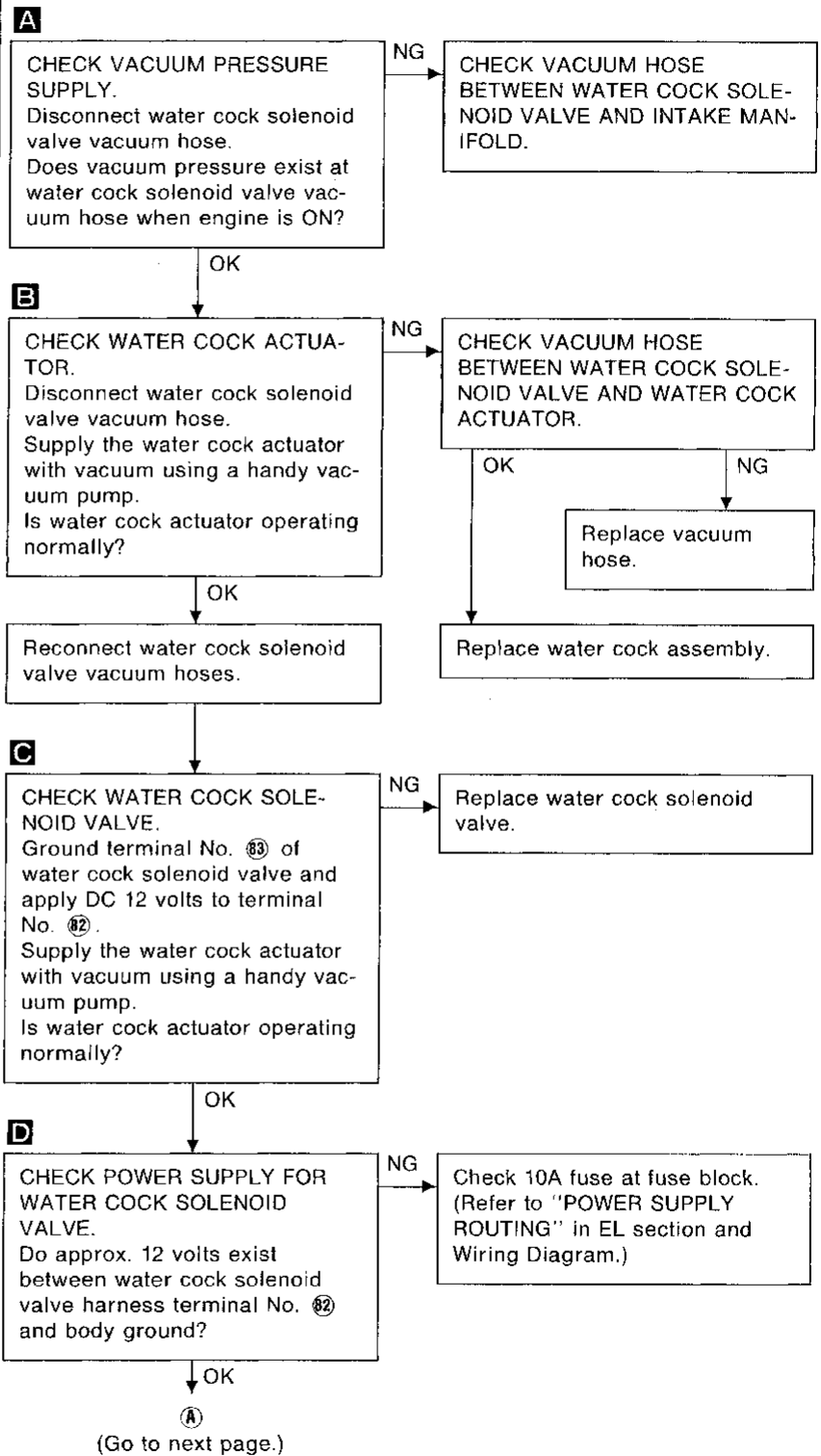
Note:
If the result is NG after checking circuit continuity, repair harness or connector.



Diagnostic Procedure 5

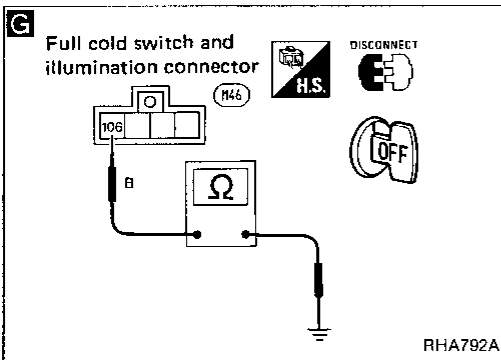
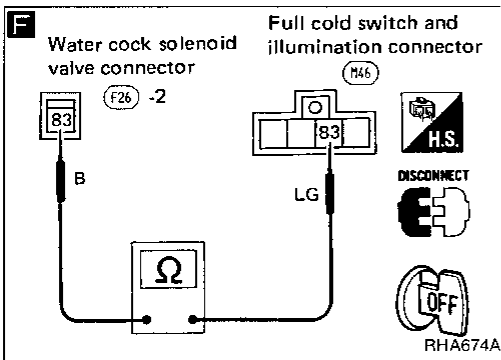
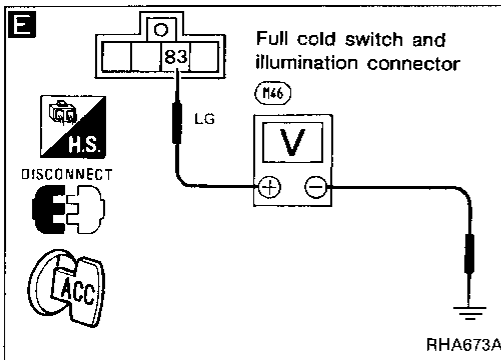
SYMPTOM: Water cock does not operate.

- Perform PRELIMINARY CHECK 2 before referring to the following flow chart.



TROUBLE DIAGNOSES — Manual Air Conditioner

Diagnostic Procedure 5 (Cont'd)



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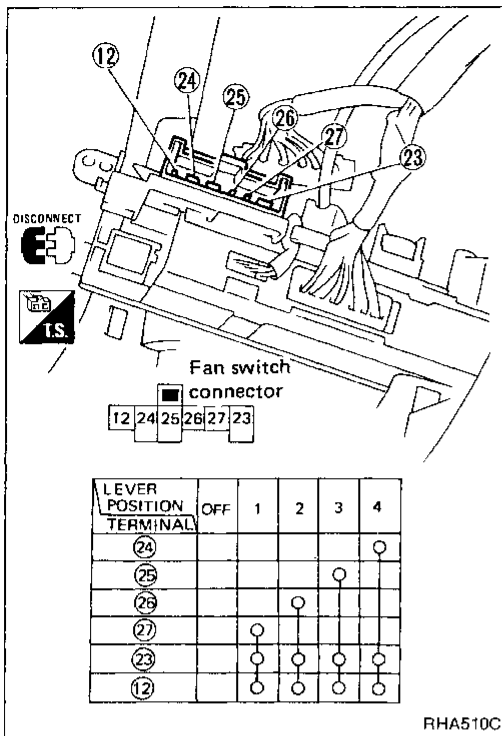
    graph TD
        Start((A)) --> StepA[CHECK WATER COCK SOLENOID VALVE AFTER DISCONNECTING IT.  
(Refer to Electrical Components Inspection.) (HA-68)]
        StepA -- NG --> NG1[Replace water cock solenoid valve.]
        StepA -- OK --> StepB[Reconnect water cock solenoid valve harness connectors.]
        StepB --> StepC[CHECK WATER COCK SOLENOID VALVE CIRCUIT BETWEEN WATER COCK SOLENOID VALVE AND FULL COLD SWITCH.  
Disconnect full cold switch harness connector.  
Do approx. 12 volts exist between full cold switch harness terminal No. 83 and body ground?]
        StepC -- NG --> NG2[Disconnect water cock solenoid valve harness connector.]
        StepC -- OK --> StepD[CHECK BODY GROUND CIRCUIT FOR FULL COLD SWITCH.  
Does continuity exist between full cold switch harness terminal No. 106 and body ground?]
        NG2 --> NoteF[F Note  
Check circuit continuity between water cock solenoid valve harness terminal No. 83 and full cold switch harness terminal No. 83.]
        NoteF --> StepD
        StepD -- OK --> StepE[CHECK FULL COLD SWITCH AFTER DISCONNECTING IT.  
(Refer to Electrical Components Inspection.) (HA-69)]
        StepD -- NG --> NG3[Replace full cold switch.]
        StepE -- OK --> End[INSPECTION END]
        StepE -- NG --> NG3
    
```

Note:
If the result is NG after checking circuit continuity, repair harness or connector.

Electrical Components Inspection

FAN SWITCH

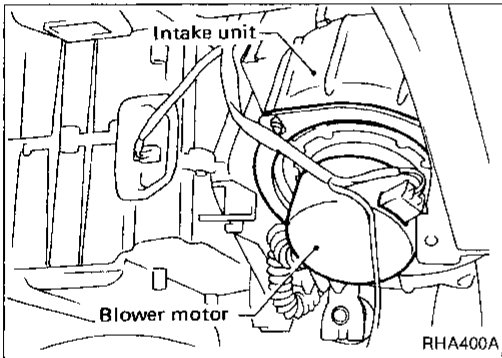
Check continuity between terminals at each switch position.



BLOWER MOTOR

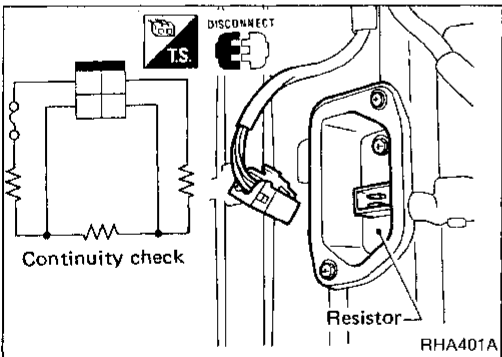
Confirm smooth rotation of the blower motor.

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



BLOWER RESISTOR

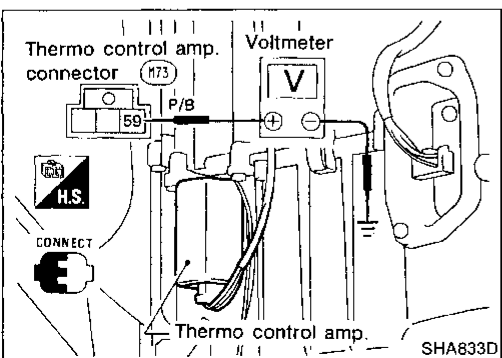
Check continuity between terminals.



THERMO CONTROL AMP.

1. Run engine, and operate A/C system.
2. Connect the voltmeter from harness side.
3. Check thermo control amp. operation shown in the table.

Evaporator outlet air temperature °C (°F)	Thermo amp. operation	Tester
Decreasing to 1.0 - 2.0 (34 - 36)	Turn OFF	Approx. 12V
Increasing to 2.5 - 3.5 (37 - 38)	Turn ON	Approx. 0V



TROUBLE DIAGNOSES — Manual Air Conditioner

Electrical Components Inspection (Cont'd)

A/C SWITCH

Check continuity between terminals at each switch position.

DISCONNECT

TS

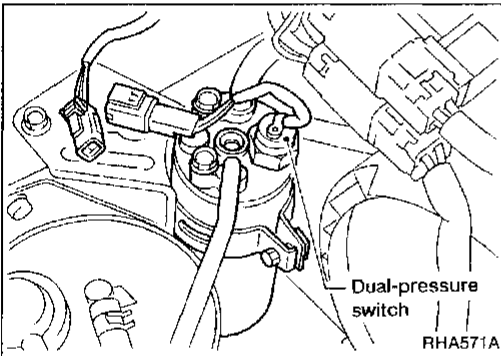
Push control unit

Push control unit connector

Switch condition		Terminal No.		Continuity
A/C	DEF	⊕	⊖	
ON	ON			Yes
ON	OFF	13	12	
OFF	ON			

RHA511C

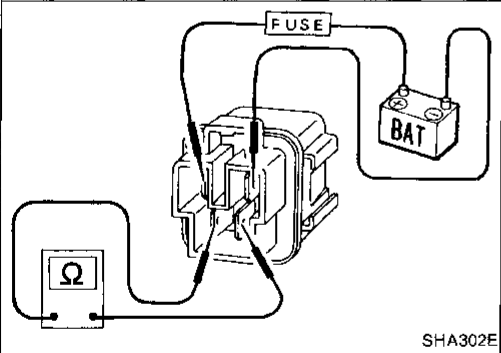
DUAL-PRESSURE SWITCH



	ON kPa (kg/cm ² , psi)	OFF kPa (kg/cm ² , psi)
Low-pressure side	157 - 216 (1.6 - 2.2, 23 - 31)	157 - 196 (1.6 - 2.0, 23 - 28)
High-pressure	392 - 785 (4.0 - 8.0, 57 - 114)	2,452 - 2,844 (25 - 29, 356 - 412)

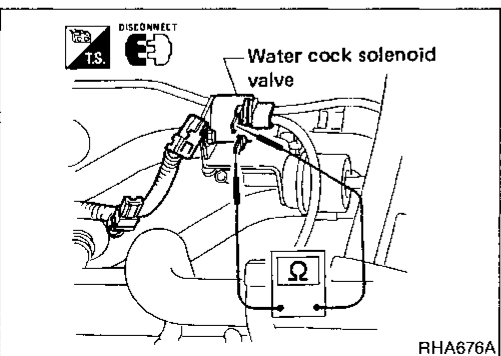
A/C RELAY AND BLOWER RELAY

Check circuit continuity between terminals by supplying 12 volts to coil side terminal of A/C relay (or Blower relay).



WATER COCK SOLENOID VALVE

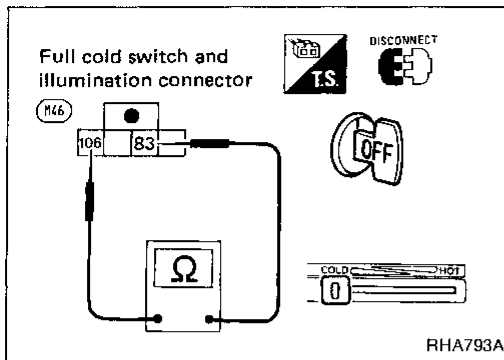
Check continuity between terminals.



Electrical Components Inspection (Cont'd)

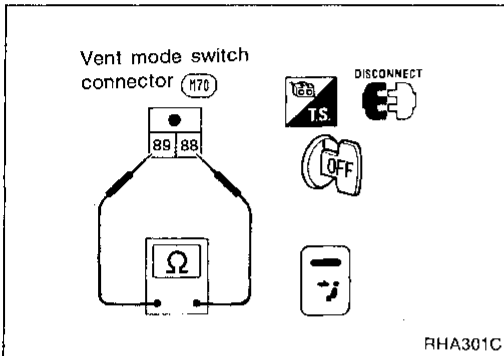
FULL COLD SWITCH

Check continuity between terminals with temperature control lever set at full cold position.



VENT MODE SWITCH

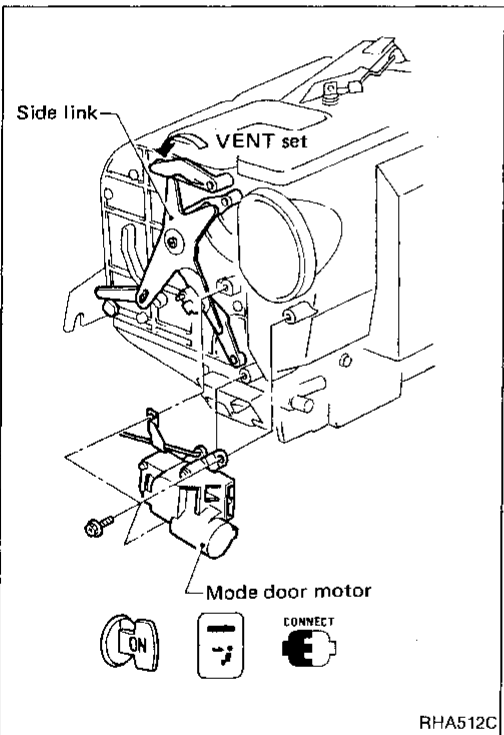
Check continuity between terminals with mode switch set at VENT mode.



Control Linkage Adjustment

MODE DOOR

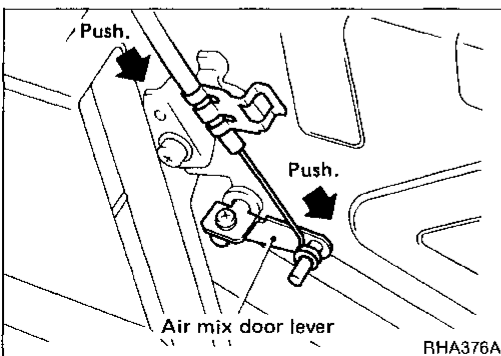
1. Move side link with hand and hold mode door in VENT mode.
2. Install mode door motor on heater unit and connect it to main harness.
3. Turn ignition switch to ON.
4. Turn VENT switch ON.
5. Attach mode door motor rod to side link rod holder.
6. Turn DEF switch ON. Check that side link operates at the fully-open position. Also turn VENT switch ON to check that side link operates at the fully-open position.



TEMPERATURE CONTROL CABLE

- Clamp the cable while pushing cable outer and air mix door lever in direction of arrow.

After positioning control cable, check it operates properly.

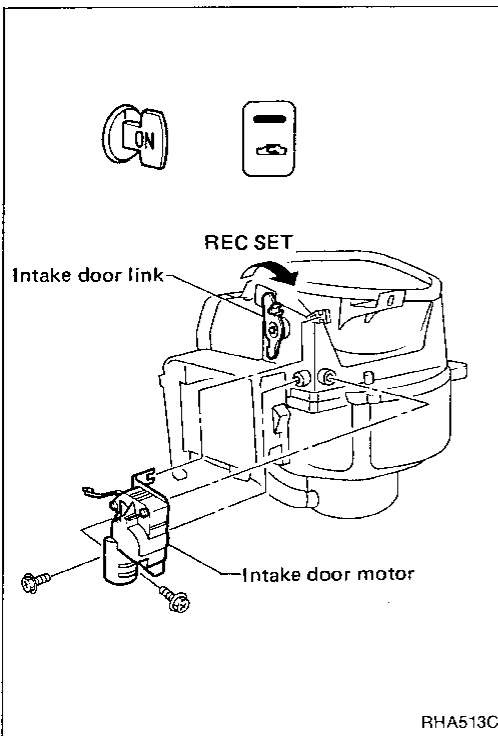


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Control Linkage Adjustment (Cont'd)

INTAKE DOOR

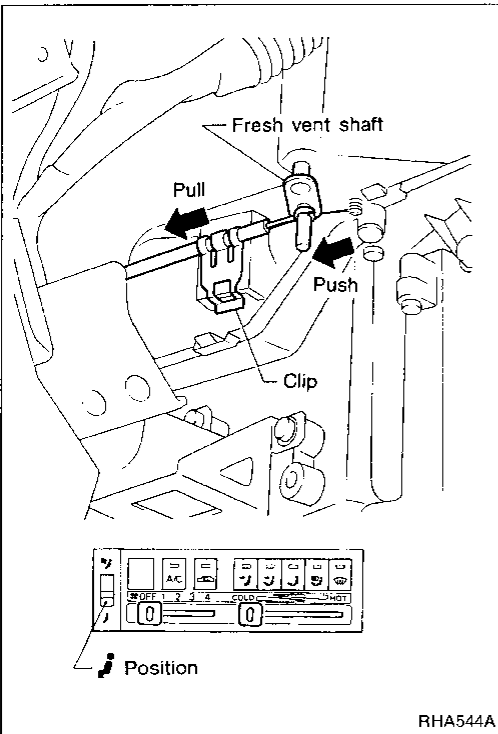
1. Connect intake door motor harness connector before installing intake door motor.
2. Turn ignition switch to ON.
3. Turn REC switch ON.
4. Install intake door motor on intake unit.
5. Install intake door lever.
6. Set intake door rod in REC position and fasten door rod to holder on intake door lever.
7. Check that intake door operates properly when REC switch is turned ON and OFF.



FRESH VENT DOOR

- Clamp the cable while pushing cable outer and fresh vent shaft in direction of arrow.

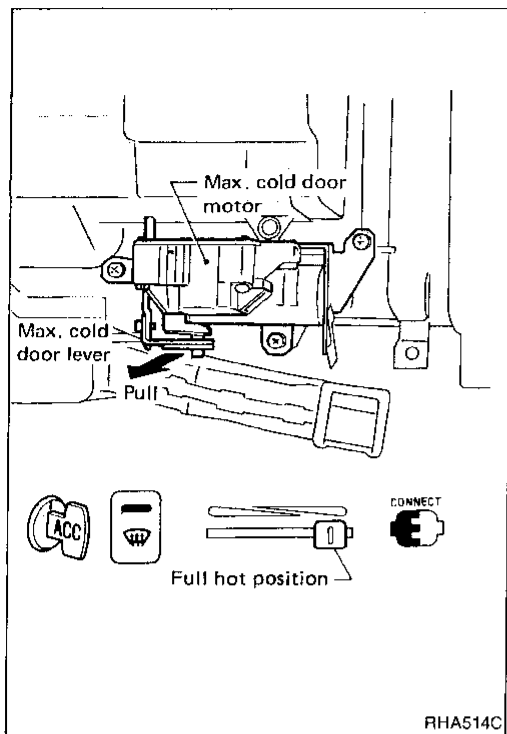
After positioning control cable, check it operates properly.



Control Linkage Adjustment (Cont'd)

MAX. COLD DOOR

1. Connect max. cold door motor harness connector before installing max. cold door motor.
2. Turn ignition switch to ACC.
3. Turn DEF switch ON.
4. Set temperature control lever to full hot position.
5. Install max. cold door motor on heater unit.
6. Attach max. cold door lever to rod holder.
7. Check that max. cold door operates properly when mode switch is turned to VENT and DEF.



RHA514C

GI

MA

EM

LC

EF &
EC

FE

CL

MT

AT

FA

RA

BR

ST

BF

HA

EL

IDX

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(25 or -25 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)	HA-102
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
TROUBLE DIAGNOSES — Auto Air Conditioner


Contents (Cont'd)

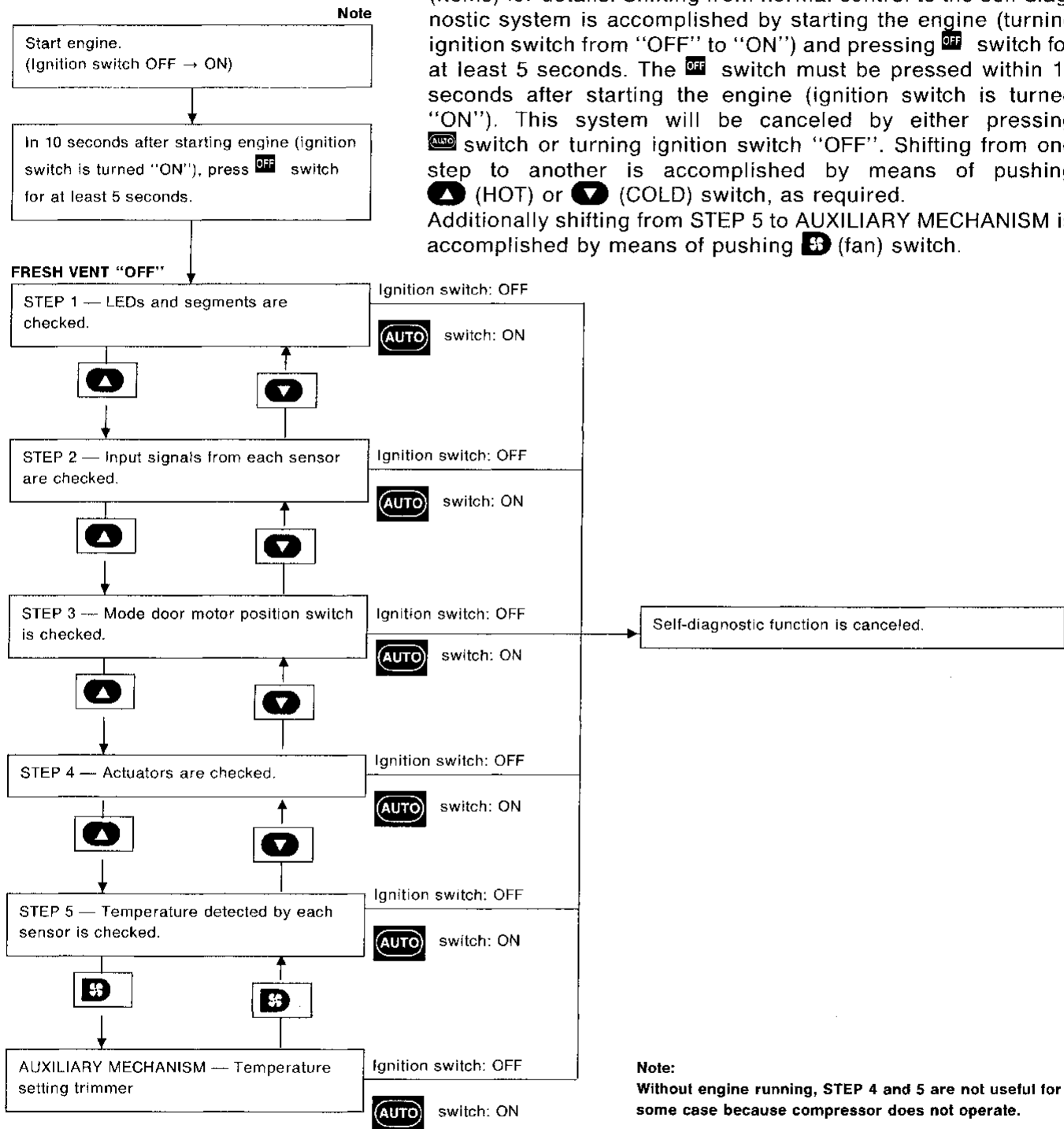
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	EM
	LC
	EF & EC
	FE
	CL
	MT
	AT
	FA
	RA
	BR
	ST
	BF
	HA
	EL
	IDX

Self-diagnosis

During self-diagnosis, be certain that the fresh vent lever is in the "OFF" position.

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 ignition switch from "OFF" to "ON") and pressing  switch for at least 5 seconds. The  switch must be pressed within 10 seconds after starting the engine (ignition switch is turned "ON"). This system will be canceled by either pressing  switch or turning ignition switch "OFF". Shifting from one step to another is accomplished by means of pushing  (HOT) or  (COLD) switch, as required.

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



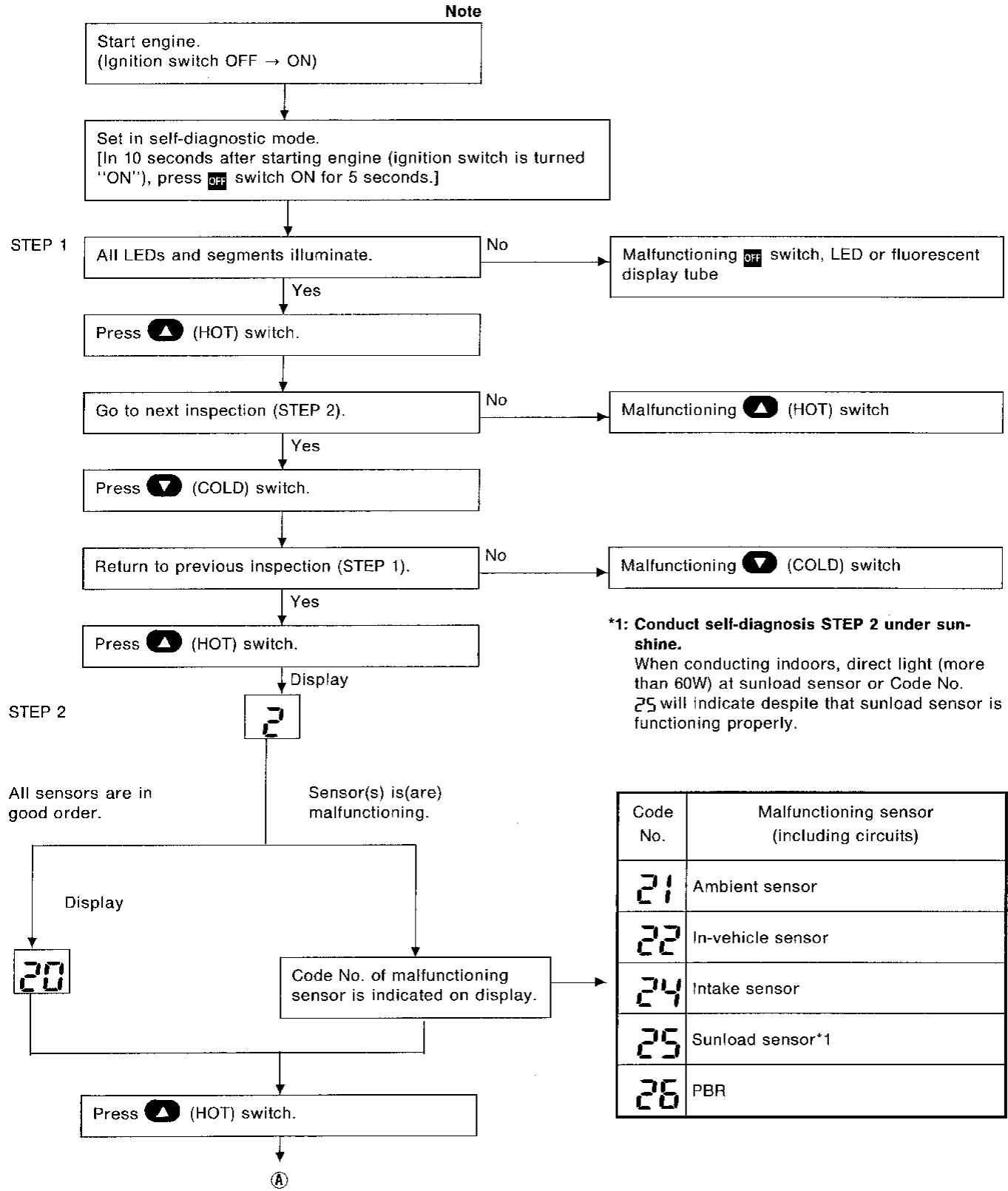
Note:

Without engine running, STEP 4 and 5 are not useful for some case because compressor does not operate.

TROUBLE DIAGNOSES — Auto Air Conditioner

Self-diagnosis (Cont'd)

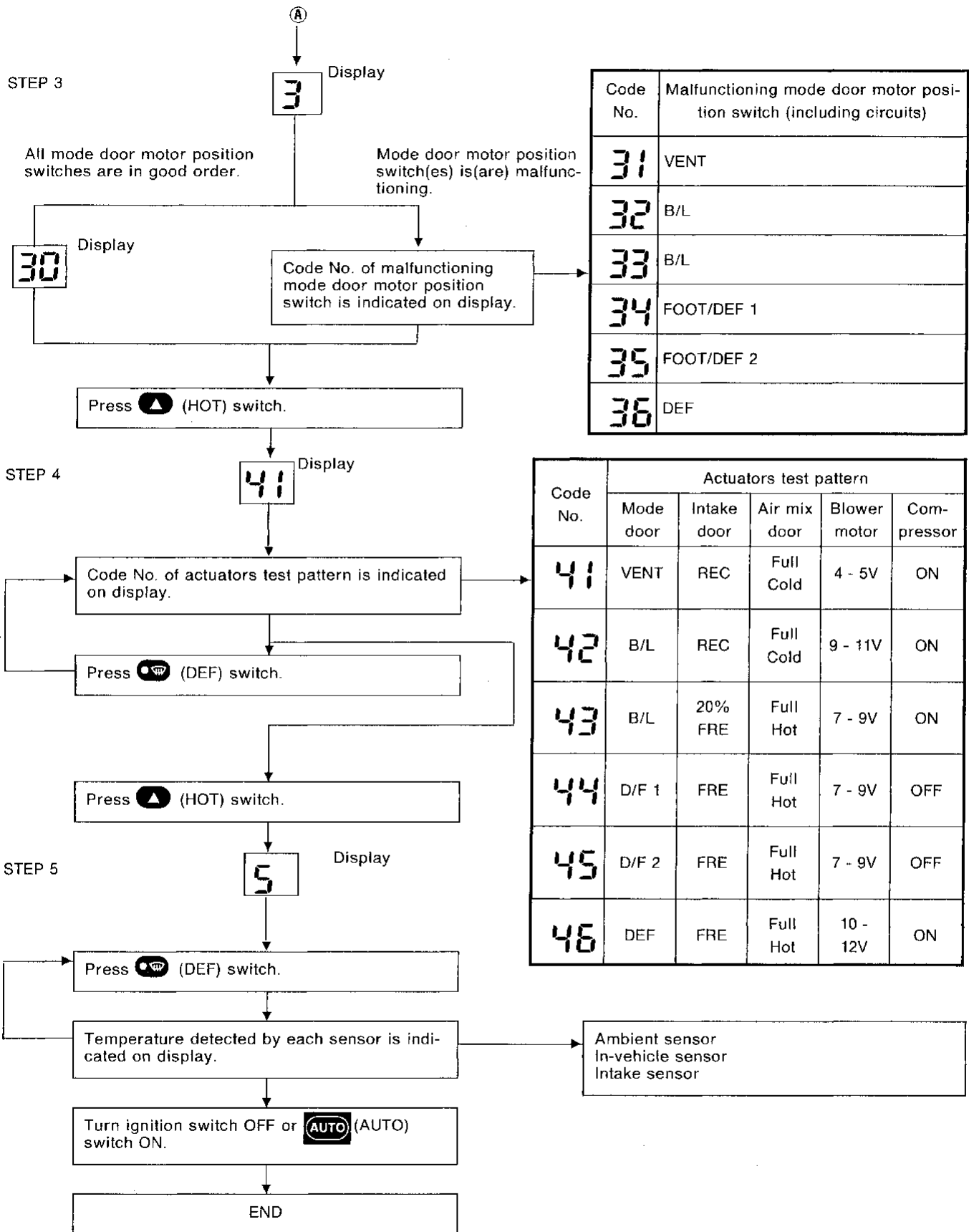
CHECKING PROCEDURE



Note:
Without engine running, STEP 4 and 5 are not useful for some case because compressor does not operate.

