

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" and "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".**

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PRECAUTIONS AND PREPARATION

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), a diagnosis sensor 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 INFINITI 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 connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS.

WARNING:

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

- 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.

WARNING:

General Refrigerant Precautions

- 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 AND PREPARATION

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:

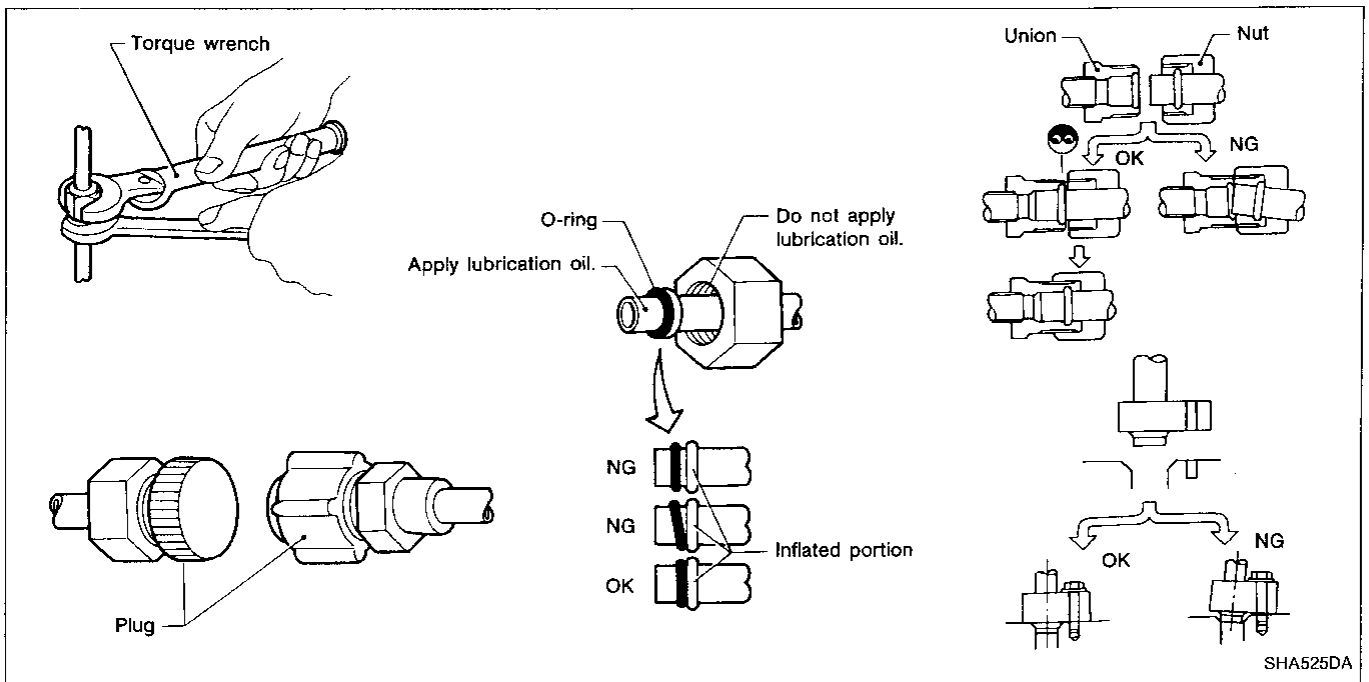
When replacing or cleaning refrigerant cycle components, observe the following.

- 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 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.



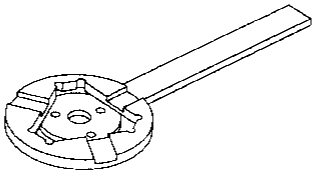
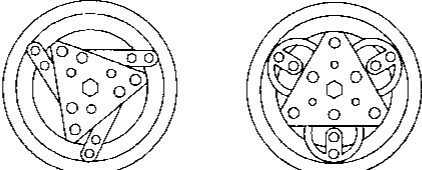
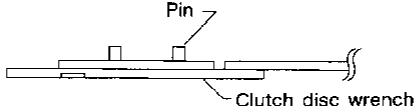
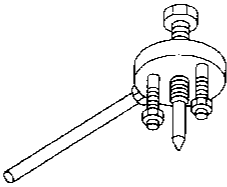
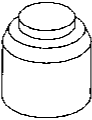
PRECAUTIONS AND PREPARATION

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-96.
- 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

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

Tool number (Kent-Moore No.) Tool name	Description
KV99106100 (J-41260) Clutch disc wrench	<div style="text-align: right;">Removing center bolt</div>  <p style="text-align: left;">NT232</p>  <div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>When replacing the magnet clutch in the above compressor, use a clutch disc wrench with the pin side on the clutch disc to remove it.</p> </div> <div style="width: 45%;"> <p>When replacing the magnet clutch in the above compressor, use a clutch disc wrench with the flat side on the clutch disc to remove it.</p> </div> </div>  <p style="text-align: left;">NT233</p>
KV99232340 (J-38874) or KV992T0001 (—) Clutch disc puller	<div style="text-align: right;">Removing clutch disc</div>  <p style="text-align: left;">NT234</p>
KV99106200 (J-41261) Pulley installer	<div style="text-align: right;">Installing pulley</div>  <p style="text-align: left;">NT235</p>

PRECAUTIONS AND PREPARATION

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

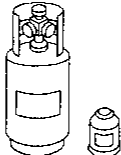

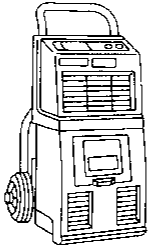
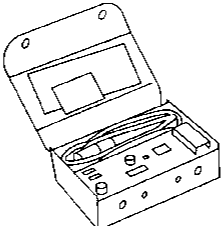
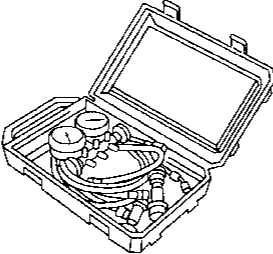
Never mix HFC-134a refrigerant and/or its specified lubricant with CFC-12 (R-12) refrigerant and/or its lubricant.

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

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

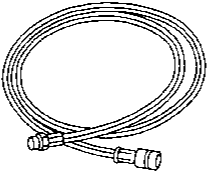
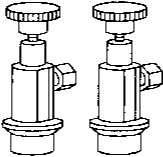

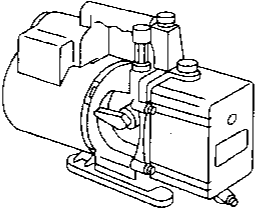
Adapters that convert one size fitting to another must never be used: refrigerant/lubricant contamination will occur and compressor failure will result.

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Tool number (Kent-Moore No.) Tool name	Description	Note
HFC-134a (R-134a) refrigerant	 NT196	Container color: Light blue Container marking: HFC-134a (R-134a) Fitting size: Thread size ● large container 1/2"-16 ACME
KLH00-PAGS0 (—) Nissan A/C System Oil Type S	 NT197	Type: Poly alkylene glycol oil (PAG), type S Application: HFC-134a (R-134a) swash plate (piston) compressors (Nissan only) Lubricity: 40 ml (1.4 US fl oz, 1.4 Imp fl oz)
(J-39500-NI) Recovery/Recycling Recharging equipment (ACR4)	 NT195	Function: Refrigerant Recovery and Recycling and Recharging
(J-39400) Electrical leak detector	 NT198	Power supply: ● DC 12 V (Cigarette lighter)
(J-39183) Manifold gauge set (with hoses and couplers)	 NT199	Identification: ● The gauge face indicates R-134a. Fitting size: Thread size ● 1/2"-16 ACME

PRECAUTIONS AND PREPARATION

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 style="text-align: center;">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 style="text-align: center;">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 style="text-align: center;">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 style="text-align: center;">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 AND PREPARATION

Precautions for Service Equipment

RECOVERY/RECYCLING EQUIPMENT

Follow the manufacturer's instructions for machine operation and machine maintenance. Never introduce any refrigerant other than that specified into the machine.

ELECTRONIC LEAK DETECTOR

Follow the manufacturer's 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.

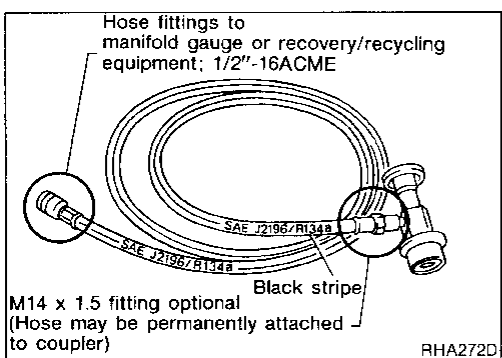
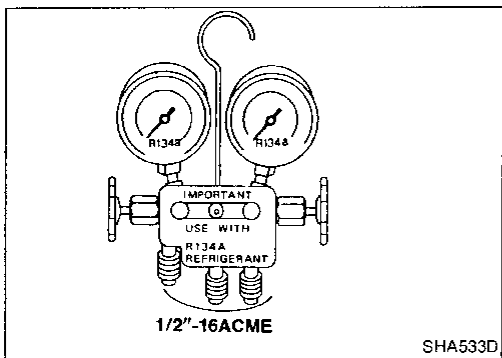
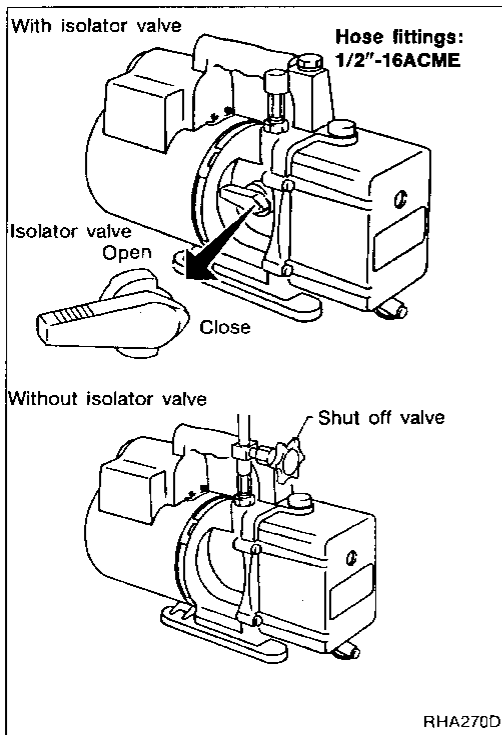
To prevent this migration, use a manual valve situated near the hose-to-pump connection, as follows.

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

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

MANIFOLD GAUGE SET

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



SERVICE HOSES

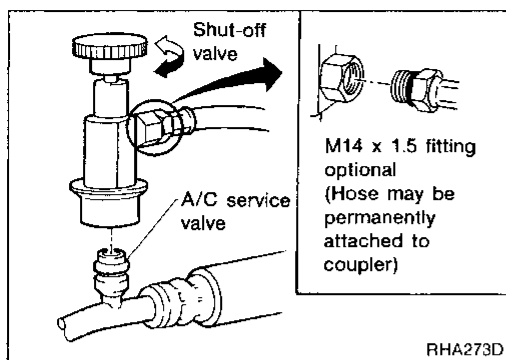
Be certain that the service hoses display the markings described (colored hose with black stripe). All hoses must include positive shut off devices (either manual or automatic) near the end of the hoses opposite the manifold gauge.

PRECAUTIONS AND PREPARATION

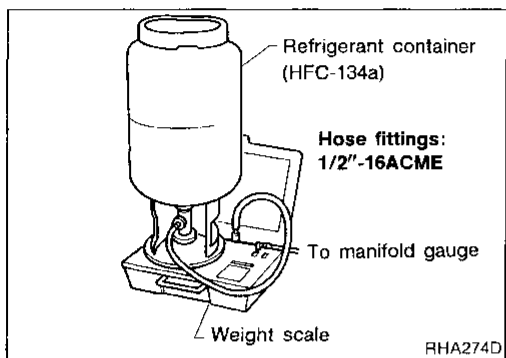
Precautions for Service Equipment (Cont'd)

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 may occur.



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



REFRIGERANT WEIGHT SCALE

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

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.

DESCRIPTION

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.

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

FREEZE PROTECTION

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

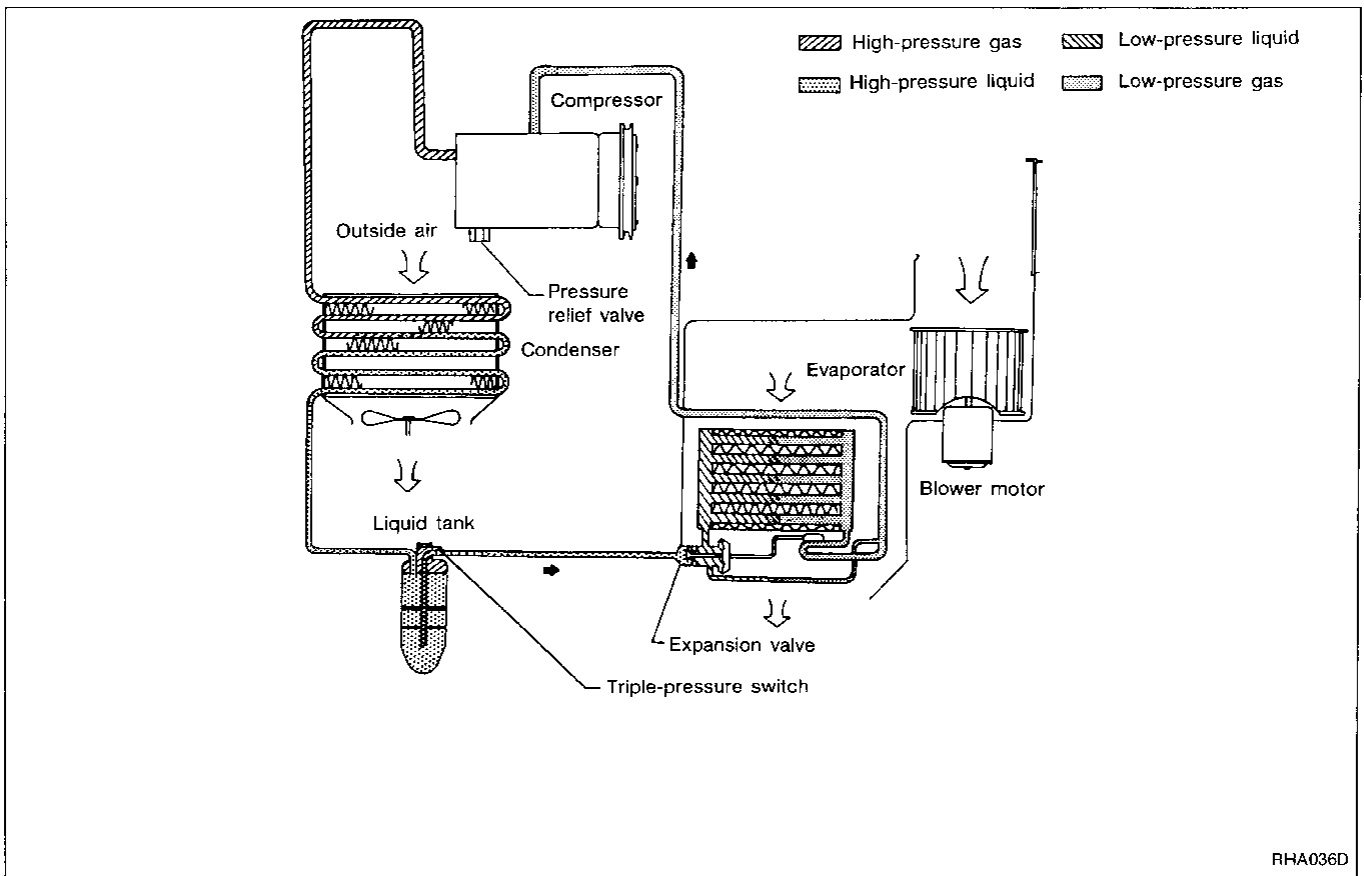
REFRIGERANT SYSTEM PROTECTION

Triple-pressure switch

The triple 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. Triple-pressure switch closes to turn on the cooling fan to reduce system pressure.

Pressure relief valve

The refrigerant system is protected by a pressure relief valve. The valve is located on the bottom of the compressor. When refrigerant system pressure increases abnormally [over 3,727 kPa (38 kg/cm², 540 psi)], the relief valve's port opens. The valve then releases refrigerant into the atmosphere.



V-6 Variable Displacement Compressor

GENERAL INFORMATION

1. The V-6 variable compressor differs from previous units. The vent temperatures of the V-6 variable compressors do not drop too far below 5°C (41°F) when:
 - evaporator intake air temperature is less than 20°C (68°F)
 - engine is running at speeds less than 1,500 rpm.This is because the V-6 compressor provides a means of “capacity” control.
2. The V-6 variable compressor provides refrigerant control under varying conditions. During cold winters, it may not produce high refrigerant pressure discharge (compared to previous units) when used with air conditioning systems.
3. A “clanking” sound may occasionally be heard during refrigerant charge. The sound indicates that the tilt angle of the swash plate has changed and is not a problem.
4. For air conditioning systems with the V-6 compressor, the clutch remains engaged unless: the system main switch, fan switch or ignition switch is turned OFF. When ambient (outside) temperatures are low or when the amount of refrigerant is insufficient, the clutch is disengaged to protect the compressor.
5. A constant range of suction pressure is maintained when engine speed is greater than a certain value. It normally ranges from 147 to 177 kPa (1.5 to 1.8 kg/cm², 21 to 26 psi) under varying conditions.
In previous compressors, however, suction pressure was reduced with increases in engine speed.

DESCRIPTION

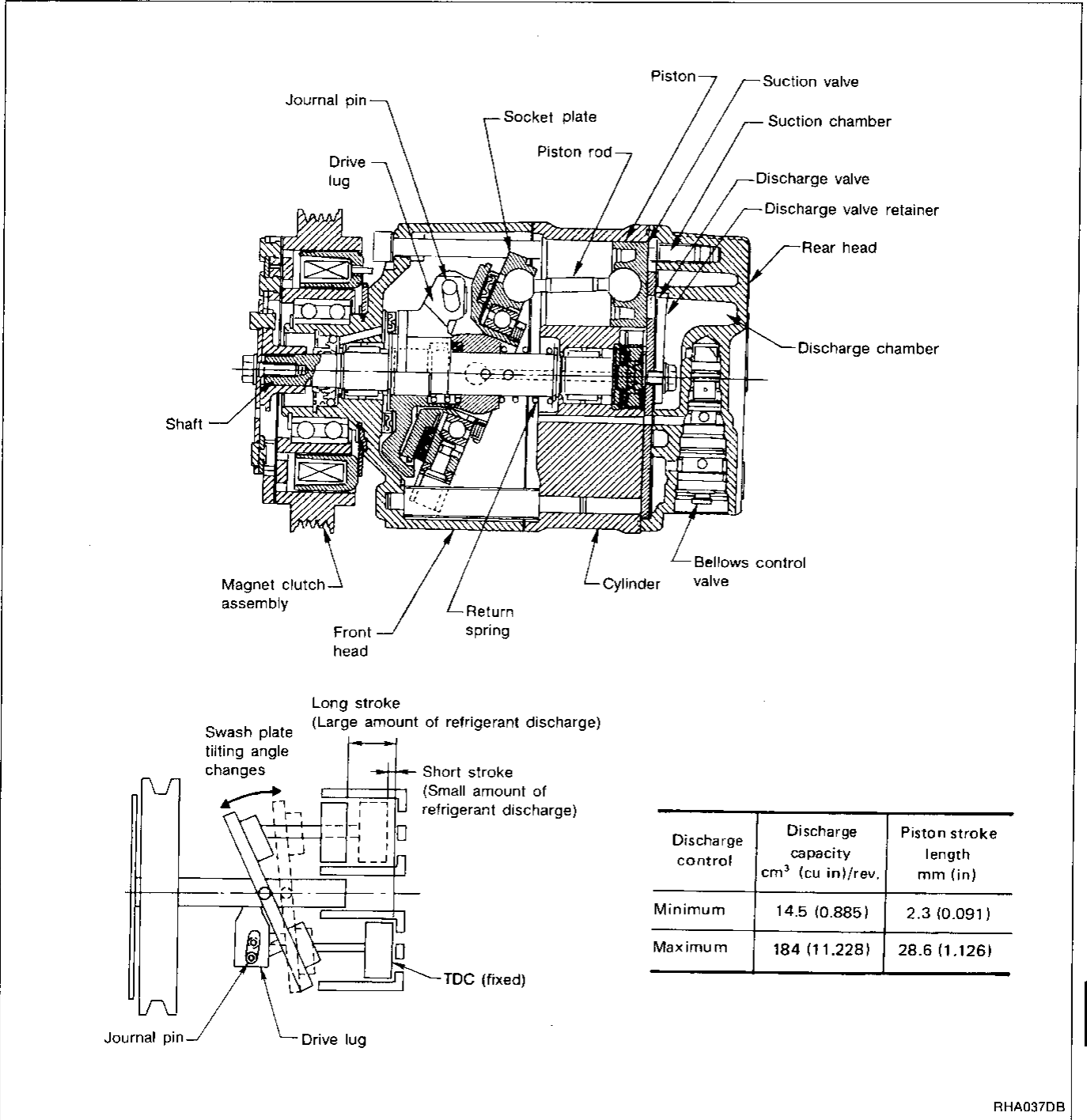
V-6 Variable Displacement Compressor (Cont'd)

DESCRIPTION

General

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

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



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DESCRIPTION

V-6 Variable Displacement Compressor (Cont'd)

Operation

1. Operation control valve

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

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

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

2. Maximum cooling

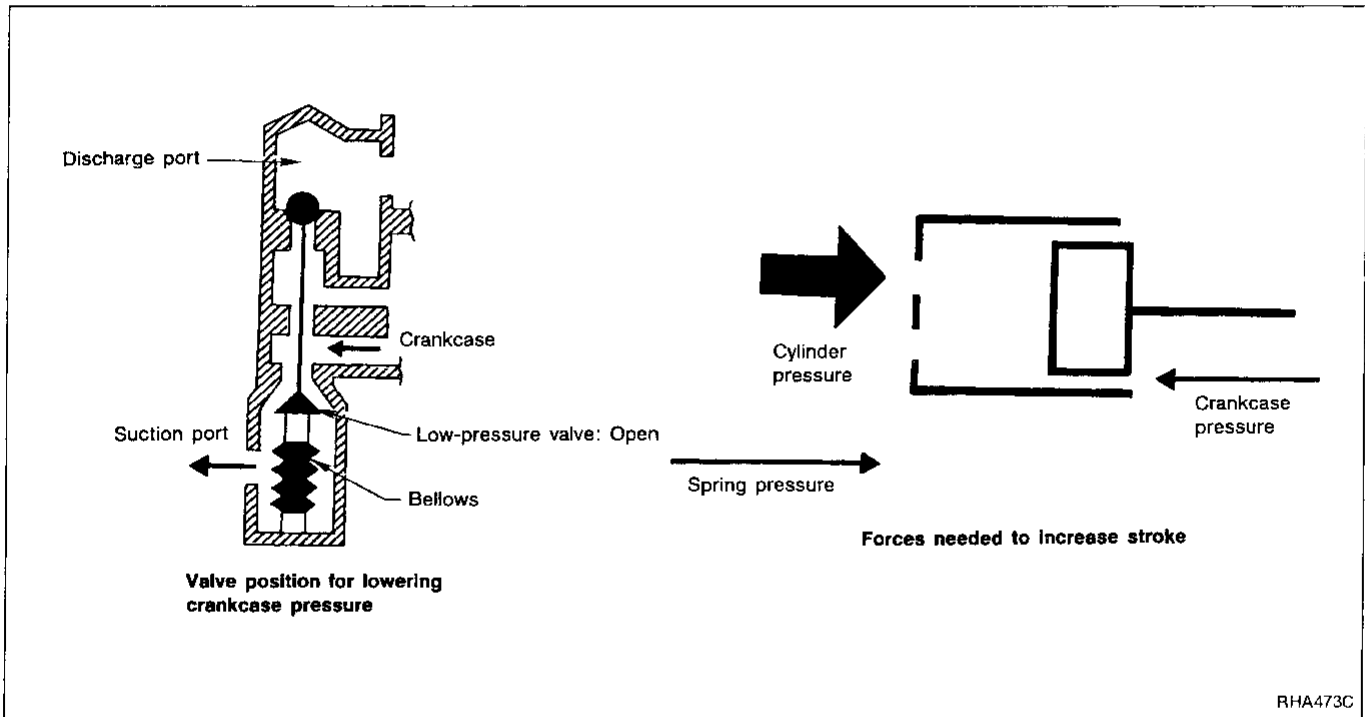
Refrigerant pressure on the low-pressure side increases with an increase in heat loads.

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

This causes the following pressure changes:

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

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



DESCRIPTION

V-6 Variable Displacement Compressor (Cont'd)

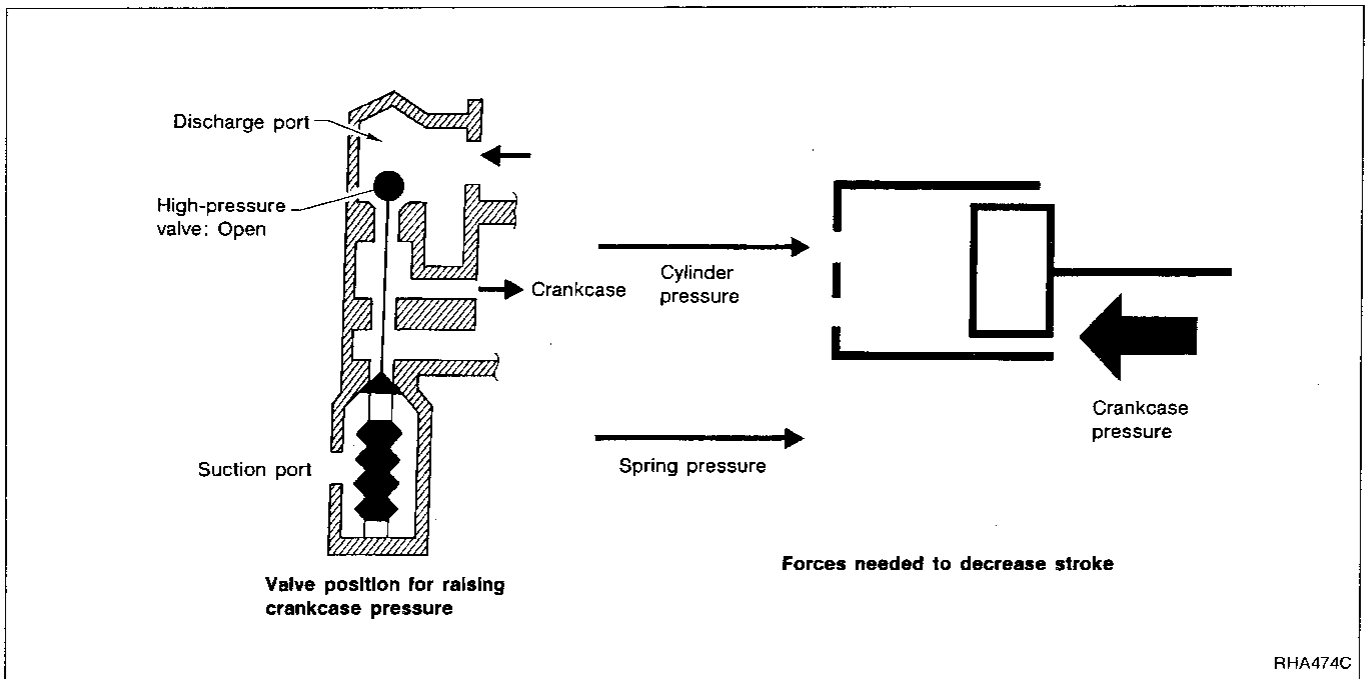
3. Capacity control

- Refrigerant pressure on suction side is low during high speed driving or when ambient or interior temperature is low.
- The bellows expands when refrigerant pressure on the suction pressure side drops below approximately 177 kPa (1.8 kg/cm², 26 psi).

Since suction pressure is low, it makes the suction port close and the discharge port open. Thus, crankcase pressure becomes high as high pressure enters the crankcase.

- The force acts around the journal pin near the swash plate, and is generated by the pressure difference before and behind the piston.

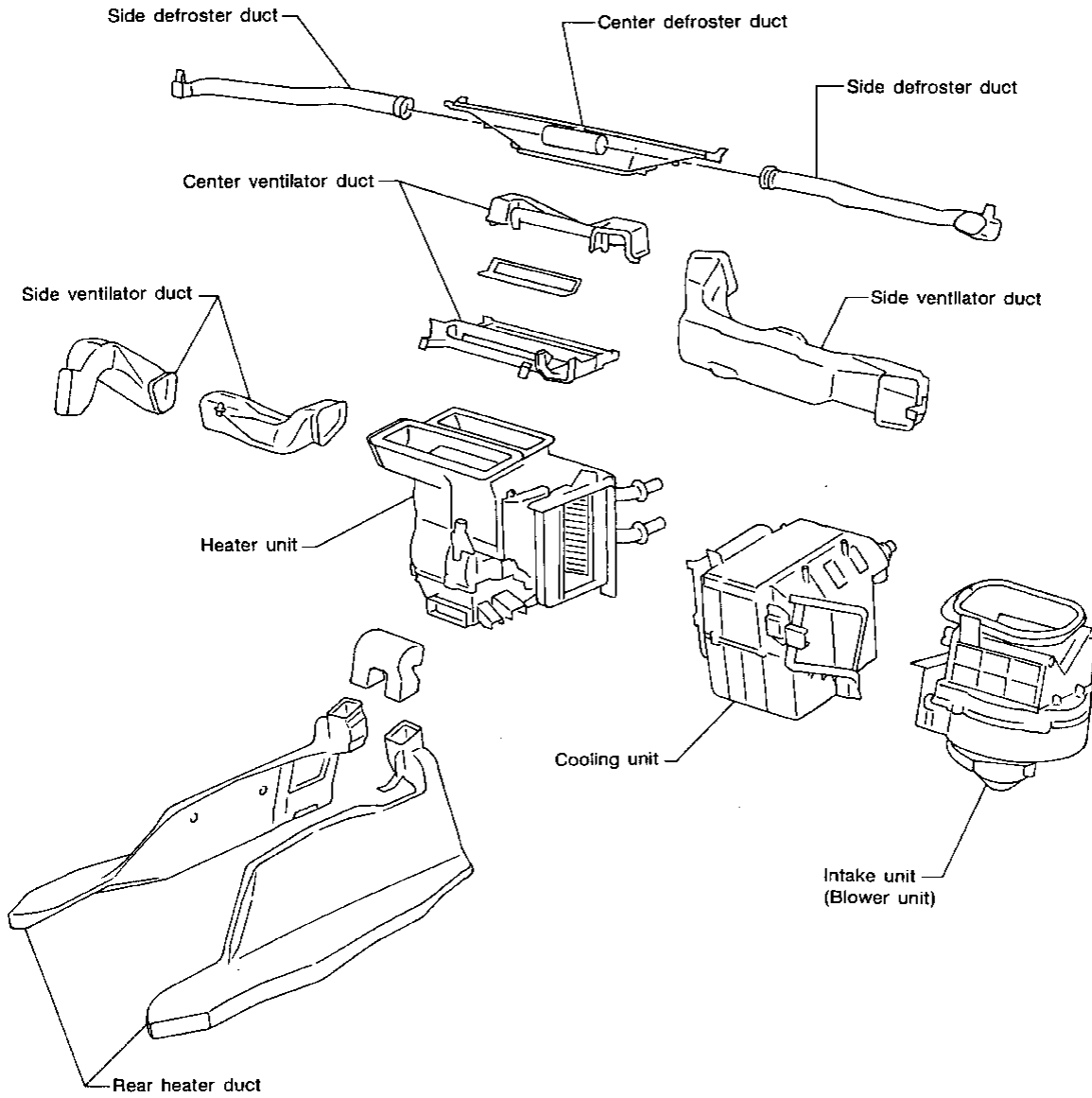
The drive lug and journal pin are located where the piston generates the highest pressure. Piston pressure is between suction pressure P_s and discharge pressure P_d , which is near suction pressure P_s . If crankcase pressure P_c rises due to capacity control, the force around the journal pin makes the swash plate angle decrease and also the piston stroke decrease. In other words, crankcase pressure increase triggers pressure difference between the piston and the crankcase. The pressure difference changes the angle of the swash plate.



DESCRIPTION

Component Layout

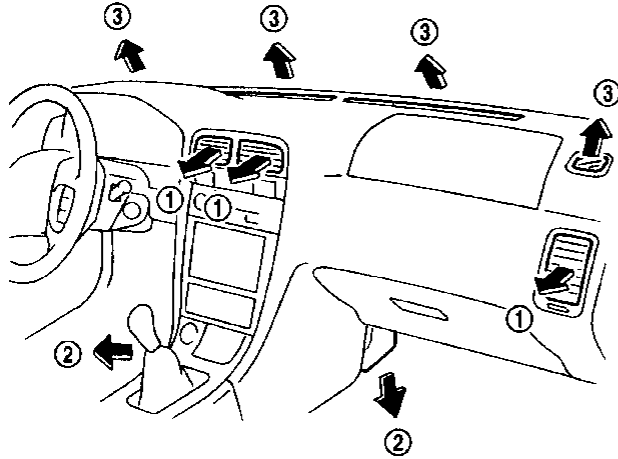
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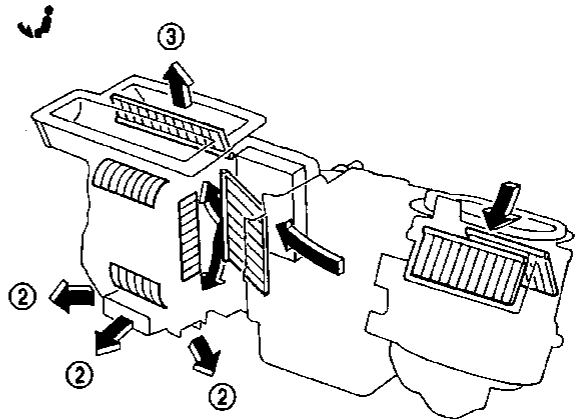
DESCRIPTION

Discharge Air Flow

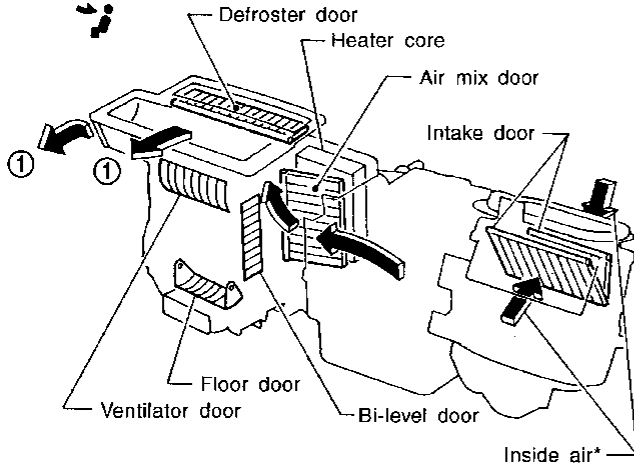
Air outlets



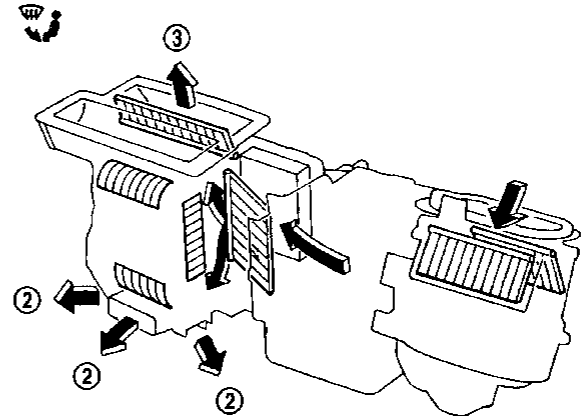
Foot



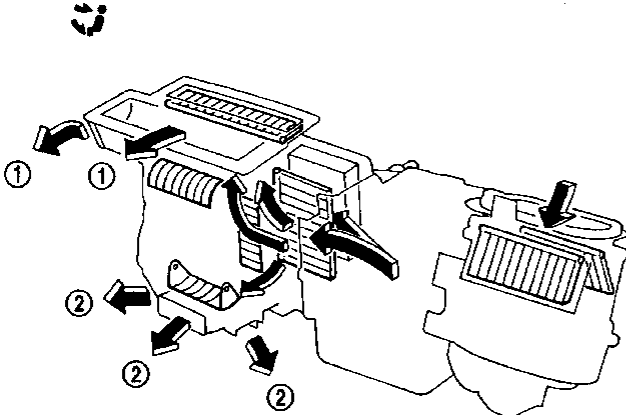
Face



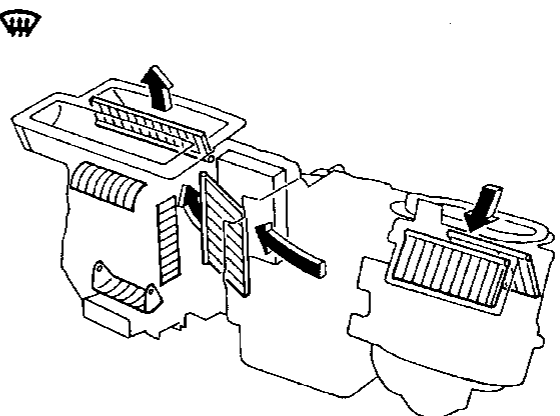
Foot and defroster



Bi-level



Defroster



① : To face

② : To foot

③ : To defroster

* : When RECIRC switch is ON

For air flow %, refer to "Operational Check",
"TROUBLE DIAGNOSES".

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Introduction

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

Features

Air mix door control (Automatic temperature control)

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

Fan speed control

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

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

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

Intake door control

The intake doors are automatically controlled by: The temperature setting, ambient temperature, in-vehicle temperature, intake air temperature, amount of sunload and ON-OFF operation of the compressor.

Outlet door control

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

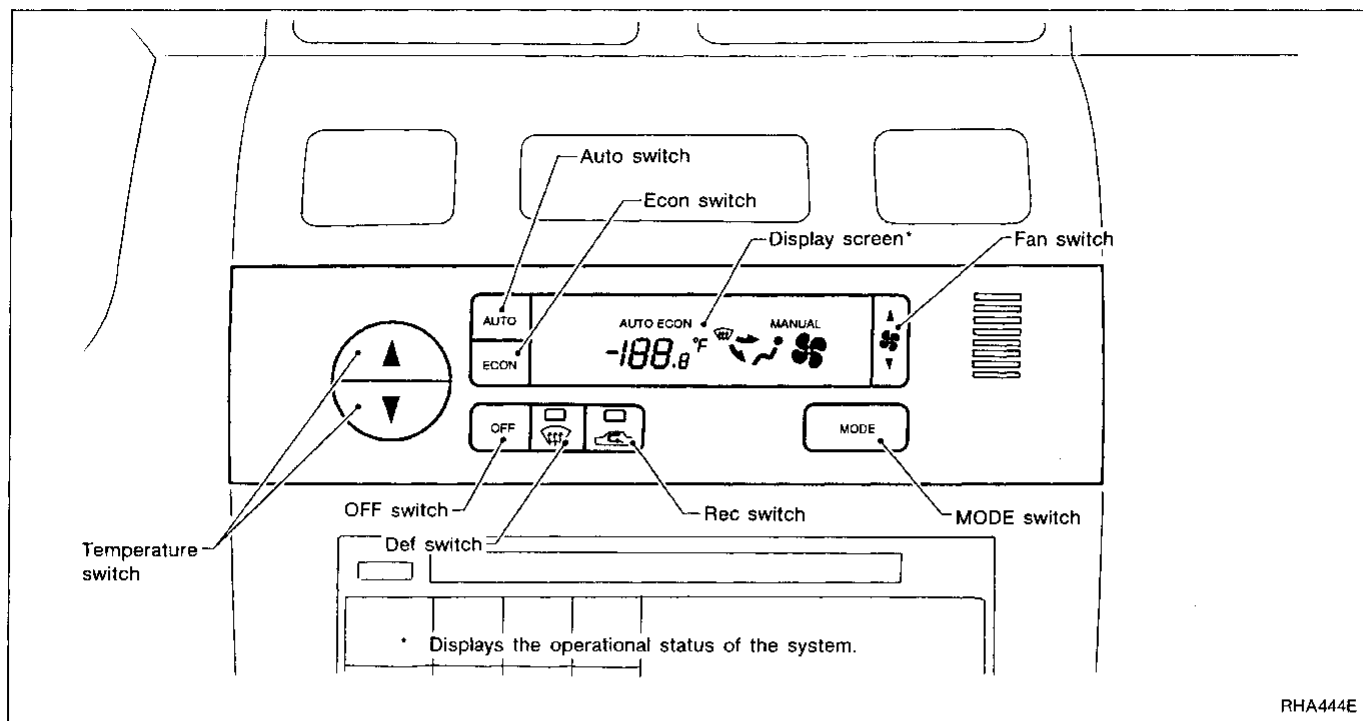
Magnet clutch control

The ECM (ECCS control module) controls compressor operation using input signals from the throttle position sensor and auto amplifier.

Self-diagnostic system

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

Control Operation



CI
MA
EM
LC
EC
FE
CL
WT
AT
FA
RA
BR
ST
RS
BT
HA
EL
DX

AUTO SWITCH

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

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

ECON SWITCH

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

TEMPERATURE SWITCH (Potentio Temperature Control)





Increases or decreases the set temperature.

OFF SWITCH

The compressor and blower are off, the air intake doors are set to the outside air position. Then, the mode doors are set to the foot (78% foot and 22% defrost) position. In the off position the ATC system uses the vehicle's "flow through" ventilation. It tries to maintain the interior temperature based on the last set temperature of the system.





