

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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Supplemental Restraint System (SRS) "AIR BAG"

The Supplemental Restraint System "Air Bag", used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), sensors, a diagnosis unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **RS** section of this Service Manual.

WARNING:

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

Introduction

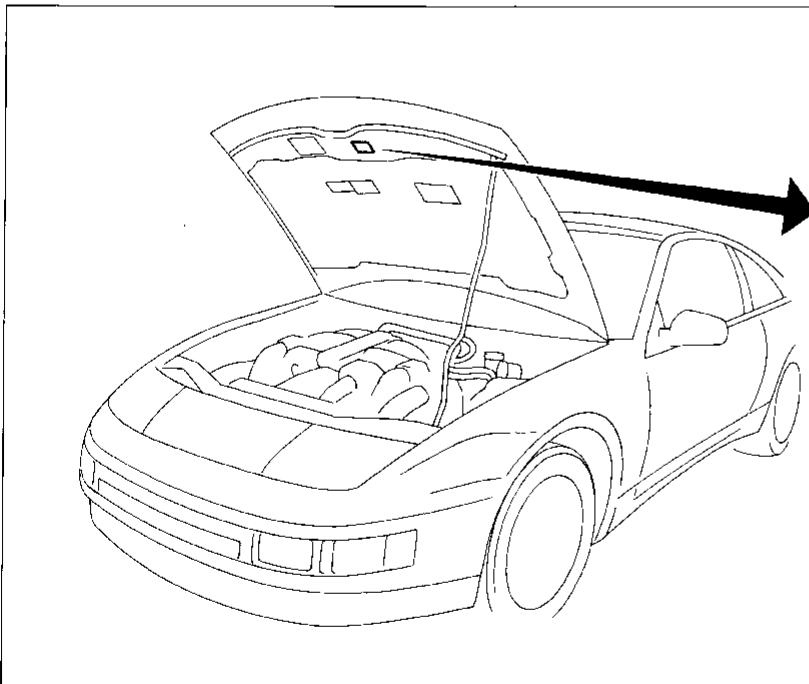
To prevent the ozone layer from being destroyed, the HFC-134a (R-134a) refrigerant has replaced the previously used CFC-12 (R-12).

HFC-134a (R-134a) and CFC-12 (R-12) refrigerants, lubricants, service tools, etc. are not interchangeable. They have different 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			NISSAN
	REFRIGERANT	COMPRESSOR LUBRICANT	
TYPE (PART NO.)	HFC-134a	△1	
AMOUNT	△3	△2	

CAUTION PRÉCAUTION

- REFRIGERANT UNDER HIGH PRESSURE.
- SYSTEM TO BE SERVICED BY QUALIFIED PERSONNEL.
- IMPROPER SERVICE METHODS MAY CAUSE PERSONAL INJURY.
- CONSULT SERVICE MANUAL.
- THIS AIR CONDITIONER SYSTEM COMPLIES WITH SAE J-639.

NISSAN MOTOR CO., LTD. Tokyo, Japan

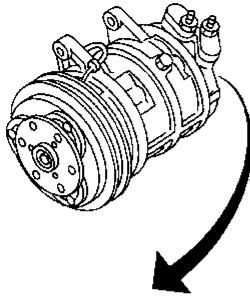
△1 : Lubricant type and service part number
 △2 : Amount of lubricant
 △3 : Amount of refrigerant

ZHA005A

Identification (Cont'd)

PARTS IDENTIFICATION

1. Compressor label



ZEXEL MADE IN JAPAN

COMP. TYPE ○○○○-○○○

PART NO. ○○○○○○-○○○○○

SERI. NO. ○○○○○○○○○○

OIL ZXL 100PG(DH-PS)
NISSAN NO. KLH00-PAGS0 ○○○ cm³

LEAK TEST HIGH SIDE 2.9 MPa
LOW SIDE 1.5 MPa

REFRIG. HFC-134a

2. Other component parts label

HFC-134a label

HFC-134a 用
USE FOR HFC-134a

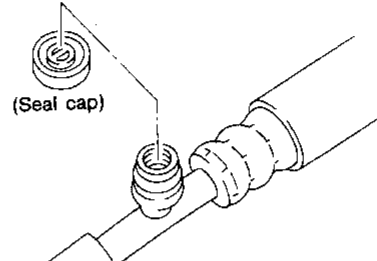
Base color: Light blue

HFC-134a 用 []

USE FOR HFC-134a []

Part name	Identification
1. Compressor	Compressor label
2. Cooling unit	HFC-134a label
3. Expansion valve	Stamp
4. Condenser	HFC-134a label
5. Liquid tank	HFC-134a label
6. Hose or pipe	HFC-134a 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".

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

WARNING:

- CFC-12 (R-12) refrigerant and HFC-134a (R-134a) refrigerant are not compatible. These refrigerants must never be mixed, even in the smallest amounts. If the refrigerants are mixed, compressor failure is likely to occur.
- Use only specified lubricant for the HFC-134a (R-134a) A/C system and HFC-134a (R-134a) components. If lubricant other than that specified is used, compressor failure is likely to occur.
- The specified HFC-134a (R-134a) lubricant rapidly absorbs moisture from the atmosphere. The following handling precautions must be observed:
 - a: When removing refrigerant components from a vehicle, immediately cap (seal) the component to minimize the entry of moisture from the atmosphere.
 - b: When installing refrigerant components to a vehicle, do not remove the caps (unseal) until just before connecting the components. Connect all refrigerant loop components as quickly as possible to minimize the entry of moisture into system.
 - c: Only use the specified lubricant from a sealed container. Immediately reseal containers of lubricant. Without proper sealing, lubricant will become moisture saturated and should not be used.
 - d: Avoid breathing A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose and throat. Remove R-134a from the A/C system, using certified service equipment meeting requirements of SAE J2210 (R-134a recycling equipment), or J2209 (R-134a recovery equipment). If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from refrigerant and lubricant manufacturers.
 - e: Do not allow lubricant (Nissan A/C System Oil Type S) to come in contact with styrofoam parts. Damage may result.

General Refrigerant Precautions

WARNING:

- Do not release refrigerant into the air. Use approved recovery/recycling equipment to capture the refrigerant every time an air conditioning system is discharged.
- Always wear eye and hand protection (goggles and gloves) when working with any refrigerant or air conditioning system.
- Do not store or heat refrigerant containers above 52°C (125°F).
- Do not heat a refrigerant container with an open flame; if container warming is required, place the bottom of the container in a warm pail of water.
- Do not intentionally drop, puncture, or incinerate refrigerant containers.
- Keep refrigerant away from open flames: poisonous gas will be produced if refrigerant burns.
- Refrigerant will displace oxygen, therefore be certain to work in well ventilated areas to prevent suffocation.
- Do not introduce compressed air to any refrigerant container or refrigerant component.

Precautions for Refrigerant Connection

WARNING:

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

CAUTION:

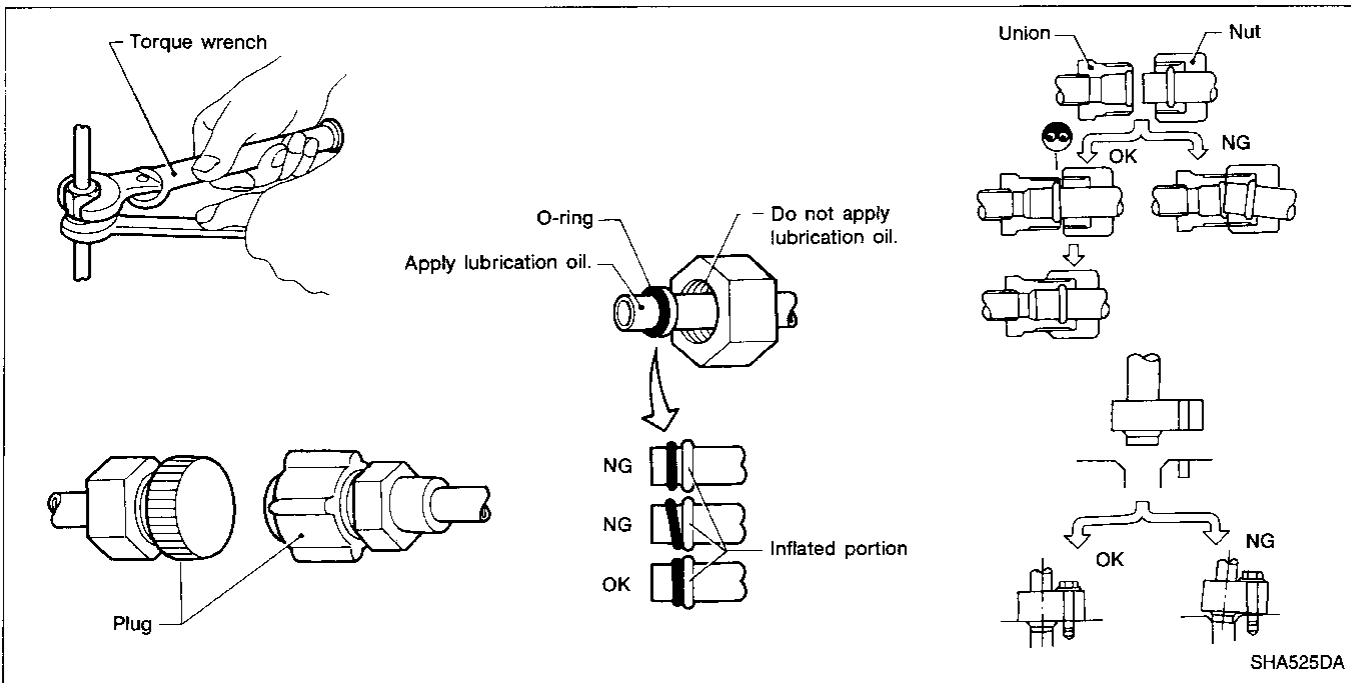
When replacing or cleaning refrigerant cycle components, observe the following.

- When the compressor is removed, store it in the same position as it is when mounted on the car. Failure to do so will cause lubricant to enter the low pressure chamber.
- When connecting tubes, always use a torque wrench and a back-up wrench.
- After disconnecting tubes, immediately plug all openings to prevent entry of dirt and moisture.
- When installing an air conditioner in the vehicle, connect the pipes as the final stage of the operation. Do not remove the seal caps of pipes and other components until just before required for connection.
- Allow components stored in cool areas to warm to working area temperature before removing seal caps. This prevents the condensation from forming inside A/C components.
- Thoroughly remove moisture from the refrigeration system before charging the refrigerant.
- Always replace used O-rings.
- When connecting tube, apply lubricant to portions shown in illustration. Be careful not to apply lubricant to threaded portion.

Lubricant name: Nissan A/C System Oil Type S

Part number: KLH00-PAGS0

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

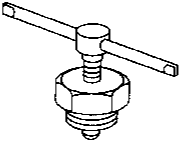

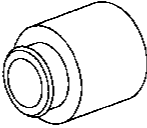
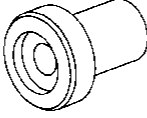
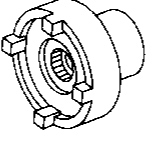


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Precautions for Servicing Compressor

- Plug all openings to prevent moisture and foreign matter from entering.
- When the compressor is removed, store it in the same position as it is when mounted on the car.
- When replacing or repairing compressor, follow "Maintenance of Oil Quantity in Compressor" exactly. Refer to HA-125.
- Keep friction surfaces between clutch and pulley clean. If the surface is contaminated, with lubricant, wipe it off by using a clean waste cloth moistened with thinner.
- After compressor service operation, turn the compressor shaft by hand more than five turns in both directions. This will equally distribute lubricant inside the compressor. After the compressor is installed, let the engine idle and operate the compressor for one hour.
- After replacing the compressor magnet clutch, apply voltage to the new one and check for normal operation.

Special Service Tools

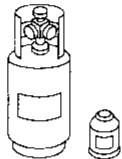

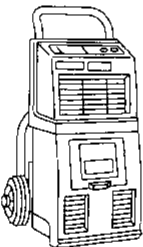
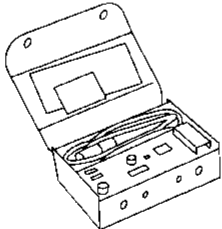
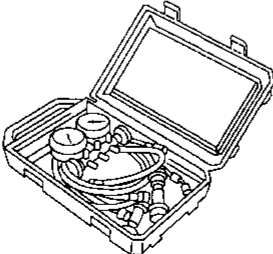
Tool number (Kent-Moore No.) Tool name	Description
KV99232022 (J26571-A) Clutch disc puller	 <p>Removing clutch disc</p> <p>NT210</p>
KV99231010 (J37877) Clutch disc wrench	 <p>Removing shaft nut and clutch disc</p> <p>NT205</p>
KV99233040 (J26720-A) Puller pilot	 <p>Removing pulley</p> <p>NT213</p>
KV99234160 (J37879) Pulley installer	 <p>Installing pulley</p> <p>NT209</p>
KV99235160 (J37882) Nut wrench	 <p>Removing lock nut</p> <p>NT212</p>

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

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

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

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

Tool number (Kent-Moore No.) Tool name	Description	Note
HFC-134a (R-134a) refrigerant	 NT196	Container color: Light blue Container marking: HFC-134a (R-134a) Fitting size: Thread size <ul style="list-style-type: none"> • large container 1/2"-16 ACME
KLH00-PAGS0 (—) Nissan A/C System Oil Type S	 NT197	Type: Poly alkylene glycol oil (PAG), type S Application: HFC-134a (R-134a) swash plate (piston) compressors (Nissan only) Lubricity: 40 m (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: <ul style="list-style-type: none"> • DC 12 V (Cigarette lighter)
(J-39183) Manifold gauge set (with hoses and couplers)	 NT199	Identification: <ul style="list-style-type: none"> • The gauge face indicates R-134a. Fitting size: Thread size <ul style="list-style-type: none"> • 1/2"-16 ACME

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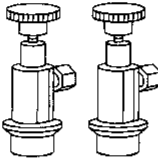

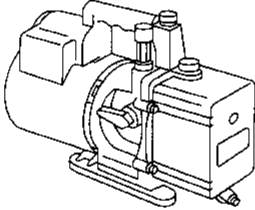
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HFC-134a (R-134a) Service Tools and Equipment (Cont'd)

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

Precautions for Service Equipment

RECOVERY/RECYCLING/RECHARGING 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.

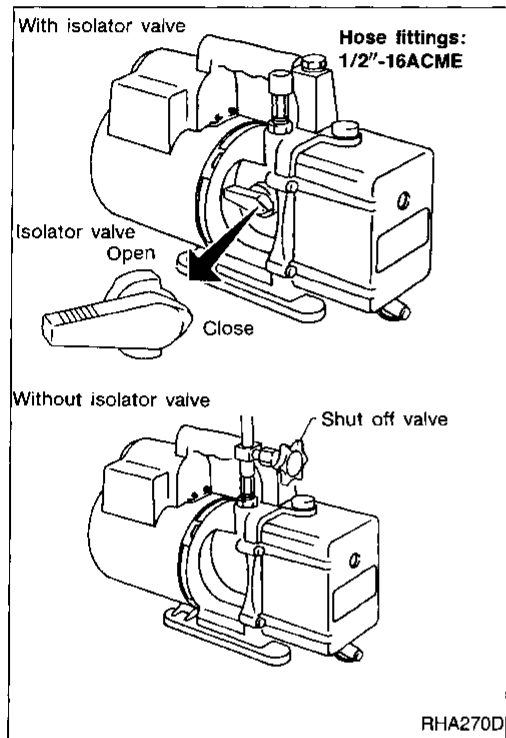
VACUUM PUMP

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

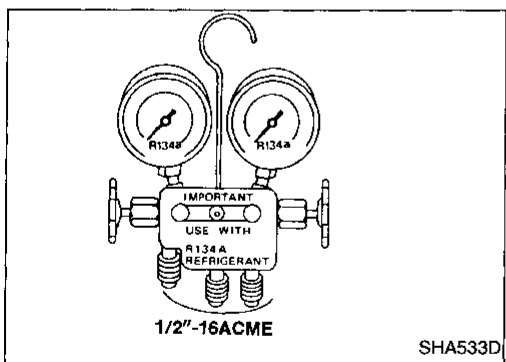
To prevent this migration, use a manual valve placed near the hose-to-pump connection, as follows.

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

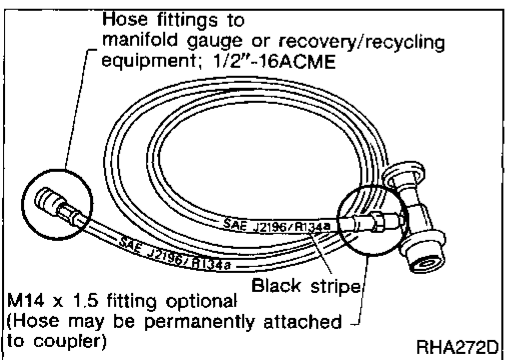
Some one-way valves open when vacuum is applied and close under a no vacuum condition. Such valves may restrict the pump's ability to pull a deep vacuum and are not recommended.



RHA270D



SHA533D



RHA272D

MANIFOLD GAUGE SET

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

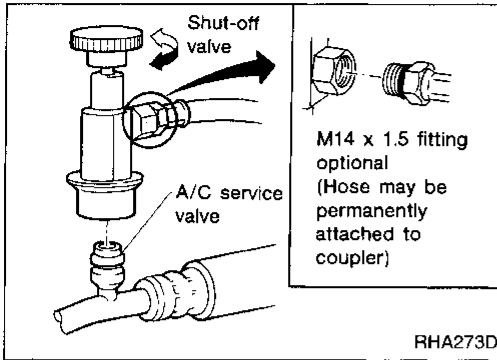
SERVICE HOSES

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

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Precautions for Service Equipment (Cont'd)

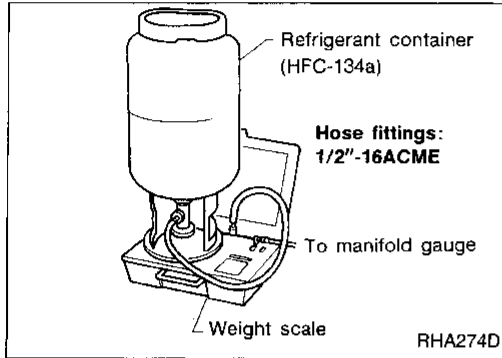
SERVICE COUPLERS



Never attempt to connect HFC-134a (R-134a) service couplers to an CFC-12 (R-12) A/C system. The HFC-134a (R-134a) couplers will not properly connect to the CFC-12 (R-12) system. However, if an improper connection is attempted, discharging and contamination can occur.

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

REFRIGERANT WEIGHT SCALE



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

CHARGING CYLINDER

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

Refrigeration Cycle

REFRIGERANT FLOW

The refrigerant flow is in the standard pattern. Refrigerant flows through the compressor, condenser, liquid tank, evaporator, and back to the compressor.

Refrigerant evaporation through the evaporator coil is controlled by an externally equalized expansion valve, located inside the evaporator case.

FREEZE PROTECTION

If evaporator coil temperature falls below a specified point, the thermo control amplifier interrupts compressor operation. When evaporator coil temperature rises above the specification, compressor operation will resume. This condition (compressor cycling) indicates a malfunction in the system.

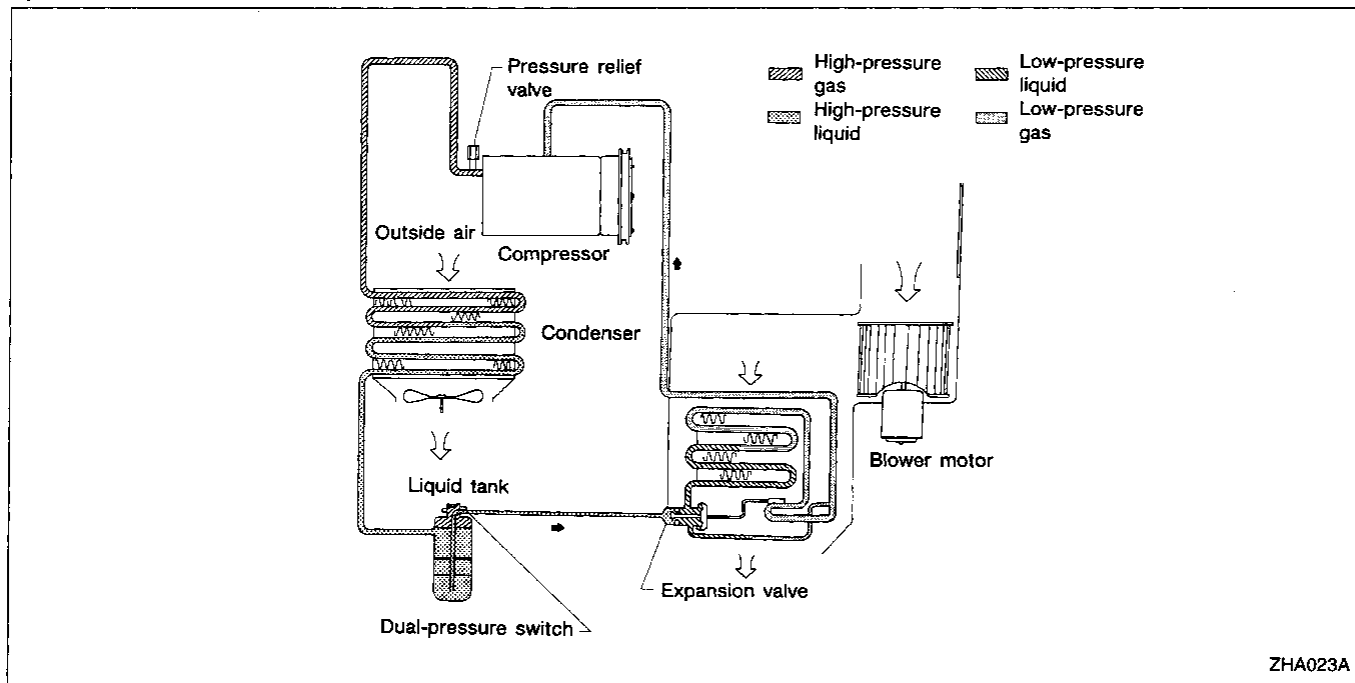
REFRIGERANT SYSTEM PROTECTION

Dual-pressure switch

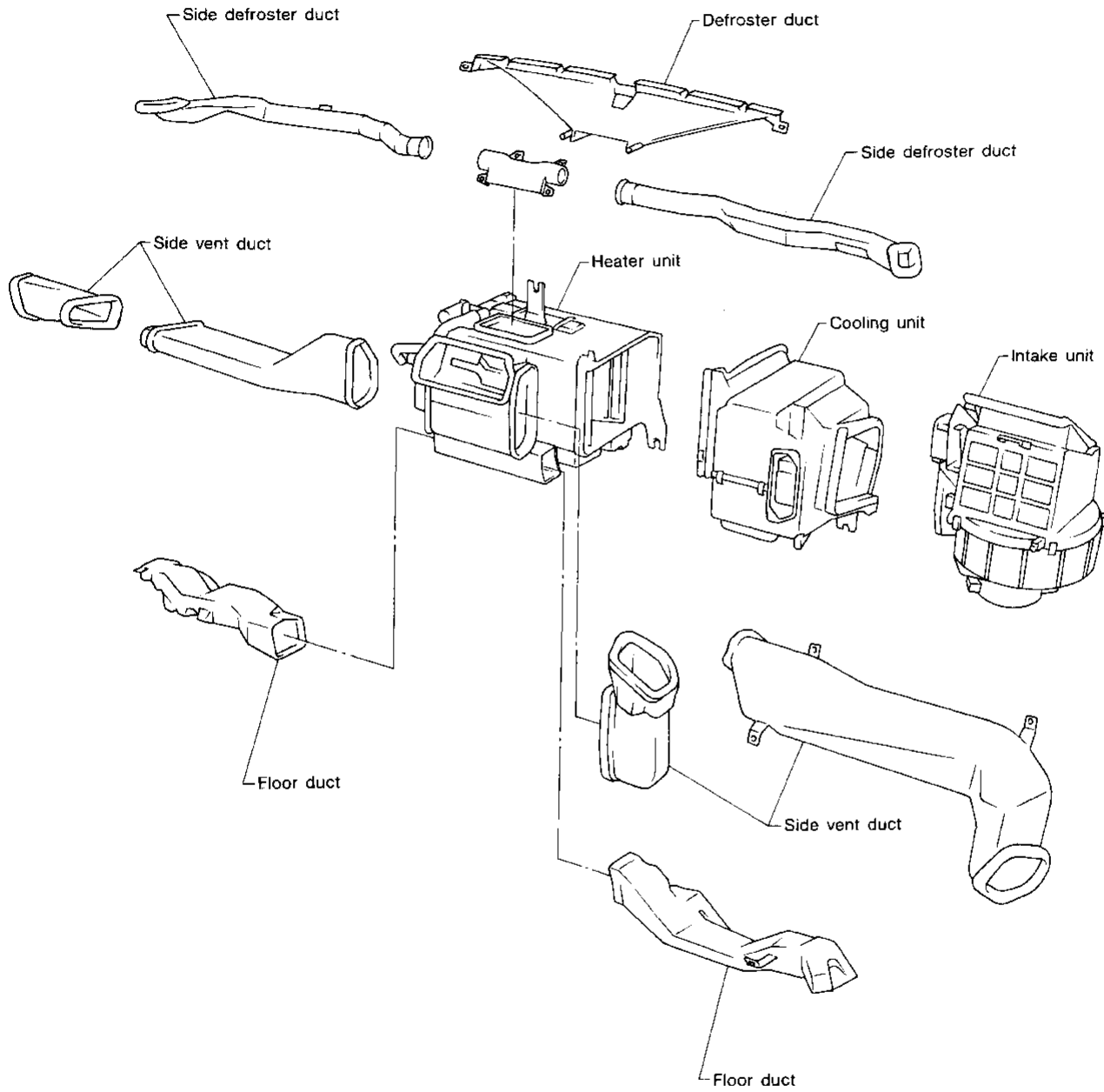
The dual-pressure switch is located on the liquid tank. If the system pressure rises, or falls out of specifications, the switch opens to interrupt compressor clutch operation.

Pressure relief valve

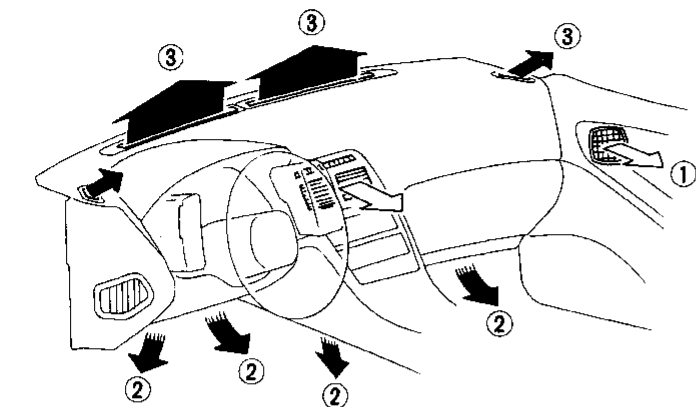
The refrigerant system is protected by a pressure relief valve. The valve is located on the end of the flexible high pressure hose near the compressor. When refrigerant system pressure abnormally increases [over 3,629 kPa (37 kg/cm², 526 psi)], the relief valve's port opens. The valve then releases refrigerant into the atmosphere.



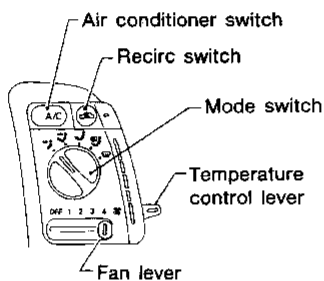
Component Layout



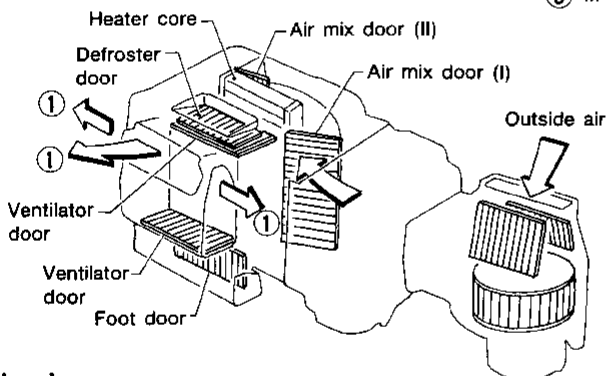
Discharge Air Flow



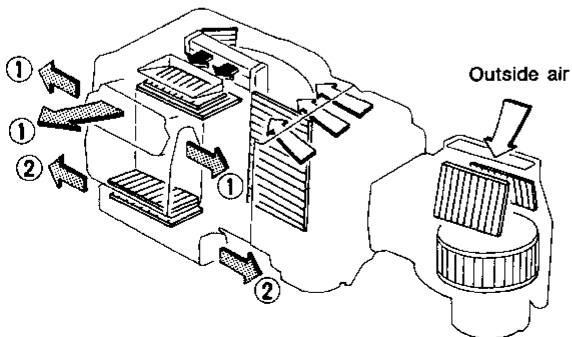
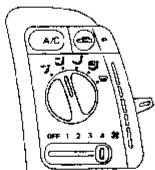
Ventilation



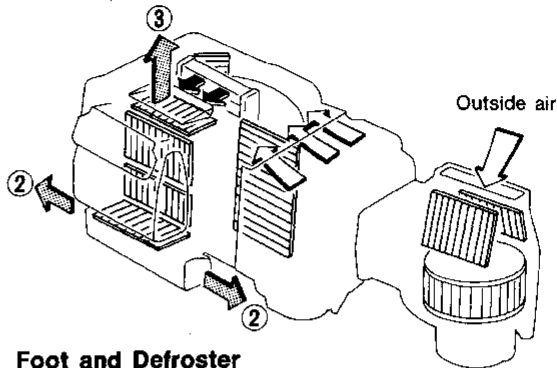
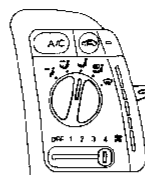
- ① ... To ventilator
- ② ... To floor
- ③ ... To defroster



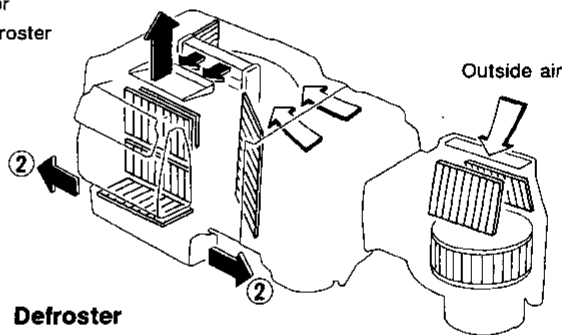
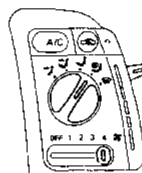
BI-level



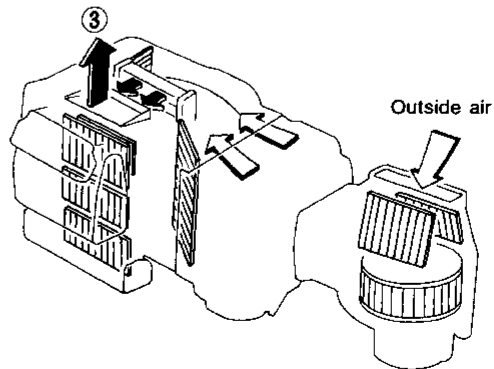
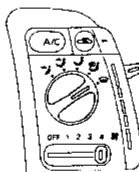
Foot



Foot and Defroster



Defroster








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

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Discharge Air Flow (Cont'd)

AIR DISTRIBUTION RATIOS

Switch mode/ Indicator	Air outlet/distribution		
	Face	Foot	Defroster
	100%	—	—
	65%	35%	—
	—	70%	30%
	—	50%	50%
	—	—	100%

Acceleration Cut System

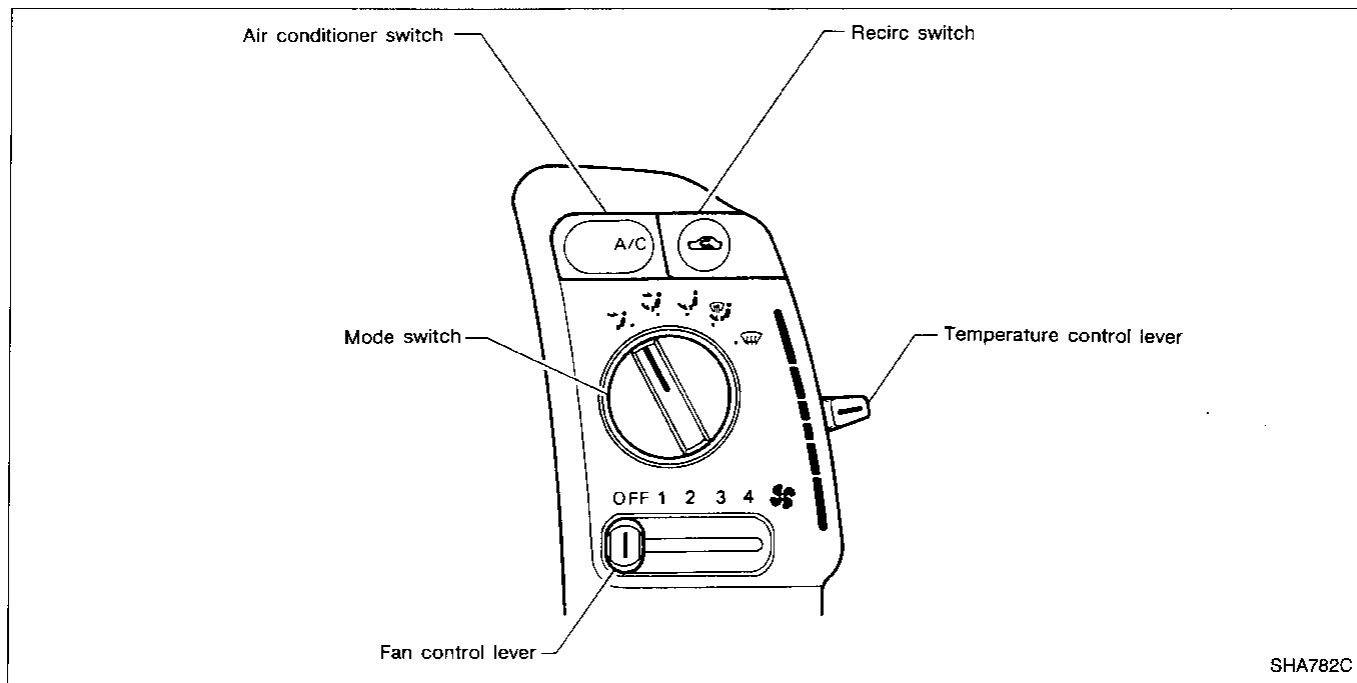
This system is controlled by ECM (ECCS control module).

When the engine is heavily overloaded, the compressor is turned off for several seconds to reduce overloading.

Water Cock Control System

The water cock is connected to the air mix doors with a cable. When the air mix doors are at the full-cold position, the water cock is fully closed. When the air mix doors are at the full-hot position, the water cock is fully opened.

Control Operation

**FAN CONTROL LEVER**

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

MODE SWITCH

This switch allows you to select the outlet air flow.

In the "DEF" mode, the intake door is set to "FRE (Fresh)". The compressor turns on in "DEF" or "F/D" mode.

TEMPERATURE CONTROL LEVER

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

RECIRC SWITCH

OFF position:

Outside air is drawn into the passenger compartment.

ON position:

Interior air is recirculated inside the vehicle.

"RECIRC" is canceled when "DEF" is selected.

AIR CONDITIONER SWITCH

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

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

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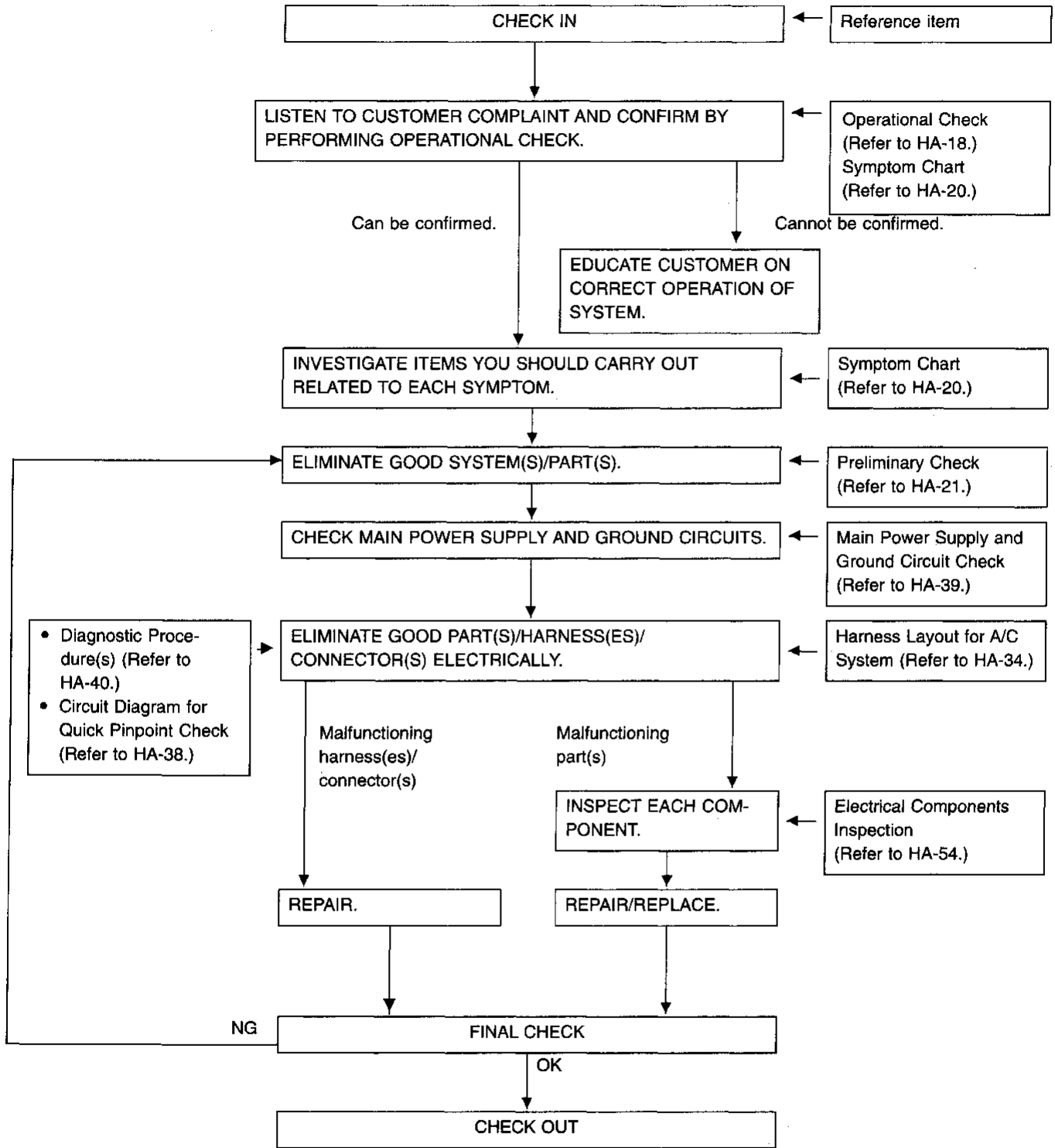
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How to Perform Trouble Diagnoses for Quick and Accurate Repair

WORK FLOW



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Operational Check

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

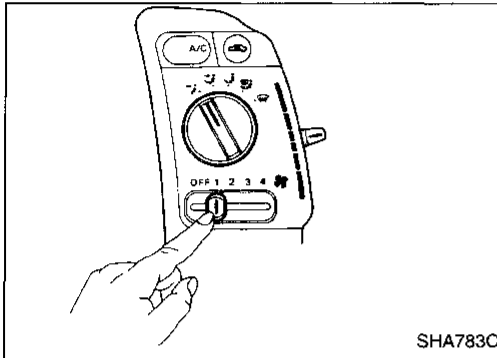
CONDITIONS:

Engine running at normal operating temperature.

PROCEDURE:

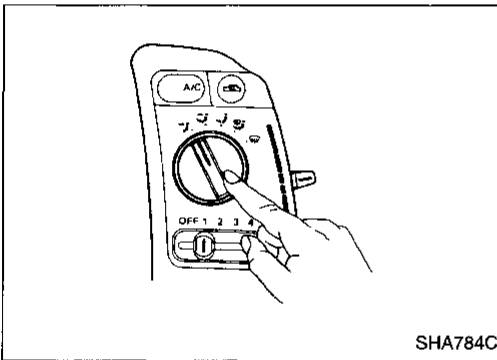
1. Check blower

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



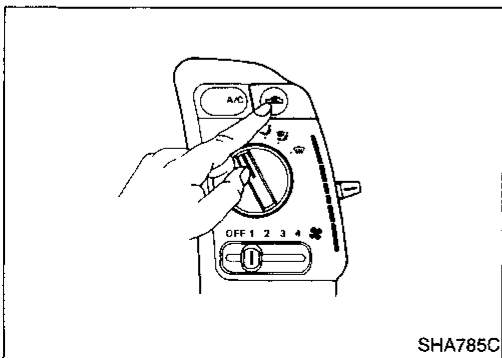
2. Check discharge air

- 1) Set mode switch at VENT position.
- 2) Confirm that all discharge air comes out of face vents.
- 3) Set mode switch at B/L position.
- 4) Confirm that discharge air comes out of face vents and foot vents.
- 5) Set mode switch at FOOT position.
- 6) Confirm that discharge air comes out of foot vents, with some air from defroster vents.
- 7) Set mode switch at F/D position.
- 8) Confirm that discharge air comes out of foot vents and defroster vents, and that compressor turns ON.
- 9) Set mode switch at DEF position.
- 10) The discharge air should come only from the defroster vents.
At the same time intake door position should be at FRESH.

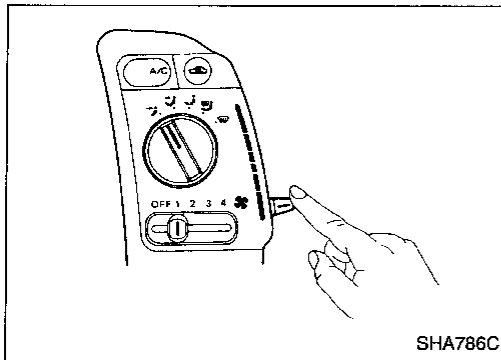


3. Check recirc

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



Operational Check (Cont'd)



4. Check temperature decrease

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

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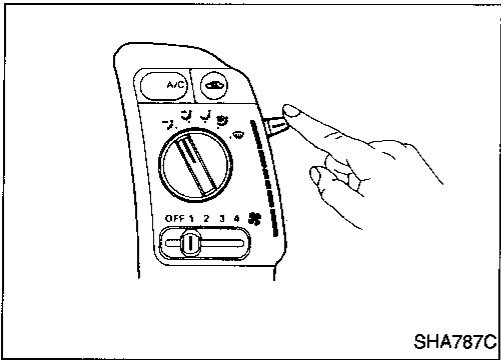
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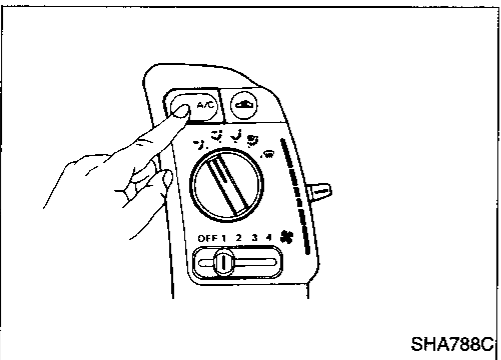
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5. Check temperature increase

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



6. Check air conditioner switch

Move fan control lever to the desired (1 to 4-speed) position and push the air conditioner switch to turn ON the air conditioner.

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

Symptom Chart

DIAGNOSTIC TABLE

PROCEDURE	Preliminary check						Diagnostic Procedure						Main power supply and Ground circuit check		Electrical components inspection														
	HA-21	HA-22	HA-23	HA-23	HA-24	HA-25	HA-40	HA-42	HA-44	HA-45	HA-49	HA-53	HA-39	HA-39	HA-54	HA-54	HA-54	HA-55	HA-55	HA-55	HA-56	HA-56	HA-58	HA-59	HA-59	—	—		
REFERENCE PAGE	Preliminary check 1	Preliminary check 2	Preliminary check 3	Preliminary check 4	Preliminary check 5	Preliminary check 6	Diagnostic procedure 1	Diagnostic procedure 2	Diagnostic procedure 3	Diagnostic procedure 4	Diagnostic procedure 5	Diagnostic procedure 6	Control amp.	Fuses	Fan switch	Blower motor	Blower resistor	A/C switch	Dual-pressure switch	Relays	Mode switch	Thermo control amp.	Air mix door motor	Mode door motor	Intake door motor	Compressor	Harness		
SYMPTOM																													
A/C does not blow cold air.	①						○						○	○					○	○								○	○
Insufficient heating						①	○						○	○									○						○
Blower motor does not rotate.	①						②						○	○															○
Air outlet does not change.				①				②					○	○								○							○
Intake door does not change in VENT, B/L or FOOT modes.									①				○	○											○				○
Intake door is not set at "FRESH" in DEF mode.	①								○				○	○											○				○
Magnet clutch does not engage when A/C switch and fan switch are ON.		①								②									○	○		○							○
Magnet clutch does not engage in FOOT & DEF or DEF mode.		①	②							○					○	○			○	○									○
Illumination or indicators on switch panel do not come on.											①			○															○
Noise					①																								○

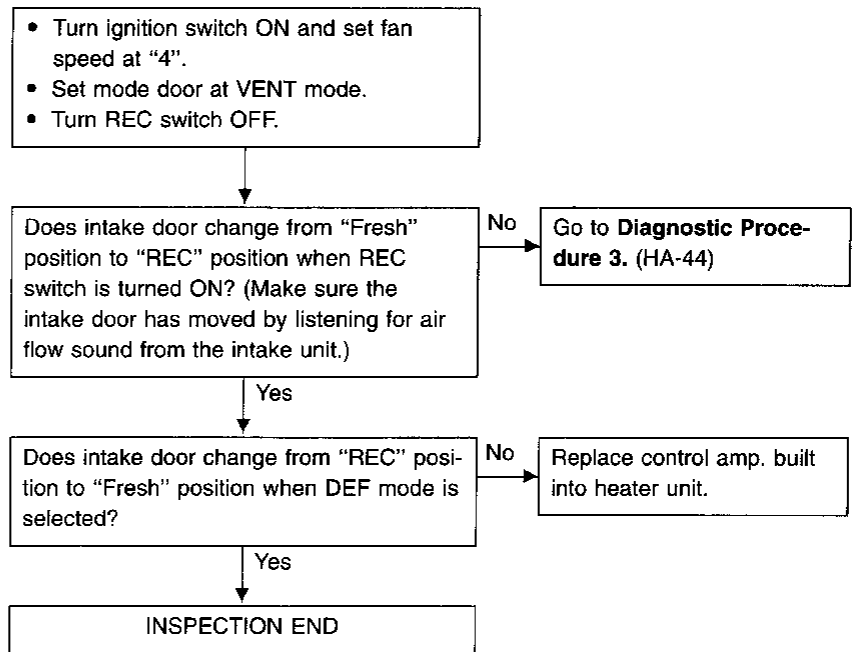
①, ②: The number means checking order.

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

Preliminary Check

PRELIMINARY CHECK 1

Intake door is not set at "FRESH" in DEF mode.

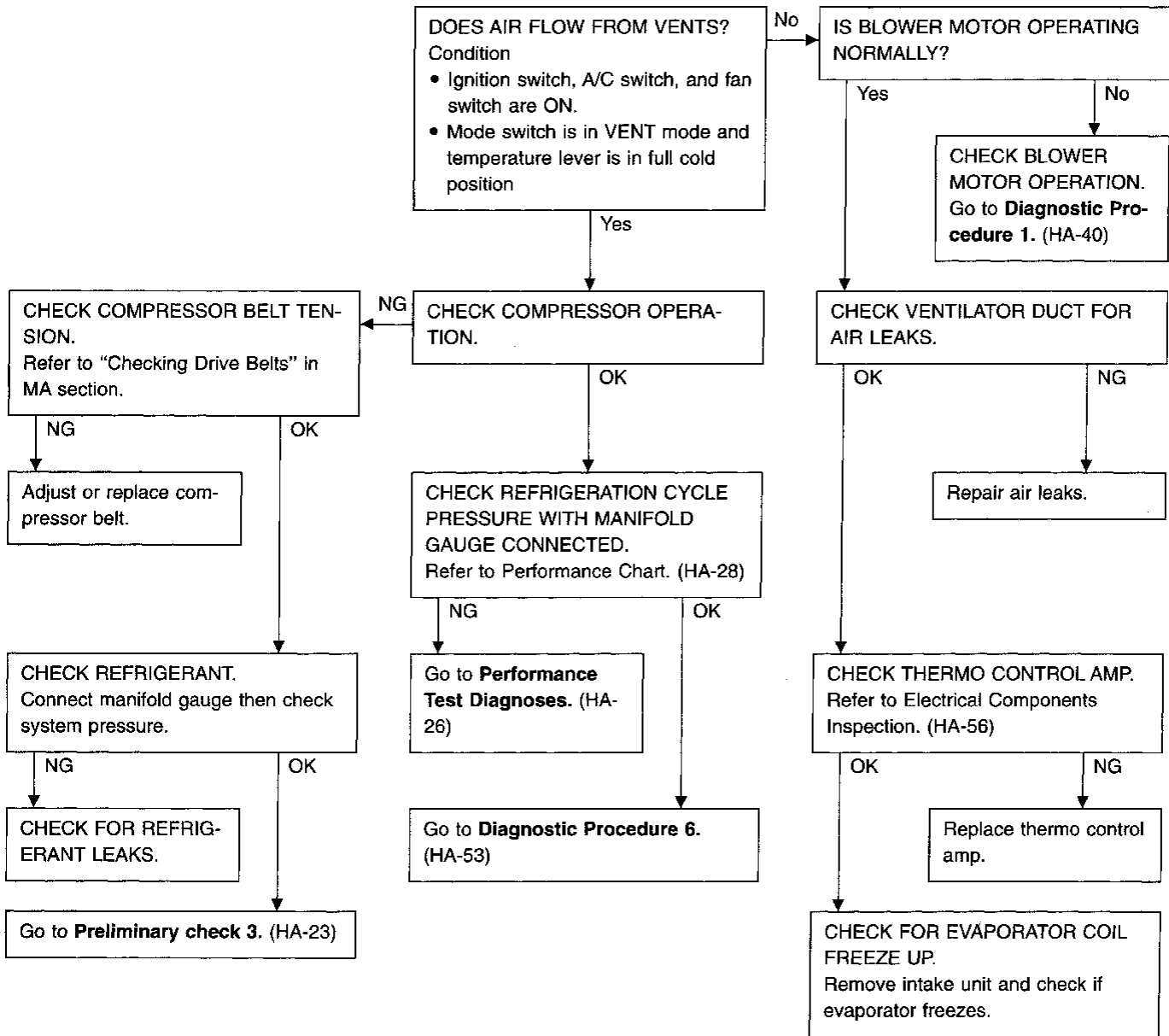


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Preliminary Check (Cont'd)

PRELIMINARY CHECK 2

A/C does not blow cold air.

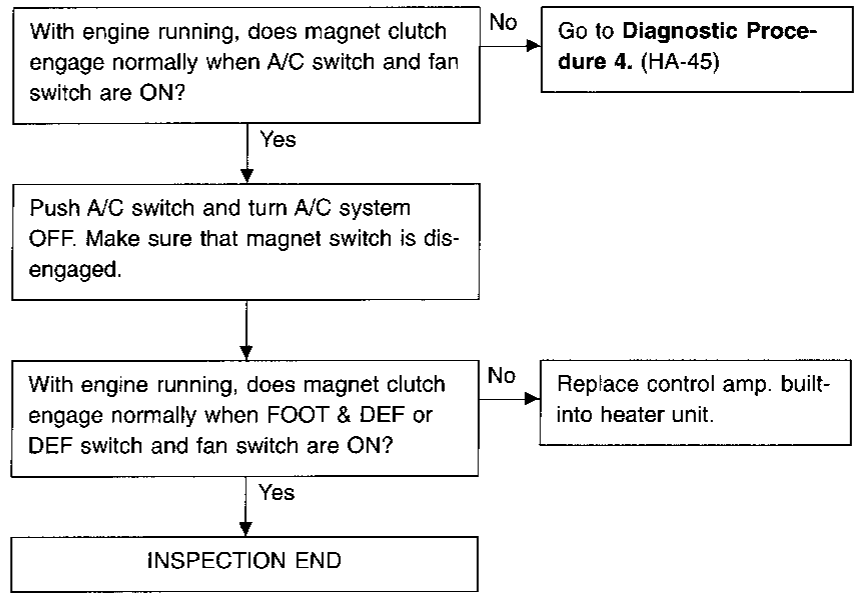


Preliminary Check (Cont'd)

PRELIMINARY CHECK 3

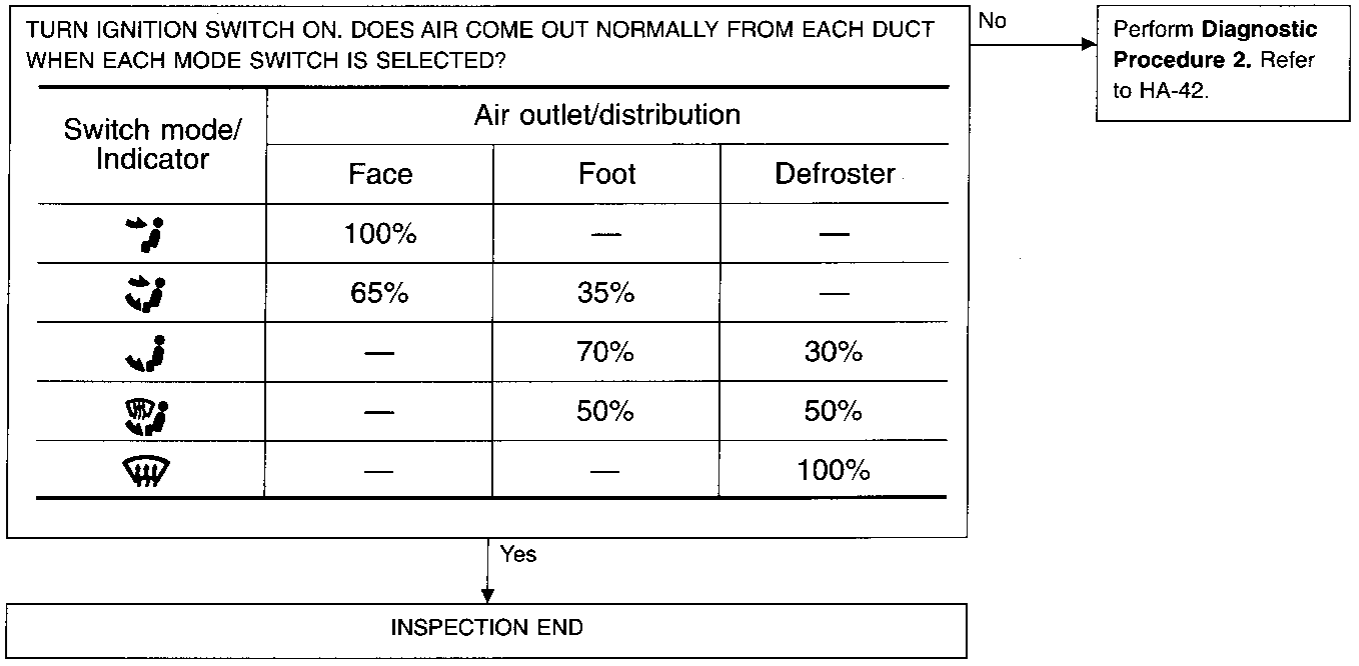
Magnet clutch does not engage in FOOT & DEF or DEF modes.

- Perform PRELIMINARY CHECK 2 and 4 before referring to the following flow chart.



