

HEATER & AIR CONDITIONER

SECTION HA

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When you read wiring diagrams:

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

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

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PRECAUTIONS

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
 PRECAUTION
 - 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.

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

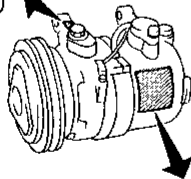
RHA198E

PARTS IDENTIFICATION

1. Compressor label

R134a label

R134a用
USE FOR R134a



CALSONIC	
TYPE	DKV-14C
PART NO.	_____
SERI. NO.	_____
REFRIG.	R-134a
OIL	DH-PR
	200cm ³ (200cc)
	(NISSAN PART No. KLH -PAGRO)
MIN. TEST PRESSURE	
	LOW SIDE 1.6MPa (15kgf/cm ² G)
	HIGH SIDE 3.0MPa (30kgf/cm ² G)
MFD.	ZEXEL CORPORATION
	MADE IN JAPAN

2. Other component parts label

R134a label

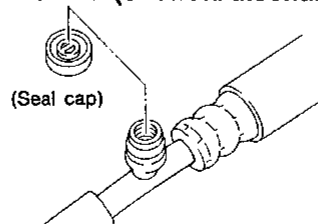
R134a用
USE FOR R134a

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 (R-134a) system. Those for the CFC-12 (R-12) system are different in size and configuration. Refer to "PREPARATION". (HA-12)

RHA254DA

PRECAUTIONS

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 lubricant vapor or mist. Exposure may irritate eyes, nose and throat. To remove R-134a from the A/C system, use service equipment certified to meet the requirements of SAE J2210 (R-134a recycling equipment) or J2209 (R-134a recovery equipment). If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from refrigerant and lubricant manufacturers.
 - e: Do not allow lubrication oil (Nissan A/C System Oil Type R) to come in contact with styrofoam parts. Damage may result.

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.

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PRECAUTIONS

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:

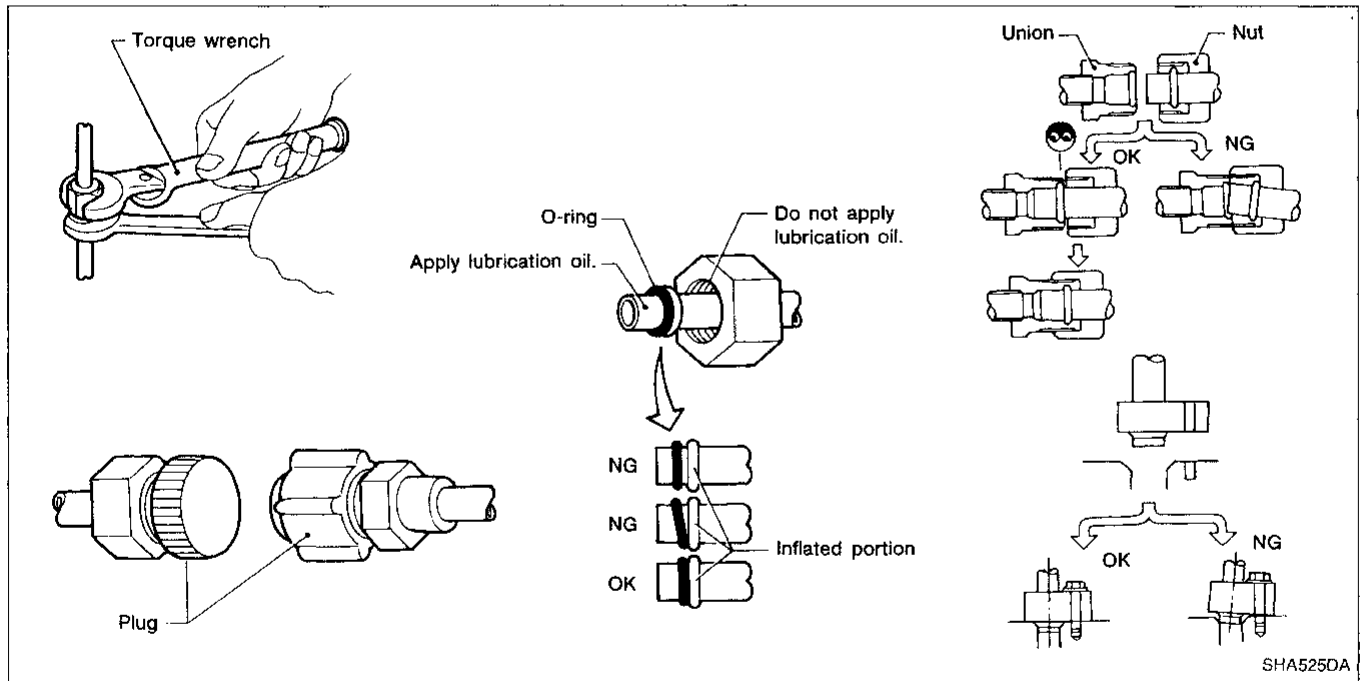
When replacing or cleaning refrigerant cycle components, observe the following.

- 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 R

Part number: KLH00-PAGR0

- 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.



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 or repairing 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.
- When the compressor magnet clutch has been replaced, be sure to check the magnet clutch for normal operation by applying voltage to the clutch.

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Introduction — Auto Air Conditioner

The automatic temperature control (ATC) system provides automatic regulation of the discharged air temperature and the discharged air volume (Blower speed).

The air outlet door, intake door and compressor magnet clutch are controlled by the manual operation of each switch.

Features — Auto Air Conditioner

Air mix door control (Automatic temperature 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 air mix door position will depend on: Ambient temperature, in-vehicle temperature, amount of sunload, set temperature and A/C switch signals.

Fan speed control

When the fan control switch is in the Auto position, the blower speed is automatically controlled, depending on: Ambient temperature, in-vehicle temperature, amount of sunload, set temperature, and A/C switch signals. It is also controlled by the manual operation of the fan control switch.

Starting fan speed control

When engine coolant temperature is low, the air outlet door position is detected by the microswitch and if this is set in B/L, FOOT or FOOT/DEF blower speed is controlled to prevent a large amount of cold air from being discharged into the floor area.

Outlet door control

This can be selected by operation of the mode switch.

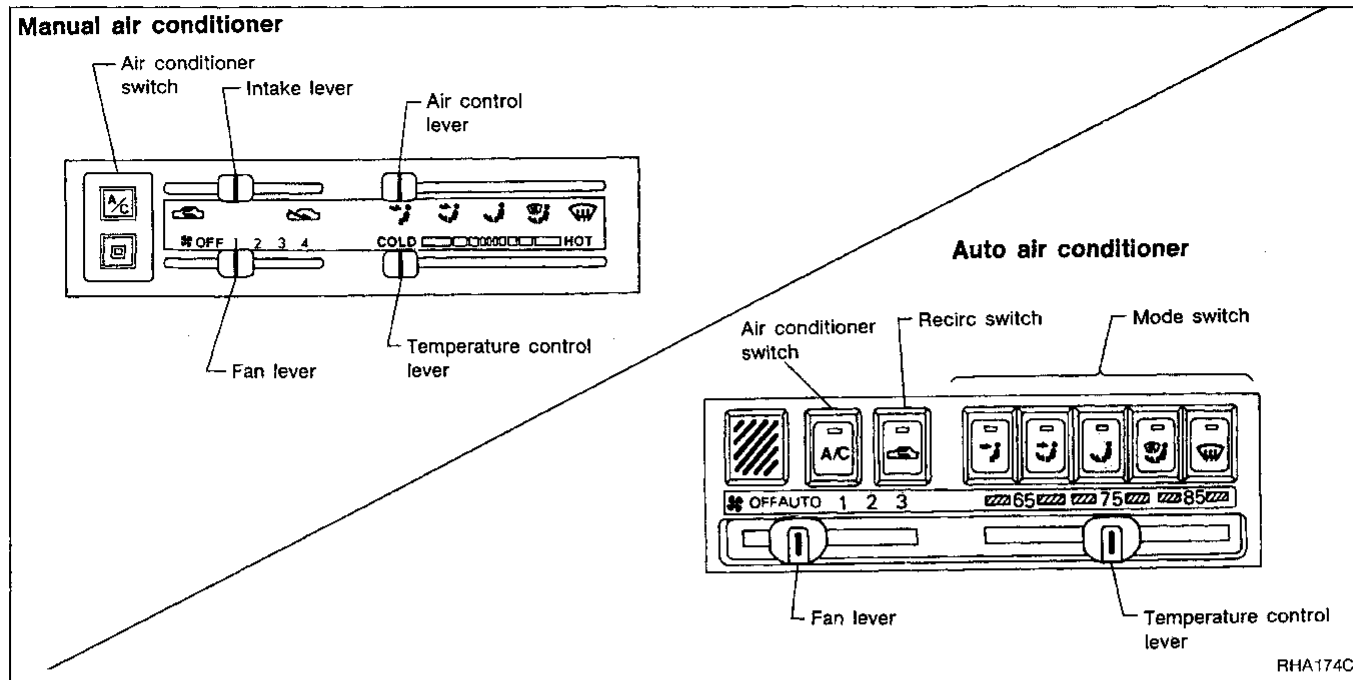
Intake door control

This can be selected by changing the REC switch position.

Compressor magnet clutch control

When the A/C switch is ON, the thermistor detects evaporator temperature. The thermo control amplifier controls clutch ON/OFF operation depending on the evaporator temperature.

Control Operation



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FAN LEVER

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

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MODE SWITCHES

These switches allows outlet air to flow. When the mode is set to "DEF" or "F/D", the push control unit sets the intake door to "FRE (Fresh)". The compressor turns on when the MODE is set to "DEF". (Auto Air Conditioner type only)


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TEMPERATURE CONTROL LEVER


This lever allows the temperature of the outlet air to be adjusted.

PD

RECIRC SWITCH

OFF position or slide to  :
Outside air is drawn into the passenger compartment.

FA

ON position or slide to  :
Interior air is recirculated inside the vehicle.

RA

"RECIRC" is canceled when "DEF" or "F/D" is selected. "RECIRC" resumes when another mode is chosen. (Auto Air Conditioner type only)

BR

AIR CONDITIONER SWITCH

Start the engine, move the fan switch to the desired (1 to 4 or Auto to 3) position and press 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.

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

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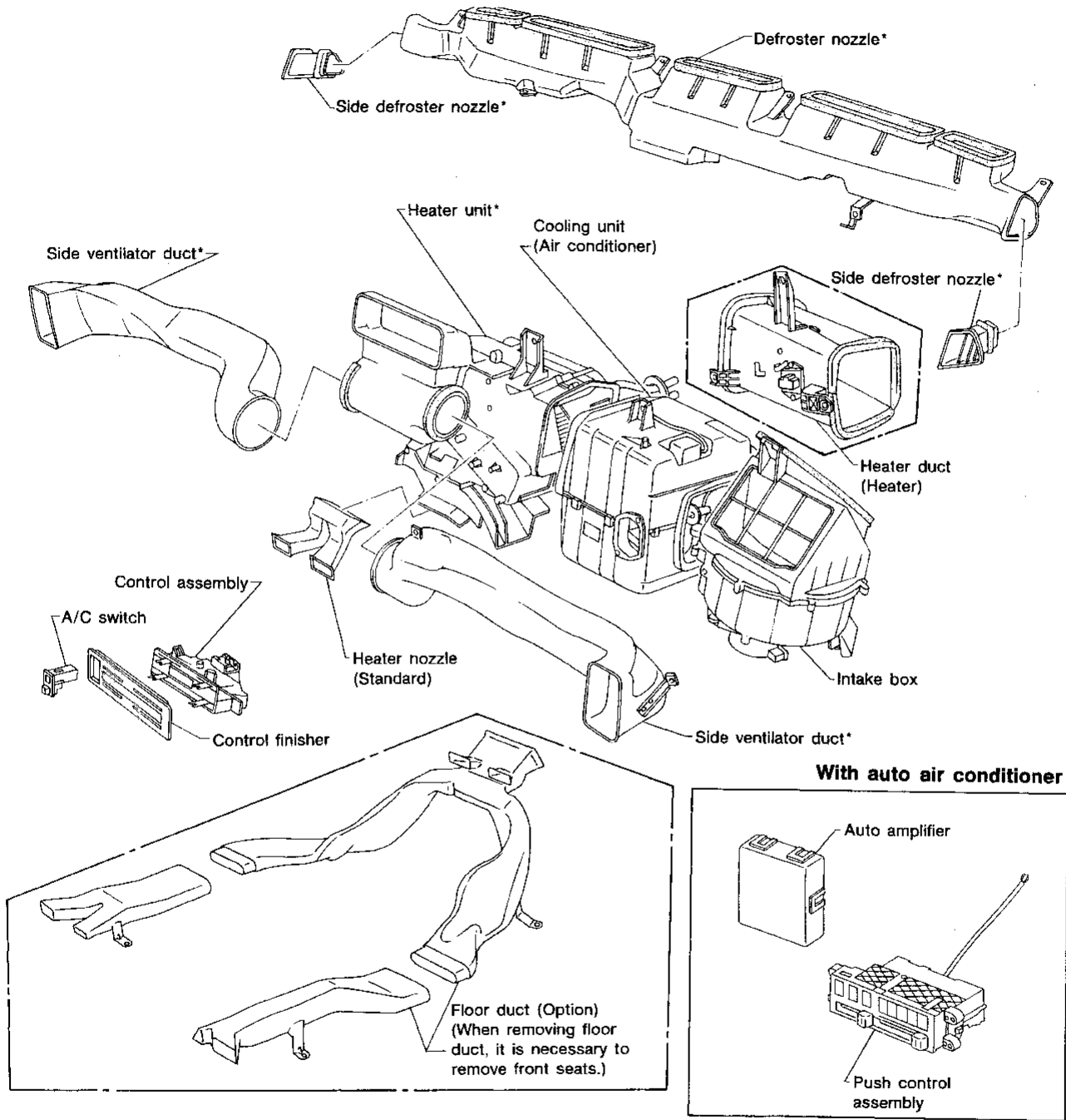
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DESCRIPTION — Overall System

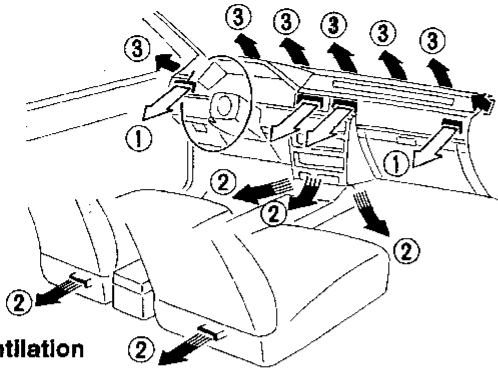
Component Layout



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

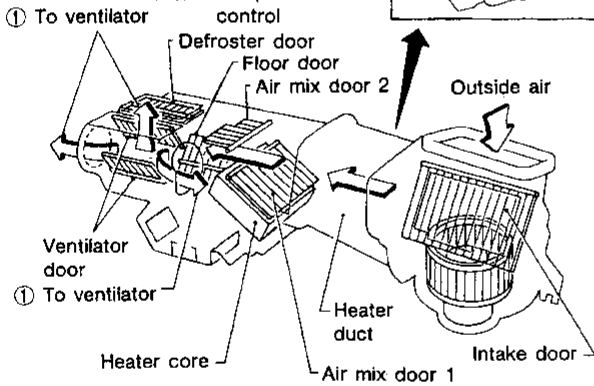
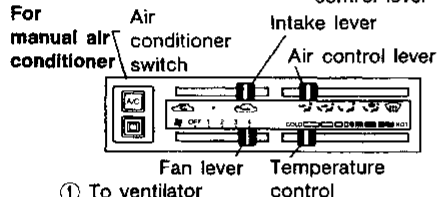
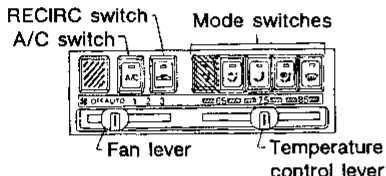
DESCRIPTION — Overall System

Air Flow

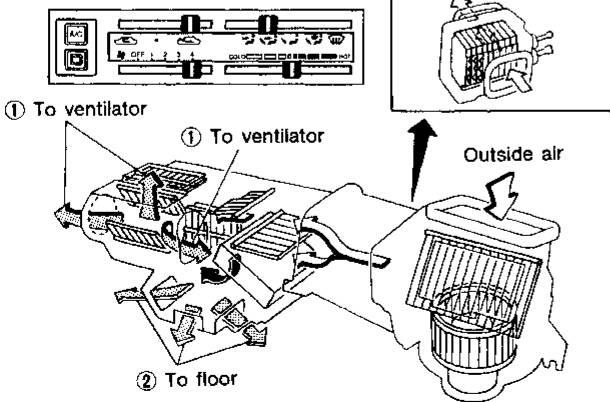


Ventilation

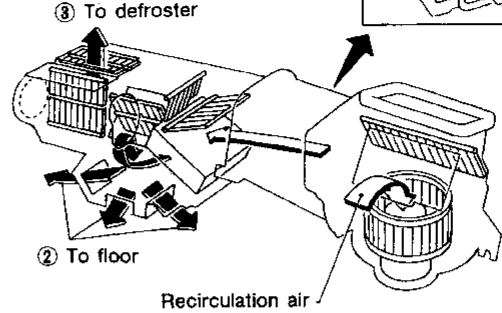
For auto air conditioner



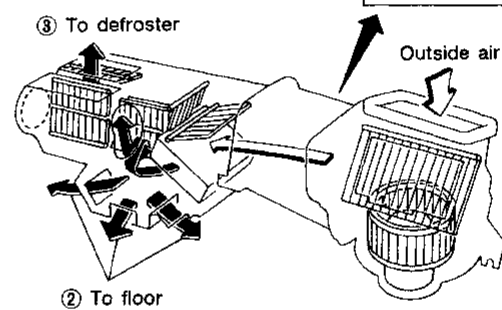
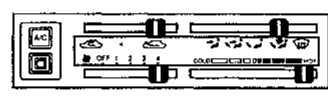
Bi-level



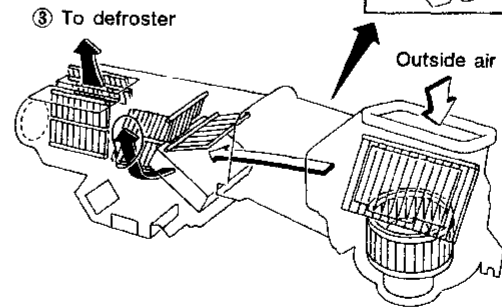
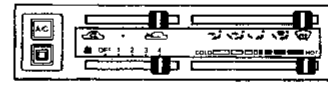
Floor



Floor and defroster



Defroster



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

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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.

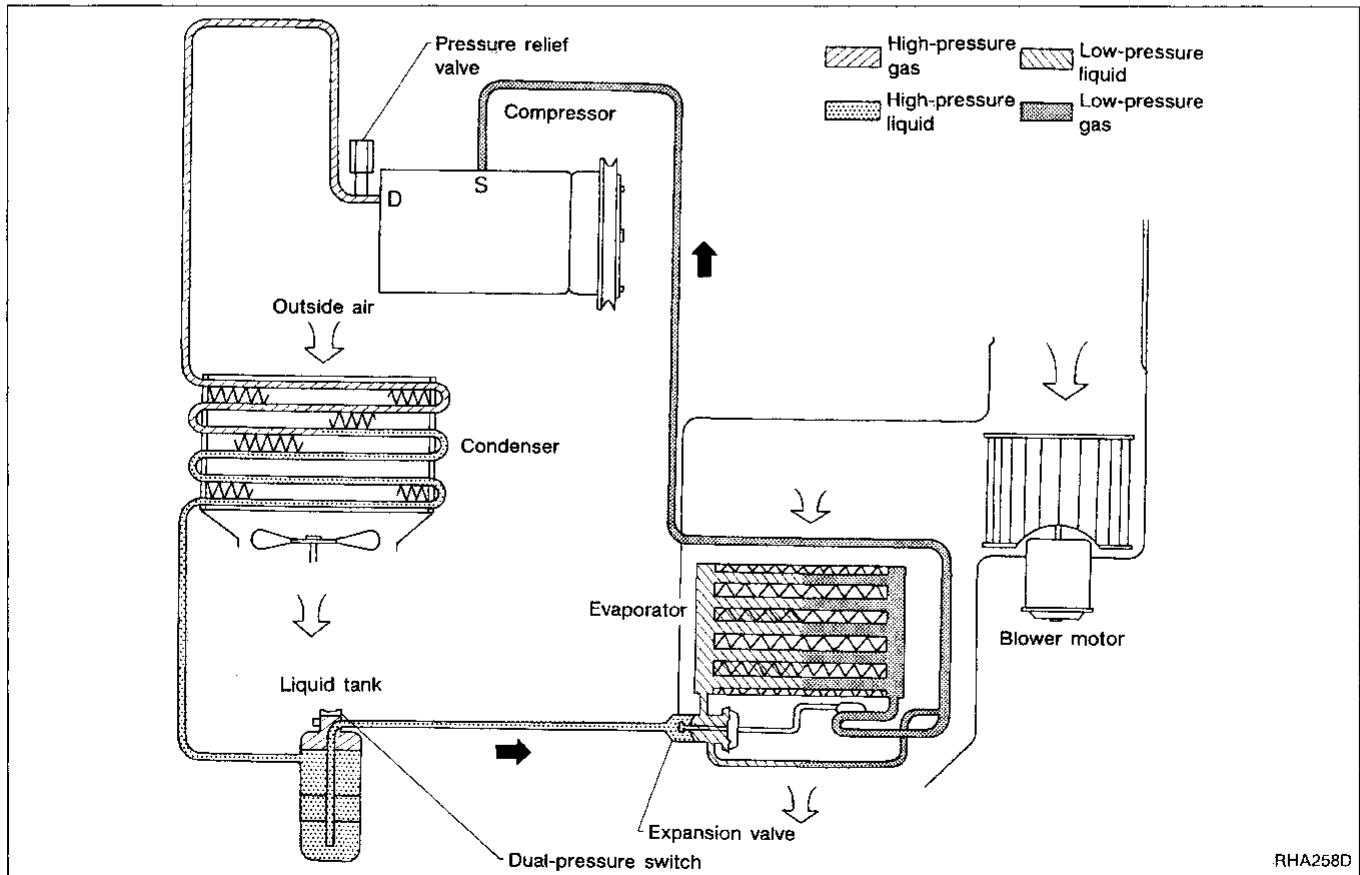
REFRIGERANT SYSTEM PROTECTION

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.

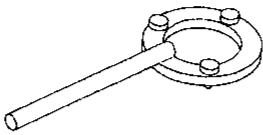
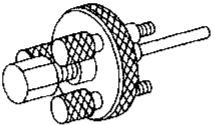
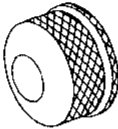
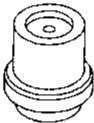
Pressure relief valve

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.



PREPARATION

Special Service Tools

Tool number (Kent-Moore No.) Tool name	Description	
KV99231260 (J-38874) Clutch disc wrench	 NT204	Removing shaft nut and clutch disc GI MA EM
KV99232340 (J-38874) Clutch disc puller	 NT206	Removing clutch disc LC EF & EC
KV99234330 (J-39024) Pulley installer	 NT207	Installing pulley FE CL
KV99233130 (J-39023) Pulley puller	 NT208	Removing pulley MT AT

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PREPARATION

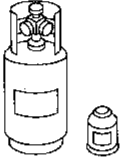

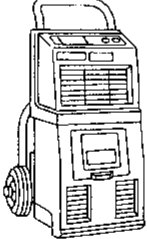
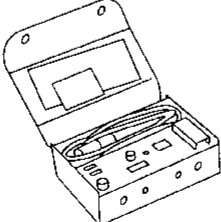
HFC-134a (R-134a) Service Tools and Equipment

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.

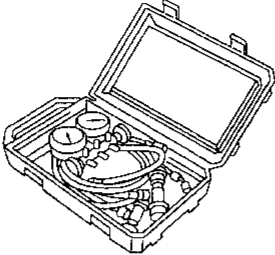

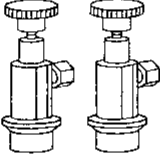

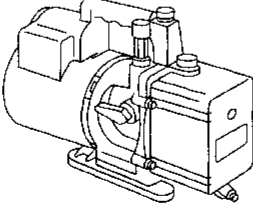
To prevent the mixing of refrigerants/lubricants, refrigerant container fittings, service hose fittings, and service equipment fittings (equipment which handles refrigerant and/or lubricant) are different between CFC-12 (R-12) and HFC-134a (R-134a).

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-PAGR0 (—) Nissan A/C System Oil Type R	 NT197	Type: Poly alkylene glycol oil (PAG), type R Application: HFC-134a (R-134a) vane rotary compressors (Nissan only) Lubricity: 40 ml (1.4 US fl oz, 1.4 Imp fl oz)
(J-39500-NI) 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)

PREPARATION

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

Tool number (Kent-Moore No.) Tool name	Description	Note	GI
(J-39183) Manifold gauge set (with hoses and couplers)	 <p style="text-align: center;">NT199</p>	Identification: ● The gauge face indicates R-134a. Fitting size: Thread size ● 1/2"-16 ACME	MA
Service hoses ● High side hose (J-39501-72) ● Low side hose (J-39502-72) ● Utility hose (J-39476-72)	 <p style="text-align: center;">NT201</p>	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 Hose fitting to gauge: ● 1/2"-16 ACME	EF & EC
Service couplers ● High side coupler (J-39500-20) ● Low side coupler (J-39500-24)	 <p style="text-align: center;">NT202</p>	Hose fitting to service hose: ● M14 x 1.5 fitting (optional) or permanently attached	MT
(J-39650) Refrigerant weight scale	 <p style="text-align: center;">NT200</p>	For measuring of refrigerant Fitting size: Thread size ● 1/2"-16 ACME	PD
(J-39649) Vacuum pump (Including the isolator valve)	 <p style="text-align: center;">NT203</p>	Capacity: ● Air displacement: 4 CFM ● Micron rating: 20 microns ● Oil capacity: 482 g (17 oz) Fitting size: Thread size ● 1/2"-16 ACME	BR

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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.

ELECTRONIC LEAK DETECTOR

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

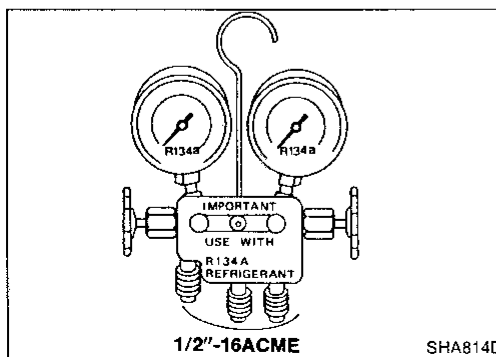
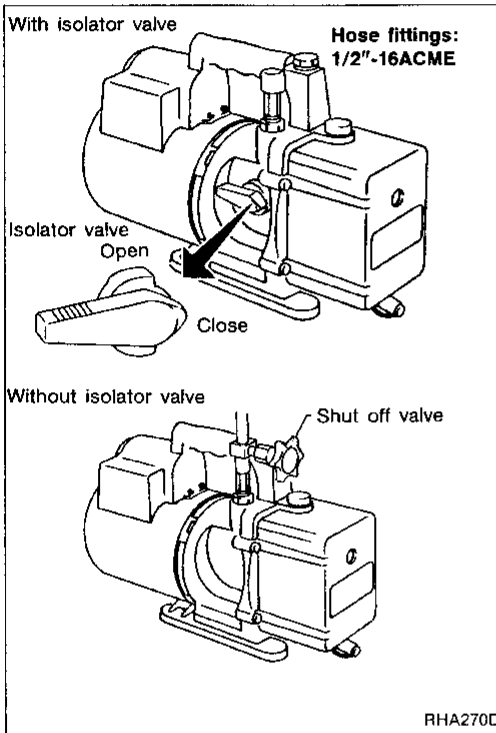
VACUUM PUMP

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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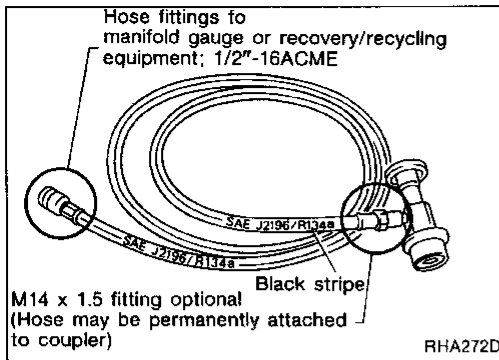
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SERVICE COUPLERS

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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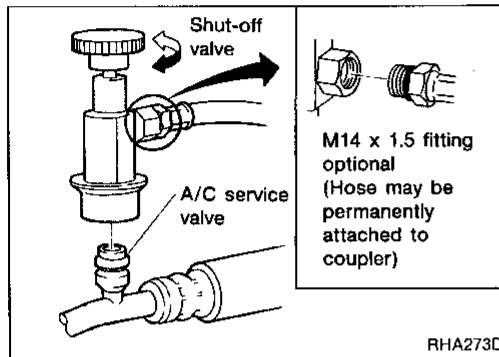
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REFRIGERANT WEIGHT SCALE

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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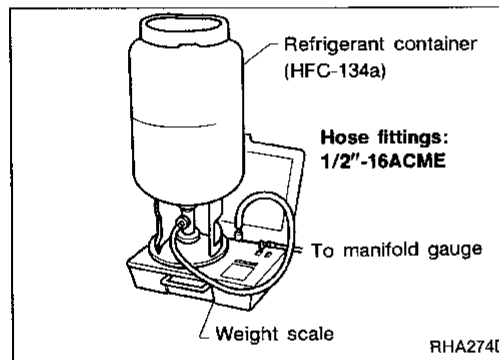
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CHARGING CYLINDER

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

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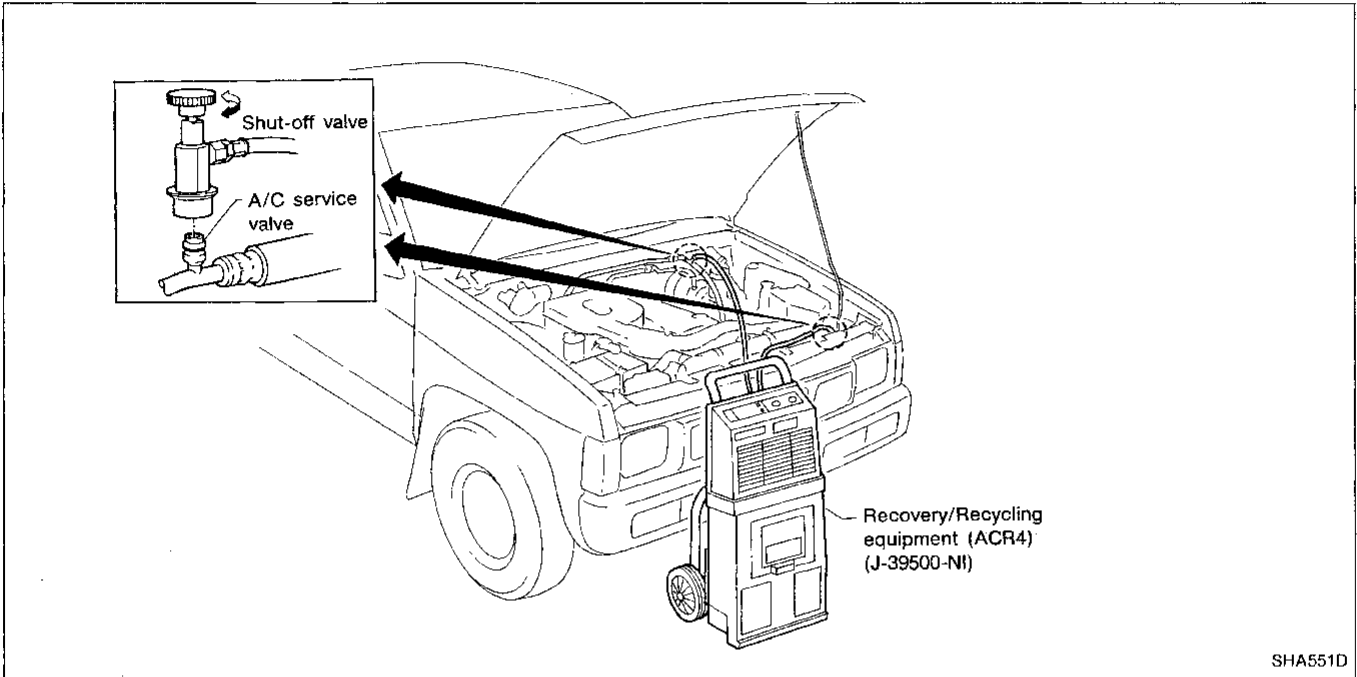
SERVICE PROCEDURES

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

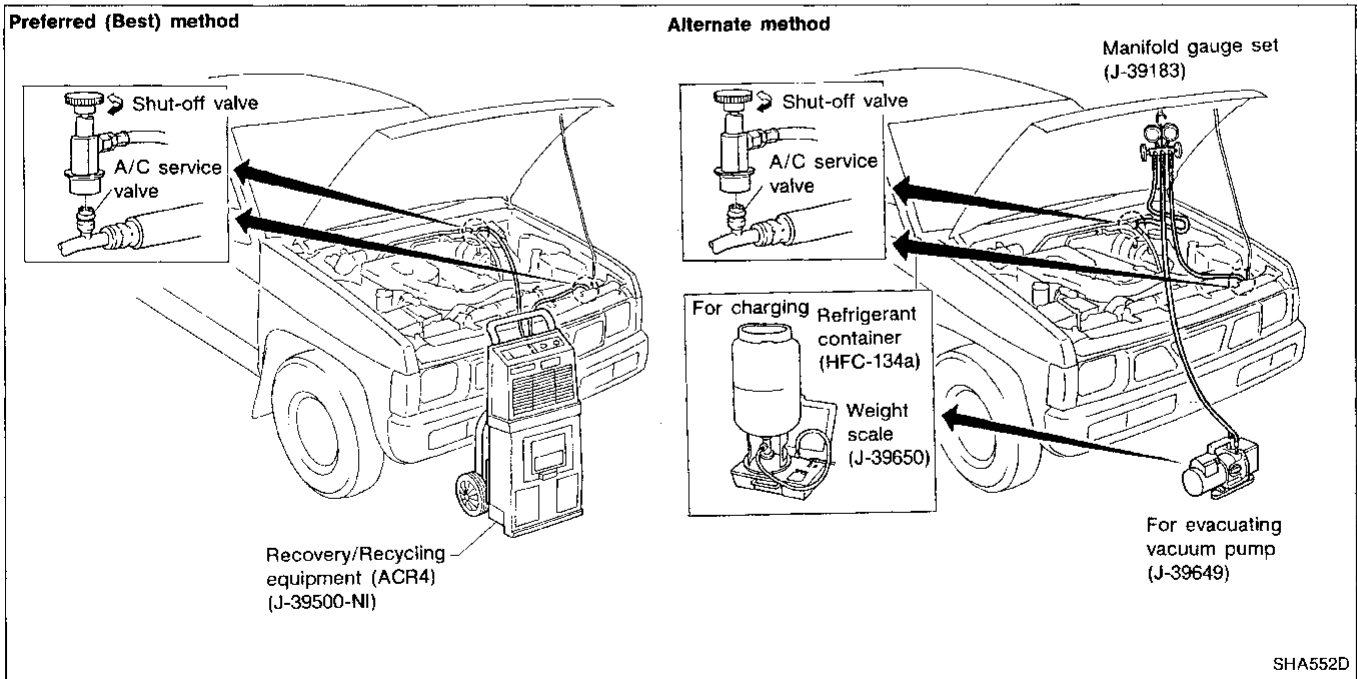
DISCHARGING REFRIGERANT

WARNING:

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



EVACUATING SYSTEM AND CHARGING REFRIGERANT

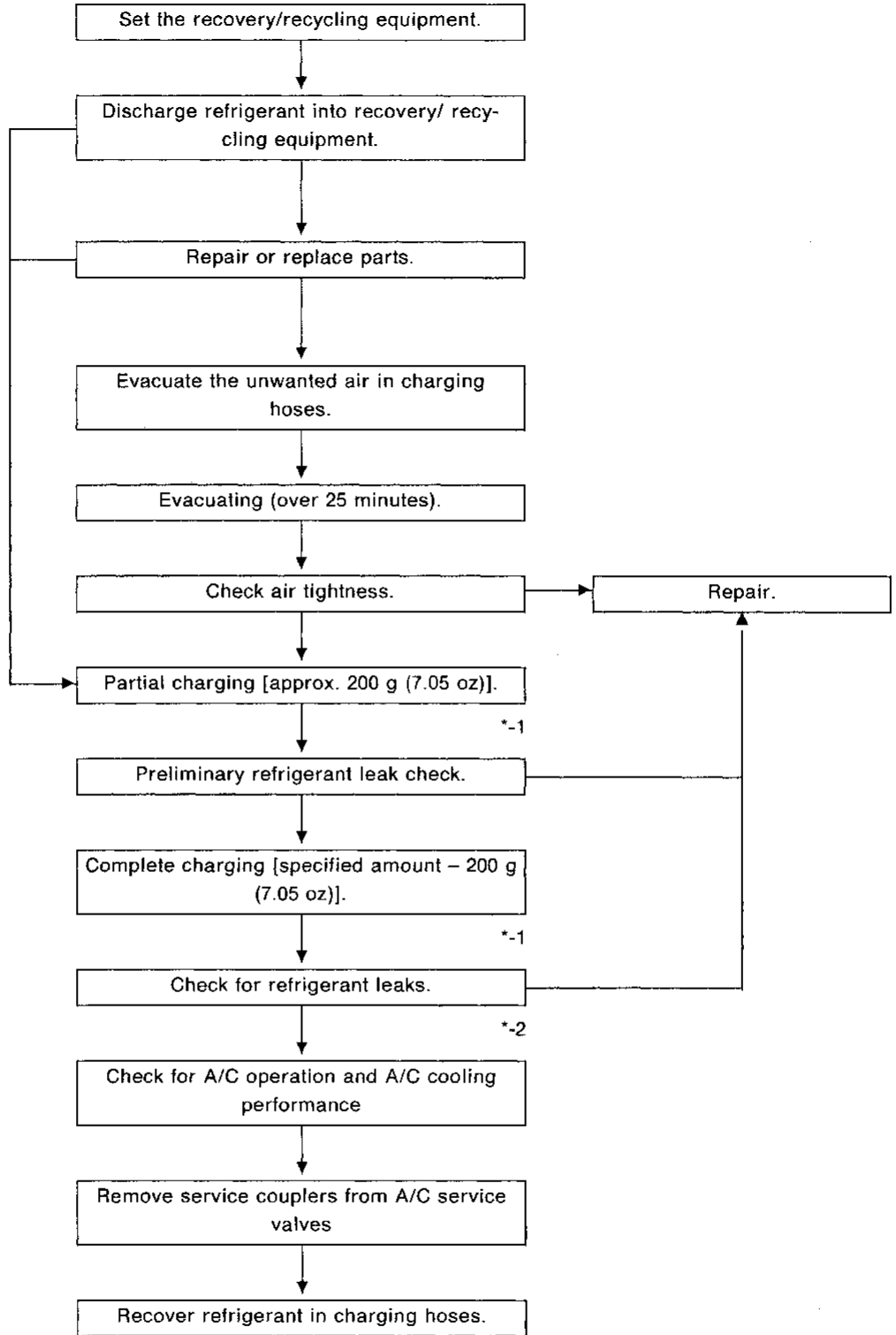


SERVICE PROCEDURES

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

WORK PROCEDURE

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



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).

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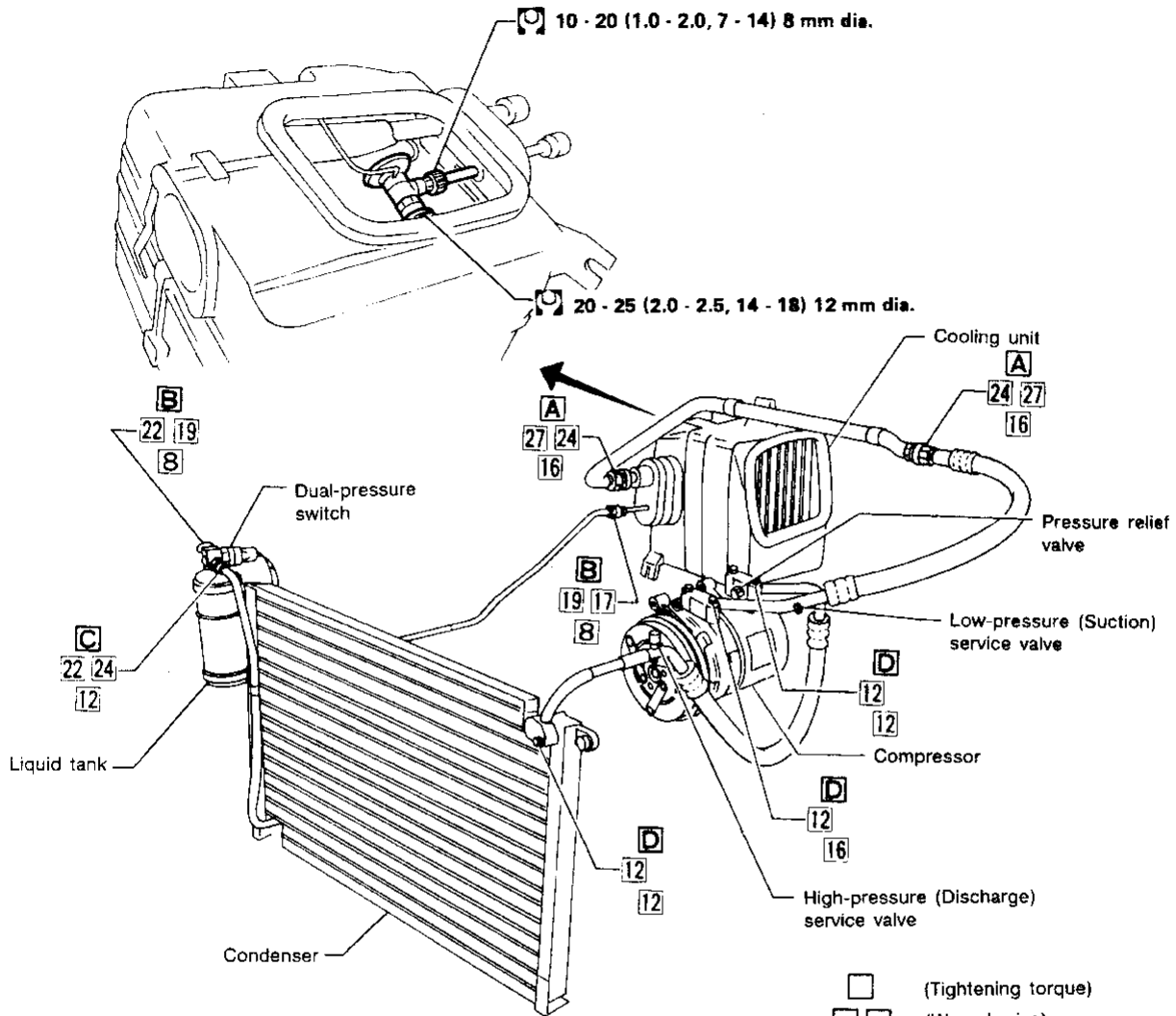
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SERVICE PROCEDURES

Refrigerant Lines

VG ENGINE MODEL

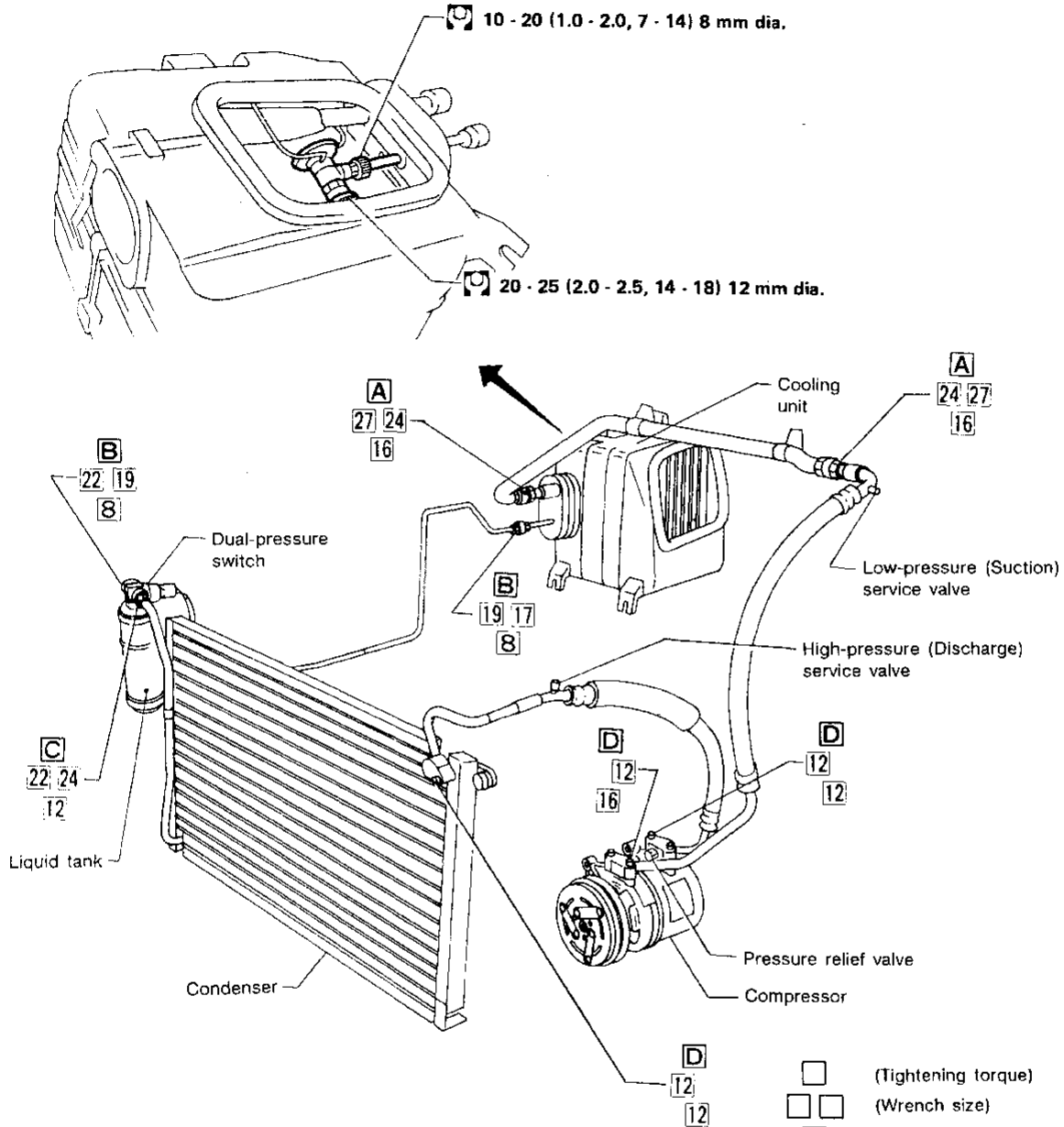


- (Tightening torque)
- (Wrench size)
- (O-ring size)
- A** : 20 - 29 (2.0 - 3.0, 14 - 22)
- B** : 10 - 20 (1.0 - 2.0, 7 - 14)
- C** : 15 - 25 (1.5 - 2.5, 11 - 18)
- D** : 8 - 11 (0.8 - 1.1, 5.8 - 8.0)
- : N·m (kg·m, ft·lb)

SERVICE PROCEDURES

Refrigerant Lines (Cont'd)

KA ENGINE MODEL



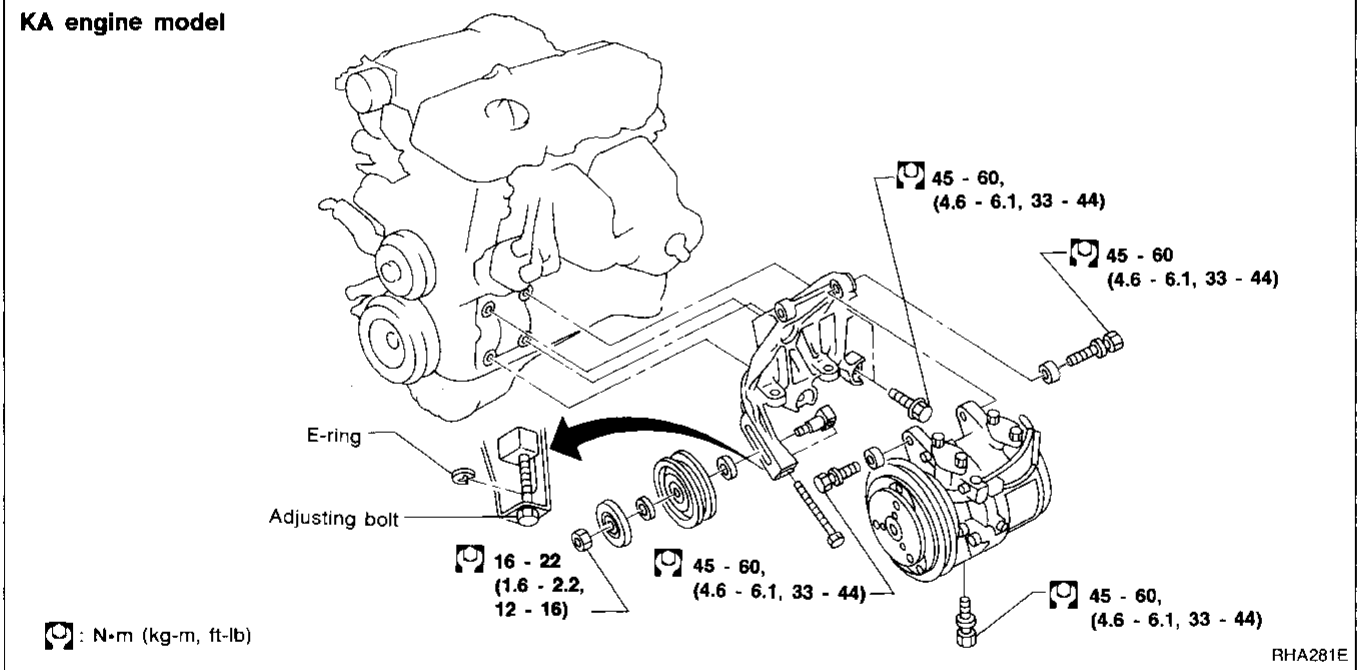
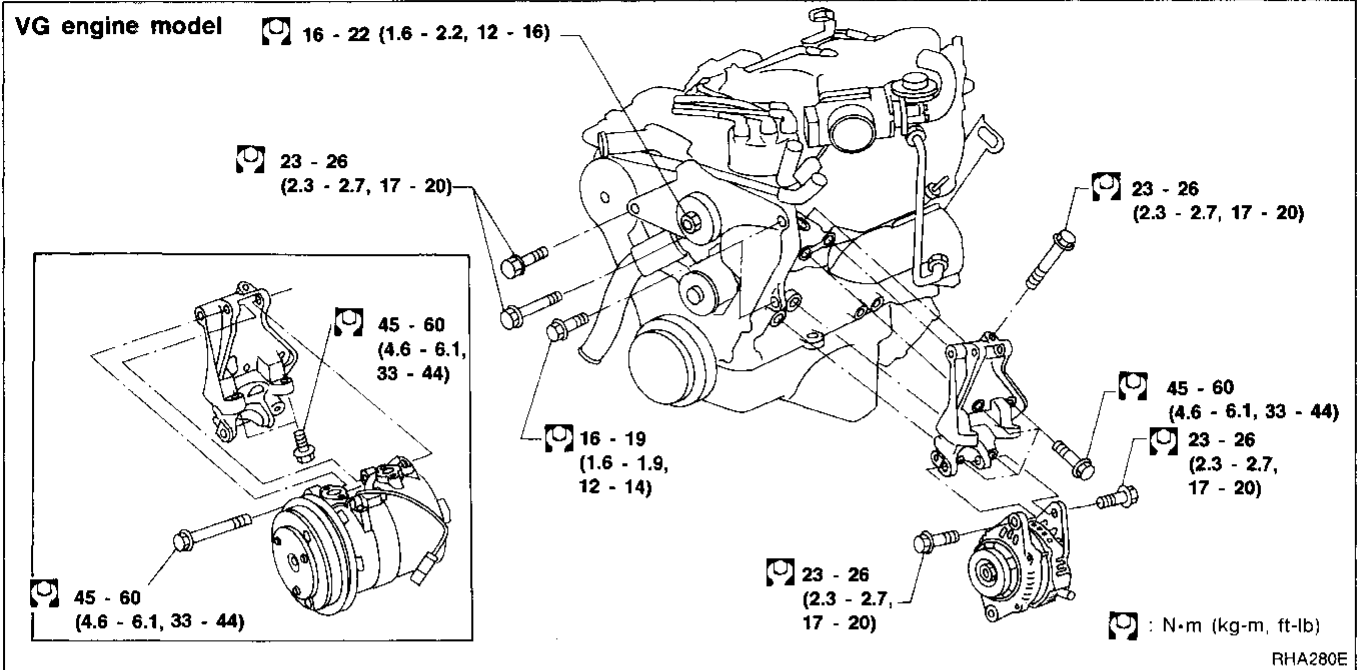
- (Tightening torque)
- (Wrench size)
- (O-ring size)
- A** : 20 - 29 (2.0 - 3.0, 14 - 22)
- B** : 10 - 20 (1.0 - 2.0, 7 - 14)
- C** : 15 - 25 (1.5 - 2.5, 11 - 18)
- D** : 8 - 11 (0.8 - 1.1, 5.8 - 8.0)
- : N·m (kg·m, ft·lb)

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SERVICE PROCEDURES

Compressor Mounting



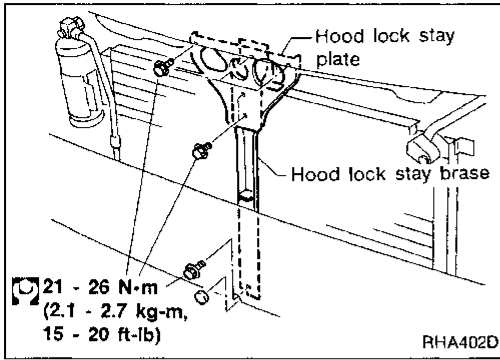
Belt Tension

- Refer to "Checking Drive Belts" in MA section.