FAN SWITCH

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

low  , medium low  , medium high  , high 

MODE SWITCH

Manual control of the air discharge outlets. Four selections are available (as shown on the display screen):

face  , bi-level  , foot  , defrost/foot 

DESCRIPTION

Control Operation (Cont'd)

REC SWITCH

ON position: Interior air is recirculated inside the vehicle.

OFF position: Automatic control resumes.

RECIRC is canceled when AUTO, DEF or ECON is selected. RECIRC resumes when another mode is chosen.

DEF SWITCH

Positions the mode doors to the defrost position. Also positions the air intake doors to the outside air position. The compressor operates at ambient temperature approx. 2°C (35°F) or above.

DESCRIPTION

NOTE

GI

WA

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LC

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FA

RA

BR

ST

RS

BT

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IDX

TROUBLE DIAGNOSES

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Diagnostic Procedure 4 SYMPTOM: Sunload sensor circuit is open or shorted. (25 or -25 is indicated on display as a result of conducting Self-diagnosis STEP 2.)	HA-65

TROUBLE DIAGNOSES

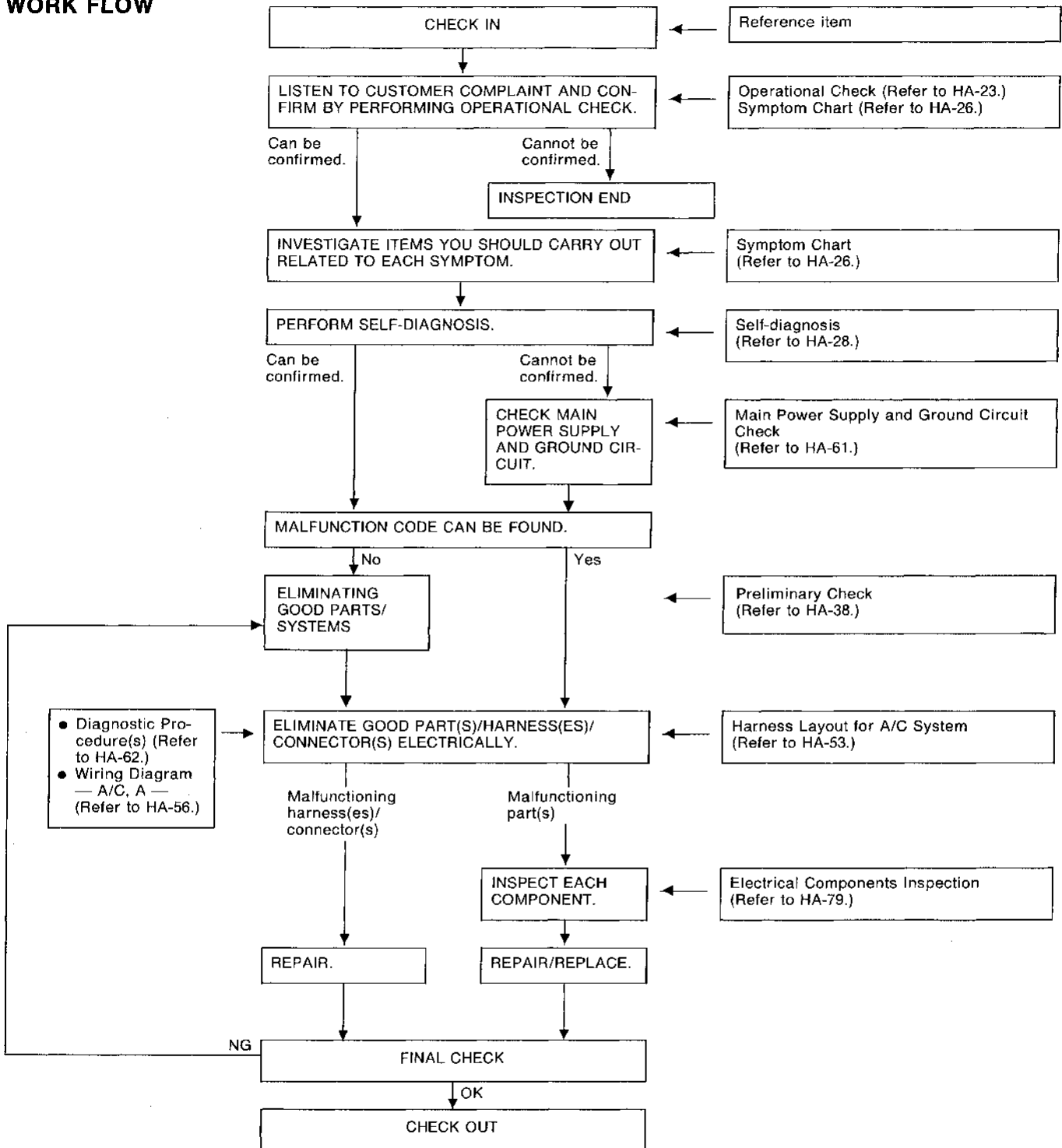
Contents (Cont'd)

Diagnostic Procedure 5		
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INTAKE SENSOR CIRCUIT CHECK	HA-67	G1
SYMPTOM: ● Control of air mix door is abnormal.		
● Control of fan speed is abnormal.		
● Control of intake door is abnormal.		MA
● Control of magnet clutch is abnormal.		
● Control of mode door is abnormal.		EM
Diagnostic Procedure 7		
SYMPTOM: Mode door motor does not operate normally.	HA-68	
Diagnostic Procedure 8		
SYMPTOM: Intake door motor does not operate normally.	HA-70	LC
Diagnostic Procedure 9		
SYMPTOM: Air mix door motor does not operate normally.	HA-72	EC
Diagnostic Procedure 10		
SYMPTOM: Bi-level (B/L) door motor does not operate normally.	HA-73	FE
Diagnostic Procedure 11		
SYMPTOM: Blower motor operation is malfunctioning under out of Starting Fan Speed Control.	HA-74	CL
Diagnostic Procedure 12		
SYMPTOM: Magnet clutch does not engage after performing Preliminary Check 6.	HA-76	MT
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● Multiplex communication error (52 with fan symbol detected as a result of conducting self-diagnosis STEP 5.)	HA-78	FA
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		BR
		ST
		RS
		BT
		HA
		EL
		IDX

TROUBLE DIAGNOSES

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 is as it should be. The systems which will be checked are the blower, mode (discharge air), intake air, temperature decrease, temperature increase, A/C switch and the memory function.

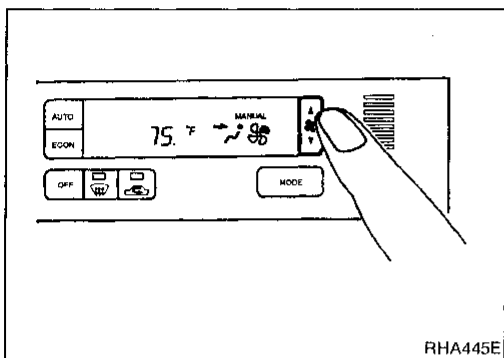
CONDITIONS:

- Engine running and at normal operating temperature.

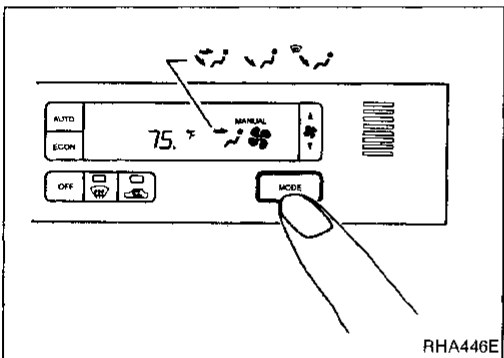
PROCEDURE:

1. Check blower

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



RHA445E



RHA446E

2. Check discharge air.

- 1) Press mode switch four times and DEF button.

- 2) Confirm that discharge air comes out according to the air distribution table at left.






Refer to "Discharge Air Flow", "DESCRIPTION" (HA-15).

NOTE:

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

Intake door position is checked in the next step.

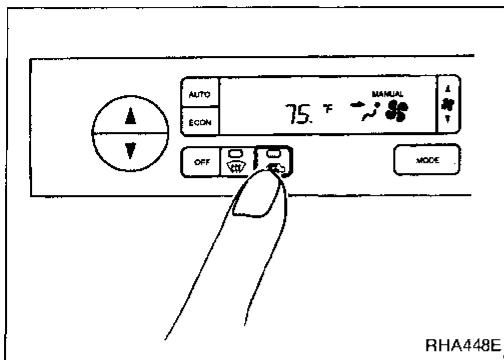
Discharge air flow

Switch mode/ indicator	Air outlet/distribution		
	Face	Foot	Defroster
	100%	—	—
	60%	40%	—
	—	78%	22%
	—	60%	40%
	—	—	100%


RHA429E

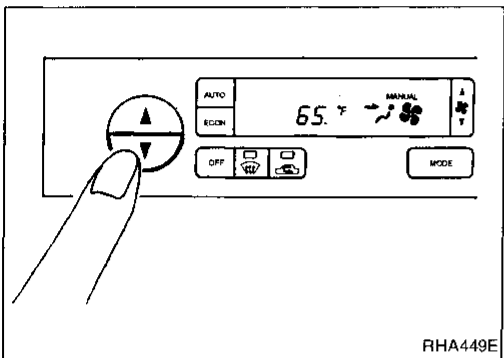
TROUBLE DIAGNOSES

Operational Check (Cont'd)



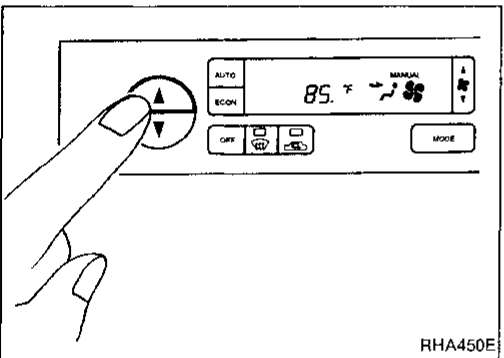
3. Check recirc

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



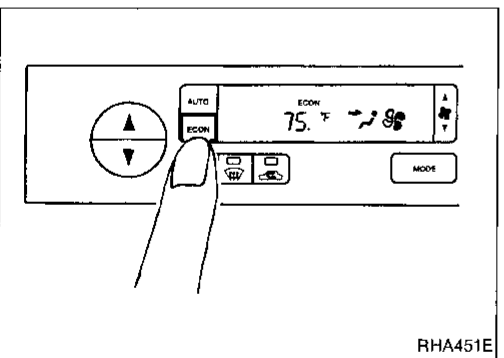
4. Check temperature decrease

- 1) Press the temperature decrease button until 18°C (65°F) is displayed.
- 2) Check for cold air at discharge air outlets.



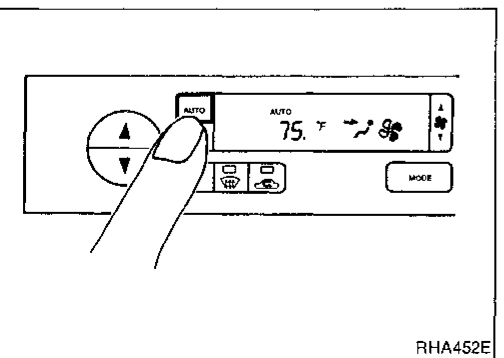
5. Check temperature increase

- 1) Press the temperature increase button until 32°C (85°F) is displayed.
- 2) Check for hot air at discharge air outlets.



6. Check ECON mode

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

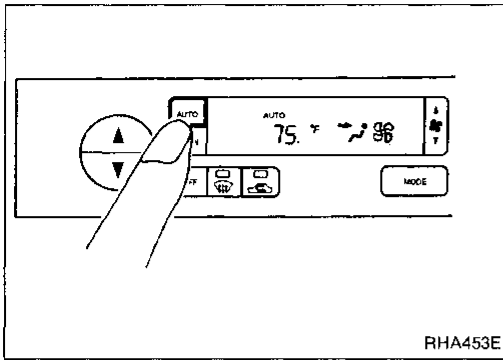


7. Check AUTO mode

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

TROUBLE DIAGNOSES

Operational Check (Cont'd)



8. Check memory function

- 1) Press OFF switch.
- 2) Turn the ignition off.
- 3) Turn the ignition on.
- 4) Press the AUTO switch.
- 5) Confirm that the set temperature remains at previous temperature.

GI

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TROUBLE DIAGNOSES

Symptom Chart

DIAGNOSTIC TABLE

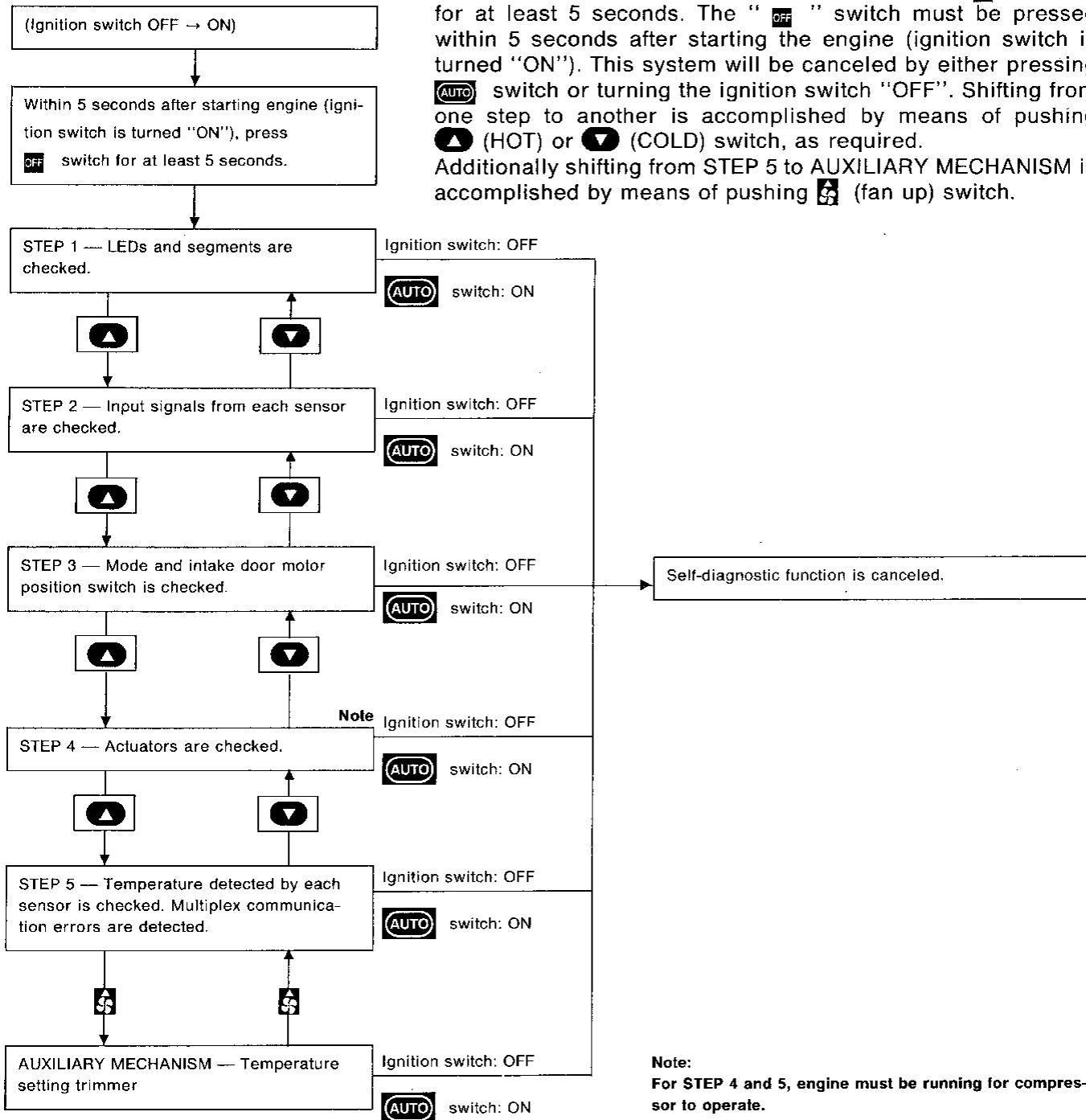
PROCEDURE	Self-diagnosis					Preliminary Check								Diagnostic Procedure						
SYMPTOM	STEP 1 (HA-29, 32)	STEP 2 (HA-29, 32)	STEP 3 (HA-30, 33)	STEP 4 (HA-30, 34)	STEP 5 (HA-31, 34)	AUXILIARY MECHANISM (HA-37)	Preliminary Check 1 (HA-38)	Preliminary Check 2 (HA-39)	Preliminary Check 3 (HA-40)	Preliminary Check 4 (HA-41)	Preliminary Check 5 (HA-42)	Preliminary Check 6 (HA-43)	Preliminary Check 7 (HA-44)	Preliminary Check 8 (HA-45)	Diagnostic Procedure 1 (HA-62)	Diagnostic Procedure 2 (HA-63)	Diagnostic Procedure 3 (HA-64)	Diagnostic Procedure 4 (HA-65)	Diagnostic Procedure 5 (HA-66)	Diagnostic Procedure 6 (HA-67)
Air outlet does not change.	①	②	○	○	○		③								○	○		○	○	○
Intake door does not change.	①	②		○	○			④							○	○		○	○	○
Insufficient cooling	○	○	○	○	○	○	○	○	①		○	○	○		○	○		○	○	○
Insufficient heating	○	○	○	○	○	○	○	○	①		○	○	○		○	○		○	○	○
Blower motor operation is malfunctioning.	①	②		○	○						③				○	○	○	○	○	○
Magnet clutch does not engage.	①	②		○	○							③			○	○		○	○	○
Discharged air temperature does not change.	①	②		○	○								③		○	○		○	○	○
Noise														①						
Result of self-diagnosis STEP 2	21	Ambient sensor circuit is open.	①	②		③									④					
	22	In-vehicle sensor circuit is open.	①	②		③										④				
	23	Thermal transmitter circuit is open.	①	②													③			
	25	Sunload sensor circuit is open.	①	②														③		
	26	PBR circuit is open.	①	②															③	
	21	Ambient sensor circuit is shorted.	①	②		③									④					
	22	In-vehicle sensor circuit is shorted.	①	②		③										④				
	23	Thermal transmitter circuit is shorted.	①	②														③		
	25	Sunload sensor circuit is shorted.	①	②															③	
	26	PBR circuit is shorted.	①	②																③
Mode door motor does not operate normally.	①	②	③	④	○										○	○		○	○	○
Intake door motor does not operate normally.	①	②		③	○										○	○		○	○	○
Air mix door motor does not operate normally.	①	②		③	○										○	○		○	○	○
Bi-level door motor does not operate normally.	①	②		③											○	○		○	○	○
Blower motor operation is malfunctioning under out of Starting Fan Speed Control.	①	②		○	○						③				○	○	○	○	○	○
Magnet clutch does not operate after performing Preliminary Check 6.	①	②		○	○							③			○	○		○	○	○
Self-diagnosis cannot be performed.																				

①, ②: The number means checking order.

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

Self-diagnosis

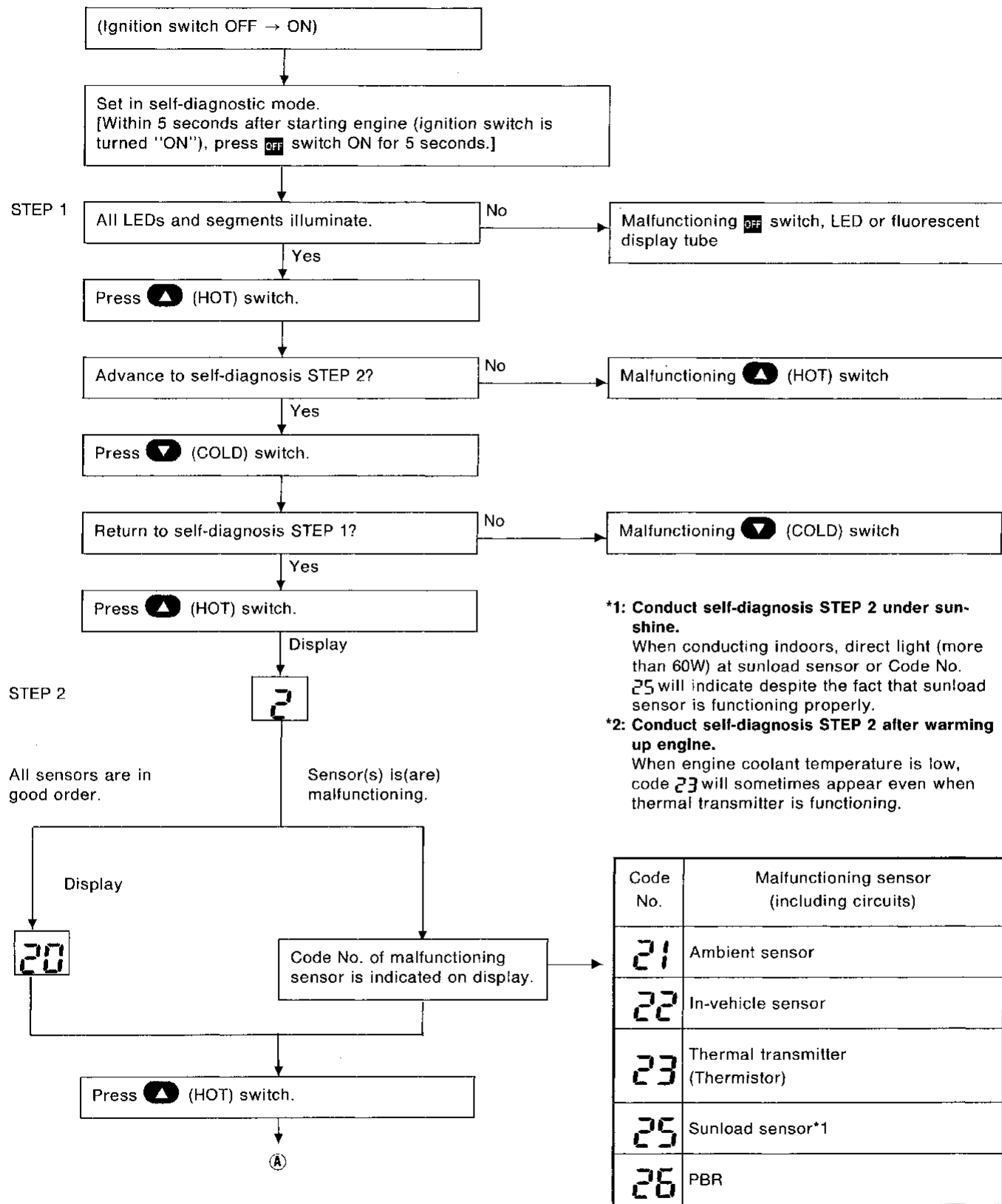
The self-diagnostic system diagnoses sensors, door motors, blower motor, etc. by system line. Refer to applicable sections (items) for details. Shifting from normal control to the self-diagnostic system is done as follows. Start the engine (turn the ignition switch from "OFF" to "ON"). And press "OFF" switch for at least 5 seconds. The "OFF" switch must be pressed within 5 seconds after starting the engine (ignition switch is turned "ON"). This system will be canceled by either pressing (AUTO) switch or turning the ignition switch "OFF". Shifting from one step to another is accomplished by means of pushing (H) (HOT) or (C) (COLD) switch, as required. Additionally shifting from STEP 5 to AUXILIARY MECHANISM is accomplished by means of pushing (S) (fan up) switch.



TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

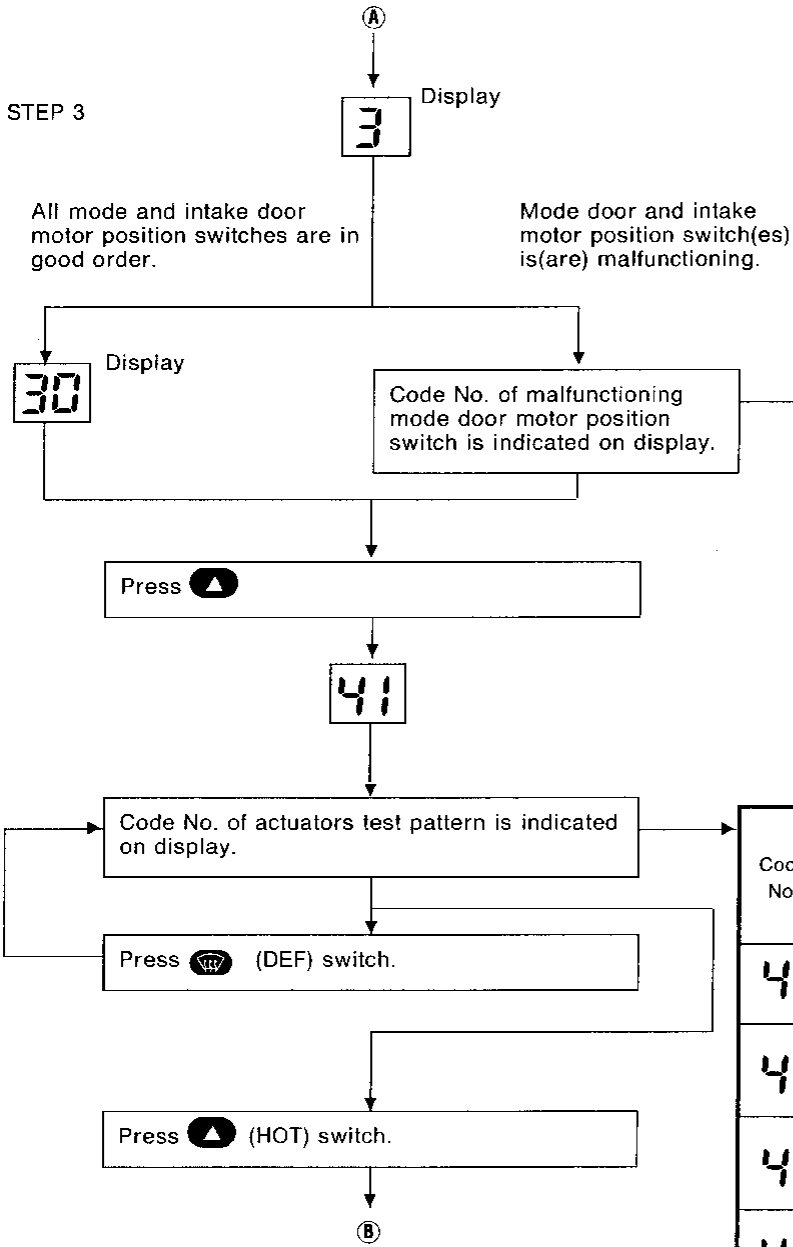
CHECKING PROCEDURE



Note:
At any time, you can return to a previous step in the self-diagnosis by pressing the ▼ (COLD) switch.

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)



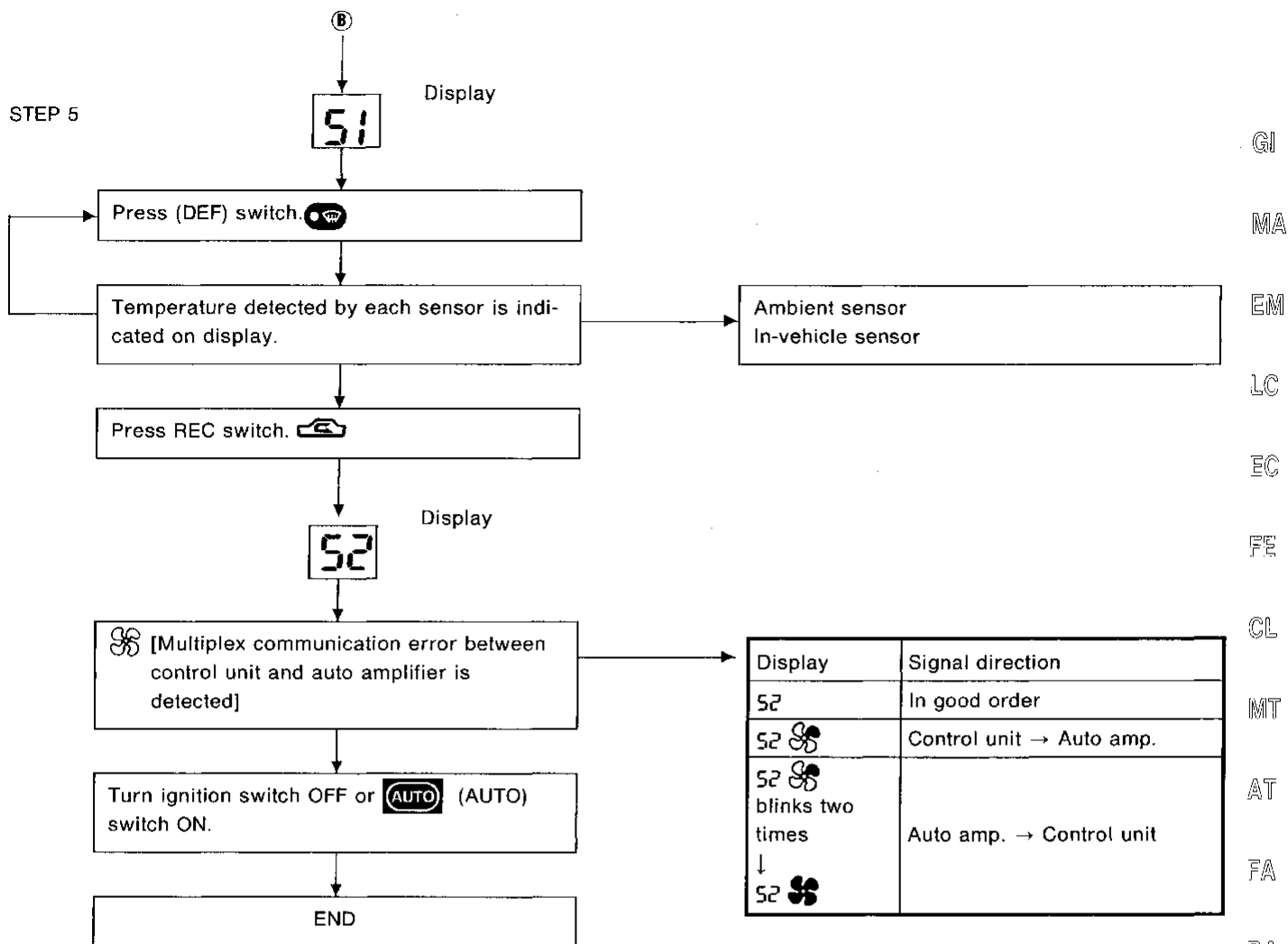
Code No.	Malfunctioning part or circuit	
	Position switch	
31	VENT	Mode door motor
32	B/L	
33	FOOT	
34	FOOT/DEF	
35	DEF	
36	FRE	Intake door motor
38	20% FRE	
39	REC	

Code No.	Actuators test pattern					
	Mode door	Intake door	Air mix door	Bi-level door	Blower motor	Compressor
41	VENT	REC	Full Cold	OPEN	4 - 5V	ON
42	B/L	REC	Full Cold	OPEN	9 - 11V	ON
43	B/L	20% FRE	Full Hot	CLOSE	7 - 9V	OFF
44	FOOT	FRE	Full Hot	CLOSE	7 - 9V	OFF
45	F/D	FRE	Full Hot	CLOSE	7 - 9V	ON
46	DEF	FRE	Full Hot	CLOSE	10 - 12V	ON

Note:
For STEP 4, engine must be running for compressor to operate.

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)



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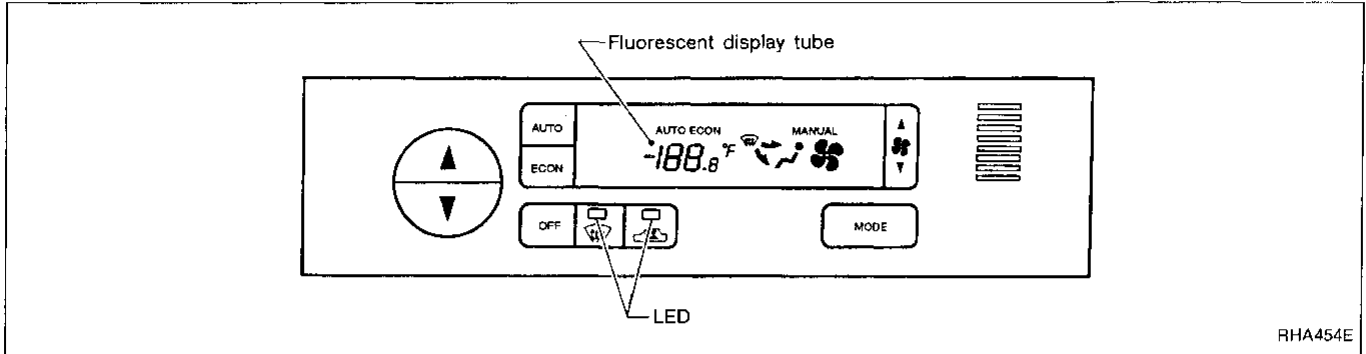
TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

HOW TO INTERPRET THE RESULTS

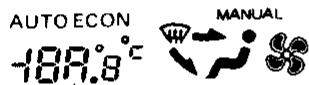
STEP 1: Checks LEDs and segments

When switch's LED and segments are in functioning properly in STEP 1, LED and display will come on.



RHA454E

Display malfunction

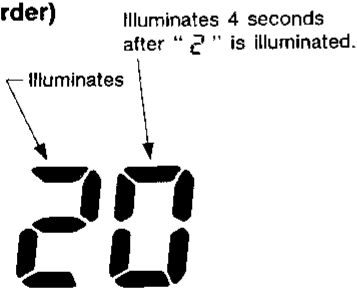


Part of segments does not illuminate.

RHA565E

If LEDs or segments malfunction, LED will not come on or display will show incomplete segment.

Display (when all sensors are in good order)



RHA499A

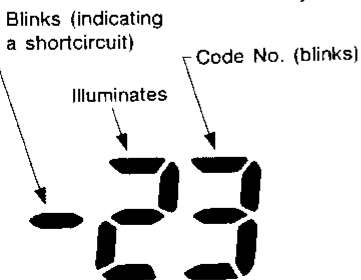
STEP 2: Checks each sensor circuit for open or short circuit

Display shows "2" in STEP 2 mode.

When all sensors are in good order, display shows "20".

It takes approximately 4 seconds to check all sensors.

Display (when sensor malfunctions)



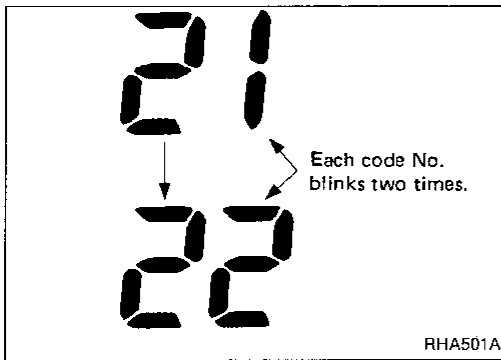
RHA500A

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

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

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



Sensors and abnormalities

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

Code No.	Sensor	Open circuit	Short circuit
21	Ambient sensor	Less than -41.9°C (-43°F)	Greater than 100°C (212°F)
22	In-vehicle sensor	Less than -41.9°C (-43°F)	Greater than 100°C (212°F)
23	Thermal transmitter*3	Less than -25.6°C (-14°F)	Greater than 150°C (302°F)
25	Sunload sensor*2	Less than 0.01515 mA	Greater than 0.545 mA
26	PBR*1	Greater than 50%	Less than 30%

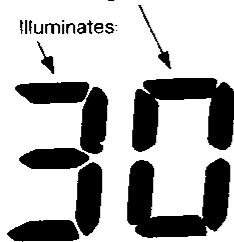
*1: "50%" and "30%" refer to percentage with respect to full stroke of air mix door. (Full cold: 0%, Full hot: 100%)

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

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

*3: **Conduct self-diagnosis STEP 2 after warming up engine.**

Display (when all doors are in good order) Illuminates 20 seconds after "3" is shown on display.

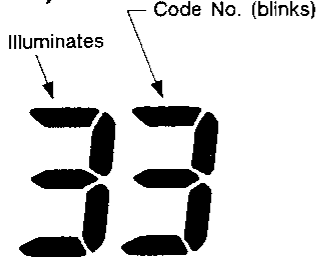


STEP 3: Checks mode and intake door positions

Display shows "3" in STEP 3 mode.

When all doors are in good order, display will then show "30". It takes approximately 20 seconds to check all mode and intake doors.

Display (when a door is out of order)



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

Code No.	31	32	33	34	35	36	38	39
Malfunctioning part	VENT	B/L	FOOT	FOOT/DEF	DEF	FRE	20% FRE	REC

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

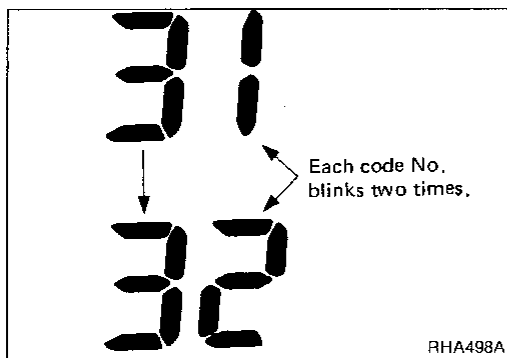
If two or more mode or intake doors are out of order, corresponding code numbers respectively blink two times.
If mode door motor harness connector is disconnected, the following display pattern will appear.

31 → 32 → 33 → 34 → 35

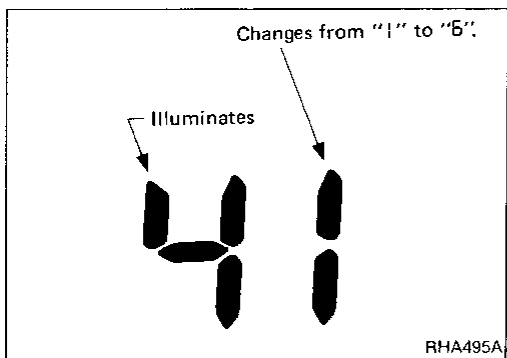
If intake mode door harness connector is disconnected, the following display pattern will appear.

36 → 38 → 39

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



RHA498A



RHA495A

STEP 4: Checks operation of each actuator

Display shows "41" in STEP 4 mode.

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

During inspection in STEP 4, the auto amp. will forcefully transmit an output to the affected actuators. The corresponding code Nos. are shown on display as indicated in the table below.

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

Code No.	41	42	43	44	45	46
Actuator	VENT	B/L	B/L	FOOT	F/D	DEF
Mode door	VENT	B/L	B/L	FOOT	F/D	DEF
Intake door	REC	REC	20% FRE	FRE	FRE	FRE
Air mix door	Full Cold	Full Cold	Full Hot	Full Hot	Full Hot	Full Hot
Blower motor	4 - 5 V	9 - 11 V	7 - 9 V	7 - 9 V	7 - 9 V	10 - 12 V
Compressor	ON	ON	OFF	OFF	ON	ON
Bi-level door	Open	Open	Shut	Shut	Shut	Shut

Operating condition of each actuator cannot be checked by indicators.

STEP 5: Checks temperature detected by sensors, and detects multiplex communication error

Checks temperature detected by sensors

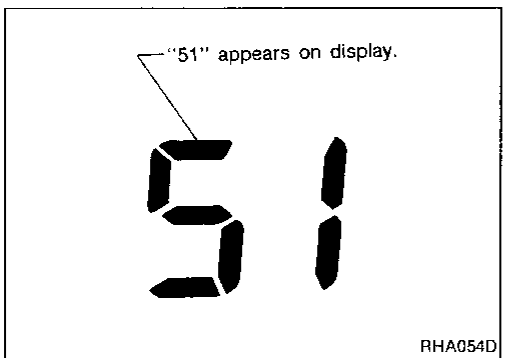
Display shows "51" in STEP 5 mode.

- When FRONT DEF switch is pressed one time, display shows temperature detected by ambient sensor.
- When FRONT DEF switch is pressed second time, display shows temperature detected by in-vehicle sensor.
- When FRONT DEF switch is pressed fourth time, display returns to original presentation "51".

Discharge air flow

Switch mode/indicator	Air outlet/distribution		
	Face	Foot	Defroster
	100%	—	—
	60%	40%	—
	—	78%	22%
	—	60%	40%
	—	—	100%

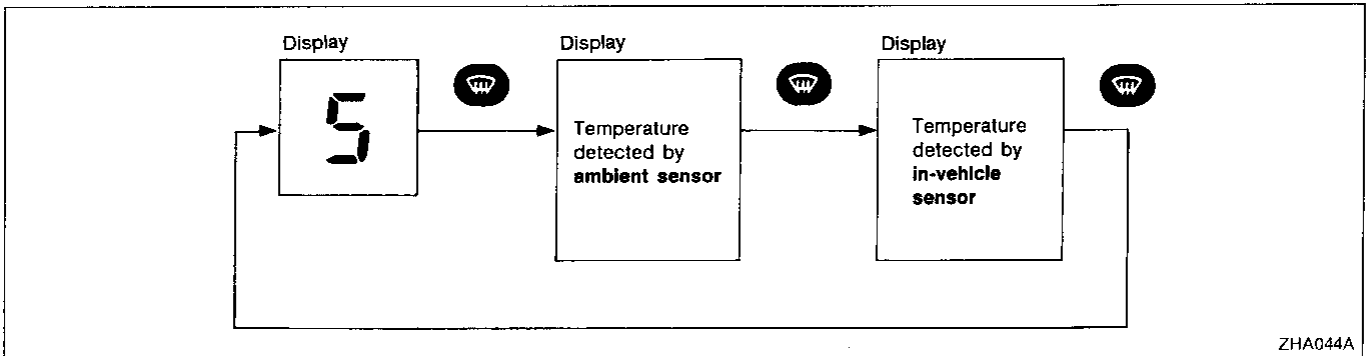
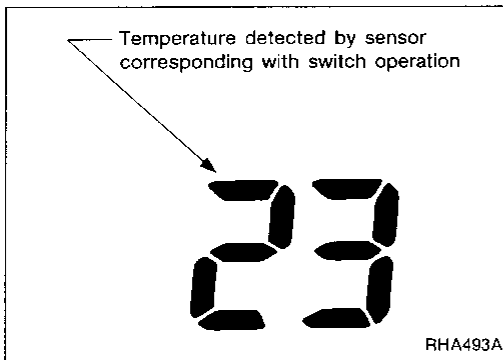
RHA429E



RHA054D

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)



If temperature shown on display greatly differs from actual temperature, check sensor circuit at first. Then inspect sensor itself according to the procedures described in **Control System Input Component**. Refer to HA-83.