TROUBLE DIAGNOSES — Auto Air Conditioner

Self-diagnosis (Cont'd)

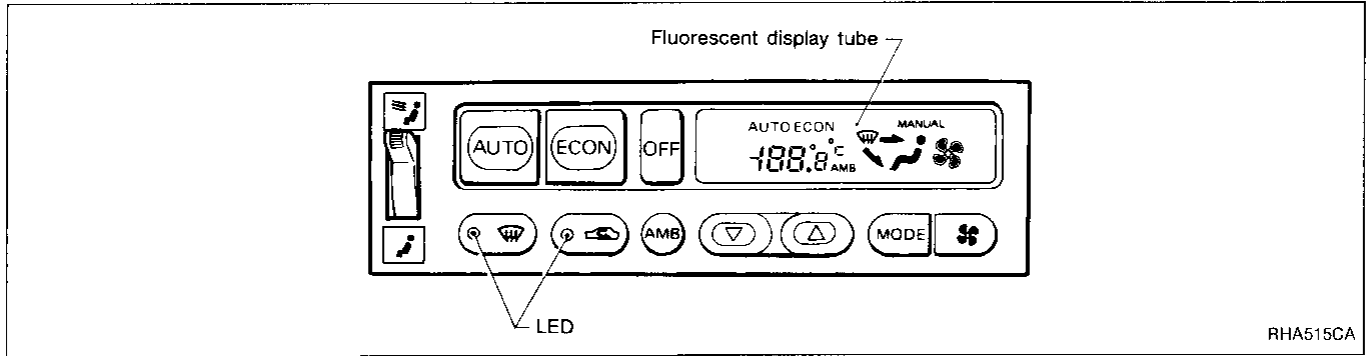


TROUBLE DIAGNOSES — Auto Air Conditioner

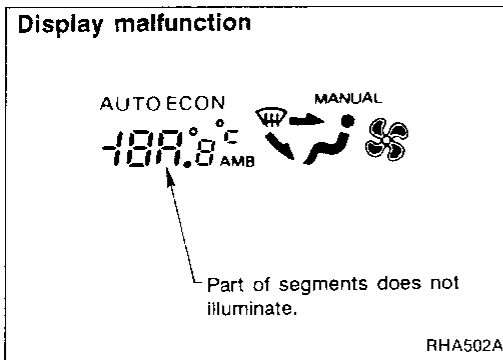
Self-diagnosis (Cont'd)

STEP 1: Checks LEDs and segments

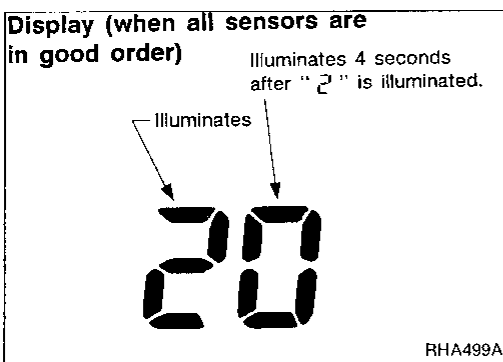
When switch's LED and segments are in good order in STEP 1 mode, the corresponding LED and fluorescent display tube will illuminate.



GI
MA
EM
LC
EF & EC
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RA
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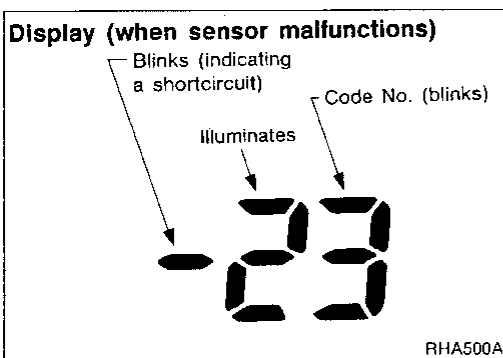


If LEDs or segments malfunction, LED does not come on or display shows incomplete segment.



STEP 2: Checks each sensor circuit for open or short circuit

Display shows "2" in STEP 2 mode. When all sensors are in good order, display shows "20". It takes approximately 4 seconds to check all sensors.

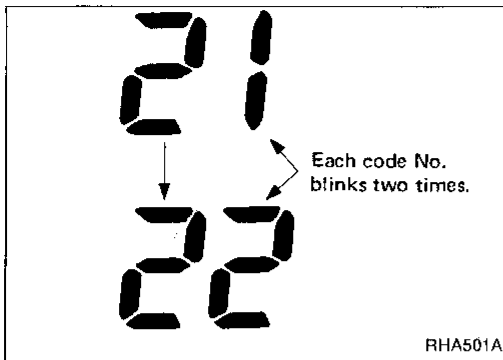


If a sensor is malfunctioning, the corresponding code No. blinks on display. A short circuit is identified by a blinking "—" mark preceding mode number.

TROUBLE DIAGNOSES — Auto Air Conditioner

Self-diagnosis (Cont'd)

If two or more sensors malfunction, corresponding code Nos. respectively blink two times.



Sensors and abnormalities

If a circuit is opened or shorted, display shows its code No. when input corresponds with any of following conditions.

Code No.	Sensor	Open circuit	Short circuit
21	Ambient sensor	Less than -41.9°C (-43°F)	Greater than 100°C (212°F)
22	In-vehicle sensor	Less than -41.9°C (-43°F)	Greater than 100°C (212°F)
24	Intake sensor	Less than -41.9°C (-43°F)	Greater than 100°C (212°F)
25	Sunload sensor*2	Less than 0.0319 mA	Greater than 1.147 mA
26	PBR*1	Greater than 50%	Less than 30%

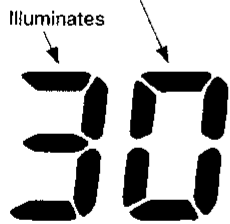
*1: "50%" and "30%" refer to percentage with respect to full stroke of air mix door. (Full cold: 0%, Full hot: 100%)

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

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

Display (when all doors are in good order)

Illuminates 16 seconds after "3" is shown on display.



STEP 3: Checks mode door position

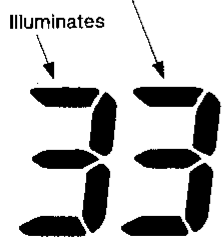
Display shows "3" in STEP 3 mode.

When all doors are in good order, display will then show "30".

It takes approximately 16 seconds to check all mode doors.

Display (when a door is out of order)

Code No. (blinks)

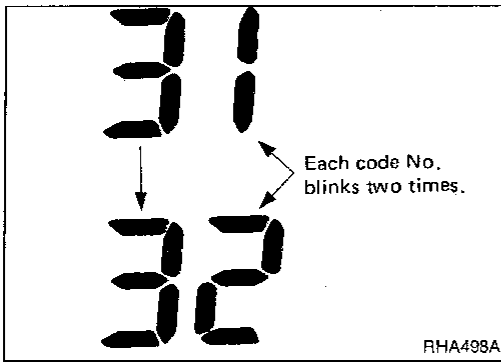


When abnormalities are detected, display shows a code No. corresponding with malfunctioning part.

Code No.	31	32	33	34	35	36
Malfunctioning part	VENT	B/L	B/L	F/D 1	F/D 2	DEF

TROUBLE DIAGNOSES — Auto Air Conditioner

Self-diagnosis (Cont'd)



If two or more mode doors are out of order, corresponding code numbers respectively blink two times.

If any mode door motor position switch is malfunctioning, mode door motor will also malfunction.

GI

MA

EW

LC

EF &
EC

FE

CL

MT

AT

FA

RA

BR

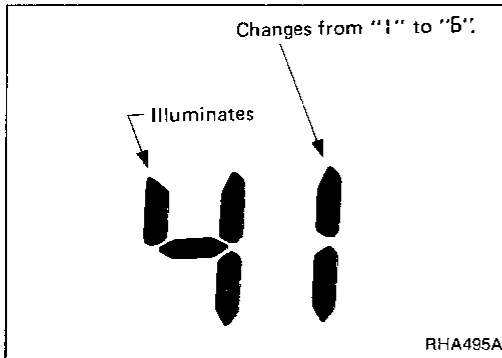
ST

BF

HA


EL

IDX



STEP 4: Checks operation of each actuator

Display shows "41" in STEP 4 mode.

When  (DEF) switch is pressed one time, display shows "42". Thereafter, each time the switch is pressed, display advances one number at a time, up to "46", then returns to "41".

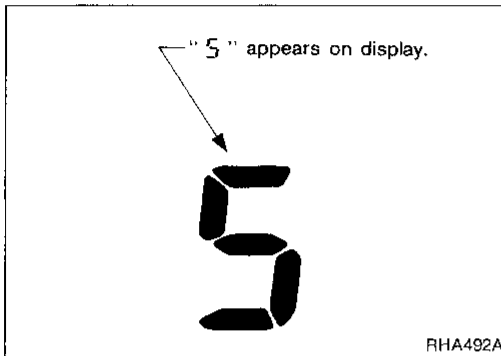
During inspection in STEP 4 mode, be certain that the fresh vent lever is in the "OFF" position. The auto amplifier will forcefully transmit an output to the affected actuators in response to code No. shown on display, as indicated in table below.

Checks must be made visually, by listening to any noise, or by touching air outlets with your hand, etc. for improper operation.

Actuator	Code No.					
	41	42	43	44	45	46
Mode door	VENT	B/L	B/L	F/D 1	F/D 2	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 V	4 - 5	9 - 11	7 - 9	7 - 9	7 - 9	10 - 12
Com-pressor	ON	ON	ON	OFF	OFF	ON





Self-diagnosis (Cont'd)

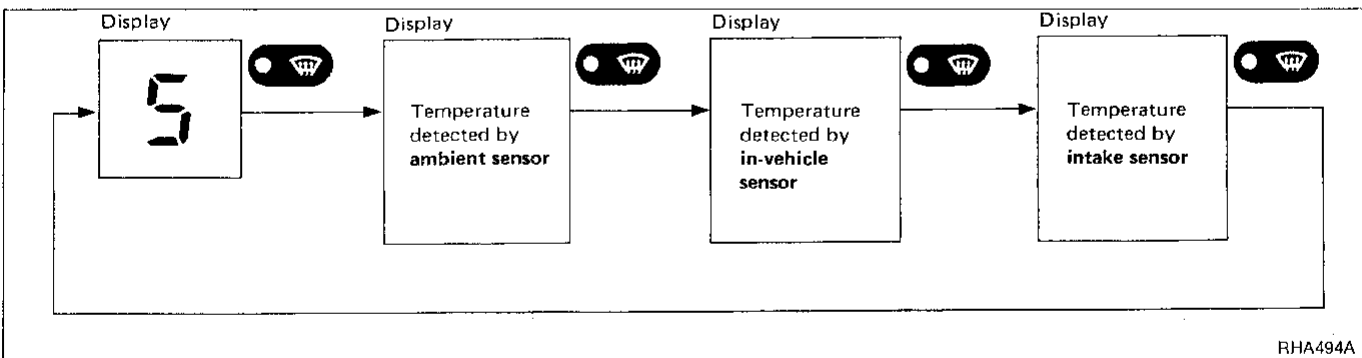
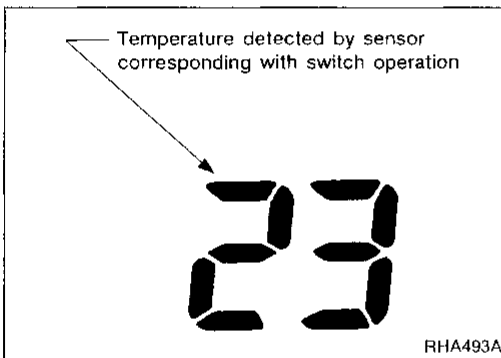
Operating condition of each actuator cannot be checked by indicators.



STEP 5: Checks temperature detected by sensors

Display shows "5" in STEP 5 mode.

- When  (DEF) switch is pressed one time, display shows temperature detected by ambient sensor.
- When  (DEF) switch is pressed second time, display shows temperature detected by in-vehicle sensor.
- When  (DEF) switch is pressed third time, display shows temperature detected by intake sensor.
- When  (DEF) switch is pressed fourth time, display returns to original presentation "5".






If temperature shown on display greatly differs from actual temperature, check sensor circuit at first then inspect sensor itself according to the procedures described in **Control System Input Components (HA-121)**.

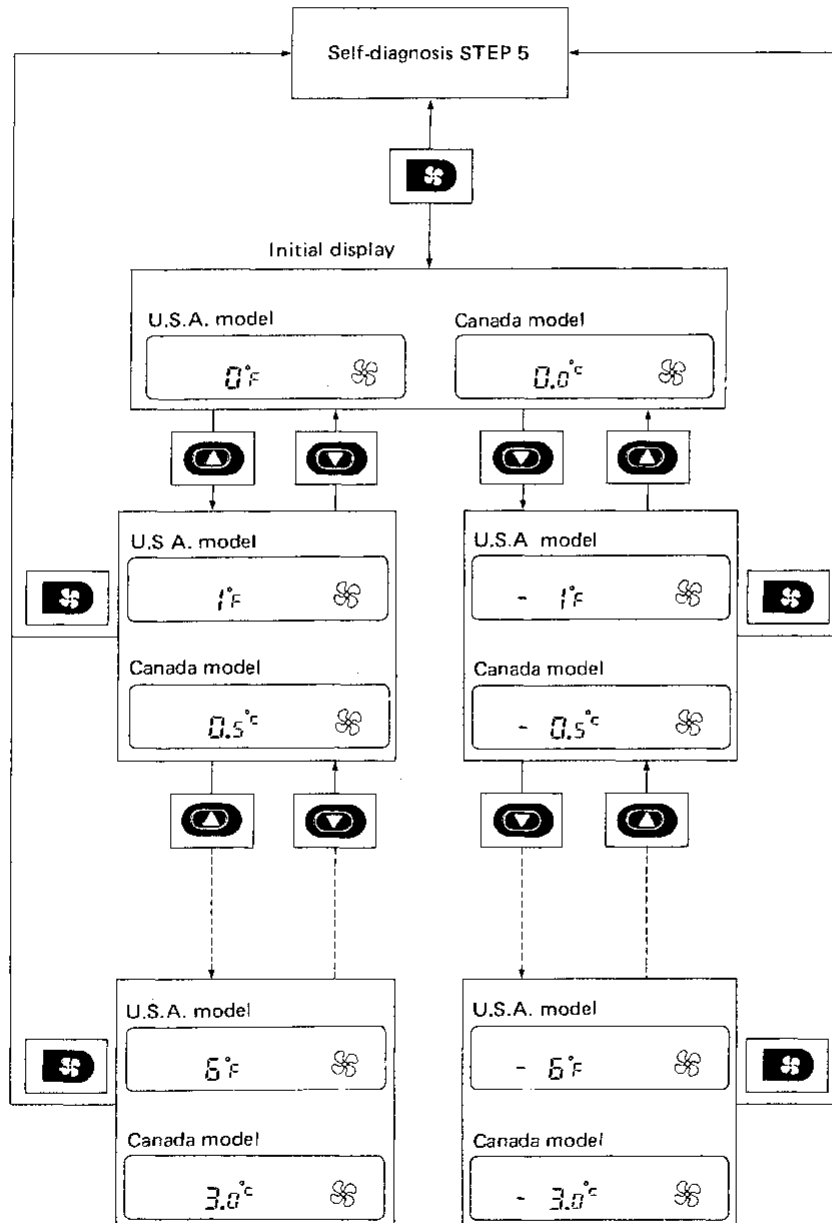
Self-diagnosis (Cont'd)

AUXILIARY MECHANISM: Temperature setting trimmer

This trimmer compensates for differences between temperature setting (displayed digitally) and temperature felt by driver in a range of $\pm 3^{\circ}\text{C}$ ($\pm 6^{\circ}\text{F}$).

Operating procedures for this trimmer are as follows:

Starting with STEP 5 under "Self-diagnostic mode", press  (fan) switch to set air conditioning system in auxiliary mode. Then, press either  (HOT) or  (COLD) switch as desired. Temperature will change at a rate of 0.5°C (1°F) each time a switch is pressed.



RHA491A

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

GI
MA
EM
LC
EF & EC
FE
CL
MT
AT
FA
RA
BR
ST
BF
HA
EL
DX

TROUBLE DIAGNOSES — Auto Air Conditioner

Symptom Chart

DIAGNOSTIC TABLE

PROCEDURE PAGE		Self-diagnosis					Preliminary Check								Diagnostic Procedure											
REFERENCE PAGE		HA-74, 77	HA-74, 77	HA-74, 78	HA-74, 79	HA-74, 80	HA-81	HA-84	HA-85	HA-86	HA-87	HA-88	HA-89	HA-90	HA-90	HA-99	HA-100	HA-101	HA-102	HA-103	HA-104	HA-106	HA-108	HA-109	HA-110	HA-113
SYMPTOM		STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	AUXILIARY MECHANISM	Preliminary Check 1	Preliminary Check 2	Preliminary Check 3	Preliminary Check 4	Preliminary Check 5	Preliminary Check 6	Preliminary Check 7	Preliminary Check 8	Diagnostic Procedure 1	Diagnostic Procedure 2	Diagnostic Procedure 3	Diagnostic Procedure 4	Diagnostic Procedure 5	Diagnostic Procedure 6	Diagnostic Procedure 7	Diagnostic Procedure 8	Diagnostic Procedure 9	Diagnostic Procedure 10	Diagnostic Procedure 11
Air outlet does not change.		①	②	○	○	○		③								○	○	○	○	○	○	○	○	○	○	○
Intake door does not change.		①	②	○	○	○			③							○	○	○	○	○	○	○	○	○	○	○
Insufficient cooling		○	○	○	○	○	○	○	○	①		○	○	○		○	○	○	○	○	○	○	○	○	○	○
Insufficient heating		○	○	○	○	○	○	○	○		①	○	○	○		○	○	○	○	○	○	○	○	○	○	○
Blower motor operation is malfunctioning.		①	②	○	○	○						③				○	○	○	○	○	○	○	○	○	○	○
Magnet clutch does not engage.		①	②	○	○	○							③			○	○	○	○	○	○	○	○	○	○	○
Discharged air temperature does not change.		①	②	○	○	○								③		○	○	○	○	○	○	○	○	○	○	○
Noise															①											
Result of Self-diagnosis STEP 2	21	Ambient sensor circuit is open.		①	②		③									④										
	22	In-vehicle sensor circuit is open.		①	②		③										④									
	24	Intake sensor circuit is open.		①	②		③											④								
	25	Sunload sensor circuit is open.		①	②														③							
	26	PBR circuit is open.		①	②															③						
	-21	Ambient sensor circuit is shorted.		①	②		③														④					
	-22	In-vehicle sensor circuit is shorted.		①	②		③															④				
	-24	Intake sensor circuit is shorted.		①	②		③																④			
	-25	Sunload sensor circuit is shorted.		①	②																			③		
	-26	PBR circuit is shorted.		①	②																				③	
Water cock does not operate.																									①	
Mode door motor does not operate normally.		①	②	③	④	○										○	○	○	○	○	○	○	○	○	○	○
Intake door motor does not operate normally.		①	②	③	○	○										○	○	○	○	○	○	○	○	○	○	○
Air mix door motor does not operate normally.		①	②	③	○	○										○	○	○	○	○	○	○	○	○	○	○
Blower motor operation is malfunctioning under out of Starting Fan Speed Control.		①	②	○	○	○					③					○	○	○	○	○	○	○	○	○	○	○
Magnet clutch does not operate after performing Preliminary Check 6.		①	②	○	○	○						③				○	○									
Self-diagnosis cannot be performed.																										

①, ②, ...: The number means checking order.
 ○: As for checking order, refer to each flow chart. (It depends on malfunctioning portion.)

TROUBLE DIAGNOSES — Auto Air Conditioner Symptom Chart (Cont'd)

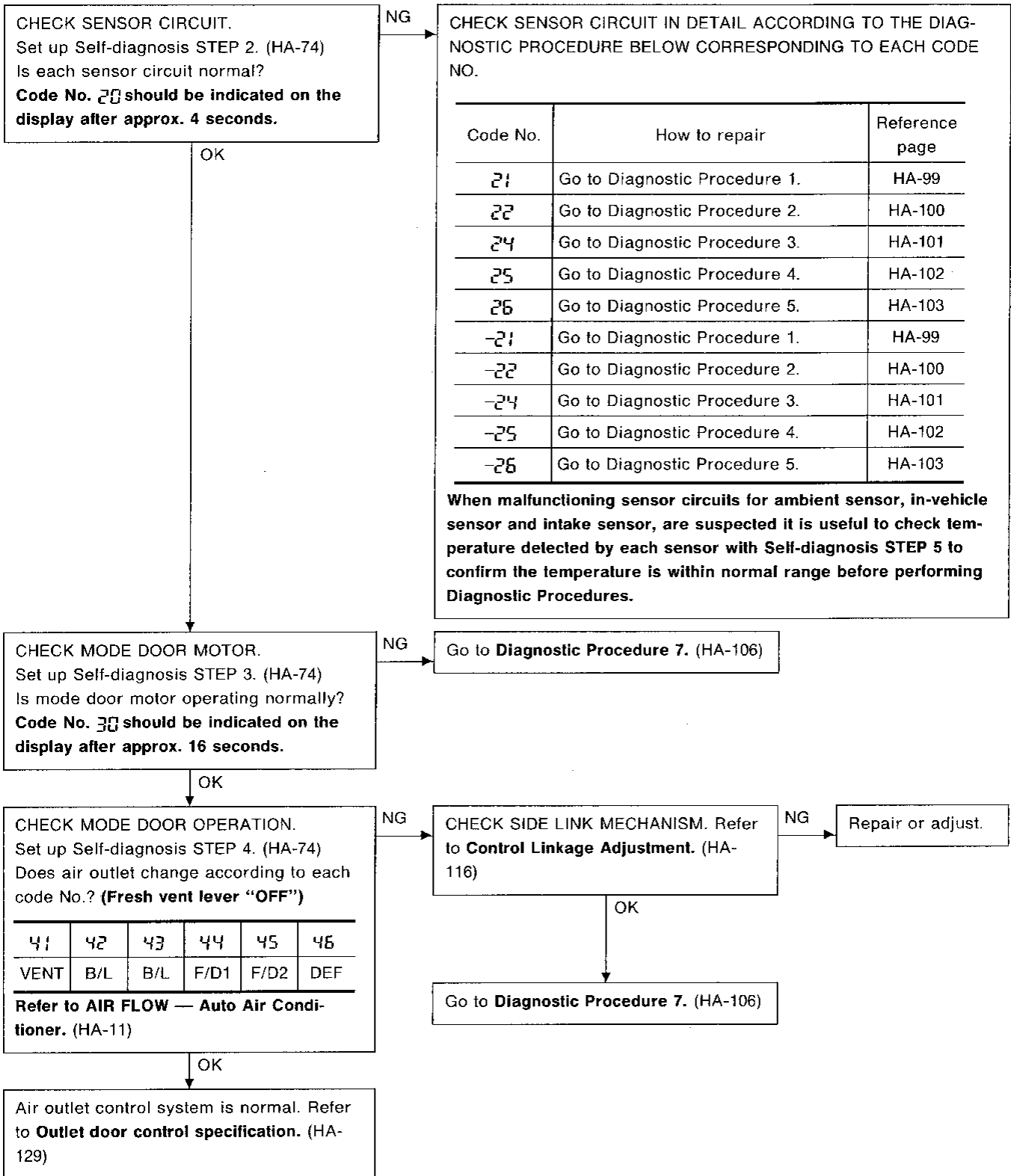
Main Power Supply and Ground Circuit Check				Electrical Components Inspection																GI					
				HA-98	MA	EM	LC	FF	FC	FH	CL	MT	AT	FA	RA	BR	ST	BF	HA	EL	IDX				
Auto amp.																									
10A Fuse #23																									
15A Fuses #4 and #5																									
10A Fuse #10																									
10A Fuse #20																									
Thermo control amp.																									
Ambient sensor																									
In-vehicle sensor																									
Intake sensor																									
Sunload sensor																									
PBR																									
Air mix door motor																									
Mode door motor																									
Intake door motor																									
Blower motor																									
Fan control amp.																									
Blower high relay																									
A/C relay																									
Dual-pressure switch																									
Magnet clutch (Compressor)																									
Water cock solenoid valve																									
Auto amp.																									
Thermo control amp.																									
ECM (ECCS control module)																									
Cooling fan motor-1																									
Cooling fan motor-2																									
Cooling fan relay-1																									
Cooling fan relay-2																									
Cooling fan relay-3																									
Vehicle speed sensor																									
Harness																									

Preliminary Check

PRELIMINARY CHECK 1

Air outlet does not change.

- Perform Self-diagnosis STEP 1 before referring to the flow chart.



Preliminary Check (Cont'd)

PRELIMINARY CHECK 2

Intake door does not change.

- Perform Self-diagnosis STEP 1 before referring to the following flow chart.

CHECK SENSOR CIRCUIT.
Set up Self-diagnosis STEP 2. (HA-74)
Is each sensor circuit normal?
Code No. 20 should be indicated on the display after approx. 4 seconds.

NG

CHECK SENSOR CIRCUIT IN DETAIL ACCORDING TO THE DIAGNOSTIC PROCEDURE BELOW CORRESPONDED TO EACH CODE NO.

Code No.	How to repair	Reference page
21	Go to Diagnostic Procedure 1.	HA- 99
22	Go to Diagnostic Procedure 2.	HA-100
24	Go to Diagnostic Procedure 3.	HA-101
25	Go to Diagnostic Procedure 4.	HA-102
-26	Go to Diagnostic Procedure 5.	HA-103
-21	Go to Diagnostic Procedure 1.	HA- 99
-22	Go to Diagnostic Procedure 2.	HA-100
-24	Go to Diagnostic Procedure 3.	HA-101
-25	Go to Diagnostic Procedure 4.	HA-102
-26	Go to Diagnostic Procedure 5.	HA-103

When malfunctioning sensor circuits for ambient sensor, in-vehicle sensor and intake sensor, are suspected it is useful to check temperature detected by each sensor with Self-diagnosis STEP 5 to confirm the temperature is within normal range before performing Diagnostic Procedures.

OK

CHECK INTAKE DOOR MOTOR OPERATION.
Set up Self-diagnosis STEP 4. (HA-74)
Does intake air change according to each code No.?

41	42	43	44	45	46
REC	REC	20% FRE	FRE	FRE	FRE

NG

CHECK INTAKE DOOR ROD or LEVER MECHANISM.
Refer to **Control Linkage Adjustment.** (HA-116)

NG

Repair or Adjust.

OK

Go to Diagnostic Procedure 8. (HA-108)

OK

Intake door control system is normal.
Refer to **Intake door control specification.** (HA-131)

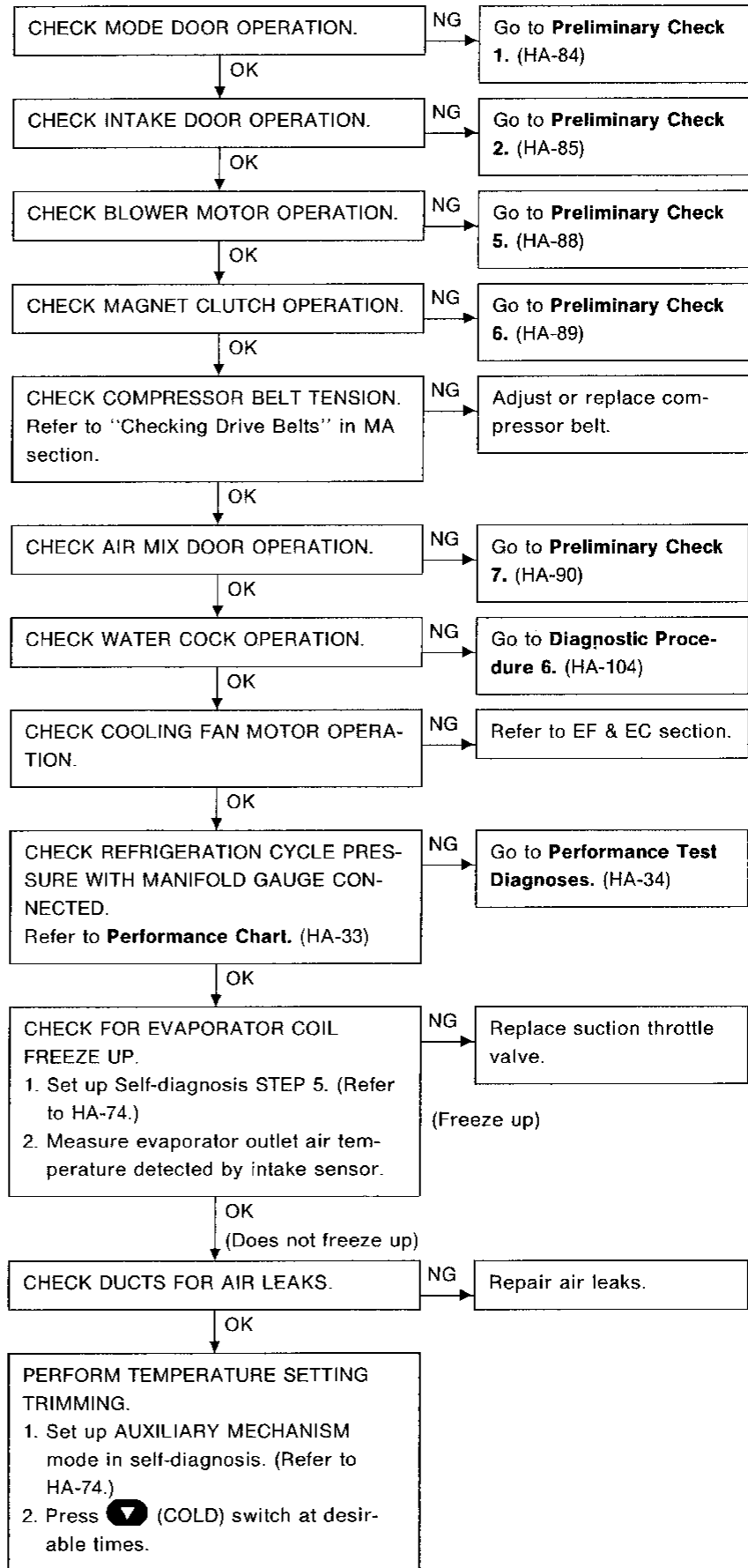
GI
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TROUBLE DIAGNOSES — Auto Air Conditioner

Preliminary Check (Cont'd)

PRELIMINARY CHECK 3

Insufficient cooling

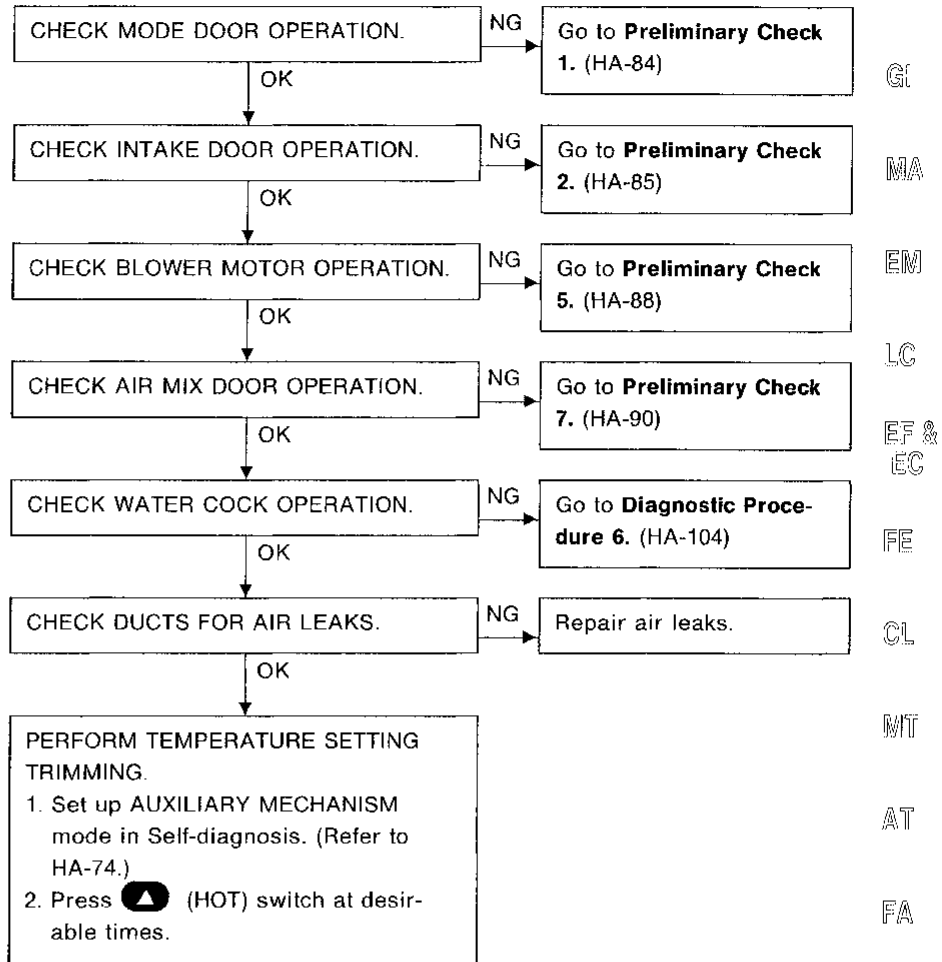


TROUBLE DIAGNOSES — Auto Air Conditioner

Preliminary Check (Cont'd)

PRELIMINARY CHECK 4

Insufficient heating



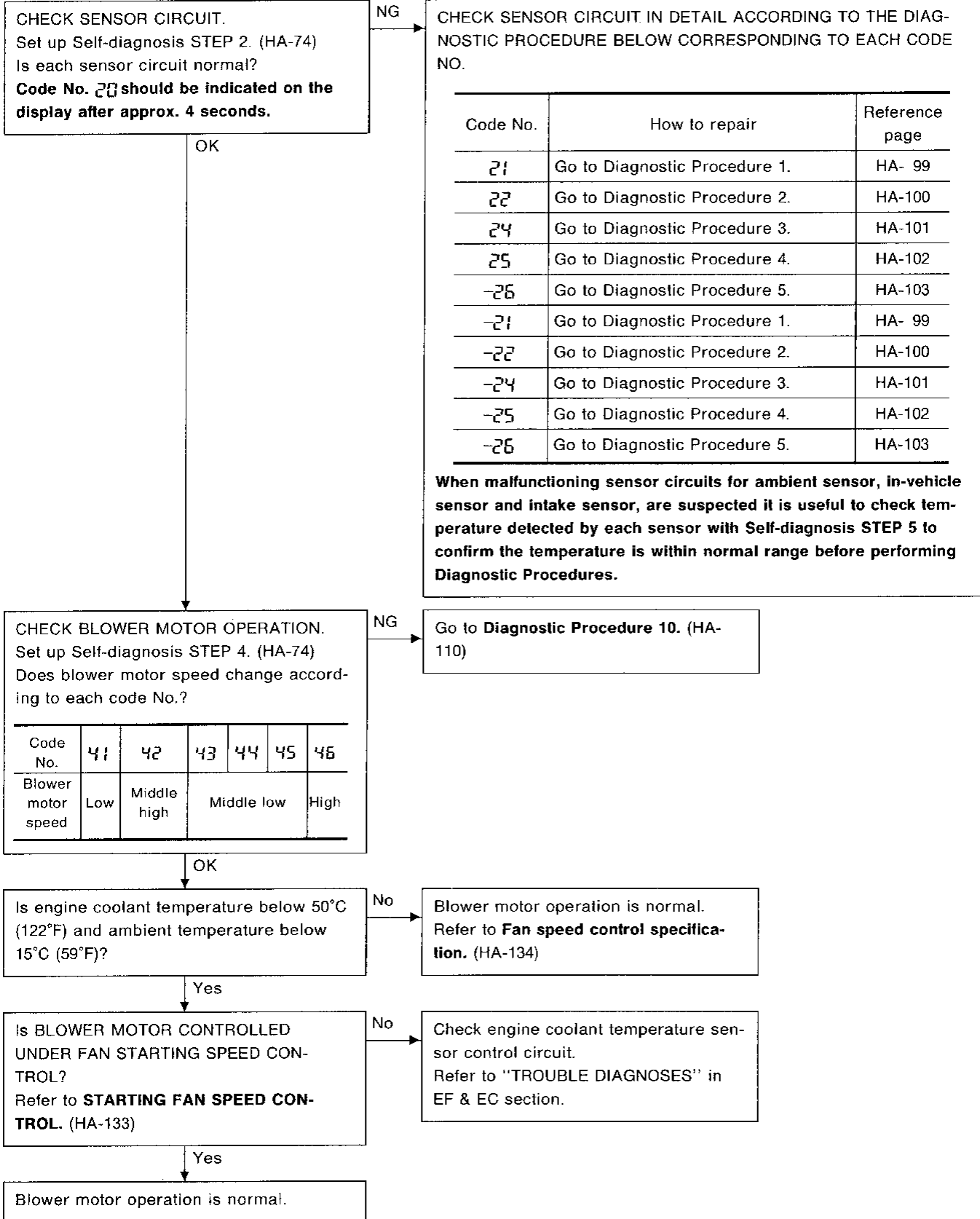
GI
 MA
 EM
 LC
 EF & EC
 FE
 CL
 WT
 AT
 FA
 RA
 BR
 ST
 BF
HA
 EL
 DX

Preliminary Check (Cont'd)

PRELIMINARY CHECK 5

Blower motor operation is malfunctioning.