Fast Idle Control Device (FICD)

- Refer to EF & EC section.

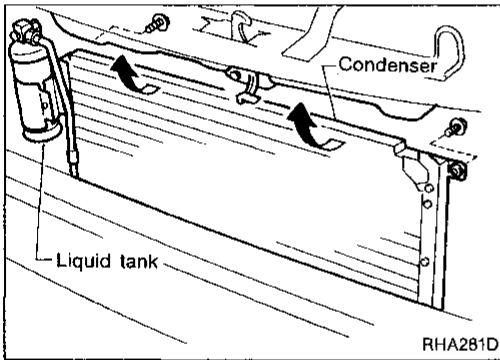
SERVICE PROCEDURES



Condenser

REMOVAL

1. Discharge refrigerant using the recovery/recycling equipment (ACR4). GI
2. Remove coolant reservoir tank (3 screws). MA
3. Remove side marker lamps. EM
4. Remove front grille (5 fasteners).
5. Remove harness clip from hood lock stay, if equipped (gently press out).
6. Remove hood lock stay plate (4 bolts) and hood lock stay brace (2 bolts).



7. Remove hose (high pressure) clamp bracket from radiator core support. MT
8. Disconnect high pressure hose at condenser. AT
9. Disconnect dual pressure switch harness connector.
10. Disconnect high pressure tube (liquid tank to cooling unit) at liquid tank. TF
11. Remove condenser mounting bolts (2 bolts). PD
12. Remove condenser assembly.

CAUTION:

Carefully lift condenser without damaging radiator (fin and tube).

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Lubrication Oil

Name: Nissan A/C System Oil Type R

Part number: KLH00-PAGR0

Maintenance of Oil Quantity in Compressor

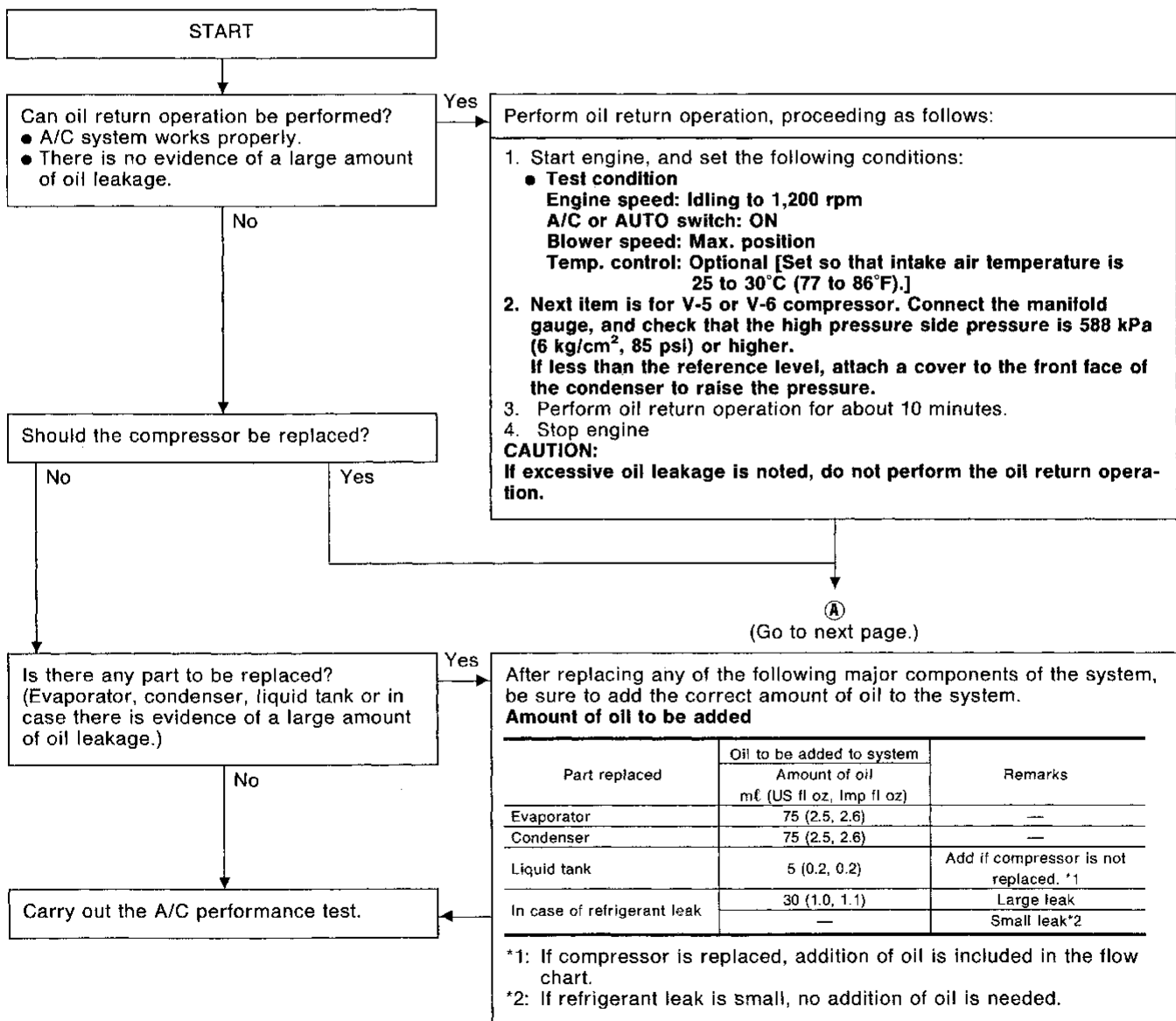
The oil used to lubricate the compressor circulates through the system with the refrigerant. Whenever any component of the system is replaced or a large amount of gas leakage occurs, add oil to the compressor to maintain the specified amount.

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 interference)

Checking and Adjusting

Adjust the oil quantity according to the flowchart shown below.



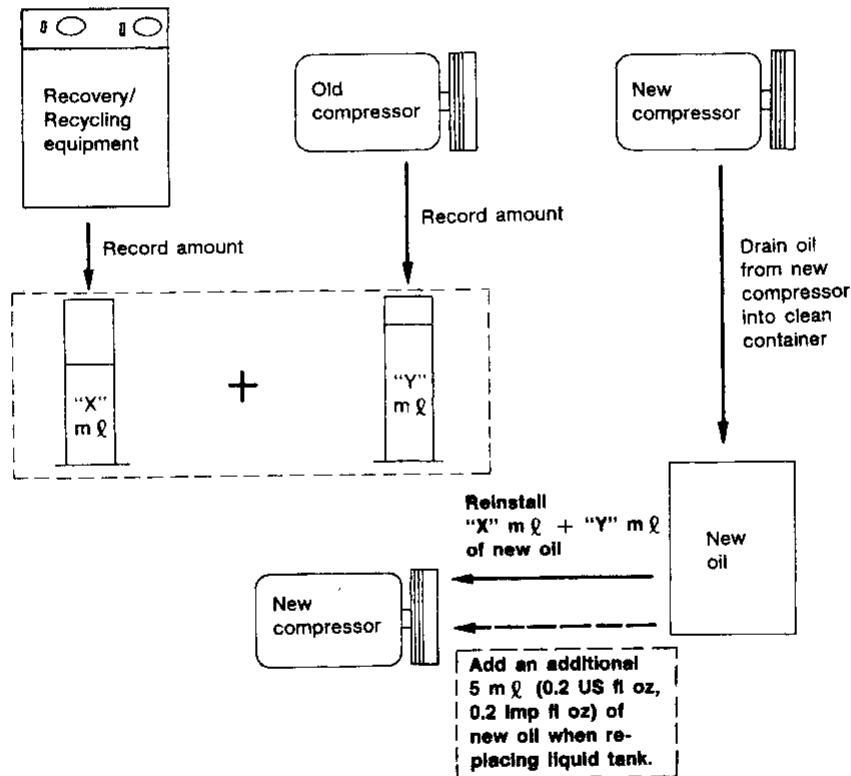
LUBRICATION OIL — Checking and Adjusting

Checking and Adjusting (Cont'd)

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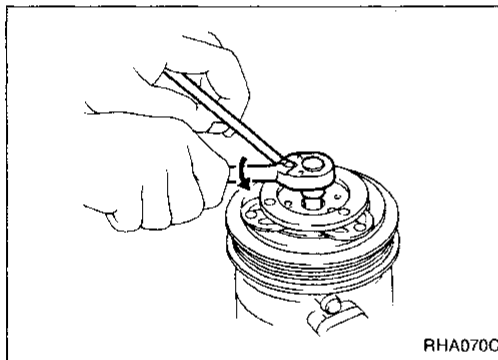
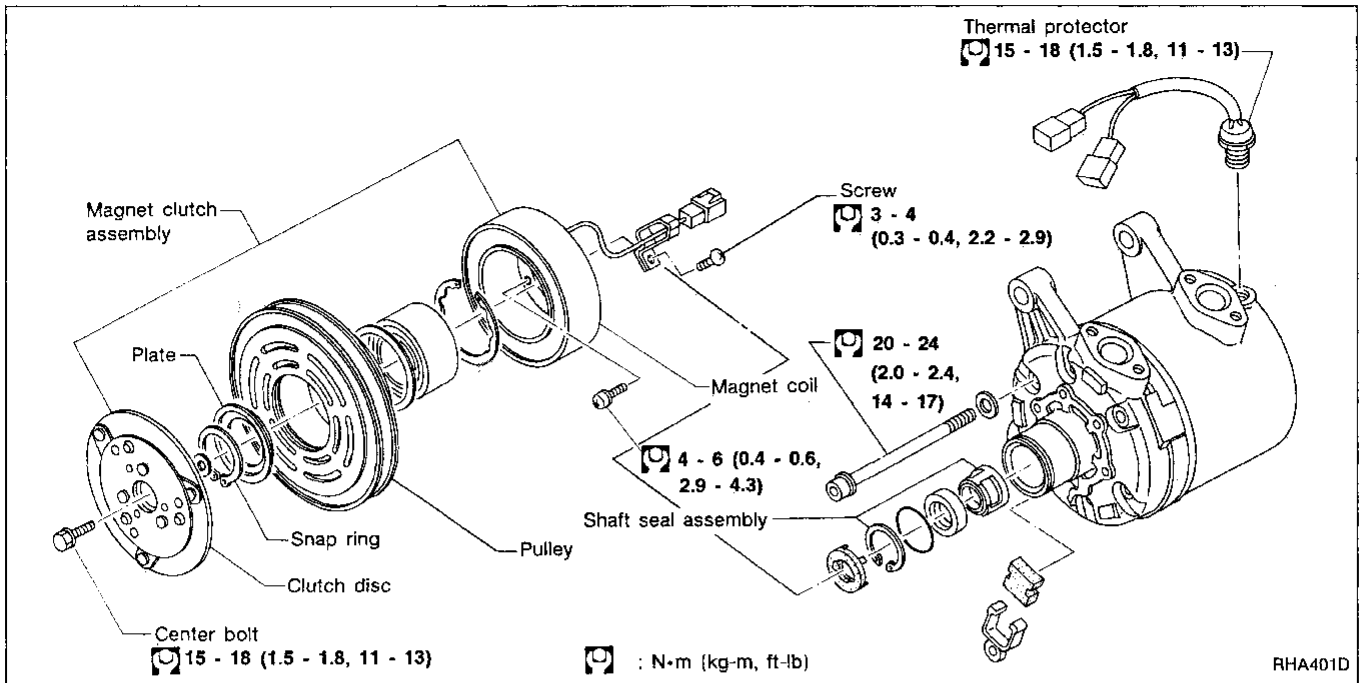
1. Discharge refrigerant into the refrigerant recovery/recycling equipment. Measure oil discharged into the recovery/recycling equipment.
2. Remove the drain plug (for V-5 or V-6, and DKS-16H compressor) and drain the oil from the "old" (removed) compressor into a graduated container, and record the 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 equal 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 equal 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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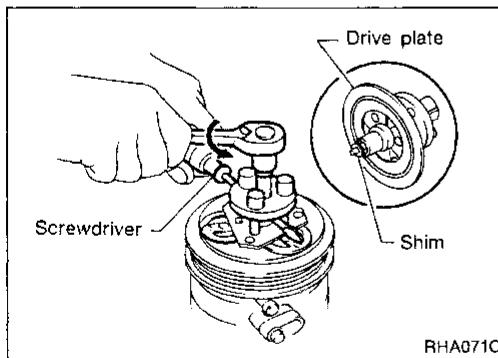
COMPRESSOR — Model DKV-14C (ZEXEL make)



Compressor Clutch

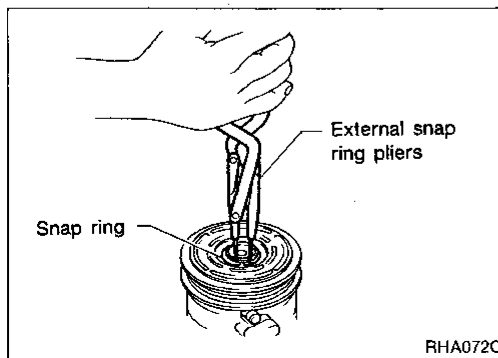
REMOVAL

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



- Remove the drive plate using the drive plate puller. Insert the holder's three pins into the holes in the drive plate, and rotate the holder clockwise to hook it onto the plate. Then, tighten the center bolt to remove the drive plate.

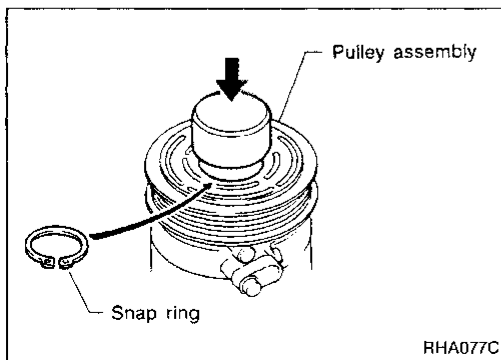
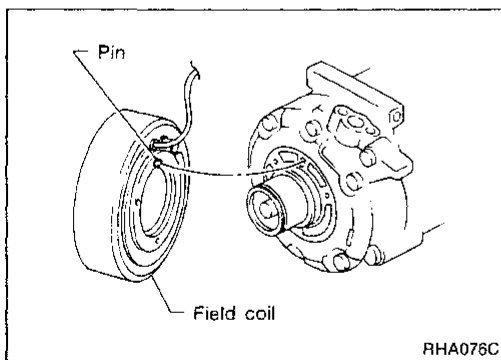
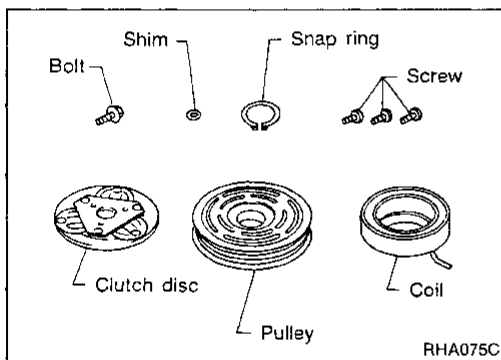
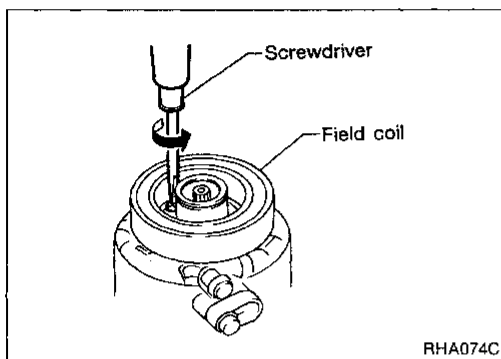
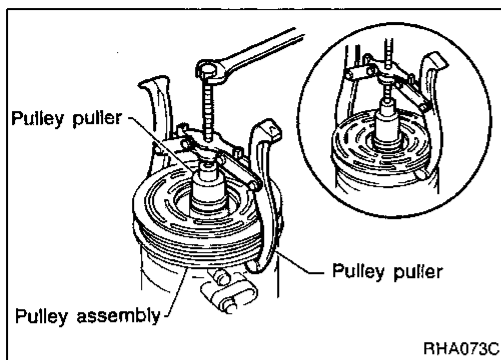
When tightening the center bolt, insert a round bar (screwdriver, etc.) between two of the pins (as shown in the left-hand figure) to prevent drive plate rotation. After removing the drive plate, remove the shims from either the drive shaft or the drive plate.



- Remove the snap ring using external snap ring pliers.

COMPRESSOR — Model DKV-14C (ZEXEL make)

Compressor Clutch (Cont'd)



- Pulley removal
Position the center pulley puller on the end of the drive shaft, and remove the pulley assembly using any commercially available pulley puller.
For pressed pulleys
To prevent deformation of the pulley groove, the puller claws should be hooked into (not under) the pulley groove.
For machine latched pulleys
Align the pulley puller groove with the pulley groove, and then remove the pulley assembly.
- Remove the field coil harness clip using a screwdriver.
- Remove the three field coil fixing screws and remove the field coil.

INSPECTION

Clutch disc : If the contact surface shows signs of damage due to excessive heat, the clutch disc 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 clutch disc 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 field coil.
Be sure to align the coil's pin with the hole in the compressor's front head.
- Install the field coil harness clip using a screwdriver.
- Install the pulley assembly using the installer and a hand press, and then install the snap ring using snap ring pliers.

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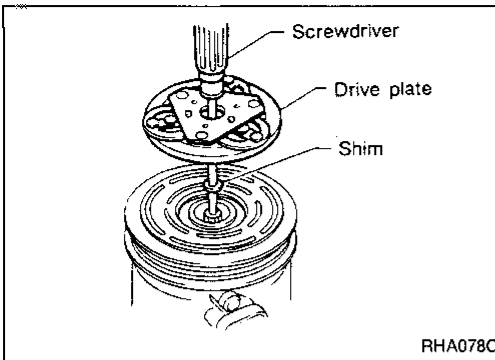
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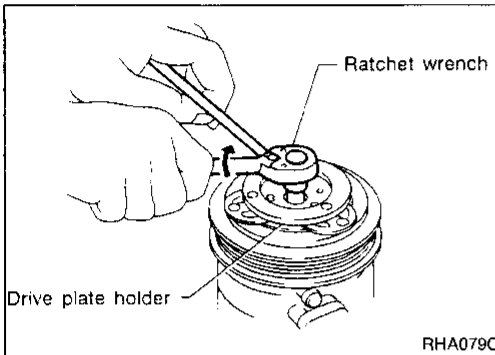
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COMPRESSOR — Model DKV-14C (ZEXEL make)

Compressor Clutch (Cont'd)

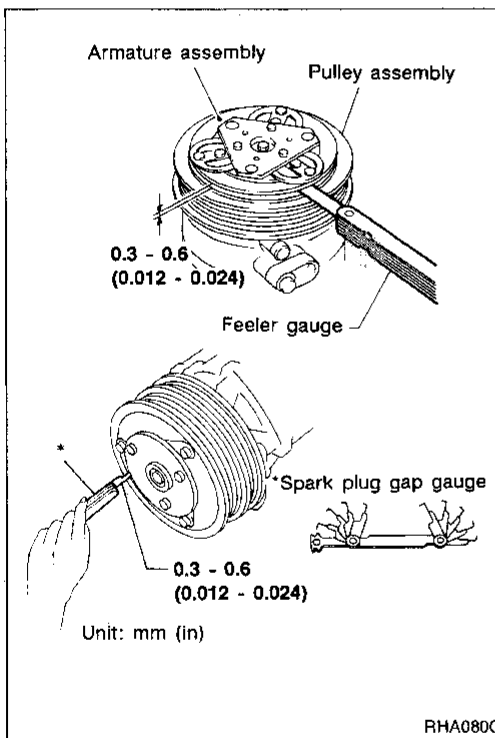


- Install the drive plate on the drive shaft, together with the original shim(s). Press the drive plate down by hand.



- Using the holder to prevent drive plate rotation, tighten the bolt to 12 to 15 N·m (1.2 to 1.5 kg·m, 9 to 11 ft-lb) torque.

After tightening the bolt, check that the pulley rotates smoothly.



- Check clearance around the entire periphery of clutch disc.

Disc-to-pulley clearance:

0.3 - 0.6 mm (0.012 - 0.024 in)

If the specified clearance is not obtained, replace adjusting spacer and readjust.

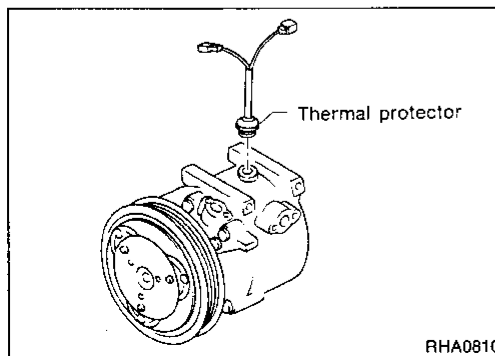
BREAK-IN OPERATION

When replacing compressor clutch assembly, 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.

Thermal Protector

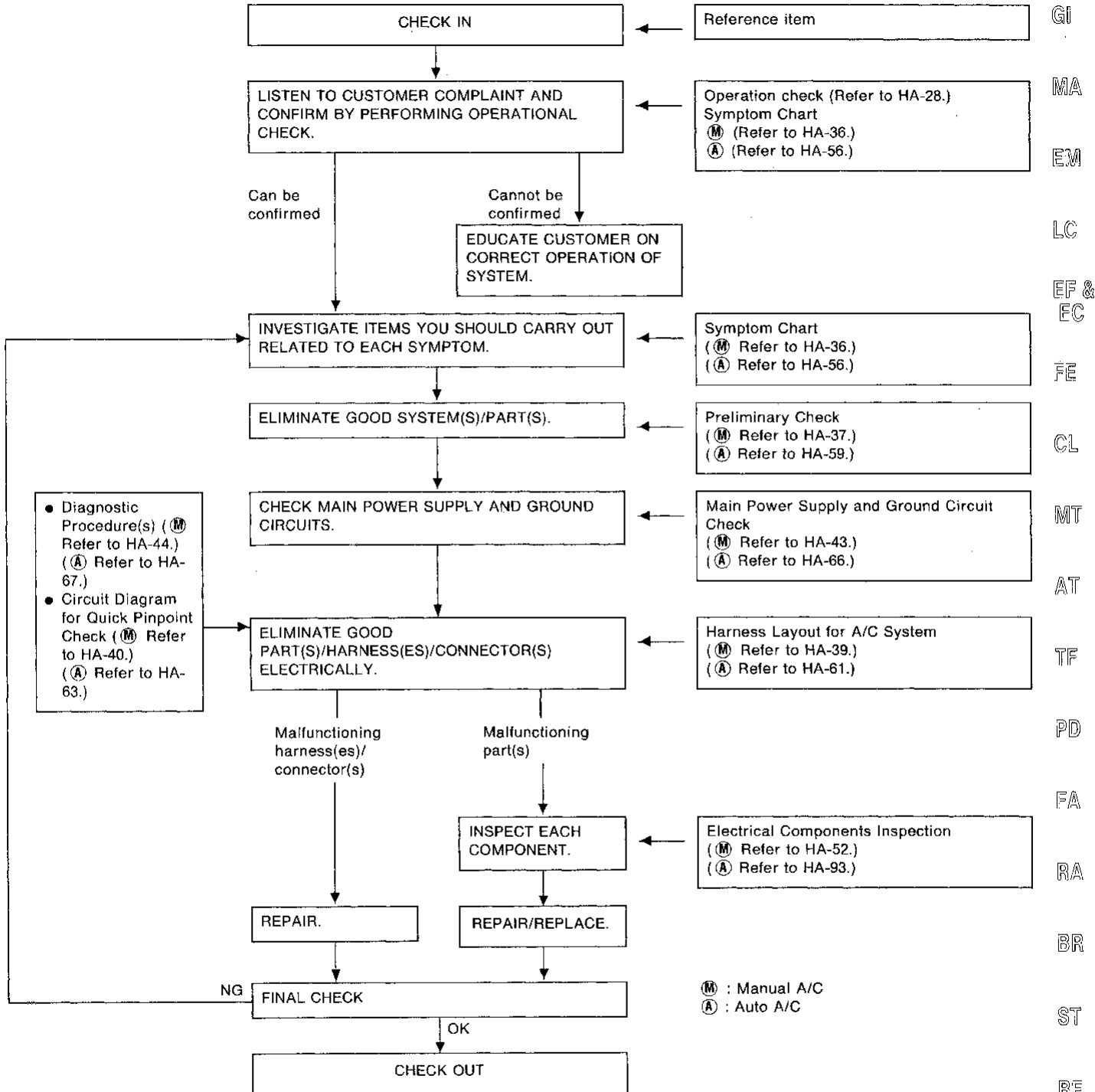
INSPECTION

- When servicing, do not allow foreign matter to get into compressor.
- Check continuity between two terminals.



How to Perform Trouble Diagnoses for Quick and Accurate Repair

WORK FLOW



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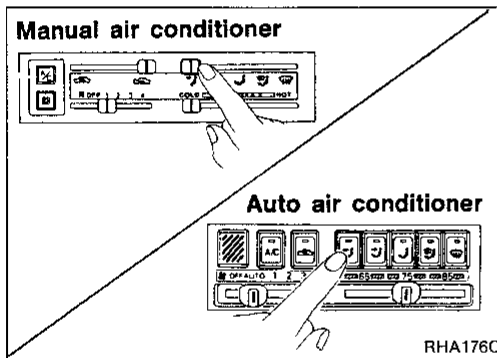
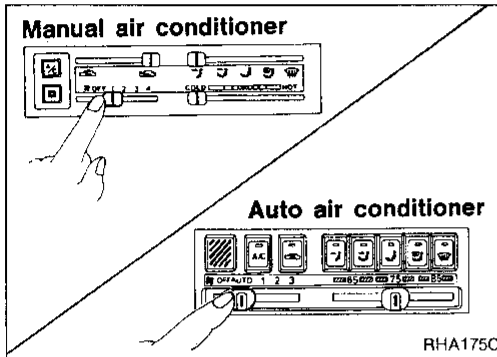
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Operation Check

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 and A/C switch systems.

CONDITIONS:

Engine running and at normal operating temperature.













PROCEDURE:

1. Check blower

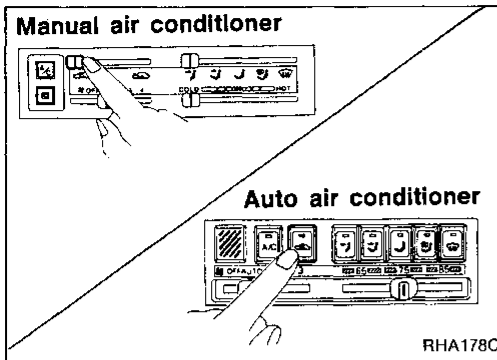
- 1) Slide FAN lever to AUTO or 1.
Blower should operate at speed AUTO or 1.
- 2) Then slide lever to speed 1 or 2.
- 3) Continue checking blower speed until all speeds are checked.
- 4) Leave blower on speed 3 or 4.

2. Check discharge air

- 1) Press  button or slide mode lever to  position. VENT indicator should illuminate (Auto Air Conditioner type only).
- 2) Confirm that all discharge air comes out of face vents.
- 3) Press  button or slide mode lever to  position. B/L indicator should illuminate (Auto Air Conditioner type only).
- 4) Confirm that discharge air comes out of face vents and foot vents.
- 5) Press  button or slide mode lever to  position. FOOT indicator should illuminate (Auto Air Conditioner type only).
- 6) Confirm that discharge air comes out of foot vents, with some air from defroster vents.
- 7) Press  button or slide mode lever to  position. F/D indicator should illuminate (Auto Air Conditioner type only).
- 8) Confirm that discharge air comes out of foot vents with some air from defroster vents. Intake door position is at FRESH. (Auto Air Conditioner type only).
- 9) Press  button or slide mode lever to  position. DEF indicator should illuminate (Auto Air Conditioner type only).
- 10) Confirm that all discharge air comes out of defroster vents. At the same time compressor should turn ON and intake door position be at FRESH. (Auto Air Conditioner type only).

DIAGNOSES — Overall System

Operation Check (Cont'd)



3. Check recirc

- 1) Press button or slide intake lever to position. RECIRC indicator should illuminate (Auto Air Conditioner type only).
- 2) Listen for intake door position change (you should hear GI

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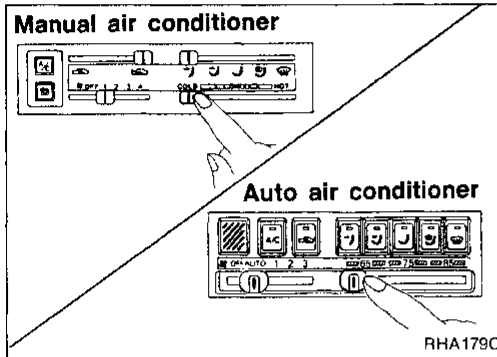
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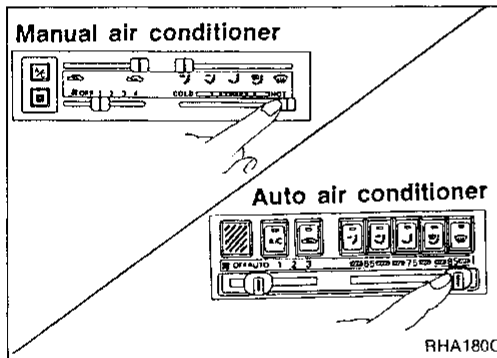
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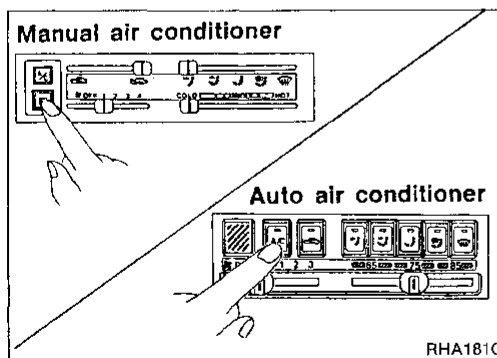
4. Check temperature decrease

- 1) Slide temperature lever to full cold.
- 2) Check for cold air at discharge air outlets.



5. Check temperature increase

- 1) Slide temperature lever to full hot.
- 2) Check for hot air at discharge air outlets.



6. Check A/C switch



Move fan control lever to the desired position (AUTO to 3 or 1 to 4) and press air conditioner button to turn ON air conditioner. Indicator light will come on when air conditioner is ON.

DIAGNOSES — Overall System

Performance Chart

TEST CONDITION

Testing must be performed as follows:

Vehicle location:	Indoors or in the shade (in a well-ventilated place)
Doors:	Closed
Door window:	Open (Front driver side only)
Hood:	Open
TEMP. control lever position:	Max. COLD
AIR control lever position:	 (Ventilation)
INTAKE lever position:	 (Recirculation)
FAN lever:	Max. speed
Engine speed:	1,500 rpm
Time required before starting testing after air conditioner starts operating:	More than 10 minutes

TEST READING

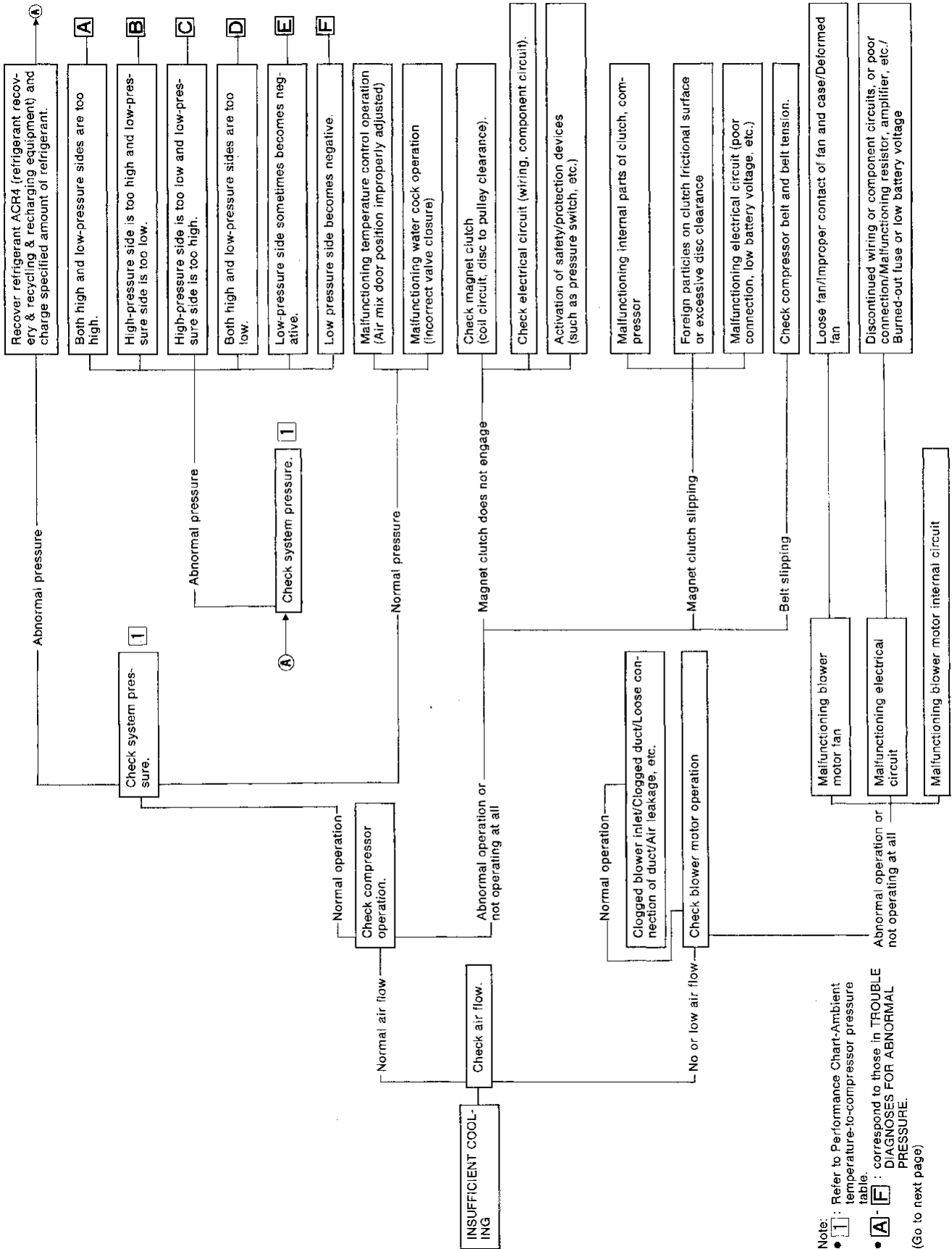
Recirculating-to-discharge air temperature table

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)	6.6 - 8.3 (44 - 47)
	25 (77)	10.4 - 12.4 (51 - 54)
	30 (86)	14.2 - 16.7 (58 - 62)
	35 (95)	18.2 - 21.0 (65 - 70)
	40 (104)	22.0 - 25.2 (72 - 77)
60 - 70	20 (68)	8.3 - 9.8 (47 - 50)
	25 (77)	12.4 - 14.4 (54 - 58)
	30 (86)	16.7 - 18.9 (62 - 66)
	35 (95)	21.0 - 23.6 (70 - 74)
	40 (104)	25.2 - 28.1 (77 - 83)

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)	961 - 1,187 (9.8 - 12.1, 139 - 172)	108 - 157 (1.1 - 1.6, 16 - 23)
	25 (77)	1,295 - 1,599 (13.2 - 16.3, 188 - 232)	161.8 - 215.8 (1.65 - 2.2, 23.5 - 31.3)
	30 (86)	1,285 - 1,569 (13.1 - 16, 186 - 228)	167 - 216 (1.7 - 2.2, 24 - 31)
	35 (95)	1,520 - 1,863 (15.5 - 19, 220 - 270)	235 - 284 (2.4 - 2.9, 34 - 41)
	40 (104)	1,765 - 2,158 (18 - 22, 256 - 313)	289.3 - 353.1 (2.95 - 3.6, 41.9 - 51.2)

Performance Test Diagnoses
INSUFFICIENT COOLING



Note:
 • [T] : Refer to Performance Chart-Ambient temperature-to-compressor pressure table.
 • [A] - [F] : correspond to those in TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE.
 (Go to next page)

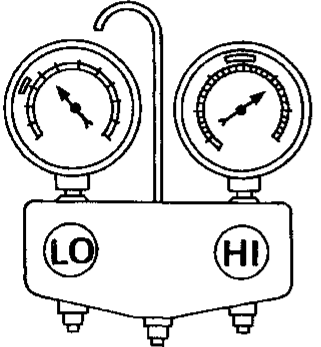
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DIAGNOSES — Overall System

Performance Test Diagnoses (Cont'd)

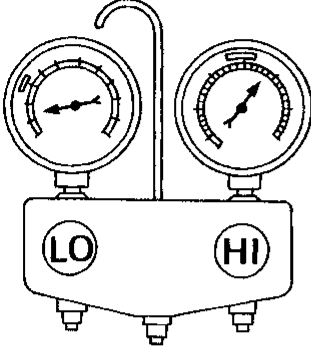
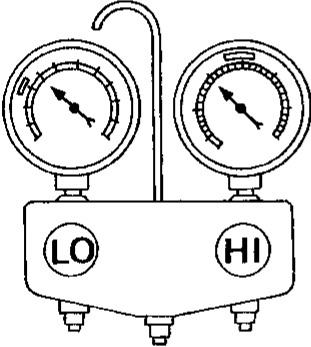
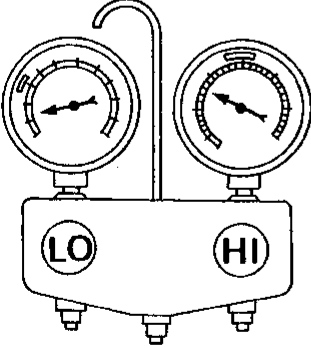
TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE

Whenever there is abnormal pressure of high and/or low sides of the system, 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 air temperature-to-compressor pressure table".

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. 	<p>Excessive refrigerant charge in refrigeration cycle</p>	<p>Reduce refrigerant until specified pressure is obtained.</p>
	<p>Air suction by radiator or condenser fan is insufficient.</p>	<p>Insufficient condenser cooling performance</p> <p style="text-align: center;">↓</p> <p>① Condenser fins are clogged. ② Improper rotation of cooling fan or condenser fan</p>	<ul style="list-style-type: none"> ● Clean condenser. ● Check and repair radiator or condenser 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>	<p>Evacuate repeatedly and recharge system.</p>
	<p>Engine tends to overheat.</p>	<p>Engine cooling systems malfunction.</p>	<p>Check and repair each engine cooling system.</p>
	<ul style="list-style-type: none"> ● 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>	<p>Replace expansion valve.</p>

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.

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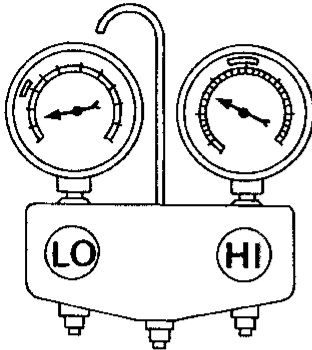
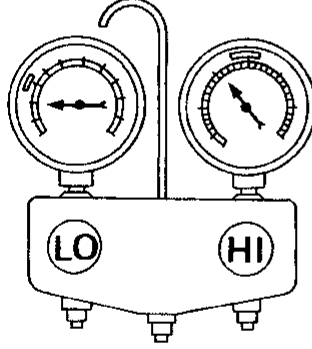
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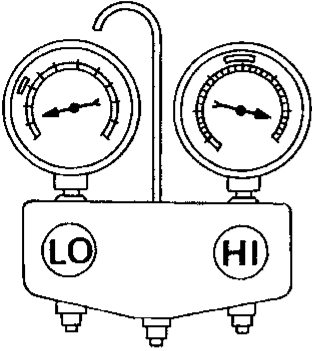
DIAGNOSES — Overall System

Performance Test Diagnoses (Cont'd)

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
<p>Both high and low-pressure sides are too low.</p> <p>D</p>  <p style="text-align: right; margin-right: 50px;">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 ② Malfunctioning thermal valve 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; margin-right: 50px;">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.

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; margin-right: 50px;">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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Symptom Chart

DIAGNOSTIC TABLE

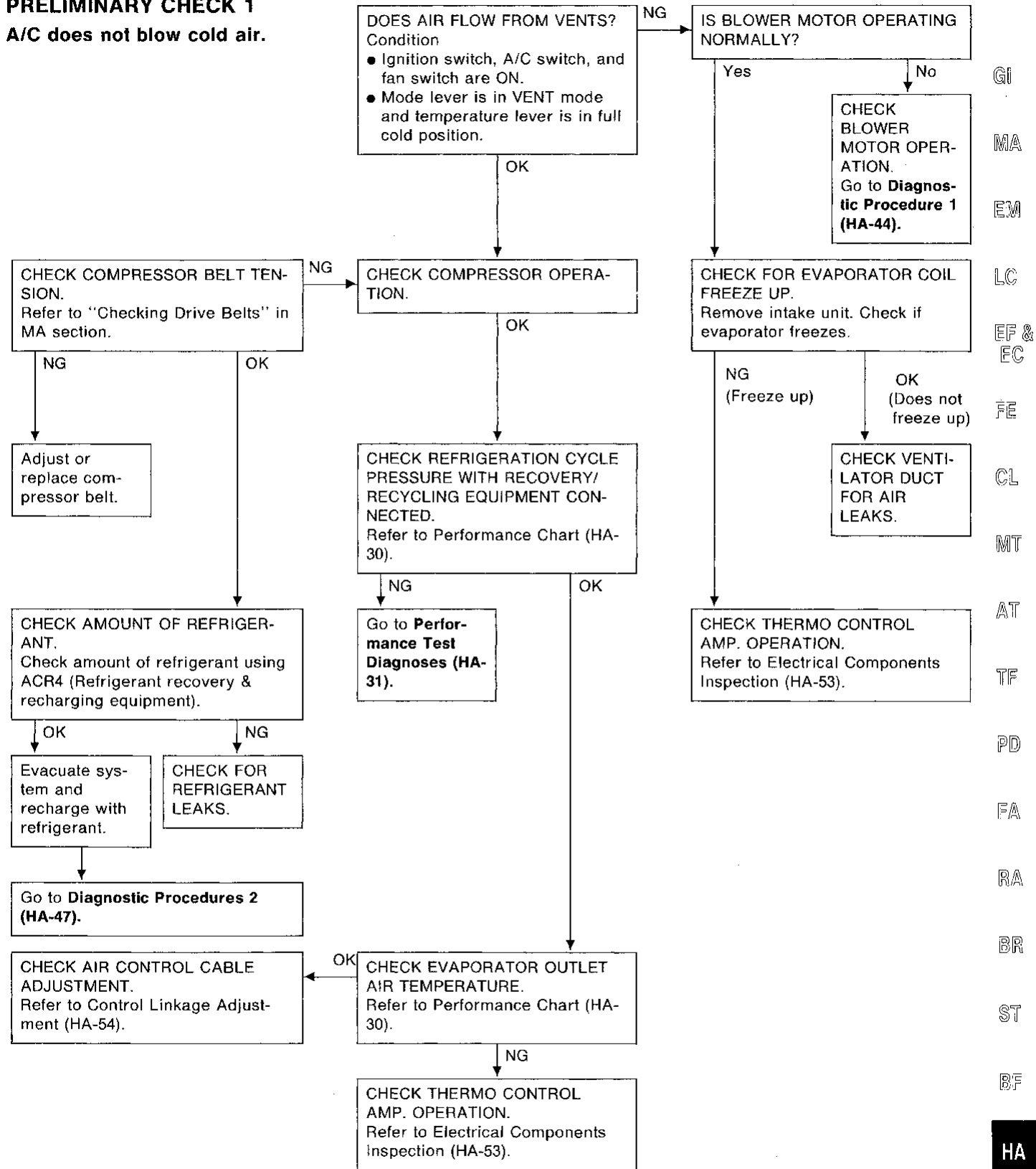
PROCEDURE	Preliminary Check		Diagnostic Procedure		Main Power Supply and Ground Circuit Check			Electrical Components Inspection										
	Preliminary check 1	Preliminary check 2	Diagnostic procedure 1	Diagnostic procedure 2	15A Fuses	10A Fuse	10A Fuse	Blower motor	Resistor	A/C switch	Fan switch	Blower relay	A/C relay	Dual-pressure switch	Compressor		Harness	
SYMPTOM															Magnet clutch	Thermal protector		
A/C does not blow cold air.	❶		○		○	○	○	○	○	○	○	○	○	○	○	○	○	○
Blower motor does not rotate.	❶		❷		○		○	○	○		○	○						○
Magnet clutch does not engage when A/C switch and fan switch are ON.	❶			❷		○	○			○	○	○	○	○	○	○	○	○
Noise		❶																

❶, ❷: The number means checking order.