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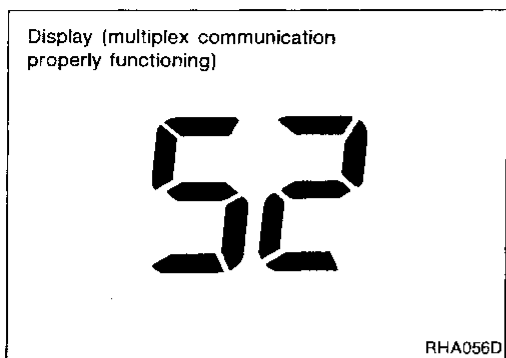
TROUBLE DIAGNOSES




Self-diagnosis (Cont'd)

Detects multiplex communication error

Display shows "52" in STEP 5 mode.

[Multiplex communication error between control unit and auto amplifier is detected]



Display	Signal direction
52	In good order
52 	Control unit → auto amp.
52  blinks two times. ↓	Auto amp. → control unit
52 	

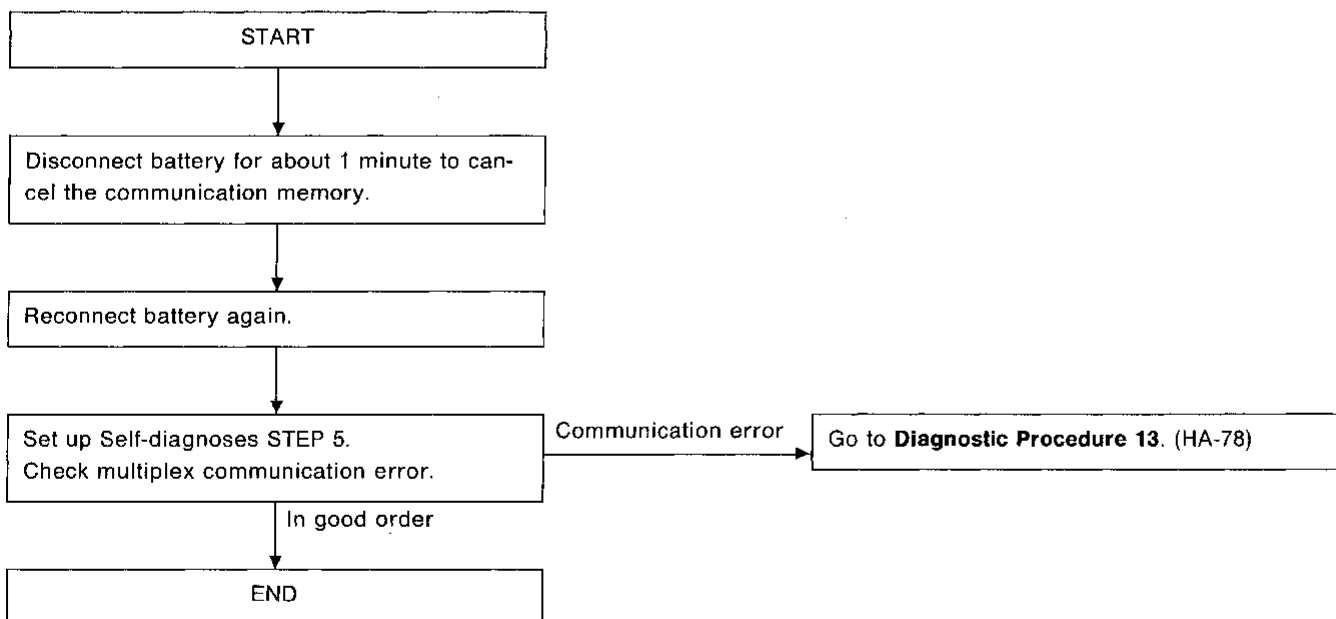
CAUTION:

The auto amp. memorizes any communication error in the system in a normal control with battery connected.

When there is an error, display will be as shown above.

When plural errors occur, the display of each error will blink two times for 0.5 second intervals.

If a communication error is displayed, follow the flow chart below. Determine if the error occurred in the past or is currently happening.



TROUBLE DIAGNOSES




Self-diagnosis (Cont'd)

AUXILIARY MECHANISM: Temperature setting trimmer

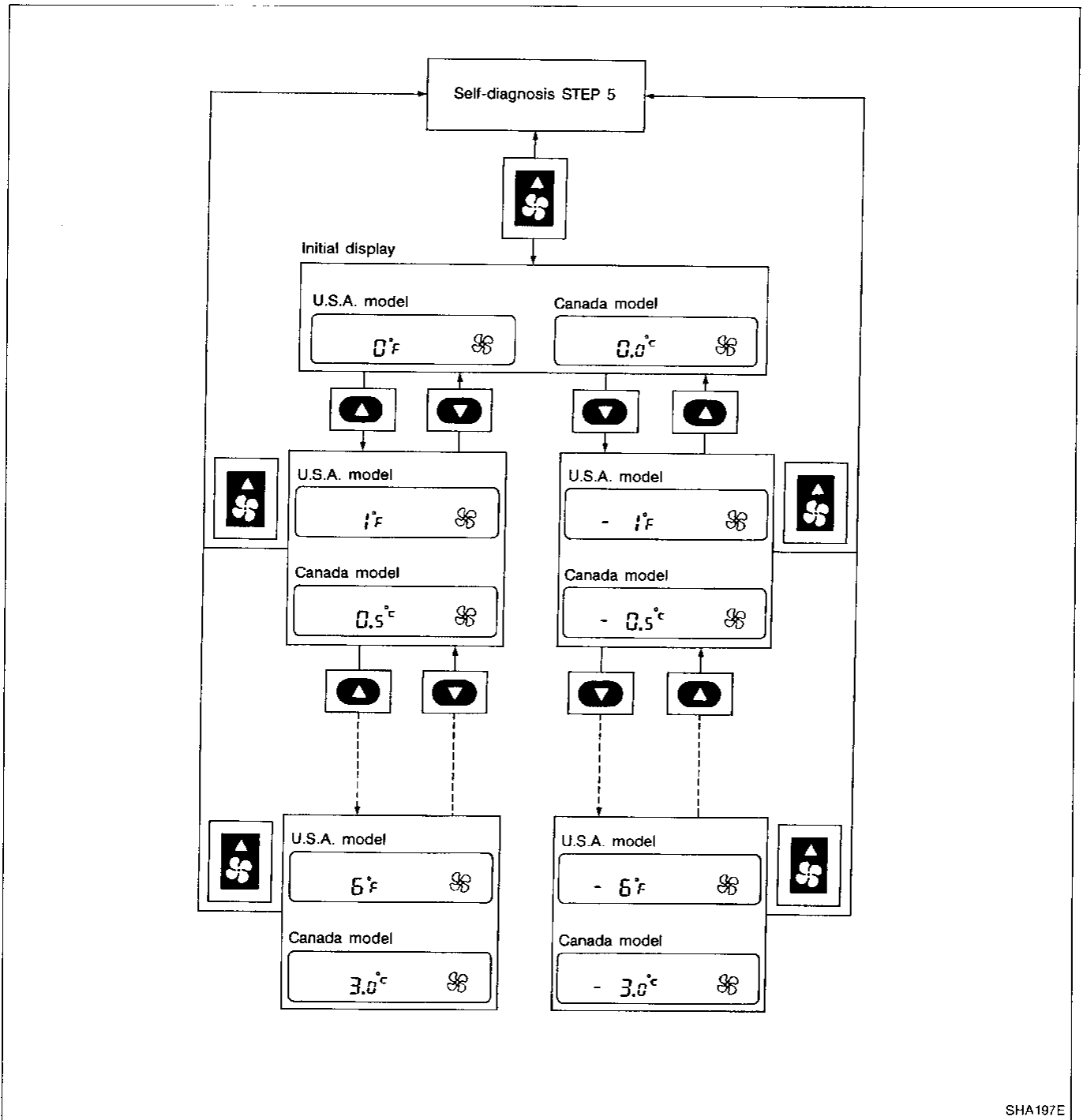
This trimmer compensates for differences between temperature setting (displayed digitally) and temperature felt by driver in a range of $\pm 3^{\circ}\text{C}$ ($\pm 6^{\circ}\text{F}$).

Operating procedures for this trimmer are as follows:

Starting with STEP 5 under "Self-diagnostic mode", press

 (fan up) switch to set air conditioning system in auxiliary mode. Then, press either  (HOT) or  (COLD) switch as desired. Temperature will change at a rate of 0.5°C (1°F) each time a switch is pressed.

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

Preliminary Check

PRELIMINARY CHECK 1

Air outlet does not change.

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

CHECK SENSOR CIRCUIT.
Set up Self-diagnosis STEP 2.
Is each sensor circuit normal?
Code No. 20 should be indicated on the display after approx. 3 seconds.

No

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

Code No.	How to repair	Reference page
21	Go to Diagnostic Procedure 1.	HA-62
22	Go to Diagnostic Procedure 2.	HA-63
23	Go to Diagnostic Procedure 3.	HA-64
25	Go to Diagnostic Procedure 4.	HA-65
26	Go to Diagnostic Procedure 5.	HA-66
-21	Go to Diagnostic Procedure 1.	HA-62
-22	Go to Diagnostic Procedure 2.	HA-63
-23	Go to Diagnostic Procedure 3.	HA-64
-25	Go to Diagnostic Procedure 4.	HA-65
-26	Go to Diagnostic Procedure 5.	HA-66

Are sensor circuits for ambient sensor and in-vehicle sensor operating normally? If malfunction is suspected, check temperature detected by each sensor using Self-diagnosis STEP 5. Confirm the temperature is within normal range before performing Diagnostic Procedures.

Yes

CHECK INTAKE SENSOR CIRCUIT.
Go to Diagnostic Procedure 6. (HA-67)

OK

CHECK MODE DOOR MOTOR.
Set up Self-diagnosis STEP 3.
Is mode door motor operating normally?
Code No. 30 should be indicated on the display after approx. 3 seconds.

No

Go to **Diagnostic Procedure 7.** (HA-68)

Yes

CHECK MODE DOOR OPERATION.
Set up Self-diagnosis STEP 4.
Does air outlet change according to each code No.?

No

CHECK SIDE LINK MECHANISM.
Refer to CONTROL LINKAGE ADJUSTMENT. (HA-80)

NG

Repair or adjust.

OK

Go to **Diagnostic Procedure 7.** (HA-68)

41	42	43	44	45	46
VENT	B/L	B/L	FOOT	F/D2	DEF

Refer to **Air Flow.** (HA-15)

Yes

Air outlet control system is normal. Refer to **Mode door control specification.** (HA-89)

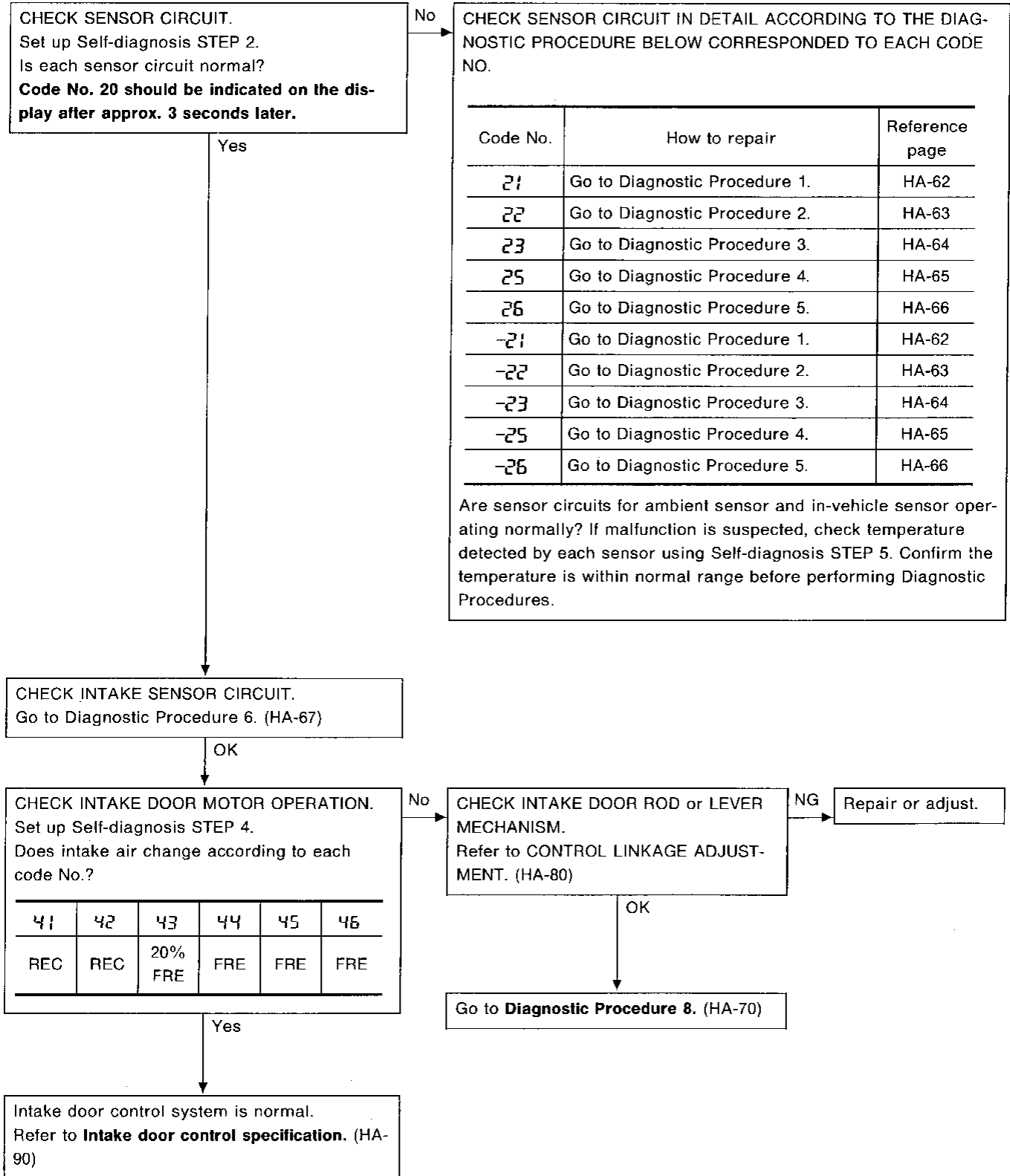
TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

PRELIMINARY CHECK 2

Intake door does not change.

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

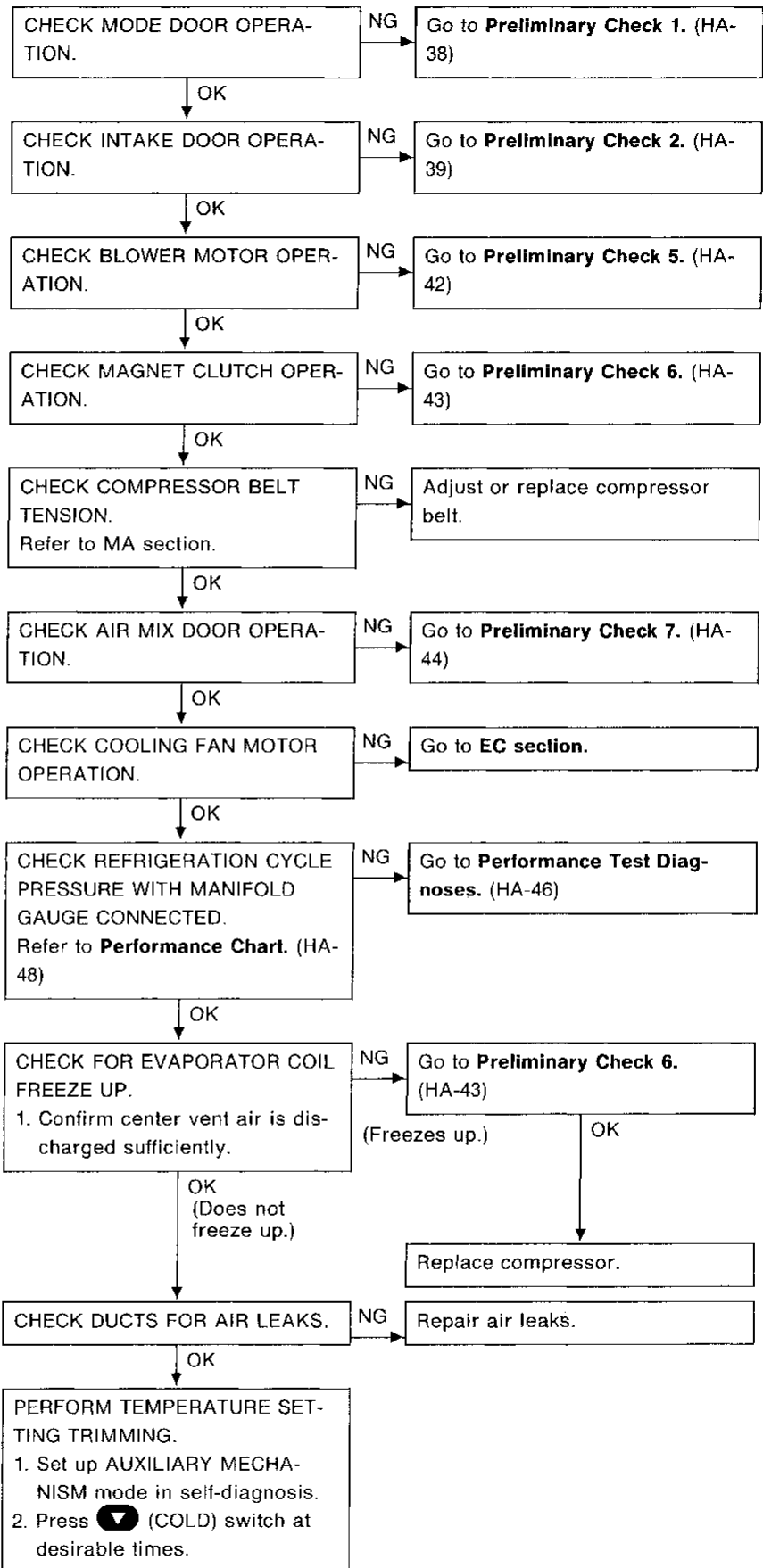


TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

PRELIMINARY CHECK 3

Insufficient cooling

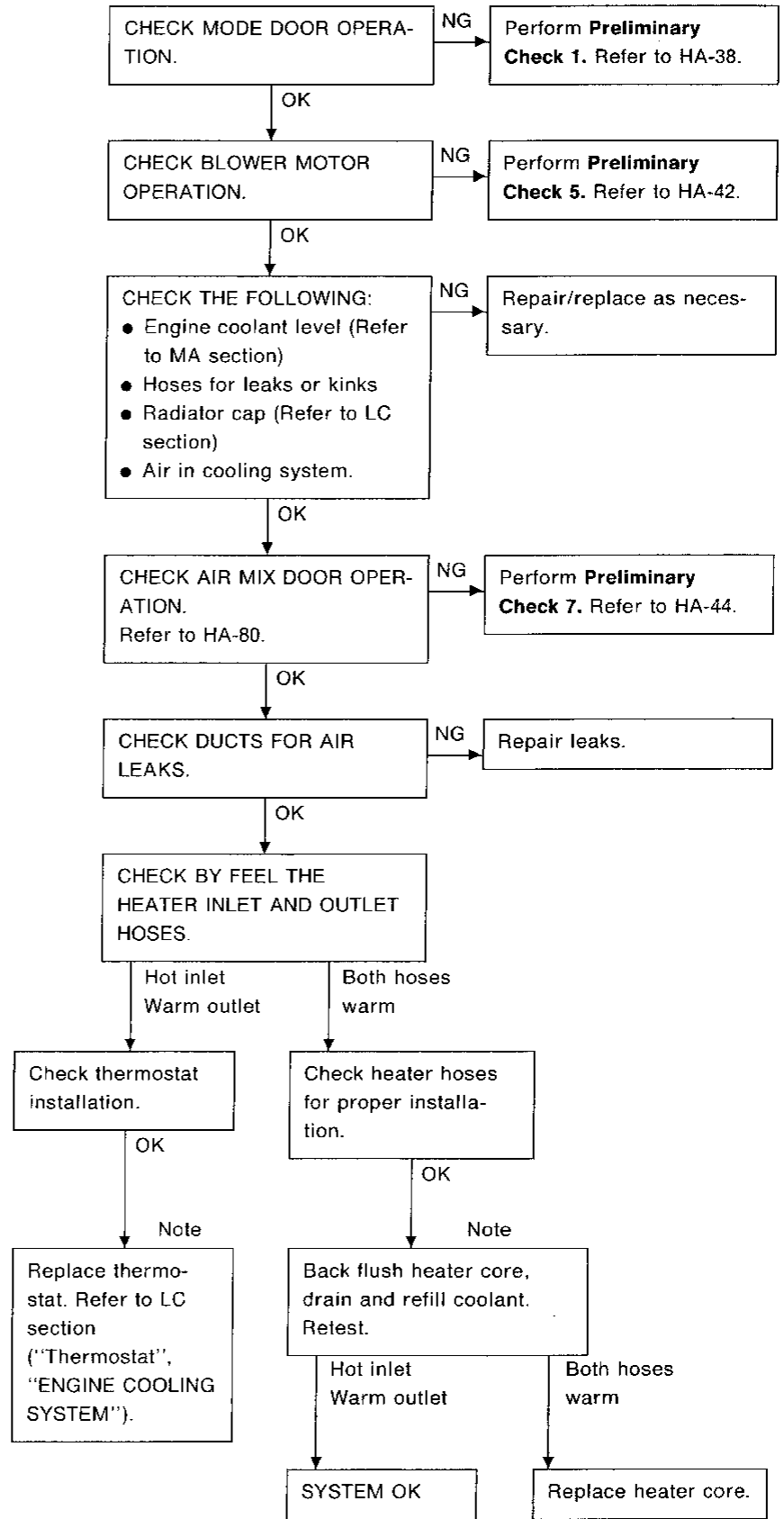


TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

PRELIMINARY CHECK 4

Insufficient heating



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Note: To avoid unnecessary service of heating system, first perform TEMPERATURE SETTING TRIMMING. Refer to "AUXILIARY MECHANISM", "Self-diagnosis".

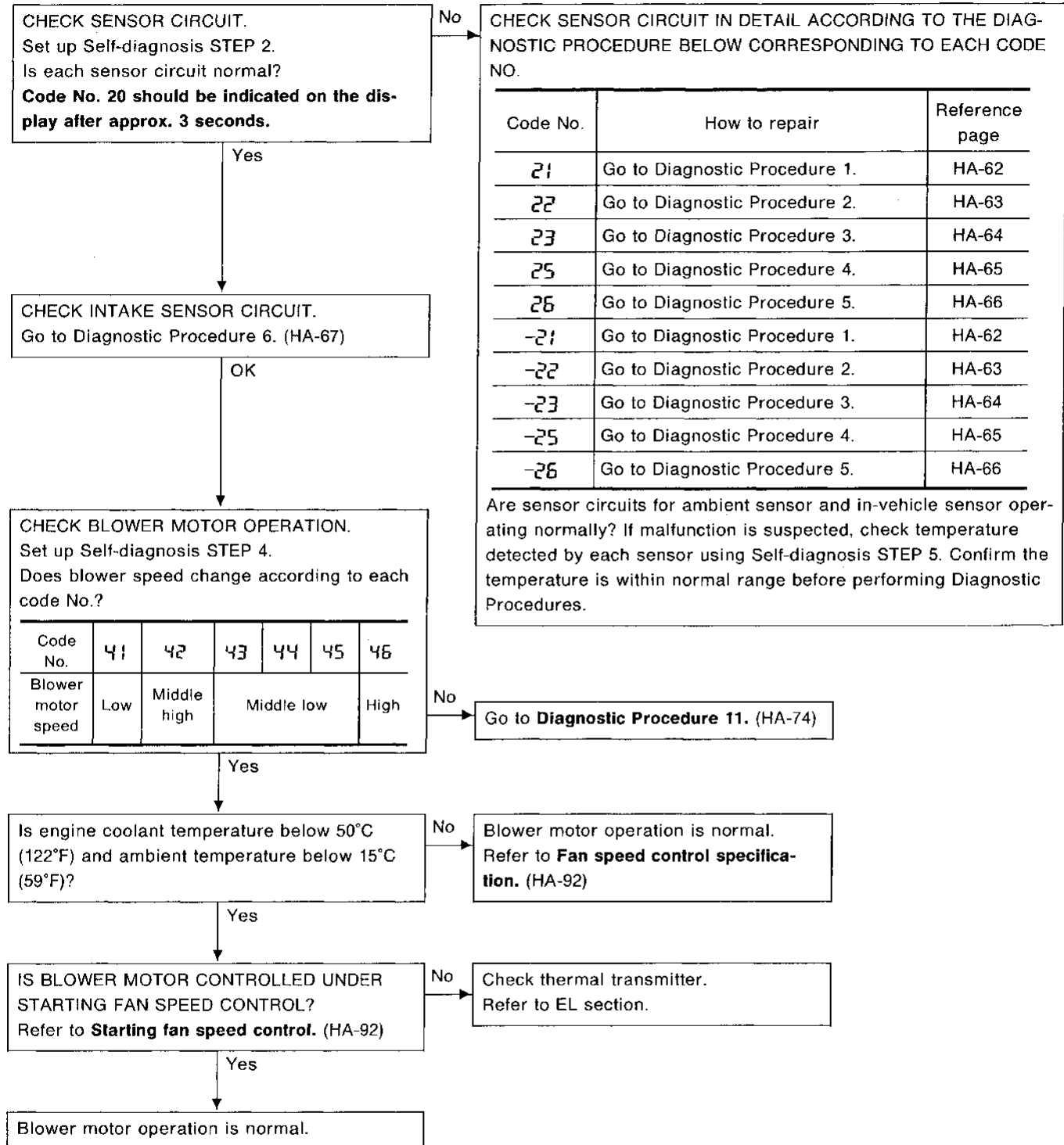
TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

PRELIMINARY CHECK 5

Blower motor operation is malfunctioning.

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



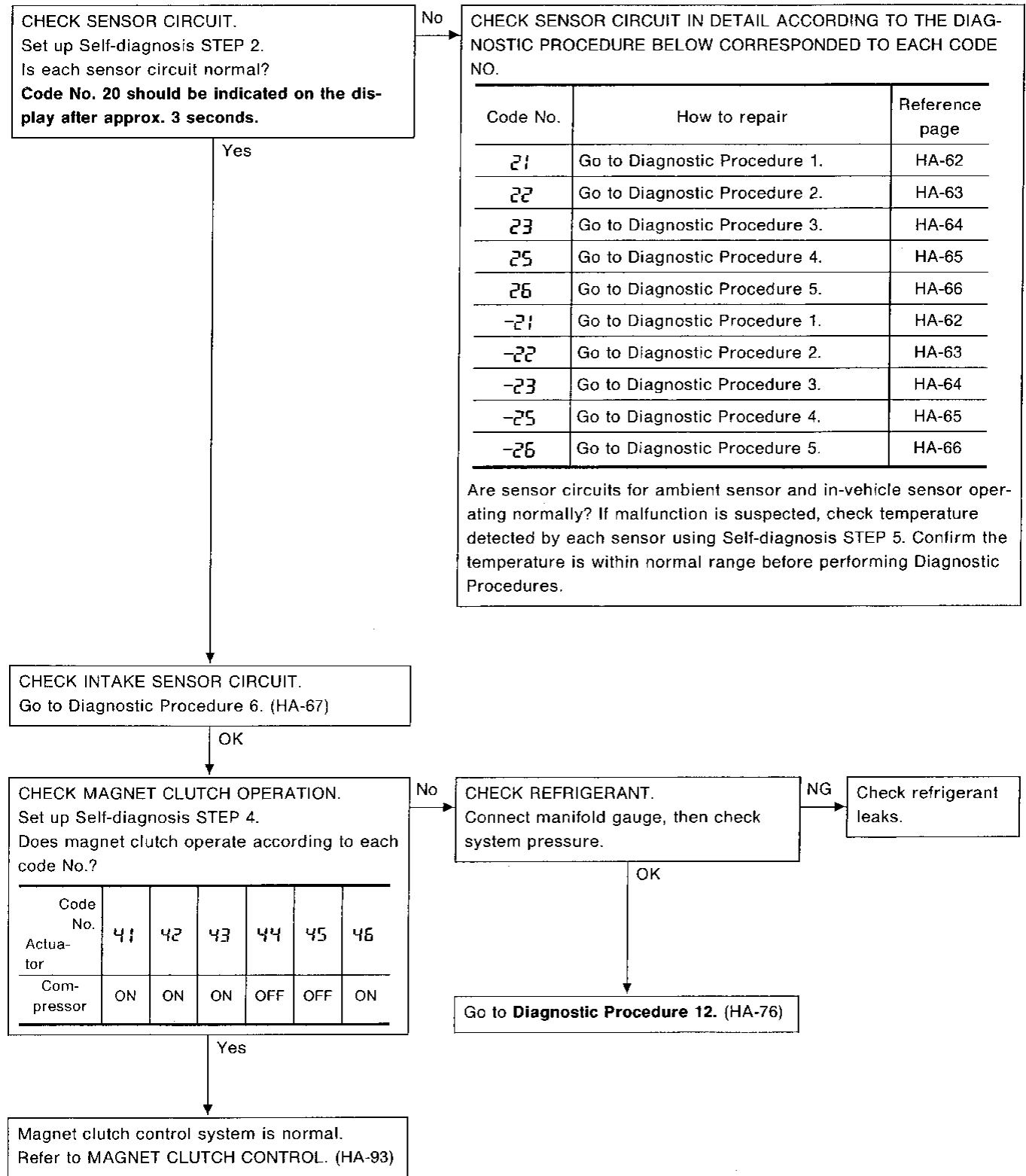
TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

PRELIMINARY CHECK 6

Magnet clutch does not engage.

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



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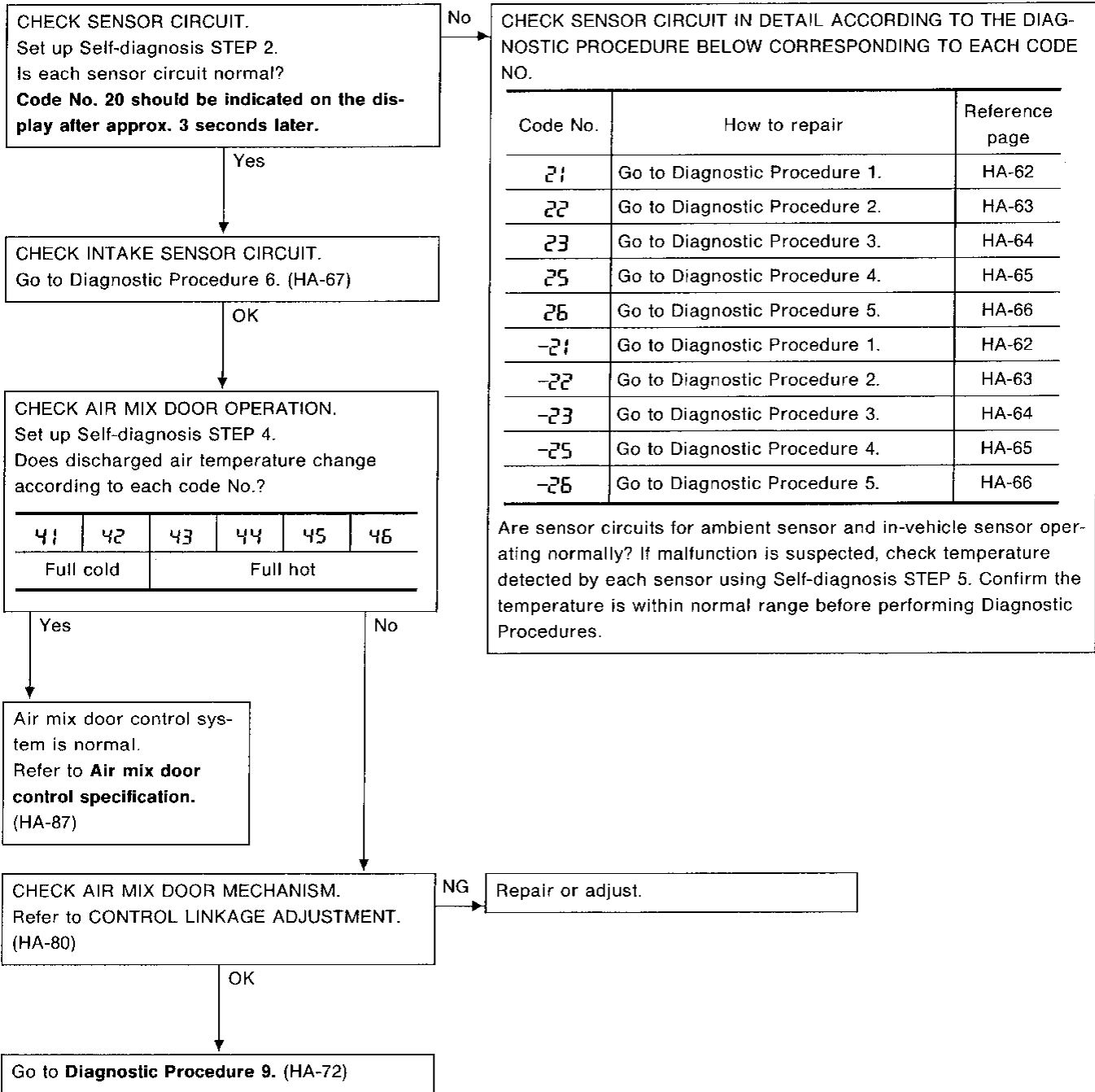
TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

PRELIMINARY CHECK 7

Discharged air temperature does not change.

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

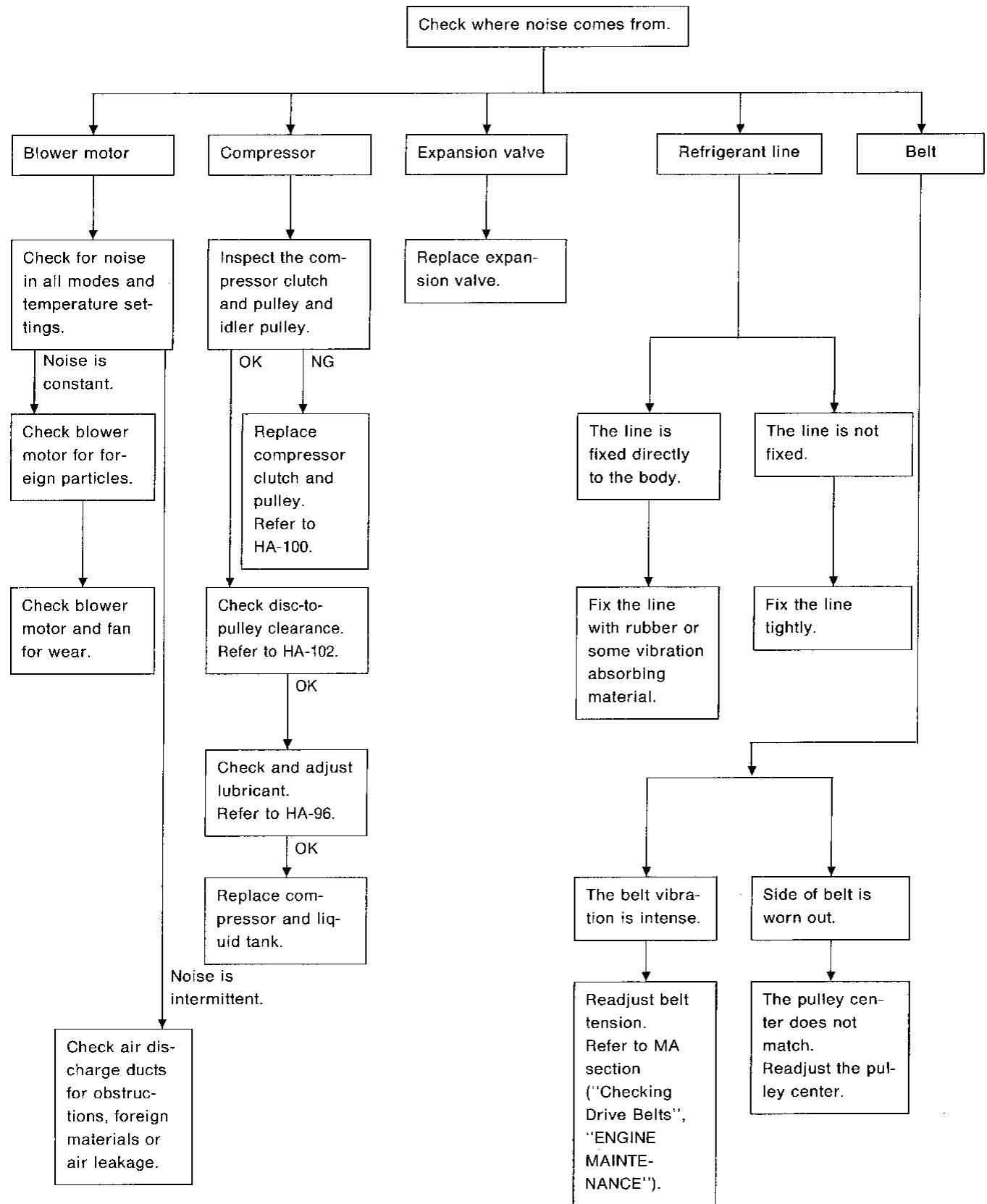


TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

PRELIMINARY CHECK 8

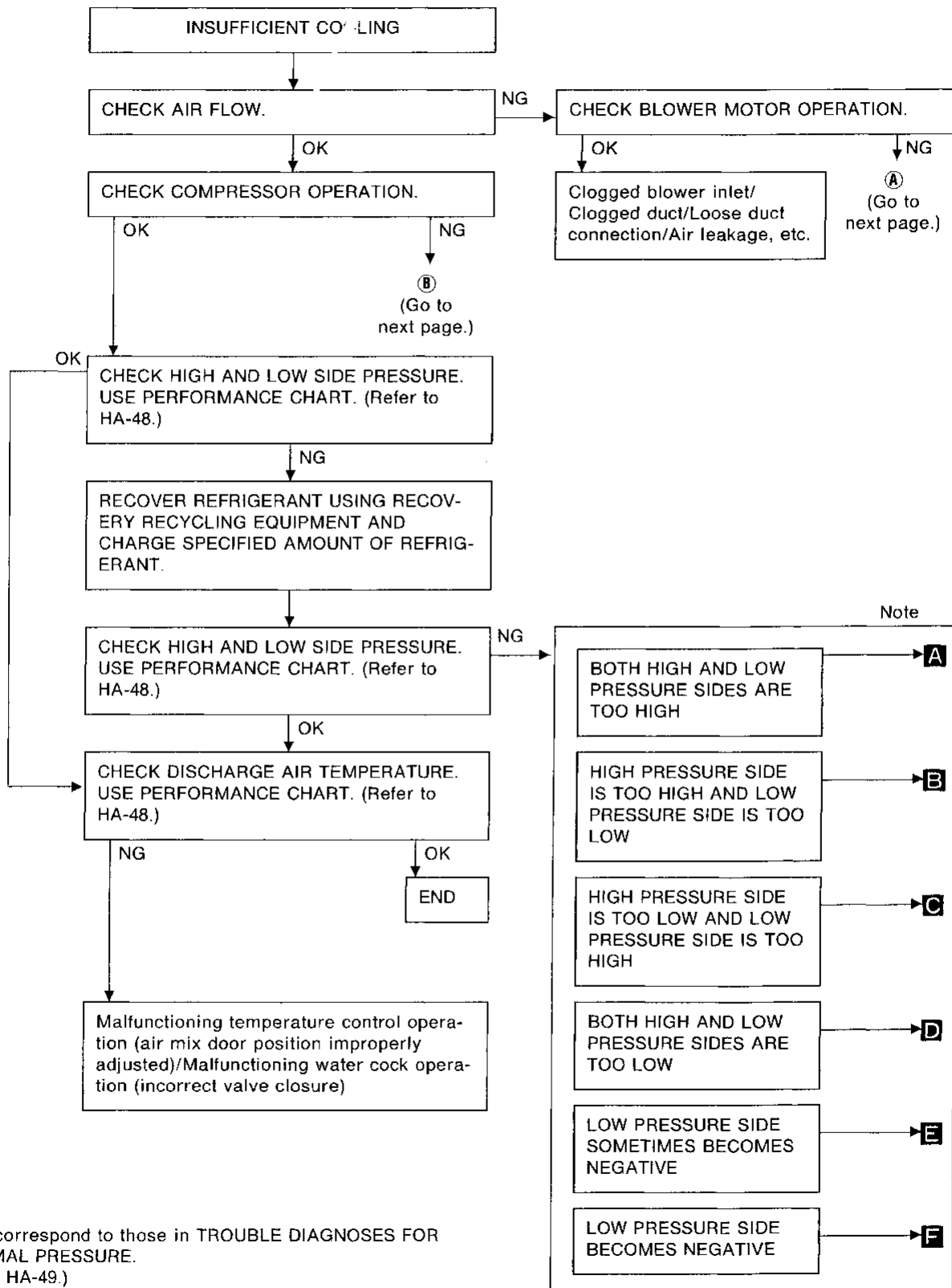
Noise



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TROUBLE DIAGNOSES

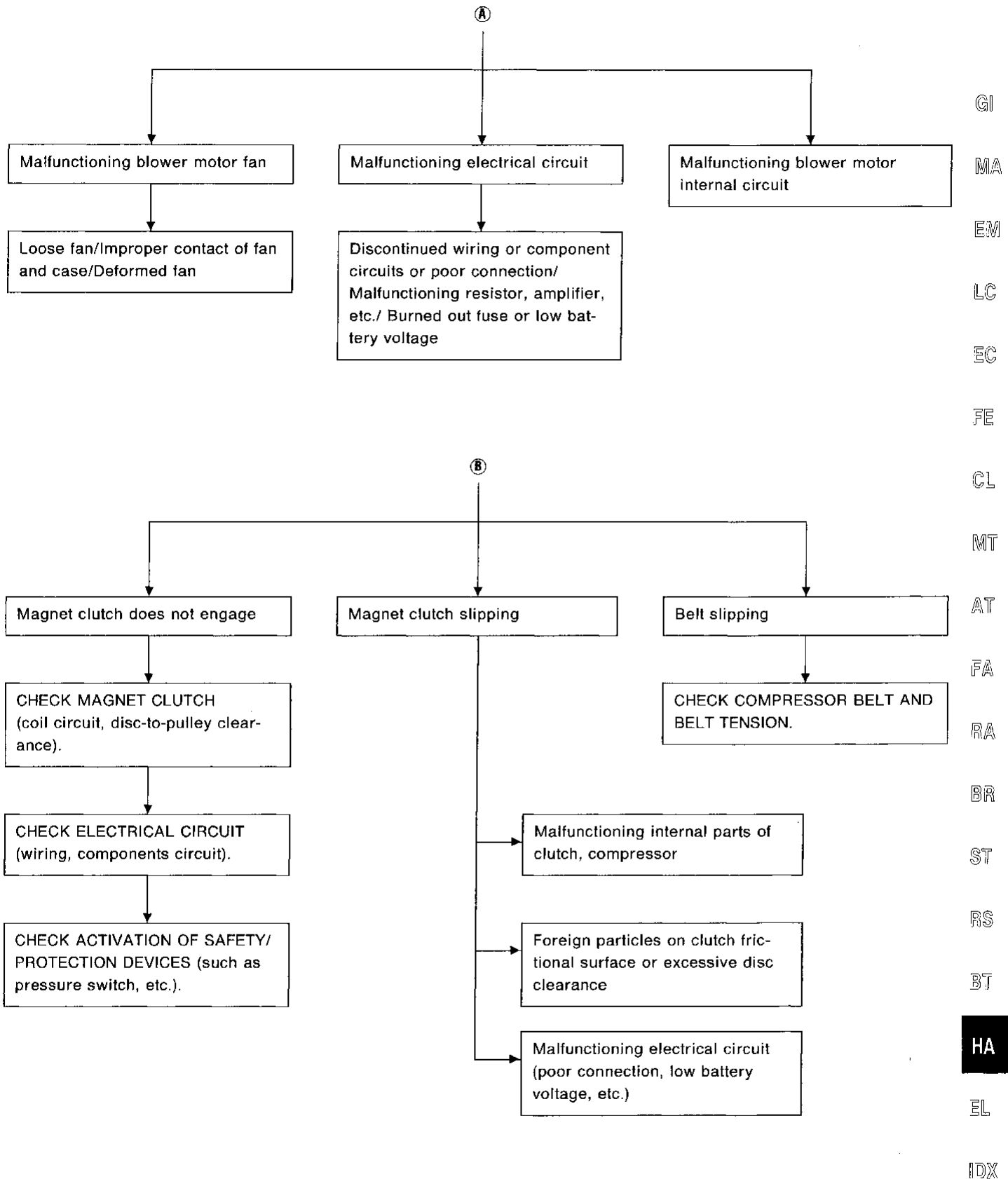
Performance Test Diagnoses INSUFFICIENT COOLING



Note: **A-F** correspond to those in TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE. (Refer to HA-49.)