- Perform Self-diagnosis STEP 1 before referring to the following flow chart.



CHECK SENSOR CIRCUIT IN DETAIL ACCORDING TO THE DIAGNOSTIC PROCEDURE BELOW CORRESPONDING TO EACH CODE NO.

Code No.	How to repair	Reference page
21	Go to Diagnostic Procedure 1.	HA- 99
22	Go to Diagnostic Procedure 2.	HA-100
24	Go to Diagnostic Procedure 3.	HA-101
25	Go to Diagnostic Procedure 4.	HA-102
-26	Go to Diagnostic Procedure 5.	HA-103
-21	Go to Diagnostic Procedure 1.	HA- 99
-22	Go to Diagnostic Procedure 2.	HA-100
-24	Go to Diagnostic Procedure 3.	HA-101
-25	Go to Diagnostic Procedure 4.	HA-102
-26	Go to Diagnostic Procedure 5.	HA-103

When malfunctioning sensor circuits for ambient sensor, in-vehicle sensor and intake sensor, are suspected it is useful to check temperature detected by each sensor with Self-diagnosis STEP 5 to confirm the temperature is within normal range before performing Diagnostic Procedures.

Go to **Diagnostic Procedure 10.** (HA-110)

Preliminary Check (Cont'd)

PRELIMINARY CHECK 6

Magnet clutch does not engage.

- Perform Self-diagnosis STEP 1 before referring to the following flow chart.

CHECK SENSOR CIRCUIT.
Set up Self-diagnosis STEP 2. (HA-74)
Is each sensor circuit normal?
Code No. 20 should be indicated on the display after approx. 4 seconds.

NG

CHECK SENSOR CIRCUIT IN DETAIL ACCORDING TO THE DIAGNOSTIC PROCEDURE BELOW CORRESPONDING TO EACH CODE NO.

Code No.	How to repair	Reference page
21	Go to Diagnostic Procedure 1.	HA- 99
22	Go to Diagnostic Procedure 2.	HA-100
24	Go to Diagnostic Procedure 3.	HA-101
25	Go to Diagnostic Procedure 4.	HA-102
26	Go to Diagnostic Procedure 5.	HA-103
-21	Go to Diagnostic Procedure 1.	HA- 99
-22	Go to Diagnostic Procedure 2.	HA-100
-24	Go to Diagnostic Procedure 3.	HA-101
-25	Go to Diagnostic Procedure 4.	HA-102
26	Go to Diagnostic Procedure 5.	HA-103

When malfunctioning sensor circuits for ambient sensor, in-vehicle sensor and intake sensor, are suspected it is useful to check temperature detected by each sensor with Self-diagnosis STEP 5 to confirm the temperature is within normal range before performing Diagnostic Procedures.

OK

CHECK MAGNET CLUTCH OPERATION.
Set up Self-diagnosis STEP 4. (HA-74)
Does magnet clutch operate according to each code No.?

Code No.	41	42	43	44	45	46
Actuator	ON	ON	ON	OFF	OFF	ON
Compressor	ON	ON	ON	OFF	OFF	ON

NG

CHECK REFRIGERANT.
Connect manifold gauge, then check system pressure.

NG

Check refrigerant leaks.

OK

Go to Diagnostic Procedure 11. (HA-113)

OK

Magnet clutch control system is normal.
Refer to MAGNET CLUTCH CONTROL. (HA-135)

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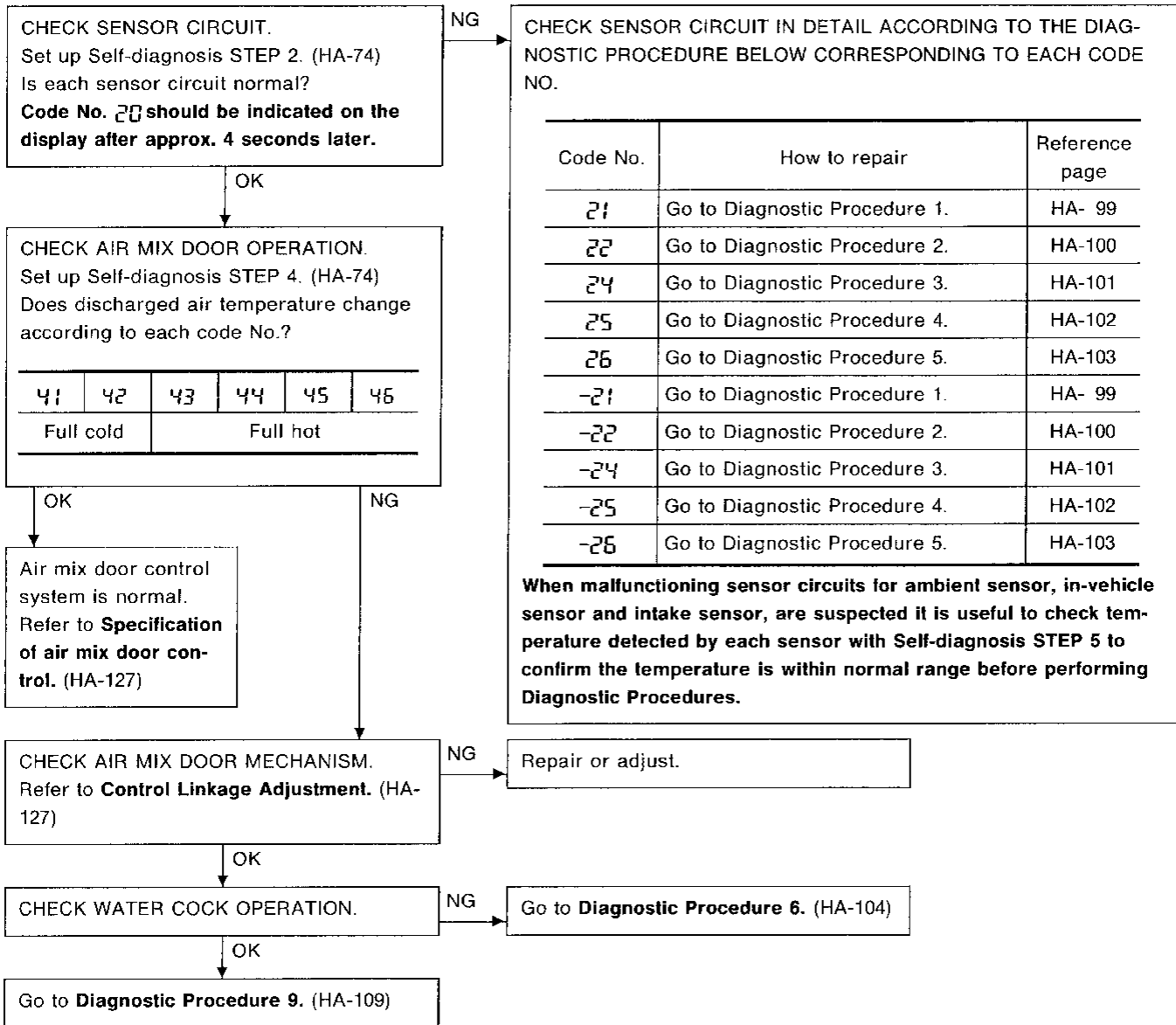
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Preliminary Check (Cont'd)

PRELIMINARY CHECK 7

Discharged air temperature does not change.

- Perform Self-diagnosis STEP 1 before referring to the following flow chart.



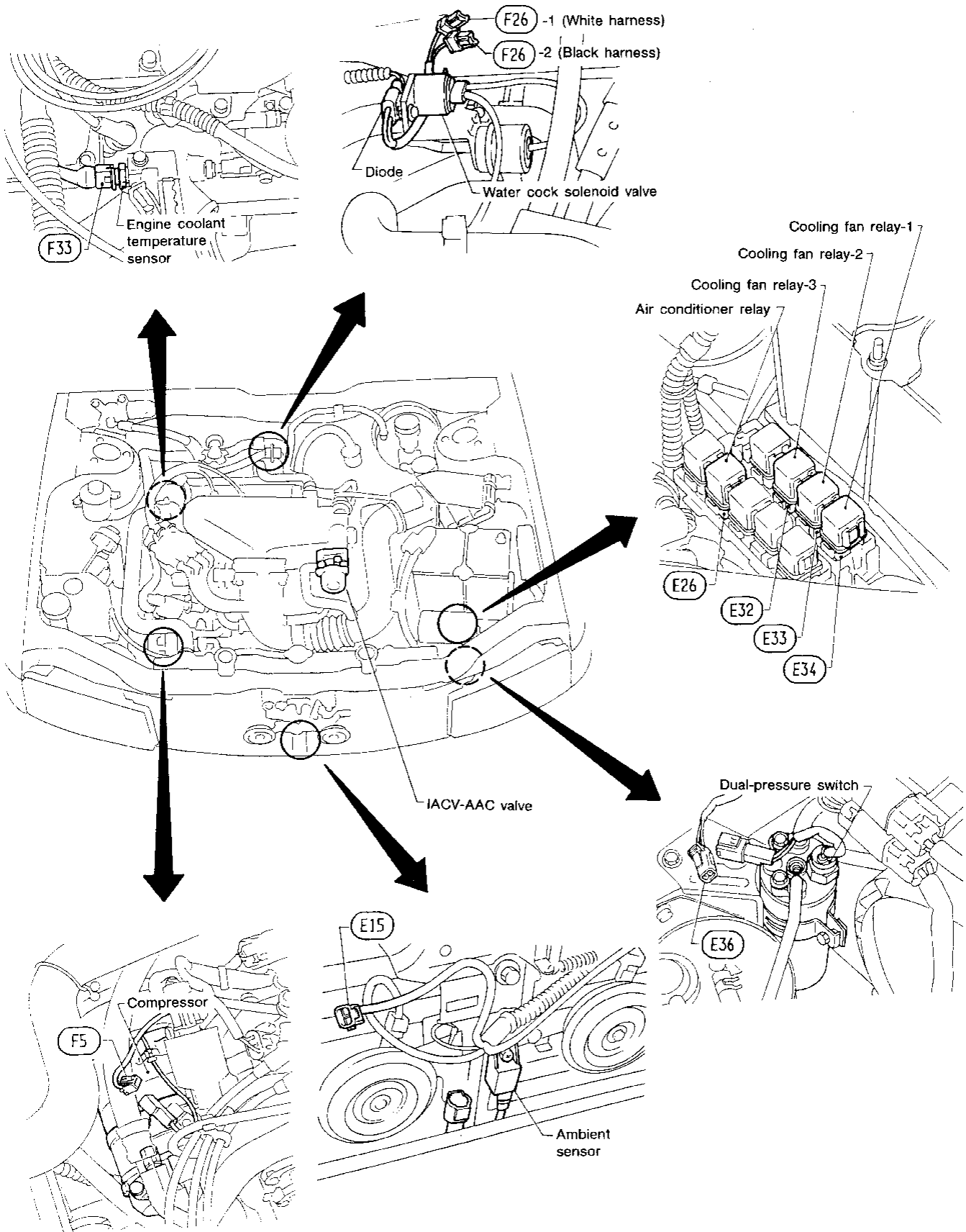
PRELIMINARY CHECK 8

Noise

Refer to HA-46.

Harness Layout for A/C System

Engine compartment

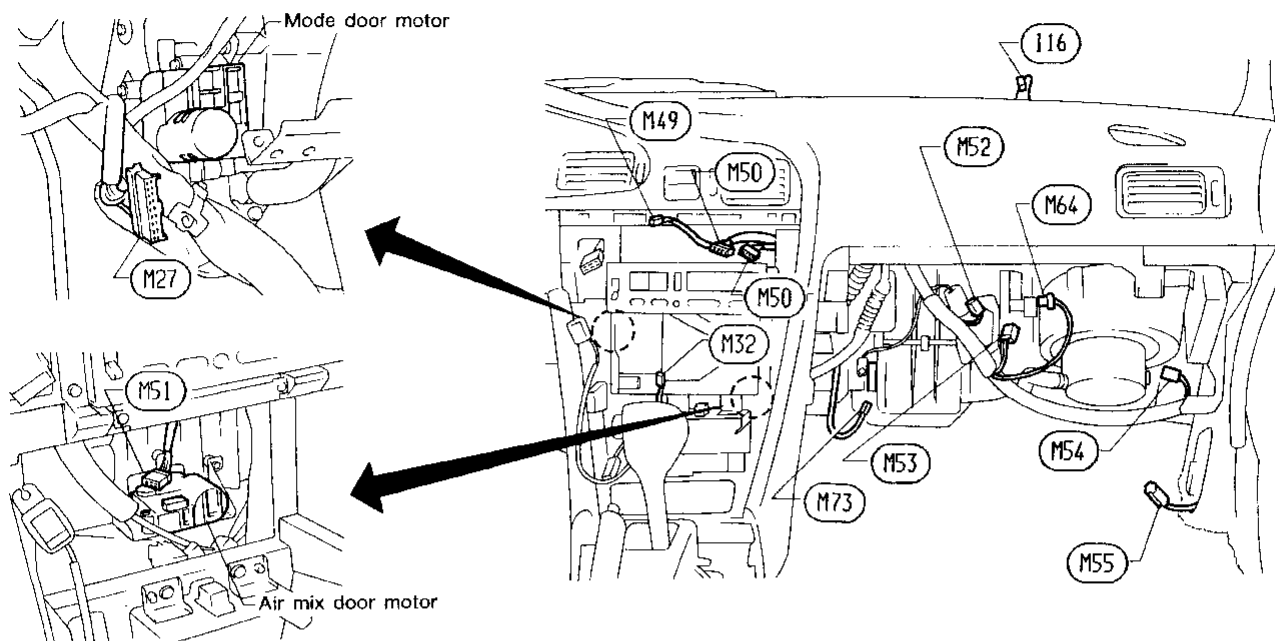


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TROUBLE DIAGNOSES — Auto Air Conditioner

Harness Layout for A/C System (Cont'd)

Passenger compartment



Main harness

- (M27) : Mode door motor
- (M32) : In-vehicle sensor
- (M49) : Fresh vent control illumination
- (M50) : Auto amp.
- (M51) : Air mix door motor
- (M52) : Intake sensor
- (M53) : Fan control amp.
- (M54) : Blower motor
- (M55) : Hi relay
- (M64) : Intake door motor
- (M73) : Thermo control amp.

Instrument harness

- (I16) : Sunload sensor

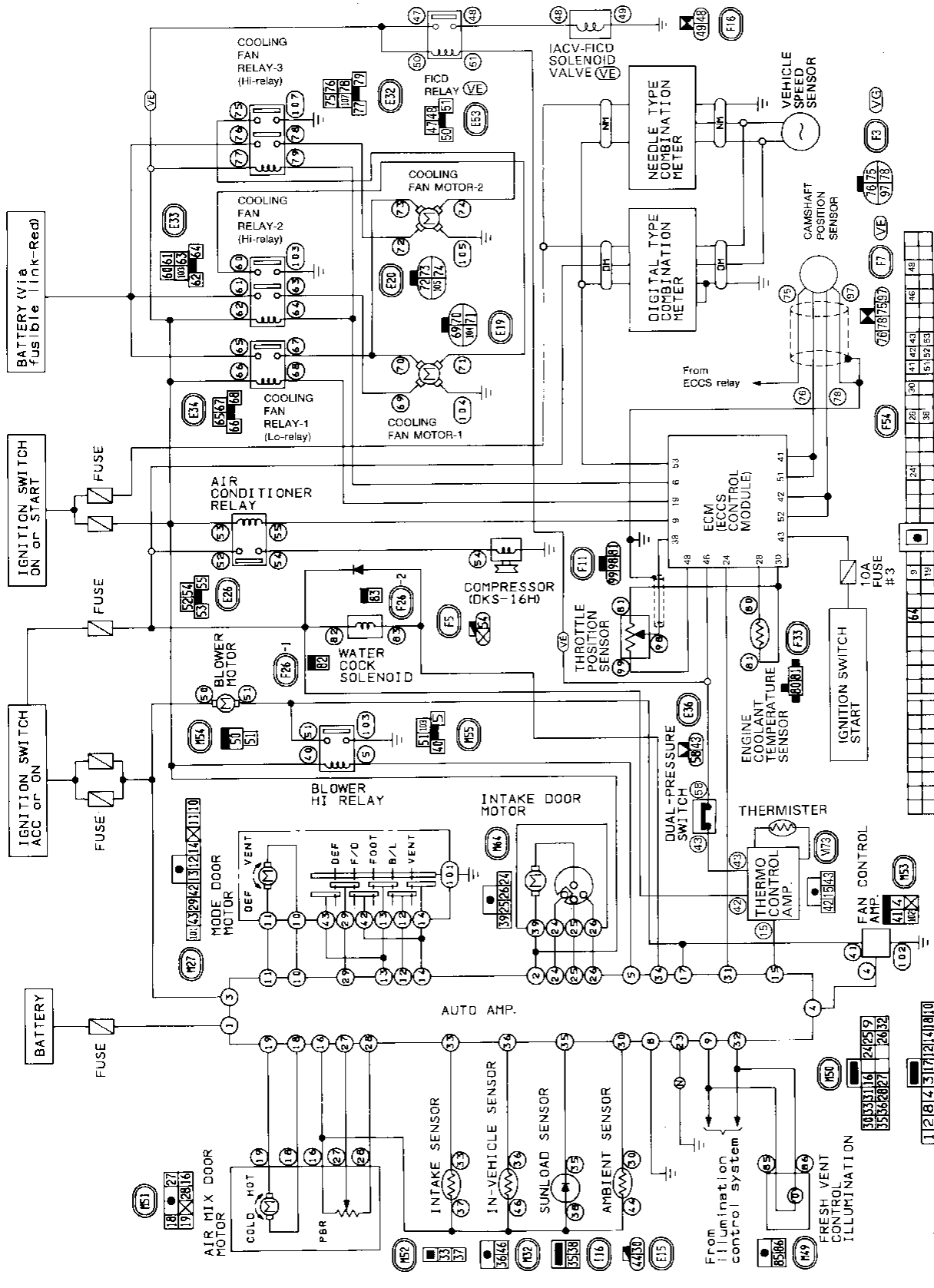
Engine room harness

- (E15) : Ambient sensor
- (E26) : A/C relay
- (E32) : Cooling fan relay-3
- (E33) : Cooling fan relay-2
- (E34) : Cooling fan relay-1
- (E36) : Dual-pressure switch

Engine control harness

- (F5) : Compressor
- (F26) -1 : Water cock solenoid valve
- (E26) -2 : Water cock solenoid valve
- (F33) : Engine coolant temperature sensor

Circuit Diagram for Quick Pinpoint Check

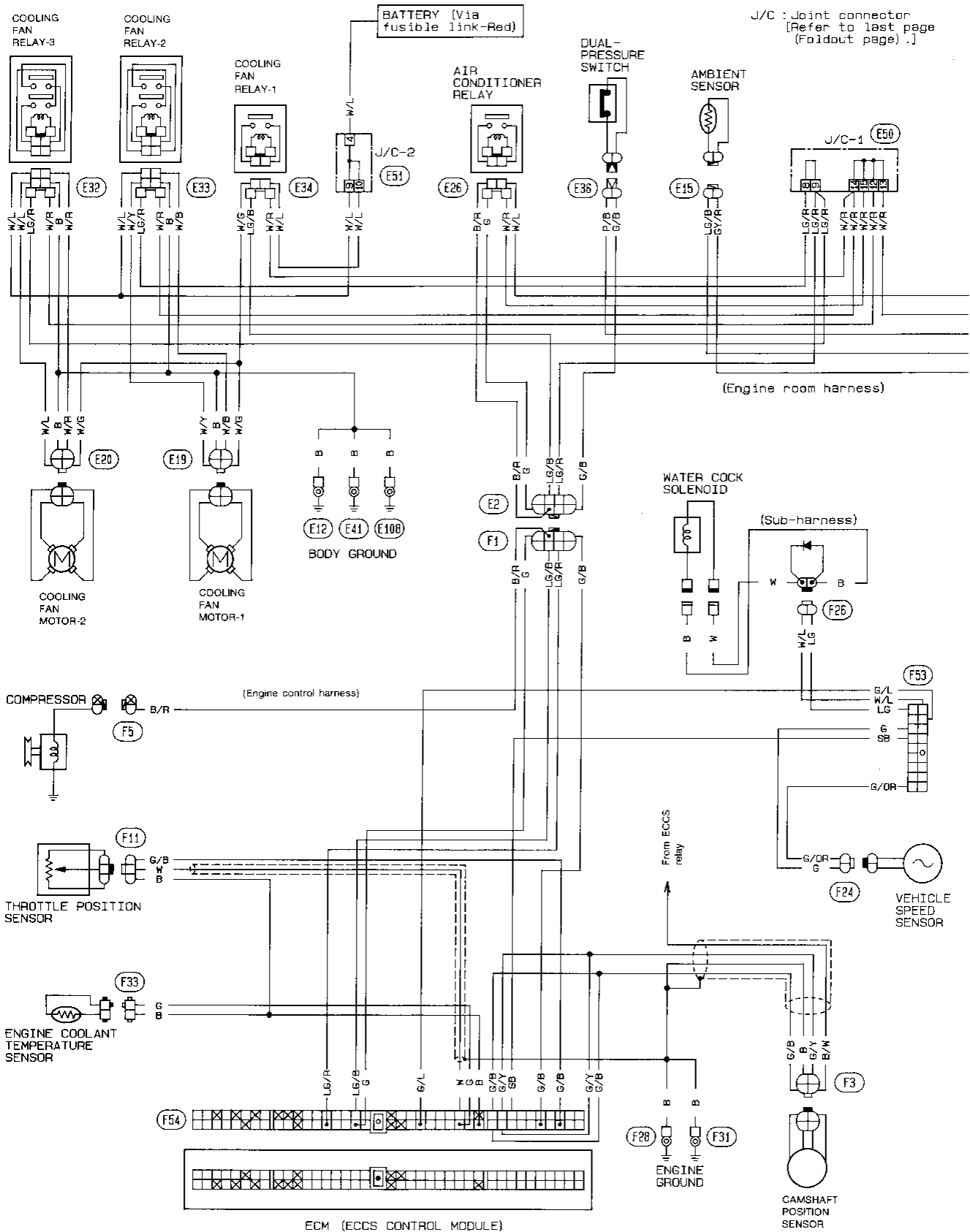


- All connectors shown in this illustration are unit side connectors.
 - The unit side connectors with a double circle "⊖" are connected to the harness side connectors shown in the "Harness Layout for A/C System". (See pages HA-91, HA-92.)
 - The terminal numbers in the connector coincide with the circuit numbers surrounded by a single circle "○".
- Legend:
- (VG) : VG engine model
 - (VE) : VE engine model
 - (DM) : Digital type combination meter
 - (NF) : Needle type combination meter
 - (N) : For Canada, temperature display is indicated in C mode.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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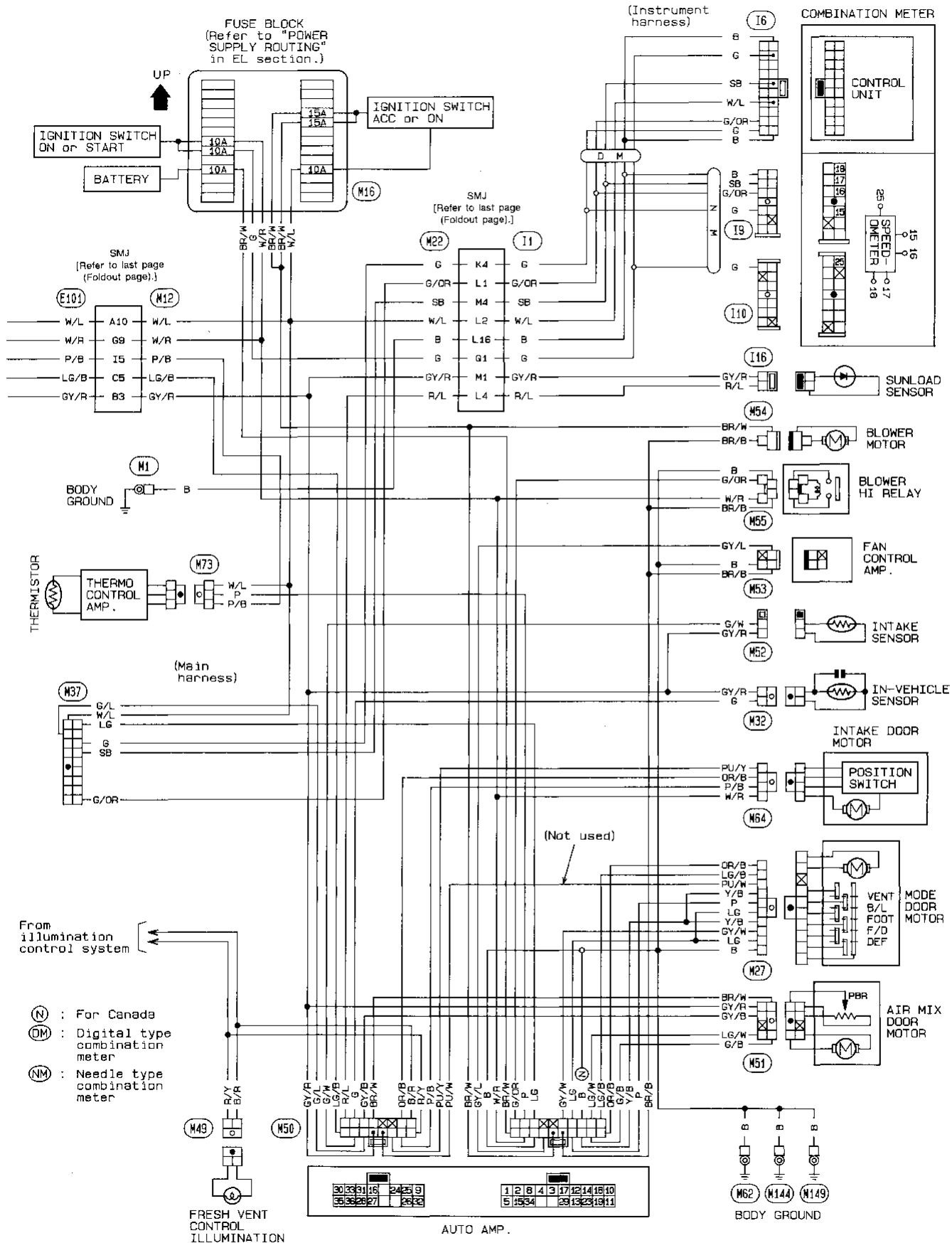
Wiring Diagram

VG ENGINE MODEL



TROUBLE DIAGNOSES — Auto Air Conditioner

Wiring Diagram (Cont'd)

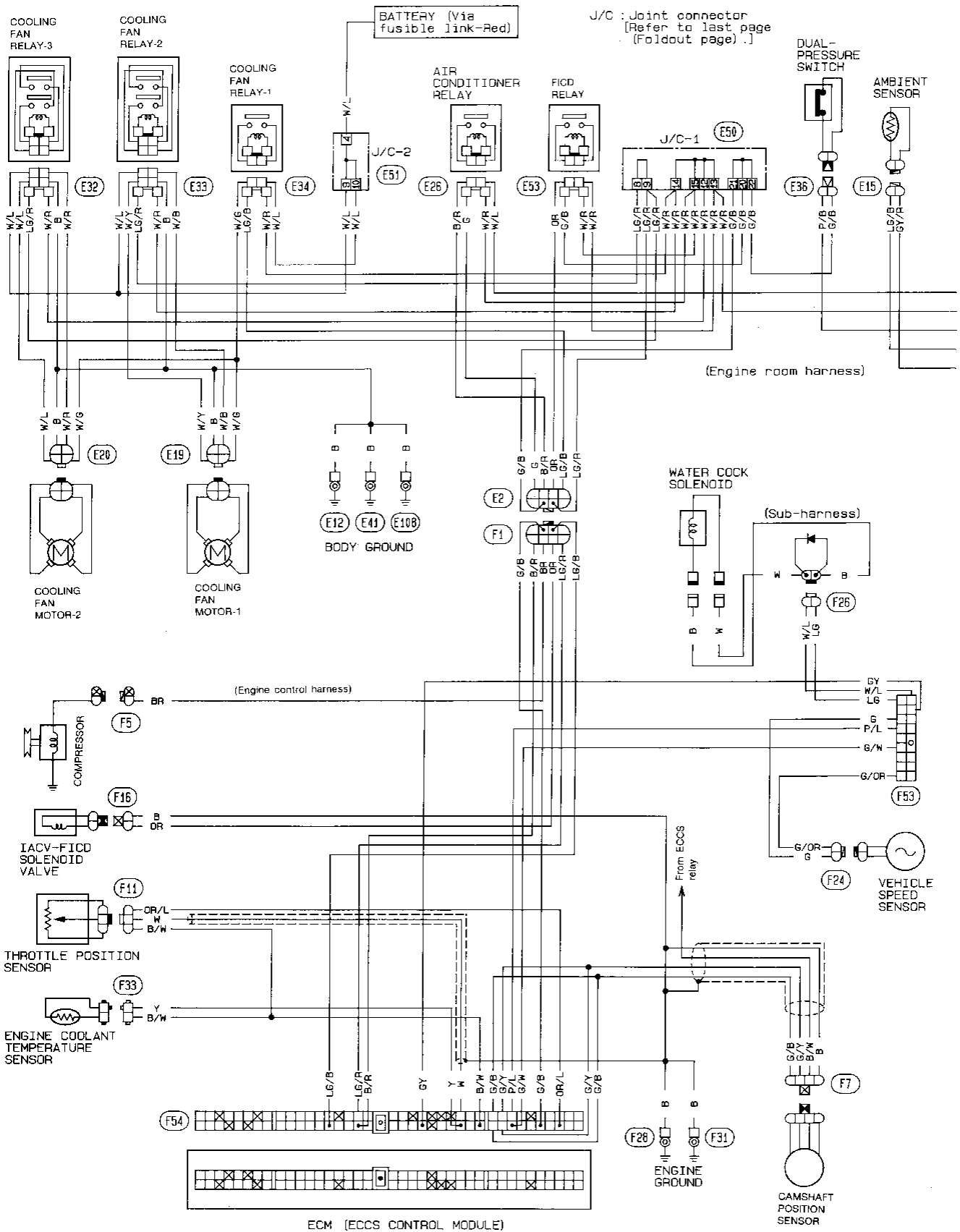


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TROUBLE DIAGNOSES — Auto Air Conditioner

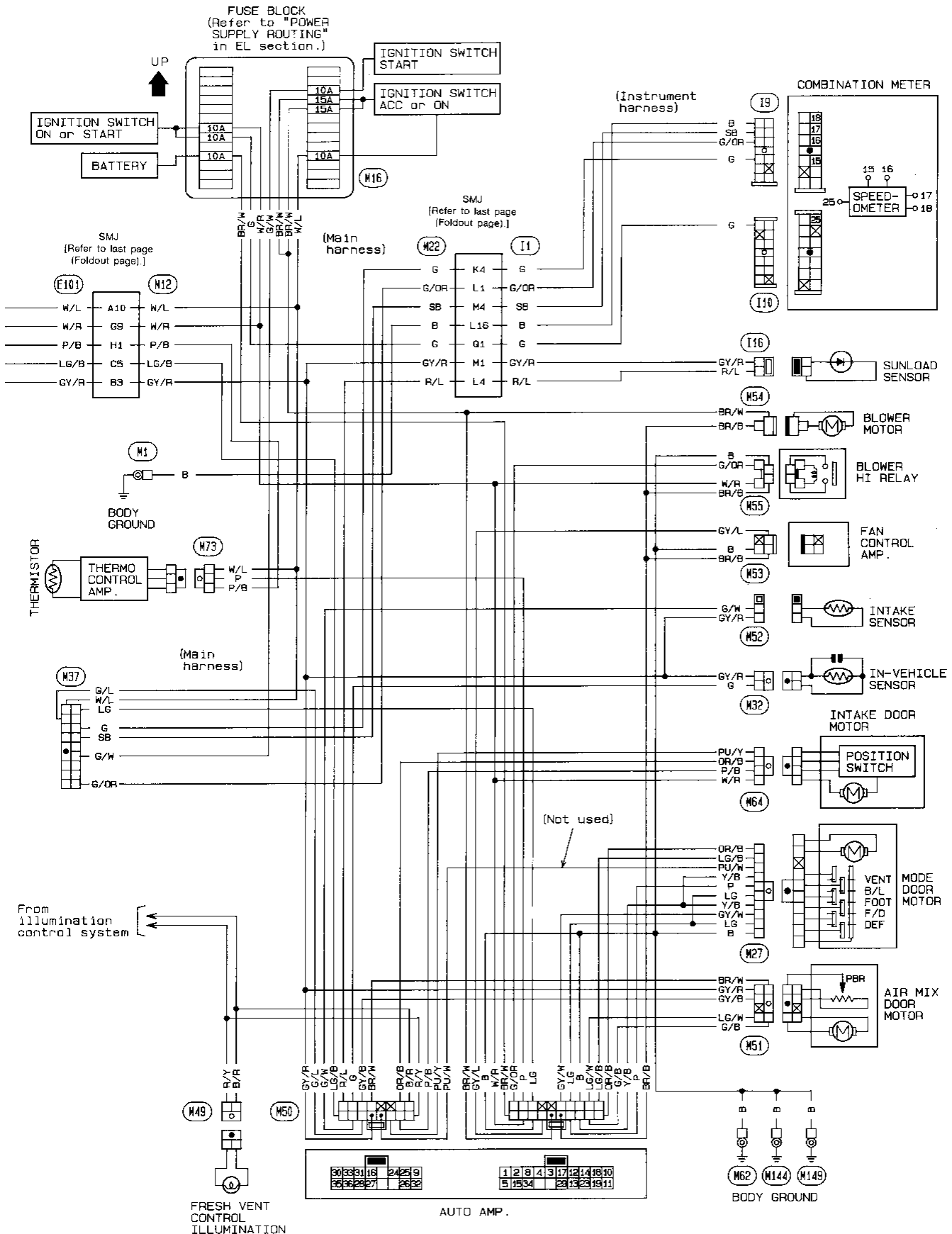
Wiring Diagram (Cont'd)

VE ENGINE MODEL



TROUBLE DIAGNOSES — Auto Air Conditioner

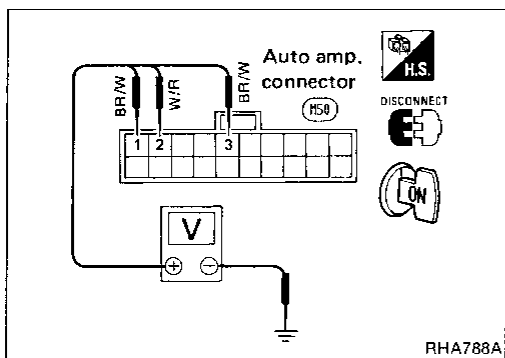
Wiring Diagram (Cont'd)



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Main Power Supply and Ground Circuit Check POWER SUPPLY CIRCUIT CHECK FOR AUTO A/C SYSTEM

Check power supply circuit for auto air conditioning system. Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram — Auto Air Conditioner.