PRELIMINARY CHECK 4

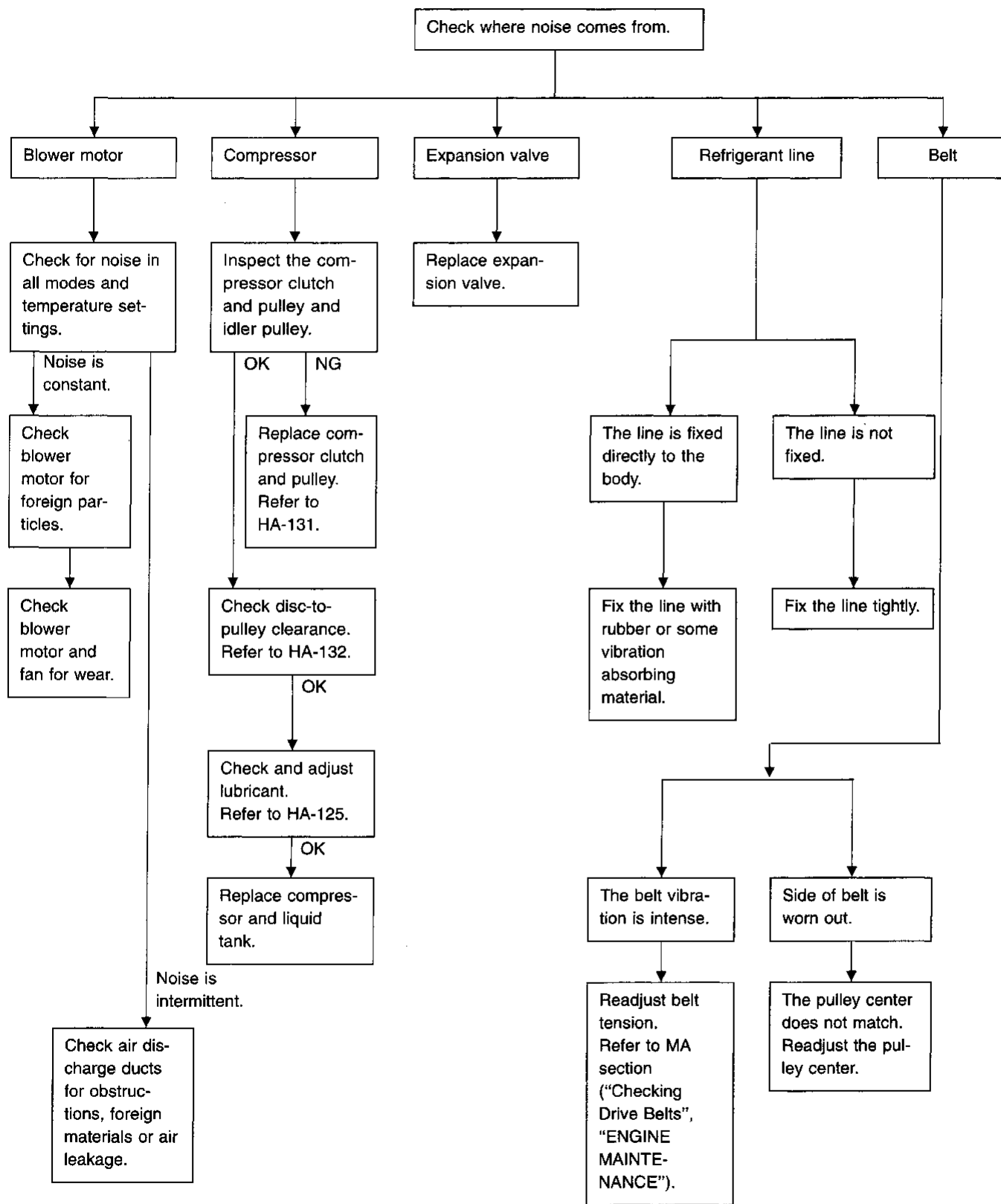
Air outlet does not change.



Preliminary Check (Cont'd)

PRELIMINARY CHECK 5

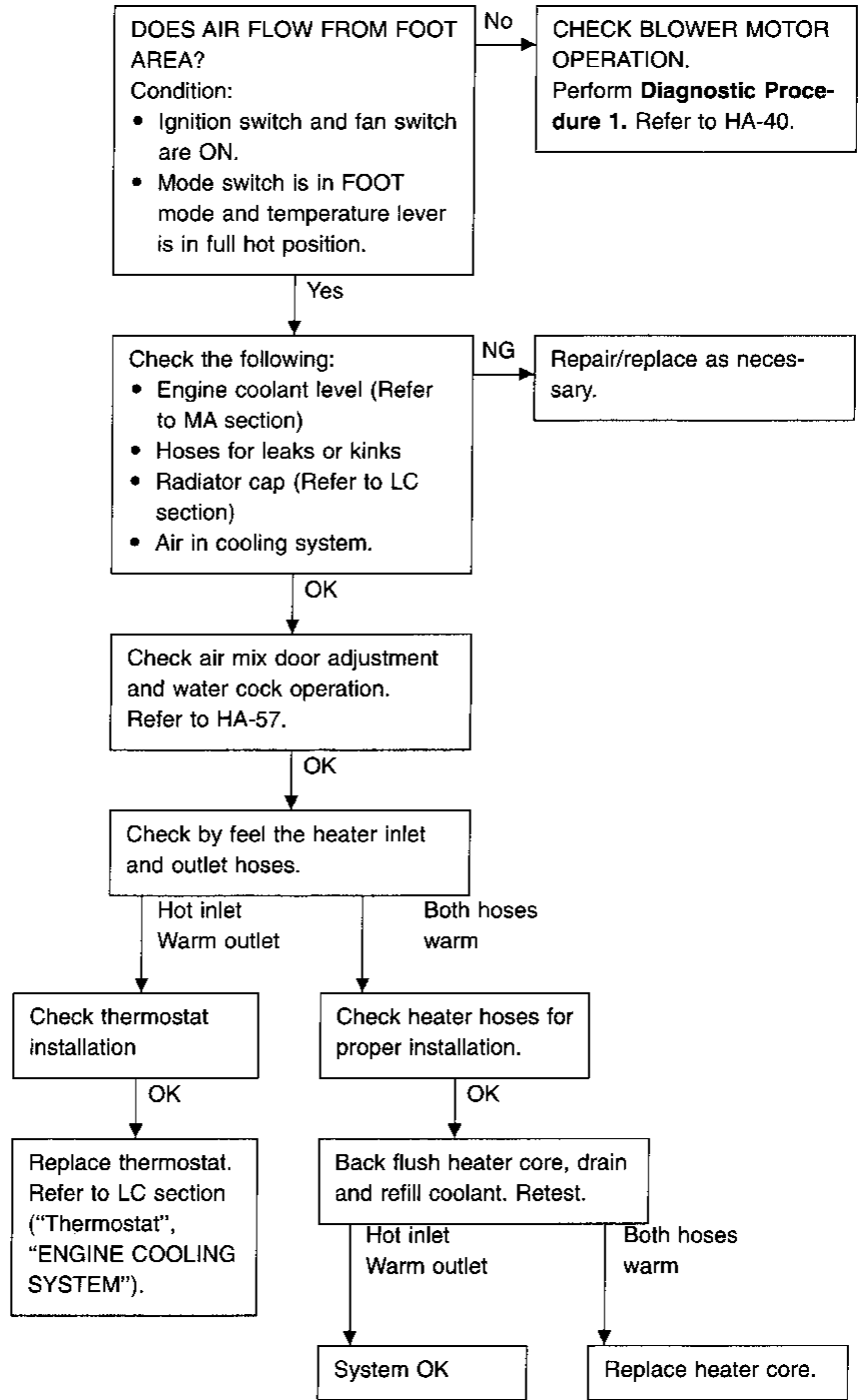
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Preliminary Check (Cont'd)

PRELIMINARY CHECK 6

Insufficient heating

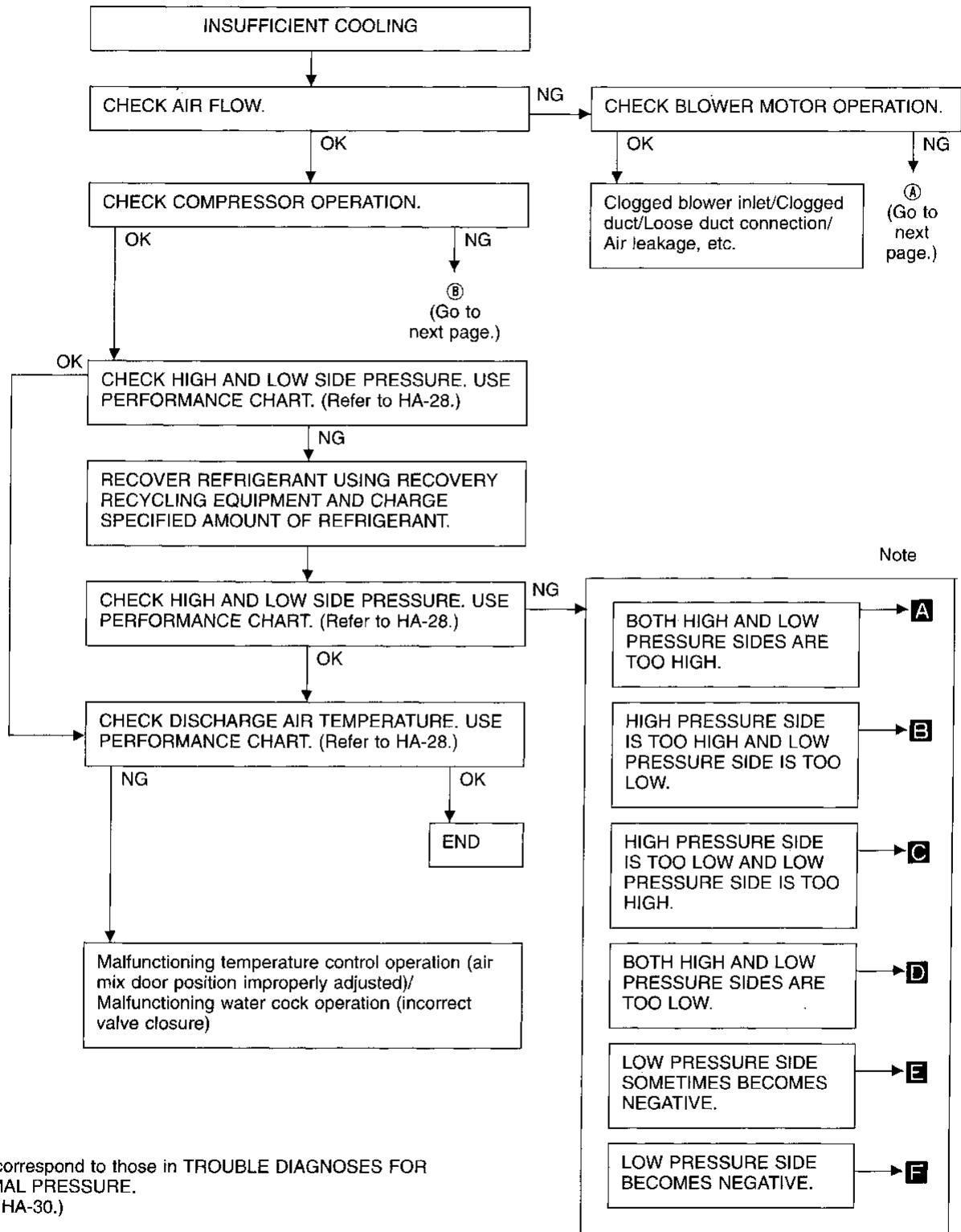


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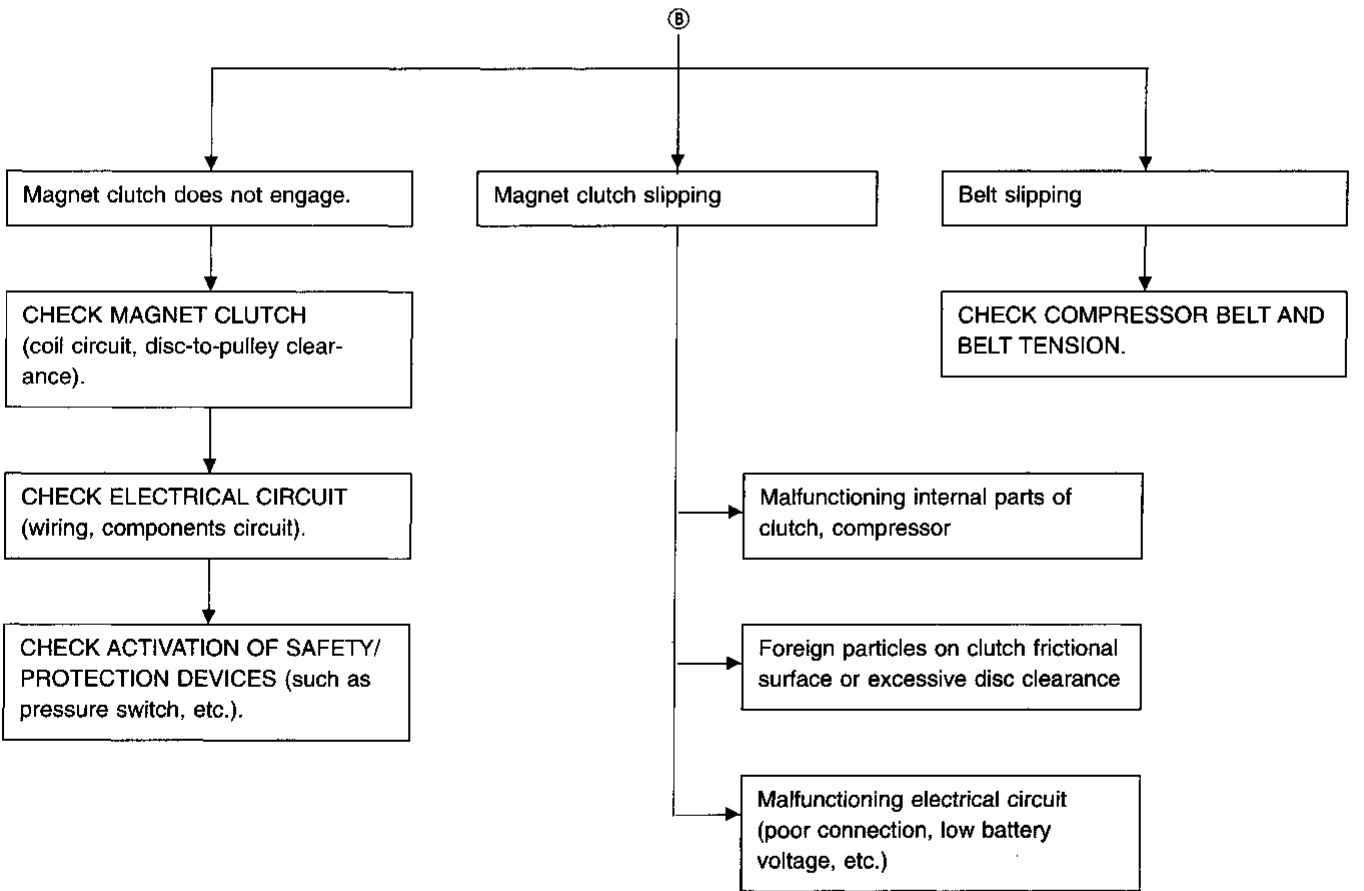
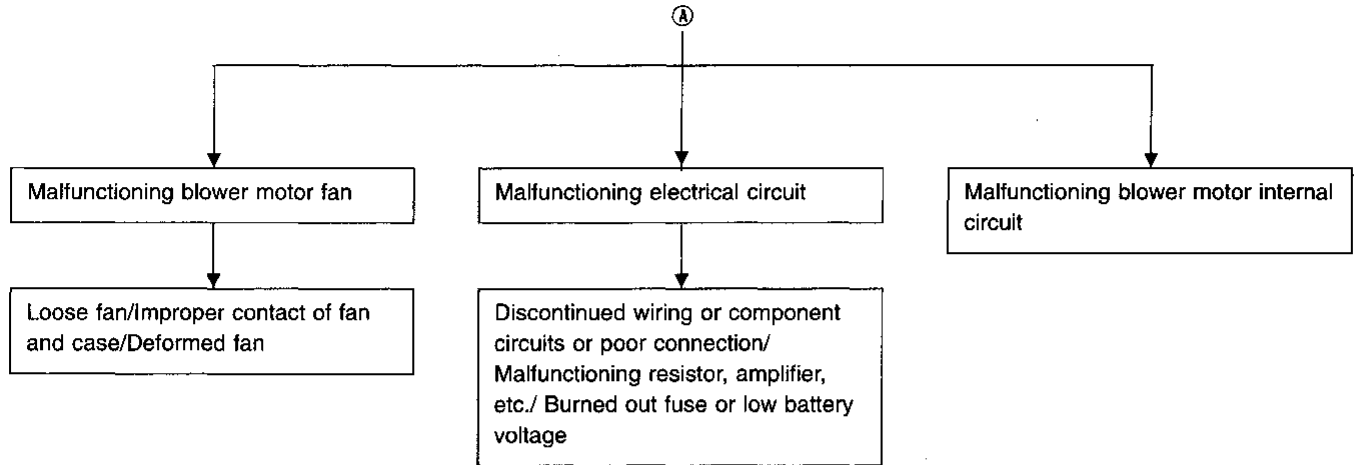
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Performance Test Diagnoses
INSUFFICIENT COOLING



Note: **A**-**F** correspond to those in TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE. (Refer to HA-30.)

Performance Test Diagnoses (Cont'd)



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Performance Chart**TEST CONDITION — For Manual Air Conditioner**

Testing must be performed as follows:

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


Doors: Closed

Door windows: Open

Hood: Open

TEMP. lever position: Max. COLD

Mode switch:  (Ventilation) set

REC switch:  (Recirculation) set

FAN level position: Max. position

Engine speed: 1,500 rpm

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

TEST CONDITION — For Auto Air Conditioner

Testing must be performed as follows:

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

Doors: Closed

Door windows: Open

Hood: Open



Set up ACTIVE-TEST with CONSULT and set each component as follows:

Mode door: VENT


Intake door: REC

Air mix door: Full-cold

Compressor: ON

Blower motor: 12V



Set up self-diagnosis STEP 2 and set code .

Performance Chart (Cont'd)

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)	5.8 - 7.5 (42 - 46)
	25 (77)	9.3 - 11.0 (49 - 52)
	30 (86)	13.9 - 15.8 (57 - 60)
	35 (95)	18.8 - 20.9 (66 - 70)
	40 (104)	23.3 - 25.5 (74 - 78)
60 - 70	20 (68)	7.5 - 9.0 (46 - 48)
	25 (77)	11.0 - 13.0 (52 - 55)
	30 (86)	15.8 - 17.0 (60 - 63)
	35 (95)	20.9 - 22.6 (70 - 73)
	40 (104)	22.5 - 27.3 (73 - 81)

Ambient air temperature-to-operating pressure table

Ambient air		High-pressure (Discharge side) kPa (kg/cm ² , psi)	Low-pressure (Suction side) kPa (kg/cm ² , psi)
Relative humidity %	Air temperature °C (°F)		
50 - 70	20 (68)	1,030 - 1,245 (10.5 - 12.7, 149 - 181)	181.4 - 221.6 (1.85 - 2.26, 26.3 - 32.1)
	25 (77)	1,118 - 1,373 (11.4 - 14.0, 162 - 199)	185.4 - 226.5 (1.89 - 2.31, 26.9 - 32.8)
	30 (86)	1,344 - 1,638 (13.7 - 16.7, 195 - 237)	220.7 - 269.7 (2.25 - 2.75, 32.0 - 39.1)
	35 (95)	1,569 - 1,922 (16.0 - 19.6, 228 - 279)	269.7 - 328.5 (2.75 - 3.35, 39.1 - 47.6)
	40 (104)	1,814 - 2,207 (18.5 - 22.5, 263 - 320)	314 - 382 (3.2 - 3.9, 46 - 55)

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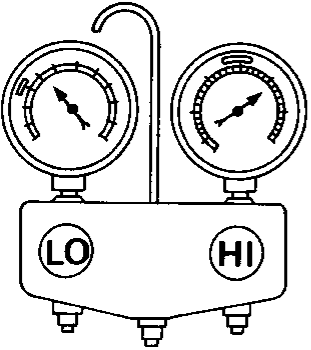
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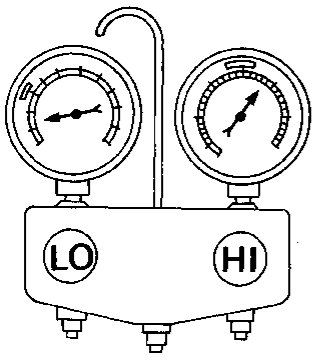
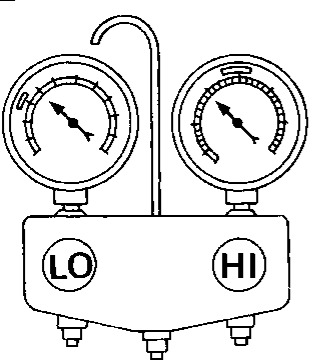
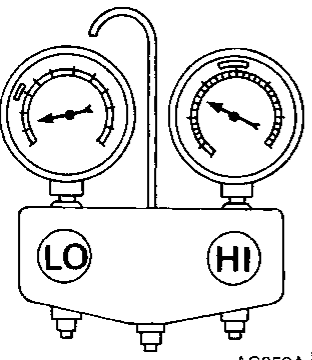
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Trouble Diagnoses for Abnormal Pressure

Whenever system's high and/or low side pressure is abnormal, diagnose using a manifold gauge. The marker above the gauge scale in the following tables indicates the standard (normal) pressure range. Since the standard (normal) pressure, however, differs from vehicle to vehicle, refer to HA-29 ("Ambient air temperature-to-operating pressure table").

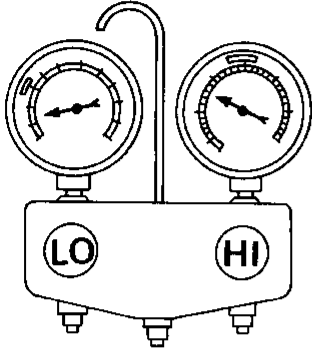
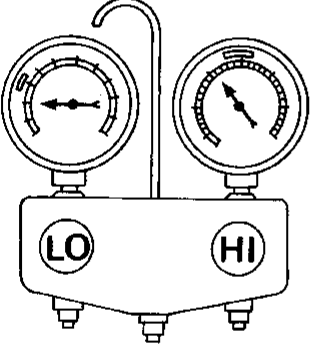
Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Both high and low-pressure sides are too high. A  AC359A	<ul style="list-style-type: none"> Pressure is reduced soon after water is splashed on condenser. 	Excessive refrigerant charge in refrigeration cycle	Reduce refrigerant until specified pressure is obtained.
	Air suction by cooling fan is insufficient.	Insufficient condenser cooling performance ↓ ① Condenser fins are clogged. ② Improper fan rotation of cooling fan	<ul style="list-style-type: none"> Clean condenser. Check and repair cooling fan as necessary.
	<ul style="list-style-type: none"> Low-pressure pipe is not cold. When compressor is stopped high-pressure value quickly drops by approximately 196 kPa (2 kg/cm², 28 psi). It then decreases gradually thereafter. 	Poor heat exchange in condenser (After compressor operation stops, high pressure decreases too slowly.) ↓ Air in refrigeration cycle	Evacuate repeatedly and recharge system.
	Engine tends to overheat.	Engine cooling systems malfunction.	Check and repair each engine cooling system.
	<ul style="list-style-type: none"> An area of the low-pressure pipe is colder than areas near the evaporator outlet. Plates are sometimes covered with frost. 	<ul style="list-style-type: none"> Excessive liquid refrigerant on low-pressure side Excessive refrigerant discharge flow Expansion valve is open a little compared with the specification. ↓ ① Improper thermal valve installation ② Improper expansion valve adjustment	Replace expansion valve.

Trouble Diagnoses for Abnormal Pressure (Cont'd)

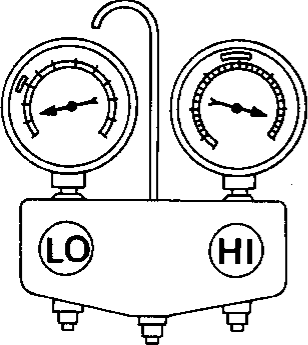
Gauge indication	Refrigerant cycle	Probable cause	Corrective action
<p>High-pressure side is too high and low-pressure side is too low.</p> <p>B</p>  <p>AC360A</p>	<p>Upper side of condenser and high-pressure side are hot, however, liquid tank is not so hot.</p>	<p>High-pressure tube or parts located between compressor and condenser are clogged or crushed.</p>	<ul style="list-style-type: none"> • Check and repair or replace malfunctioning parts. • Check lubricant for contamination.
<p>High-pressure side is too low and low-pressure side is too high.</p> <p>C</p>  <p>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>Both high- and low-pressure sides are too low.</p> <p>D</p>  <p>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. • 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>Liquid tank inside is clogged a little.</p> <p>High-pressure pipe located between liquid tank and expansion valve is clogged.</p>	<ul style="list-style-type: none"> • Replace liquid tank. • Check lubricant for contamination. • Check and repair malfunctioning parts. • Check lubricant for contamination.

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Trouble Diagnoses for Abnormal Pressure
(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>AC353A</p>	<p>There is a big temperature difference between expansion valve inlet and outlet while the valve itself is frosted.</p> <p>An area of the low-pressure pipe is colder than areas near the evaporator outlet.</p> <p>Air flow volume is not enough or is too low.</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> <p>Low-pressure pipe is clogged or crushed.</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>	<ul style="list-style-type: none"> • Remove foreign particles by using compressed air. • Check lubricant for contamination. <ul style="list-style-type: none"> • Check and repair malfunctioning parts. • Check lubricant for contamination. <p>Replace compressor.</p>
<p>Low-pressure side sometimes becomes negative.</p> <p>E</p>  <p>AC354A</p>	<ul style="list-style-type: none"> • Air conditioning system does not function and does not cyclically cool the compartment air. • The system constantly functions for a certain period of time after compressor is stopped and restarted. 	<p>Refrigerant does not discharge cyclically.</p> <p 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.

Trouble Diagnoses for Abnormal Pressure
(Cont'd)

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
<p>Low-pressure side becomes negative.</p> <p>F</p>  <p>AC362A</p>	<p>Liquid tank or front/rear side of expansion valve's pipe is frosted or dewed.</p>	<p>High-pressure side is closed and refrigerant does not flow.</p> <p style="text-align: center;">↓</p> <p>Expansion valve or liquid tank is frosted.</p>	<p>Leave the system at rest until no frost is present. Start it again to check whether or not the problem is caused by water or foreign particles.</p> <ul style="list-style-type: none"> • If water is the cause, initially cooling is okay. Then the water freezes, causing a blockage. Drain water from refrigerant or replace refrigerant. • If due to foreign particles, remove expansion valve and remove the particles with dry and compressed air (not shop air). • If either of the above methods cannot correct the problem, replace expansion valve. • Replace liquid tank. • Check lubricant for contamination.

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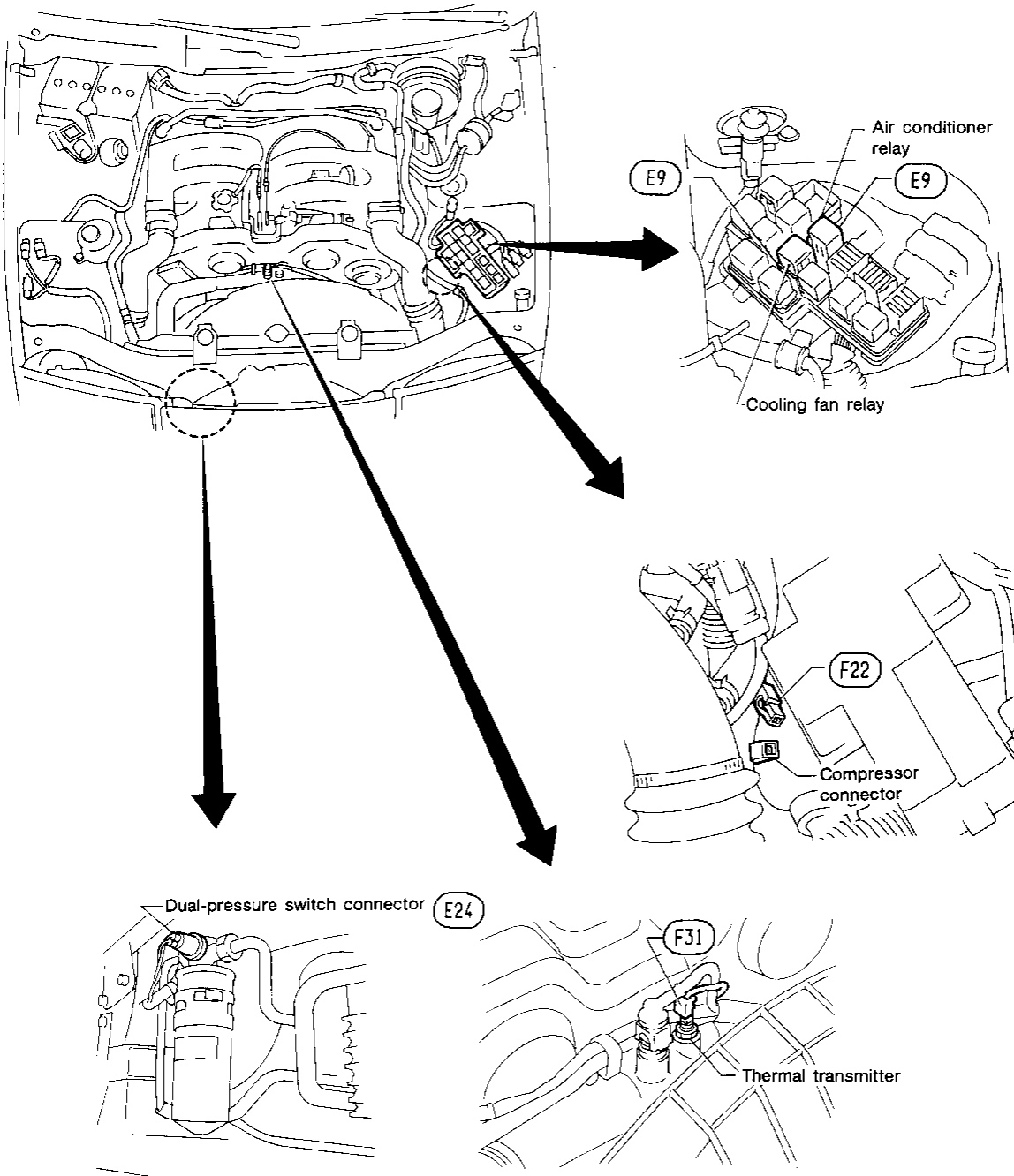
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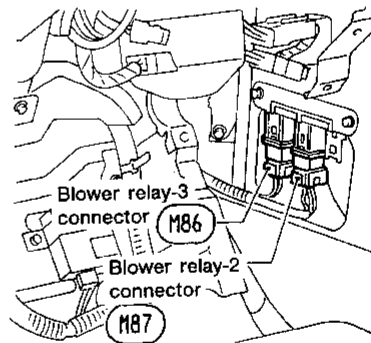
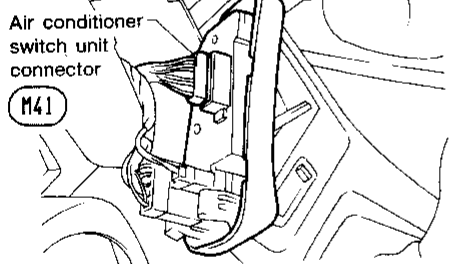
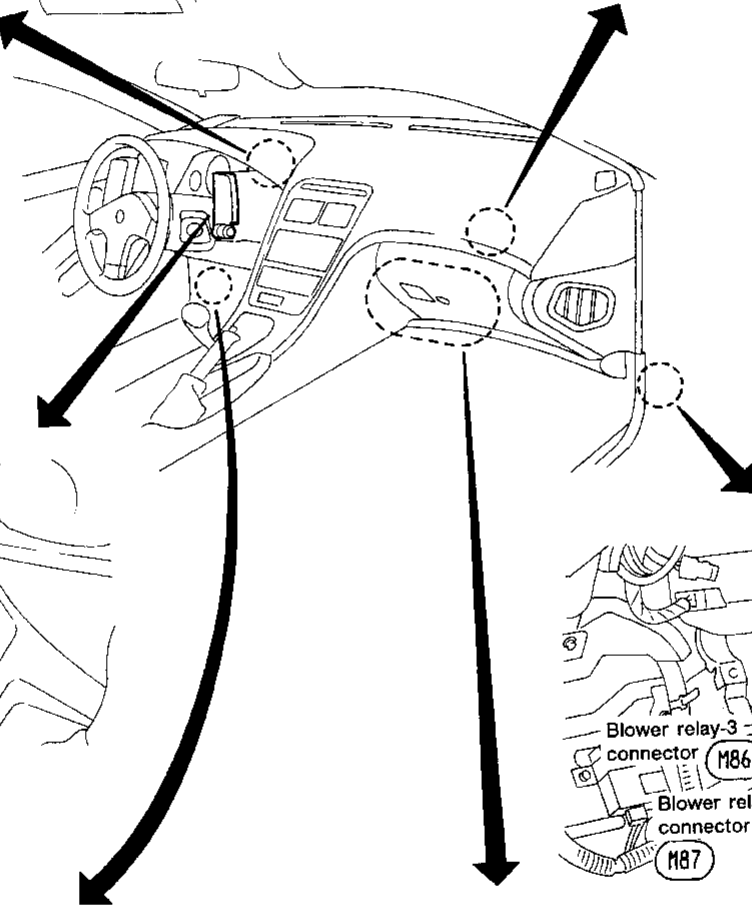
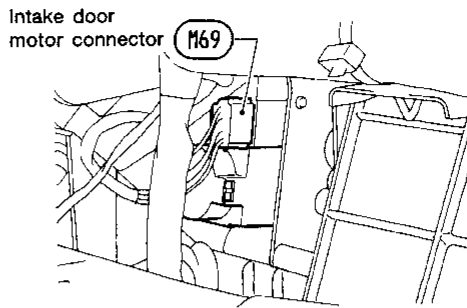
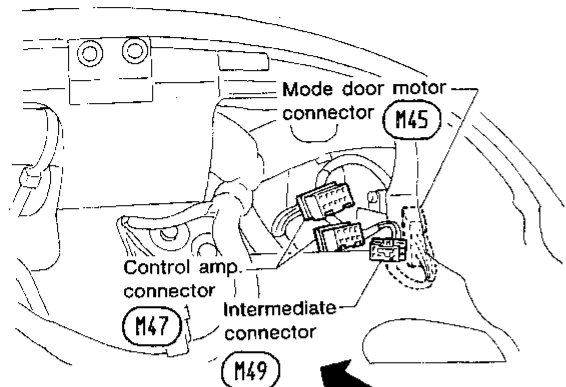
Harness Layout for A/C System

ENGINE COMPARTMENT

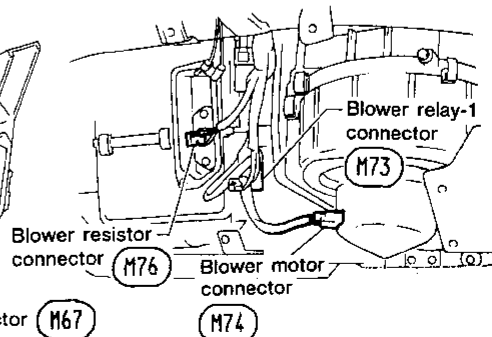
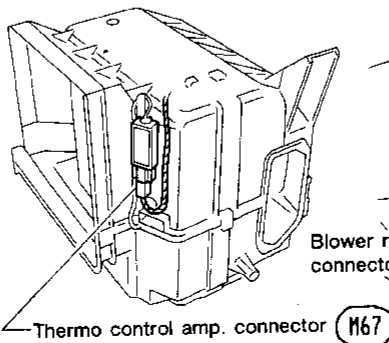
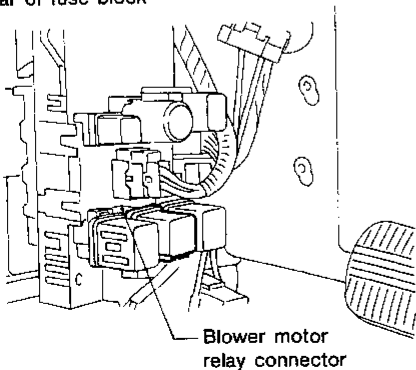


Harness Layout for A/C System (Cont'd)

PASSENGER COMPARTMENT

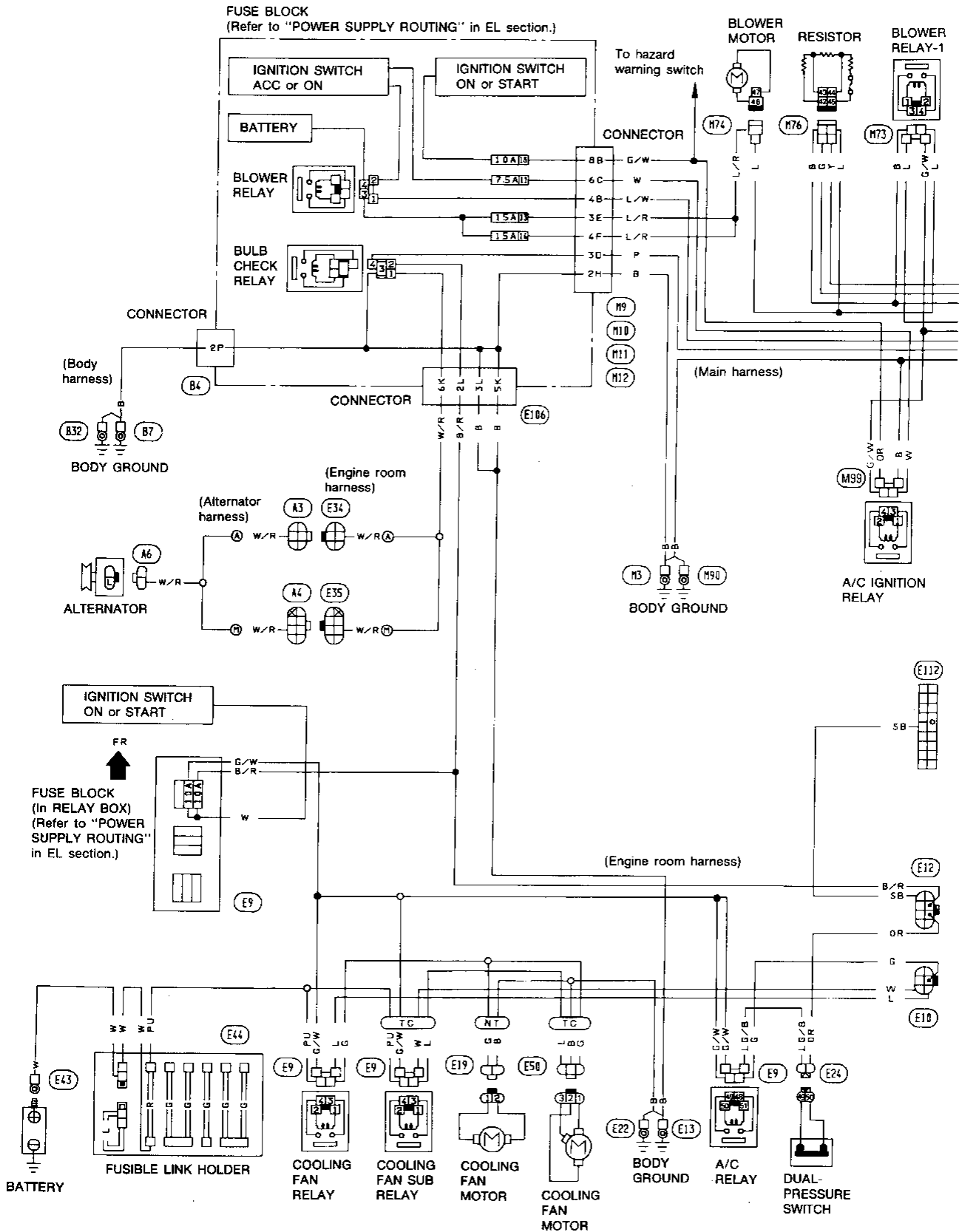


Rear of fuse block



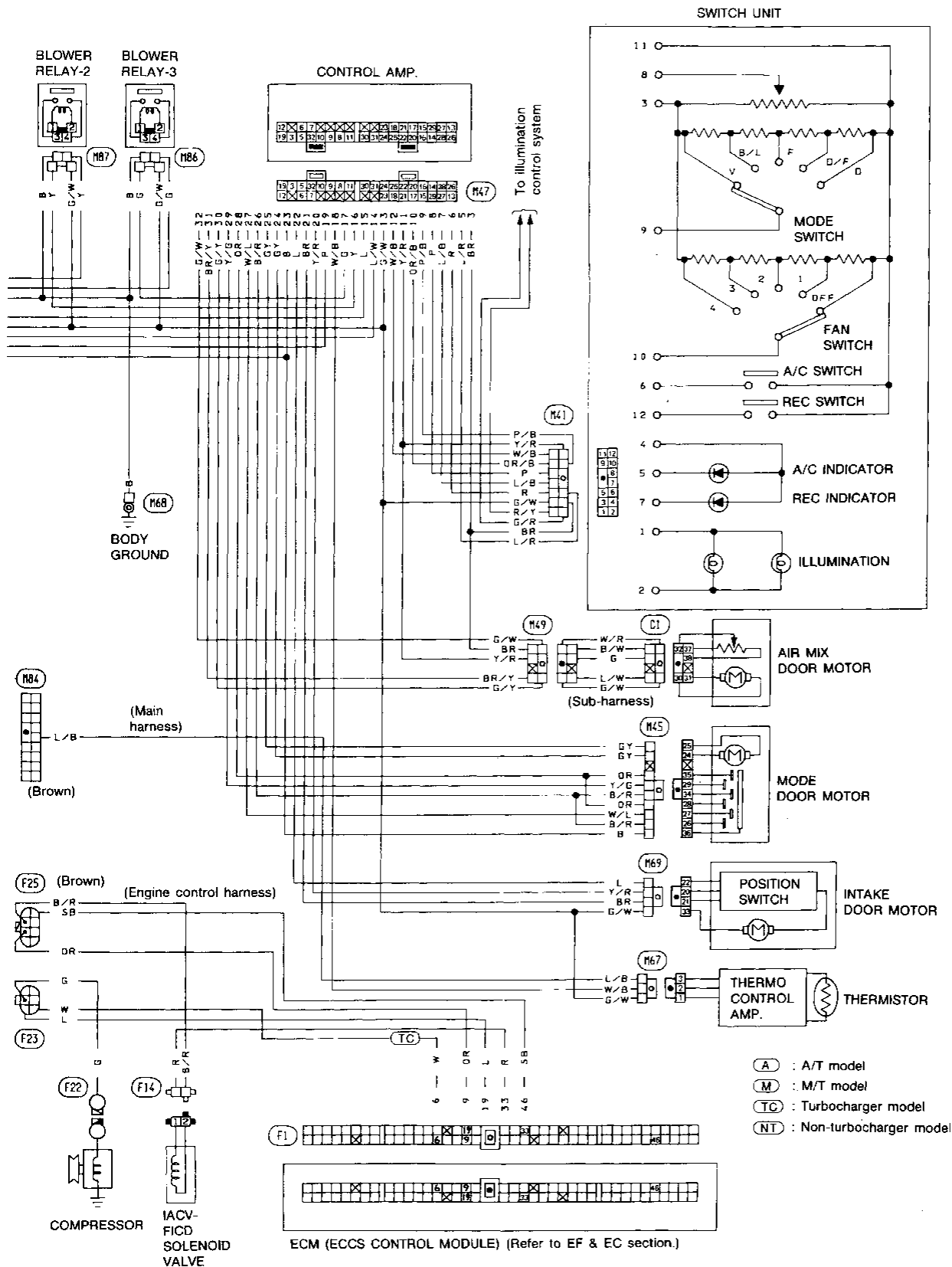
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Wiring Diagram

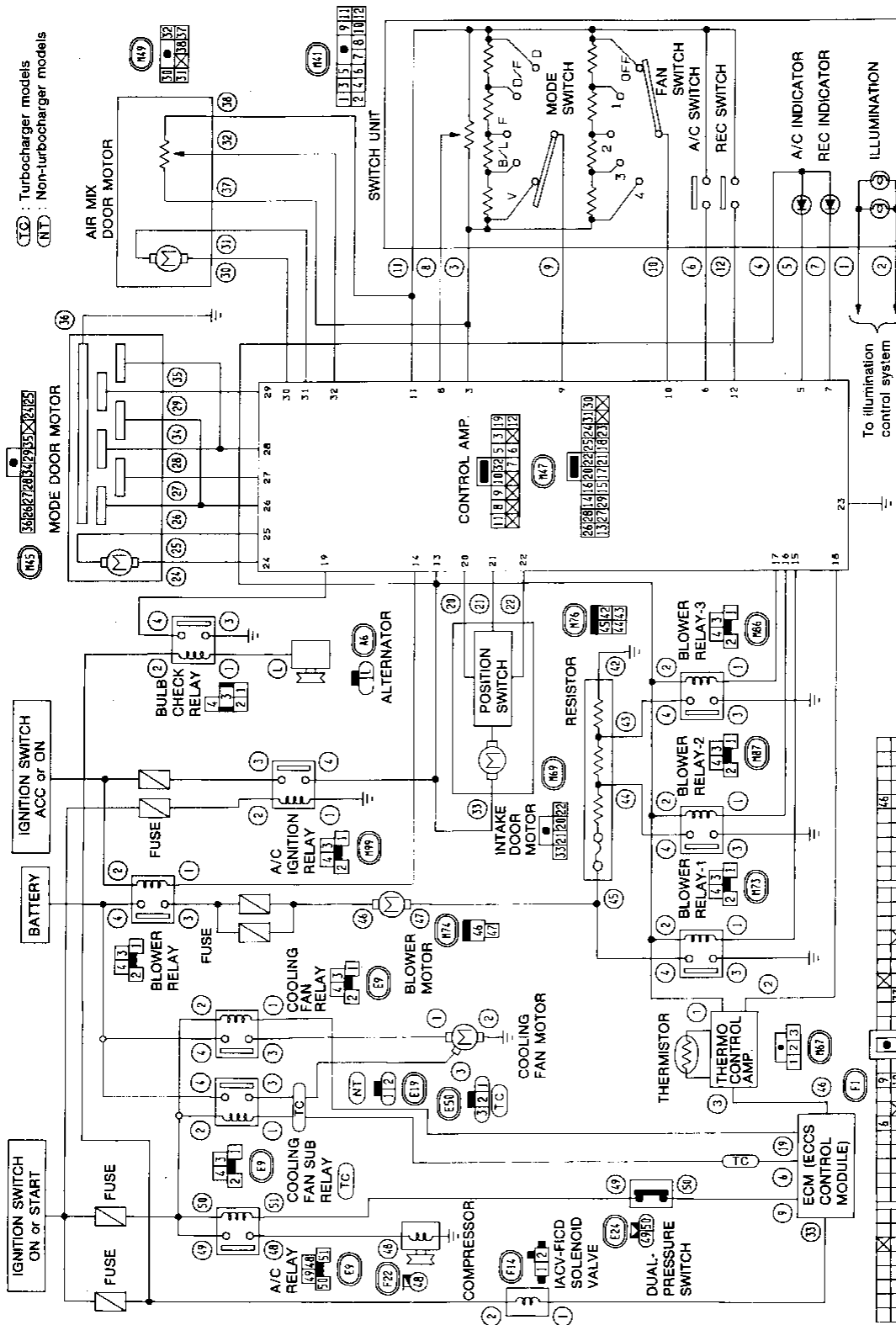


Wiring Diagram (Cont'd)

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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-34.)
- The terminal numbers in the connector coincide with the circuit numbers surrounded by a single circle "O".

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

Check power supply circuit for air conditioning system.

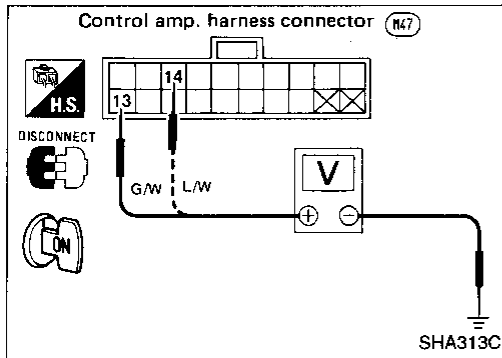
Refer to "POWER SUPPLY ROUTING" in section EL and Wiring Diagram.

CONTROL AMP. REMOVAL

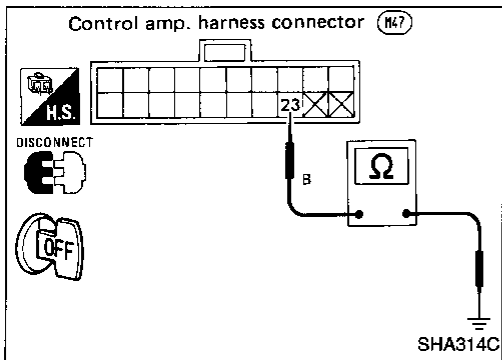
1. Remove driver side instrument lower lid.
2. Remove vent duct.
3. Remove control amp. with harness connected.

CONTROL AMP. CHECK

1. Disconnect control amp. harness connector.
2. Connect voltmeter from harness side.
3. Measure voltage across terminal No. ⑬ or No. ⑭ and body ground.



Voltmeter terminal		Voltage
⊕	⊖	
⑬	Body ground	Approximately 12V
⑭		



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

1. Disconnect control amp. harness connector.
2. Connect ohmmeter from harness side.
3. Check continuity between terminal No. ⑳ and body ground.

Ohmmeter terminal		Continuity
⊕	⊖	
㉑	Body ground	Yes

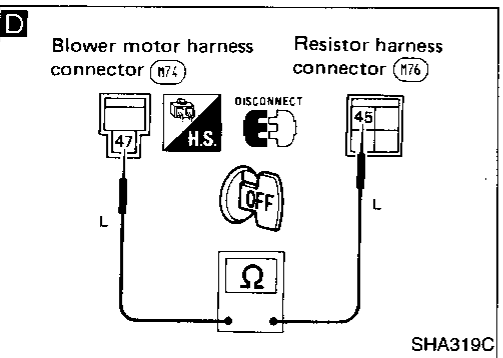
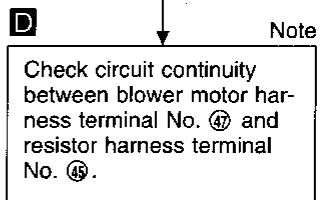
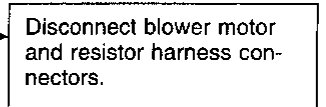
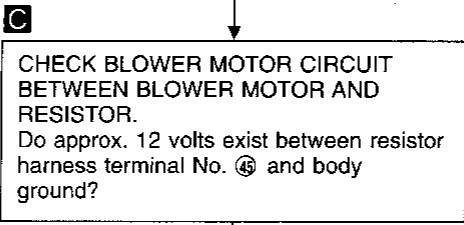
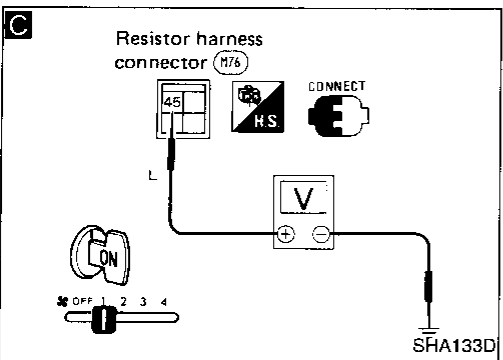
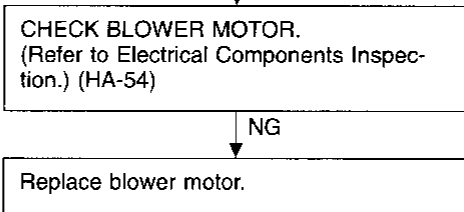
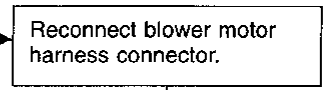
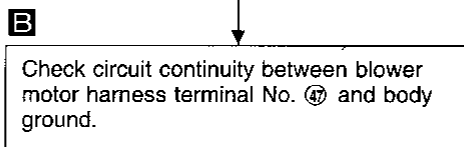
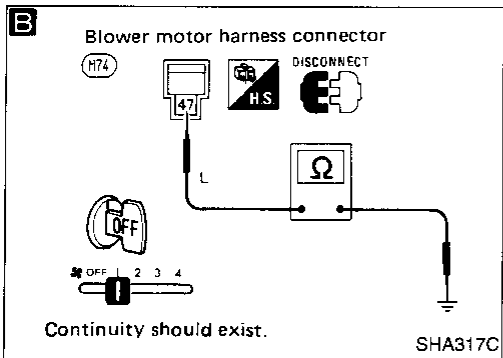
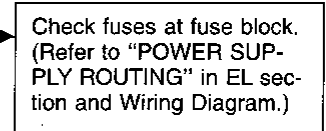
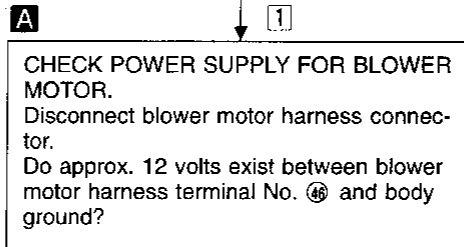
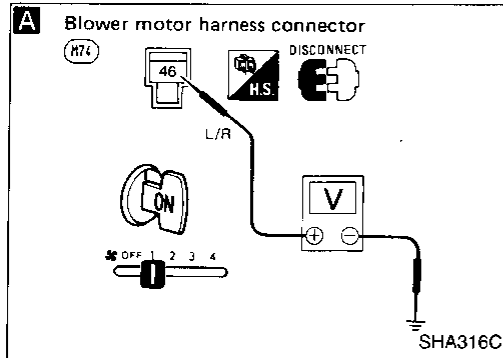
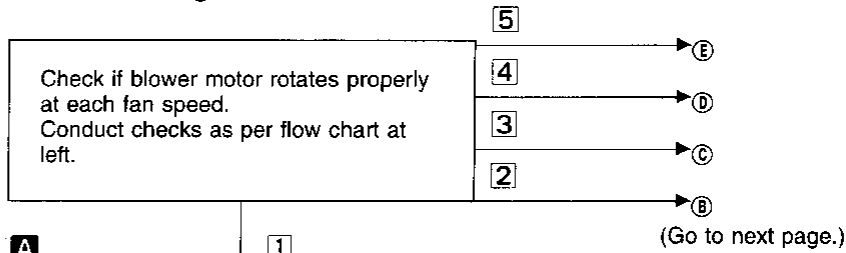
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	INCIDENT	Flow chart No.
1	Fan fails to rotate.	1
2	Fan does not rotate at 1-speed.	2
3	Fan does not rotate at 2-speed.	3
4	Fan does not rotate at 3-speed.	4
5	Fan does not rotate at 4-speed.	5

Diagnostic Procedure 1

SYMPTOM: Blower motor does not rotate.