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

Preliminary Check

PRELIMINARY CHECK 1
A/C does not blow cold air.

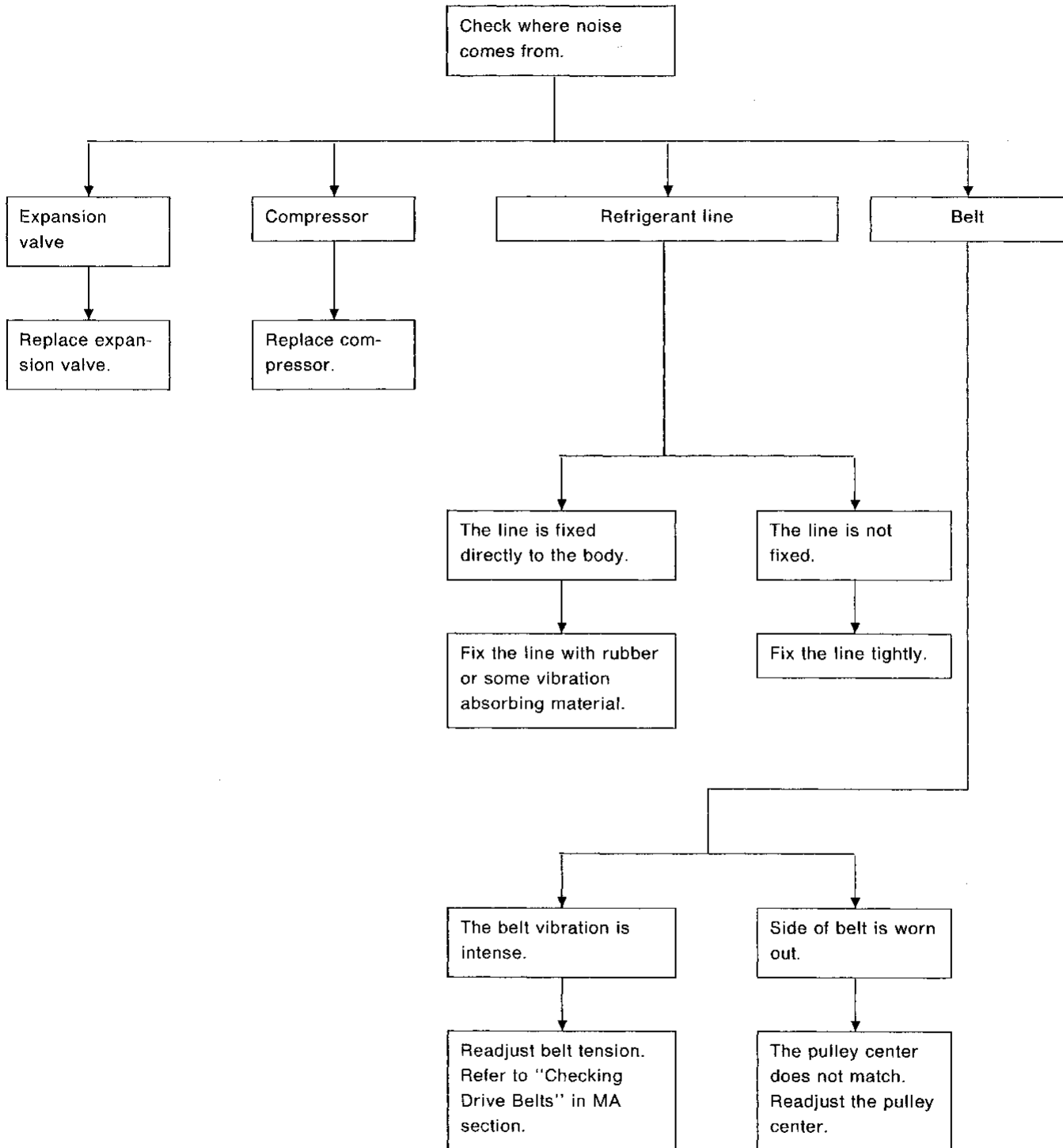


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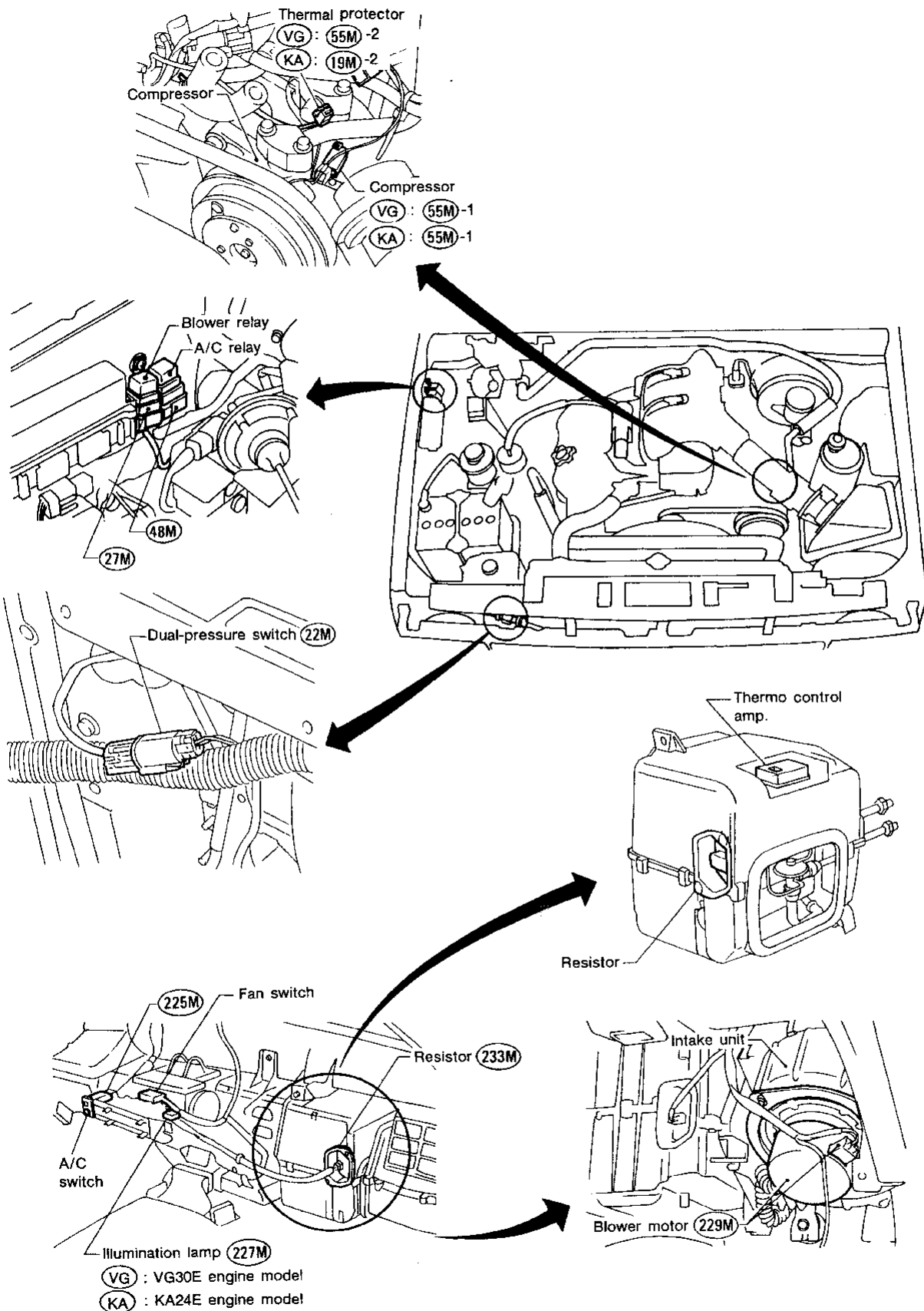
Preliminary Check (Cont'd)

PRELIMINARY CHECK 2

Noise

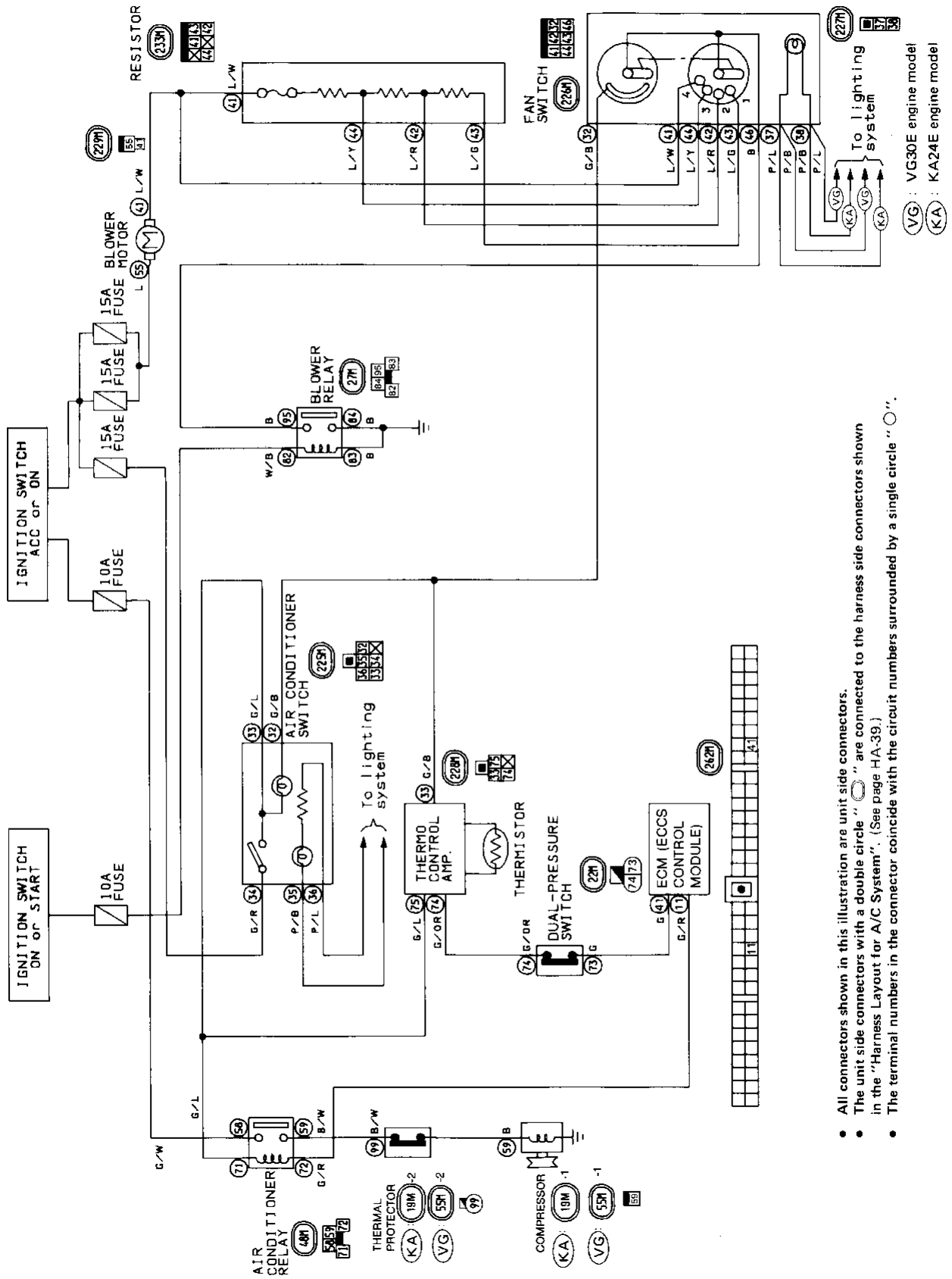


Harness Layout for A/C System



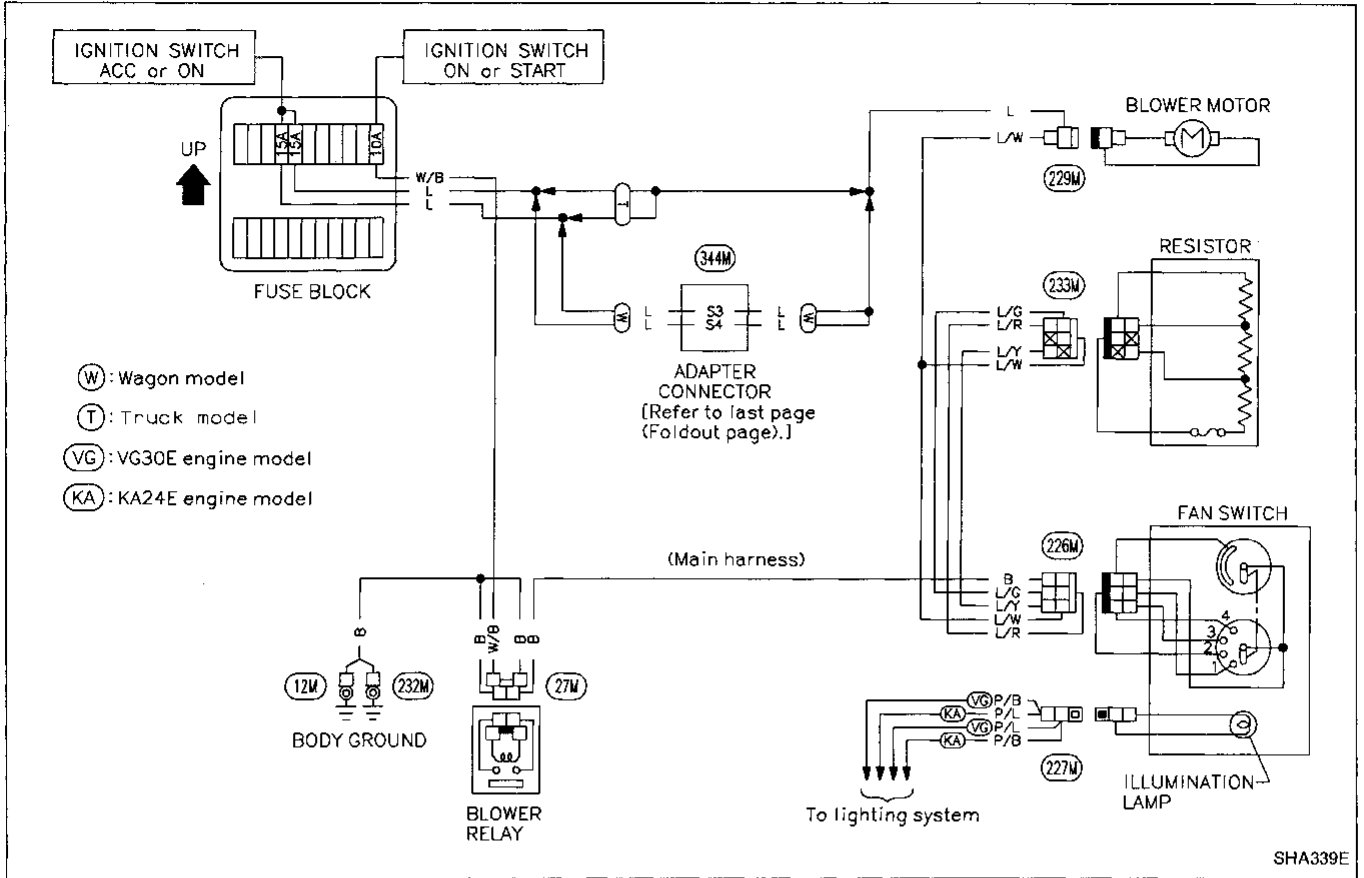
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Circuit Diagram for Quick Pinpoint Check



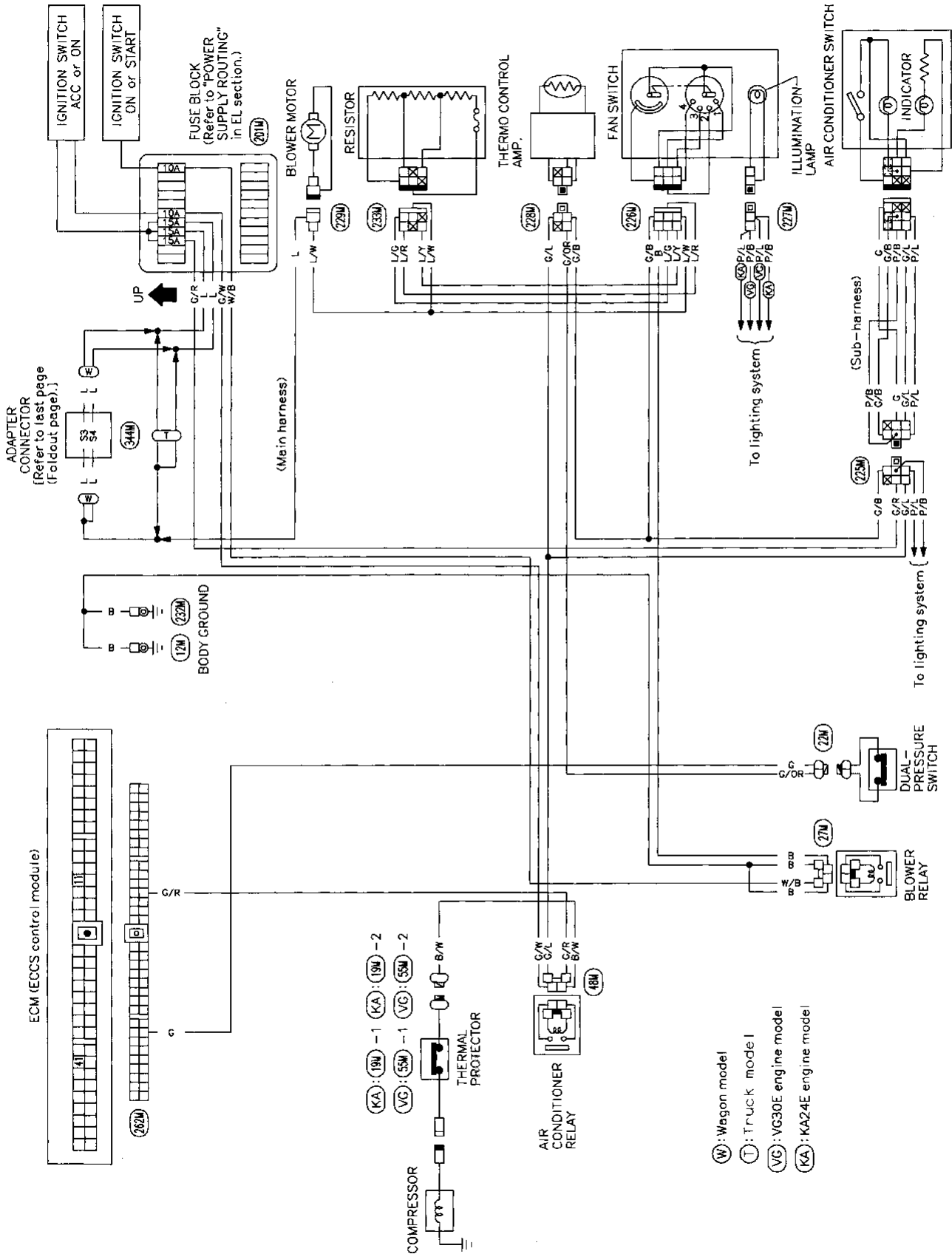
- All connectors shown in this illustration are unit side connectors.
- The unit side connectors with a double circle "⊖" are connected to the harness side connectors shown in the "Harness Layout for A/C System". (See page HA-39.)
- The terminal numbers in the connector coincide with the circuit numbers surrounded by a single circle "○".

Wiring Diagram — Heater



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Wiring Diagram



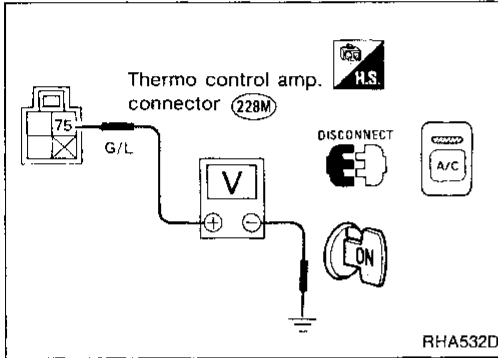
Main Power Supply and Ground Circuit Check

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".

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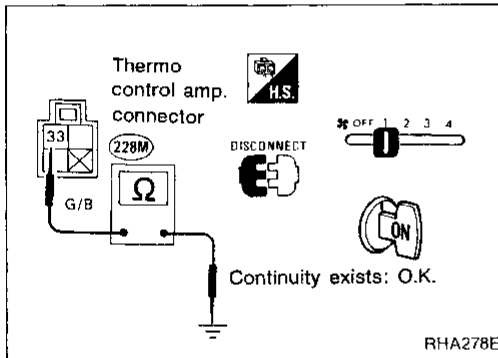


THERMO CONTROL AMP. CHECK

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

1. Disconnect thermo control amp. harness connector.
2. Connect voltmeter from harness side.
3. Measure voltage across terminal No. 75 and body ground.

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



Check body ground circuit for thermo control amp. with ignition switch ON and fan switch ON.

1. Disconnect thermo control amp. harness connector.
2. Connect ohmmeter from harness side.
3. Check for continuity between terminal No. 33 and body ground.

Ohmmeter terminal		Continuity
⊕	⊖	
33	Body ground	Yes

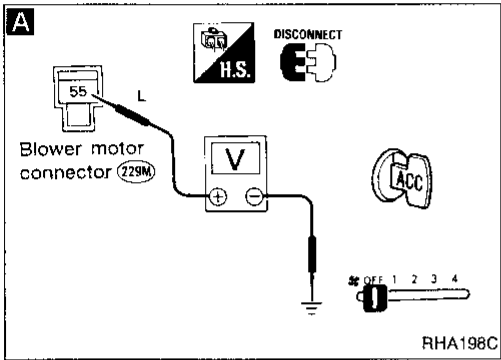
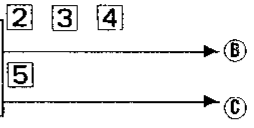
Diagnostic Procedure 1

SYMPTOM: Blower motor does not rotate.

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

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

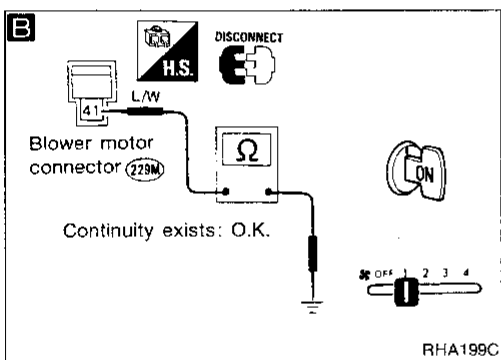
Check if blower motor rotates properly at each fan speed. Conduct check as per flow chart at left.



A

CHECK POWER SUPPLY FOR BLOWER MOTOR.
Disconnect blower motor harness connector. Do approx. 12 volts exist between blower motor harness terminal No. 55 and body ground?

NG → Check 15A fuses at fuse block. (Refer to "POWER SUPPLY ROUTING" in EL section and "Wiring Diagram".)



OK →

B

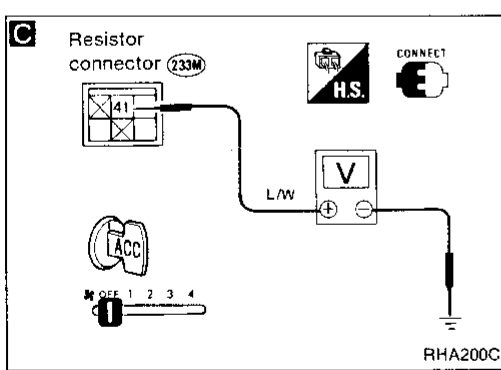
Check circuit continuity between blower motor harness terminal No. 41 and body ground.

NG → Reconnect blower motor harness connector.

OK →

CHECK BLOWER MOTOR.
Refer to Electrical Components Inspection (HA-52).

NG → Replace blower motor.



C

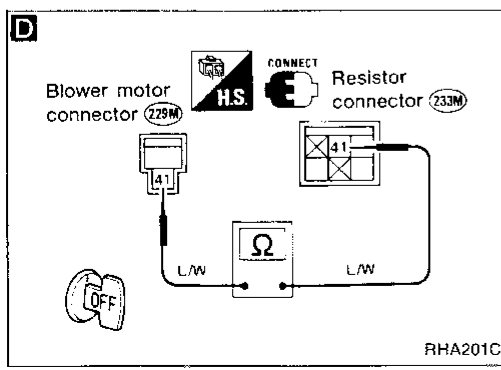
CHECK BLOWER MOTOR CIRCUIT BETWEEN BLOWER MOTOR AND RESISTOR.
Do approx. 12 volts exist between resistor harness terminal No. 41 and body ground?

NG → Disconnect blower motor and resistor harness connectors.

D

Note

Check circuit continuity between blower motor harness terminal No. 41 and resistor harness terminal No. 41.

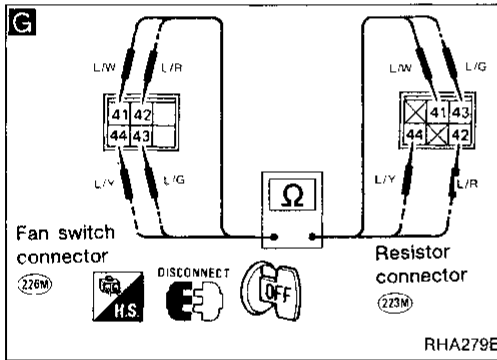
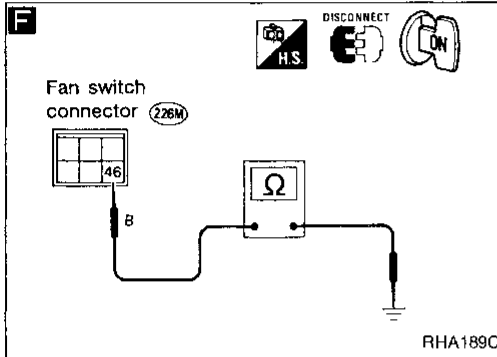
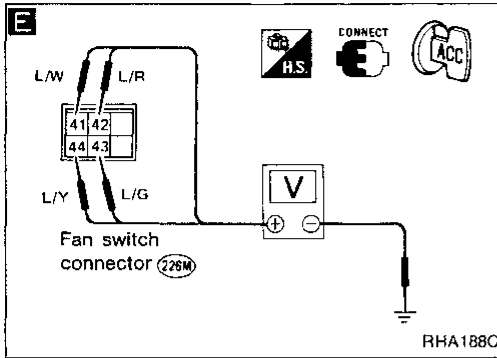


OK →

(Go to next page.)

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

Diagnostic Procedure 1 (Cont'd)



1 ↓ A ↓ B ↓ 2 3 4

CHECK RESISTOR AFTER DISCONNECTING IT.
Refer to Electrical Components Inspection (HA-52).

OK → NG →

Replace resistor.

Reconnect resistor harness connector.

1 2 3 4 5 ↓ C ↓

CHECK FAN SWITCH CIRCUIT.
Do approx. 12 volts exist between each fan switch harness terminal and body ground?

Flow chart No.	Terminal No.		Voltage
	⊕	⊖	
2	43	Body ground	Approx. 12V
3	42		
4	44		
5	41		

OK → 2 3 4 5 ↓

CHECK FAN SWITCH AFTER DISCONNECTING IT.
Refer to Electrical Components Inspection (HA-52).

OK → NG →

Check circuit continuity between fan switch harness terminal No. 46 and body ground.

OK → NG →

Replace blower motor.

Note

Check circuit continuity between fan switch and resistor.

Replace fan switch.

Disconnect blower motor relay harness connector.

ⓐ (Go to next page.)

Note:

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

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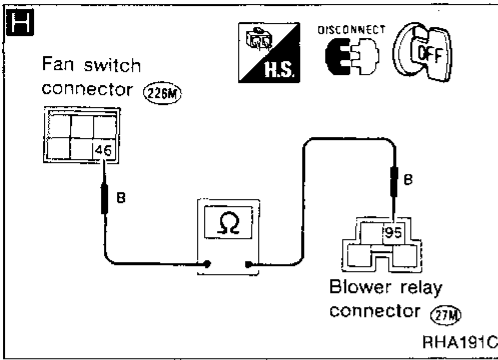
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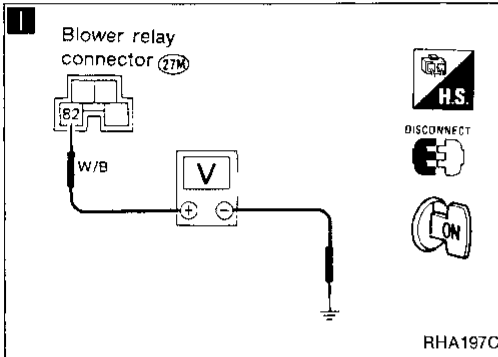
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TROUBLE DIAGNOSES — Manual Air Conditioner

Diagnostic Procedure 1 (Cont'd)

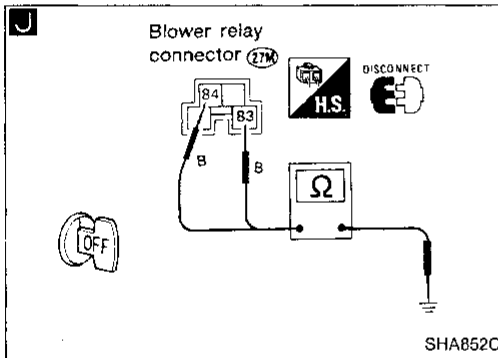


H **Note**
 Check circuit continuity between fan switch harness terminal No. ④⑥ and blower relay harness terminal No. ⑨⑤.



I
CHECK POWER SUPPLY FOR BLOWER RELAY.
 Do approx. 12 volts exist between blower relay 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.)



J **Note**
 Check circuit continuity between blower relay harness terminal No. ⑧④, ⑧③ and body ground.

CHECK BLOWER RELAY AFTER DISCONNECTING IT.
 Refer to Electrical Components Inspection (HA-53).

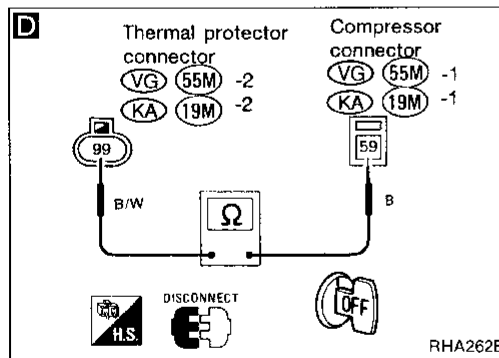
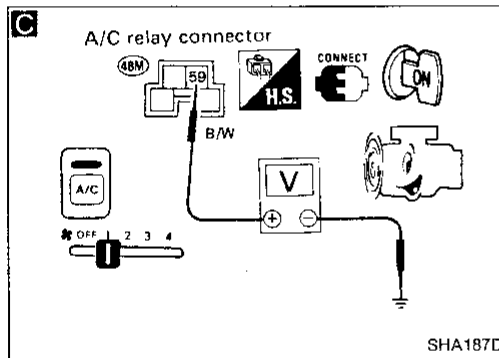
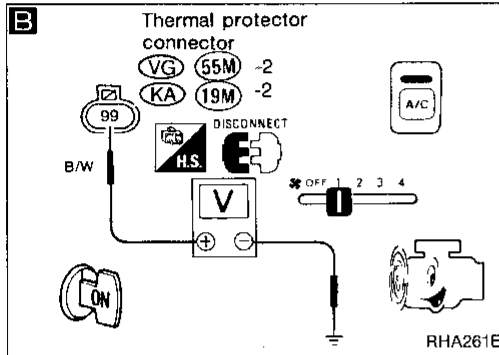
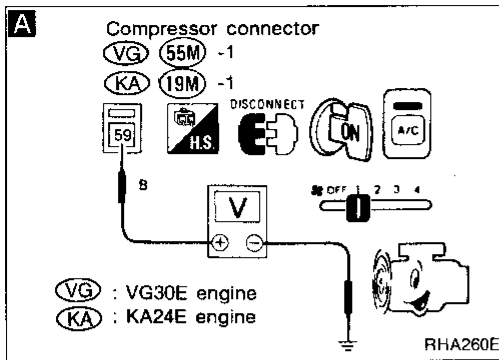
NG → Replace blower relay.

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

Diagnostic Procedure 2

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

- Perform **PRELIMINARY CHECK 1** before referring to the following flow chart.



A CHECK POWER SUPPLY FOR COMPRESSOR.
Disconnect compressor harness connector.
Do approx. 12 volts exist between compressor harness terminal No. 59 and body ground?

Check magnet clutch coil.

Replace magnet clutch.
Refer to COMPRESSOR — Model DKV-14C (ZEXEL make) (HA-24).

B CHECK POWER SUPPLY FOR THERMAL PROTECTOR.
Disconnect thermal protector harness connector.
Do approx. 12V exist between thermal protector harness terminal No. 99 and body ground?

C CHECK A/C RELAY OPERATION.
Do approx. 12 volts exist between A/C relay harness terminal No. 59 and body ground.

D CHECK THERMAL PROTECTOR.
Check circuit continuity between thermal protector harness terminal No. 99 and compressor harness terminal No. 59.

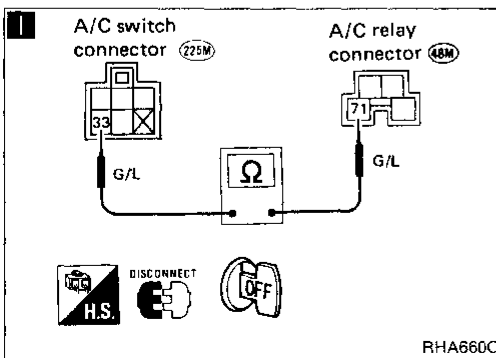
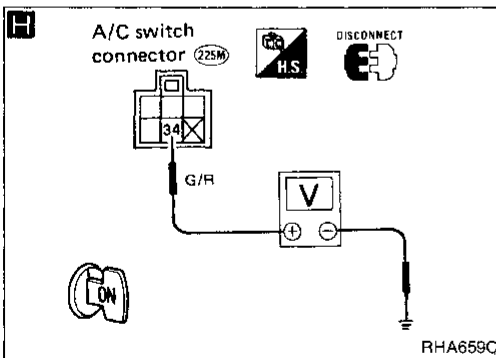
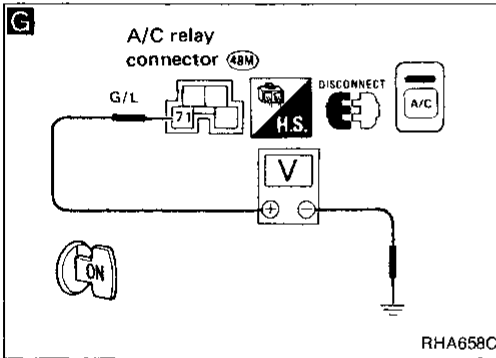
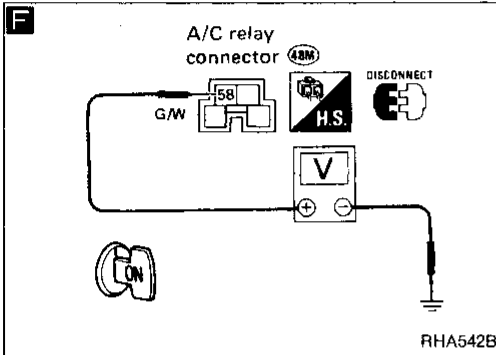
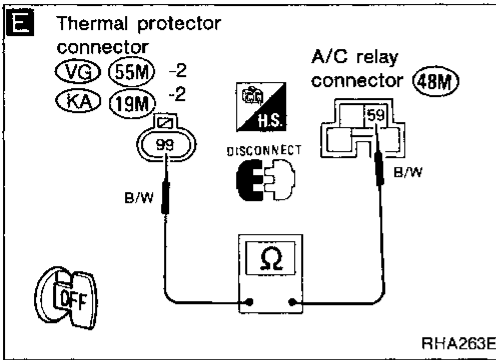
Replace thermal protector.

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

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TROUBLE DIAGNOSES — Manual Air Conditioner

Diagnostic Procedure 2 (Cont'd)



A Disconnect A/C relay harness connector.

E Note: Check circuit continuity between A/C relay harness terminal No. 59 and thermal protector harness terminal No. 99.

B **F** CHECK POWER SUPPLY FOR A/C RELAY. Disconnect A/C relay. Do approx. 12 volts exist between A/C relay harness terminal No. 58 and body ground?

OK → CHECK POWER SUPPLY CIRCUIT AND 10A FUSE AT FUSE BLOCK. (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

NG →

G CHECK POWER SUPPLY FOR A/C RELAY. Do approx. 12 volts exist between A/C relay harness terminal No. 71 and body ground?

OK → **C** (Go to next page.)

NG → **H**

H CHECK POWER SUPPLY FOR A/C SWITCH. Disconnect A/C switch harness connector. Do approx. 12 volts exist between A/C relay harness terminal No. 34 and body ground?

OK →

NG →

CHECK A/C SWITCH. Refer to Electrical Components Inspection (HA-52).

OK →

NG → Replace A/C switch.

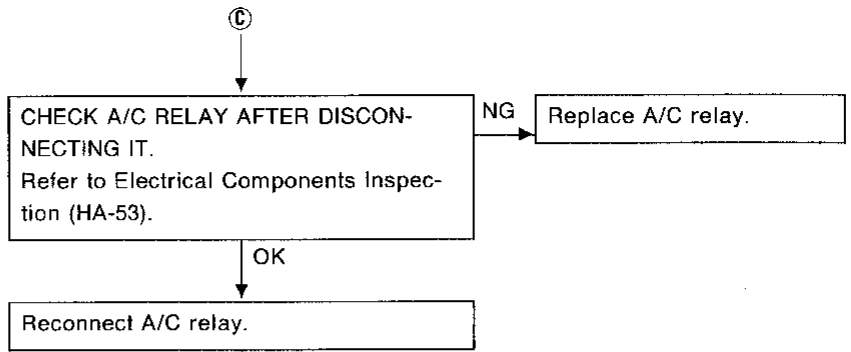
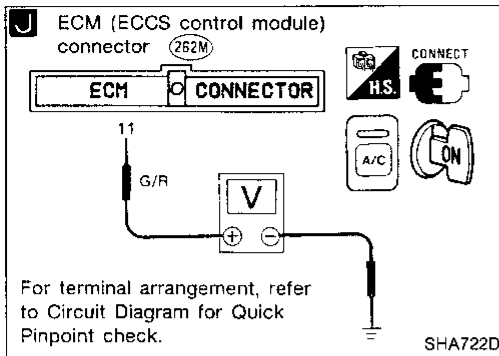
CHECK POWER SUPPLY CIRCUIT AND 10A FUSE AT FUSE BLOCK. (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

I Note: Check circuit continuity between A/C switch harness terminal No. 33 and A/C relay harness terminal No. 71.

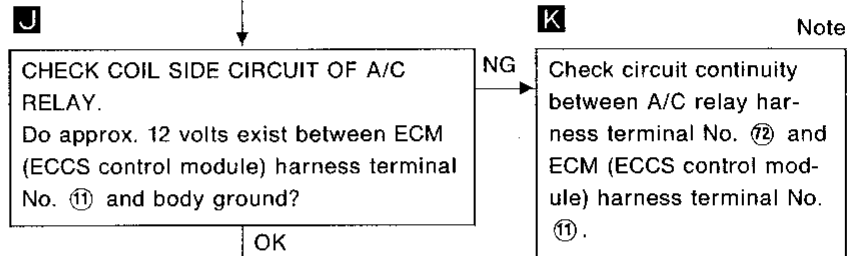
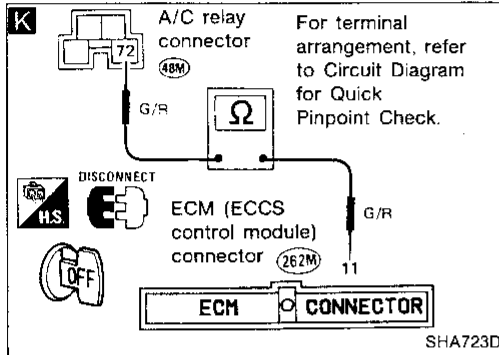
Note: If the result is NG after checking circuit continuity, repair harness or connector.

TROUBLE DIAGNOSES — Manual Air Conditioner

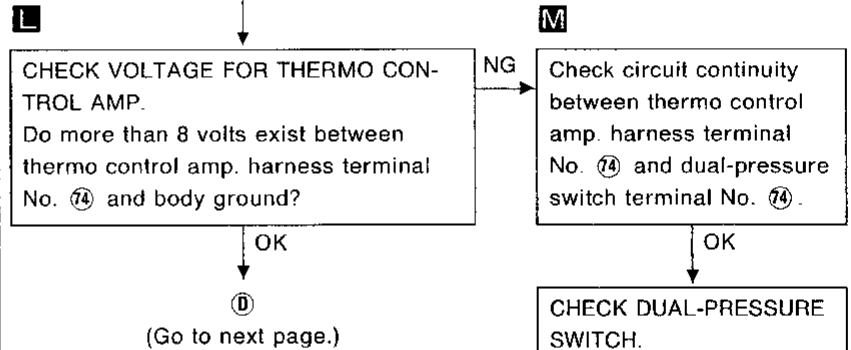
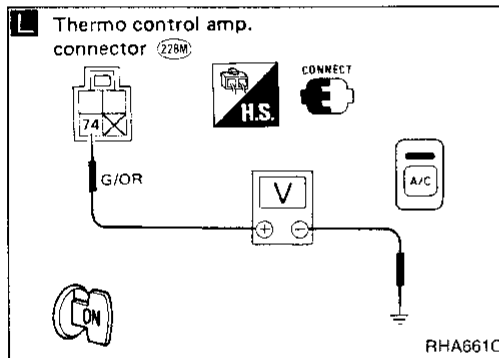
Diagnostic Procedure 2 (Cont'd)



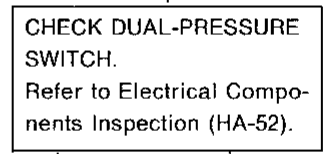
GI
MA
EM



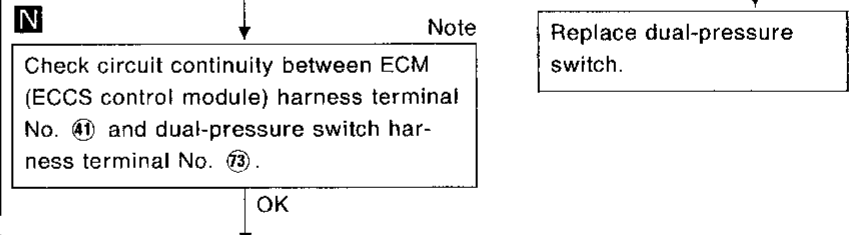
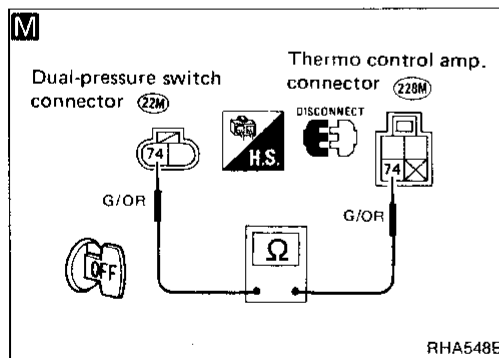
LC
EF & EC
FE



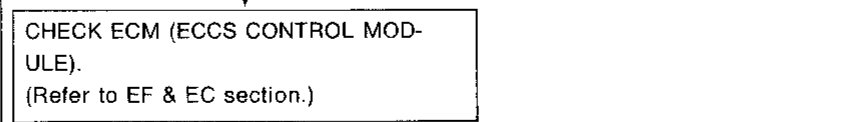
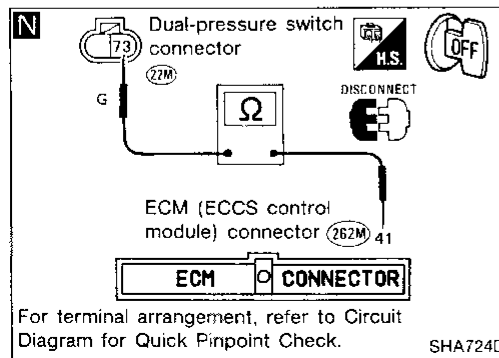
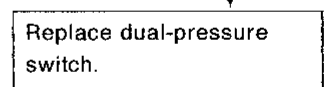
CL
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AT
TF



PD
FA



RA
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ST



BF

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

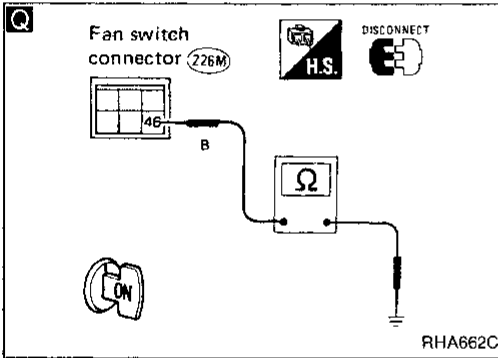
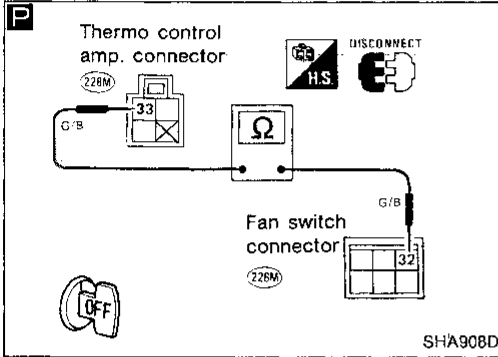
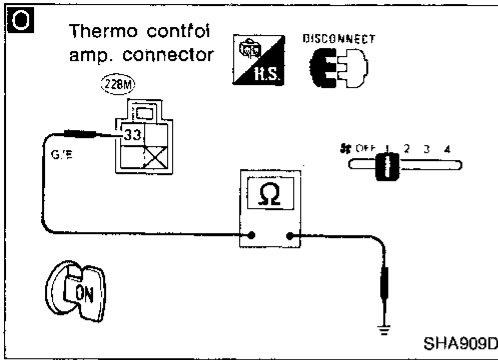
HA

EL

IDX

TROUBLE DIAGNOSES — Manual Air Conditioner

Diagnostic Procedure 2 (Cont'd)



D

CHECK POWER SUPPLY FOR THERMO CONTROL AMP.
Go to Main Power Supply and Ground Circuit Check.

OK

O

CHECK BODY GROUND CIRCUIT FOR THERMO CONTROL AMP.
Disconnect thermo control amp. harness connector.
Does continuity exist between thermo control amp. harness terminal No. ③③ and body ground?

NG → Disconnect fan switch harness connector.

P Note
Check circuit continuity between thermo control amp. harness terminal No. ③③ and fan switch harness terminal No. ③②.

OK

Replace thermo control amp.

OK

Q Note
CHECK BODY GROUND CIRCUIT FOR FAN SWITCH.
Does continuity exist between fan switch harness terminal No. ④④ and body

NG → **E** (Go to next page.)

OK

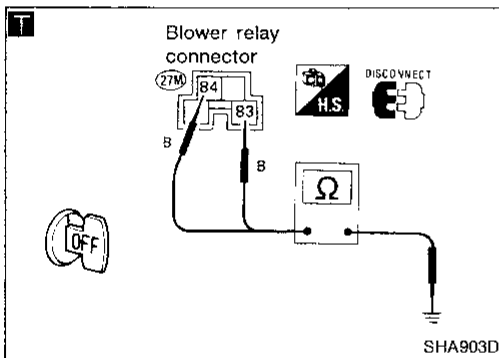
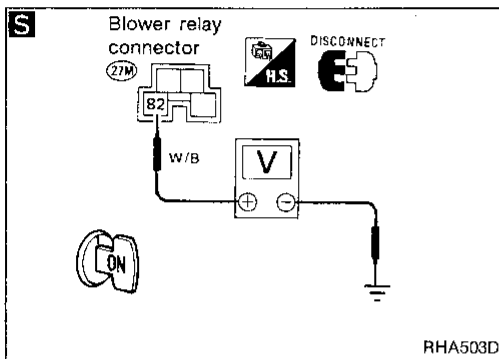
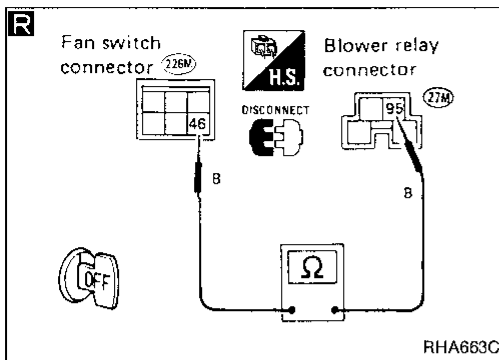
CHECK FAN SWITCH.
Refer to Electrical Components Inspection (HA-52).

Replace fan switch.

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

TROUBLE DIAGNOSES — Manual Air Conditioner

Diagnostic Procedure 2 (Cont'd)



E

Disconnect blower relay harness connector.

R Note

Check circuit continuity between fan switch harness terminal No. 46 and blower relay harness terminal No. 95.

OK

S

CHECK POWER SUPPLY FOR BLOWER RELAY.
Do approx. 12 volts exist between blower relay 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

T Note

Check circuit continuity between blower relay harness terminal No. 83, 84 and body ground.

OK

CHECK BLOWER RELAY AFTER DISCONNECTING IT.
Refer to Electrical Components Inspection (HA-53).

NG

Replace blower relay.