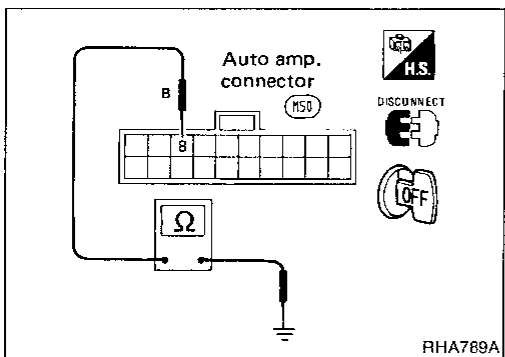


AUTO AMP. CHECK

Check power supply circuit for auto amp. with ignition switch ON.

1. Disconnect auto amp. harness connector.
2. Measure voltage across terminal No. ①, ②, ③ and body ground.

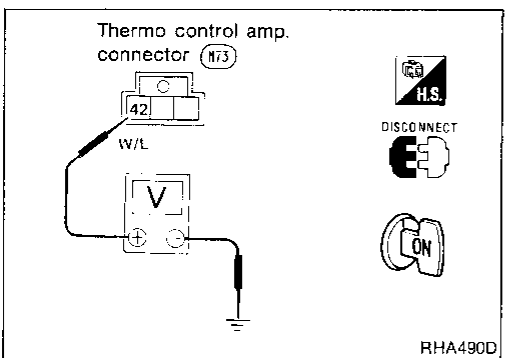
Voltmeter terminal		Voltage
⊕	⊖	
①, ②, ③	Body ground	Approx. 12V



Check body ground circuit for auto amp. with ignition switch OFF.

1. Disconnect auto amp. harness connector.
2. Check for continuity between terminal No. ⑧ and body ground.

Ohmmeter terminal		Continuity
⊕	⊖	
⑧	Body ground	Yes

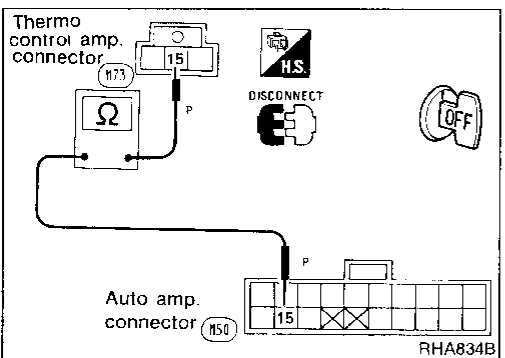


THERMO CONTROL AMP. CHECK

Check power supply circuit for thermo control amp. with ignition switch ON.

1. Disconnect thermo control amp. harness connector.
2. Measure voltage across terminal No. ④② and body ground.

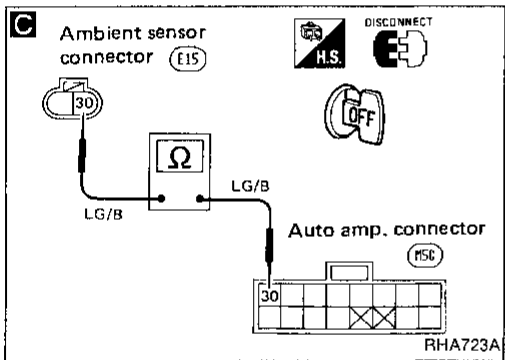
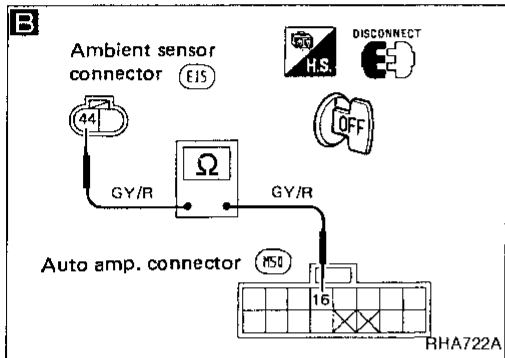
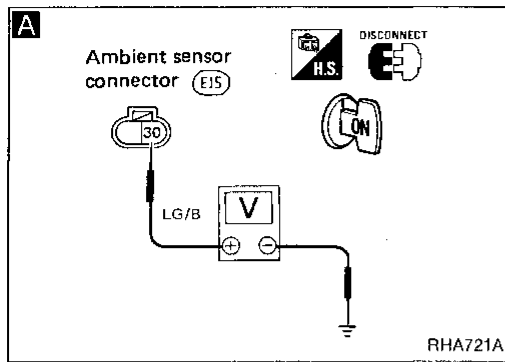
Voltmeter terminal		Voltage
⊕	⊖	
④②	Body ground	Approx. 12V



Check body ground circuit for thermo control amp. with ignition switch OFF.

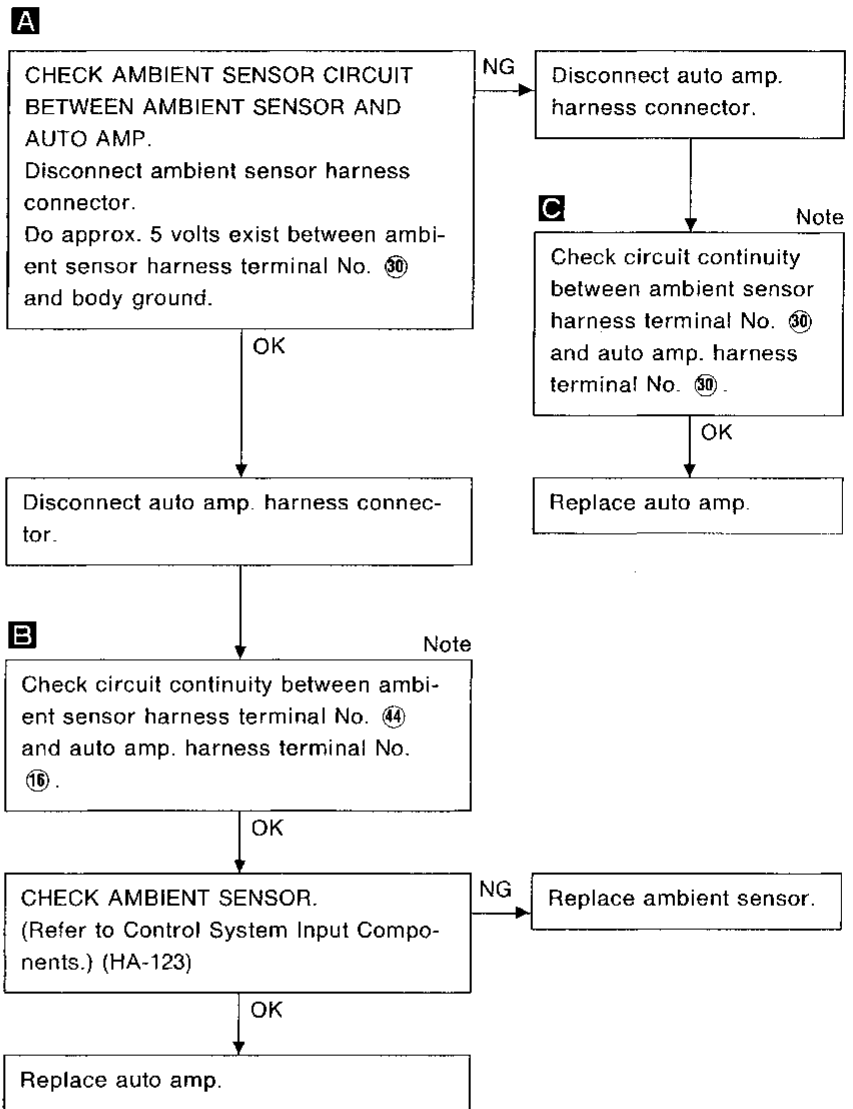
1. Disconnect thermo control amp. and amp. harness connectors.
2. Check for continuity between auto amp. harness terminal No. ⑮ and thermo control amp. harness terminal No. ⑮.

Ohmmeter terminal		Continuity
Auto amp.	Thermo control amp.	
⑮	⑮	Yes



Diagnostic Procedure 1

SYMPTOM: Ambient sensor circuit is open or shorted. (21 or -21 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)



Note:
If the result is NG after checking circuit continuity, repair harness or connector.

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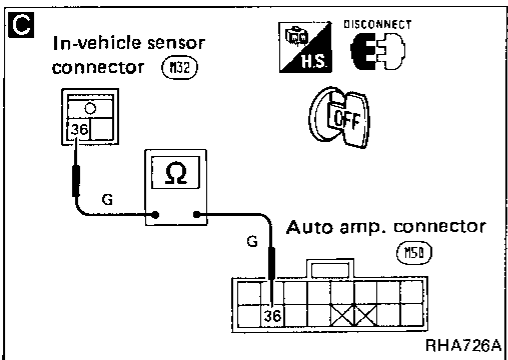
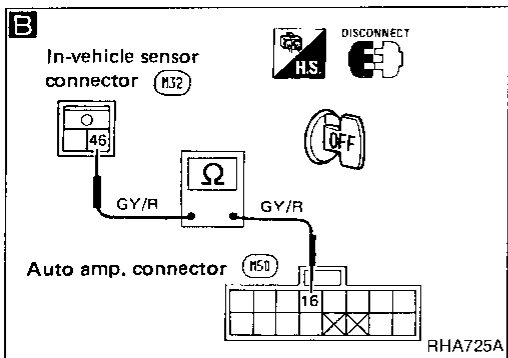
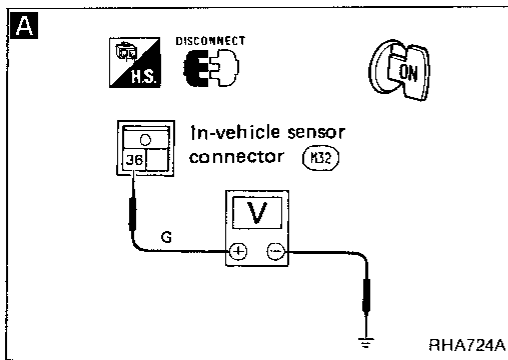
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Diagnostic Procedure 2

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



A

CHECK IN-VEHICLE SENSOR CIRCUIT BETWEEN IN-VEHICLE SENSOR AND AUTO AMP.
Disconnect in-vehicle sensor harness connector.
Do approx. 5 volts exist between in-vehicle sensor harness terminal No. 36 and body ground?

NG → Disconnect auto amp. harness connector.

OK → Disconnect auto amp. harness connector.

C Note

Check circuit continuity between in-vehicle sensor harness terminal No. 36 and auto amp. harness terminal No. 36.

OK → Replace auto amp.

B Note

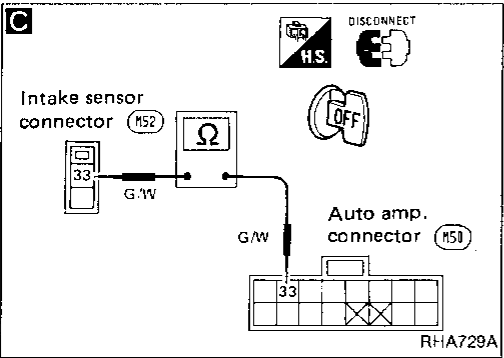
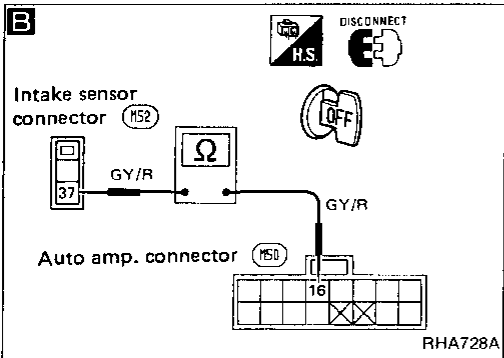
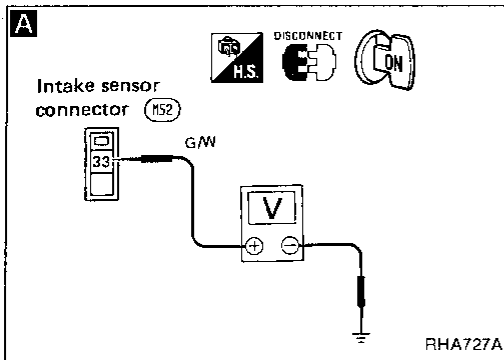
Check circuit continuity between in-vehicle sensor harness terminal No. 46 and auto amp. harness terminal No. 16.

OK → CHECK IN-VEHICLE SENSOR. (Refer to Control System Input Components.) (HA-121)

NG → Replace in-vehicle sensor.

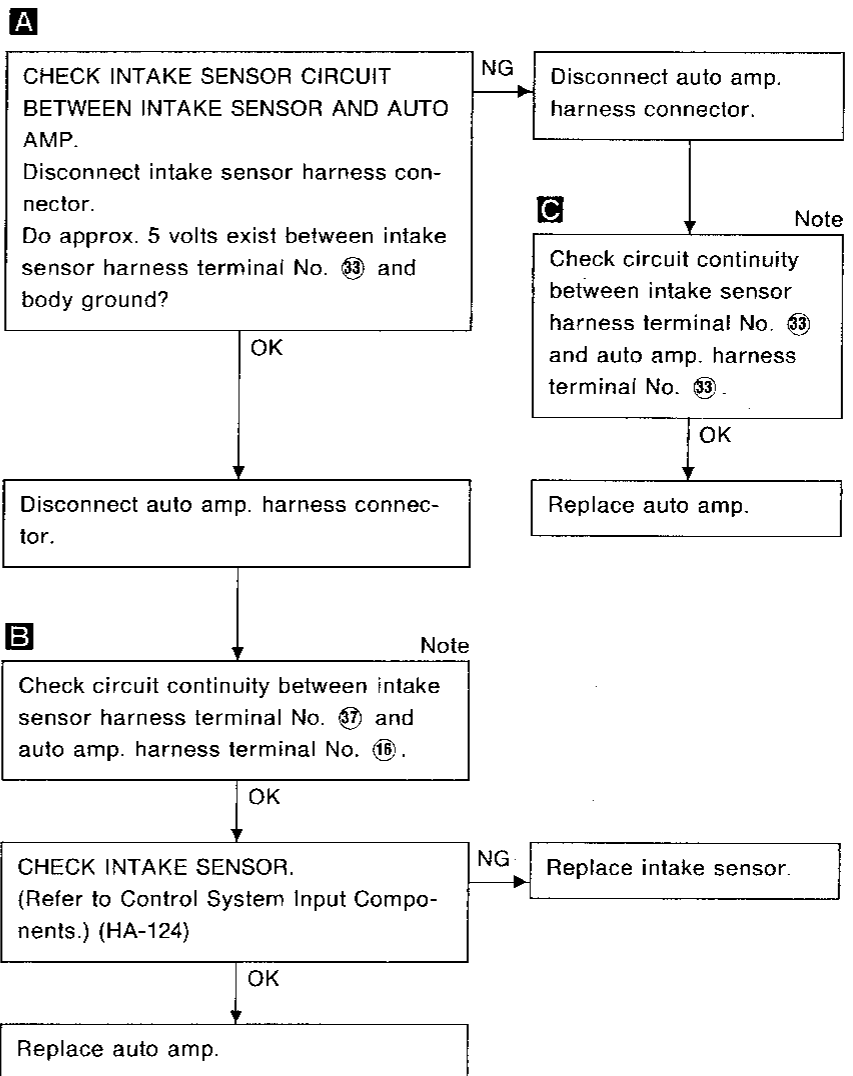
OK → Replace auto amp.

Note:
If the result is NG after checking circuit continuity, repair harness or connector.



Diagnostic Procedure 3

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



Note:

If the result is NG after checking circuit continuity, repair harness or connector.

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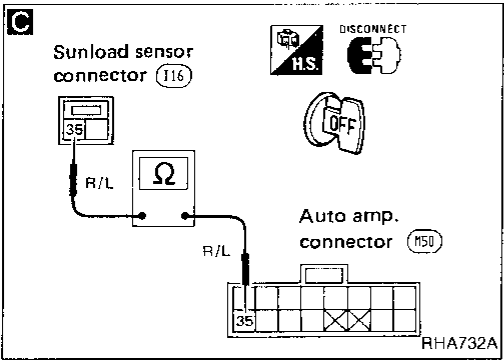
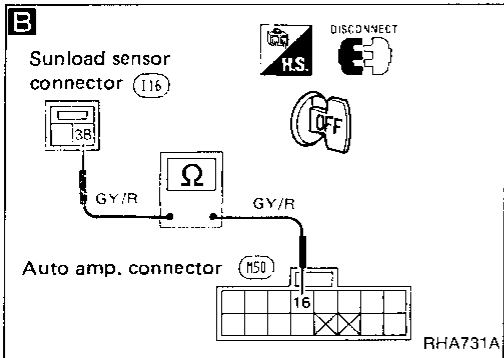
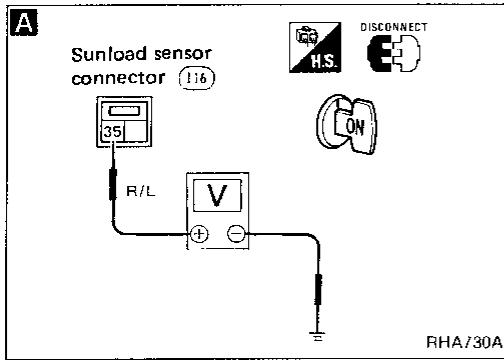
HA

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Diagnostic Procedure 4

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



A

CHECK SUNLOAD SENSOR CIRCUIT BETWEEN SUNLOAD SENSOR AND AUTO AMP.
Disconnect sunload sensor harness connector.
Do approx. 5 volts exist between sunload sensor harness terminal No. ③⑤ and body ground?

OK

Disconnect auto amp. harness connector.

NG → Disconnect auto amp. harness connector.

C Note

Check circuit continuity between sunload sensor harness terminal No. ③⑤ and auto amp. harness terminal No. ③⑤.

OK

Replace auto amp.

B Note

Check circuit continuity between sunload sensor harness terminal No. ③⑥ and auto amp. harness terminal No. ①⑥.

OK

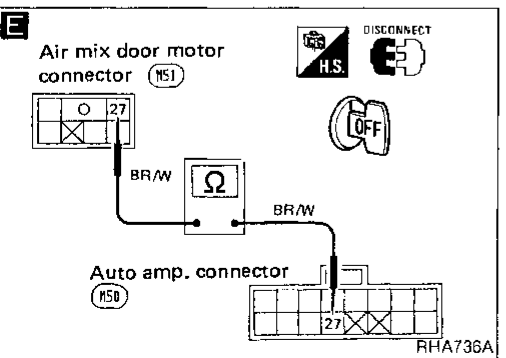
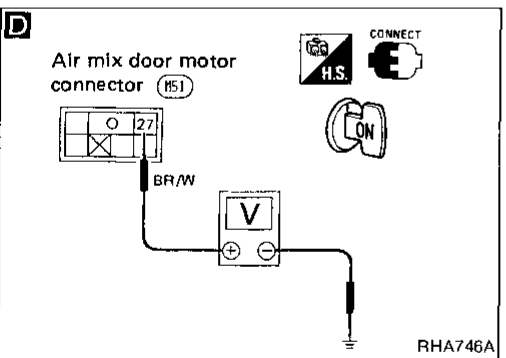
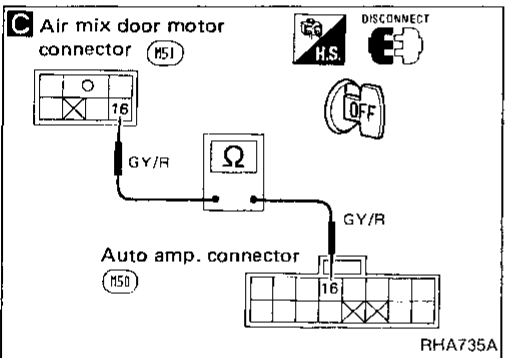
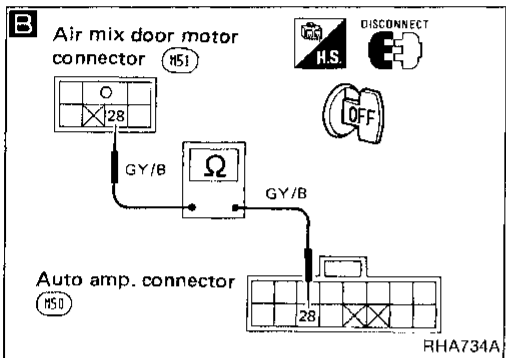
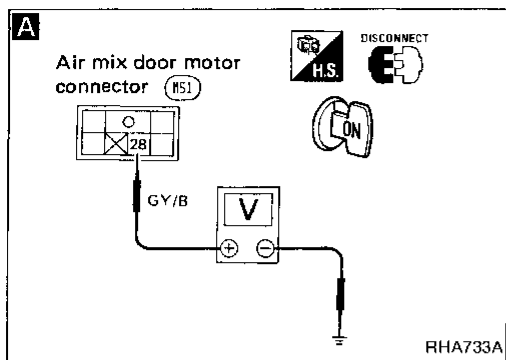
CHECK SUNLOAD SENSOR.
(Refer to Control System Input Components.) (HA-123)

OK

Replace auto amp.

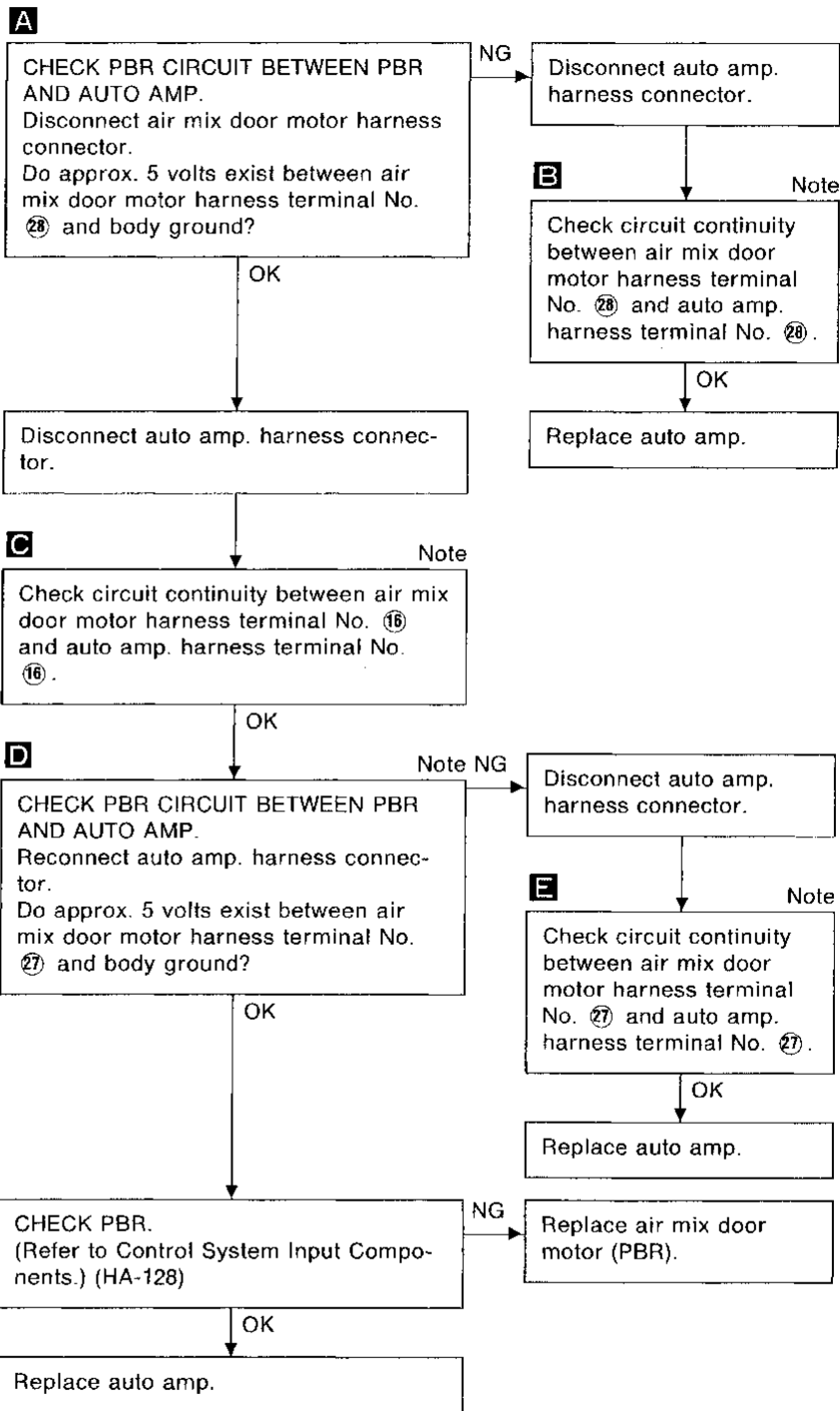
NG → Replace sunload sensor.

Note:
If the result is NG after checking circuit continuity, repair harness or connector.



Diagnostic Procedure 5

SYMPTOM: PBR circuit is open or shorted. (25 or -25 is indicated on auto amp. as a result of conducting Self-diagnosis STEP 2.)



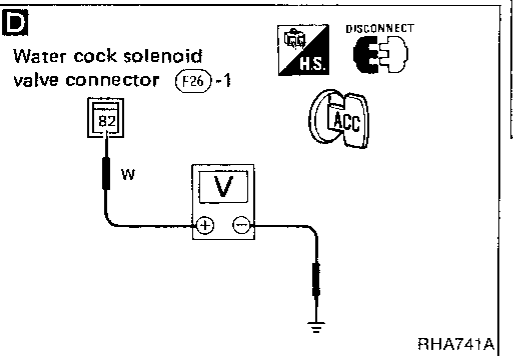
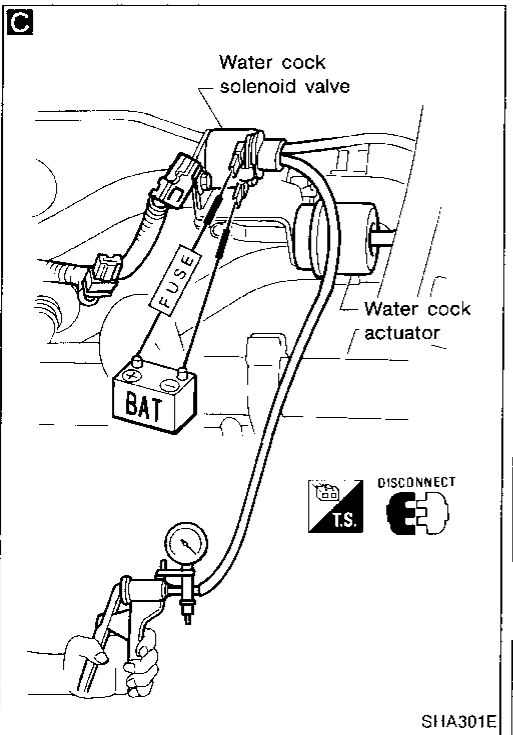
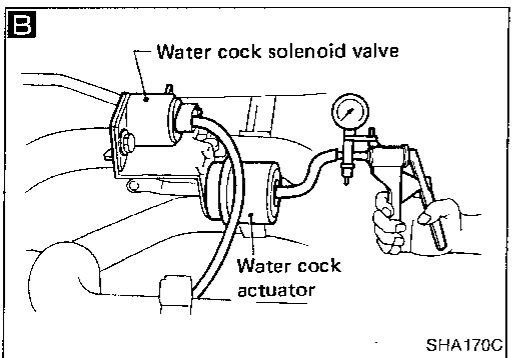
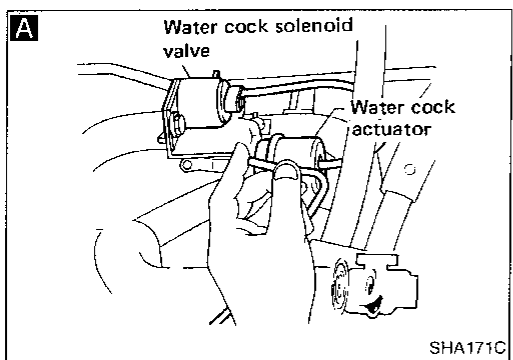
Note:

If the result is NG after checking circuit continuity, repair harness or connector.

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Diagnostic Procedure 6

SYMPTOM: Water cock does not operate.



A
CHECK VACUUM PRESSURE SUPPLY.
Disconnect w/cock solenoid valve vacuum hose.
Does vacuum pressure exist at w/cock solenoid valve vacuum hose when vacuum pump is ON?

NG → CHECK VACUUM HOSE BETWEEN W/COCK SOLENOID VALVE AND VACUUM PUMP.

OK ↓
B
CHECK W/COCK ACTUATOR.
Disconnect w/cock solenoid valve vacuum hose.
Supply the w/cock actuator with vacuum using a handy vacuum pump.
Is w/cock actuator operating normally?

NG → CHECK VACUUM HOSE BETWEEN W/COCK SOLENOID VALVE AND W/COCK ACTUATOR.

OK ↓
NG ↓
Replace vacuum hose.

OK ↓
Reconnect w/cock solenoid valve vacuum hoses.

OK ↓
NG ↓
Replace w/cock assembly.

C
CHECK W/COCK SOLENOID VALVE.
Ground w/cock solenoid valve terminal No. ⑤ and apply DC 12 volts, to terminal No. ③.
Supply the w/cock actuator with vacuum using a handy vacuum pump.
Is w/cock actuator operating normally?

NG → Replace w/cock solenoid valve.

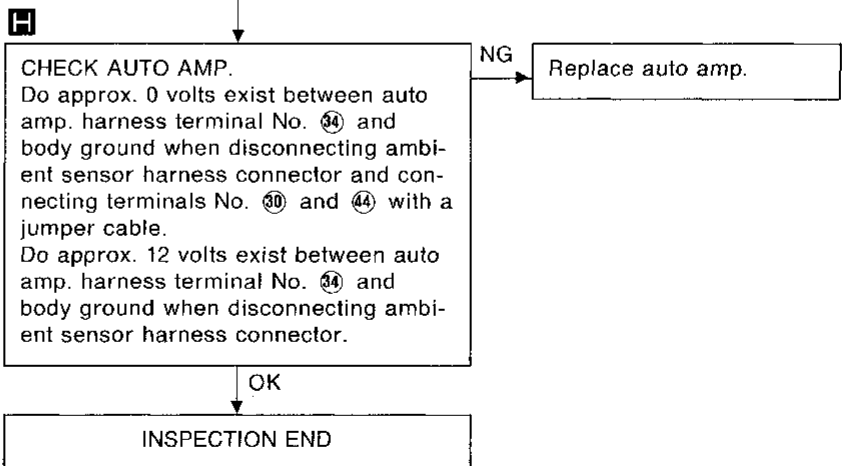
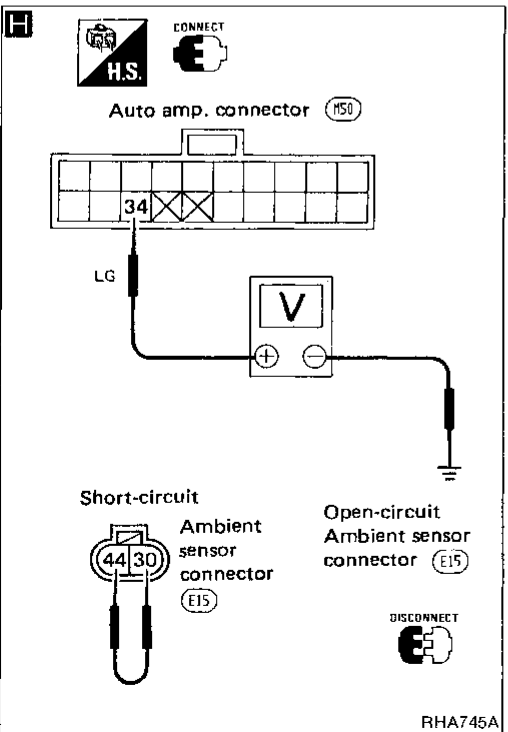
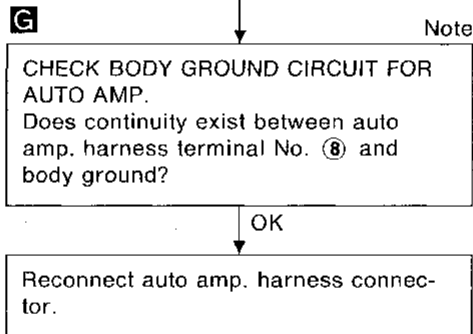
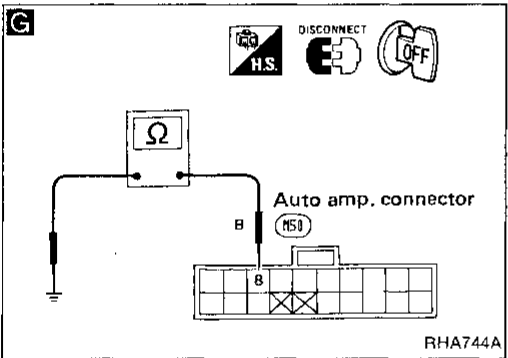
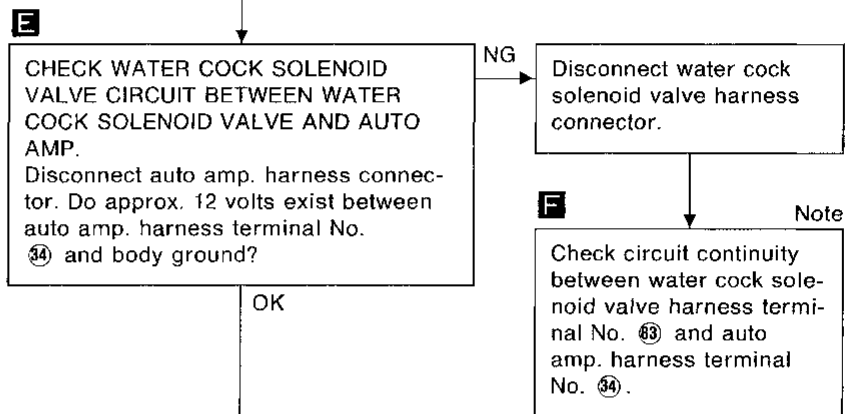
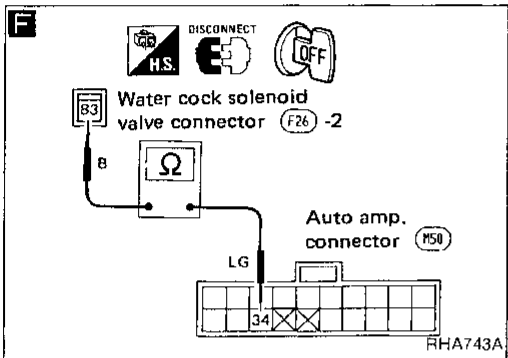
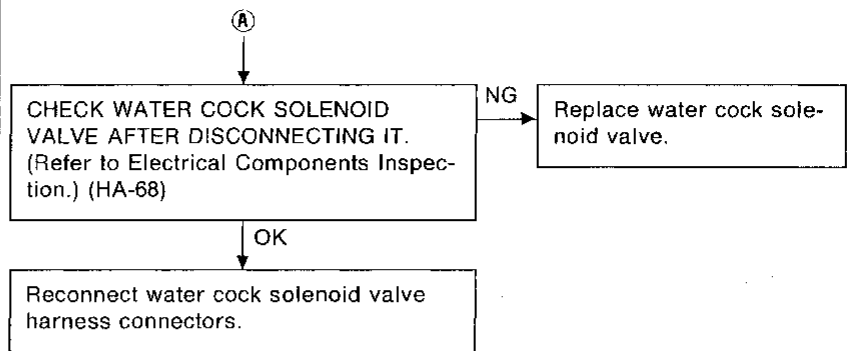
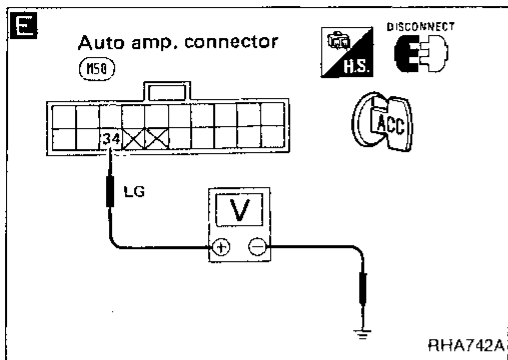
OK ↓
D
CHECK POWER SUPPLY FOR WATER COCK SOLENOID VALVE.