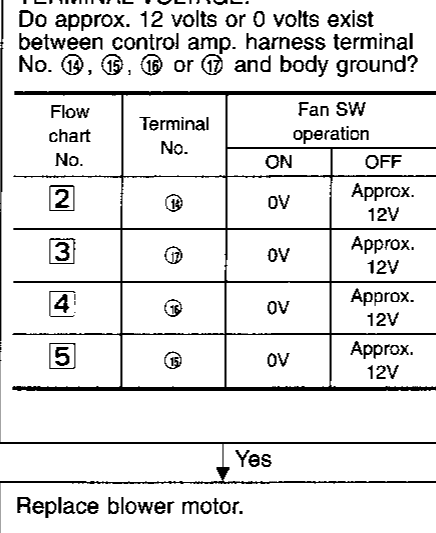
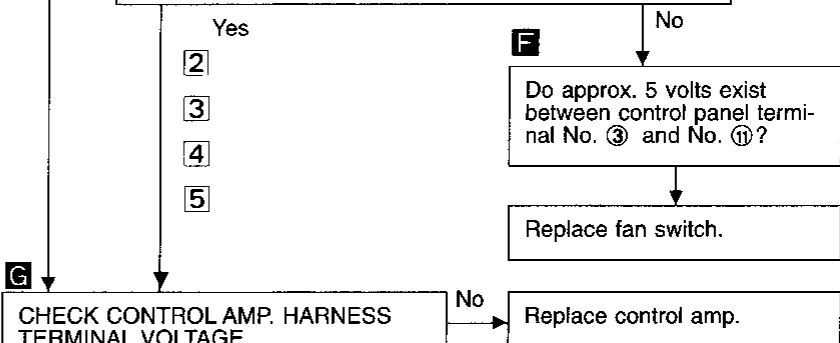
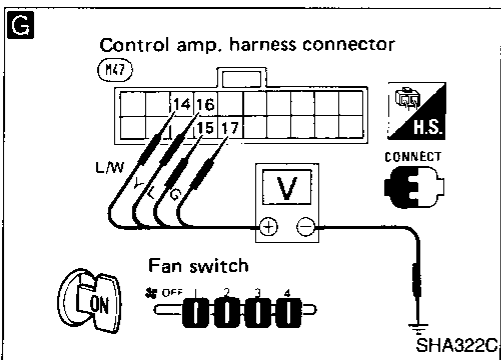
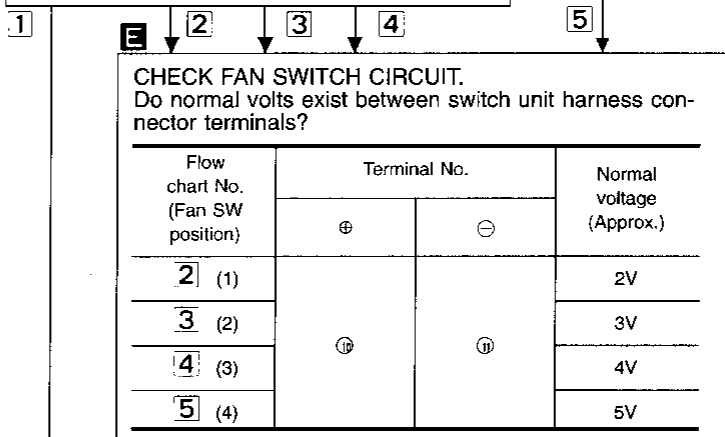
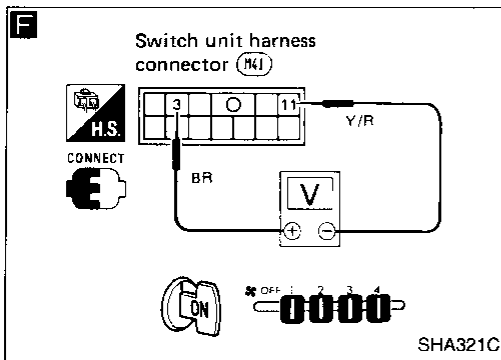
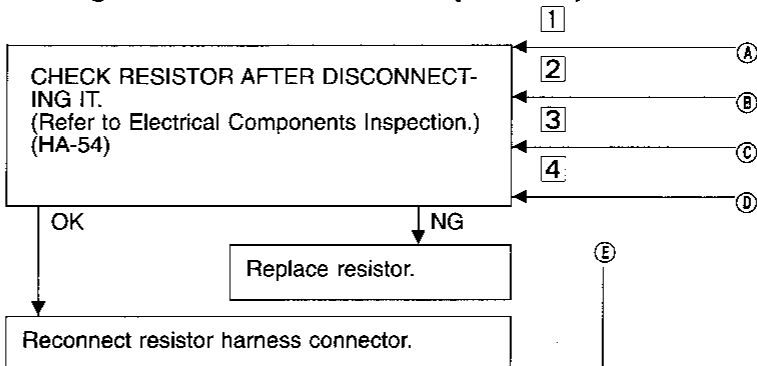
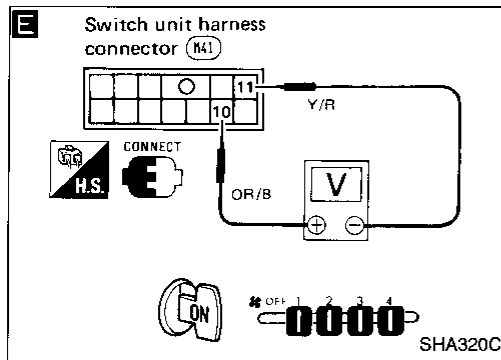
- Perform **PRELIMINARY CHECK 2** before referring to the following flow chart.



(Go to next page.)

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

Diagnostic Procedure 1 (Cont'd)

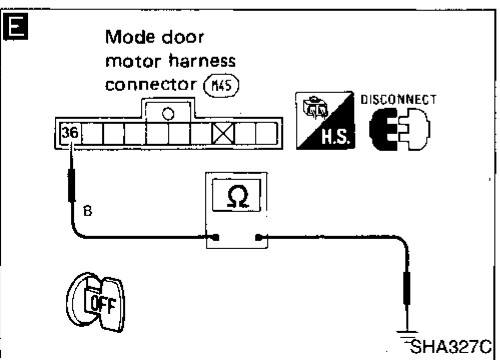
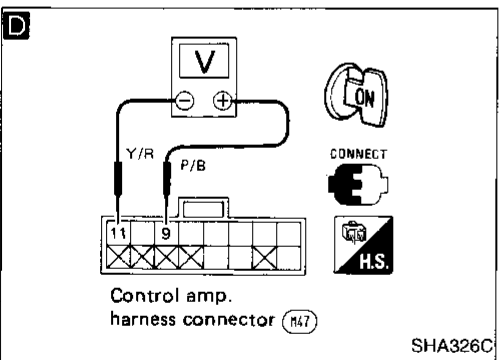
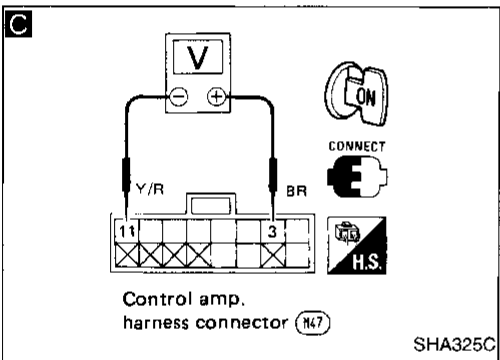
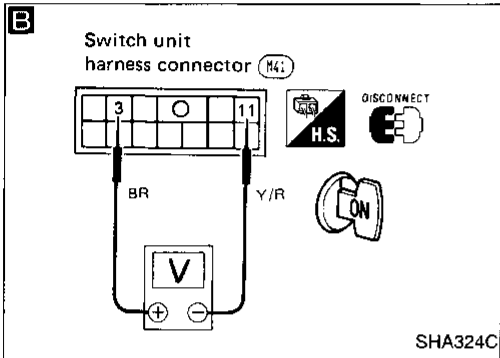
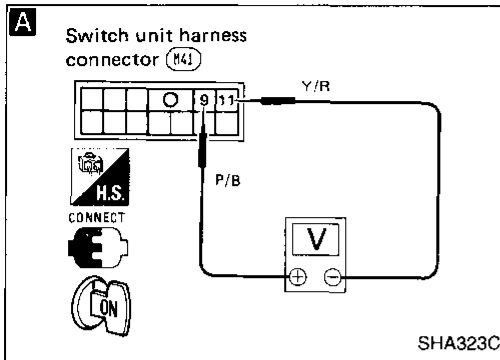


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Diagnostic Procedure 2

SYMPTOM: Air outlet does not change.

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



A

CHECK MODE DOOR MOTOR POSITION SWITCH.
Measure voltage between switch unit harness connector terminal No. ⑨ and ⑩.

Mode switch	Terminal No.		Voltage (Approx.)
	⊕	⊖	
VENT			5V
B/L			4V
FOOT	⑨	⑩	3V
F/D			2V
DEF			0V

OK

D

Measure voltage between control amp. harness connector terminal No. ⑨ and ⑩.

Mode switch	Terminal No.		Voltage (Approx.)
	⊕	⊖	
VENT			5V
B/L			4V
FOOT	⑨	⑩	3V
F/D			2V
DEF			0V

OK

E

CHECK BODY GROUND CIRCUIT FOR MODE DOOR MOTOR.
Does continuity exist between mode door motor harness connector terminal No. ③ and body ground?

NG → Disconnect switch unit harness connector.

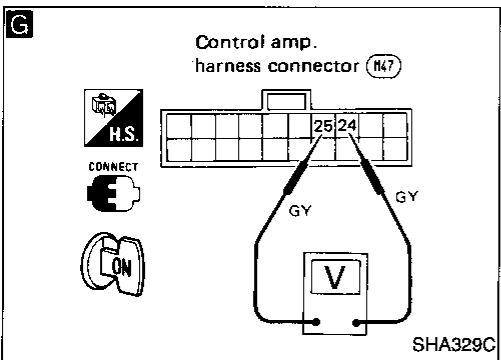
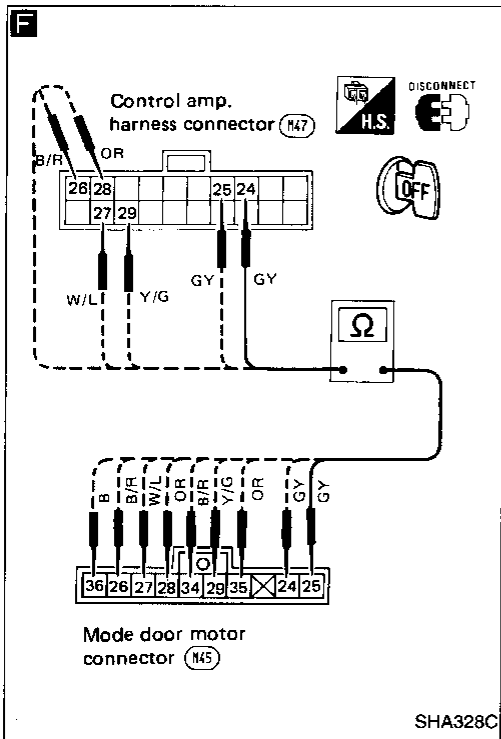
B Do approx. 5 volts exist between switch unit harness connector terminal No. ③ and ⑩.
No → Replace switch unit.
Yes →

C Do approx. 5 volts exist between control amp. harness connector No. ③ and ⑩.
No → Repair harness or connector.
Yes → Replace control amp.

NG → Repair harness or connector.

No → Repair harness or connector.

Diagnostic Procedure 2 (Cont'd)



F

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

Terminal No.		Continuity
Control amp.	Mode door motor	
Ⓜ	Ⓜ	Yes
Ⓝ	Ⓝ	
Ⓜ	Ⓜ and Ⓝ	
Ⓝ	Ⓝ	
Ⓜ	Ⓜ and Ⓝ	
Ⓝ	Ⓝ	

NG → Repair harness or connector.

G

CHECK FOR OUTPUT OF CONTROL AMP.

When mode is switched from "VENT" to "DEF" or when mode is switched from "DEF" to "VENT": Do approx. 12 volts exist between control amp. harness terminal No. Ⓜ and Ⓝ?

Terminal No.		Mode door motor	
Ⓜ	Ⓝ	Mode door operation	Direction of linkage rotation
⊖	⊕	VENT → DEF	Clockwise
⊕	⊖	DEF → VENT	Counter-clockwise

No → Replace control amp.

Yes

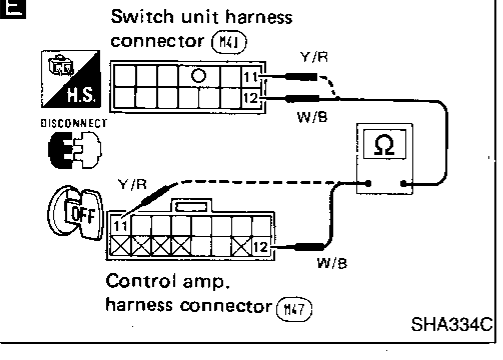
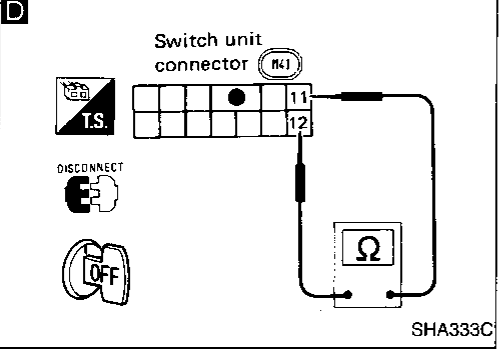
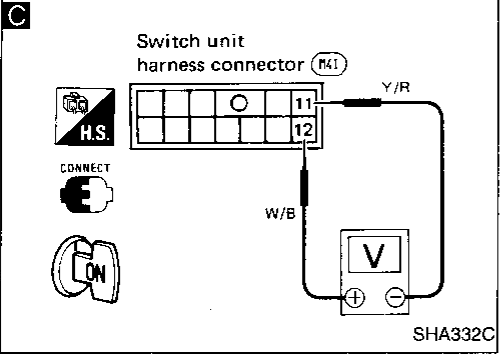
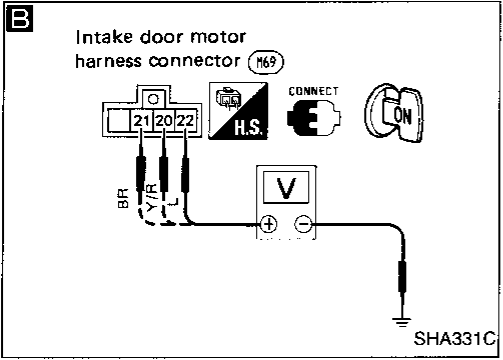
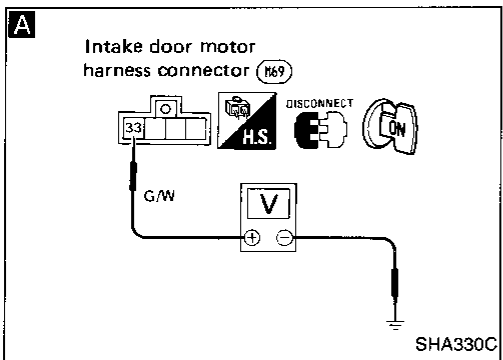
Replace mode door motor.

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Diagnostic Procedure 3

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

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



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. ③ and body ground?

No → Check intake door motor power supply circuit continuity.

B

Select VENT mode and check the voltage between intake door motor harness terminal No. ②①, ②②, ②③ and body ground.

A/C switch	REC switch	Mode	Terminal voltage (Approx.)		
			②①	②②	②③
ON	ON	REC	12V	12V	0V
ON	OFF	REC/FRE	12V	0V	12V
OFF	OFF	FRE	0V	12V	12V

C

Check the voltage between control panel harness connector terminal No. ⑫ and ⑪.

A/C switch	Terminal No.		Voltage (Approx.)
	⑫	⑪	
Switch pressed	⊕	⊖	0V
Switch free	⊕	⊖	5V

OK → Replace intake door motor.

NG → Disconnect control panel connector.

OK → Replace control amp.

D

Check circuit continuity between control panel terminal No. ⑫ and ⑪.

REC switch	Continuity between terminal No. ⑫ and ⑪
Switch pressed	Yes
Switch free	No

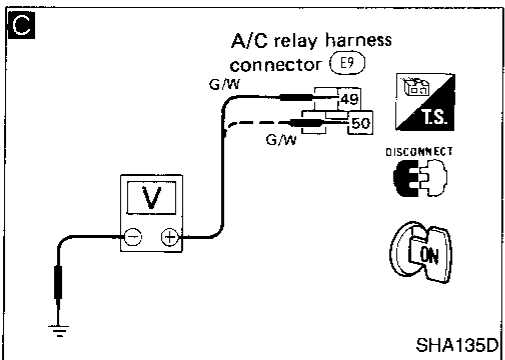
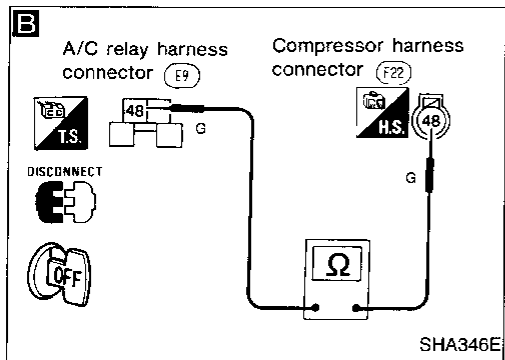
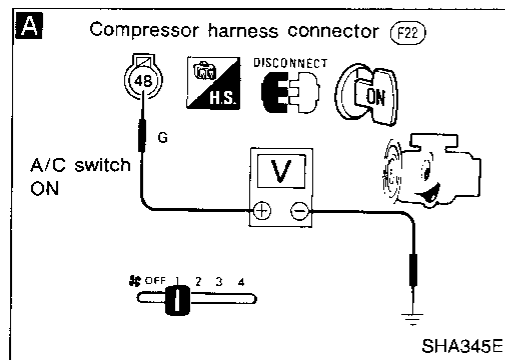
NG → Replace control panel.

E

Check circuit continuity between control panel harness terminal No. ⑫ (⑪) and control amp. harness terminal No. ⑫ (⑪).

NG → Repair harness or connector.

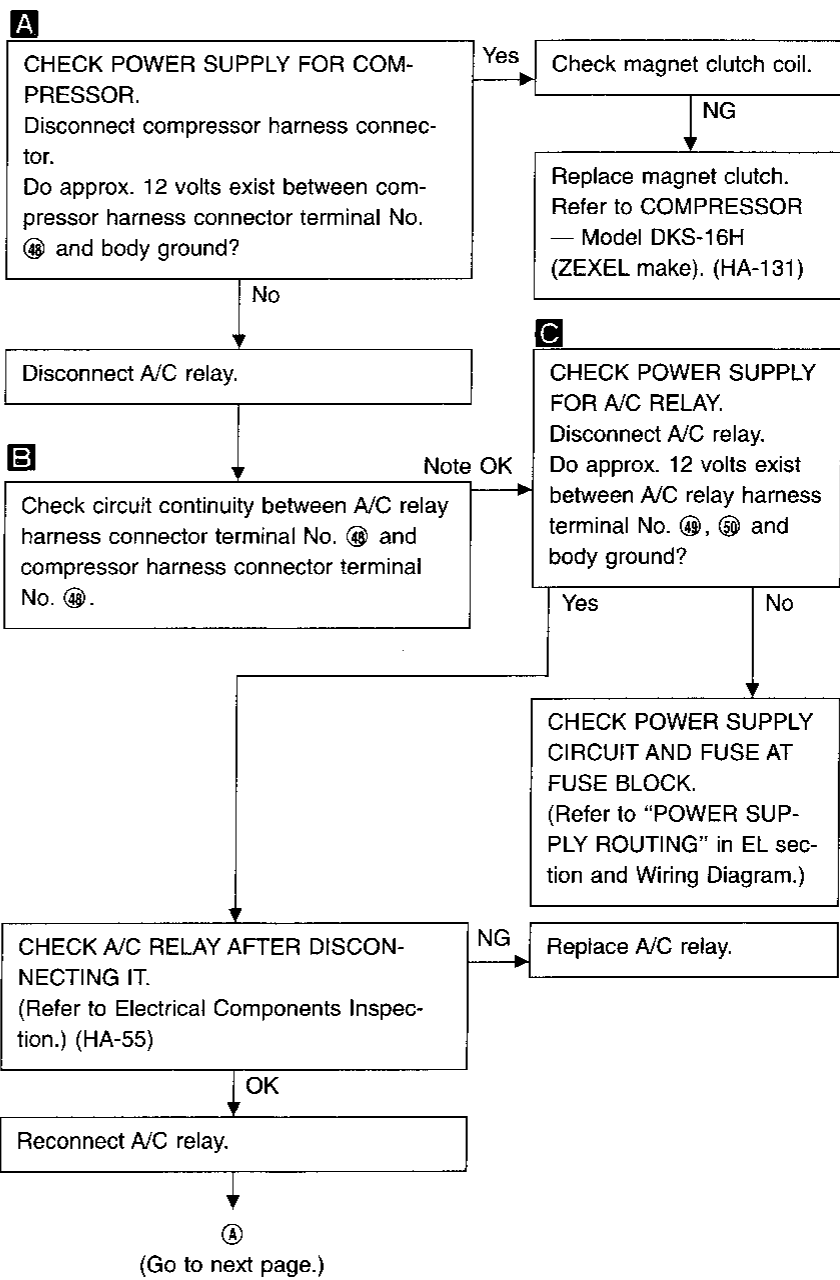
OK → Replace control amp.



Diagnostic Procedure 4

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

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



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

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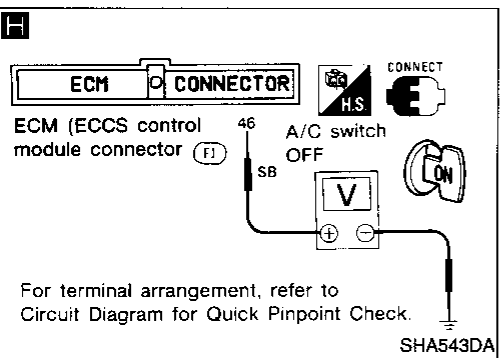
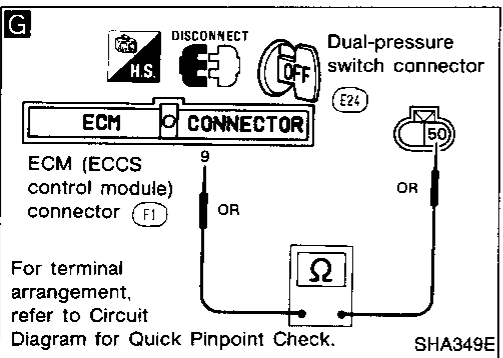
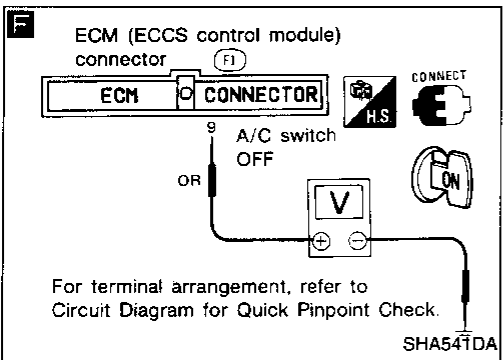
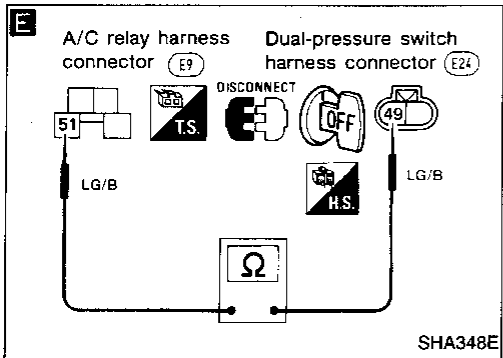
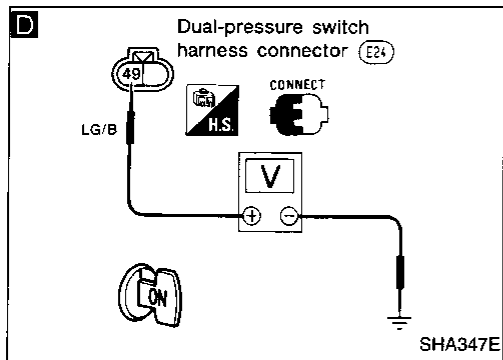
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Diagnostic Procedure 4 (Cont'd)



A

D CHECK COIL SIDE CIRCUIT OF A/C RELAY.
Do approx. 12 volts exist between dual-pressure switch harness connector terminal No. ④ and body ground?

No → **E** Check circuit continuity between A/C relay harness connector terminal No. ⑤ and dual-pressure switch harness connector terminal No. ④.

Yes → **F** Do approximately 12 volts exist between ECM (ECCS control module) harness terminal No. ⑨ and body ground?

No → **G** Check circuit continuity between dual-pressure switch harness connector terminal No. ⑤ and ECM (ECCS control module) harness connector terminal No. ⑨. *Note*

OK → CHECK DUAL-PRESSURE SWITCH. (Refer to Electrical Components Inspection.) (HA-55)

NG → Replace dual-pressure switch.

Yes → **H** Do more than 8 volts exist between ECM (ECCS control module) harness connector terminal No. ④ and body ground?

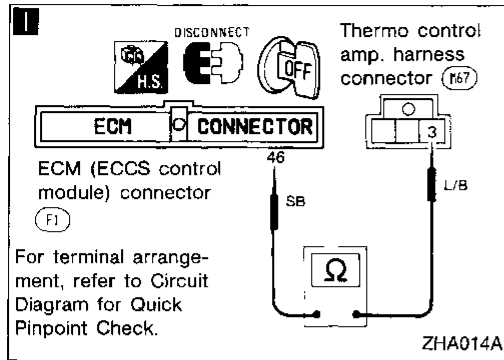
No → CHECK ECM (ECCS control module). (Refer to EF & EC section.)

Yes → Disconnect ECM (ECCS control module) harness connector and thermo amp. harness connector.

B (Go to next page.)

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

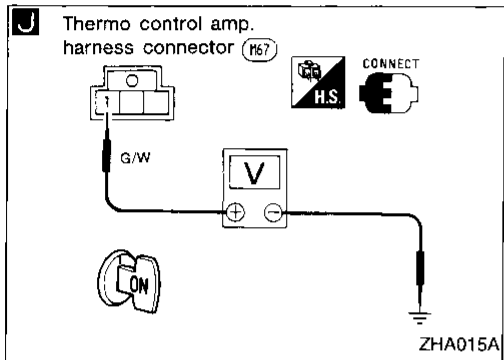
Diagnostic Procedure 4 (Cont'd)



I Note

Check circuit continuity between thermo control amp. harness connector terminal No. ③ and ECM (ECCS control module) harness connector terminal No. ④.

OK



J

CHECK POWER SUPPLY FOR THERMO AMP.

Do approx. 12 volts exist between thermo amp. harness connector terminal No. ① and body ground?

No → **CHECK POWER SUPPLY CIRCUIT AND FUSE AT FUSE BLOCK.** (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

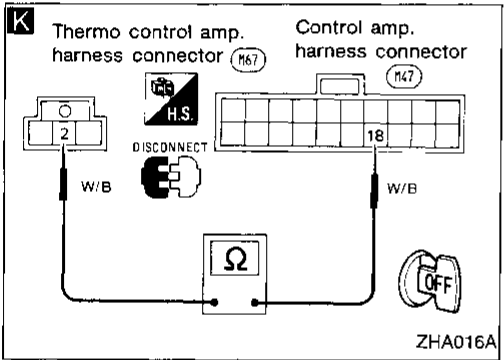
Yes

K

CHECK THERMO CONTROL AMP. (Refer to Electrical Components Inspection.) (HA-56)

NG → Replace thermo control amp.

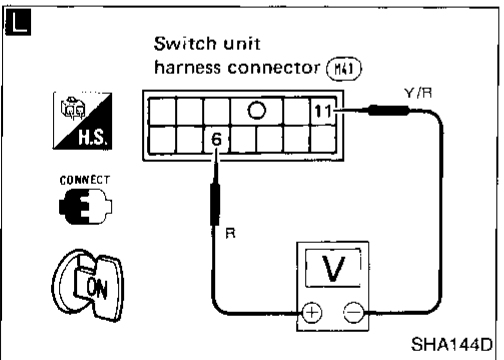
OK



K Note

Check continuity between thermo control amp. harness connector terminal No. ② and control amp. harness connector terminal No. ⑱.

OK



L

CHECK A/C SWITCH OF SWITCH UNIT. Check the voltage between switch unit harness connector terminal No. ⑥ and ⑪.

NG → Disconnect switch unit connector.

OK

REC switch	Terminal No.		Voltage (Approx.)
	⑥	⑪	
Switch pressed	⊕	⊖	0V
Switch free	⊕	⊖	5V

OK

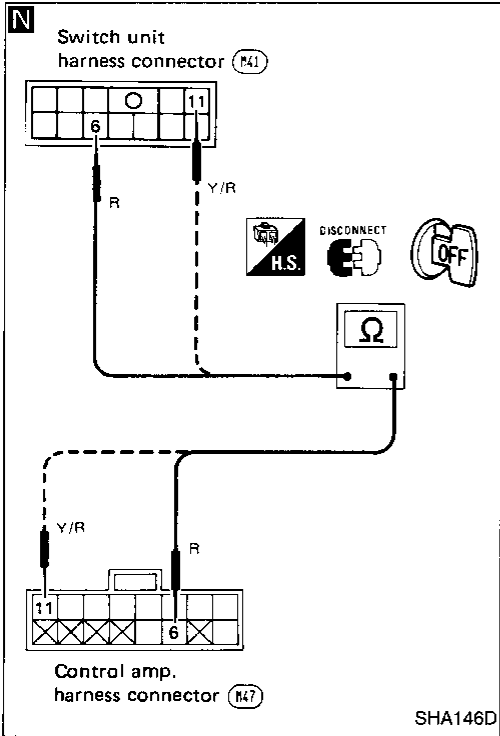
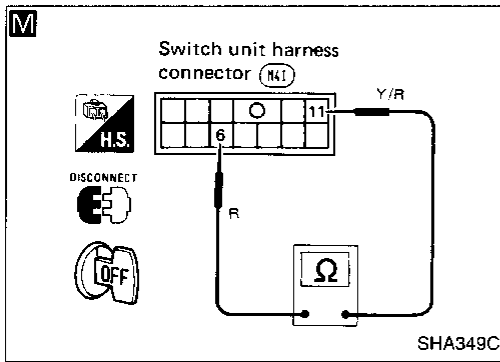
Replace control amp.

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

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Diagnostic Procedure 4 (Cont'd)



M

Check circuit continuity between switch unit harness connector terminal No. ⑥ and ⑪.

A/C switch	Continuity between terminal No. ⑥ and ⑪
Switch pressed	Yes
Switch free	No

NG → Replace switch unit.

N Note

Check circuit continuity between switch unit harness connector terminal No. ⑥ (⑪) and control amp. harness connector terminal No. ⑥ (⑪).

OK → Replace control amp.

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

Diagnostic Procedure 5

SYMPTOM: Illumination or control panel indicators 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 ON.
- Rotary VENT, B/L, FOOT, F/D and DEF switches in order.
- Check for incidents and follow the repairing methods as shown.

INCIDENT			How to repair
ILL Control panel	A/C	REC	
x	○	○	Go to DIAGNOSTIC PROCEDURE 5-1.
○	x	○	Go to DIAGNOSTIC PROCEDURE 5-2.
○	○	x	Go to DIAGNOSTIC PROCEDURE 5-3.
○	x	x	Go to DIAGNOSTIC PROCEDURE 5-4.

○: Illumination or indicator comes on.
x: Illumination or indicator does not come on.

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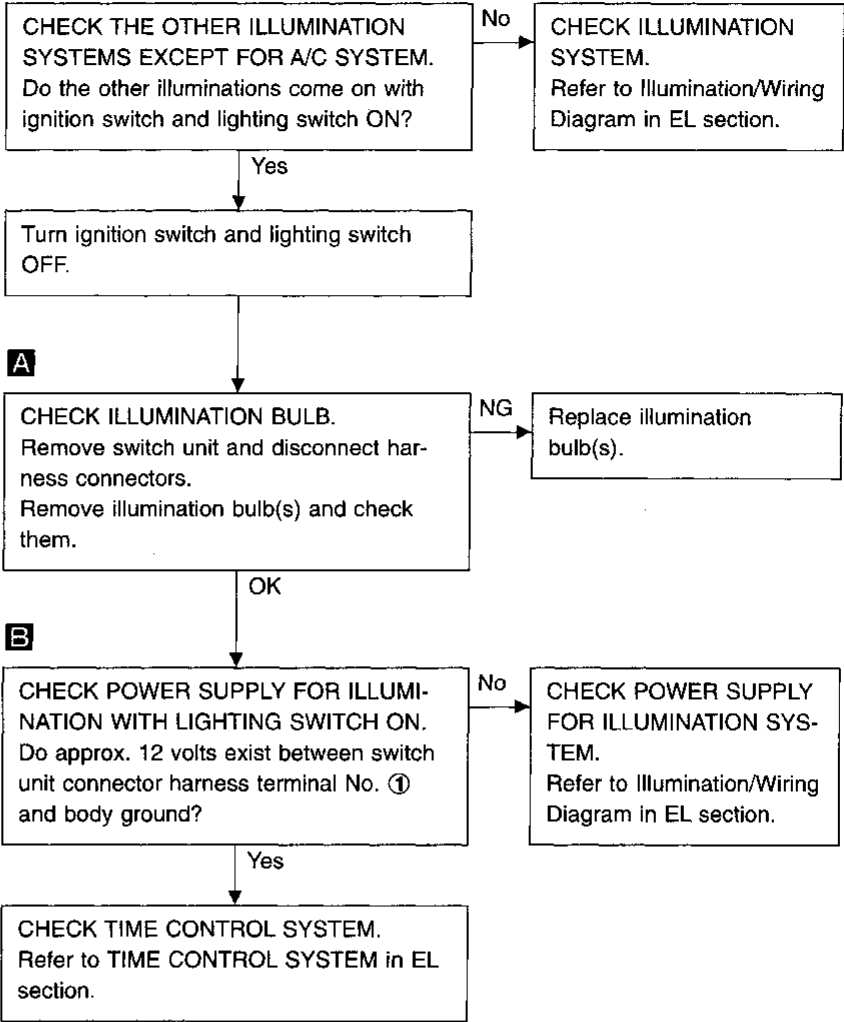
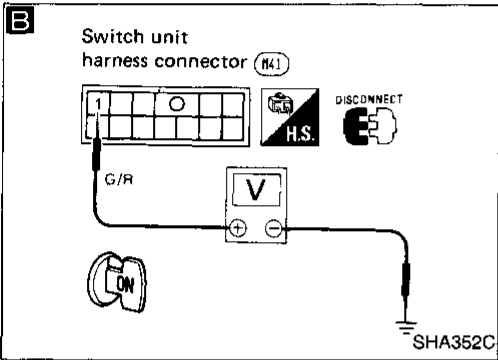
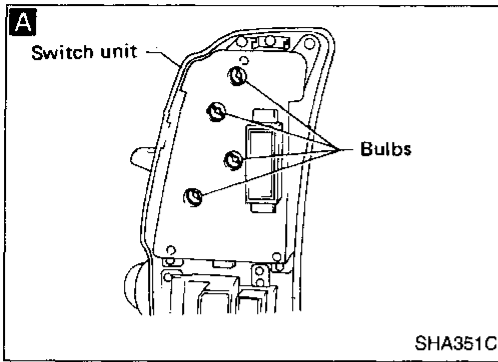
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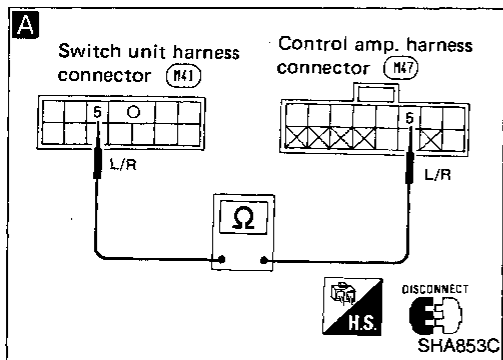
Diagnostic Procedure 5 (Cont'd)

DIAGNOSTIC PROCEDURE 5-1



Diagnostic Procedure 5 (Cont'd)

DIAGNOSTIC PROCEDURE 5-2



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

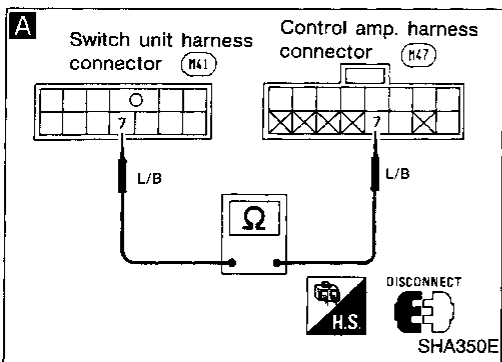
No → Go to Diagnostic Procedure 4. (HA-45)

Yes

Note
Check continuity between switch unit harness connector terminal No. ⑤ and control amp. harness connector terminal No. ⑤.

OK → Replace switch unit.

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DIAGNOSTIC PROCEDURE 5-3

CHECK INTAKE DOOR OPERATION. Does intake door operate normally when engine is ON and A/C switch, fan switch are ON?

No → Go to Diagnostic Procedure 3. (HA-44)

Yes

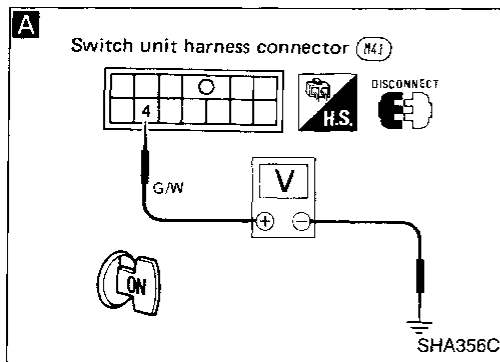
Note
Check continuity between switch unit harness connector terminal No. ⑦ and control amp. harness connector terminal No. ⑦.

OK → Replace switch unit.

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

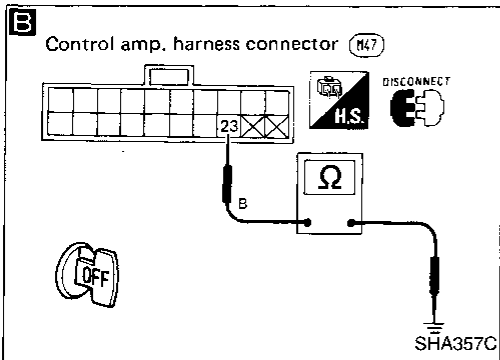
Diagnostic Procedure 5 (Cont'd)

DIAGNOSTIC PROCEDURE 5-4



Turn ignition switch and lighting switch OFF.

Disconnect switch unit harness connector.



A CHECK POWER SUPPLY FOR SWITCH UNIT.
Do approx. 12 volts exist between switch unit harness connector terminal No. ④ and body ground?

No → Check harness of switch unit power supply circuit. (Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

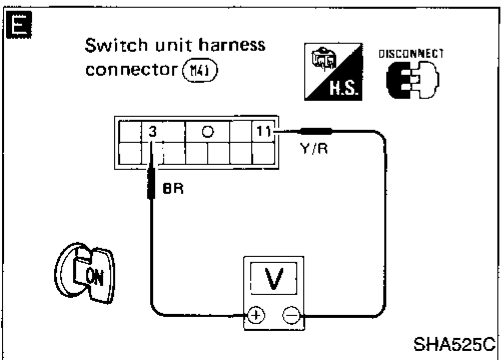
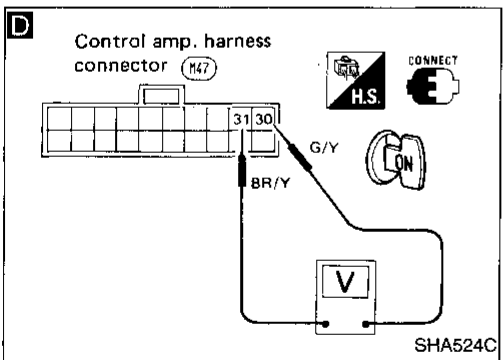
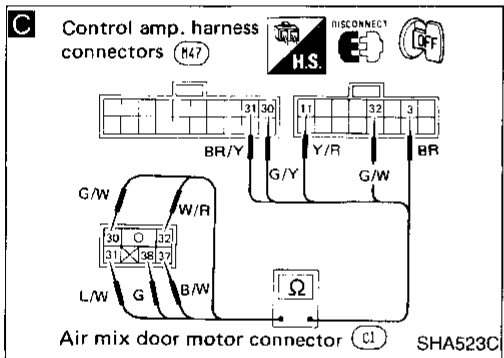
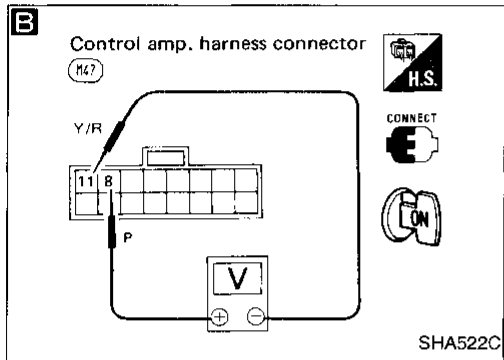
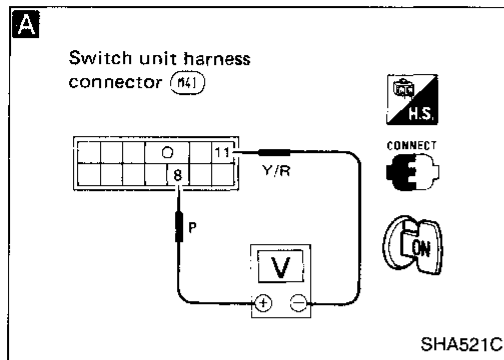
B CHECK BODY GROUND CIRCUIT FOR CONTROL AMP.
Does continuity exist between control amp. harness connector terminal No. ⑭ and body ground?

Note

Replace control amp.

Note:

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



Diagnostic Procedure 6

SYMPTOM: Temperature of air outlet does not change.

A

CHECK TEMPERATURE CONTROL LEVER.
Measure voltage between control panel harness connector terminals No. ⑧ and ⑩.

Temp. control lever	Terminal No.		Voltage (approx.)
	⊕	⊖	
Full hot	⑧	⑩	5V
Full cold	⑧	⑩	0V

NG → Disconnect control amp. harness connector.

E

Check if approx. 5 volts exist between control panel harness connector terminals No. ③ and ⑩.

NG → (Go to next page.)

OK → Replace control amp.

B

Measure voltage between control amp. harness connector terminals No. ⑧ and ⑩.

Temp. control lever	Terminal No.		Voltage (approx.)
	⊕	⊖	
Full hot	⑧	⑩	5V
Full cold	⑧	⑩	0V

OK →

C

Check continuity between each terminal of control amp. and air mix door motor.

Terminal No.		Continuity
Control amp.	Air mix door motor	
②	②	Yes
⑩	⑩	
③	⑩	
⑩	③	
⑩	②	

NG → Repair harness or connector.

OK →

D

CHECK FOR CONTROL AMP. OUTPUT.
Check if 12 volts exist between control amp. harness connector terminals No. ⑩ and ③ when temp. control lever is moved.

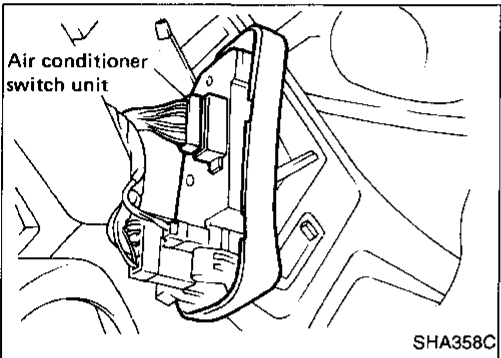
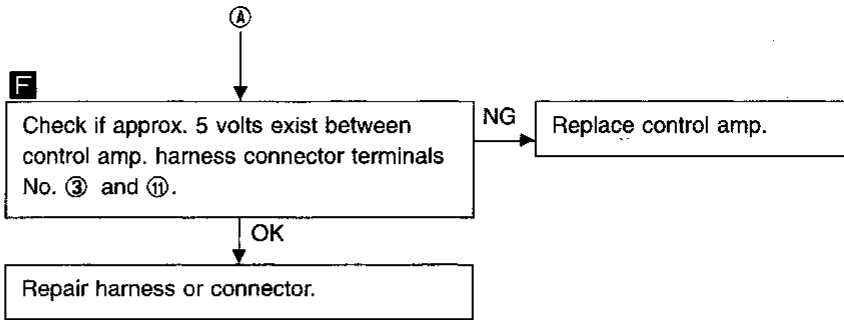
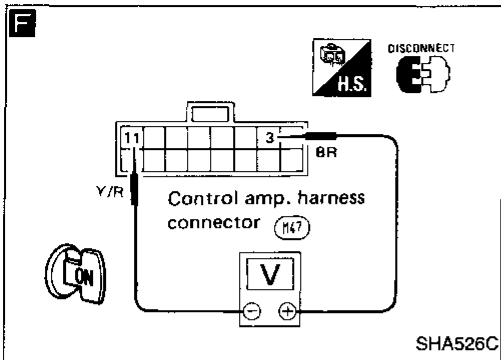
Terminal No.	Air mix door motor	Direction of linkage rotation	
⑩	③	Air mix door operation	
⊖	⊕	Cold→Hot	Clockwise
⊕	⊖	Hot→Cold	Counter-clockwise

NG → Replace control amp.

OK → Replace air mix door motor.

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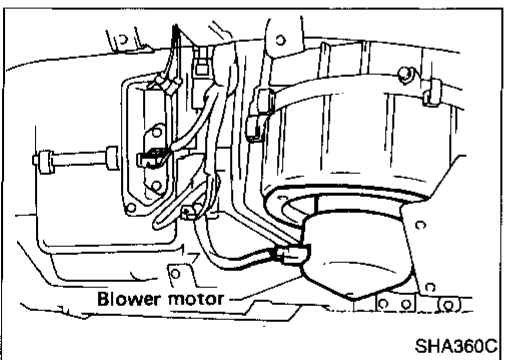
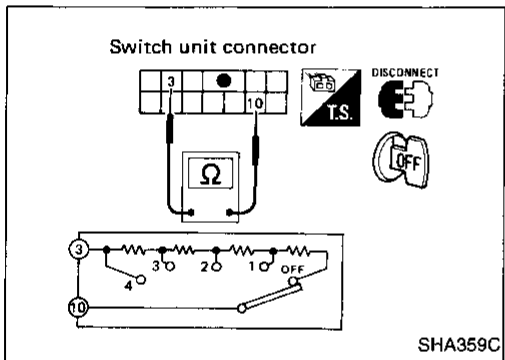
Diagnostic Procedure 6 (Cont'd)



Electrical Components Inspection
FAN SWITCH

Check resistance between terminals at each switch position.

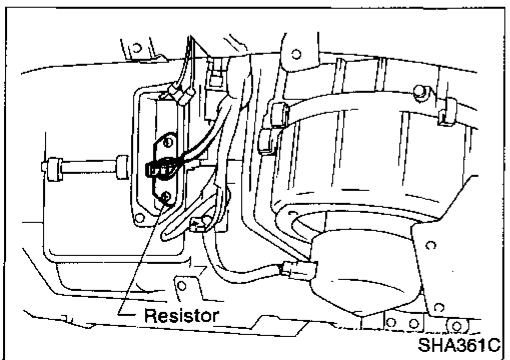
Switch position	Resistance between terminals No. ③ and ⑩ (Approx. Ω)
OFF	710
1	1,140
2	460
3	270
4	0



BLOWER MOTOR

Confirm smooth rotation of the blower motor.

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



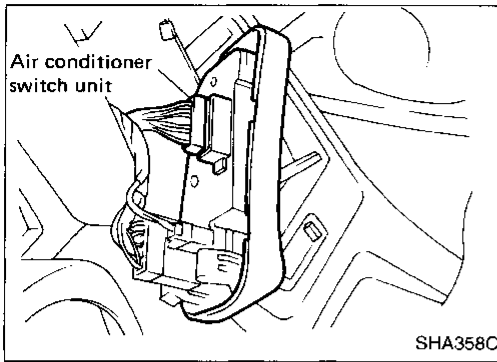
BLOWER RESISTOR

Check continuity between terminals.

Electrical Components Inspection (Cont'd)

A/C SWITCH

Check continuity between terminals at each switch position.



Switch condition	Terminal No.		Continuity
While A/C switch is pushed	⑥	⑪	Yes
While REC switch is pushed	⑫	⑪	Yes

GI

MA

EM

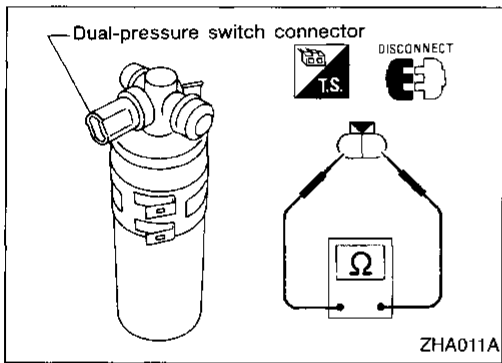
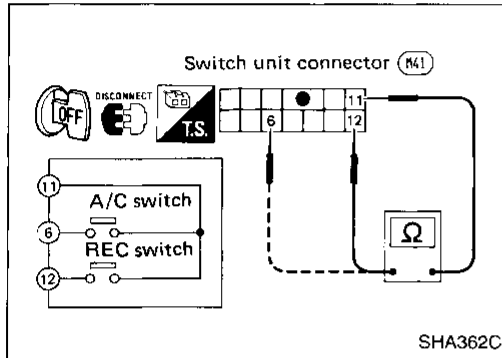
LC

EF & EC

FE

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MT



DUAL-PRESSURE SWITCH

High-pressure side line pressure kPa (kg/cm ² , psi)	Operation	Continuity
Decreasing to 152.0 - 201.0 (1.55 - 2.05, 22.0 - 29.2)	Turn OFF.	Does not exist.
Increasing to 2,452 - 2,844 (25 - 29, 356 - 412)	Turn ON.	Exists.
Increasing to 157 - 216 (1.6 - 2.2, 23 - 31)		
Decreasing to 1,275 - 1,667 (13 - 17, 185 - 242)		

AT

PD

FA

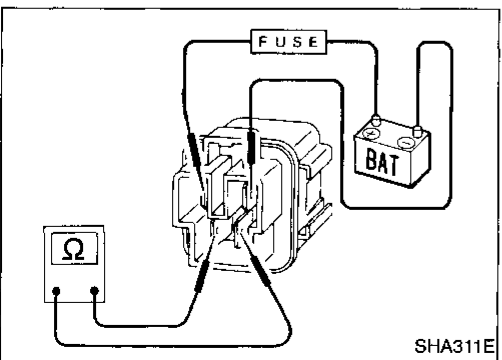
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RELAYS

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

HA

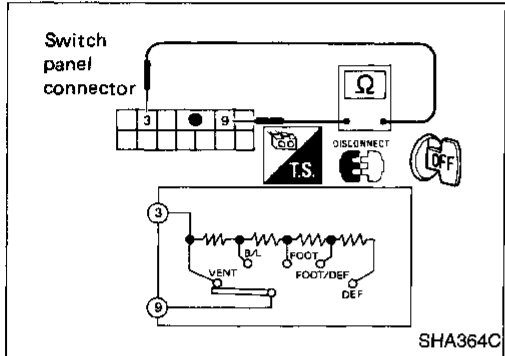
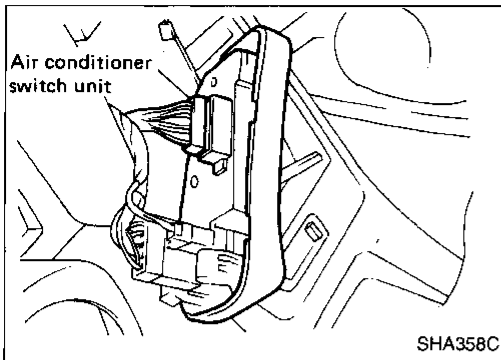
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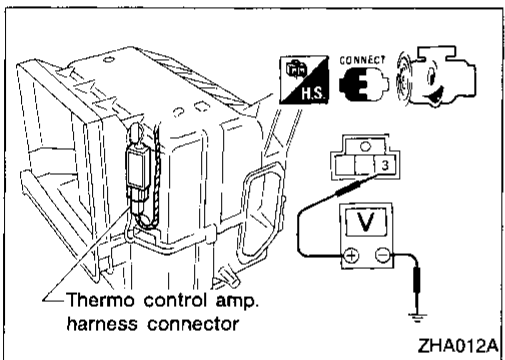
Electrical Components Inspection (Cont'd)

MODE SWITCH

Check resistance between terminals at each switch position.



Switch position	Resistance between terminals No. ⑨ and No. ③ (Ω)
VENT	0
B/L	270
FOOT	460
FOOT/DEF	1,140
DEF	710



THERMO CONTROL AMP.

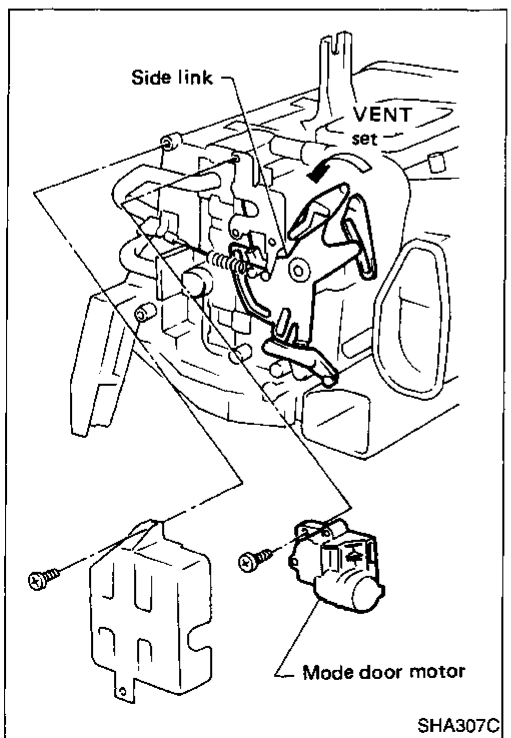
1. Run engine and operate A/C system.
2. Connect the voltmeter from harness side.
3. Check thermo control amp. operation shown in the table.

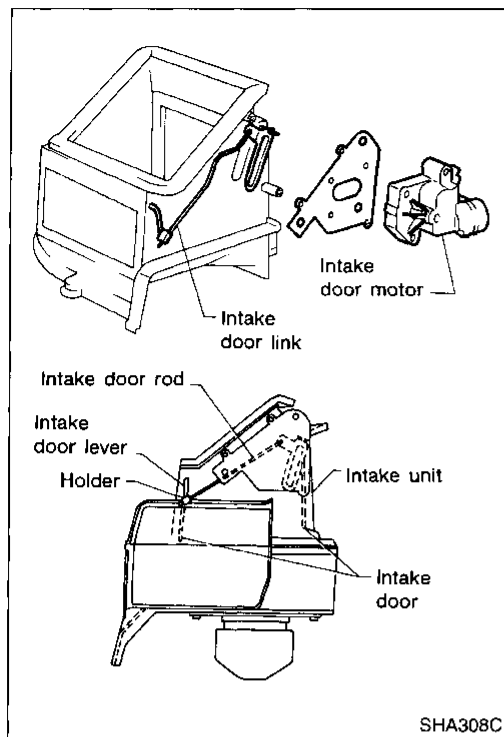
Evaporator outlet air temperature °C (°F)	Thermo amp. operation	Voltage (Approx.)
Decreasing to 3.0 - 4.0 (37 - 39)	Turn OFF	12V
Increasing to 4.0 - 6.0 (39 - 43)	Turn ON	0V

Control Linkage Adjustment

MODE DOOR

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



Control Linkage Adjustment (Cont'd)**INTAKE DOOR**

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

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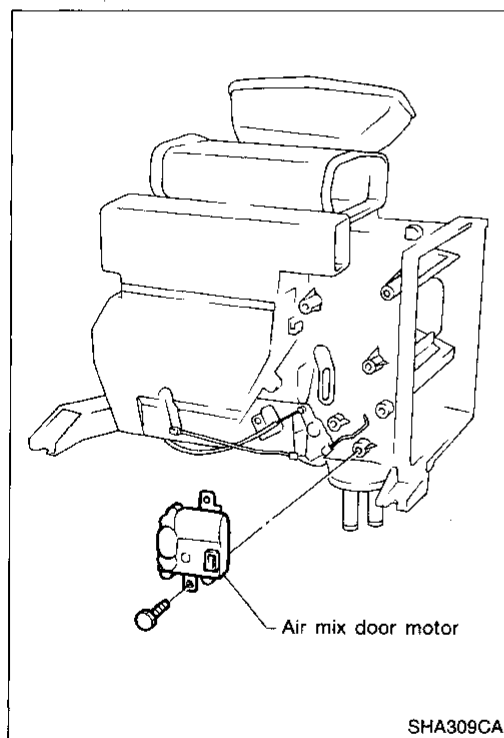
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AIR MIX DOOR

1. Connect harness to air mix door motor and set temperature control lever at full-cold position.
2. Set air mix doors I and II at full-cold position and fasten door rod.
3. Check that both doors are at full-cold position when temperature control lever is at full-cold. Also, check that both doors are at full-hot position when temperature control lever is at full-hot.

AT

PD

FA

RA

BR

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RS

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WATER COCK CONTROL CABLE

Clamp cable at full-close position when air mix doors I and II are at full-cold position. Check that water cock operates properly when temperature control lever is at full-hot position and full-cold position.