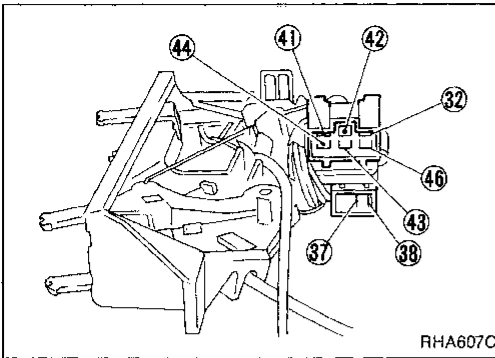
Note:
If the result is NG after checking circuit continuity, repair harness or connector.

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Electrical Components Inspection

FAN SWITCH

Check continuity between terminals at each switch position.



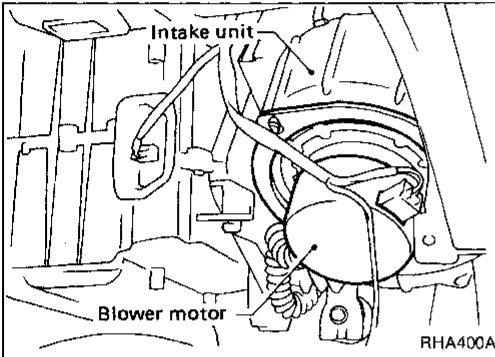
TERMINAL	LEVER POSITION	OFF	1	2	3	4
41						○
43		○				
42			○			
44				○		
46			○	○	○	○
32						○
37		○	○	○	○	○
38						○

Illumination lamp

BLOWER MOTOR

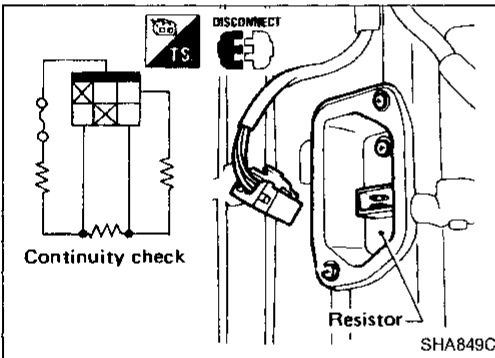
Confirm smooth rotation of the blower motor.

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



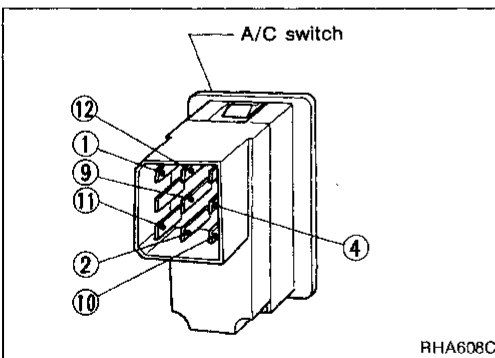
BLOWER RESISTOR

Check continuity between terminals.



A/C SWITCH

Check continuity between terminals at each switch position.

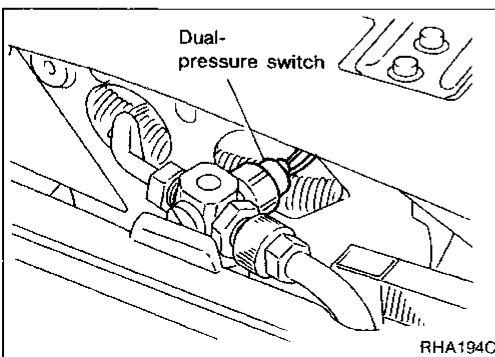


	ON	OFF
1	○	○
10	○	○
9	○	○
11	○	○
12	○	○
2	○	○
4	○	○

A/C indicator lamp

Illumination lamp (A/C)

DUAL-PRESSURE SWITCH

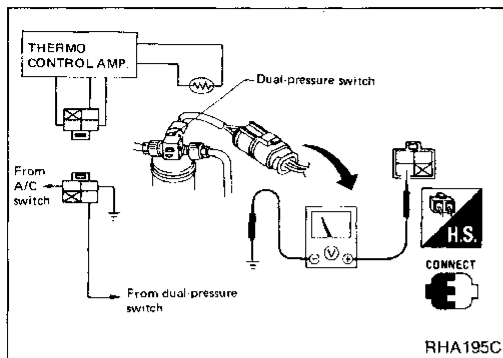


High-pressure side line pressure kPa (kg/cm ² , psi)	Operation	Continuity
Decreasing to 157 - 216 (1.6 - 2.2, 23 - 31) Increasing to 2,452 - 2,844 (25 - 29, 356 - 412)	Turn OFF	Does not exist
Increasing to 157 - 235 (1.6 - 2.4, 23 - 34) Decreasing to 1,863 - 2,256 (19 - 23, 270 - 327)	Turn ON	Exists

TROUBLE DIAGNOSES — Manual Air Conditioner

Electrical Components Inspection (Cont'd)

THERMO CONTROL AMP.



Evaporator outlet air temperature °C (°F)	Thermo amp. operation	Tester
Decreasing to 0.1 - 0.9 (32 - 34)	Turn OFF	Approx. 12V
Increasing to 2.5 - 3.5 (37 - 38)	Turn ON	Approx. 0V

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EF &
EC

FE

CL

MT

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PD

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BR

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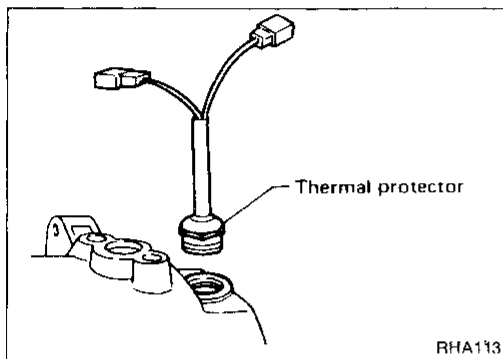
BF

HA

EL

IDX

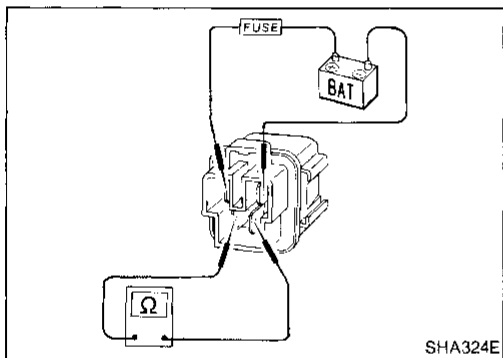
THERMAL PROTECTOR



Temperature of compressor °C (°F)	Operation
Increasing to approx. 145 - 155 (293 - 311)	Turn OFF
Decreasing to approx. 130 - 140 (266 - 284)	Turn ON

A/C RELAY AND BLOWER RELAY

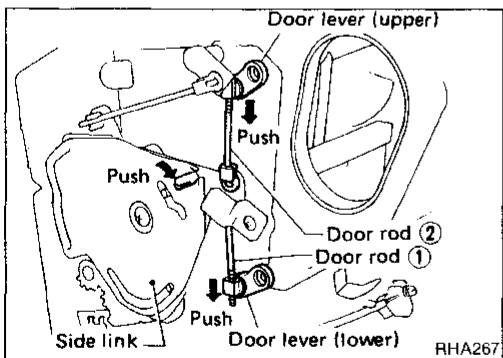
Check circuit continuity between terminals by supplying 12 volts to coil side terminal of relay.



Control Linkage Adjustment

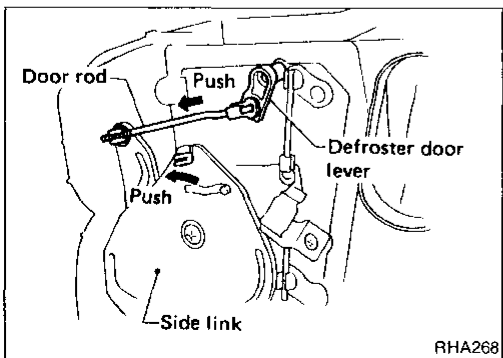
VENTILATOR DOOR CONTROL ROD

1. Move side link in direction of arrow.
2. With upper and lower ventilator door levers held in the direction of the arrow, connect rods ① and ② to their corresponding ventilator door levers in that order.



DEFROSTER DOOR CONTROL ROD


1. Move side link in direction of arrow.
2. Connect rod to side link while pushing defroster door lever in direction of arrow.



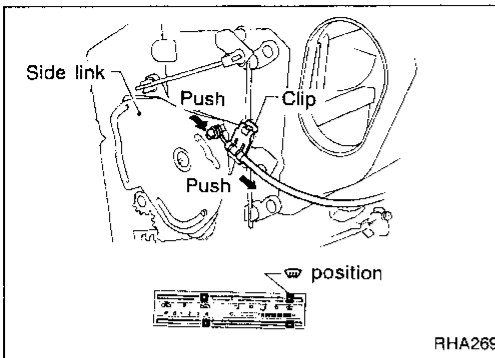
TROUBLE DIAGNOSES — Manual Air Conditioner

Control Linkage Adjustment (Cont'd)

AIR CONTROL CABLE

- Move air control lever to  position.
Set side link in DEF mode.
Pull on outer cable in direction of arrow and then clamp it.

After positioning control cable, check it operates properly.

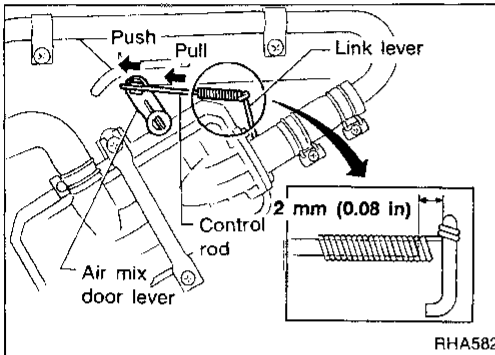


WATER COCK CONTROL ROD

- When adjusting water cock control rod, first disconnect temperature control cable from air mix door lever and then adjust control rod. Reconnect temperature control cable and readjust it. (Refer to next item.)

1. Push air mix door lever in direction of arrow.
2. Pull control rod of water cock in direction of arrow so as to make clearance of about 2 mm (0.08 in) between ends of rod and link lever and connect the rod to door lever.

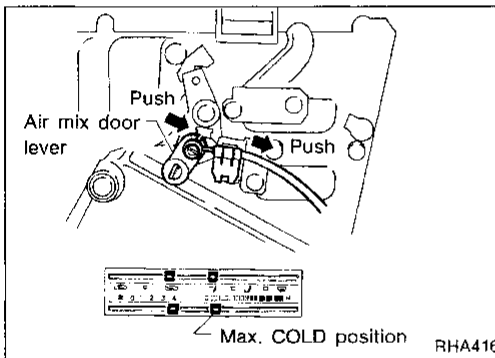
After connecting control rod, check it operates properly.




TEMPERATURE CONTROL CABLE

- When adjusting ventilator door rod and defroster door rod, first disconnect air control cable from side link. Reconnect and readjust air control cable.
- Move temperature control lever to max. COLD position. Set air mix door lever in full hot mode. Pull on outer cable in direction of arrow and then clamp it.

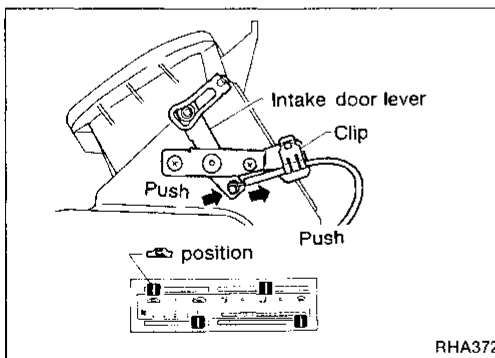
After positioning control cable, check it operates properly.



INTAKE DOOR CONTROL CABLE

- Move intake door lever to  position.
Set intake door lever in REC mode.
Pull on outer cable in direction of arrow and then clamp it.

After positioning control cable, check it operates properly.



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TROUBLE DIAGNOSES — Auto Air Conditioner

Symptom Chart

DIAGNOSTIC TABLE

PROCEDURE	Preliminary Check					Diagnostic Procedure															Main Power Supply and Ground Circuit Check					
	Preliminary check 1	Preliminary check 2	Preliminary check 3	Preliminary check 4	Preliminary check 5	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	Diagnostic Procedure 12	Diagnostic Procedure 13	Diagnostic Procedure 14	Diagnostic Procedure 15	15A Fuses	10A Fuse	10A Fuse	Push control unit	Auto amp.	
A/C does not blow cold air.		①				○																○	○	○	○	○
Blower motor does not rotate at all. (Fan switch [AUTO] [1] [2] [3])		①				②																○		○		
Blower motor does not rotate at all when the fan speed is in AUTO. (It operates in 1, 2, or 3-speed only)							①															○		○	○	
Blower motor fan speed does not change when fan speed is in AUTO. (Fan speed is fixed in Hi or MH.)								①														○		○	○	
Blower motor fan speed does not change when fan speed is in AUTO. (Fan speed is fixed in LO.)									①													○		○	○	
Starting fan speed control does not operate.										①														○	○	
There is too much difference between setting temp. on PTC and in-vehicle temp.		①									②												○	○	○	
Air mix door motor does not operate normally.		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 when A/C switch and fan switch are ON.		①													②								○	○		
Magnet clutch does not engage in DEF mode.		①	②												○								○	○		
Ambient sensor circuit is open or shorted.																①								○	○	
In-vehicle sensor circuit is open or shorted.																	①							○	○	
Sunload sensor circuit is open or shorted.																		①						○	○	
Water temperature sensor circuit is open or shorted.																			①					○	○	
Illumination or indicators of push control unit do not come on.																				○			○	○		
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 — Auto Air Conditioner

Symptom Chart (Cont'd)

Electrical Components Inspection

	Blower motor	Resistor	A/C switch	REC switch	VENT switch	B/L switch	FOOT switch	F/D switch	DEF switch	Fan switch	PTC	Air mix door motor	PBR	Mode door motor	Intake door motor	Auto amp.	Ambient sensor	In-vehicle sensor	Sunload sensor	Water temperature sensor	A/C relay	Auto amp. relay	Blower relay	LO relay	ML relay	MH relay	HI relay	Thermo control amp.	Dual-pressure switch	Magnet clutch	Thermal protector	ECM (ECCS control module)	Illumination system	Microswitch	Aspirator motor	Harness
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Checking Resistor

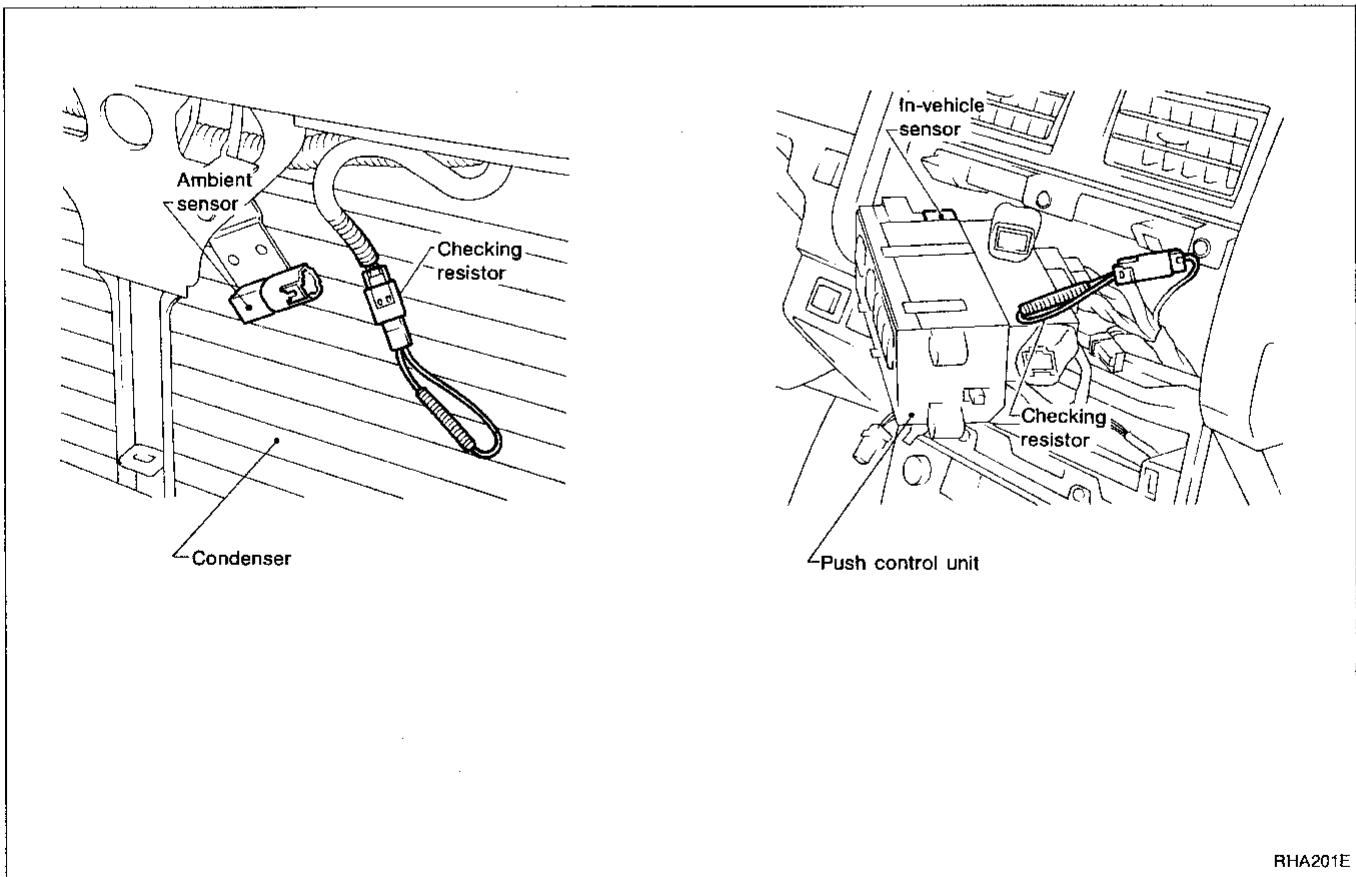
Checking resistors are used for trouble diagnoses of blower motor operation and air mix door motor operation. Use checking resistor when inspecting portions with **C/R** *1, **C/R** *2 in flow chart.

CAUTION:

Select checking resistors which have resistance values corresponding with those indicated in table below, and connect to respective sensors.

	Checking resistor	Ambient sensor	In-vehicle sensor	Wattage
Blower motor operation check	C/R *1	1,000Ω	1,500Ω	1/4W
Air mix door motor operation check	C/R *2		2,490Ω	

1. Disconnect ambient sensor and in-vehicle sensor harness connectors.
2. Connect checking resistor as shown in figure.
3. Turn ignition switch ON.
4. Turn A/C switch ON.
5. Turn VENT switch ON.
6. Keep sunload sensor away from sunlight by covering it.

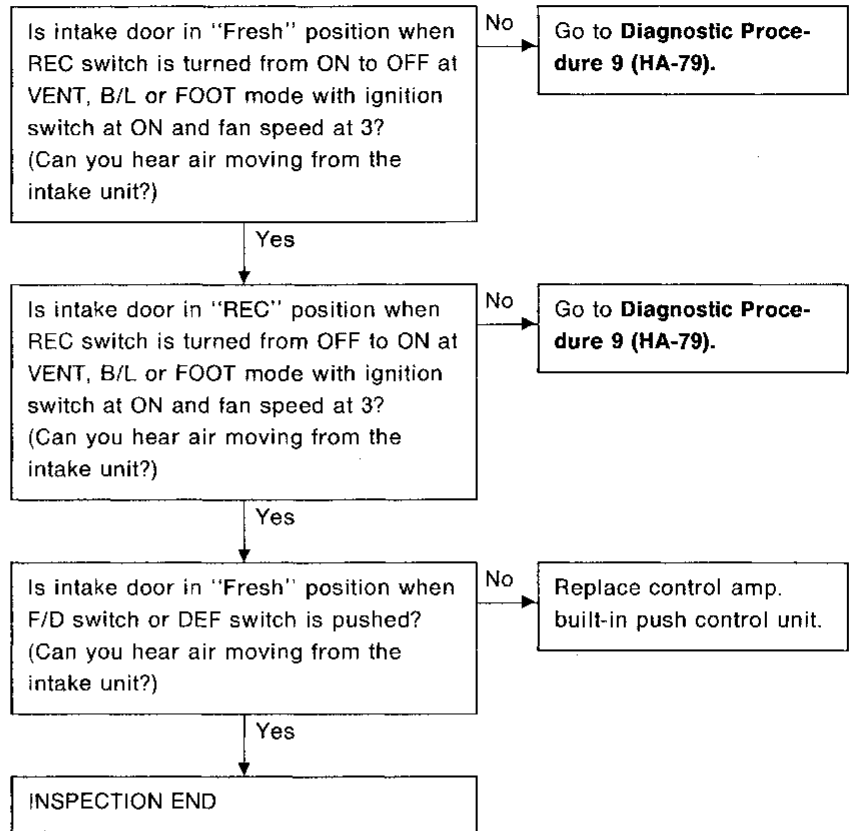


RHA201E

Preliminary Check

PRELIMINARY CHECK 1

Intake door is not set at "FRESH" in DEF or F/D mode.



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PRELIMINARY CHECK 2

A/C does not blow cold air.

Refer to HA-37.

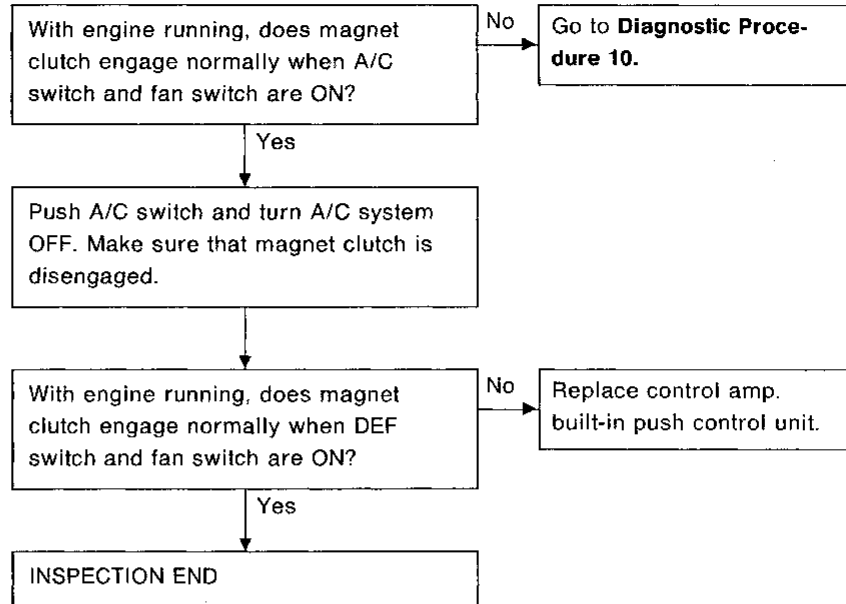
TROUBLE DIAGNOSES — Auto Air Conditioner

Preliminary Check (Cont'd)

PRELIMINARY CHECK 3

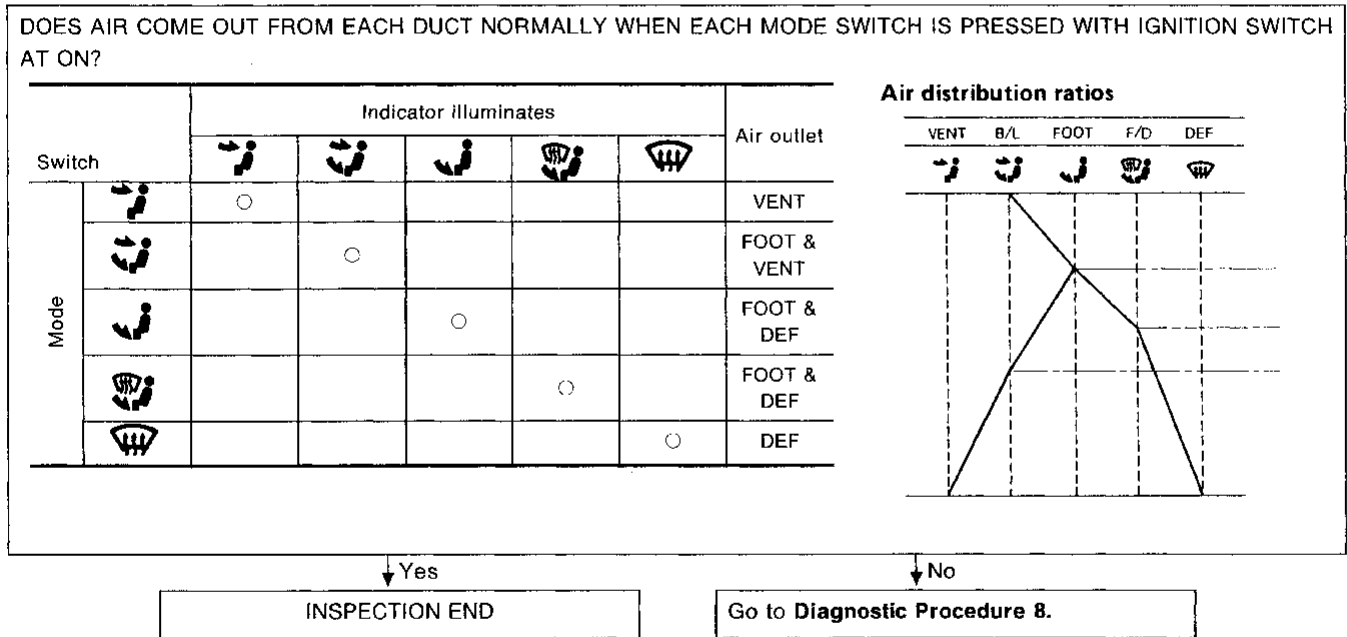
Magnet clutch does not engage in DEF mode.

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



PRELIMINARY CHECK 4

Air outlet does not change.



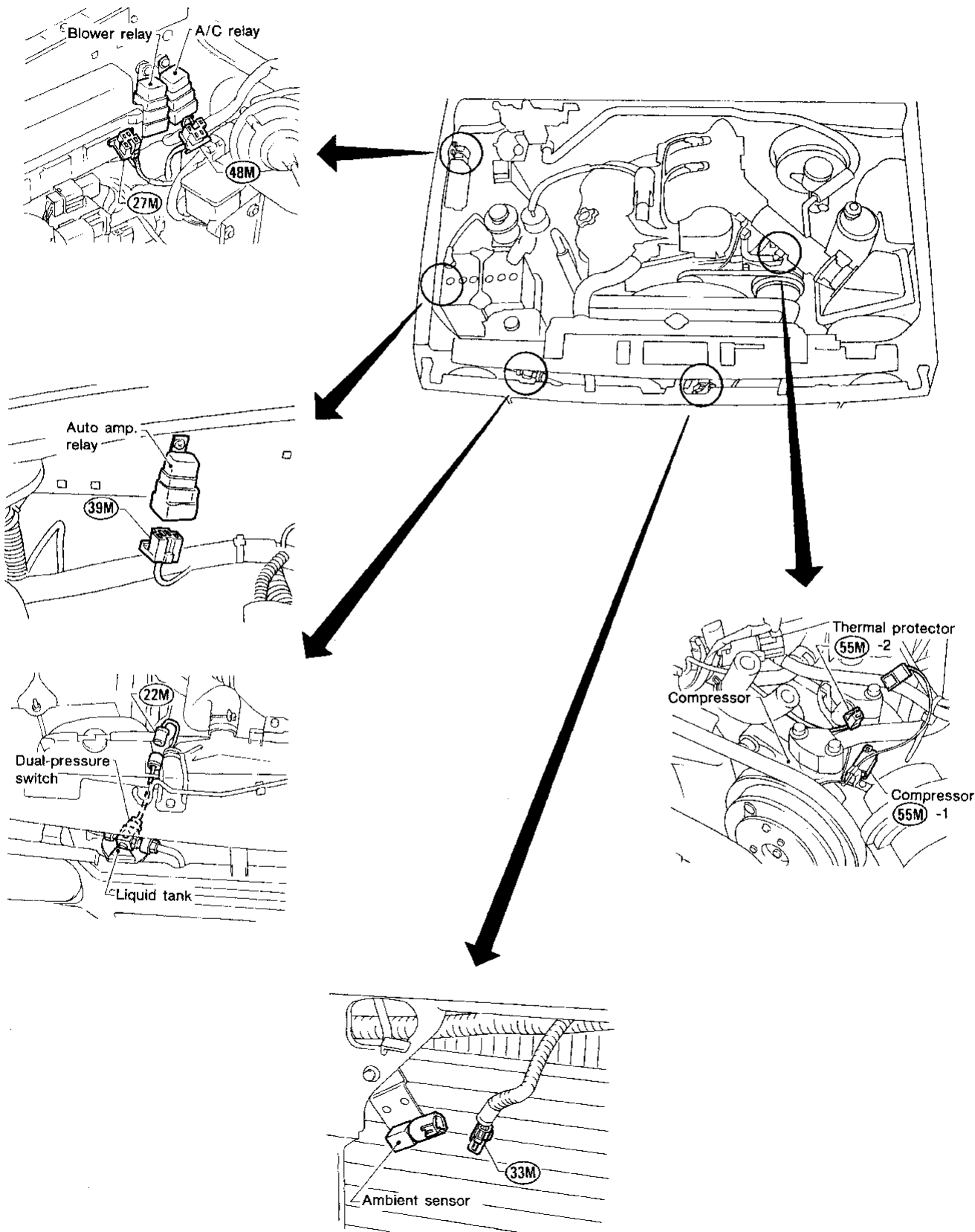
PRELIMINARY CHECK 5

Noise

Refer to HA-38.

Harness Layout for A/C System

Engine compartment

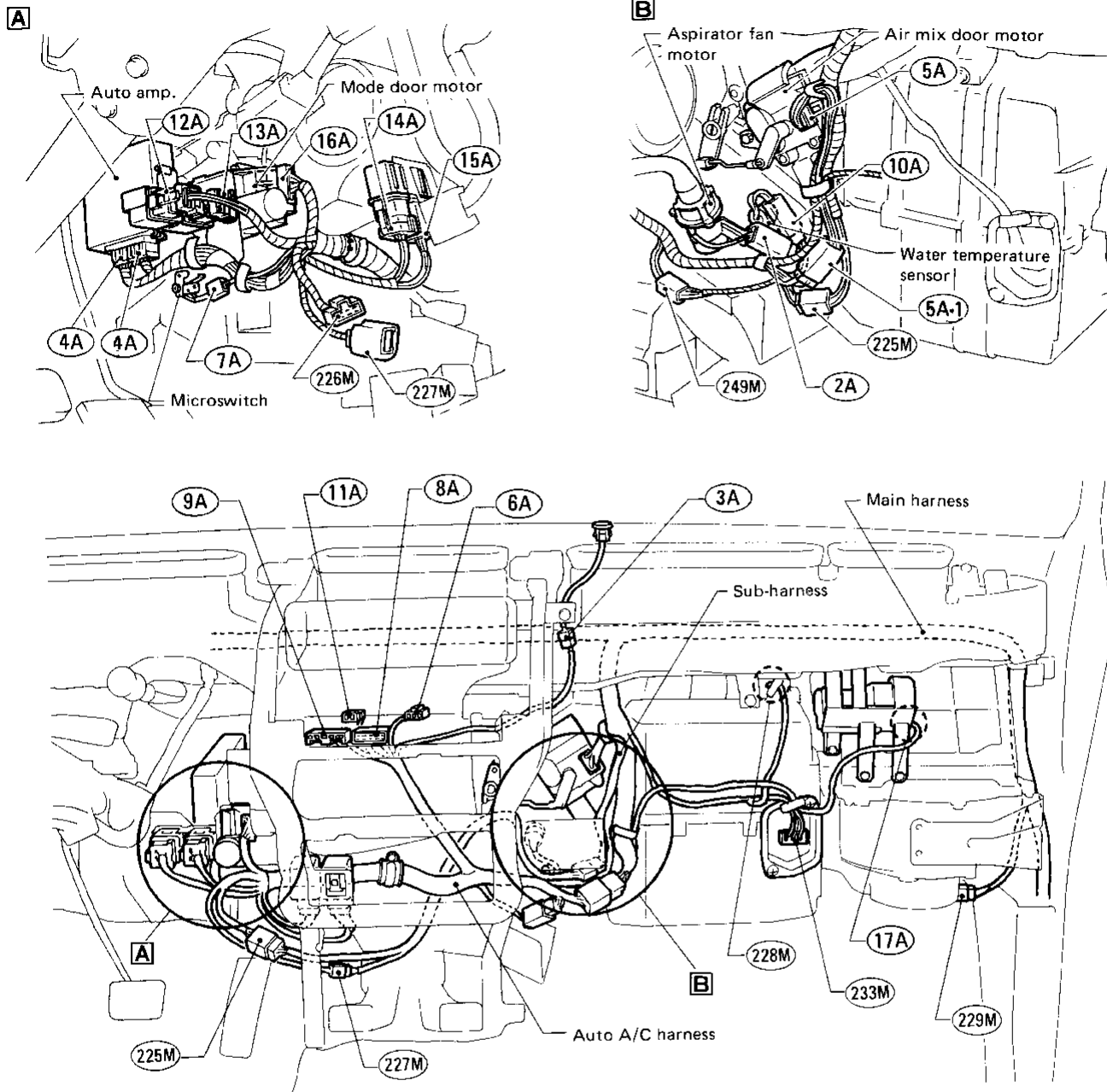


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TROUBLE DIAGNOSES — Auto Air Conditioner

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

Passenger compartment



Main harness

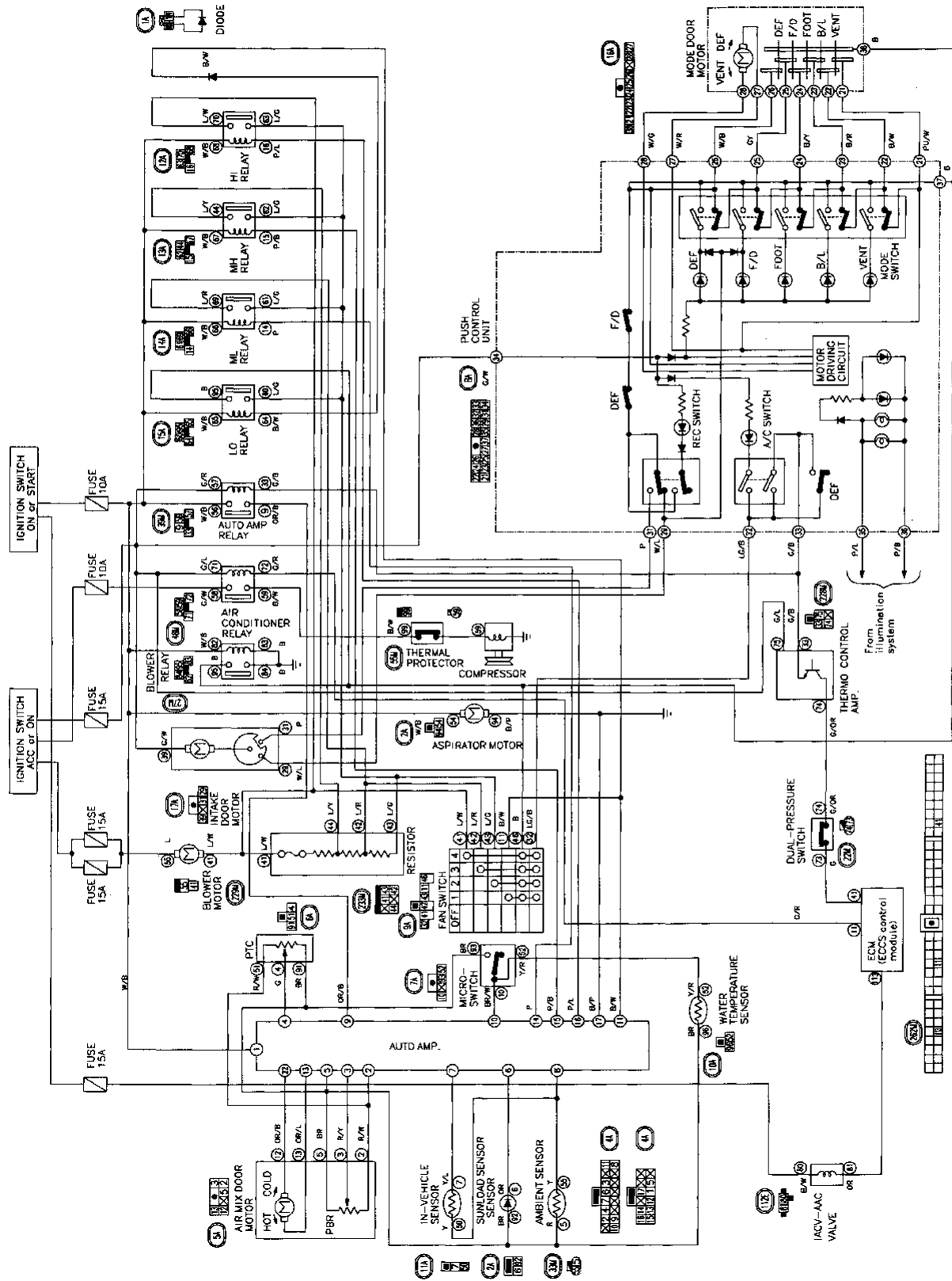
- (22M) : Dual-pressure switch
- (27M) : Blower relay
- (33M) : Ambient sensor
- (48M) : A/C relay
- (55M) : Compressor
- (225M) : Auto A/C harness
- (228M) : Thermo control amp.
- (229M) : Blower motor
- (233M) : Resistor

Auto A/C harness

- (2A) : Aspirator motor
- (3A) : Sunload sensor
- (4A) : Auto amp.
- (4A) : Auto amp.
- (5A) : Air mix door motor
- (6A) : PTC
- (7A) : Microswitch
- (8A) : Push control unit

- (9A) : Fan switch
- (10A) : Water temperature sensor
- (11A) : In-vehicle sensor
- (12A) : HI relay (Taping color: Yellow)
- (13A) : MH relay (Taping color: Blue)
- (14A) : ML relay (Taping color: White)
- (15A) : LO relay
- (16A) : Mode door motor
- (17A) : Intake door motor

Circuit Diagram for Quick Pinpoint Check

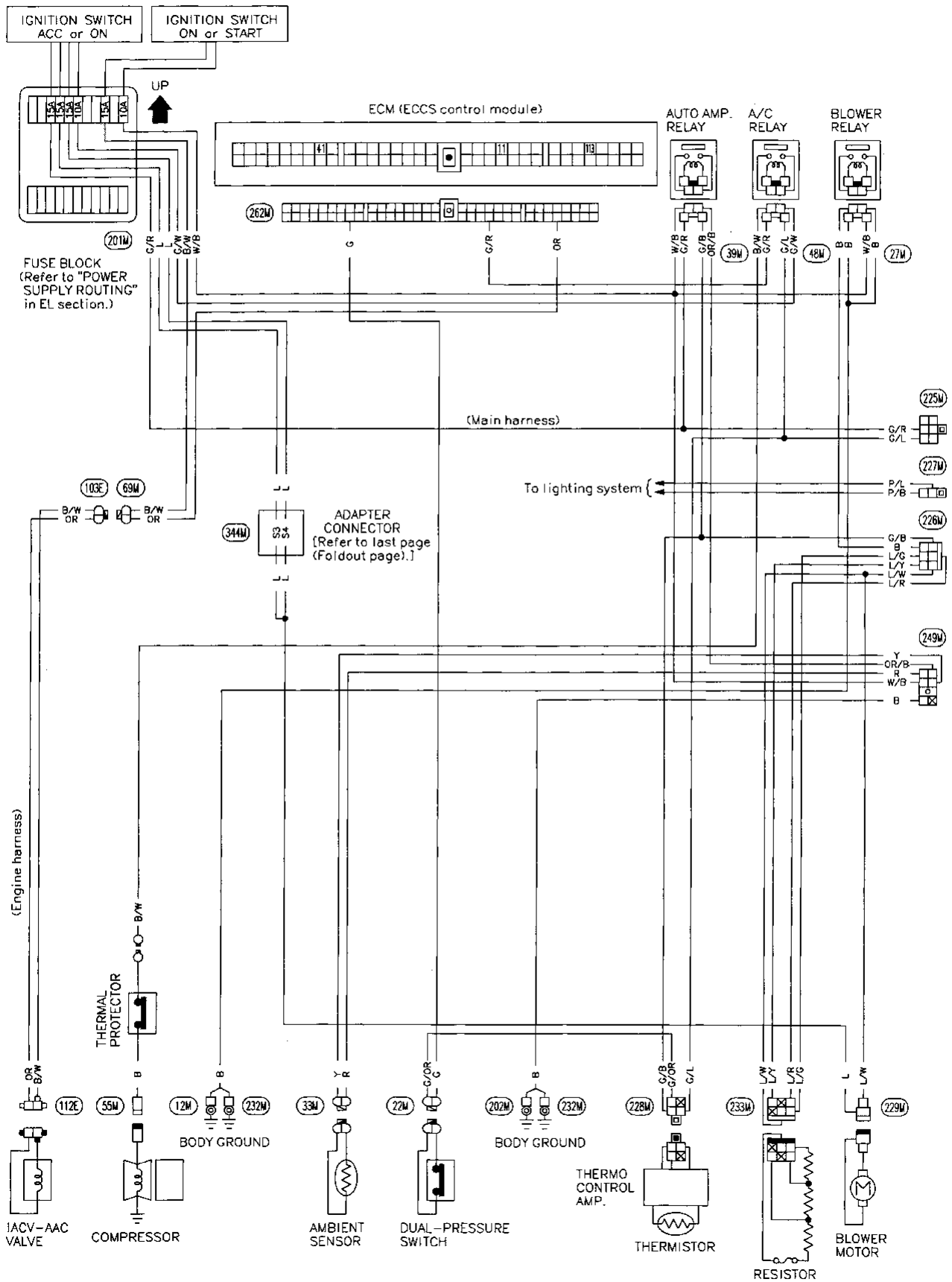


- All connectors shown in this illustration are unit side connectors.
- The unit side connectors with a double circle "O" are connected to the harness side connectors shown in the "Harness Layout for A/C System". (See pages HA-61, HA-62.)
- The terminal numbers in the connector coincide with the circuit numbers surrounded by a single circle "O".
- *: These switches are built into push control unit and mechanically linked to corresponding switches.

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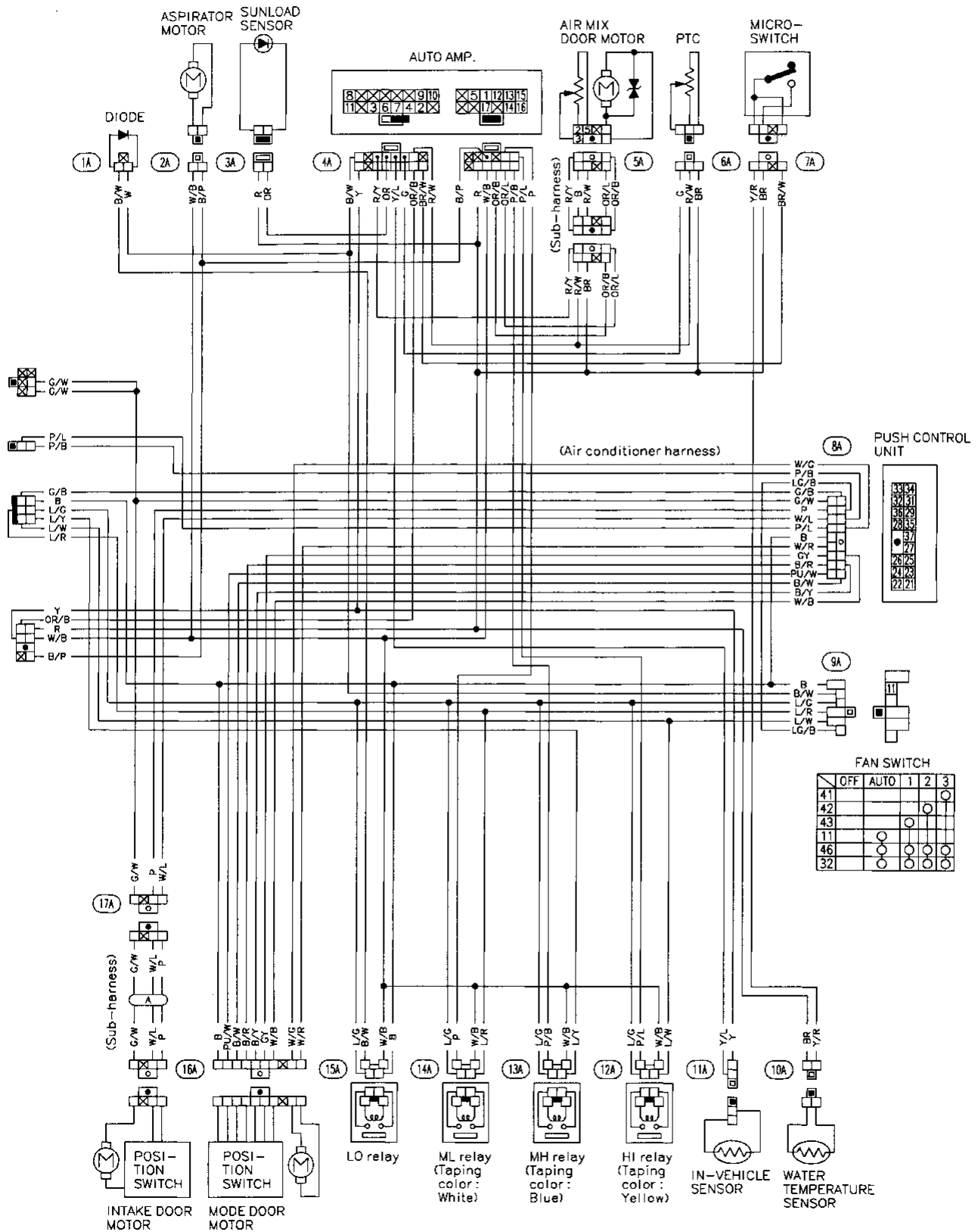
TROUBLE DIAGNOSES — Auto Air Conditioner

Wiring Diagram



TROUBLE DIAGNOSES — Auto Air Conditioner

Wiring Diagram (Cont'd)



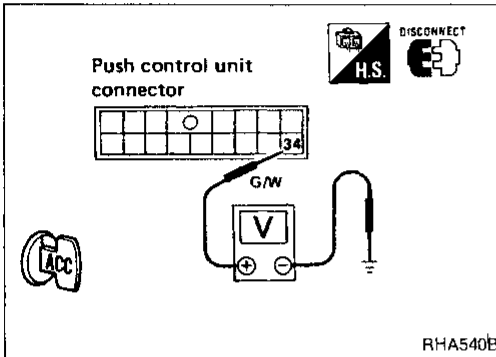
(A) : A/C kit only

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HA

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.

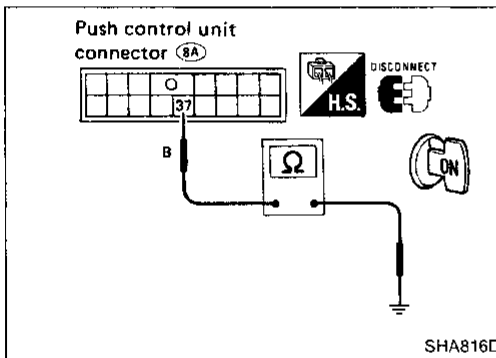


PUSH CONTROL UNIT CHECK

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

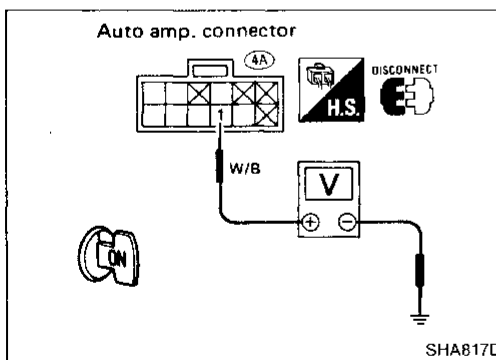
1. Disconnect push control unit harness connector.
2. Connect voltmeter from harness side.
3. Measure voltage across terminal No. ③④ and body ground.

Voltmeter terminal		Voltage
⊕	⊖	
③④	Body ground	Approx. 12V



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

1. Disconnect push control unit harness connector.
2. Connect ohmmeter from harness side.
3. Check for continuity between terminal No. ③⑦ and body ground.

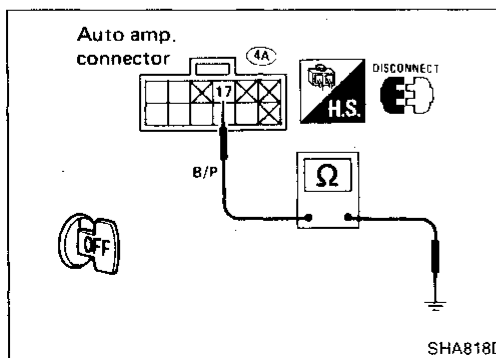


AUTO AMP. CHECK

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

1. Disconnect auto amp. harness connector.
2. Connect voltmeter from harness side.
3. Measure voltage across terminal No. ① and body ground.

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



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

1. Disconnect auto amp. harness connector.
2. Connect ohmmeter from harness side.
3. Check for continuity between terminal No. ⑰ and body ground.