TROUBLE DIAGNOSES

Performance Test Diagnoses (Cont'd)



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TROUBLE DIAGNOSES

Performance Chart

TEST CONDITION

Testing must be performed as follows:

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

Doors: Closed

Door window: Open

Hood: Open

TEMP. setting: Max. COLD

Discharge Air: Face Vent

RECIRC switch: (Recirculation) ON

FAN speed: 4-speed

A/C switch: ON

Engine speed: 1,500 rpm

Operate the air conditioning system for 10 minutes before taking measurements.

TEST READING

Recirculating-to-discharge air temperature table

Inside air (Recirculating air) at blower assembly inlet		Discharge air temperature at center ventilator °C (°F)
Relative humidity %	Air temperature °C (°F)	
50 - 60	20 (68)	1.5 - 2.6 (35 - 37)
	25 (77)	3.7 - 5.7 (39 - 42)
	30 (86)	7.6 - 10.0 (46 - 50)
	35 (95)	12.4 - 15.2 (54 - 59)
60 - 70	20 (68)	2.6 - 3.6 (37 - 38)
	25 (77)	5.7 - 7.6 (42 - 46)
	30 (86)	10.0 - 12.4 (50 - 54)
	35 (95)	15.2 - 18.0 (59 - 64)

Ambient air temperature-to-operating pressure table

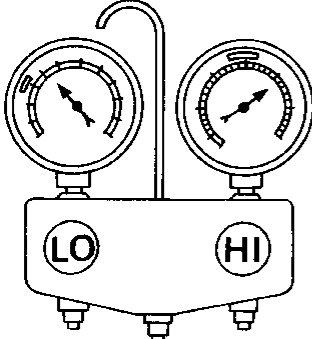
Ambient air		High-pressure (Discharge side) kPa (kg/cm ² , psi)	Low-pressure (Suction side) kPa (kg/cm ² , psi)
Relative humidity %	Air temperature °C (°F)		
50 - 70	20 (68)	785 - 1,040 (8.0 - 10.6, 114 - 151)	137 - 167 (1.4 - 1.7, 20 - 24)
	25 (77)	981 - 1,304 (10.0 - 13.3, 142 - 189)	137 - 167 (1.4 - 1.7, 20 - 24)
	30 (86)	1,167 - 1,550 (11.9 - 15.8, 169 - 225)	147 - 177 (1.5 - 1.8, 21 - 26)
	35 (95)	1,373 - 1,804 (14.0 - 18.4, 199 - 262)	157 - 186 (1.6 - 1.9, 23 - 27)
	40 (104)	1,550 - 2,059 (15.8 - 21.0, 225 - 299)	167 - 206 (1.7 - 2.1, 24 - 30)

If pressure is not within range, refer to HA-49, "Trouble Diagnoses for Abnormal Pressure".

TROUBLE DIAGNOSES

Trouble Diagnoses for Abnormal Pressure

Whenever system's high 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-48 ("Ambient air temperature-to-operating pressure table").

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

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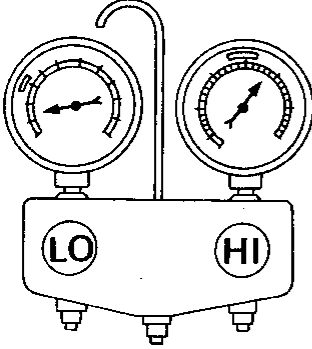
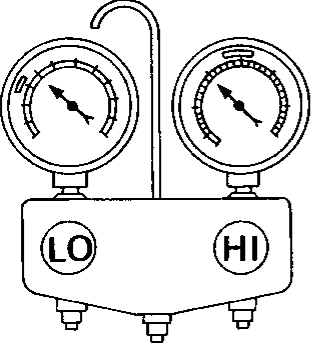
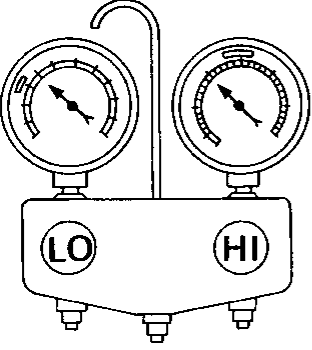
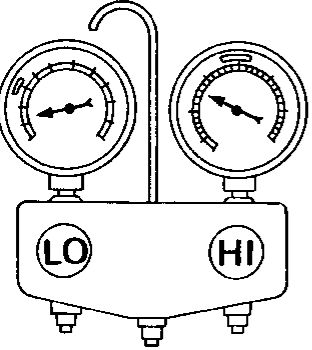
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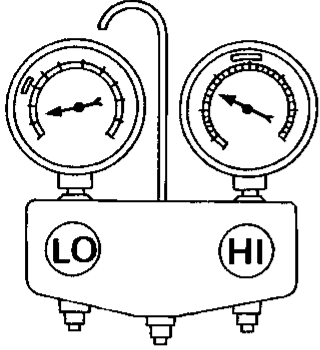
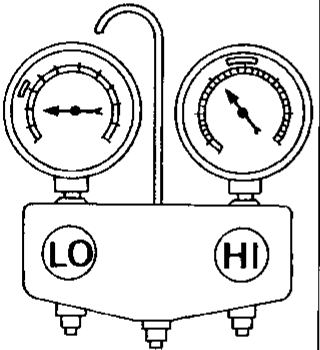
TROUBLE DIAGNOSES

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 style="text-align: center;">AC350A</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 style="text-align: center;">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>High-pressure side is too low and low-pressure side is too high.</p> <p>C</p>  <p style="text-align: center;">AC356A</p>	<p>No temperature difference between high and low-pressure sides</p>	<p>Compressor discharge capacity does not change. (Compressor stroke is set at maximum.)</p>	<p>Replace compressor.</p>
<p>Both high- and low-pressure sides are too low.</p> <p>D</p>  <p style="text-align: center;">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.

TROUBLE DIAGNOSES

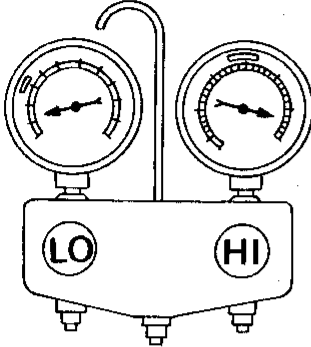
Trouble Diagnoses for Abnormal Pressure (Cont'd)

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
<p>Both high- and low-pressure sides are too low.</p> <p>D</p>  <p style="text-align: right;">AC353A</p>	<p>There is a big temperature difference between expansion valve inlet and outlet while the valve itself is frosted.</p>	<p>Expansion valve closes a little compared with the specification.</p> <p style="text-align: center;">↓</p> <p>① Improper expansion valve adjustment ② Malfunctioning thermal valve ③ Outlet and inlet may be clogged.</p>	<ul style="list-style-type: none"> ● Remove foreign particles by using compressed air. ● Check lubricant for contamination.
	<p>An area of the low-pressure pipe is colder than areas near the evaporator outlet.</p>	<p>Low-pressure pipe is clogged or crushed.</p>	<ul style="list-style-type: none"> ● Check and repair malfunctioning parts. ● Check lubricant for contamination.
	<p>Air flow volume is not enough or is too low.</p>	<p>Evaporator is frozen.</p> <p style="text-align: center;">↓</p> <p>Compressor discharge capacity does not change. (Compressor stroke is set at maximum length.)</p>	<p>Replace compressor.</p>
<p>Low-pressure side sometimes becomes negative.</p> <p>E</p>  <p style="text-align: right;">AC354A</p>	<ul style="list-style-type: none"> ● Air conditioning system does not function and does not cyclically cool the compartment air. ● The system constantly functions for a certain period of time after compressor is stopped and restarted. 	<p>Refrigerant does not discharge cyclically.</p> <p style="text-align: center;">↓</p> <p>Moisture is frozen at expansion valve outlet and inlet.</p> <p style="text-align: center;">↓</p> <p>Water is mixed with refrigerant.</p>	<ul style="list-style-type: none"> ● Drain water from refrigerant or replace refrigerant. ● Replace liquid tank.

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TROUBLE DIAGNOSES

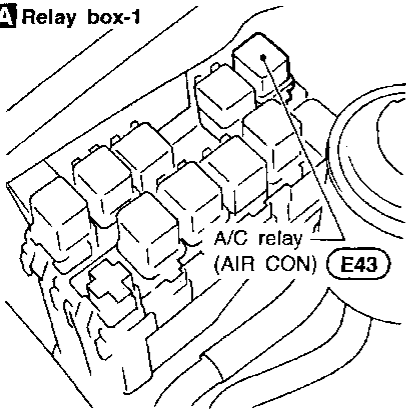
Trouble Diagnoses for Abnormal Pressure (Cont'd)

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
<p>Low-pressure side becomes negative.</p> <p>F</p>  <p style="text-align: right;">AC362A</p>	<p>Liquid tank or front/rear side of expansion valve's pipe is frosted or dewed.</p>	<p>High-pressure side is closed and refrigerant does not flow.</p> <p style="text-align: center;">↓</p> <p>Expansion valve or liquid tank is frosted.</p>	<p>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 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.

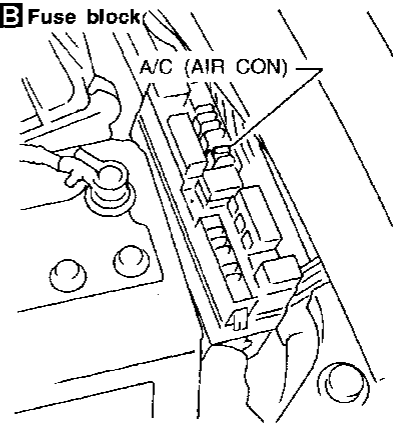
Harness Layout

ENGINE COMPARTMENT

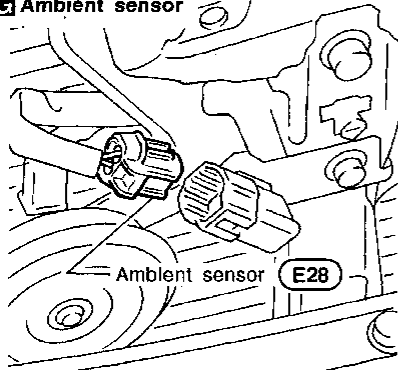
A Relay box-1



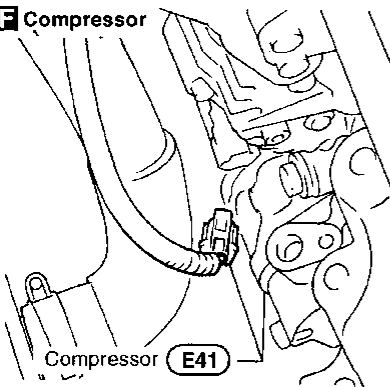
B Fuse block



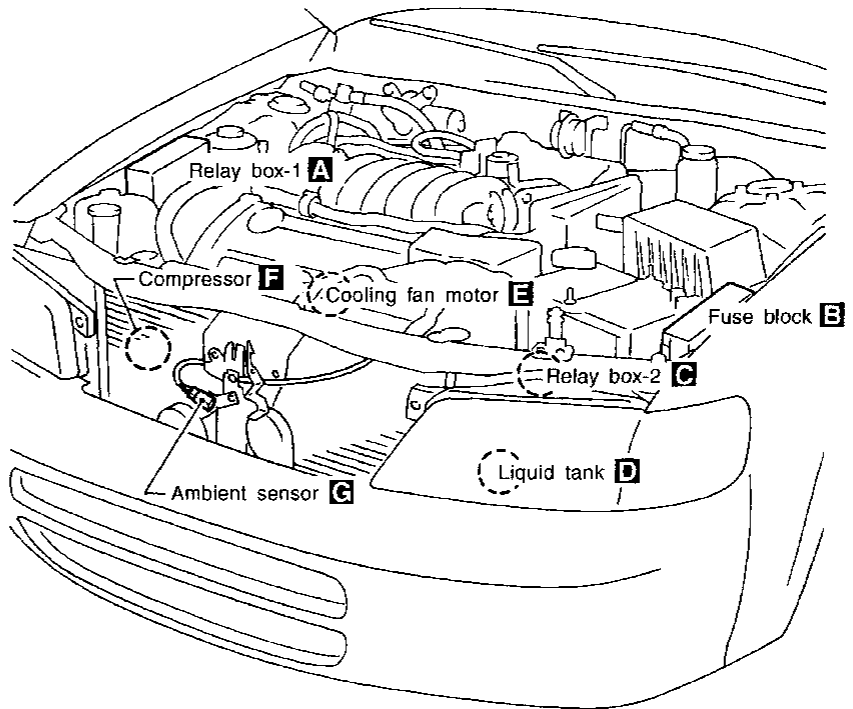
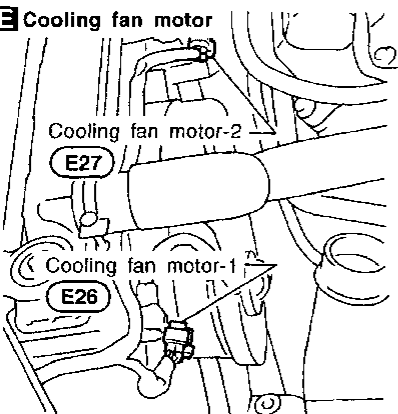
C Ambient sensor



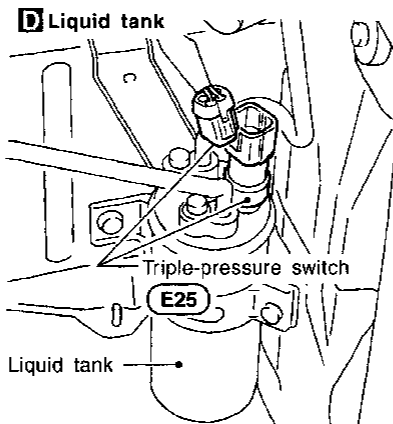
F Compressor



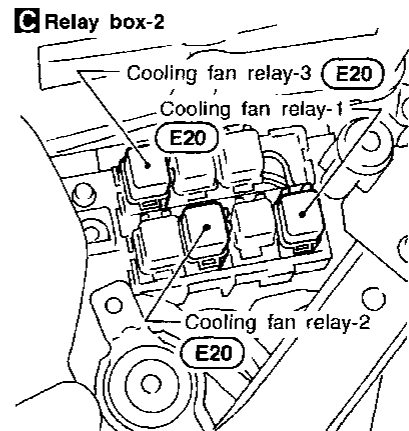
E Cooling fan motor



D Liquid tank



C Relay box-2



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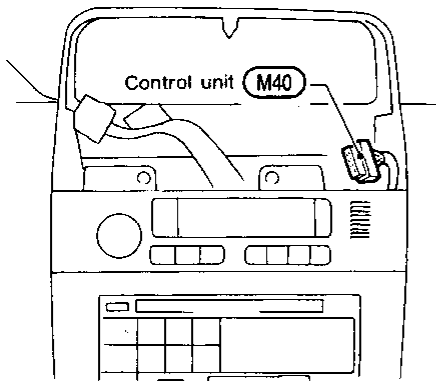
DX

TROUBLE DIAGNOSES

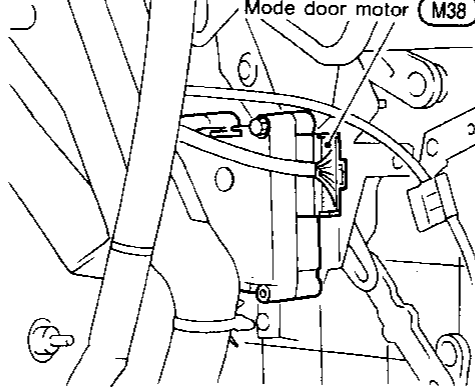
Harness Layout (Cont'd)

PASSENGER COMPARTMENT

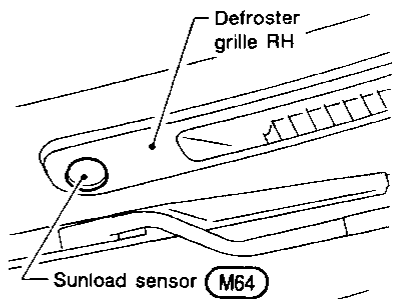
A Control unit



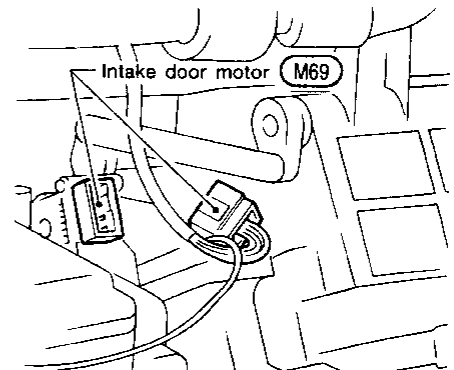
B Mode door motor



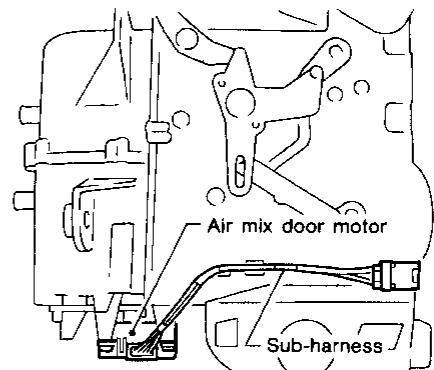
C Sunload sensor



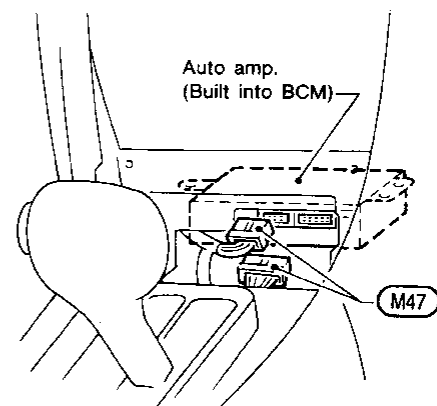
D Intake door motor



E Air mix door motor



F Auto amp. (BCM)



Control unit **A** (M40)

In-vehicle sensor **G** (M41)

Mode door motor **B** (M38)

Sunload sensor **C** (M64)

Intake door motor **D** (M69)

Fuse block **H**

Auto amp. (Built into BCM) **F** (M47)

Air mix door motor **E** (M49)

Bi-level door motor **G** (M53)

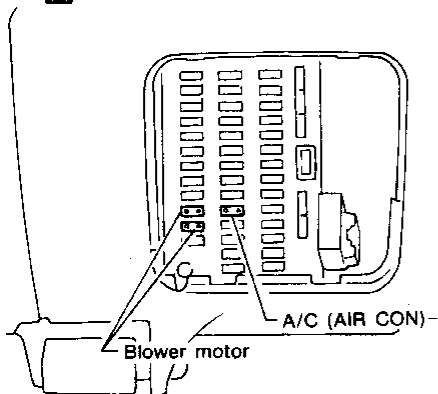
Blower motor **M76**

Fan control amp. **M57**

Intake sensor **M54**

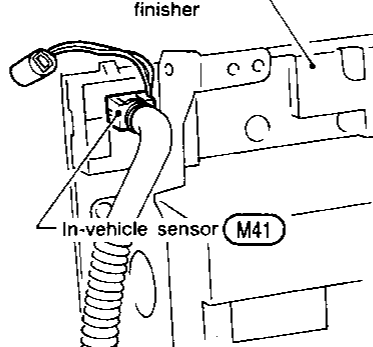
Aspirator

H Fuse block

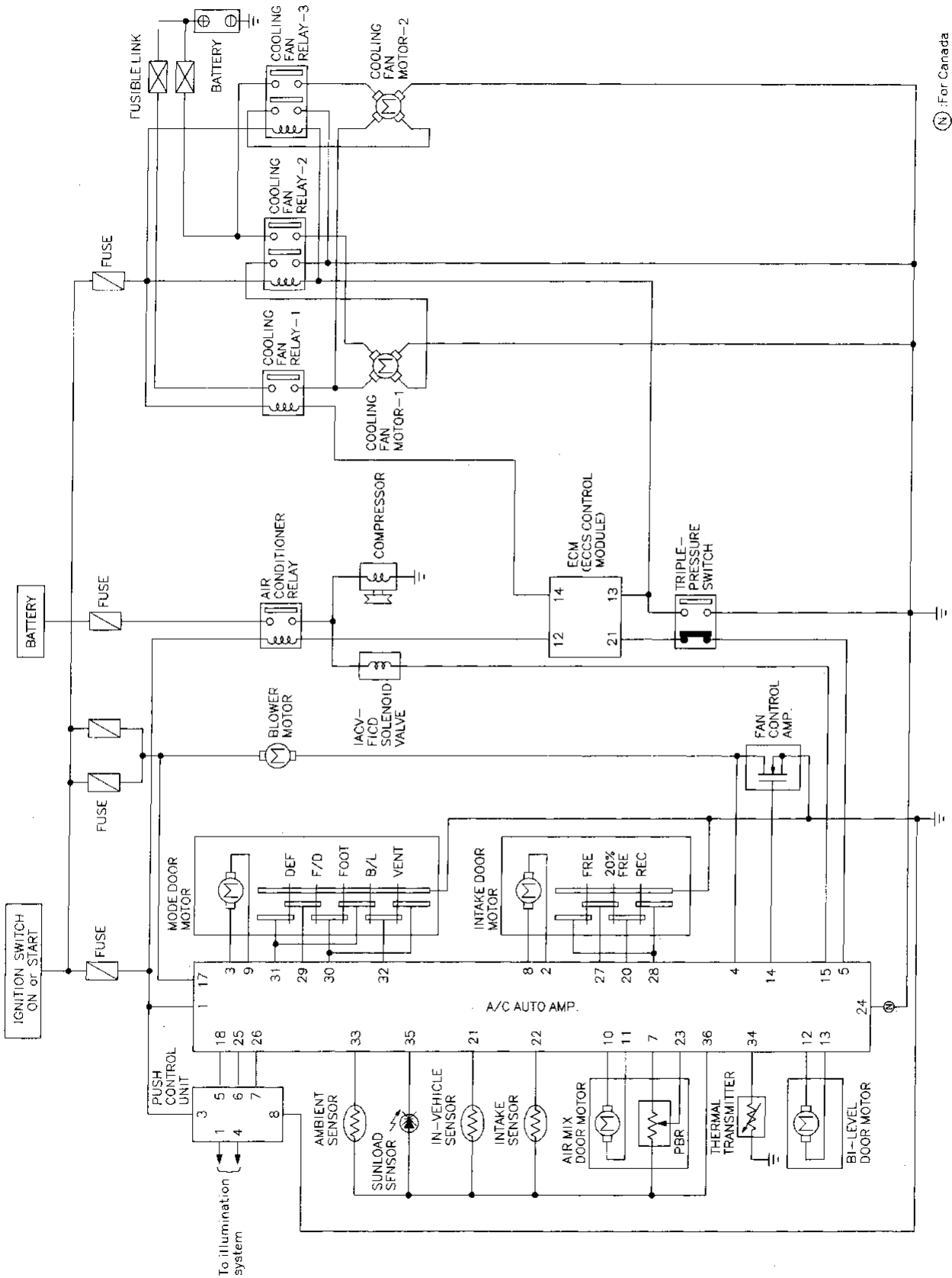


G In-vehicle sensor

Instrument finisher



Circuit Diagram for Quick Pinpoint Check



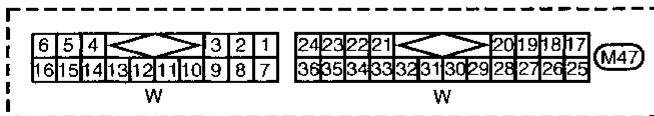
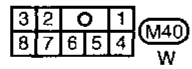
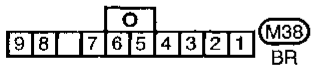
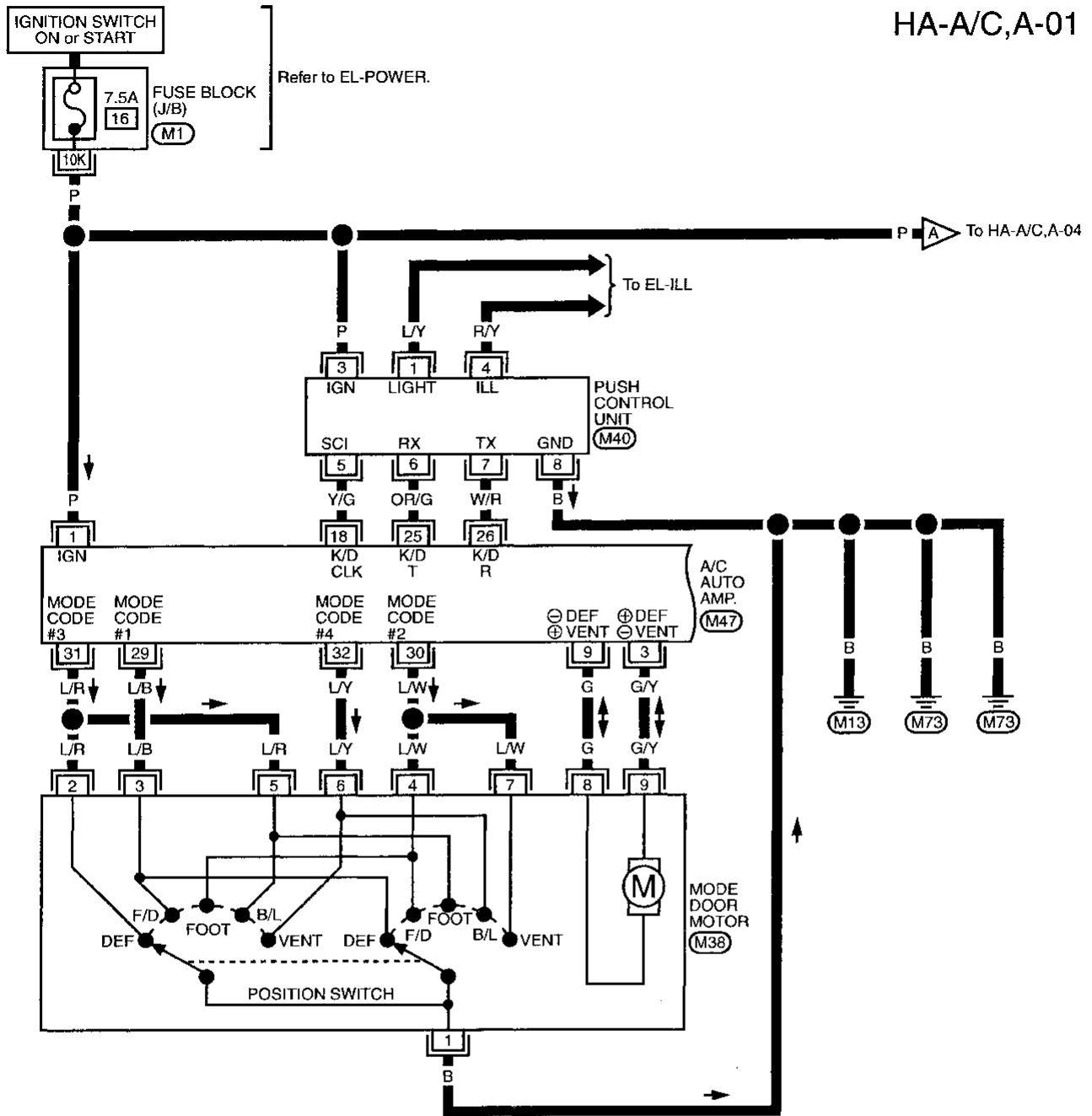
For Canada

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TROUBLE DIAGNOSES

Wiring Diagram — A/C, A —

HA-A/C,A-01



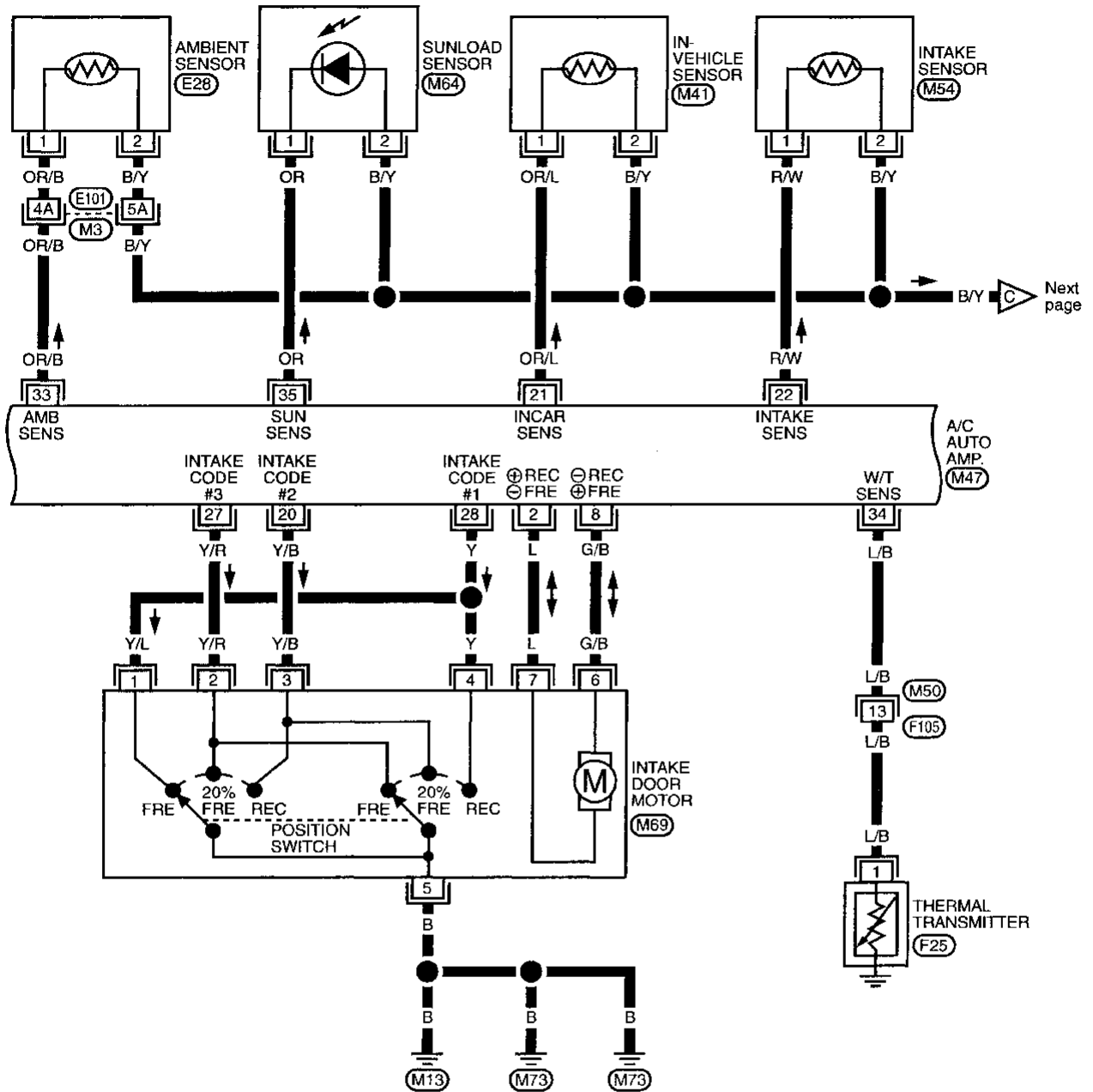
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M1

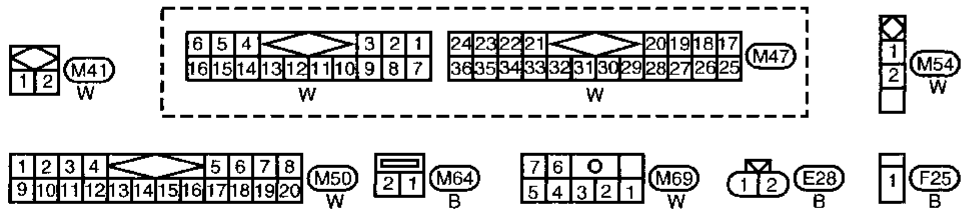
TROUBLE DIAGNOSES

Wiring Diagram — A/C, A — (Cont'd)

HA-A/C,A-02



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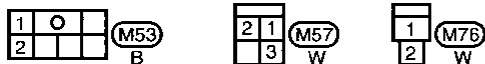
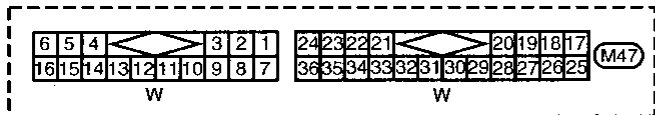
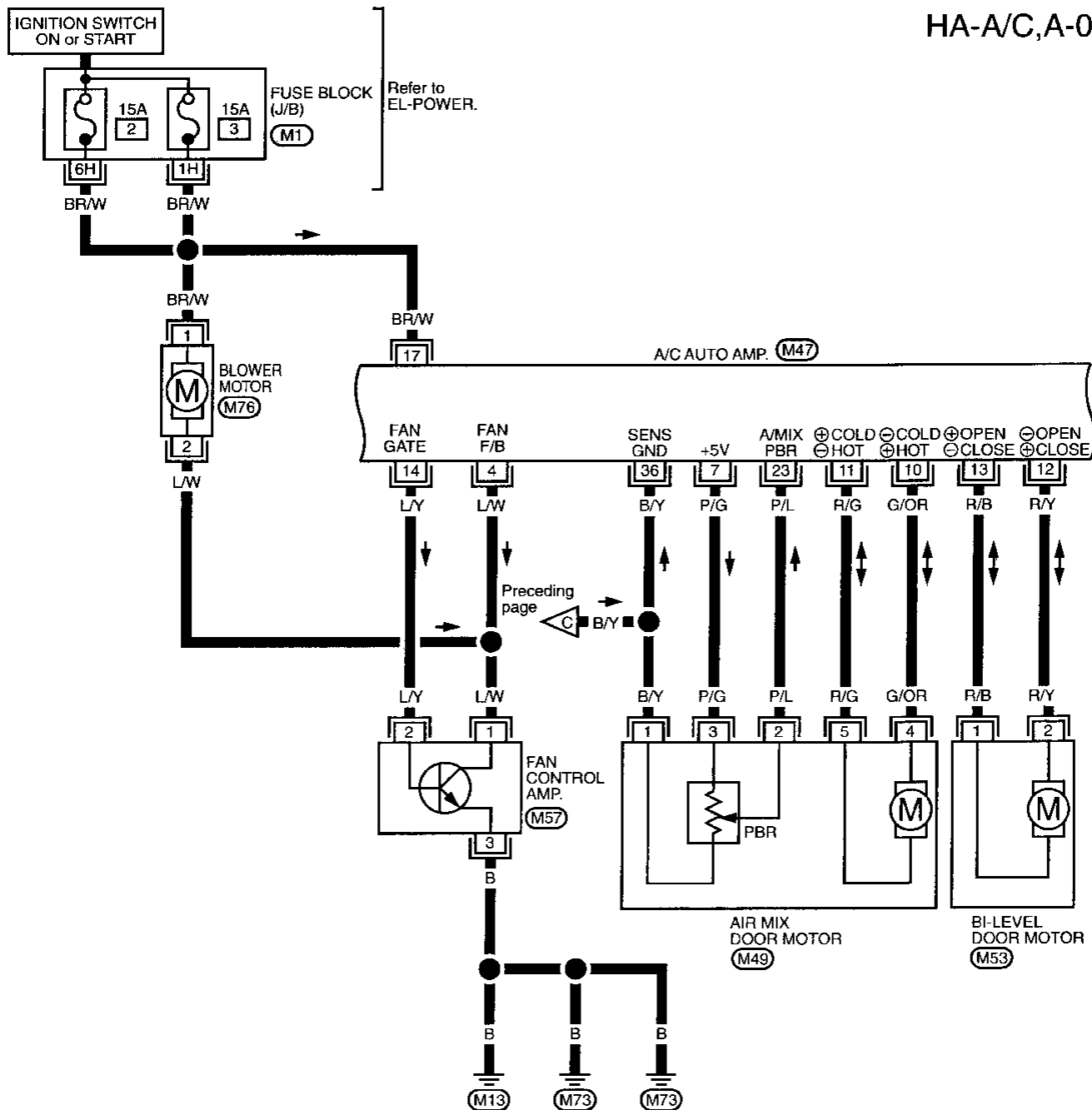
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M3, E101

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TROUBLE DIAGNOSES

Wiring Diagram — A/C, A — (Cont'd)

HA-A/C,A-03

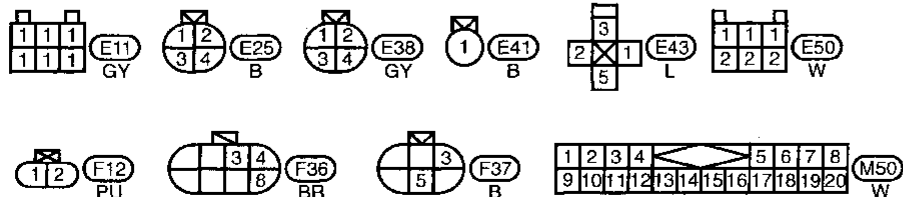
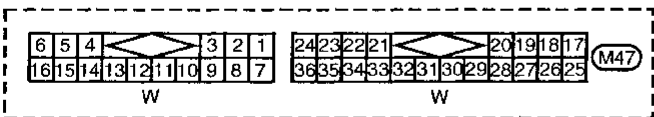
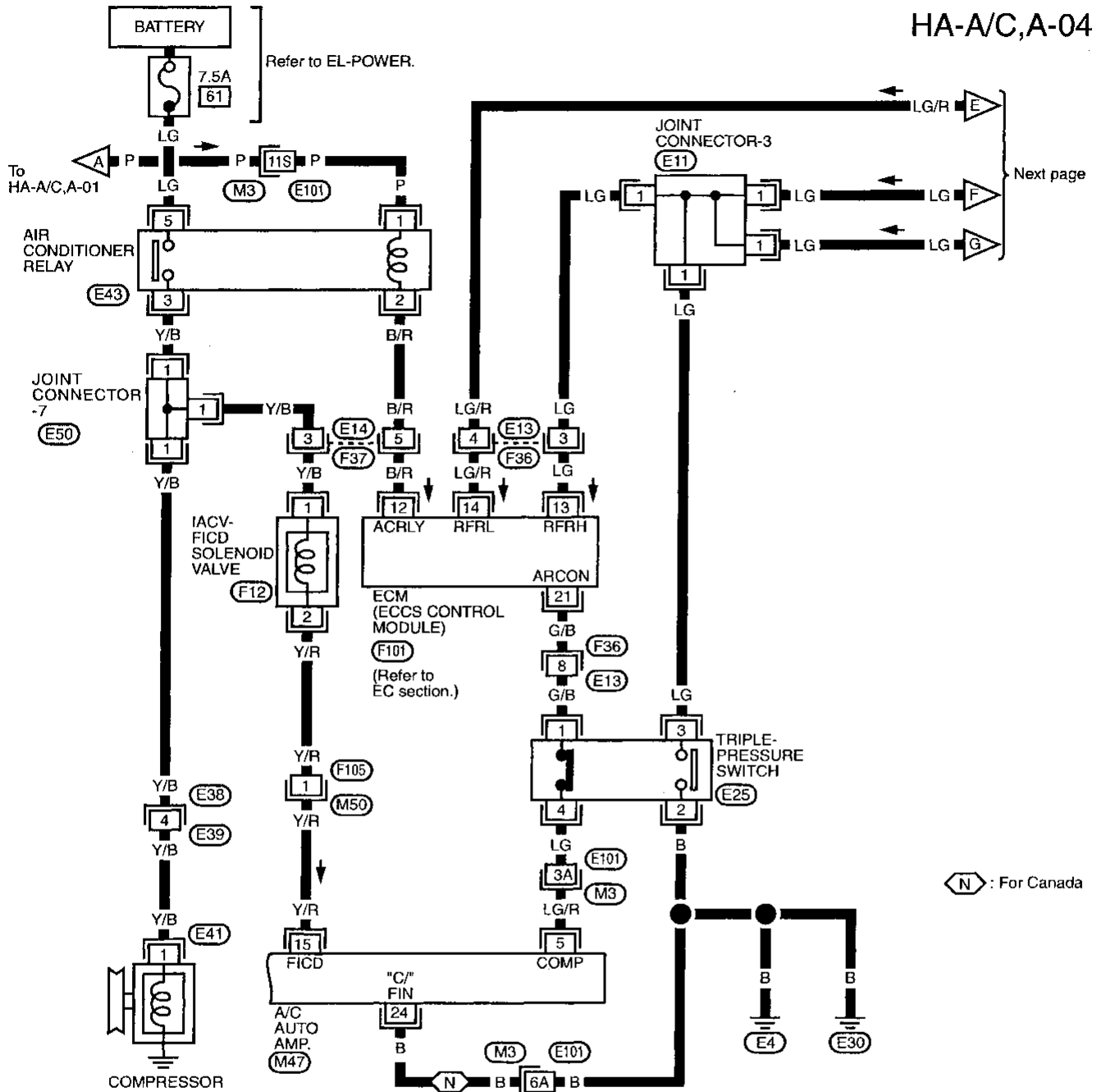


Refer to last page (Foldout page).