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Control Switches

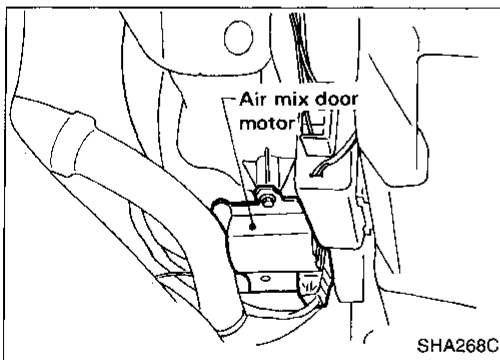
SWITCHES AND THEIR CONTROL FUNCTIONS

Switch	Indicator illuminates		Air outlet	Intake air	Compressor
	A/C				
A/C					ON*1
Mode			VENT	*3	*1*4
			B/L	*5	*1*4
			FOOT	*5	*1*4
			F/D	*5	ON*1
			DEF	FRE	ON*1
				REC*2	ON*1

- *1: Compressor is operated by thermo control amp. and ECM (ECCS control module).
- *2: Depending on mode switch position.
- *3: When vent mode is selected, REC switch function is as in the following chart:
- *4: Depending on A/C switch position.
- *5: Depending on REC switch position.

		REC	
		ON	OFF
A/C SW	ON	REC	REC/FRE
	OFF	REC	FRE

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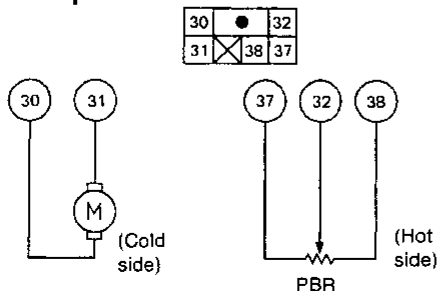
Specifications

AIR MIX DOOR MOTOR

The air mix door motor is attached to the heater unit. It rotates, opening the air mix door to the position set by the temperature control lever.

Motor rotation is conveyed through shafts and linkages. The air mix door position is fed back to the control amplifier by the Potentio Balance Resistor (PBR) built into the air mix door motor.

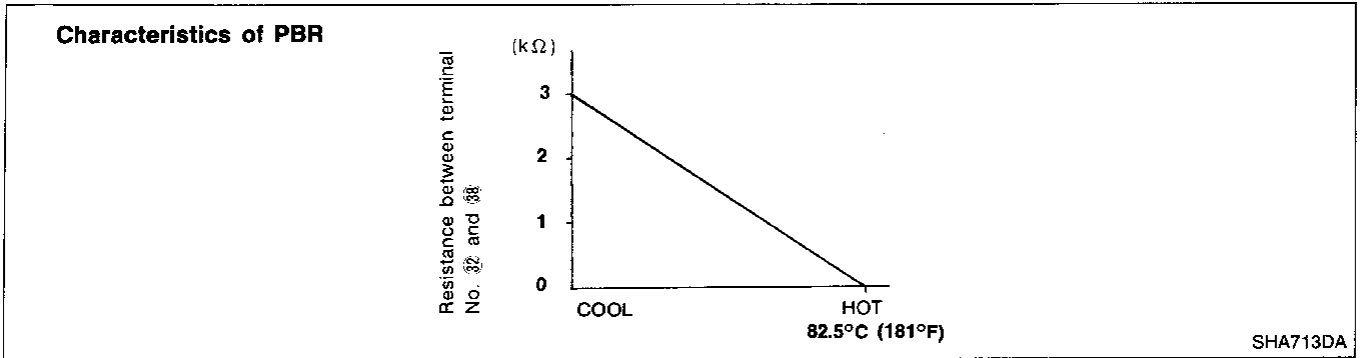
Air mix door motor operation



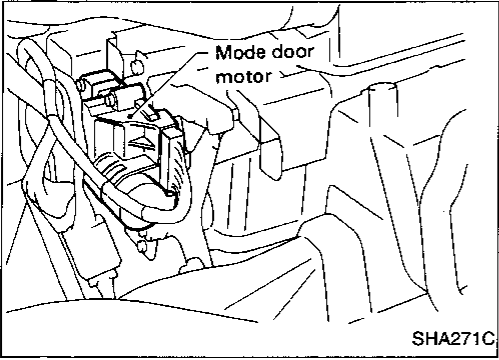
31	30	Air mix door operation	Direction of lever movement
⊕	⊖	COLD → HOT	Clockwise (Toward passenger compartment)
-	-	STOP	STOP
⊖	⊕	HOT → COLD	Counterclockwise (Toward engine compartment)

SHA363E

Specifications (Cont'd)



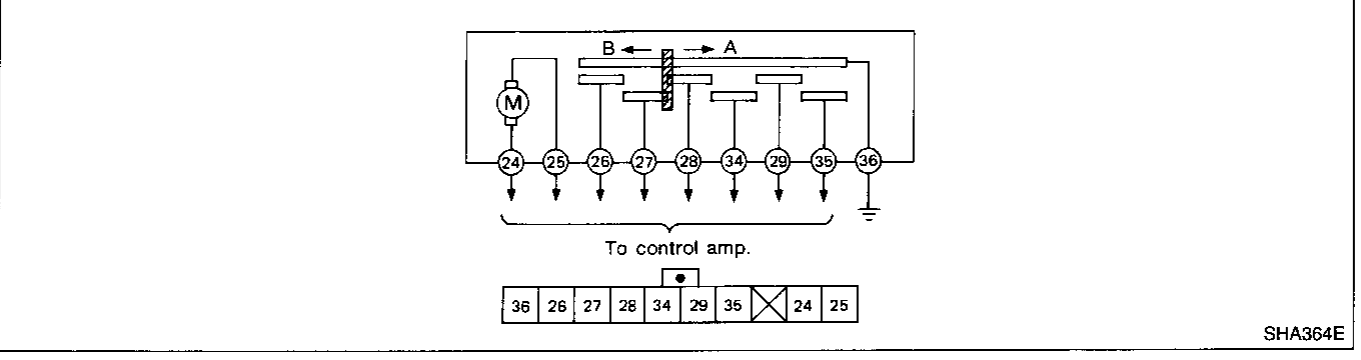
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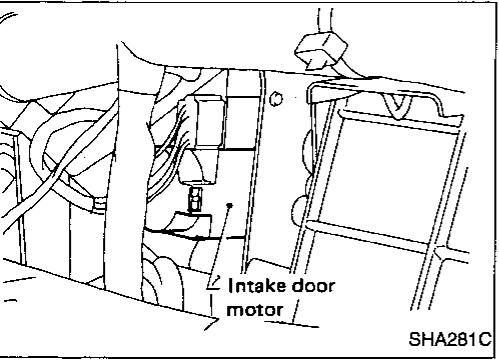
MODE DOOR MOTOR

When a mode switch is selected, 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.

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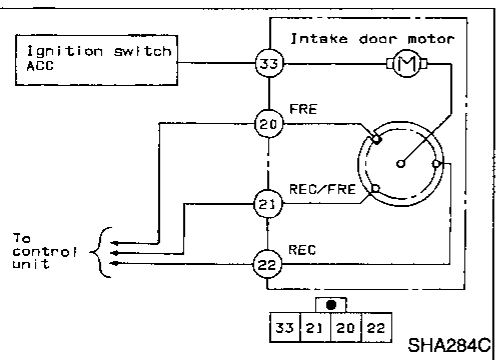
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INTAKE DOOR MOTOR

The intake door motor is installed on the side portion of the intake unit. Using a rod and link it opens and closes the intake door. When the REC switch is ON (OFF), the ground line of the intake door motor is switched from terminal 20 to 22 (22 to 20). Now, the position switch contacts built into the motor are set to the current flow position. This causes the motor to start. The contacts turn along with the motor. When they reach the non-current flow position, the motor will stop. The motor always turns in the same direction. (FRE→REC→REC/FRE)

BR
ST
RS
BT



HA
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Features

OUTLET AIR TEMPERATURE CONTROL (Air mix door control)

The automatic temperature control (ATC) system determines both the head and foot target temperatures when the desired temperature is set on the control panel. At the same time, the ATC system determines target upper (VENT and DEF) and lower (FOOT) outlet air temperatures. This computation is accomplished in relation to the desired temperature, and outside conditions (ambient temperature and sunload). The automatic temperature control system then controls the air mix door position so that the outlet air temperatures meet target* outlet air temperatures.

A summary of the automatic temperature control system is as follows:

1. The upper and lower air temperatures are independently controlled to provide a comfortable ride.
2. Optimum outlet air temperatures can be set to the passenger's preference.
3. Outlet air temperature feedback control through duct sensors permits a "potentiometerless" air mix door design. It requires no adjustment, increases service life and improves performance reliability.

FAN SPEED CONTROL

The ATC system continuously regulates fan speed according to the difference between the target temperature and the temperatures detected at the upper and lower in-vehicle sensors. The greater the difference between the temperatures the higher the blower speed. If the cabin sunload or ambient temperature is high, fan speed will be increased.

INTAKE DOOR CONTROL

The ATC system adjusts the intake door position once every thirty seconds. The system is programmed to take in outside air as much as possible.

OUTLET DOOR CONTROL

The ATC system controls distribution of air through the VENT, DEF and FOOT outlets based on the cabin sunload, ambient temperature and the set temperature.

COMPRESSOR MAGNET CLUTCH CONTROL

The ATC system automatically shuts off the compressor at temperatures lower than 0°C (32°F).

SELF-DIAGNOSTIC SYSTEM

The ATC system contains an on-board diagnosis system which can be used to check the ATC system sensors and motors. Any trouble data will be stored in the memory.

Pushing the "AUTO" and "OFF" switches at the same time for more than 5 seconds will give the self-diagnostic mode. There are 4 kinds of self-diagnostic systems (STEP 1 to STEP 4). Each step can be accessed by pushing the "AUTO" switch. The functions of each step are as follows:

- STEP 1 — Monitor diagnosis
- STEP 2 — Actuator test
- STEP 3 — Change of difference between upper and lower target temperature
- STEP 4 — Readout of trouble data memory

*: Target temperature

Set a temperature for the cabin using the TEMP. SET switch. Then, the ATC system calculates an initial target temperature based on information from the various ATC system sensors. This target temperature is continuously updated. Doing so, the cabin temperature reaches the set temperature in the most comfortable way possible for the occupants. (The program for this was made after careful study of comfort levels related to car interiors).

Control Operation

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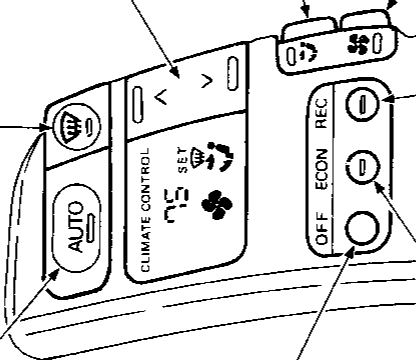
DEF SWITCH	
INTAKE DOOR POSITION	OUTSIDE AIR
OUTLET DOOR POSITION	DEFROSTER
AIR MIX DOOR POSITION	AUTOMATIC CONTROL
FAN SPEED	AUTOMATIC CONTROL
COMPRESSOR	ON [outside air temperature above 0°C (32°F)]
REMARKS	Fan speed can be set at 4 speeds.

TEMP. SET SWITCH
Each time corresponding switch is pressed, set temperature is increased or decreased by 1°F. When it is pressed for more than 0.5 seconds, set temperature can be continuously changed.

MODE SWITCH
VENT → B/L → FOOT → D/F
"DEF" mode is canceled when MODE switch is pressed.

FAN SWITCH
LO → M1 → M2 → HI
Fan speed can be set at 4 speeds in any mode.

RECIRC SWITCH	
INDICATOR	ON OFF
INTAKE DOOR POSITION	RECIRCULATED AIR AUTOMATIC CONTROL
REMARKS	"RECIRC" is cancelled when "DEF" is selected or "RECIRC" switch is pressed again.



AUTO SWITCH	
INTAKE DOOR POSITION	OUTSIDE AIR
OUTLET DOOR POSITION	DEFROSTER
AIR MIX DOOR POSITION	AUTOMATIC CONTROL
FAN SPEED	AUTOMATIC CONTROL
COMPRESSOR	ON [outside air temperature above 0°C (32°F)]
REMARKS	Fan speed can be set at 4 speeds. Outlet mode can be set at 4 modes.

OFF SWITCH	
INTAKE DOOR POSITION	OUTSIDE AIR
OUTLET DOOR POSITION	DEFROSTER
AIR MIX DOOR POSITION	AUTOMATIC CONTROL
FAN SPEED	OFF
COMPRESSOR	OFF
REMARKS	REC switch and MODE switch can be set. Outlet mode can be set at 4 modes.

ECON SWITCH	
INTAKE DOOR POSITION	OUTSIDE AIR
OUTLET DOOR POSITION	DEFROSTER
AIR MIX DOOR POSITION	AUTOMATIC CONTROL
FAN SPEED	AUTOMATIC CONTROL
COMPRESSOR	OFF
REMARKS	Fan speed can be set at 4 speeds. Outlet mode can be set at 4 modes.

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 (SYMPTOM: When air conditioner switch is operated it does not beep.) HA-107

Diagnostic Procedure 23
 (SYMPTOM: Figures of set temperature do not appear on the display window and indicator lamp (LED) does not come on.) HA-108

Diagnostic Procedure 24
 (SYMPTOM: Switches do not work.) HA-109 BR

Diagnostic Procedure 25
 (SYMPTOM: Blower motor operation is malfunctioning.) HA-109

Electrical Components Inspection HA-112 ST

Control Linkage Adjustment HA-114

RS

BT

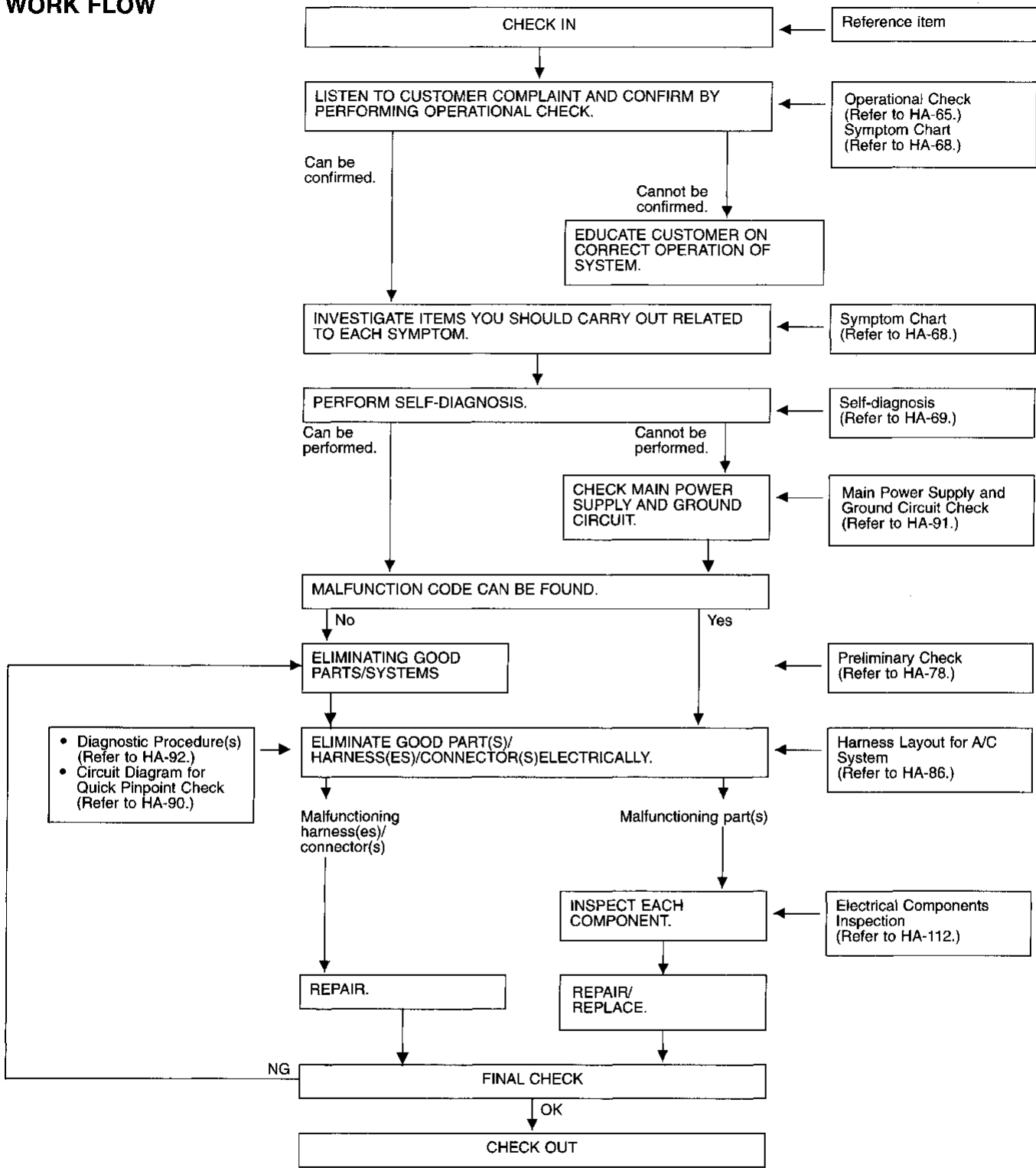
HA

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How to Perform Trouble Diagnoses for Quick and Accurate Repair

WORK FLOW



Operational Check

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

CONDITIONS:

Engine running at normal operating temperature.

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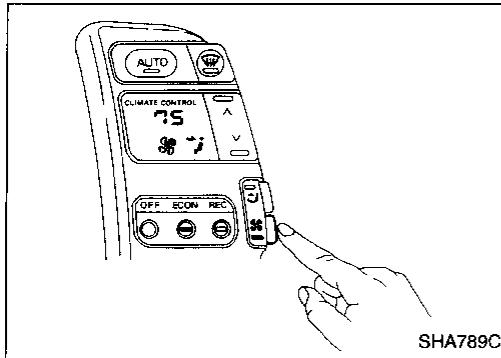
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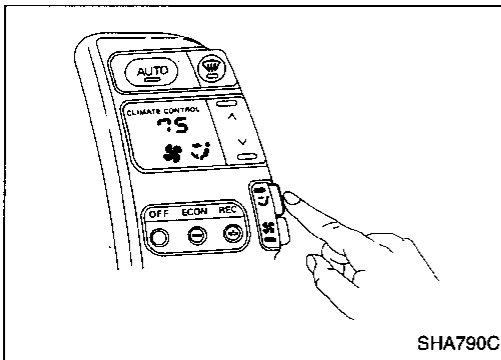
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PROCEDURE:

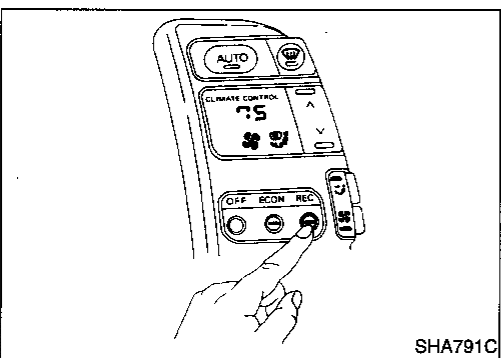
1. Check blower

- 1) Press fan switch one time.
ECON indicator should light.
Blower should operate on low speed, and the fan symbol should have one blade lit ().
- 2) Press fan switch one more time.
- 3) Continue checking blower speed and fan symbol until all four speeds have been checked.
- 4) Leave blower on high speed.



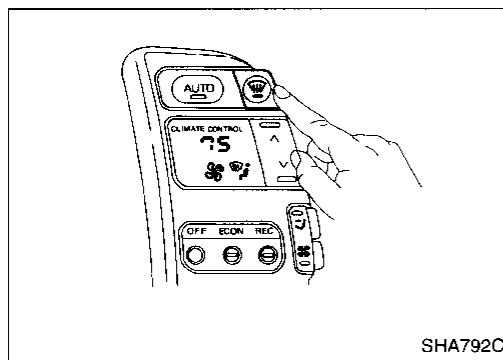
2. Check discharge air

- 1) Press mode switch one time.
Display should show air to face ().
- 2) Confirm that all discharge air comes out of face vents.
- 3) Press mode switch one more time.
Display should show air to face and foot (bi-level) ().
- 4) Confirm that discharge air comes out of face and foot vents.
- 5) Press mode switch one more time.
Display should show air to foot ().
- 6) Confirm that discharge air comes mostly from foot outlets, with some air from defroster outlets.
- 7) Press mode switch one more time.
Display should show air to foot and defroster ().
- 8) Confirm that discharge air comes out of foot vents and defroster vents.
- 9) Leave system in F/D mode.




3. Check recirc

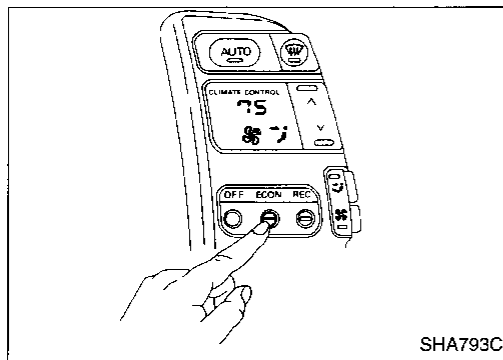
- 1) Press RECIRC switch.
RECIRC indicator should illuminate.
- 2) Listen for intake door position change (you should hear blower sound change slightly).

Operational Check (Cont'd)

SHA792C

4. Check defrost

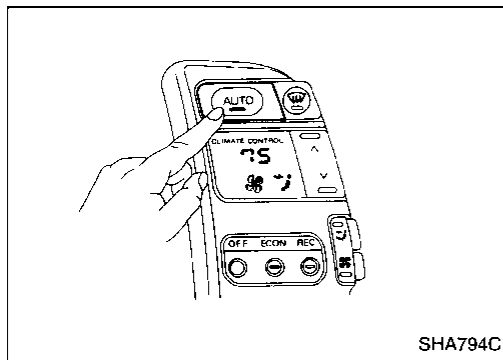
- 1) Press DEF switch.
- 2) Check that RECIRC, ECON, MODE and Fan are canceled. The discharge air should be coming only from defrost vents.
- 3) Confirm that compressor clutch is engaged (visual inspection). Display should show air to defroster ().



SHA793C

5. Check ECON mode

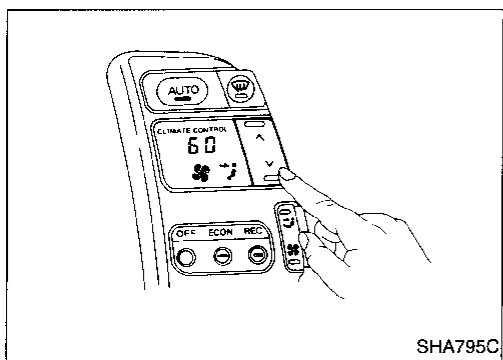
- 1) Press ECON switch. Defrost should be canceled. Discharge air outlet will depend on ambient, in-vehicle, and set temperatures.
- 2) Confirm that the compressor clutch is not engaged (visual inspection).



SHA794C

6. Check AUTO mode

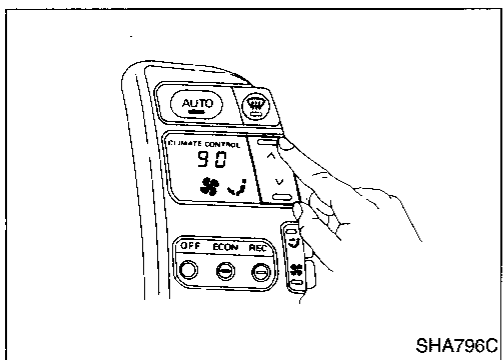
- 1) Press AUTO switch.
- 2) Confirm that compressor clutch engages (audio or visual inspection). Discharge air will depend on ambient, in-vehicle, and set temperatures.



SHA795C

7. Check temperature decrease

- 1) Press temperature set switch until 10°C (60°F) is displayed.
- 2) Listen for changes in blower speed as set temperature changes.
- 3) Check for cold air at discharge air outlets.



SHA796C

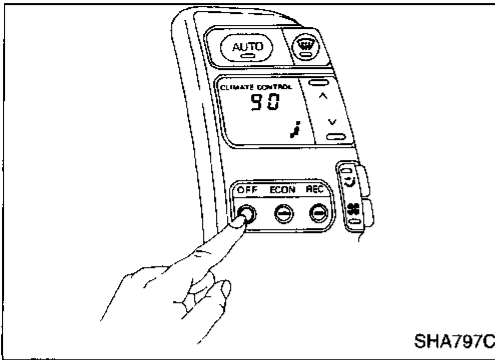
8. Check temperature increase

- 1) Press temperature set switch until 40°C (90°F) is displayed.
- 2) Listen for changes in blower speed as set temperature changes.
- 3) Check for hot air at discharge air outlets.

Operational Check (Cont'd)

9. Check memory function

- 1) Press off button.
- 2) Turn ignition off.
- 3) Wait 15 seconds.
- 4) Turn ignition on.
- 5) Press AUTO button.
- 6) Confirm that the set temperature remained at 40°C (90°F).



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Symptom Chart

DIAGNOSTIC TABLE

Symptom	Possible cause	Diagnostic procedure
Air outlet does not change	<ul style="list-style-type: none"> • Mode door motor not operating correctly • Inaccurate sensor input • No output to mode door motor from auto amplifier 	Proceed to Preliminary check 1 (HA-78), then to Diagnostic procedures 17 (HA-101) and 18 (HA-102) if air mix door is malfunctioning.
Intake door does not change	<ul style="list-style-type: none"> • Intake door motor or mechanism malfunctioning • Inaccurate sensor input • No output to intake door motor from auto amplifier 	Proceed to Preliminary check 2 (HA-79). If intake door is at fault, go to Diagnostic procedure 16 (HA-100).
Insufficient cooling	<ul style="list-style-type: none"> • Compressor clutch not engaged • Air mix door motors not working properly • Condenser fan inoperative • Low freon level 	Proceed to Preliminary check 3 (HA-80). If air mix doors do not operate properly, go to Diagnostic procedure 15 (HA-99). Check compressor clutch operation and freon level of system.
Discharged air temperature does not change	<ul style="list-style-type: none"> • Air mix doors do not operate correctly • Incorrect sensor input 	Proceed to Preliminary check 7 (HA-85).
Noise	<ul style="list-style-type: none"> • Compressor belt tension • Compressor component malfunction • Blower motor interference • Radiator cooling fan interference 	Proceed to Preliminary check 8 (HA-85).
Air conditioner control switch panel illumination does not come on	<ul style="list-style-type: none"> • Blown fuse • Loose or open in harness • Blown bulb 	Proceed to Diagnostic procedure 20 (HA-106).
Insufficient heating	<ul style="list-style-type: none"> • Coolant temperature is low • Air mix doors not in correct position • Incorrect sensor circuit 	Proceed to Preliminary check 4 (HA-82). If air mix doors do not operate correctly, go to Diagnostic procedure 15 (HA-99).
Blower motor operation is malfunctioning	<ul style="list-style-type: none"> • Blower motor is not receiving power • Vents may be obstructed • Motor does not spin freely • Air intake obstructed • Blown fuse • Malfunctioning blower relay 	Proceed to Preliminary check 5 (HA-83). If blower motor is malfunctioning, go to Diagnostic procedure 25 (HA-109).
Magnet clutch does not engage.	<ul style="list-style-type: none"> • Blown fuse • A/C relay inoperative • Open in wiring • Open ambient sensor circuit • Low freon level • Malfunctioning clutch assembly 	Proceed to Preliminary check 6 (HA-84), then Diagnostic procedure 19 (HA-103) if clutch is at fault.
No display on A/C switch panel	<ul style="list-style-type: none"> • Blown fuse • Malfunctioning bulb 	Proceed to Diagnostic procedure 20 (HA-106).
Set temperature and mode indication do not appear on display window	<ul style="list-style-type: none"> • Malfunctioning switch unit • Open in circuit • Malfunctioning auto amplifier 	Proceed to Diagnostic procedure 21 (HA-106).
When air conditioner switch is operated, it does not beep	<ul style="list-style-type: none"> • Malfunctioning A/C switch • Open in harness or connector • Malfunctioning auto amplifier 	Proceed to Diagnostic procedure 22 (HA-107).
Set temperature and mode indication do not appear in display and indicator lamp (LED) does not come on	<ul style="list-style-type: none"> • Open in harness • Malfunctioning switch panel • Malfunctioning auto amplifier 	Proceed to Diagnostic procedure 23 (HA-108).
Switches do not work	<ul style="list-style-type: none"> • Malfunctioning switch panel • Open in harness • Malfunctioning auto amplifier 	Proceed to Diagnostic procedure 24 (HA-109).

Self-diagnosis

CONSULT AND ONBOARD SELF-DIAGNOSTIC SYSTEM

Function of CONSULT and ONBOARD SELF-DIAGNOSTIC SYSTEM are as follows:

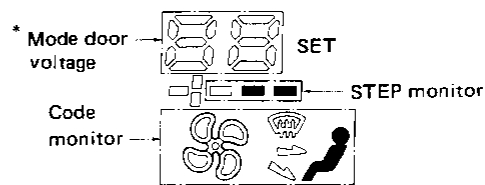
ITEM	MONITOR		CHANGE PARAMETER		READOUT OF TROUBLE DATA STORED IN MEMORY	
	CONSULT	ONBOARD	CONSULT	ONBOARD	CONSULT	ONBOARD
Ambient temp.	○	○			○	○
In-vehicle temp. (Upper)	○	○			○	○
In-vehicle temp. (Lower)	○	○			○	○
Duct temp. (Defroster)	○	○			○	○
Duct temp. (Ventilator)	○	○			○	○
Duct temp. (Floor)	○	○			○	○
Sunload	○	○			○	○
Water temp.	○	○				
Mode door PBR	○	○				
In-vehicle target temp. (Upper)	○					
In-vehicle target temp. (Lower)	○					
Outlet air target temp. (Upper)	○		○	*○		
Outlet air target temp. (Lower)	○		○	*○		
Mode door target position	○		○	*○		
Intake door target position	○		○	*○		
Blower motor target voltage	○		○	*○		
Difference between upper and lower target temp.	○		○	*○		
Output signal to compressor	○		○	*○		
Set temp.	○					
Selected mode	○					
Operated switches status	○					
Manual select status	○					

*: These can be set by self-diagnosis step II; their combinations are as follows:

Actuator test

Code	Intake	Outlet	A/M door	Comp.
☹	Outside air	DEF	Full Hot	OFF
☹	Outside air	FOOT	Full Hot	OFF
☹	Partial outside air	B/L	30°C (86°F)	ON
☹	Recirculation air	VENT	Full Cool	ON

Code	Voltage
☹	4V
☹	6V
☹	9V
☹	12V



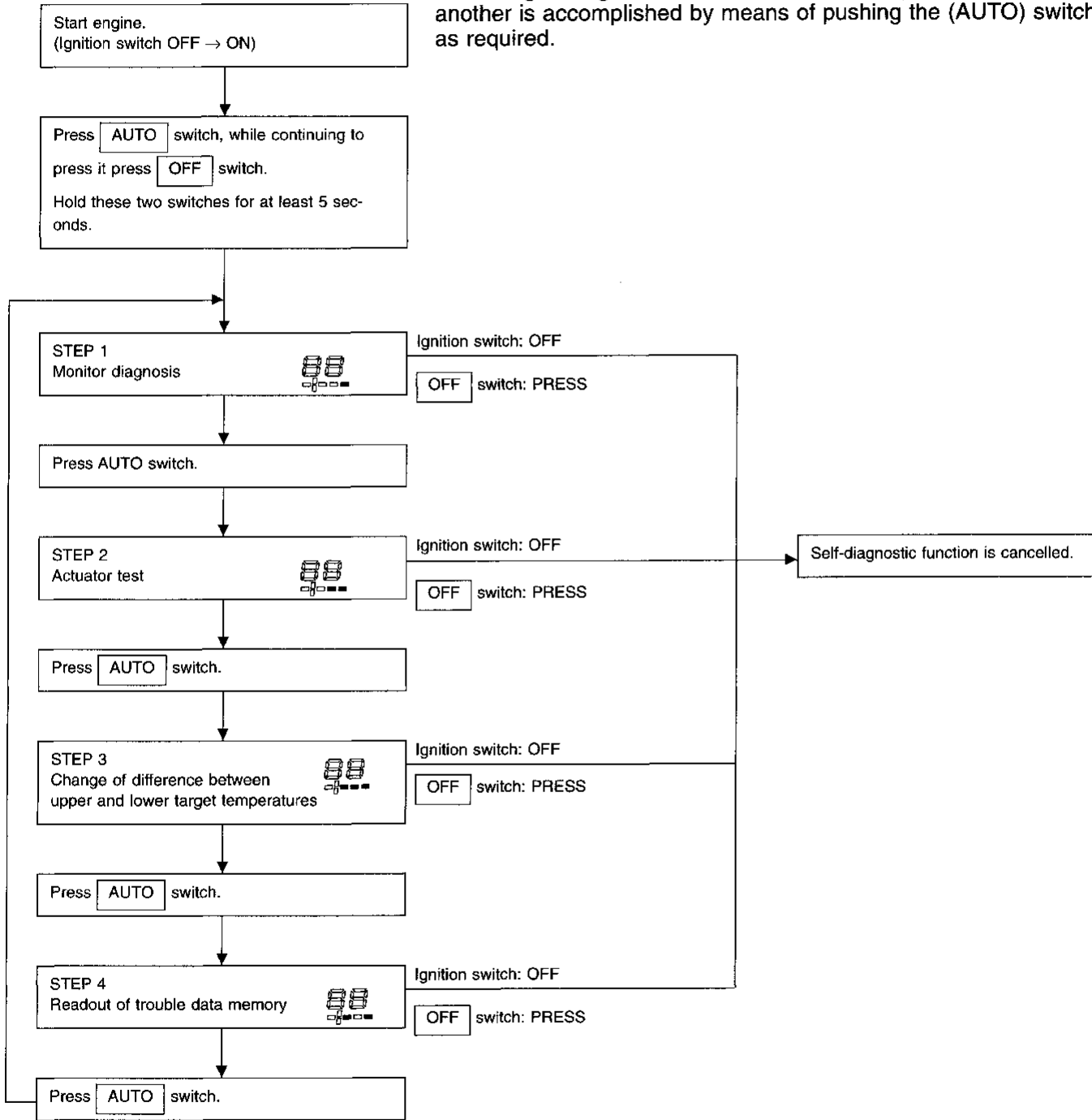
*: Mode door voltage: 0 = VENT, 5 = DEF
Ten times the value in V.

SHA755C

Self-diagnosis (Cont'd)

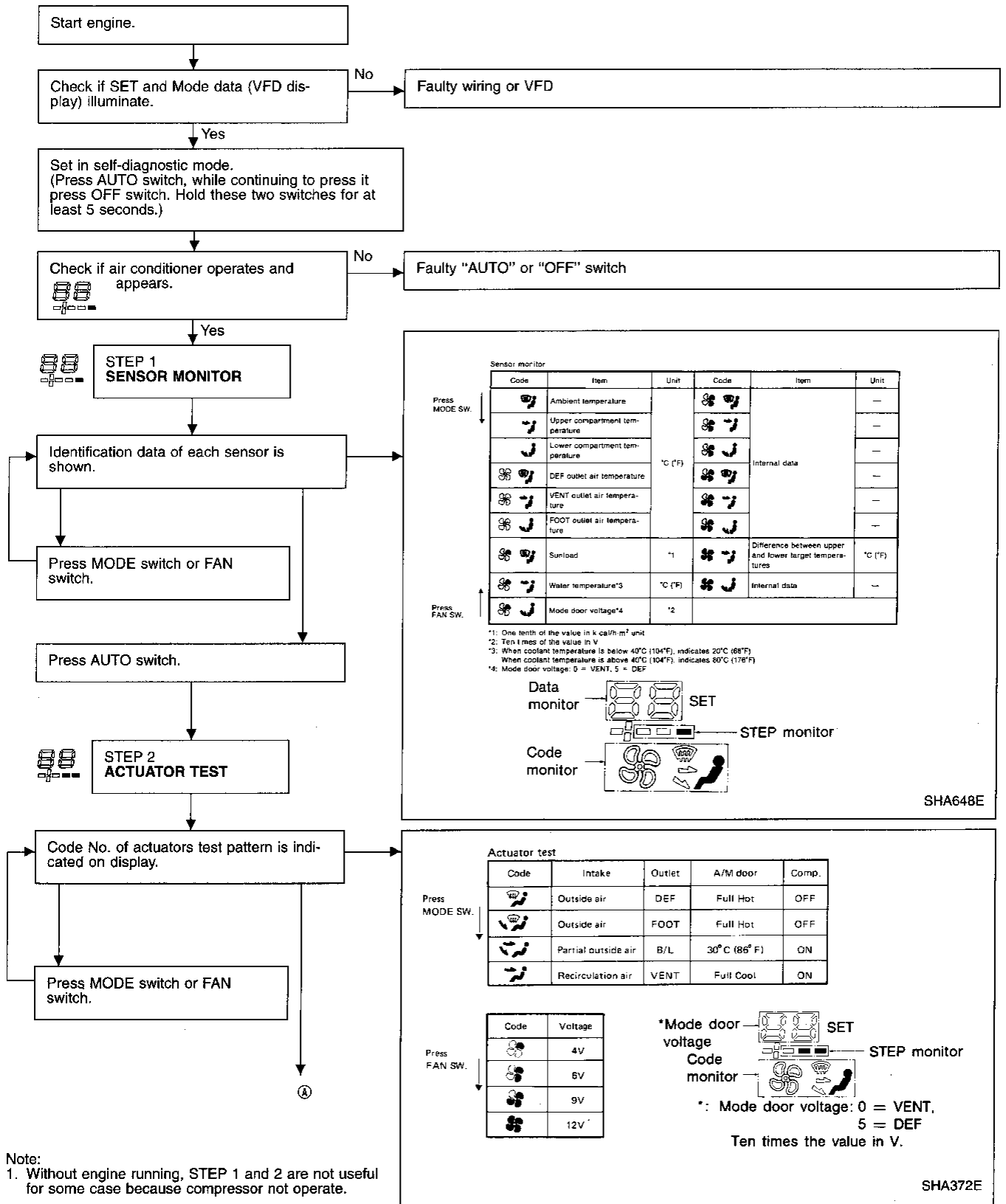
The self-diagnostic system diagnoses the sensors, door motors, blower motor, etc. by system line. Refer to applicable sections (items) for details. Shifting from normal control to the self-diagnostic system is done as follows. Start the engine (turning ignition switch from "OFF" to "ON"). Press both the (AUTO) and (OFF) switch for at least 5 seconds.

This system will be cancelled by either pressing the (OFF) switch or turning the ignition switch "OFF". Shifting from one step to another is accomplished by means of pushing the (AUTO) switch, as required.



Self-diagnosis (Cont'd)

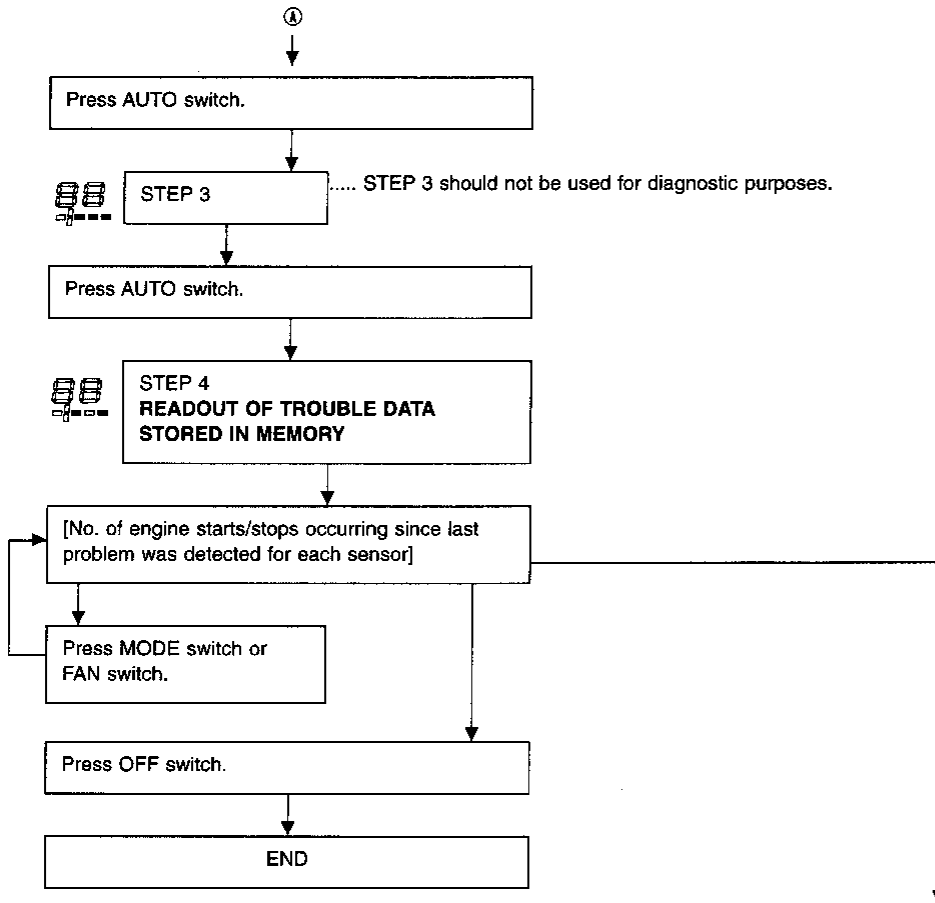
CHECKING PROCEDURE



Note:
 1. Without engine running, STEP 1 and 2 are not useful for some case because compressor not operate.

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Self-diagnosis (Cont'd)



Readout of trouble data stored in memory

Code	Item	Trouble diagnosis criteria	Remarks
	Ambient sensor trouble data	Less than -70°C (-94°F) Greater than 141°C (286°F)	
	Upper in-vehicle sensor trouble data		
	Lower in-vehicle sensor trouble data		
	DEF Duct sensor trouble data		Less than -38°C (-36°F) Greater than 141°C (286°F)
	VENT Duct sensor trouble data		
	FOOT Duct sensor trouble data		
	Sunload sensor trouble data	—	Detects only short circuit

Press MODE SW. ↓

Press FAN SW. ↑

Trouble data

Open circuit

Short circuit

Code monitor

SET

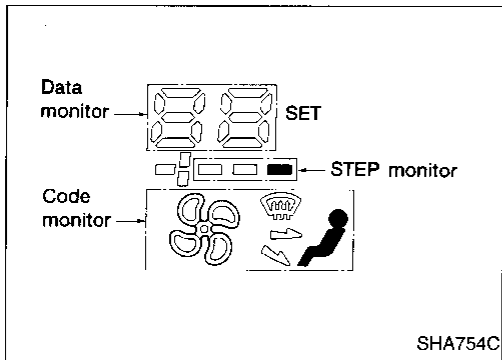
STEP monitor

Trouble data
No. of IGN ON/OFF operations since last trouble was detected.
50: No problem
49 - 01: Problem existed
0: Problem exists

SHA649E

Self-diagnosis (Cont'd)

STEP 1: MONITOR DIAGNOSIS



By setting in self-diagnostic mode, VFD display shows that Step 1 mode has begun.

In this mode, each time the FAN or MODE SW is pressed, the code monitor changes in turn. Data corresponding with each code appears in the data monitor.

If the temperature shown on the display greatly differs from the actual temperature, check the sensor circuit first. Then, inspect the sensor itself according to the procedures described in Electrical Components Inspection.

* For cross-reference of code and corresponding data, refer to "Sensor monitor" in "Checking procedure".

	Code	Item	Unit	Code	Item	Unit
Press MODE SW.		Ambient temperature	°C (°F)		Internal data	—
		Upper compartment temperature				—
		Lower compartment temperature				—
		DEF outlet air temperature				—
		VENT outlet air temperature				—
Press FAN SW.		FOOT outlet air temperature				—
		Sunload	*1		Difference between upper and lower target temperatures	°C (°F)
		Water temperature*3	°C (°F)		Internal data	—
		Mode door voltage*4	*2			

*1: One tenth of the value in kcal/h·m² unit

*2: Ten times of the value in V

*3: When coolant temperature is below 40°C (104°F), indicates 20°C (68°F)
When coolant temperature is above 40°C (104°F), indicates 80°C (176°F)

*4: Mode door voltage: 0 = VENT, 5 = DEF

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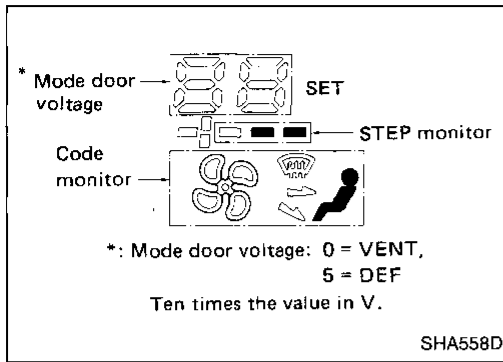
Self-diagnosis (Cont'd)

STEP 2: ACTUATOR TEST

By pushing the AUTO SW once, self-diagnosis is changed from step 1 to step 2.

During inspection in STEP 2 mode, the auto amplifier will forcefully transmit an output to the affected actuators. This responds to the code shown on the display, as indicated in the table below. Each operating condition can be set in turn by pressing FAN or MODE SW.

When improper operation is detected, check visually. Also, check by listening to any noise, or by touching air outlets with your hand, etc.



Press
MODE SW. →

Display				
Actuator				
Mode door	DEF	D/FOOT	B/L	VENT
Intake door	FRE	FRE	50% FRE	REC
Air mix door	Full Hot	Full Hot	30°C (86°F)	Full Cold
Compressor	OFF	OFF	ON	ON

Press
FAN SW. →

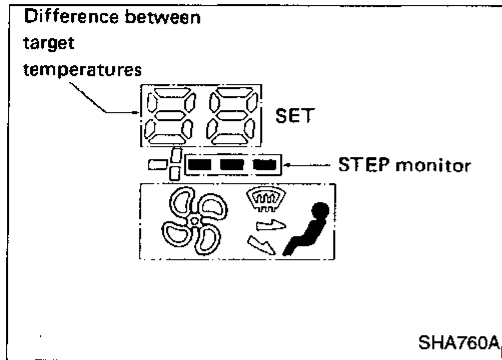
Display				
Blower motor				
Voltage	4V	6V	9V	12V

Operating condition of each actuator cannot be checked by indicators.

- * 1) Mode and fan speed can be set independently.
- 2) When appears, air mix door activates.
A stabilized outlet temperature 30°C (86°F) is reached after air mix door has been operating for approximately one minute.

Self-diagnosis (Cont'd)

STEP 3: AUXILIARY MECHANISM



Changes of difference between upper and lower target temperatures.

* Figures in parentheses “()” refer to values for “°F” specifications.

Each time the “MODE” switch is pressed, the number in the SET section advances. This number will increase up to 20 for °C specifications and 36 for °F specifications. Each time the “FAN” switch is pressed, the number decreases. This number decreases to -20 for °C specifications and -36 for °F specifications.

For °C specifications, pressing the “MODE” or “FAN” switch each time increases or decreases the data number by “1” degree (and by “1” through “3” degrees for °F specifications).



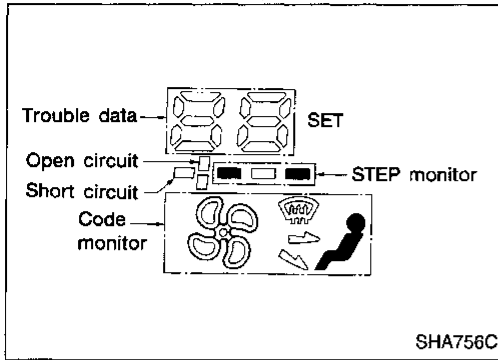
	Data	-20	.....	-1	0	1	.....	20
°C specifications	Difference between upper and lower target temperatures	-2.0°C	.....	-0.1°C	0°C	0.1°C	.....	2.0°C
	Data	-36	.....	-2	0	2	.....	36
°F specifications	Difference between upper and lower target temperatures	-3.6°F	.....	-0.2°F	0°F	0.2°F	.....	3.6°F

The change of difference between upper and lower target temperatures is kept until the next change or battery cable removal.

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Self-diagnosis (Cont'd)

STEP 4: READOUT OF TROUBLE DATA STORED IN MEMORY



By pushing the AUTO SW once in step 3, self-diagnosis is changed to step 4.

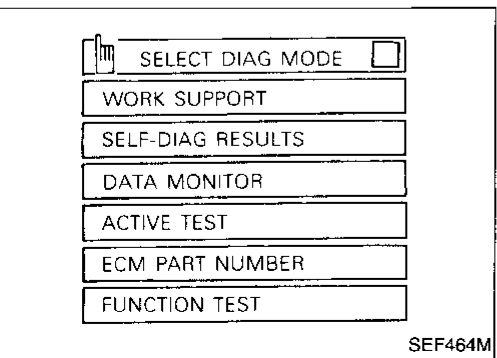
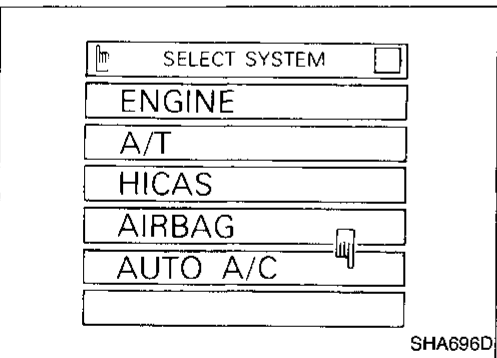
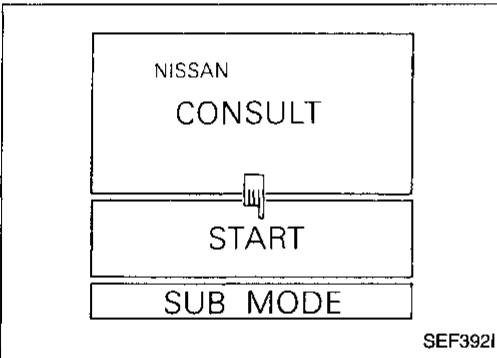
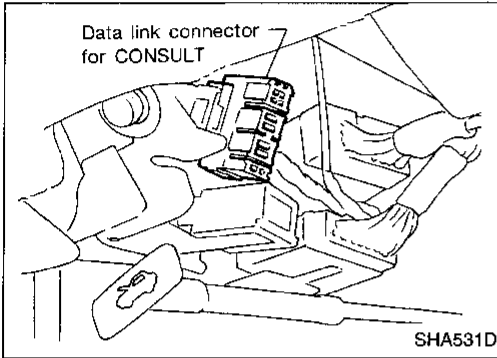
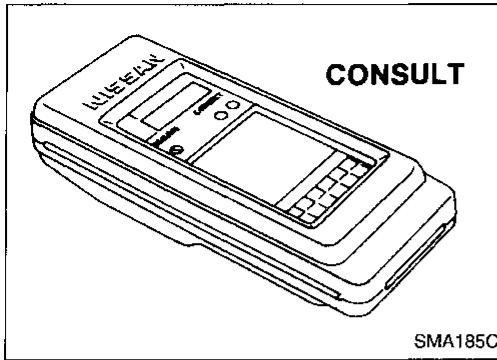
In this mode, each time the FAN or MODE SW is pressed, the code monitor changes in turn. Data or status of each sensor appears in the data monitor.

When the sensor becomes inoperative, a number appears in the SET section. This is the number of IGN ON/OFF operations occurring since the last trouble was detected.

Open circuit or short circuit is indicated by "□" or "□".

Conditions for open or short circuit

	Code	Sensor	Open circuit	Short circuit
Press MODE SW.		Ambient sensor	Less than -70°C (-94°F)	Greater than 141°C (286°F)
		Room upper sensor	Less than -38°C (-36°F)	Greater than 141°C (286°F)
		Room lower sensor	Less than -38°C (-36°F)	Greater than 141°C (286°F)
Press FAN SW.		DEF duct sensor	Less than -38°C (-36°F)	Greater than 141°C (286°F)
		VENT duct sensor	Less than -38°C (-36°F)	Greater than 141°C (286°F)
		Foot duct sensor	Less than -38°C (-36°F)	Greater than 141°C (286°F)
		Sunload sensor	Open circuit can not be detected by self-diagnosis.	Greater than 1.784 kW (1,534 kcal/h, 6,087 BTU/h)/m ² [0.1657 kW (142.51 kcal/h, 565.5 BTU/h)/sq ft]



Consult

CONSULT INSPECTION PROCEDURE

1. Turn off ignition switch.
2. Connect "CONSULT" to data link connector for CONSULT.
(Data link connector for CONSULT is located in left dash side panel.)

3. Turn on ignition switch.
4. Touch "START".

5. Touch "AUTO A/C".

6. Perform each diagnostic mode according to the inspection sheet as follows:

For further information, read the CONSULT Operation Manual.

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Preliminary Check

PRELIMINARY CHECK 1

Air outlet does not change.

Does this incident occur only in Manual Select Mode? Yes → Go to Diagnostic Procedure 24. (HA-109)

↓ No
CHECK SENSOR CIRCUIT.
 (CONSULT icon) Read out trouble data with CONSULT.
 or
 (Self-diagnosis icon) Set up self-diagnosis STEP 4. Is each sensor circuit normal? No → CHECK SENSOR CIRCUIT IN DETAIL ACCORDING TO THE DIAGNOSTIC PROCEDURE BELOW CORRESPONDING TO EACH CODE NO.

↓ Yes
CHECK MODE DOOR OPERATION.
 (CONSULT icon) Set up "ACTIVE TEST" mode with CONSULT.
 or
 (Self-diagnosis icon) Set up self-diagnosis STEP 2.
 Does air outlet change according to each mode?

	DEF	HEAT	B/L	VENT
(CONSULT icon) Set mode	DEF	HEAT	B/L	VENT
(Self-diagnosis icon) Code No.				
Air outlet	DEF	FOOT/DEF	FOOT/VENT	VENT

Refer to **AIR DISTRIBUTION RATIOS.** (HA-14)

↓ Yes → Air outlet control system is normal. Refer to **Specifications.** (HA-117)
 ↓ No → CHECK SIDE LINK MECHANISM. Refer to **Control Linkage Adjustment.** (HA-114)

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

CONSULT indication	Self-diagnosis		How to repair
	code No.	data	
Ambient sensor circuit is open		|	Go to Diagnostic procedure 2. (HA-92)
Ambient sensor circuit is shorted.		—	Go to Diagnostic procedure 3. (HA-93)
Upper in-vehicle sensor circuit is open.		|	Go to Diagnostic procedure 4. (HA-93)
Upper in-vehicle sensor circuit is shorted.		—	Go to Diagnostic procedure 5. (HA-94)
Lower in-vehicle sensor circuit is open.		|	Go to Diagnostic procedure 6. (HA-94)
Lower in-vehicle sensor circuit is shorted.		—	Go to Diagnostic procedure 7. (HA-95)
Defroster (duct) sensor circuit is open.		|	Go to Diagnostic procedure 8. (HA-95)
Defroster (duct) sensor circuit is shorted.		—	Go to Diagnostic procedure 9. (HA-96)
Vent (duct) sensor circuit is open.		|	Go to Diagnostic procedure 10. (HA-96)
Vent (duct) sensor circuit is shorted.		—	Go to Diagnostic procedure 11. (HA-97)
Foot (duct) sensor circuit is open.		|	Go to Diagnostic procedure 12. (HA-97)
Foot (duct) sensor circuit is shorted.		—	Go to Diagnostic procedure 13. (HA-98)
Sunload sensor circuit is shorted.		—	Go to Diagnostic procedure 14. (HA-98)

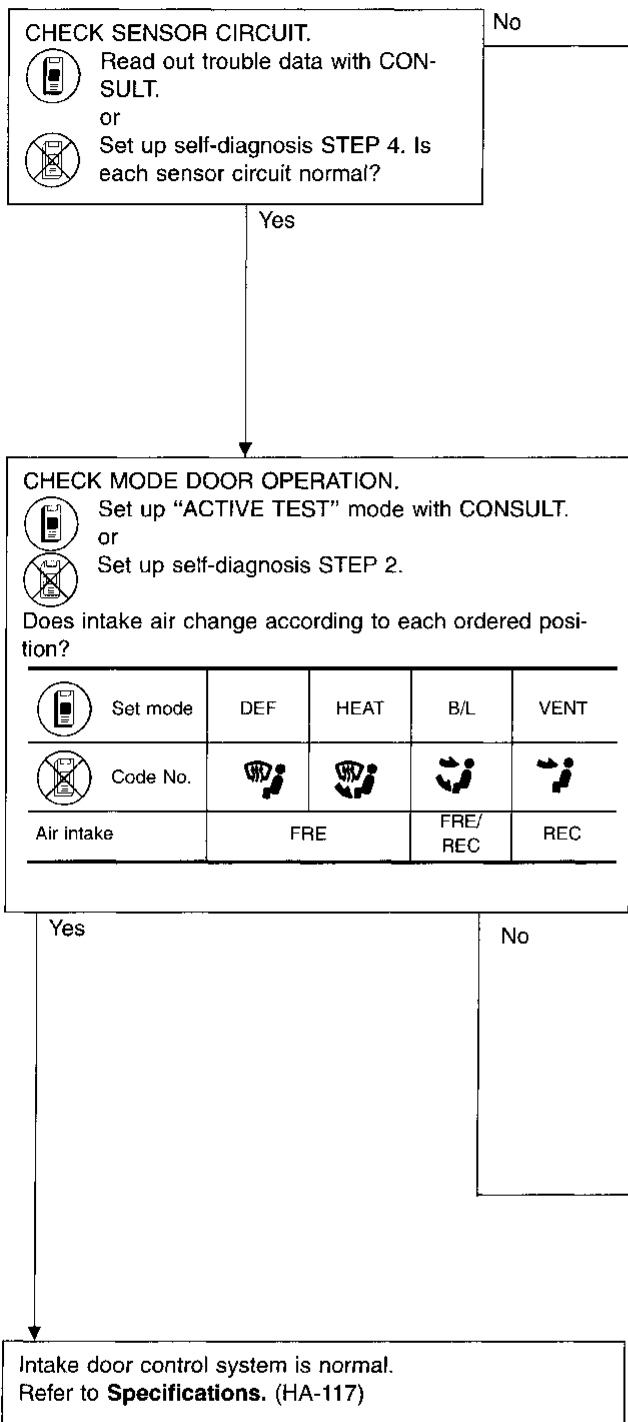
Are sensor circuits for ambient sensor, in-vehicle sensor, and duct sensors operating normally? If malfunction is suspected, check temperature detected by each sensor using Self-diagnosis STEP 1. Confirm the temperature is within normal range before performing Diagnostic Procedures.