Do approx. 12 volts exist between water cock solenoid valve harness terminal No. ⑧2 and body ground?

NG → Check 10A fuse at fuse block. (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

OK ↓
Ⓐ
(Go to next page.)

TROUBLE DIAGNOSES — Auto Air Conditioner

Diagnostic Procedure 6 (Cont'd)



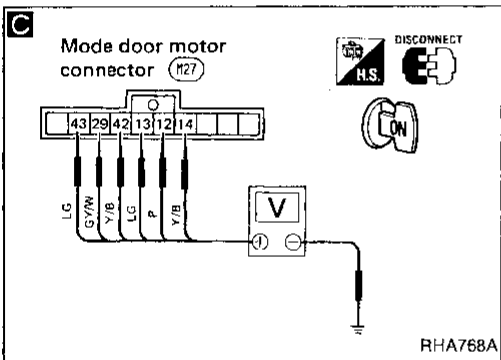
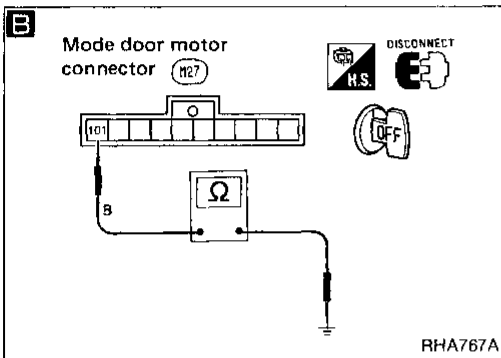
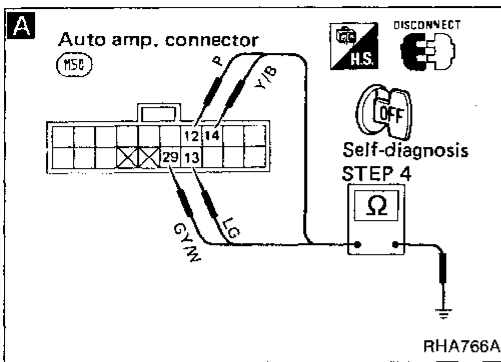
Note:

If the result is NG after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 7

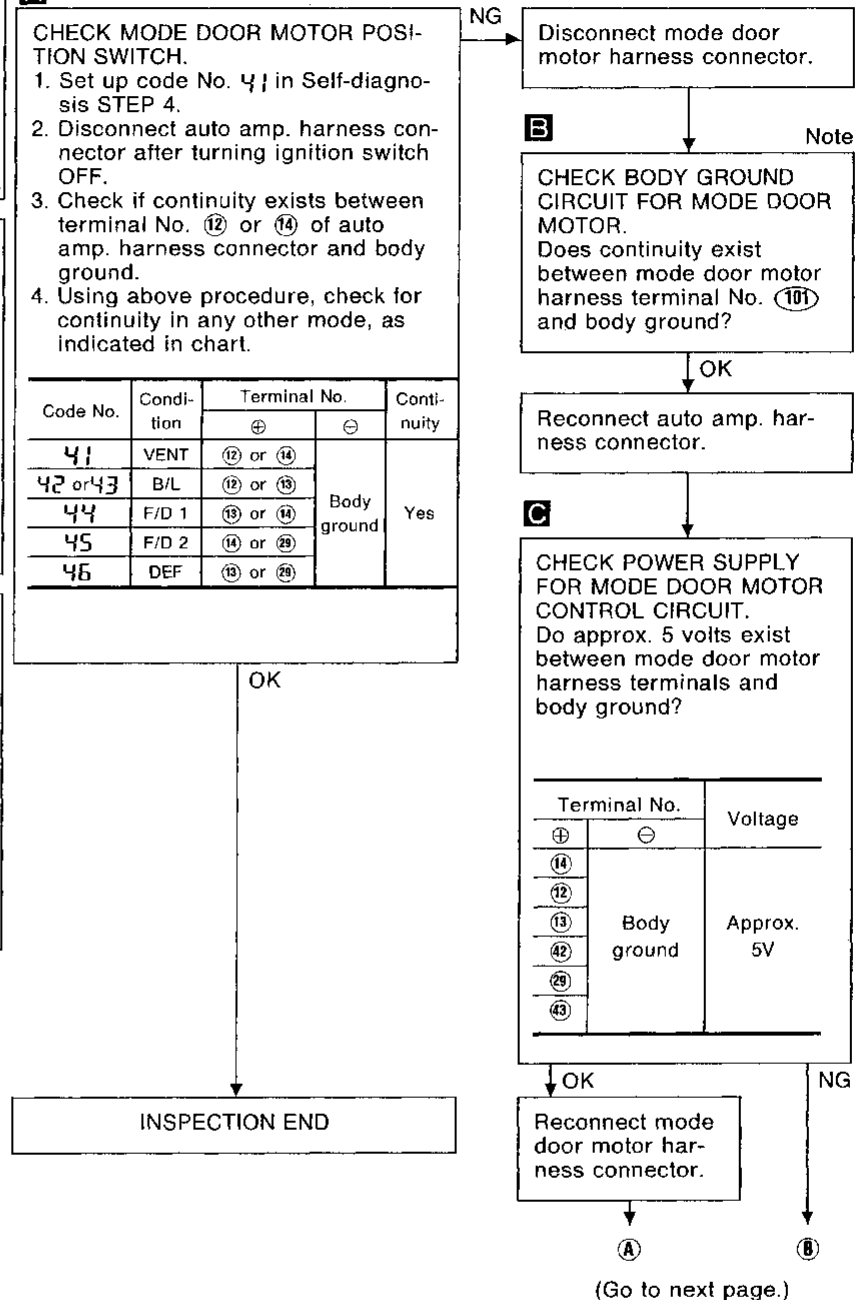
SYMPTOM: Mode door motor does not operate normally.

- Perform Self-diagnosis STEPS 1 to 4 before referring to the following flow chart.



- A**
- CHECK MODE DOOR MOTOR POSITION SWITCH.**
1. Set up code No. 41 in Self-diagnosis STEP 4.
 2. Disconnect auto amp. harness connector after turning ignition switch OFF.
 3. Check if continuity exists between terminal No. 12 or 14 of auto amp. harness connector and body ground.
 4. Using above procedure, check for continuity in any other mode, as indicated in chart.

Code No.	Condition	Terminal No.		Continuity
		⊕	⊖	
41	VENT	12 or 14	Body ground	Yes
42 or 43	B/L	12 or 13		
44	F/D 1	13 or 14		
45	F/D 2	14 or 29		
46	DEF	13 or 29		



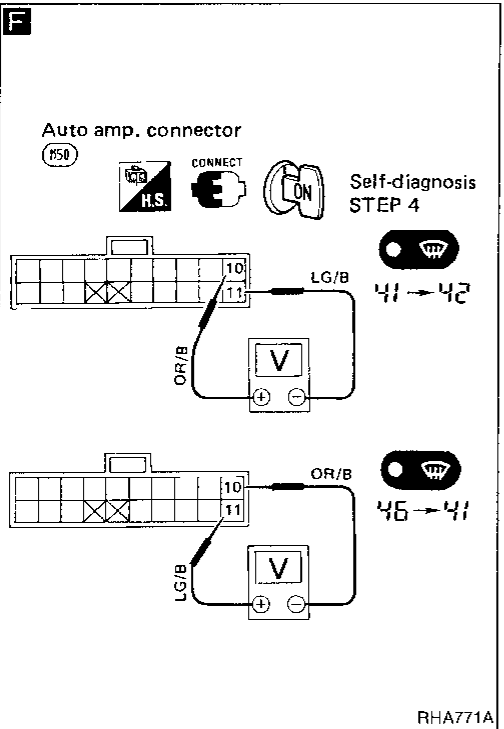
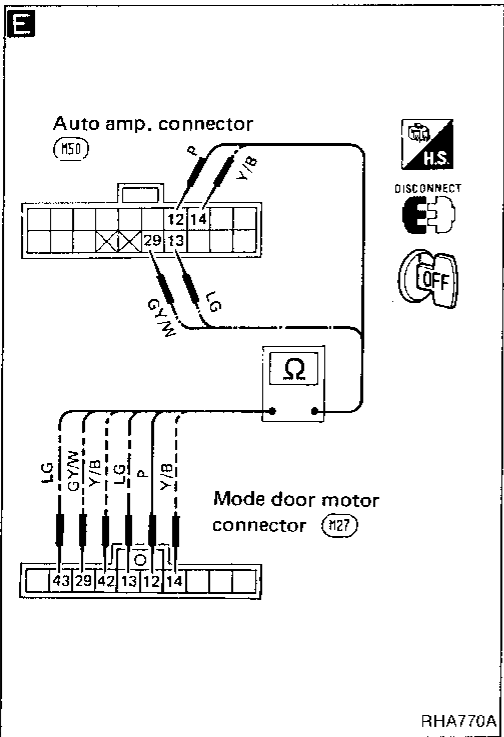
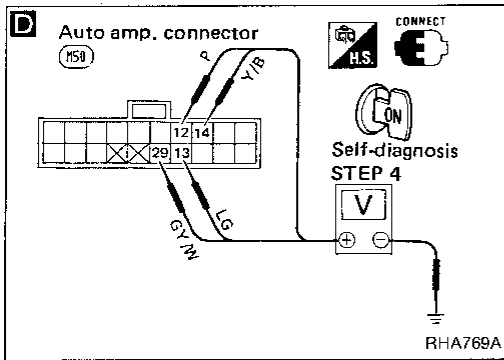
Note:

If the result is NG after checking circuit continuity, repair harness or connector.

(Go to next page.)

TROUBLE DIAGNOSES — Auto Air Conditioner

Diagnostic Procedure 7 (Cont'd)



A

D CHECK MODE DOOR MOTOR POSITION SWITCH.
Set up Self-diagnosis STEP 4.
Measure voltage across auto amp. harness terminals and body ground.

Code No.	Con- dition	Terminal No.				⊖
		⊕				
		(14)	(12)	(13)	(29)	
41	VENT	0V	0V	5V	5V	Body ground
42 or 43	B/L	5V	0V	0V	5V	
44	D/F 1	0V	5V	0V	5V	
45	D/F 2	0V	5V	5V	0V	
46	DEF	5V	5V	0V	0V	

0V: Approx. 0V
5V: Approx. 5V

B

E Note
Check circuit continuity between each terminal on auto amp. and on mode door motor.

Terminal No.		Continuity
⊕	⊖	
Auto amp. (29)	Mode door motor (29)	Yes
(13)	(13) or (43)	
(12)	(12)	
(14)	(14) or (42)	

OK

Replace auto amp.

OK →

NG →

Replace mode door motor.

F CHECK FOR OUTPUT OF AUTO AMP.
Do approx. 10.5 volts exist between auto amp. harness terminals No. (10) and (11) when code No. is switched from "41" to "42" or when code No. is switched from "46" to "41"?

Code No.	Mode door motor operation	Terminal No.		Voltage V
		(10)	(11)	
41 → 42	VENT → B/L	⊕	⊖	Approx. 10.5
46 → 41	DEF → VENT	⊖	⊕	
-	Stop	-	-	0

OK →

NG →

Replace auto amp.

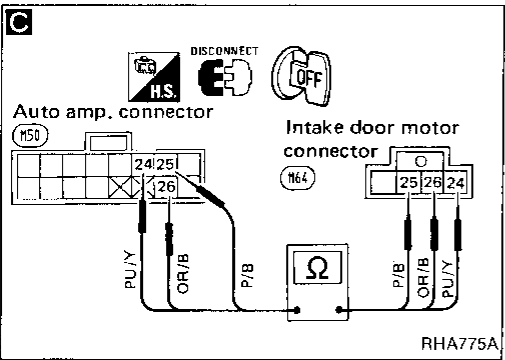
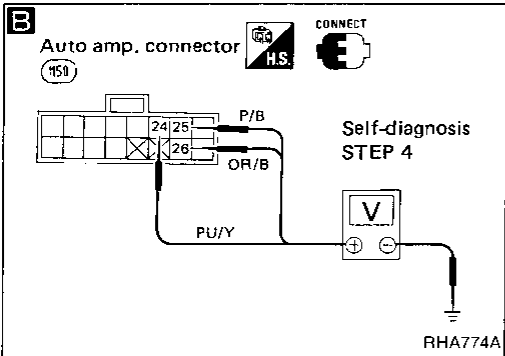
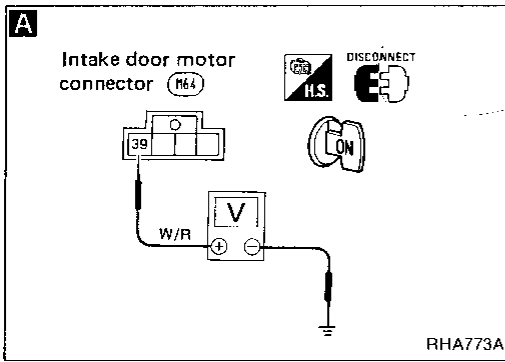
Replace mode door motor.

Note:
If the result is NG after checking circuit continuity, repair harness or connector.

Diagnostic Procedure 8

SYMPTOM: Intake door motor does not operate normally.

- Perform Self-diagnosis STEPS 1, 2 and 4 before referring to the following flow chart.



A

CHECK POWER SUPPLY FOR INTAKE DOOR MOTOR.

Disconnect intake door motor harness connector.

Do approx. 12 volts exist between intake door motor harness terminal No. ③⑨ and body ground?

NG → Check 10A fuse at fuse block. (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

OK

Reconnect intake door motor harness connector.

B

CHECK FOR OUTPUT OF AUTO AMP.

Set up Self-diagnosis STEP 4.

Measure voltage across auto amp. harness terminals and body ground.

NG → Disconnect auto amp. and intake door motor harness connectors.

Code No.	Terminal No.		Condition	Voltage V
	⊕	⊖		
41, 42	②④	Body ground	REC	0
Other			12	
43	②⑤	Body ground	20% FRE	0
Other			12	
44, 45	②⑥	Body ground	FRE	0
Other			12	

0V: Approx. 0V
12V: Approx. 12V

OK

INSPECTION END

C Note

Check circuit continuity between each terminal on auto amp. and on intake door motor.

Terminal No.		Continuity
⊕	⊖	
Auto amp.	Intake door motor	Yes
②④	②④	
②⑤	②⑤	
②⑥	②⑥	

OK

Ⓐ

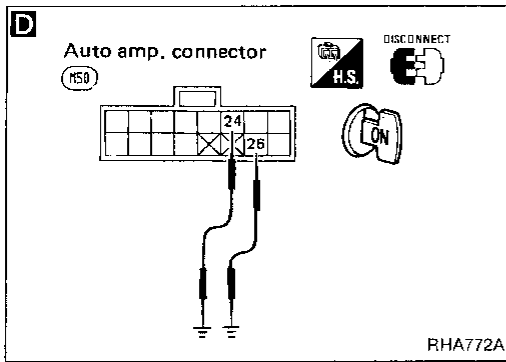
(Go to next page.)

Note:

If the result is NG after checking circuit continuity, repair harness or connector.

TROUBLE DIAGNOSES — Auto Air Conditioner

Diagnostic Procedure 8 (Cont'd)



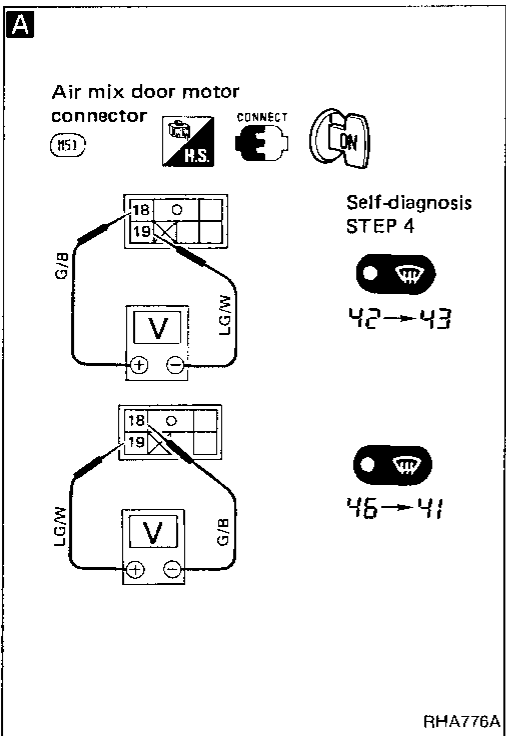
A

Reconnect intake door motor harness connector.

D CHECK INTAKE DOOR MOTOR. Does intake door move to "REC" position after connecting auto amp. harness terminal No. 24 and body ground with a jumper cable? Then, does intake door move to "FRE" position after connecting auto amp. harness terminal No. 25 and body ground with a jumper cable?

NG → Replace intake door motor.

OK → Replace auto amp.



Diagnostic Procedure 9

SYMPTOM: Air mix door motor does not operate normally.

- Perform Self-diagnosis STEPS 1, 2 and 4 before referring to the following flow chart.

IS PBR OPERATING NORMALLY? Refer to Self-diagnoses STEP 2.

NG → CHECK PBR CIRCUIT. Go to Diagnostic Procedure 5. (HA-103)

OK →

A CHECK FOR OUTPUT OF AUTO AMP. Set up Self-diagnosis STEP 4. Do approx. 10.5 volt exist between air mix door motor harness terminals No. 18 and 19 when code No. is switched from "42" to "43" or when code No. is switched from "45" to "41"?

Code No.	Air mix door operation	Terminal No.		Voltage V
		18	19	
42 → 43	Cold → Hot	⊕	⊖	Approx. 10.5
45 → 41	Hot → Cold	○	⊕	
-	Stop	-	-	0

NG → Disconnect auto amp. and air mix door motor harness connectors.

B Check circuit continuity between auto amp. harness terminal No. 18 (19) and air mix door motor harness terminal No. 18 (19).

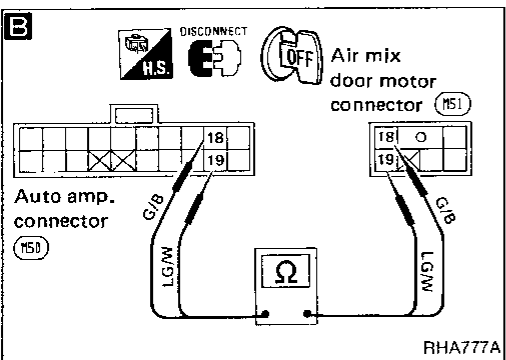
Note

OK → Replace auto amp.

OK → Replace air mix door motor.

Note:

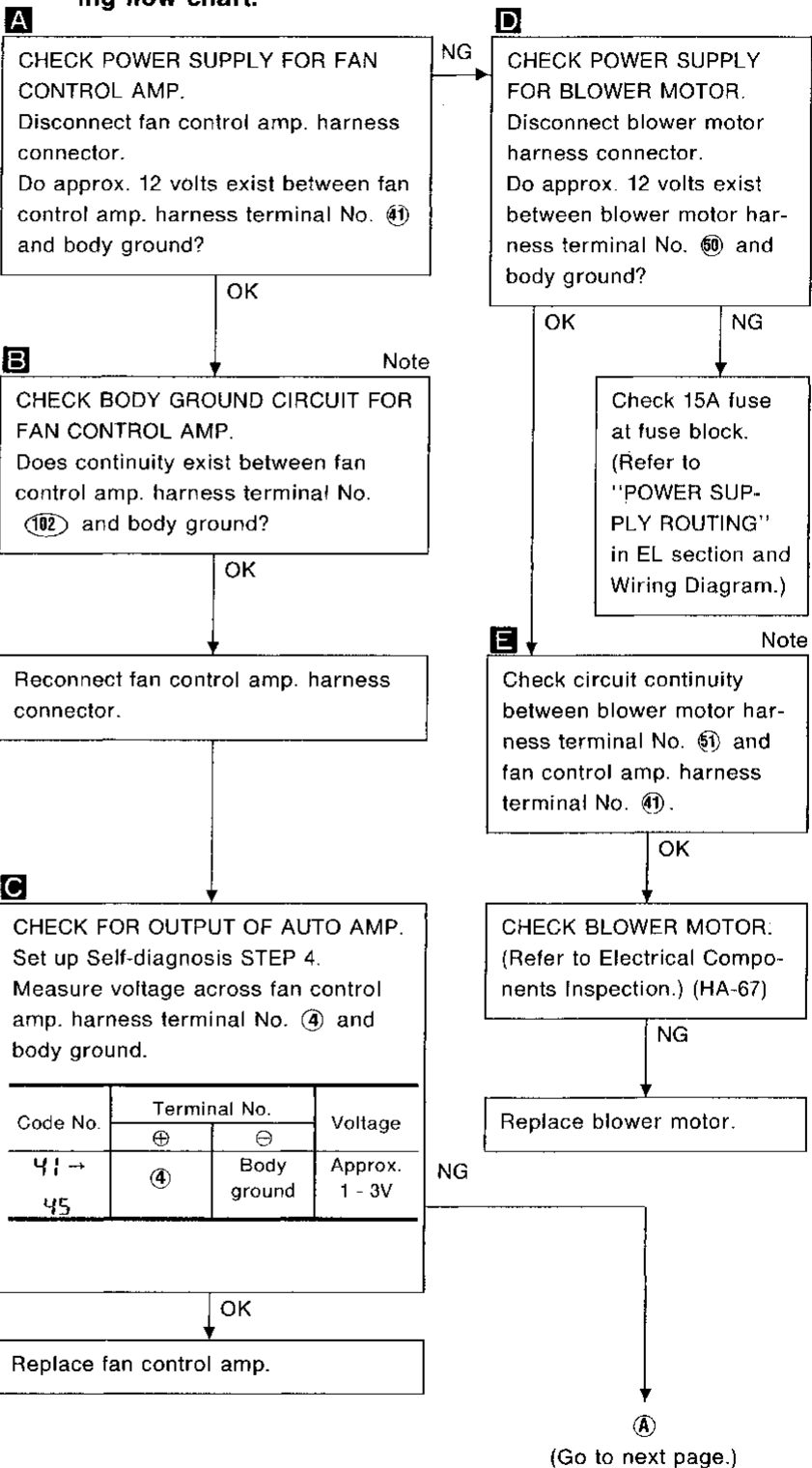
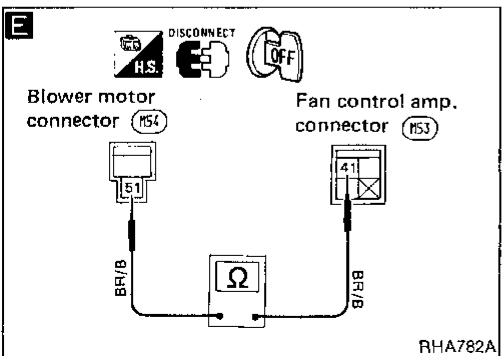
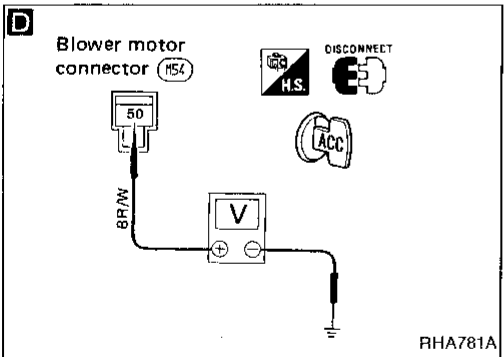
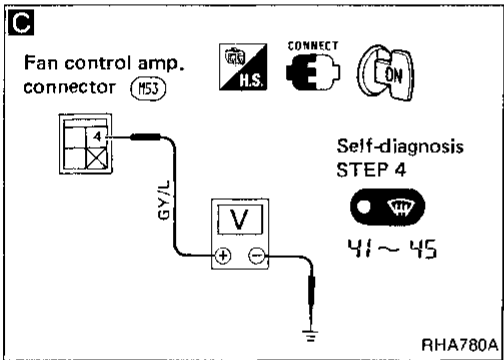
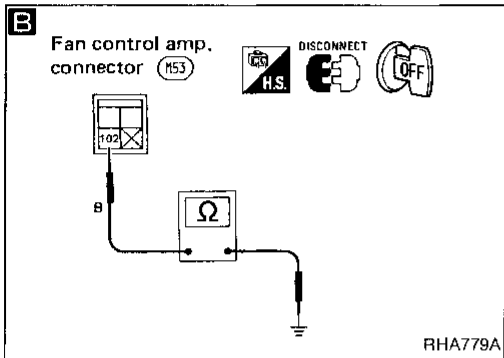
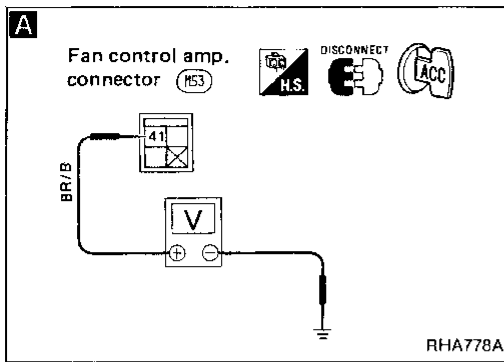
If the result is NG after checking circuit continuity, repair harness or connector.



Diagnostic Procedure 10

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

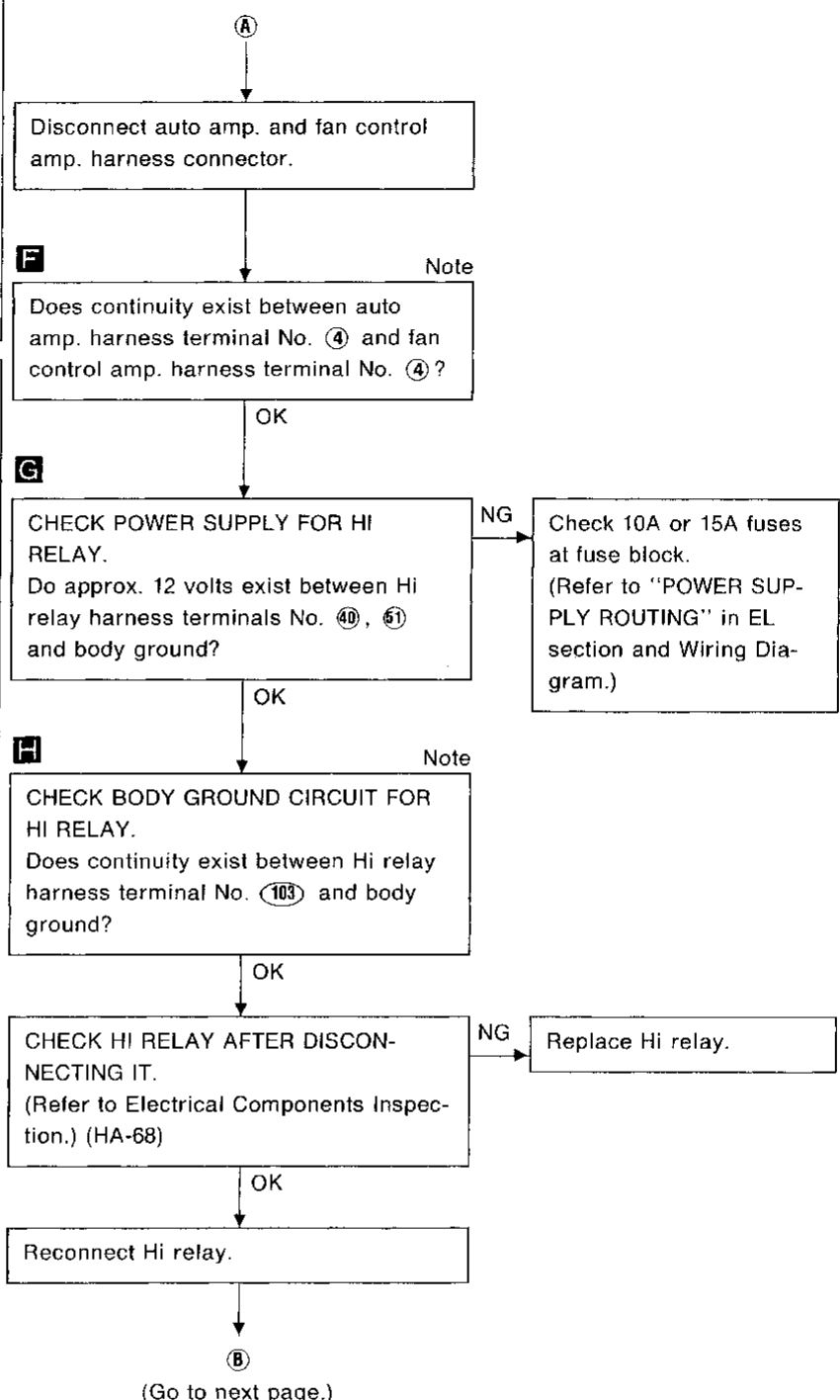
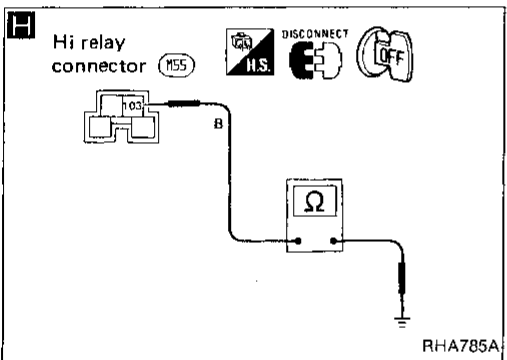
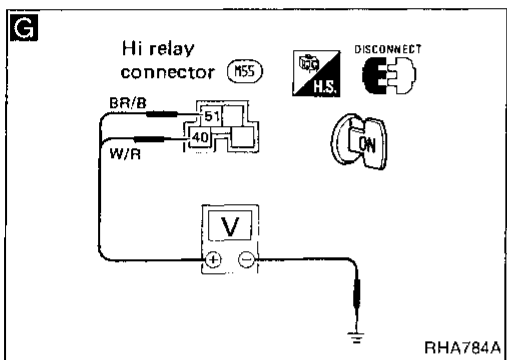
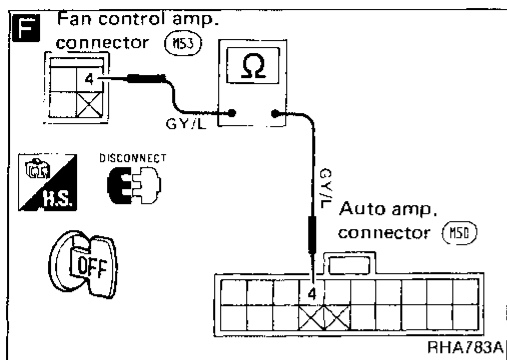
- Perform Preliminary Check 5 before referring to the following flow chart.



Note:
If the result is NG after checking circuit continuity, repair harness or connector.

TROUBLE DIAGNOSES — Auto Air Conditioner

Diagnostic Procedure 10 (Cont'd)

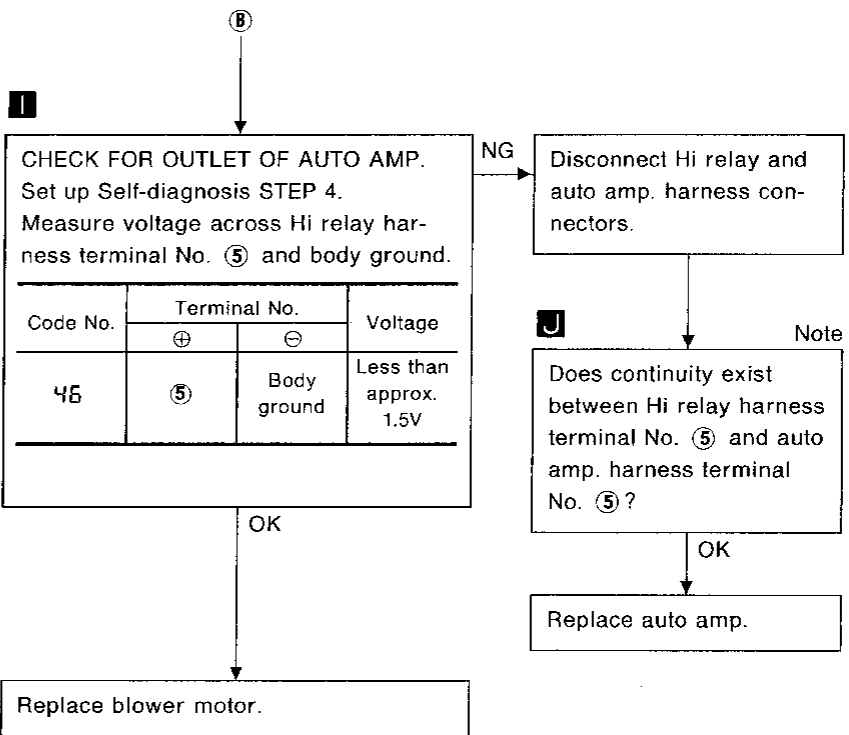
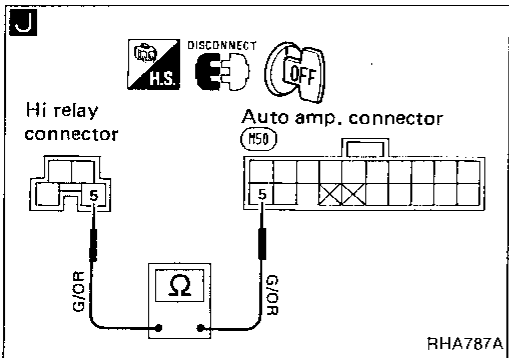
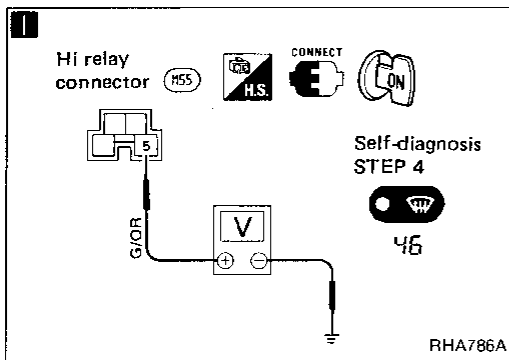


Note:
If the result is NG after checking circuit continuity, repair harness or connector.