(M1)

TROUBLE DIAGNOSES

Wiring Diagram — A/C, A — (Cont'd)



Refer to last page (Foldout page).

- (M3), (E101)
- (E11)
- (E50)
- (F101)

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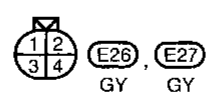
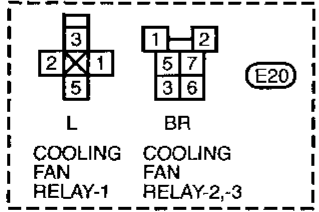
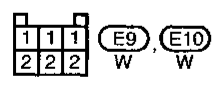
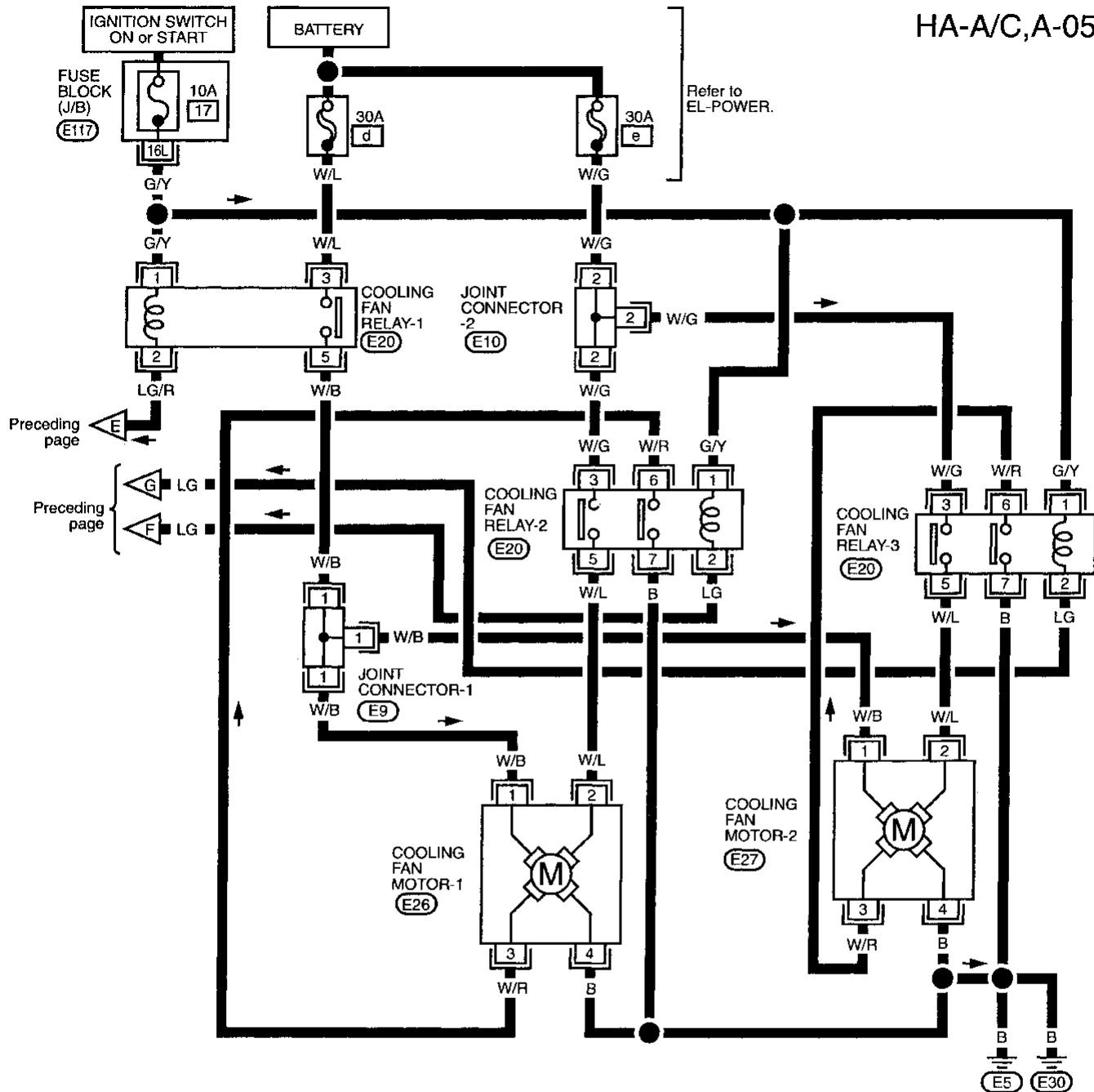
HA

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IX

TROUBLE DIAGNOSES

Wiring Diagram — A/C, A — (Cont'd)

HA-A/C,A-05



Refer to last page (Foldout page).
 (E9)
 (E10)
 (E17)

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

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

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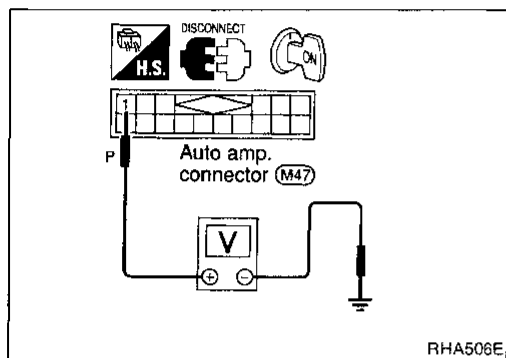
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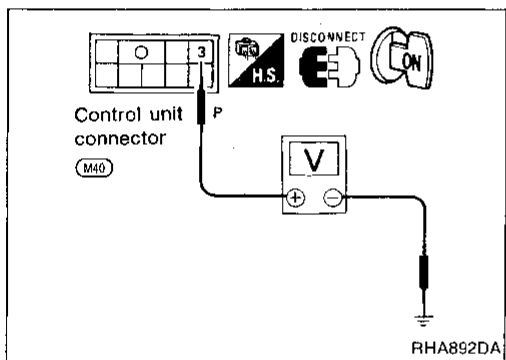


AUTO AMP. (BCM) CHECK

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

1. Disconnect auto amp. (BCM) harness connector.
2. Connect voltmeter from harness side.
3. Measure voltage across terminal ① and body ground.

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

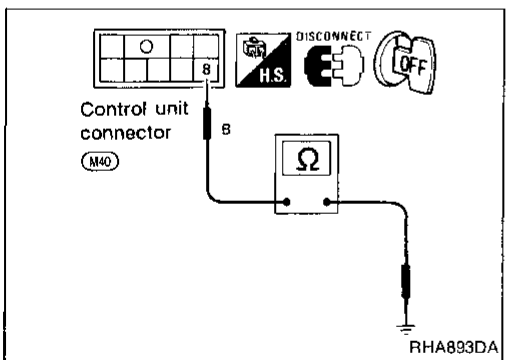


CONTROL UNIT CHECK

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

1. Disconnect push control unit harness connector.
2. Connect voltmeter from harness side.
3. Measure voltage across terminal ③ and body ground.

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



Check body ground circuit for push control unit.

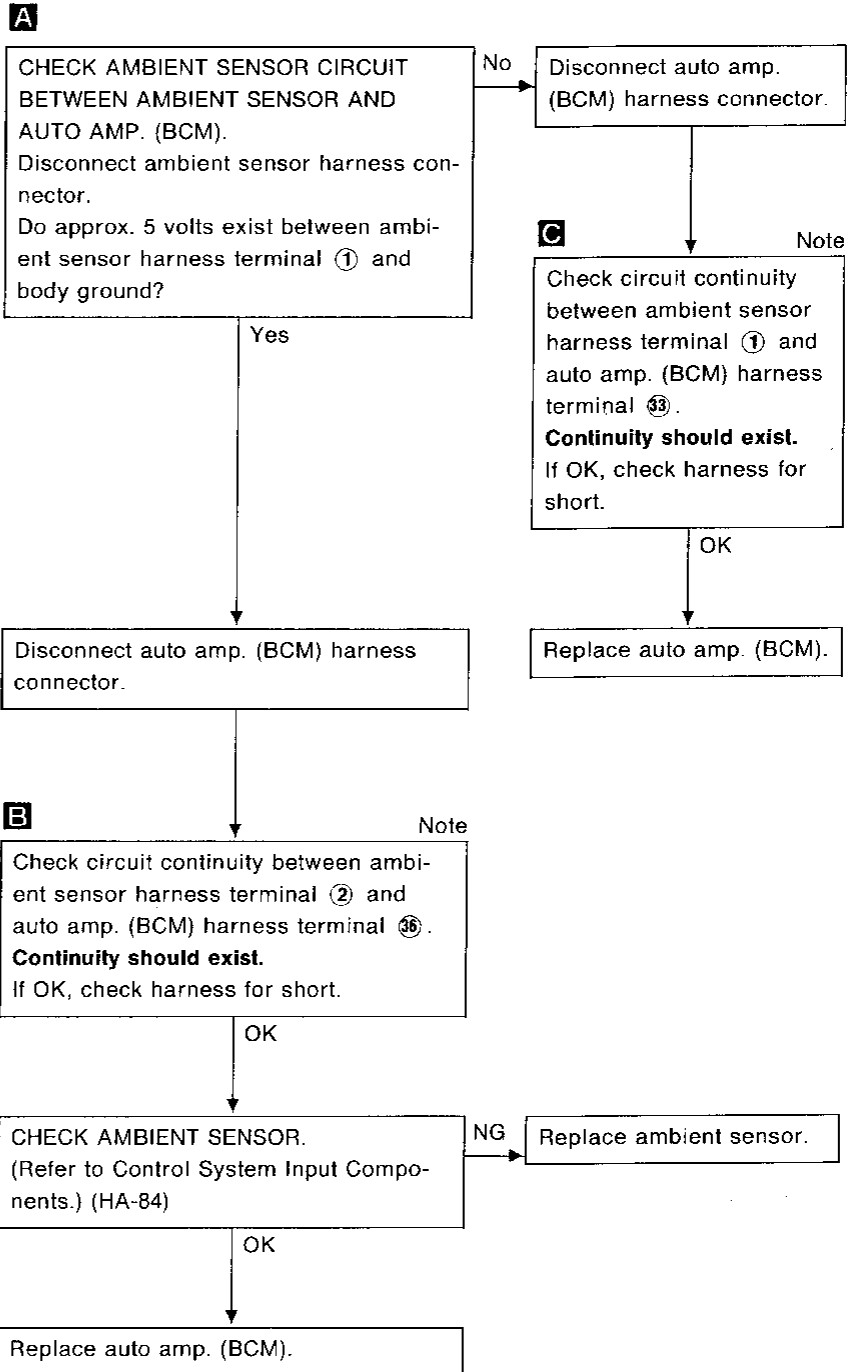
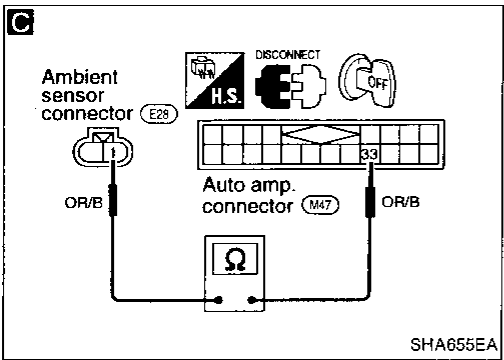
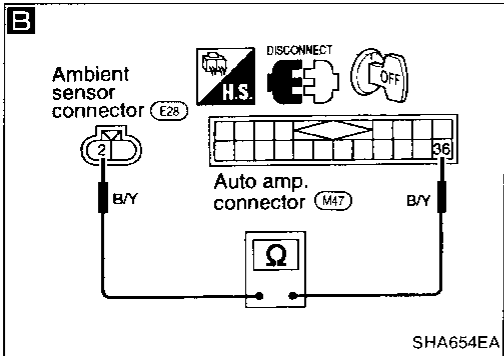
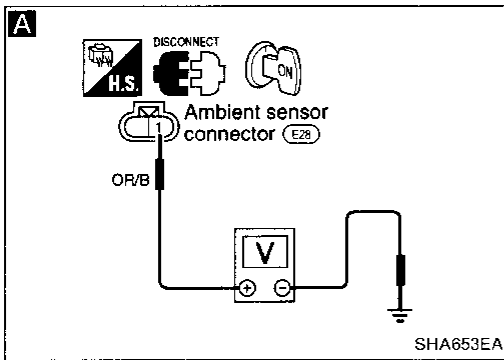
1. Disconnect push control unit harness connector.
2. Connect ohmmeter from harness side.
3. Check for continuity between terminal ⑧ and body ground.

Ohmmeter terminal		Continuity
⊕	⊖	
⑧	Body ground	Yes

TROUBLE DIAGNOSES

Diagnostic Procedure 1

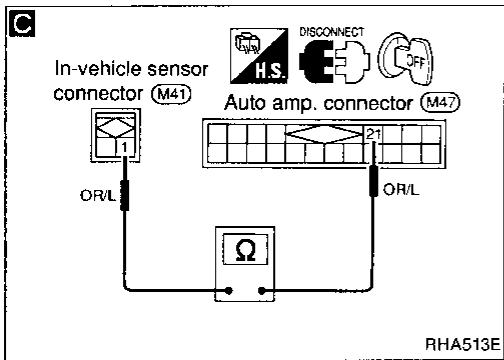
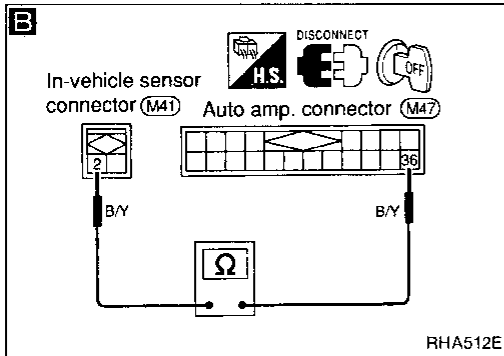
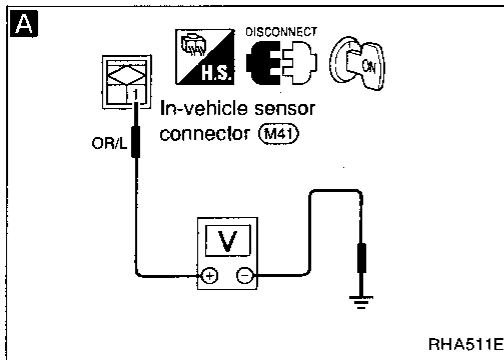
SYMPTOM: Ambient sensor circuit is open or shorted. (21 or -21 is indicated on display as a result of conducting Self-diagnosis STEP 2.)



Note:

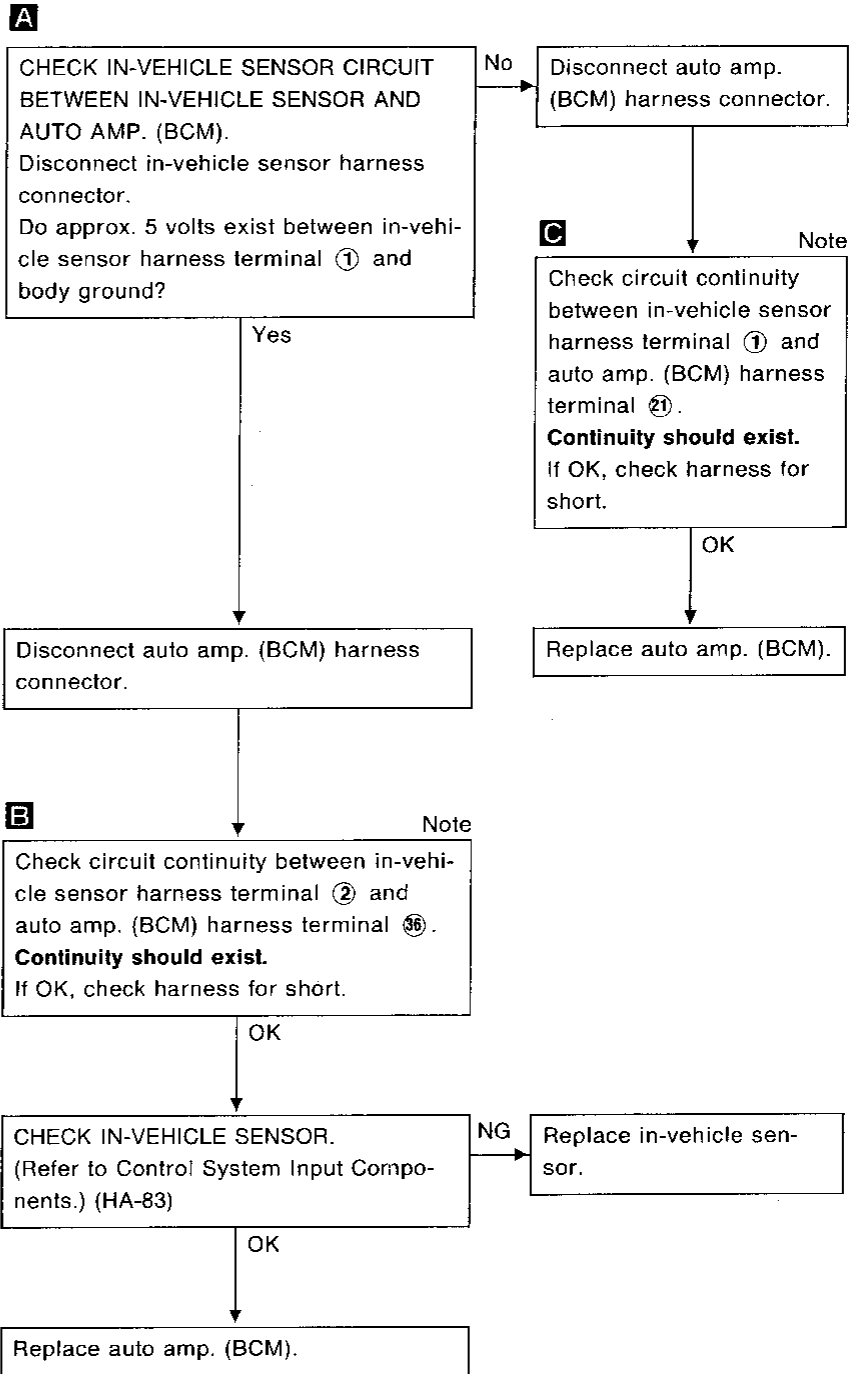
If the result is NG after checking circuit continuity, repair harness or connector.

TROUBLE DIAGNOSES



Diagnostic Procedure 2

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



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

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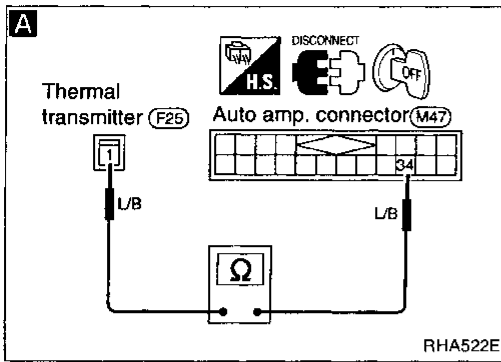
BT

HA

EL

DX

TROUBLE DIAGNOSES



Diagnostic Procedure 3

SYMPTOM: Thermal transmitter circuit is open or shorted. (23 or -23 is indicated on display as a result of conducting Self-diagnosis STEP 2.)

A Note

CHECK THERMAL TRANSMITTER CIRCUIT BETWEEN THERMAL TRANSMITTER AND AUTO AMP. (BCM).
Disconnect thermal transmitter harness connector and auto amp. (BCM) harness connector.

Check circuit continuity between thermal transmitter harness terminal ① and auto amp. (BCM) harness terminal ③4.

Continuity should exist.

If OK, check harness for short.

OK

CHECK THERMAL TRANSMITTER.
Refer to EL section.

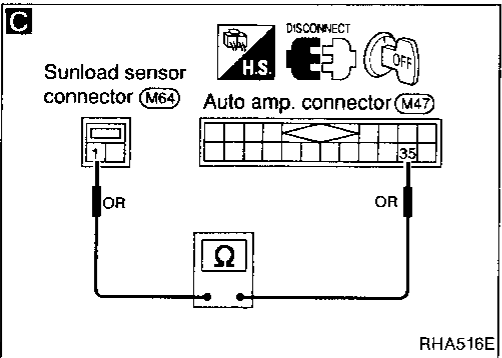
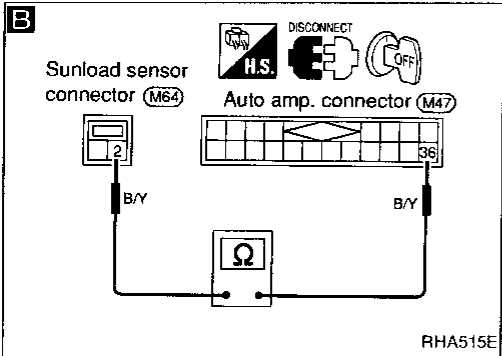
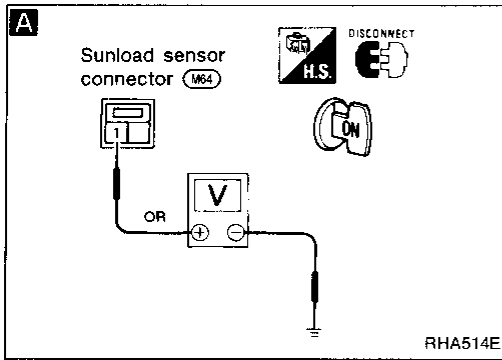
OK

Replace auto amp. (BCM).

Note:

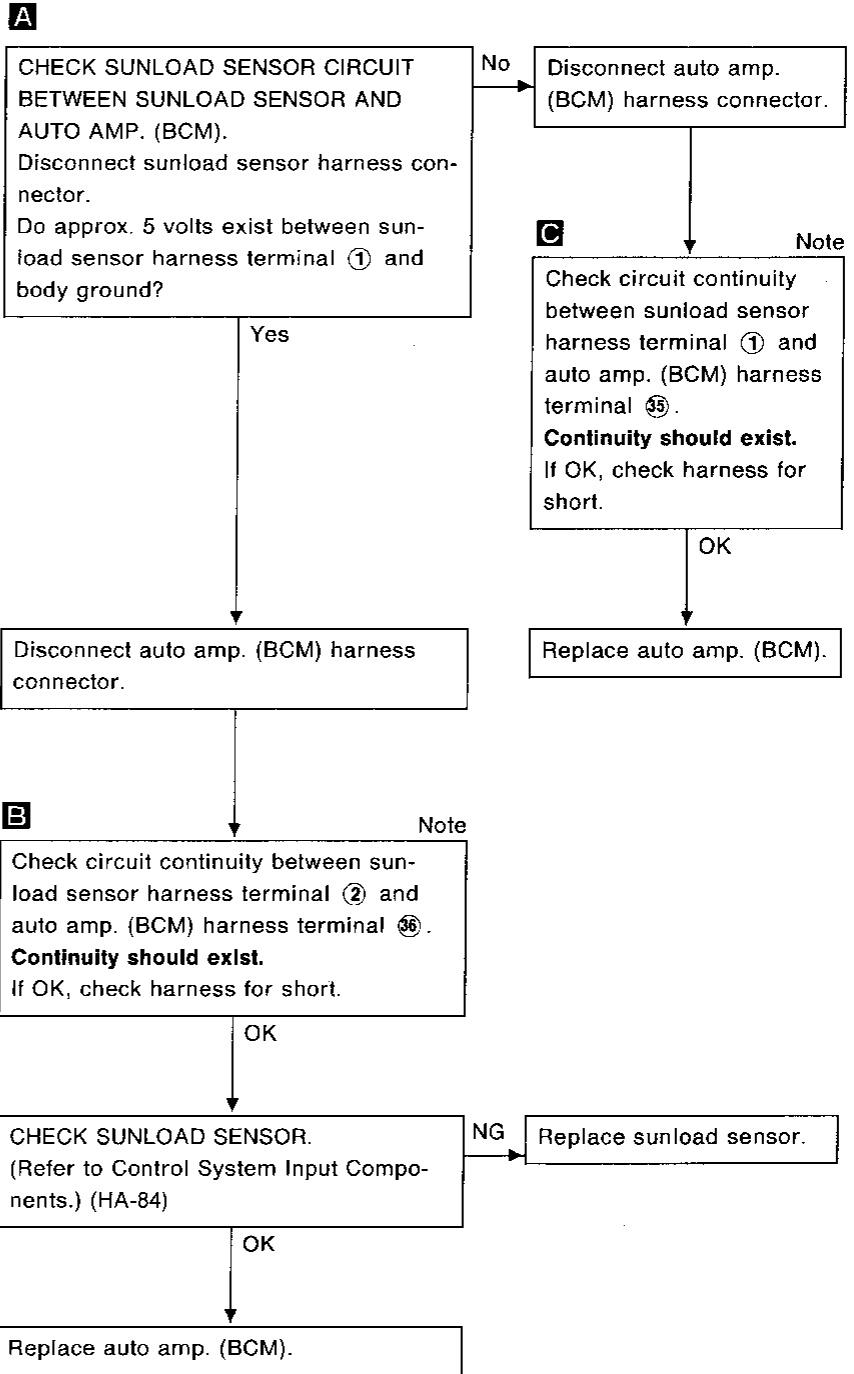
If the result is NG after checking circuit continuity, repair harness or connector.

TROUBLE DIAGNOSES



Diagnostic Procedure 4

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

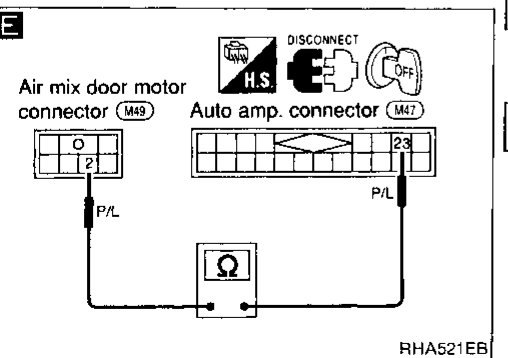
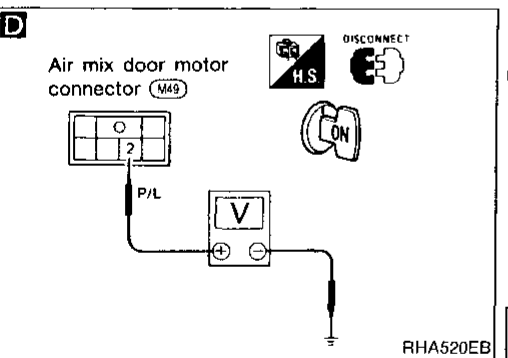
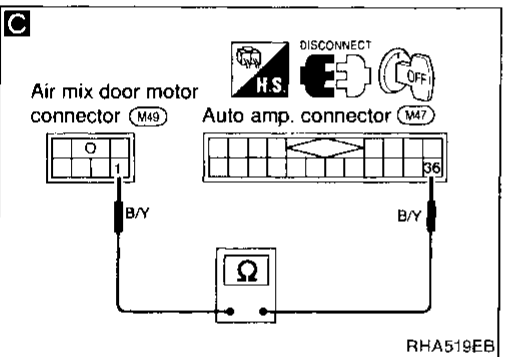
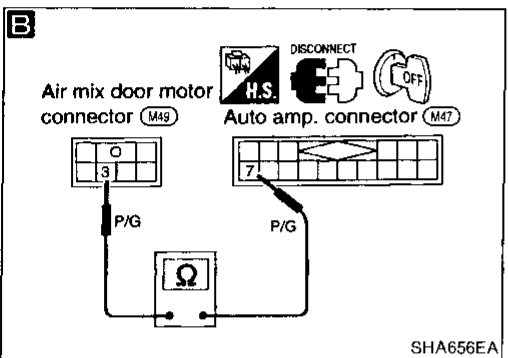
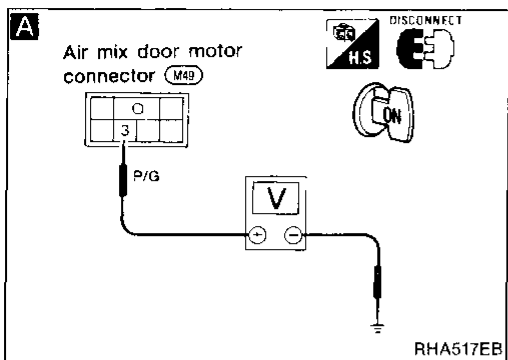


Note:
If the result is NG after checking circuit continuity, repair harness or connector.

TROUBLE DIAGNOSES

Diagnostic Procedure 5

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



A
CHECK PBR CIRCUIT BETWEEN PBR AND AUTO AMP. (BCM). Disconnect air mix door motor harness connector. Do approx. 5 volts exist between air mix door motor harness terminal ③ and body ground?

No → Disconnect auto amp. (BCM) harness connector.

B Note
Check circuit continuity between air mix door motor harness terminal ③ and auto amp. (BCM) harness terminal ⑦. **Continuity should exist.** If OK, check harness for short.

OK → Replace auto amp. (BCM).

Yes → Disconnect auto amp. (BCM) harness connector.

C Note
Check circuit continuity between air mix door motor harness terminal ① and auto amp. harness terminal ③⑥. **Continuity should exist.** If OK, check harness for short.

OK → **D**
D
CHECK PBR CIRCUIT BETWEEN PBR AND AUTO AMP. (BCM).
1. Set temperature switch to full hot 32°C (90°F) with ignition switch ON.
2. Turn ignition switch OFF.
3. Reconnect auto amp. (BCM) harness connector.
4. Do approx. 5 volts exist between air mix door motor harness terminal ② and body ground?

Yes → Disconnect auto amp. (BCM) harness connector.

E Note
Check circuit continuity between air mix door motor harness terminal ② and auto amp. (BCM) harness terminal ②③. **Continuity should exist.** If OK, check harness for short.

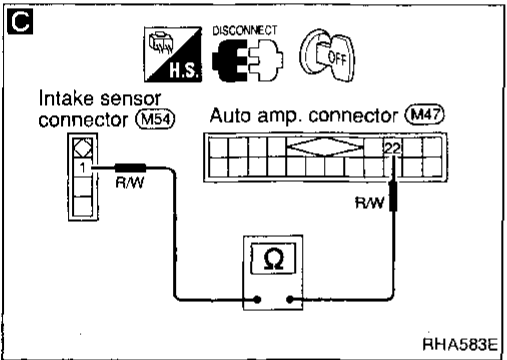
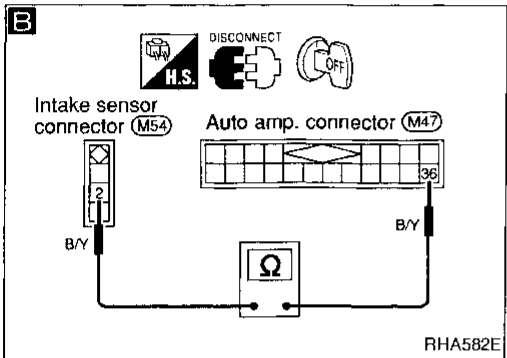
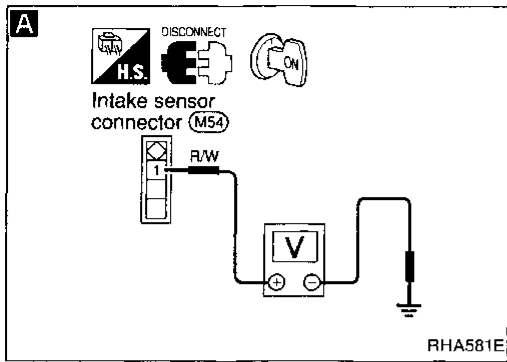
OK → Replace auto amp. (BCM).

No → CHECK PBR. (Refer to Control System Output Components.) (HA-88)

NG → Replace air mix door motor (PBR).

OK → Replace auto amp. (BCM).

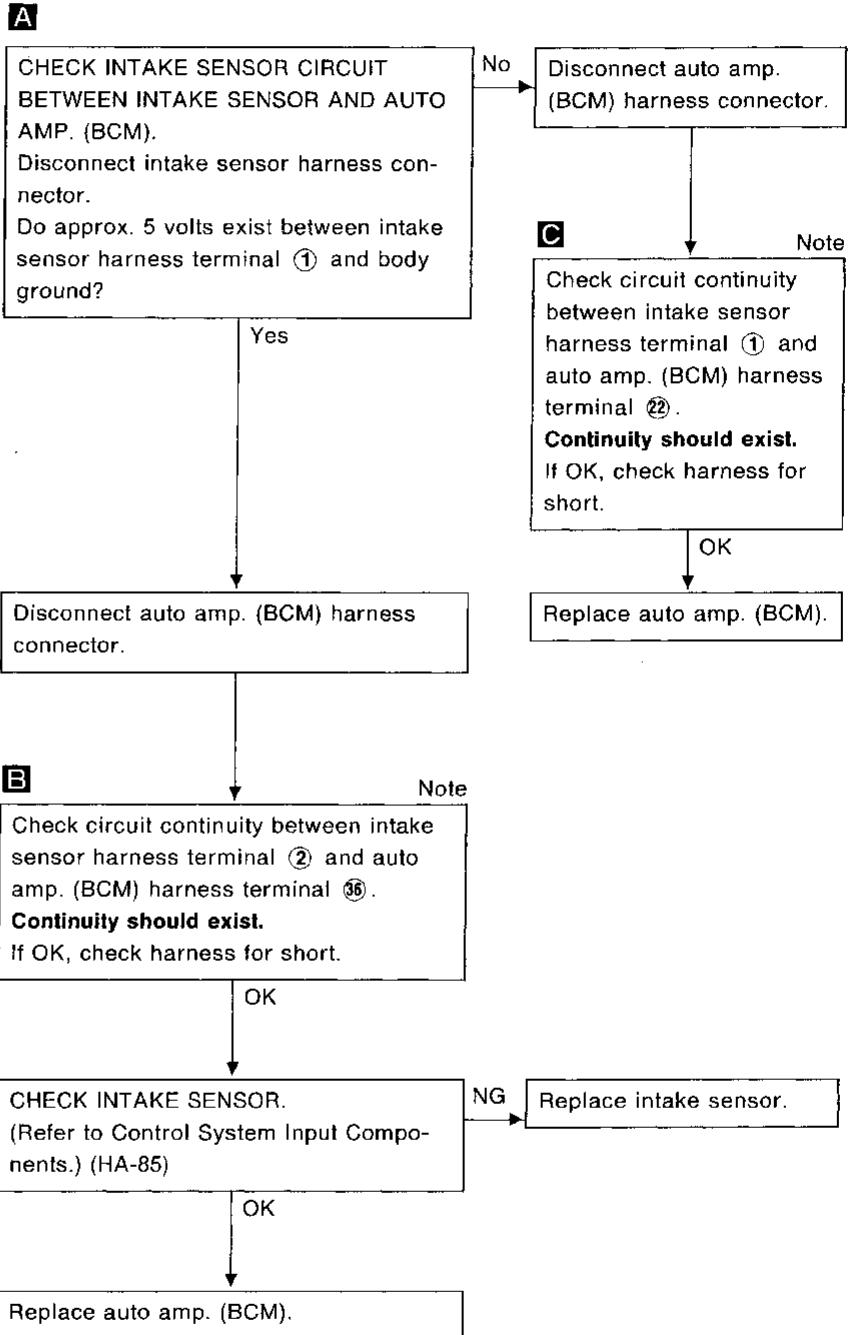
Note:
If the result is NG after checking circuit continuity, repair harness or connector.



Diagnostic Procedure 6

INTAKE SENSOR CIRCUIT CHECK

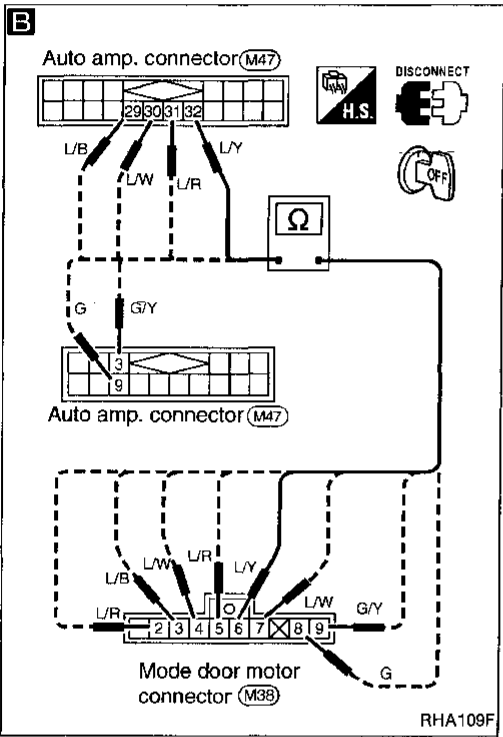
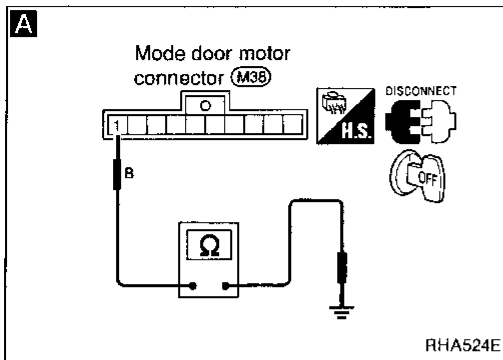
- SYMPTOM:**
- Control of air mix door is abnormal.
 - Control of fan speed is abnormal.
 - Control of intake door is abnormal.
 - Control of magnet clutch is abnormal.
 - Control of mode door is abnormal.



Note:

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

TROUBLE DIAGNOSES



Diagnostic Procedure 7

SYMPTOM: Mode door motor does not operate normally.

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

Disconnect mode door motor harness connector.

A Note

CHECK BODY GROUND CIRCUIT FOR MODE DOOR MOTOR.

Does continuity exist between mode door motor harness terminal ① and body ground?

OK

Disconnect auto amp. (BCM) harness connector.

B Note

Check circuit continuity between each terminal on auto amp. (BCM) and on mode door motor.

Terminal No.		Continuity
⊕	⊖	
Auto amp. (BCM)	Mode door motor	Yes
⑳	③	
㉑	④ or ⑦	
㉒	② or ⑤	
㉓	⑥	
③	⑨	
⑨	⑧	

If OK, check harness for short.

OK

Reconnect auto amp. (BCM) harness connector.