↓ OK → Go to **Diagnostic Procedure 17 or 18.** (HA-101 or 102)
 ↓ NG → Repair or adjust.

Preliminary Check (Cont'd)

PRELIMINARY CHECK 2

Intake door does not change.



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

CONSULT indication	Self-diagnosis		How to repair
	code No.	data	
Ambient sensor circuit is open		0	Go to Diagnostic procedure 2. (HA-92)
Ambient sensor circuit is shorted.		1	Go to Diagnostic procedure 3. (HA-93)
Upper in-vehicle sensor circuit is open.		0	Go to Diagnostic procedure 4. (HA-93)
Upper in-vehicle sensor circuit is shorted.		1	Go to Diagnostic procedure 5. (HA-94)
Lower in-vehicle sensor circuit is open.		0	Go to Diagnostic procedure 6. (HA-94)
Lower in-vehicle sensor circuit is shorted.		1	Go to Diagnostic procedure 7. (HA-95)
Defroster (duct) sensor circuit is open.		0	Go to Diagnostic procedure 8. (HA-95)
Defroster (duct) sensor circuit is shorted.		1	Go to Diagnostic procedure 9. (HA-96)
Vent (duct) sensor circuit is open.		0	Go to Diagnostic procedure 10. (HA-96)
Vent (duct) sensor circuit is shorted.		1	Go to Diagnostic procedure 11. (HA-97)
Foot (duct) sensor circuit is open.		0	Go to Diagnostic procedure 12. (HA-97)
Foot (duct) sensor circuit is shorted.		1	Go to Diagnostic procedure 13. (HA-98)
Sunload sensor circuit is shorted.		1	Go to Diagnostic procedure 14. (HA-98)

Are sensor circuits for ambient sensor, in-vehicle sensor, and duct sensors operating normally? If malfunction is suspected, check temperature detected by each sensor using Self-diagnosis STEP 1. Confirm the temperature is within normal range before performing Diagnostic Procedures.

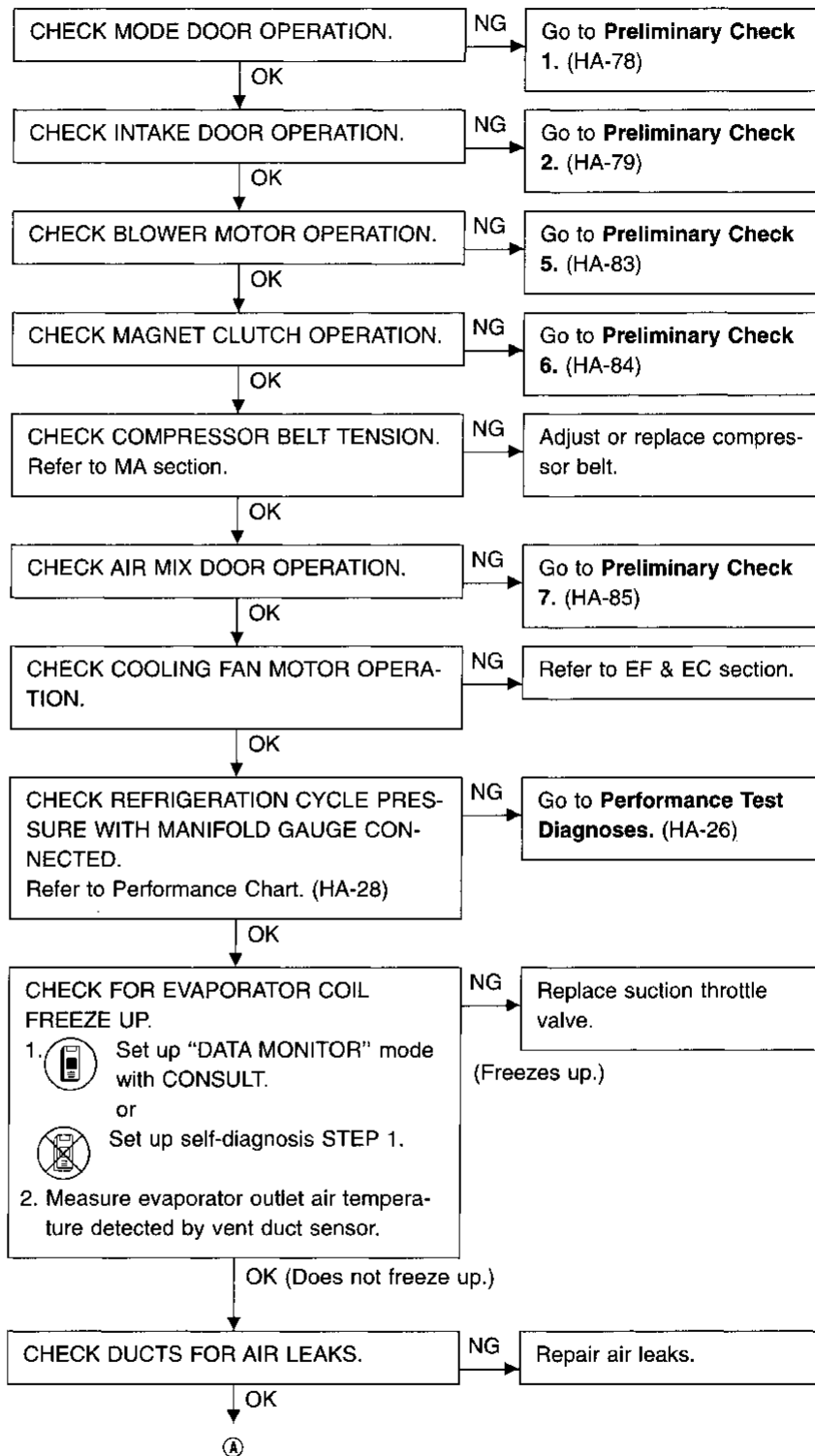
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Preliminary Check (Cont'd)

PRELIMINARY CHECK 3

Insufficient cooling



- Read out self-diagnosis result with CONSULT or perform self-diagnosis STEP 4 before referring to the following flow chart.



Preliminary Check (Cont'd)



PERFORM TEMPERATURE SETTING
(Upper and lower).

-  Set up "WORK SUPPORT"
mode with CONSULT.
or
 Set up self-diagnosis STEP 3.
- Adjust difference between upper and
lower target temperatures.

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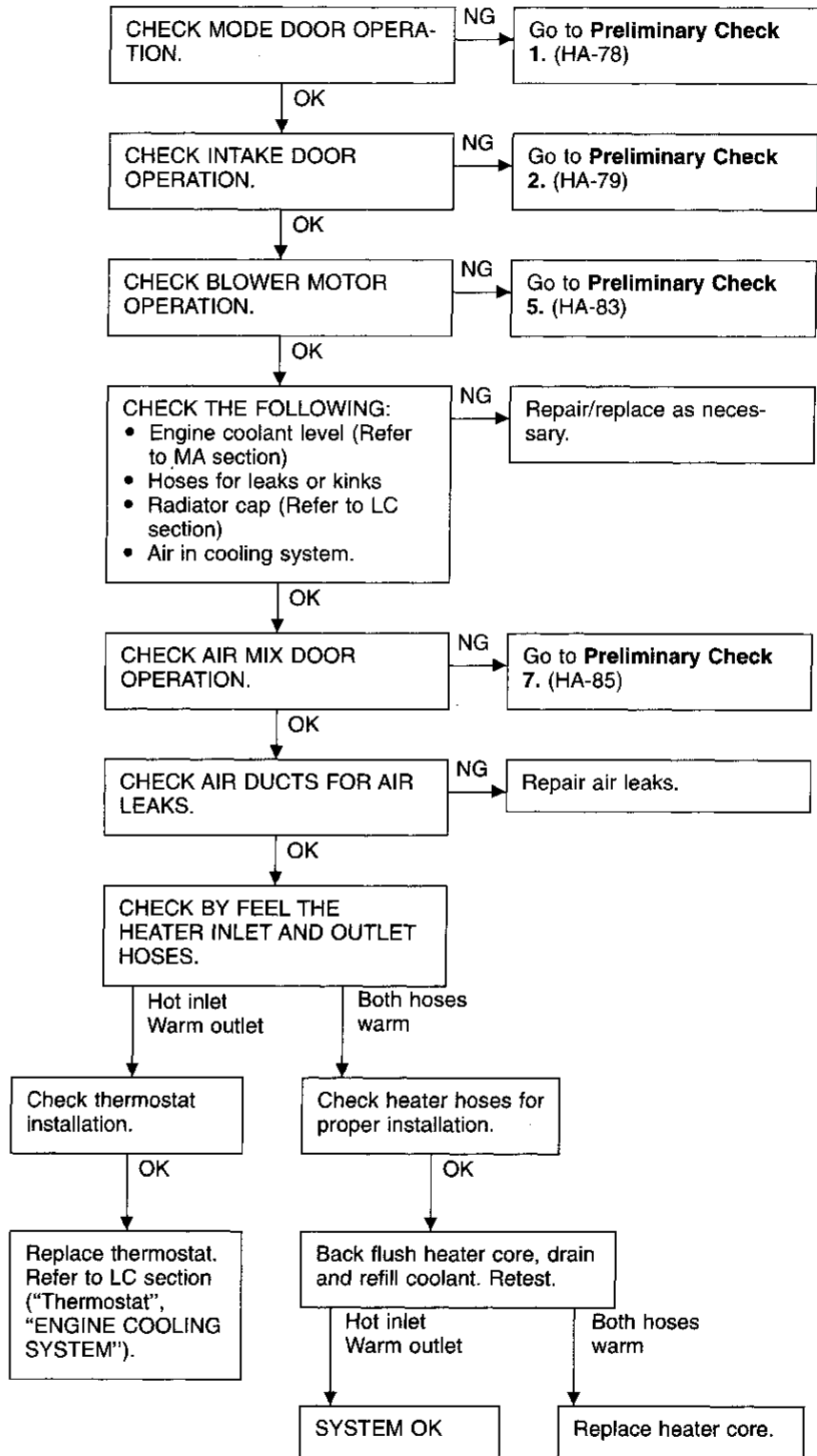
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Preliminary Check (Cont'd)

PRELIMINARY CHECK 4

Insufficient heating

- Read out self-diagnosis result with CONSULT or perform self-diagnosis STEP 4 before referring to the following flow chart.



Preliminary Check (Cont'd)

PRELIMINARY CHECK 5

Blower motor operation is malfunctioning.

Does this incident occur only in Manual Select Mode? Yes → Go to Diagnostic Procedure 24. (HA-109)

No
CHECK SENSOR CIRCUIT.
 Read out trouble data with CONSULT.
 or
 Set up self-diagnosis STEP 4. Is each sensor circuit normal?
 No → CHECK SENSOR CIRCUIT IN DETAIL ACCORDING TO THE DIAGNOSTIC PROCEDURE BELOW CORRESPONDING TO EACH CODE NO.

CONSULT indication	Self-diagnosis		How to repair
	code No.	data	
Ambient sensor circuit is open		|	Go to Diagnostic procedure 2. (HA-92)
Ambient sensor circuit is shorted.		—	Go to Diagnostic procedure 3. (HA-93)
Upper in-vehicle sensor circuit is open.		|	Go to Diagnostic procedure 4. (HA-93)
Upper in-vehicle sensor circuit is shorted.		—	Go to Diagnostic procedure 5. (HA-94)
Lower in-vehicle sensor circuit is open.		|	Go to Diagnostic procedure 6. (HA-94)
Lower in-vehicle sensor circuit is shorted.		—	Go to Diagnostic procedure 7. (HA-95)
Defroster (duct) sensor circuit is open.		|	Go to Diagnostic procedure 8. (HA-95)
Defroster (duct) sensor circuit is shorted.		—	Go to Diagnostic procedure 9. (HA-96)
Vent (duct) sensor circuit is open.		|	Go to Diagnostic procedure 10. (HA-96)
Vent (duct) sensor circuit is shorted.		—	Go to Diagnostic procedure 11. (HA-97)
Foot (duct) sensor circuit is open.		|	Go to Diagnostic procedure 12. (HA-97)
Foot (duct) sensor circuit is shorted.		—	Go to Diagnostic procedure 13. (HA-98)
Sunload sensor circuit is shorted.		—	Go to Diagnostic procedure 14. (HA-98)

Yes
CHECK BLOWER MOTOR OPERATION.
 Set up "ACTIVE TEST" mode with CONSULT.
 or
 Set up self-diagnosis STEP 2.
 Does blower motor speed change according to each ordered fan speed?

Set fan speed	4V	6V	9V	12V
Code No.				
Fan speed				

Yes → Is engine coolant temperature below 40°C (104°F) and foot duct temperature below 30°C (86°F)?
 No → Blower motor operation is normal.
 Yes → IS BLOWER MOTOR CONTROLLED UNDER FAN STARTING SPEED CONTROL? Refer to Starting fan speed control specification. (HA-122)
 No → Check thermal transmitter circuit.
 Yes → Blower motor operation is normal.
 No → Go to Diagnostic Procedure 25. (HA-109)

Are sensor circuits for ambient sensor, in-vehicle sensor, and duct sensors operating normally? If malfunction is suspected, check temperature detected by each sensor using Self-diagnosis STEP 1. Confirm the temperature is within normal range before performing Diagnostic Procedures.

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Preliminary Check (Cont'd)

PRELIMINARY CHECK 6

Magnet clutch does not engage.

CHECK SENSOR CIRCUIT.
 Read out trouble data with CONSULT.
 or
 Set up self-diagnosis STEP 4. Is each sensor circuit normal?

No

Yes

CHECK MAGNET CLUTCH OPERATION.
 Set up "ACTIVE TEST" mode with CONSULT.
 or
 Set up self-diagnosis STEP 2.
 Check if magnet clutch engages according to order from CONSULT or each code No.

Set fan speed	4V	6V	9V	12V
Code No.				
Fan speed				

OK

NG

Magnet clutch control system is normal.
 Refer to **MAGNET CLUTCH CONTROL.** (HA-122)

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

CONSULT indication	Self-diagnosis		How to repair
	code No.	data	
Ambient sensor circuit is open		|	Go to Diagnostic procedure 2. (HA-92)
Ambient sensor circuit is shorted.		—	Go to Diagnostic procedure 3. (HA-93)
Upper in-vehicle sensor circuit is open.		|	Go to Diagnostic procedure 4. (HA-93)
Upper in-vehicle sensor circuit is shorted.		—	Go to Diagnostic procedure 5. (HA-94)
Lower in-vehicle sensor circuit is open.		|	Go to Diagnostic procedure 6. (HA-94)
Lower in-vehicle sensor circuit is shorted.		—	Go to Diagnostic procedure 7. (HA-95)
Defroster (duct) sensor circuit is open.		|	Go to Diagnostic procedure 8. (HA-95)
Defroster (duct) sensor circuit is shorted.		—	Go to Diagnostic procedure 9. (HA-96)
Vent (duct) sensor circuit is open.		|	Go to Diagnostic procedure 10. (HA-96)
Vent (duct) sensor circuit is shorted.		—	Go to Diagnostic procedure 11. (HA-97)
Foot (duct) sensor circuit is open.		|	Go to Diagnostic procedure 12. (HA-97)
Foot (duct) sensor circuit is shorted.		—	Go to Diagnostic procedure 13. (HA-98)
Sunload sensor circuit is shorted.		—	Go to Diagnostic procedure 14. (HA-98)

Are sensor circuits for ambient sensor, in-vehicle sensor, and duct sensors operating normally? If malfunction is suspected, check temperature detected by each sensor using Self-diagnosis STEP 1. Confirm the temperature is within normal range before performing Diagnostic Procedures.

CHECK REFRIGERANT.
 Connect manifold gauge then check system pressure.

NG

Check for refrigerant leaks.

OK

Go to **Diagnostic Procedure 19.** (HA-103)

Preliminary Check (Cont'd)

PRELIMINARY CHECK 7

Discharged air temperature does not change.

CHECK SENSOR CIRCUIT.

- Read out trouble data with CONSULT.
- or
- Set up self-diagnosis STEP 4. Is each sensor circuit normal?

OK

CHECK AIR MIX DOOR OPERATION.

- Set up "ACTIVE TEST" mode with CONSULT.
- or
- Set up self-diagnosis STEP 2.

Check if discharge air temperature changes as in following chart.

Set magnet clutch operation	OFF		ON	
Code No.				
Magnet clutch operation	OFF		ON	

OK

NG

Air mix door control system is normal. Refer to **Specification of air mix door control.** (HA-116)

CHECK AIR MIX DOOR MECHANISM. Refer to **Control Linkage Adjustment.** (HA-115)

OK

Go to **Diagnostic Procedure 15.** (HA-99)

NG

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

CONSULT indication	Self-diagnosis		How to repair
	code No.	data	
Ambient sensor circuit is open.		0	Go to Diagnostic procedure 2. (HA-92)
Ambient sensor circuit is shorted.		-	Go to Diagnostic procedure 3. (HA-93)
Upper in-vehicle sensor circuit is open.		0	Go to Diagnostic procedure 4. (HA-93)
Upper in-vehicle sensor circuit is shorted.		-	Go to Diagnostic procedure 5. (HA-94)
Lower in-vehicle sensor circuit is open.		0	Go to Diagnostic procedure 6. (HA-94)
Lower in-vehicle sensor circuit is shorted.		-	Go to Diagnostic procedure 7. (HA-95)
Defroster (duct) sensor circuit is open.		0	Go to Diagnostic procedure 8. (HA-95)
Defroster (duct) sensor circuit is shorted.		-	Go to Diagnostic procedure 9. (HA-96)
Vent (duct) sensor circuit is open.		0	Go to Diagnostic procedure 10. (HA-96)
Vent (duct) sensor circuit is shorted.		-	Go to Diagnostic procedure 11. (HA-97)
Foot (duct) sensor circuit is open.		0	Go to Diagnostic procedure 12. (HA-97)
Foot (duct) sensor circuit is shorted.		-	Go to Diagnostic procedure 13. (HA-98)
Sunload sensor circuit is shorted.		-	Go to Diagnostic procedure 14. (HA-98)

Are sensor circuits for ambient sensor, in-vehicle sensor, and duct sensors operating normally? If malfunction is suspected, check temperature detected by each sensor using Self-diagnosis STEP 1. Confirm the temperature is within normal range before performing Diagnostic Procedures.

Repair or adjust.

PRELIMINARY CHECK 8

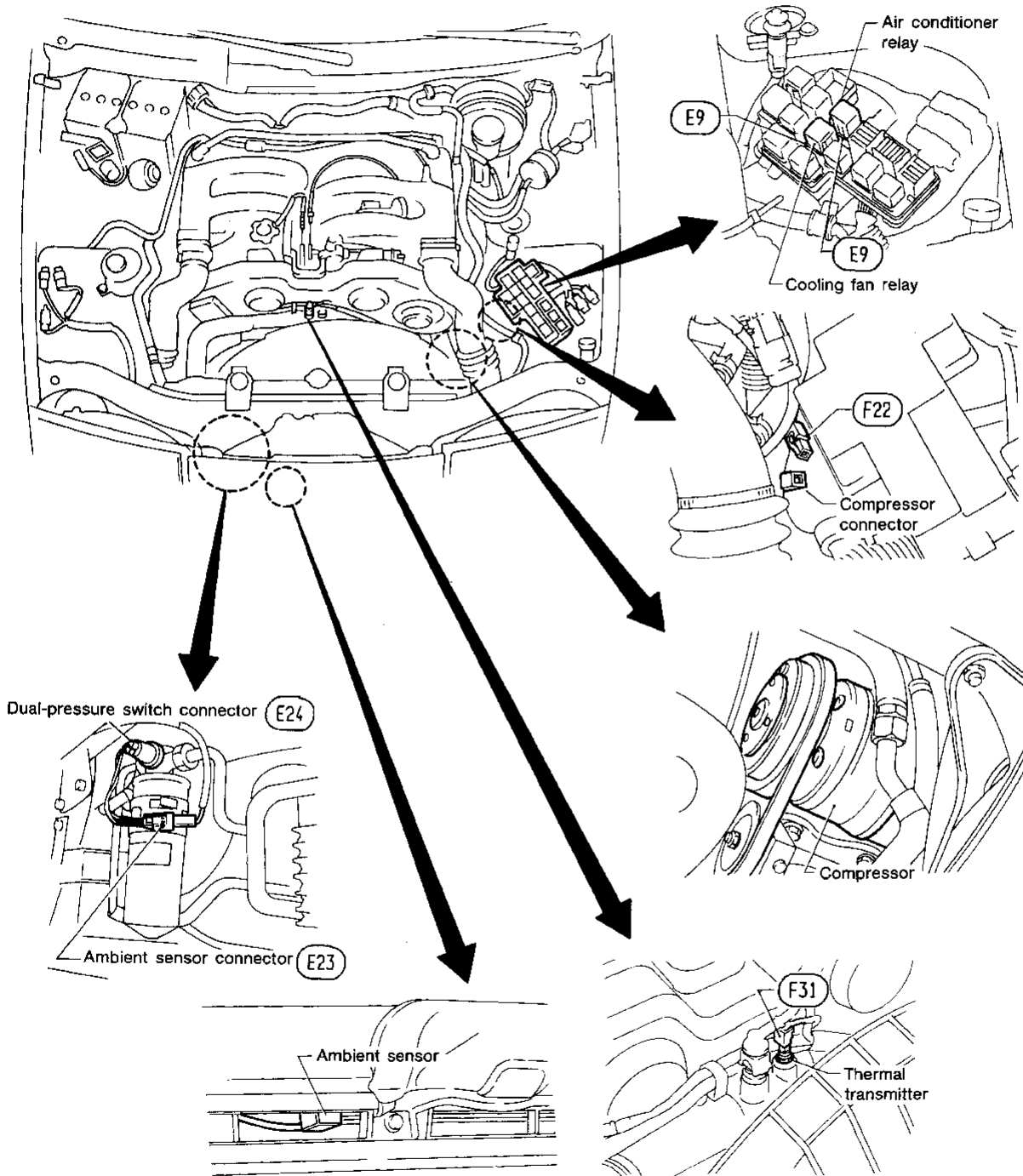
Noise

Refer to page HA-24.

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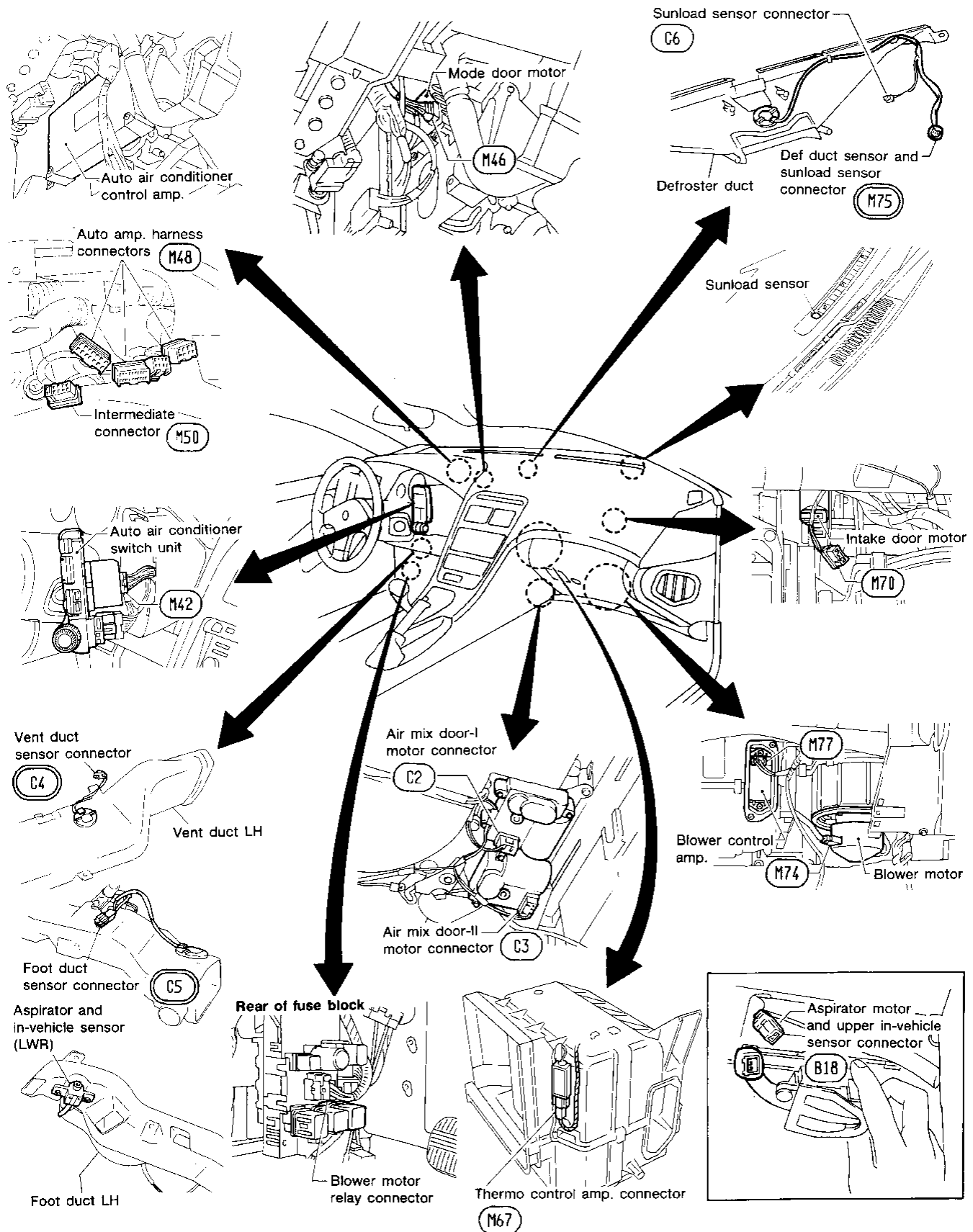
Harness Layout for A/C System

Engine compartment



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

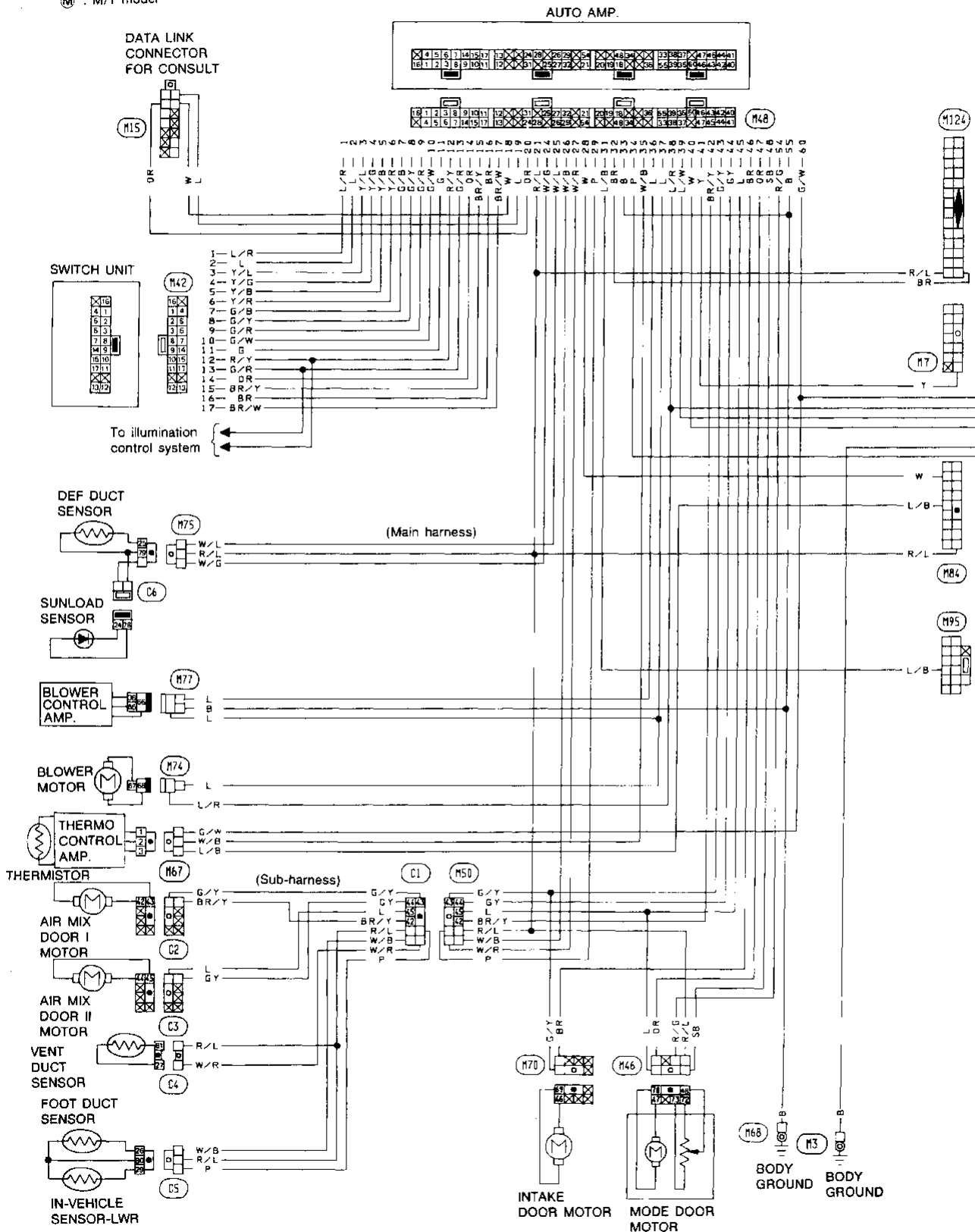
Passenger compartment



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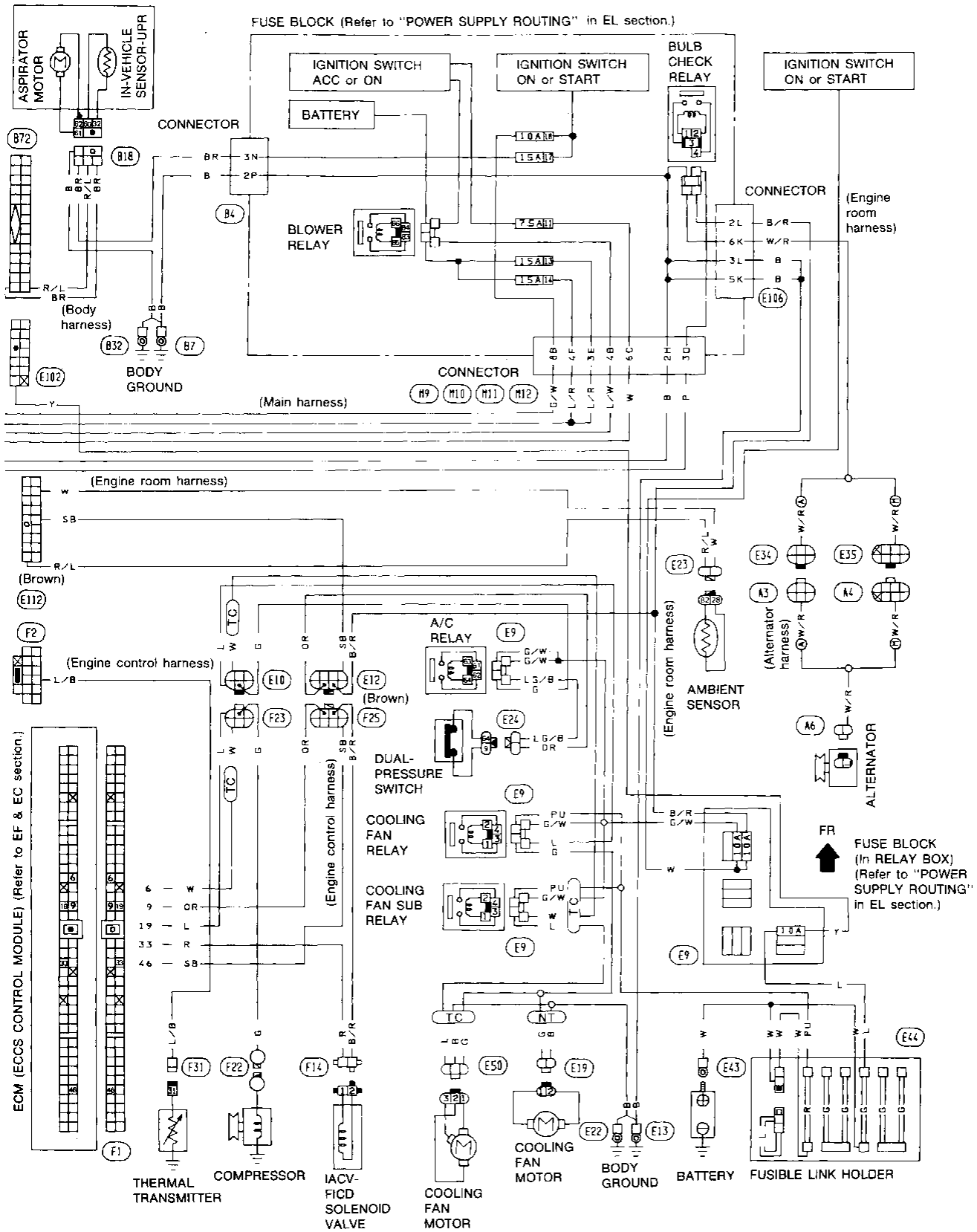
Wiring Diagram

- (TC) : Turbocharger model
- (NT) : Non-turbocharger model
- (A) : A/T model
- (M) : M/T model

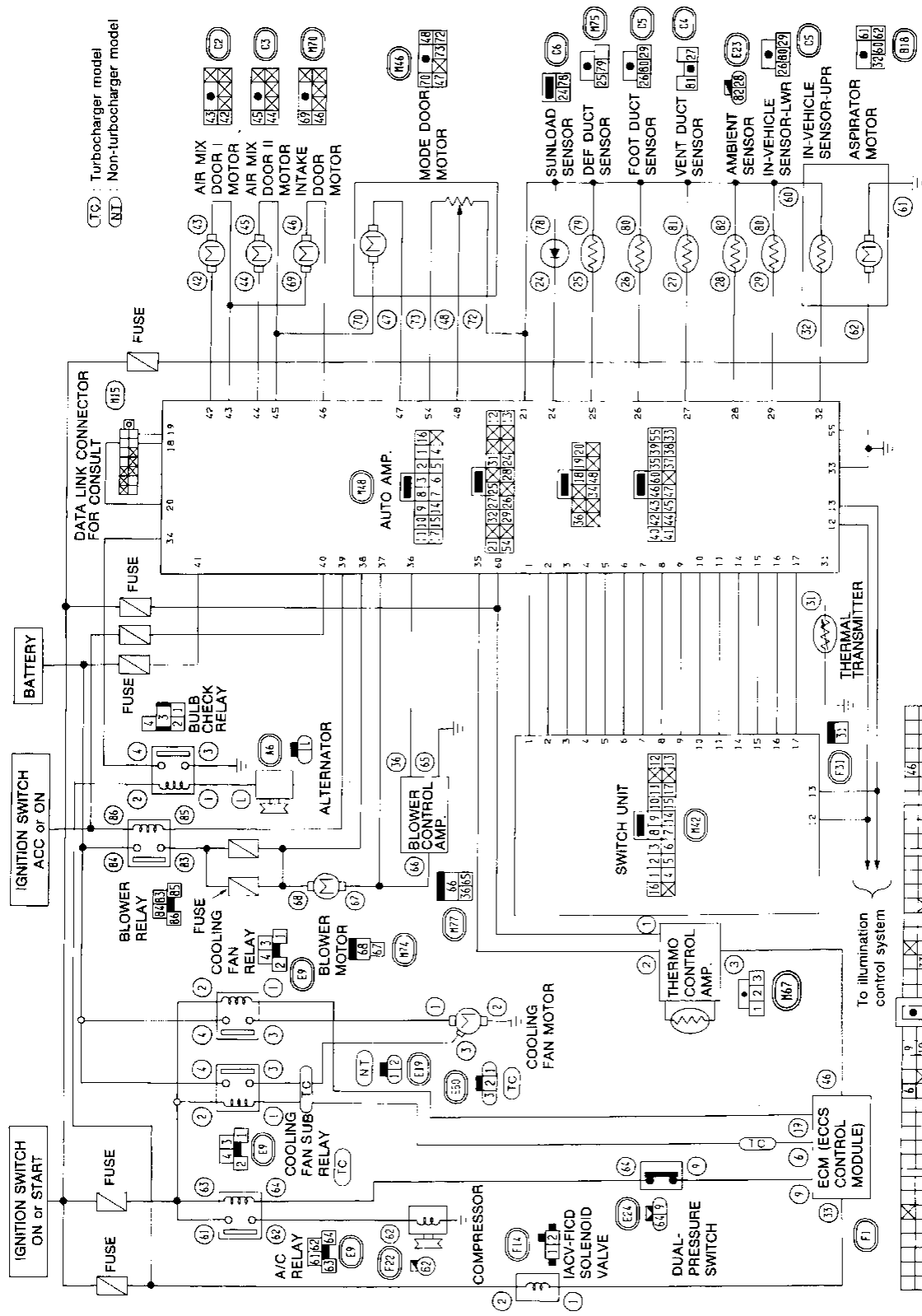


Wiring Diagram (Cont'd)

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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-86.)
- The terminal numbers in the connector coincide with the circuit numbers surrounded by a single circle "○".

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 section EL and Wiring Diagram.

AUTO AMP. REMOVAL

1. Remove driver side instrument lower lid.
2. Remove vent duct.
3. Remove auto amp. with harness connected.

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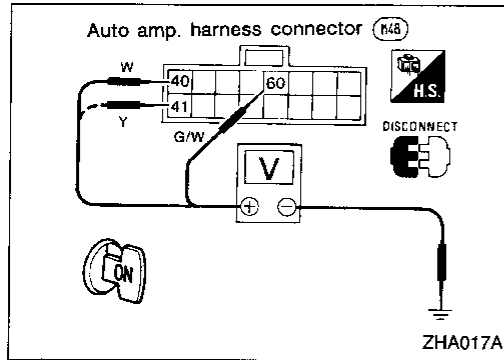
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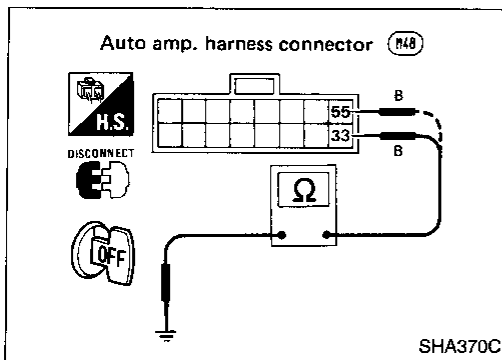
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AUTO AMP. CHECK

1. Disconnect auto amp. harness connectors.
2. Connect voltmeter from harness side.
3. Measure voltage across terminal No. ④①, ④① or ⑥① and body ground.

Voltmeter terminal		Voltage (Approx.)
⊕	⊖	
④①	Body ground	12V
④①		
⑥①		



Check body ground circuit for control unit with ignition switch OFF.

1. Disconnect auto amp. harness connector.
2. Connect ohmmeter from harness side.
3. Check continuity between terminal No. ③③ or ⑤⑤ and body ground.

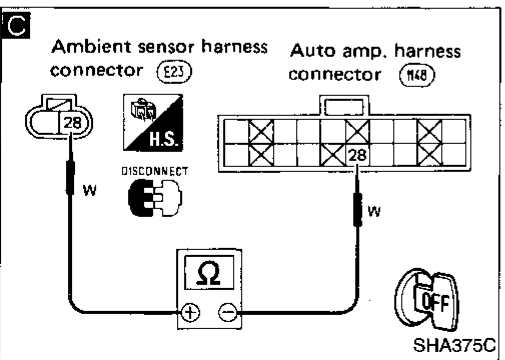
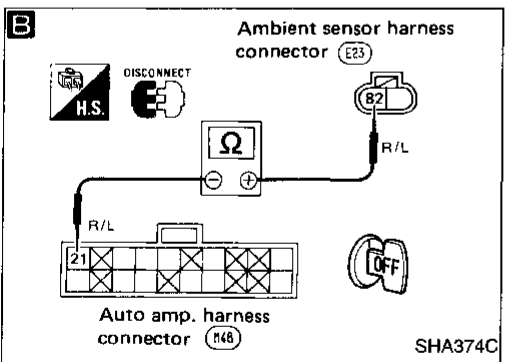
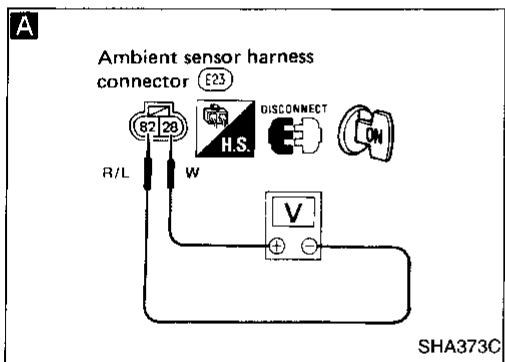
Ohmmeter terminal		Continuity
⊕	⊖	
③③	Body ground	Yes
⑤⑤		

Diagnostic Procedure 1

SYMPTOM: Self-diagnosis detects intermittent short or open circuit in each sensor circuit.

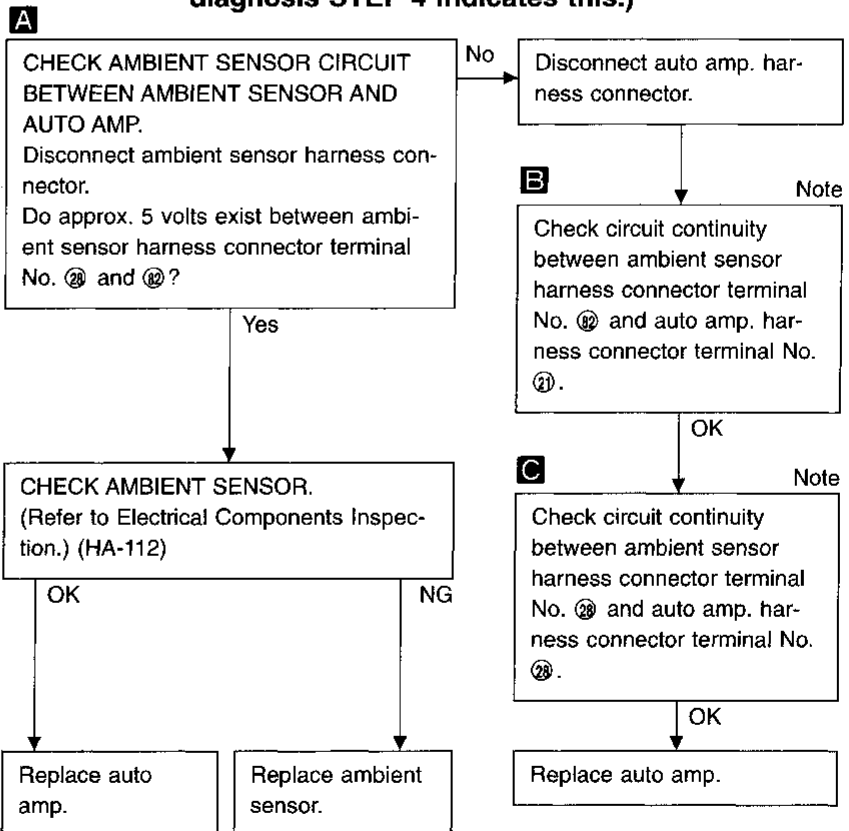
Check each connector connection as shown in the following table, and check each line's condition.

Malfunctioning circuit	Connector No. to be checked			
	Main harness	Engine room harness	Body harness	A/C sub-harness
Ambient sensor	M48 M84	E23 E112		
Upper in-vehicle sensor	M124 M48		B72 B18	
Lower in-vehicle sensor	M48 M50			C5 C1
DEF duct sensor	M48			
VENT duct sensor	M48 M50			C1 C4
Foot duct sensor	M48 M50			C5 C1
Sunload sensor	M48			C6
	M75			

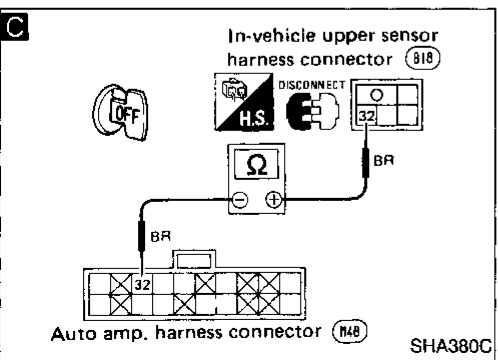
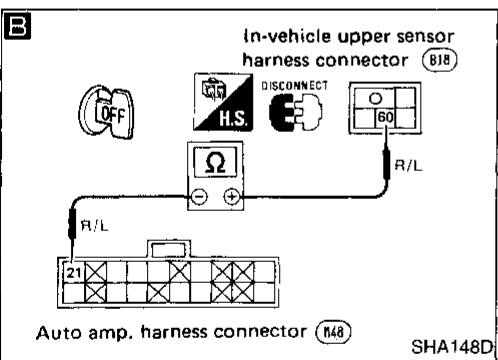
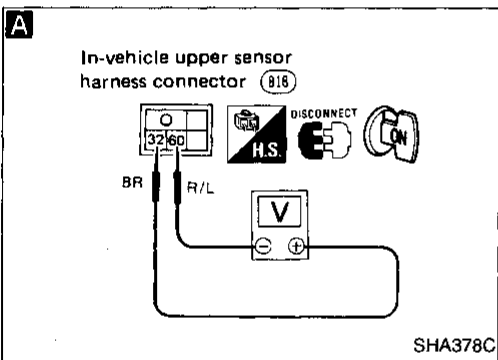
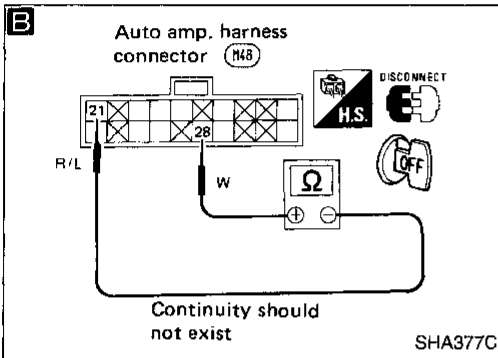
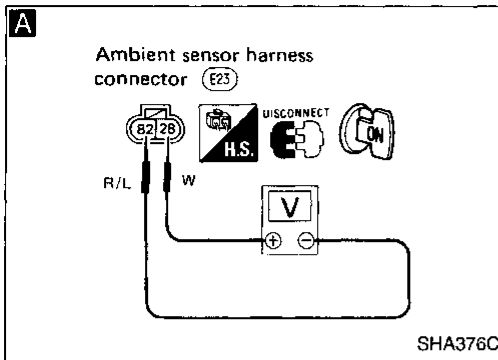


Diagnostic Procedure 2

SYMPTOM: Ambient sensor circuit is open. (CONSULT or self-diagnosis STEP 4 indicates this.)

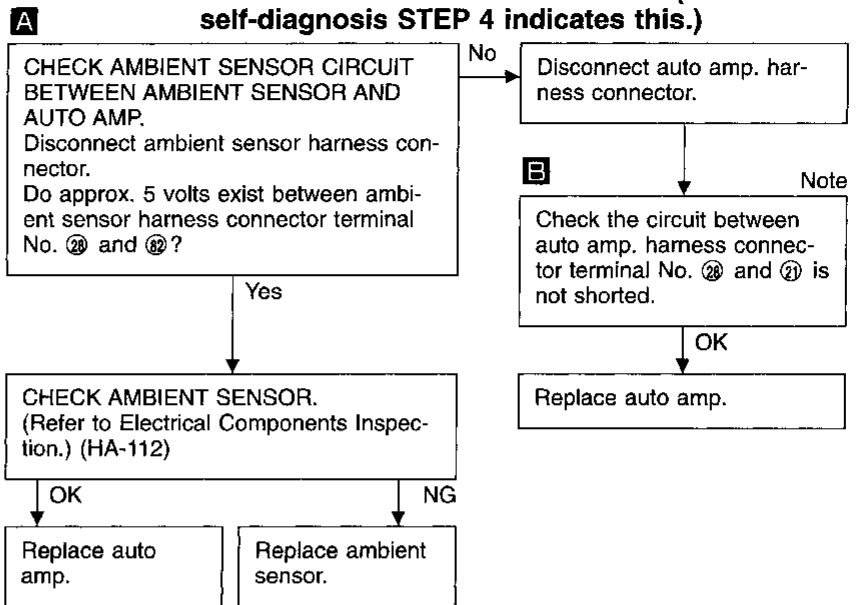


Note:
If the result is NG after checking circuit continuity, repair harness or connector.



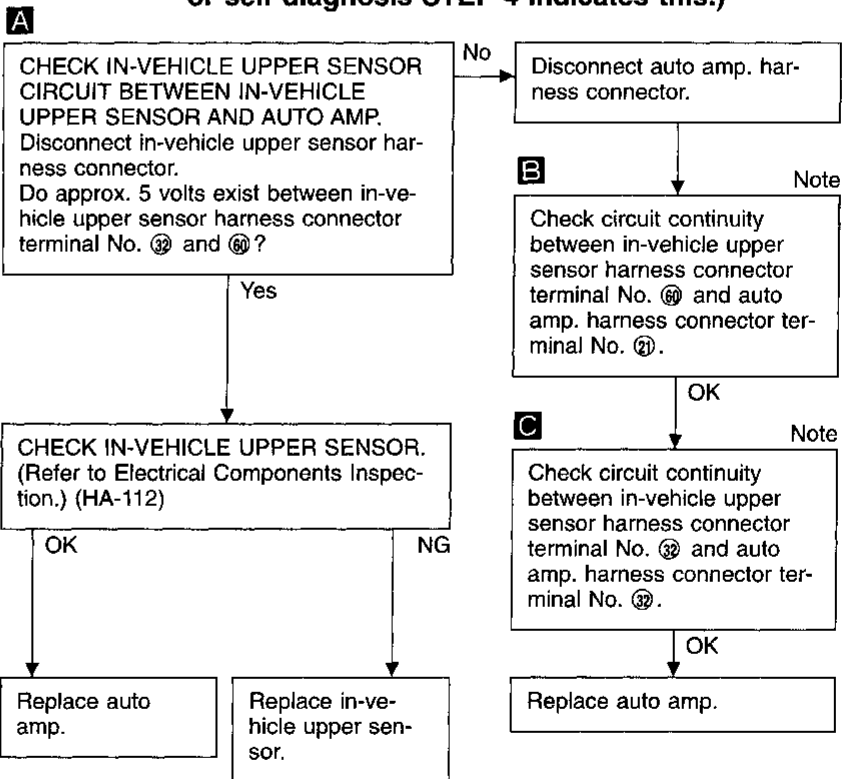
Diagnostic Procedure 3

SYMPTOM: Ambient sensor circuit is shorted. (CONSULT or self-diagnosis STEP 4 indicates this.)



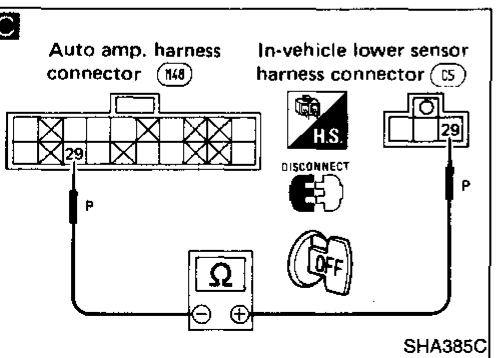
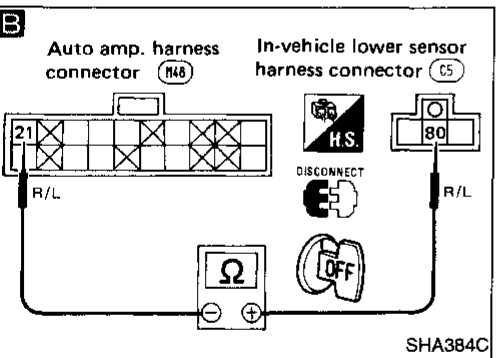
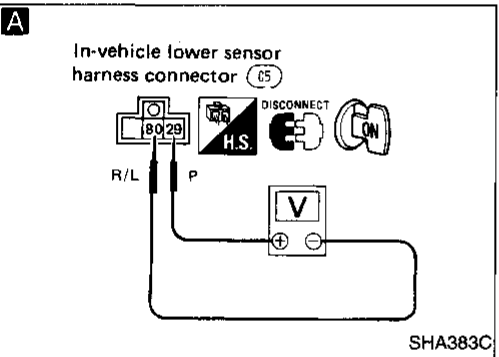
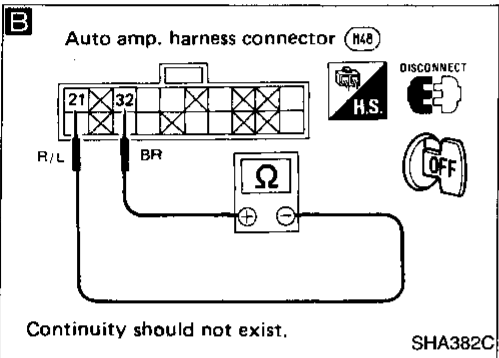
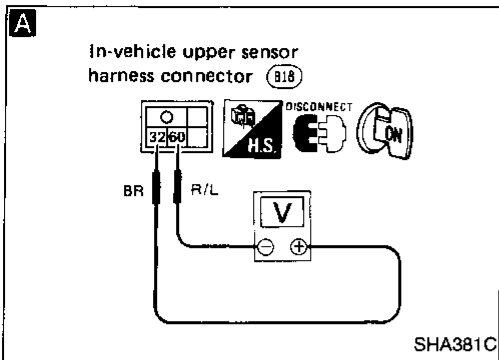
Diagnostic Procedure 4

SYMPTOM: In-vehicle upper sensor circuit is open. (CONSULT or self-diagnosis STEP 4 indicates this.)