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 EL
 IDX

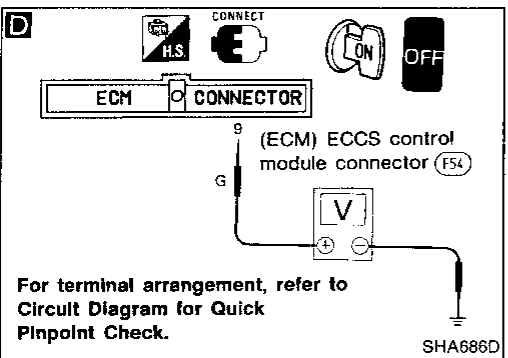
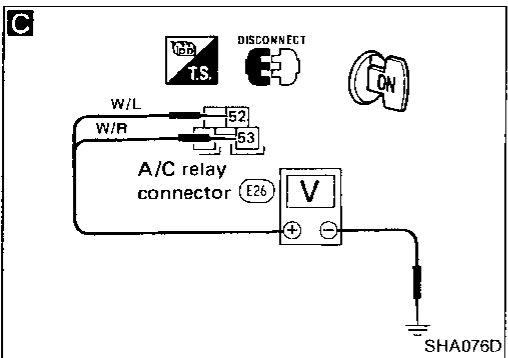
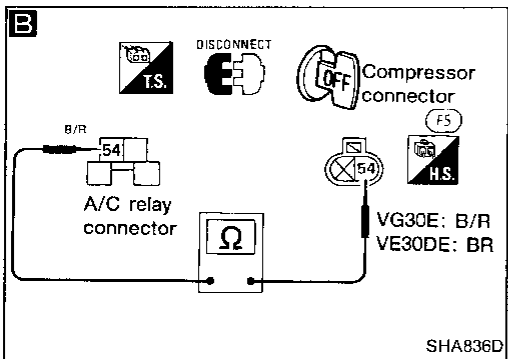
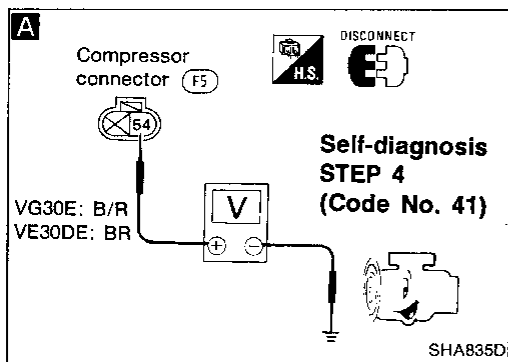
TROUBLE DIAGNOSES — Auto Air Conditioner

Diagnostic Procedure 10 (Cont'd)



Note:

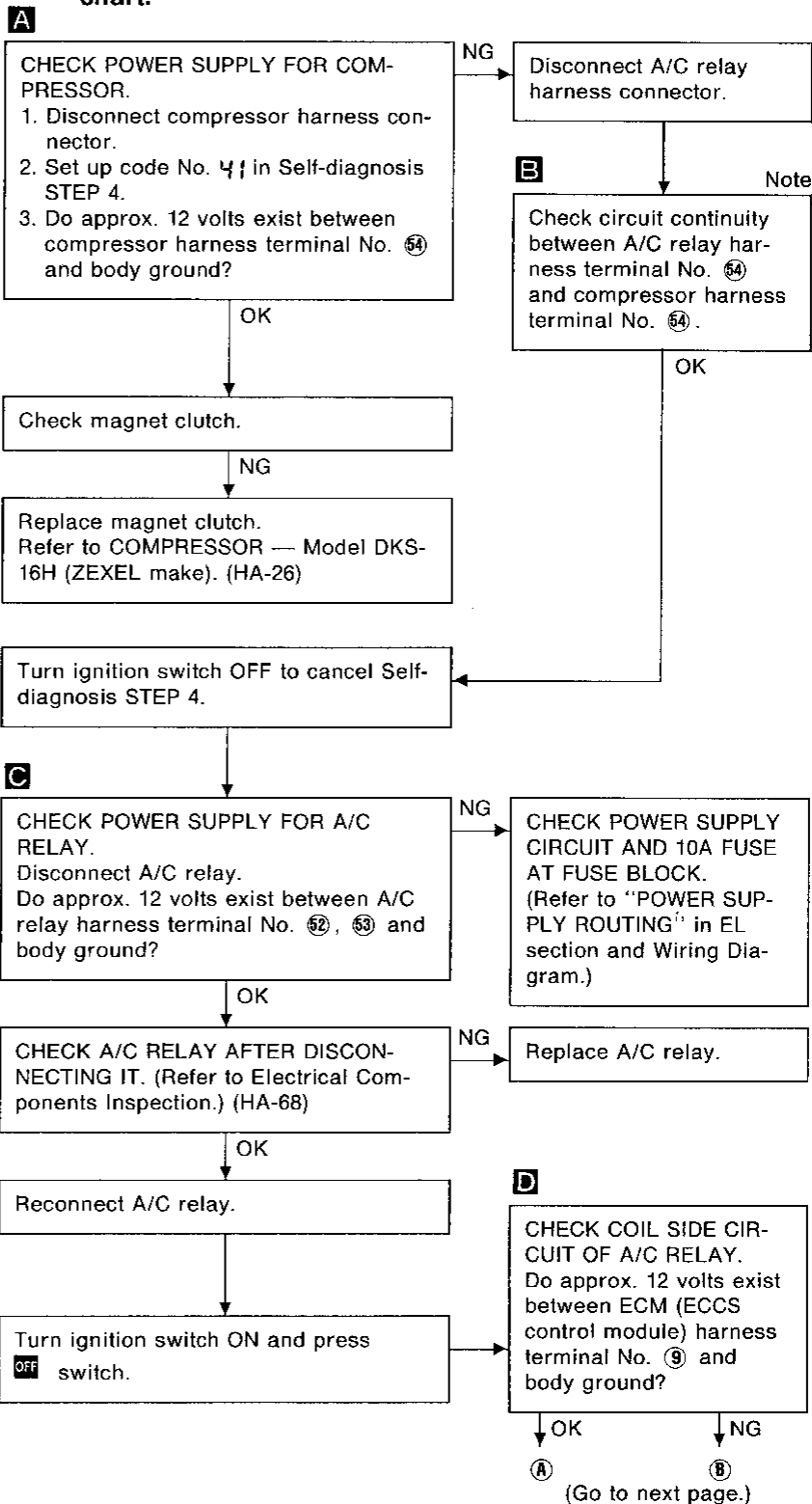
If the result is NG after checking circuit continuity, repair harness or connector.



Diagnostic Procedure 11

SYMPTOM: Magnet clutch does not engage after performing Preliminary Check 6.

- Perform Preliminary Check 6 before referring to the flow chart.

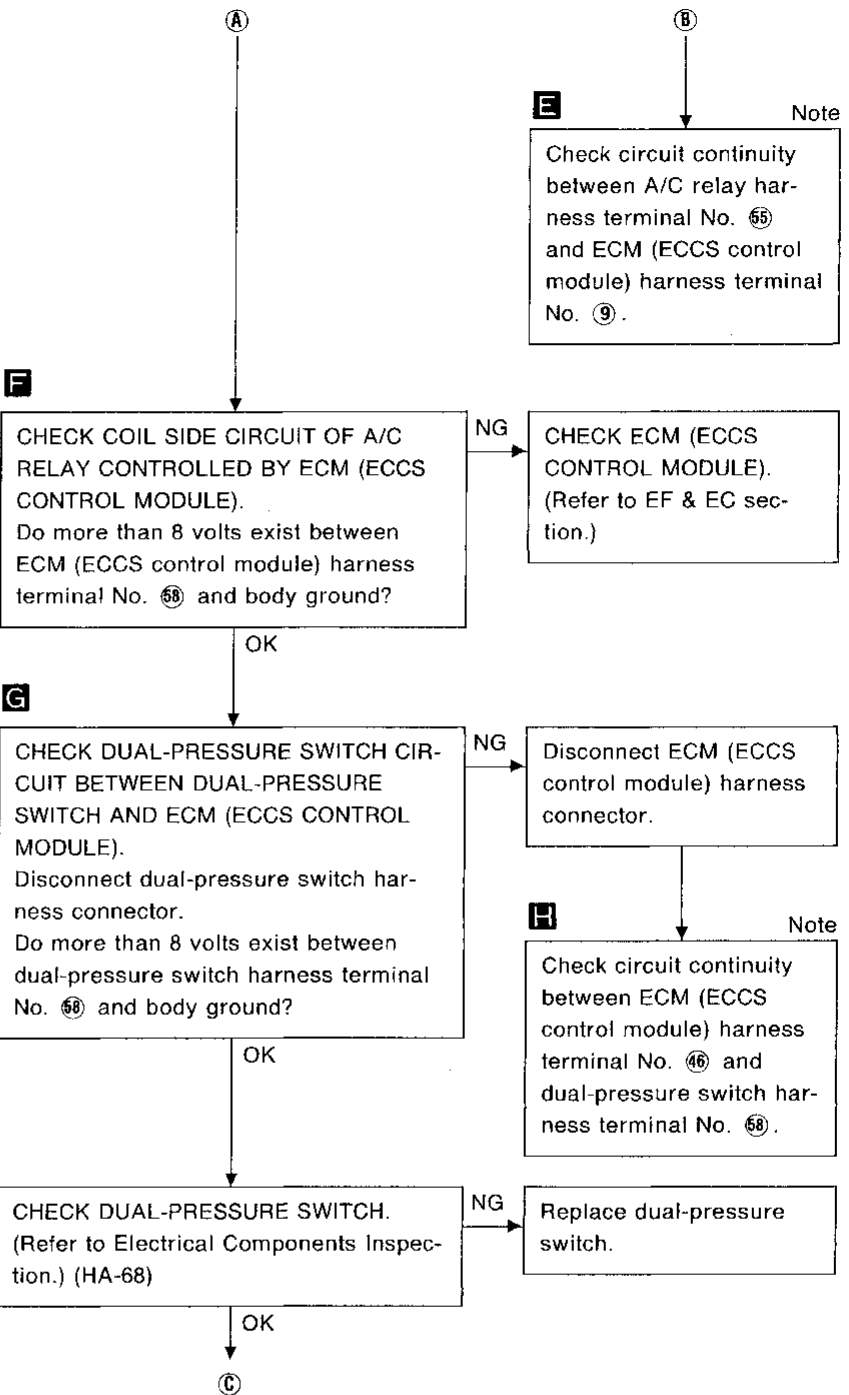
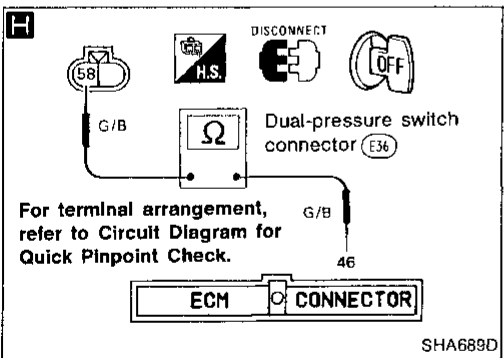
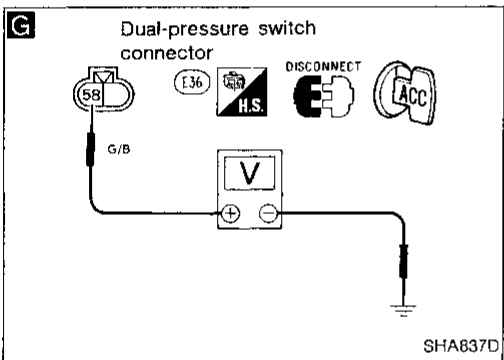
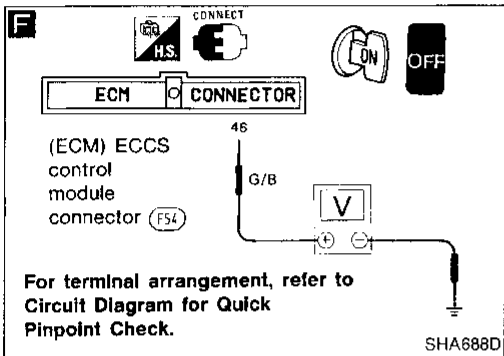
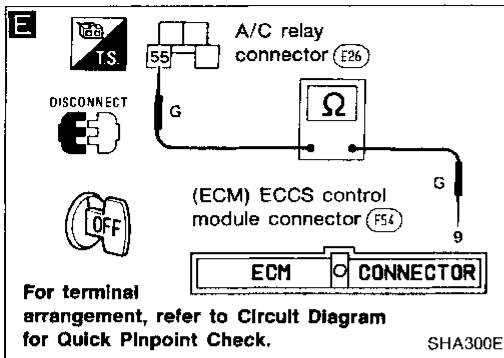


Note:

If the result is NG after checking circuit continuity, repair harness or connector.

TROUBLE DIAGNOSES — Auto Air Conditioner

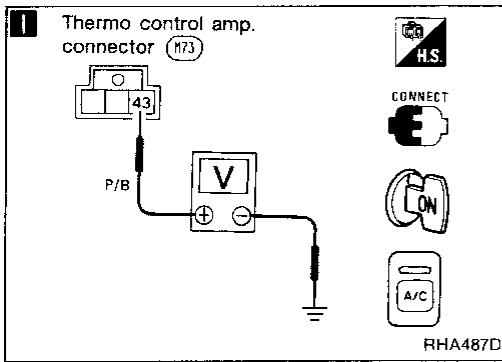
Diagnostic Procedure 11 (Cont'd)



Note:
If the result is NG after checking circuit continuity, repair harness or connector.

TROUBLE DIAGNOSES — Auto Air Conditioner

Diagnostic Procedure 11 (Cont'd)

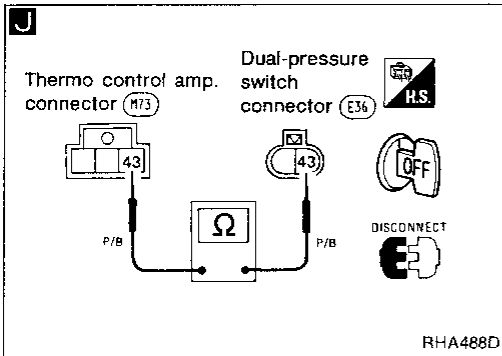


I **C**

CHECK VOLTAGE FOR THERMO CONTROL AMP.
Do approx. 12 volts exist between thermo control amp. harness terminal No. ④③ and body ground?

J **Note**

Check circuit continuity between thermo control amp. harness terminal No. ④③ and dual-pressure switch harness terminal No. ④③.



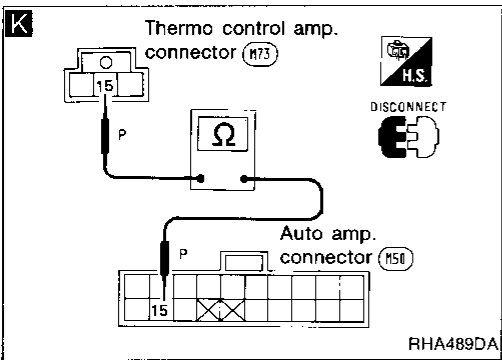
CHECK POWER SUPPLY FOR THERMO CONTROL AMP.
Go to Main Power Supply and Ground Circuit Check. (HA-98)

NG Disconnect auto amp. harness connector.

OK Replace thermo control amp.

K **Note**

Check circuit continuity between auto amp. harness terminal No. ①⑤ and thermo control amp. harness terminal No. ①⑤.



OK Replace auto amp.

Note:
If the result is NG after checking circuit continuity, repair harness or connector.

GI

MA

EM

LC

EF & EC

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MT

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FA

RA

B.R

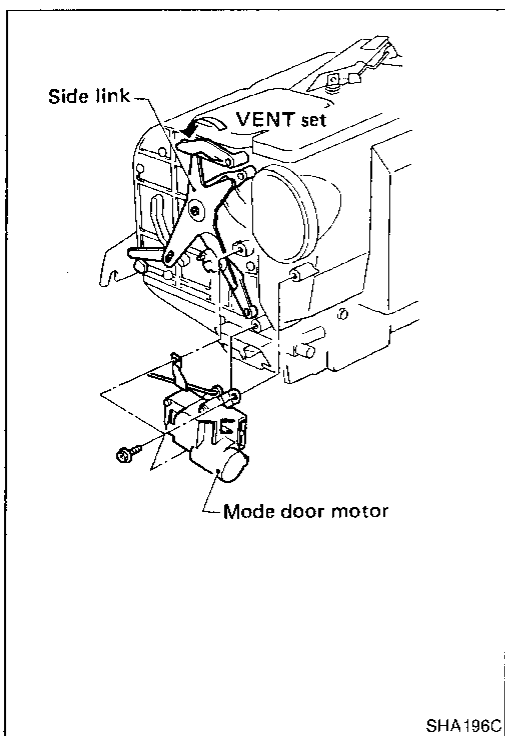
ST

BF

HA


EL

IDX

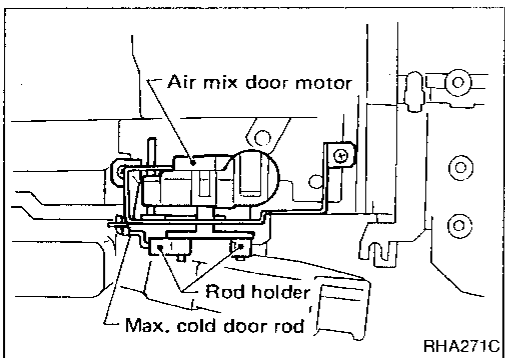


Control Linkage Adjustment


MODE DOOR

1. Install mode door motor on heater unit and connect it to main harness.
2. Set up code No. 41 in Self-diagnosis STEP 4.
3. Move side link by hand and hold mode door in VENT mode.
4. Attach mode door motor rod to side link rod holder.
5. Check mode door operates properly when changing code No. 41 to 46 by pushing  (DEF) switch.

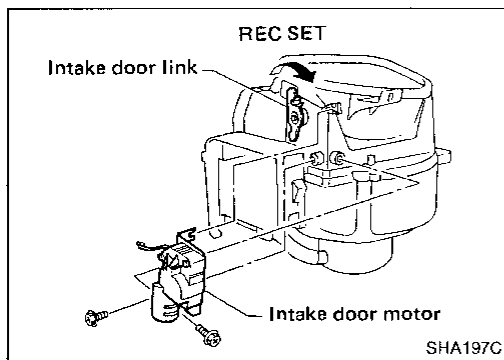
41	42	43	44	45	46
VENT	B/L	B/L	D/F1	D/F2	DEF




AIR MIX DOOR AND MAX. COLD DOOR

1. Install air mix door motor on heater unit and connect it to main harness.
2. Set up code No. 45 in Self-diagnosis STEP 4.
3. Move air mix door lever by hand and hold it at full hot position.
4. Attach air mix door lever to rod holder.
5. Move max. cold door rod holder to driver's side.
6. Slightly move max. cold door rod to driver's side (with max. cold door kept closed), then attach max. cold door rod to rod holder.
7. Check air mix door operates properly when changing code No. 41 to 46 by pushing  (DEF) switch.

41	42	43	44	45	46
Full cold			Full hot		

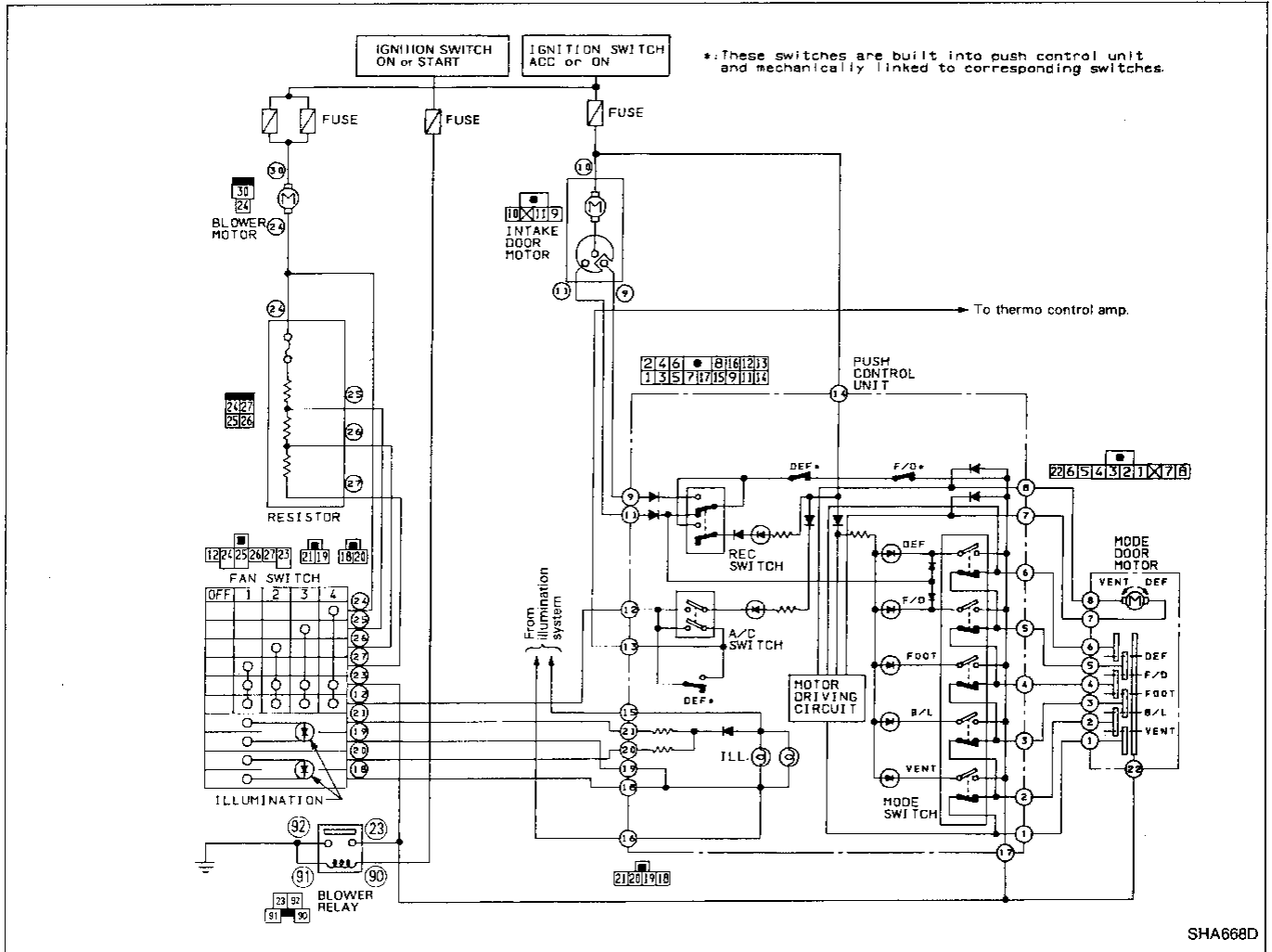


INTAKE DOOR

1. Install intake door motor on intake unit and connect it to main harness.
2. Set up code No. 41 in Self-diagnosis STEP 4.
3. Move intake door link by hand and hold it at REC position.
4. Attach intake door lever to rod holder.
5. Check intake door operates properly when changing code No. 41 to 46 by pushing  (DEF) switch.

41	42	43	44	45	46
REC	20% FRE		FRE		

Push Control System



GI
MA
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FA
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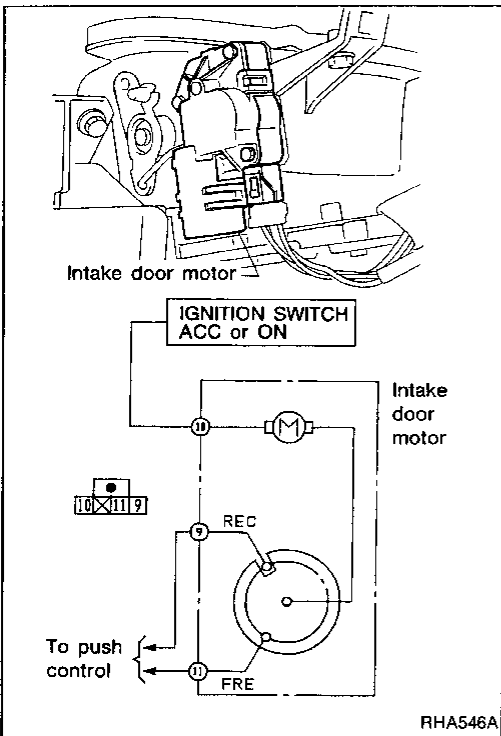
This push control system operates the intake and mode door motors to activate their corresponding doors.

SWITCHES AND THEIR CONTROL FUNCTIONS

Switch	Indicator illuminates							Air out-let	Intake air	Com-pressor
	A/C									
A/C	○							—	—	ON*2
Mode			○					VENT	—	—
				○				B/L	—	—
					○			FOOT	—	—
						○		F/D	FRE	—
						○	DEF	FRE	ON *2	
							○*1	—	REC*1	—

*1: Depending on mode switch position
*2: Compressor is operated by thermo control amp.

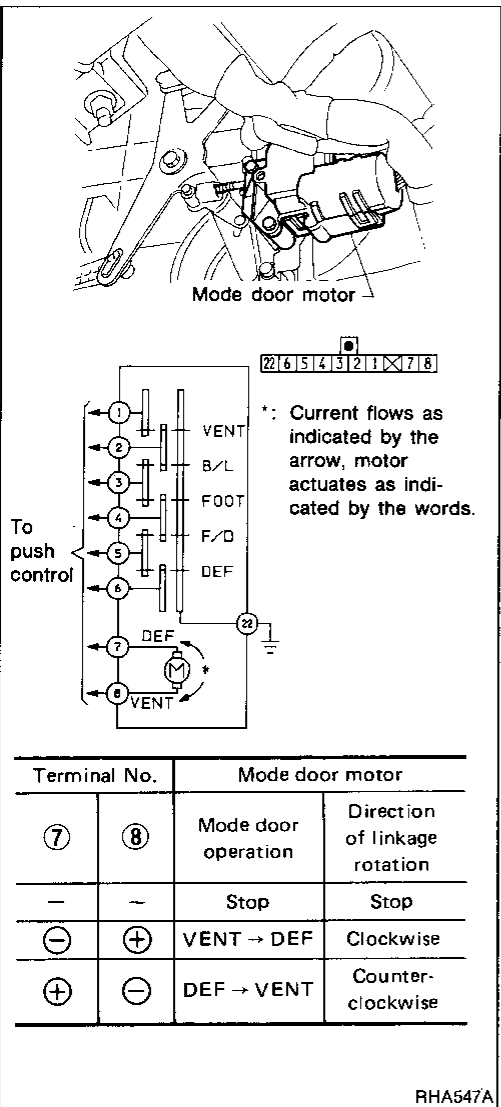
BR
ST
BF
HA
EL



Intake Door Motor

The intake door motor is installed on the front portion of the intake unit. Using a rod and link it opens and closes the intake door.

When the REC switch is ON (OFF), the ground line of the intake door motor is switched from terminal 11 to 9 (9 to 11). This causes the motor to start because the position switch contacts built into it are set to the current flow position. The contacts turn along with the motor. When they reach the non-current flow position, the motor will stop. The motor always turns in the same direction.

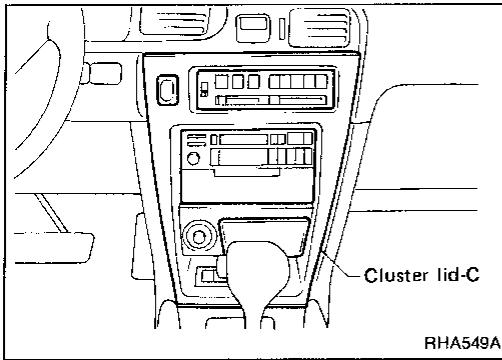


Mode Door Motor

The mode door motor is located on the left side of the heater unit. Through the side link it opens and closes the vent, foot and defroster door.

When one mode switch is pushed, the position switch built into it reads the corresponding mode to determine the direction of the motor rotation. As soon as the desired mode is set, the position switch stops the motor.

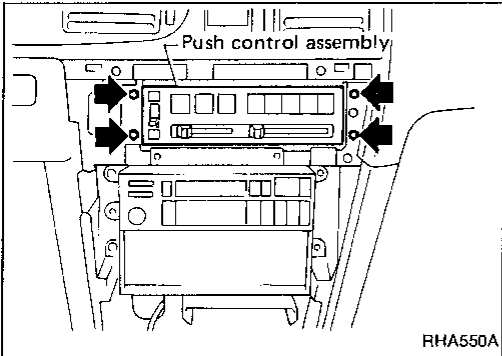
SYSTEM DESCRIPTION — Push Control



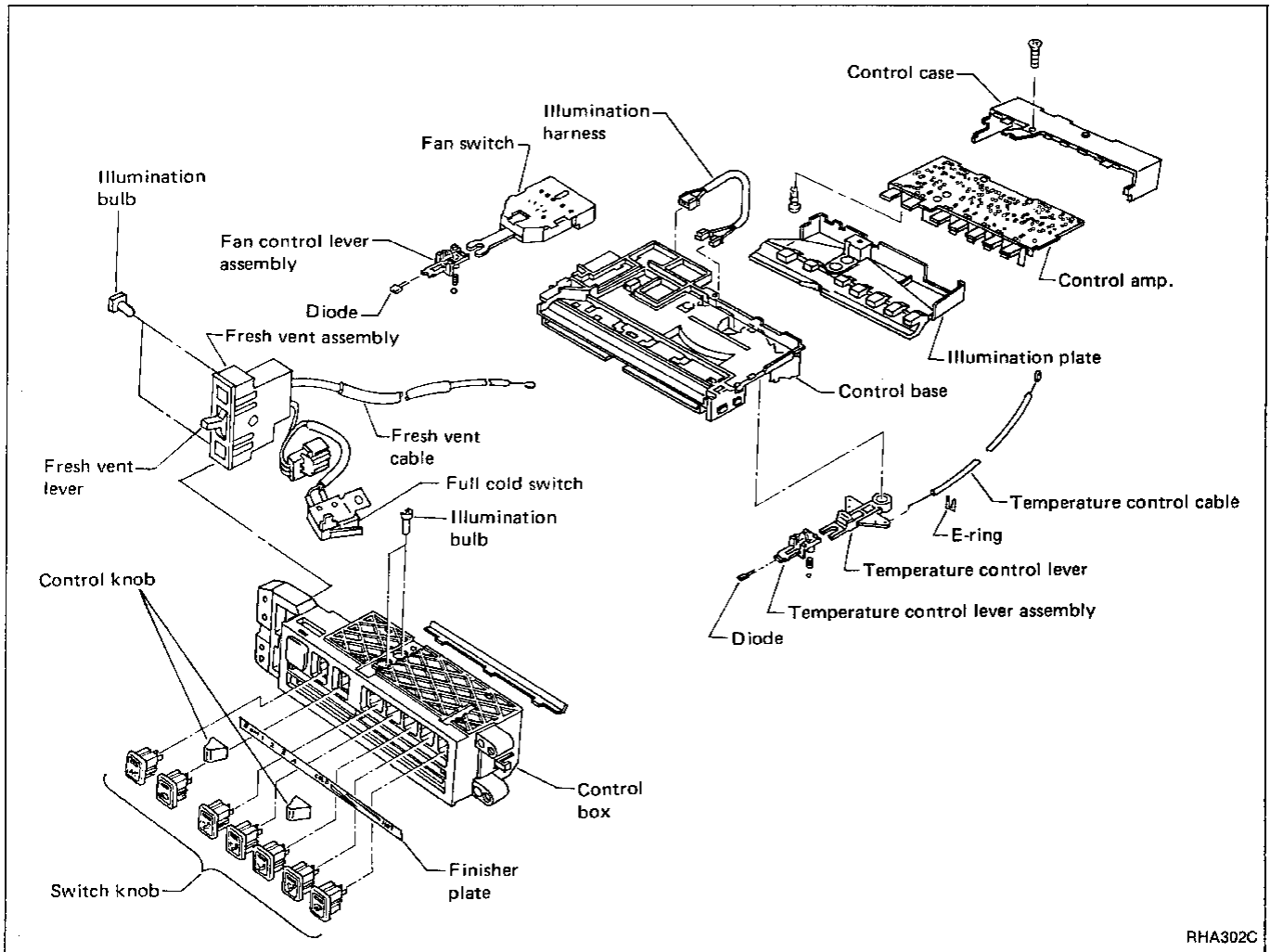
Removal and Installation

1. Remove cluster lid C.
2. Remove audio (radio).
3. Remove four screws of push control unit.
4. Remove temperature control cable.
5. Remove fresh vent door cable.
6. Disconnect push control unit harness connectors.
7. Remove push control unit.
8. Installation is in the reverse order of removal.

Refer to "Control Linkage Adjustment" for temperature control cable. (HA-69)

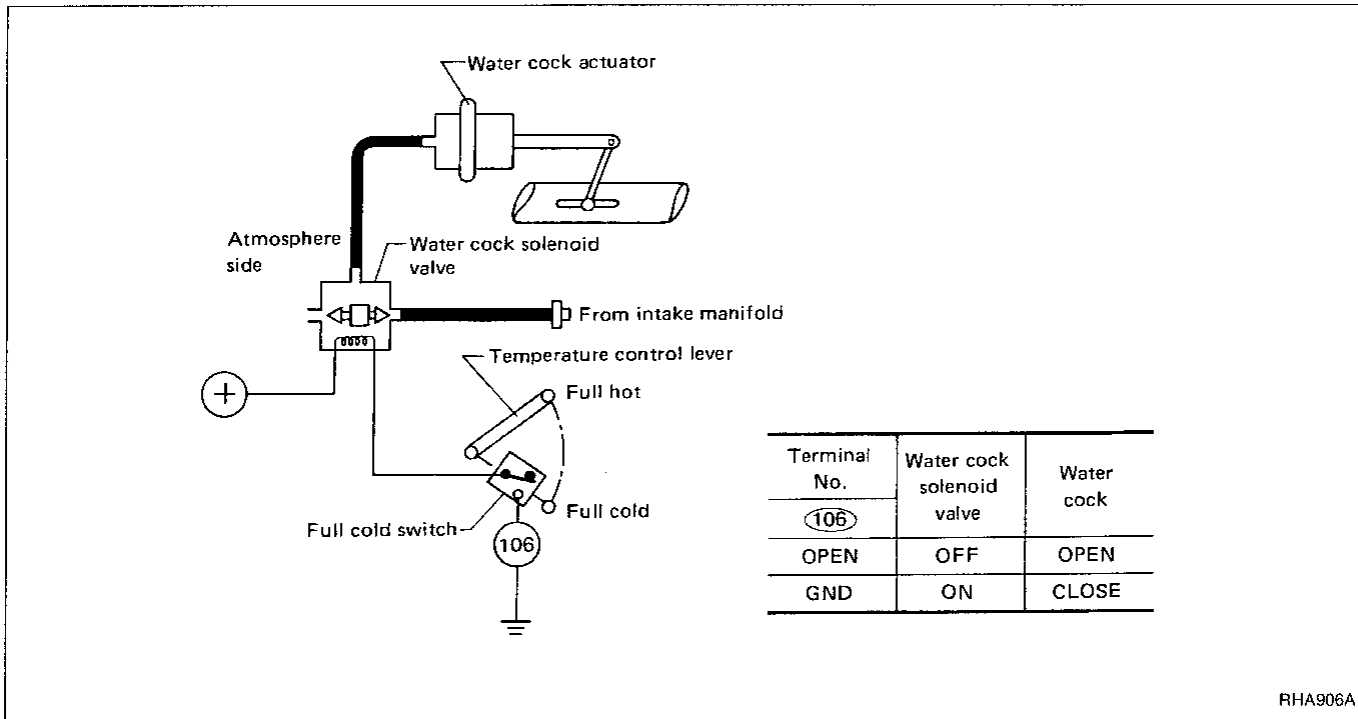


Overhaul — Push control unit assembly



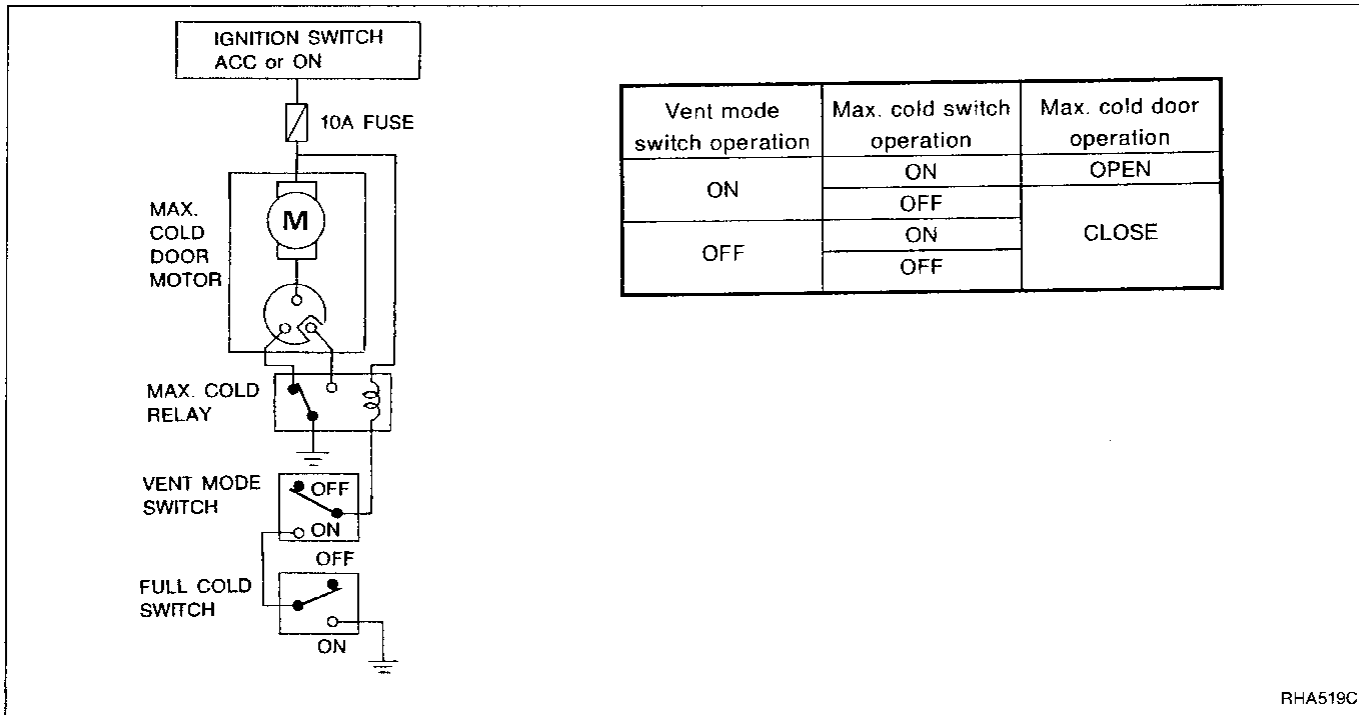
Water Cock Control System

Full cold switch built-in push control unit turns the solenoid valve "ON" when temperature control lever is set at full cold position, and closes the water cock.