A

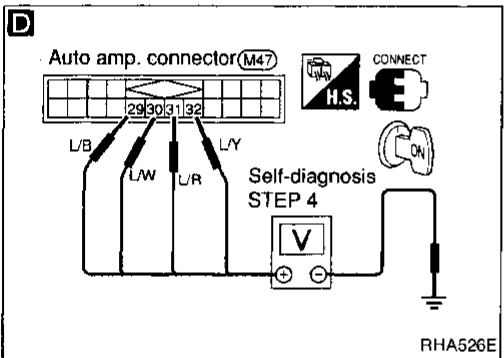
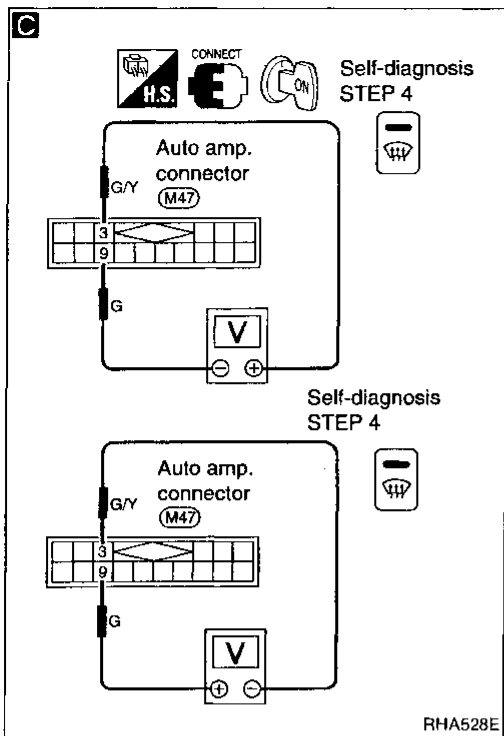
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Note:

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

TROUBLE DIAGNOSES

Diagnostic Procedure 7 (Cont'd)



C

CHECK FOR OUTPUT OF AUTO AMP.
Do approx. 10.5 volts exist between auto amp. (BCM) harness terminals ③ and ⑨ when code No. is switched from "41" to "42" or when code No. is switched from "46" to "41"?

Code No.	Mode door motor operation	Terminal No.		Voltage V
		③	⑨	
41 → 42	VENT → B/L	⊕	⊖	Approx. 10.5
46 → 41	DEF → VENT	⊖	⊕	
-	Stop	-	-	0

No → Replace auto amp. (BCM).

D

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

Code No.	Con- dition	Terminal No.				⊖
		②⑨	③⑩	④⑪	⑤⑫	
41	VENT	5V	0V	5V	0V	Body ground
42 or 43	B/L1	5V	5V	0V	0V	
44	D/F 1	5V	0V	0V	5V	
45	D/F 2	0V	0V	5V	5V	
46	DEF	0V	5V	0V	5V	

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

NG → Replace mode door motor.

OK → INSPECTION END

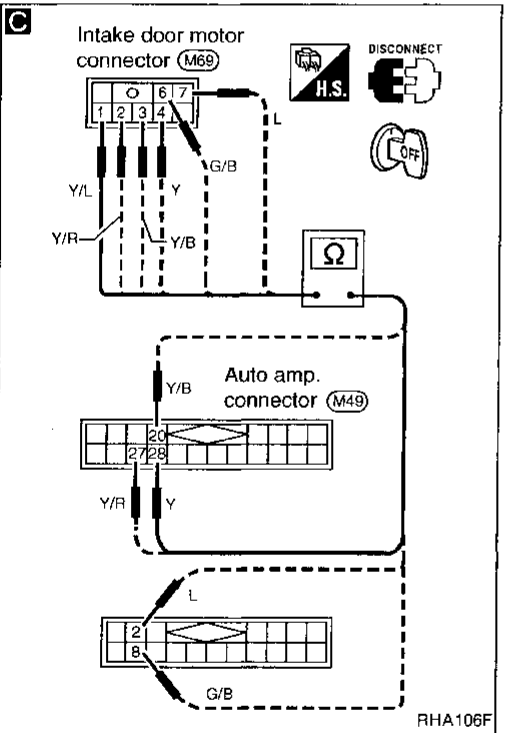
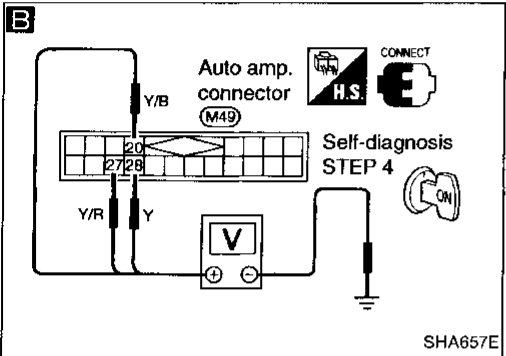
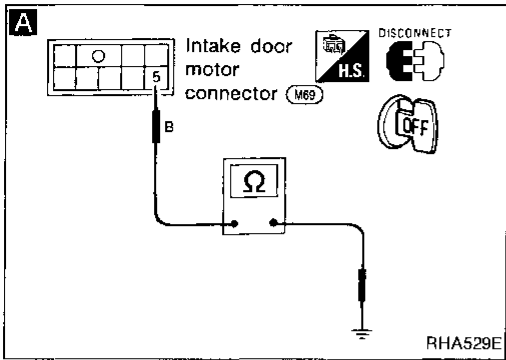
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TROUBLE DIAGNOSES

Diagnostic Procedure 8

SYMPTOM: Intake door motor does not operate normally.

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



A Note

CHECK BODY GROUND CIRCUIT FOR INTAKE DOOR MOTOR.
Disconnect intake door motor harness connector.
Does continuity exist between intake door motor harness terminal ⑤ and body ground?

Yes

Reconnect intake door motor harness connector.

B CHECK FOR AUTO AMP. (BCM) OUTPUT.
Set up Self-diagnosis STEP 4.
Measure voltage across auto amp. (BCM) harness terminals and body ground.

Code No.	Terminal No.		Condition	Voltage V
	⊕	⊖		
41	27		REC	12
42	28, 20			0
43	28	Body ground	20% REC	12
	27, 20			0
44	28, 27		FRE	12
45				0
46	20			0

12V: Approx. 12V
If OK, check harness for short.

OK

INSPECTION END

C Note

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

Terminal No.			Continuity
Auto amp. (BCM)	Intake door motor		
28	1	Yes	
27	2		
20	3		
28	4		
2	7		
8	6		

If OK, check harness for short.

OK

A

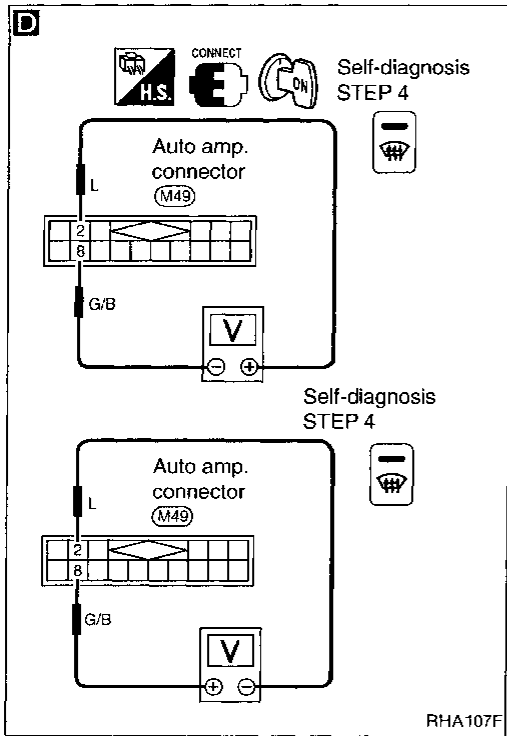
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Note:

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

TROUBLE DIAGNOSES

Diagnostic Procedure 8 (Cont'd)



D

A

CHECK FOR AUTO AMP. (BCM) OUTPUT.
Set up Self-diagnosis STEP 4.
Measure voltage across auto amp. (BCM) harness terminals and body ground.

Code No.	Terminal No.		Condition	Voltage V
	⊕	⊖		
41	②		REC	12
42	⑧			0
44	②		FRE	0
45	⑧			12

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

NG → Replace auto amp. (BCM).

OK → Replace intake door motor

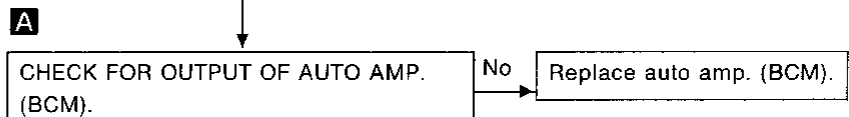
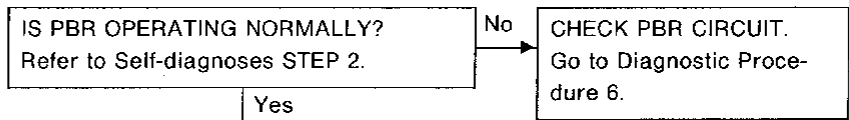
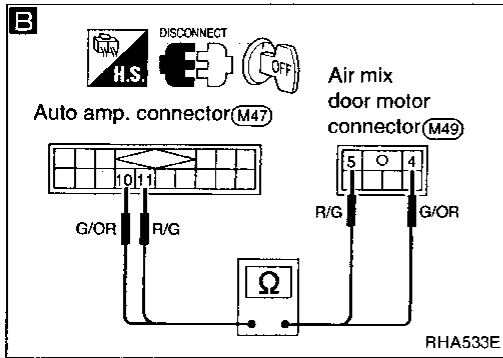
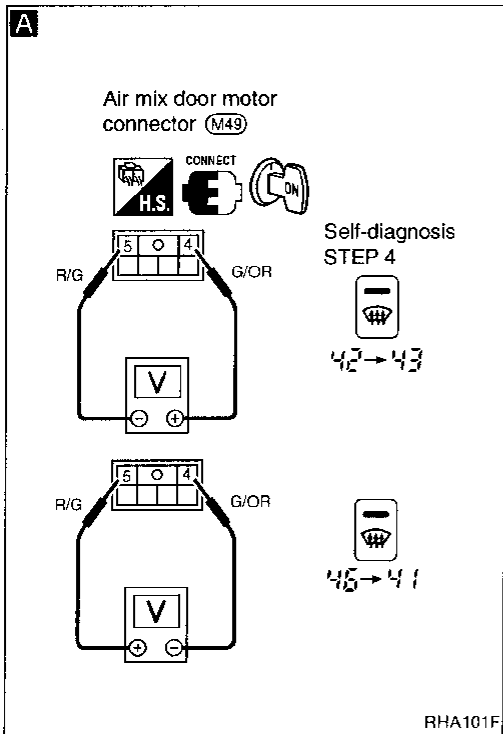
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TROUBLE DIAGNOSES

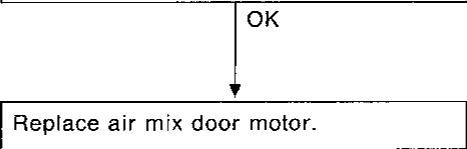
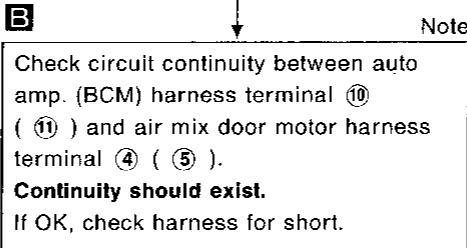
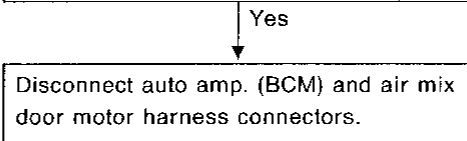
Diagnostic Procedure 9

SYMPTOM: Air mix door motor does not operate normally.

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



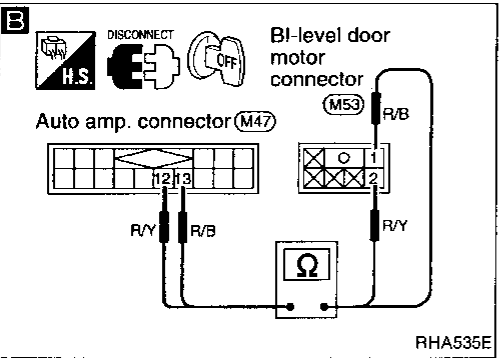
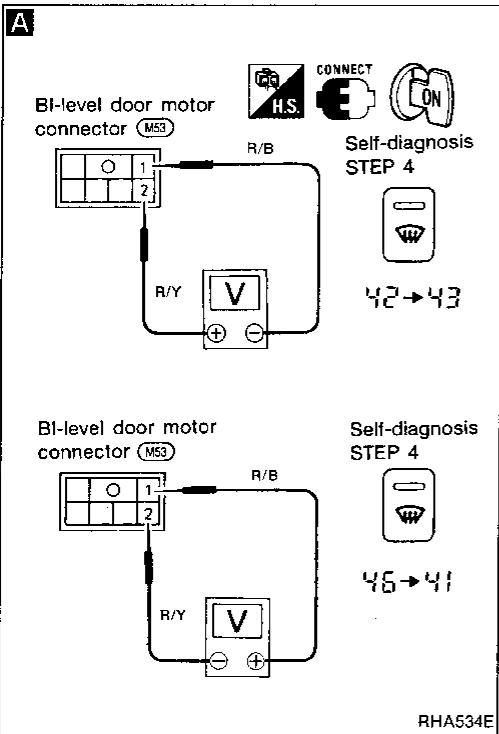
Code No.	Air mix door operation	Terminal No.		Voltage V
		④	⑤	
42 →	Cold → Hot	⊕	⊖	Approx. 10.5
43				
45 →	Hot → Cold	⊖	⊕	0
41				
-	Stop	-	-	



Note:

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

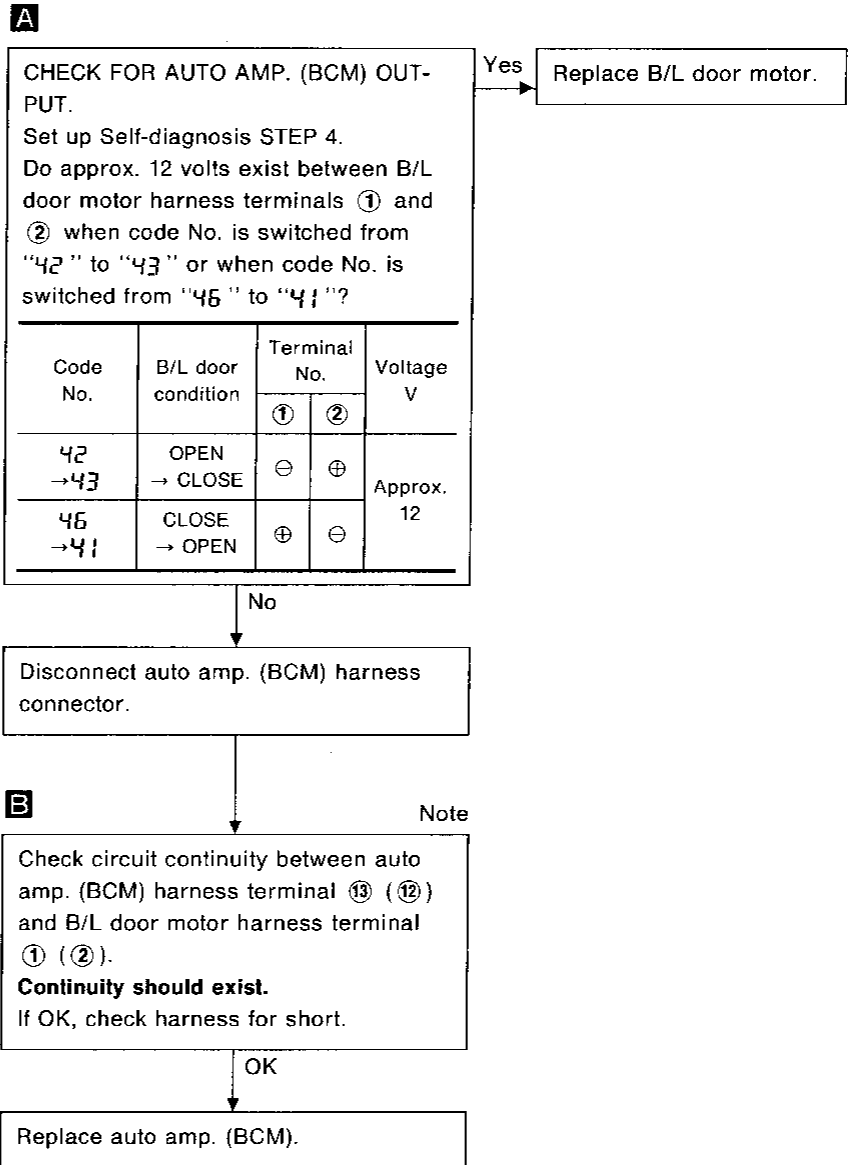
TROUBLE DIAGNOSES



Diagnostic Procedure 10

SYMPTOM: Bi-level (B/L) door motor does not operate normally.

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



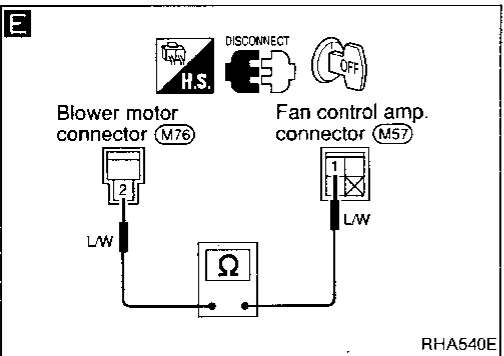
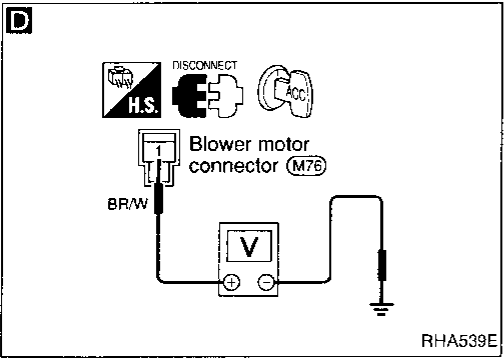
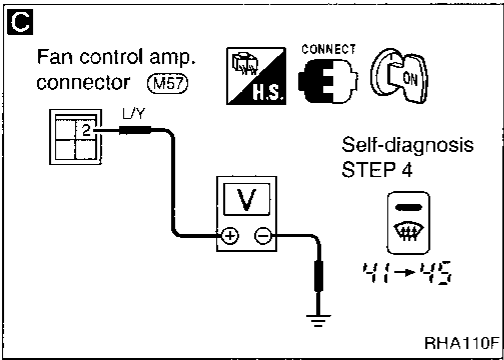
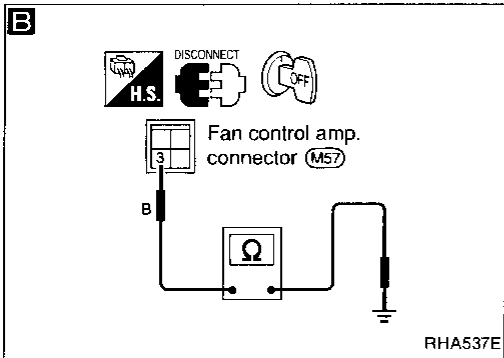
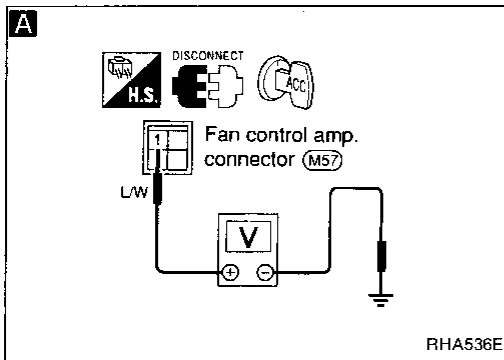
Note:

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

Diagnostic Procedure 11

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

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



A

CHECK POWER SUPPLY FOR FAN CONTROL AMP.
Disconnect fan control amp. harness connector.
Do approx. 12 volts exist between fan control amp. harness terminal ① and body ground?

B Note

CHECK BODY GROUND CIRCUIT FOR FAN CONTROL AMP.
Check harness continuity between fan control amp. harness terminal ③ and body ground.
Continuity should exist.
If OK, check harness for short.

Reconnect fan control amp. harness connector.

C

CHECK FOR OUTPUT OF AUTO AMP.
Set up Self-diagnosis STEP 4.
Measure voltage across fan control amp. harness terminal ② and body ground.

Code No.	Terminal No.		Voltage
	⊕	⊖	
41→45	②	Body ground	Approx. 2.5 - 9.0V

Replace fan control amp.

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

D

CHECK POWER SUPPLY FOR BLOWER MOTOR.
Disconnect blower motor harness connector.
Do approx. 12 volts exist between blower motor harness terminal ① and body ground?

Note

Check 15A fuses (No. ② and ③), located in the fuse block.
(Refer to "POWER SUPPLY ROUTING" in EL section and Wiring Diagram.)

E Note

Check circuit continuity between blower motor harness terminal ② and fan control amp. harness terminal ①.
Continuity should exist.
If OK, check harness for short.

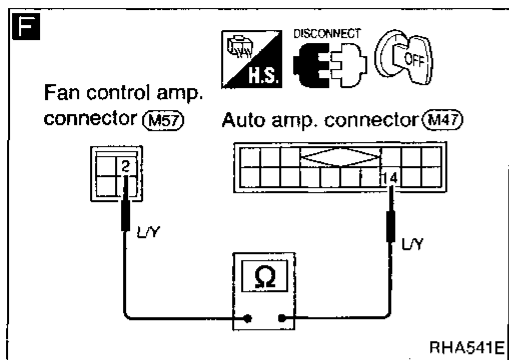
CHECK BLOWER MOTOR.
(Refer to Electrical Components Inspection.) (HA-79)

Replace blower motor.

NG → (Go to next page.)

TROUBLE DIAGNOSES

Diagnostic Procedure 11 (Cont'd)



A

Disconnect auto amp. (BCM) and fan control amp. harness connector.

F Note

Check harness continuity between auto amp. (BCM) harness terminal ⑭ and fan control amp. harness terminal ②.

Continuity should exist.

If OK, check harness for short.

OK

Replace auto amp. (BCM).

Note:

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

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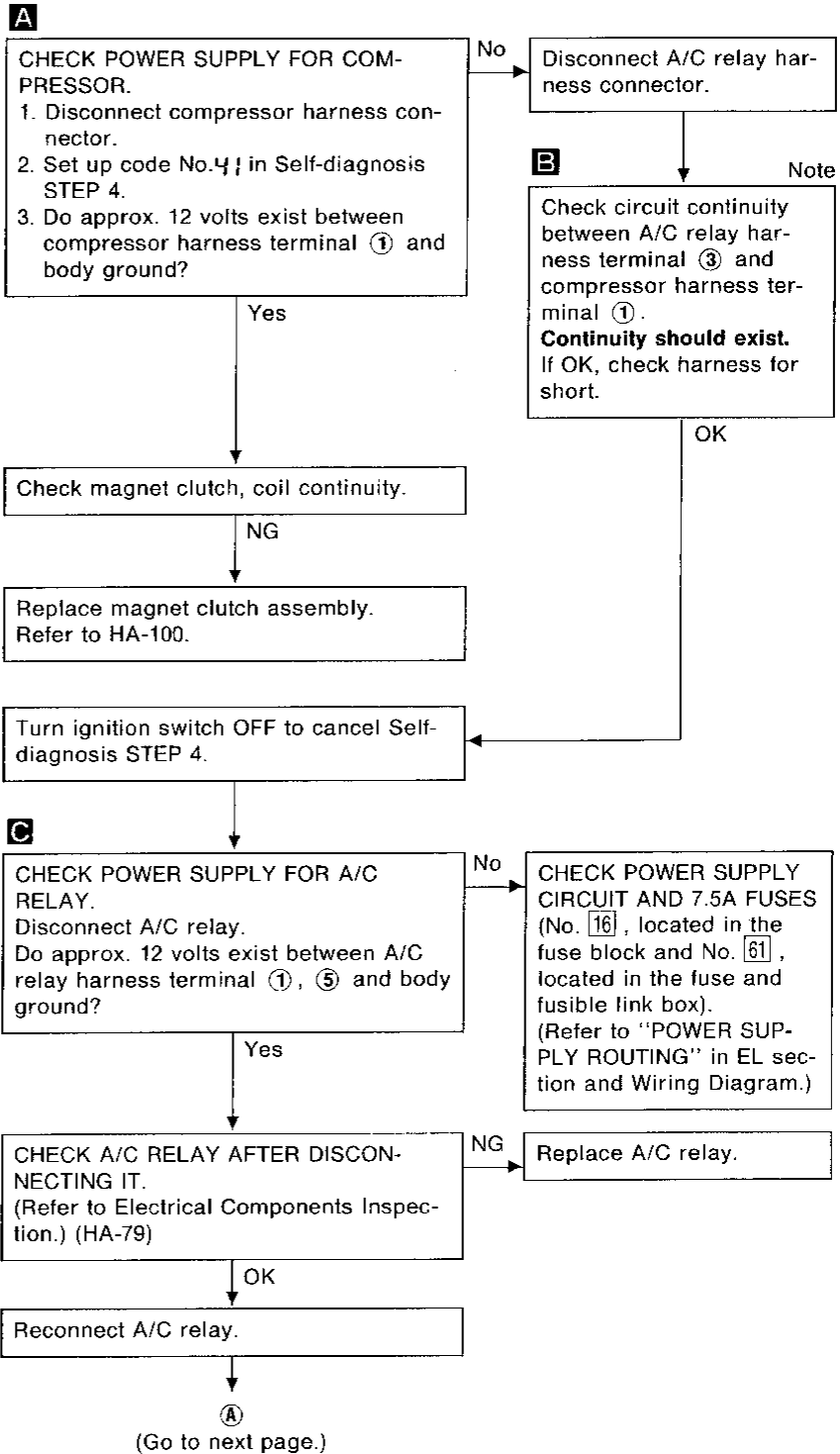
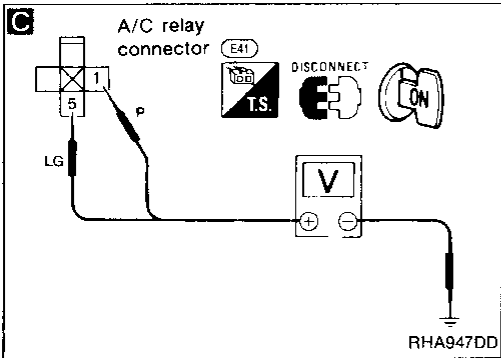
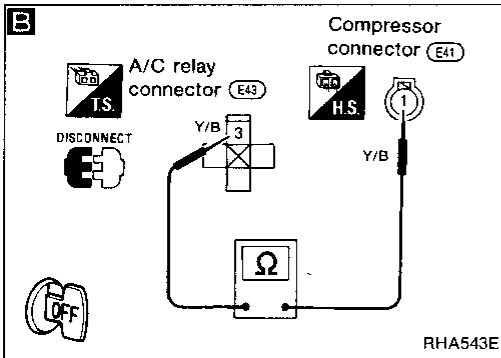
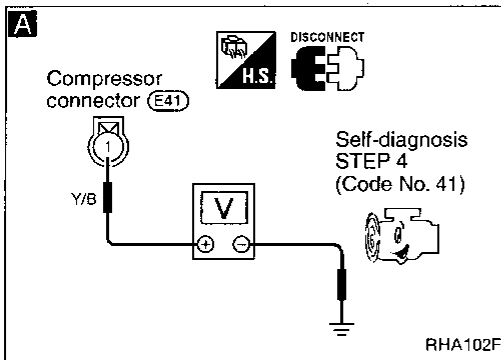
IDX

TROUBLE DIAGNOSES

Diagnostic Procedure 12

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

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

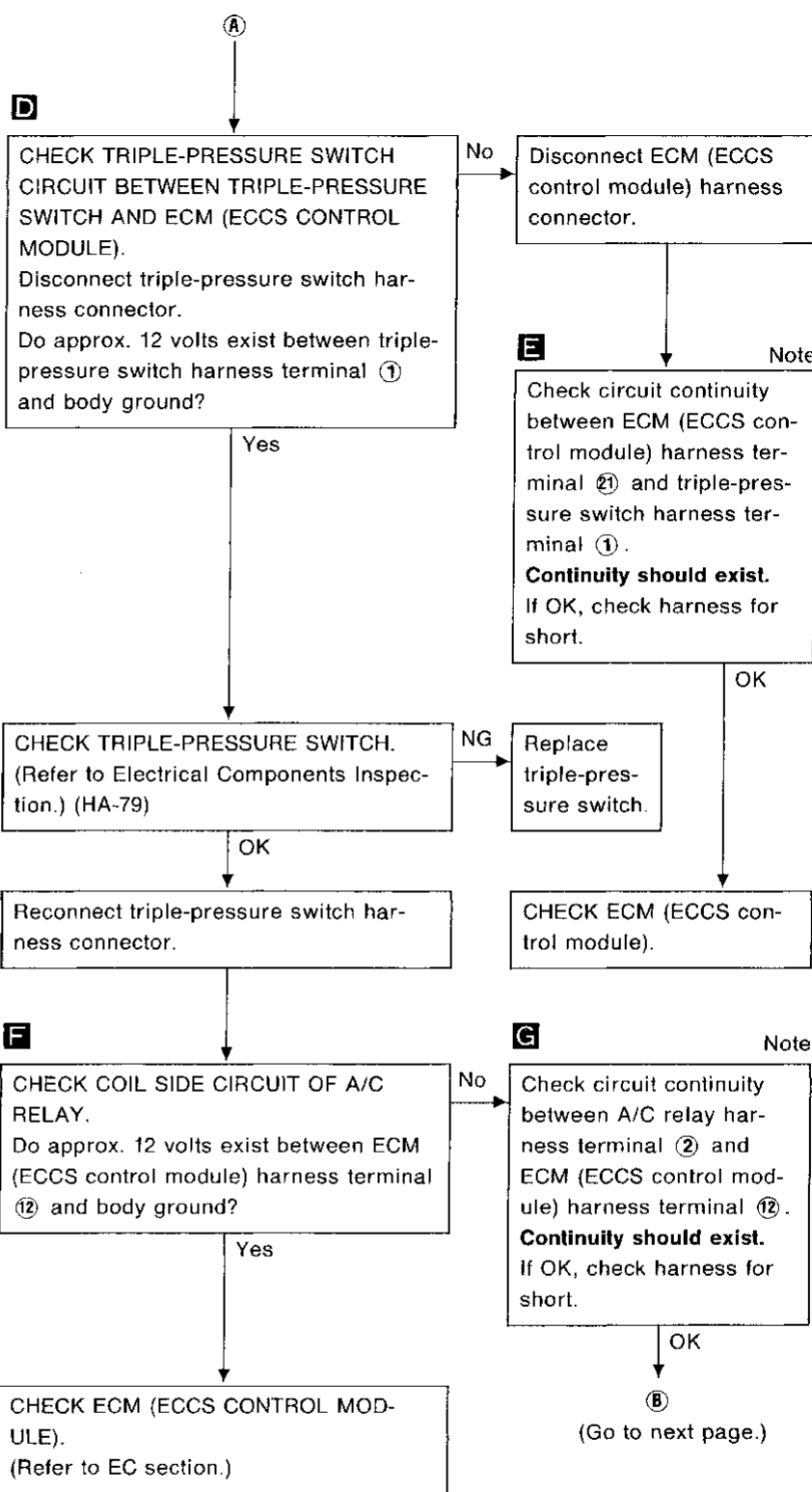
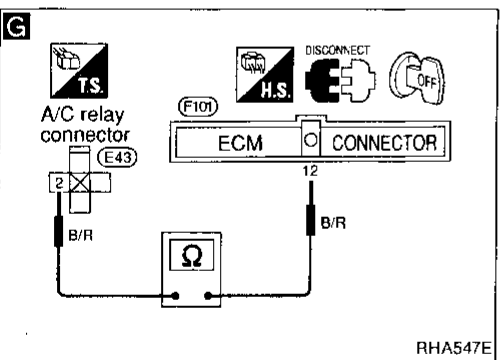
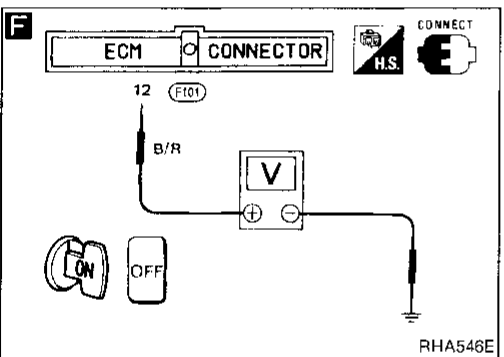
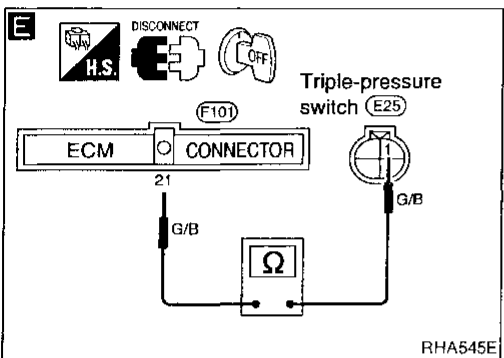
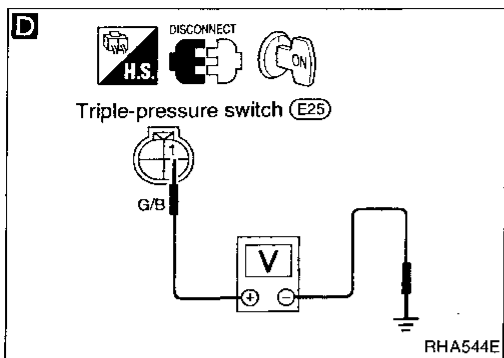


Note:

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

TROUBLE DIAGNOSES

Diagnostic Procedure 12 (Cont'd)

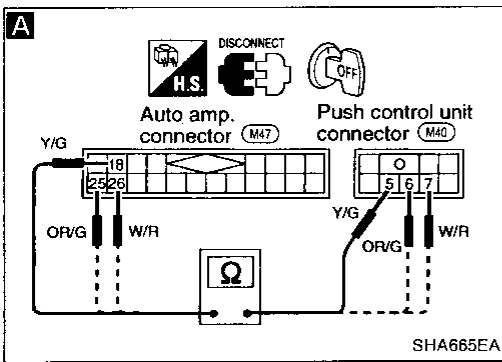
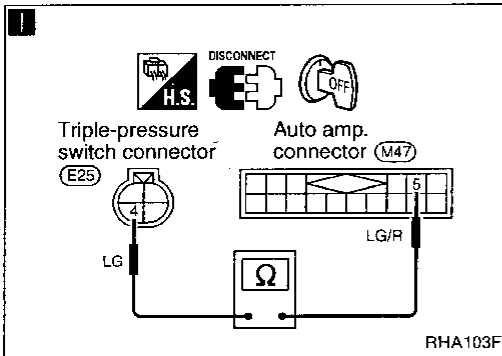
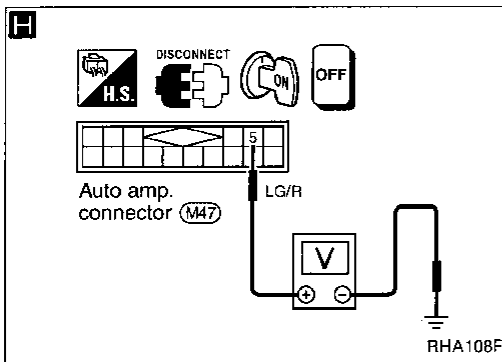


Note:

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

TROUBLE DIAGNOSES

Diagnostic Procedure 12 (Cont'd)



⑧

Disconnect auto amp. (BCM) harness connector.

H

CHECK AUTO AMP. (BCM) CIRCUIT BETWEEN AUTO AMP. (BCM) AND TRIPLE-PRESSURE SWITCH. Do approx. 12 volts exist between auto amp. (BCM) harness terminal ⑤ and body ground?

I Note

Check circuit continuity between auto amp. (BCM) harness terminal ⑤ and triple-pressure switch harness terminal ④. **Continuity should exist.** If OK, check harness for short.

Yes

Replace auto amp. (BCM).

Note:

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

Diagnostic Procedure 13

SYMPTOM: ● Self-diagnosis cannot be performed.

● Multiplex communication error (5² with fan symbol detected as a result of conducting self-diagnosis STEP 5.)

CHECK MAIN POWER SUPPLY AND GROUND CIRCUIT FOR AUTO AMP. (BCM) AND CONTROL UNIT. (Refer to HA-61.)

NG → Repair Main Power Supply and Ground Circuit.

OK

A Note

Check circuit continuity between each terminal on auto amp. (BCM) and push control unit.

Terminal No.		Continuity
⊕	⊖	
Auto amp. (BCM)	Push control unit	Yes
⑱	⑤	
⑳	⑥	
㉑	⑦	

If OK, check harness for short.

OK

Replace auto amp. (BCM) or push control unit.

Note:

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

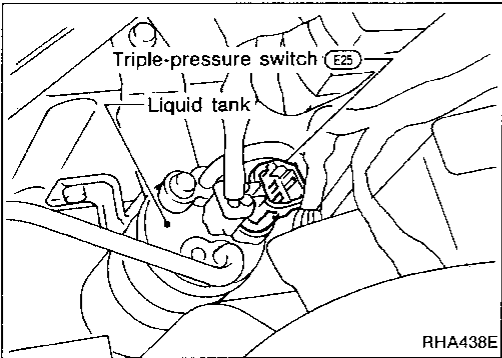
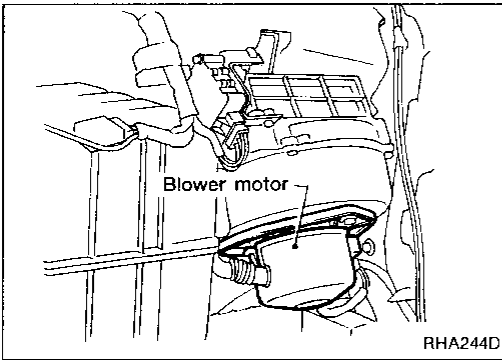
TROUBLE DIAGNOSES

Electrical Components Inspection

BLOWER MOTOR

Check blower motor for smooth rotation.

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



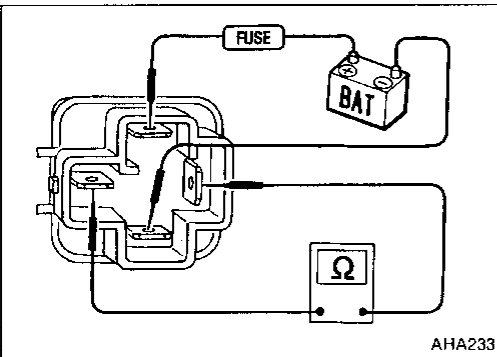
TRIPLE-PRESSURE SWITCH

	Terminals	High-pressure side line pressure kPa (kg/cm ² , psi)	Operation	Continuity
Low-pres- sure side	① - ④	Increasing to 157 - 226 (1.6 - 2.3, 23 - 33)	ON	Exists.
		Decreasing to 152.0 - 201.0 (1.55 - 2.05, 22.0 - 29.2)	OFF	Does not exist.
Medium- pressure side*	② - ③	Increasing to 1,422 - 1,618 (14.5 - 16.5, 206 - 235)	ON	Exists.
		Decreasing to 1,128 - 1,422 (11.5 - 14.5, 164 - 206)	OFF	Does not exist.
High-pres- sure side	① - ④	Increasing to 1,667 - 2,059 (17 - 21, 242 - 299)	ON	Exists.
		Decreasing to 2,452 - 2,844 (25 - 29, 356 - 412)	OFF	Does not exist.

* For cooling fan motor operation.

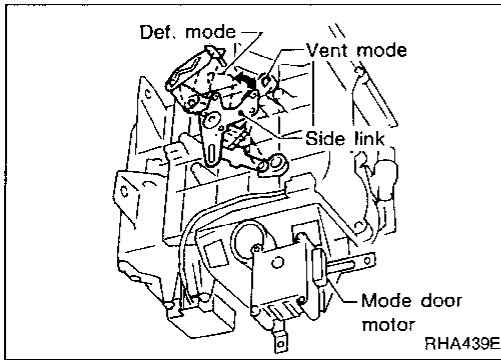
A/C RELAY

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



TROUBLE DIAGNOSES

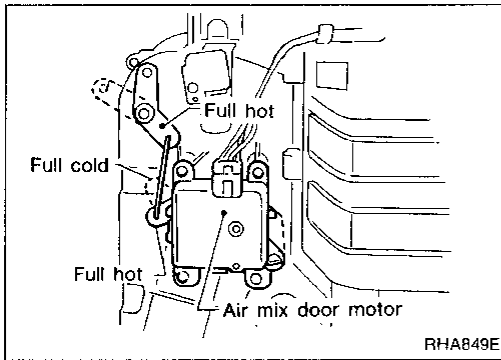
Control Linkage Adjustment



MODE DOOR

1. Install mode door motor on heater unit and connect it to main harness.
2. Set up code No. 45 in Self-diagnosis STEP 4.
3. Make sure mode door operates properly when changing from code No. 41 to 45 by pushing DEF switch.

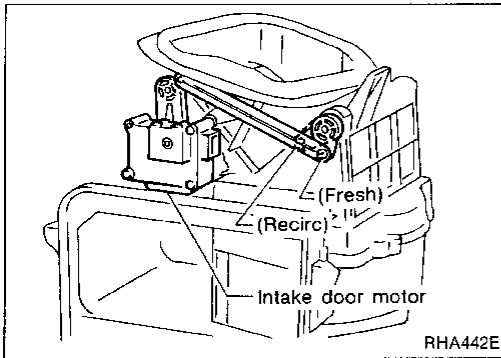
41	42	43	44	45	46
VENT	B/L	B/L	FOOT	F/D,	DEF



AIR MIX DOOR

1. Install air mix door motor on heater unit and connect it to main harness.
2. Set up code No. 41 in Self-diagnosis STEP 4.
3. Make sure air mix door operates properly when changing from code No. 41 to 45 by pushing DEF switch.