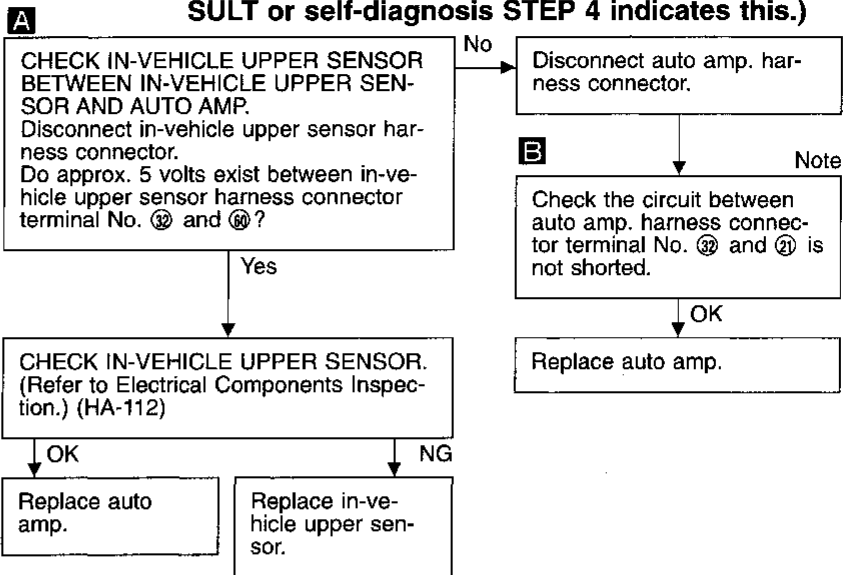
Note:
If the result is NG after checking circuit continuity, repair harness or connector.

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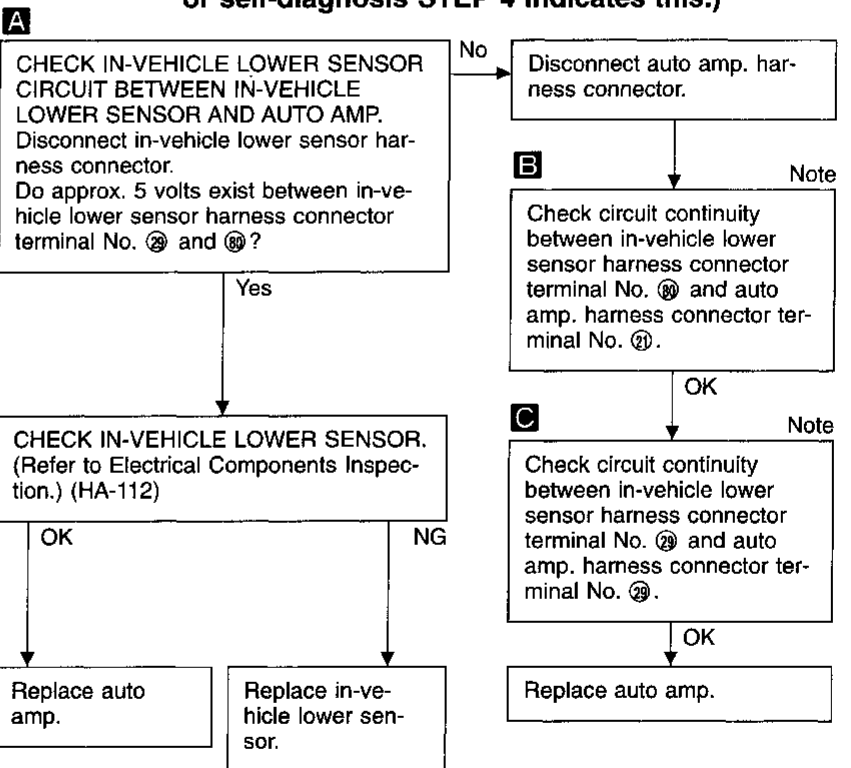
Diagnostic Procedure 5

SYMPTOM: In-vehicle upper sensor circuit is shorted. (CONSULT or self-diagnosis STEP 4 indicates this.)

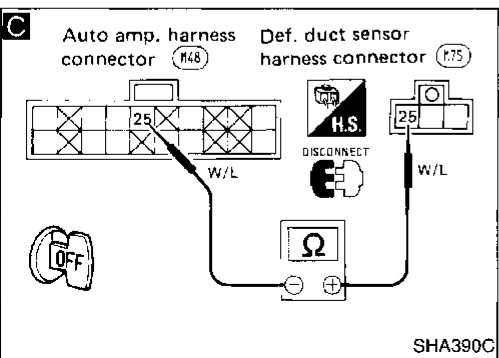
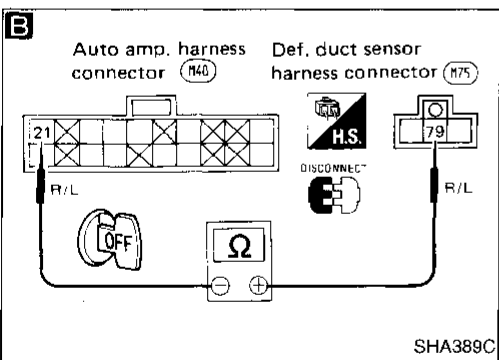
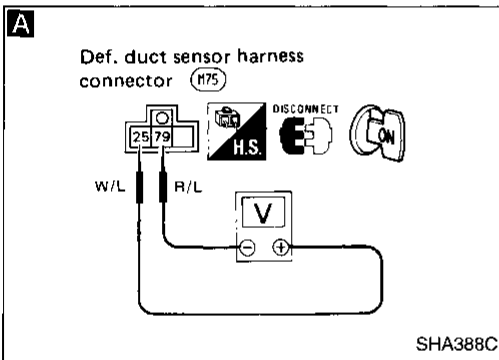
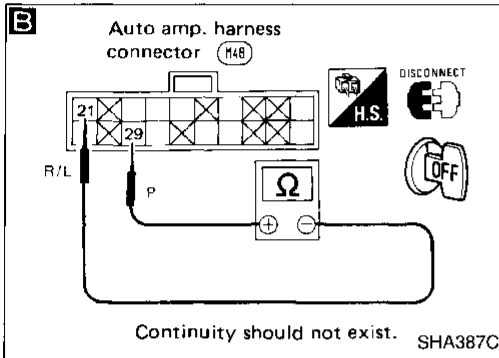
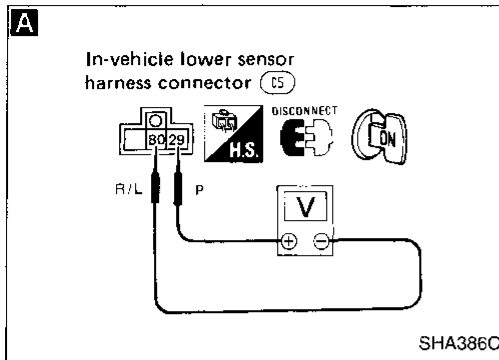


Diagnostic Procedure 6

SYMPTOM: In-vehicle lower sensor circuit is open. (CONSULT or self-diagnosis STEP 4 indicates this.)

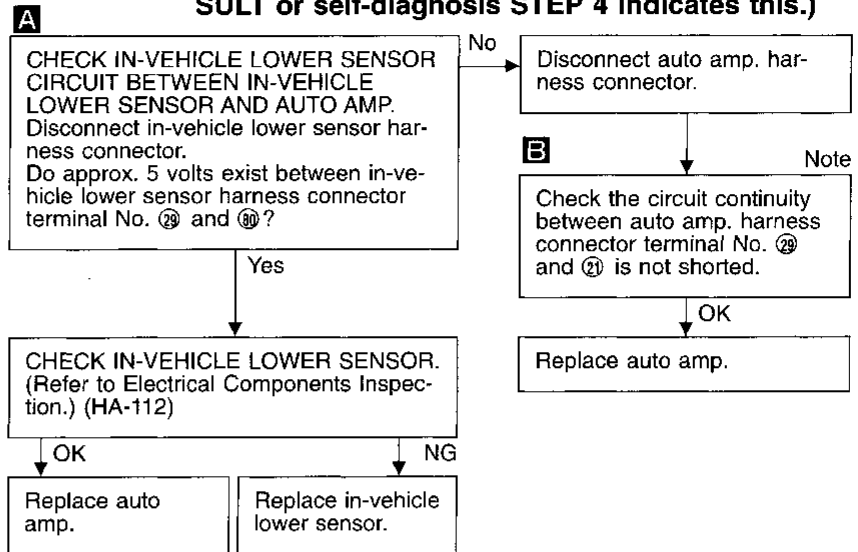


Note: If the result is NG after checking circuit continuity, repair harness or connector.



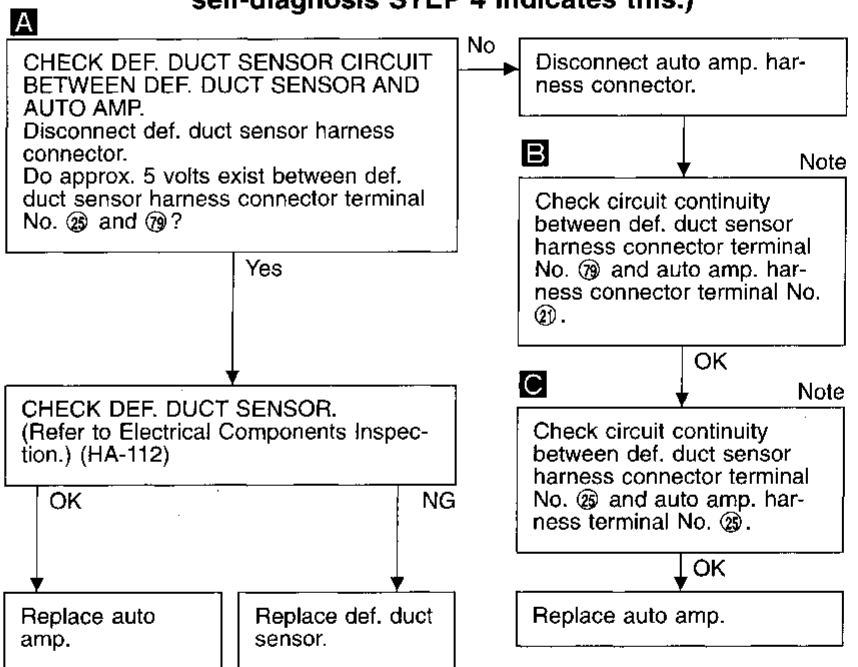
Diagnostic Procedure 7

SYMPTOM: In-vehicle lower sensor circuit is shorted. (CONSULT or self-diagnosis STEP 4 indicates this.)



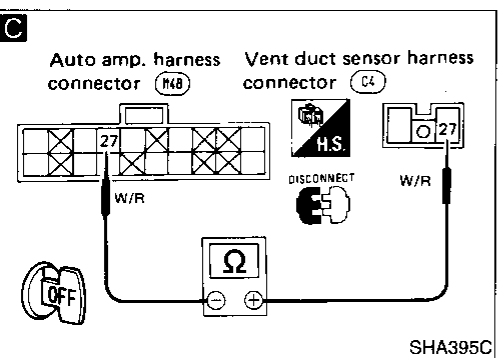
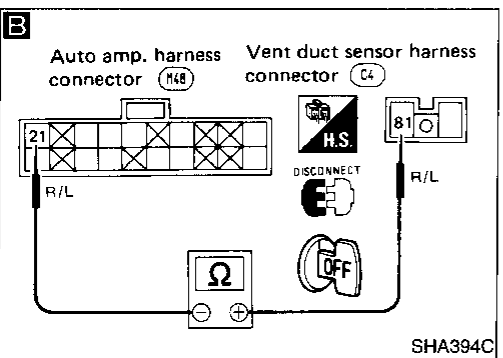
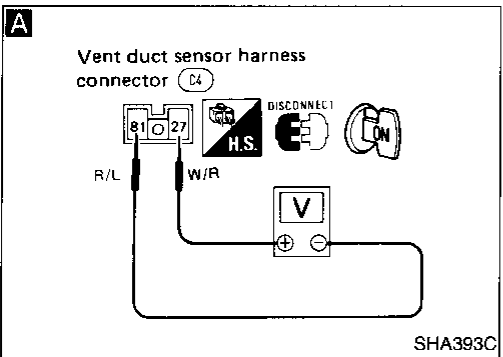
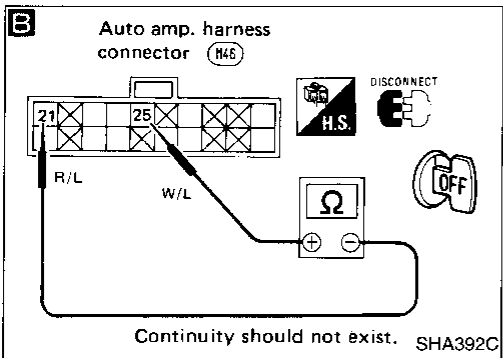
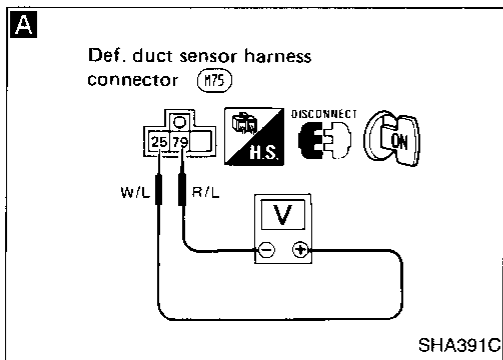
Diagnostic Procedure 8

SYMPTOM: Def. duct sensor circuit is open. (CONSULT or self-diagnosis STEP 4 indicates this.)



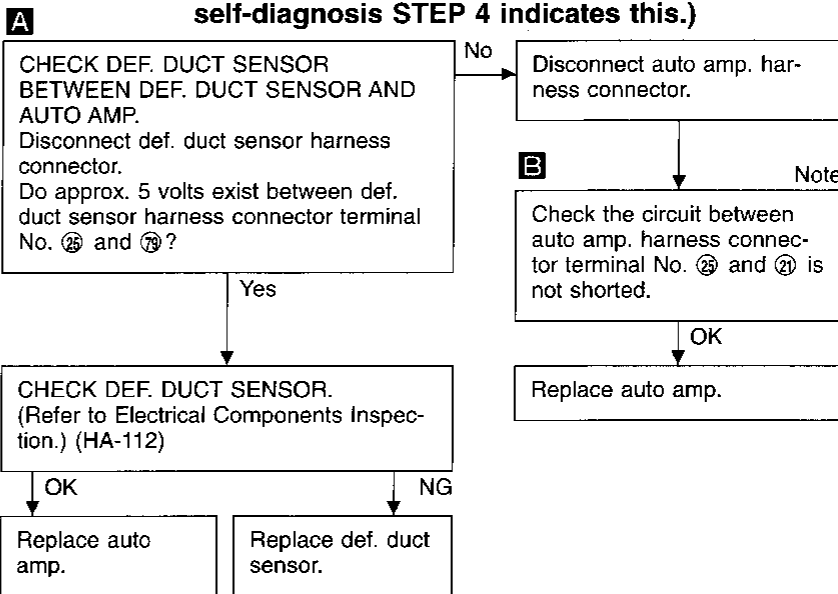
Note:
If the result is NG after checking circuit continuity, repair harness or connector.

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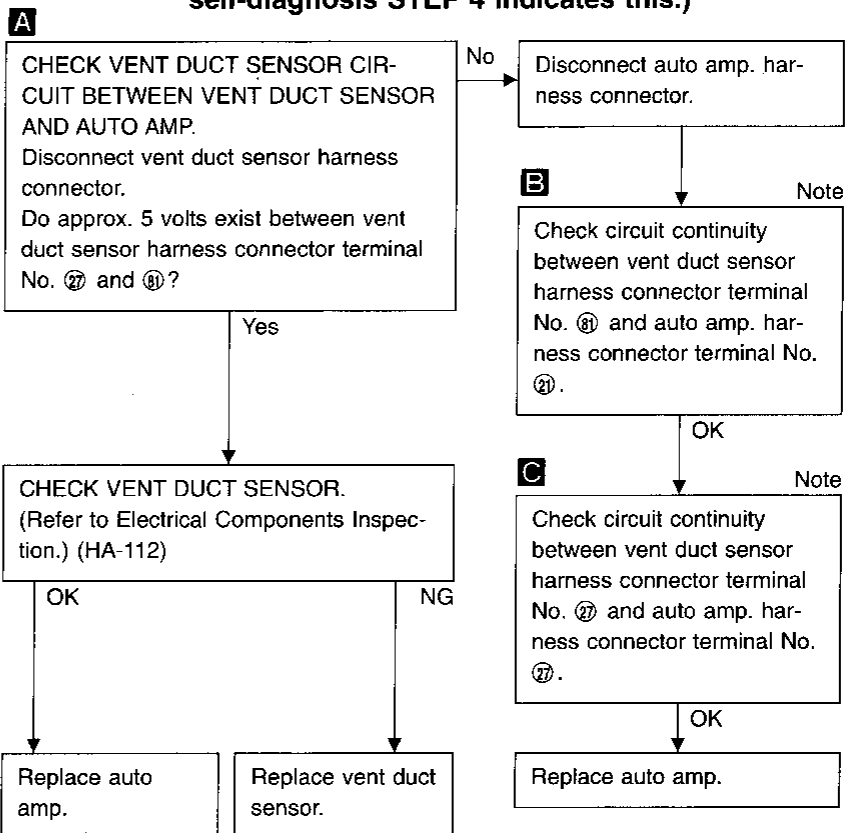
Diagnostic Procedure 9

SYMPTOM: Def. duct sensor circuit is shorted. (CONSULT or self-diagnosis STEP 4 indicates this.)

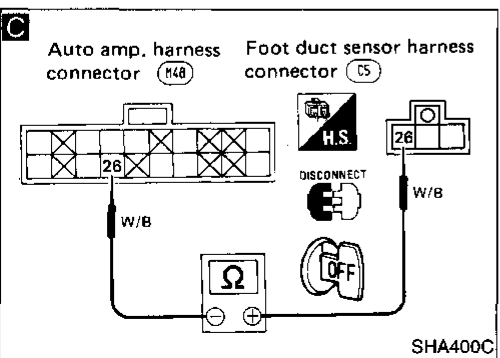
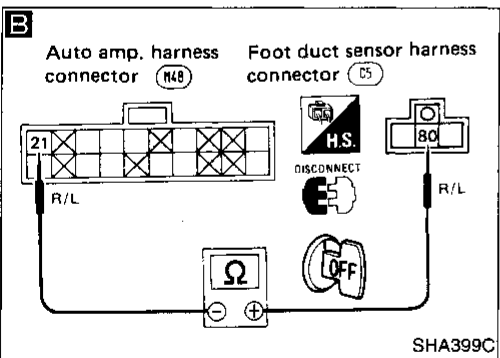
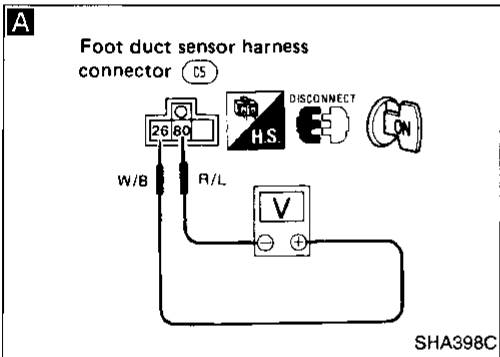
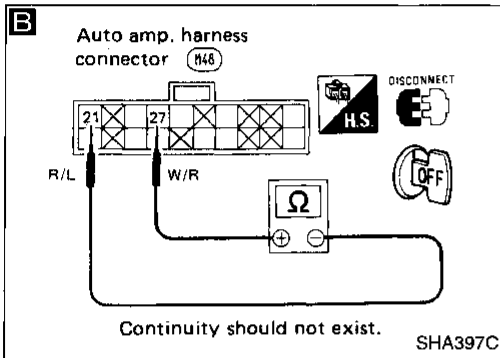
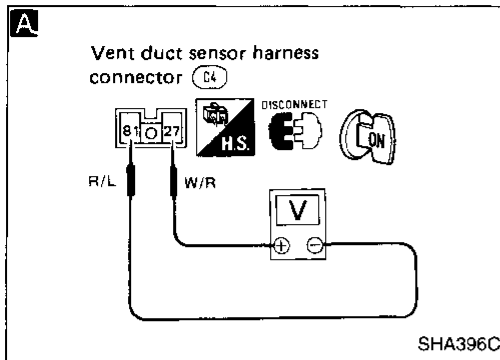


Diagnostic Procedure 10

SYMPTOM: Vent duct sensor circuit is open. (CONSULT or self-diagnosis STEP 4 indicates this.)

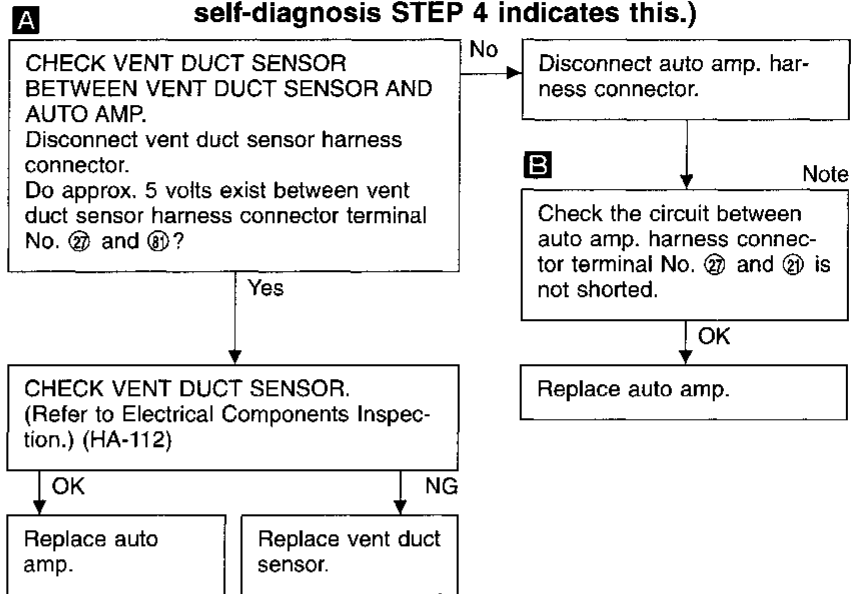


Note:
If the result is NG after checking circuit continuity, repair harness or connector.



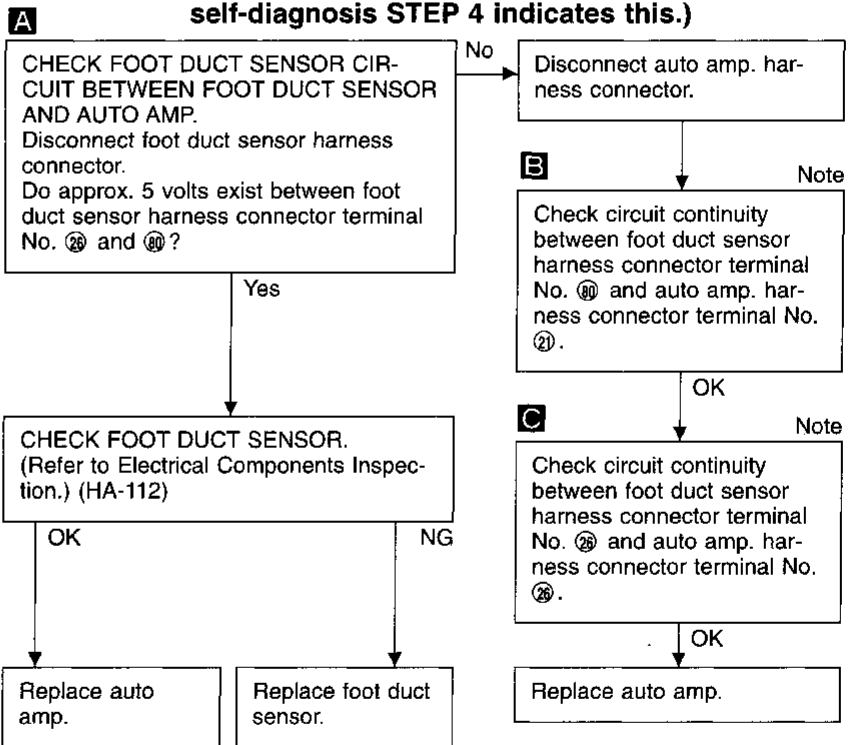
Diagnostic Procedure 11

SYMPTOM: Vent duct sensor circuit is shorted. (CONSULT or self-diagnosis STEP 4 indicates this.)



Diagnostic Procedure 12

SYMPTOM: Foot duct sensor circuit is open. (CONSULT or self-diagnosis STEP 4 indicates this.)

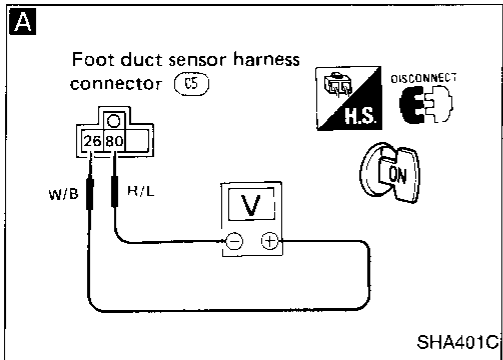


Note:
If the result is NG after checking insulation of each terminal, repair harness or connector.

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Diagnostic Procedure 13

SYMPTOM: Foot duct sensor circuit is shorted. (CONSULT or self-diagnosis STEP 4 indicates this.)



A

CHECK FOOT DUCT SENSOR BETWEEN FOOT DUCT SENSOR AND AUTO AMP.
 Disconnect foot duct sensor harness connector.
 Do approx. 5 volts exist between foot duct sensor harness connector terminal No. ②⑥ and ②⑩?

No → Disconnect auto amp. harness connector.

B Note

Check the circuit between auto amp. harness connector terminal No. ②⑥ and ②⑩ is not shorted.

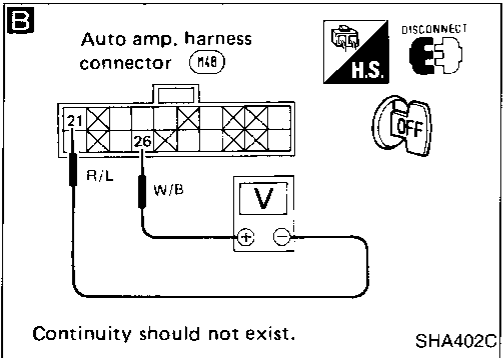
OK → Replace auto amp.

Yes →

CHECK FOOT DUCT SENSOR.
 (Refer to Electrical Components Inspection.) (HA-112)

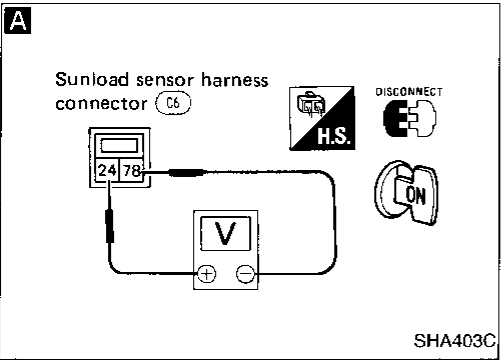
OK → Replace auto amp.

NG → Replace foot duct sensor.



Diagnostic Procedure 14

SYMPTOM: Sunload sensor circuit is shorted. (CONSULT or self-diagnosis STEP 4 indicates this.)



A

CHECK SUNLOAD SENSOR BETWEEN SUNLOAD SENSOR AND AUTO AMP.
 Disconnect sunload sensor harness connector.
 Do approx. 5 volts exist between sunload sensor harness connector terminal No. ②④ and ②⑩?

No → Disconnect auto amp. harness connector.

B Note

Check the circuit between auto amp. harness connector terminal No. ②④ and ②⑩ is not shorted.

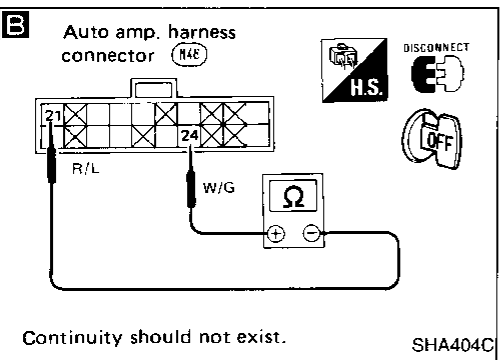
OK → Replace auto amp.

Yes →

CHECK SUNLOAD SENSOR.
 (Refer to Electrical Components Inspection.) (HA-113)

NG → Replace sunload sensor.

OK → Replace auto amp.



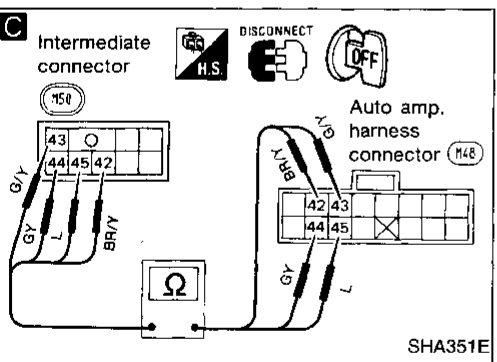
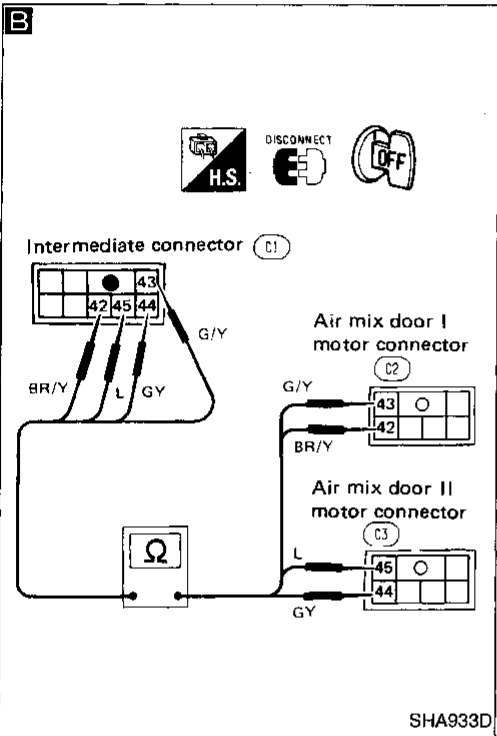
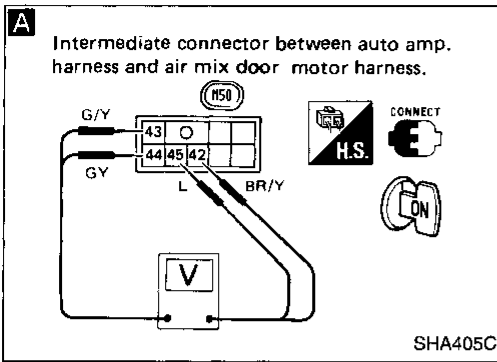
Note:
 If the result is NG after checking insulation of each terminal, repair harness or connector.

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Diagnostic Procedure 15

SYMPTOM: Air mix door does not operate normally.

- Read out self-diagnosis result with CONSULT or perform self-diagnosis STEP 4 before referring to the following flow chart.
- Remove combination meter assembly to make working space and reconnect air conditioner switch connector.



A CHECK FOR SIGNALS TO AIR MIX DOOR MOTOR.

- Set up "ACTIVE TEST" mode with CONSULT.
- Set up self-diagnosis STEP 2.

Set air mix door position as shown in the following chart. Check if approx. 10V exists for 3 seconds every 10 seconds between each terminal.*

Air mix door position	Code No.	Terminal No.			
		Air mix door I		Air mix door II	
		⊕	⊖	⊕	⊖
Full-Hot		ⓐ	ⓑ	ⓒ	ⓓ
Full-Cool		ⓔ	ⓕ	ⓖ	ⓗ

*: After two minutes power supply is automatically cut off.

C Check circuit continuity between auto amp. harness connector terminals and intermediate connector terminals.

Intermediate connector	Auto amp. connector	Continuity
ⓐ	ⓐ	Yes
ⓑ	ⓑ	Yes
ⓒ	ⓒ	Yes
ⓓ	ⓓ	Yes

E Check continuity between intermediate connector terminal and each air mix door motor harness connector terminal.

Intermediate connector	Air mix door I motor connector	Continuity
ⓐ	ⓐ	Yes
ⓑ	ⓑ	Yes

Intermediate connector	Air mix door I motor connector	Continuity
ⓒ	ⓒ	Yes
ⓓ	ⓓ	Yes

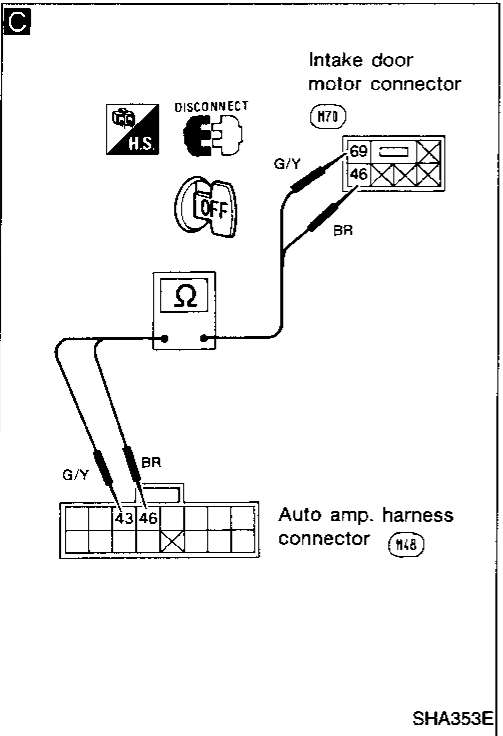
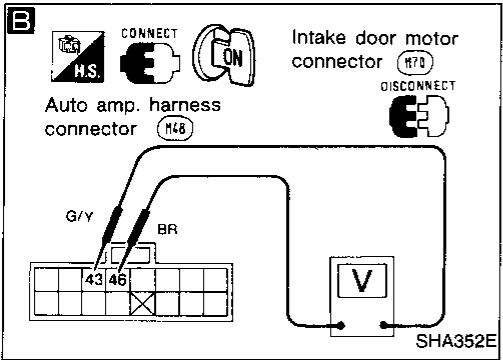
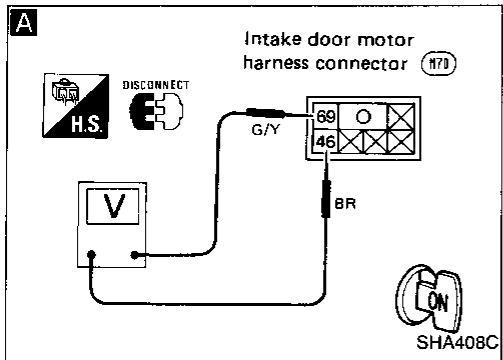
Flowchart:

- Start at A. If NG, go to C.
- From C, if OK, go to E. If NG, go to "Repair harness or connector."
- From E, if OK, go to "Replace air mix door motor." If NG, go to "Remove heater unit assembly."
- From "Remove heater unit assembly," go to C.
- From C, if OK, go to "Replace auto amp." If NG, go to "Repair harness or connector."

Diagnostic Procedure 16

SYMPTOM: Intake door does not operate normally.

- Read out self-diagnosis result with CONSULT or perform self-diagnosis STEP 4 before referring to the following flow chart.



A

CHECK FOR SIGNALS TO INTAKE DOOR MOTOR.
Disconnect intake door motor harness connector.

- Set up "ACTIVE TEST" mode with CONSULT.
 - Set up self-diagnosis STEP 2.
- Set intake door position as shown in the following chart.
Check if approx. 10V exists for 2.5 seconds between each terminal.

Intake door position	Code No.	Terminal No.	
		⊕	⊖
FRE/REC → REC		Ⓔ	Ⓢ
REC → FRE		Ⓢ	Ⓔ

OK

Replace intake door motor.

B

CHECK OUTPUT OF AUTO AMP.

- Set up "ACTIVE TEST" mode with CONSULT.
 - Set up self-diagnosis STEP 2.
- Set intake door position as shown in the following chart.
Check if approx. 10V exists for 2.5 seconds between each terminal.

Intake door position	Code No.	Terminal No.	
		⊕	⊖
FRE/REC → REC		Ⓔ	Ⓢ
REC → FRE		Ⓢ	Ⓔ

OK

NG

Replace auto amp.

C

Check continuity between auto amp. harness connector terminal No. ④ and intake door motor harness connector terminal No. ④.

Check auto amp. harness connector terminal No. ④ and intake door motor harness connector terminal No. ⑥.

NG

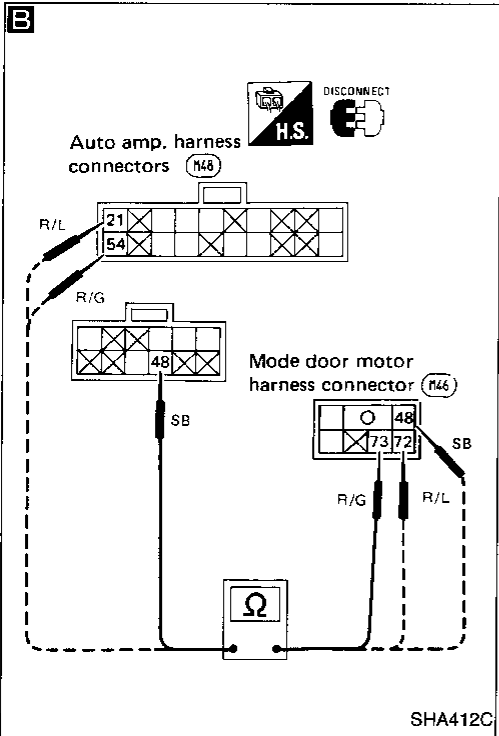
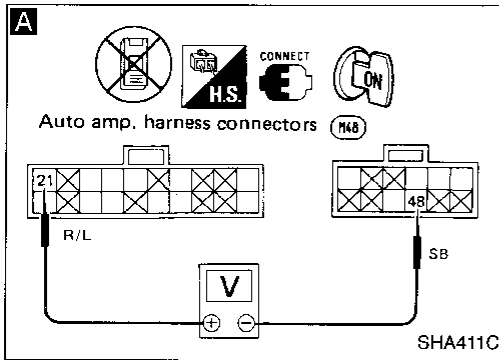
Repair harness or connector.

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Diagnostic Procedure 17

SYMPTOM: Mode door does not operate normally.

- Read out self-diagnosis result with CONSULT or perform self-diagnosis STEP 4 before referring to the following flow chart.



A

CHECK PBR CIRCUIT.

- Set up "ACTIVE TEST" mode with CONSULT.
- Set up self-diagnosis STEP 2.

Set mode door motor as shown in the following chart.

- Check PBR voltage with data monitor function in "ACTIVE TEST" mode.

Mode door position	PBR voltage (approx.)
DEF	4.8V
FOOT/DEF	2.5V
B/L	1.1V
VENT	0V

Check if voltage between auto amp. harness connector terminals ④ and ⑦ varies from approx. 5V to approx. 0V according to mode door position varies.

Code No.	Voltage	
	④	⑦
④	⊖	⊕
⑤	4.8V	
⑥	2.5V	
⑦	1.1V	
⑧	0V	

B

CHECK MODE DOOR MOTOR.

Refer to Electrical Components Inspection. (HA-113)

OK → Replace mode door motor.

NG →

CHECK HARNESS BETWEEN AUTO AMP. AND MODE DOOR MOTOR.

Auto amp. harness connector terminal	Mode door motor harness connector terminal	Continuity
⑦	④	No
	⑦	Yes
	⑧	No
④	④	Yes
	⑦	No
	⑧	No
⑧	④	No
	⑦	No
	⑧	Yes

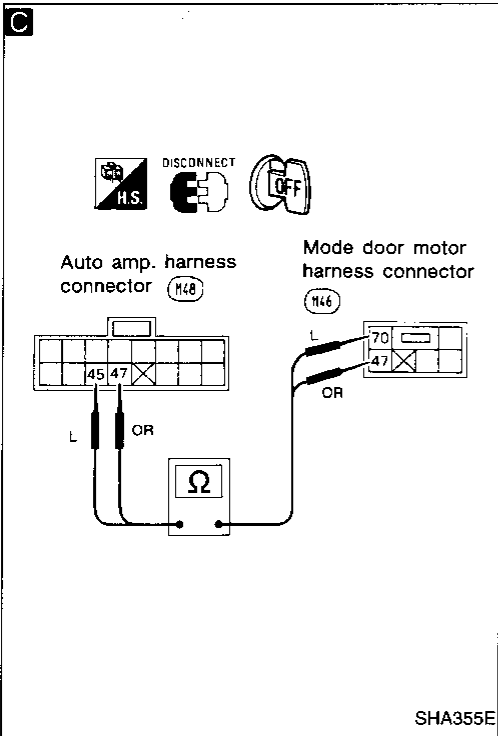
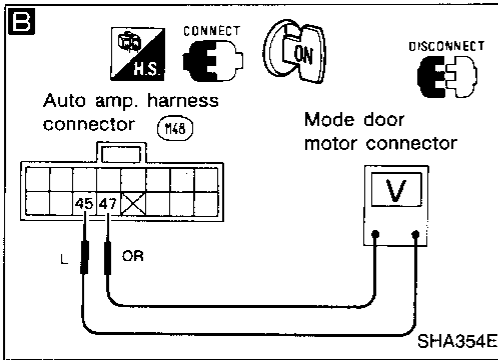
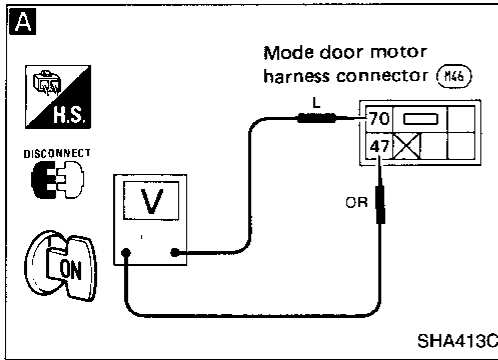
OK → Go to diagnostic procedure 18. (HA-102)

NG → Repair harness or connector.

Diagnostic Procedure 18

SYMPTOM: Mode door does not move at all.

- Read out self-diagnosis result with CONSULT or perform self-diagnosis STEP 4 before referring to the following flow chart.



A

CHECK FOR SIGNALS TO MODE DOOR MOTOR.

- Set up "ACTIVE TEST" mode with CONSULT.
- Set up self-diagnosis STEP 2.

Set mode door position as shown in the following chart.

Check if approx. 10V exists between mode door motor harness connector terminals ④ and ⑦ for approx. 1.3 second every 10 seconds.

Mode door position	Code No.	Terminal No.	
		⊕	⊖
DEF		④	⑦
VENT		④	⑦

B

CHECK OUTPUT OF AUTO AMP.

- Set up "ACTIVE TEST" mode with CONSULT.
- Set up self-diagnosis STEP 2.

Set mode door position as shown in the following chart.

Check if approx. 10V exists between mode door motor harness connector terminals ④ and ⑤ for approx. 1.3 second every 10 seconds.

Mode door position	Code No.	Terminal No.	
		⊕	⊖
DEF		④	⑦
VENT		④	⑤

OK

Replace mode door motor.

NG

Replace auto amp.

C

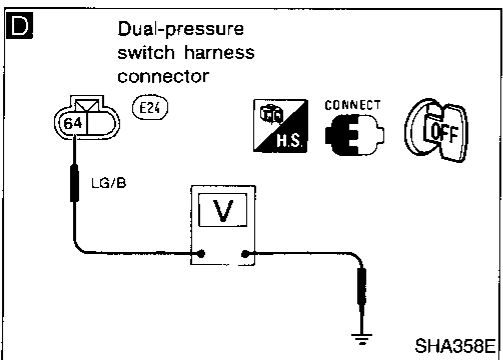
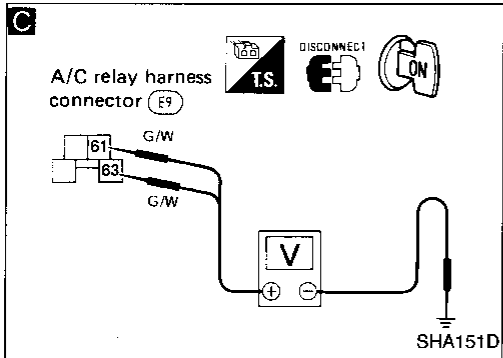
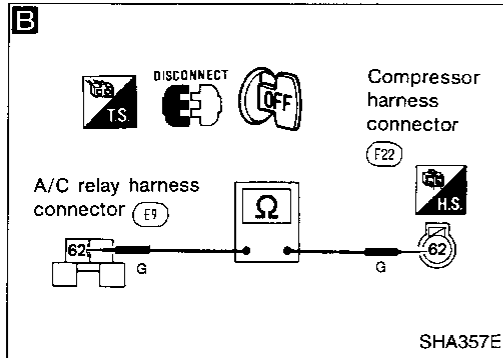
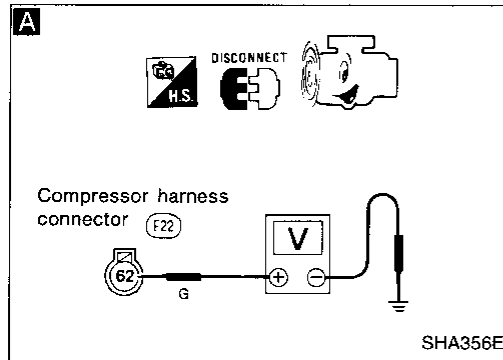
Check continuity between auto amp. harness connector terminal No. ④, ⑤ and mode door motor harness connector terminal No. ④, ⑦ respectively.

OK

NG

Repair harness or connector.

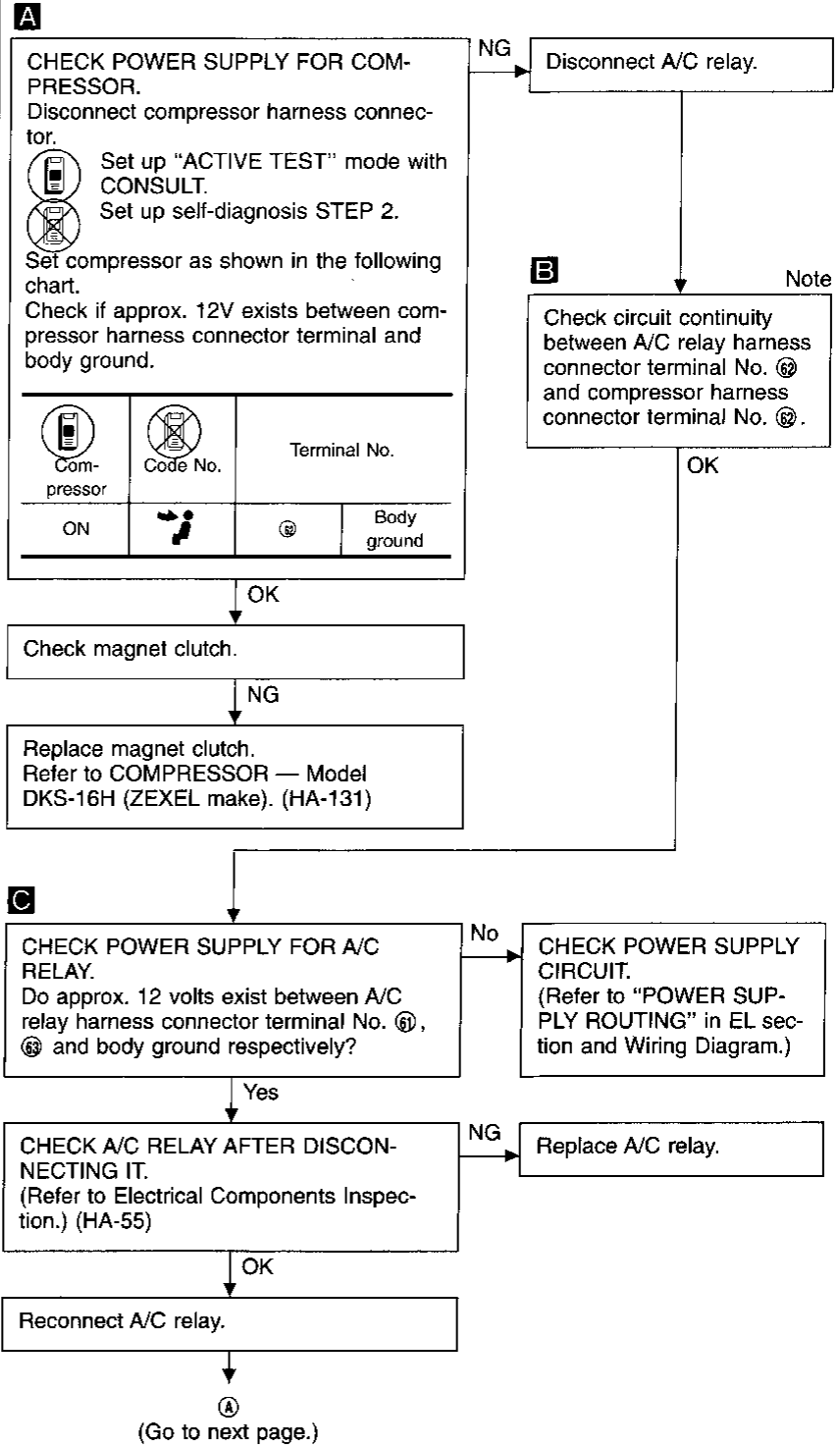
INSPECTION END



Diagnostic Procedure 19

SYMPTOM: Magnet clutch does not engage.

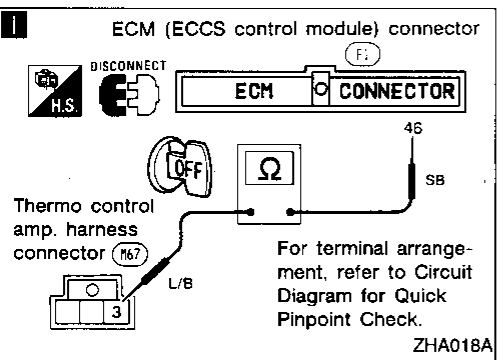
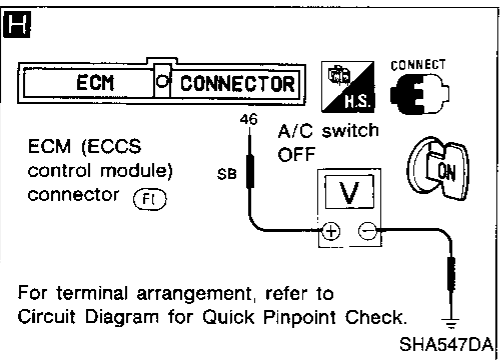
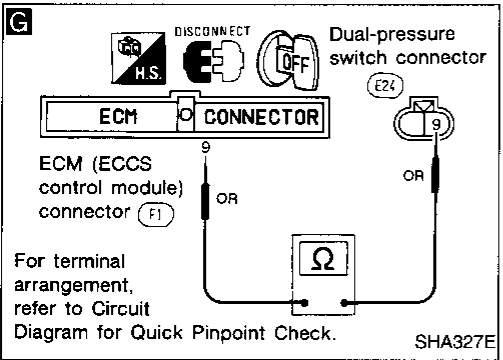
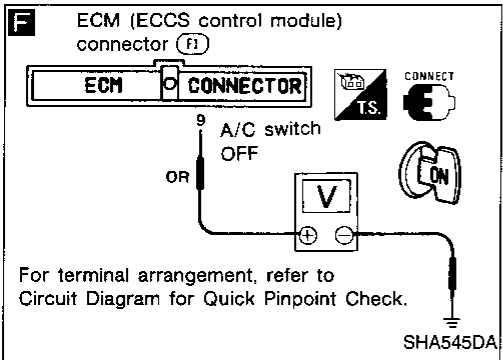
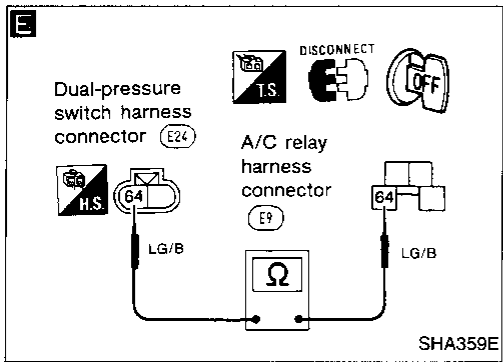
- Perform Preliminary check 6 before referring to the following flow chart.



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

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Diagnostic Procedure 19 (Cont'd)



Turn ignition switch ON and press OFF switch.

D CHECK COIL SIDE CIRCUIT OF A/C RELAY.
Do approx. 12 volts exist between dual-pressure switch harness connector terminal No. 64 and body ground?

E Note
Check circuit continuity between A/C relay harness connector terminal No. 64 and dual-pressure harness connector terminal No. 64.

F Do approx. 12 volts exist between ECM (ECCS control module) harness connector terminal No. 9 and body ground?

G Note
Check circuit continuity between dual-pressure switch harness connector terminal No. 9 and ECM (ECCS control module) harness connector terminal No. 9.

OK

CHECK DUAL-PRESSURE SWITCH.
(Refer to Electrical Components Inspection.) (HA-55)

NG

Replace dual-pressure switch.

H Do more than 8 volts exist between ECM (ECCS control module) harness connector terminal No. 46 and body ground?

I Check circuit continuity between ECM (ECCS control module) harness connector terminal No. 46 and thermo control amp. harness connector terminal No. 3.

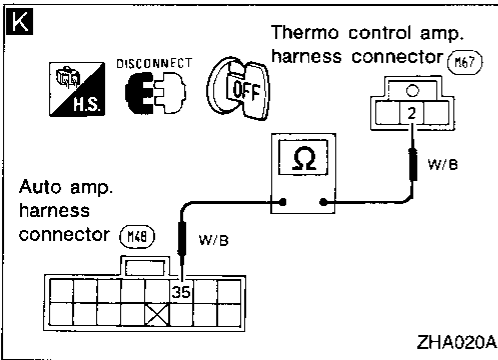
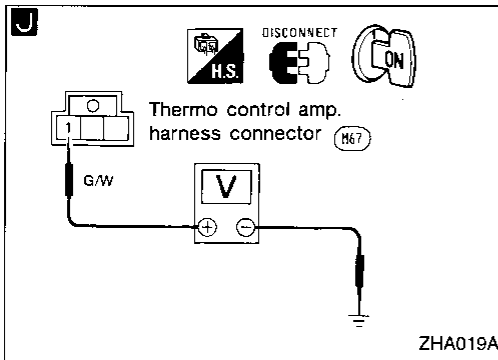
OK

OK

(Go to next page.)

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

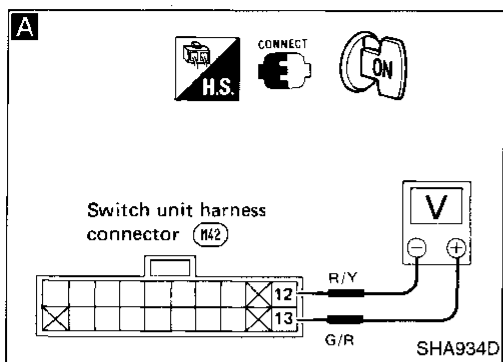
Diagnostic Procedure 19 (Cont'd)



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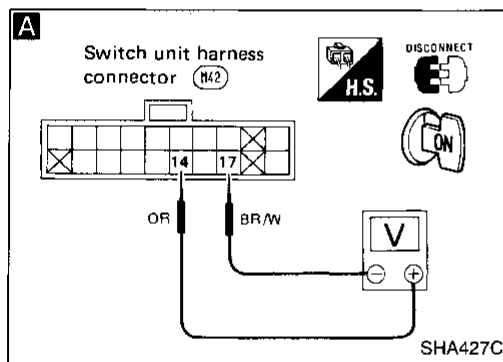
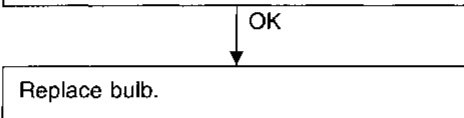
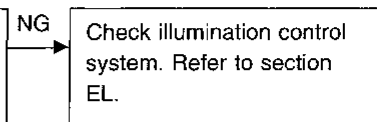
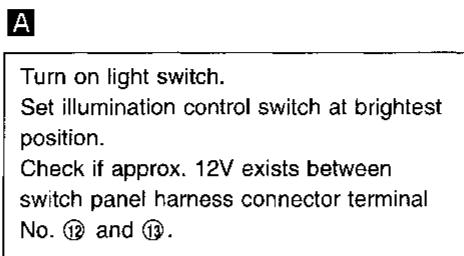
    graph TD
        B((B)) --> J
        subgraph J [J]
            J1[CHECK POWER SUPPLY FOR THERMO CONTROL AMP.  
Do approx. 12 volts exist between thermo control amp. harness connector terminal No. ① and body ground?]
        end
        J1 -- No --> J2[CHECK POWER SUPPLY CIRCUIT.  
(Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)]
        J1 -- Yes --> J3
        subgraph J3 [J]
            J3_1[CHECK THERMO CONTROL AMP.  
(Refer to Electrical Components Inspection.) (HA-56)]
        end
        J3_1 -- NG --> J3_2[Replace thermo control amp.]
        J3_1 -- OK --> K
        subgraph K [K]
            K1[Disconnect auto amp. harness connector.  
Check circuit continuity between auto amp. harness connector terminal No. ③⑤ and thermo control amp. harness connector terminal No. ②.]
        end
        K1 -- OK --> K2[Replace auto amp.]
    