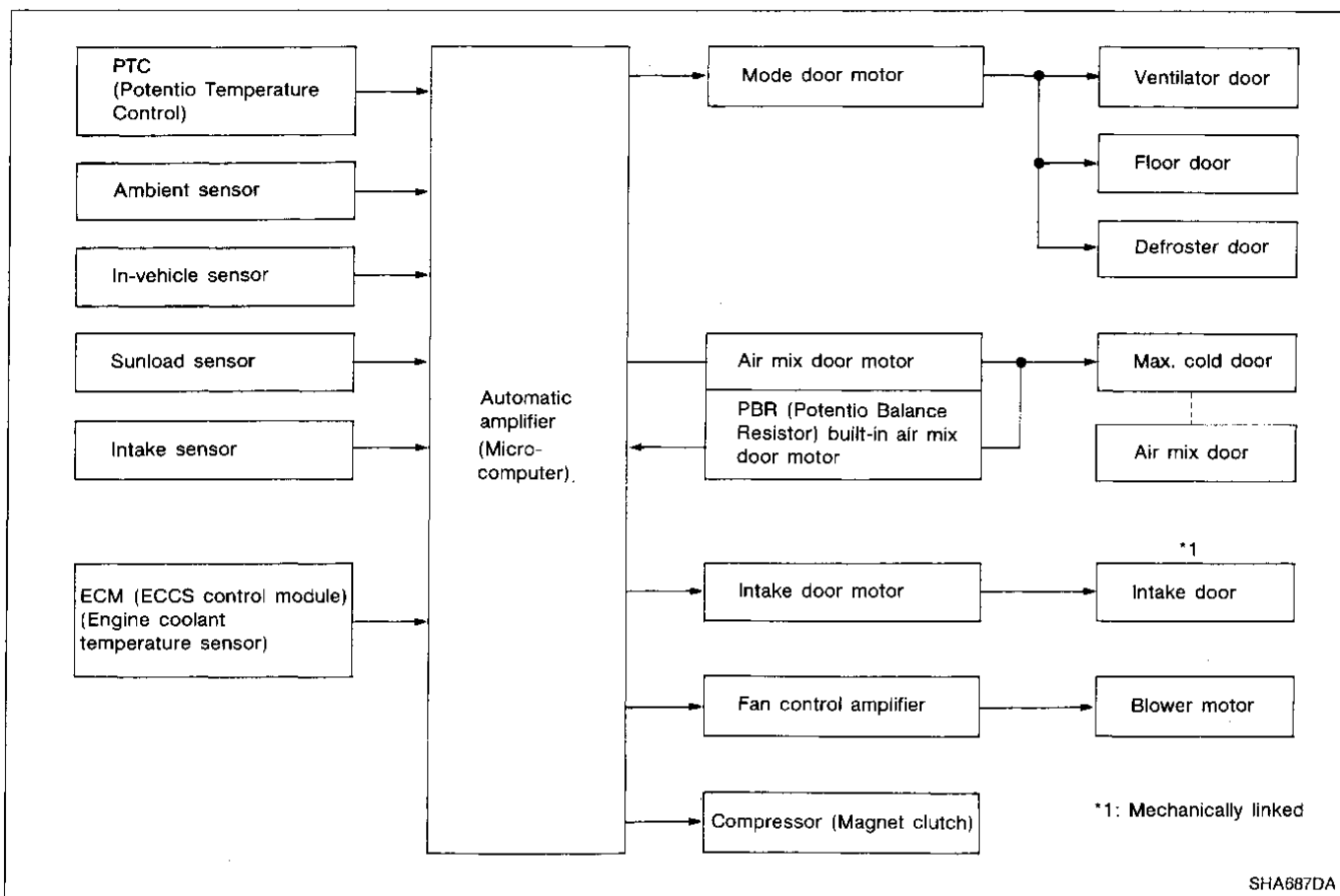
Max. Cold Door Control System

When the mode switch is set to VENT and the temperature control lever is set to the full cold position, the max. cold door motor opens the max. cold door.

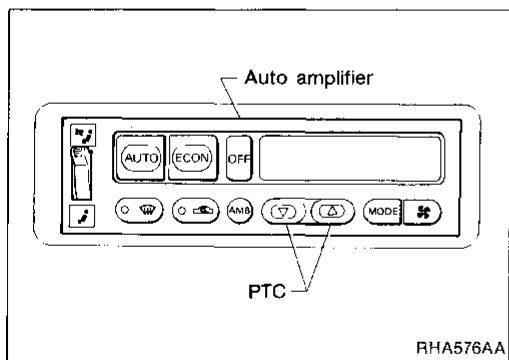


Overview of Control System

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



GI
MA
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EF &
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FE
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MT
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FA
RA



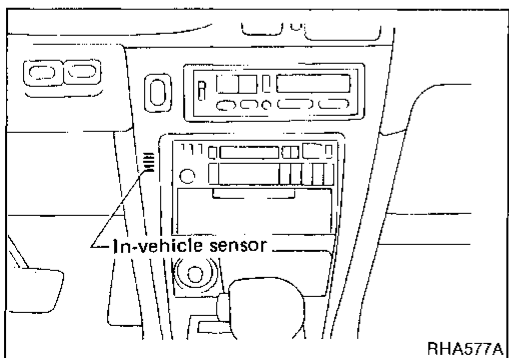
Control System Input Components

POTENTIO TEMPERATURE CONTROL (PTC)

The PTC is built into the auto amplifier. It can be set at an interval of 0.5°C (1.0°F) through both ▲ (HOT) and ▼ (COLD) control switches. Setting temperature is digitally displayed.

BR
ST
BF

HA



IN-VEHICLE SENSOR

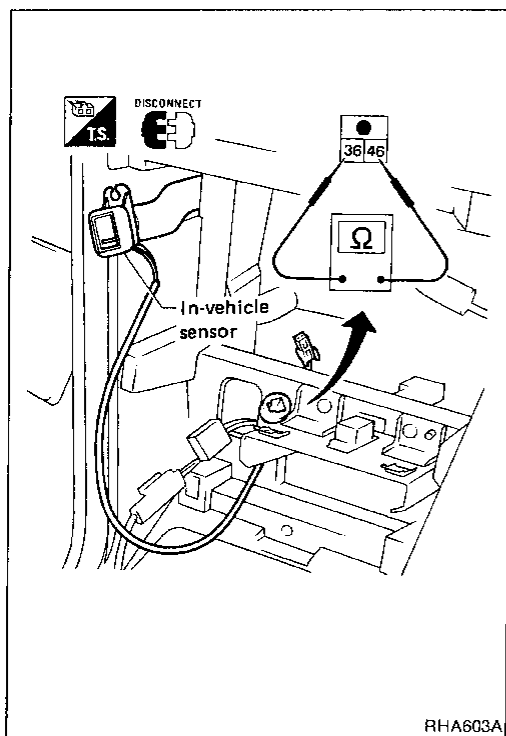
The in-vehicle sensor is attached to cluster lid-C. It converts variations in temperature of compartment air drawn from an aspirator into a resistance value which is then input into the auto amplifier.

EL
FDX

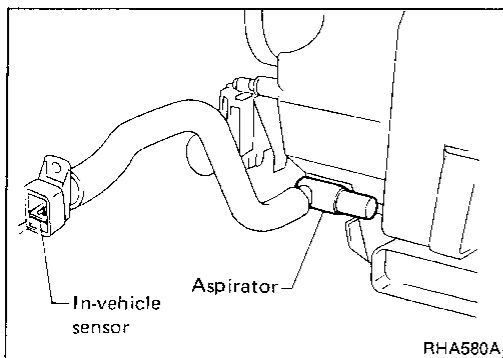
SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Input Components (Cont'd)

After disconnecting in-vehicle sensor harness connector, measure resistance between terminals ③⑥ and ④⑥ at sensor harness side, using the table below.

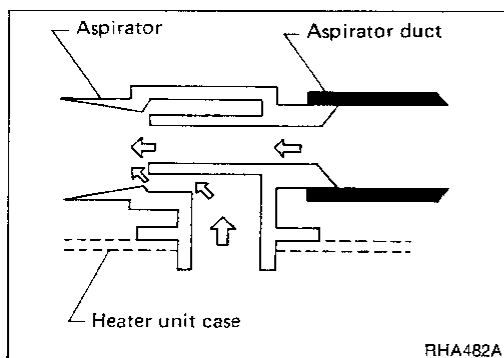


Temperature °C (°F)	Resistance kΩ
-35 (-31)	38.35
-30 (-22)	28.62
-25 (-13)	21.61
-20 (-4)	16.50
-15 (5)	12.73
-10 (14)	9.92
-5 (23)	7.80
0 (32)	6.19
5 (41)	4.95
10 (50)	3.99
15 (59)	3.24
20 (68)	2.65
25 (77)	2.19
30 (86)	1.81
35 (95)	1.51
40 (104)	1.27
45 (113)	1.07
50 (122)	0.91
55 (131)	0.77
60 (140)	0.66
65 (149)	0.57



ASPIRATOR

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

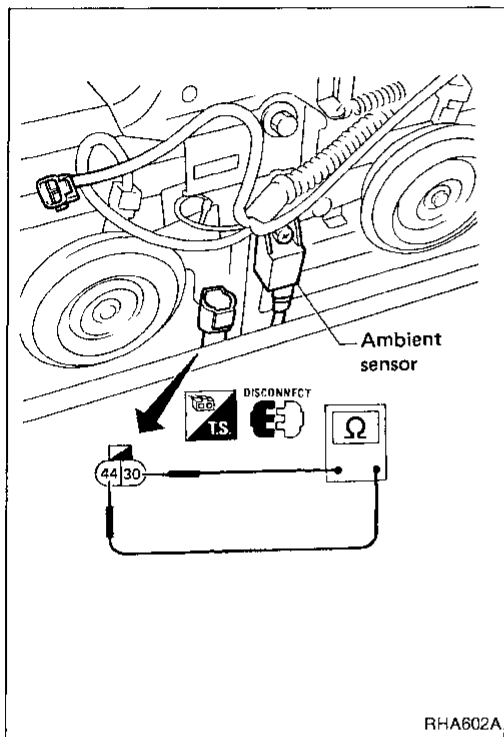
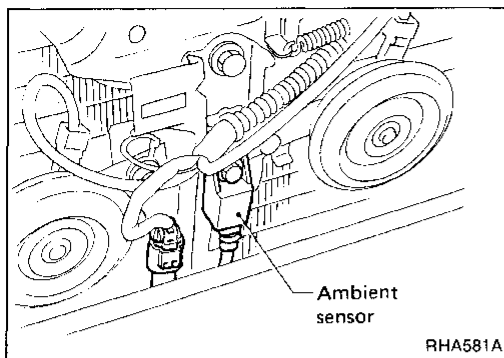


SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Input Components (Cont'd)

AMBIENT SENSOR

The ambient sensor is attached to hood lock stay. It detects ambient temperature and converts it into a resistance value which is then input to the auto amplifier.



After disconnecting ambient sensor harness connector, measure resistance between terminals ③① and ④④ at sensor harness side, using the table below.

Temperature °C (°F)	Resistance kΩ
-35 (-31)	38.35
-30 (-22)	28.62
-25 (-13)	21.61
-20 (-4)	16.50
-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
50 (122)	0.91
55 (131)	0.77
60 (140)	0.66
65 (149)	0.57

GI

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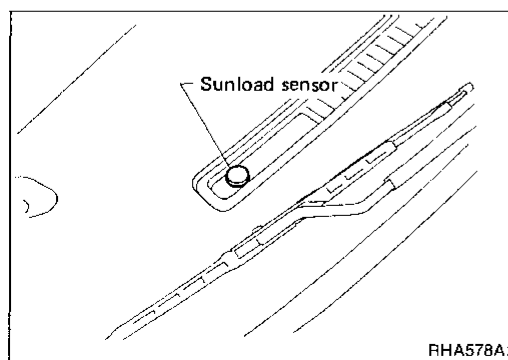
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SUNLOAD SENSOR

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

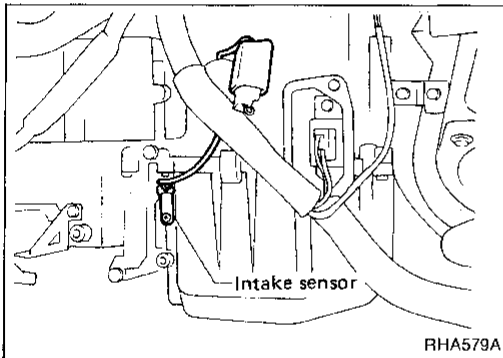
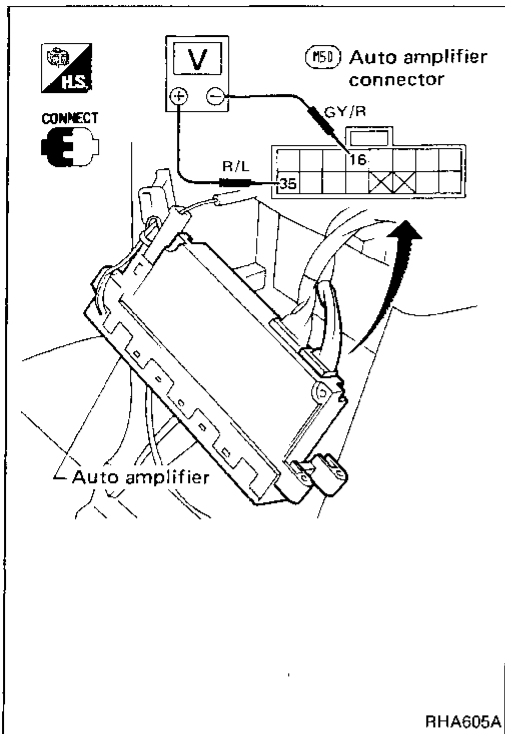
SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Input Components (Cont'd)

Measure voltage between terminals ⑩ and ⑤ at vehicle harness side, using the table below.

Input current mA	Output voltage V
0	5.0
0.1	4.1
0.2	3.1
0.3	2.2
0.4	1.3
0.5	0.4

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



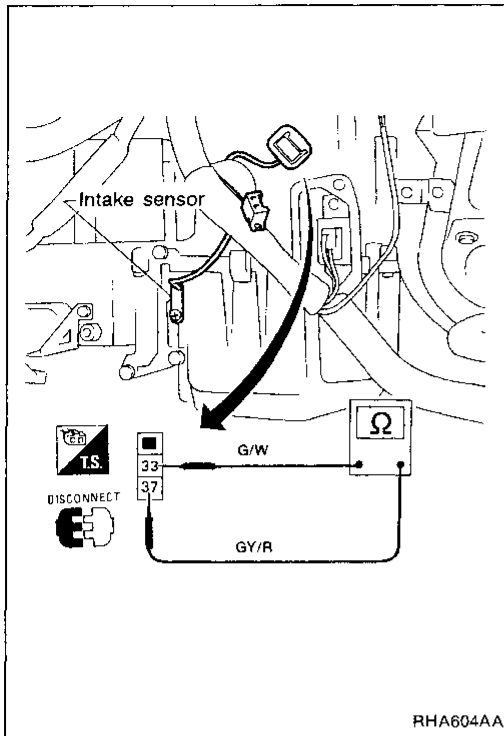
INTAKE SENSOR

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 amplifier.

SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Input Components (Cont'd)

After disconnecting intake sensor harness connector, measure resistance between terminals 33 and 37 at sensor harness side, using the table below.



Temperature °C (°F)	Resistance kΩ
-35 (-31)	38.35
-30 (-22)	28.62
-25 (-13)	21.61
-20 (-4)	16.50
-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
50 (122)	0.91
55 (131)	0.77
60 (140)	0.66
65 (149)	0.57

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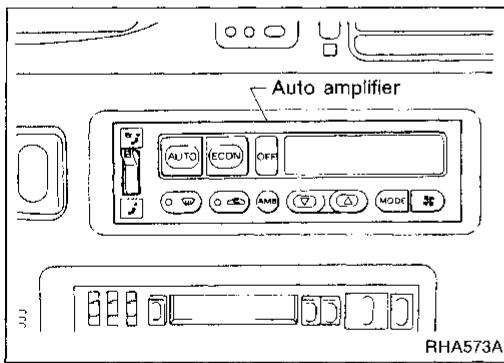
EL
DX

Control System Automatic Amplifier (Auto amp.)

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.



SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Automatic Amplifier (Auto amp.) (Cont'd)

AMBIENT TEMPERATURE INPUT PROCESS

The automatic amplifier includes a "processing circuit" for the ambient sensor input. When the temperature detected by the ambient sensor increases quickly, the processing circuit allows the auto amp. to recognize an ambient temperature increase of only 0.33°C (0.6°F) per 100 seconds.

As an example, consider stopping for a cup of coffee after high speed driving. Even though the actual ambient temperature has not changed, the temperature detected by the ambient sensor will increase because heat radiated from the engine compartment can radiate to the front grille area (where the ambient sensor is located).

SUNLOAD INPUT PROCESS

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 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.

Control System Output Components

AIR MIX DOOR CONTROL (Automatic temperature control)

Component parts

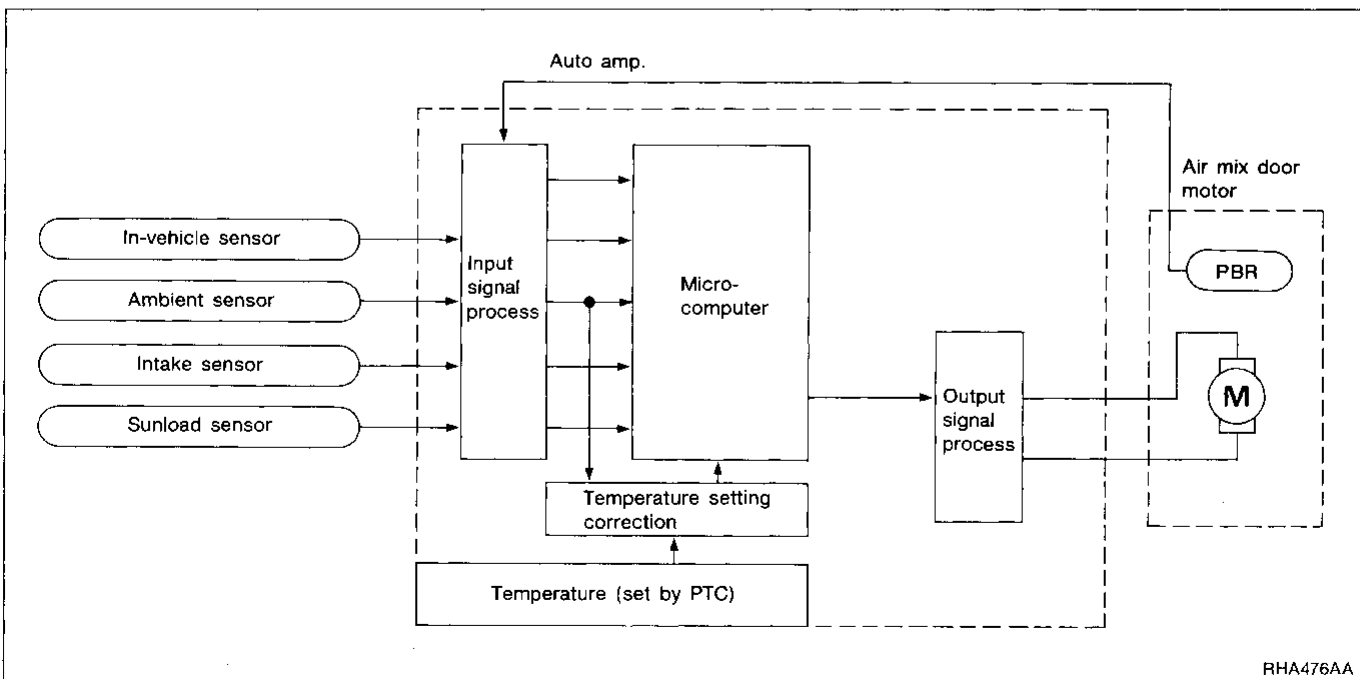
Air mix door control system components are:

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

System operation

Temperature set by Potentio Temperature Control (PTC) is compensated through setting temperature correction circuit to determine target temperature.

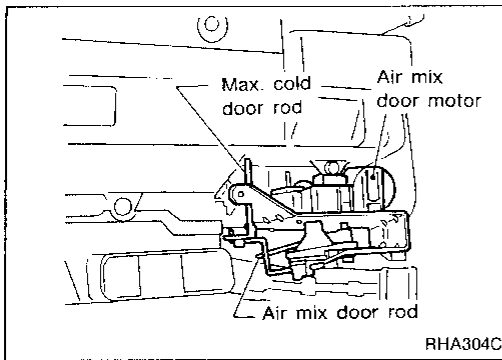
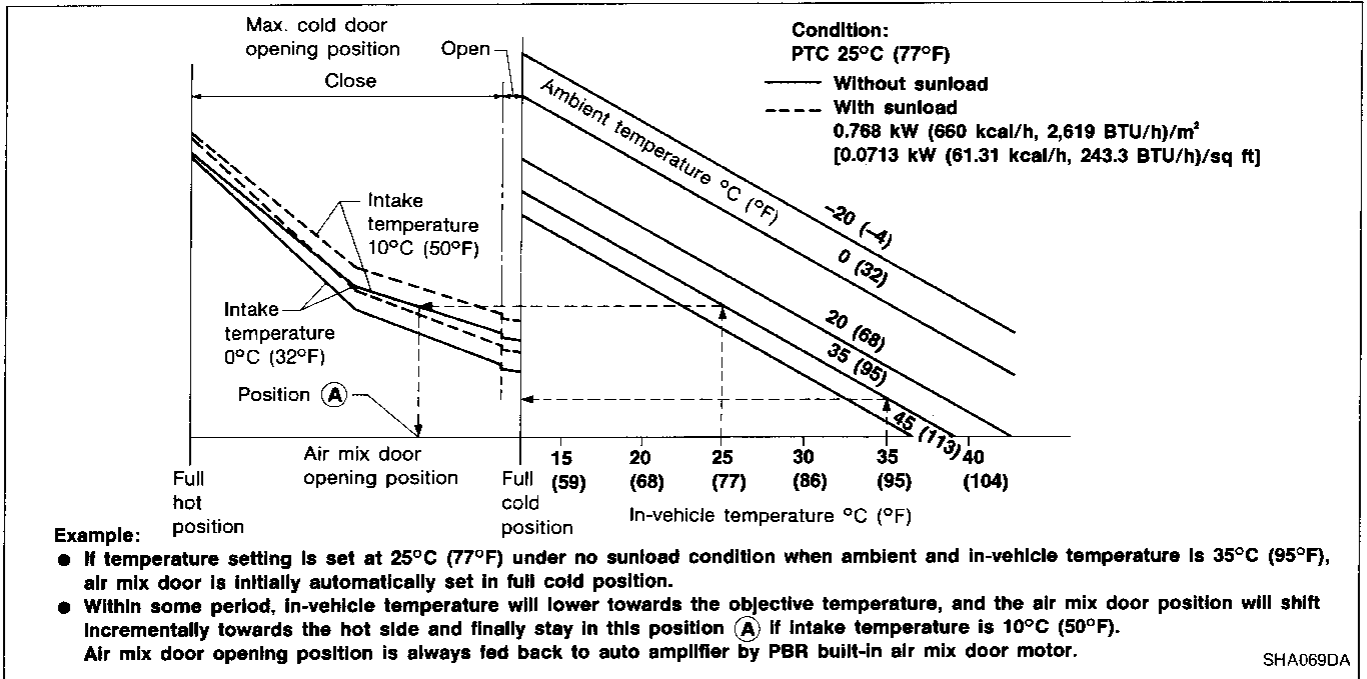
Auto amplifier will operate air mix door motor to set air conditioning system in HOT or COLD position, depending upon relationship between conditions (target temperature, sunload, in-vehicle temperature and ambient temperature) and conditions (air mix door position and intake air temperature).



SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Output Components (Cont'd)

Air mix door control specification



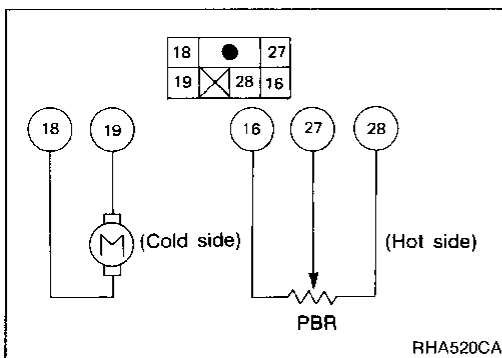
AIR MIX DOOR MOTOR

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

The max. cold door is operated by the air mix door motor. This motor operates both the max. cold door and the air mix door (by mechanical linkage).

When the air mix door is in the full cold position and the discharge mode is vent, the max. cold door is open (in auto mode, the discharge mode is always vent when the mix door is at full cold).

When a discharge mode other than vent is selected by manual mode control (and the air mix door is in the full cold position), the max. cold door is closed by the air mix door motor.



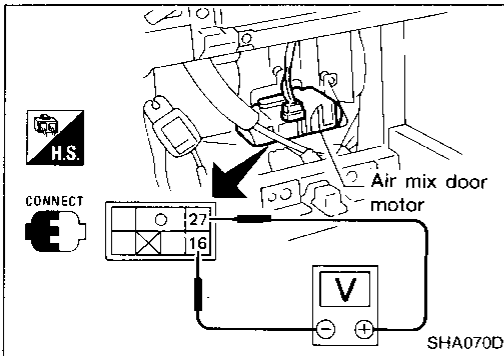
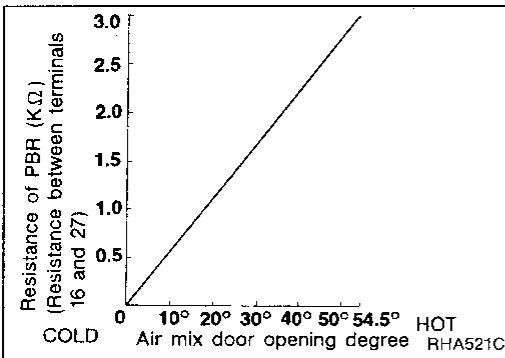
Air mix door operation

18	19	Air mix door operation	Direction of lever movement
⊕	⊖	COLD → HOT	Clockwise (Toward passenger compartment)
-	-	STOP	STOP
⊖	⊕	HOT → COLD	Counterclockwise (Toward engine compartment)

SYSTEM DESCRIPTION — Auto Air Conditioner

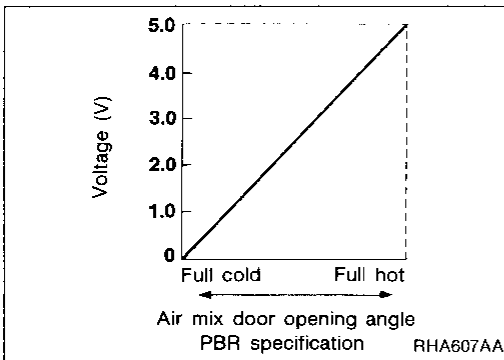
Control System Output Components (Cont'd)

Characteristic of PBR



PBR

Measure voltage between terminals ②⑦ and ①⑥ at vehicle harness side.

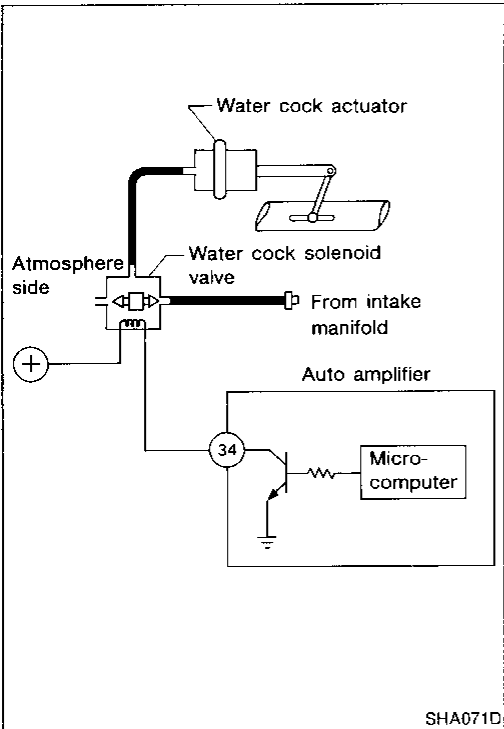


Ignition switch: ON

- Ensure tester pointer deflects smoothly when PTC is moved from 18°C (65°F) to 32°C (85°F) and vice versa.

WATER COCK CONTROL

The water cock control turns the solenoid valve "ON" when judging "Full cold" position from target temperature determined by the air mix door control, and closes the water cock.