41	42	43	44	45	46
Full cold			Full hot		



INTAKE DOOR

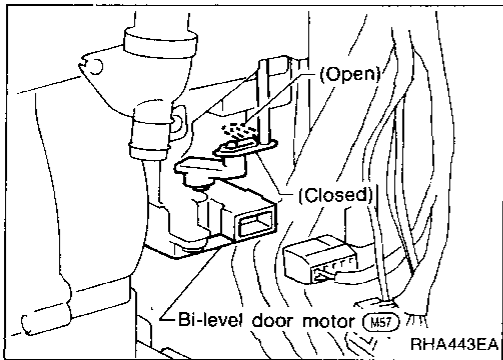
1. Install intake door motor on intake unit and connect it to main harness.
Make sure lever of intake door motor is fitted in the slit of intake door link.
2. Set up code No. 41 in Self-diagnosis STEP 4.
3. Make sure intake door operates properly when changing from code No. 41 to 45 by pushing DEF switch.

41	42	43	44	45	46
REC		20% FRE	FRE		

TROUBLE DIAGNOSES

Control Linkage Adjustment (Cont'd)

BI-LEVEL DOOR



1. Install Bi-level door motor on cooling unit and connect it to main harness.
Make sure lever of Bi-level door motor is fitted in the slit of Bi-level door link.
2. Set up code No. 45 in self-diagnosis STEP. 4.
3. Make sure Bi-level door operates properly when changing from code No. 41 to 45 by pushing DEF switch.

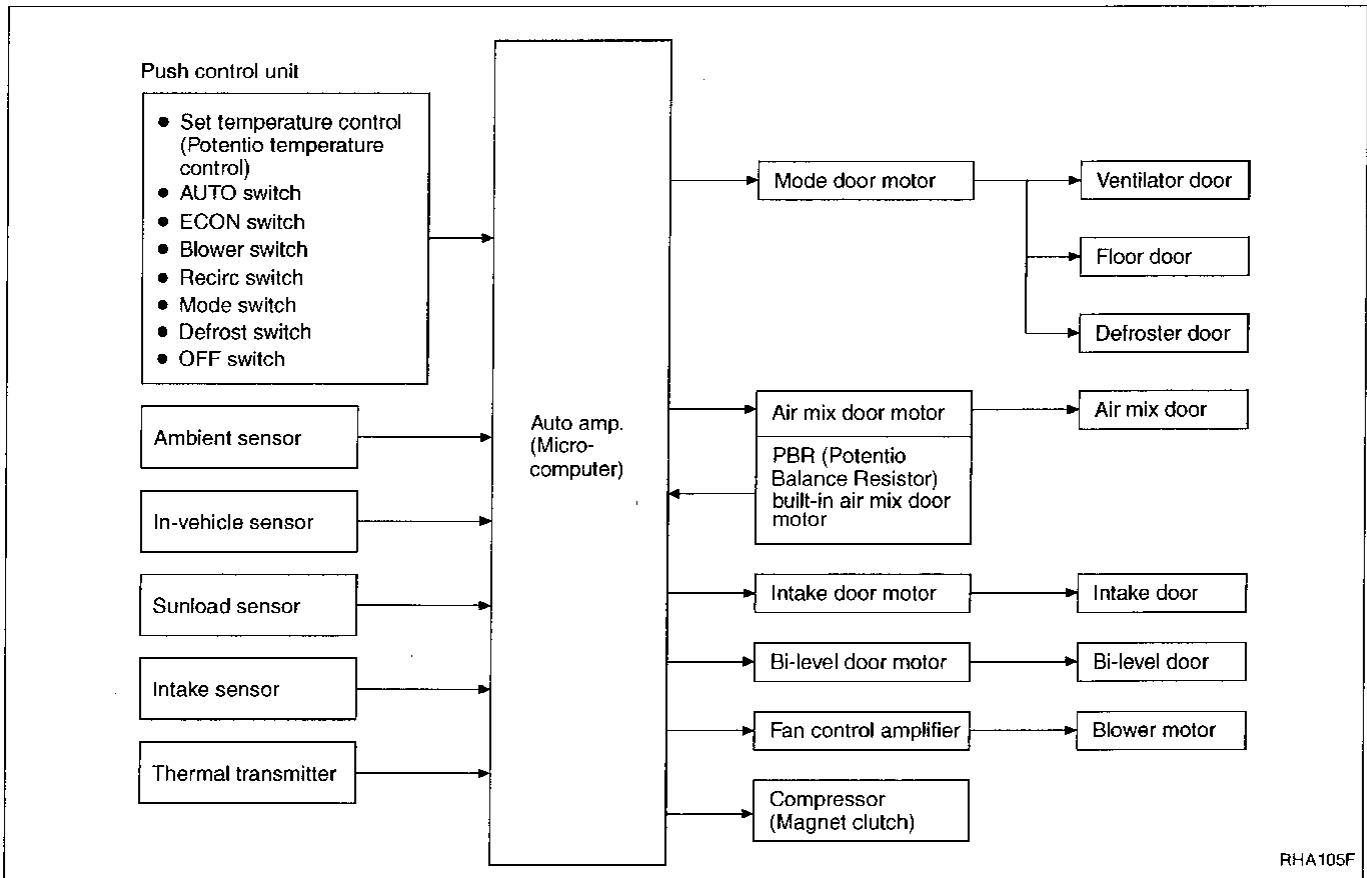
41	42	43	44	45	46
OPEN			CLOSE		

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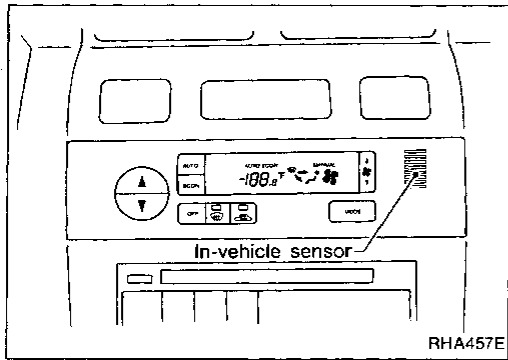
SYSTEM DESCRIPTION

Overview of Control

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



SYSTEM DESCRIPTION



Control System Input Components

POTENTIO TEMPERATURE CONTROL (PTC)

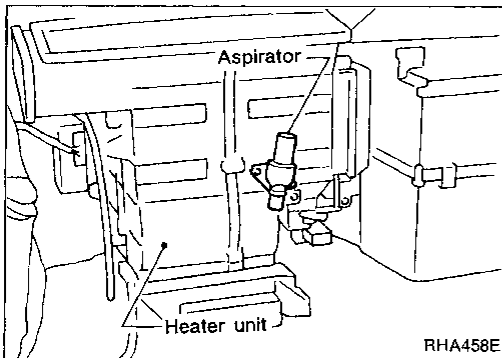
The PTC is built into the push control unit. It can be set at an interval of 1°C (2°F) through both ▲ (HOT) and ▼ (COLD) control switches. Setting temperature is digitally displayed.

IN-VEHICLE SENSOR

The in-vehicle sensor is attached to A/C control finisher. It converts variations in temperature of compartment air drawn from an aspirator into a resistance value. It is then input into the auto amp.

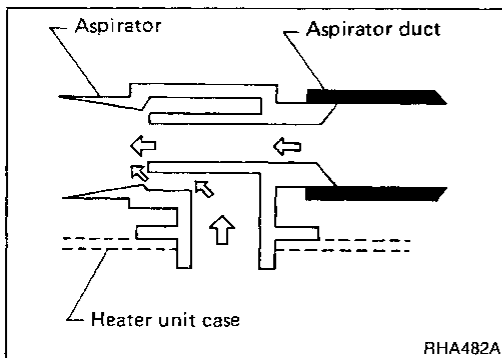
After disconnecting in-vehicle sensor harness connector, measure resistance between terminals ① and ② at sensor harness side, using the table below.

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



ASPIRATOR

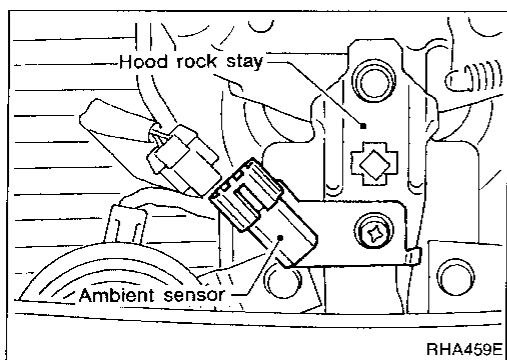
The aspirator is located on heater unit. It produces vacuum pressure due to air discharged from the heater unit, continuously taking compartment air in the aspirator.



SYSTEM DESCRIPTION

Control System Input Components (Cont'd)

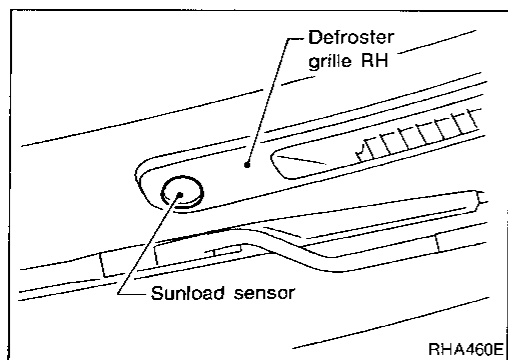
AMBIENT SENSOR



The ambient sensor is attached to the radiator core support. It detects ambient temperature and converts it into a resistance value which is then input to the auto amp.

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

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



SUNLOAD SENSOR

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

Measure voltage between terminals ① and ② at vehicle harness side, using the table below.

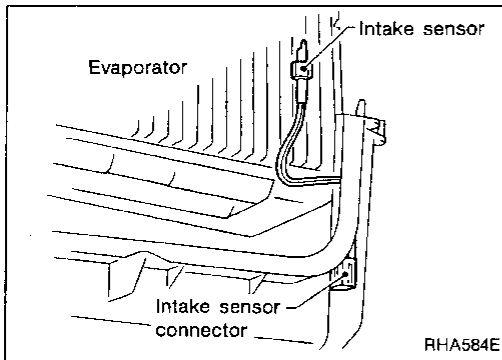
Input current mA	Output voltage V
0	5.0
0.1	4.1
0.2	3.1
0.3	2.2
0.4	1.3
0.5	0.4

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

SYSTEM DESCRIPTION

Control System Input Components (Cont'd)

INTAKE SENSOR



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

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

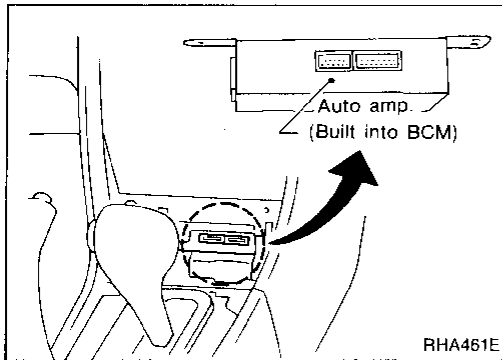
Temperature °C (°F)	Resistance kΩ
-15 (5)	12.73
-10 (14)	9.92
-5 (23)	7.80
0 (32)	6.19
5 (41)	4.95
10 (50)	3.99
15 (59)	3.24
20 (68)	2.65
25 (77)	2.19
30 (86)	1.81
35 (95)	1.51
40 (104)	1.27
45 (113)	1.07

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Control System Automatic Amplifier (Auto amp.)

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

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

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

SYSTEM DESCRIPTION

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

AMBIENT TEMPERATURE INPUT PROCESS

The auto amp. includes a "processing circuit" for the ambient sensor input. When the ambient temperature increases quickly, the processing circuit controls the input from the ambient sensor. It allows the auto amp. to recognize the increase of temperature only 0.2°C (0.4°F) per 100 seconds. As an example, consider stopping for a cup of coffee after high speed driving. Even though the ambient temperature has not changed, the ambient sensor will detect the increase of temperature. The heat radiated from the engine compartment can radiate to the front grille area. The ambient sensor is located there.

SUNLOAD INPUT PROCESS

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

For example, consider driving along a road bordered by an occasional group of large trees. The sunload detected by the sunload sensor will vary whenever the trees obstruct the sunlight. The processing circuit averages the detected sunload over a period of time. As a result, the effect the above mentioned does not cause any change in the ATC system operation. On the other hand, shortly after entering a long tunnel, the system will recognize the change in sunload, and the system will react accordingly.

Control System Output Components

AIR MIX DOOR CONTROL (Automatic temperature control)

Component parts

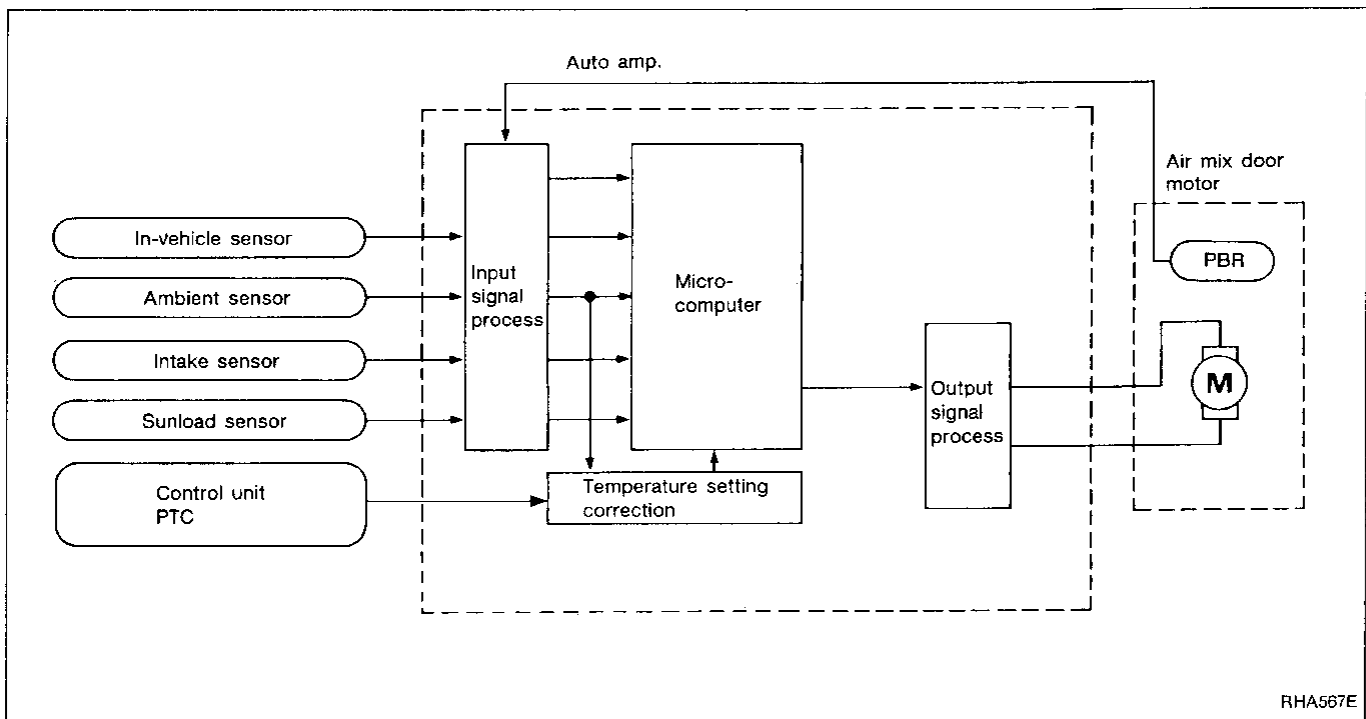
Air mix door control system components are:

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

System operation

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

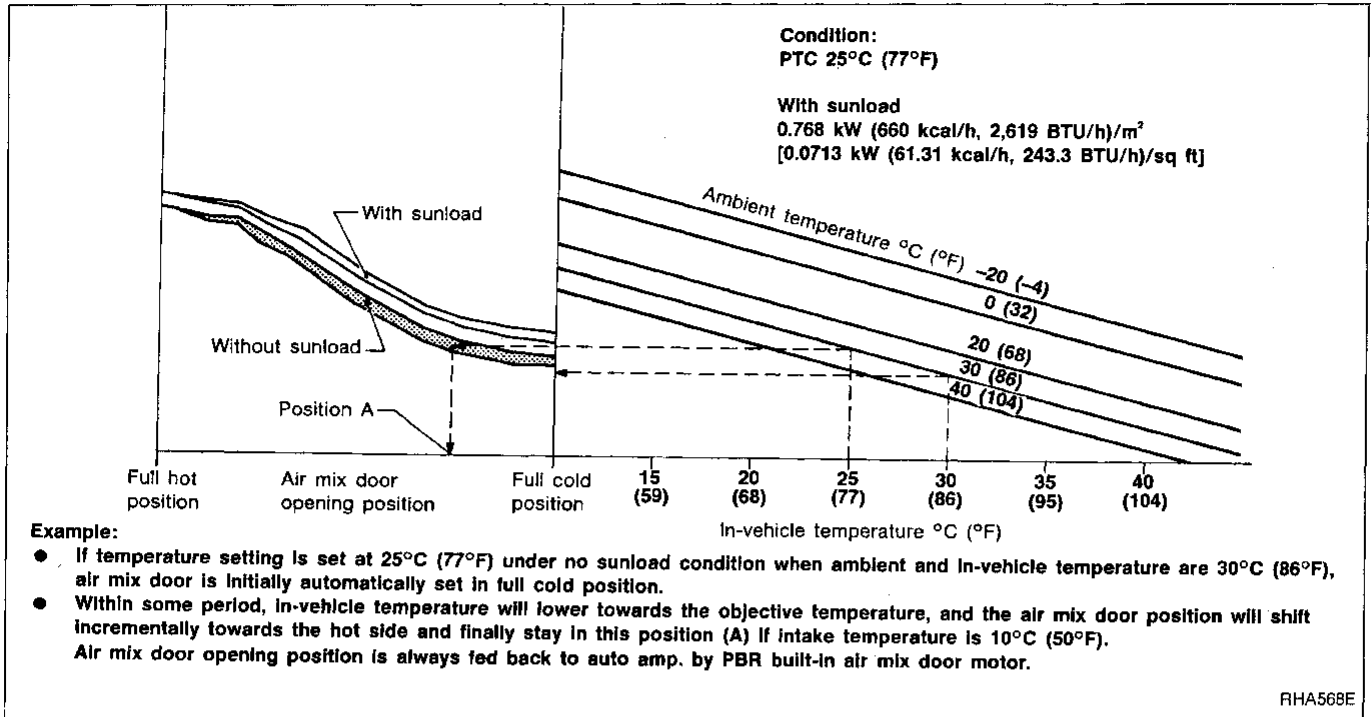
Auto amp. will operate air mix door motor to set air conditioning system in HOT or COLD position, depending upon relationship between conditions (target temperature, sunload, in-vehicle temperature, intake air temperature and ambient temperature) and conditions (air mix door position and compressor operation).



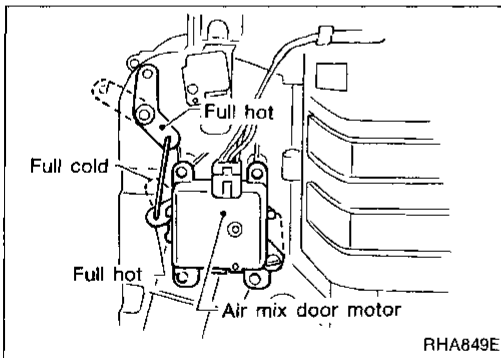
SYSTEM DESCRIPTION

Control System Output Components (Cont'd)

Air mix door control specification

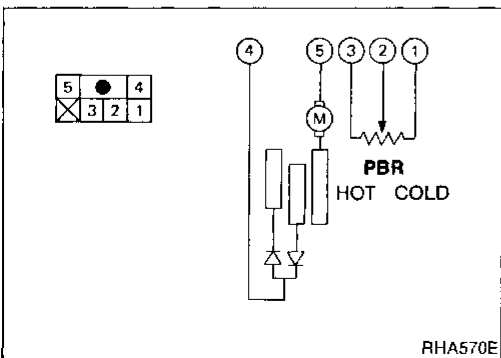


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AIR MIX DOOR MOTOR

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



Air mix door operation

4	5	Air mix door operation	Direction of lever movement
⊕	⊖	COLD → HOT	Clockwise (Toward passenger compartment)
—	—	STOP	STOP
⊖	⊕	HOT → COLD	Counterclockwise (Toward engine compartment)

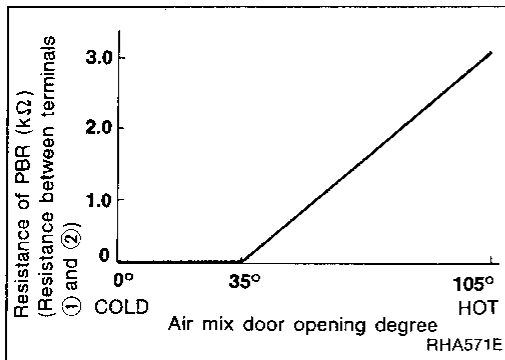
HA
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SYSTEM DESCRIPTION

Control System Output Components (Cont'd)

PBR characteristics

Measure resistance between terminals ① and ② at vehicle harness side.



MODE DOOR CONTROL

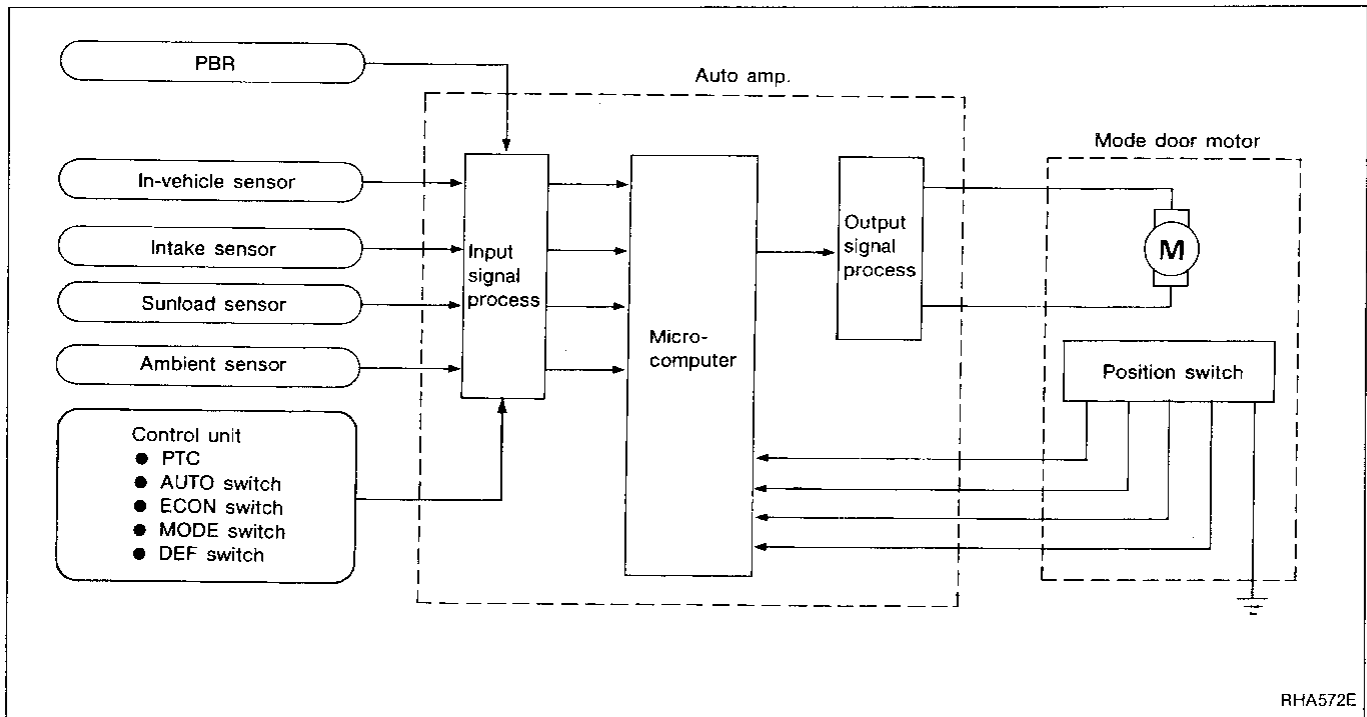
Component parts

Mode door control system components are:

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

System operation

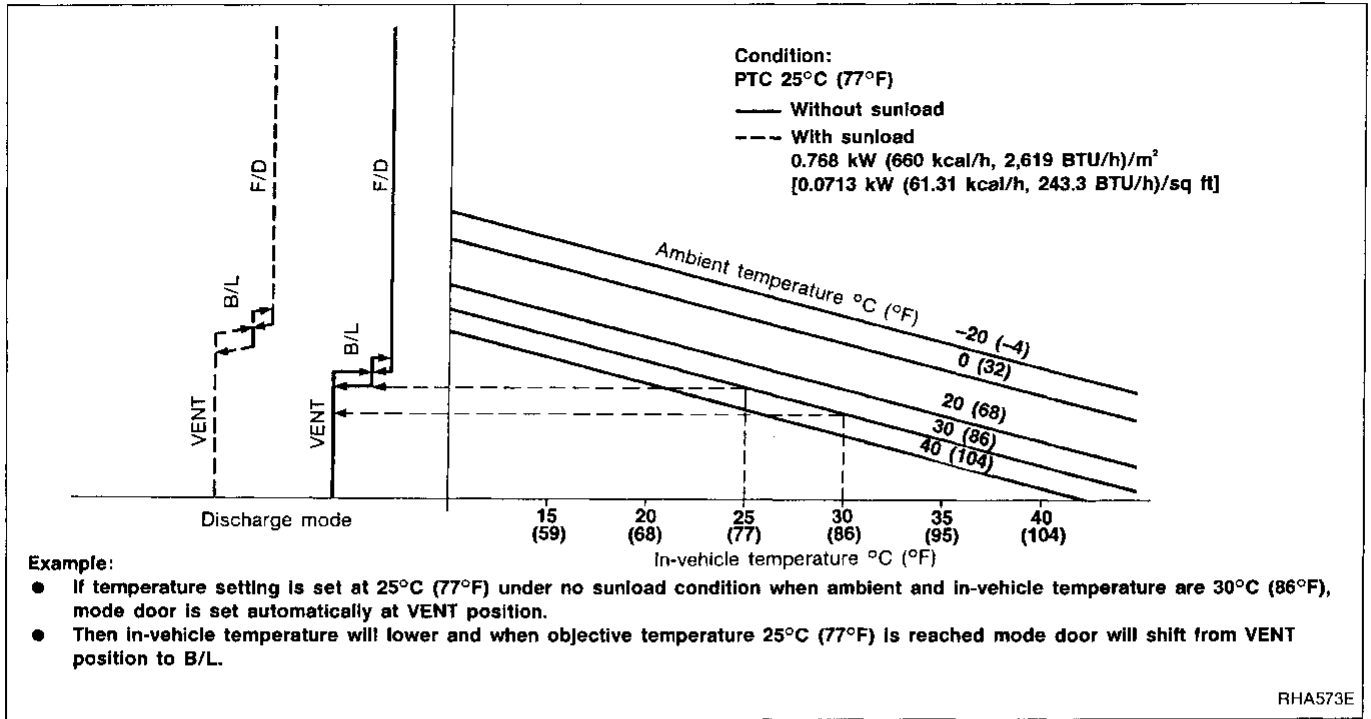
The auto amp. computes the air discharge conditions according to the ambient temperature, the intake air temperature and the in-vehicle temperature. The computed discharge conditions are then corrected for sunload. By this correction, it is determined through which outlets air will flow into the passenger compartment.



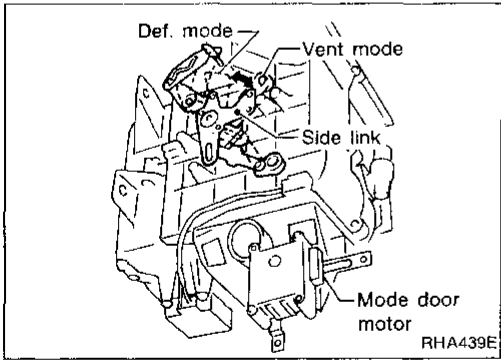
SYSTEM DESCRIPTION

Control System Output Components (Cont'd)

Mode door control specification



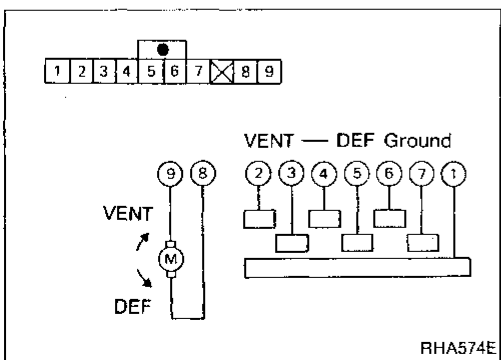
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MODE DOOR MOTOR

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

9	8	Mode door operation	Direction of side link rotation
⊕	⊖	VENT → DEF	Clockwise
—	—	STOP	STOP
⊖	⊕	DEF → VENT	Counterclockwise



SYSTEM DESCRIPTION

Control System Output Components (Cont'd)

INTAKE DOOR CONTROL

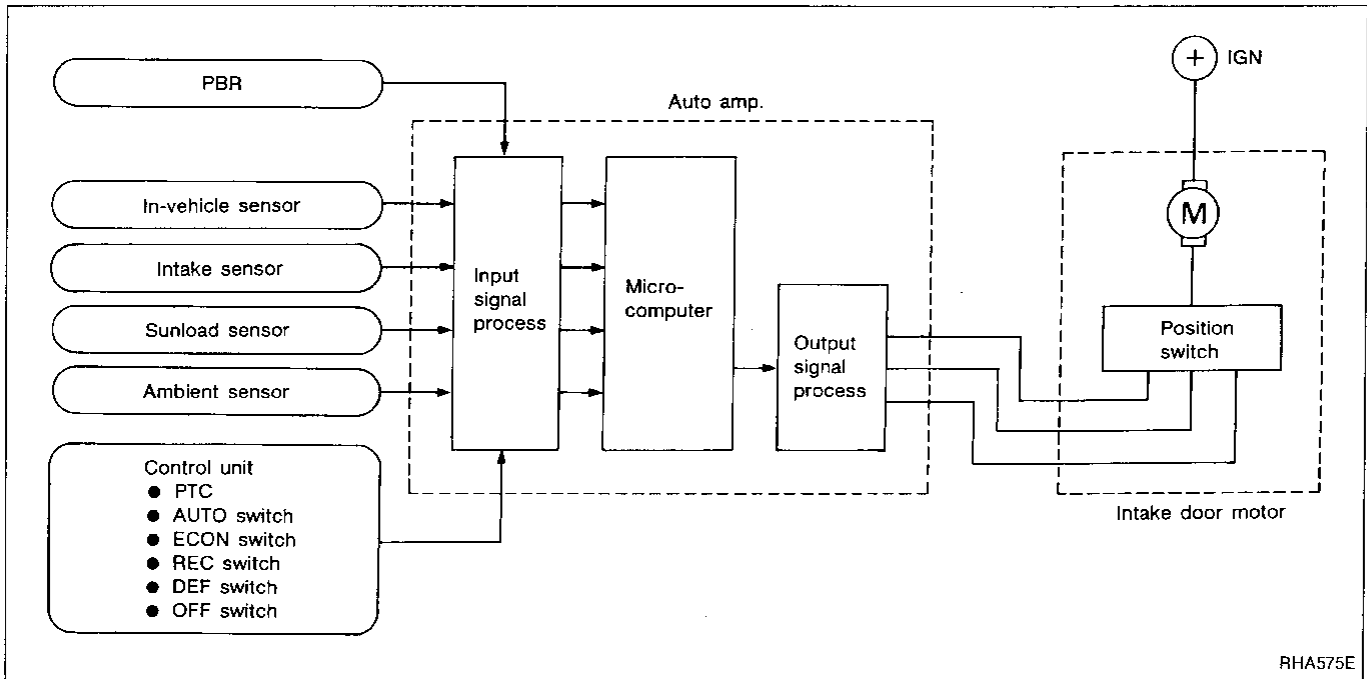
Components parts

Intake door control system components are:

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

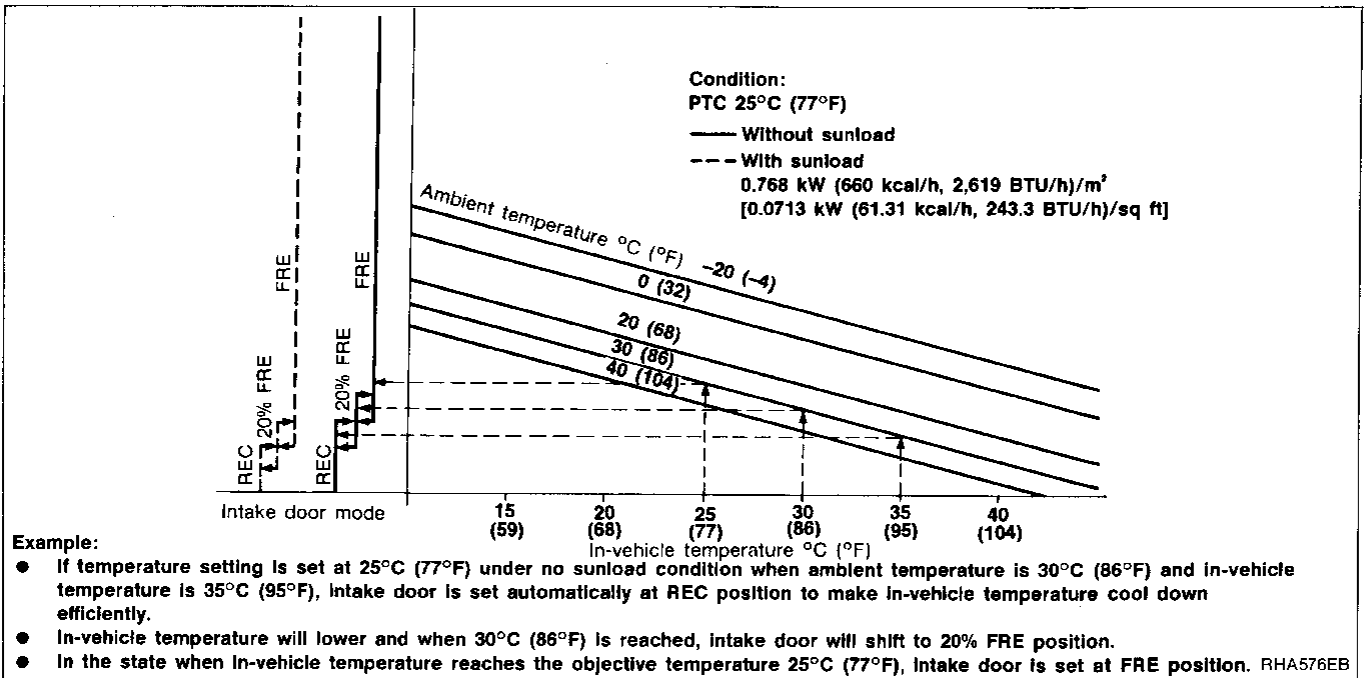
System operation

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



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Intake door control specification

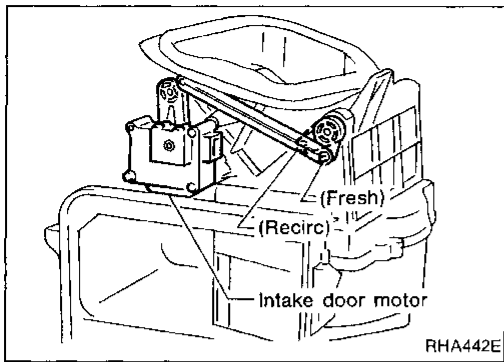


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SYSTEM DESCRIPTION

Control System Output Components (Cont'd)

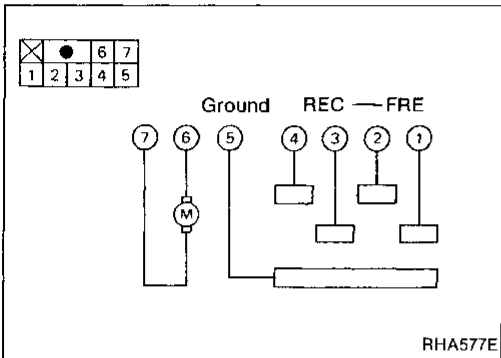
INTAKE DOOR MOTOR



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

Intake door motor operation

6	7	Intake door operation	Movement of link rotation
⊕	⊖	REC → FRE	Clockwise
—	—	STOP	STOP
⊖	⊕	FRE → REC	Counterclockwise



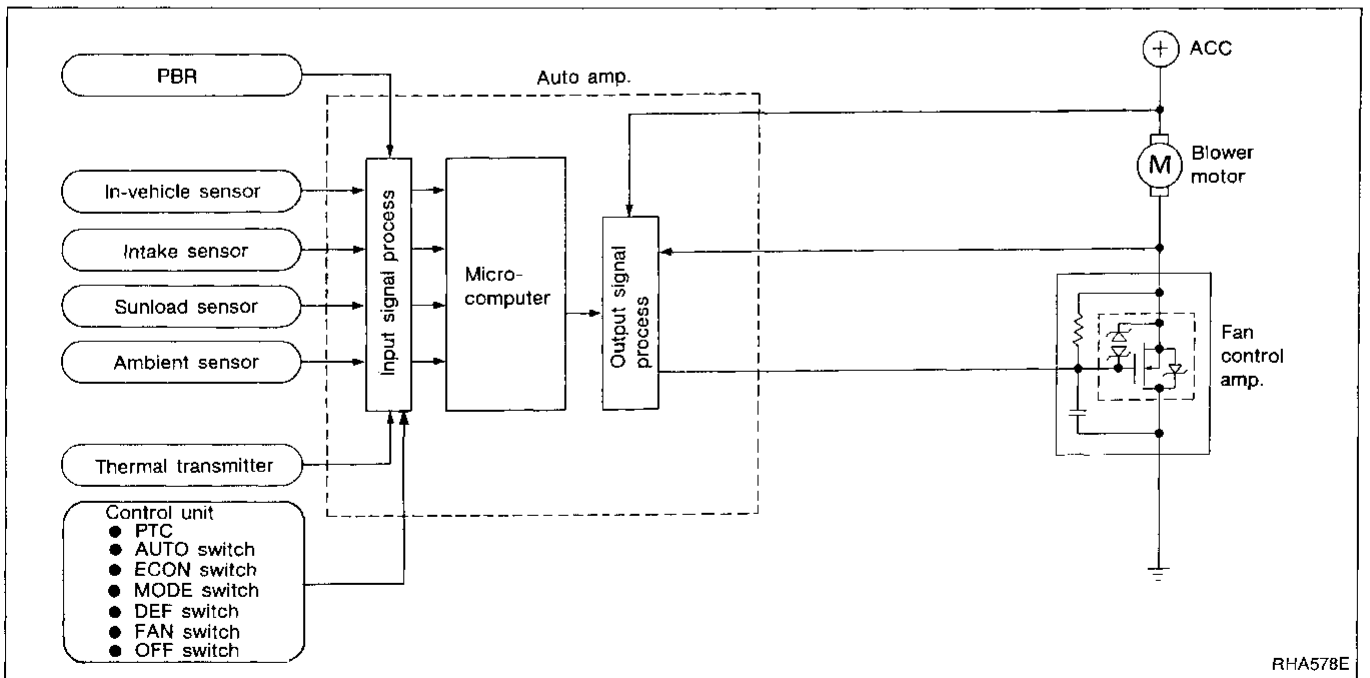
FAN SPEED CONTROL

Component parts

Fan speed control system components are:

- | | |
|--------------------------|------------------------|
| 1) Auto amp. | 4) In-vehicle sensor |
| 2) Fan control amplifier | 5) Ambient sensor |
| 3) PBR | 6) Intake sensor |
| | 7) Sunload sensor |
| | 8) Thermal transmitter |

System operation



SYSTEM DESCRIPTION

Control System Output Components (Cont'd)

AUTOMATIC MODE

In the automatic mode, the blower motor speed is calculated by the auto amp. based on inputs from the PBR, in-vehicle sensor, intake sensor, sunload sensor, and ambient sensor. The blower motor applied voltage ranges from approximately 4.5 volts (lowest speed) to 12 volts (highest speed).

To control blower speed, the auto amp. supplies a signal (in the range of 2.5V to 9V), to the fan control amplifier. Based on this signal, the fan control amplifier controls the current flow from the blower motor to ground.

STARTING FAN SPEED CONTROL

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

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

In the most extreme case (very low ambient) the

blower starting delay will be 150 seconds. After this delay, the blower will operate at low speed until the engine coolant temperature rises above 50°C (122°F). Then the blower speed will increase to the objective speed.