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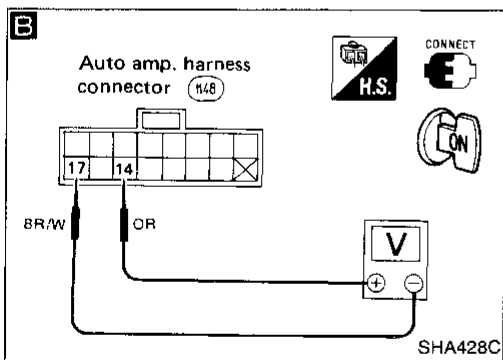
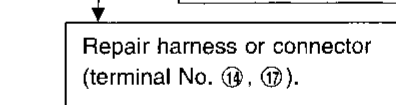
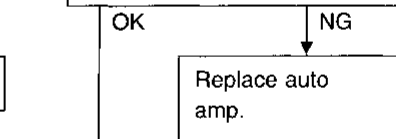
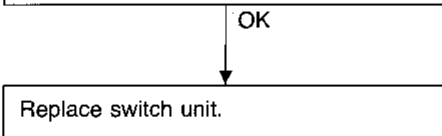
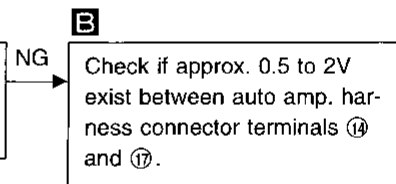
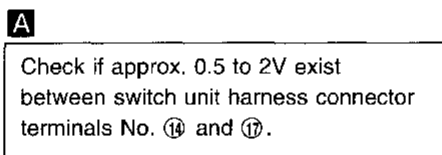
Diagnostic Procedure 20

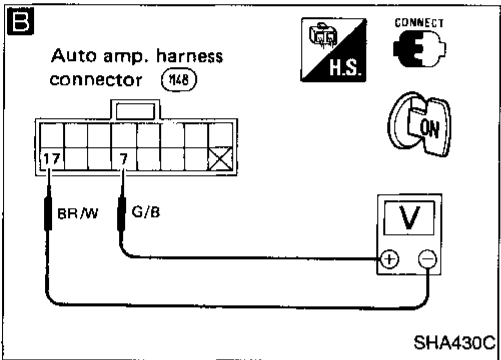
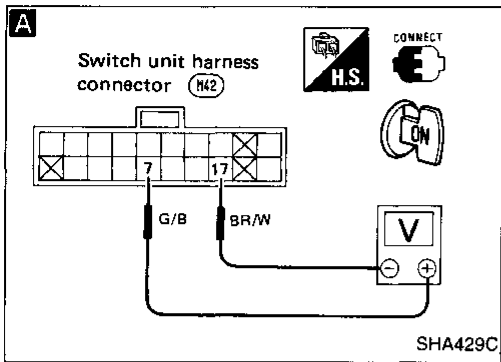
SYMPTOM: Air conditioner control switch panel illumination does not come on.



Diagnostic Procedure 21

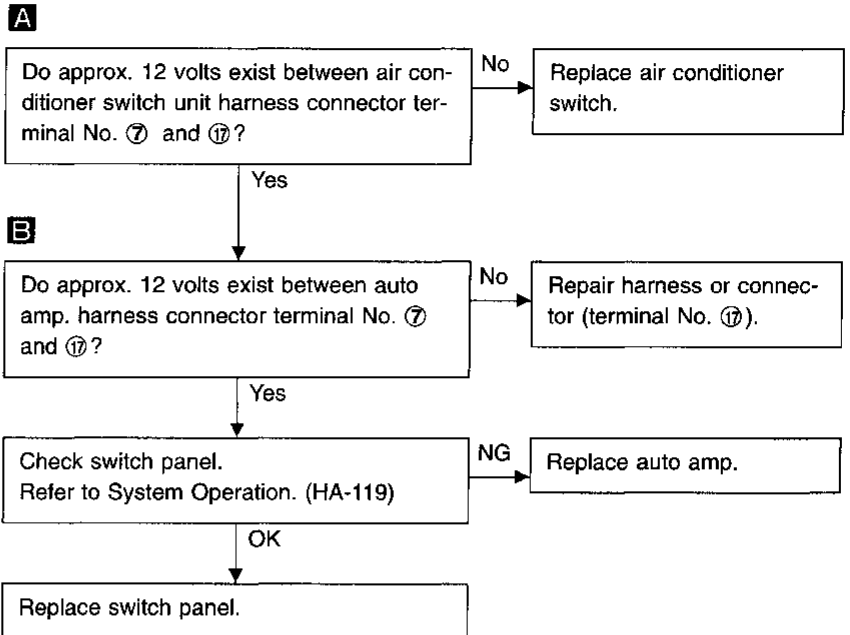
SYMPTOM: Set temperature and mode display do not appear on display window.





Diagnostic Procedure 22

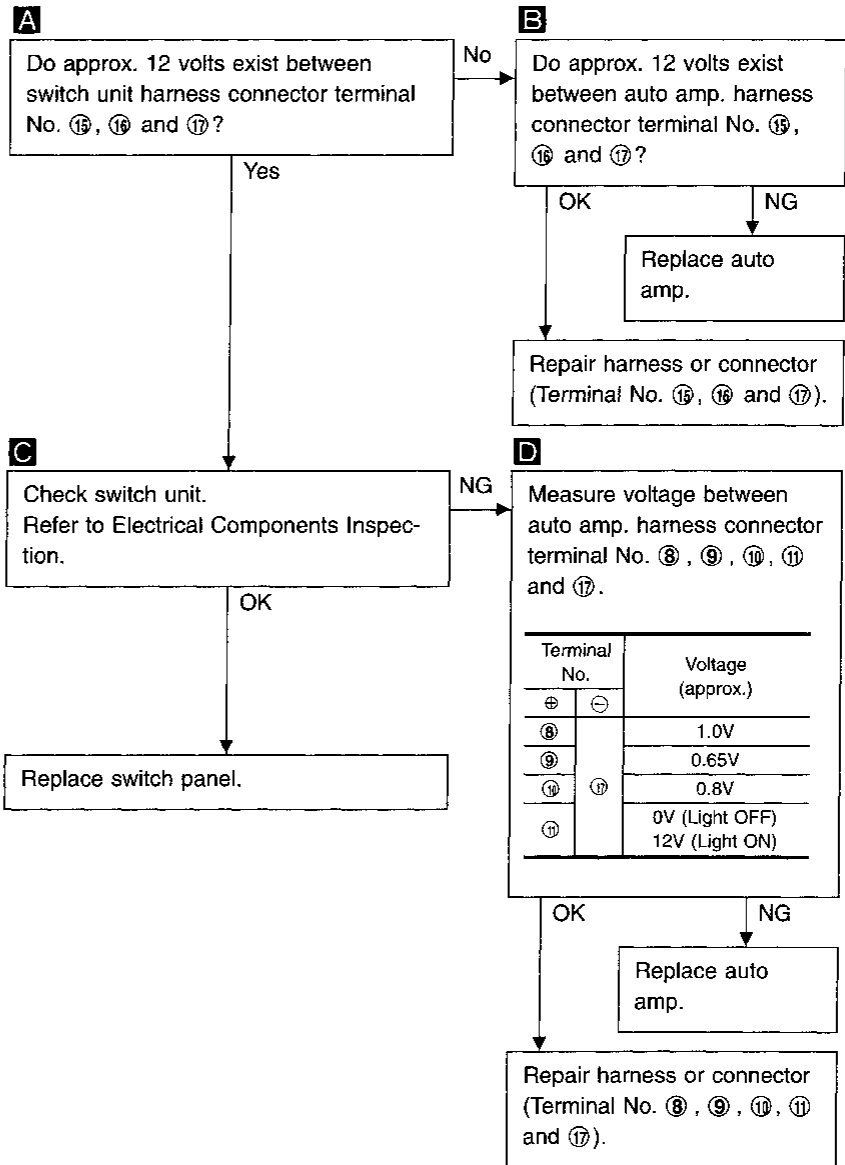
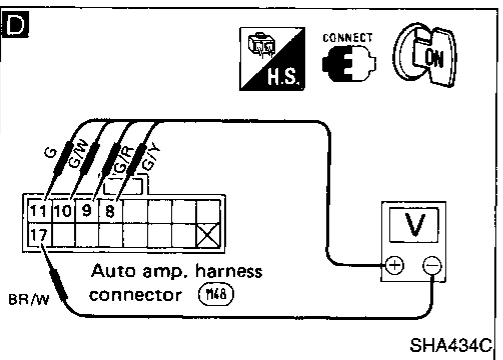
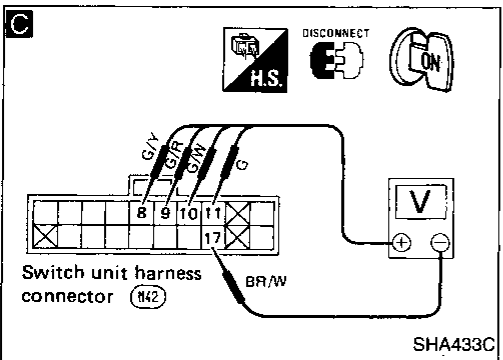
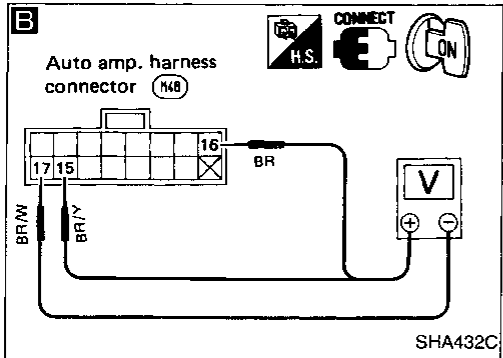
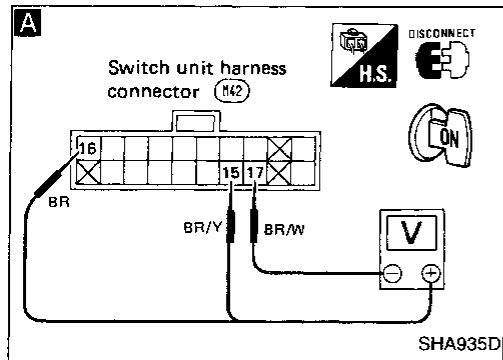
SYMPTOM: When air conditioner switch is operated, it does not beep.



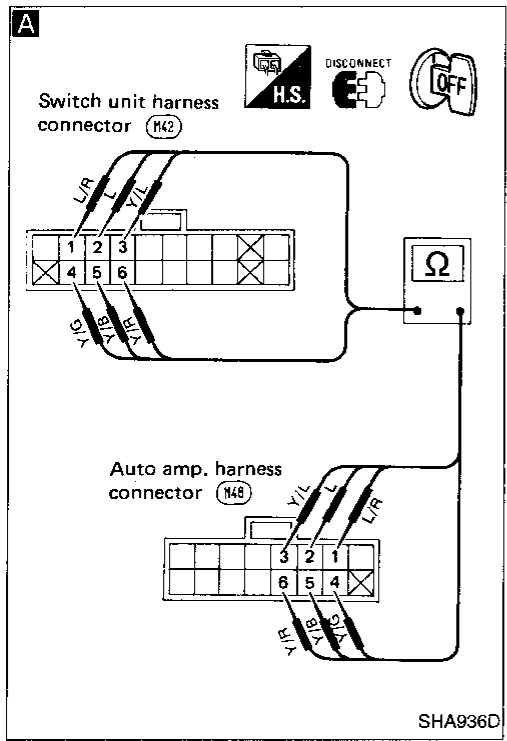
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Diagnostic Procedure 23

SYMPTOM: Figures of set temperature do not appear on the display window and indicator lamp (LED) does not come on.

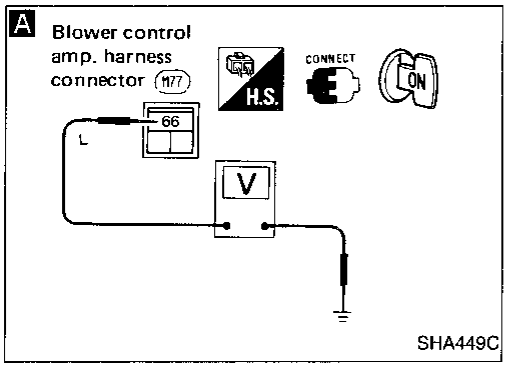
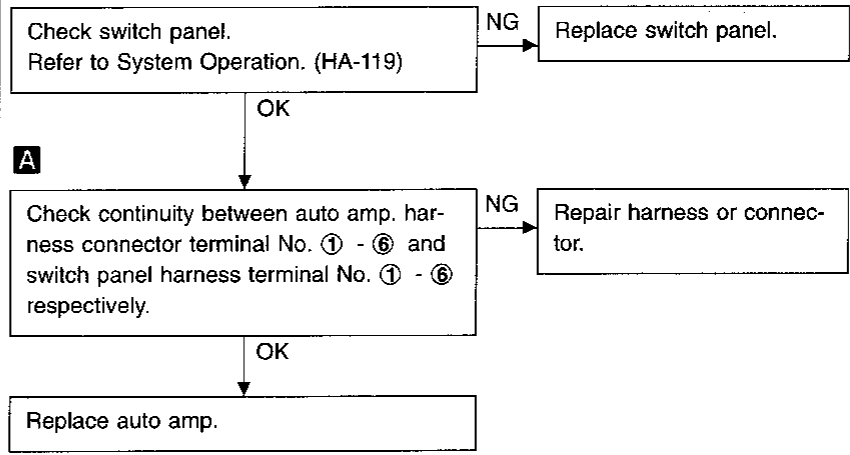


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Diagnostic Procedure 24

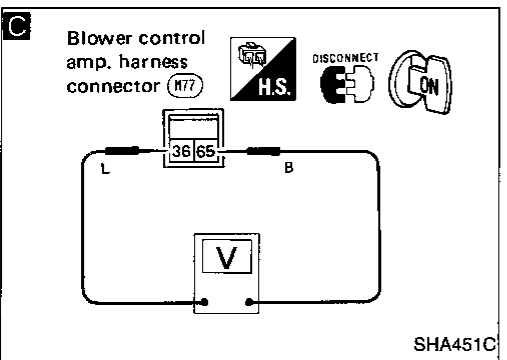
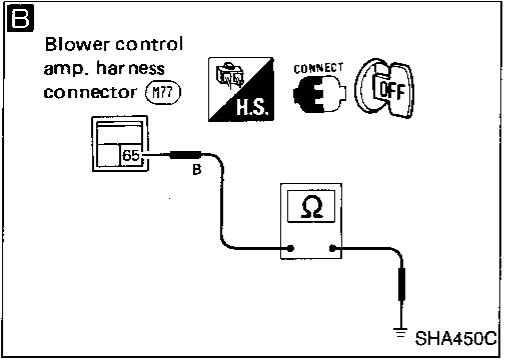
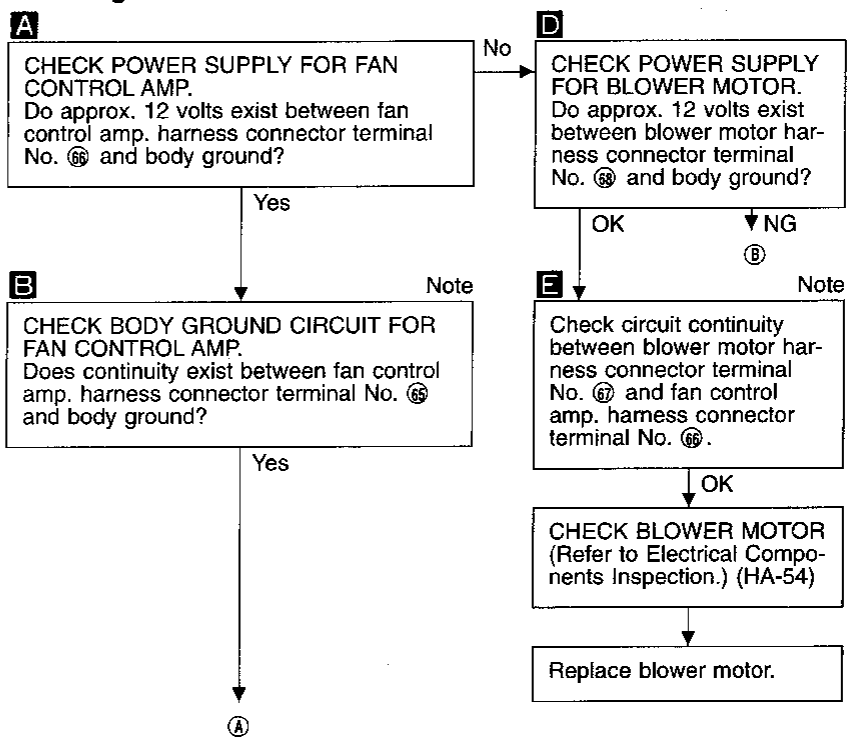
SYMPTOM: Switches do not work.



Diagnostic Procedure 25

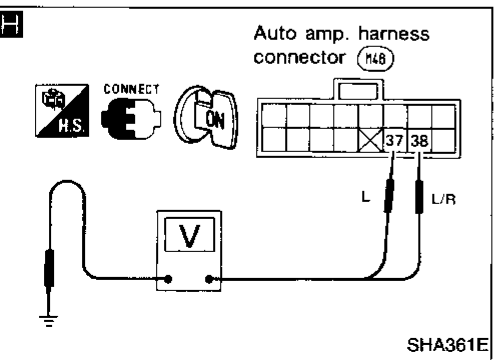
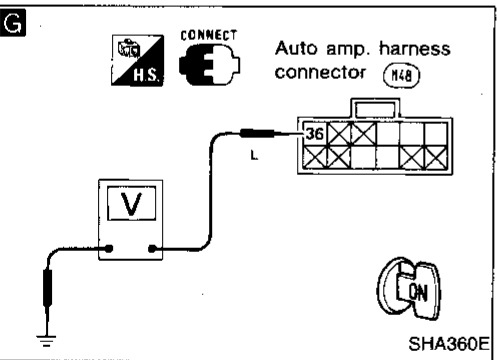
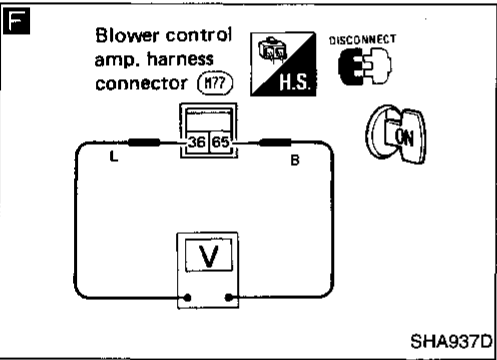
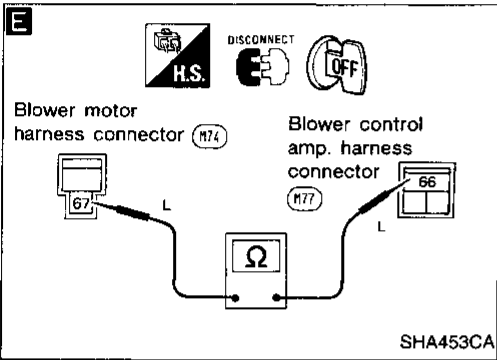
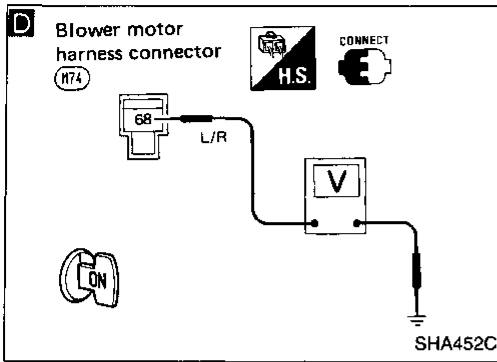
SYMPTOM: Blower motor operation is malfunctioning.

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



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

Diagnostic Procedure 25 (Cont'd)



C CHECK OUTPUT OF AUTO AMP.

- Set up "ACTIVE TEST" mode with CONSULT.
- Set up self-diagnosis STEP 2.

Measure voltage across fan control amp. harness connector terminals No. ③⑥ and ③⑦.

Blower motor voltage (V)	Code No.	Terminal No.		Voltage (Approx.) (V)
		③⑥	③⑦	
4	①			1.2
6	②			1.3
9	③	③⑥	③⑦	1.4
12	④			1.6

OK → Replace fan control amp.
 NG →

F Set up "ACTIVE TEST" mode with CONSULT. Set blower motor voltage at 9 volts. Set up self-diagnosis STEP 2. Set code No. in ④.

Do approx. 12 volts exist between fan control amp. harness connector terminal No. ③⑥ and ③⑦?

Yes →

Replace fan control amp.

G CHECK FOR OUTPUT OF AUTO AMP.

- Set up "ACTIVE TEST" mode with CONSULT.
- Set blower motor voltage at 9 volts.
- Set up self-diagnosis STEP 2. Set code No. in ④.

Do approx. 12 volts exist between auto amp. harness connector terminal No. ③⑥ and body ground?

NG →

OK →

Repair harness or connector.

H CHECK FOR FEEDBACK SIGNAL TO AUTO AMP.

Disconnect fan control amp. connector only. Do approx. 12 volts exist between auto amp. harness connector terminal No. ③⑦, ③⑧ and body ground?

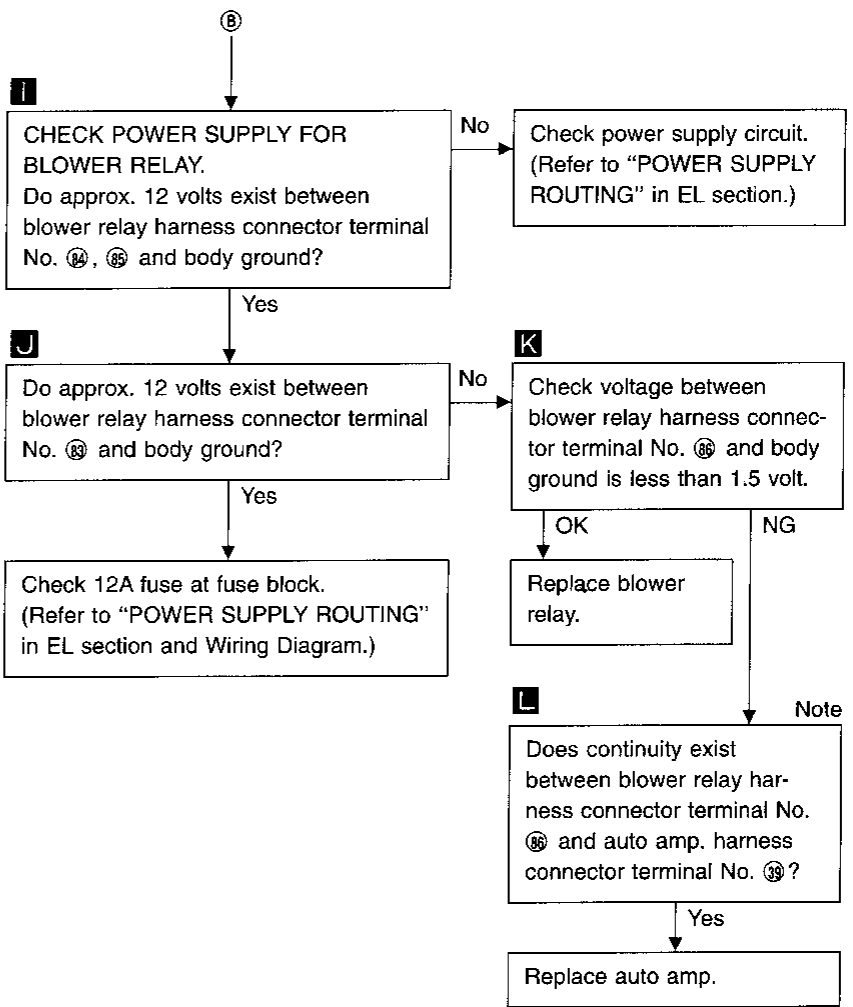
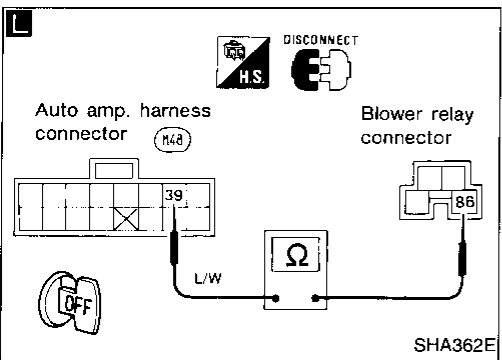
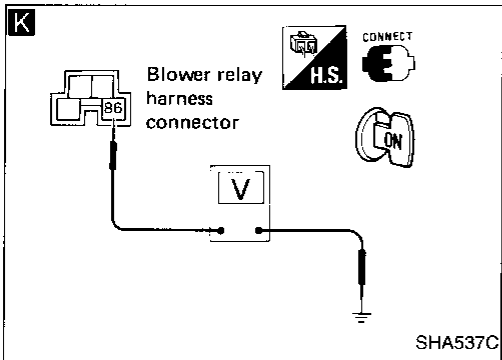
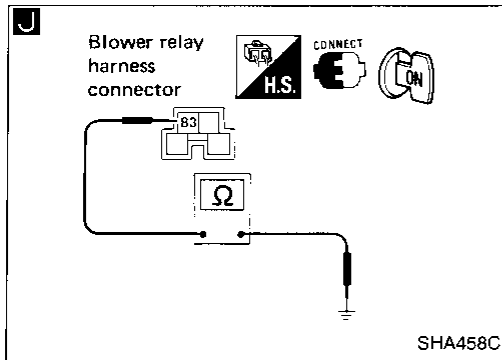
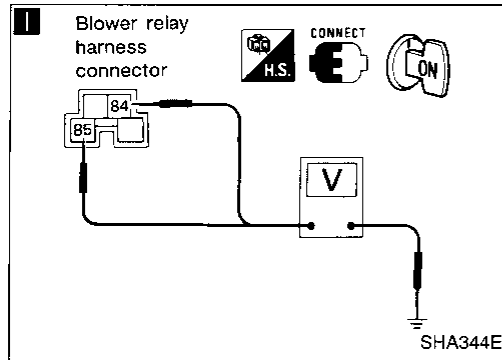
No →

Yes →

Repair harness or connector.

Replace auto amp.

Diagnostic Procedure 25 (Cont'd)



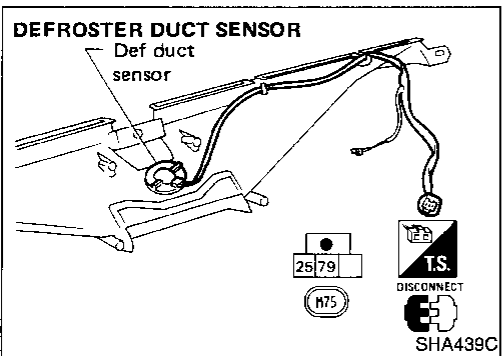
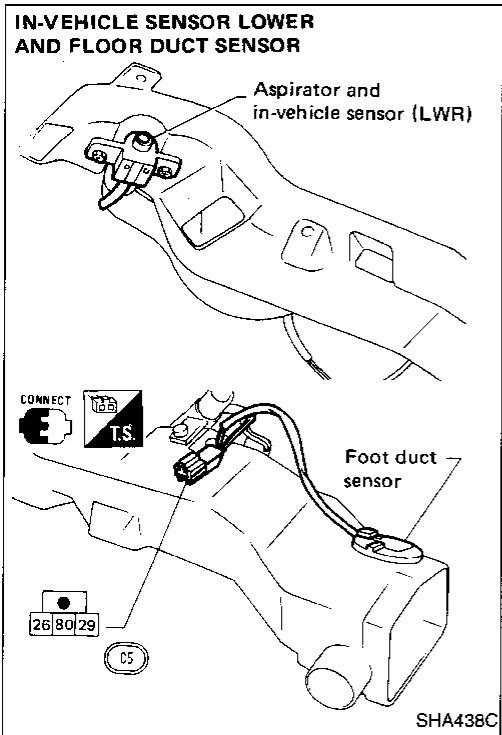
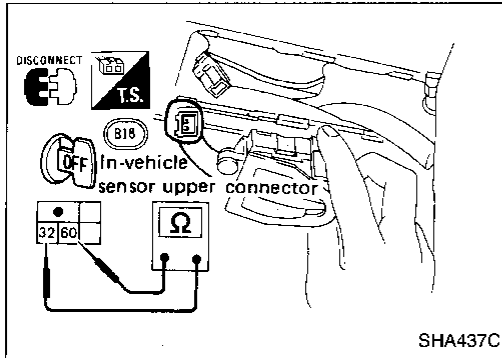
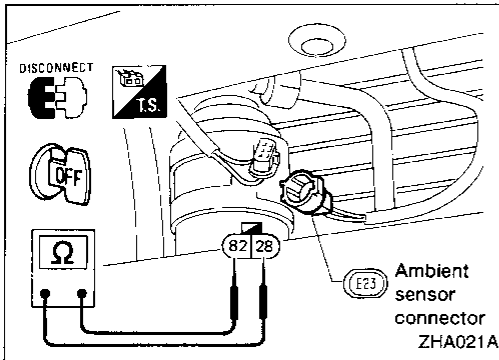
Note:
If the result is No after checking circuit continuity, repair harness or connector.

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Electrical Components Inspection

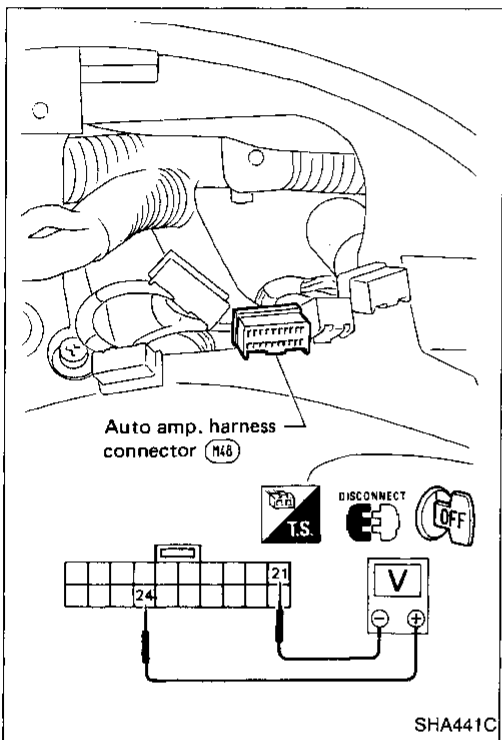
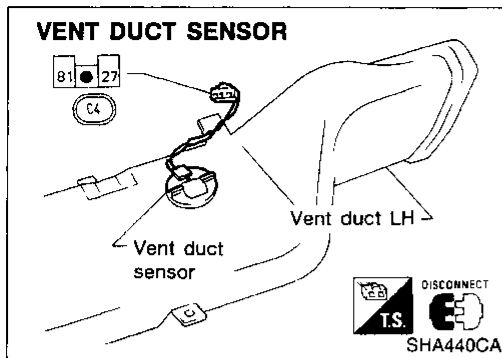
TEMPERATURE SENSORS

After disconnecting temperature sensors harness connector measure resistance between terminals of each sensor, using the table below.



Temperature °C (°F)	Resistance kΩ
-40 (-40)	210.55
-35 (-31)	146.86
-30 (-22)	103.97
-25 (-13)	74.63
-20 (-4)	54.28
-15 (5)	39.97
-10 (14)	29.77
-5 (23)	22.43
0 (32)	17.07
5 (41)	13.11
10 (50)	10.18
15 (59)	7.96
20 (68)	6.29
25 (77)	5.00
30 (86)	4.01
35 (95)	3.24
40 (104)	2.63
45 (113)	2.15
50 (122)	1.77
55 (131)	1.47
60 (140)	1.22
65 (149)	1.02
70 (158)	0.86
75 (167)	0.73
80 (176)	0.62

Electrical Components Inspection (Cont'd)



SUNLOAD SENSOR

Measure voltage between terminals ⑳ and ㉑ at vehicle harness side using the table below.

Input current mA	Output voltage (V)
0	5
0.1	4
0.2	3
0.3	2
0.4	1
0.5	0

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

MODE DOOR MOTOR

Check to see if motor rotates when 12V is applied across mode door motor connector terminals No. ④⑦ and No. ⑦⑩.

Terminal No.		Mode door operation
④⑦	⑦⑩	
⊖	⊕	VENT → DEF
⊕	⊖	DEF → VENT

Check to see if mode door PBR resistance is varied according to mode door position, as shown in the following table.

Mode door position	Resistance between terminal No. ④⑥ and ⑦⑩
DEF	3 kΩ
FOOT/DEF	1.6 kΩ
B/L	0.7 kΩ
VENT	0Ω

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Electrical Components Inspection (Cont'd)

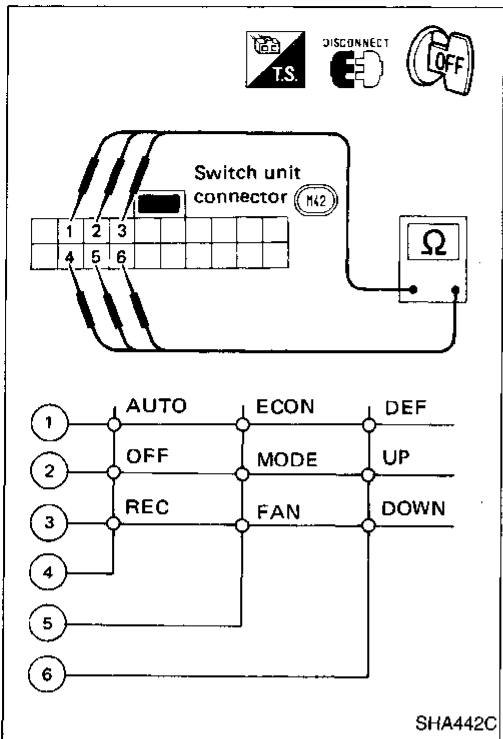
AIR CONDITIONER SWITCH UNIT

Check the resistance between switch unit connector terminals as follows:

Switch condition	Resistance
Press	Less than 500Ω
Free	∞

Example:

When Auto switch is pressed, the resistance between terminal No. ① and ④ is less than 500Ω.



BLOWER MOTOR

- Refer to page HA-54.

RELAYS

- Refer to page HA-55.

DUAL-PRESSURE SWITCH

- Refer to page HA-55.

Control Linkage Adjustment

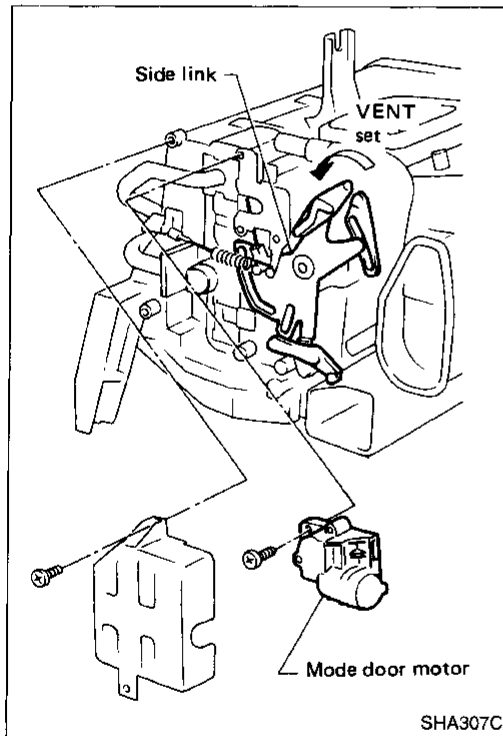
MODE DOOR

1. Move side link by hand and hold mode door in VENT mode.
2. Install mode door motor on heater unit and connect it to harness.
3. Turn ignition switch to ON.
4. Set up "ACTIVE TEST" mode with CONSULT or set up self-diagnosis STEP 2.
5. Set MODE DOOR position as in the following table.

MODE DOOR POSITION	Code No.
VENT	2

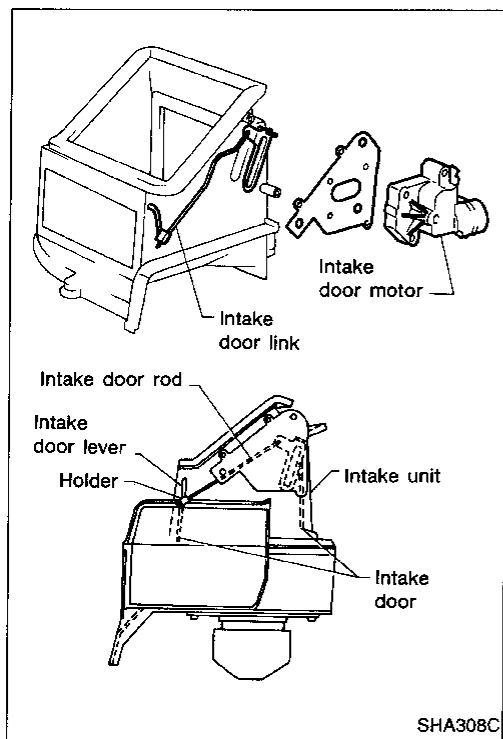
6. Attach mode door rod to side link rod holder.
7. Check mode door operates when position is changed with CONSULT or when code No. 2 is changed to others.

Code No.	DEF	HEAT	B/L	VENT
Mode door position	DEF	HEAT	B/L	VENT







Control Linkage Adjustment (Cont'd)






INTAKE DOOR

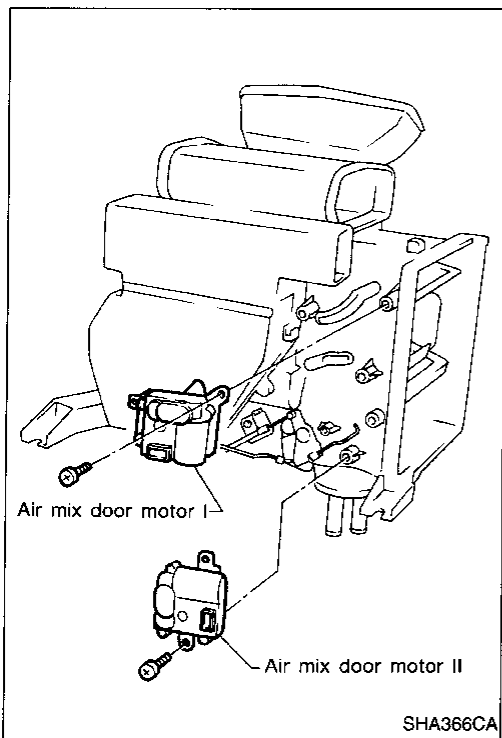


1. Install intake door motor on intake unit.
2. Connect intake door motor to harness.
3. Turn ignition switch to ON.
4. Set up "ACTIVE TEST" mode with CONSULT or set up self-diagnosis STEP 2.
5. Set INTAKE DOOR position as in the following table.

 INTAKE DOOR POSITION	 Code No.
REC	

6. Install intake door lever.
7. Set intake door rod in REC position and fasten intake door rod to holder intake door lever.
8. Check intake door operates properly when position is changed with CONSULT or when code No.  is changed to others.

 Code No.				
Intake door position	Outside air	Partial outside air	Recirculation	



AIR MIX DOOR

1. Connect harness to air mix door motors I and II and set temperature control lever at full-cold position.
2. Set air mix doors I and II at full-cold position and fasten door rod.
3. Check that both doors are at full-cold position when temperature control lever is at full-cold. Also, check that both doors are at full-hot position when temperature control lever is at full-hot.

WATER COCK CONTROL CABLE

Clamp cable at full-close position when air mix door II is at full-cold position. Check that water cock operates properly when the set temperature is at full-hot and full-cold.

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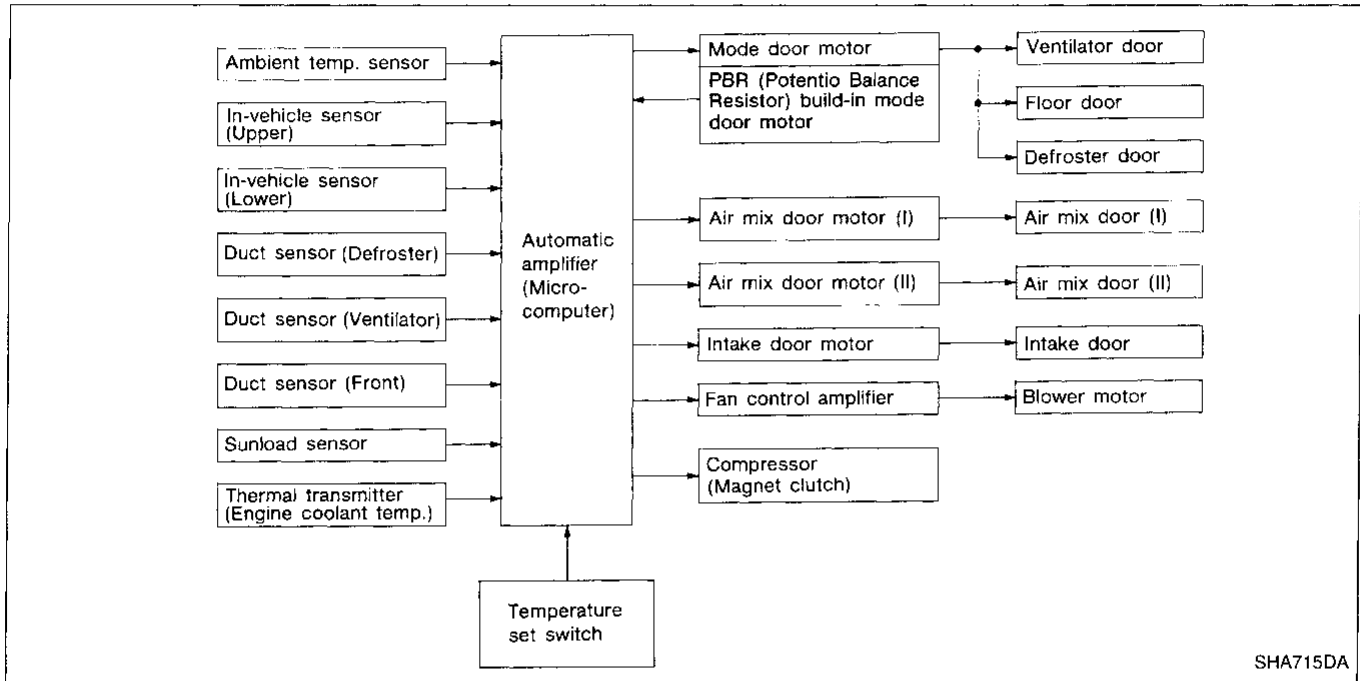
IDX

Specifications

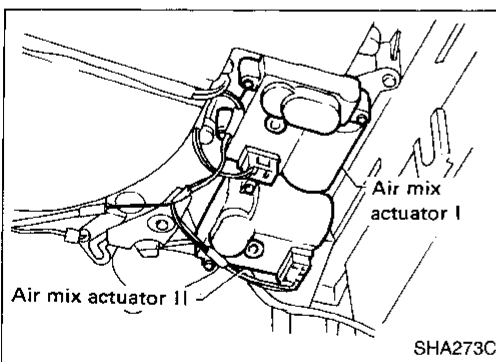
AUTO AMPLIFIER

The auto amplifier has a built-in microcomputer which processes information from the ATC system sensors. Signals are sent from the auto amplifier to activate the ATC system. This activation depends upon the information sent by these sensors and the set temperature selected on the switch panel.

The ATC system's self-diagnostic capabilities are built into the auto amplifier.



SHA715DA



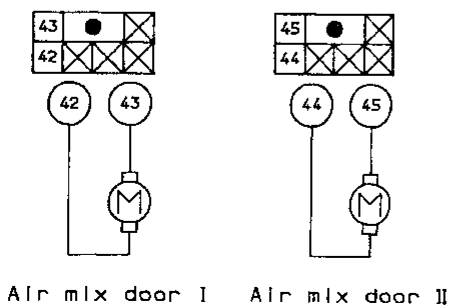
SHA273C

AIR MIX DOOR I AND II MOTORS

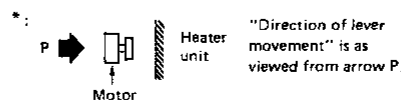
Component and related parts

- Auto amplifier
- Air mix door motors
- In-vehicle sensors (upper and lower)
- Duct sensors (vent, foot, defroster)
- Ambient sensor
- Sunload sensor

Operation of air mix door I and II motors



④② ④④	④③ ④⑤	Air mix door I and II operation	Direction of lever movement
⊖	⊕	COLD → HOT	*Clockwise
-	-	STOP	STOP
⊕	⊖	HOT → COLD	*Counterclockwise



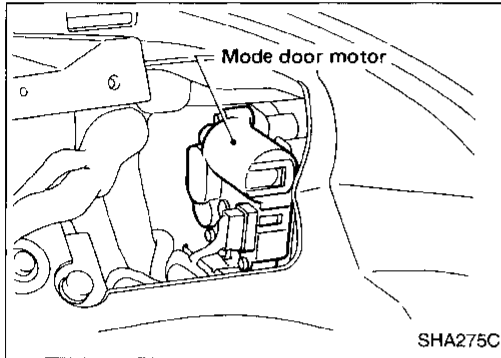
SHA940D

Specifications (Cont'd)

System operation

The air mix door motors are attached to the bottom of the heater unit. The motors rotate, moving a lever system which varies the air mix door position to heat or cool the inlet air. Outlet air temperature is measured by the duct sensors. Signals from the duct sensors are sent to the auto amplifier. The auto amplifier uses the signals to modify the air mix door position to achieve the current target temperature.

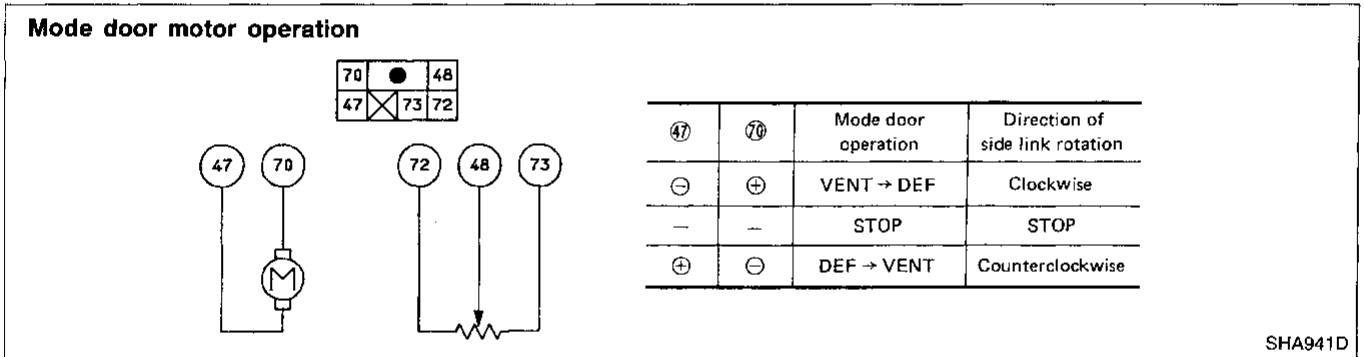
- It takes about 1 minute to stabilize duct air temperature.
- When ambient temperature is below 5°C (41°F) or above 60°C (140°F), air mix door position is fixed.



MODE DOOR MOTOR

Component and related parts

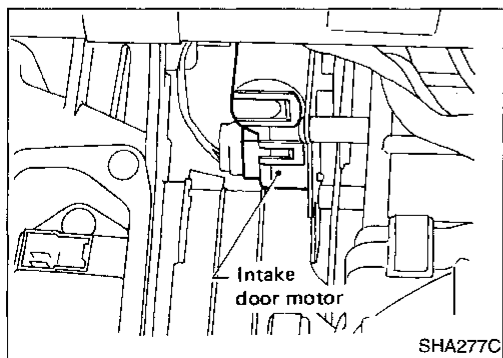
- Auto amplifier
- Mode door motor with potential ballast resistor (PBR)
- Lower in-vehicle sensor
- Ambient sensor
- Sunload sensor



System operation

The mode door motor is attached to the heater unit. The motor operates a cam assembly which moves the air outlet doors. The auto amplifier controls air distribution to the VENT, DEF and FOOT outlets. Outlet door position is conveyed to the auto amplifier by the PBR built into the mode door motor.

The auto amplifier computes air outlet conditions according to ambient temperature, set temperature and sunload. When thermal loads are great, the air outlet computation is additionally influenced by the foot area temperature. The air outlet positions are smoothly adjusted in response to changes in ambient temperatures. When the set temperature is decreased or when the sunload is increased, the air flow volume from the vent outlets is increased.



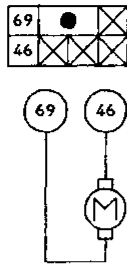
INTAKE DOOR MOTOR

Component and related parts

- Auto amplifier
- Intake door motor
- Upper in-vehicle sensor
- Vent duct sensor
- Ambient sensor
- Sunload sensor

Specifications (Cont'd)

Intake door operation



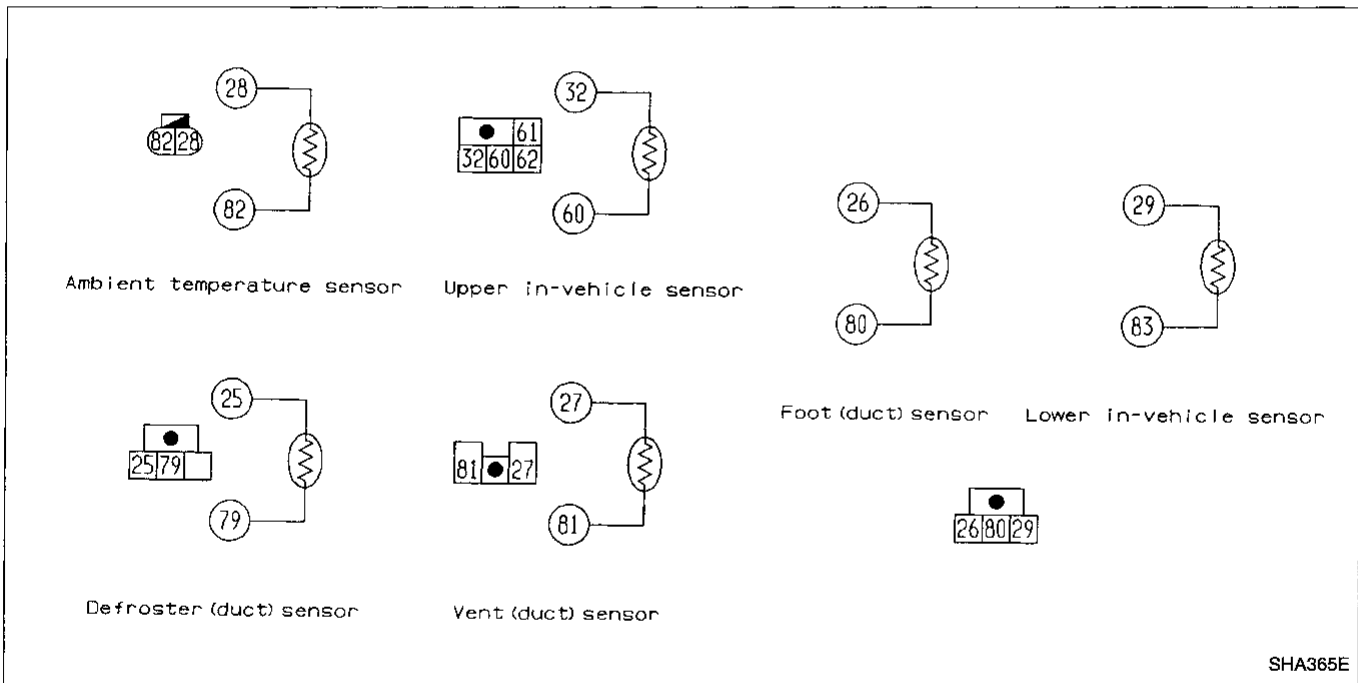
46	69	Intake door operation	Direction of lever rotation
⊖	⊕	REC → FRE	Counterclockwise
-	-	STOP	STOP
⊕	⊖	FRE → REC	Clockwise

SHA942D

System operation

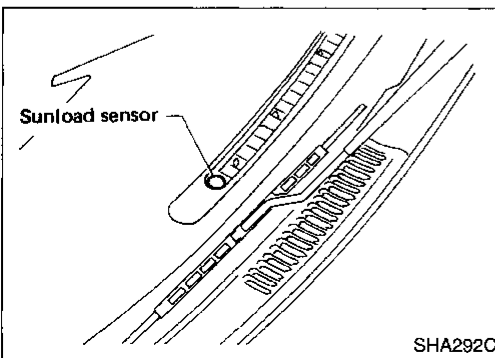
The intake door motor is attached to the air intake unit. Intake door position is controlled approximately once every thirty seconds, according to the difference between target and actual vent air temperatures. When the actual outlet air temperature is higher than the target vent air temperature, the intake door will gradually shift toward the recirculation-air side. When the outlet air temperature reaches the target outlet air temperature, the intake door will gradually shift toward the fresh air side. However, when the ambient temperature is lower than 20°C (68°F), 100% fresh air is taken regardless of outlet air temperatures. When the compressor is "OFF" the auto amplifier sets the intake door at the "FRESH" position except when the "RECIRC" switch is "ON".