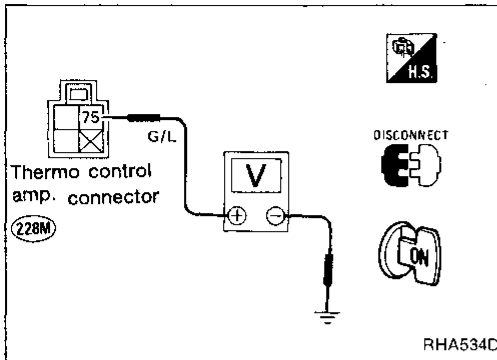
Ohmmeter terminal		Continuity
⊕	⊖	
⑰	Body ground	Yes

Main Power Supply and Ground Circuit Check (Cont'd)

THERMO CONTROL AMP. CHECK

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

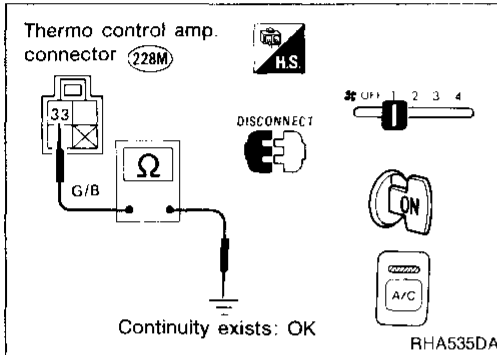
1. Disconnect thermo control amp. harness connector.
2. Connect voltmeter from harness side.
3. Measure voltage across terminal No. 75 and body ground.



Voltmeter terminal		Voltage
⊕	⊖	
75	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. Connect ohmmeter from harness side.
3. Check for continuity between terminal No. 33 and body ground.

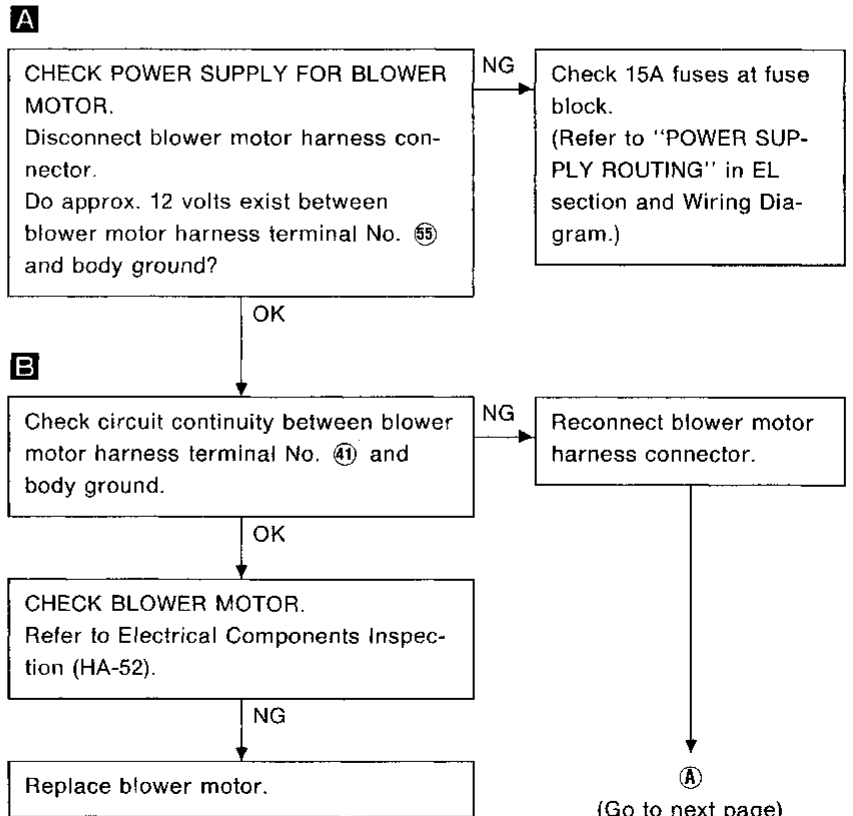
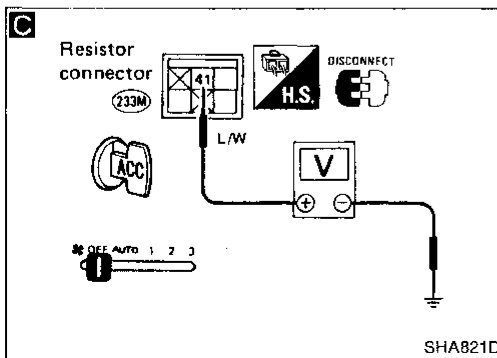
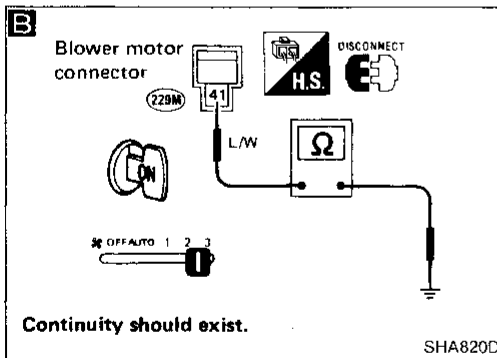
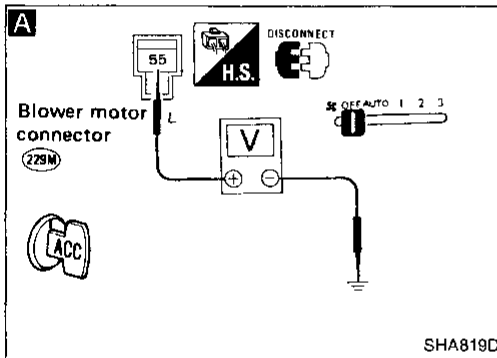


Ohmmeter terminal		Continuity
⊕	⊖	
33	Body ground	Yes

Diagnostic Procedure 1

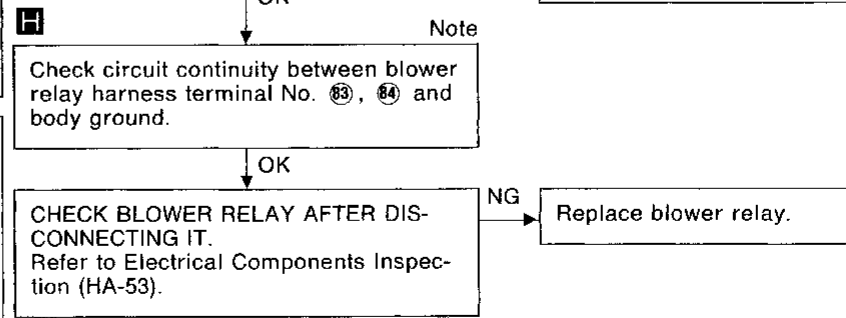
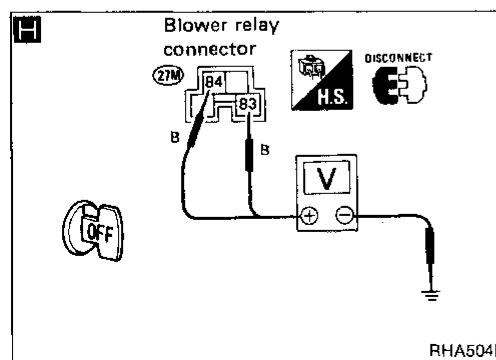
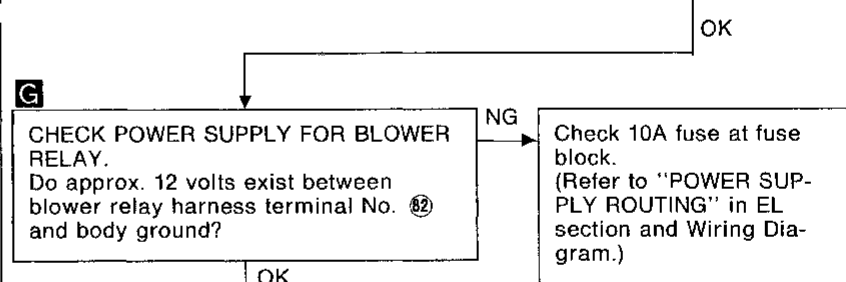
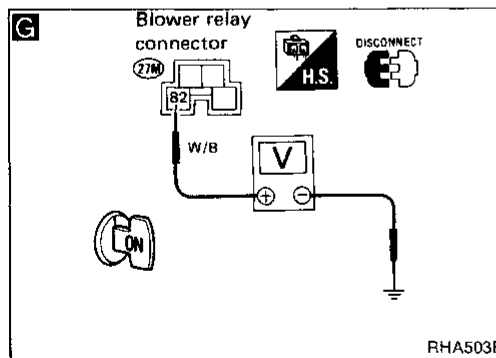
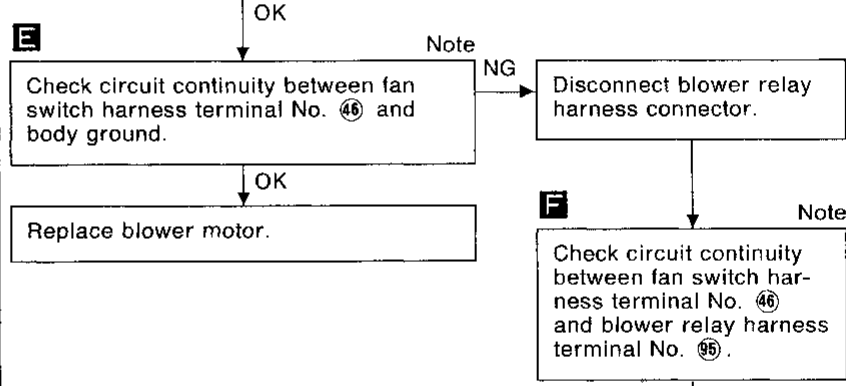
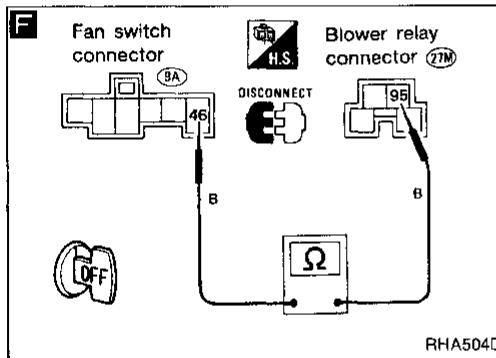
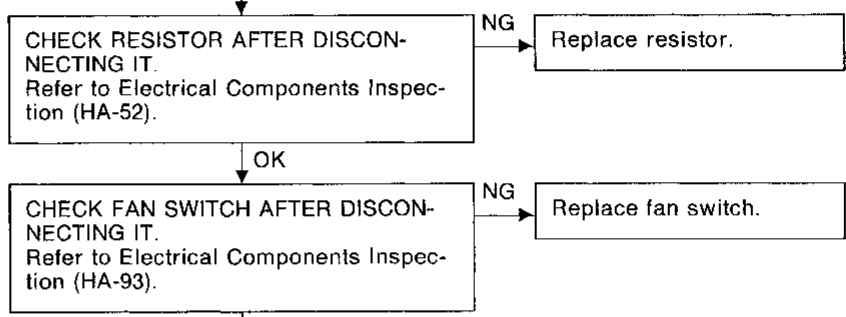
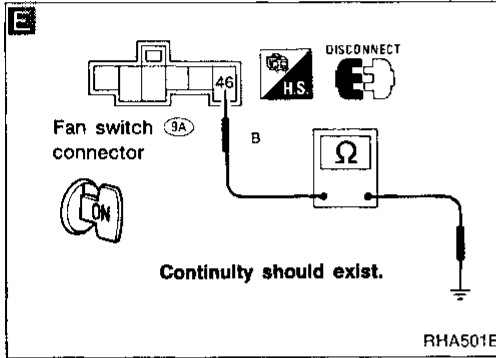
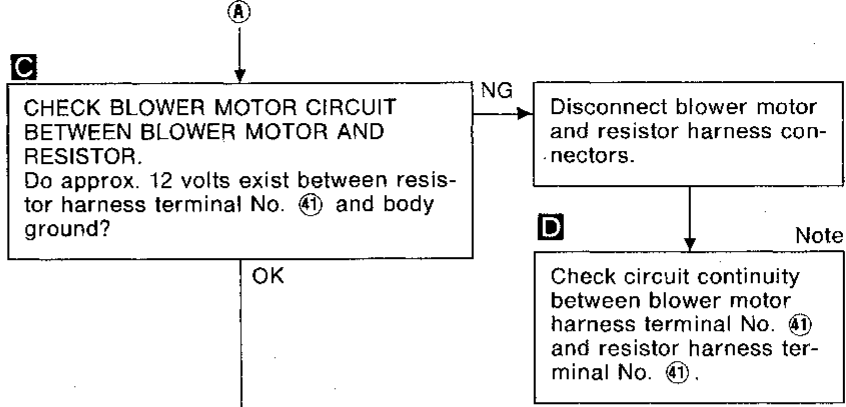
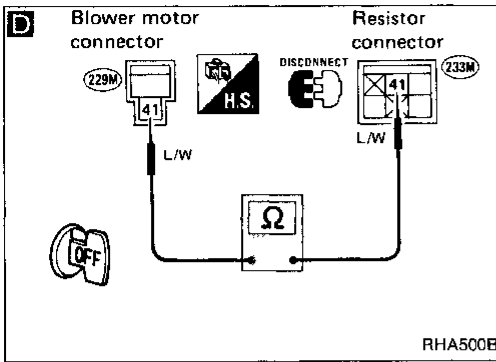
SYMPTOM: Blower motor does not rotate at all. (Fan switch "AUTO", "1", "2", "3")

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



TROUBLE DIAGNOSES — Auto Air Conditioner

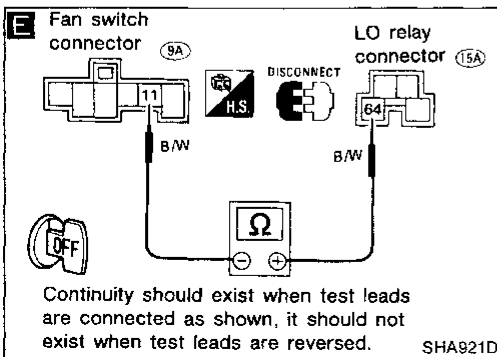
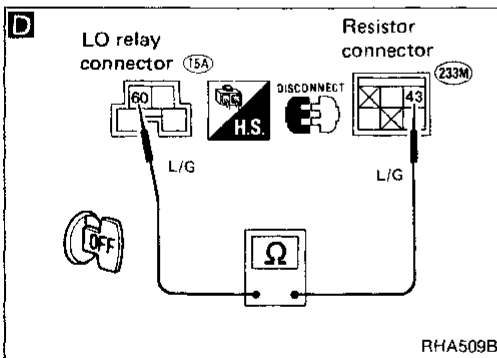
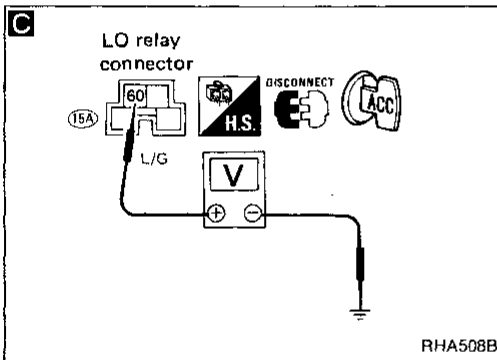
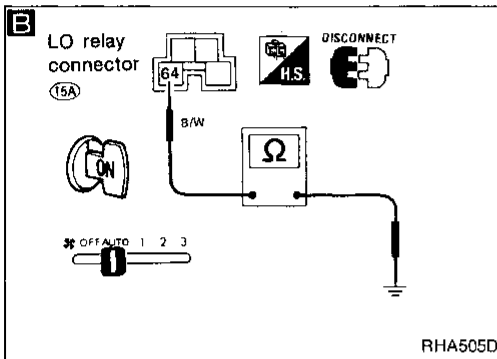
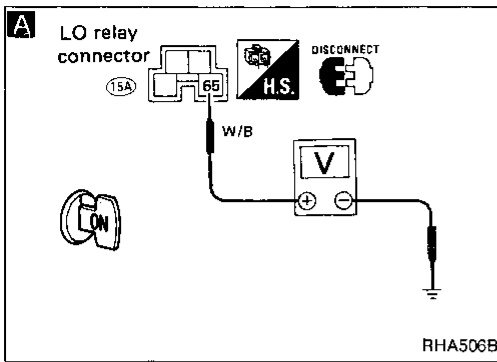
Diagnostic Procedure 1 (Cont'd)



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

Diagnostic Procedure 2

SYMPTOM: Blower motor does not rotate at all when the fan speed is in AUTO. (It operates in 1, 2, or 3-speed only.)



A CHECK POWER SUPPLY FOR LO RELAY.
Disconnect LO relay harness connector.
Do approx. 12 volts exist between LO relay harness terminal No. 65 and body ground?

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

OK ↓

B Check circuit continuity between LO relay harness terminal No. 64 and body ground.

NG → CHECK FAN SWITCH AFTER DISCONNECTING IT.
Refer to Electrical Components Inspection (HA-93).

OK ↓

NG → Replace fan switch.

E Note
Check circuit continuity between LO relay harness terminal No. 64 and fan switch harness terminal No. 11.

C CHECK POWER SUPPLY FOR LO RELAY.
Do approx. 12 volts exist between LO relay harness terminal No. 60 and body ground?

NG → **D** Note
Check circuit continuity between resistor harness terminal No. 43 and LO relay harness terminal No. 60.

OK ↓

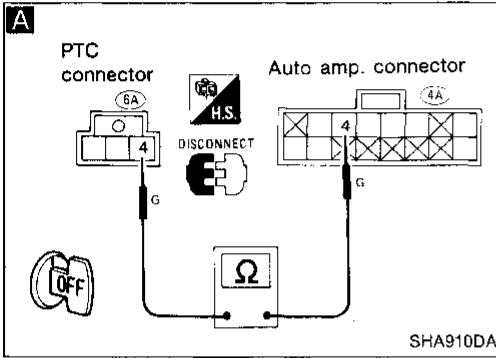
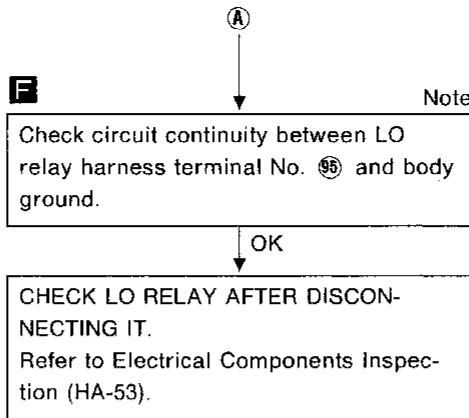
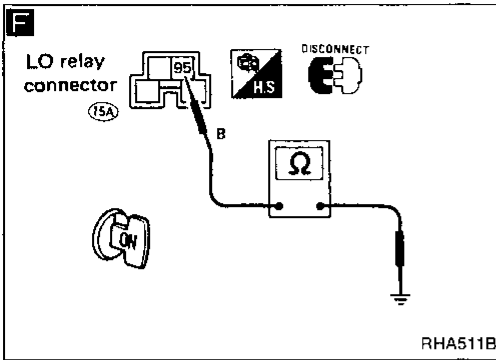
(A)
(Go to next page.)

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

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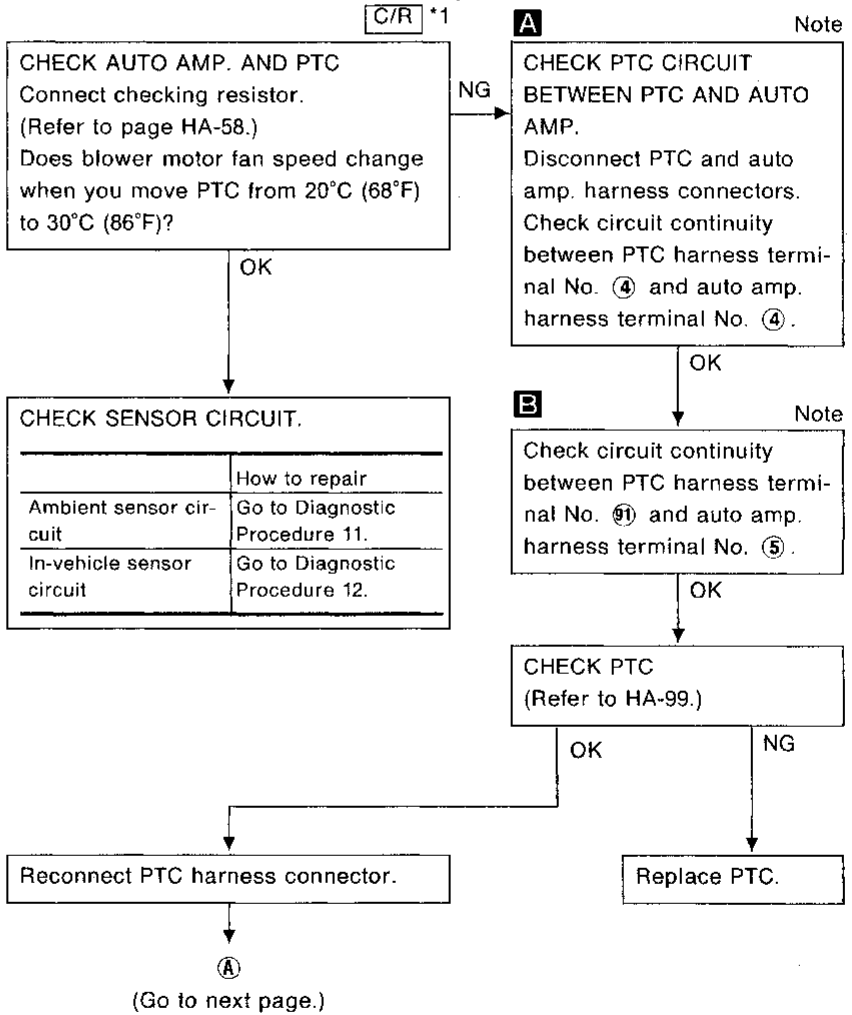
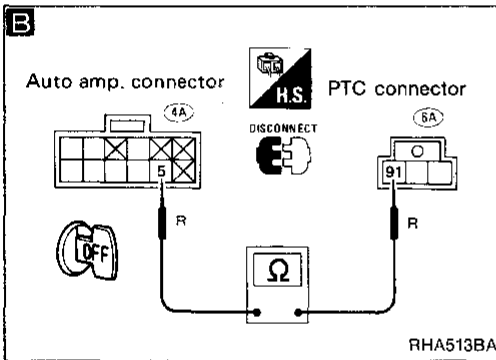
TROUBLE DIAGNOSES — Auto Air Conditioner

Diagnostic Procedure 2 (Cont'd)



Diagnostic Procedure 3

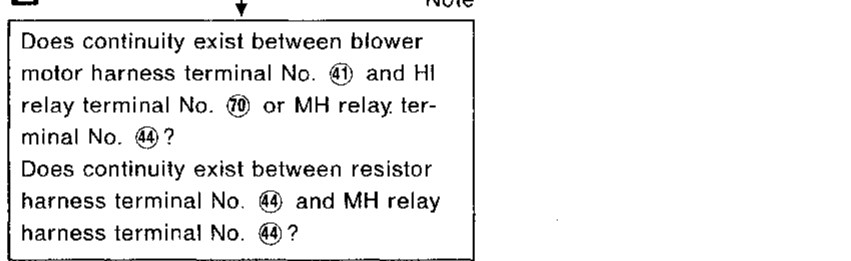
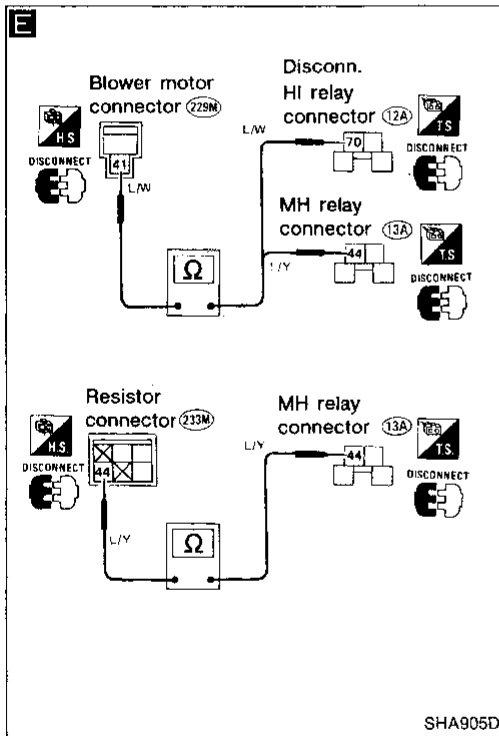
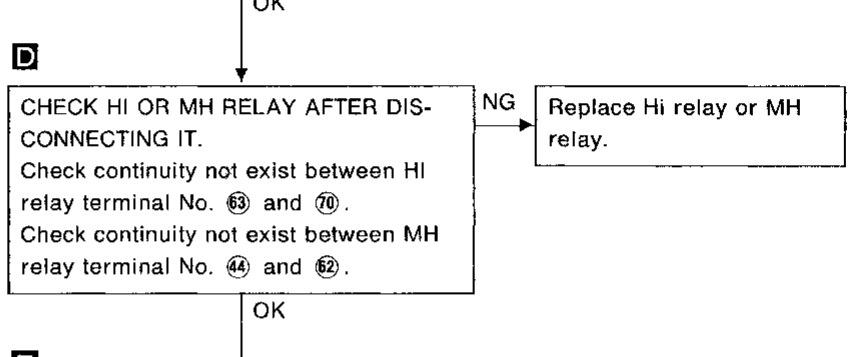
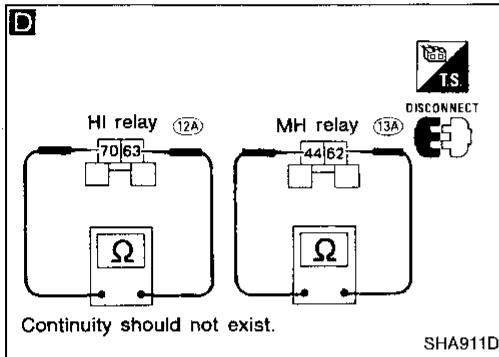
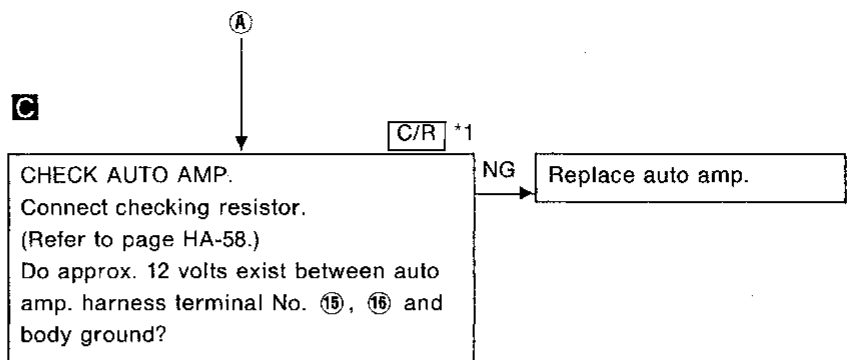
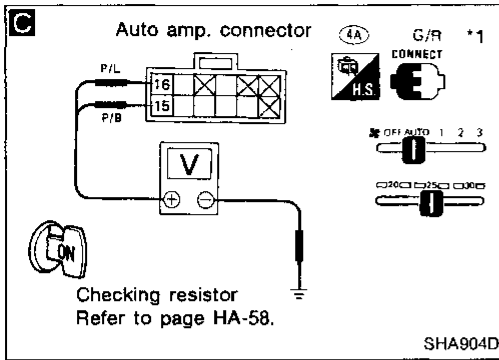
SYMPTOM: Blower motor fan speed does not change when fan speed is in AUTO. (Fan speed is fixed in HI or MH.)



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

TROUBLE DIAGNOSES — Auto Air Conditioner

Diagnostic Procedure 3 (Cont'd)



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

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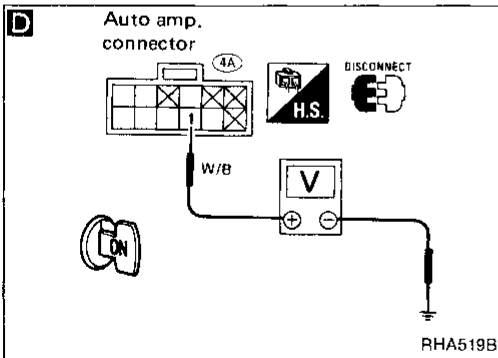
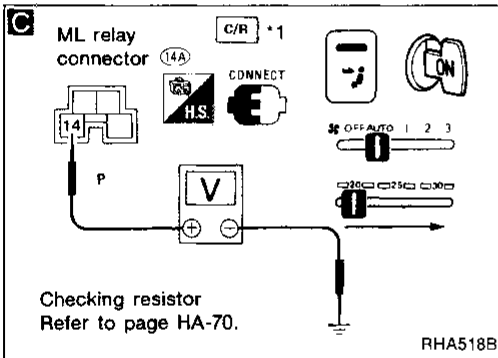
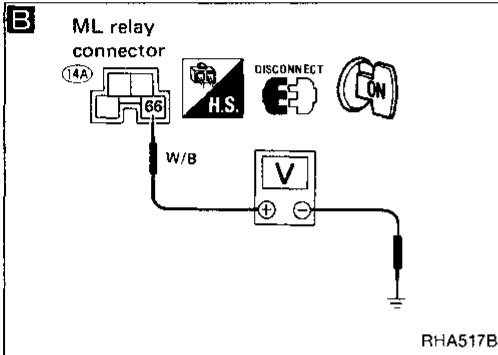
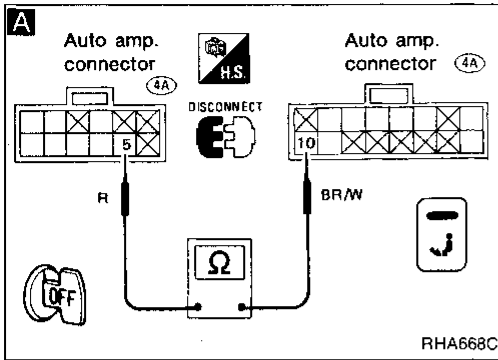
HA

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Diagnostic Procedure 4

SYMPTOM: Blower motor fan speed does not change when fan speed is in AUTO. (Fan speed is fixed in LO.)



A
CHECK WATER TEMPERATURE SENSOR.
Disconnect auto amp. harness connector.
Is resistance between auto amplifier terminal No. ⑩ and ⑤ lower than approx. 940Ω?

B
CHECK POWER SUPPLY FOR ML RELAY
Disconnect ML relay.
Do approx. 12 volts exist between ML relay harness terminal No. ⑥⑥ and body ground?

NG
CHECK WATER TEMPERATURE SENSOR CIRCUIT.
Go to **Diagnostic Procedure 14 (HA-88)**.

OK
NG

Reconnect ML relay.

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

C [C/R] *1
CHECK AUTO AMP.
Connect checking resistor.
(Refer to page HA-58.)
Do approx. 0 volts exist between ML relay harness terminal No. ⑭ and body ground when you move PTC from 20°C (68°F) to 30°C (86°F)?

NG
Replace ML relay.

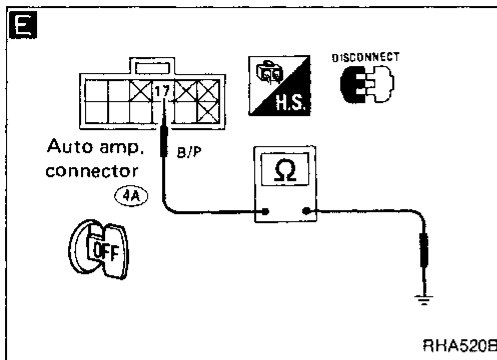
OK
D
CHECK POWER SUPPLY FOR AUTO AMP.
Disconnect auto amp. harness connector.
Do approx. 12 volts exist between auto amp. harness terminal No. ① and body ground?

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

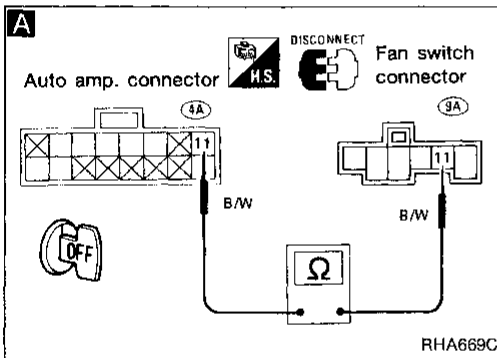
Diagnostic Procedure 4 (Cont'd)



E Note

CHECK BODY GROUND CIRCUIT FOR AUTO AMP.
Does continuity exist between auto amp. harness terminal No. ⑰ and body ground?

Replace auto amp.



Diagnostic Procedure 5

SYMPTOM: Starting fan speed control does not operate.

CHECK WATER TEMPERATURE SENSOR CIRCUIT.
Go to **Diagnostic Procedure 14 (HA-88)**.

NG → Replace auto amp. or water temperature sensor or microswitch.

A Note

CHECK BODY GROUND CIRCUIT FOR AUTO AMP.
Disconnect auto amp. and fan switch harness connector.
Check circuit continuity between auto amp. harness terminal No. ⑪ and fan switch harness terminal No. ⑪.

Replace auto amp.

Note:

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

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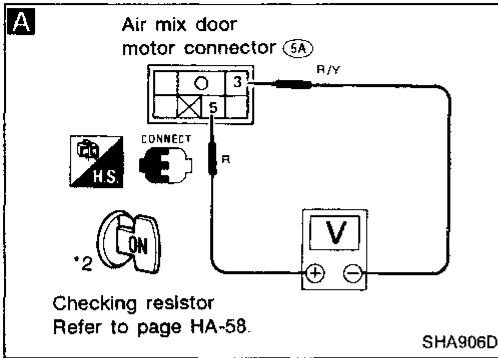
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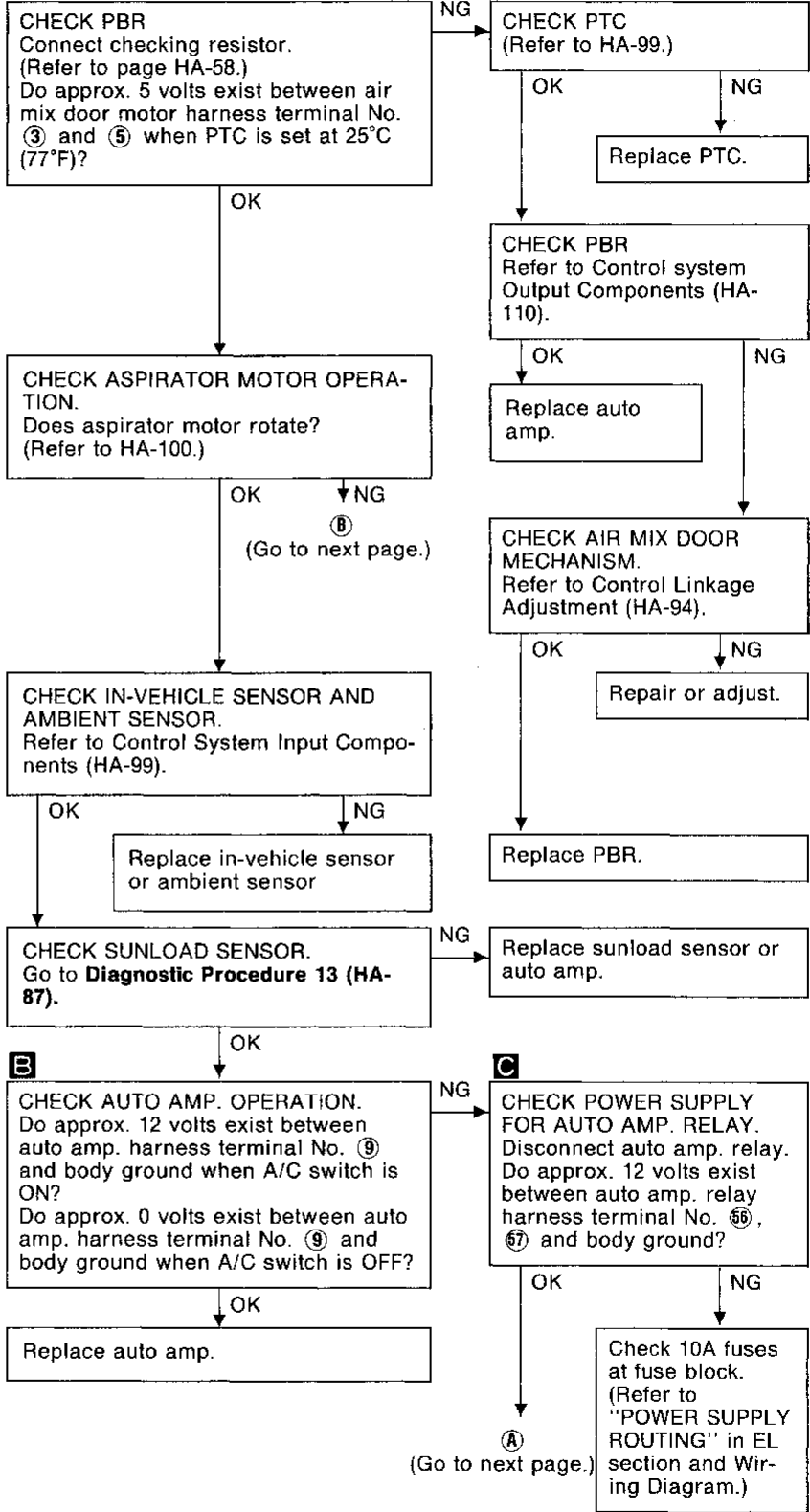
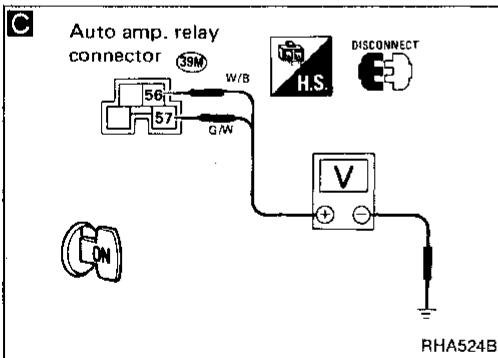
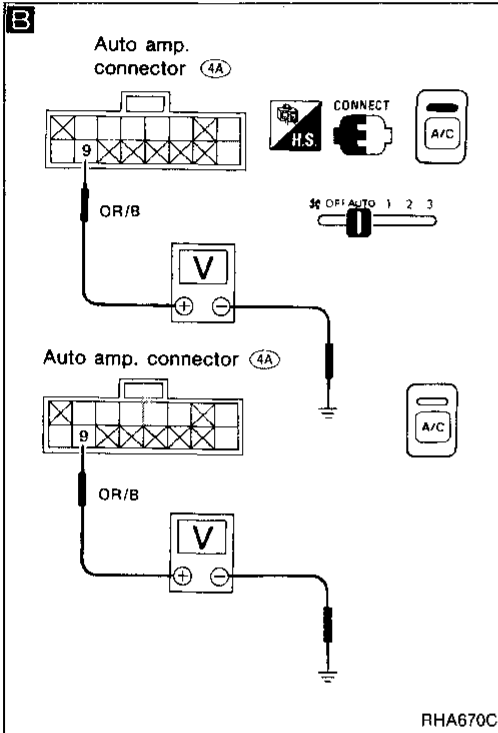
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Diagnostic Procedure 6

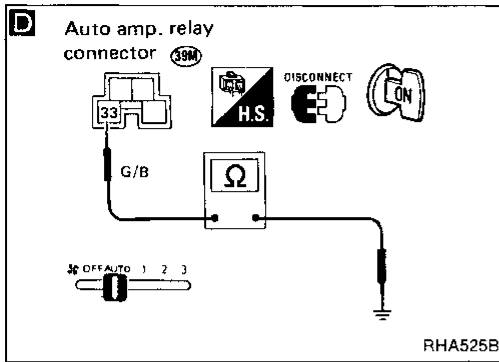
SYMPTOM: There is too much difference between setting temp. on PTC and in-vehicle temp.

- Perform **PRELIMINARY CHECK 2** before referring to the following flow chart. C/R *2



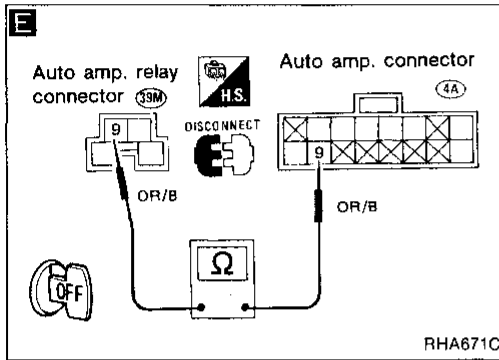
TROUBLE DIAGNOSES — Auto Air Conditioner

Diagnostic Procedure 6 (Cont'd)



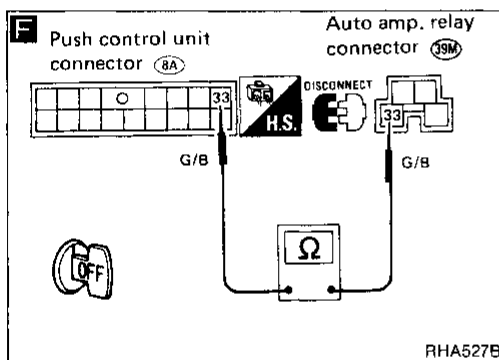
D CHECK COIL SIDE CIRCUIT OF AUTO AMP. RELAY.
Does continuity exist between auto amp. relay harness terminal No. 33 and body ground?

Note
Check circuit continuity between auto amp. relay harness terminal No. 33 and push control unit harness terminal No. 33.

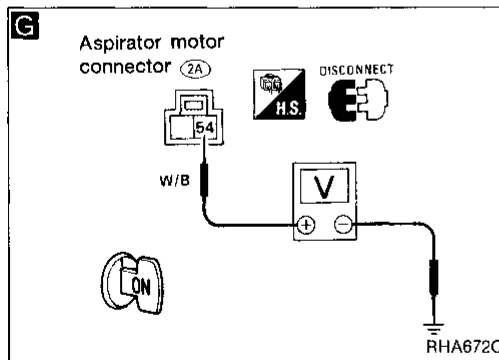


E CHECK AUTO AMP. RELAY AFTER DISCONNECTING IT.
Refer to Electrical Components Inspection (HA-53).

Replace auto amp. relay.

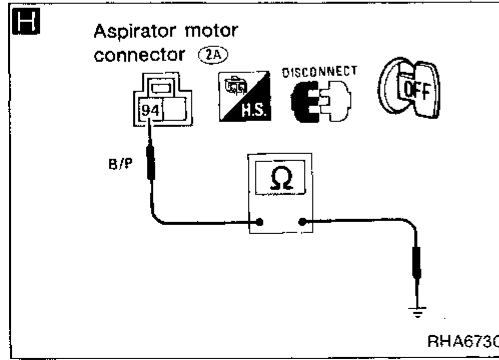


F Check circuit continuity between auto amp. relay harness terminal No. 9 and auto amp. harness terminal No. 9.



G CHECK POWER SUPPLY FOR ASPIRATOR MOTOR.
Disconnect aspirator motor harness connector.
Do approx. 12 volts exist between aspirator motor harness terminal No. 54 and body ground?

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



H CHECK BODY GROUND CIRCUIT FOR ASPIRATOR MOTOR.
Does continuity exist between aspirator motor harness terminal No. 94 and body ground?

Replace aspirator motor.

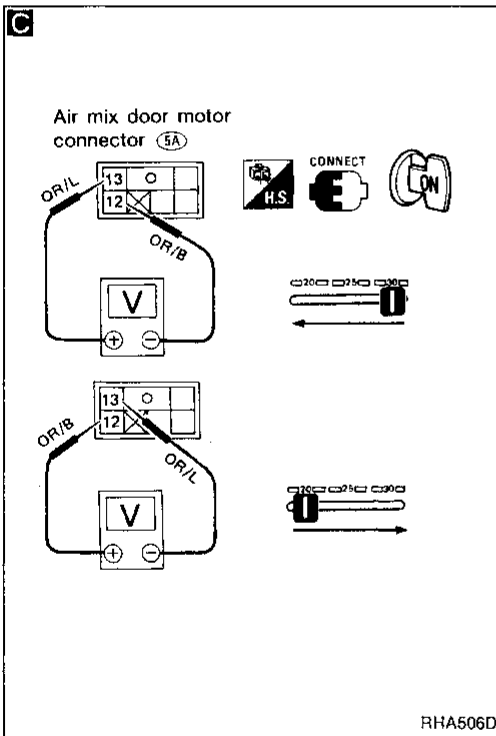
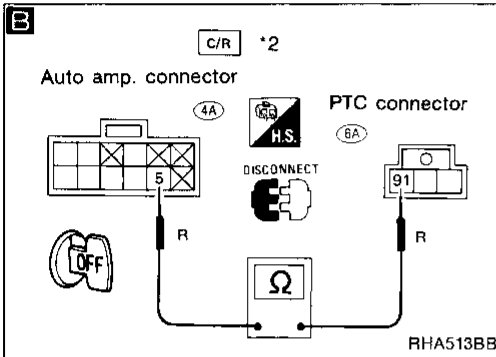
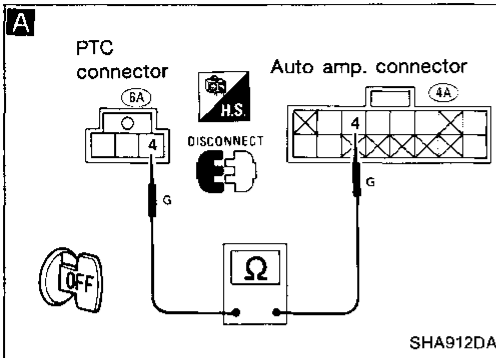
Note:
If the result is NG after checking circuit continuity, repair harness or connector.

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Diagnostic Procedure 7

SYMPTOM: Air mix door motor does not operate normally.

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



C/R *2

CHECK AUTO AMP. AND PTC
Connect checking resistor.
(Refer to page HA-58.)
Does air outlet temperature change
when you move PTC from 20°C (68°F) to
30°C (86°F)?

Note

A CHECK PTC CIRCUIT
BETWEEN PTC AND
AUTO AMP.
Disconnect PTC and auto
amp. harness connectors.
Check circuit continuity
between PTC harness ter-
minal No. ④ and auto
amp. harness terminal
No. ④.

CHECK SENSOR CIRCUIT.

	How to repair
Ambient sensor cir- cuit	Go to Diagnostic Procedure 11.
In-vehicle sensor circuit	Go to Diagnostic Procedure 12.

Note

B Check circuit continuity
between PTC harness ter-
minal No. ⑨① and auto
amp. harness terminal
No. ⑤.

CHECK PTC
(Refer to page HA-99.)

Replace PTC.

C/R *2

C CHECK FOR OUTPUT OF AUTO AMP.
Connect checking resistor.
Do approx. 10.5 volts exist between air
mix door motor harness terminals No.
⑫ and ⑬ when you move PTC from
20°C (68°F) to 30°C (86°F) or when you
move PTC from 30°C (86°F) to 20°C
(68°F)?

Air mix door operation	Terminal No.		Voltage
	⑫	⑬	
Cold → Hot	⊕	⊖	Approx. 10.5V
Hot → Cold	⊖	⊕	
Stop	—	—	0V

Disconnect auto amp. and
air mix door motor har-
ness connectors.

Note

Check circuit continuity
between auto amp. har-
ness terminal No. ⑫
(⑬) and air mix door
motor harness terminal
No. ⑫ (⑬).

Replace air mix door motor.

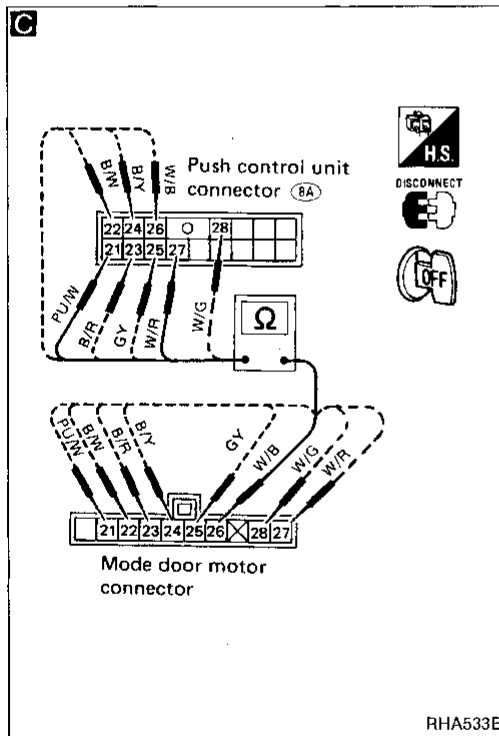
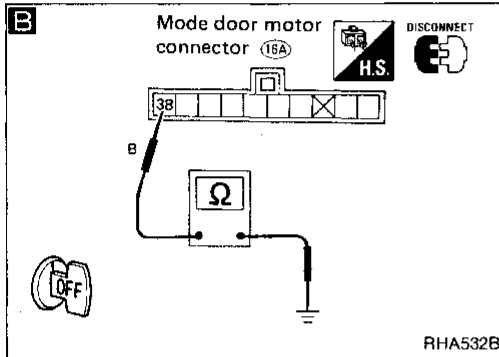
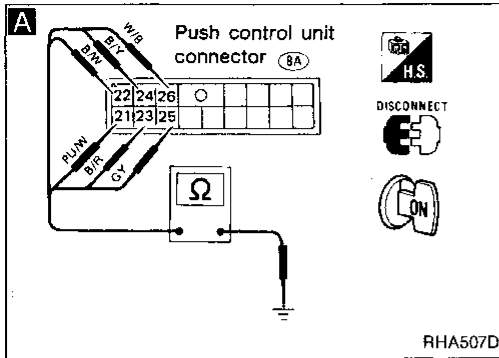
Replace auto amp.