Start up from normal or "HOT SOAK" condition (Automatic mode)

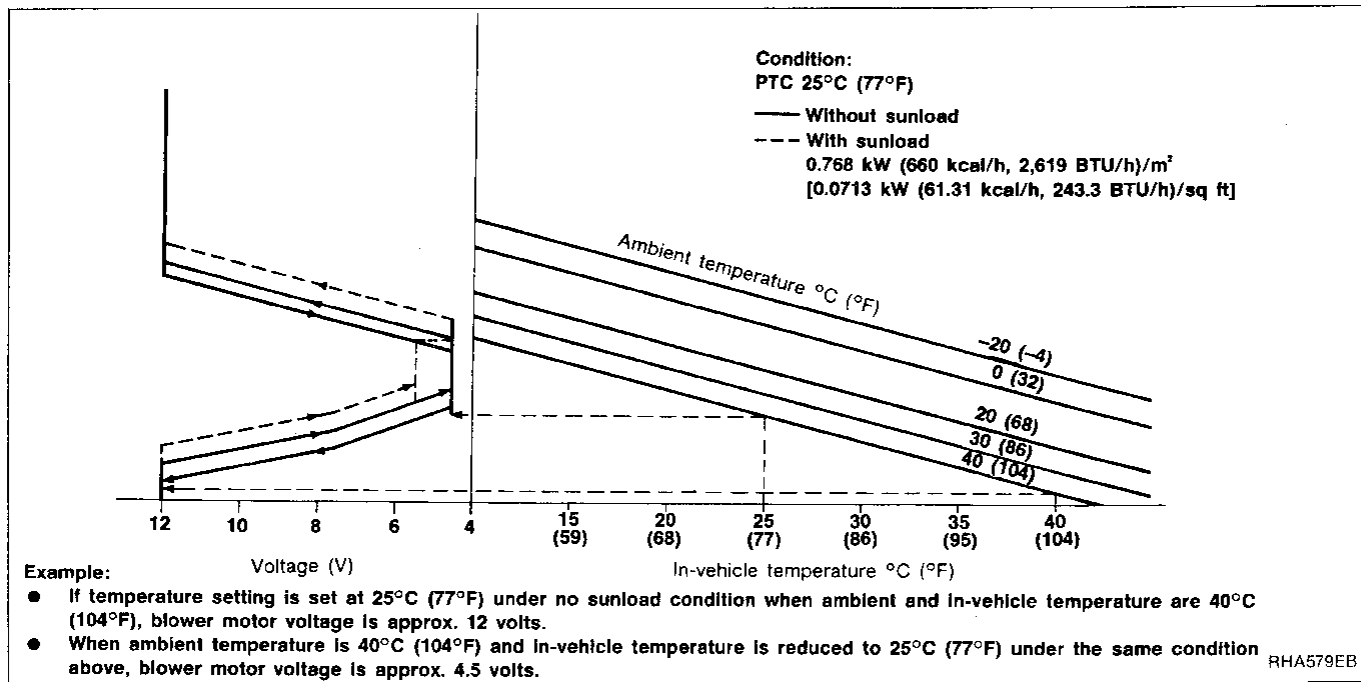
The blower will begin operation momentarily after the AUTO button is pushed. The blower speed will gradually rise to the objective speed over a time period of 5 seconds or less (actual time depends on the objective blower speed).

BLOWER SPEED COMPENSATION

Sunload

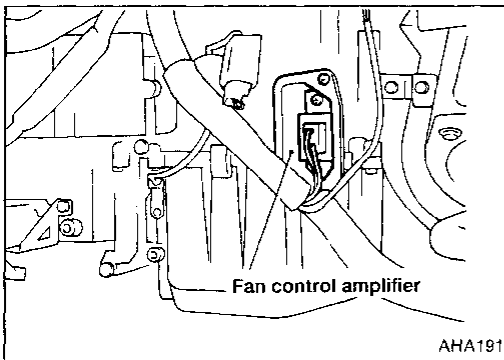
When the in-vehicle temperature and the set temperature are very close, the blower will operate at low speed. The low speed varies depending on the sunload. During conditions of high sunload, the blower low speed is "normal" low speed (approx. 5.5V). During lesser sunload conditions, the low speed will drop to "low" low speed (approx. 4.5V).

Fan speed control specification



SYSTEM DESCRIPTION

Control System Output Components (Cont'd)



FAN CONTROL AMPLIFIER

The fan control amplifier is located on the cooling unit. It amplifies the base current flowing from the auto amp. to change the blower speed within the range of 4V to 12V.

MAGNET CLUTCH CONTROL

The ECM (ECCS control module) controls compressor operation using inputs from the throttle position sensor and auto amplifier.

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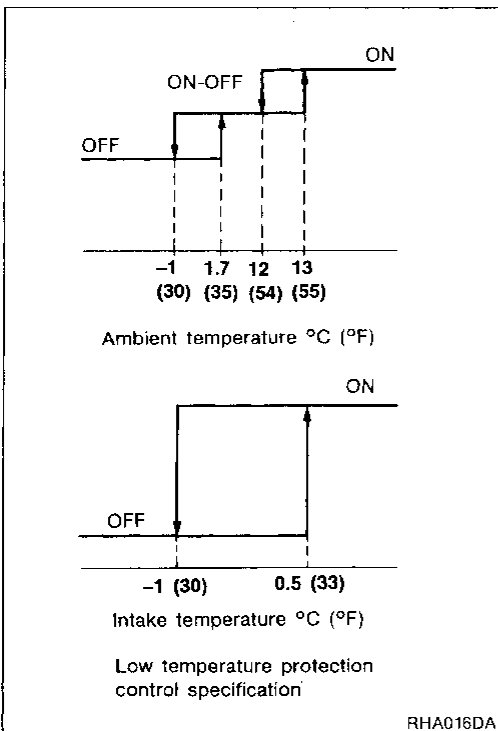
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Low temperature protection control

Auto amplifier will turn the compressor "ON" or "OFF" as determined by a signal detected by ambient temperature sensor and intake sensor.

When ambient temperatures are greater than 13°C (55°F), the compressor turns "ON". The compressor turns "OFF" when ambient temperatures are less than -1°C (30°F).

Between the ambient temperatures 13°C (55°F) and -1°C (30°F), the auto amplifier controls the compressor ON-OFF operation as determined by a signal from the intake sensor.

Acceleration cut control

The ECM (ECCS control module) will turn the compressor "ON" or "OFF" based on the signal from the throttle position sensor.

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BI-LEVEL DOOR CONTROL

Component parts

- 1) Auto amp.
- 2) PBR
- 3) Mode door motor
- 4) Bi-level door motor

System operation

The auto amplifier will activate the Bi-level door motor when the air outlets are set to the B/L position or when the air mix door is set to the "FULL COLD" position with air outlets set to "VENT". In all other modes the Bi-level door is closed.

SERVICE PROCEDURES

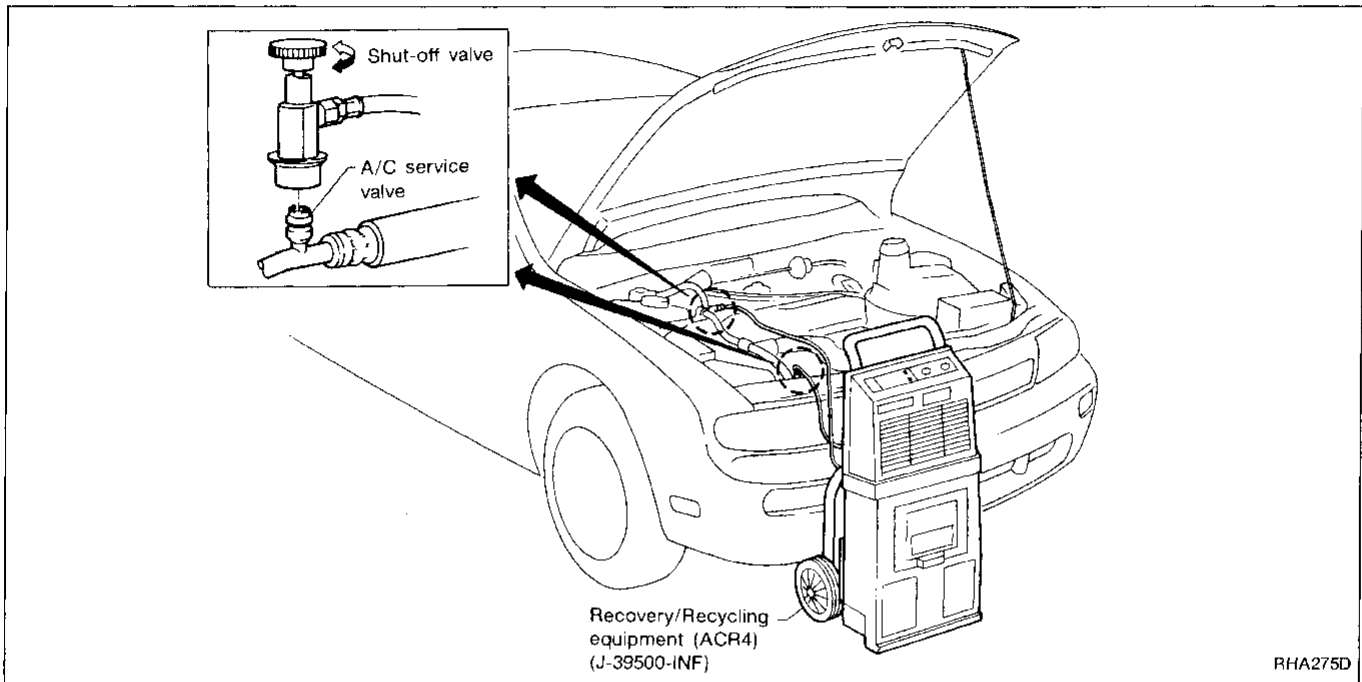
HFC-134a (R-134a) Service Procedure

SETTING OF SERVICE TOOLS AND EQUIPMENT

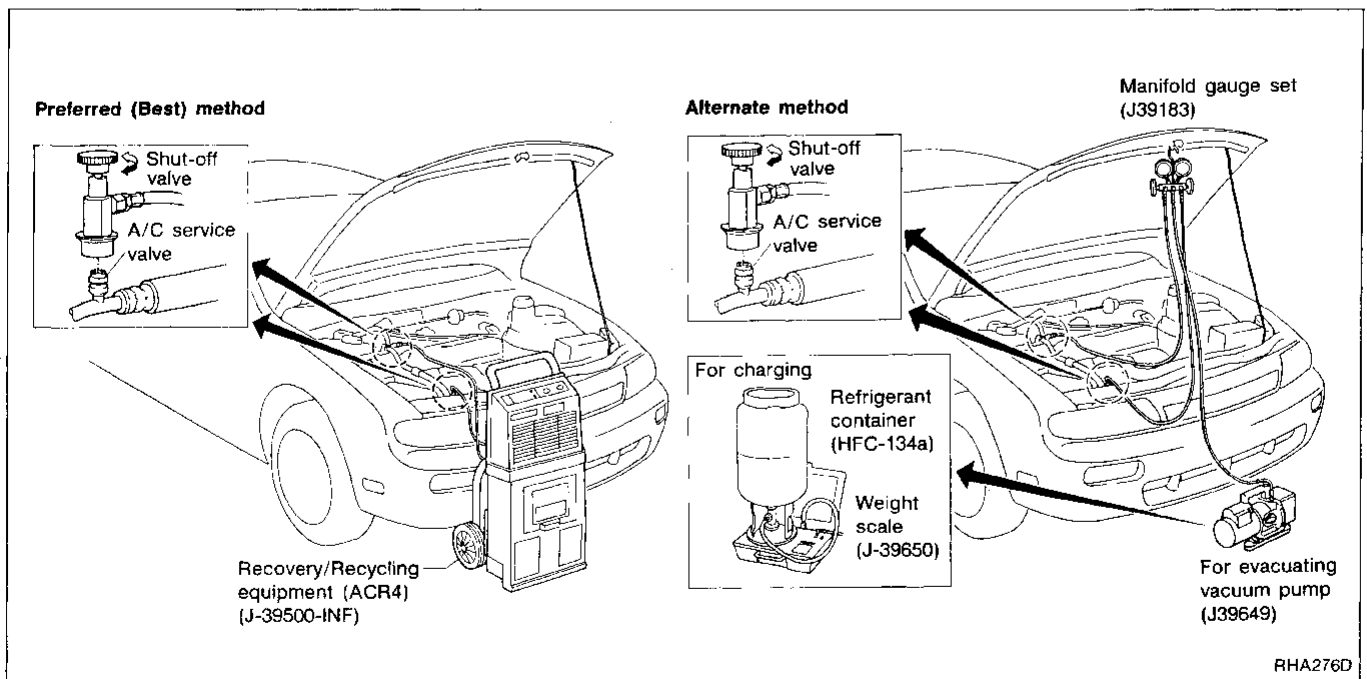
DISCHARGING REFRIGERANT

WARNING:

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

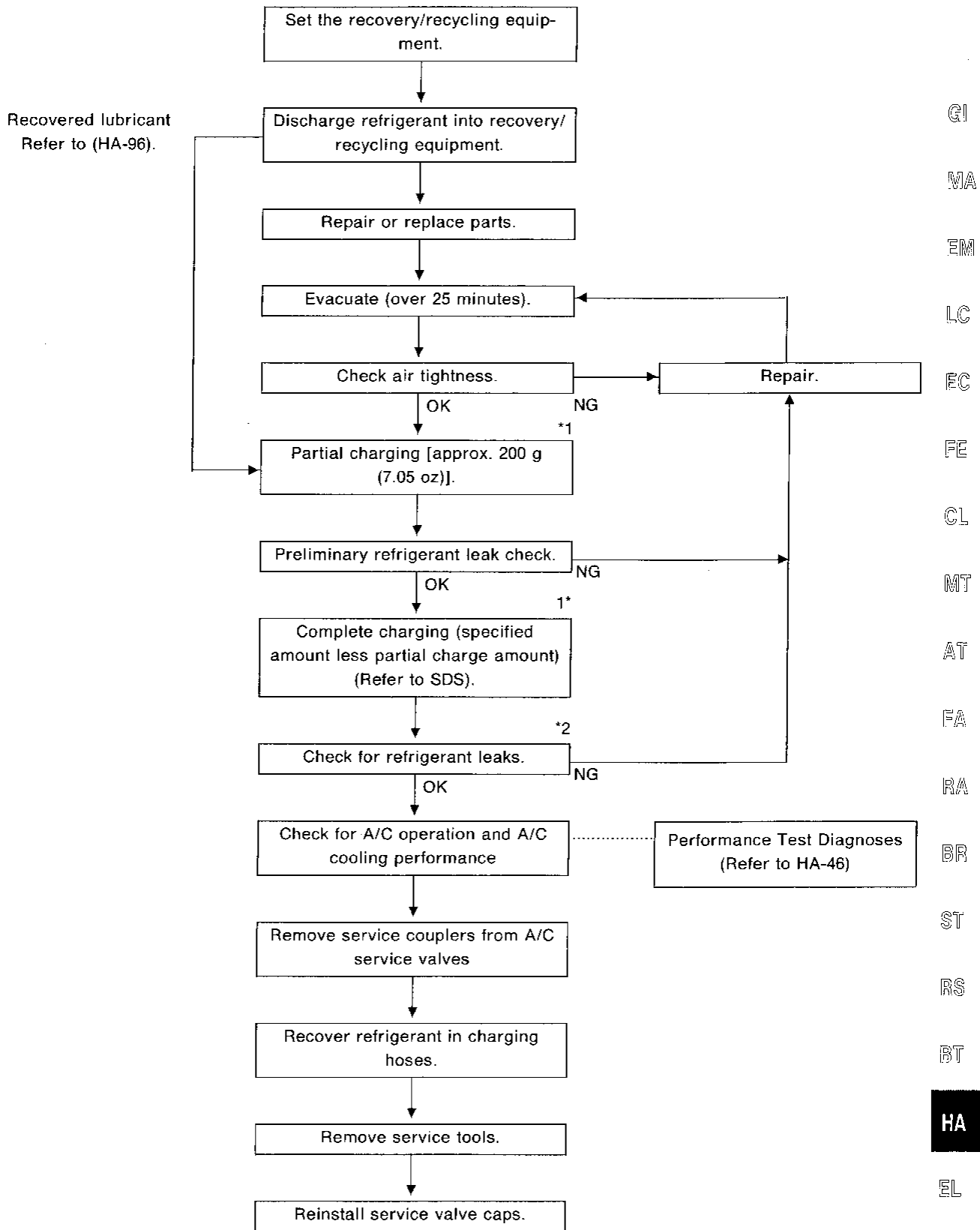


EVACUATING SYSTEM AND CHARGING REFRIGERANT



SERVICE PROCEDURES

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 engine off. Service valve caps must be installed to prevent leakage.

Maintenance of Lubricant Quantity in Compressor

The lubricant used to lubricate the compressor circulates through the system with the refrigerant. Add lubricant to the compressor to maintain the specified amount when: replacing any component of the system, or a large amount of gas leakage occurs.

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)

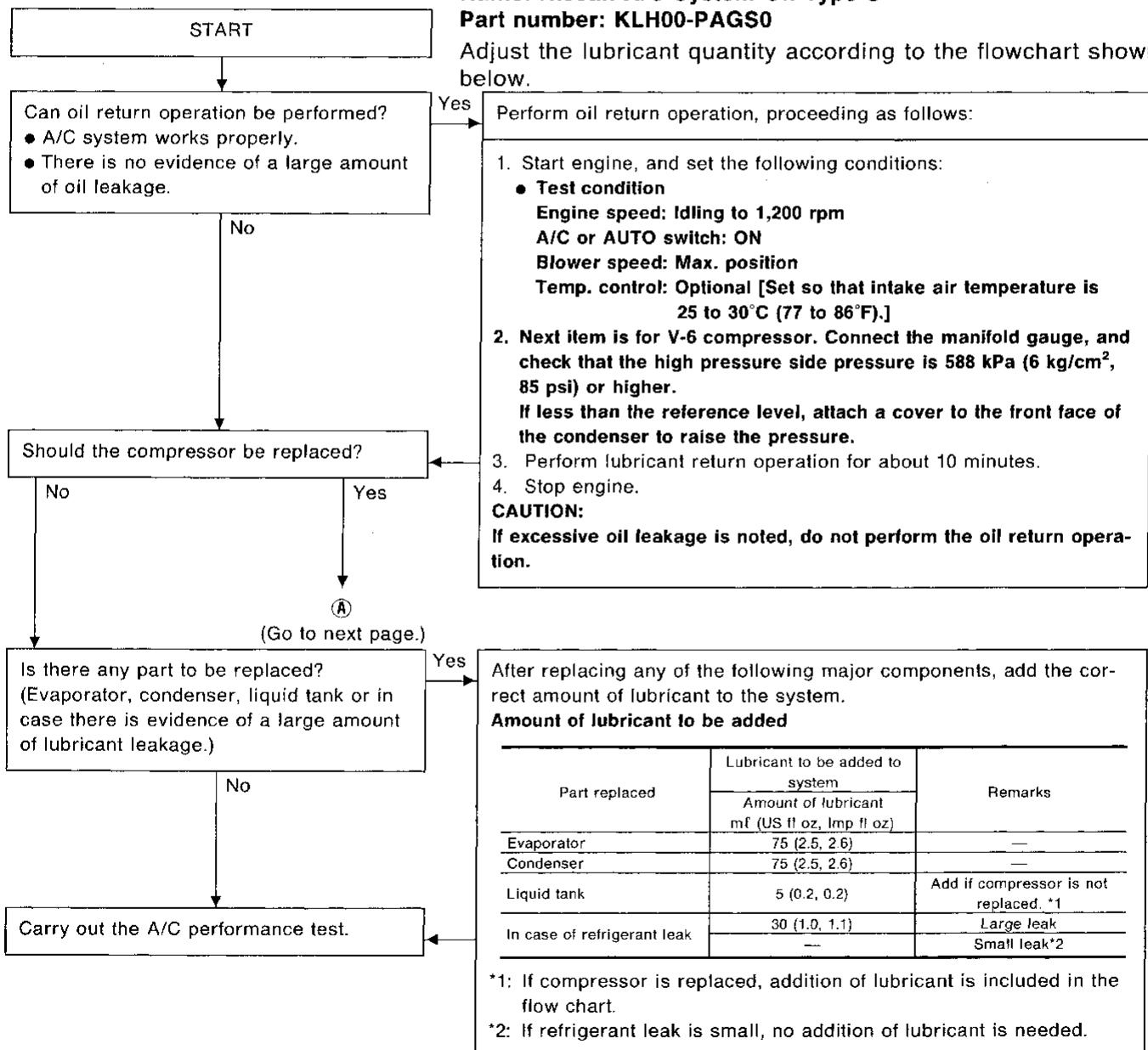
CHECKING AND ADJUSTING

LUBRICANT

Name: Nissan A/C System Oil Type S

Part number: KLH00-PAGS0

Adjust the lubricant quantity according to the flowchart shown below.



SERVICE PROCEDURES

Maintenance of Lubricant Quantity in Compressor (Cont'd)

(A)

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-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. Put the same amount (refer to 2. above) of new oil into the new compressor. Put it through the drain plug or suction port opening.
5. Also add the old oil amount [discharged from A/C system (refer to 1. above)] of the new oil to the new compressor.
6. Torque the drain plug.

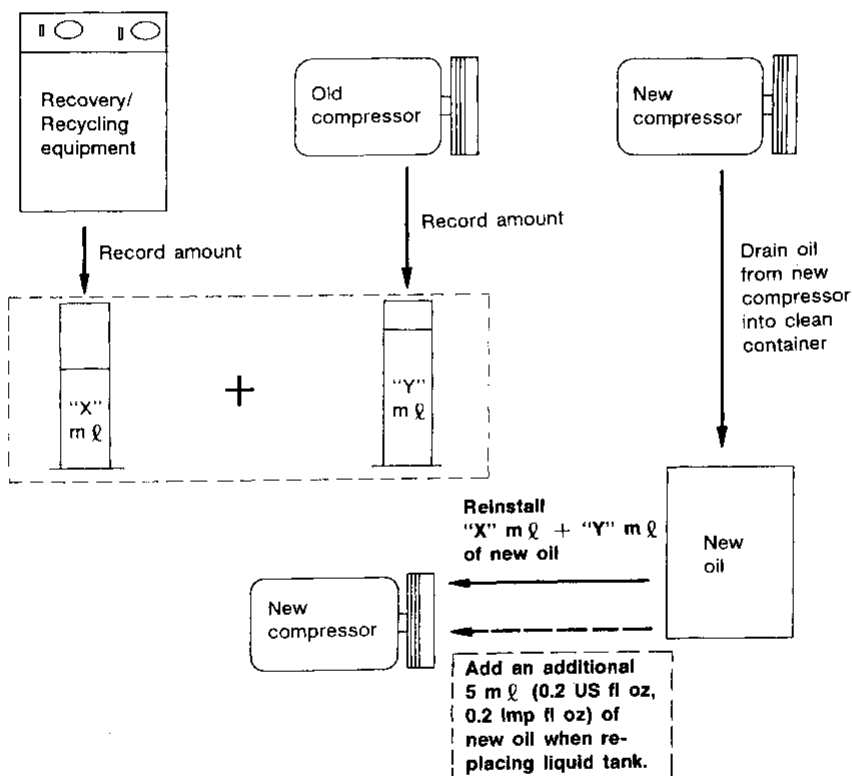
V-6 compressor: 18 - 19 N·m (1.8 - 1.9 kg·m, 13 - 14 ft·lb)

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

7. If the liquid tank also needs to be replaced, add an additional 5 ml (0.2 US fl oz, 0.2 Imp fl oz) of oil at this time.

Do not add this 5 ml (0.2 US fl oz, 0.2 Imp fl oz) of oil if only replacing the compressor.

Oil adjusting procedure for compressor replacement



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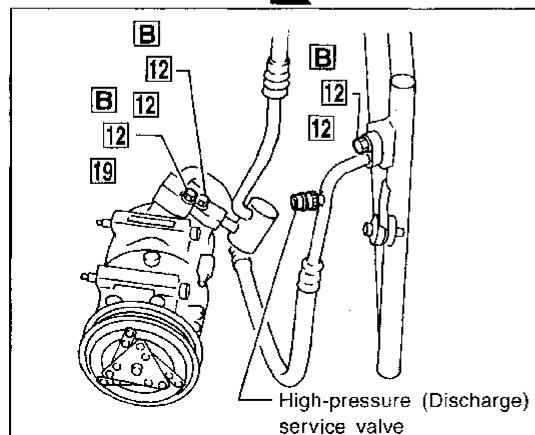
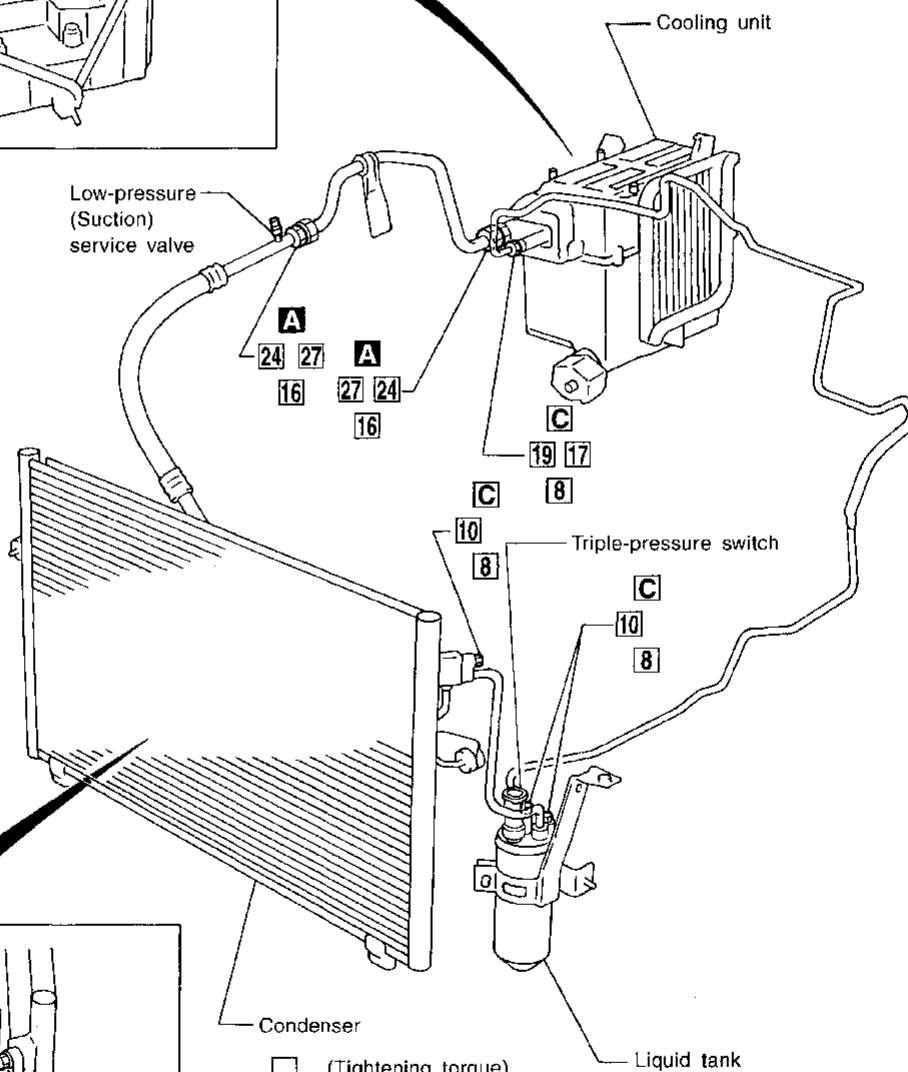
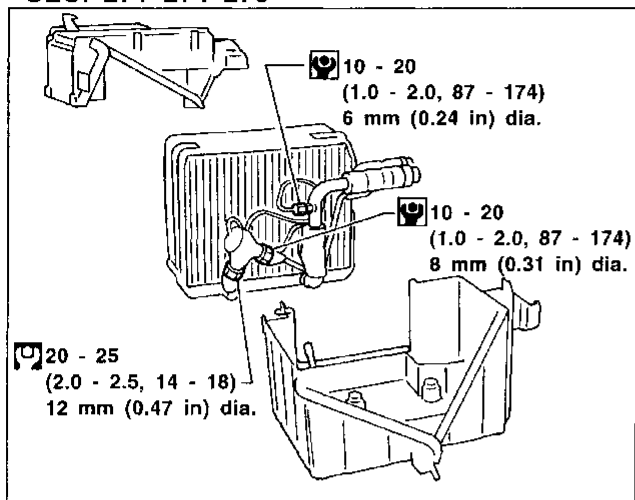
SERVICE PROCEDURES

Refrigerant Lines

- Refer to HA-9.

LHD MODELS

SEC. 271•274•276



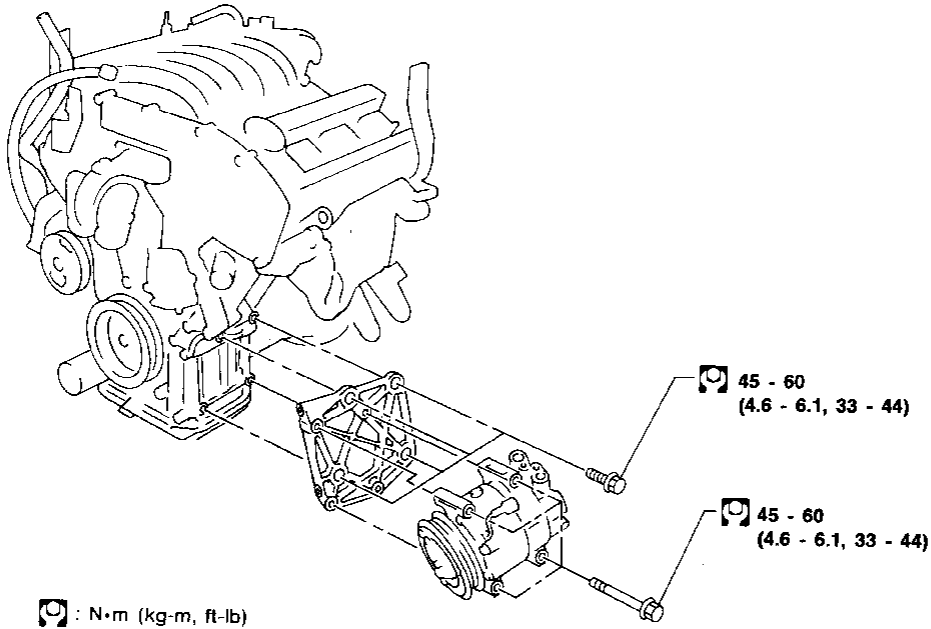
- (Tightening torque)
- (Wrench size)
- (O-ring size)
- ☞ : N-m (kg-m, ft-lb)
- ⓐ : 20 - 29 (2.0 - 3.0, 14 - 22)
- ⓑ : N-m (kg-m, in-lb)
- ⓑ : 9.3 - 10.8 (0.95 - 1.1, 82.5 - 95.5)
- ⓒ : 3.8 - 4.5 (0.39 - 0.46, 33.9 - 39.9)

HA-98

RHA100F

Compressor Mounting

SEC. 274-275



RHA463E

Belt Tension

- Refer to MA section (“Checking Drive Belts”, “ENGINE MAINTENANCE”).

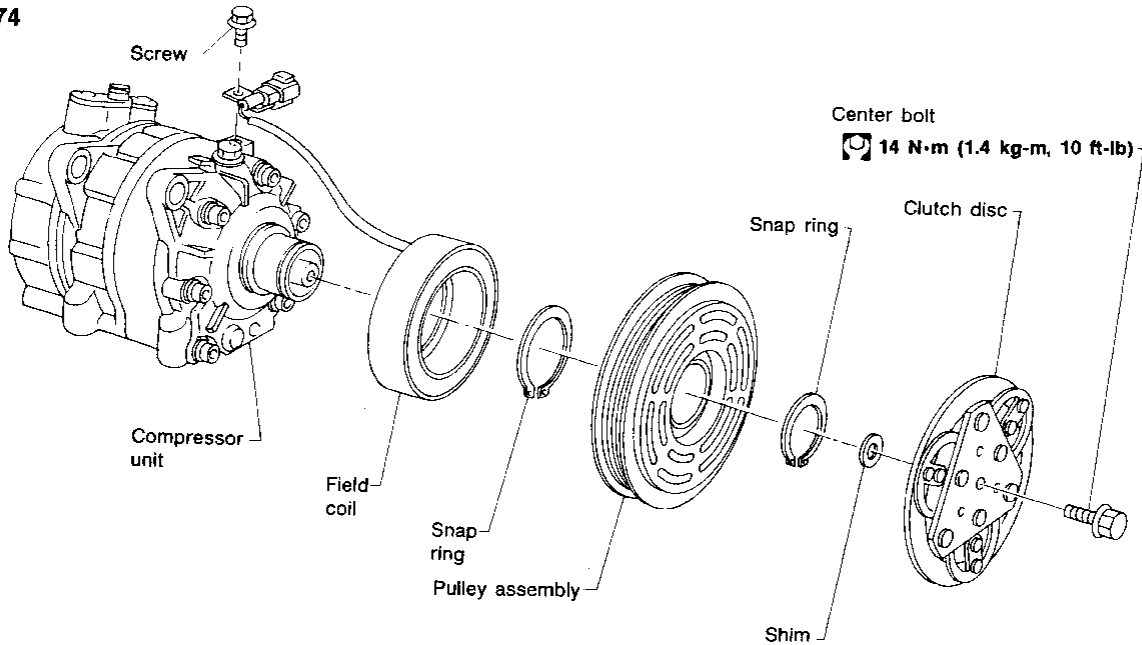
Fast Idle Control Device (FICD)

- Refer to EC section (“IACV-FICD SOLENOID VALVE”, “TROUBLE DIAGNOSES FOR NON-DETECTIVE ITEMS”).

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Compressor

SEC. 274

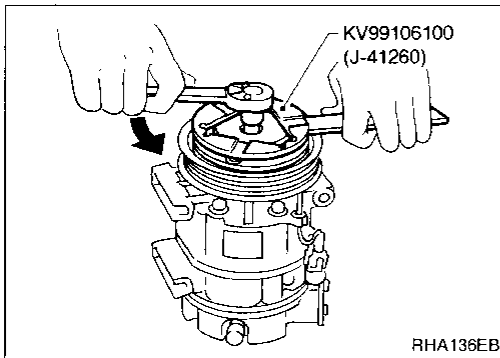


RHA135EA

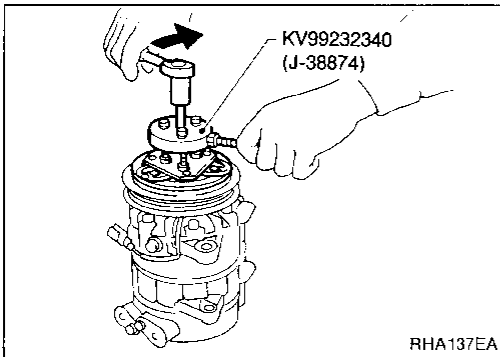
Compressor Clutch

REMOVAL

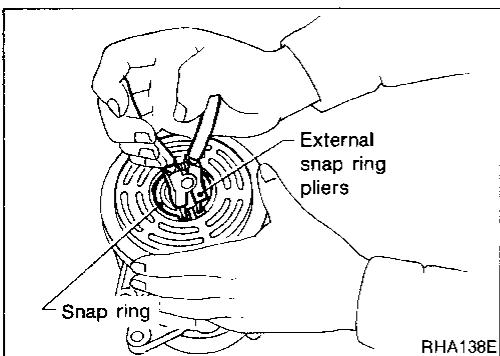
- When removing center bolt, hold clutch disc with clutch disc wrench.
- Remove the clutch disc using the clutch disc puller. Insert the holder's three pins into the holes in the clutch disc. Rotate the holder clockwise to hook it onto the plate. Then, tighten the center bolt to remove the clutch disc.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



RHA136EB



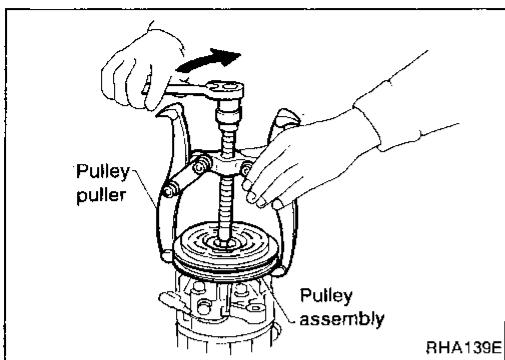
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SERVICE PROCEDURES

Compressor Clutch (Cont'd)

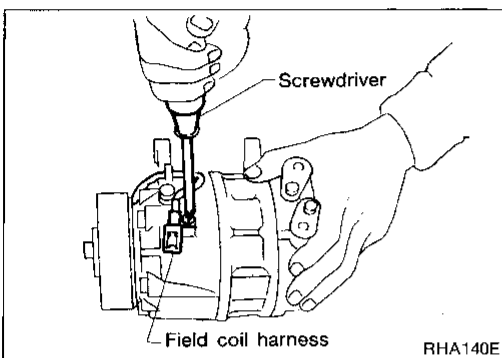


- Pulley removal
Position the center pulley puller on the end of the drive shaft, and remove the pulley assembly using any commercially available pulley puller.
To prevent the pulley groove from being deformed, the puller claws should be positioned onto the edge of the pulley assembly.

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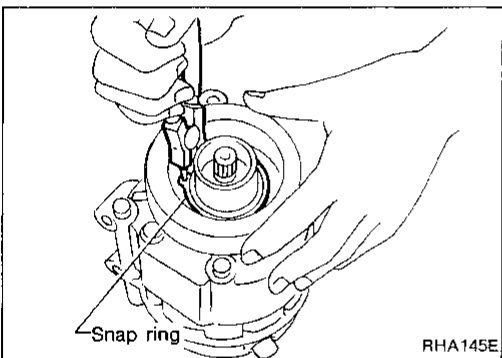
- Remove the field coil harness clip using a screwdriver.

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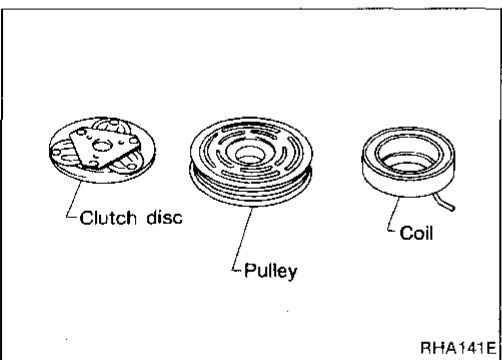
- Remove the snap ring using external snap ring pliers.

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INSPECTION

Clutch disc

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

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Pulley

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

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Coil

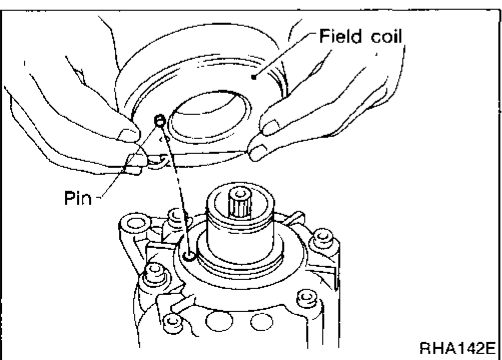
Check coil for loose connection or cracked insulation.

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INSTALLATION

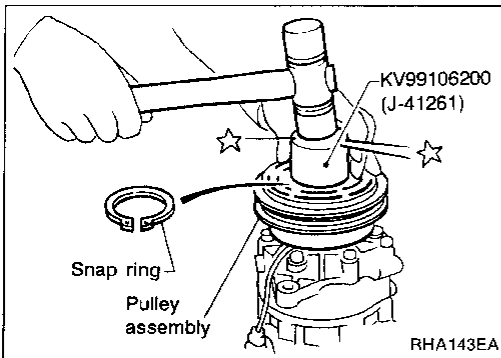
- Install the field coil.
Be sure to align the coil's pin with the hole in the compressor's front head.
- Install the field coil harness clip using a screwdriver.

IDX

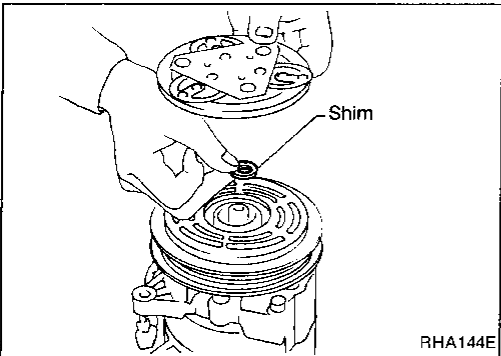


SERVICE PROCEDURES

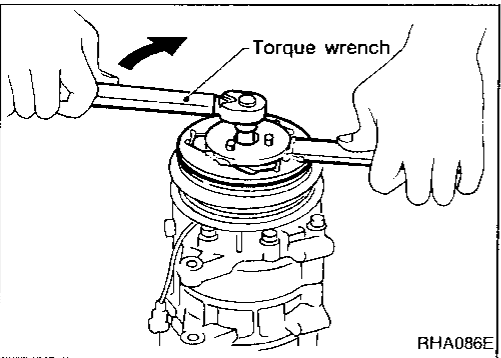
Compressor Clutch (Cont'd)



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

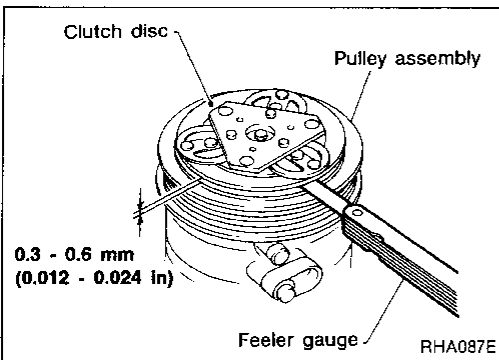


- Install the clutch disc on the drive shaft, together with the original shim(s). Press the clutch disc down by hand.



- Using the holder to prevent clutch disc rotation, tighten the bolt to 14 N·m (1.4 kg-m, 10 ft-lb) torque.

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



- Check clearance around the entire periphery of clutch disc.

Disc-to-pulley clearance:

0.3 - 0.6 mm (0.012 - 0.024 in)

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

BREAK-IN OPERATION

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

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

COMPRESSOR

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

LUBRICATION OIL

Model	CALSONIC make V-6
Name	Nissan A/C System Oil Type S
Part number	KLH00-PAGSO
Capacity	ml (US fl oz, Imp fl oz)
Total in system	250 (8.5, 8.8)
Compressor (Service part) charging amount	250 (8.5, 8.8)

REFRIGERANT

Type	HFC-134a (R-134a)
Capacity	kg (lb) 0.65 ± 0.05 (1.43 ± 0.11)

Inspection and Adjustment

ENGINE IDLING SPEED (When A/C is ON)

- Refer to EC section.

BELT TENSION

- Refer to Checking Drive Belts (MA section).

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