TEMPERATURE SENSORS



SHA365E

SUNLOAD SENSOR



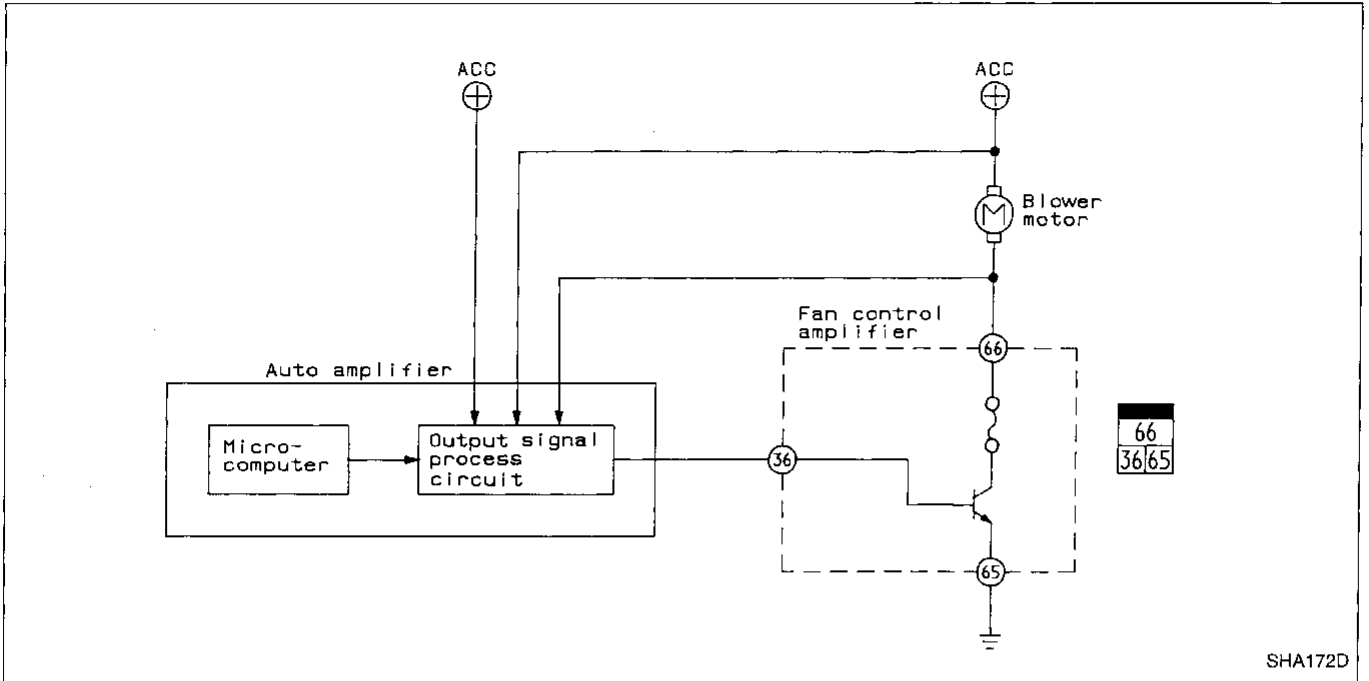
SHA292C

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

Specifications (Cont'd)

FAN CONTROL AMPLIFIER

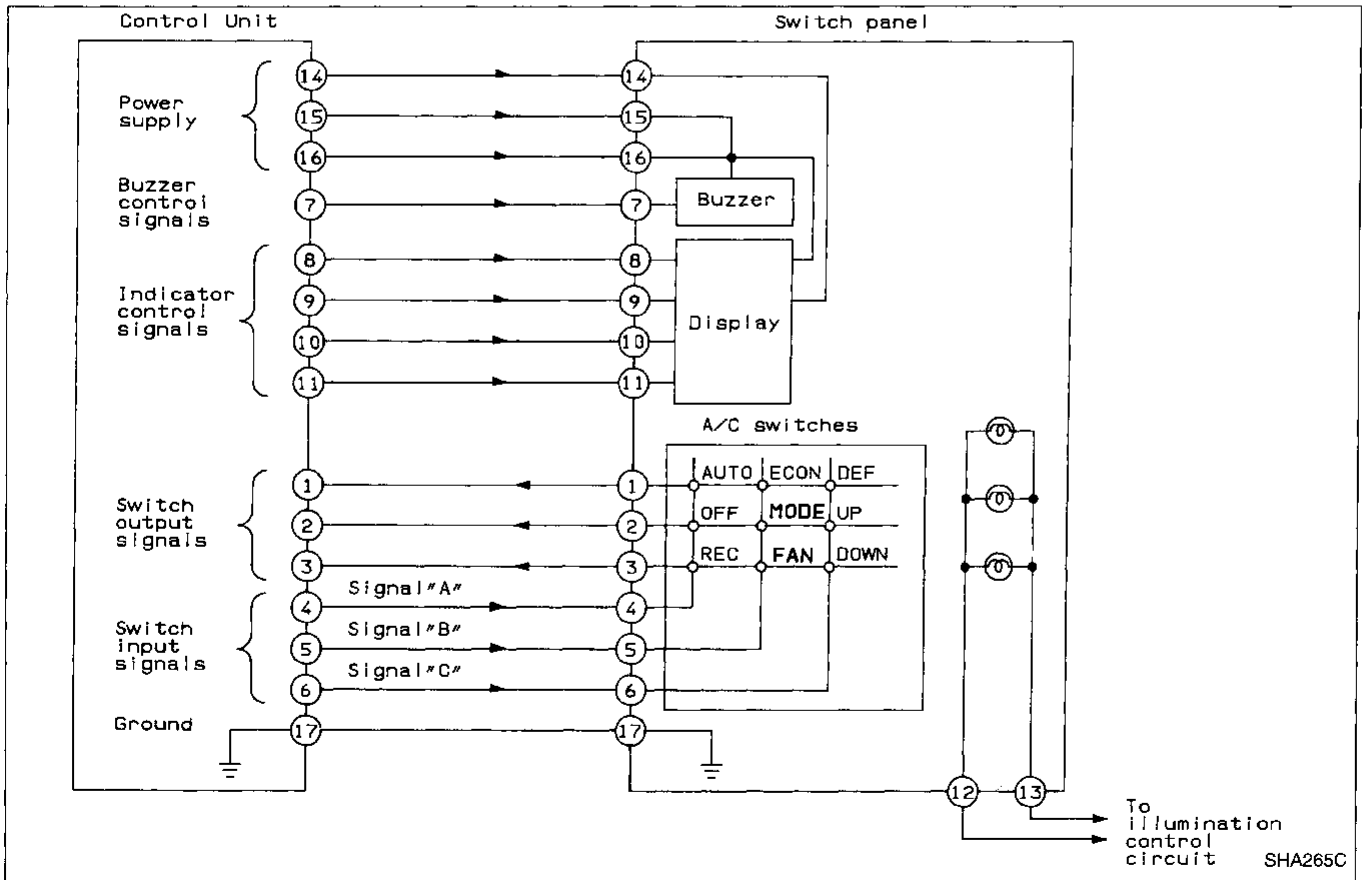
The fan control amplifier is located on the cooling unit. It amplifies the base current flowing from the auto amplifier to change the blower speed.



SHA172D

System Operation

SWITCH PANEL



SHA265C

System Operation (Cont'd)

System operation

Except for illumination lamp terminals ⑫ and ⑬, the switch panel is operated by signals emitted from the control unit. There are three categories of signals.

- 1) Power and ground signals
- 2) Indicators (VFD and LED) and buzzer control signals
- 3) Switch input and output signals

The control unit always sends three different signals to the switch panel on three lines ④, ⑤, and ⑥. For example, when the "Auto" switch is pushed, signal "A" returns to the control unit on line No. ①. And when the "Econ" switch is pushed, signal "B" returns to the control unit on line No. ①.

Similarly for the other switches; the control unit recognizes which signal returns on which line, and then identifies which switch is pushed.

AMBIENT TEMPERATURE INPUT PROCESS

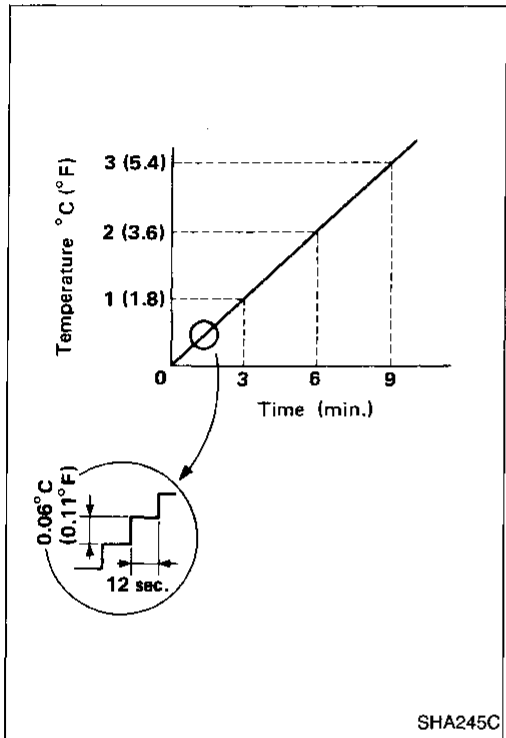
For ATC system operation an accurate ambient sensor signal is necessary. The auto amplifier contains a circuit to ensure accurate measurement of increases in ambient temperature. Sudden temperature increase of 16°C (61°F) or more may be detected when encountering heavy traffic after high speed cruising. It will be processed through a delay circuit. The delay circuit processes any temperature increase in increments of 0.06°C (0.11°F) every 12 seconds. In this way, the ATC system is protected from any sudden changes in ambient sensor signal due to low air flow around the sensor.

Temperature decreases are not processed through the time delay circuit.

Example:

In the case of a signal stop after high-speed cruising, the ambient temperature will rise suddenly.

The ambient temperature input process functions at this time to prevent unpleasant air conditioning system changes.

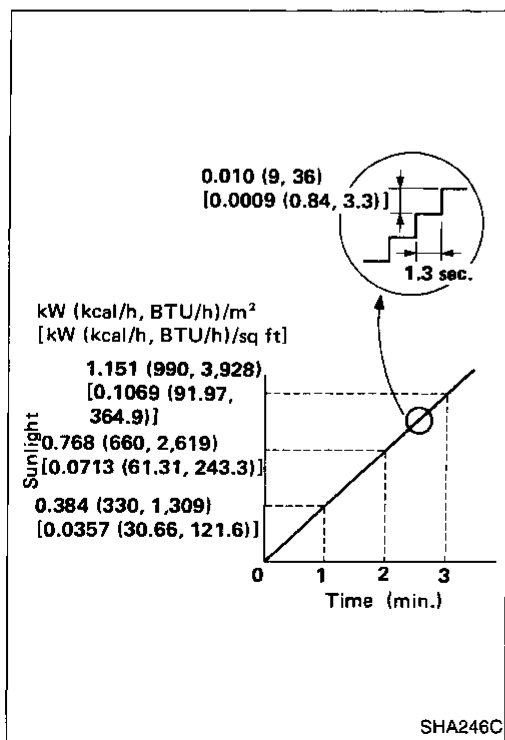


SUNLOAD INPUT PROCESS

The sunload input circuit in the auto amplifier also features a time delay to prevent abrupt ATC system changes. This feature operates under rapid increases and decreases in sunload.

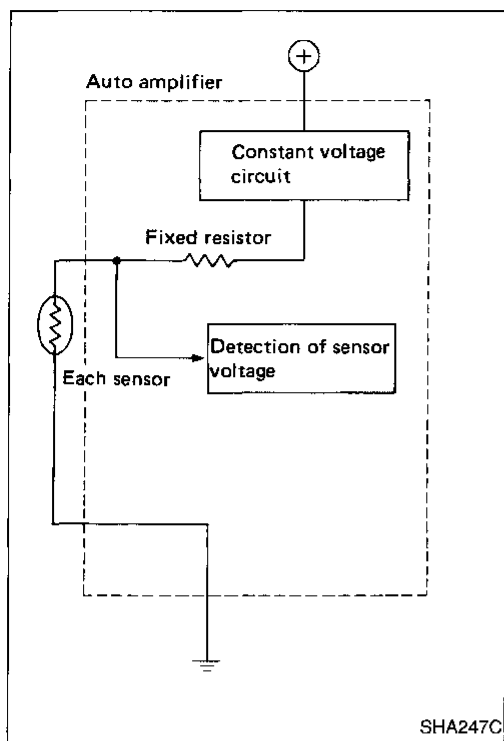
Example:

When entering a tunnel the sunload will change suddenly. The sunload input process system functions at this time to prevent unpleasant air conditioning system changes.



System Operation (Cont'd)

SENSOR INPUT PROCESS



A fixed resistor is built into the auto amplifier. 12V DC is converted to 5V DC by the constant voltage circuit. It is then applied to the ground line of the auto amplifier by the fixed resistor and sensors. The auto amplifier monitors the voltage between each sensor and the fixed resistor. The resistance of each sensor varies according to temperature.

Accordingly, the voltage at each sensor varies according to the temperature. The voltage signal is processed by the auto amplifier for ATC system operation.

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STARTING FAN SPEED AND OUTLET DOOR CONTROL

Component parts

Starting fan speed and outlet door control components are:

- Auto amplifier.
- Fan control amplifier.
- In-vehicle sensors (Upper and Lower).
- Duct sensor (Defroster, Ventilator and Floor).
- Ambient sensor.
- Sunload sensor.
- Thermal transmitter (Engine coolant temperature sensor).

System operation

- Fan speed control

The fan starts at minimum flow rate under the following conditions:

- The set temperature is 25°C (77°F).
- The upper compartment temperature is below 21°C (70°F).
- The outlet duct temperature is lower than 35°C (95°F).

As the discharge air temperature increases, the air flow rate increases. This brings the compartment temperature to the target level as quickly as possible.

When the ambient temperature is above 40°C (104°F), fan air flow rate is at full volume.

As interior temperature begins to reach the target temperature, fan speed decreases.

Under heavy sunload conditions, fan speed is increased to maintain uniform interior temperature. Fan speed also increases if the set temperature is decreased.

- Outlet door control

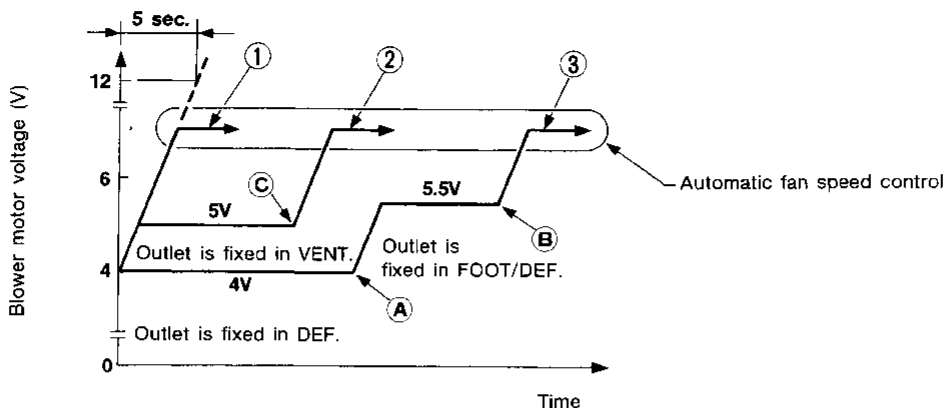
The system starts with the minimum airflow rate in the defroster mode under the following conditions:

- The set temperature is 25°C (77°F).
- The upper in-vehicle temperature is lower than 21°C (70°F).
- All of the outlet air temperatures are lower than 24°C (75°F).

When defroster duct temperature rises above 24°C (75°F), the air outlet mode changes from the defroster mode to the DEF/FOOT mode. When foot duct temperature exceeds 39°C (102°F), the starting fan speed control and outlet door control mode are replaced by the normal automatic control mode. With a large sunload, the upper in-vehicle temperature will be far greater than the lower in-vehicle temperature. In this case, the system starts with the ventilator mode. This mode is replaced by the automatic control mode as the coolant temperature and outlet air temperature increase.

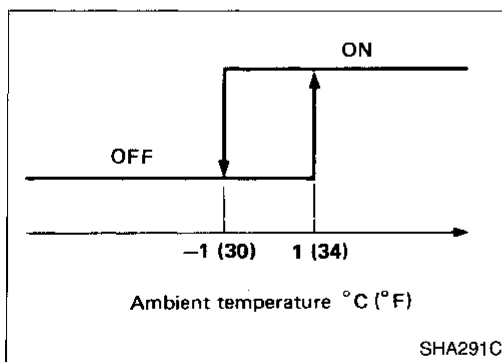
System Operation (Cont'd)

Starting fan speed and outlet door control specifications



- ① : When both upper and lower in-vehicle temperatures are much higher than set temperature.
- ② : When upper in-vehicle temperature is higher than set temperature.
- ③ : When upper in-vehicle temperature is lower than set temperature.
- Ⓐ : When DEF duct temperature rises above 24°C (75°F)
(Exact temperature depends on ambient temperature.)
- Ⓑ : When FOOT duct temperature rises above 39°C (102°F)
(Exact temperature depends on ambient temperature.)
- Ⓒ : When engine coolant temperature rises above 40°C (104°F) and difference between outlet air temperature and target temperature is lower than 5°C (9°F).

SHA550D



SHA291C

MAGNET CLUTCH CONTROL

The auto amplifier controls compressor operation by the ambient temperature and signals from the ECM (ECCS control module). The auto amplifier will turn the compressor "ON" or "OFF" as determined by a signal detected by the ambient temperature sensor.

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

SETTING OF SERVICE TOOLS AND EQUIPMENT

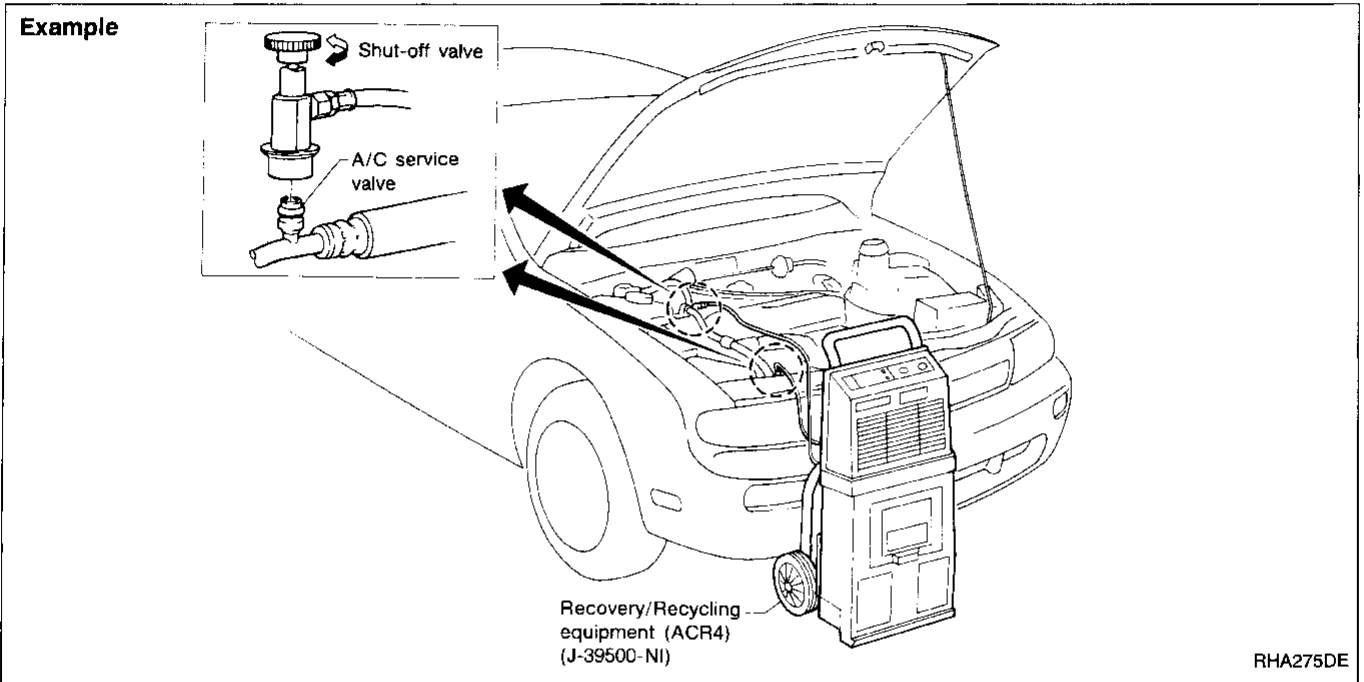
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DISCHARGING REFRIGERANT

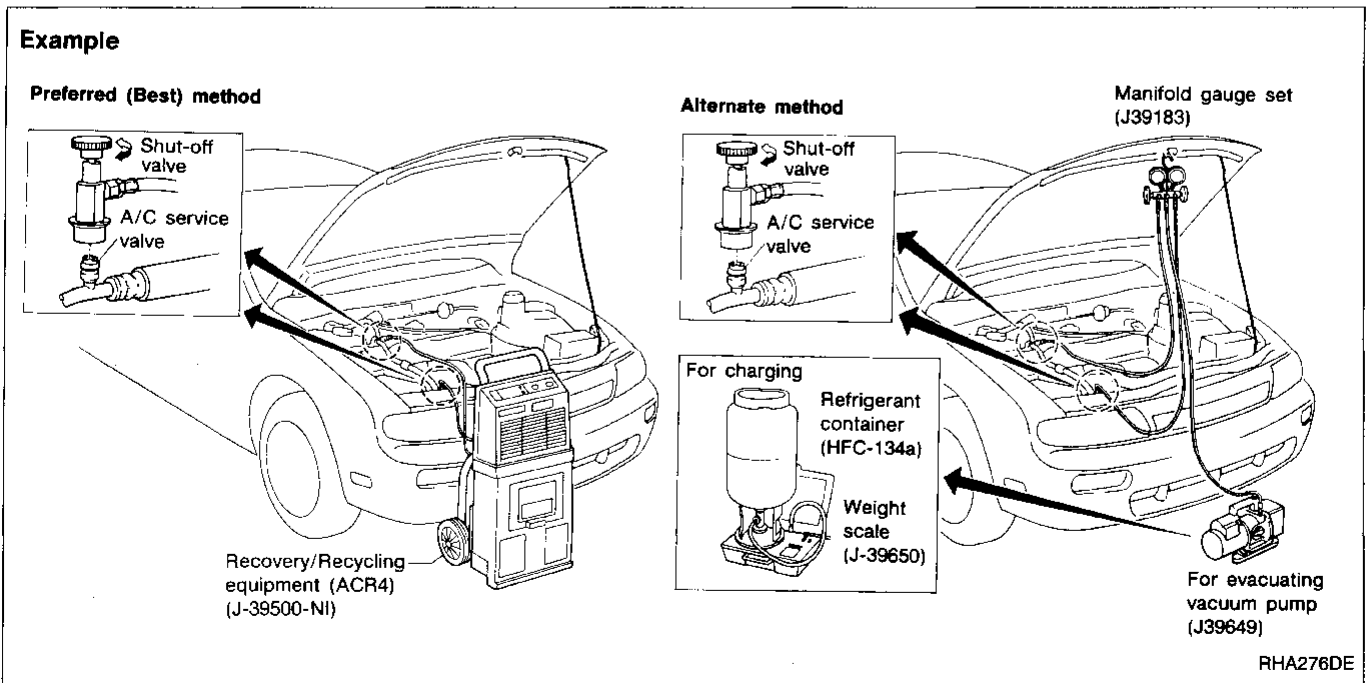
WARNING:

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

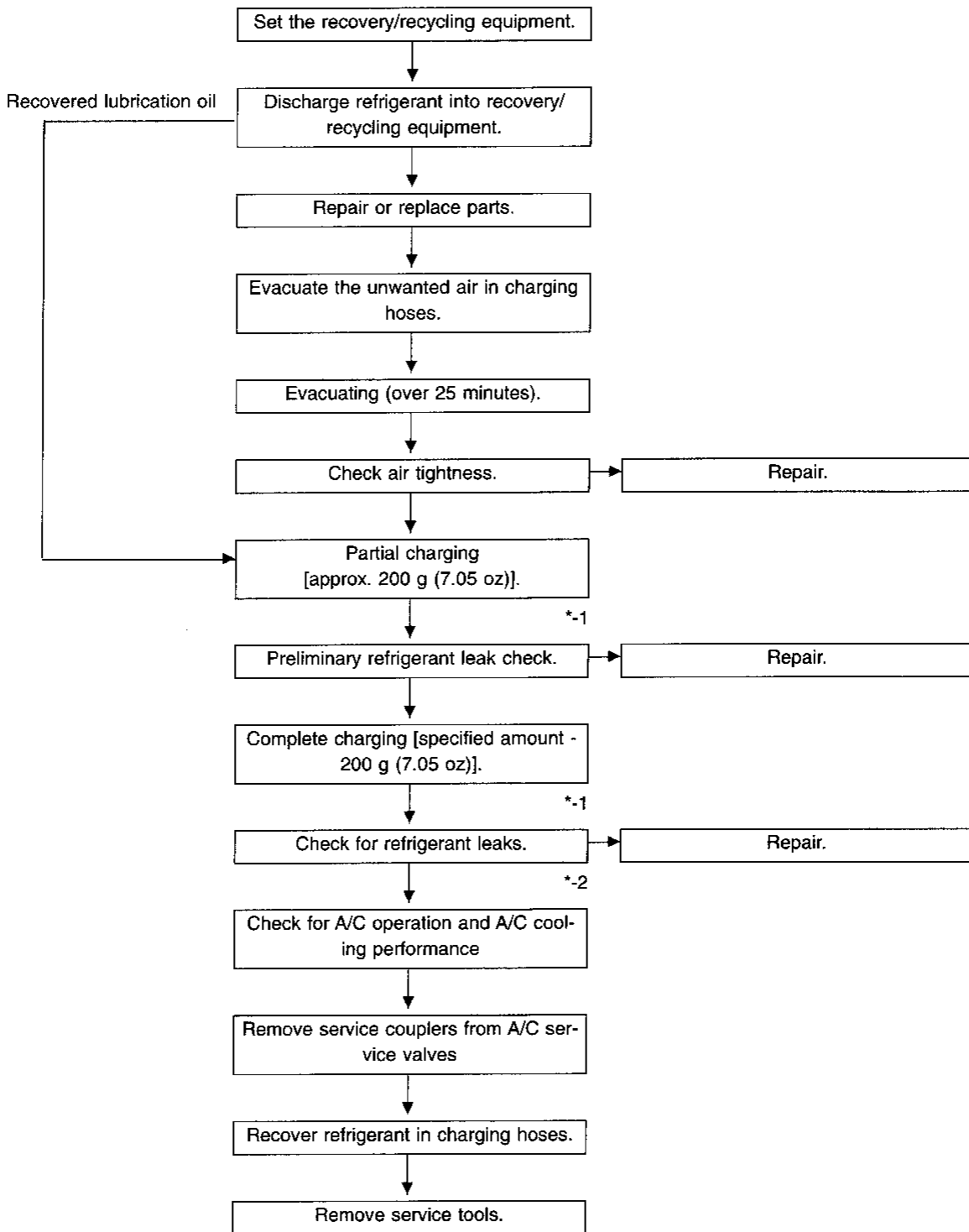
Additional health and safety information may be obtained from refrigerant and lubricant manufacturers.



EVACUATING SYSTEM AND CHARGING REFRIGERANT



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



Note: *-1 Before charging refrigerant, ensure engine is off.

*-2 Before checking for leaks, start engine to activate air conditioning system then turn off. Service valve caps must be attached to valves (to prevent leakage).

Maintenance of Oil Quantity in Compressor

The lubricant used to lubricate the compressor circulates through the system with the refrigerant. Add lubricant to compressor when replacing any component or a large amount of gas leakage has occurred. It is important to maintain the specified amount.

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

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

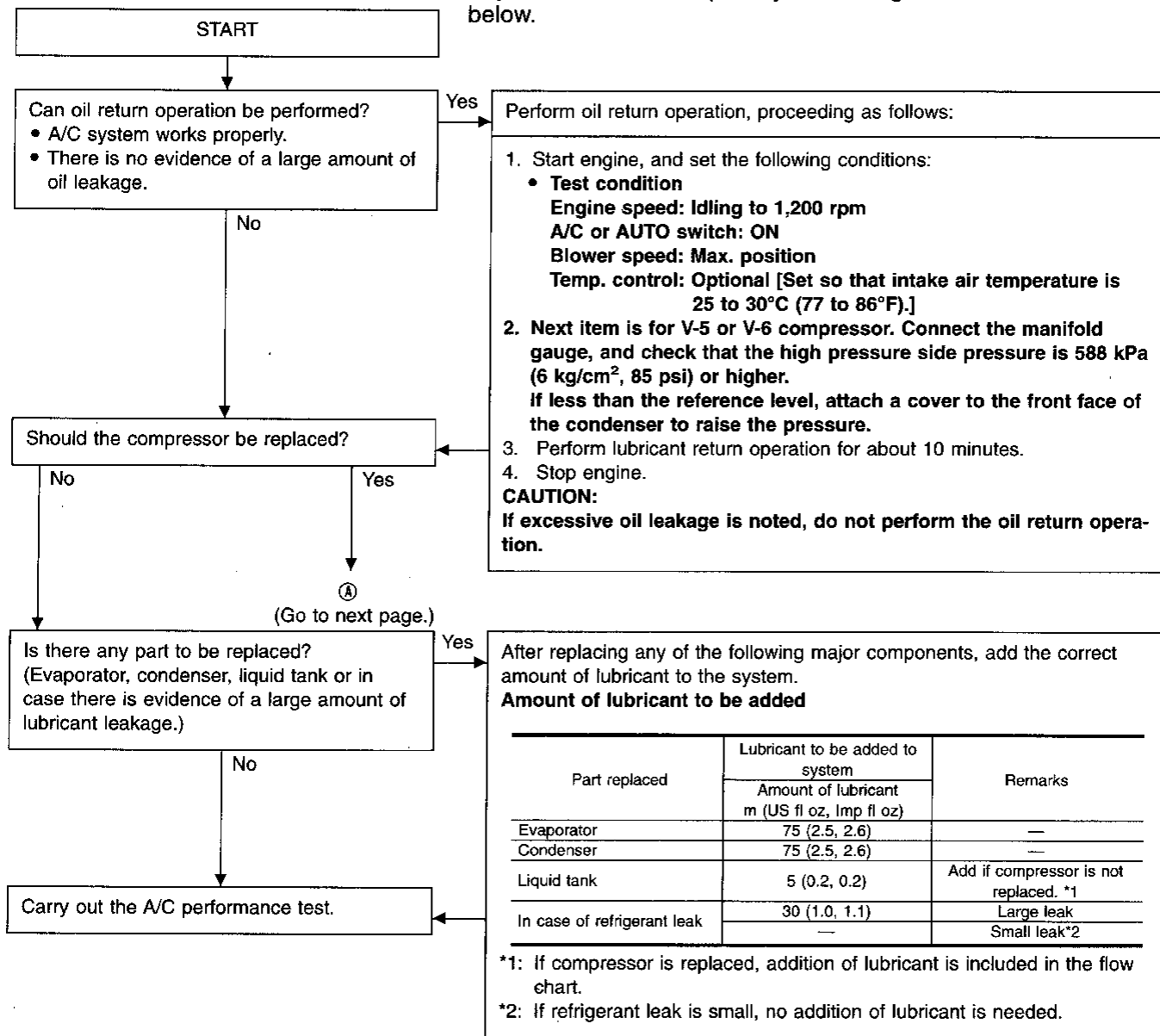
LUBRICANT

Name: Nissan A/C System Oil Type S

Part number: KLH00-PAGS0

CHECKING AND ADJUSTING

Adjust the lubricant quantity according to the flowchart shown below.

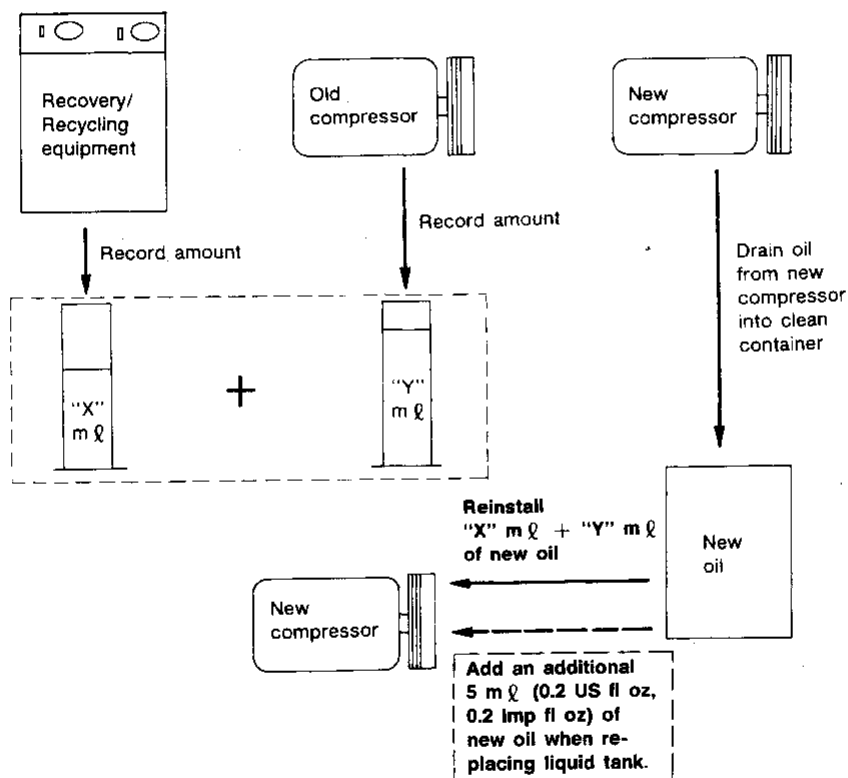


Maintenance of Oil Quantity in Compressor
(Cont'd)



1. Discharge refrigerant into the refrigerant recovery/recycling equipment. Measure oil discharged into the recovery/ recycling equipment.
2. Remove the drain plug of the "old" (removed) compressor (applicable only to V-5, V-6 or DKS-16H compressor). Drain the oil into a graduated container and record the amount of drained oil.
3. Remove the drain plug and drain the oil from the "new" compressor into a separate, clean container.
4. Measure an amount of new oil equal to amount drained from "old" compressor. Add this oil to "new" compressor through the suction port opening.
5. Measure an amount of new oil equal to the amount recovered during discharging. Add this oil to "new" compressor through the 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 m (0.2 US fl oz, 0.2 Imp fl oz) of oil at this time.
Do not add this 5 m (0.2 US fl oz, 0.2 Imp fl oz) of oil if only replacing the compressor.

Oil adjusting procedure for compressor replacement

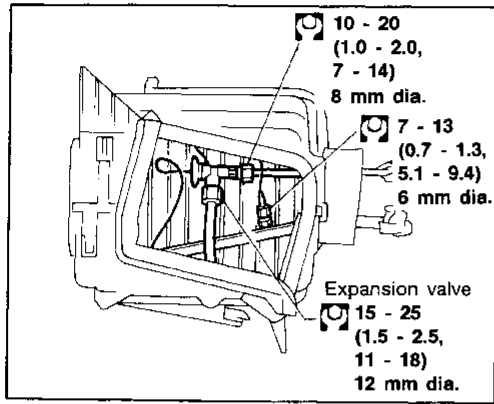


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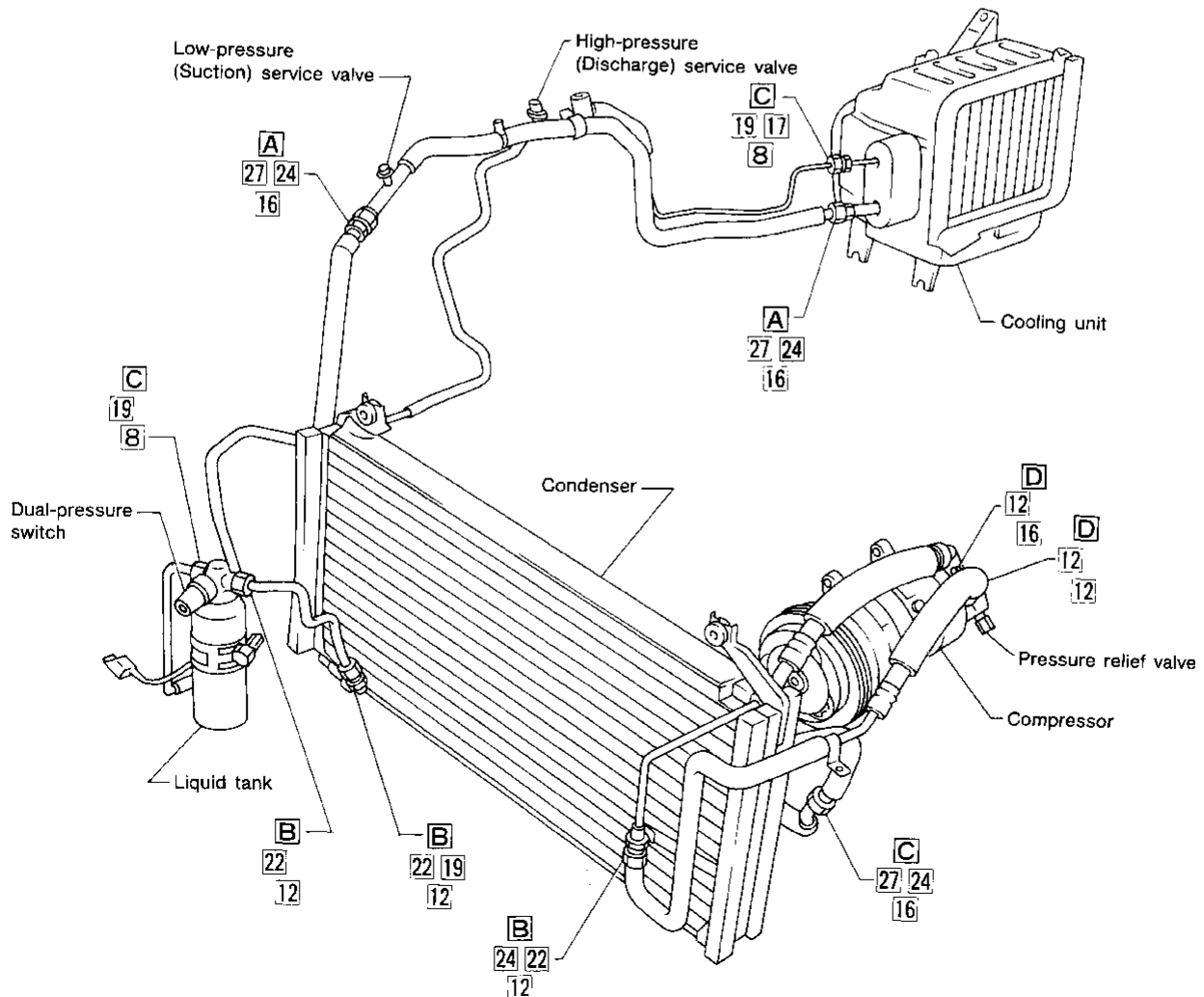
Refrigerant Lines

- Refer to "Precautions for Refrigerant Connection" on page HA-5.

VG30DE ENGINE MODEL



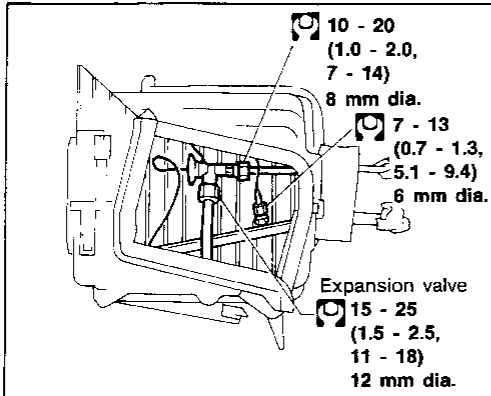
- (Tightening torque)
- (Wrench size)
- (O-ring size)
- A** : 20 - 29 (2.0 - 3.0, 14 - 22)
- B** : 15 - 25 (1.5 - 2.5, 11 - 18)
- C** : 10 - 20 (1.0 - 2.0, 7 - 14)
- D** : 15 - 19 (1.5 - 1.9, 11 - 14)
- : N·m (kg-m, ft-lb)



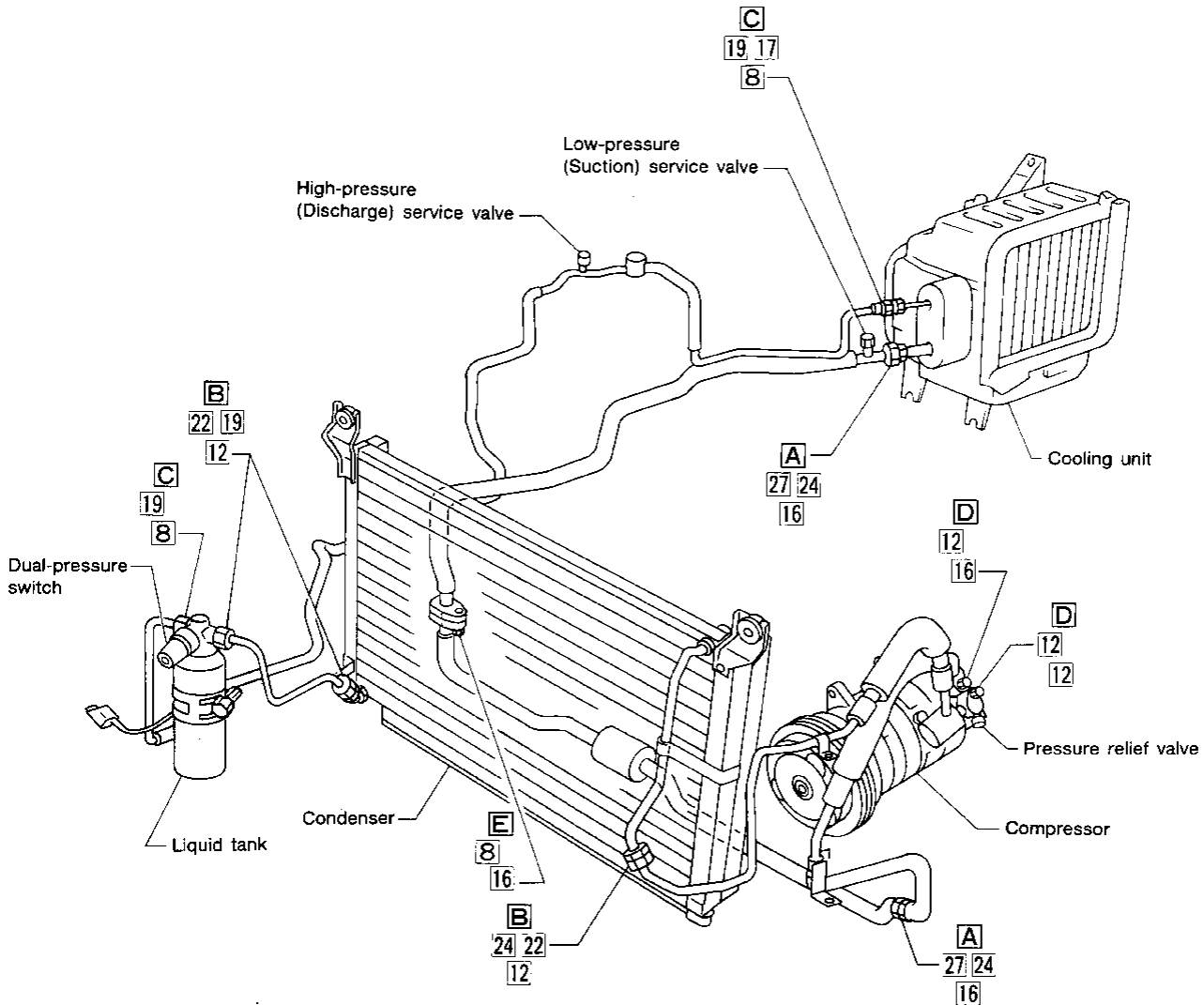
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Refrigerant Lines (Cont'd)

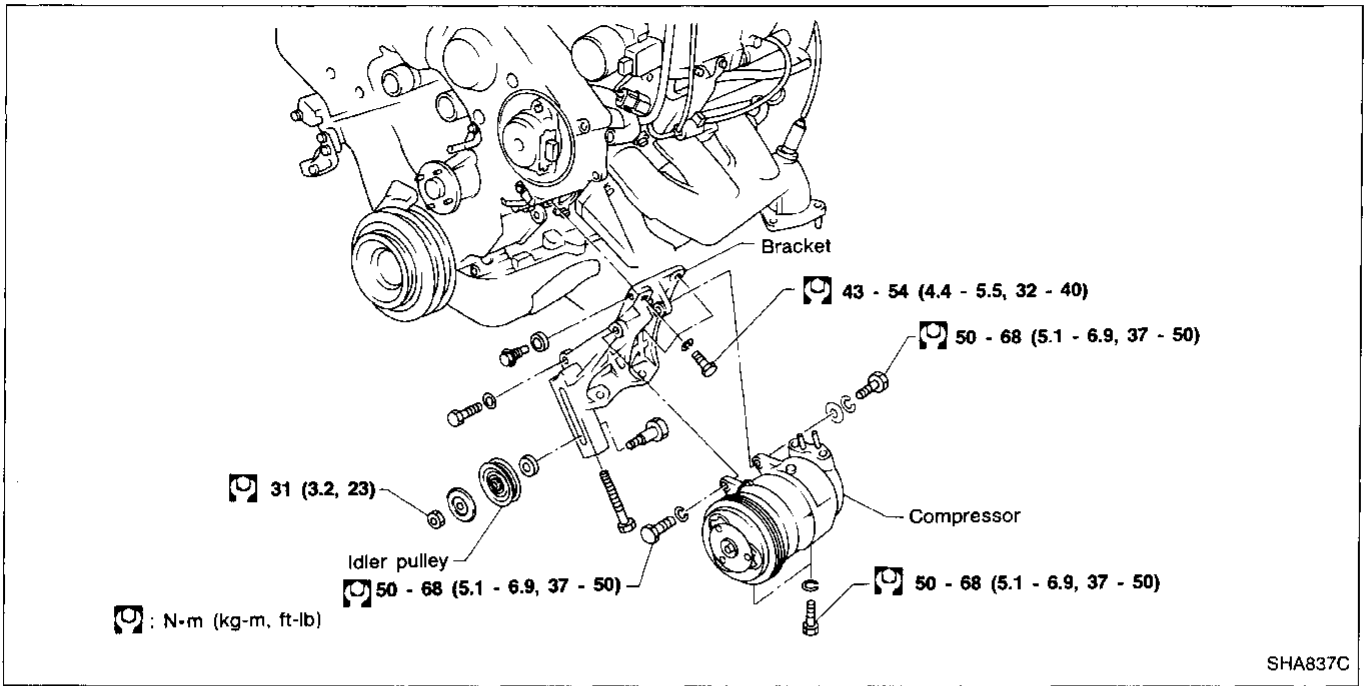
VG30DETT ENGINE MODEL



- (Tightening torque)
- (Wrench size)
- (O-ring size)
- A** : 20 - 29 (2.0 - 3.0, 14 - 22)
- B** : 15 - 25 (1.5 - 2.5, 11 - 18)
- C** : 10 - 20 (1.0 - 2.0, 7 - 14)
- D** : 15 - 19 (1.5 - 1.9, 11 - 14)
- E** : 14 - 18 (1.4 - 1.8, 10 - 13)
- : N·m (kg-m, ft-lb)



Compressor Mounting



Belt Tension

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

Fast Idle Control Device (FICD)

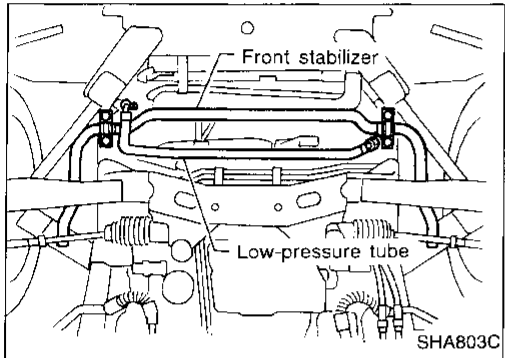
- Refer to section EF & EC.

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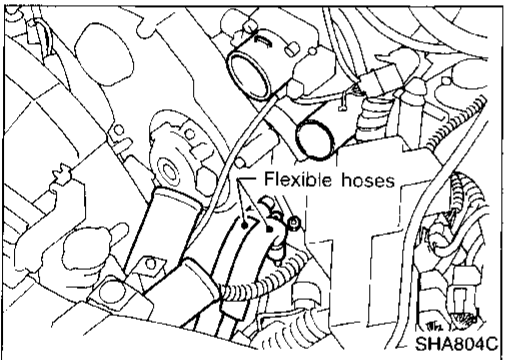
Removal and Installation — Compressor

REMOVAL

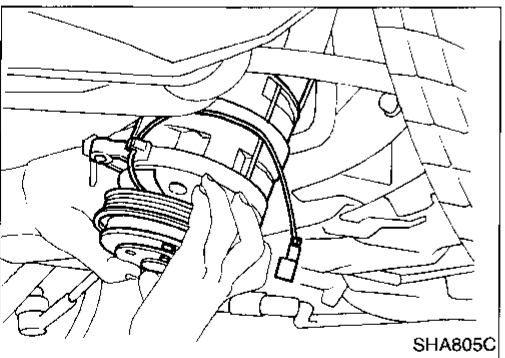
1. Disconnect battery cable.
2. Discharge refrigerant into your refrigerant recycling equipment.
3. Remove under cover.



4. Remove low pressure tube, front stabilizer bar and its clamps.
5. Loosen idler pulley nut and adjusting bolt. Remove idler pulley.



6. Remove air pipes and hoses to make room.
7. Remove two nuts to separate high and low pressure flexible hoses from compressor.
8. Disconnect compressor harness connector.
9. Remove two compressor fixing bolts (upper).

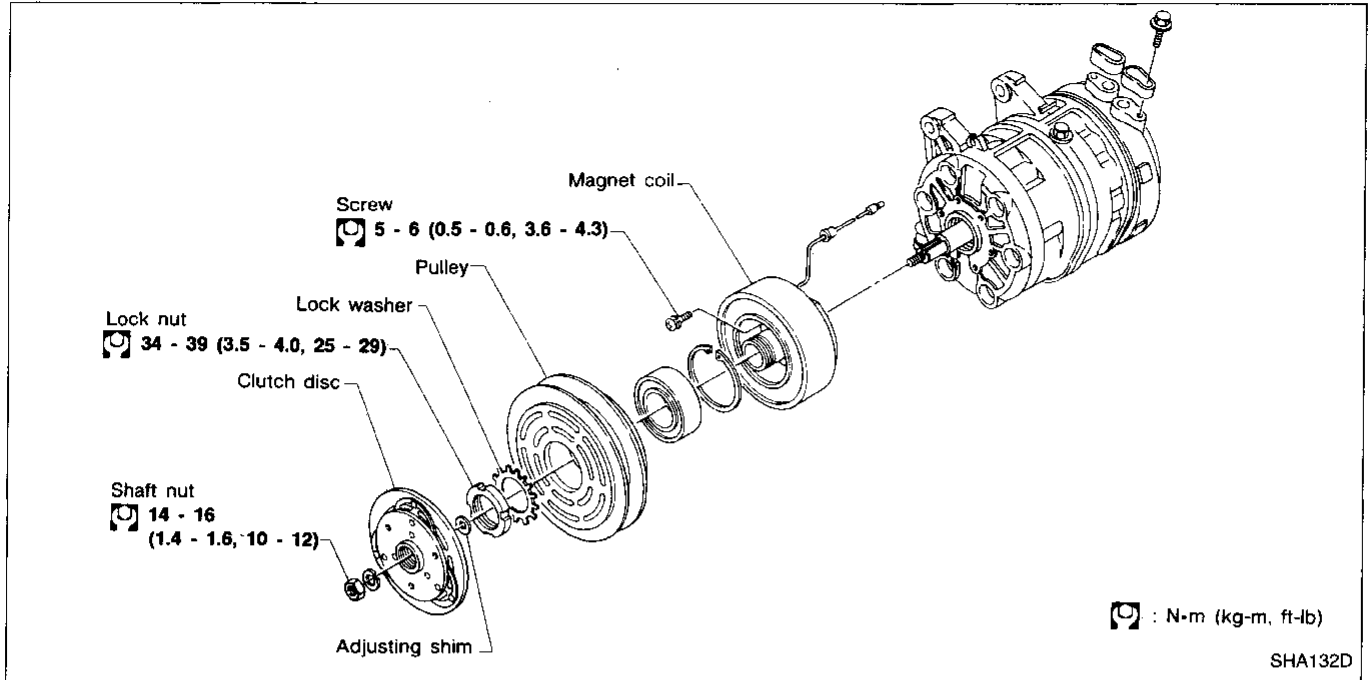


10. Remove two compressor fixing bolts (lower).
11. Remove the compressor as shown in the left-hand figure.

INSTALLATION

Installation is the reverse order of removal. Tightening torque related to front stabilizer: refer to FA section.

Compressor — Model DKS-16H (ZEXEL make)

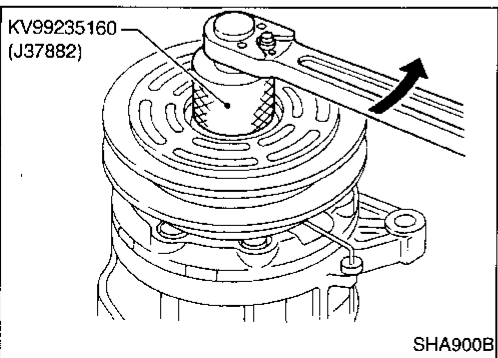
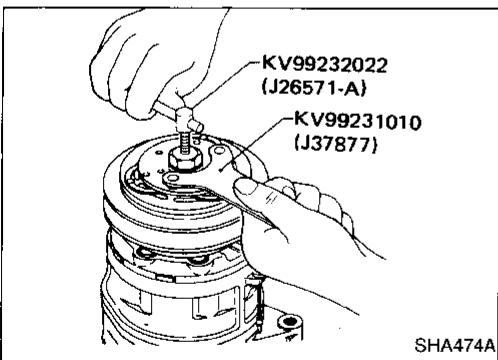
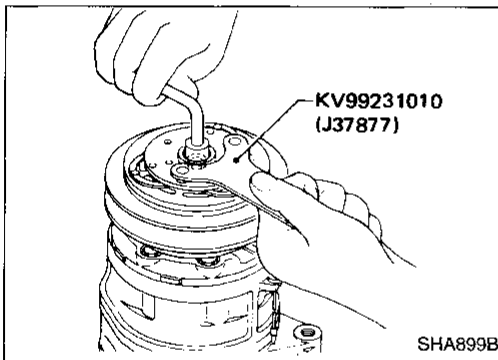


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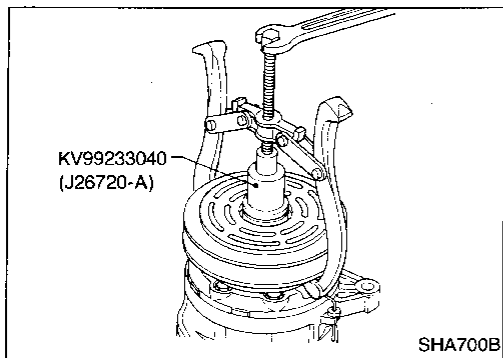
COMPRESSOR CLUTCH

Removal

- When removing shaft nut, hold clutch disc with clutch disc wrench.
- Using clutch disc puller, clutch disc can be removed easily.
- Bend down pawl of lock washer.
- When removing pulley, remove lock nut with nut wrench.



**Compressor — Model DKS-16H (ZEXEL make)
(Cont'd)**



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

Inspection

Clutch disc

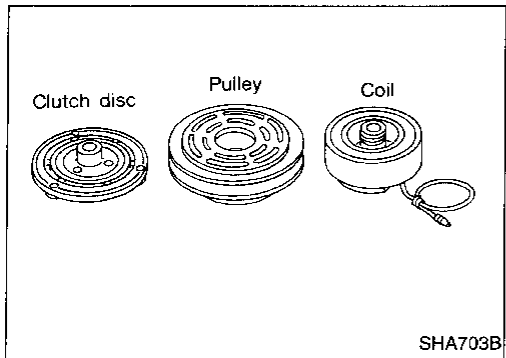
If the contact surface shows signs of damage due to excessive heat, replace drive plate and pulley.

Pulley

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

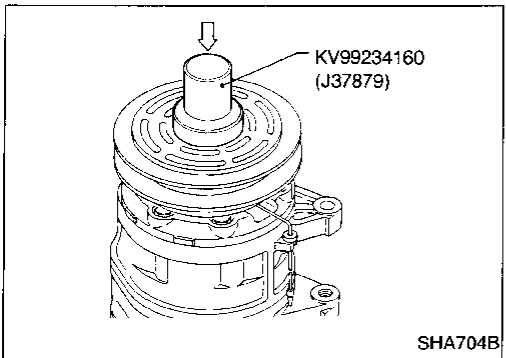
Coil

Check coil for loose connection or cracked insulation.

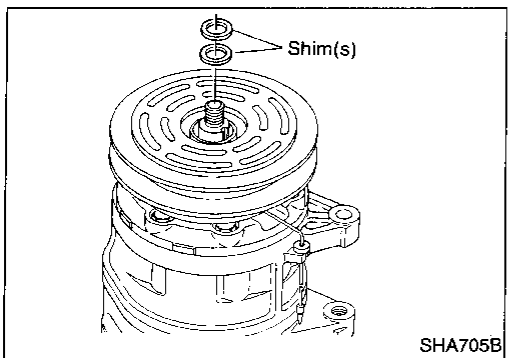


Installation

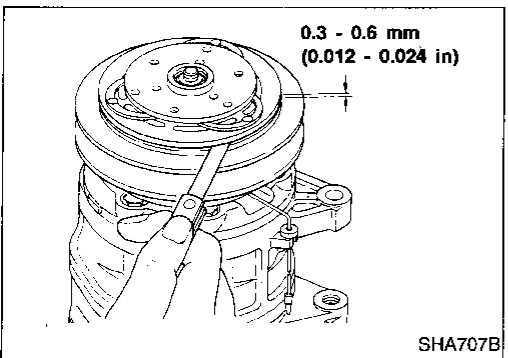
- Install the key in the keyway on the compressor drive shaft.
- Install the coil to compressor (lead wire up) and tighten the mounting screws.
- Install the lead wire into the holder correctly.



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



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



Break-in operation

When replacing compressor clutch assembly, always conduct the break-in operation. This is done by engaging and disengaging the clutch about thirty times.

Break-in operation raises the level of transmitted torque.

General Specifications

COMPRESSOR

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

LUBRICATION OIL

Model	ZEXEL make DKS-16H
Type	KLH00-PAGS0
Capacity m (US fl oz, Imp fl oz)	
Total in system	200 (6.8, 7.0)
Compressor (Service parts) charging amount	200 (6.8, 7.0)

REFRIGERANT

Type	HFC-134a
Capacity kg (lb)	0.600±0.050 (1.323±0.110)

Inspection and Adjustment

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

- Refer to EF & EC section.

BELT TENSION

- Refer to Checking Drive Belts (MA section).

COMPRESSOR

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

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