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

Diagnostic Procedure 8

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. Check if continuity exists between each terminal on 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	Ⓐ or Ⓑ	Body ground	Yes
B/L	Ⓒ or Ⓓ		
FOOT	Ⓔ or Ⓕ		
F/D	Ⓖ or Ⓗ		
DEF	Ⓘ or Ⓚ		

NG → 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. 38 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
Ⓐ	Ⓐ	
Ⓑ	Ⓑ	
Ⓒ	Ⓒ	
Ⓓ	Ⓓ	
Ⓔ	Ⓔ	
Ⓕ	Ⓕ	
Ⓖ	Ⓖ	

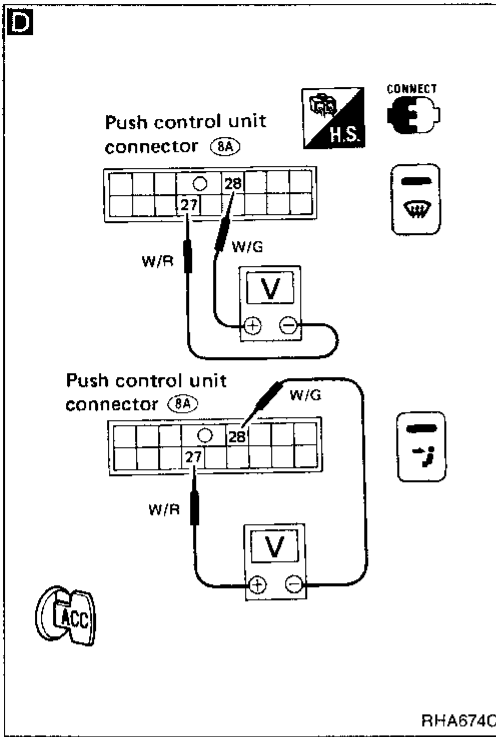
OK → **CHECK SIDE LINK.**
(Refer to HA-93.)

(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 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. 27 and 28 when mode is switched from "VENT" to "DEF" or when mode is switched from "DEF" to "VENT"?

Terminal No.		Mode door motor	
27	28	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

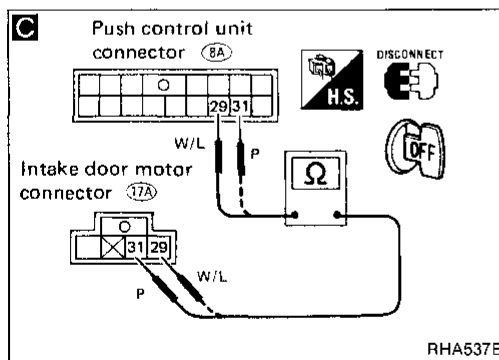
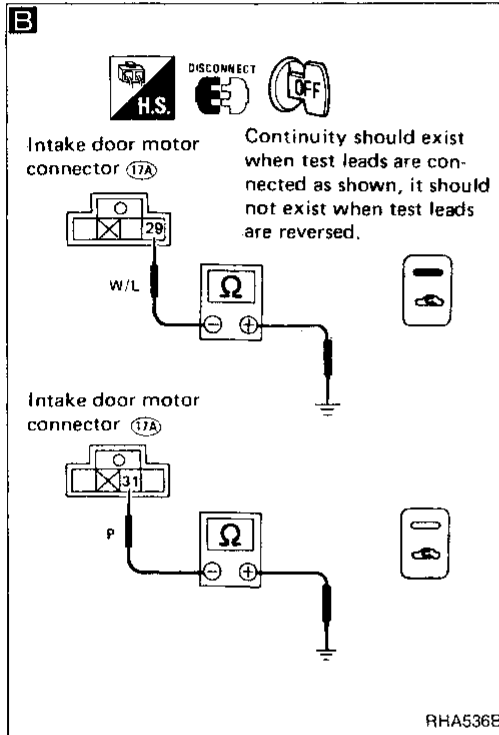
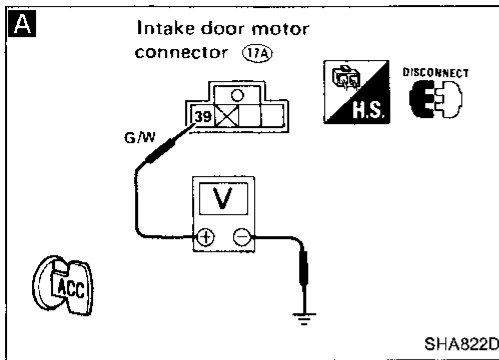
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Replace mode door motor.

Diagnostic Procedure 9

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.



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. ⑳ and body ground?

NG

Check 10A fuses at fuse block.

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

B

CHECK BODY GROUND CIRCUIT FOR INTAKE DOOR MOTOR.

Does continuity exist between intake door motor harness terminal No. ㉑ and body ground when REC switch is ON?

Does continuity exist between intake door motor harness terminal No. ㉒ and body ground when REC switch is OFF?

NG

Disconnect push control unit harness connector.

C

Note

Check circuit continuity between push control unit harness terminal No. ㉑ (㉒) and intake door motor harness terminal No. ㉑ (㉒)?

OK

Replace intake door motor.

OK

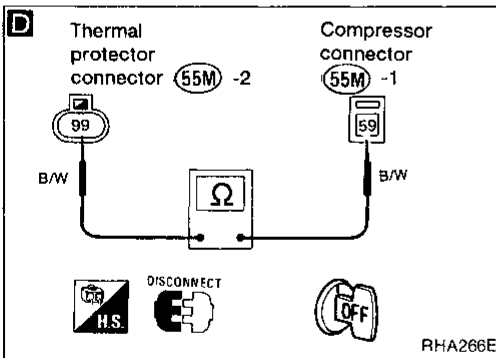
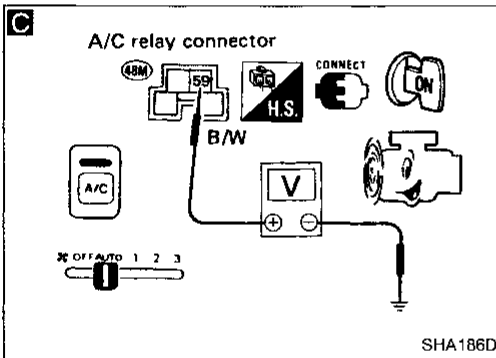
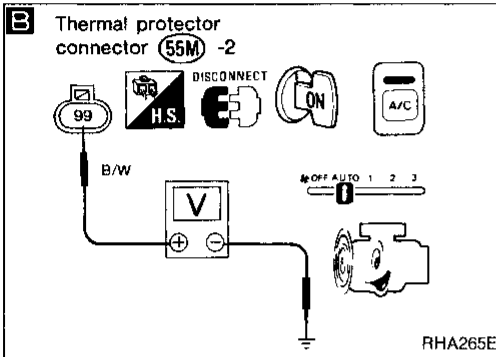
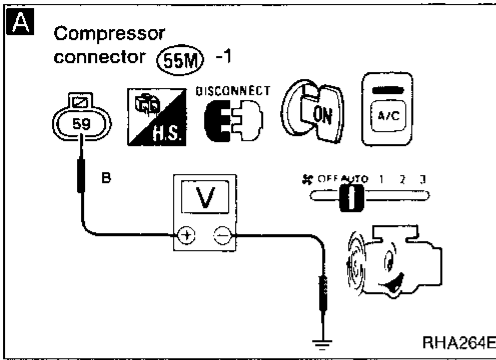
Replace control amp. built-in push control unit.

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

Diagnostic Procedure 10

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

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



A CHECK POWER SUPPLY FOR COMPRESSOR.
Disconnect compressor harness connector.
Do approx. 12 volts exist between compressor harness terminal No. 59 and body ground?

Check magnet clutch coil.

Replace magnet clutch.
Refer to COMPRESSOR — Model DKV-14C (ZEXEL make) (HA-24).

B CHECK POWER SUPPLY FOR THERMAL PROTECTOR.
Disconnect thermal protector harness connector.
Do approx. 12V exist between thermal protector harness terminal No. 99 and body ground?

C CHECK A/C RELAY OPERATION.
Do approx. 12 volts exist between A/C relay harness terminal No. 59 and body ground?

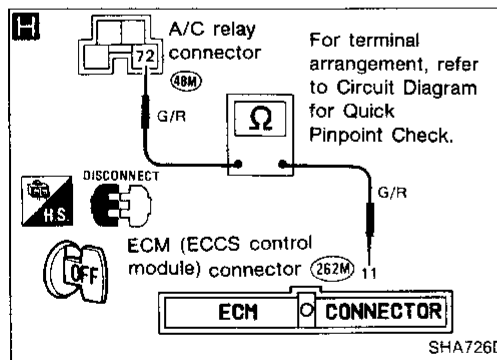
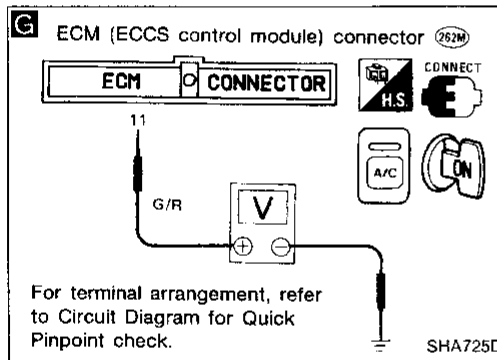
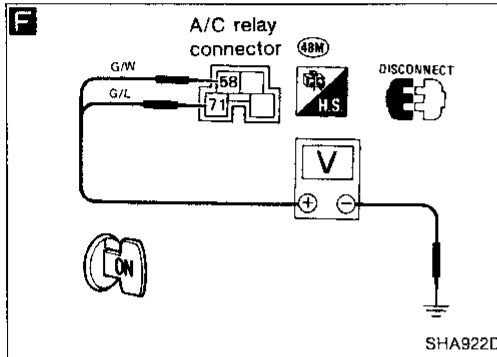
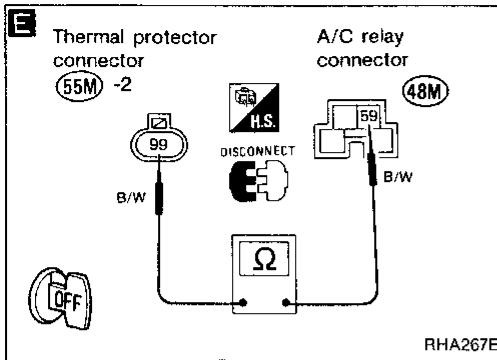
D CHECK THERMAL PROTECTOR.
Check circuit continuity between thermal protector harness terminal No. 99 and compressor harness terminal No. 59.

Replace thermal protector.

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

TROUBLE DIAGNOSES — Auto Air Conditioner

Diagnostic Procedure 10 (Cont'd)



A

Disconnect A/C relay harness connector.

E Note

Check circuit continuity between A/C relay harness terminal No. 58 and thermal protector harness terminal No. 99.

B

F

CHECK POWER SUPPLY FOR A/C RELAY. Disconnect A/C relay. Do approx. 12 volts exist between A/C relay harness terminal No. 58, 71 and body ground?

OK

NG

CHECK POWER SUPPLY CIRCUIT AND 10A FUSE AT FUSE BLOCK. (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

CHECK A/C RELAY AFTER DISCONNECTING IT. Refer to Electrical Components Inspection (HA-53).

NG

Replace A/C relay.

OK

Reconnect A/C relay.

G

CHECK COIL SIDE CIRCUIT OF A/C RELAY. Do approx. 12 volts exist between ECM (ECCS control module) harness terminal No. 11 and body ground?

H Note

Check circuit continuity between A/C relay harness terminal No. 72 and ECM (ECCS control module) harness terminal No. 11.

OK

C

(Go to next page.)

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

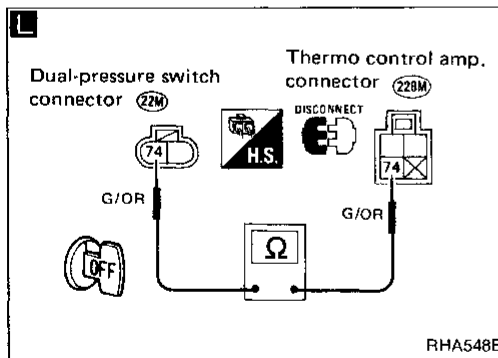
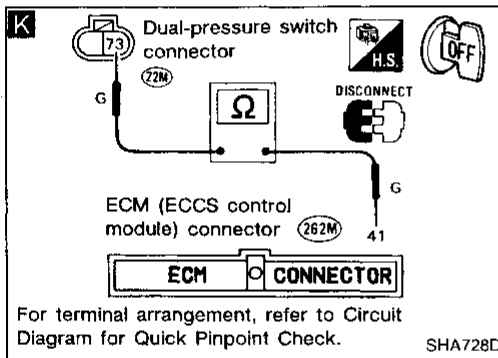
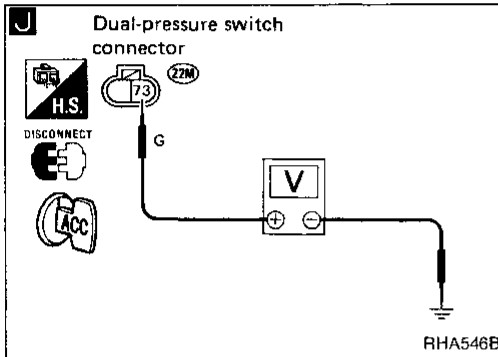
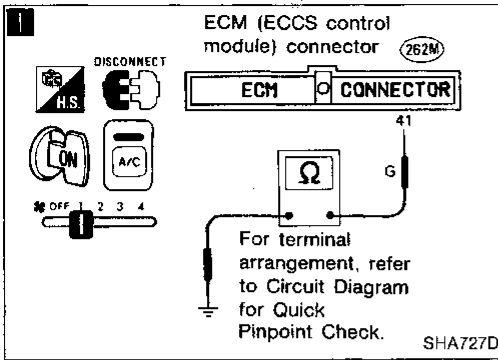
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TROUBLE DIAGNOSES — Auto Air Conditioner

Diagnostic Procedure 10 (Cont'd)



I

Ⓢ

CHECK COIL SIDE CIRCUIT OF A/C RELAY.
Disconnect ECM (ECCS control module) harness connector.
Does continuity exist between ECM (ECCS control module) harness terminal No. ④① and body ground?

NG

Reconnect ECM (ECCS control module) harness connector.

J

CHECK DUAL-PRESSURE SWITCH CIRCUIT BETWEEN DUAL-PRESSURE SWITCH AND ECM (ECCS CONTROL MODULE).
Disconnect dual-pressure switch harness connector.
Do more than 8 volts exist between dual-pressure switch harness terminal No. ⑦③ and body ground?

OK

CHECK ECM (ECCS CONTROL MODULE).
Refer to EF & EC section.

OK

NG

Disconnect ECM (ECCS control module) harness connector.

K Note

Check circuit continuity between ECM (ECCS control module) harness terminal No. ④① and dual-pressure switch harness terminal No. ⑦③.

CHECK DUAL-PRESSURE SWITCH.
Refer to Electrical Components Inspection (HA-52).

NG

Replace dual-pressure switch.

OK

Disconnect thermo control amp. harness connector.

L Note

Check circuit continuity between dual-pressure switch harness terminal No. ⑦④ and thermo control amp. harness terminal No. ⑦④.

OK

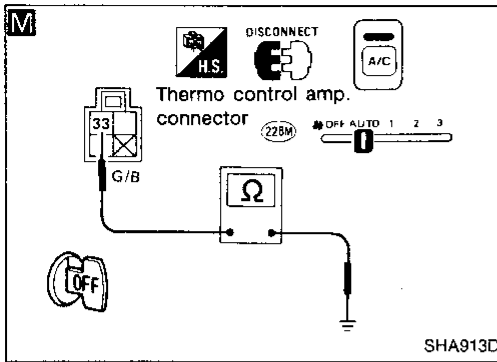
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Note:
If the result is NG after checking circuit continuity, repair harness or connector.

TROUBLE DIAGNOSES — Auto Air Conditioner

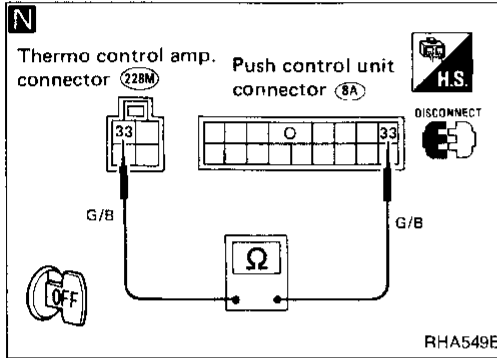
Diagnostic Procedure 10 (Cont'd)



D

CHECK POWER SUPPLY FOR THERMO CONTROL AMP.
Refer to Main Power Supply and Ground Circuit Check (HA-67).

GI
MA



M

CHECK BODY GROUND CIRCUIT FOR THERMO CONTROL AMP.
Disconnect thermo control amp. harness connector.
Does continuity exist between thermo control amp. harness terminal No. ③③ and body ground?

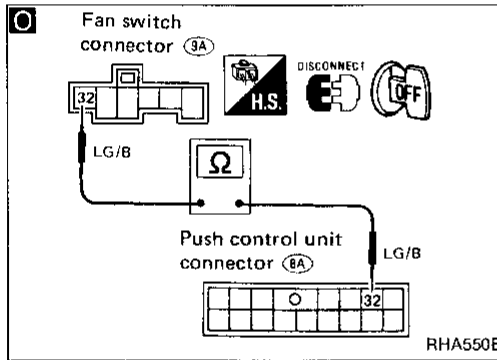
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OK → Replace fan switch.

NG

Disconnect push control unit harness connector.

FE
CL



N Note

Check circuit continuity between thermo control amp. harness terminal No. ③③ and push control unit harness terminal No. ③③.

MT
AT

OK →

NG → Replace control amp. built into push control unit.

OK

CHECK A/C SWITCH OF PUSH CONTROL UNIT.
Refer to Electrical Components Inspection (HA-93).

TF
PD

OK

Disconnect fan switch harness connector.

FA
RA

O Note

Check circuit continuity between push control unit harness terminal No. ③② and fan switch harness terminal No. ③②.

BR
ST

OK

BF

E
(Go to next page.)

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

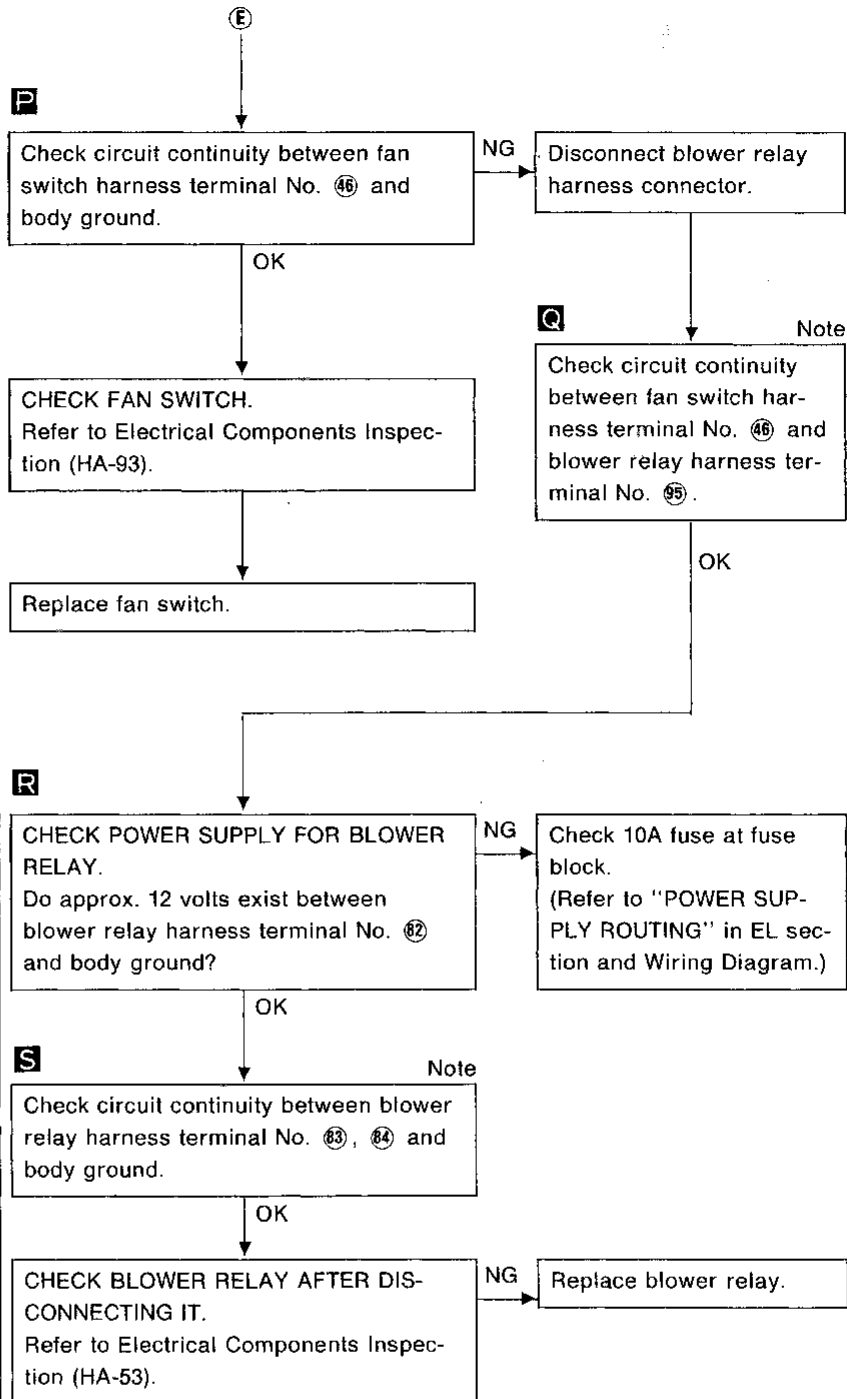
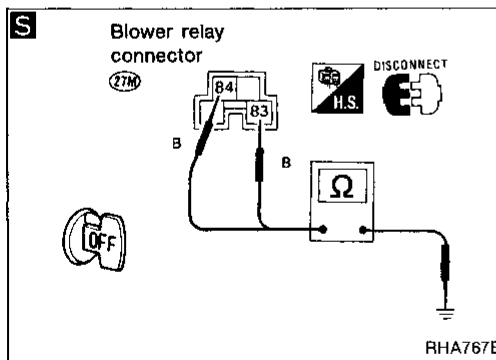
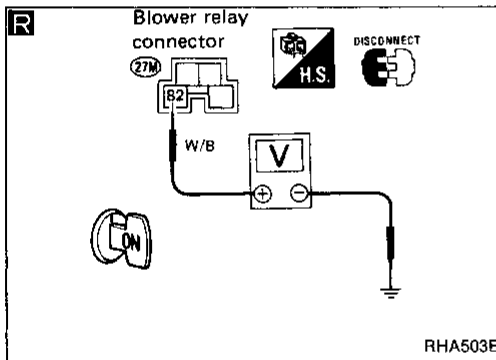
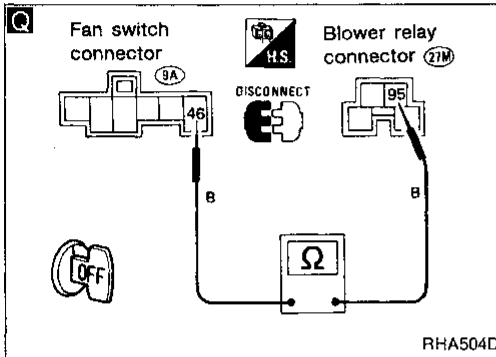
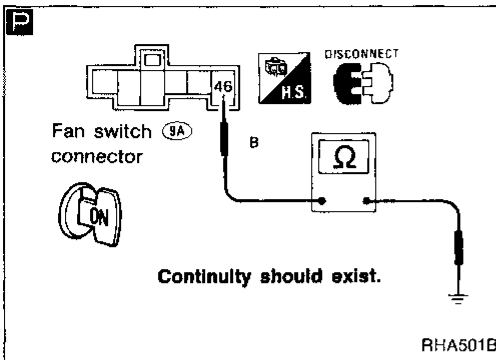
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TROUBLE DIAGNOSES — Auto Air Conditioner

Diagnostic Procedure 10 (Cont'd)

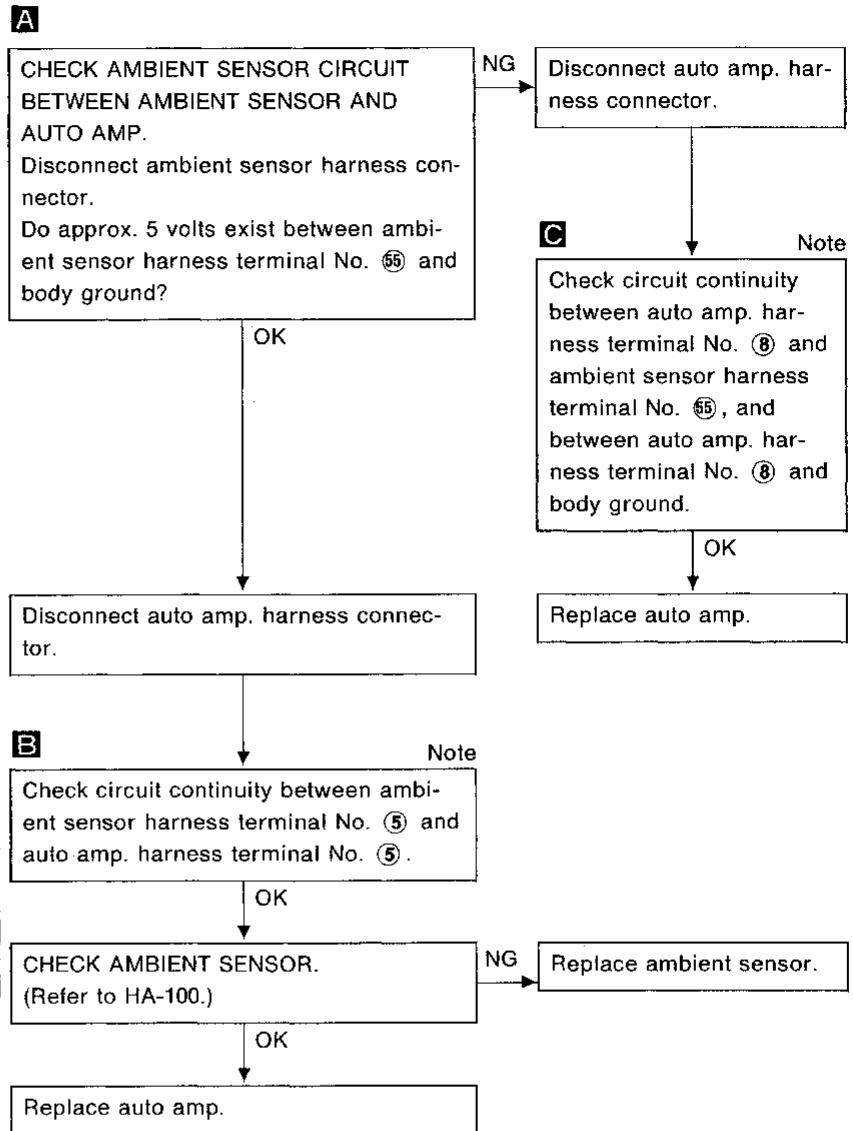
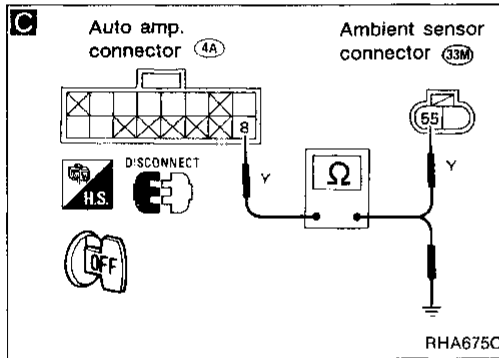
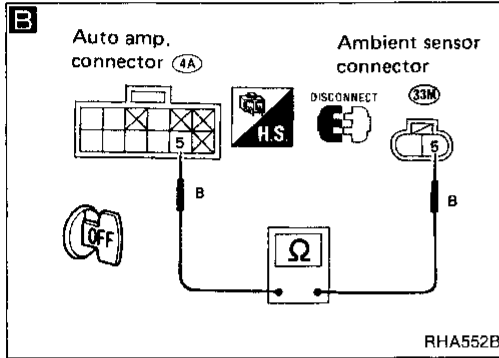
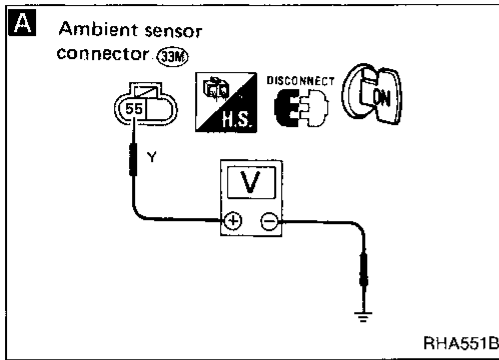


Note:

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

Diagnostic Procedure 11

SYMPTOM: Ambient sensor circuit is open or shorted.



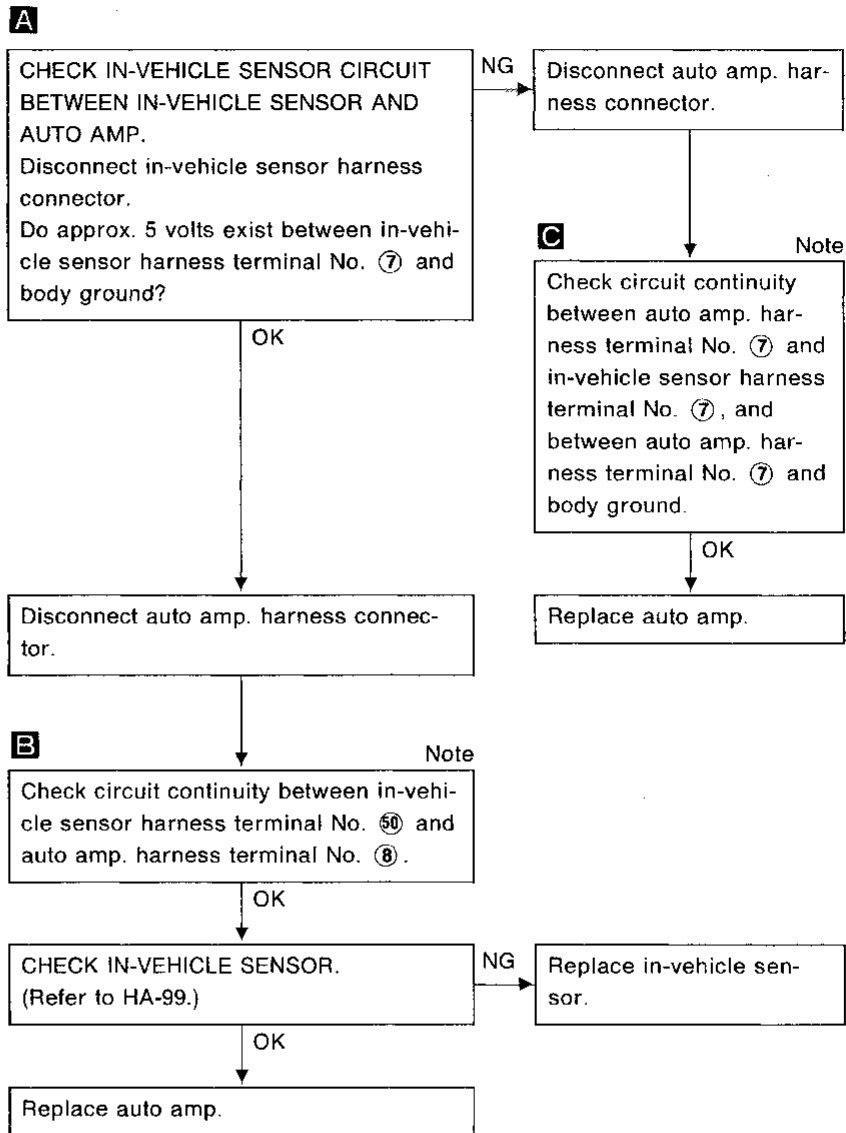
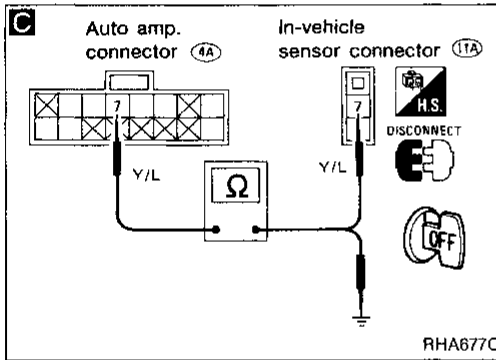
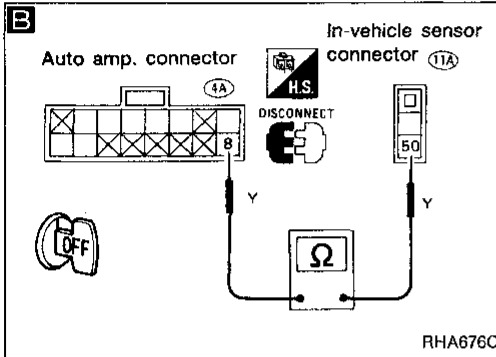
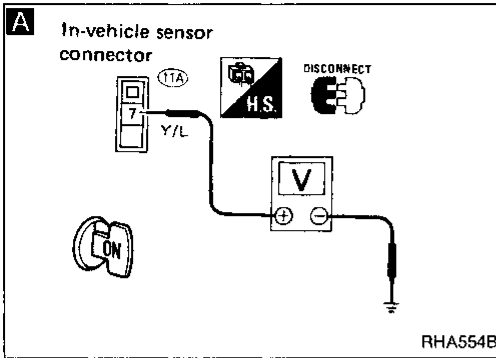
Note:

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

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Diagnostic Procedure 12

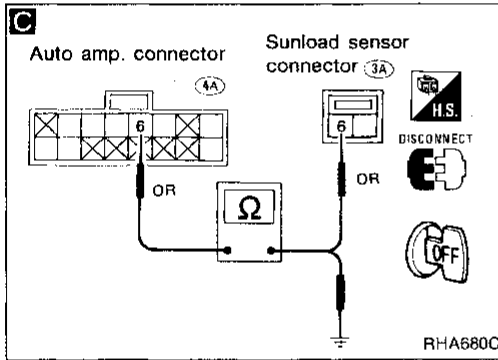
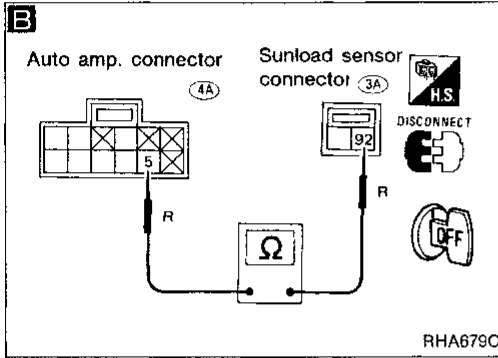
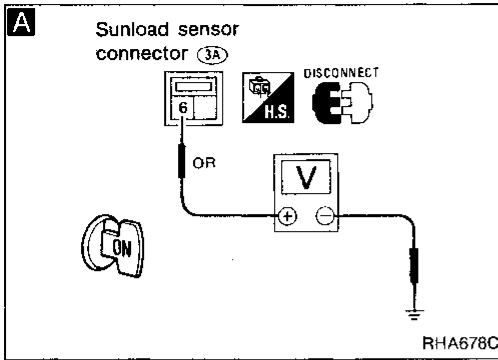
SYMPTOM: In-vehicle sensor circuit is open or shorted.



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

Diagnostic Procedure 13

SYMPTOM: Sunload sensor circuit is open or shorted.



```

    graph TD
      A["A  
CHECK SUNLOAD SENSOR CIRCUIT  
BETWEEN SUNLOAD SENSOR AND  
AUTO AMP.  
Disconnect sunload sensor harness con-  
nector.  
Do approx. 5 volts exist between sun-  
load sensor harness terminal No. ⑥  
and body ground?"]
      B["B  
Check circuit continuity between sun-  
load sensor harness terminal No. ⑨②  
and auto amp. harness terminal No. ⑤."]
      C["C  
Check circuit continuity  
between auto amp. har-  
ness terminal No. ⑥ and  
sunload sensor harness  
terminal No. ⑥ and  
between auto amp. har-  
ness terminal No. ⑥ and  
body ground."]
      D["Disconnect auto amp. har-  
ness connector."]
      E["Disconnect auto amp. har-  
ness connector."]
      F["CHECK SUNLOAD SENSOR.  
(Refer to HA-101.)"]
      G["Replace sunload sensor."]
      H["Replace auto amp."]
      I["Replace auto amp."]

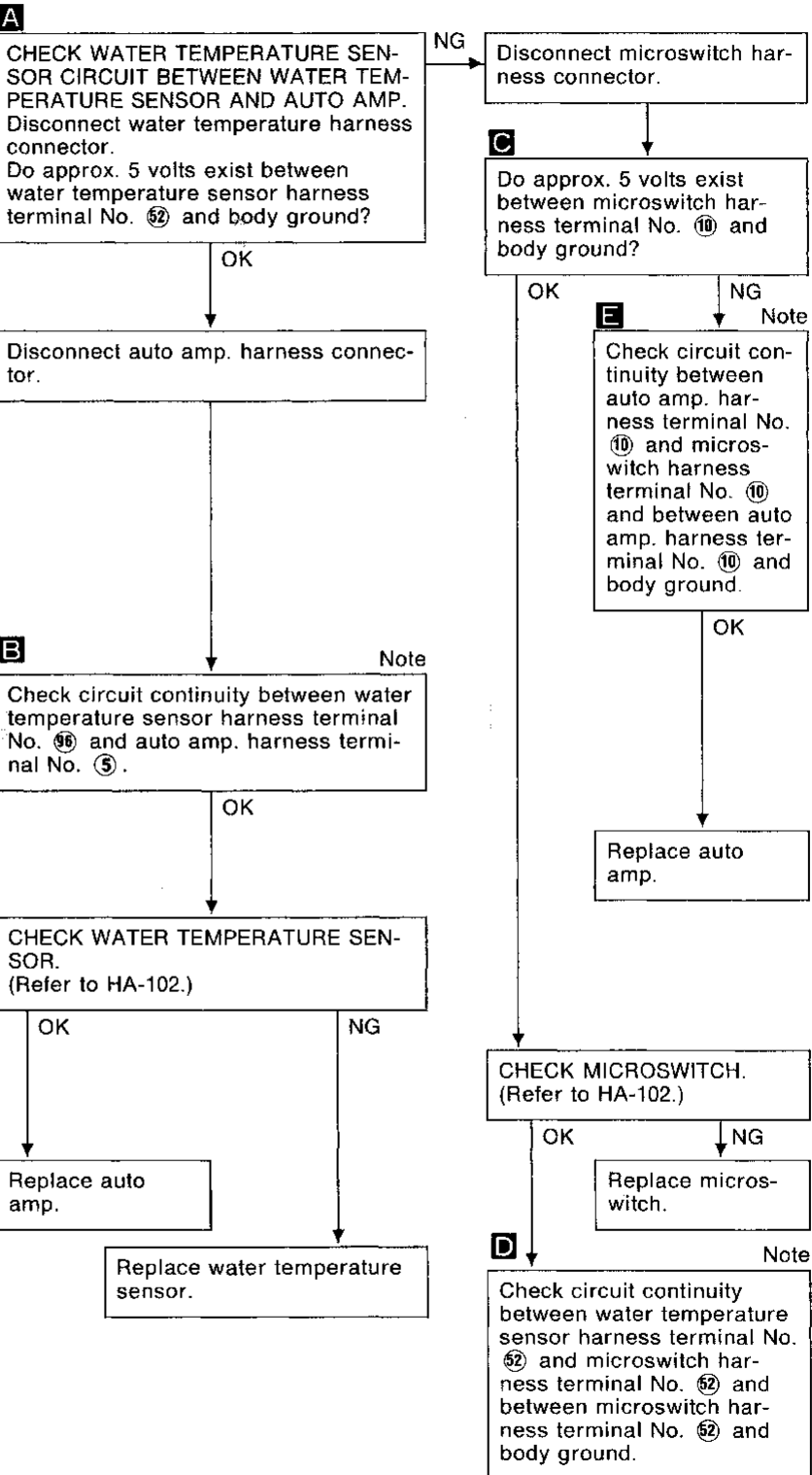
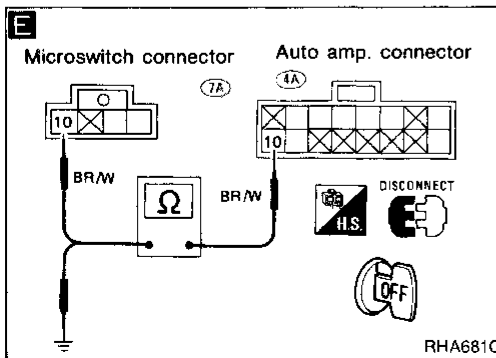
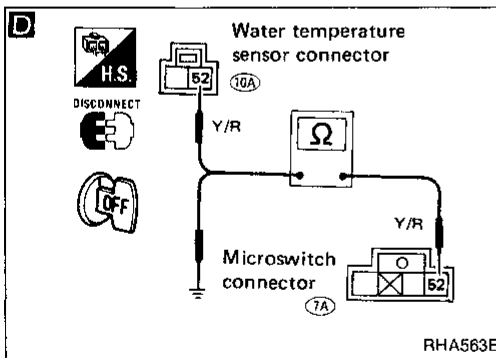
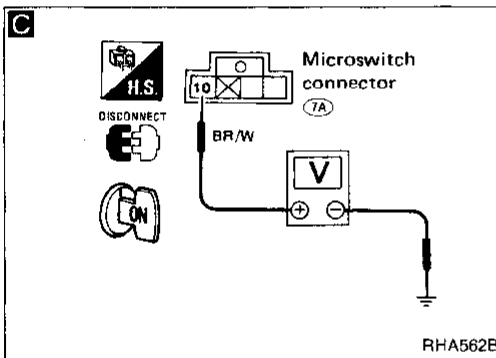
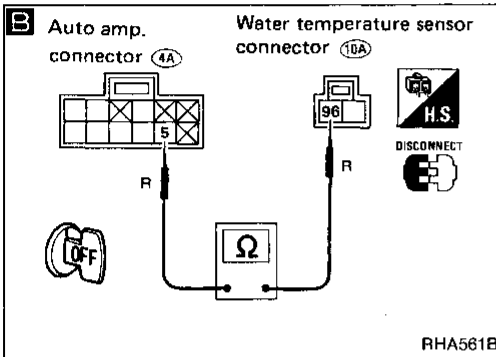
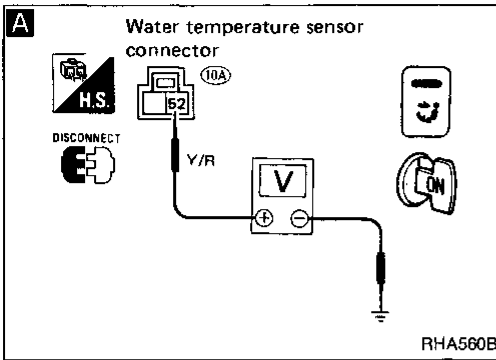
      A -- NG --> D
      D --> C
      C -- OK --> I
      C -- NG --> A
      A -- OK --> E
      E --> B
      B -- OK --> F
      B -- NG --> C
      F -- NG --> G
      F -- OK --> H
  
```

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

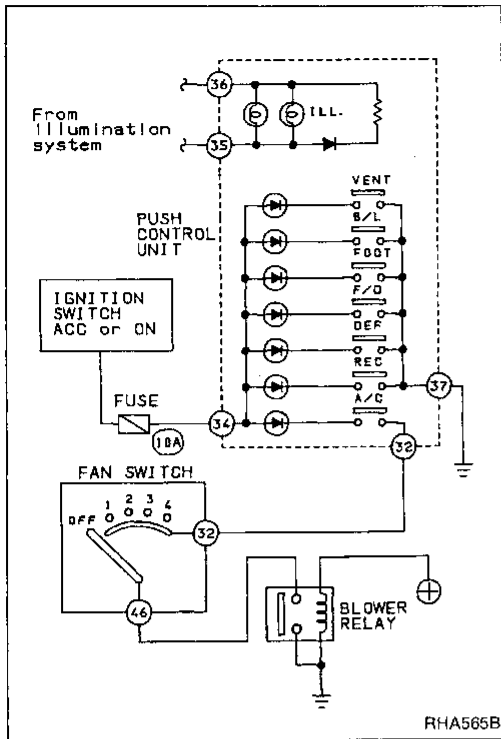
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Diagnostic Procedure 14

SYMPTOM: Water temperature sensor circuit is open or shorted.



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



Diagnostic Procedure 15

SYMPTOM: Illumination or indicators of push control unit do not come on.

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

Turn ignition switch and lighting switch ON.

CHECK ILLUMINATION AND INDICATORS.

- Turn A/C, REC and fan switches ON.
- Push VENT, B/L, FOOT, F/D and DEF switches in order.
- Check for incidents and follow the repairing methods as shown:

INCIDENTS								"How to repair"
ILL. Push control unit	VENT	B/L	FOOT	F/D	DEF	REC	A/C	
X	○	○	○	○	○	○	—	Go to DIAGNOSTIC PROCEDURE 15-1.
—	○	○	○	○	○	○	X	Go to DIAGNOSTIC PROCEDURE 15-2.
○	X	X	X	X	X	X	—	Go to DIAGNOSTIC PROCEDURE 15-3.
—	△						—	Replace control amp. built into push control unit.
○	X	X	X	X	X	X	○	Replace control amp. built into push control unit.
—	X	X	X	X	X	X	○	Go to DIAGNOSTIC PROCEDURE 15-4.

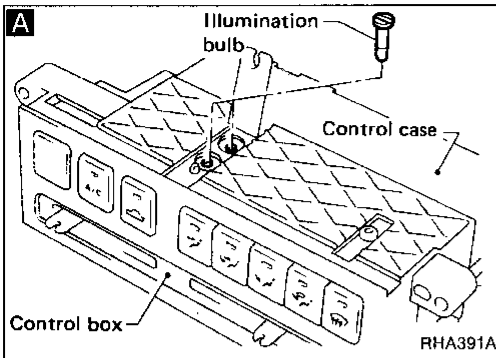
○: Illumination or indicator comes on.
 X: Illumination or indicator does not come on.
 △: Some indicators for VENT, B/L, FOOT, F/D, DEF or REC come on.

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TROUBLE DIAGNOSES — Auto Air Conditioner

Diagnostic Procedure 15 (Cont'd)

DIAGNOSTIC PROCEDURE 15-1

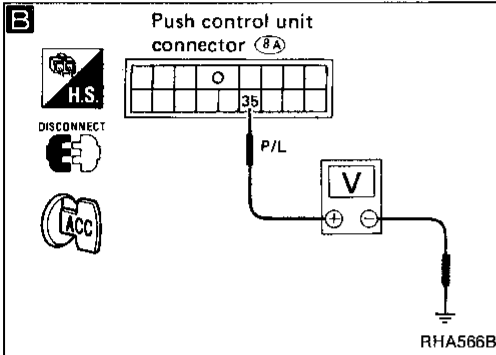


CHECK THE OTHER ILLUMINATION SYSTEMS EXCEPT FOR A/C SYSTEM.
Do the other illumination come on with ignition switch and lighting switch ON?

NG → CHECK ILLUMINATION SYSTEM.
Refer to Illumination/Wiring Diagram in EL section.

OK

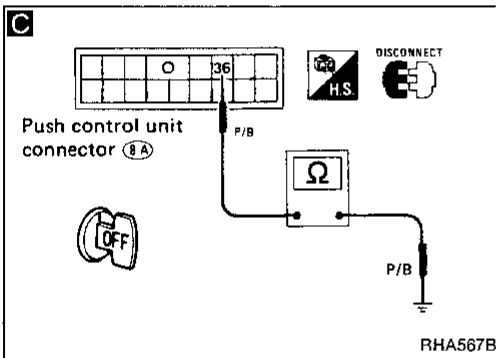
Turn ignition switch and lighting switch OFF.



CHECK ILLUMINATION BULB.
Remove push control unit and disconnect harness connectors.
Remove illumination bulb(s) and check them.

NG → Replace illumination bulb(s).

OK



CHECK POWER SUPPLY FOR ILLUMINATION WITH LIGHTING SWITCH ON.
Do approx. 12 volts exist between push control unit harness terminal No. 35 and body ground?

NG → CHECK POWER SUPPLY FOR A/C ILLUMINATION SYSTEM.
Refer to Illumination/Wiring Diagram in EL section.

OK

CHECK BODY GROUND CIRCUIT FOR ILLUMINATION.
Does continuity exist between push control unit harness terminal No. 36 and body ground?

Note

OK

Replace control amp. built-in push control unit.

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

TROUBLE DIAGNOSES — Auto Air Conditioner

Diagnostic Procedure 15 (Cont'd)

DIAGNOSTIC PROCEDURE 15-2

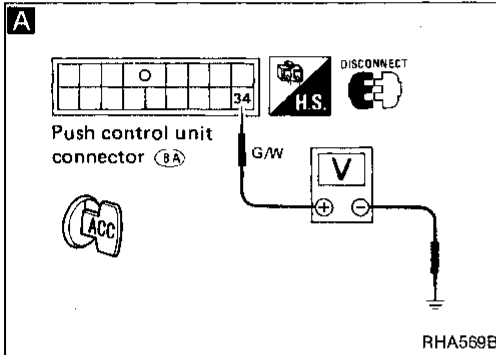
CHECK MAGNET CLUTCH OPERATION.
Does magnet clutch operate normally
when engine ON, A/C switch, fan switch
are ON?