Terminal No.	Water cock solenoid valve	Water cock
③④		
OPEN	OFF	OPEN
GND	ON	CLOSE

SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Output Components (Cont'd)

OUTLET DOOR CONTROL

Component parts

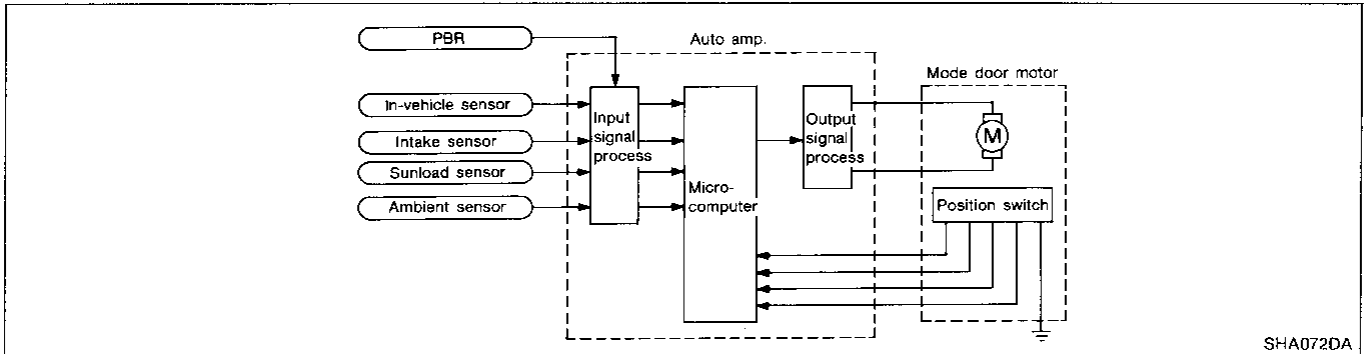
Outlet door control system components are:

- 1) Auto amplifier
- 2) Mode door motor
- 3) PBR
- 4) In-vehicle sensor
- 5) Ambient sensor
- 6) Sunload sensor
- 7) Intake sensor

System operation

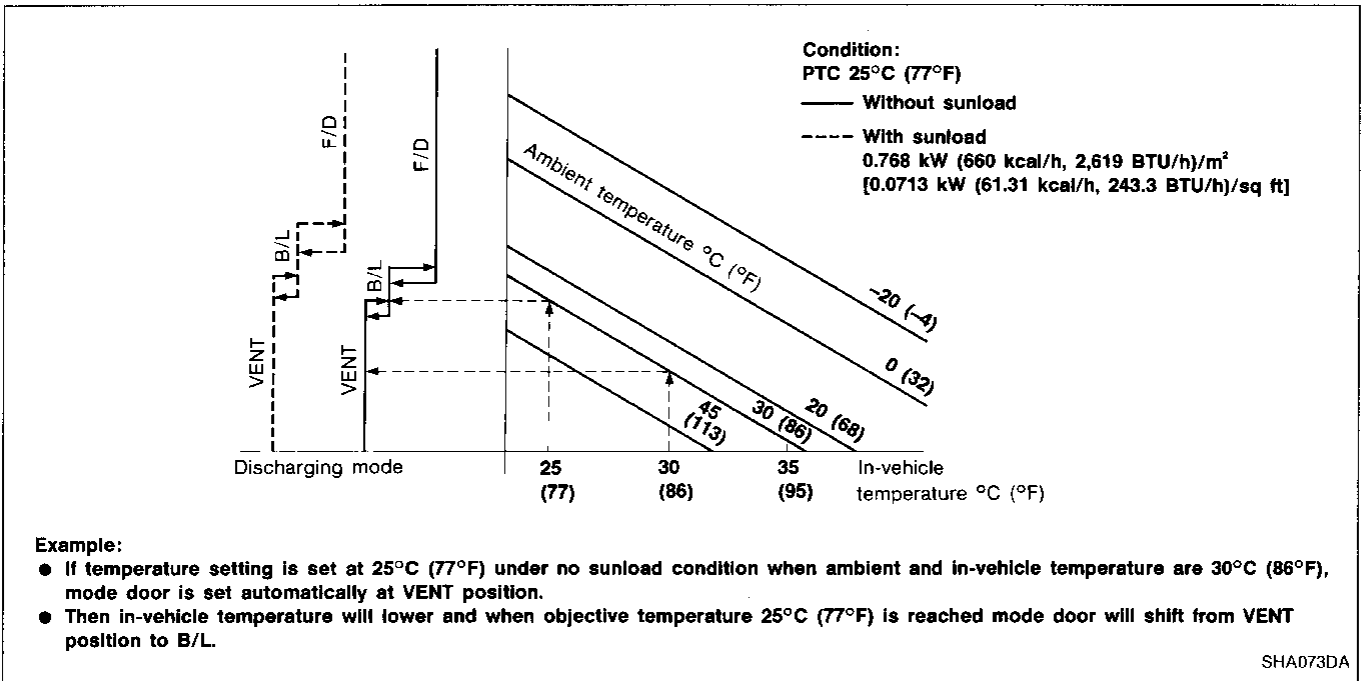
The auto amplifier computes the air outlet conditions according to the ambient temperature and the in-vehicle temperature. The computed outlet conditions are then corrected for sunload to determine the air outlets through which air is discharged into the passenger compartment.

When the air outlets is automatically selected to be FOOT/DEF, the actual outlet will be either F/D 1 or F/D 2 depending on the target temperature and the ambient temperature.

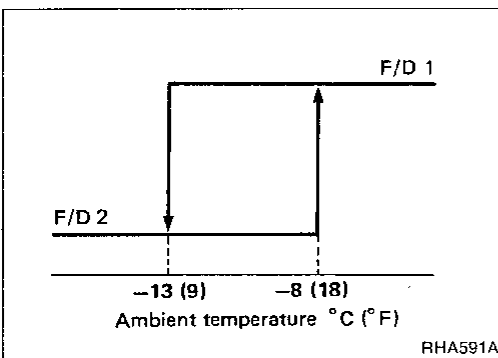


SHA072DA

Outlet door control specification



SHA073DA



RHA591A

FOOT/DEF mode specification

When the air outlet is automatically selected as F/D when the target temperature is high, the air outlet is fixed at F/D1.

When the target temperature is low, the air outlet will be either F/D 1 or F/D2 depending on the ambient temperature.

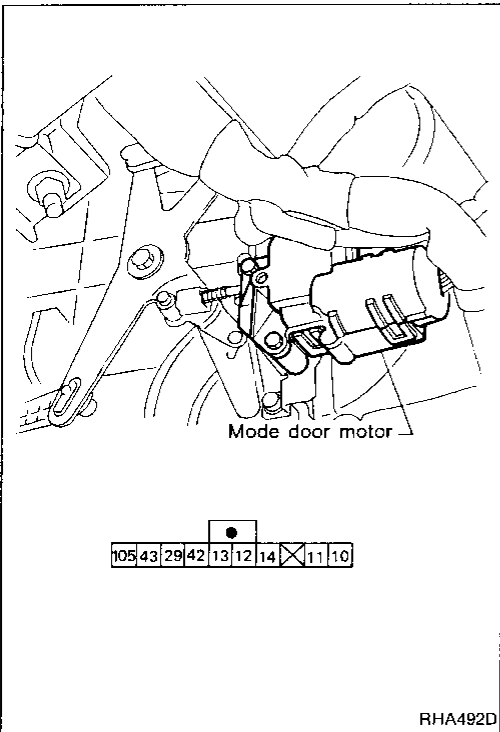
- When the ambient temperature decreases to -13°C (9°F), air outlet is changed from F/D1 to F/D2.
- When the ambient temperature increases to -8°C (18°F), air outlet is changed from F/D2 to F/D1.

SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Output Components (Cont'd)

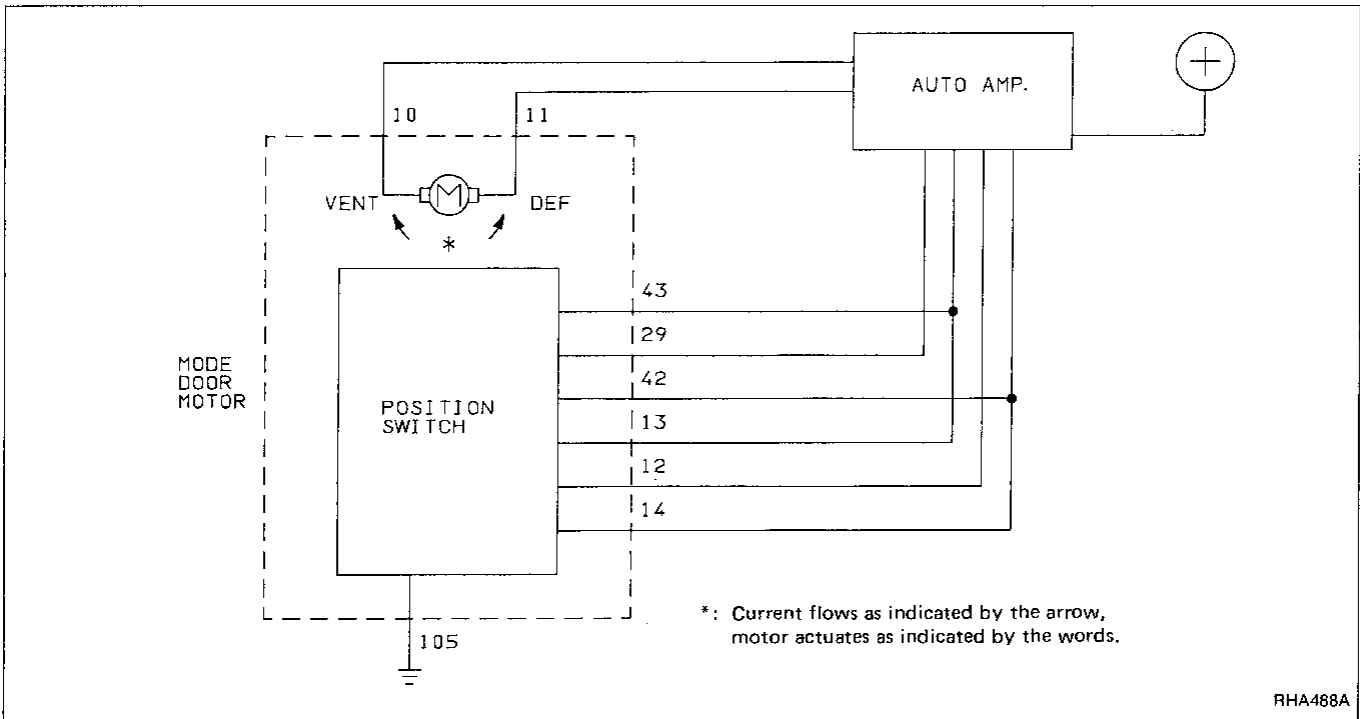
MODE DOOR MOTOR

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



RHA492D

10	11	Mode door operation	Direction of side link rotation
⊕	⊖	VENT → DEF	Clockwise
-	-	STOP	STOP
⊖	⊕	DEF → VENT	Counterclockwise



RHA488A

SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Output Components (Cont'd)

INTAKE DOOR CONTROL

Components parts

Intake door control system components are:

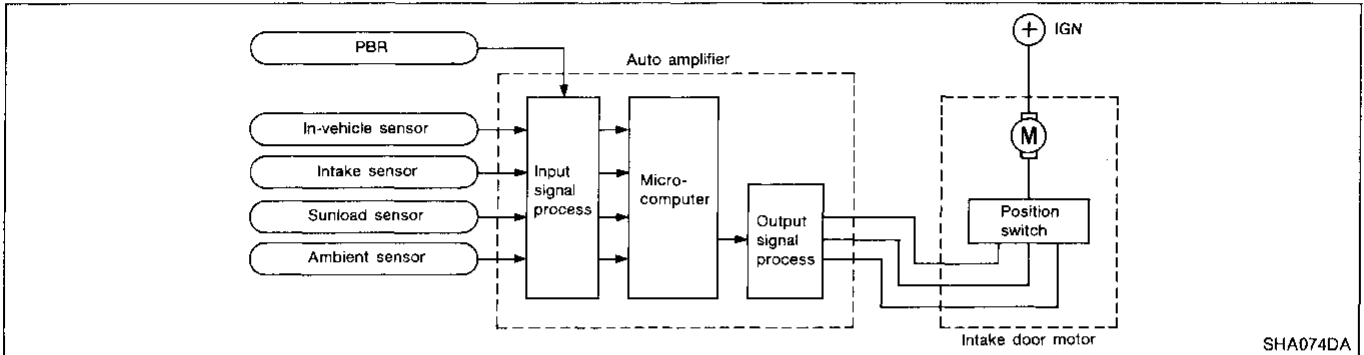
- 1) Auto amplifier
- 2) Intake door motor
- 3) PBR
- 4) In-vehicle sensor
- 5) Ambient sensor

6) Sunload sensor

7) Intake sensor

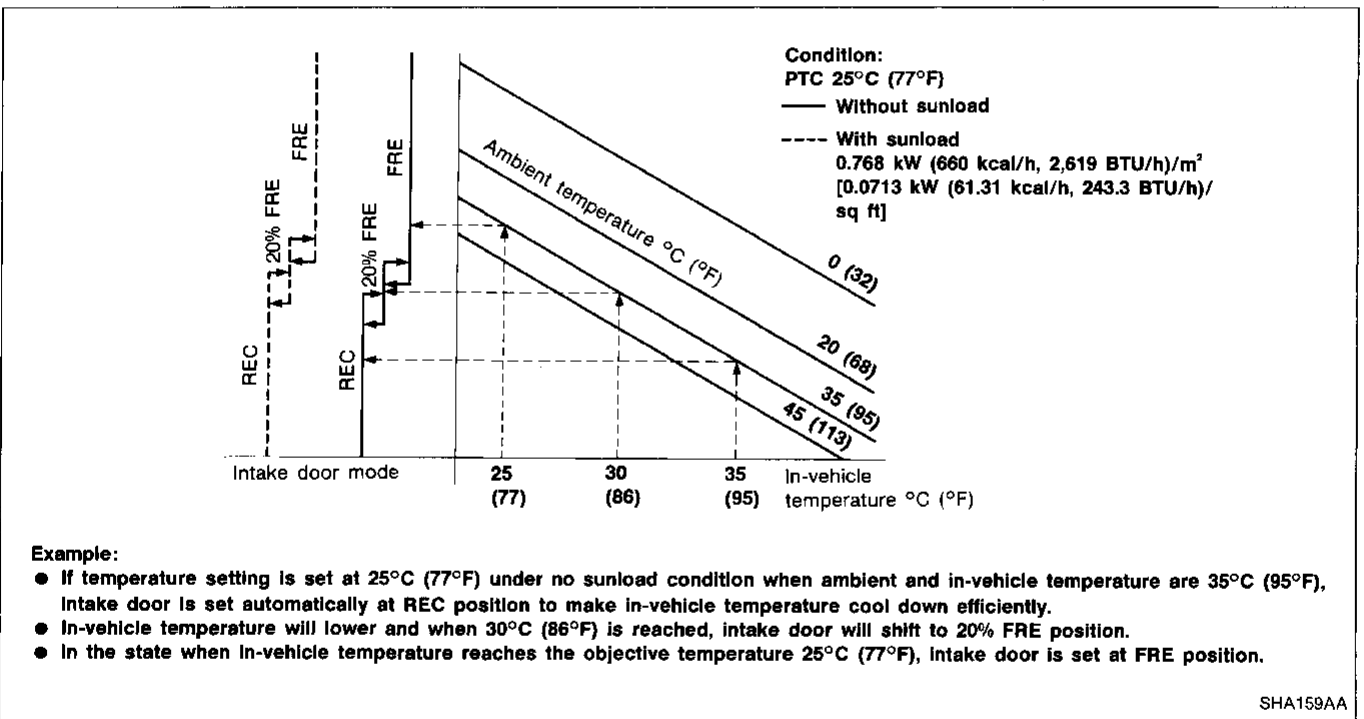
System operation

The intake door control determines intake door position based on the ambient temperature and the in-vehicle temperature. When the ECON, DEF, or OFF buttons are pushed, the auto amplifier sets the intake door at the "Fresh" position.



SHA074DA

Intake door control specification



Example:

- If temperature setting is set at 25°C (77°F) under no sunload condition when ambient and in-vehicle temperature are 35°C (95°F), intake door is set automatically at REC position to make in-vehicle temperature cool down efficiently.
- In-vehicle temperature will lower and when 30°C (86°F) is reached, intake door will shift to 20% FRE position.
- In the state when in-vehicle temperature reaches the objective temperature 25°C (77°F), intake door is set at FRE position.

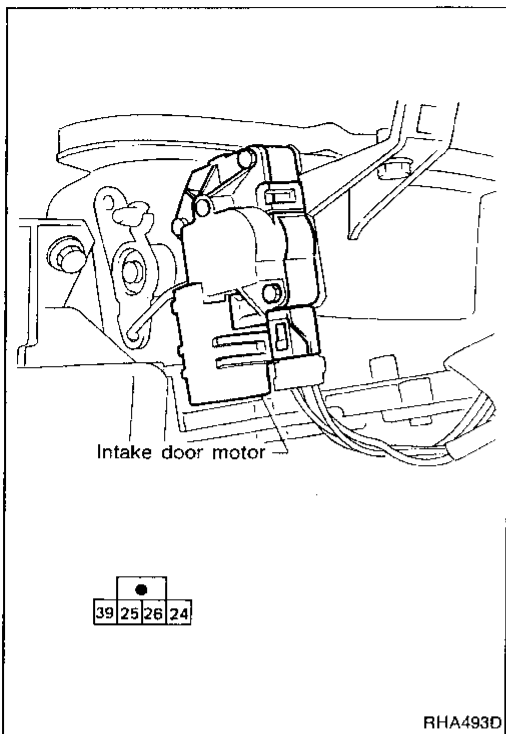
SHA159AA

SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Output Components (Cont'd)

INTAKE DOOR MOTOR

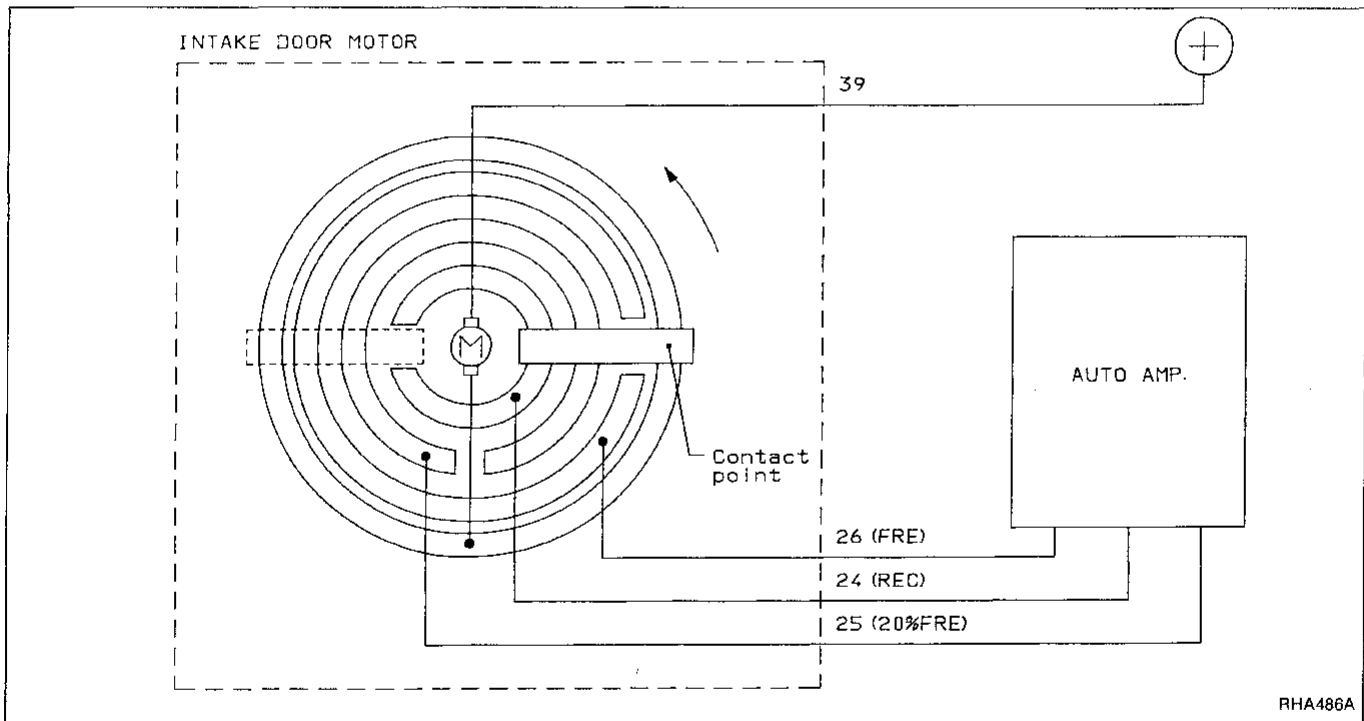
The intake door motor is attached to the heater unit. It rotates so that air is drawn from inlets set by the auto amplifier. Motor rotation is conveyed to a lever which activates the intake door.



24	25	26	Intake door operation	Direction of lever rotation
CL	OP	OP	REC	Counter-clockwise
OP	CL	OP	20% FRE	
OP	OP	CL	FRE	

OP: Open
CL: Close

RHA493D



RHA486A

Control System Output Components (Cont'd)

FAN SPEED CONTROL

Component parts

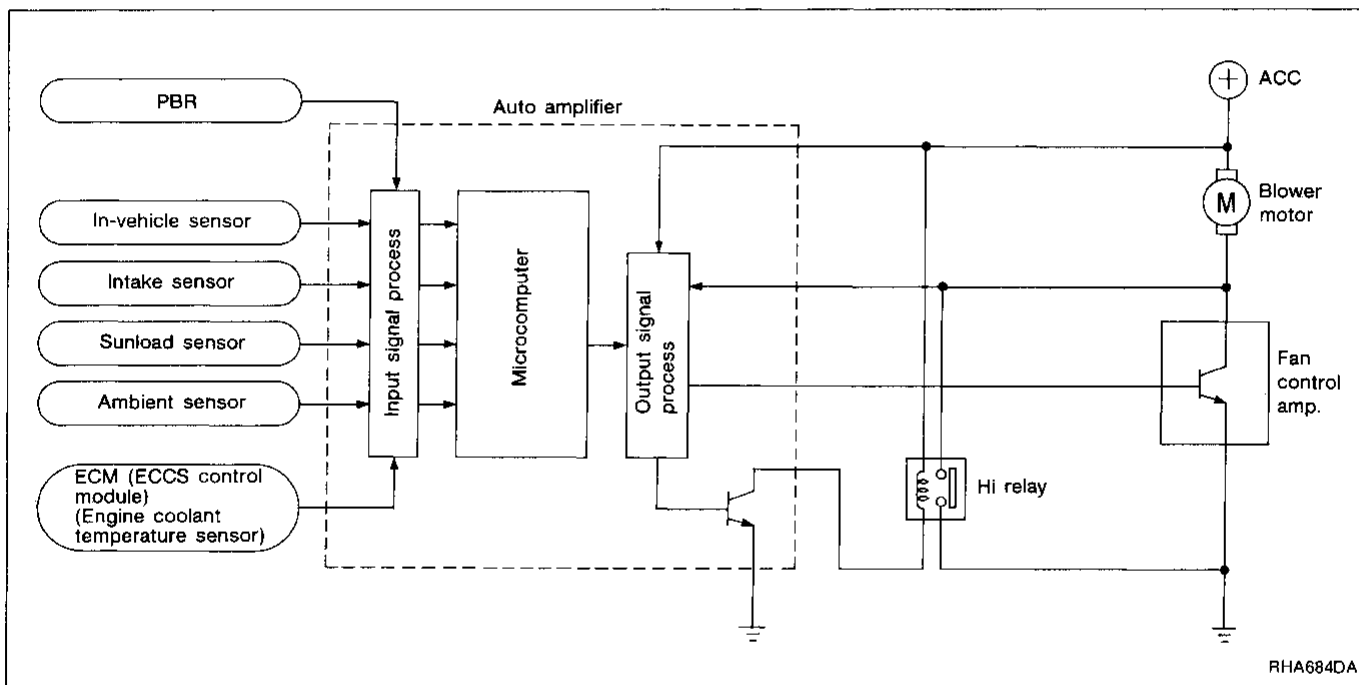
Fan speed control system components are:

- 1) Auto amplifier
- 2) Fan control amplifier
- 3) PBR
- 4) In-vehicle sensor
- 5) Ambient sensor
- 6) Sunload sensor
- 7) Intake sensor
- 8) Hi relay
- 9) ECM (ECCS control module) (Engine coolant temperature sensor)

System operation

AUTOMATIC MODE

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, and ambient sensor. The blower motor applied voltage ranges from approximately 4.5 volts (lowest speed) to 12 volts (highest speed). To control blower speed (in the range of 4.5V to 10.5V), the automatic amplifier supplies a signal to the fan control amplifier. Based on this signal, the fan control amplifier controls the current flow from the blower motor to ground. If the computed blower voltage (from the automatic amplifier) is above 10.5 volts, the high blower relay is activated. The high blower relay provides a direct path to ground (bypassing the blower amplifier), and the blower motor operates at high speed.



STARTING FAN SPEED CONTROL

Start up from "COLD SOAK" condition (Automatic mode)

In a cold start up condition where the engine coolant temperature is below 50°C (122°F) and the ambient temperature is below 15°C (59°F), the blower will not operate for a short period of time (up to 150 seconds). The exact start delay time varies depending on the ambient and engine coolant temperature.

In the most extreme case (very low ambient) the blower starting delay will be 150 seconds. After this delay, the blower will operate at low speed until the engine coolant temperature rises above 50°C (122°F), at which time the blower speed will increase to the objective speed.

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 5 seconds or less (actual time depends on the objective blower speed).

SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Output Components (Cont'd)

BLOWER SPEED COMPENSATION

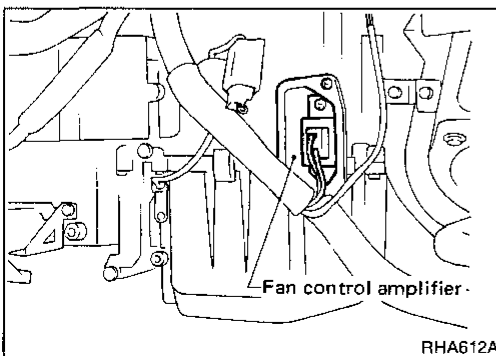
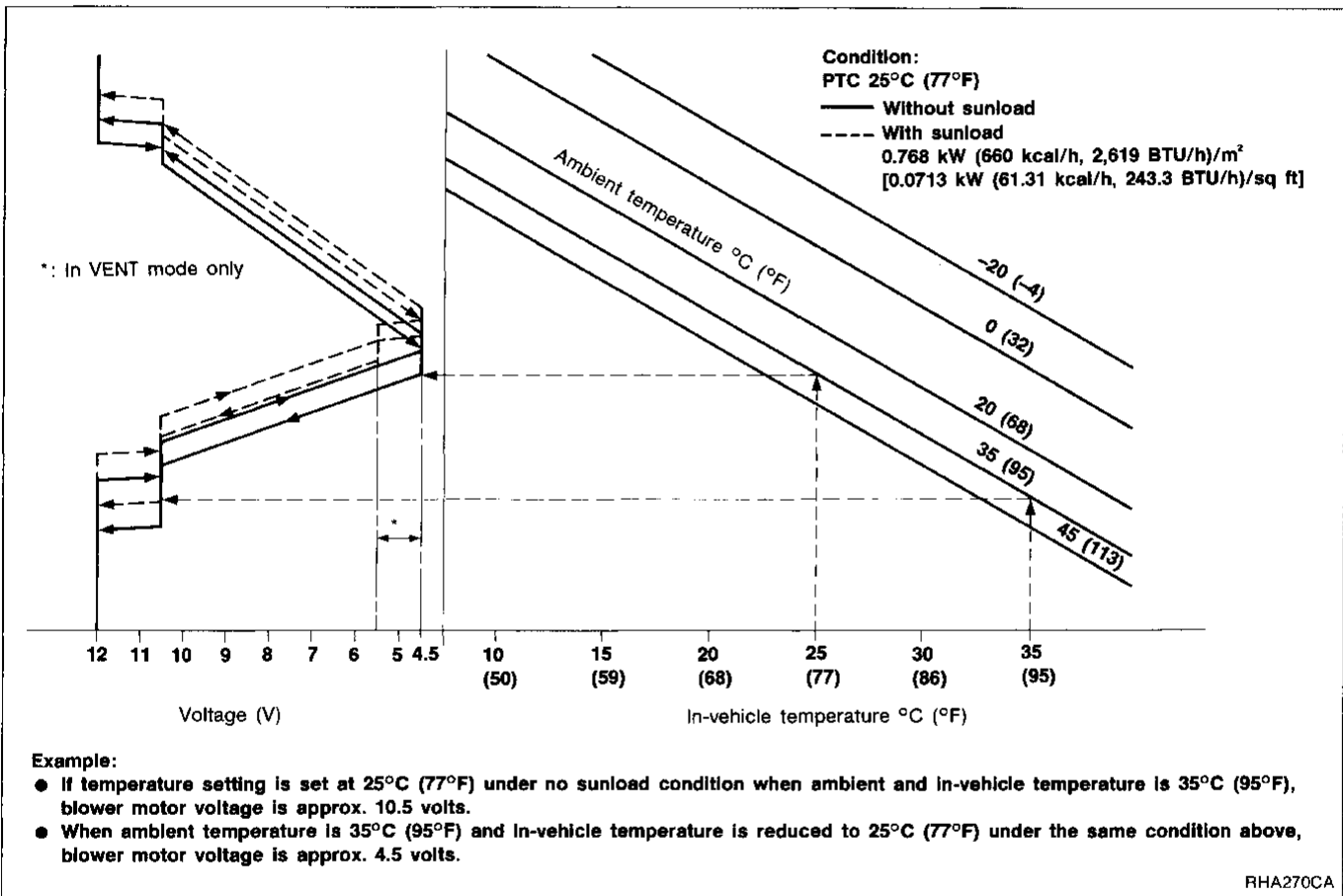
Sunload

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. 5.5V). During low or no sunload conditions, the low speed will drop to "low" low speed (approx. 4.5V).

Ambient

When the ambient temperature is in the "moderate" range [10 to 15°C (50 to 59°F)], the computed blower voltage will be compensated (reduced) by up to 6.0V (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 to 10°C (32 to 50°F) and 15 to 20°C (59 to 68°F)], the amount of compensation (for a given blower speed) varies depending on the ambient temperature.

Fan speed control specification

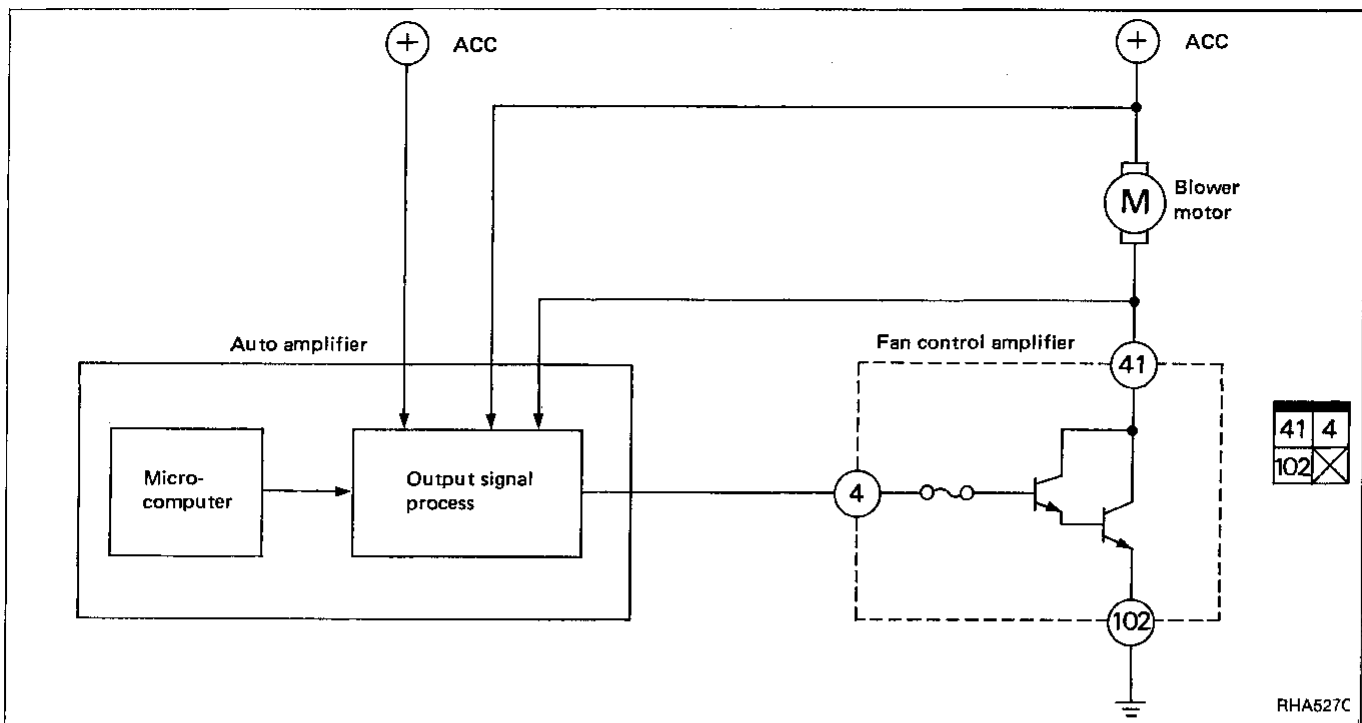


FAN CONTROL AMPLIFIER

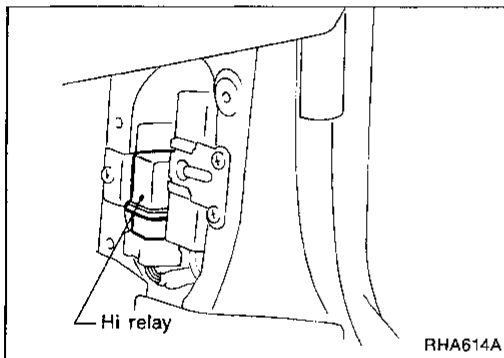
The fan control amplifier is located on the cooling unit. It amplifies a 12-step base current flowing from the auto amplifier to change the blower speed within the range of 4.5V to 10.5V. Above 10.5 volts, the high relay applies a direct ground to the blower motor.

SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Output Components (Cont'd)



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HI RELAY

The Hi relay is located on the intake unit. It receives a signal from the auto amplifier to operate the blower motor at high speed.

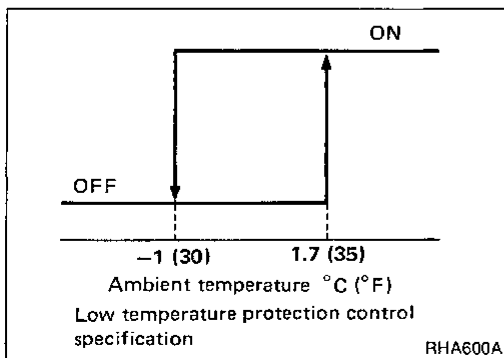
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MAGNET CLUTCH CONTROL

The ECM controls compressor operation using inputs from the throttle position sensor and auto amplifier.

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HA



Low temperature protection control

The auto amplifier will signal the ECM to turn the compressor "ON" or "OFF" based on the signal supplied to the auto amplifier by the ambient temperature sensor.

EL
IDX

Acceleration cut control

The ECM will turn the compressor "ON" or "OFF" based on the signal from the throttle position sensor.

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

COMPRESSOR

Model	ZEXEL make DKS-16H
Type	Swash plate
Displacement cm ³ (cu in)/Rev.	167 (10.19)
Cylinder bore x stroke mm (in)	37.0 x 25.8 (1.457 x 1.016)
Direction of rotation	Clockwise (viewed from drive end)
Drive belt	Poly V

LUBRICATION OIL

Model	ZEXEL make DKS-16H
Type	Nissan A/C System Oil Type S
Capacity ml (US fl oz, Imp fl oz)	
Total in system	200 (6.8, 7.0)
Compressor (Service parts) charging amount	200 (6.8, 7.0)

REFRIGERANT

Type	HFC-134a (R-134a)
Capacity kg (lb)	0.85 - 0.95 (1.87 - 2.09)

Inspection and Adjustment

ENGINE IDLING SPEED (When A/C is ON.)

- Refer to SERVICE DATA AND SPECIFICATIONS in EF & EC section.

BELT TENSION

- Refer to Checking Drive Belts (MA section).

COMPRESSOR

Model	DKS-16H
Clutch disc-pulley clearance mm (in)	0.3 - 0.6 (0.012 - 0.024)