NG

Go to Diagnostic Procedure 10 (HA-80).

OK

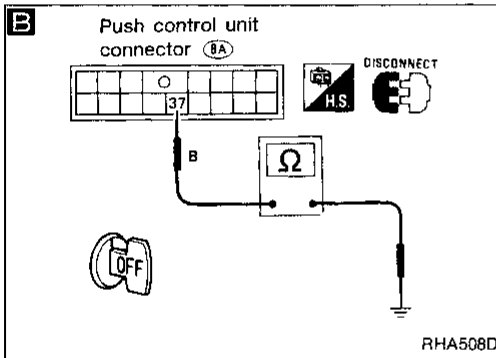
Replace control amp. built-in push control unit.



DIAGNOSTIC PROCEDURE 15-3

Turn ignition switch and lighting switch OFF.

Disconnect push control unit harness connector.



A

CHECK POWER SUPPLY FOR PUSH CONTROL UNIT.
Do approx. 12 volts exist between push control unit harness terminal No. ③④ and body ground?

NG

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

OK

B Note

CHECK BODY GROUND CIRCUIT FOR PUSH CONTROL UNIT.
Does continuity exist between push control unit harness terminal No. ③⑦ and body ground?

OK

Replace control amp. built-in push control unit.

Note:

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

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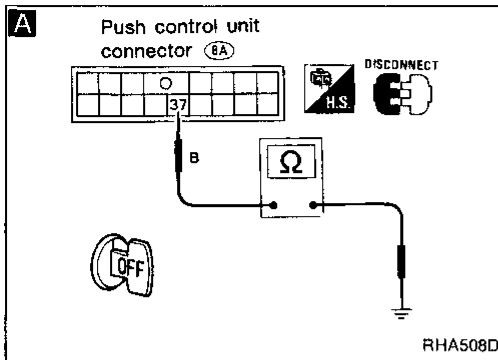
EL

IDX

TROUBLE DIAGNOSES — Auto Air Conditioner

Diagnostic Procedure 15 (Cont'd)

DIAGNOSTIC PROCEDURE 15-4



Turn ignition switch and lighting switch OFF.

Disconnect push control unit harness connector.

A Note

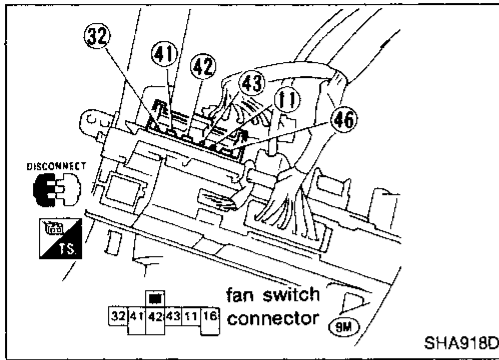
CHECK BODY GROUND CIRCUIT FOR PUSH CONTROL UNIT.
Does continuity exist between push control unit harness terminal No. 37 and body ground?

OK

Replace control amp. built-in push control unit.

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.

TERMINAL	LEVER POSITION				
	OFF	AUTO	1	2	3
41					○
42				○	○
43			○		
11		○			
46		○	○	○	○
32		○	○	○	○

GI

MA

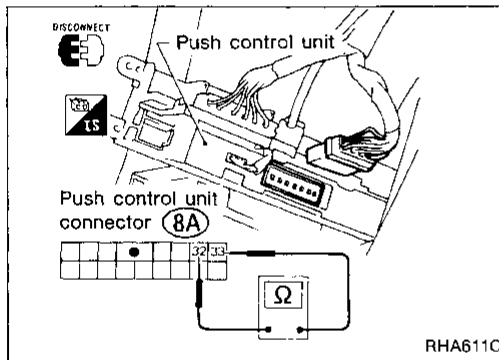
EM

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A/C SWITCH

Check continuity between terminals at each switch position.

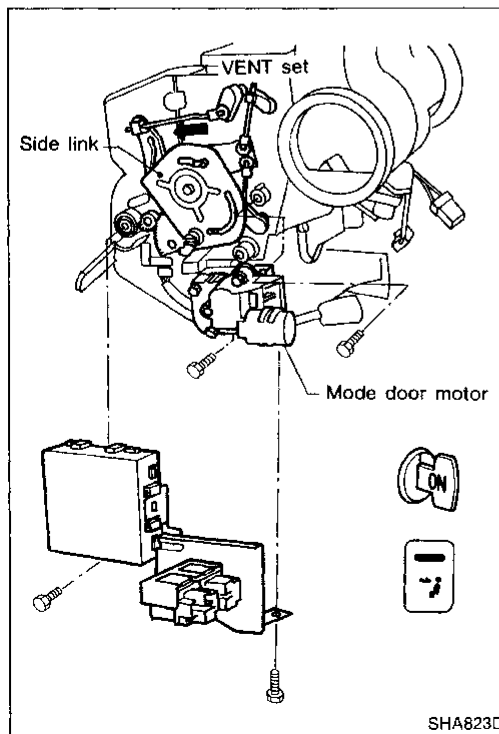
Switch condition		Terminal No.		Continuity
A/C	DEF	⊕	⊖	
ON	ON	33	32	Yes
ON	OFF			
OFF	ON			

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PD



Control Linkage Adjustment

MODE DOOR

1. Remove auto amplifier and relay bracket.
2. Move side link by hand and hold mode door in VENT mode.
3. Install mode door motor on heater unit and connect it to the auto A/C harness.
4. Turn ignition switch to ON.
5. Turn VENT switch ON.
6. Attach mode door motor rod to side link rod holder.
7. 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.

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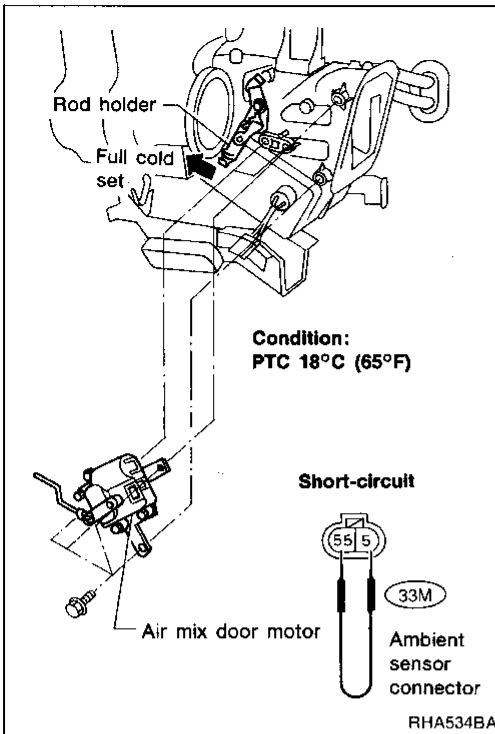
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Control Linkage Adjustment (Cont'd)

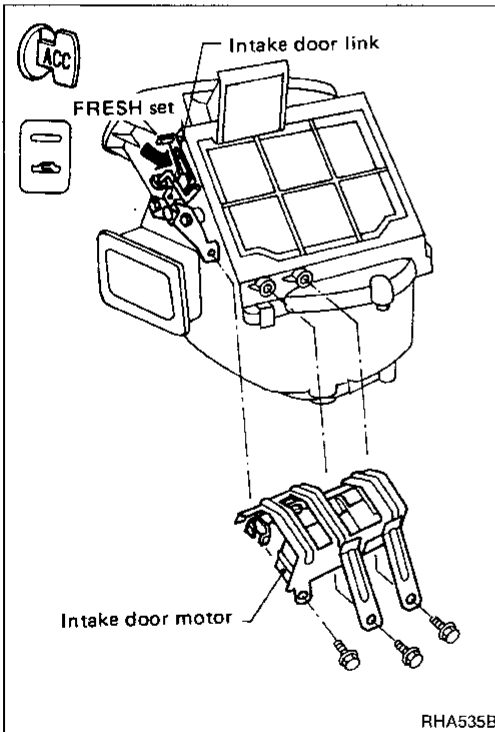
AIR MIX DOOR

1. Install air mix door motor on heater unit and connect it to the auto A/C harness.
2. Disconnect ambient sensor harness connector and connect terminals No. ⑤ and ⑤⑤ with a jumper cable.
3. Set PTC at 18°C (65°F) and air mix door motor at "full cold".
4. Move air mix door lever by hand and hold it at the full-cold position.
5. Attach air mix door lever to rod holder.
6. Check that air mix door operates properly when PTC is moved from 18 to 32°C (65 to 85°F).

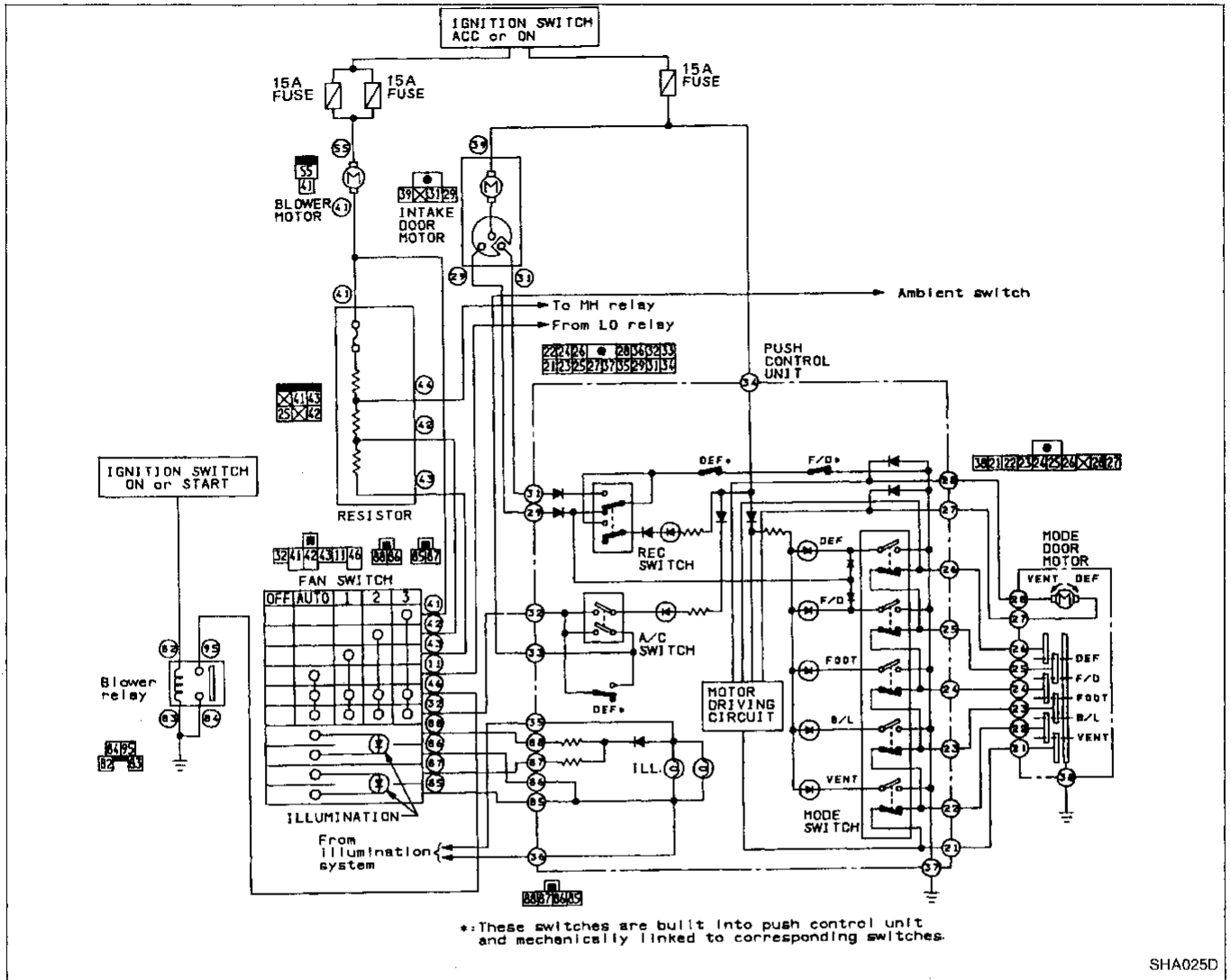


INTAKE DOOR

1. Connect intake door motor harness connector before installing to intake door motor.
2. Turn ignition switch to ACC.
3. Turn REC switch OFF.
4. Set intake door lever in FRE and install intake door motor on intake unit.
5. Check that intake door operates properly when REC switch is turned ON and OFF.



Push Control System



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 outlet	Intake air	Compressor
	A/C									
A/C	○							—	—	ON*1
Mode		○						VENT	—	—
			○					B/L	—	—
				○				FOOT	—	—
					○			F/D	FRE	—
					○			DEF	FRE	ON*1
							○*2	—	REC*2	—

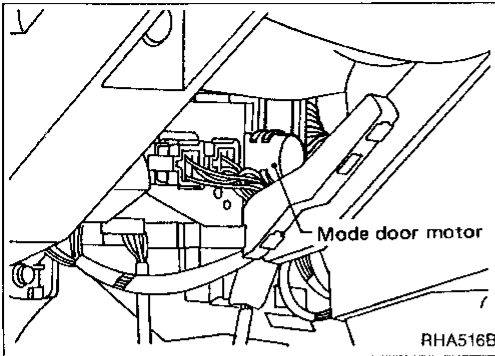
*1: Compressor is operated by thermo control amp.

*2: Depending on mode switch position

SYSTEM DESCRIPTION — Auto Air Conditioner

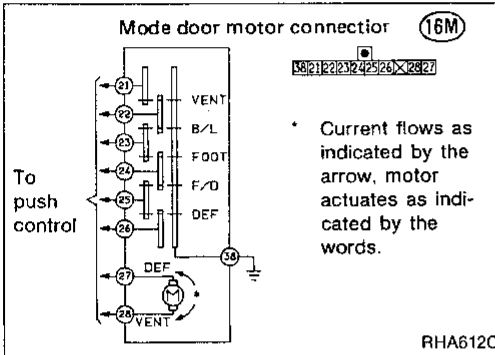
Push Control System (Cont'd)

MODE DOOR MOTOR

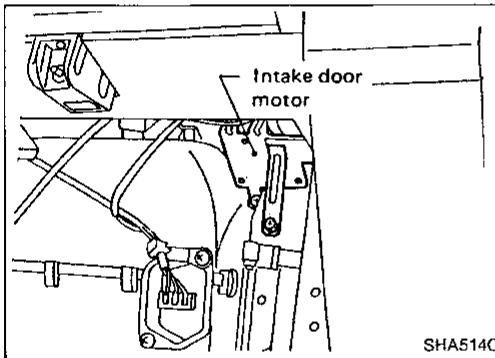


The mode door motor is located on the left side of the heater unit. Through the side link it opens and closes the vent, foot and defroster doors.

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

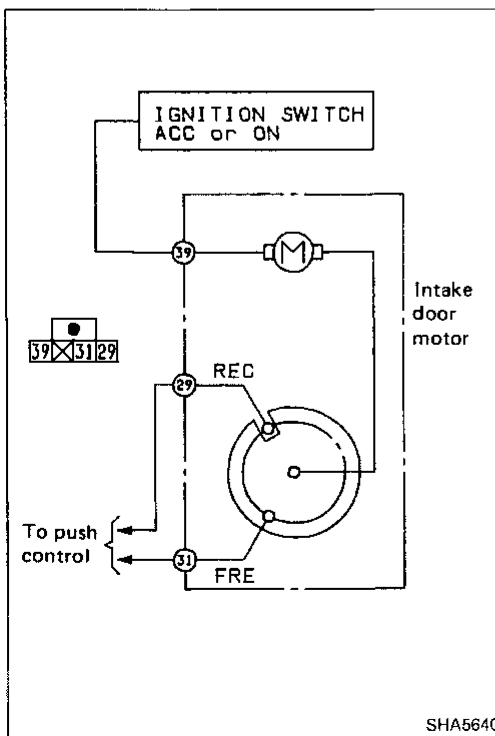


Terminal No.		Mode door motor	
27	28	Mode door operation	Direction of linkage rotation
—	—	Stop	Stop
⊖	⊕	VENT → DEF	Clockwise
⊕	⊖	DEF → VENT	Counterclockwise

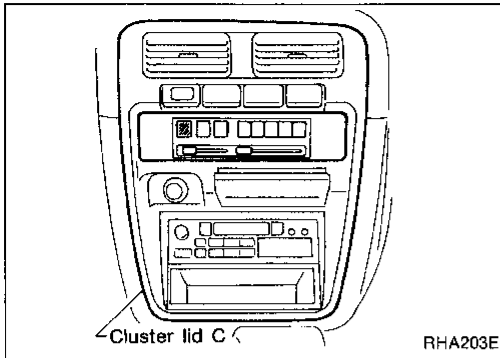


INTAKE DOOR MOTOR

The intake door motor is installed on the intake unit. When the door position is determined by pushing the "REC" switch on the control panel, the motor rotates and the air inlet is changed.

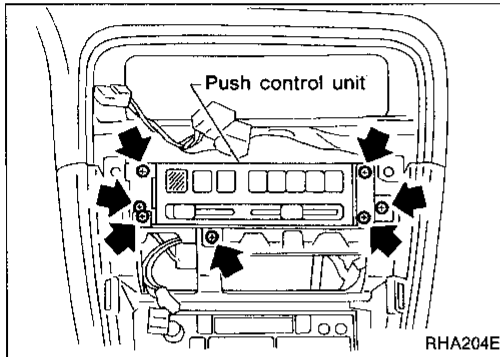


SYSTEM DESCRIPTION — Auto Air Conditioner

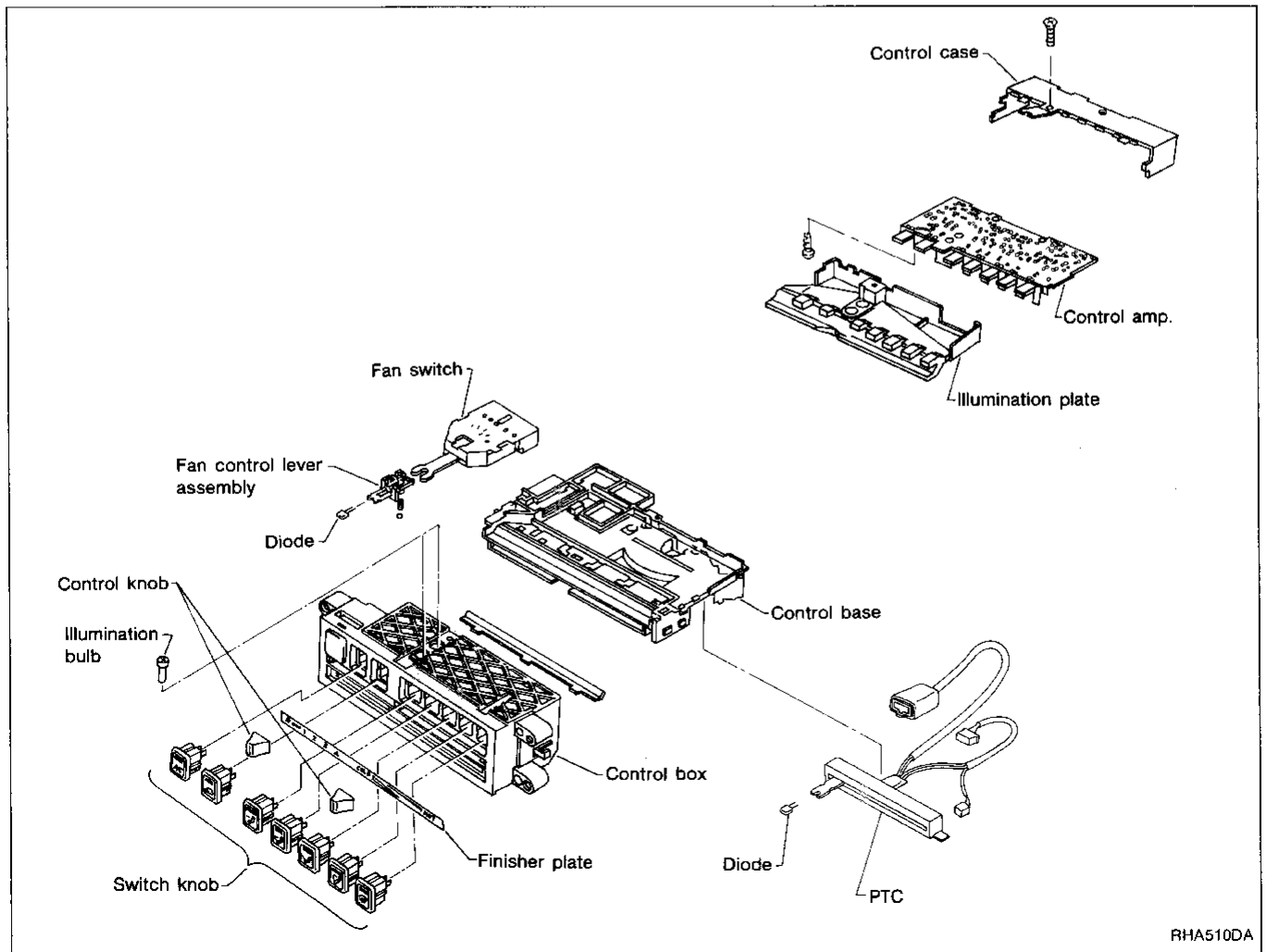


Removal and Installation

1. Remove cluster lid C.
2. Remove seven screws of push control unit and BRKT.
3. Disconnect push control unit, in-vehicle sensor and PTC harness connectors.
4. Remove push control unit.
5. Installation is in the reverse order of removal.



Overhaul — Push control unit assembly



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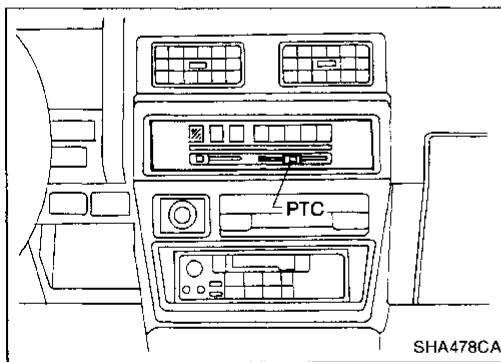
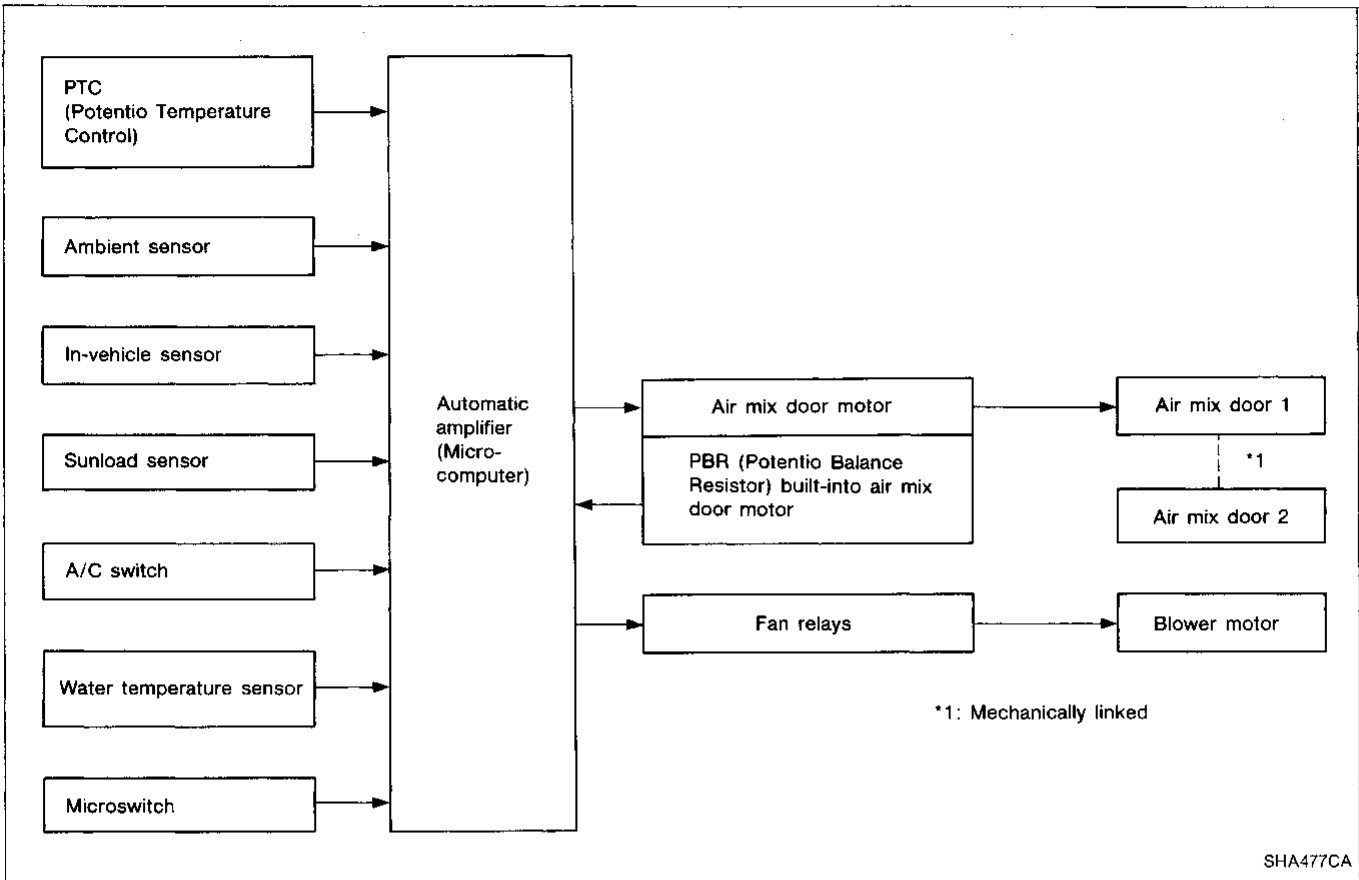
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Overview of Control System

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.



Control System Input Components

POTENTIO TEMPERATURE CONTROL (PTC)

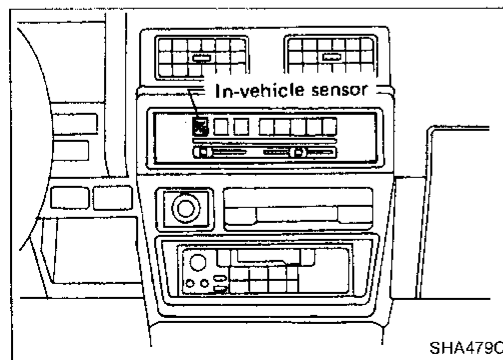
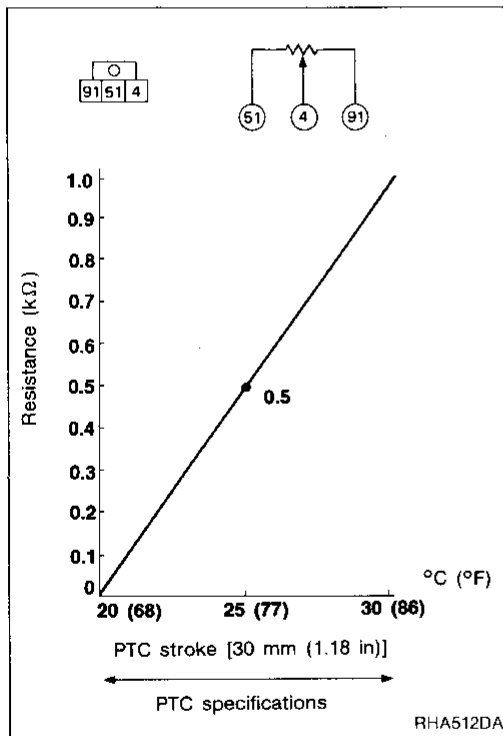
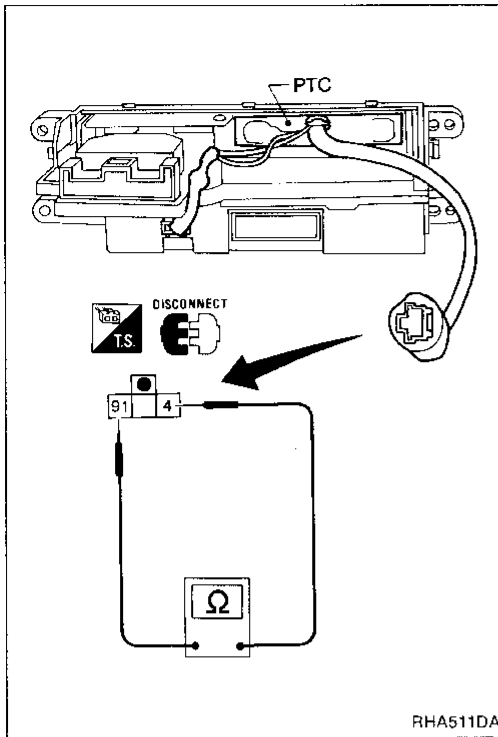
The PTC is built into the control unit. It has a variable resistance which changes according to the set temperature. This resistance is connected to the temperature lever.

SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Input Components (Cont'd)

PTC

After disconnecting PTC harness connector, measure resistance between terminals ④ and ⑨1 at PTC harness side.



IN-VEHICLE SENSOR

The in-vehicle sensor is attached to the left side of the control unit. It converts variations in the temperature of the compartment air drawn in by the aspirator into a resistance value, which is then input into the auto amplifier.

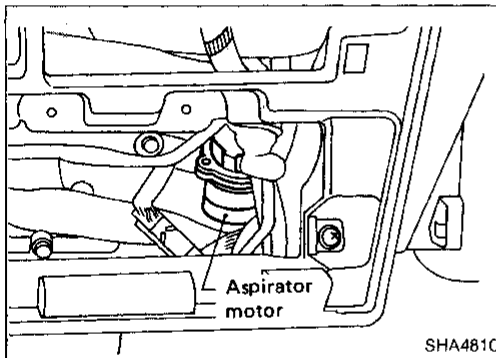
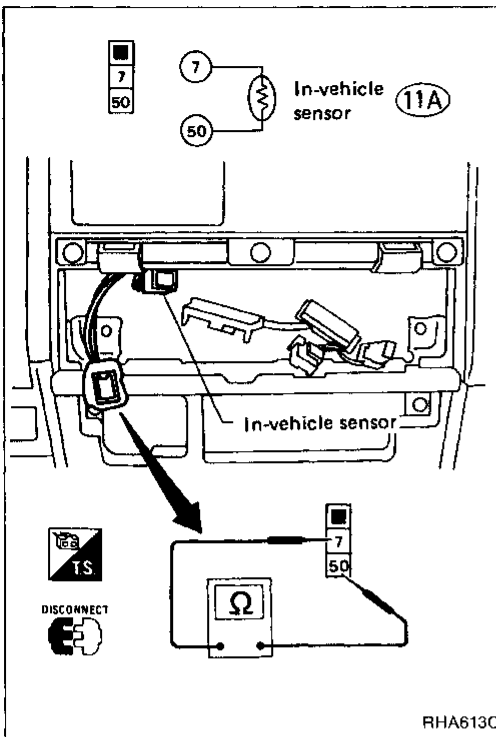
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SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Input Components (Cont'd)

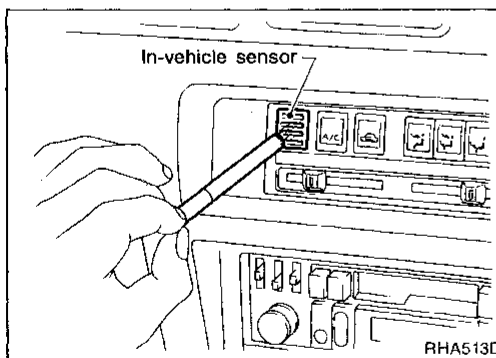
After disconnecting in-vehicle sensor harness connector, measure resistance between terminals ⑦ and ⑤① at sensor harness side, using the table below.

Temperature °C (°F)	Resistance kΩ
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

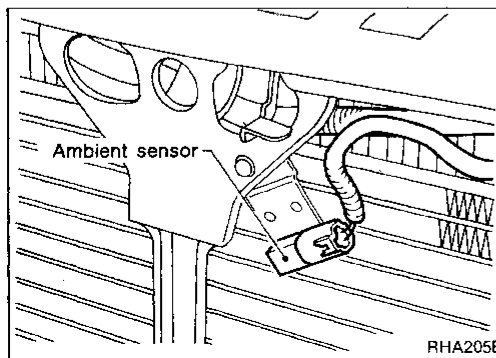


ASPIRATOR MOTOR

The aspirator motor is located in front of the heater unit. The aspirator motor continuously draws compartment air into the in-vehicle sensor while the ignition switch is ON.



Check that smoke is properly sucked into in-vehicle sensor when a lighted cigarette is moved close to the sensor.



AMBIENT SENSOR

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

SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Input Components (Cont'd)

After disconnecting ambient sensor harness connector, measure resistance between terminals ⑤ and ⑤5 at sensor harness side, using the table below.

Temperature °C (°F)	Resistance kΩ
-20 (-4)	9.93
-10 (14)	5.57
0 (32)	3.26
10 (50)	1.98
20 (68)	1.25
25 (77)	1.00
30 (86)	0.81
40 (104)	0.54

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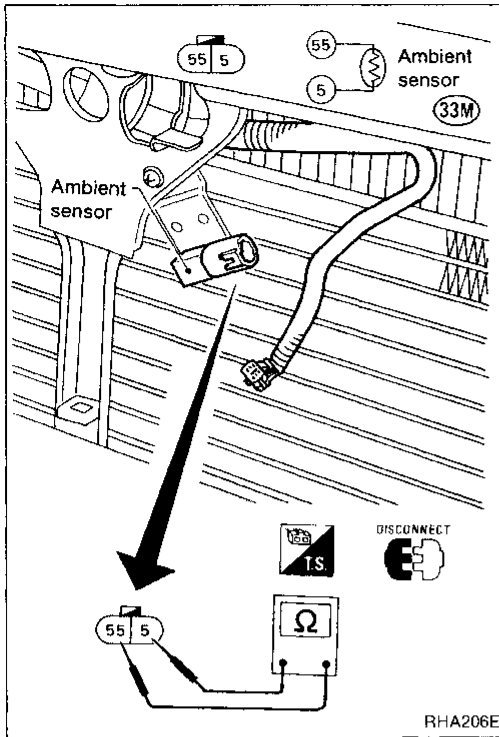
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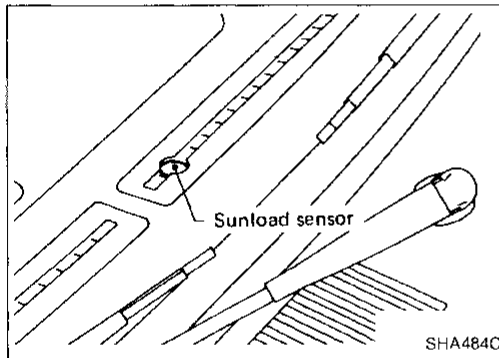
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SUNLOAD SENSOR

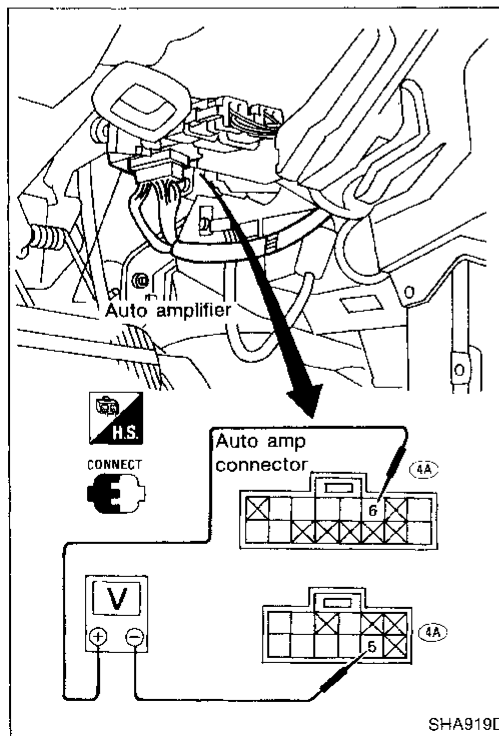
The sunload sensor is located on the center defroster grille. It detects sunload entering through the windshield by means of a photo diode and converts it into a current value which is then input to the auto amplifier.



Measure voltage between terminals ⑤ and ⑥ at auto air conditioner harness side, using the table below.

Input current mA	Output voltage V
0	5.00
0.1	4.09
0.2	3.18
0.3	2.27
0.4	1.36
0.5	0.45

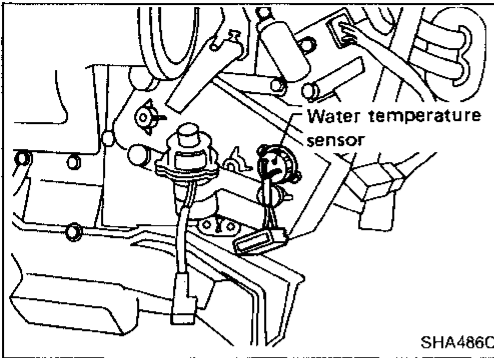
- When checking sunload sensor, select a place where sun shines directly on it.



SYSTEM DESCRIPTION — Auto Air Conditioner

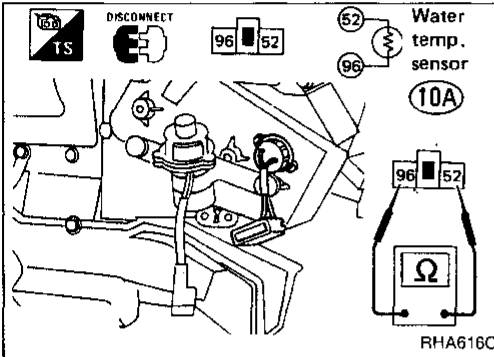
Control System Input Components (Cont'd)

WATER TEMPERATURE SENSOR



SHA486C

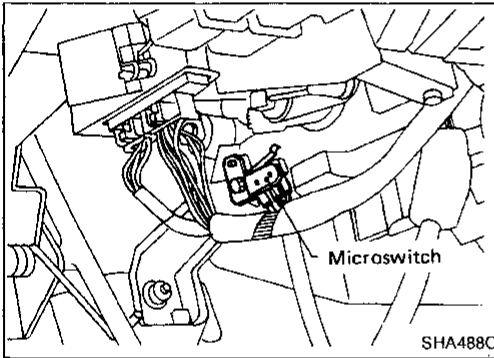
The water temperature sensor is attached to the heater unit and is in contact with the heater core assembly. It detects engine coolant temperature through the heater core and converts it into a resistance value, which is then input into the auto amplifier. When the VENT switch or DEF switch is ON, signals from the water temperature sensor are not input into the auto amplifier. After disconnecting water temperature sensor harness connector, measure resistance between terminals 52 and 96 at sensor harness side, using the table below.



RHA616C

Temperature °C (°F)	Resistance kΩ
0 (32)	3.99
10 (50)	2.54
20 (68)	1.67
30 (86)	1.12
40 (104)	0.78
50 (122)	0.55
60 (140)	0.40
70 (158)	0.29
80 (176)	0.22

MICROSWITCH

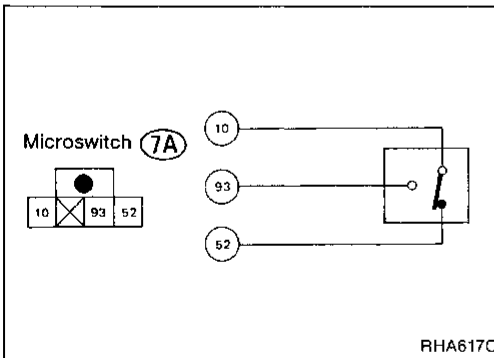


SHA488C

The microswitch is installed around the side link of the heater unit and operates the link in response to the position of the mode switch.

The operation of this microswitch is as shown below:

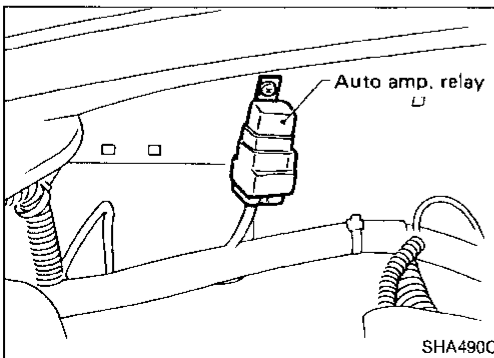
Microswitch operation



RHA617C

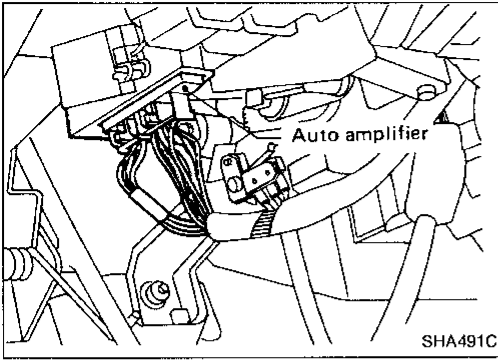
MODE	VENT	B/L	FOOT	FOOT/DEF	DEF
Terminal No. 10	○	○	○	○	○
93	○	○	○	○	○
52		○	○	○	

AUTO AMP. RELAY



SHA490C

The auto amp. relay is located on the left side of the engine room. When the A/C switch and fan switch are ON, the auto amp. relay operates and transmits A/C operation signals to the auto amplifier.



Control System Auto Amplifier (Auto amp.)

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

Signals from the various switches and the Potentio Temperature Control (PTC) are directly entered into the auto amplifier.

SUNLOAD INPUT PROCESS

The auto amp. also includes a processing circuit which "averages" 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.

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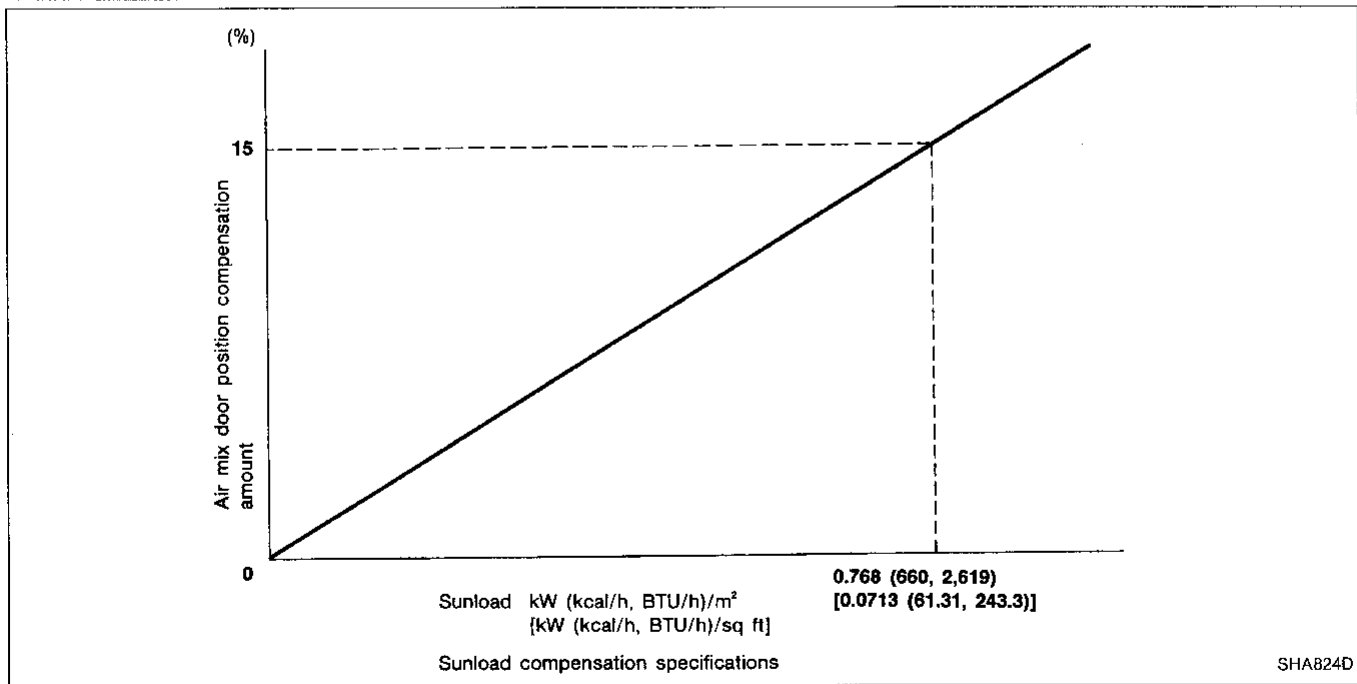
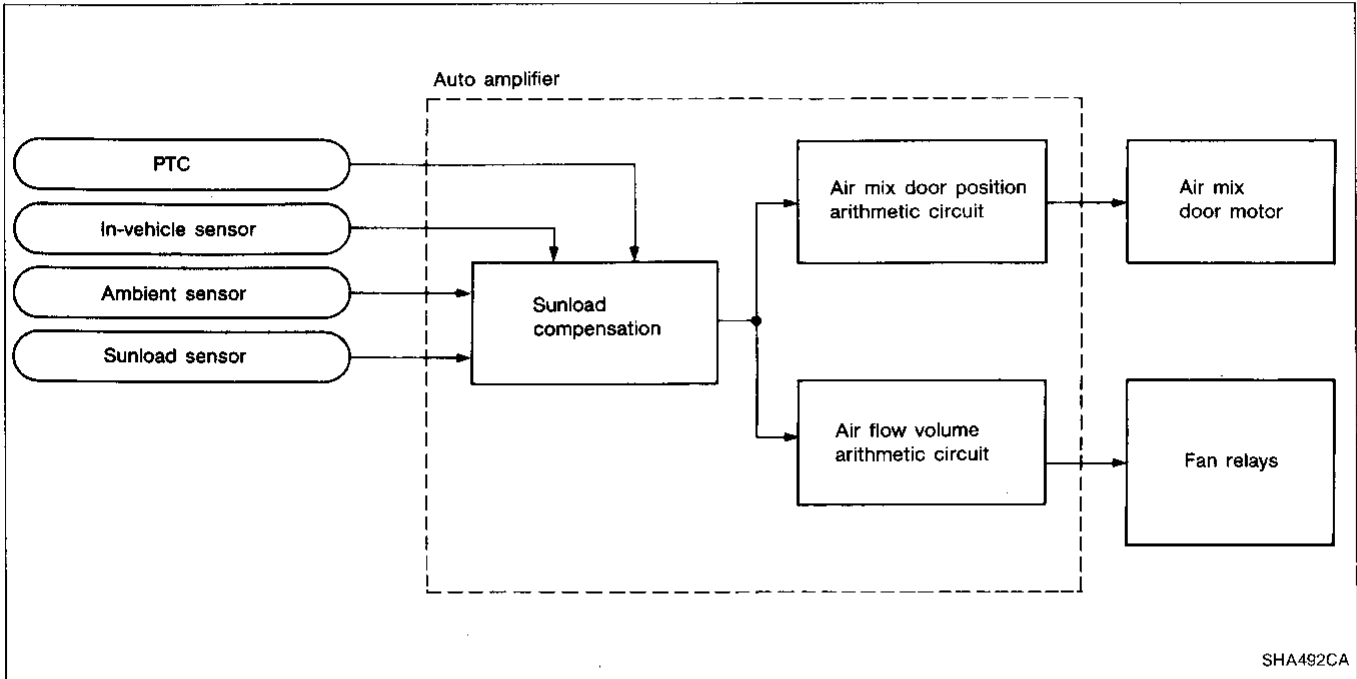
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SYSTEM DESCRIPTION — Auto Air Conditioner

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

SUNLOAD COMPENSATION

The auto amplifier compensates for sunload by altering the air mix door position and air flow volume according to the amount of sunload detected by the sunload sensor. When the amount of sunload is great, the air mix door is moved toward the "COLD" side. Along with this air mix door movement, air flow volume will also be changed.



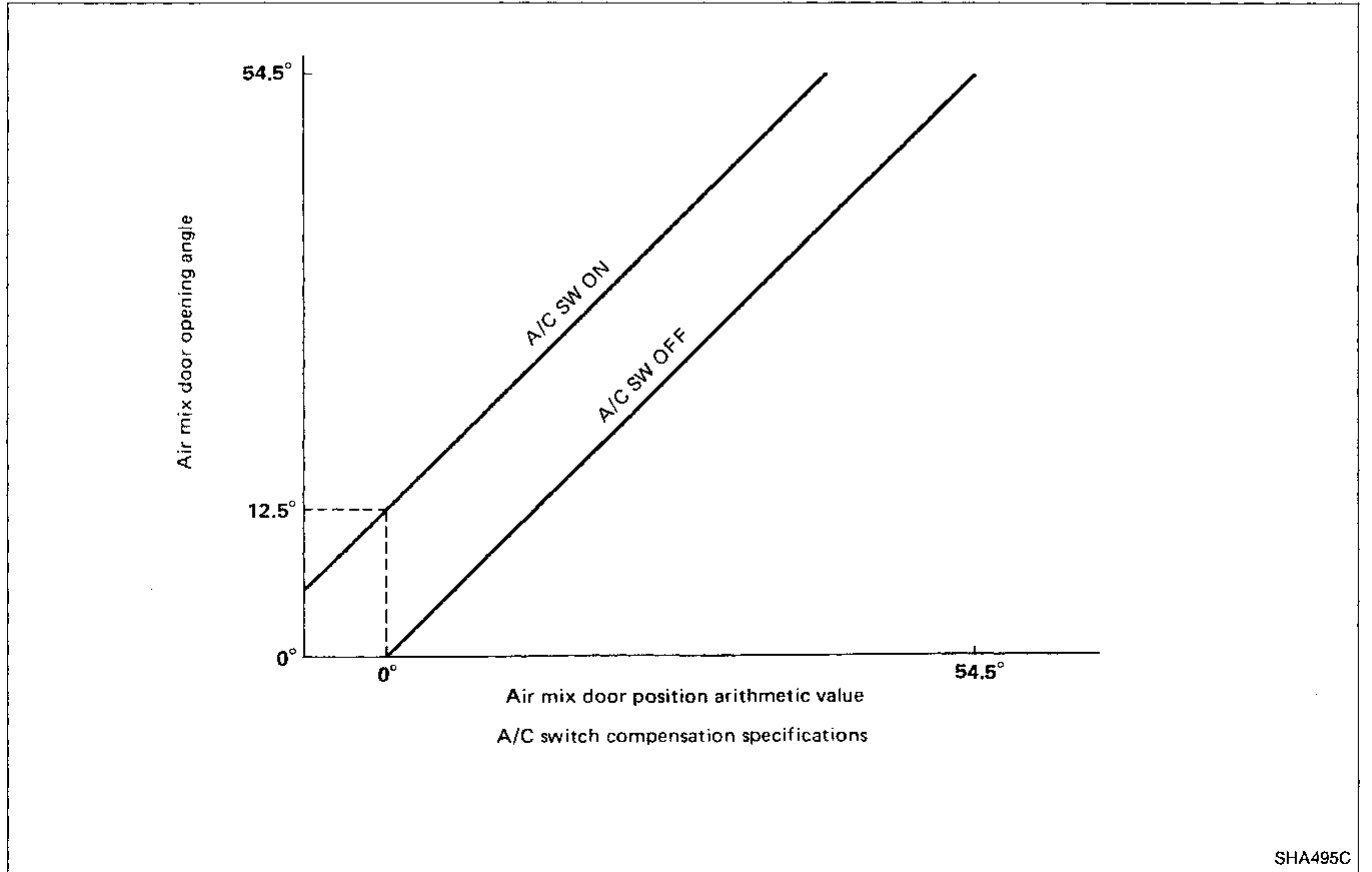
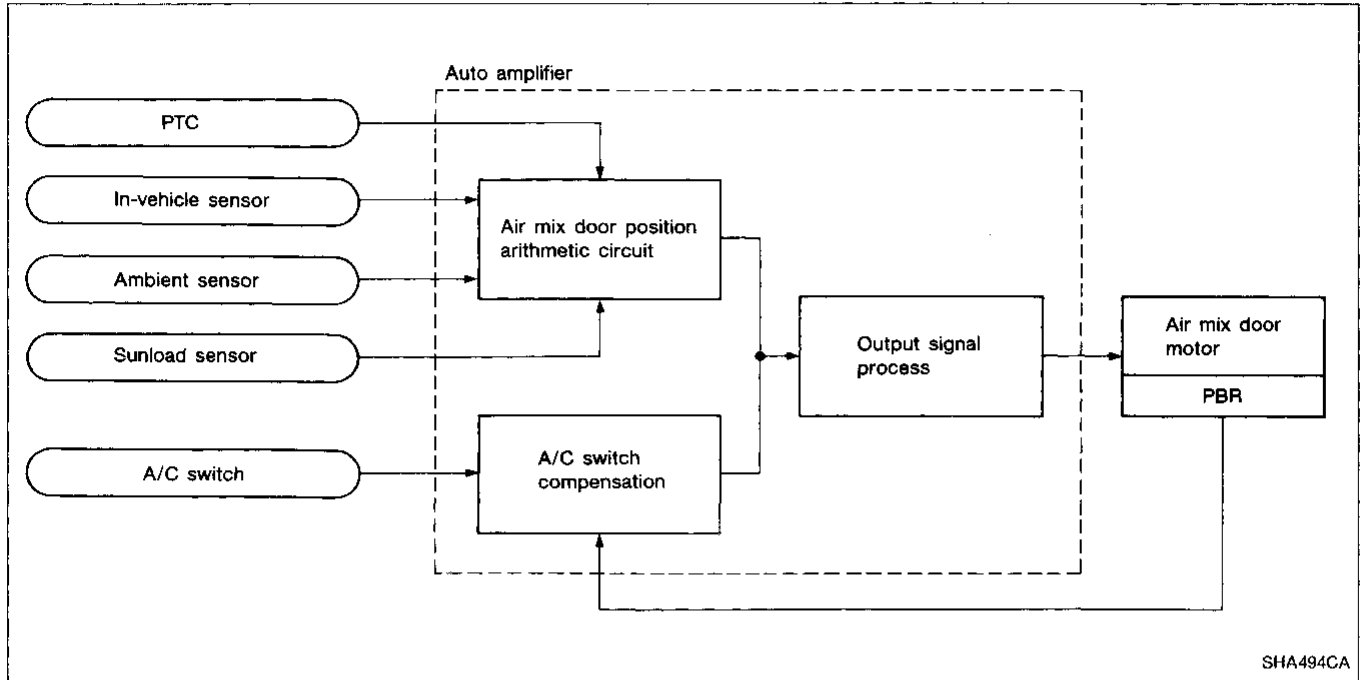
SYSTEM DESCRIPTION — Auto Air Conditioner

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

A/C SWITCH COMPENSATION

The auto amplifier alters the air mix door position and air flow volume according to a signal emitted from the A/C switch.

When the A/C switch is "ON", the auto amplifier compensates for the PBR's input signal and moves the air mix door toward the "HOT" side.



Control System Output Components

AIR MIX DOOR CONTROL (Automatic temperature control)

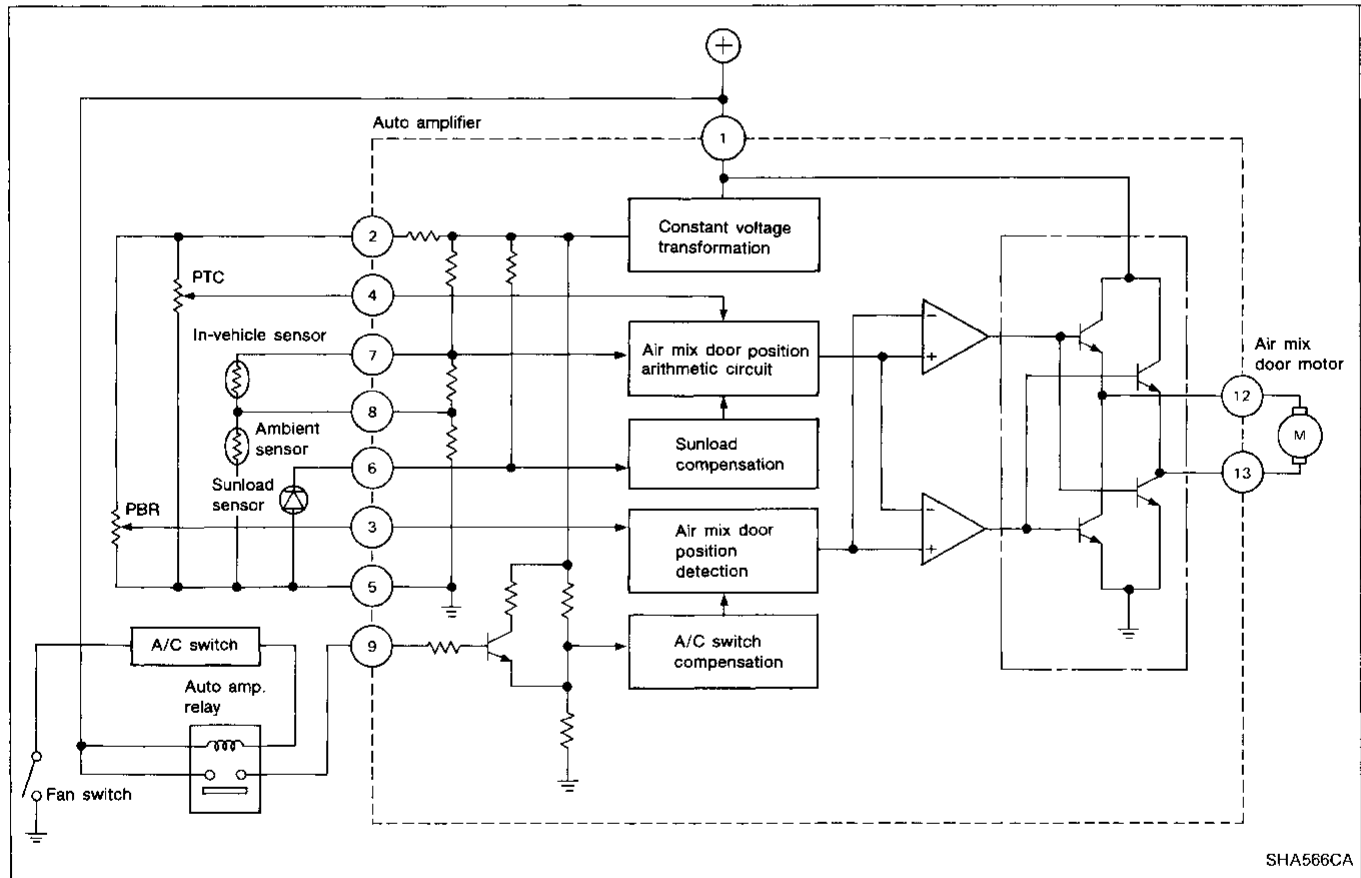
Component parts

Air mix door control system components are:

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

System operation

The air mix door is automatically controlled so that in-vehicle temperature is maintained to the set temperature. The temperature set by the PTC (Potentio Temperature Control) and the temperature detected by the in-vehicle sensor and ambient sensor are compensated by the sunload sensor signal. The auto amplifier then determines the air-mix door position. The air mix door position detected by the PBR is compensated by the ON-OFF operation of the A/C switch. The air mix door position determined by the auto amplifier is compared with that detected by the PBR. The auto amplifier then transmits the signal to the air mix door motor in order to activate it.

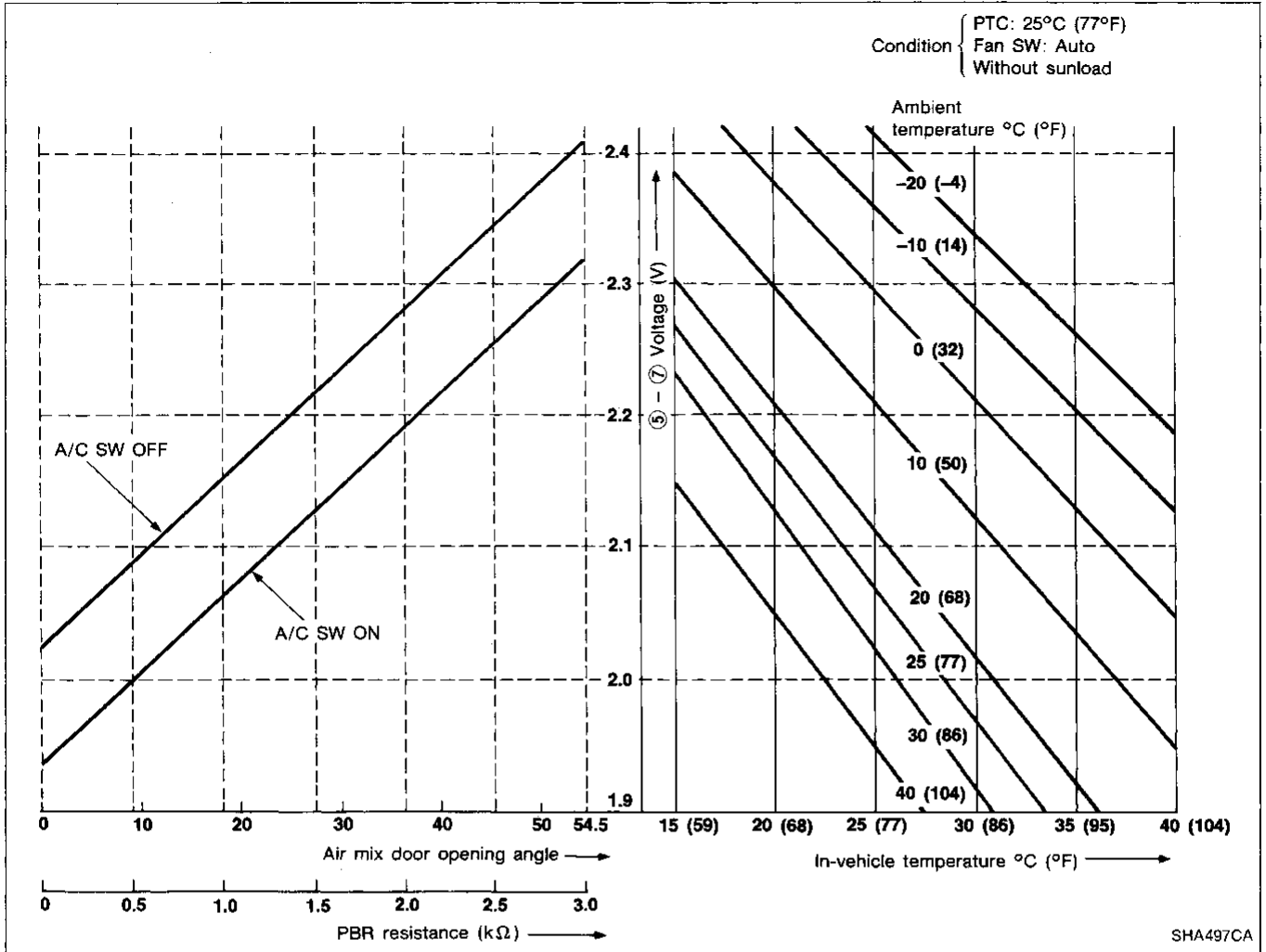


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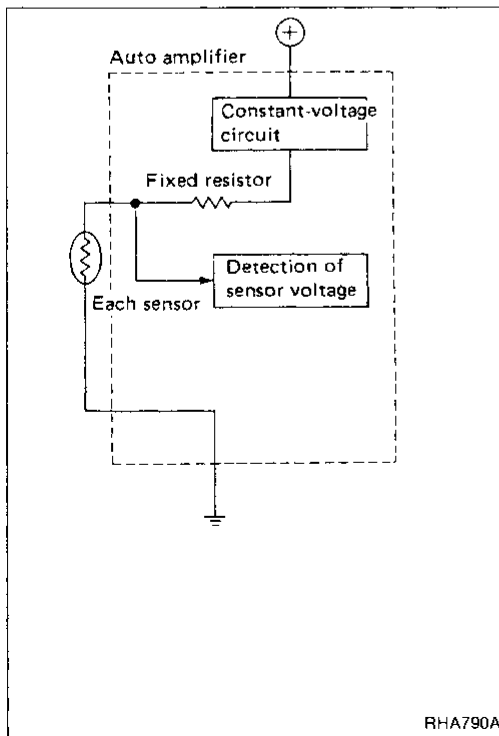
SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Output Components (Cont'd)

Air mix door control specifications



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SENSOR INPUT PROCESS

The auto amplifier detects the voltage produced by each sensor, the PBR and fixed resistor. The fixed resistor is built into the auto amplifier. 12-volt power voltage is first converted to approximately 5 volts by the constant voltage circuit where it is then applied to the ground line of the auto amplifier via the fixed resistor and the sensor. In this manner, the auto amplifier monitors the voltages of the fixed resistor, each sensor and the PBR to determine sensor input.

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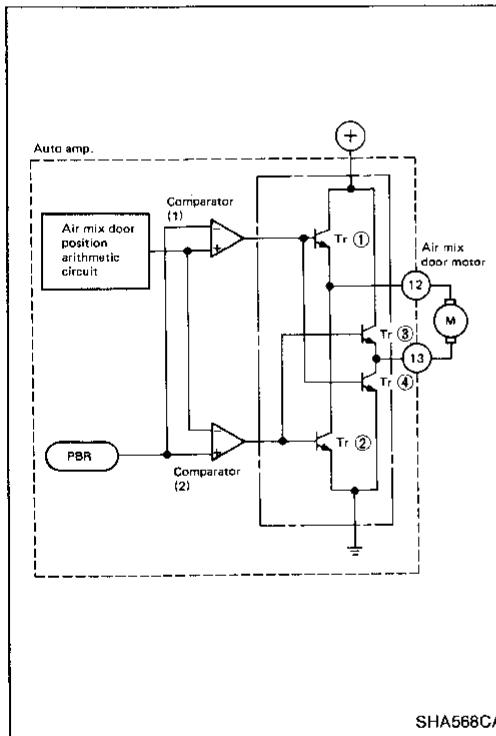
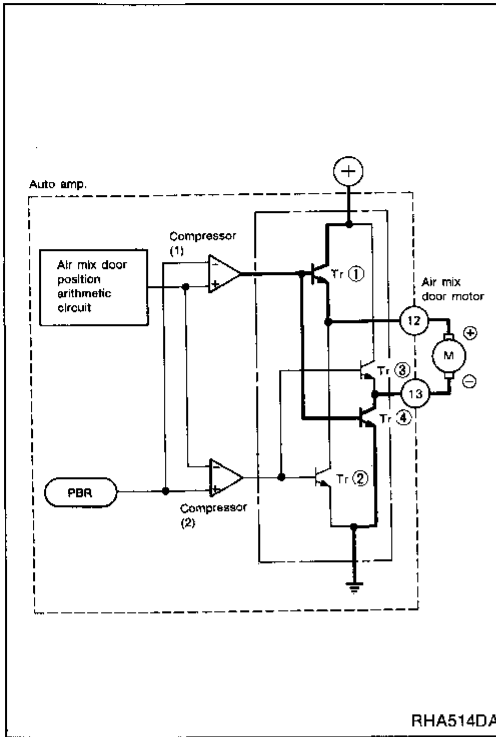
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SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Output Components (Cont'd)

OPERATION OF AIR MIX DOOR MOTOR

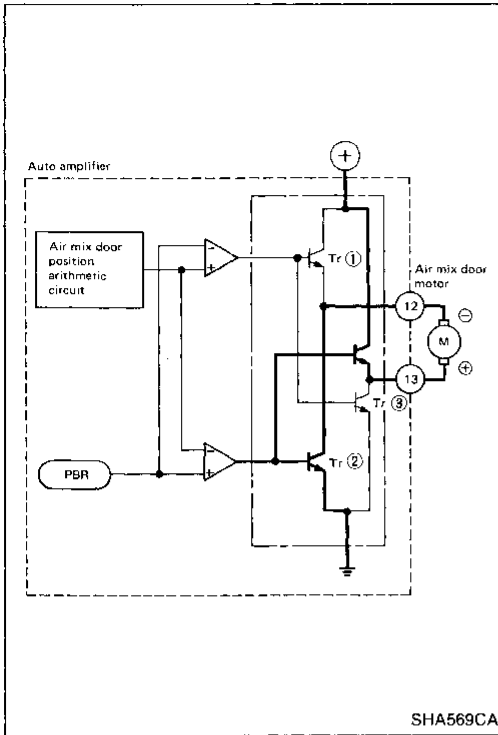
- Example ①
When the temperature in the vehicle is lower than the set temperature.
When the temperature in the vehicle is low, in-vehicle sensor resistance is great and the input voltage to the auto amplifier becomes great. As a result, the voltage from the air mix door position arithmetic circuit also becomes great. When this voltage is greater than the voltage from the PBR, comparator (1), Tr ① and Tr ④ turn ON. Accordingly terminal No. ⑫ becomes ⊕ and terminal No. ⑬ becomes ⊖. The air mix door motor rotates clockwise and the air mix door moves toward the "HOT" side.



As the air mix door moves toward the "HOT" side, the voltage from the PBR becomes greater and consequently becomes equal to that from the air mix door position arithmetic circuit. As a result, comparator (1) turns OFF and the air mix door motor stops.

SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Output Components (Cont'd)



- Example ②
When the temperature in the vehicle is higher than the set temperature.
When the temperature in the vehicle is high, in-vehicle sensor resistance is small and the input voltage to the auto amplifier becomes small. As a result, the voltage from the air mix door position arithmetic circuit also becomes small. When this voltage is smaller than the voltage from the PBR, comparator (2), Tr ② and Tr ③ turn ON. Accordingly terminal No. ⑬ becomes ⊕ and terminal No. ⑫ becomes ⊖. The air mix door motor rotates counterclockwise and the air mix door moves toward the "COLD" side.

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As the air mix door moves toward the "COLD" side, the voltage from the PBR becomes smaller and consequently becomes equal to that from the air mix door position arithmetic circuit. As a result, comparator (2) turns OFF and the air mix door motor stops.

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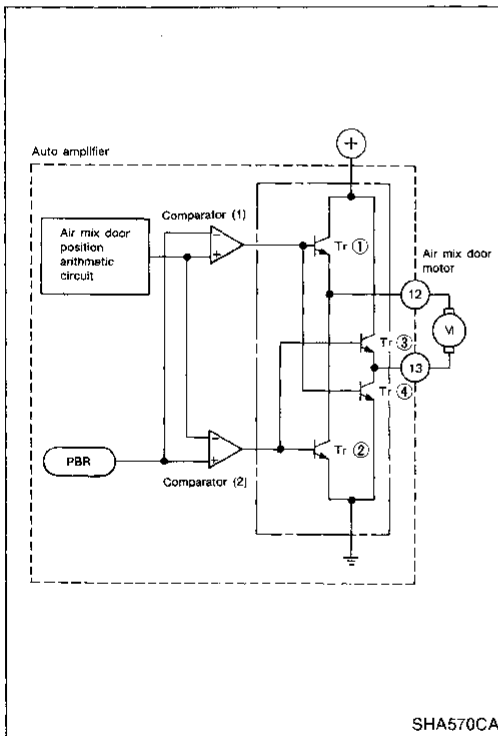
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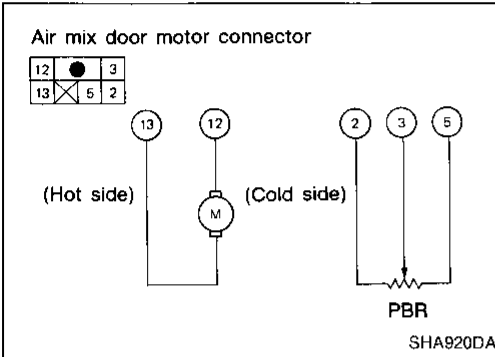
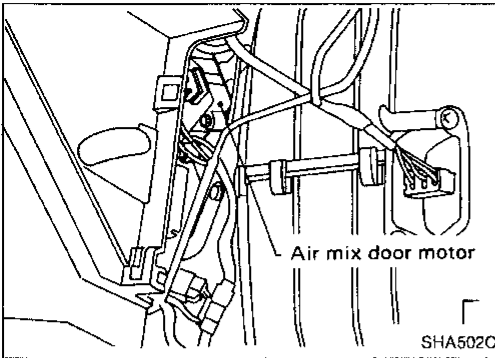


SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Output Components (Cont'd)

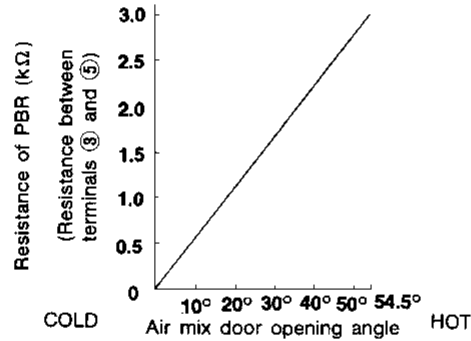
AIR MIX DOOR MOTOR

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 conveyed through a shaft. The air mix door position is then fed back to the auto amplifier by the PBR built into the air mix door motor.

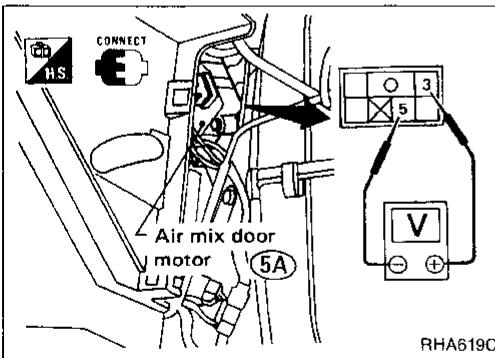


12	13	Air mix door operation	Direction of lever movement
⊕	⊖	COLD → HOT	Clockwise (Toward passenger compartment)
—	—	STOP	STOP
⊖	⊕	HOT → COLD	Counterclockwise (Toward engine compartment)

Characteristic PBR

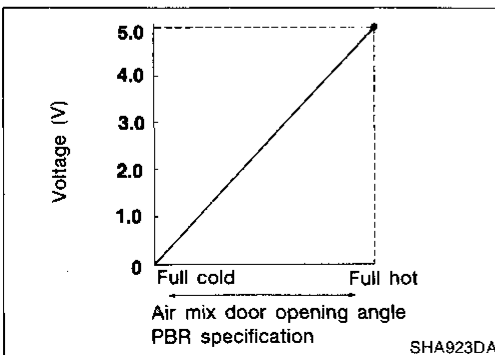


SHA729DA



PBR

Measure voltage between terminals ③ and ⑤ 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.

SHA923DA

FAN SPEED CONTROL

Component parts

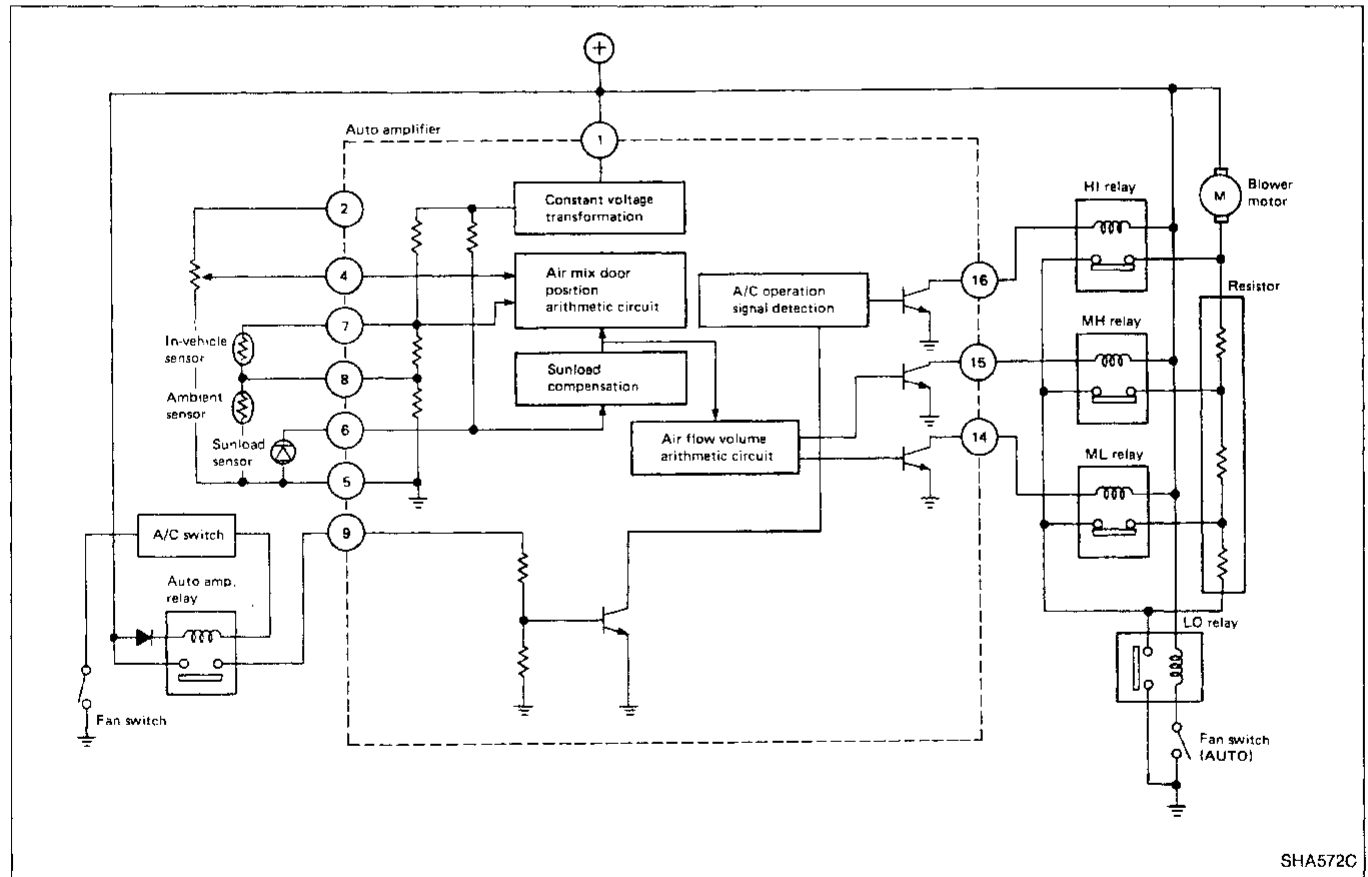
Fan speed control system components are:

- 1) Auto amplifier
- 2) In-vehicle sensor
- 3) Ambient sensor
- 4) Sunload sensor
- 5) Auto amp. relay
- 6) A/C switch
- 7) Fan switch
- 8) Blower motor
- 9) Resistance

System operation

Blower fan speed is automatically controlled so that the in-vehicle temperature is maintained to the set temperature.

The temperature set by the PTC (Potentio Temperature Control) and the temperature detected by the in-vehicle sensor and ambient sensor are compensated by the sunload sensor signal. The auto amplifier then determines fan speed from the ON-OFF operation of the A/C switch. The fan speed decision by the auto amplifier activates the fan relay and the blower fan motor rotates. When the A/C switch is ON, fan speed is activated in 4 steps, HI, MH, ML, and LO. When the A/C switch is OFF, fan speed is activated in 3 steps, MH, ML, and LO.



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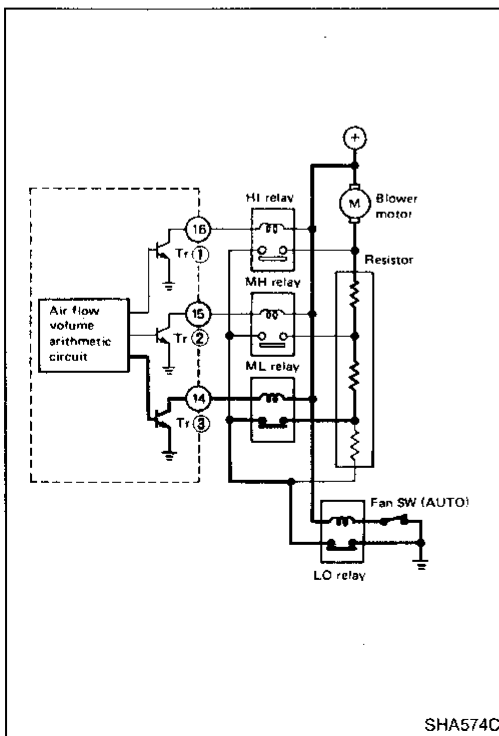
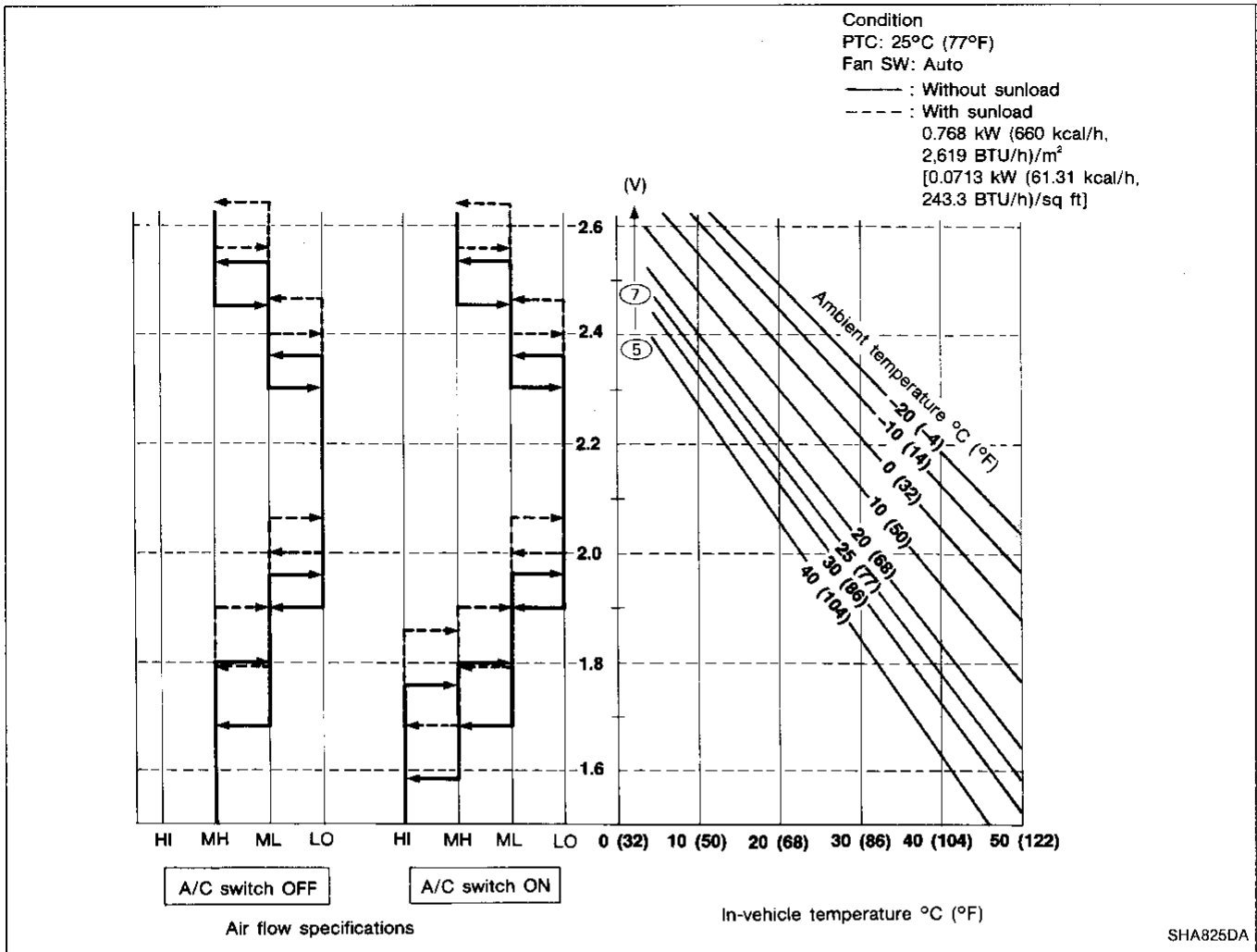
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SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Output Components (Cont'd)



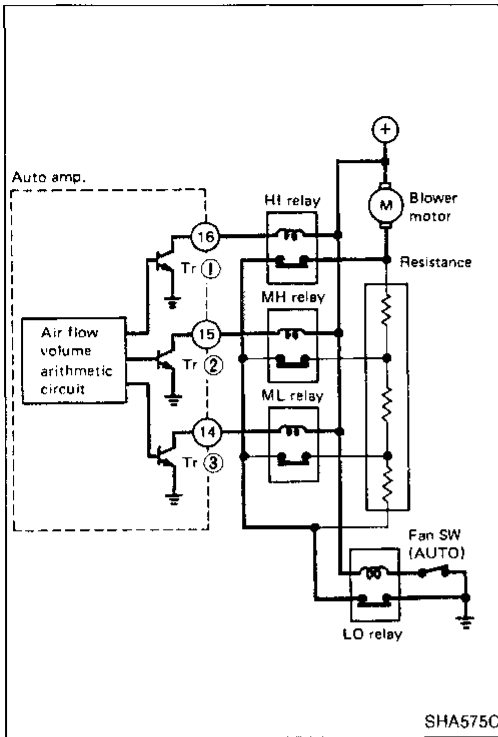
Signals from each sensor, PTC, A/C switch etc. are sent to the air flow volume arithmetic circuit in the auto amplifier. Air flow volume is determined by this circuit.

(1) When the air flow volume is set to ML

The air flow volume arithmetic circuit gives current to Tr ③, which turns the ML relay on. Thus, the blower motor rotates in the ML condition.

SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Output Components (Cont'd)



(2) When set to HI

The air flow volume arithmetic circuit gives current to Tr ①, which turns the HI relay on. Thus, the blower motor rotates in the HI condition. Also, Tr ② and Tr ③ are receiving current and as a result the ML and MH relays are on.

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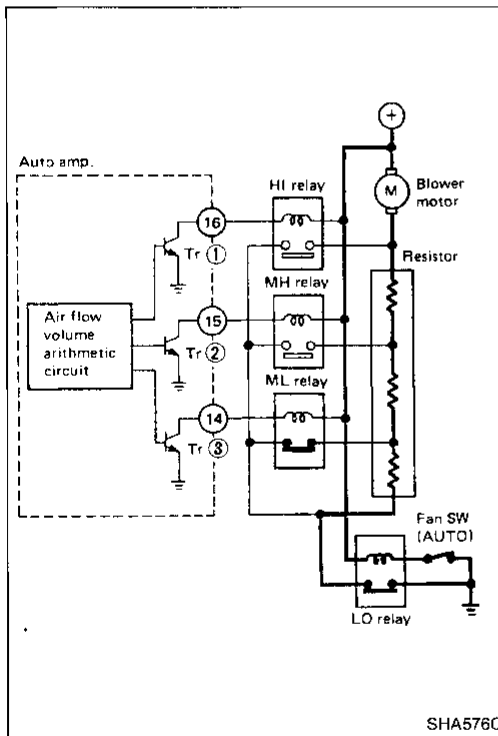
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(3) When set to LO

The air flow volume arithmetic circuit does not give any current to Tr ①, ② nor ③.

Only the LO relay turns on and so the blower motor rotates in the LO condition.

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SYSTEM DESCRIPTION — Auto Air Conditioner

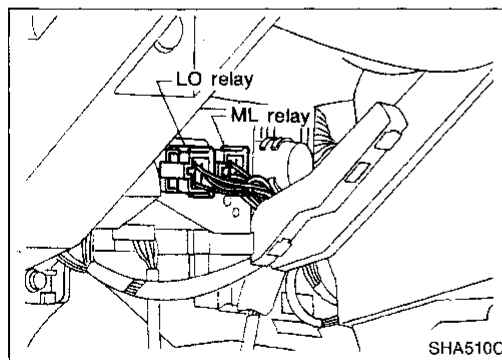
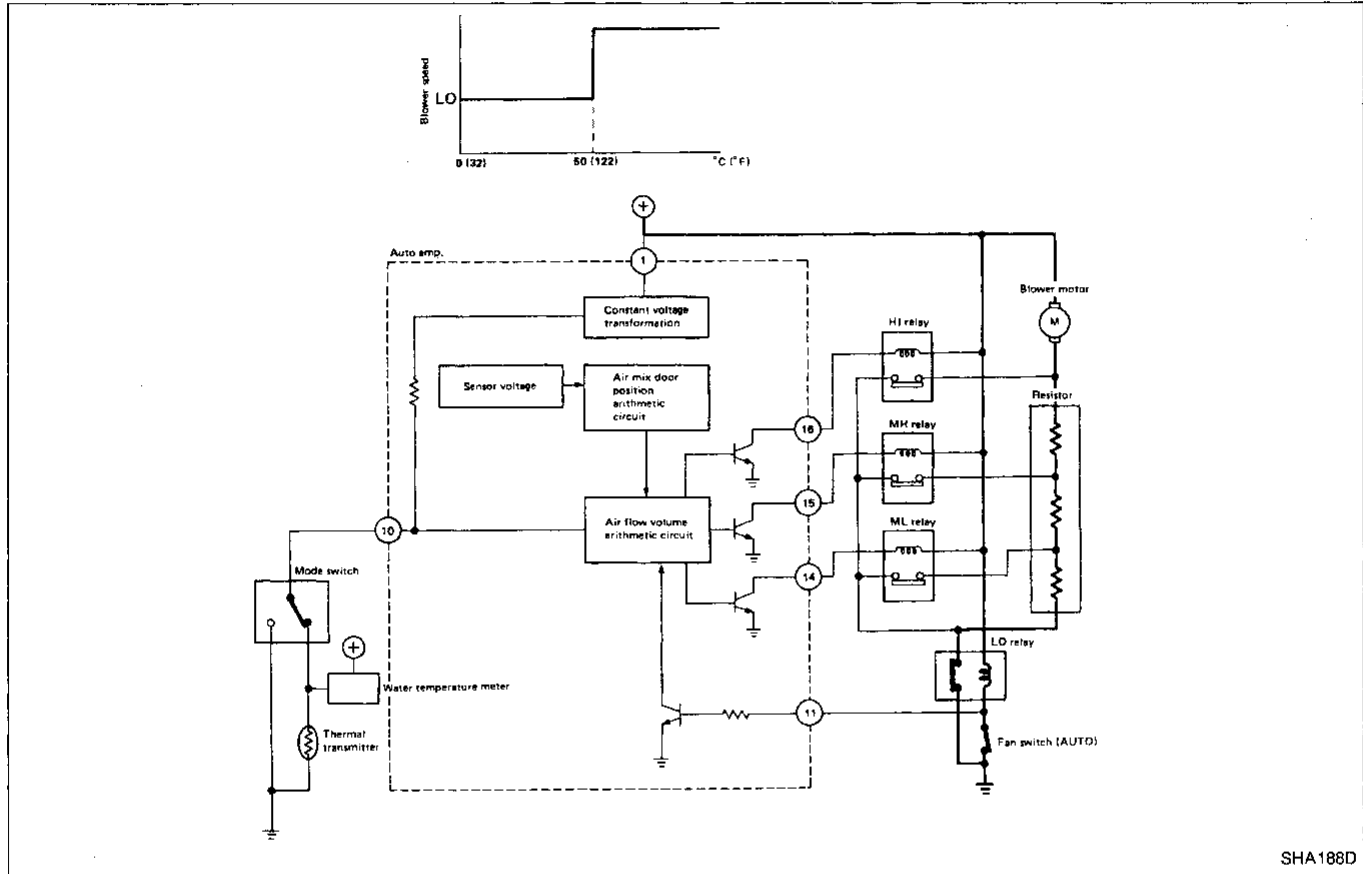
Control System Output Components (Cont'd)

STARTING FAN SPEED CONTROL

The starting fan control system is so designed to prevent excess cold air from being expelled after the engine is started when the engine coolant temperature is low.

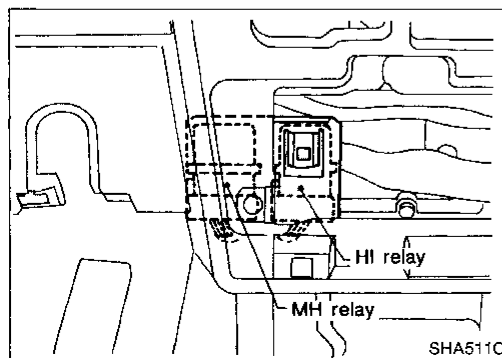
The component parts related to this system are the water temperature sensor microswitch, fan relays, blower motor, resistance and auto amplifier.

When the fan switch is set to AUTO, the microswitch to ON (either B/L, FOOT or FOOT/DEF) and the engine coolant temperature is below 50°C (122°F), the speed of the blower motor is fixed in the LO position.



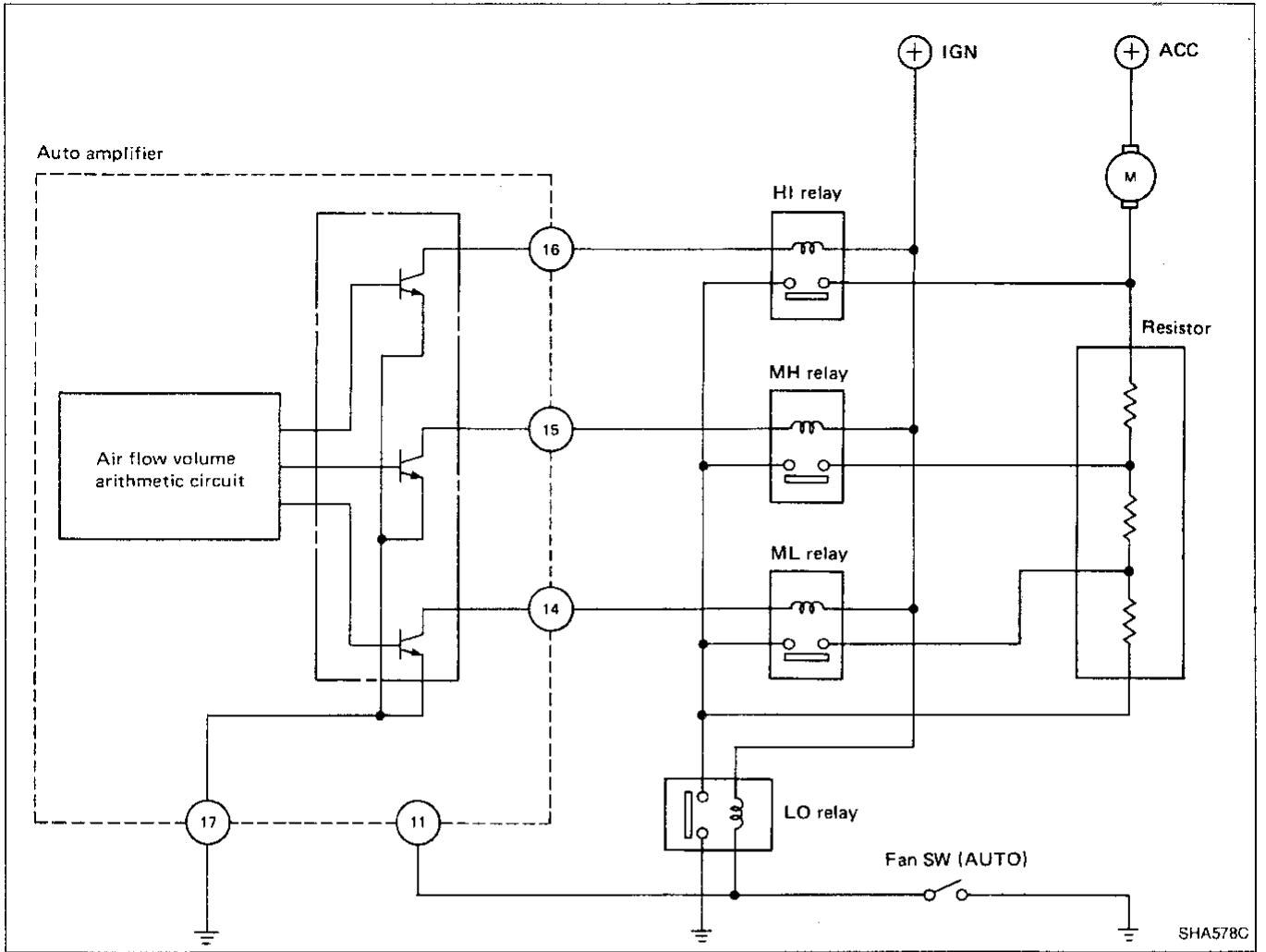
FAN RELAY

The LO and ML fan relays are located on the auto amplifier bracket, and the MH and HI fan relays are installed on the back side of the audio unit. Each fan relay operates according to the air flow volume determined by the auto amplifier. The blower motor then operates accordingly.

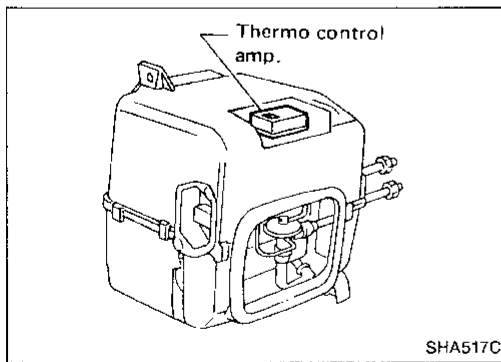


SYSTEM DESCRIPTION — Auto Air Conditioner

Control System Output Components (Cont'd)



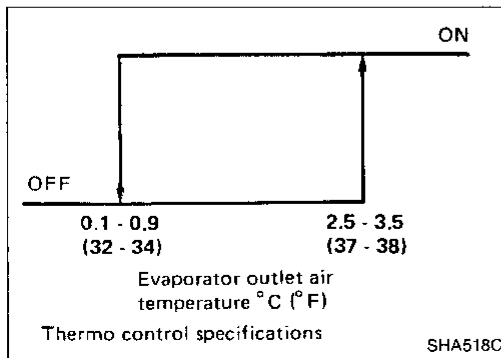
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THERMO CONTROL AMP.

The thermo control amplifier is installed on the top of the cooling unit. It detects the temperature of the evaporator using a thermistor and turns the compressor on or off.

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SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

COMPRESSOR

Model	DKV-14C
Type	Vane rotary
Displacement cm ³ (cu in)/Rev	140 (8.54)
Direction of rotation	Clockwise (Viewed from drive end)
Drive belt	A type

LUBRICATION OIL

Model	ZEXEL make DKV-14C
Name	Nissan A/C System Oil Type R
Part number	KLH00-PAGR0
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	R134a
Capacity kg (lb)	0.75 - 0.85 (1.65 - 1.87)

Inspection and Adjustment

ENGINE IDLING SPEED

When A/C is ON (FICD is actuated)
Refer to EF & EC section.

BELT TENSION

Refer to Checking Drive Belts (MA section).

COMPRESSOR

Model	DKV-14C
Clutch disc-to-pulley clearance mm (in)	0.3 - 0.6 (0.012 - 0.024)